Title:	Impact Assessment (IA)
Dogger Bank Special Area of Conservation.	**IA No:** Defra1344
Lead department or agency: Defra Marine Biodiversity Policy	**Date:** 04/07/2011
Other departments or agencies: Joint Nature Conservation Committee (JNCC)	**Stage:** Final
	Source of intervention: EU
	Type of measure: Secondary legislation
	Contact for enquiries: Gareth.Johnson@jncc.gov.uk (01733) 866838

Summary: Intervention and Options

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

Due to pressures of anthropogenic activities on habitats and species in the marine environment many are currently in decline. Although regulation is in place for some activities, it is not necessarily designed to achieve nature conservation objectives. Intervention is needed in order to manage activities in key areas for important species and habitats and to promote a healthy and resilient marine environment. JNCC have assessed this site against the Habitats Directive Annex III selection criteria, and advised the Secretary of State that it is eligible for identification as a 'Site of Community Importance' and should therefore be transmitted to the European Commission as required under Regulation 7 of the Offshore Marine Conservation Regulations 2007 (as 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 promote biodiversity maintenance. This Directive requires the UK (as a Member State) to propose sites hosting habitat types and species in need of conservation listed in the Directive, which are eligible for identification as SCIs and designation as Special Areas of Conservation (SAC). The UK is required to establish conservation measures for sites designated as SACs which is achieved by managing potentially damaging activities where the habitats and species are present and in their vicinity. 'Sandbanks which are slightly covered by seawater all the time' (Habitat 1110 in Annex I) are habitats of European importance and are the qualifying feature of Dogger Bank

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

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

Option 1: Propose the site to the EC for designation. This is the preferred option as it will contribute towards conserving habitat of European importance along with its typical species located in UK waters. The option to search for an alternative site is not been considered further here as there are no known alternative sites. If this site is not designated there is a significant risk that the EC will judge the UK's contribution to the network of SACs for sandbank to be insufficient, which could lead to infraction proceedings. Alternative sites of similar quality and extent are not currently known to exist (known 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.

Will the policy be reviewed? It will be reviewed. **If applicable, set review date:** 1/2021	
What is the basis for this review? Duty to review. **If applicable, set sunset clause date:** Month/Year	
Are there arrangements in place that will allow a systematic collection of monitoring information for future policy review?	Yes

Ministerial Sign-off For final proposal stage Impact Assessments:

I have read the Impact Assessment and I am satisfied that (a) it represents a fair and reasonable view of the expected costs, benefits and impact of the policy, and (b) the benefits justify the costs.

Signed by the responsible Minister: ..... Date: .....

Summary: Analysis and Evidence

Policy Option 1

Description:

The assessment considers the minimum and maximum plausible management scenarios to achieve conservation objectives.

Price Base Year 2011	PV Base Year 2011	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: n/a	**High:** n/a	**Best Estimate: n/a**

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	£12.29m		£0.21m	**£14.08m**
High	£101.33m		£726.99m	**£5,660.16m**
Best Estimate	£12.29m		£0.21m	**£14.08m**

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

Low: monitoring for oil and gas (£48k pa); lost revenue for fisheries (£122k pa); increased assessment for aggregates (£230k) and renewables (survey £10m; AA £1881k); and enforcement (£181k and £40k pa)
High: monitoring for oil and gas (£240k pa assessment; £52k pa monitoring); lost revenue for fisheries (£813k pa); assessment in aggregates sector (£1148k); renewables (£100m sunk costs; alternatives £242m pa 2016; £483m pa 2017; £725m pa 2018; £966 pa 2019); enforcement and monitoring (Annex IV)

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

High: some fishermen exit sector, knock-on effect to local economy of costs to fishermen. Costs if proposals for consent are refused; increased assessment for renewables; of assessment and vessel changes in gas sector; long term loss of assets to Crown Estate; increased aggregates screening costs.

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 cannot be readily quantified and most of the benefits are not traded so cannot be easily valued.

Details of the qualitative assessment of the benefits are provided in the evidence base.

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

Moderate beneficial impacts on non-use values of natural environment in the area that is designated; reduction in fishing mortality in the area that is designated and benefits to ecosystem services beyond the next 10 yrs with the magnitude of benefits dependent on the selection of management measures.

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

Management measures for site will not be known until after designation so a realistic range of measures is used for analysis. If site is not designated condition of the habitats may be maintained but could be at risk to further deterioration. Formal mechanisms to avoid damage to the habitats are weaker if the site is not designated. Risk of infraction if the suite of proposed SACs is not designated. Benefits could be jeopardised if appropriate fisheries management measures are not agreed through the Common Fisheries Policy, or if they are not enforced effectively. Displacement of activities could increase environmental degradation in other areas. Risk of cumulative economic impacts of marine protected areas. Difference between MMO landings data and those provided by fishing industry.

Direct impact on business (Equivalent Annual) £m):			In scope of OIOO?	Measure qualifies as
Costs: £0.162m	**Benefits:** n/a	**Net:**	No	NA

Enforcement, Implementation and Wider Impacts

What is the geographic coverage of the policy/option?			United Kingdom		
From what date will the policy be implemented?			March 2011		
Which organisation(s) will enforce the policy?			MMO, DECC, JNCC		
What is the annual change in enforcement cost (£m)?			£0.040m		
Does enforcement comply with Hampton principles?			Yes		
Does implementation go beyond minimum EU requirements?			No		
What is the CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent)			**Traded:** n/a	**Non-traded:** n/a	
Does the proposal have an impact on competition?			No		
What proportion (%) of Total PV costs/benefits is directly attributable to primary legislation, if applicable?			**Costs:** 0	**Benefits:** 0	
Distribution of annual cost (%) by organisation size (excl. Transition) (Constant Price)	**Micro**	**< 20**	**Small** 72%	**Medium**	**Large** 28%
Are any of these organisations exempt?	No	No	No	No	No

Specific Impact Tests: Checklist

Set out in the table below where information on any SITs undertaken as part of the analysis of the policy options can be found in the evidence base. For guidance on how to complete each test, double-click on the link for the guidance provided by the relevant department.

Please note this checklist is not intended to list each and every statutory consideration that departments should take into account when deciding which policy option to follow. It is the responsibility of departments to make sure that their duties are complied with.

Does your policy option/proposal have an impact on…?	**Impact**	**Page ref within IA**
Statutory equality duties[1] Statutory Equality Duties Impact Test guidance	No	
Economic impacts		
Competition Competition Assessment Impact Test guidance	Yes	56
Small firms Small Firms Impact Test guidance	Yes	56
Environmental impacts		
Greenhouse gas assessment Greenhouse Gas Assessment Impact Test guidance	Yes	57
Wider environmental issues Wider Environmental Issues Impact Test guidance	Yes	All
Social impacts		
Health and well-being Health and Well-being Impact Test guidance	No	
Human rights Human Rights Impact Test guidance	No	
Justice system Justice Impact Test guidance	No	
Rural proofing Rural Proofing Impact Test guidance	Yes	58
Sustainable development Sustainable Development Impact Test guidance	Yes/No	All

[1] Public bodies including Whitehall departments are required to consider the impact of their policies and measures on race, disability and gender. It is intended to extend this consideration requirement under the Equality Act 2010 to cover age, sexual orientation, religion or belief and gender reassignment from April 2011 (to Great Britain only). The Toolkit provides advice on statutory equality duties for public authorities with a remit in Northern Ireland.

Evidence Base (for summary sheets) – Notes

Use this space to set out the relevant references, evidence, analysis and detailed narrative from which you have generated your policy options or proposal. Please fill in **References** section.

References

Include the links to relevant legislation and publications, such as public impact assessments of earlier stages (e.g. Consultation, Final, Enactment) and those of the matching IN or OUTs measures.

No.	Legislation or publication
1	Dogger Bank SAC Selection Assessment, v7.0, JNCC
2	Dogger Bank draft Conservation Objectives and Advice on Operations v5.0, JNCC
3	Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 (as amended)
4	Dogger Bank SAC Consultation IA

+ Add another row

Evidence Base

Ensure that the information in this section provides clear evidence of the information provided in the summary pages of this form (recommended maximum of 30 pages). Complete the **Annual profile of monetised costs and benefits** (transition and recurring) below over the life of the preferred policy (use the spreadsheet attached if the period is longer than 10 years).

The spreadsheet also contains an emission changes table that you will need to fill in if your measure has an impact on greenhouse gas emissions.

Annual profile of monetised costs and benefits* - (£m) constant prices

	Y_0	Y_1	Y_2	Y_3	Y_4	Y_5	Y_6	Y_7	Y_8	Y_9
Transition costs	12.18	0	0	0.115	0	0	0	0	0	0
Annual recurring cost	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Total annual costs	12.39	0.21	0.21	0.33	0.21	0.21	0.21	0.21	0.21	0.21
Transition benefits	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Annual recurring benefits	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total annual benefits	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

* For non-monetised benefits please see summary pages and main evidence base section

Microsoft Office Excel Worksheet

Evidence Base (for summary sheets)

There is discretion for departments and regulators as to how to set out the evidence base. However, it is desirable that the following points are covered:

- Problem under consideration;
- Rationale for intervention;
- Policy objective;
- Description of options considered (including do nothing);
- Costs and benefits of each option (including administrative burden);
- Risks and assumptions;
- Direct costs and benefits to business calculations (following OIOO methodology);
- Wider impacts;
- Summary and preferred option with description of implementation plan.

Inserting text for this section:

Replace the notes on this page with the text for the evidence base.

To maintain consistent formatting, apply Styles from the toolbar. The **Paste Without Format** toolbar button can be used to paste text from other documents in the current style here.

Annexes

Annex 1 should be used to set out the Post Implementation Review Plan as detailed below. Further annexes may be added where the Specific Impact Tests yield information relevant to an overall understanding of policy options.

Annex 1: Post Implementation Review (PIR) Plan

A PIR should be undertaken, usually three to five years after implementation of the policy, but exceptionally a longer period may be more appropriate. If the policy is subject to a sunset clause, the review should be carried out sufficiently early that any renewal or amendment to legislation can be enacted before the expiry date. A PIR should examine the extent to which the implemented regulations have achieved their objectives, assess their costs and benefits and identify whether they are having any unintended consequences. Please set out the PIR Plan as detailed below. If there is no plan to do a PIR please provide reasons below.

Basis of the review: [The basis of the review could be statutory (forming part of the legislation), i.e. a sunset clause or a duty to review , or there could be a political commitment to review (PIR)]; PIR consists of two elements: 1. Assessment of any additional management needed to fulfil conservation objectives for the site, accompanied by assessment of likely socio-economic effects of any such management proposals. 2. Statutory monitoring of the condition of interest features in the site, six yearly report to Euro Commission required, next report due 2013.
Review objective: [Is it intended as a proportionate check that regulation is operating as expected to tackle the problem of concern?; or as a wider exploration of the policy approach taken?; or as a link from policy objective to outcome?] 1. Implementation of any management of marine activities required post-designation to fulfil conservation objectives for the features at the site. 2. The statutory monitoring of condition of the features aims to assess whether the conservation objectives for the site are being achieved. If conservation objectives are not being achieved, management of activities affecting the site will need to be reviewed.
Review approach and rationale: [e.g. describe here the review approach (in-depth evaluation, scope review of monitoring data, scan of stakeholder views, etc.) and the rationale that made choosing such an approach] 1. Review of existing industry activities at or affecting the site, based on information from regulators and stakeholders. 2. Conduct survey to monitor condition of features of the site, and activities which may affect those features, within 6 year reporting framework set by European Commission.
Baseline: [The current (baseline) position against which the change introduced by the legislation can be measured] Baseline data on the condition of interest features in the site and baseline data collected for the impact assessment on human activities in or affecting the site.
Success criteria: [Criteria showing achievement of the policy objectives as set out in the final impact assessment; criteria for modifying or replacing the policy if it does not achieve its objectives] Achievement of the conservation objectives for the site.
Monitoring information arrangements: [Provide further details of the planned/existing arrangements in place that will allow a systematic collection systematic collection of monitoring information for future policy review] Statutory monitoring of the condition of interest features in the site following designation. Ongoing collation of socio-economic information from regulators and stakeholders on activities on or affecting the site.
Reasons for not planning a review: [If there is no plan to do a PIR please provide reasons here]

Add annexes here.

CONTENTS

LIST OF FIGURES

ANNEXES

1 INTRODUCTION

1.1 Purpose

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

This impact assessment addresses the recommendation by the Joint Nature Conservation Committee (JNCC) for designation of an offshore Special Area of Conservation (SAC) of the UK part of Dogger Bank. The part of the sandbank in UK waters is being recommended for SAC designation due to its Annex I sandbank (habitat 1110).

Human activities can adversely affect our marine environment. Many of our marine habitats have been altered or damaged by activities such as fishing, windfarm development, dredge disposal and oil and gas extraction (Eastwood 2007). Direct harvesting of fish has caused dramatic decreases in populations of target species including cod, herring, plaice and sole (Hall 1999) and even localised extirpation in parts of UK waters, for example the "common" skate[2] in the Irish Sea (Reynolds et al 2001; Dulvy & Reynolds 2002). Species that are not the target of harvesting may also be damaged, particularly through inadvertent bycatch, and damage to habitats, for example through the use of destructive bottom fishing gear (Jennings and Kaiser 1998).

Currently only 4% of the UK's offshore marine environment is protected for conservation purposes. Consequently, protection is not being provided to examples of the variety of habitats found in UK offshore waters. Given the overlap between anthropogenic activities and habitats of conservation importance, it is evident that additional management is needed to maintain and restore the healthy structure and function of marine ecosystems whilst supporting sustainable industries.

The IA informs the government of impacts 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 (which should be based on the site's Selection Assessment Document). This is because under the European Union's (EU's) Habitats Directive economic or social impacts should not influence selection of SACs or delineation of their site 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 considered to be most in need of conservation at a European level (which are listed in Annex I and Annex II of the Directive respectively). Habitats have been included on Annex I because they are either in danger of disappearance within their natural range, have a small natural range, or they present outstanding examples of typical characteristics of the biogeographical regions listed in the Directive. The Habitats Directive not only aims to conserve the habitats but also their typical species. The UK (as a Member

[1] Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna.
[2] Since this research was conducted, the common skate (*Dipturus batis*) has been reclassified as two separate species, the blue skate (*D. flossada*) and the flapper skate (*D. intermedia*) (Iglésias et al 2010)
[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

State) is required to take measures to maintain or restore favourable conservation status[5] of these natural habitats and to introduce robust protection for them.

Under the Habitats Directive, habitats and species are to be protected by a coherent European ecological network of sites (called Natura 2000) identified by the European Commission from lists of national sites proposed by each Member State. The network of sites will enable habitat types to be maintained at, or restored to, favourable conservation status within their natural range. Once adopted in the Natura 2000 network, the sites are designated by Member States as Special Areas of Conservation (SACs).

The Offshore Marine Conservation (Natural Habitats, & c.) Regulations 2007 (as amended) (the "Offshore Habitats Regulations") transpose the Habitats Directive (92/43/EEC) and Wild Birds Directive (2009/147/EC) into national 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. Site selection criteria comprise:

- 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 are responsible for providing scientific advice to Government on nature conservation matters, including on the selection of SAC sites in the UK offshore marine area under the Offshore Habitats Regulations.

The European Commission will assess whether the list of SACs submitted by UK Government to them is sufficient or not. JNCC have worked to provide the best estimate of whether the UK's sites submitted so far will be sufficient or not 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].

JNCC concluded that if at least one example of each Annex I habitat sub-type 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).

b) UK identification of Annex I sandbank sites

Thirty two SACs with marine components have already been designated for sandbank features (H1110). Five of these sites are located in UK offshore waters (i.e. outside of 12 nm). One offshore site (North Norfolk Sandbanks and Saturn Reef), was consulted on in 2007-8, and three (Inner Dowsing, Race Bank and North Ridge; Haisborough, Hammond and Winterton; and Bassurelle Sandbank) were subject to formal consultation in 2009-10, along with two inshore sites for sandbanks. Two of these sites (Inner Dowsing, Race Bank and North Ridge, and Haisborough, Hammond and Winterton) cross the 12 nm boundary and were progressed jointly with Natural England. All four of these sites were submitted to the European Commission in August 2010.

[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'.
[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: www.jncc.gov.uk/page-161.

In the Southern North Sea Regional Sea where Dogger Bank is located, there are inshore SACs that have been designated for sandbanks which are slightly covered by seawater all of the time comprising the Wash and North Norfolk Coast, Essex Estuaries, and Humber Estuary. All are estuarine or coastal sandbank and are subsequently exposed to significant freshwater or coastal influence.

Other SACs for sandbanks which are slightly covered by seawater all of the time in the same regional sea include: North Norfolk Sandbanks and Saturn Reef; Inner Dowsing, Race Bank and North Ridge; and Haisborough, Hammond and Winterton. These sites represent different sub-types of the habitat to that present at Dogger Bank, which is a sandy mound, formed by glacial processes and submergence through sea level rise. Therefore, Dogger Bank is needed within the network to represent that subtype of sandbank and also to ensure sufficient UK resource of sandbank habitat is represented within the network. The UK part of the site adjoins German and Dutch sites already designated for H1110.

c) Conservation objectives and management of sites

JNCC are responsible for establishing conservation objectives for 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 document[8] and inform the responsibilities of the Competent Authorities to exercise their functions regarding 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 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.

To fulfil conservation objectives for Annex I sandbanks which are slightly covered by seawater all the time, it will be necessary for the competent authority to manage human activities where possible to ensure that the feature is not impacted through: 1) physical loss through obstruction or smothering; 2) physical damage by physical disturbance or abrasion; and/or 3) 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 Dogger Bank SAC Impact Assessment. Two options were initially considered for this site:

- Baseline: do nothing
- Option 1: designate the site

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

This IA presents JNCC's quantitative assessment of the potential costs and benefits of the policy option (designate the site). It was informed by a public consultation on the scientific justification for the site and the impact assessment, and includes data and information that was provided during the consultation.

