Title: Anton Dohrn Seamount Special Area of Conservation **IA No:** **Lead department or agency:** Marine Scotland **Other departments or agencies:** Joint Nature Conservation Committee (JNCC)	**Impact Assessment (IA)** **Date:** 12/09/2012 **Stage:** Development/Options **Source of intervention:** EU **Type of measure:** Secondary legislation **Contact for enquiries**: Katherine Ross Frin.Ross@jncc.gov.uk 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 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) aims to protect biodiversity. This Directive requires the UK (as a Member State) 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 Anton Dohrn Seamount.

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 and its typical species.

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** No	**< 20** Yes	**Small** No	**Medium** No	**Large** No
What is the CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent)			**Traded:** na	**Non-traded:** 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	0.669		0.012	**0.694**
High	0.669		0.012	**0.694**
Best Estimate	0.669		0.012	**0.694**

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

Costs to the UK of low and high management measures are the same.
Administration, enforcement and monitoring (£669k and £12k .pa)
Lost profitability for fisheries (less than £1k. pa)

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

None

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.
Moderate beneficial impacts on 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: <0.001	**Benefits:** na	**Net:**	No	NA

CONTENTS

1 INTRODUCTION 3

1.1 Purpose 3
1.2 Policy drivers 3
a) Habitats Directive 3
b) UK identification of Annex I reef sites 4
c) Conservation objectives and management of sites 5
1.3 Background information on the Impact Assessment 5

2 BACKGROUND INFORMATION ON THE SITE 6

2.1 Baseline 6
2.2 Characteristics of the site 6
2.3 Vulnerability of the site to human impacts 9
2.4 Human activity and regulation of activity at the site 11
Shipping 12
Fisheries 12

3 APPROACH TO ANALYSIS OF COSTS AND BENEFITS 20

3.1 Approach 20
3.2 Costs 21
a) Policy costs to the private sector 21
b) Administration costs to the private sector 22
c) Costs to the public sector 22
3.3 Benefits 22

4 COSTS AND BENEFITS OF OPTION 1: DESIGNATE THE SITE 23

4.1 Implications of designation 23
4.2 Costs 23
a) Shipping 23
b) Fisheries 24
c) Administration costs to Government 26
4.3 Benefits of designating the site 27
a) Provisioning services 27
b) Regulating services 27
c) Types of value 27
d) Benefits to economic activity 30
4.4 Summary of costs and benefits 30
4.5 Impact tests 31
a) Competition assessment 31
b) Small firms impact test 32
c) Legal aid 32
d) Carbon Assessment 32
e) Rural proofing 33
f) Other impact tests 33

5 CONCLUSIONS 33

6 REFERENCES 34

FIGURES

Figure 2.1 Proposed pSAC boundary and ICES fisheries closure....8
Figure 2.2 ICES Rectangles overlaying Anton Dohrn Seamount 14

TABLES

Table 2.1 Sensitivity, exposure and vulnerability of the Anton Dohrn Seamount reef 10
Table 2.2 Fisheries landings 2006-10 by ICES rectangle....15
Table 2.3 Fisheries landings 2006-10 by gear type....15
Table 2.4 Fisheries landings 2006-10 by vessel nationality....16
Table 2.5 Fisheries landings 2006-10 by port of landing 17
Table 2.6 Fisheries landings 2006-10 by target species....18
Table 4.1 “Minimum” and “maximum” management scenarios....23
Table 4.2 Summary of “minimum” and “maximum” management assumptions in estimating costs 25
Table 4.3 Potential significance of ecosystem services improvements....29
Table 4.4 Summary costs and benefits table for Option 1: Designate the site....30
Table 4.5 Competition assessment for Anton Dohrn Seamount pSAC....32

ANNEXES

ANNEX I CALCULATIONS OF COSTS TO FISHING INDUSTRY BY GEAR TYPE
ANNEX II FRENCEH DEMERSAL FISHING OVER ANTON DOHRN SEAMOUNT
ANNEX III COSTS BY SECTOR OF DESIGNATION

1 INTRODUCTION

1.1 Purpose

Within Europe natural habitats are deteriorating and an increasing number of wild species are seriously threatened by human activities. The European Habitats Directive[1] aims to promote the maintenance of biodiversity by requiring Member States to maintain or restore habitats and species to a 'Favourable Conservation Status'. It also introduces robust protection for habitats and species of European importance.

This Impact Assessment (IA) addresses the recommendation by the Joint Nature Conservation Committee (JNCC) for designation of an offshore Special Area of Conservation (SAC) at Anton Dohrn Seamount for its Reef habitat (Habitat H1170 under Annex I of the Habitats Directive). The reef at Anton Dohrn includes stony, bedrock and biogenic habitats.

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 European Union's (EU's) 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 be used to 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 most in need of conservation across Europe (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 aims to conserve habitats *and* their typical species. As a Member State the UK is required to take measures to maintain or restore these habitats to Favourable Conservation Status[5] 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 (EC) from lists of national sites proposed by each Member State. The network of sites will enable habitat

[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'.

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

The Offshore Marine Conservation (Natural Habitats, & c.) Regulations 2007 (as amended in 2010) (the "Offshore Habitats Regulations") transpose the Habitats Directive (92/43/EEC) and Wild Birds Directive (2009/147/EC) into UK law. These regulations apply to 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' which 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 the 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].

[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 now were subject to public consultation between March and May 2012.

Other offshore SACs with reef (H1170) as a qualifying feature comprise: 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 SAC (cSAC) proposals were submitted to the EC in August 2010; Pisces Reef Complex and Wight Barfleur Reef cSAC proposals were submitted to the EC in September 2012; and East Rockall Bank, Hatton Bank, Pobie Bank Reef and Solan Bank Reef have recently been approved as possible SACs (pSACs).

Anton Dohrn Seamount is located within the Rockall Trough and Bank Regional Sea. Other sites within this Regional Sea that have reef as a qualifying feature are: Darwin Mounds SCI, North-West Rockall Bank cSAC, and East Rockall Bank pSAC.

Like Anton Dohrn Seamount, Darwin Mounds and the Rockall Banks support biogenic (*Lophelia*) reef. The biogenic reef at Anton Dohrn Seamount, however, is comprised predominately of dead *Lophelia* frameworks in-filled with sediments. This type of reef is thought to be rare and although it occurs at East Rockall Bank its extent there is far lower than at Anton Dohrn Seamount. Many of the faunal assemblages seen at Anton Dohrn Seamount have not been recorded elsewhere in UK waters (Long *et al*. 2010).

c) Conservation objectives and management of sites

JNCC is responsible for establishing conservation objectives for the features 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, 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 Anton Dohrn Seamount pSAC. Two options were considered for this site:

Baseline: do nothing
Option 1: designate the site

No other options are considered as Anton Dohrn Seamount, 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 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 ongoing 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 involves a description of:

- 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 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 can be valued in monetary units; qualitative impacts on goods and services that are not traded in commercial markets; and other impacts (such as change to non-use value).

Impacts have been assessed over a timescale of 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 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

Anton Dohrn Seamount is located approximately 200 km west of the Outer Hebrides in the central Rockall Trough. The seamount is a former volcano which rises to a relatively flat top at a depth of 530 m to 1100 m. The seamount is surrounded by a steep cliff that extends down to a moat at around 2400 m water depth. The feature is roughly 40 km in diameter. Geologically, the feature has developed on highly stretched and thinned continental crust and is partially buried by Palaeocene and Cenozoic sediments. The majority of the seamount is composed of basaltic lavas which form outcrops at the seabed, on the crest, and its steep flanks. One area of exposed basalt outcrop forms a central pinnacle that is the shallowest point of the seamount. On the lower flanks, parasitic cones were formed when volcanic material erupted from lateral fractures, rather than the

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

central vent. A rockfall-landslide is also apparent on the north-west seamount flank (Long *et al.* 2010, Howell *et al*. 2010).

The site represents the Annex I Reef sub-types bedrock, biogenic and stony reef. The upper regions of the flanks represent bedrock reef grading to stony reef on the lower flanks. These habitats support assemblages of sea cucumbers, brittlestars, caryophyllid corals and encrusting and lamellate sponges. Other bedrock and stony features support dense aggregations of gorgonians and other corals, equivalent to the OSPAR listed habitat termed "coral gardens".[10]

Annex I biogenic reef, in the form of live cold water coral reef (*Lophelia pertusa*), occurs on the top of small mounds along the edge of the cliff. Sediment in-filled dead *L. pertusa* frameworks occurring on the radial ridges, parasitic cones and the rockfall-landslide also represent Annex I biogenic reef. These frameworks were probably produced during the growth stages of *L. pertusa*[11] and support a rich assemblage of fauna.

The proposed site boundary for Anton Dohrn Seamount has been defined using JNCC's marine SAC boundary definition guidelines.[12] The proposed boundary encloses the minimum area necessary to protect the Annex I habitat. It excludes the central summit of the seamount, which comprises mostly sands and gravels.

Note that the boundary proposed is for the pSAC. Future management measures required under the Offshore Marine Conservation (Natural Habitats, & c.) Regulations 2007 (as amended) will be determined by Competent Authorities in consultation with JNCC, and may have different boundaries.

[10] OSPAR Commission, 2010. Background document for Coral gardens. Biodiversity Series. Publication Number: 486/2010 [online]. Available from: http://www.ospar.org/documents/dbase/publications/P00486_Coral_Garden.pdf [Accessed October 2011].
[11] Wilson, J.B. 1979. 'Patch' development of the deep-water coral *Lophelia pertusa* (L.) on Rockall Bank. Journal of the Marine Biological Association of the United Kingdom, 59, 165-177.
[12] JNCC. 2008. UK Guidance on defining boundaries for marine SACs for Annex I habitat sites fully detached from the coast [online]. Peterborough, JNCC. Available from: http://jncc.defra.gov.uk/pdf/SACHabBoundaryGuidance_2008Update.pdf [Accessed October 2011].

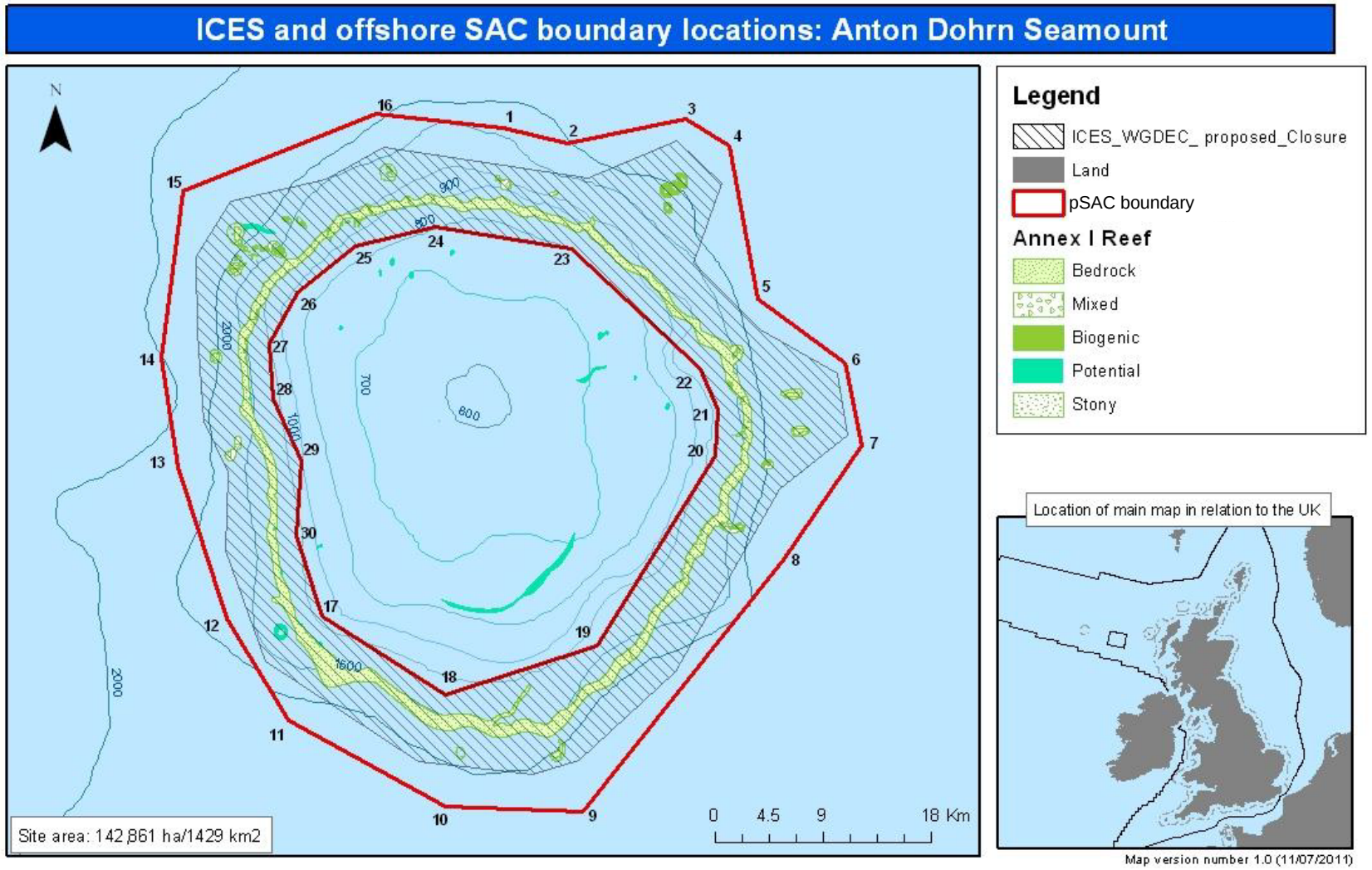


Figure 2.1 Proposed pSAC boundary and area proposed by ICES for closure to all demersal fisheries (fisheries closures are discussed in section 2.4).

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 document 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 the Anton Dohrn Seamount Draft Conservation Objectives and Advice on Operations document[13] for more-detailed information.)

[13] Available from: http://jncc.defra.gov.uk/pdf/Anton%20Dohrn_ConservationObjectives_AdviceonOperations_V2.0_withbookmarks.pdf

Table 2.1 Sensitivity, exposure and vulnerability of the Anton Dohrn Seamount reef to physical, chemical and biological pressures (taken from the Anton Dohrn Conservation Objectives and Advice on Operations v1.1)

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

List of pressures which may cause deterioration or disturbance (with example activities)		Anton Dohrn Seamount**:** Lophelia pertusa reef		
		Sensitivity	**Exposure**	**Vulnerability**
Physical Loss	**Removal** (e.g. aggregate dredging, isolated rock dump, infrastructure development)	•••	**None**	**No known vulnerability**
	Obstruction (e.g. permanent constructions (oil & gas infrastructure, windfarms, cables) & wrecks)	•••	**Low**	**Low vulnerability**
	Smothering (e.g. drill cuttings)	••	**None**	**No known vulnerability**
Physical Damage	**Changes in suspended sediment** (e.g. screening plumes from aggregate dredging)	•	**None**	**No known vulnerability**
	Physical disturbance or abrasion (e.g. mobile benthic fishing, anchoring, windfarm scour pits, pipeline burial, potting)	•••	**Low**	**Moderate vulnerability**
Non-physical disturbance	**Noise** (e.g. boat activity, seismic)	○	**?**	**No known vulnerability**
	Visual presence (e.g. recreational activity)	○	**None**	**No known vulnerability**
Toxic contamination	**Introduction of synthetic compounds** (e.g. TBT, PCBs, industrial chemical discharge, produced water, fuel oils)	••	**None**	**No known vulnerability**
	Introduction of non-synthetic compounds (e.g. heavy metals, crude oil spills)	••	**None**	**No known vulnerability**
	Introduction of radionuclides (e.g. nuclear energy industry)	**?**	**None**	**No known vulnerability**

Non-toxic contamination	**Changes in nutrient loading** (e.g. outfalls)	••	**None**	**No known vulnerability**
	Changes in thermal regime (e.g. cooling water discharges)	•••	**None**	**No known vulnerability**
	Changes in turbidity (e.g. laying of pipelines, aggregate dredging)	•••	**None**	**No known vulnerability**
	Changes in salinity (e.g. outfalls from rigs, ships)	•••	**None**	**No known vulnerability**
Biological disturbance	**Introduction of microbial pathogens** (e.g. outfalls)	**?**	**?**	**No known vulnerability**
	Introduction of non-native species and translocation (e.g. ballast water, hull fouling)	**?**	**?**	**Insufficient information**
	Selective extraction of species (e.g. bioprospecting, scientific research, demersal fishing)	•••	**Low**	**Moderate vulnerability**

Table 2.1 shows that Anton Dohrn Seamount and its associated biological communities are:

- Moderately vulnerable to: physical disturbance or abrasion (e.g. from demersal fishing); and selective extraction of species (e.g. from demersal fishing)
- Vulnerable at low levels to obstruction (e.g. wrecks and permanent constructions including cables).

It has not been possible to determine whether the interest feature is vulnerable to the introduction of non-native species and translocation.

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 EC Habitats Directive to maintain or restore Annex I habitats.

The conservation objective, based on current evidence, for the management of Anton Dohrn Seamount is to restore the reef to favourable condition. Activities that do not result in pressures to which the feature is sensitive may continue at current levels. The management of other activities to which the feature is vulnerable may need to be reviewed by the competent authorities. If new information suggests that the condition of the feature at the site is not significantly affected by the level of current activities and assessment indicates the site is in favourable condition, then the conservation objective for the reef will be changed to 'maintain' the features in favourable condition.

2.4 Human activity and regulation of activity at the site

Current and proposed economic activity at Anton Dohrn Seamount is described below under the following sectors:

- Shipping – low activity.
- Oil and gas – no current or planned activity at or near the site.
- Aggregate extraction – no current or planned activity at or near the site.
- Cables – no cables cross the site. (One telecom cable runs 12 nm to the west of the site; it is not discussed further in this assessment)
- Fisheries – activity in part of the site and the surrounding area.

- Renewable energy schemes – no current or planned activity at or near the site.

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

Under regulation 25 of the 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. Under regulation 26, 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.

The Offshore Habitats Regulations set out that where consent for a plan or project has been granted by a Competent Authority prior to the site becoming a European Offshore Marine Site, consent must be reviewed against the Conservation Objectives for the site

Not all activities that may affect the reef are considered plans or projects under Regulation 25 of the Offshore 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).

The site is within a Ministry of Defence (MOD) firing range where weapons firing activities can take place throughout the year (although on an infrequent basis). The firing range has an Integrated Rural Management Plan (IRMP) which governs the military use of the area against a range of components, including the protection of the marine environment. Following notification to the EC of Anton Dohrn as a cSAC, the MOD, being a Competent Authority, will be required to ensure that the IRMP does not allow activities which could significantly affect the site. Changes to the IRMP and impacts on military training are likely to be minimal because the pSAC is very small relative to the range area, and the range is used infrequently.

Shipping

Parts of the site may be crossed by ships. It is assumed that there are no significant effects associated with shipping at the site and therefore that no changes to shipping activity will occur under any of the options under consideration in this IA.

Fisheries

Current activity (Baseline)

Fishing in offshore waters is managed at a UK and European level but non-European Union vessels may fish by agreement. Comprehensive data on location and types of fishing are difficult to obtain and recent fishing data are a reflection of activity already managed to an extent by total allowable catch (TAC) 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 (≥15m) that have vessel monitoring systems (VMS). These provide 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.

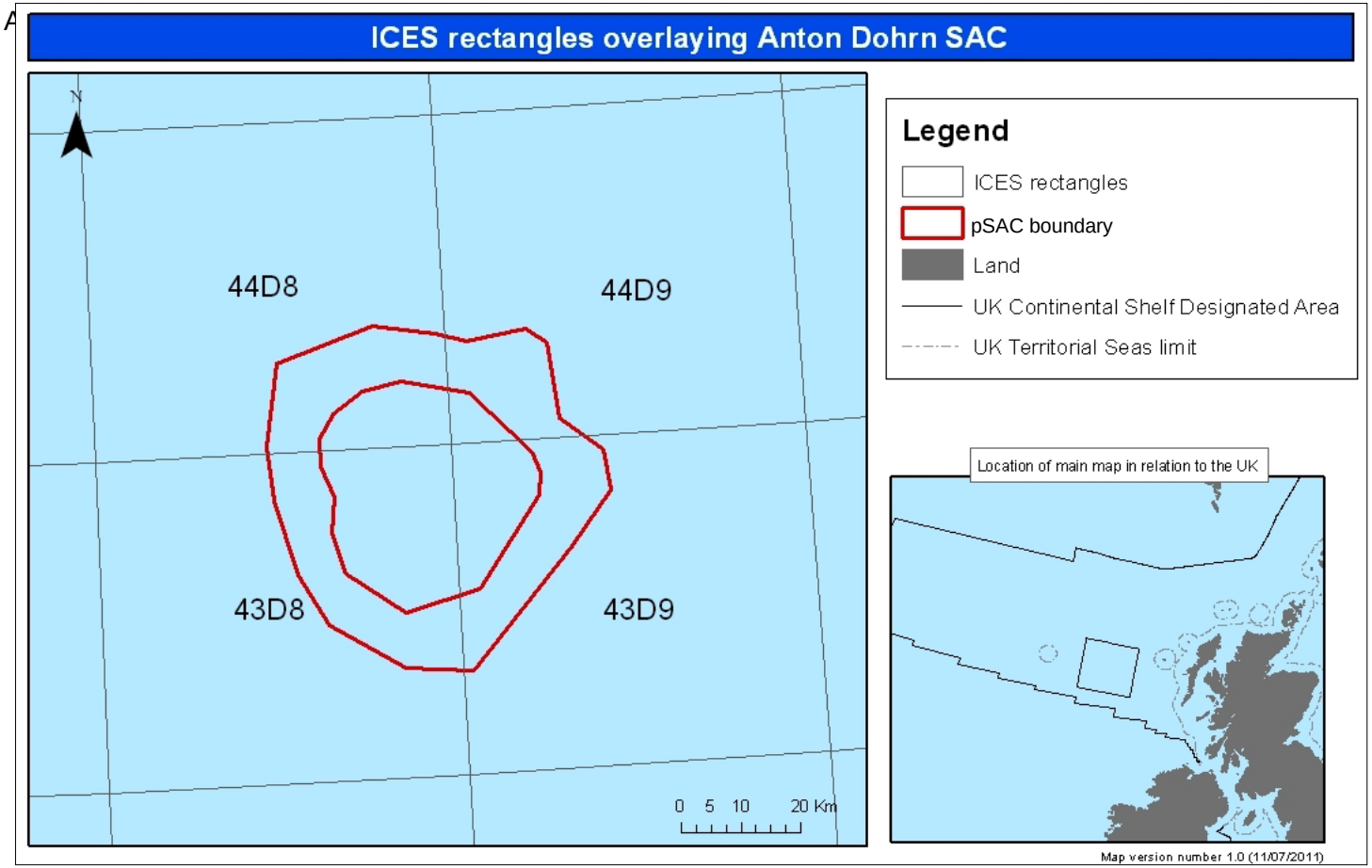
There are no landings data available specifically for the area which is proposed for designation. Marine Scotland and the Marine Management Organisation compile various data at the level of ICES rectangles. Catch data encompasses information for UK-registered vessels landing in UK and non-UK ports, and 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 non-UK vessels that fish within territorial waters, but that land to non-UK ports; currently it is not possible to obtain weights and values of landings for these vessels. This IA is currently concerned with the impacts of the UK's potential designation of Anton Dohrn Seamount on UK businesses. However the effects of designations on other Member States are relevant and information on Spanish fishing vessels has been provided by Pescagalicia-Arpega-Obarco[14].

Information on landings from the region around Anton Dohrn Seamount is given at the scale of ICES statistical rectangle (0.5^{o} latitude, 1.0^{o} longitude). The data are presented here in tables 2.2 to 2.6; five years are shown (2006-10) to illustrate inter-annual variation in catches. The area of Anton Dohrn Seamount pSAC is 1429 km^{2}; this area is less than half of a statistical rectangle but the site crosses four rectangles (Figure 2.2). Resolving whether fishing activities actually overlap with the site and feature is not therefore possible from landings data alone. Analysed VMS data[15] 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 (Lee *et al.* 2010).

[14] This information was provided in written response to the Consultation Impact Assessment in July 2012.
[15] 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 project MB106.)



Map projected in WGS 84 (Zone 28N). The exact limits of the UK continental Shelf are set out in orders made under section 1(7) of the Continental Shelf Act 1964 (© Crown Copyright). World Vector shoreline © US Defence Mapping Agency. GEBCO bathymetry © NERC 1994, 1997. Map copyright JNCC 2012.