Impacts have been assessed over a timescale of approximately ten years. The decision to use this timeframe was based on various factors. It provides a sufficiently long period over which conservation benefits may arise and fisheries control measures may be implemented. Assessment of the impacts beyond ten years becomes more uncertain. For example, businesses have greater scope to adjust their activities in the long-term (for example through purchasing new equipment) and may therefore avoid

[8] Dogger Bank SAC: Draft Conservation Objectives and Advice on Operations v5.0 JNCC http://www.jncc.gov.uk/pdf/DoggerBank_ConservationObjectivesAdviceonOperations_5.0.pdf

costs that arise in the short-term. Costs are calculated over the 10-year period using a discount rate of 3.5%, based on Green Book recommendations[9].

The overall approach to assessing potential costs and benefits is based on the approach adopted by JNCC for their previous offshore SAC IAs (eftec 2008) and the joint consultation in 2009-10 on 12 inshore and offshore SACs and SPAs. A framework is used to combine and assess cost and benefit information from different sources on the likely impacts of potential management measures for the sites.

This framework involves a description of:

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

This IA was prepared using information that was publicly available and information provided by government departments, regulators[10] and stakeholders, from Jan 2009 to November 2010.

2 BACKGROUND INFORMATION ON THE SITE

2.1 Baseline

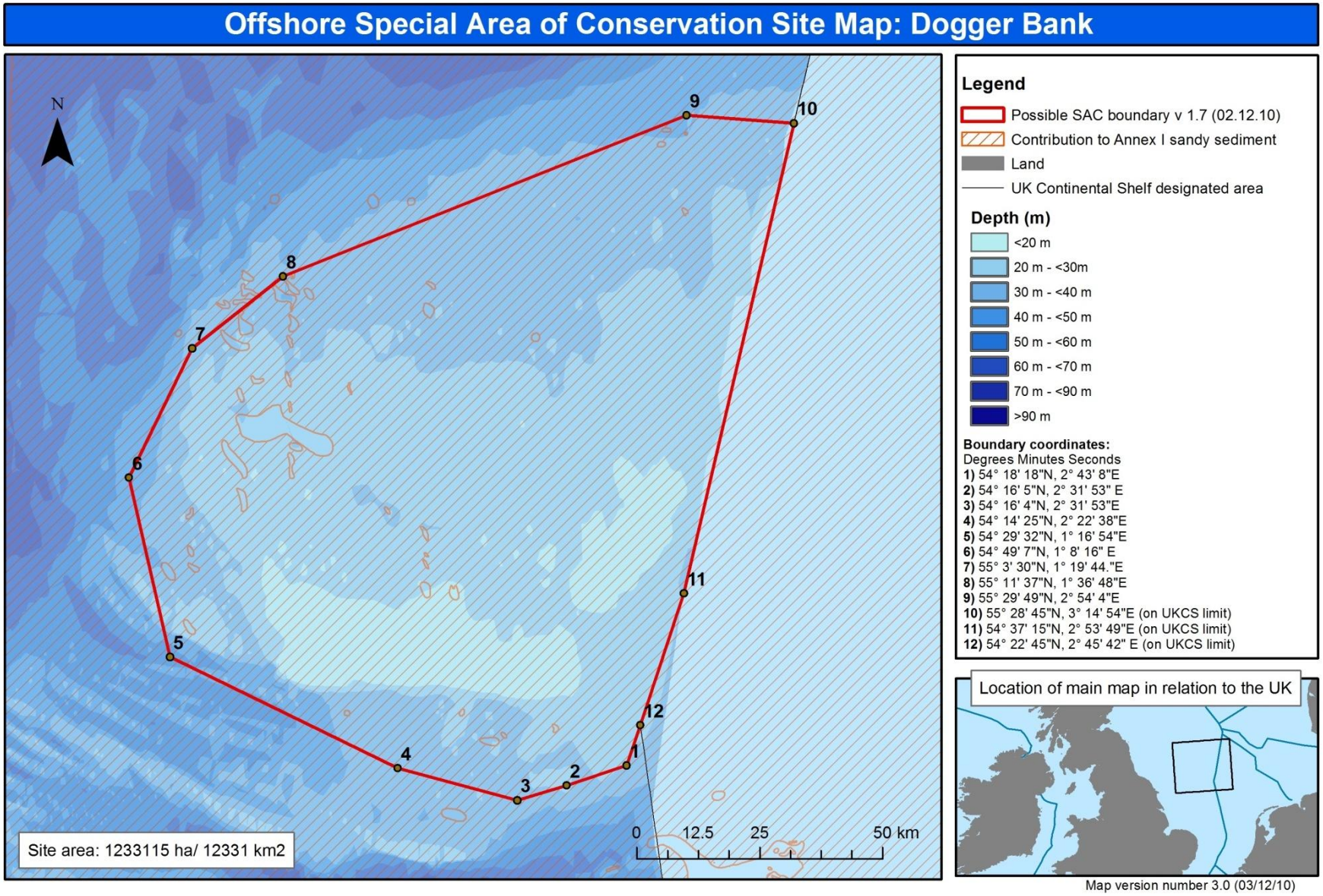
Information about the current condition of the site forms a baseline scenario against which the potential impacts of the policy options are assessed. This section assesses the current activities at the site, and what is likely to happen over the assessment period if the site is not designated. This is the baseline against which the potential costs and benefits of Option 1 are compared in Section 4. By definition the costs and benefits of the baseline are zero since no additional actions will be taken.

2.2 Characteristics of the site

The Dogger Bank is the largest single continuous expanse of shallow sandbank in UK waters (Figure 2.1). It is located in the southern North Sea, approximately 150km north east of the Humber Estuary, and was formed by glacial processes before being submerged through sea level rise. The southern area of the bank is covered by water seldom deeper than 20m and extends within the pSAC in UK waters down to 35-40m deep. The bank structure slopes down further in UK and also in Dutch and German waters to greater than 50m deep outside the SAC boundary (Figure 2.2). Its location in open sea exposes the bank to substantial wave energy and prevents the colonisation of the sand by vegetation. Sediments range from fine sands containing many shell fragments on top of the bank to muddy sands at greater depths (Kröncke & Knust, 1995) supporting invertebrate communities typical of such sediments, characterised by polychaete worms, amphipods and small clams within the sediments, and hermit crabs, flatfish, starfish and brittlestars on the seabed (Wieking & Kröncke, 2001). Sand eels are an important prey resource found at the bank supporting a variety of species including fish, seabirds, seals and cetaceans (Cefas, 2007). Discrete areas of coarser sediments (including pebbles) are recorded on the bank, dominated by the soft coral *Alcyonium digitatum*, the bryozoan *Alcyonidium diaphanum* and serpulid worms (Diesing *et al.*, 2009). These do not form part of the Annex I habitat.

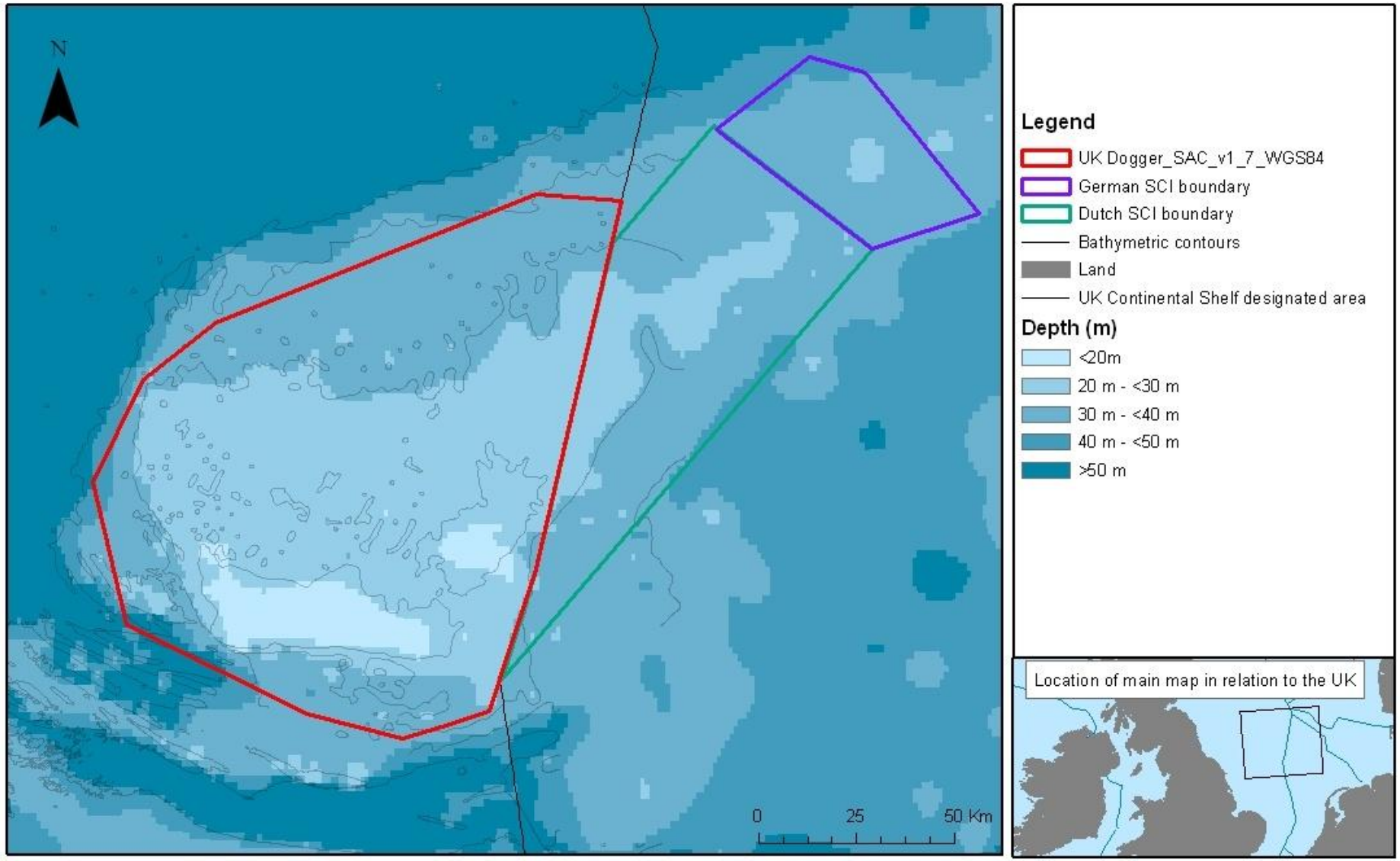
[9] HM Treasury, The Green Book: http://www.hm-treasury.gov.uk/data_greenbook_index.htm
[10] Department of Energy and Climate (DECC); Department for Environment, Food and Rural Affairs (Defra); and Marine Scotland.

Figure 2.1 Map of Dogger Bank possible SAC site boundary showing surrounding bathymetry and distribution of sandbank habitat



Map projected in WGS84 (Zone 31N). World Vector Shoreline © US Defense Mapping Agency. Seabed habitat derived from BGS 1:250,000 seabed sediment maps © NERC and SeaZone bathymetry © British Crown and SeaZone Solutions Limited. All rights reserved. Products Licence No. PGA042006.003. Bathymetry © The GEBCO Digital Atlas published by the British Oceanographic Data Centre on behalf of IOC and IHO, 2003. NOT TO BE USED FOR NAVIGATION. 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). Map copyright JNCC

Figure 2.2 UK Dogger Bank possible SAC site boundary in relation to neighbouring Member State's SAC site boundaries



Map projected in WGS84 (Zone 31N). World Vector Shoreline © US Defense Mapping Agency. Seabed habitat derived from BGS 1:250,000 seabed sediment maps © NERC and SeaZone bathymetry © British Crown and SeaZone Solutions Limited. All rights reserved. Products Licence No. PGA042006.003. Bathymetry © The GEBCO Digital Atlas published by the British Oceanographic Data Centre on behalf of IOC and IHO, 2003. NOT TO BE USED FOR NAVIGATION. 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). Map copyright JNCC

2.3 Baseline condition of the site

The condition of the site into the future if it is not designated forms the baseline against which to judge the value of potential improvements as a result of designating the site and achieving its conservation objectives.

Table 2.1 below summarises initial assessment of the site's vulnerability to pressures which was undertaken for the draft conservation objectives and advice on operations for the site. It will be updated and revised as necessary to reflect new evidence. The advice on operations assesses the vulnerability of the site's sandbanks to current activities on the site. The vulnerability is determined by a combination of the sensitivity of the sandbank to the specified pressures and current exposure to those pressures. Only if a site feature is both sensitive and exposed to a human activity is it considered vulnerable. The scores of relative sensitivity, exposure and vulnerability have been derived using best available scientific information and informed scientific interpretation and judgement (sources of the information are noted in the conservation objectives document itself). More information on how site vulnerability was assessed can be found in the supporting Dogger Bank draft Conservation Objectives and Advice on Operations document[11].

The process uses sufficiently coarse categorisation to minimise uncertainty in information and reflects the current state of our knowledge and understanding of the marine environment. Sensitivity, defined as the intolerance of a habitat, community or individual (or individual colony) of a species to damage, or death, from an external factor has been assessed for the effects of broad categories of human activities. Current exposure of the sandbanks to the effects of these categories of activities was assessed on best available advice (as of March 2010).

Key:

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.

[11] JNCC 2007 Dogger Bank: Draft Conservation Objectives and Advice on Operations v3.1, JNCC http://www.jncc.gov.uk/page-4535

Table 2.1 Sensitivity, exposure and vulnerability of the Dogger Banks' sandbanks which are slightly covered by seawater all the time to physical, chemical and biological pressures.

List of pressures which may cause deterioration or disturbance (with example activities)		**Dogger Bank:** Sandbanks which are slightly covered by seawater all the time		
		Sensitivity	**Exposure**	**Vulnerability**
Physical loss	**Removal** (e.g. aggregate dredging, isolated rock dump, infrastructure development)	••	**Low**	**Low: 2**
	Obstruction (e.g. permanent constructions [oil & gas infrastructure, windfarms, cables] & wrecks)	•••	**Low**	**Moderate: 3**
	Smothering (e.g. drill cuttings)	•	**Low**	**Low: 1**
Physical damage	**Changes in suspended sediment** (e.g. screening plumes from aggregate dredging)	•	**Low**	**Low: 1**
	Physical disturbance or abrasion (e.g. mobile benthic fishing, anchoring, windfarm scour pits, pipeline burial, potting)	••	**High**	**High: 6**
Non-physical disturbance	**Noise** (e.g. boat activity, seismic)	○	**?**	**No known vulnerability: 0**
	Visual presence (e.g. recreational activity)	○	**None**	**No known vulnerability: 0**
Toxic contamination	**Introduction of synthetic compounds** (e.g. TBT, PCBs, industrial chemical discharge, produced water, fuel oils)	••	**Unknown level**	**Vulnerability (not quantifiable)**
	Introduction of non-synthetic compounds (e.g. heavy metals, crude oil spills)	••	**Unknown level**	**Vulnerability (not quantifiable)**
	Introduction of radionuclides (e.g. nuclear energy industry)	?	**?**	**Insufficient information**
Non-toxic contamination	**Changes in nutrient loading** (e.g. outfalls)	••	**Unknown level**	**Vulnerability (not quantifiable)**
	Changes in thermal regime (e.g. cooling water discharges)	•	**None**	**No known vulnerability: 0**
	Changes in turbidity (e.g. laying of pipelines, aggregate dredging)	•	**Low**	**Low: 1**
	Changes in salinity (e.g. outfalls from rigs, ships)	••	**None**	**No known vulnerability: 0**
Biological disturbance	**Introduction of microbial pathogens** (e.g. outfalls)	?	**?**	**Insufficient information**
	Introduction of non-native species and translocation (e.g. ballast water, hull fouling)	?	**?**	**Insufficient information**
	Selective extraction of species (e.g. bioprospecting, scientific research, demersal fishing)	••	**High**	**High: 6**

Table 2.1 shows that Dogger Bank and associated biological communities are:

- Highly vulnerable to physical disturbance or abrasion (e.g. by pipeline burial, demersal fishing) and selective extraction of species (e.g. by demersal fishing)
- Moderately vulnerable to obstruction (e.g. by oil and gas infrastructure; wrecks; and cables)
- Vulnerable at low levels to removal (e.g. by oil and gas; aggregates; and cables), smothering (oil and gas), changes in suspended sediment (e.g. by demersal trawling) and changes in turbidity (e.g. by demersal trawling).

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

The exposure of the interest feature to the introduction of synthetic and non-synthetic compounds or to changes in nutrient loading is unknown.

The sandbank is at risk of deterioration under the baseline as a result of the potential impacts of demersal fishing and infrastructure development. Some activities that take place at the site are already subject to regulations and conditions that are likely to prevent significant damage occurring to the features. These activities include the oil and gas installations, aggregates industry operations and laying of submarine cables and pipelines. However, demersal fishing would be difficult to control if the site is not designated and this is likely to contribute to some level of decline of the features over the assessment period. 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 Dogger Bank is to restore the sandbank to favourable condition. Activities that do not result in pressures to which the feature is sensitive may continue at current levels of spatial and temporal intensity. The management of other activities to which the feature is vulnerable may need to be reviewed by competent authorities. If new information suggests that the condition of the feature at the site is not significantly affected by current activities and assessment indicates the site is in favourable condition, then the conservation objective for the sandbank will be changed to “maintain” the features in favourable condition.