Figure 2.2 ICES Rectangles overlaying Anton Dohrn Seamount pSAC

Table 2.2 Fisheries landings 2006-10 from the ICES rectangles containing Anton Dohrn Seamount pSAC.

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
43D9	51	105	5,834	895	13	19	513	112	406	82	1,363	243	45	49
44D8	1,894	194	32	73	1,911	279	23	13	2	5	772	113	26	23
44D9	2,063	254	11	21	38	41	26	27	521	84	532	85	18	17
43D8	902	115	12	31	206	38	1	1	544	109	333	59	11	12
TOTAL	**4,909**	**668**	**5,889**	**1,021**	**2,168**	**376**	**563**	**153**	**1,474**	**281**	**3,001**	**500**	**100**	**100**

Table 2.3 Fisheries landings 2006-10 from the ICES rectangles containing Anton Dohrn Seamount pSAC divided 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	3,755	361	5,820	865	1,340	147	482	78	1,470	272	2,573	345	86	69
Otter trawls - bottom	1,146	299	49	92	827	225	81	75	4	8	421	140	14	28
Pots	9	7	15	47	1	4	0	0	0	0	5	11	<1	2
Longlines (not spec.)	1	1	5	15	0	0	0	0	0	0	1	3	<1	1
Traps (not spec.)	0	0	1	3	0	0	0	0	0	0	<1	1	<1	<1

Table 2.4 Fisheries landings 2006-10 from the ICES rectangles containing Anton Dohrn Seamount pSAC divided by vessel nationality.

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	4,381	408	3,452	453	284	39	1	4	949	188	1,814	218	60	44
England	442	81	2,385	472	0	0	0	0	0	0	565	111	19	22
France	77	172	49	92	75	96	79	72	4	8	57	88	2	18
Norway	0	0	0	0	1,809	242	482	78	521	84	562	81	19	16
Germany	9	7	3	2	0	0	0	0	0	0	2	2	<1	<1
Wales	0	0	1	3	0	0	0	0	0	0	<1	1	<1	<1

Table 2.5 Fisheries landings 2006-10 from the ICES rectangles containing Anton Dohrn Seamount pSAC divided 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
Peterhead	728	67	1,614	207	750	125	0	0	1,470	272	912	134	30	27
Lerwick	1,254	100	1,834	231	1,059	116	482	78	0	0	926	105	31	21
Ijmuiden	442	79	2,373	427	0	0	0	0	0	0	563	101	19	20
Lochinver	68	147	47	89	75	96	79	72	4	8	55	82	2	16
Skaagen	1,331	114	0	0	281	31	0	0	0	0	322	29	11	6
Fuglefjord	1,044	89	0	0	0	0	0	0	0	0	209	18	7	4
Ullapool	34	56	4	4	2	4	1	4	0	0	8	14	<1	3
Corunna	1	1	12	51	1	4	0	0	0	0	3	11	<1	2
Scrabster	9	13	0	0	0	0	0	0	0	0	2	3	<1	1
Vigo	0	0	5	12	0	0	0	0	0	0	1	2	<1	<1

Table 2.6 Fisheries landings 2006-10 from the ICES rectangles containing Anton Dohrn Seamount pSAC, divided by target species.

Target 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
Blue Whiting	4,799	450	5,820	865	2,090	273	482	78	1,470	272	2,932	388	98	78
Black Scabbard Fish	42	104	34	71	68	89	70	63	2	5	43	66	1	13
Deepwater Red Crab	9	7	12	45	1	4	0	0	0	0	4	11	<1	2
Haddock	23	37	0	0	0	0	0	0	0	0	5	7	<1	1
Blue Ling	15	24	1	2	1	1	0	0	0	0	4	5	<1	1
Orange Roughy	6	25	1	1	0	0	0	0	0	0	2	5	<1	1
Monks or Anglers	1	5	1	3	1	4	2	7	<1	1	1	4	<1	1
Sharks	0	0	2	14	0	0	0	0	0	0	<1	3	<1	1
Portuguese Dogfish (Shark)	2	2	2	8	1	1	0	0	0	0	1	2	<1	<1
Roundnose Grenadier	6	7	2	<1	1	0	0	0	0	0	2	2	<1	<1
Rabbit Fish (Rattail)	2	1	5	4	2	1	3	1	1	<1	3	1	<1	<1
Longnose Velvet Dogfish	0	0	3	3	0	0	0	0	0	0	1	1	<1	<1
Greater Forked Beard	1	2	0	0	0	0	0	0	0	0	0	0	<1	<1
Common Mora	0	0	0	0	0	0	0	0	<1	2	0	0	<1	<1
Deep-Water Cardinal Fish	0	0	0	0	0	0	1	1	0	0	0	0	<1	<1
Ling	0	0	0	0	<1	1	0	0	0	0	0	0	<1	<1
Saithe	0	0	0	0	1	1	0	0	0	0	0	0	<1	<1
Other	3	3	4	4	2	2	2	3	0	0	2	3	<1	1

Average total ladings for the four ICES rectangles overlaying Anton Dohrn seamount were 3000 tonnes; worth £500k per year (see Table 2.2). Catches for each rectangle varied highly between years. Annual variation in landings reflects changing markets, regulations (e.g. proper implementation of the Buyers and Sellers Register), and quota allocation, in addition to changes in fish and shellfish abundance. Very high landings (totalling 5834 tonnes), were taken from rectangle 43D9 in 2007, but peak landings were not consistently from any single rectangle. Landings were chiefly from Scottish registered vessels and most fish and shellfish were landed to Scotland (predominantly Peterhead, Lerwick and Lochinver) and the Netherlands (Ijmuiden). Smaller landings were made to Denmark, the Faroe Islands and Spain.

Fishing was primarily by midwater otter trawling (86 % of average landings by weight) for blue whiting. Bottom otter trawling also yielded valuable landings, (14% by weight, 28% by value) of species including black scabbard fish, haddock (haddock records may be misrecorded as they are rarely caught at the water depths characterising this area (>600m)), blue ling, orange roughy, monkfish and sharks (some blue whiting catches were also attributed to bottom otter trawling but this may also have been misreported as this species is generally caught by midwater trawling). Prior to 2009 small amounts of sharks were harvested by longlines and German registered vessels used pots to catch deepwater red crab.

VMS data (Annex II) showed that demersal trawling over the seamount was concentrated in a ring around the summit, some of which is within the pSAC. This trawling was dominated by French vessels that are likely to have targeted black scabbard fish and other deepwater species: seven French vessels currently operate around Anton Dohrn Seamount pSAC[16] Spanish vessels also operate in the area, primarily targeting monkfish with gill nets: up to 15 gill-netting vessels operate in ICES zone VI and each has around 15-17 crew members. UK fishing activity within the pSAC was negligible.

Current management of activity (baseline)

The European Union's Common Fisheries Policy (CFP) sets the framework for regulation of fisheries in UK waters. European competence and specific regulations vary in their application depending on geography. In the UK, the management of fisheries in all waters beyond 12nm 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 0–12nm)[17]. 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 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.

The European Commission has been advised by ICES that populations of many of the species caught near Anton Dohrn Seamount (e.g. black scabbard fish and roundnose grenadier) have declined below safe biological limits. Total Allowable Catches for these species have decreased and the Commission has banned fishing for deep sea sharks and orange roughy[18].

[16] Information provided on 23.5.2012 by the National Federation of Fishermen's Organisations in their written response to the consultation Impact Assessment.
[17] Quotas are informed by annual scientific stock assessment advice formulated by ICES; adherence to their advice is not mandatory.
[18] http://www.cfp-reformwatch.eu/2010/10/deep-sea-fisheries-quota-proposal-for-2011-and-2012-published/ [Accessed 24.10.11].
and http://cefas.defra.gov.uk/our-science/fisheries-information/deep-water-species,-ne-atlantic.aspx [Accessed 26.01.12].

North East Atlantic Fisheries Commission (NEAFC) and/orEC fisheries closures are enforced at the Hatton Bank pSAC, North West Rockall Bank cSAC and Darwin Mounds cSAC to protect cold water coral and other vulnerable marine ecosystems. A fisheries closure over the steep flanks and outlying volcanic cones of Anton Dohrn Seamount was proposed by the ICES Working Group on Deep-water Ecology in 2007 to protect vulnerable marine ecosystems (structural corals and sponges) from all demersal fishing gear. Following analysis of new benthic survey data this proposal was recently included in formal ICES advice to the EC (ICES 2011). The boundary of the proposed fisheries closure traces the inner extent of the pSAC boundary, but has a narrower outer extent (Figure 2.1) because it does not protect some of the Annex 1 habitat that was included in the pSAC boundary[15]. Boundaries of both the pSAC and the proposed ICES closure includes a substantial margin around the features they aim to protect to allow for mobile fishing gear on the seabed being at some distance from the vessel on the sea's surface[19].

Since 2007 fishing with gill nets and entangling nets has also been prohibited at depths of over 600 m in the ICES zone containing Anton Dohrn Seamount (V1a) and there are technical restrictions on nets used at shallower depths[20].

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[21] . Vessels over 15m in length are required to have a Vessel Monitoring System and their activities are monitored via satellite by Marine Scotland's Marine Monitoring Centre[22].

Likely future regulation of activity following designation

The UK is likely to consider applying to the EC for controls to close areas of Anton Dohrn Seamount pSAC to some forms of demersal fishing to minimise risk of damage to habitat and associated typical species. Fisheries management measures are legislated through the CFP. The CFP is currently undergoing reform and a revised regulation will come into effect in January 2013.

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 over ten years. Section 2 has outlined the current situation at the site (the baseline) in terms of economic activities. It should be remembered that the baseline may be dynamic, and the assessments try to take account of this.

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; and, 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.

[19] Anton Dohrn SAC Selection Assessment v1.1 JNCC
[20] European Council Regulation No 41/2007
[21] http://www.scotland.gov.uk/Topics/marine/Compliance/resources [Accessed 12.10.11].
[22] http://www.scotland.gov.uk/Topics/marine/Compliance/satellite [Accessed 12.10.11].

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 benefits 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 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;
- 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 there is not sufficient evidence 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 way of addressing 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 to comply with the policy objectives. The costs considered include the direct and indirect economic costs to operators, enforcement authorities and wider society. The costs are expected to result from the range of management measures that may be required to meet the site's objectives and 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 restore the reef species to favourable condition. These measures 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 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 competent authority in its assessment under the Offshore Habitat Regulations;
- 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[23] assessment under the Offshore Habitat 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:

- Costs of monitoring the site and maintaining information on its conservation status;
- Costs of regulating and activities that might impact on the conservation status of the site, and
- Costs of enforcing management measures

3.3 Benefits

The benefits of site designation primarily arise from the increase in the area protected for nature conservation purposes[24]. Benefits are assessed in terms ecosystem services that benefit humans[25]. The following overarching categories of ecosystem services are used[26]:

- 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[27] (such as cycling of nutrients and photosynthesis) are assumed to be captured by the other benefits listed

[23] 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.
[24] 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.
[25] As described in Parliamentary Office of Science and Technology (2007).
[26] These are the categories used in the Millennium Ecosystem Assessment (MEA 2005), http://www.millenniumassessment.org [Accessed 01.11.11].
[27] Supporting services described as "those that are necessary for the production of all other ecosystem services" in the MEA

and so are not examined separately[28]. 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 ecosystem services are analysed further in Section 4.3. In addition to these categories biodiversity has an intrinsic value that gives rise to other benefits. Intrinsic value is important but it cannot be assessed using conventional economic techniques[29] and is not analysed further in this document.

4 COSTS AND BENEFITS OF OPTION 1: DESIGNATE THE SITE

4.1 Implications of designation

To assess the range of potential costs and benefits likely minimum and maximum management measures for the site have been assessed. Choice of measures was informed by Table 2.1 and experience of managing similar sites.

The minimum scenario requires the smallest change in activities 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 'restore' the reef feature to favourable condition. Because UK vessels do not currently fish at Anton Dohrn with static gear, minimum and maximum scenarios therefore incur the same costs.

Table 4.1 Summary of management scenarios that may be required if Anton Dohrn Seamount pSAC is designated.

Minimum scenario:	Maximum scenario
Existing activities Ban use of all mobile demersal gear over the SAC. Proposed activities Due to its location it is assumed that no projects will be undertaken over or near the site that could significantly impact its integrity.	Existing activities Ban use of all demersal gear (static and towed) over the SAC. Proposed activities Due to its location it is assumed that no projects will be undertaken over or near the site that could significantly impact its integrity.

4.2 Costs

In line with the purposes of this IA this section deals only with costs to the UK economies which are assumed to include those to UK registered vessels landing to the UK. Profits from UK registered vessels landing to foreign ports and foreign vessels landing to the UK are assumed to be primarily absorbed outside of the UK: landings data for these vessels are presented in the fisheries section for information but are not included in the costs calculated below and presented in the summary sheets.

a) Shipping

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

[28] 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.
[29] For example, in MEA (page 7, Section 2): http://www.millenniumassessment.org/documents/document.354.aspx.pdf [Accessed 01.11.11].

b) Fisheries

Potential UK economic impact of foregoing landings

As the reefs of Anton Dohrn Seamount are sensitive to impacts from demersal gear, it is expected that, at a minimum, the site will be closed to all types of towed demersal gear (e.g. bottom otter trawls). A maximum measure would be to ban all demersal fishing (including static gear such as pots and longlines) if these are thought to damage the reef habitat. Under both scenarios the costs of enforcing a fishing closure are considered.

These scenarios involve displacing fishing from the whole pSAC. It is uncertain whether fishers would move elsewhere or if there will be less fishing in global terms. To estimate the potential maximum direct effect of designation the impact to the UK economy of losing the value of demersal landings from the site are considered (i.e. it is assumed that fishers will not make-up their losses elsewhere).

It is likely that the fisheries closure proposed by ICES will be implemented by 2014 (independent of this pSAC designation). This closure would ban fishing with demersal gear over the steep flanks of the seamount but excludes some deeper (over 1000 m) areas within the pSAC boundary (Fig. 2.1). Demersal fishing is unlikely to occur in water of this depth, VMS records (Annex I) indicate small amounts of bottom otter trawling in 2006 (Annex I, Fig.1), but this is consistent with midwater trawl activity (Annex 1 Fig. 5) and is likely to be misrecording. The costs estimated here to fishers and government may therefore be significantly reduced by the time that management measures are implemented.

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 location. 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[30]:

- 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 designation of Anton Dohrn Seamount pSAC 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 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 is provided in Appendix I. Profit is calculated as 30% of gross landings from the pSAC.

[30] 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].

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
Ban use of mobile (towed) demersal gear over the pSAC.	Loss of total net profit from mobile demersal gear (profit estimated at 30% of average annual UK landings value of 1.6 k p.a., this is entirely attributed to vessels using bottom otter trawls)	£0.5 k p.a.
Maximum scenario	Assumptions	Change in costs
Ban use of all demersal gear (static and towed over the pSAC).	Loss of total net profit from all demersal gear (profit estimated at 30% of average annual UK landings value of 1.6 k p.a.)	£0.5 k p.a.

Under the maximum scenario all vessels using demersal gear would be impacted. Landings data for the ICES rectangles containing the pSAC show that these are primarily Scottish, English and French vessels using towed gear (Norwegian vessels are assumed to have used mid-water gear as explained in Appendix 1). Demersal catches are chiefly landed to Lochinver and Ullapool.

As detailed above landings to foreign ports are not included in the cost analysis and headline figures presented in this IA however significant landings are detailed here for information because they may have indirect impacts on the UK economy. Catches from the pSAC by UK registered vessels using demersal gear were landed to Spain: the average annual demersal landings from *the whole of all of the ICES rectangles* containing Anton Dohrn Seamount pSAC to Spain were £14k p.a. These vessels are likely to be from Anglo-Spanish UKRFO vessels, based on Defra (2009) and expert opinion[31].

Average annual landings to the UK from foreign vessels fishing demersally within the pSAC were £47 k pa. These landings were from French bottom trawlers.

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. Pescagalia-Arpega-Obarco suggest that Spanish gill-netters could suffer serious socio-economic consequences if gill netting is prohibited at Anton Dohrn Seamount. This is because gill-netters have recently been prohibited from fishing in other traditional grounds by various fisheries management measures including closures to protect Vulnerable Marine Habitats (North West Rockall Bank, Darwin Mounds and Hatton Bank) and restrictions on gill-netting at depths of over 200 m (as described in section 2.4).

In some cases, particularly where moving to an alternative ground would be unprofitable, individual fishermen may stop fishing. This may not reduce total income to the sector as many stocks have fixed quotas and other vessels maybe able to draw on quota foregone. Quotas are often not fully used and some stocks are not subject to quota. Where individual fishers stop fishing then there may also be implications to the fishers 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 cost implications. At this stage the best that can be done for most closures is to provide an indication

[31] Two significant landings of blue-whiting were made by UK registered vessels to Faeroes ports in 2006 (£89k total value) but as detailed in Appendix 1 this species is normally targeted with pelagic gear and it is likely that these records are incorrectly recorded catches from mid-water trawlers.

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.

Fisheries closures, even if undertaken unilaterally by the UK, would have to be agreed with other Member States of the European Union through the CFP. This process would take at least a year and therefore that closures would not be in place until 2014. This minimum timeframe is used in the IA to ensure that the costs are not underestimated. Fisheries costs may be lower than set out here if the fisheries closure currently proposed by ICES is enforced before management measures are implemented for this site.

It is recognised that fishers are currently be 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[32].

One-off costs are identified in relation 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 current 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 should ensure compliance with fisheries restrictions.

These 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).[33]

ii. *Enforcement.* Additional enforcement costs (e.g. prosecutions) to Marine Scotland Compliance for any fisheries management measures are estimated to be £12k annually[29]. 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)[34]. 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

[32] Summary of Costs to the Scottish Government for Implementing New Site Protection Measures in the Marine (Scotland) Bill: Final Regulatory Impact Assessment 2009.
[33] 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)
[34] N.Golding JNCC *pers. comm.* 7.11.2011

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. Enforcement costs may be lower if the fisheries closure currently proposed by ICES is enforced before management measures are implemented for this site.

4.3 Benefits of designating the site

Reef at Anton Dohrn Seamount is thought to be well preserved[35]. Protecting Anton Dohrn Seamount from damage will enable species that form the reef and are associated with it to grow, feed and reproduce. Some species live primarily on the reef (e.g. sponges and cup 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 areas (e.g. invertebrrates 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 Anton Dohrn Seamount (Appendix I) but we do not know if it impacts the reef community directly[36]. If the reef was not designated it would remain at risk of abrasion damage from demersal fishing which can cause physical damage and remove fish and shellfish. *Lophelia pertusa* coral reef is the most sensitive community proposed for protection at Anton Dohrn Seamount. This slow-growing coral can take tens to thousands of years to develop (Bell and Smith 1999; Roberts 2002; Friewald *et al.* 2004). It is very fragile (Wilson 1979) and may take decades to recover from damage, or may never recover (Williams *et al.* 2010). Future deterioration of the biogenic, 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

Anton Dohrn Seamount increases habitat heterogeneity and complexity by providing hard substrate in a predominately sedimentary environment of muddy and sandy plains (McBreen *et al.* 2011). Patches of unique habitat have been shown to increase the number of juvenile fish species surviving to adulthood in other regions (e.g. Connell & Jones 2003 – New Zealand) by offering refuge 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 to conserve in future. Also,

[35] Anton Dohrn SAC Selection Assessment Document v1.1 JNCC
[36] Anton Dohrn Seamount SAC: Draft Conservation Objectives and Advice on Operations v1.0 JNCC

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).

Non-use Values

Most people who benefit from knowing the site is being conserved are unlikely to use it or get tangible benefits from it. This is known as the existence value of conserving the site. Some people will also gain satisfaction from knowing that the reef habitat is being conserved for others in the current generation (altruistic value) and for future generations (bequest 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 certain species of mammal). 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 Anton Dohrn Seamount for the provision of each of the ecosystem services described above is summarised in Table 4.3 below as the differences envisaged following site designation in comparison to the baseline (no designation). It is assumed that fisheries management measures and 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 the 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 assigned at the base of the table.

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 Anton Dohrn Seamount 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 habitat for commercially exploited fish and shellfish.	**Low.** Interruption of lifecycle processes could cause some decline.	**Low.** Improvement on site may support some species of human interest.	**Low-Moderate.** Improvement on site may support species of human interest. Some species could be protected from over fishing.	**Low.** An important island of hard substrate in an otherwise sandy/muddy area.	**Low-Moderate.** Though this is a relatively small area it could be important for connectivity with other sites.	**Low.** Unsure whether species that would benefit are currently impacted by habitat damage and harvesting.
Fish for non-human consumption							
Carbon sequestration	**Minimal.** Features are likely to have low effect and cover a small area.	**Minimal.** Unlikely to affect biological pump.	**Minimal.** Unlikely to affect biological pump.	**Minimal.** Unlikely to affect biological pump	**Mod**. High value but site plays minimal role.	**Minimal**	**Mod.** Biological pump not well understood.
Waste assimilation	**Minimal.** The features are not recognised as significant waste assimilators and cover a small area.	**Minimal.** Unlikely to affect assimilation.	**Minimal.** Unlikely to affect assimilation functions and processes.	**Minimal.** Unlikely to affect assimilation functions and processes.	**Minimal.** Site plays minimal role.	**Nil.**	**Moderate**. Assimilation not well understood.
Non-use value of natural environment	**Low- Mod.** Public has preference for rare and visually appealing features perhaps including the corals found here.	**Low.** Impacts on reef uncertain.	**Low-Moderate.** Some recovery of biodiversity and community composition possible.	**Low-Moderate.** Some recovery of biodiversity and community composition possible.	**Low.** All UK population is relevant but relatively low value per capita.	**Low - Moderate**	**Low.**
Scientific research	**Moderate.** Unique habitat.	**Low.** Level of decline uncertain.	**Moderate.** Potential for detailed research work to be carried out.	**Moderate.** Potential for detailed research work to be carried out.	**Moderate.** For 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 public and private sectors with marine spatial planning and a more strategic consideration of available resources. In particular they will have better knowledge of a) the nature conservation significance of different parts of the marine environment, and b) the added costs of applications within a site boundary.

4.4 Summary of costs and benefits

Table 4.4 below summarises the potential costs and benefits of the site analysed in this section. The costs are analysed over a period of ten years from designation in 2012, and are discounted at 3.5% per annum[37]. There are uncertainties in the assessment of costs, and some costs have not been quantified.

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

	Minimum and maximum management scenarios	
	Costs	**Benefits**
Assessed	**Sectors**	Low-Moderate: possible impacts on fish species, scientific and non-use natural environment.
	Shipping: £0	
	Fishing: £1k.pa	
	Government: Enforcement £12k.pa Management £77 one-off Ecological assessment £342k one-off, and £250k 'one-off' (every five years)	
Total annual	£13k.pa	Low-Moderate
Total one-off	£669k	
Total (Present Value*)	£694k	Low-Moderate
Not assessed	• Costs if any projects are refused • Costs from cumulative MPA impacts • Costs beyond next 10 years	• Role of feature in wider ecosystem including suite of marine SACs. • Intrinsic value of biodiversity improvements • 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.)

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

Risk of unintended consequences
The main risks of unintended consequences are:

- 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 through public consultation.

Under the Offshore 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 Anton Dohrn Seamount pSAC.

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, 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 equally 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 Anton Dohrn Seamount 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: - raise significantly the costs of new suppliers relative to existing suppliers, - raise significantly the costs of some existing suppliers relative to other existing suppliers: or, - raise significantly the costs of entering, or exiting, the affected market. 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 stakeholders and Government with information on the benefits and impacts of the designation of Anton Dohrn Seamount pSAC. This assessment considered the impacts of Option 1 (designating the site) relative to the baseline.

Designating this site will protect a reef habitat, and its associatied species which have 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 yrs. These benefits are difficult to monitise and have been presented qualitatively. Designation of the site may also result in the restritiction 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 the site has been designated it is necessary to make assumptions about the measures that might be required. The reef is vulnerable to damage from demersal fishing, but we do not know if or the extent to which 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.

For Anton Dohrn Seamount pSAC likely minimum and maximum management scenarios are estimated to have equal impacts on the UK economy. The economic impacts may be less than those presented if the proposed ICES fisheries closure for Anton Dohrn Seamount is implemented prior to designation of the pSAC.

As Table 4.4 shows if the site is designated total costs over ten years are estimated to be around £694k (under both minimum and maximum management scenarios). Indirect costs from potential fisheries losses have not been examined quantitatively. Both scenarios bring low to moderate benefits for fish and shellfish habitat, non-use attributes and scientific research and knowledge.