In its current condition a range of non-monetised benefits are obtained from the site. How marine ecosystem services are assessed is described in detail in Annex III. The possible degradation of the site if not designated would potentially decrease each of these values. Baseline levels of activity in relation to benefits of fisheries and recreation are described below. Other benefits include option and non-use value: benefits from values associated with potential future use, existence and others use of the site.

2.4 Human activity and regulation of activity at the site

Current and proposed economic activity at Dogger Bank is described below under the following sectors:

- Oil and gas – many fields, pipelines and wells outlined below
- Renewables – proposal for substantial windfarm development
- Aggregate extraction – two small areas licensed for extraction
- Shipping – low activity due to the shallow sandbanks
- Cables – one operational cable runs through the site
- Fisheries – fishing across the site

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

Designation of the site would mean that under regulation 25 of the Offshore Habitats Regulations, before a Competent Authority undertakes or authorises a plan or project which may have a significant effect on the site, it is required to carry out an Appropriate Assessment to assess the implications for the site in view of its conservation objectives. The Competent Authority can only agree to the plan or project if it

has ascertained that it will not adversely affect the integrity of the site. Under regulation 26, a Competent Authority can agree to a plan or project for imperative reasons of overriding public interest (IROPI), notwithstanding its adverse effect, if there are no alternative solutions. This effectively places the burden of proof on developers and Competent Authorities to show the absence of an adverse effect, rather than requiring those opposing a plan or project to show that there would be an adverse effect.

If consent has already been granted by a Competent Authority for a plan or project at the time a site becomes a European Offshore Marine Site, under the Offshore Habitats Regulations that consent will need to be reviewed against the conservation objectives for the site, and affirmed, modified or revoked.

Not all activities that may affect the sandbank for which the site is designated 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).

a) Oil and gas

Description of known current and future activity relevant to the site

Only natural gas production (extraction) occurs in the Dogger Bank pSAC area due to the nature of the hydrocarbon reservoirs in the southern North Sea. Gas extraction activities can be further separated into three main phases: 1) exploration, 2) development, and 3) production. Following the cessation of production operations there will also be decommissioning activities. Specific operations relating to each phase are well described as part of the SEA (Strategic Environmental Assessment) process[12] initiated by DECC's[13] predecessor, BERR[14].

Using the web-based service DEAL[15] a review of the drilling activity within the proposed site boundary was made by Oil & Gas UK in December 2008. DEAL provided a list of the different wells and their history status within the area of the proposed site (Table 2.2).

Table 2.2 Summary of drilling activity within the Dogger Bank area

Well intent	Drilled before 1980	Drilled from 1980 to 1989	Drilled from 1990 to 1999	Drilled after 2000	Unknown	TOTAL
Exploration	21	19	40	17		97
Appraisal	0	13	10	4		27
Development	0	8	19	32	2	61
Not Released	0	0	0	7		7
TOTAL	21	40	69	60	2	192

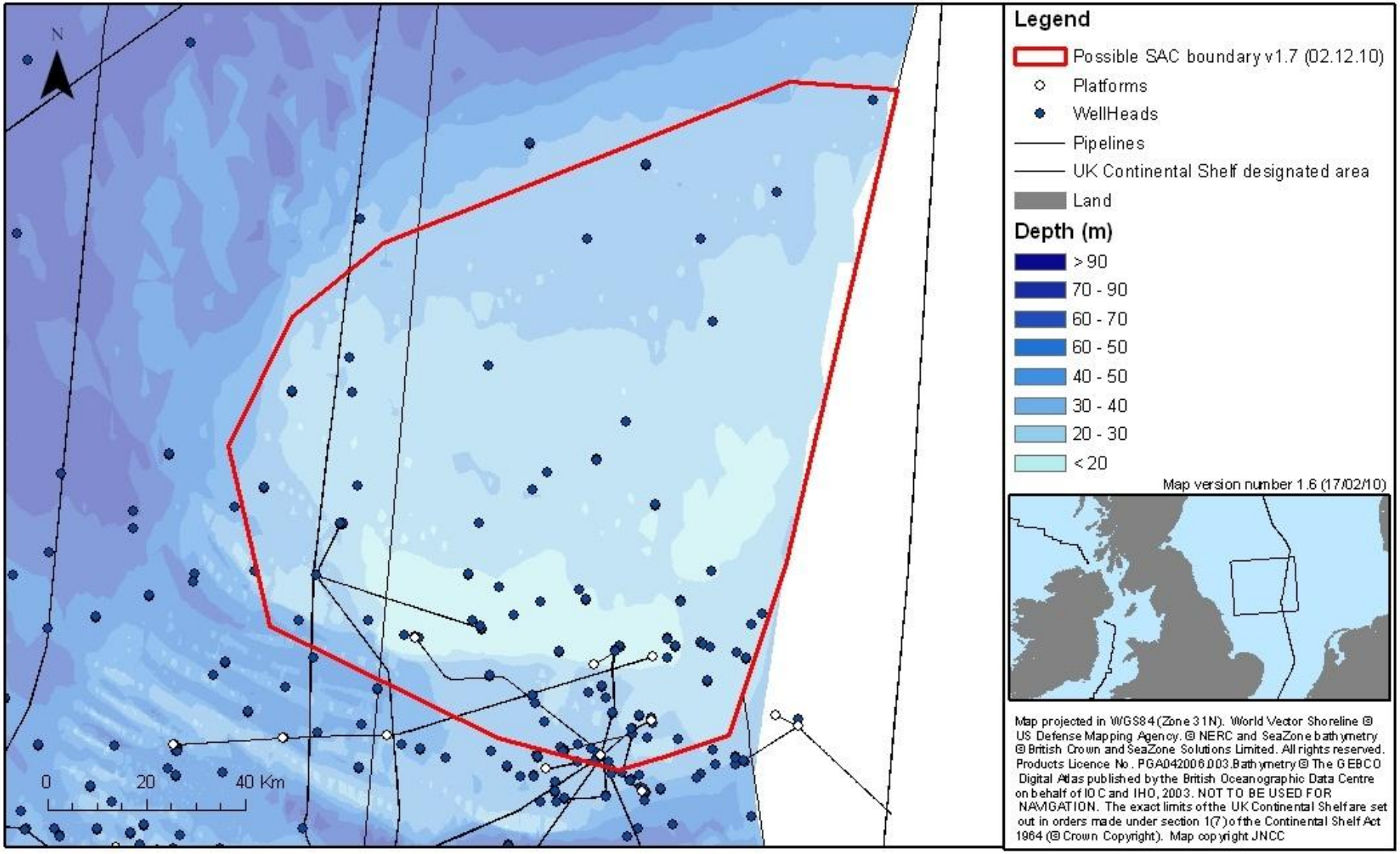
Out of the 192 wells in total, Oil & Gas UK report that:

- 117 are currently plugged and abandoned (about 61%);
- 45 are completed (about 23%); and
- 25 are suspended (13%).

Figure 2.3 shows the distribution of known gas activity (major pipelines, wellheads and platforms only) within the proposed site boundary.

[12] see www.offshore-sea.org.uk
[13] Department of Energy and Climate Change (DECC)
[14] Department for Business Enterprise and Regulatory Reform (BERR)
[15] www.ukdeal.co.uk **Disclaimer**: The proposed Dogger Bank SAC boundaries could only be plotted approximately using DEAL according to the coordinates mentioned above. However, this should not affect the assessment of the oil and gas industry extent within that area.

Figure 2.3 Gas infrastructure around the Dogger Bank SAC proposal (from SeaZone 2008)



Map projected in WGS84 (Zone 31N). World Vector Shoreline © US Defense Mapping Agency. Seabed habitat derived from BGS 1:250,000 seabed sediment maps © NERC and SeaZone bathymetry © British Crown and SeaZone Solutions Limited. All rights reserved. Products Licence No. PGA042006.003. Bathymetry © The GEBCO Digital Atlas published by the British Oceanographic Data Centre on behalf of IOC and IHO, 2003. NOT TO BE USED FOR NAVIGATION. 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). Map copyright JNCC

A list of the different blocks[16] currently under license within the area of the proposed site and those on offer in the 26th Seaward Licensing Round was also provided using DEAL. In the site boundary there are 109 blocks currently under license, and 47 blocks were offered in the 25th Seaward Licensing Round. Overall, there were over 200 blocks under offer in this Round. Therefore, the proposed Dogger Bank site involved a significant minority (approximately a quarter) of the blocks on offer. However, this may not be an accurate measure of the scale of resources involved, because blocks may be split, will contain different resources and will be exploited in different ways. In addition, blocks may not be awarded (for example if no one applies for a license or the Government does not accept proposals). For example, no new licences were awarded in the Dogger Bank area in the 25th Seaward Licensing Round.

From DEAL, Oil & Gas UK provided a list of the different fields included in the area of the proposed site. Gas production of these fields in 2009[17] was 646 MSm^3 gas. Annual UK production was 58,000 MSm^3 gas in 2009[18], which satisfies 68% of total UK gas consumption and was a drop of 15% compared to the previous year. Therefore, the current production from Dogger is approximately 1% UK production.

	2006	2007	2008	**2009**	2010
FORBES†	-	-	-	**-**	-
ESMOND†	-	-	-	**-**	-
GORDON†	-	-	-	**-**	-
HAWKSLEY‡	0	275	1,994	**279**	0
TYNE NORTH‡	40,612	84,023	31,465	**23,368**	16,799
TYNE SOUTH‡	62,148	81	44,347	**58,208**	35,263
MCADAM‡	925,826	468,108	354,001	**241,805**	180,806
MURDOCH‡	442,796	447,149	340,104	**320,733**	278,881
HUNTER‡	32,597	14,934	23,806	**1,760**	315
Total	1,503,979	1,014,570	795,717	**646,153**	512,064

†Produced oil until circa. 1986; no hydrocarbon production since
‡UK dry gas production (kSm3)

There has been approximately £500 million invested in gas infrastructure within the proposed site boundary. Oil and Gas UK report that there are currently 5 active platforms within the proposed site. There are also seven subsurface infrastructures including three templates, two wellheads, one pipe-junction, and 49 pipes/umbilical connections have been recorded using DEAL's web-based service, which corresponds to a total length of approximately 1,500km of pipes. These are linked to either Bacton or Theddlethorpe terminals on the East coast of England. DECC[19] estimate that there are 12 - 13 different fields, seven installations, and around 60 surface well locations in the area.

These represent a significant amount of infrastructure and are operated by three different commercial companies.

None of the blocks on offer in the 25th Seaward Licensing Round within the proposed site were awarded. However, the 26th Licensing Round has commenced and offers 60 blocks within the Dogger Bank SAC boundary, though over half of these were blocks that were relinquished after the 25th Round[20]. In addition, there are 15 blocks from the 25th Round within the site that were applied for and warrant further assessment.

A medium size gas development project (Phase 1 of the Cygnus Field) is currently underway within the site, operated by GDF SUEZ E&P UK Ltd (GaS UK). The proposal consists of four new wells, platform

[16] The UKCS is divided into quadrants of 1 degree latitude by one degree longitude. Each quadrant is sub-divided into 30 blocks measuring 10 minutes latitude and 12 minutes longitude.
[17] Oil and Gas UK, Nov 2008, from DECC website.
[18] Oil and Gas UK, 2010 Economic Report.
[19] Information previously received from BERR (Department for Business Enterprise and Regulatory Reform), but now responsibility of Department of Energy and Climate Change (DECC) which came into existence on 3 October 2008
[20] https://www.og.decc.gov.uk/information/maps_offshore.htm

and pipeline within the southern portion of the SAC boundary. An ES has been produced and submitted to DECC[21] and DECC have already undertaken an Appropriate Assessment (AA). Following the consultation period and the appropriate assessment exercise undertaken by the Department, DECC and its consultees are satisfied that the development is not likely to have a significant impact on the receiving environment, including any sites or species protected under the Offshore Habitats Regulations.

In addition to gas extraction, the possibility exists that Dogger Bank would be used as a natural gas storage site. A number of commercial gas storage projects are currently under consideration in the North Sea, including the Encore Esmond development[22] which is on the Dogger Bank. Other projects such as the Centrica Baird and ENI Hewitt are closer to shore and therefore would be cheaper to exploit and hence likely to be chosen as locations in preference to Dogger Bank. Therefore, it is assumed that there will be no gas storage at the site in the next 10 years.

There are several areas with potential for carbon capture and storage (CCS) developments within the proposed SAC. A typical scheme would be expected to store around 5m tonnes of CO_2 per annum[23]. CCS development in the UK is at an early stage. CCS will probably use spent fields of the type likely to be available at Dogger Bank (and an application has already been submitted in relation to development at Dogger Bank), and may also use existing gas extraction infrastructure where possible.[24] Because of the uncertainties surrounding CCS development, for this impact assessment it is assumed that it will not take place at Dogger Bank within the 10 year assessment period, and hence is not considered in more detail in this IA. However, the area of the proposed SAC could in the long term represent a strategic resource for the UK for CCS and a significant contribution to the achievement of UK carbon reduction targets. This is dependent upon the scale of other carbon mitigation options available to the UK and global agreements to tackle climate change.

Regulation and consents (baseline)

The environmental impacts of oil and gas activities are regulated by DECC. An EIA is required under the Offshore Petroleum Production and Pipe-lines (Assessment of Environmental Effects) (Amendment) Regulations 2007 and an Environmental Statement will be submitted by the operator to DECC prior to consent for the activity under the Petroleum Act 1998. A full Environmental Statement may not be required for certain proposals[25] where it is thought that an activity will not have a significant effect on the environment, based on information provided in a Petroleum Operations Notice (PON) 15 submission.

Requirements of the Birds and Habitats Directive in relation to oil and gas plans or projects within UK waters and the UK continental shelf are implemented through The Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001 (as amended 2007). Regulation 5 of the regulations requires DECC to consider whether an AA should be undertaken prior to granting any consent under the Petroleum Act 1998. The regulations also require consent to be obtained for geological surveys and for the testing of equipment to be used in geological surveys related to oil and gas activities undertaken in UK waters and the UK continental shelf. Offshore installations are required by the Merchant Shipping (Oil Pollution Preparedness, Response and Co-operation Convention) Regulations 1998 and the Offshore Installation (Emergency Pollution Control) Regulations 2002 to prepare Oil Pollution Emergency Plans outlining response and mitigation procedures for oil pollution incidents occurring from and around the installation and service vessels. These plans are submitted for consultation to a number of departments and agencies, including the statutory nature conservation advisers to ensure that environmental concerns have been considered and addressed appropriately. In relation to toxic contamination, all chemicals used and discharged offshore require a permit[26] and their potential

[21] http://www.metoc.co.uk/uploaded_files/GaS%20UK-Cygnus%20ES.pdf
[22] http://www.encoreoil.co.uk/pages/content/index.asp?PageID=89
[23] Dermot Grimson, Crown Estate, (pers comm.) November 2008.
[24] This may not be possible as to transport CO_2 pipelines need to be designed to specific standards.
[25] Certain projects such as pipelines of 800 mm diameter and 40 kilometres or more in length must have an Environmental Statement.
[26] Through the Offshore Chemicals Regulations (2002) and Offshore Petroleum Activities (Oil Pollution Prevention and Control) Regulations 2005

environmental impacts are assessed through the use of chemical risk assessment models, including Chemical Hazard Assessment and Risk Management (CHARM).

A range of other consents and licences, for instance in relation to the discharge of chemicals, deposits in the sea, control of pollution etc, may be necessary depending on the precise nature of the activity. Information about the full range of environmental consents that may be applicable may be found at: https://www.og.berr.gov.uk/environment/environ_leg_index.htm

DECC's Offshore Inspectorate Team inspects installations and expect maintenance to be undertaken to prevent environmental discharges (for example from drains and binding, hoses and diesel tanks). Inspectors also have the powers to investigate whether requirements or restrictions imposed on the operator by DECC are complied with and to monitor any permitted or unplanned discharge of oil and chemicals. During an inspection, the Inspectorate can ask to see any reports of inspections undertaken by operators and review them with respect to environmental concerns (such as corrosion) and ask for a timeline for continued monitoring or remediation works. If the Inspectorate Team identifies any potential environmental issues they can make a condition under the International Convention on Oil Pollution Preparedness, Response and Co-operation[27], for example, that maintenance is undertaken.

The decommissioning of disused offshore installations and pipelines is governed by national and international regulations and overseen by DECC's Offshore Decommissioning Unit. Decommissioning includes the preparation and submission of a Decommission Programme supported by an EIA. Relevant regulations include: Petroleum Act 1998, Energy Act 2008, Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001 as amended, and OSPAR Decision 98/3 (this normally requires the removal of the whole installation but there are possible exceptions for larger structures).

Likely future regulation of activity following designation

Any oil and gas plan or project would be subject to screening to assess if it were likely to have a significant effect on the sandbanks at Dogger Bank. If effects are likely to be significant, an AA would be conducted by DECC, with information provided by the developer, including environmental information such as that normally provided for Environmental Impact Assesment (EIA) outside a Natura site. It is normally possible to put in place mitigation measures which ensure that a plan or project will not have an adverse effect on site integrity. If such mitigation measures are not possible, the proposed development should be refused, unless the competent authority considers that there are imperative reasons of overriding public interest (IROPI) for the development to proceed, and no alternative solutions.

Examples of oil and gas activities that could have a significant effect on the integrity of the site are rock dumping, to protect pipelines, and the practice of 'shaving' sand crests (physically removing the tops of the sand waves) because the crests inhibit adequate pipeline burial or increase the risk of free spans. The Competent Authority is likely to be required to show that such activities will not adversely affect the integrity of the site before issuing consent. They may also apply stricter rules on decommissioning, for example they may require removal of all infrastructure (including concrete mattresses) once a project has been completed.