6 REFERENCES

ANDERSON, J. AND CURTIS, H. (2007) The economic impacts of the UK sea fishing and fish processing sectors: an Input-Output analysis. www.seafish.org/pdf.pl?file=seafish/Documents/2006 I-O Key Features Final 090108.pdf

BELL, N. AND SMITH, J. (1999) Coral growing on North Sea oil rigs. Nature, 402, 601.

BETTER REGULATION EXECUTIVE (2005) Measuring Administrative Costs: UK Standard Cost Model Manual: www.berr.gov.uk/files/file44503.pdf

BEAUMONT, N., AUSTEN, M., ATKINS, J., BURDON, D., DEGRAER, S., DENTINHO, T., DEROUS, S., HOLM, P., HORTON, T., VAN IERLAND, E., MARBOE, A. (2007) Identification, definition and quantification of goods and services provided by marine biodiversity: Implications for the ecosystem approach, *Marine Pollution Bulletin* 54, 253–265.

BEAUMONT, N., TOWNSEND, M., MANGI, S. AND AUSTEN, M.C. (2006) *Marine biodiversity: an economic valuation. Building the evidence base for the Marine Bill*, report for Defra available from the Defra website.

CEFAS. (2007) Multispecies Fisheries Management: A Comprehensive Impact Assessment of the Sand eel Fishery Along the English East Coast. CEFAS Contract Report MF0323/01.

CHRISTIE, M., HANLEY, N., WARREN, J., MURPHY, K. AND WRIGHT, R. (2004) Valuing biodiversity in the UK using choice experiments and contingent valuation. DEFRA-funded research project 'Developing measures for valuing changes in biodiversity'. Accessed July 2010: http://strathprints.strath.ac.uk/7220/1/strathprints007220.pdf

CONNELL, S.D. AND JONES, G.P. (2003) The influence of habitat complexity on post-recruitment processes in a temperate reef fish population. *Journal of Experimental Marine Biology and Ecology* 151, 271-294

DEFRA (2009) A review of the effectiveness of the Economic Link. Final Report by VividEconomics 81pp.
DE GROOT, R.S., WILSON, M.A. AND BOUMANS, R.M.J. (2002) A typology for the classification, description and valuation of ecosystem functions, goods and services. *Ecological economics* 41, 393-408.

EFTEC (2008) Impact Assessments for Two Offshore Special Areas of Conservation – Inception and Methodology. Report for JNCC.

EUROPEAN COMMISSION (2007) Guidelines for the establishment of the Natura 2000 network in the marine environment. Application of the Habitats and Birds Directives. May 2007.

EUROPEAN TOPIC CENTRE ON BIOLOGICAL DIVERSITY. (2008) Article 17: EU Consultation Tool – Coastal Habitats. Available 28 July – 15 September 2008.

FREIWALD, A., FOSSÅ, J.H., GREHAN, A., KOSLOW, T. AND ROBERTS, J.M. (2004) Cold-water coral reefs. Cambridge, UK:UNEP-WCMC. Available from: http://www.unep-wcmc.org/medialibrary/2010/09/10/29fefd54/CWC.pdf [Accessed October 2011.]

HOWELL, K.L., MOWLES, S.L., AND FOGGO, A. (2010) Mounting Evidence: near-slope seamounts are faunally indistinct from adjacent bank. Marine Ecology, 31 (suppl.1), 52-62.

ICES (2008) Report of the Workshop on dealing with Natura 2000 and Related Requests (WKN2K), 5 June 2008, Copenhagen, Denmark. ICES CM 2008/ACOM:46. 48 pp.

ICES (2011) General advice: Update of cold-water coral and sponge maps and the information underpinning such maps on Vulnerable Marine Habitats (including Hatton and Rockall Banks). ICES Advice 2011. Book 1: 1.5.1.3/1.5.4.1

JNCC (2003) Summary of the working methodology for identifying habitat sacs in UK waters (adopted March 2003) http://www.jncc.gov.uk/pdf/consultation_habitatsiteselectionmethodology.pdf

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.

LONG, D., HOWELL, K.L., DAVIES, J. AND STEWART, H., (2010) JNCC Offshore Natura Survey of Anton Dohrn Seamount and East Rockall Bank Areas of Search. JNCC Report Series 437.

MATTHIOPOULOS, J. (2007) Preliminary methods for designing marine SACs for UK pinnipeds on the basis of space use. SCOS 2007 Briefing Paper 07/8.

MCBREEN, F., ASKEW, N., CAMERON, A., CONNOR, D., ELLWOOD, H. & CARTER, A. (2011) UKSeaMap (2010) Predictive mapping of seabed habitats in UK waters. JNCC Report, No. 446.

Millennium ecosystem assessment (2005) Ecosystems and Human Well-Being: Synthesis Report, available from www.millenniumassessment.org

MILLS, C. M., TOWNSEND, S. E., JENNINGS, S., EASTWOOD, P. D., AND HOUGHTON, C. A. (2007) Estimating high resolution trawl fishing effort from satellite-based vessel monitoring system data. ICES Journal of Marine Science. 64: 248–255.

MUNKA, P., WRIGHT, P.J. AND PIHL, N.J. (2002) Distribution of the Early Larval Stages of Cod, Plaice and Lesser Sandeel across Haline Fronts in the North Sea, Estuarine, Coastal and Shelf Science 55, 139–149.

ROBERTS, J.M. (2002) The occurrence of the coral *Lophelia pertusa* and other conspicuous epifauna around an oil platform in the North Sea. Journal of the Society for Underwater Technology. 25, 83-91.

SEAFISH (2007) The economic impacts of the UK sea fishing and fish processing sectors: An input-output analysis. 12pp

SEAFISH 2011. (2009) Economic Survey of the UK Fishing Fleet. Available here: http://www.seafish.org/resources/publications.asp?c=Economics%20and%20Business

CURTIS, H., BRODIE, C. AND LONGONI, E. (2010) 2008 Economic Survey of the UK Fishing Fleet. SEAFISH 116pp.

WHITE, P.C.L., BENNETT, A.C. AND HAYES, J.V. (2001) The use of willingness-to-pay approaches in mammal conservation. Mammal Review 31, 151-167

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

WILSON, J.B. (1979) The distribution of the coral *Lophelia pertusa* (L.) [*L. prolifera* (Pallas)] in the North East Atltantic. Journal of the Marine Biological Association of the UK, 59, 149-164

ANNEXES

ANNEX I: CALCULATIONS OF COSTS TO FISHING INDUSTRY BY GEAR TYPE 1

Otter trawling - bottom 1
Otter trawling (midwater) 4

ANNEX II: FRENCH DEMERSAL FISHING OVER ANTON DOHRN SEAMOUNT 6

ANNEX III: COSTS OF DESIGNATION OF ANTON DOHRN SEAMOUNT BY SECTOR 9

Enforcement and monitoring 9
Fisheries 10

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

The distribution of UK vessels (≥15m) that have vessel monitoring systems (VMS) is presented here. Such monitoring systems 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 speed. Using a speed rule to partition active fishing from VMS 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 of 1-6 knots to represent fishing activity. These data enabled fishing effort both inside and outside of Anton Dohrn Seamount 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). Landings data by ICES rectangle are from Marine Scotland and the Marine Management Organisation, only landings data for UK registered vessels landing to UK ports are included in these analyses.

Landings data calculations are only presented for vessels using demersal gear (bottom otter trawling) as these may impact the reef and be managed if the pSAC is designated. (Midwater otter trawling does not impact the reef and is not anticipated to be effected by the potential pSAC designation.)

Otter trawling - bottom

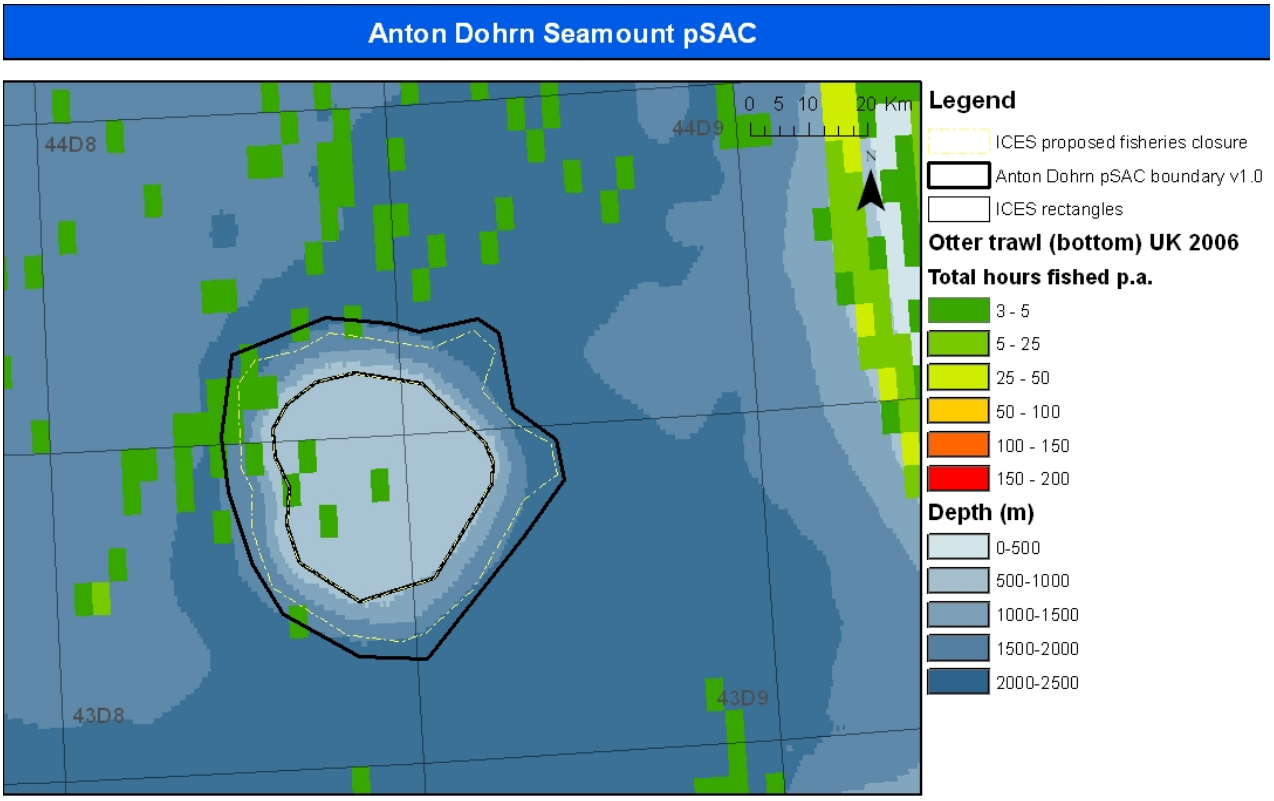
Landings by UK registered demersal fishing vessels landing to UK ports, partitioned by ICES rectangle and UK fishing effort over Anton Dohrn Seamount pSAC. (Some inconsistencies arise between VMS and landings data because of the different ways the data are collected.)

ICES	2006		
	Fishing within dSAC (%)	Value (£)	
		ICES rectangle	dSAC
44D8	16	10,527	1,700
44D9	-	0	0
43D8	17	27,190	4,525
43D9	-	0	0
TOTAL		**37,717**	**6,225 (1,556 average annual value 2006-2009)**

VMS data (below) shows that bottom otter trawling only occurred in the pSAC in 2006. Landings for this gear type were primarily blue whiting. It seems likely that the VMS and landings data were for midwater trawls mistakenly recorded at bottom otter trawls.

[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.

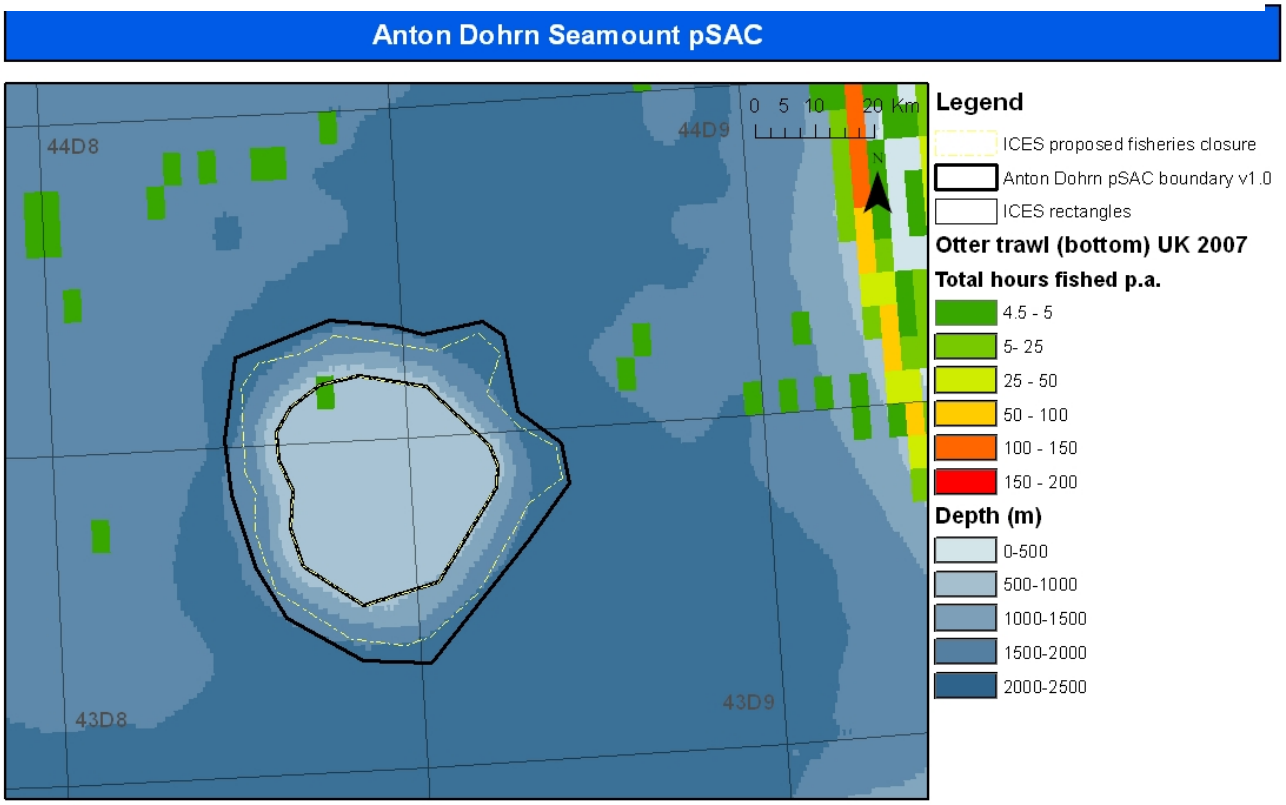
[2] Cefas (2010) Report no. 1: Objective 1 – Provision of geo-database containing standardised layers showing the distribution of specified activities, sites and resources with associated metadata and comments. Project MB106: Further development of marine pressure data layers and ensuring the socio-economic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



VMS data is from Cefas data contract MB106

Site map projected in WGS 84 (Zone 28N). NOT TO BE USED FOR NAVIGATION. Seabed habitat data derived from BGS 1:250,000 seabed sediment maps. The exact limits of the UK Continental Shelf are set out in orders made under section 1(7) of the continental Shelf Act 1964 (© Crown Copyright). World Vector Shoreline © US Defense Mapping Agency. GEBCO Bathymetry © NERC 1994, 1997. Map © JNCC 2011.

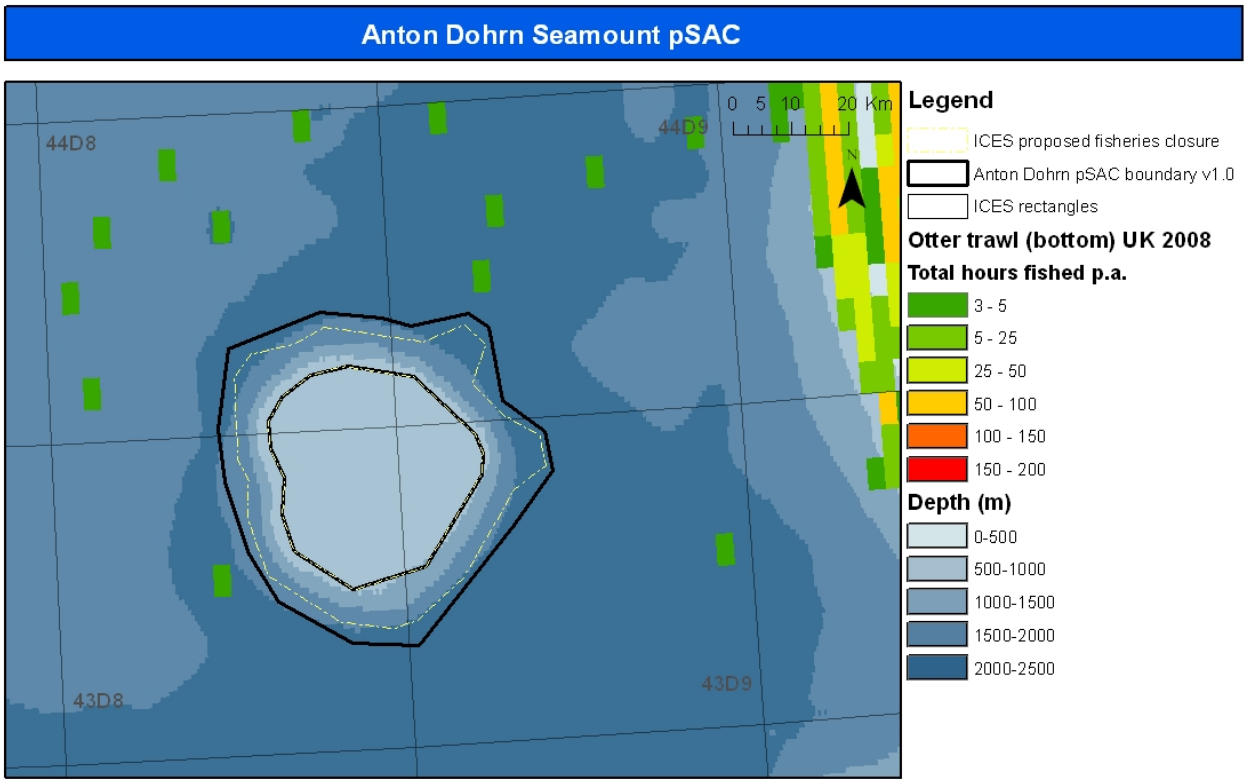
Distribution of UK-registered otter trawl (bottom) activity in 2006



VMS data is from Cefas data contract MB106

Site map projected in WGS 84 (Zone 28N). NOT TO BE USED FOR NAVIGATION. Seabed habitat data derived from BGS 1:250,000 seabed sediment maps. The exact limits of the UK Continental Shelf are set out in orders made under section 1(7) of the continental Shelf Act 1964 (© Crown Copyright). World Vector Shoreline © US Defense Mapping Agency. GEBCO Bathymetry © NERC 1994, 1997. Map © JNCC 2011.

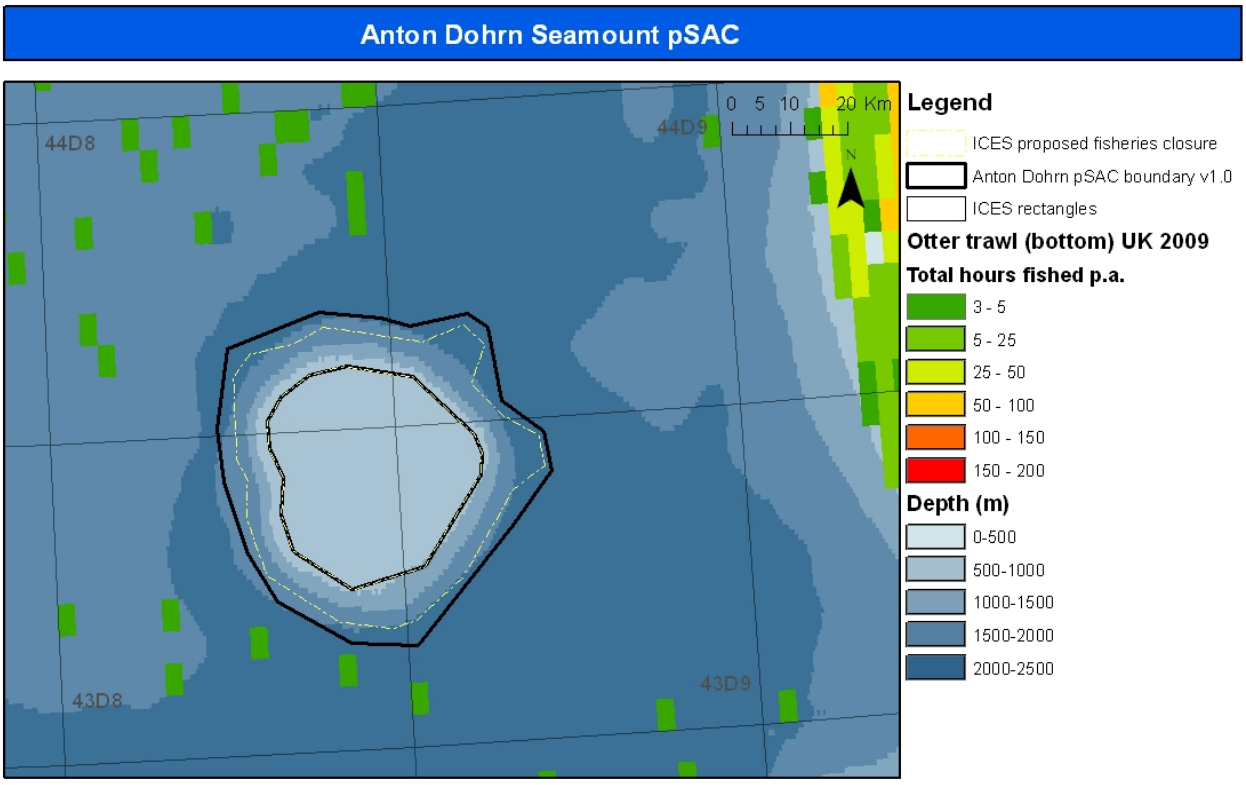
Distribution of UK-registered otter trawl (bottom) activity in 2007



VMS data is from Cefas data contract MB106

Site map projected in WGS 84 (Zone 28N). NOT TO BE USED FOR NAVIGATION. Seabed habitat data derived from BGS 1:250,000 seabed sediment maps. The exact limits of the UK Continental Shelf are set out in orders made under section 1(7) of the continental Shelf Act 1964 (© Crown Copyright). World Vector Shoreline © US Defense Mapping Agency. GEBCO Bathymetry © NERC 1994, 1997. Map © JNCC 2011.

Distribution of UK-registered otter trawl (bottom) activity in 2008

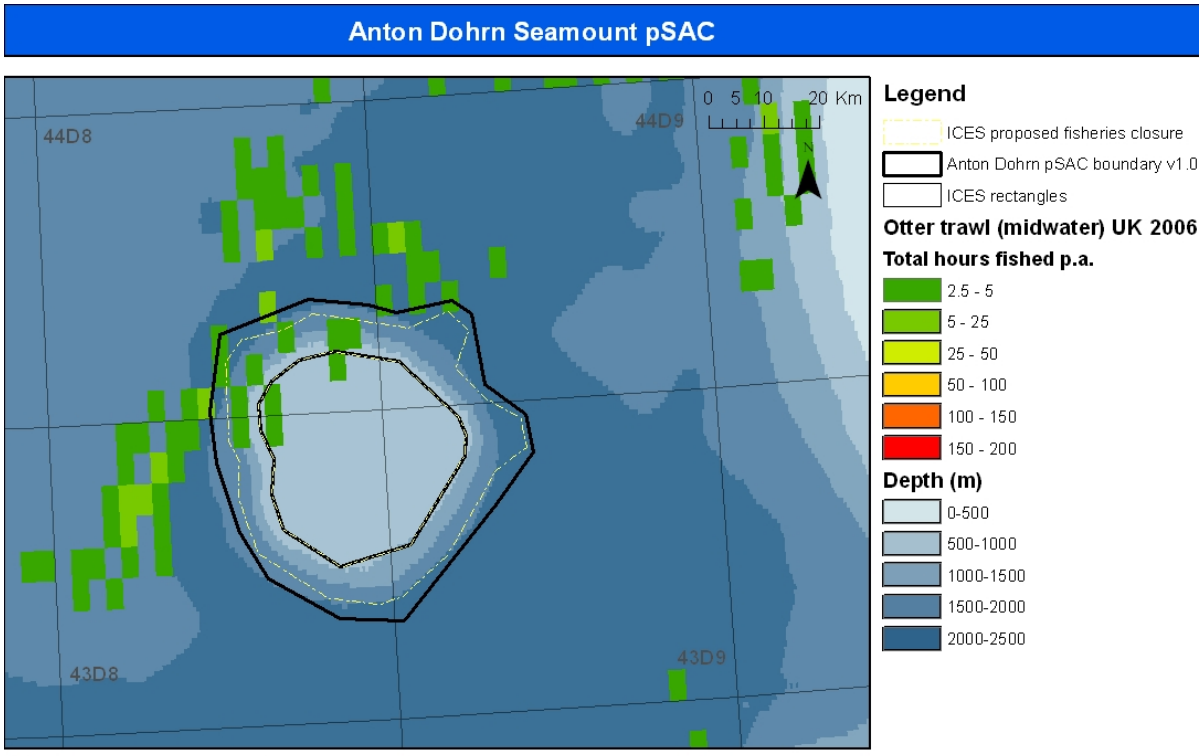


VMS data is from Cefas data contract MB106

Site map projected in WGS 84 (Zone 28N). NOT TO BE USED FOR NAVIGATION. Seabed habitat data derived from BGS 1:250,000 seabed sediment maps. The exact limits of the UK Continental Shelf are set out in orders made under section 1(7) of the continental Shelf Act 1964 (© Crown Copyright). World Vector Shoreline © US Defense Mapping Agency. GEBCO Bathymetry © NERC 1994, 1997. Map © JNCC 2011.