For a Natura 2000 site, the Environmental Impact Assessment should include robust and transparent modelling of the amount of drill cuttings and their distribution under certain conditions. It will also discuss and report the impacts that these drill cuttings have on the site. The modelling should be detailed enough to demonstrate the impacts that the drill cuttings will have on the conservation objectives of that site. The modelling should also be appropriate to enable/indicate the requirement for future modelling.

b) Renewables

Description of known current and future activity relevant to the site

[27] OPRC, 1990

The Dogger Bank site has limited wave and tidal stream resources. However, the wind resource is strong and hence the area is attractive to wind farm developments. Therefore, this analysis of renewable resources looks solely at wind power.

In 2009, the Government concluded on the basis of the Offshore Energy Strategic Environmental Assessment that a strategic level, there are no overriding environmental considerations to prevent the achievement of up to 33GW of offshore wind in UK waters. Much of the Dogger Bank SAC includes a portion of this area that has been identified as a development zone through the Marine Resource System (MaRS) by The Crown Estate. This was followed by an announcement in January 2010 by The Crown Estate of those developers granted Zone Development Agreements (ZDAs) through the Round 3 offshore wind competition. The ZDA for the Dogger Bank zone has been granted to the Forewind consortium which, subject to further zonal assessment and the planning process, hopes to build up to 9GW of installed capacity by 2020. Forewind have also identified a possible further 4GW of potential within the zone. This is the largest generation potential identified out of all the Round 3 zones. JNCC has met with the Crown Estate's selected developer (Forewind) for the Dogger Bank Round 3 zone. The proposed development may consist of >2000 turbines and associated infrastructure (for example, inter-array cabling, sub-stations, and accommodation platforms).

For the analysis in this IA, a figure of 9GW is taken as the maximum possible development for the site within the 10 year assessment period. A figure of up to 13GW is taken to represent the maximum long term potential development.

Using a 43% capacity factor[28] and a current public domain basket price (wholesale, including ROCs and LECs[29]) of "green" electricity of £126.9/MWh gives a total value of potential power generated from the estimated 9GW capacity at Dogger Bank of £4.3bn per annum. Figure 2.4 shows the location of the proposed R3 development zone that overlaps with the boundary for the Dogger Bank SAC proposal.

Regulation of activity (baseline)

An Offshore Energy SEA was concluded in June 2009 which assessed the environmental implications of the installation of 25GW of offshore wind in the UK Renewable Energy Zone of England and Wales (to meet the UK government targets of 15 percent of electricity from renewable sources by 2020), as well as further licensing for oil and gas, and gas storage in depleted reservoirs. The Crown Estate concurrently initiated the leasing process for Round 3, based on areas it had determined as suitable for wind farm development, subject to the outcomes of the SEA. The zonal approach to round 3 allows for some flexibility regarding the location of development(s) within the zone. This means that it may be possible to locate development in areas of the zone that are less likely to impact on features in any overlapping Natura 2000 sites. Assessment of the impacts of further developments both alone and in combination will be required following the submission of applications and accompanying data. It is highly likely that there will be further leasing rounds for wind farm development in the future. Leases for wave and tidal devices have currently been considered on an individual basis.

Following on from the Strategic Environmental Assessment (SEA), the Crown Estate, using the information from the SEA and the information from developers, has determined which areas of the seabed are suitable for leasing, and nine Zone Development Agreements were awarded in January 2010. The wind farm developers will now need to gain consent to install a wind farm and also to connect to the UK electricity grid.

Any application for a wave or tidal power project offshore will require an Environmental Statement that identifies the likely significant effects of the device, array or farm on the environment and proposes suitable mitigation measures.

[28] This assumes that wind farms are operating to capacity for 43% of the time (Mott MacDonald 2010).
[29] ROCs (Renewables Obligation Certificates) and renewables LECs (Levy Exemption Certificates, relating to the Climate Change Levy) are Government regulations that influence the wholesale price of different forms of electricity.

Prior to construction, surveys are conducted to inform the EIA and provide baseline data on the site. These involve the developer undertaking bathymetric, geophysical and benthic surveys to determine the nature of the seabed and its associated plants and animals as well as studies to investigate bird, fish and marine mammal use of the site. Meteorological masts, wave buoys and current meters are also installed to investigate the wind resources and hydrodynamic conditions at the site.

Likely future regulation of activity following designation

JNCC provided advice to The Crown Estate (TCE) on their Habitats Regulations Assessment (HRA) for the Round 3 Plan. TCE concluded, based on advice and the assumption that Dogger Bank will become an SAC, that there should be consideration of the impact of development on the different biotopes that together represent the sandbank qualifying feature of the SAC. JNCC Report 429[30] provides some information on the known biotope distribution on Dogger Bank.

In order to ensure the regulator has a robust audit trail to inform appropriate assessment of projects for Round 3 on Dogger Bank SAC, it is likely that that additional information on the biotope distribution will be needed. Whilst not pre-judging individual appropriate assessments carried out by the Regulator, it is likely that the survey information that would be provided by the developer for Environmental Impact Assessment should be sufficient to characterise the biotope distribution of the Zone and conduct appropriate assessment (AA), therefore survey in addition to that which would be required for EIA in the absence of the SAC is unlikely to be needed.

In terms of assessing impacts against the conservation objectives in order to establish the effect on site integrity, a key objective for AA is likely to be to consider the extent of loss of sandbank habitat as a consequence of wind farm installation (including, for example, turbines, cabling, scour protection, and sub-stations), and also impacts on sediment processes, scouring effects and alteration of habitat. Whilst not pre-judging individual appropriate assessments carried out by the Regulator, it is likely that construction of Round 3 combined with other oil & gas development and aggregate extraction on the site (which may result in the same pressures on the habitat) is unlikely to have a likely significant effect for the following reasons:

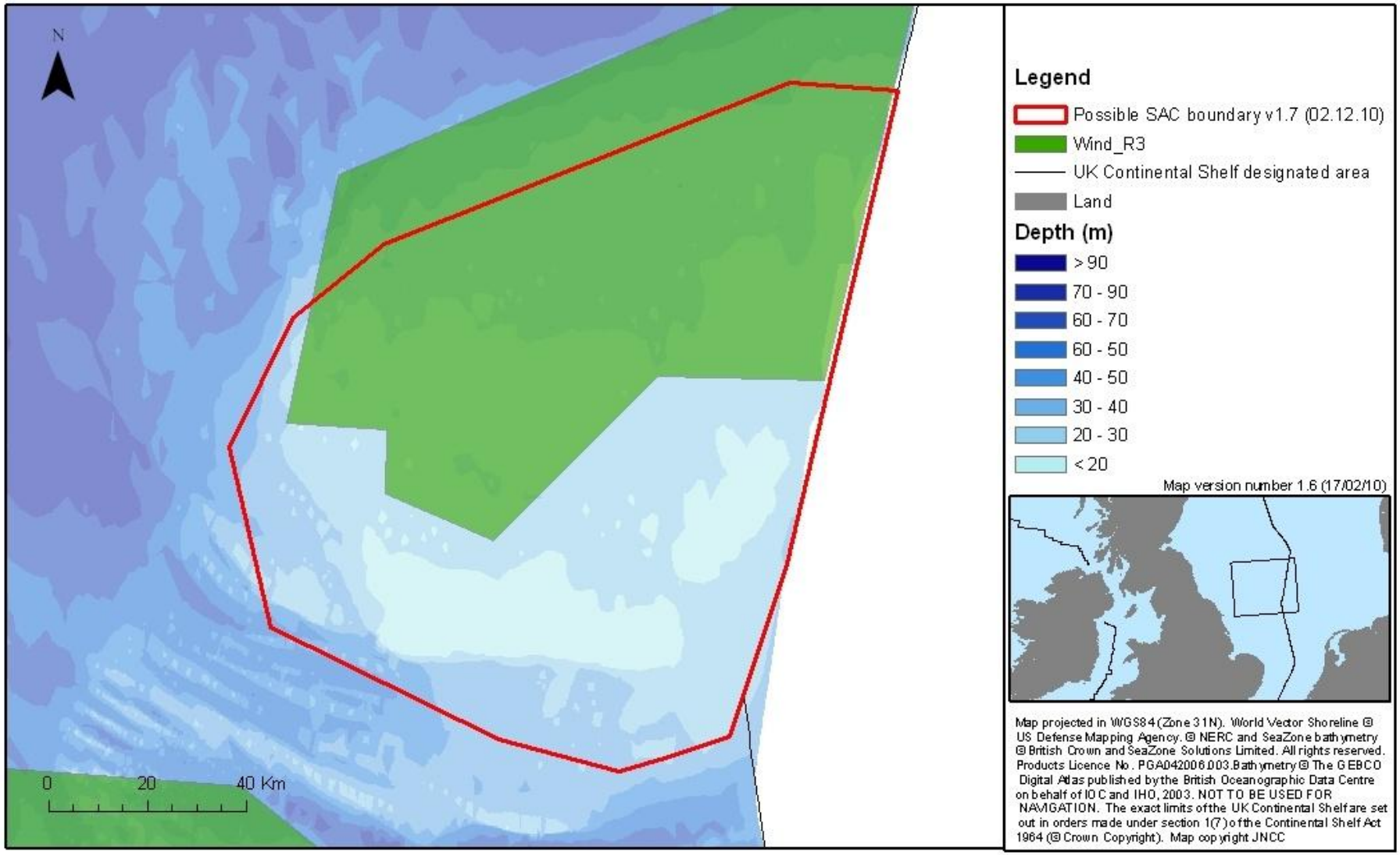
- To optimise use of wind resource, turbines are placed at significant distances apart (>1km), therefore the proportion of seabed lost or affected through installation or local scour is likely to be minimal;
- Cabling is not likely to result in habitat loss except for instances when rock-dumping and/or concrete mattressing is used to protect cables, changing the benthic habitat to hard substrate. Use of these techniques is likely to be localised compared to the overall extent of wind farm infrastructure;
- The amount of habitat loss at the site from oil & gas development and aggregate extraction is currently very small, so the risks associated with in-combination impacts are low.

A better understanding of biotope distribution will enable developers to demonstrate that they are not having a disproportionate impact on any biotope and that rare and sensitive biotopes are avoided.

Widespread development across sandbanks can disrupt natural processes in a manner that would significantly change the way a habitat functions. Some sandbank habitats are more active than others and the developer would need to evaluate available baseline information to consider the risks. Dogger Bank is not a tidally generated sandbank, having been formed through peri-glacial processes followed by submergence during post-glacial sea level rise. Taking into consideration the known sediment movement that occurs on this relict glacial feature, it is thought that the sandbank is a relatively stable habitat. Whilst not pre-judging individual AA carried out by the Regulator, the risk of disruption of dynamic processes acting on the sandbank as a result of turbine installation is likely to be negligible.

[30] Diesing, M., Ware, S., Foster-Smith, B., Stewart, H., Long, D., Vanstaen, K., Forster, R. & Morando, A, (2009), Understanding the marine environment - seabed habitat investigations of the Dogger Bank offshore draft SAC, JNCC Report 429, ISSN 0963 8901.

Figure 2.4 Round 3 windfarm licensing around the Dogger Bank SAC (from SeaZone)



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c) Aggregates

Description of known current and future activity relevant to the site

Licenses for aggregate extraction have been applied for within the proposed site boundary (Figure 2.5):

- **Licence Area 466**: Maximum of 3 million tonnes over 15 years with a maximum annual off-take of 600,000 tonnes; extraction will be limited to 200,000 tonnes per year for the first five years of dredging. An official application was submitted to the MFA (now MMO) in August 2009.
- **Licence Area 485**: 7.5 million tonnes over 15 years with a maximum annual extraction rate of 1 million tonnes and an expected average of 500,000 tonnes per annum). An application is expected in 2011.

The Crown Estate estimates these assets to be worth approximately £5m. The value to the operators in landing the product is many times (possibly around 10 times) that. As this area has also been the subject of failed tender bids in the past, it is possible that these licences will not be granted. However, each application for permission to the MMO will be subject to EIA and Appropriate Assessment (if the proposed dredging activities are likely to significantly affect the Dogger Bank pSAC). Thus, if the operator obtains a permission to dredge then it seems likely that the Crown Estate will issue a licence.

Regulation of activity (baseline)

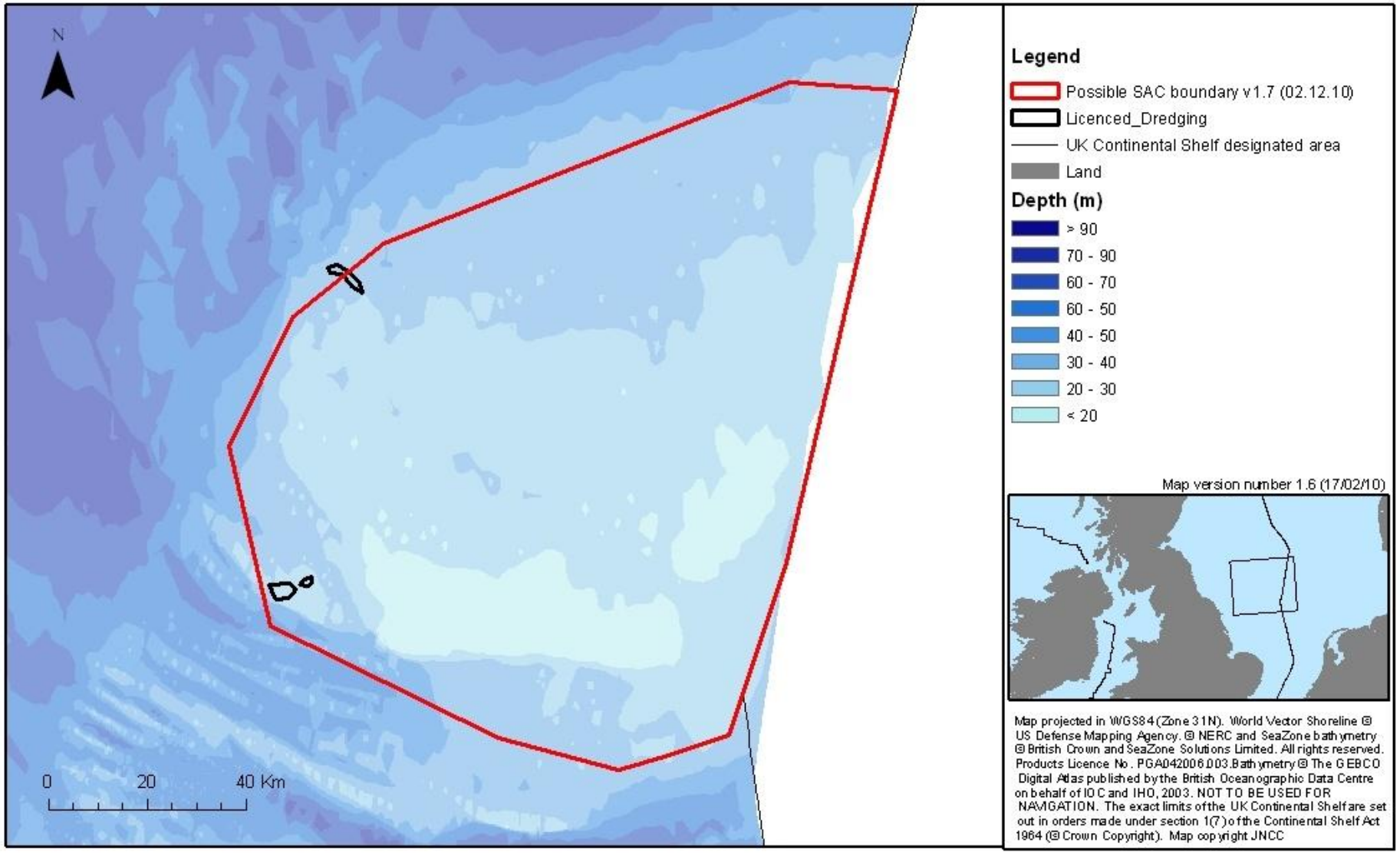
The Crown Estate (TCE) owns the seabed to the 12-mile territorial limit and the rights to non-energy minerals out to the edge of the UK continental shelf and, as such, grants commercial production licences to the aggregate industry. Such a licence will only be issued if the dredging company has obtained a dredging permission from the regulator. In UK offshore waters, new applications for aggregate extraction are regulated by the MMO predominantly through the Environmental Impact Assessment and Natural Habitats (Extraction of Minerals by Marine Dredging) (England and Northern Ireland) Regulations 2007 ("Marine Mineral Regulations 2007"). The Secretary of State is likely to determine that marine minerals dredging of more than 10,000 tonnes will require an EIA[31]. JNCC provide MMO with advice on such EIAs and on any screening exercises or appropriate assessments carried out in relation to Natura 2000 sites, for UK offshore waters.

Once an EIA has been approved and consent for dredging granted, the dredging permission will be accompanied by a detailed "schedule of condition" including definition of the working area, the term of the dredging permission, and the permitted extraction tonnage. The conditions also cover management, mitigation and monitoring requirements on a site-specific basis.

The management measures set out permitted working practices such as whether trailing or static dredging is permitted, whether screening is allowed, and defined access routes to and from the licence. Mitigation measures stipulate steps to be taken to minimise or reduce the potential effects of dredging, such as minimising the area available to be dredged at any time and seasonal restrictions. Monitoring measures include bathymetric and side scan sonar surveys, benthic surveys, and fisheries studies, as well as the use of electronic monitoring systems (EMS) – 'black boxes' that record the time and location of all dredging activities using GPS satellite positioning. All vessel records are audited by the MMO and the managing agents for The Crown Estate on a monthly basis.

[31] See www.marinemanagement.org.uk/works/minerals/documents/mmg2.pdf

Figure 2.5 Aggregate extraction within the Dogger Bank pSAC (from SEAZONE)



Map projected in WGS84 (Zone 31N). World Vector Shoreline © US Defense Mapping Agency. Seabed habitat derived from BGS 1:250,000 seabed sediment maps © NERC and SeaZone bathymetry © British Crown and SeaZone Solutions Limited. All rights reserved. Products Licence No. PGA042006.003. Bathymetry © The GEBCO Digital Atlas published by the British Oceanographic Data Centre on behalf of IOC and IHO, 2003. NOT TO BE USED FOR NAVIGATION. 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). Map copyright JNCC

Likely future regulation of activity following designation

Under the Review of Consent procedure detailed in the Marine Mineral Regulations 2007, regulation 24 and Schedule 3, the Secretary of State is required to review marine minerals dredging permissions[32] as soon as is practicable following the date on which a site becomes a European site (which includes sites transmitted to the European Commission).

In general, management measures for aggregate extraction are already such that the sector should not prevent the delivery of favourable condition of the Annex I sandbank in the Dogger Bank pSAC, in the event of a dredging permission being subject to a review. There is a small risk that applications for dredging within the Dogger Bank pSAC will be turned down on the basis of the conclusions of AAs or review of consent being incompatible with the site's Conservation Objectives.

d) Shipping

Description of known current and future activity relevant to the site

There are busy shipping lanes between the Dogger Bank site and the coast, but, given the shallow depth of some parts of Dogger Bank (less than ~18m), shipping is expected to already avoid parts of the site (Figure 2.6). There are no major shipping or ferry routes that cross the site boundary and no anchorages within or near to the boundary. Parts of the site are crossed by regular shipping traffic though this isn't heavy (<240 passes pa).

Regulation of activity (baseline)

The International Convention for the Prevention of Pollution from Ships (MARPOL) is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes. The MARPOL Convention, which was adopted by the International Maritime Organisation in 1973, covered pollution by oil, chemicals, harmful substances in packaged form, sewage and garbage. Measures relating to tanker design and operation (arising from the Convention on the Safety of Life at Sea, 1974) were also incorporated into the MARPOL Protocol. As the 1973 MARPOL Convention had not yet entered into force, it was absorbed into the 1978 MARPOL Protocol. The Convention includes regulations aimed at preventing and minimizing pollution from ships, both accidental pollution and that from routine operations. It now includes six technical Annexes which came into force in 1983:

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

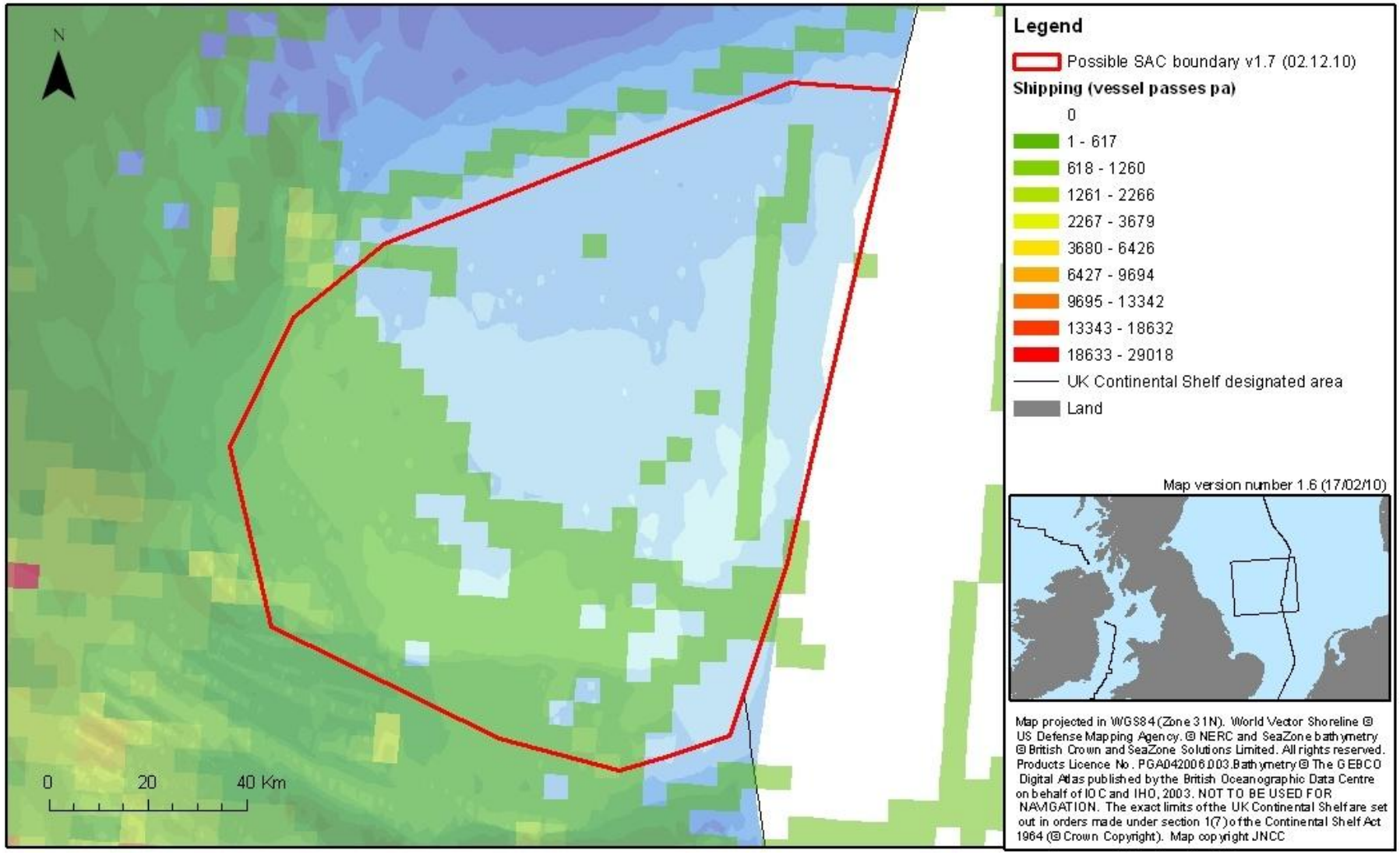
Signatories to the Convention, which include the UK, must accept Annexes I and II, but the other Annexes are voluntary.

Likely future regulation of activity following designation

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

[32] These functions are carried out by the Marine Management Organisation (MMO)

Figure 2.6 Shipping activity around Dogger Bank SAC from the Cefas data contract (MB106[33]). Data derived from Automatic Identification Systems (AIS), a collision-avoidance system for ships over 300GT that travel in international waters. Data provided by the Maritime and Coastguard Agency. Data for 2008 are represented as the total number of vessels passing through each 5km grid cell. Data are represented on a scale of 'low' to 'high'



[33] 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

e) Cables

Description of known current and future activity relevant to the site

There are four submarine telecommunications cables that cross the site and two cables that run parallel to the site boundary to the north.

Regulation of activity (baseline)

Most sub-sea cables are exempt from licence control under the Food & Environment Protection Act (FEPA) though associated works such as rock armouring and mattressing, the construction of facilities at the shore landing, and pre-sweep and trenching may require a FEPA licence. A 'pre-sweep' licence is required where activities are to be undertaken that will result in the re-deposition of material other than at an existing designated disposal site. Where a cable is an integral component of a larger scheme, such as the construction of an offshore energy generation project, any FEPA licence issued for the project will need to include the laying of the cable.

Following enactments of the Marine and Coastal Access Bill electricity cables require a Marine Licence.

Likely future regulation of activity following designation

There are no plans to install any new cables unless associated with wind farms (discussed in renewables section). As such, the regulations are not expected to change following designation.

f) Fisheries

Description of known current and future activity relevant to the site

Note that fishing is carried out on a European level, by UK vessels, European and non-European vessels by agreement. Data on location and type of fishing is difficult to obtain comprehensively due to various issues. Also, fishing data from recent years is a reflection of fisheries already managed to an extent by total allowable catch (TAC) and species quotas. As there are no indications that these measures are likely to change within the timeframe of the IA, the current situation is taken as the baseline.

It is possible to obtain information on the distribution of fishing effort within the region for UK vessels (≥15m) that have vessel monitoring systems (VMS). These provide a vessels position, speed and heading either hourly or every two hours. Such information can be analysed spatially in relation to the site boundary. As vessels fish at characteristic speeds, VMS data can be processed to provide proxy patterns of 'active fishing'. The European Commission has passed a regulation requiring all member states to assure that VMS terminals in use on fishing vessels (≥15m) of its national fleet are secure[34]. Though VMS data only cover vessels of over 15m in length. However, there is no known activity of vessels <15m at the Dogger Bank[35]. Using a simple speed rule to partition active fishing from VMS is a coarse but effective means of estimating fishing effort (Mills *et al*. 2007).

There are no landings data available specifically for the area which is proposed for designation. The Marine Management Organisation's Fisheries Activity Database (hereafter, FAD) compiles various data at the level of ICES rectangle. Catch data encompasses information for UK-registered vessels landing in UK and non-UK ports, and for non-UK registered vessels landing in UK ports. Data includes:

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

Note, the exception is for non-UK vessels that fish within territorial waters, but that land at non-UK ports; it is not possible to obtain weights and values of landings for these vessels. This impact assessment is

[34] http://ec.europa.eu/fisheries/index_en.htm
[35] MPA Fisheries Coalition, Nov 2010.

concerned with the impacts of the UK's potential designation of Dogger Bank on UK businesses. However for fisheries, designations of other areas of the marine environment by other Member States are also relevant as there will also be effects on businesses in other countries. The Dogger Bank habitat feature extends into Dutch and German waters, and therefore the costs or benefits of a closed zone in UK waters are impacted by whether or not these countries also designate their areas of Dogger Bank, and the management options they choose. Germany has already designated the site and Netherlands are in the process of preparing a designation. Work to develop coordinated management measures across the trans-boundary site has already commenced.

Within the LOT 7 EU funded project[36] a collaborative study of VMS data was agreed with the North Sea Regional Advisory Council (NSRAC). Dogger Bank SAC was considered to be a suitable case study and was subsequently the focus of a NSRAC workshop (though this was for the larger 2008 boundary). It was found that, in 2006, there were 30 UK vessels active in the SAC area (21 beam trawlers, 6 otter trawlers and 3 Danish seine netters). In 2007, numbers were similar, with 23 beam trawlers, 8 otter trawlers and 2 Danish seine netters fishing in the area. Fishing effort within the site was greatest between April and September.

Current fishing practices at Dogger Bank were assessed using four years (2006-9) of VMS and landings data for the same years for the ICES rectangles[37] within which the draft SAC is sited (Figure 2.7).

Table 2.3 shows landings data for the whole ICES rectangles containing Dogger Bank SAC. Overall, landings were greatest from rectangles 37F2 and 39F3, together representing 50% (£3.4m) of landings by value from the region. The vast majority of landings recorded from the region by MMO were from English and Scottish vessels, representing 54% and 35% of the catch respectively (Table 2.4). Data from foreign vessels landing in foreign ports were not captured by the MMO though. There were however significant landings to UK ports from Dutch and Danish vessels. Total landings from the region have increased slightly over the four year period from £6.1m in 2006 to approximately £7.7m in 2009. This corresponds to a significant increase in the weight of landings from 4.3m kg in 2006 to 8.9m kg in 2009.

Table 2.5 shows that the major port relating to Dogger Bank is Harlingen in the Netherlands. There is a large fishery for plaice around the Dogger Bank region and landings are made predominately to Harlingen. This port consistently accounts for the vast majority of landings – 49% (£3.4m) of the catch by value and 35% (2.3m kg) by weight on average. Sole and cod are also landed here. Other ports in decreasing order of importance are: Grimsby (£0.6m average) (plaice and cod), Scarborough (£0.5m) (nephrops and lobsters), an unspecified Dutch port (£0.4m) (plaice), Whitby (£0.3m) (nephrops with cod and lobsters), North Shields (£0.3m) (nephrops), Scheveningen (£0.3m) (plaice, sole and cod), Hartlepool (£0.2m) (sole and nephrops) and Urk (£0.2m) (plaice and sole). Significant ports for the Danish sand eel fishery include Esbjerg, Skaagen and other unspecified Danish ports.

Table 2.6 shows that most fish are targeted using beam and unspecified otter trawls – landing 52% (£3.6m) and 16% (£1.1m) by value respectively. Otter trawls (bottom) land 34% (2.3m kg) by weight, but this only accounts for 8% (£0.6m) by value, predominately as a result of the lower value of Danish sand eel fishery caught by this method.

The most significant species both in terms of weight and value is plaice, accounting for 55% (£3.8m) of landings by value and 45% (£3.0m) by weight (Table 2.7). The next most important species are: nephrops (£0.9m), turbot (£0.5m), sole (£0.4m), lemon sole (£0.3m), cod (£0.2m), dabs (£0.1m) and sand eels (£0.1m).

[36] Joint data collection between the fishing sector and the scientific community in the North Sea

[37] The International Council for the Exploration of the Sea (ICES) divides seas into rectangles and this system is used to assist monitoring and enforcement of marine activities.

Table 2.3 Total value of landings from ICES rectangles containing Dogger Bank SAC for all nationalities landing in UK ports and UK vessels landing in foreign ports

	2006		2007		2008		2009		Average		Average as a percentage	
	Weight (kg)	Value (£)	Weight (kg)	Value (£)	Weight (kg)	Value (£)	Weight (kg)	Value (£)	Weight (kg)	Value (£)	Weight	Value
37F2	391643	755212	1162142	2137953	1833245	1836775	1899081	2157117	1321528	1721764	20.09	24.90
39F3	1241390	1811407	895579	1259645	1310197	1951717	1643544	1850956	1272678	1718431	19.34	24.85
37F1	1327322	1732148	948760	1319889	556042	1094489	2180890	1206449	1253253	1338244	19.05	19.35
38F2	269888	406613	669019	957333	622014	728959	1412845	1514052	743442	901739	11.30	13.04
39F2	552502	828850	612698	836451	1135391	557960	363721	488339	666078	677900	10.12	9.80
38F1	339749	313766	273408	312538	577834	460469	766008	421554	489250	377082	7.44	5.45
39F1	179665	301098	53150	75460	2450332	236891	650294	106380	833360	179957	12.67	2.60
Total	**4,302t**	**£6,149k**	**4,615t**	**£6,899k**	**8,485t**	**£6,867k**	**8,916t**	**£7,745k**	**6,580t**	**£6,915k**	**100.0**	**100.0**

Table 2.4 Total catch by nationality from the ICES rectangles containing Dogger Bank SAC (2006-9)

	2006		2007		2008		2009		Average		Average as a percentage	
	Weight (kg)	Value (£)	Weight (kg)	Value (£)	Weight (kg)	Value (£)	Weight (kg)	Value (£)	Weight (kg)	Value (£)	Weight	Value
England	1512399	2468130	2492071	3781078	2587232	4234297	3799576	5263286	2597820	3936698	39.48	56.93
Scotland	2458969	3036329	1446645	2423313	5466093	2206474	4943064	2123698	3578693	2447454	54.39	35.39
Netherlands	192752	477549	125086	310618	42109	114557	47500	181554	101862	271070	1.55	3.92
Denmark	107621	124906	110656	136823	97347	128760	62252	83607	94469	118524	1.44	1.71
N Ireland	0	0	94182	179109	51198	92308	63991	92701	52343	91030	0.80	1.32
Faeroe Is.	0	0	343460	64779	0	0	0	0	85865	16195	1.31	0.23
Norway	0	0	0	0	220690	62972	0	0	55173	15743	0.84	0.23
France	16047	24593	0	0	20387	27893	0	0	9108	13121	0.14	0.19
Jersey	14374	17586	0	0	0	0	0	0	3594	4396	0.05	0.06
Belgium	0	0	2657	3549	0	0	0	0	664	887	0.01	0.01

Table 2.5 Major ports of landing from the ICES rectangles containing Dogger Bank SAC (2006-9)

		2006		2007		2008		2009		Average		Average as a percentage	
		Weight (kg)	Value (£)	Weight (kg)	Value (£)	Weight (kg)	Value (£)	Weight (kg)	Value (£)	Weight (kg)	Value (£)	Weight (kg)	Value (£)
Harlingen	NED	2051002	3165625	2428833	3547661	2324816	3591026	2324199	3175631	2282212	3369986	34.69	48.73
Grimsby	GBE	413729	594341	348714	512909	412524	639474	530783	762725	426438	627362	6.48	9.07
Scarborough	GBE	178742	393714	282459	619885	320002	611118	190273	293832	242869	479637	3.69	6.94
Unspecified Dutch Port	NED	76140	152107	35752	111644	30709	39816	756835	1120038	224859	355901	3.42	5.15
Whitby	GBE	80985	208194	217704	446935	183313	327404	167353	234379	162339	304228	2.47	4.40
North Shields	GBE	133196	272113	127727	269418	161545	315386	142411	213012	141220	267482	2.15	3.87
Scheveningen	NED	1251	1677	207343	288496	148328	228548	343178	481528	175025	250062	2.66	3.62
Hartlepool	GBE	129554	337695	123768	304065	49622	133580	49545	186446	88122	240447	1.34	3.48
Urk	NED	76266	111821	179540	239257	7344	9436	375572	456395	159680	204227	2.43	2.95
Den Helder	NED	156504	235206	75231	91111	234559	298863	40968	57317	126815	170624	1.93	2.47
Bridlington	GBE	57500	153546	48805	147210	33313	139908	7214	10719	36708	112846	0.56	1.63
Ijmuiden	NED	30611	56412	87048	138791	28184	41263	105911	162590	62938	99764	0.96	1.44
Unspecified Danish Port	DEN	0	0	0	0	1867629	120124	2937619	264386	1201312	96127	18.26	1.39
Hull	GBE	108886	234106	2294	7119	0	0	0	0	27795	60306	0.42	0.87
Peterhead	GBS	8155	10825	345327	69824	229709	78930	319277	80810	225617	60097	3.43	0.87
Egersound	NOR	0	0	0	0	0	0	592347	182659	148087	45665	2.25	0.66
Eyemouth	GBS	48020	73526	26188	53258	13433	20980	12870	19087	25128	41713	0.38	0.60
Unspecified Norwegian Port	NOR	0	0	0	0	1223000	73810	0	0	305750	18452	4.65	0.27
Skaagen	DEN	0	0	0	0	1164083	70254	0	0	291021	17563	4.42	0.25
Thyboron	DEN	0	0	0	0	3094	51883	998	6910	1023	14698	0.02	0.21
Esbjerg	DEN	687832	41512	46616	5901	0	0	1504	2604	183988	12504	2.80	0.18
Fraserburgh	GBS	1346	3096	4457	9141	12348	22770	6573	13911	6181	12229	0.09	0.18
Aberdeen	GBS	8249	18555	10518	17764	0	0	6264	10590	6258	11727	0.10	0.17
Eemshaven	NED	12968	14760	8277	9983	14858	17152	0	0	9026	10474	0.14	0.15