Distribution of UK-registered otter trawl (bottom) activity in 2009

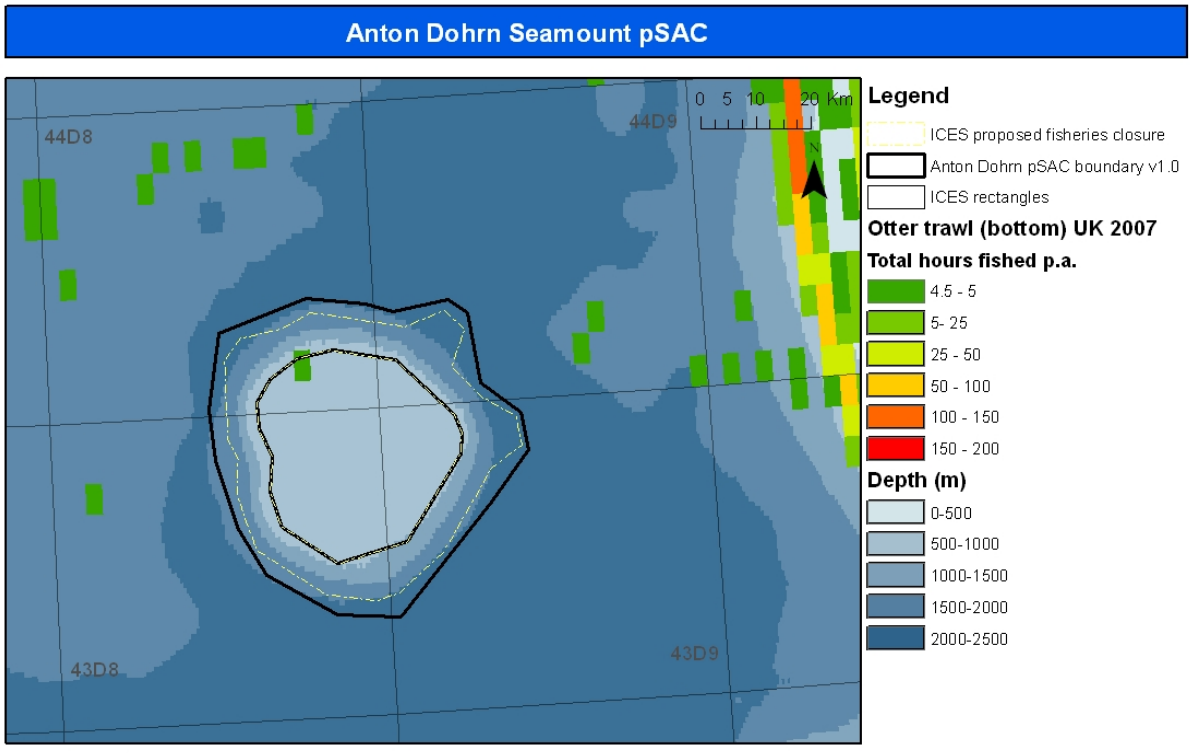
Otter trawling (midwater)



VMS data is from Cefas data contract MB106

Site map projected in WGS 84 (Zone 28N). NOT TO BE USED FOR NAVIGATION. Seabed habitat data derived from BGS 1:250,000 seabed sediment maps . The exact limits of the UK Continental Shelf are set out in orders made under section 1(7) of the continental Shelf Act 1964 (© Crown Copyright). World Vector Shoreline © US Defense Mapping Agency. GEBCO Bathymetry © NERC 1994, 1997. Map © JNCC 2011.

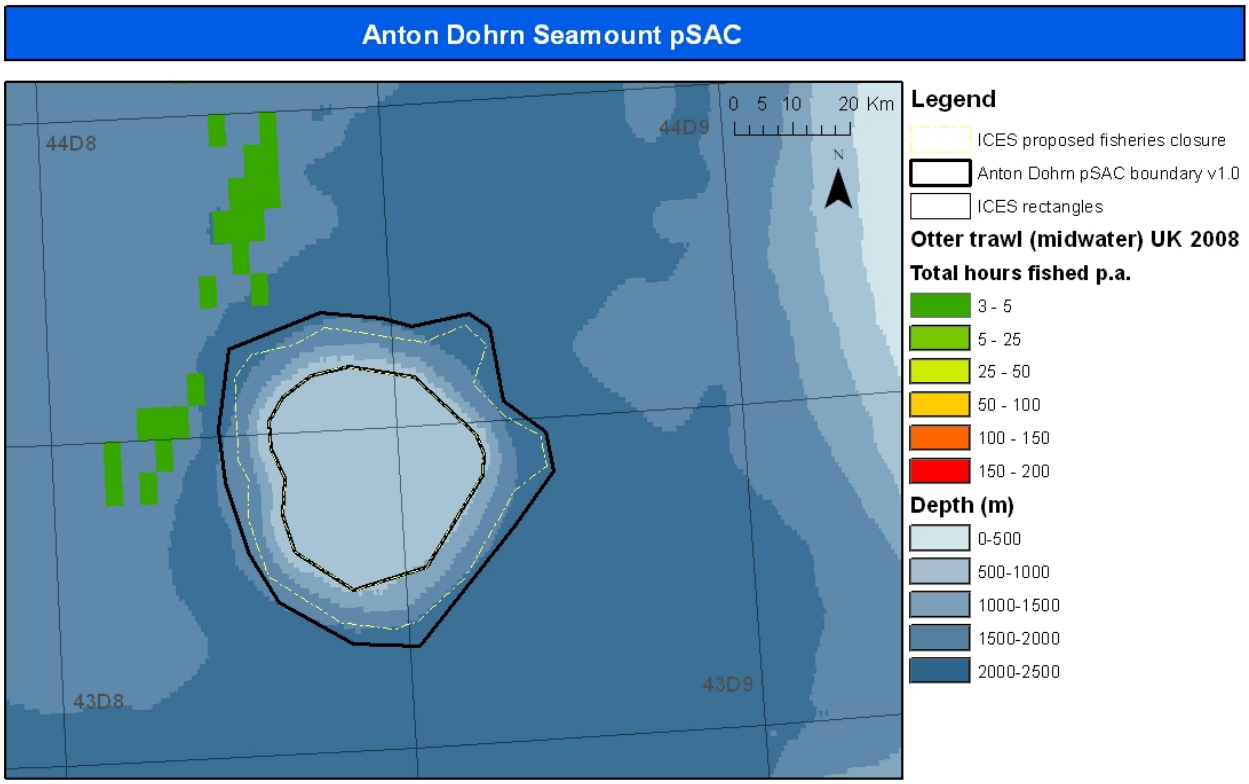
Distribution of UK-registered otter trawl (midwater) activity in 2006



VMS data is from Cefas data contract MB106

Site map projected in WGS 84 (Zone 28N). NOT TO BE USED FOR NAVIGATION. Seabed habitat data derived from BGS 1:250,000 seabed sediment maps . The exact limits of the UK Continental Shelf are set out in orders made under section 1(7) of the continental Shelf Act 1964 (© Crown Copyright). World Vector Shoreline © US Defense Mapping Agency. GEBCO Bathymetry © NERC 1994, 1997. Map © JNCC 2011.

Distribution of UK-registered otter trawl (midwater) activity in 2007



VMS data is from Cefas data contract MB106

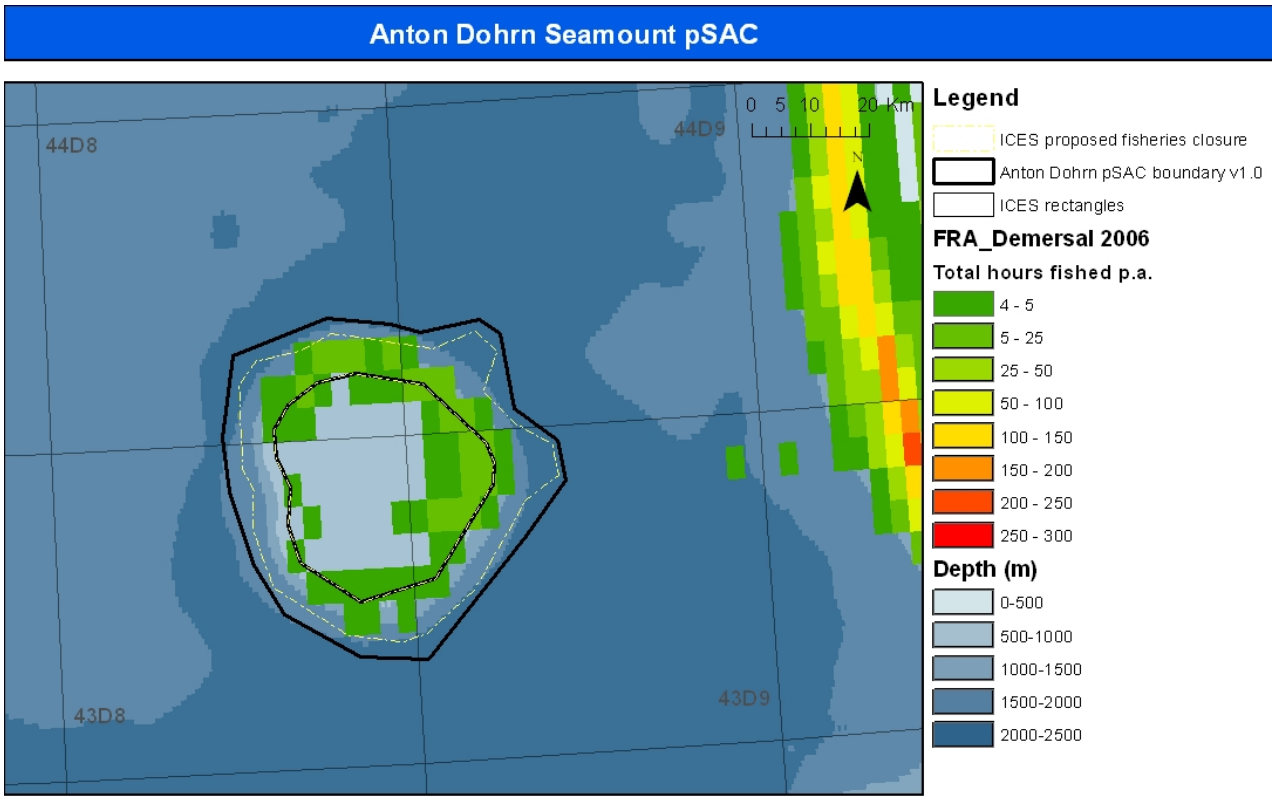
Site map projected in WGS 84 (Zone 28N). NOT TO BE USED FOR NAVIGATION. Seabed habitat data derived from BGS 1:250,000 seabed sediment maps. The exact limits of the UK Continental Shelf are set out in orders made under section 1(7) of the continental Shelf Act 1964 (© Crown Copyright). World Vector Shoreline © US Defense Mapping Agency. GEBCO Bathymetry © NERC 1994, 1997. Map © JNCC 2011.

Distribution of UK-registered otter trawl (midwater) activity in 2008

VMS data showed no records UK-registered otter trawl (midwater) fishing in this area in 2009.