Table 2.6 Use of gear types in the ICES rectangles containing Dogger Bank SAC (2006-9)

	2006		2007		2008		2009		Average		Average as a percentage	
	Weight (kg)	Value (£)	Weight (kg)	Value (£)	Weight (kg)	Value (£)	Weight (kg)	Value (£)	Weight (kg)	Value (£)	Weight (kg)	Value (£)
Beam trawls	2511574	4079141	2588125	3966600	1876025	3035934	2254467	3332286	2307548	3603490	35.07	52.11
Otter trawls (not specified)	212795	348014	636336	1015859	989134	1432726	1205411	1588004	760919	1096151	11.56	15.85
Nephrops trawls	292338	641116	377283	807757	396468	738543	164129	238909	307555	606581	4.67	8.77
Otter trawls - bottom	781403	227599	111084	118671	4479429	645045	3678795	1343838	2262678	583788	34.39	8.44
Danish seines	239213	319210	259348	349410	303219	481049	406740	564227	302130	428474	4.59	6.20
Otter twin trawls	91537	179239	203650	336561	141253	235563	203406	289597	159961	260240	2.43	3.76
Pots	78007	217573	67500	200099	58036	197671	17533	26550	55269	160473	0.84	2.32
Otter trawls - midwater	0	0	343460	64779	220690	62972	869347	208622	358374	84093	5.45	1.22
Pair trawls - bottom	75173	106684	21055	29584	10398	12846	27658	37668	33571	46695	0.51	0.68
Scottish seines	8155	10825	0	0	1117	902	72329	91163	20400	25722	0.31	0.37
Set gillnets (anchored)	11037	17613	614	1498	9202	23848	2009	2698	5716	11414	0.09	0.17
Shrimp trawls - midwater	0	0	0	0	0	0	14558	21284	3640	5321	0.06	0.08
Gillnets (not specified)	0	0	6198	8330	85	162	0	0	1571	2123	0.02	0.03
Trammel nets	927	2079	102	124	0	0	0	0	257	551	0.00	0.01

Table 2.7 Species landed in the ICES rectangles containing Dogger Bank SAC (2006-9)

	2006		2007		2008		2009		Average		Average as a percentage	
	Weight (kg)	Value (£)	Weight (kg)	Value (£)	Weight (kg)	Value (£)	Weight (kg)	Value (£)	Weight (kg)	Value (£)	Weight (kg)	Value (£)
Plaice	2188123	2876478	2801972	3341827	2823069	3813563	4097449	5048855	2977653	3770181	45.26	54.52
Nephrops (Norway Lobster)	391748	936563	523979	1173640	454332	934773	243418	412831	403369	864452	6.13	12.50
Turbot	49556	397303	81215	667624	66012	436674	73320	508049	67526	502412	1.03	7.27
Sole	64675	576150	53743	450519	27970	235522	44782	421099	47793	420822	0.73	6.09
Lemon Sole	160591	441557	145131	414431	116916	307459	87650	185384	127572	337208	1.94	4.88
Cod	60853	93133	76116	127557	146373	289719	180447	321408	115947	207954	1.76	3.01
Dabs	323906	159483	306863	215635	144347	99921	141768	107799	229221	145709	3.48	2.11
Sand Eels	687832	41512	45000	2716	4249083	256438	2937619	264386	1979884	141263	30.09	2.04
Lobsters	14177	152236	13813	148152	15962	154254	1281	15331	11308	117493	0.17	1.70
Sprats	0	0	0	0	0	0	869347	208622	217337	52156	3.30	0.75
Haddock	66999	91826	30022	33332	24088	20536	64346	59626	46364	51330	0.70	0.74
Crabs (C.P.Mixed Sexes)	60661	64060	61614	65140	50193	52706	26249	21836	49679	50935	0.76	0.74
Brill	14455	84189	9209	44751	7414	33843	6258	32219	9334	48751	0.14	0.70
Monks or Anglers	14832	36795	17287	40476	17805	39130	9778	22622	14925	34756	0.23	0.50
Herring	0	0	340041	64608	220690	62972	0	0	140183	31895	2.13	0.46
Whiting	54285	42349	13896	9927	23965	27692	29341	16344	30371	24078	0.46	0.35
Whelks	64853	49806	11292	6587	13497	6546	18287	8212	26982	17788	0.41	0.26
Skates and Rays	22049	22645	23818	26100	10885	10577	1245	1790	14499	15278	0.22	0.22
Halibut	1609	9638	1615	9645	3636	19515	1745	12291	2151	12772	0.03	0.18
Squid	5179	13370	5901	15275	3261	8006	4227	11903	4642	12139	0.07	0.18
Spurdog	18740	23701	3707	4970	4548	8420	2505	4735	7375	10457	0.11	0.15
Red Mullet	1823	4281	2868	6054	3178	7437	3046	13937	2729	7927	0.04	0.11
Gurnard and Latchet	9417	4218	16574	5423	27300	7625	43813	14086	24276	7838	0.37	0.11

The proposed UK SAC overlaps seven ICES rectangles (39F1-3, 38F1-2, 37F1-2) to varying degrees (Figure 2.7). Rectangle 38F3 is not included here as less than 1% is covered by the SAC. In order to estimate the value of landings within the SAC boundary, effort data generated by Cefas was used to calculate what fraction of the catch was made from the portion of the ICES rectangle containing the SAC.

The effort method assumes that catch is directly proportionate to effort. The percentage of the effort for a given gear type in a given rectangle that occurs within the proposed site boundary was used to estimate the value of the landings from the area of the site in that rectangle. Annex I shows how the calculations were made and gives maps of effort for each gear type from 2006-9.

Effort data were derived from work on a Defra marine biodiversity research programme (MB106)[38]. Estimations of fishing activity were derived from Vessel Monitoring System (VMS) data and are available for 2006-9. The derived surfaces represent activity from all vessels (both UK and non-UK registered vessels) of at least 15-m length. VMS data for UK vessels were linked to skipper logbook information in order to determine the fishing gear being employed. For non-UK registered vessels where logbook information is not available information on fishing gear employed has been obtained from 'primary gear' listed on the EU vessel register. Unprocessed VMS data have been filtered using a simple speed rule of between 1 and 6 knots to indicate fishing activity for all gear types. Date and time information attached to unprocessed VMS data were used to determine elapsed time between consecutive VMS locations for each vessel (usually 2 hours) and summarised at a cell resolution of 0.05 decimal degrees.

Table 2.8 Landings from within the site made by UK-registered vessels using demersal gear (calculations given in Annex I)

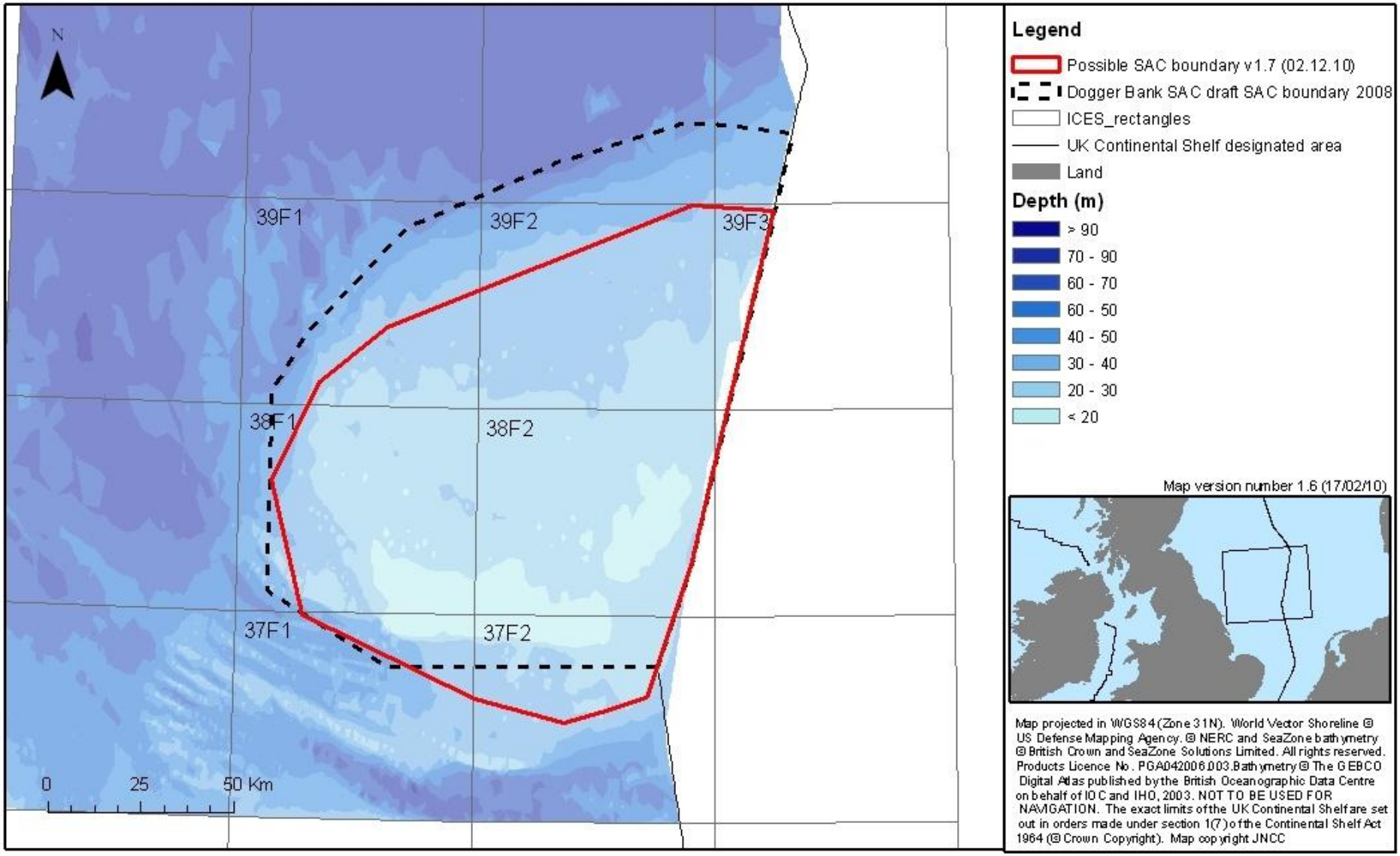
	Landings by UK vessels within Dogger Bank SAC (£)				
	2006	**2007**	**2008**	**2009**	**Average**
Beam trawl	1649634	1931064	1300642	1962008	1710837
Otter trawl (unspecified)	17142	262184	453181	762899	373852
Nephrops trawl	0	371	14532	0	3726
Otter trawl (bottom)	105415	62660	21244	331737	130264
Otter twin	12515	138674	8742	147761	76923
Pair trawl	1623	0	0	0	406
Danish seine	310215	309048	469829	562343	412859
Total (demersal)	**£2,099k**	**£2,706k**	**£2,270k**	**£3,769k**	**£2,709k**

Table 2.8 shows that the average landing made by UK-registered vessels over the last four years is £2.7m. This is the value that is used in the calculations going forward as it takes into consideration annual variations in effort and landings. Though the value of landings from 2009 (£3.8m) is the highest in recent years there is not a trend of increasing value over the four years analysed.

The average value is higher than estimates made in earlier iterations of this Dogger Bank IA (in 2009), which only considered ICES rectangles that were covered over 50% by the SAC. Those estimates used average landings data over 2000-2008, and resulted in a much lower estimate of the value of catch to UK vessels (£0.58m). However, this estimate only included landings of UK-registered vessels to UK ports and we are confident that the new methods give a more realistic estimate of costs to the UK economy. Much of the landings from Dogger Bank are made by the Anglo-Dutch fleet and were not considered in previous costs. The revised estimate is similar to the estimate made in the 2010 Consultation IA.

[38] 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

Figure 2.7 ICES rectangles overlapping with the Dogger Bank SAC and the revised boundary in relation to the draft 2008 boundary



Map projected in WGS84 (Zone 31N). World Vector Shoreline © US Defense Mapping Agency. Seabed habitat derived from BGS 1:250,000 seabed sediment maps © NERC and SeaZone bathymetry © British Crown and SeaZone Solutions Limited. All rights reserved. Products Licence No. PGA042006.003. Bathymetry © The GEBCO Digital Atlas published by the British Oceanographic Data Centre on behalf of IOC and IHO, 2003. NOT TO BE USED FOR NAVIGATION. 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). Map copyright JNCC

Additional fishing data provided through formal consultation

Additional information on fishing activity was provided by a number of domestic and international fishing groups following the formal consultation. Due to the lack of time series data and limited spatial resolution it was not included in the cost calculations but is provided here to inform interpretation of costs and to recognise the size of the international fishery. At least some of these data would have been captured by our initial analysis of the data as foreign vessels that land in UK ports.

1. UK Marine Protected Area Coalition

MPAC offered additional information on fishing in the wider Dogger Bank region, though this is not a definitive list of vessels fishing in the area:

Lowestoft Producer's Organisation (PO) – Includes 4 beam trawlers, 2 euro beamers/ twin rigger, 4 fly shooters twin rigger vessels dependent upon the Dogger Bank area for 80% of landings worth around £11 million between January and end Oct 2010 and £8.5 million in 2009. Main species: Plaice, sole, lemon sole, dab, turbot, brill.

North Sea Fishermen's Organisation (NSFO) – Includes 4 beam trawlers, 5 fly shooters, 2 twin rigger vessels dependent upon the Dogger Bank for 75% landings worth £9million in 2009. Main species: Plaice, sole, lemon sole, dab, turbot, brill.

Eastern England Fish Producer's Organisation (FPO) – Two anchor seiners: 99% landings of plaice: 504 tonnes, £0.8 million (2009); 402 tonnes £0.7 million (2010 to November).

2. North-east of Scotland Fishermen's Organisation

In addition to the MPAC response, an Anglo-Dutch vessel (Miranda P224) using a twin-rig and beam trawl estimated that they caught £460-490k pa on average.

3. Dutch Fisheries Organisation

For the past forty years, the Dogger Bank (especially the southern part of the UK area) has been a key fishing ground for the Dutch fishing fleet and Dutch flag vessels, i.e. Dutch-owned but UK-registered. The area is especially important for the beam trawl fleet (total 16 vessels approx) drawn from Texel, Den Helder, Urk and Scheveningen.

Based on extrapolations (by the Dutch Fisheries Organisation) to the UK Dogger Bank area from a study of Dutch Natura 2000 sites (Oostenbrugge *et al*, 2010. LEI-report 2010-066), catches/values for the Dutch fleet on Dogger were:

Table 2.9 Dutch landings from the UK Dogger Bank area (data provided by the Dutch Fisheries Organisation)

Year	Catch (kg/km^2)	Value (EUR/km^2)	Value (£/km^2)[39]
2007	100-600	250-2000	213-1700
2008	50-400*	126-1000	107-850

* Catches lower in 2008 due to lack of days at sea

From the attached maps (Annex II) in 2007 approximately 100-600 kg /km^2 with a value of 213-1700 £/km^2 was caught. In 2008, due to e.g. lack of days at sea, the estimated catch was 50-400 kg-km^2 (worth 107-850 £/km^2).

In comparison, the Dutch part of the Dogger had revenue of £23,180 in 2008. However the English part of the Dogger is more important and the revenue in 2008 will have been much higher than 2007. Of particular importance is the southern part of the English Dogger Bank.

[39] 1.0 EUR = 0.85 GBP www.xe.com

4. Norwegian directorate of fisheries

Data submitted were weighted landing data and value from first hand sale. The source of data submitted was landings and sales notes documents. In Norway, upon landing a landing note has to be filled out. If the fish is sold upon landing the first hand value is registered in the same document. If the fish is sold at a later time, the value will be registered in the sales document, with reference to the landing document. Both documents contain information on zone, statistical main fishing areas, and if considered important, the most important statistical rectangles where the fishing took place at that trip.

Information on fishing area from the landing documents can never be as accurate as logbook information with regards to catch areas. Quantities and specification of species are better in the landings and sales documents. Rectangle information is not mandatory on the landing and sales notes, only the main Norwegian statistical area.

For other fisheries the information on the main Norwegian statistical area is of good quality, but the rectangle information is given as the most important rectangle on the trip (one for each trip). If a vessel is fishing in more than one rectangle, only the most important one with regard to the target species is registered. This has to be taken into consideration when using the data.

The data provided are for an area bigger than the site, which is likely to result in an overestimate of landings coming from within the SAC. However, it provides a good picture of the gear types used and target fish important to the Norwegian fisheries on Dogger Bank.

Table 2.10 Norwegian landings from the ICES rectangles that contain Dogger Bank (for those vessels that recorded the most important rectangle on trip)

Year	Important gear	Dominant target species	Value of landings (of those recorded)[40]
2005	Bottom trawl	Sand eel	£236k
2007	Bottom trawl Pelagic trawl	Sand eel Atlantic herring	£490k
2008	Bottom trawl Pelagic trawl Double trawl	Sand eel Sand eel European plaice	£2,497k
2009	Bottom trawl Pelagic trawl	Sand eel Sand eel	£2,905k

The data indicates that the sand eel fishery is the most important Norwegian fishery on Dogger Bank in terms of value. As the data provides a minimum value of landings from the area, it is impossible to give an accurate estimate of total landings.

Data provided by NSRAC is for 30 Norwegian vessels fishing for sand eel. Most sand eels were landed in Norway, but some in Denmark:

[40] 1.0 GBP = 9.7 NOK www.xe.com

Table 2.11 Norwegian sand eel fishery (data provided by NSRAC)

Year	Catch (tonnes)	Value (NOK)	Value (£)
2008	60,000	70 million	7,700k
2009	27,500	42 million	4,620k
2010	27,500	55 million	5,000k

There are also Norwegian catches of plaice from Area IVb in which the Dogger Bank lies (unfortunately no statistics were available for Dogger Bank specifically). The vast majority were caught with trawls but some also with gill-nets and even less with lines. Almost 100% of Norway's plaice is caught on Dogger Bank. Landings are not only in Norway – much is landed in the Netherlands:

Table 2.12 Norwegian plaice fishery (data provided by NSRAC)

Year	Location	Catch tonnes	Value (NOK)	Value (£)
2006	ICES IVb	1280	19,684	£2k
2009	North Sea (all)	1690	17,173	£2k

Table 2.13 Norwegian fishery for flatfish and other demersal fish (data provided by NSRAC)*

Year	Location	Catch tonnes	Value (NOK)	Value (£)
2008	ICES IVb	1156	16,685	£2k
2009	ICES IVb	1199	15,156	£2k

[* most of these catches are apparently plaice from Dogger Bank]

The 2009 catches of flatfish and other demersal species from Area IVb represented 2.36% by weight and 3.05% by value of the total landings (50,843t) and value (NOK 547,634) that year of these species by Norwegian vessels from all fishing grounds.

5. Danish Fishermen's Association

Denmark has 3 main fisheries in the wider Dogger Bank area (i.e. including areas outside of the pSAC). In 2008, these collectively yielded about £18.4m[41] to the fishermen, representing 6.6% of the total value from Danish landings.

- Gill-nets (4 vessels, catching 100t turbot, value to fishermen app. £0.85m)
- Danish seines (10 vessels, 1000t plaice (mainly),value app. £1.7m)
- Sand eel trawlers (30-35 vessels, ca 150,000t (250,000 in 2008), value app. £17m).

Exclusion of the sand eel fishery in particular would impact heavily on the Danish sand eel fleet for which the Dogger Bank is by far its biggest source of catches and revenue.

In the table below, catches for 2009 and so far January to October 2010 is shown. In 2009, the total value of the Danish fishery on the Dogger Bank was £19m and so far for 2010 £33.5m. The main fishery is by far the sand eel fishery of which Denmark holds about 95% of the EU quota.

[41] 1.0 EUR = 0.85 GBP www.xe.com

Table 2.14 Danish landings from the wider Dogger Bank (provided by the Danish Fishermen's Association)

	Weight (kg)		Value (£)	
	2009	**2010 (Jan to Oct)**	**2009**	**2010 (Jan to Oct)**
Sand eel	£127,549k	£1,868k	£15,580k	£32,243k
Sprat	£17,808k	0	£2,175k	£379k
Herring	£663k	£538k	£243	0
Plaice	£610k	£7k	£809k	£690k
Turbot	£9k	£3k	£76k	£53k
Lemon sole	£3k	0	£14k	£12k
Other			£170k	£170k
Total	**£146,643k kg**	**2,415k kg**	**£18,897k**	**£33,377k**

In addition, NSRAC provided details of Danish fishing. They stated that in recent years, about 50% of Danish sandeel landings have been from Dogger Bank.

Regulation of activity (baseline)

The European Common Fisheries Policy (CFP) sets the framework for almost all regulation of fisheries in UK waters. European competence and specific regulations vary in their application depending on exact geography. In the UK, all waters beyond 12nm fall under the jurisdiction of the European Commission through the CFP. It is transposed through the Control Regulation (which sets quotas each year in December under separate EC legislation), and Technical Conservation Regulation (covering issues like sizes of nets, closed fishing areas, etc.).

Fishing for pressured stocks beyond 12nm is managed at the European level with each Member State receiving an annual allocation (quota) of each stock at each December Fisheries Council (with a small amount of the total quota allocated to 0–12nm)[42]. Non-pressured stocks such as bass, scallops and cuttlefish still have no applicable quotas. This means that when quota levels are reached vessels tend to move into the inshore zone to catch those species for which there is a market but in effect no restrictions on what can be landed.

Fisheries Regulations apply to anyone fishing from a powered boat and selling their catch, including trawling, netting or potting. Vessels used to catch fish for sale must be licensed as a fishing vessel (subject to exceptions[43]). As well as setting limits on pressured stock (total allowable catches) the CFP puts in place a series of regulations including minimum landing sizes for certain fish as well as seasonal measures needed for stock management. These may take the form of spatial closures that prevent the use of particular fishing techniques in certain areas either permanently or on a time-limited basis. The CFP can also place limits on the amount of fishing that can take place either by limiting the amount of static fishing gear or by limiting the power of the fishing vessels that can take part in the fishery. Further, the more recent "Registered Sellers and Buyers Regulation" has greatly helped manage the issue of 'black' fish by preventing those fish caught by illegal means entering the market. By denying a market for such fish it is hoped that fishermen will more generally comply with the regulations.

Fisheries regulations and policy are enforced, in English Waters, through the MMO sea fisheries enforcement programme, which includes the inspection of fishing vessels and fishing industry premises in the major fishing ports, fish markets and other locations around the coast by Marine Management Organisation officers. Fishing vessels are also inspected at sea by the Royal Navy's Fishery Protection

[42] Quotas are informed by annual scientific stock assessment advice formulated by ICES (the International Council for the Exploration of the Seas) although adherence to this advice is not mandatory.

[43] A licence is not required if a vessel is not powered by an engine or if it is fishing for common eels. If a vessel is only fishing for salmon and migratory trout it does not require a licence but must be registered with the Environment Agency.

Squadron operating under a Defra/Ministry of Defence agreement. There is also a program of aerial surveillance[44].

Likely future regulation of activity following designation

If management measures for an MPA in offshore waters are required, the UK must seek them through the proposal of fisheries management measures under the CFP by the European Commission.

The CFP is currently undergoing reform and a revised regulation will come into effect in January 2013. The Green Paper[45] currently (October 2009) sets out some of the areas that the Commission would like to review; at this stage it is however impossible to predict which, if any, of those proposed measures will come into effect.

The UK will consider, in collaboration with the Dutch and German authorities, applying to the EC for controls to close parts or all of the Dogger Bank (across UK, Dutch and German SACs) to some forms of fishing if justified to achieve the conservation objectives in order to reduce the impacts of fishing on benthic communities and target and non-target fish and shellfish species. Experimental closures may be considered, to inform future management measures based on their relative success.

3 APPROACH TO ANALYSIS OF COSTS AND BENEFITS

3.1 Approach

This final IA presents a quantitative assessment of the potential costs and benefits to the UK of the policy option to designate the site. Impacts have been assessed in the IA over a time scale of approximately ten years[46]. 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 not be static (it may be subject to ongoing change), and the assessments try to take account of this (for example, where a benefit is identified as preventing continuing decline).

The same method has been adopted to develop impact assessments for a suite of marine Natura 2000 sites consulted on in 2009-2010. However, different sites have different baselines, activities and circumstances. Therefore even with a consistent methodology, different assumptions may be made, different impacts may be identified and even the same type of impact may have different monetary cost or benefit estimates associated with it for 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 features and surrounding environment would change under Option 1; 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:

[44] www.marinemanagement.org.uk/fisheries/monitoring/regulations.htm
[45] http://ec.europa.eu/fisheries/reform/
[46] 20 year calculations have been included as a "sensitivity assessment" later in the document.

- 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 and realistic minimum and maximum impact on economic sectors rather than the actual expected impact; and
- not assessed indirect impacts on elements of the supply chain potentially affected. This is because there is not sufficient evidence available to accurately predict the distribution of net changes in activity within the regional economy.

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

3.2 Costs

a) Policy costs to the private sector

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

The costs borne by each of the key sectors will depend on the extent to which their activity impacts on the site and the management measures deemed necessary to restore the sandbanks and their typical species to favourable condition, if that is deemed necessary. These 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 in early 2011, and that some costs (for example, of more detailed EIA requirements) would arise immediately. The timing of some one-off costs is unpredictable within the ten year assessment period, so are assumed to fall in 2015. Assume fisheries management measures may take at least a year to be developed and implemented but it is likely to take considerably longer in order that all issues are considered and addressed with domestic and foreign stakeholders.

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 the plan/project can be implemented which result in costs to businesses. Restrictions are determined by the competent authority in its assessment under the Habs Regs, and
- 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.
- Activity in the area is restricted (e.g. certain fishing activity) and therefore 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 required 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 the management measures that may be needed;
- For ongoing or new plans and projects, the cost to businesses of providing more detailed information than that which would be required if the site was not designated. This is required to inform the Competent Authority's[47] assessment of the plan or project under the Habitat Regulations, and
- Undertaking more detailed analysis (such as EIA) and reporting in some cases.

c) Costs to the public sector

Potential administration costs to the public sector are:

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

3.3 Benefits

The potential benefits of site designation primarily arise from the increase in the area protected for nature conservation purposes[48]. The benefits are assessed in terms of the impact on ecosystem services provided by the natural environment that benefit humans[49]. The following overarching categories of ecosystem services are used[50]:

- 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, archaeology).

Here, and following Defra's guidance on the valuation of ecosystem services, the relevant benefits gained from supporting services[51] (such as cycling of nutrients and photosynthesis) are viewed as essentially being captured by the other benefits listed and so are not examined separately[52]. The analysis in Section 4 is based on a list of ecosystem service categories that are relevant to the site. *Relevant* means that the designation of the SAC would have a noticeable impact on the benefits derived from the service.

The impacts of designation on these ecosystem services are analysed further in Section 4.3 below. In addition to these categories it is recognised by many that biodiversity has an intrinsic value. This value is viewed as an inherent characteristic of biodiversity that gives rise to other benefits. Therefore, intrinsic value cannot be assessed using economic valuation techniques[53] and is not analysed further here. However, because intrinsic value cannot be valued in conventional economic terms does not mean that intrinsic value is regarded as unimportant.

[47] 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. If a Competent Authority undertakes a plan or project itself, it may need to do its own Appropriate Assessment
[48] 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.
[49] As described in Parliamentary Office of Science and Technology (2007).
[50] These are the categories used in the Millennium Ecosystem Assessment (MEA 2005), http://www.maweb.org/en/index.aspx)
[51] Supporting services described as "those that are necessary for the production of all other ecosystem services" in the MEA
[52] 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.
[53] For example, in MEA (page 7, Section 2) : <http://www.maweb.org/documents/document.354.aspx.pdf>.

4 COSTS AND BENEFITS OF OPTION 1: DESIGNATE THE SITE

4.1 Implications of designation

Once sites have been submitted to the EC, Competent Authorities have obligations to consider the likely significant effect of plans or projects they undertake or consent on the integrity of the site. Consequently, effects of the site on offshore industries operating near the site are not yet known.

In order to be able to assess the range within which the true costs and benefits are likely to fall, scenarios have been developed to identify the minimum and maximum potential management measures that might be required at the site. Development of these was informed by Table 2.1 and the potential environmental impacts of activities if the site was not designated.

The minimum scenario requires the smallest change in activities that may be needed compared with the baseline and therefore presents the minimum potential effect on activities.

The maximum scenario is at the other end of the scale: it involves the maximum change in activities that may be needed. This is in line with maximum costs. Table 4.1 outlines these scenarios for the site. This is an estimate of the measures that may be required for the site to achieve the conservation objective of 'restore' the sandbank feature to favourable condition.

Table 4.1 Summary of the "minimum" and "maximum" management scenarios that may be required for Dogger Bank SAC

"Minimum" scenario:	*"Maximum" scenario*
Existing activities Experimental closures of ecologically representative areas of sandbanks. Closures may be to all activity and some to a selection (e.g. just towed gear). Closures should be sufficiently large, and kept in place for adequate time, to be able to clearly demonstrate effects of such closures.	Existing activities Ban on all forms of towed, demersal fishing over the whole site
Proposed activities Plans or projects which are likely to have a significant effect on the offshore SAC will be subject to Appropriate Assessment (AA). In response to a perception of more rigorous consideration of proposals – and on the advice of authorities and statutory advisers - businesses may make adjustments to projects proposed relative to baseline to ensure no significant effects. Businesses are also likely to invest more in assessment (+10%). It is possible that there may be some wind farm and/or aggregates applications that will not be consented if it cannot be ascertained that there will be no adverse effect on the integrity of the site.	Proposed activities Offshore industry plans or projects which are likely to have a significant effect on the offshore SAC will be subject to AA More adjustments to project proposals are made to minimise interference with features e.g. prohibition of rock dumping on features, detours in pipelines to avoid feature, reduction of scour protection or cable armouring where windfarms are on sandbanks. Businesses are also likely to invest more in assessment (+50%). It is possible that some applications will not be consented if it cannot be ascertained that there will be no adverse effect on site integrity. Under the maximum scenario, it is likely that more projects would not pass the test of 'no adverse effect'.

4.2 Costs

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

a) Oil and gas

In summary, whilst not pre-judging individual EIAs or Appropriate Assessments (AAs), JNCC believe, taking into account past experience, that designating the Dogger Bank sandbank feature will impact upon the gas industry/ regulator in the following manner:

- Operators proposing new developments (pipelines, platforms and exploration wells) are likely to be advised by the regulators to conduct an environmental baseline survey. There are likely to be additional costs incurred for preparation of an AA and during the EIA process in terms of processing and interpretation of the significance of the survey information and operations on the conservation objectives of the sandbank feature.
- Activities that cause permanent and physical damage to the seabed such as rock dumping are likely to be subject to a higher degree of scrutiny in the EIA process by the regulators and their environmental advisors. Operators will be expected to justify proposals for rock dumping and demonstrate that no satisfactory alternatives exist. This could result in the regulators not permitting rock dumping in certain circumstances.

Oil and Gas UK were of the view that the requirement for AA was likely to mean going about assessments in a slightly different way rather than adding to costs significantly. Existing assessments have typically cost between £107k and £376k (for deeper waters) (average £240k).

Oil and Gas UK have previously estimated the costs of time series monitoring in an SAC. Their estimates, in 2010 prices, are around £5.2k-£10.4k per station per year over multiple stations in an area. Whether or not monitoring is necessary throughout the period would depend on the initial results.

Table 4.2 Summary of "minimum" and "maximum" management scenarios and assumptions made in estimating costs for the oil and gas industry of designating the pSAC compared with not designating the site

"Minimum" scenario	*Assumptions*	*Change in costs*
Increased costs related to appropriate assessments for new proposals	Average costs of around £240k could increase by 10%. Number of new proposals difficult to predict (assumed to be 2 pa based on 2009)	£48k pa
"Maximum" scenario	*Assumptions*	*Change in costs*
Increased costs related to appropriate assessments for new proposals	Average costs of around £240k could increase by 50%. Number of new proposals difficult to predict (assumed to be 2 pa based on 2009)	£240k pa
Time series monitoring	For five platforms in the site. Increased monitoring costs of up to £10.4k pa each	£52k pa

There is a small chance that a development will be refused if it cannot be ascertained that there will be no adverse effect on the integrity of the site. The scales of such an impact are unknown, but the costs are potentially significant.

b) Renewables

The Crown Estate has identified a development zone in the current (3rd) offshore wind power licensing round in the northern half of the Dogger Bank with predicted generating capacity of 9GW. Out of a total of 32GW potential from all Round 3 zones, Zone 3 (Dogger Bank) has the largest potential capacity.

The impacts of designating Dogger Bank on delivery of offshore wind power are difficult to predict. The impacts depend on the actual level of development that would have occurred had the site not been designated. The actual level of development at Dogger will depend on its characteristics relative to other sites - it is further offshore than most making it more expensive, but is in shallow water making it potentially more attractive.

Dogger Bank could potentially support 13GW of wind power[54], but a maximum of 9GW by 2020 has been allocated under Round 3. Therefore, the maximum *expected* development at Dogger in the current planning round and over the next 10 years is estimated as 9GW of wind farm capacity.