ANNEX II: FRENCH DEMERSAL FISHING OVER ANTON DOHRN SEAMOUNT

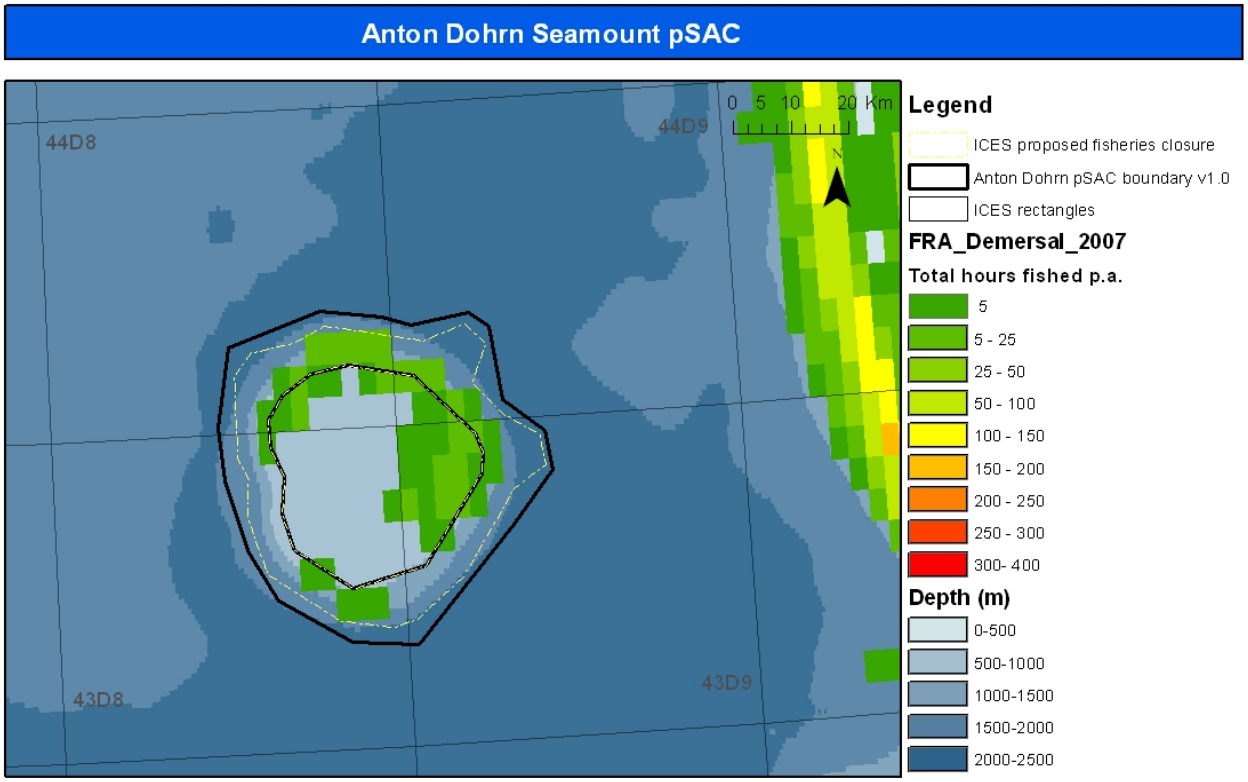
The summit of Anton Dohrn has been regularly fished by French demersal trawlers, - often targeting black scabbard fish. Costs to this fishery are not included in the economic analysis but fishing activity is presented here for information.



VMS data is from Cefas data contract MB106

Site map projected in WGS 84 (Zone 28N). NOT TO BE USED FOR NAVIGATION. Seabed habitat data derived from BGS 1:250,000 seabed sediment maps . The exact limits of the UK Continental Shelf are set out in orders made under section 1(7) of the continental Shelf Act 1964 (© Crown Copyright). World Vector Shoreline © US Defense Mapping Agency. GEBCO Bathymetry © NERC 1994, 1997. Map © JNCC 2011.

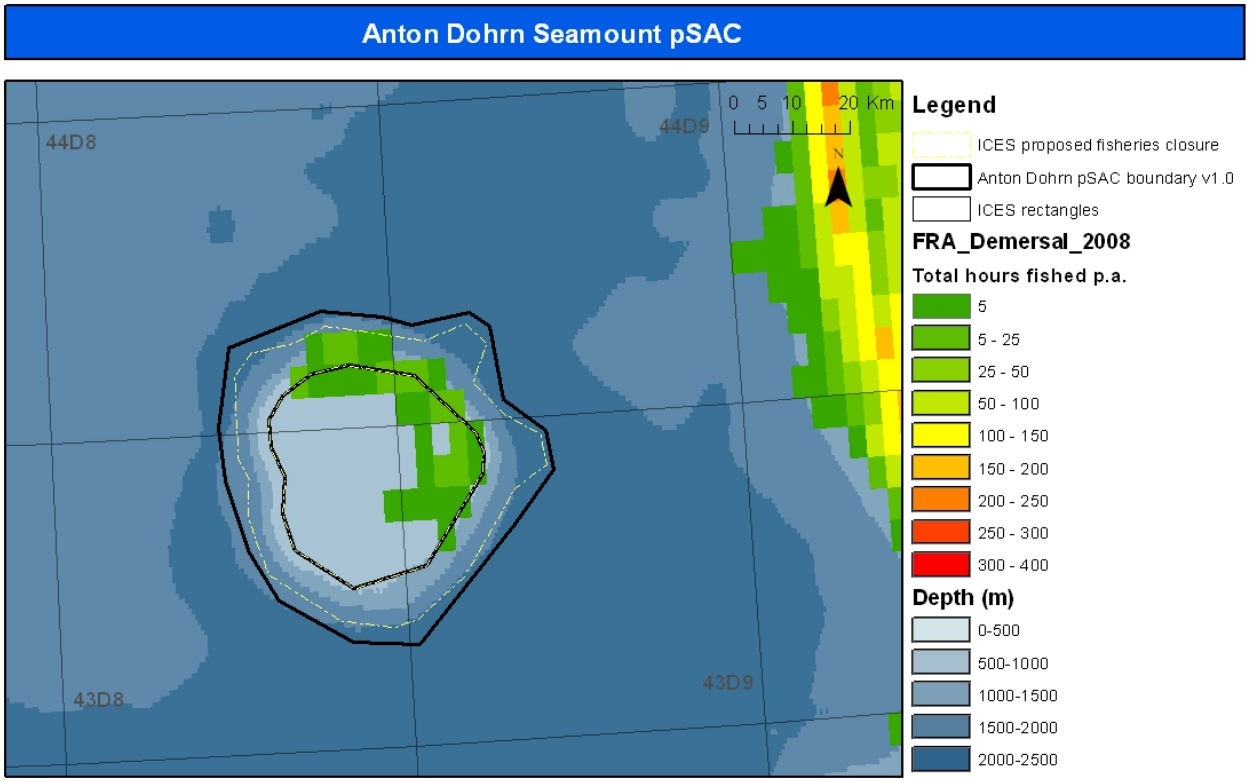
Distribution of French-registered demersal fishing activity in 2006



VMS data is from Cefas data contract MB106

Site map projected in WGS 84 (Zone 28N). NOT TO BE USED FOR NAVIGATION. Seabed habitat data derived from BGS 1:250,000 seabed sediment maps . The exact limits of the UK Continental Shelf are set out in orders made under section 1(7) of the continental Shelf Act 1964 (© Crown Copyright). World Vector Shoreline © US Defense Mapping Agency. GEBCO Bathymetry © NERC 1994, 1997. Map © JNCC 2011.

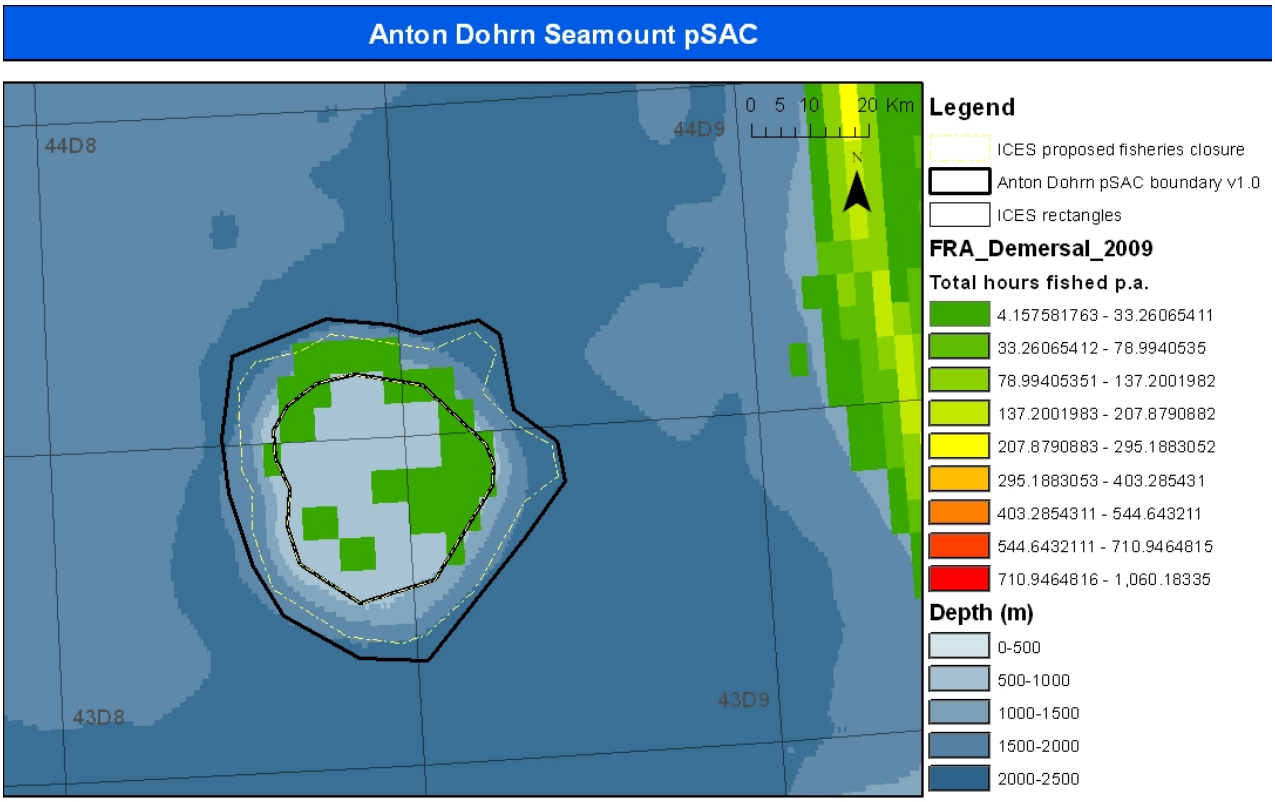
Distribution of French-registered demersal fishing activity in 2007



VMS data is from Cefas data contract MB106

Site map projected in WGS 84 (Zone 28N). NOT TO BE USED FOR NAVIGATION. Seabed habitat data derived from BGS 1:250,000 seabed sediment maps . The exact limits of the UK Continental Shelf are set out in orders made under section 1(7) of the continental Shelf Act 1964 (© Crown Copyright). World Vector Shoreline © US Defense Mapping Agency. GEBCO Bathymetry © NERC 1994, 1997. Map © JNCC 2011.

Distribution of French-registered demersal fishing activity in 2008



VMS data is from Cefas data contract MB106

Site map projected in WGS 84 (Zone 28N). NOT TO BE USED FOR NAVIGATION. Seabed habitat data derived from BGS 1:250,000 seabed sediment maps. The exact limits of the UK Continental Shelf are set out in orders made under section 1(7) of the continental Shelf Act 1964 (© Crown Copyright). World Vector Shoreline © US Defense Mapping Agency. GEBCO Bathymetry © NERC 1994, 1997. Map © JNCC 2011.

Distribution of French-registered demersal fishing activity in 2009

ANNEX III: COSTS OF DESIGNATION OF ANTON DOHRN SEAMOUNT BY SECTOR

Enforcement and monitoring

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

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***
BOTH	Loss of revenue	Policy			0.5	2014	0.4
Total		***Admin***	0.0		0.0		0.0
		Policy	0.0		0.5		0.4
		Both	0.0		0.5		0.4

Cost £k	***Present Value***	***2012***	***2013***	***2014***	***2015***	***2016***	***2017***	***2018***	***2019***	***2020***	***2021***
	3.3	0.0	0.0	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4
Admin	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Policy	3.3	0.0	0.0	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4
Both	3.3	0.0	0.0	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4

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