It is difficult to predict the impacts of the Dogger Bank SAC on the offshore renewables industry as it is at a stage of development where there is great uncertainty over individual project locations, numbers of turbines in a location/project and grid connections. Whilst not pre-judging individual EIAs or AAs, JNCC believe, taking into account past experience, that designating the Dogger Bank sandbank feature is expected to impact upon the renewable industry in the following manner:

- Developers will need to provide the Competent Authority with enough information to undertake an AA;
- The level of information required on both environmental description and justifying conclusions on impact assessment is likely to be higher than at non-designated sites due to the need for the Competent Authority to be confident in any decision that the development will have no adverse effect on site integrity;
- More intensive surveying may be required to ensure that the resulting habitat distribution mapping is suitable for determining the significance of impacts in appropriate assessment, appropriate to the conservation objectives of the site;
- Micrositing to avoid sensitive habitats is likely to be required;
- Designation may restrict the level of development at the site, and present a risk to consenting which may deter investors, both resulting in loss of revenue to developers (this is difficult to calculate). It will be necessary for the Competent Authority to carry out an AA which will need additional resources possibly both in staff time and resources for extra work. This is considered under the 'costs to Government of administering the regime', below;
- Whilst individual turbines are 'not likely to significantly affect' the Dogger Bank SAC, there is the possibility that in the future, combination, cumulative impacts from wind farm turbines and cables could adversely affect the integrity of a site. If the Competent Authority considered this to be the case, there is a possibility that projects could not go ahead, unless for reasons of over-riding public interest and where there are no alternatives. This is very much dependent upon the scale of wind farm proposals alongside what infrastructure (cabling and offshore transformers or substations) is required.

Micrositing and post-construction monitoring are likely to be required whether or not the SAC designation is in place. It is therefore predicted that the likely increase in costs to the overall development budget (derived from higher resolution survey requirements, an increased proportion of consultant reporting time and additional consultation activities) are likely to exceed £10m for 12.8GW[55]. Here, a figure of £10m is used as an estimate of costs to the initial development of 9GW. This figure assumes that prescriptive requirements for foundation types will not be necessary. If this assumption is not correct then there could be significant additional costs. In addition, the additional one-off costs of undertaking appropriate assessments for the use of the site for wind power regeneration are estimated at £1.88m.

There is also the potential for cumulative effects on offshore renewables capacity if further marine areas are designated following the proposed designation of Dogger Bank. Further inshore, marine sites have been proposed by Natural England and JNCC, and include areas of sandbanks that are potentially

[54] Phil Bloor, DECC pers comm. 18/12/08.
[55] Forewind, July 2010

suitable for wind farms. However, other than overlap with Dogger Bank SAC proposal, there is only overlap of potential wind farm development areas from Round 3 with one other Natura 2000 site (Haisborough, Hammond and Winterton, which is currently being considered for designation by Natural England and JNCC). Therefore, the potential for major cumulative effects of SAC designations within the current round of wind farm development is judged to be small. However, the risk may increase when considered in relation to past, current and future rounds of wind farm development.

Here, we assume that some of the 9GW can be developed under the minimum potential management scenarios. In reality, however, it is possible that not all 9GW of potential wind energy capacity at Dogger will actually be developed over the next 10 years[56]. Therefore, the minimum impacts actually relate to the proportion (between 0% and 100%) of the 9GW of maximum expected development that would be developed. This proportion is difficult to predict, the 9GW of expected capacity at Dogger Bank is equivalent to the total expected capacity of offshore wind farm developments in the UK through Rounds 1 and 2[57], but a significant increase in the speed of development is needed to meet renewable energy targets[58].

There is also a possibility that a wind farm may be refused permission or that development would be restricted. This would cause delay (resulting in a cost of continuing to employ a project team) and any costs incurred (e.g. assessment costs and royalties paid to the The Crown Estate) would be sunk. It would also lead to a loss of potential revenue to The Crown Estate.

It is possible that, under the maximum scenario the spatio-temporal restrictions imposed on the construction of the offshore wind farms would make the development economically unfeasible.

If development was unable to proceed because of the SAC designation, there are a variety of costs that would potentially be incurred by industry. These costs are highly uncertain. The costs have been considered as follows::

- Sunk development costs - estimated to approximately £100m
- Sunk Grid Connection Agreement Costs
- Lost opportunity costs
- Long term costs driven from the need to develop elsewhere
- Impacts to the supply chain

Sunk Development Costs

Should the SAC designation prohibit delivery of the 9GW of offshore wind farm projects that Forewind are proposing to deliver before 2020 then there is potential for all this money to be lost. The development costs already sunk in the project would need to be spent elsewhere in the UK economy to develop alternative capacity, resulting in an additional cost of an estimated £100m one-off[59]. These costs are included in the summary figures for the 'maximum scenario' as they are assumed to be in addition to the per MWh costings provided in the 'long term costs' section.

Sunk Grid Connection Agreement Costs

[56] Forewind estimate construction to last from 2015-23 with first grid connection in 2016. www.forewind.co.uk/files/stakeholder-fact-sheet.pdf
[57] DECC expect 8GW from offshore wind farms from Rounds 1 & 2 when complete (Phil Bloor, pers com., 18/12/08).
[58] "Having consented approximately 3GW in the seven years since 2001, ten times that amount must pass through the system in ten years time for Government and the industry to meet and construct its objective." http://www.bwea.com/pdf/publications/33GW_08.pdf - page 5.
[59] Pers comm. DECC, 2010/11

Whilst sunk grid connection agreement costs are discussed here, they are not included in the total cost estimate as they do not represent a cost to the UK economy, rather a transfer from the developer to the NGET (National Grid Electricity Transmission) and OFTO (Offshore Transmission Network Owners).

Forewind would have signed Bilateral Connection Agreements with NGET for connection to the UK transmission network. Should the projects not achieve the expected consents, the developer would have to pay cancellation Final Sums to NGET to cover work to date on the required onshore grid reinforcements to facilitate these connections. Depending on the set of transmission network reinforcements identified by National Grid as required to connect Dogger Bank, these cancellation securities could reach as high as hundreds of millions of pounds by the time of Tranche A consent being secured (late 2013).

Due to the proposed structure of the enduring Offshore Transmission Regime, developers are required to appoint an OFTO to design, procure, construct and build the connection assets for wind-farms. This tendering process carries a fee to the developer of £50,000, with a cancellation security per project tender of £500,000 (per OFTO which is a maximum 13 for Forewind). If the failure to obtain consent caused Forewind to have to pull out of this mid-process, both these amounts would be at risk.

Lost Opportunity Costs

Using a predicted generating capacity of 9GW and assuming a 43% capacity factor and a current public domain basket (wholesale including ROC's and LEC's) price of green electricity of £126.9/MWh (Mott MacDonald 2010) Dogger Bank has the potential to generate a total value of power of £4.30bn pa[60]. According to Forewind's projections, they hope to have 9GW in operation by 2020 so if the entire value of power is lost, then this would be the foregone income from 2020 onwards. This figure is not used in the summary figures provided within this IA since as it is possible that the power will be generated elsewhere (see subsequent section on 'long term costs')

Long-Term Costs

Inability to develop on Dogger Bank would necessitate development in other areas in order to ensure that the Government's renewable energy targets could be achieved. Zones that have been identified through Round 3 represent the "best" available sites based on the available wind resource and water depths as well as a variety of constraints including other users of the sea. Any replacement sites identified to fill in the gap resulting from not developing Dogger Bank can therefore be expected to be less suited to offshore wind farm developments and have a higher cost of development and construction associated with them (e.g. due to higher cost of foundations in deeper water) and lower rate of return (e.g. due to lower wind speeds).

The costs of not developing the 9GW at Dogger Bank are the additional costs of developing this capacity at an alternative location. This section looks at the additional per MWh cost based on the differences between the long-term resource costs of developing wind farm generation capacity in the UK at Dogger Bank and at a deeper water site. Costs are based on the 'levelised'[61] costs reported by Mott MacDonald (2010). These costs vary significantly depending on assumptions made in modelling levelised costs.

From the Mott MacDonald report, the costs of development of Dogger are based on costs of offshore wind development located 25km from shore in 20m of water. Alternative costs are based on the R3 costs offshore wind located 75km from shore in 50m of water. While Dogger Bank is located 150km offshore, 20m is representative of its typical depth, and this feature is a major determinant of wind farm costs.

[60] £126,900/GWhr x 8760hr x 9GW x 0.43 = £4.3bn pa

[61] Levelised cost of generation is the lifetime discounted cost of ownership of using a generation asset converted into an equivalent unit cost of generation in £/MWh or p/kWh. This is sometimes called a life cycle cost, which emphasises the cradle to grave aspect of the definition (Mortt MacDonald, 2010). Whilst assumptions in the Mott MacDonald report are clearly not the same as the assumptions of the IA they are currently the best available.

Costs in the report are calculated using a 10% discount rate, assuming a 2013 project start date and projected engineering procurement and construction prices. Under these assumptions the difference in costs is £28.50/MWh of capacity. Assuming a 43% load factor (Mott MacDonald 2010) gives a cost of £107.35m /GW pa. These costs are applied to the proposed 9GW of developments over 2016-2019[62].

It should be noted that there are complex spatial constraints on the location of offshore wind farms in UK waters and therefore the availability of alternative locations is not straightforward or guaranteed. If other viable wind power projects are not available, then the value of the lost renewable generation capacity can be estimated based on the marginal cost of other forms of renewable electricity generation in the UK. This marginal cost is estimated at £881 per MWhour (DECC, pers comm. January 2011). Assuming a 43% load factor, this would value the lost capacity at Dogger at £29.87bn.

Impacts to the Supply Chain

The offshore wind industry has experienced a recent and sharp increase in capital costs (due in part to supply chain constraints and the devaluing of the sterling) which has resulted in economic viability being considered a significant barrier to the delivery of projects.

A recent study commissioned by Renewable UK (formerly BWEA) (Ref: "UK Offshore Wind: Charting the Right Course – Scenarios for offshore capital costs for the next five years") concludes that the success of the offshore wind farm industry is dependent on increased supply chain confidence which could bring about a reduction in capital costs of between 15 to 20%.

Dogger Bank represents 28% of the Crown Estates Round 3 delivery plan (9 of 32 GW) and hence represents a significant proportion of the market to a developing supplier. Its loss would be a significant blow to suppliers and could affect confidence in the wider industry, decreasing the potential for developers to realise early reductions in capital costs. Decreased confidence could also lead to decreased inward investment and fewer jobs created in anticipation of the developing industry.

Due to the complexity of estimating this figure, it was not considered appropriate to try and monetise it.

Table 4.3 Summary of "minimum" and "maximum" management scenarios and assumptions made in estimating costs for the offshore wind farm sector of designating the pSAC compared to not designating the site[63]

"Minimum" scenario	*Assumptions*	*Change in costs*
Higher resolution survey requirements, an increased proportion of consultant reporting time and additional consultation activities (from micro-siting and post-construction monitoring)		£10m one-off in 2011
Increased costs of appropriate assessments		£1.8m one-off in 2011
"Maximum" scenario	*Assumptions*	*Change in costs*
Sunk development costs		£100m in 2011
Lost opportunity/ revenue costs	Alternative wind power development locations cost more than Dogger Bank	£107.35m per GW of capacity pa from 2016 – 2019

[62] It is assumed that the 9GW comes onstream linearly over this 4-yr period
[63] Costs were provided by developers, Forewind, July 2010.

The impact of this loss on the UK economy is dependent on other factors influencing the development of renewable energy, such as the availability of other renewable technologies, the cumulative effects of marine conservation and other marine planning constraints.

c) Aggregates

No aggregates extraction licences have yet been approved at the site, but two licences have been applied for with an expected average annual extraction of 700,000 tonnes pa from 2011.

In exploiting these extraction licenses it is likely that screening of material would be undertaken on or near the site. The practice of screening arises from the fact that sand and gravel is required in particular ratios – roughly 50:50. Seabed deposits do not necessarily provide the ratio required and material is therefore sometimes returned to the seabed to avoid unnecessary transport and disposal on land. In the event that screening was restricted, it may be possible to balance out the proportions of materials extracted from the two areas using other sources. If this is not the case, then additional costs will arise[64].

Whilst not pre-judging individual EIAs or AAs, based on experience, designating the Dogger Bank sandbank feature is expected to impact upon the aggregates dredging industry in the following manner:

- For applications within the Dogger Bank area, it is likely that a more in-depth knowledge of the area will be required for EIA purposes. BMAPA have previously suggested that the current costs of EIA are around £300k - £800k per application (giving a mid-point of £550k). In 2010 prices, this midpoint is £574k. Designation may raise costs faced by the industry in terms of environmental survey work and appropriate assessments by 10 - 50%. It is especially important that for EIA purposes, industry is able to put any area of a Natura 2000 site in context of both the wider site and the wider marine environment.
- For applications within the Dogger Bank, MMO will be responsible for undertaking the AA process. This will increase resources required by the MMO in terms of time and effort to process applications. This impact on MMO is assessed under 'costs to government of administering the regime' (below).
- Restriction on screening could increase operating costs aggregate extraction. Not being able to screen could make dredging significantly more costly and possibly unviable (increased costs are estimated at approx £1m pa). There may be additional steaming time as a result of prohibition of screening on or adjacent to the site. However, it is considered unlikely that management of the site would allow aggregate dredging to continue but ban screening. Therefore, costs of a ban on screening alone are not included in the costs in this assessment because screening would either be allowed or the whole operation would be disallowed.
- There is a risk that applications for dredging operations on the Dogger Bank will be turned down by MMO on the basis of the conclusions of AA.

Table 4.4 Summary of "minimum" and "maximum" management scenarios and assumptions made in estimating costs for the aggregates extraction industry of designating the pSAC compared with not designating the site

"Minimum" scenario	*Assumptions*	*Change in costs*
Increased cost of EIA	Costs of two current application areas (on average £574k) increase by 10% Costs of two new application areas (2014) (on average £574k) increase by 10%	£115k one-off £115k one-off
"Maximum" scenario	*Assumptions*	*Change in costs*
Increased cost of EIA	Costs of two current application areas (on average £574k) increase by 50% Costs of two new application areas (2014) (on average £574k) increase by 50%	£574k one-off £574k one-off

[64] Mark Russell, BMAPA, pers comm.

If extraction applications are turned down or companies perceive that the relevant authority will judge that future dredging will adversely affect the integrity of the SAC and are less likely to bring forward applications to exploit reserves within it, this would lead to a failure to exploit potential resources. It is difficult to judge the likelihood of this happening, but it would mean that companies would not realise the value of the specific natural assets and the Crown Estate would not receive royalties from the assets. It would normally be expected that companies would seek alternative extraction areas or that market demand would be met by other companies exploiting sources of sand and gravel such as from other areas of the seabed or from terrestrial sources. This would be considered a transfer in the economy rather than a cost. If, however, total resources are constrained in the longer term then it may mean less income to UKPLC. Should this happen it is assumed to be beyond the timescale of the assessment. For these reasons any risk of not being able to realise assets is not quantified in this assessment.

d) Shipping

Current shipping activity within the site is relatively light and is not thought to be impeding conservation objectives for the site. Prevention of pollution by contaminants from ships is already well regulated. Therefore, shipping activity is unlikely to be affected by site designation and impacts under minimum and maximum management scenarios are expected to be zero.

e) Cables

There are no plans to install new cables apart from those associated with wind farms (included above) or for any upgrade activity in the near or medium term. Therefore, cable activity is unlikely to be affected by the designation and impacts under both the minimum and maximum scenarios are assumed to be zero.

f) Fisheries

Whilst not pre-judging decisions made by competent authorities on whether management of fishing activities will be required within the site, the vulnerability of the Dogger Bank feature to pressures associated with fishing (Table 2.1**Table 2.1**) implies that some regulation of mobile demersal gear may be required in order to meet the site's conservation objectives. Controls could range from experimental closures of part of the site (assumed to be 15%[65]) to towed demersal gear to complete closure of the site to towed demersal fishing. The impact on fishermen of closing areas to certain types of fishing is complex and difficult to predict. It will depend on what individual fishermen do as a result of restrictions and the cost implications of changes. Current fishing practice at Dogger Bank is assessed here using 2006-9 Vessel Monitoring System (VMS)[66] and landings data for the ICES rectangles[67] within which the possible SAC is sited.

Potential UK economic impact of foregoing landings

Without further analysis, it is uncertain whether the fishing activity within areas closed to fishing will be partly or wholly displaced to other fishing grounds or whether there will simply be less fishing in global terms. To provide an indication of the maximum direct effect of designation, the impact on the UK economy of foregoing the landings from towed demersal gear from within the entire SAC is considered. As discussed above (see Section 2), the value of annual landings from UK vessels using towed demersal gear - at UK and non-UK ports - within the boundaries of the proposed Dogger Bank SAC has been estimated at approximately £2.71m.

Using input-output multipliers based on this data allows analysis of the impact on the UK economy. However, it should be noted that multipliers are limited to a static reflection of economic linkages and will change over time and with differences in the economic structure of different areas. The multipliers used to determine these effects were recommended by Sea Fish Industry Authority (SeaFish 2007) as the

[65] This is an arbitrary figure; the estimate depends on which areas are selected for the experimental closures, and whether alternative fishing grounds within or outside the SAC can be found.
[66] VMS records the location of vessels over 15 metres by satellite.
[67] The International Council for the Exploration of the Sea divides seas into rectangles and this system is used to assist monitoring and enforcement of marine activities.

best available and account for landings in UK ports by domestic and foreign vessels. Loss of £2.71m of landings could lead to a reduction in[68]:

- UK Employment by 175 FTE jobs; and
- UK GDP by £4.7 million.

Although it does not take account of some of the potential indirect effects, these estimates give an indication of the scale of the potential maximum economic impact from changes in fishing activity as a result of designation. The 'further analysis' section below discusses data needed to undertake a fuller analysis. The necessary data to fully understand the employment and profit impacts from landings in foreign ports on the UK economy is complex and has not been scrutinised for this IA. An estimate of the value of other Member State's fishing effort on the site is provided, but is not incorporated into cost calculations.

The economic impacts of the potential closure of Dogger Bank are estimated as the loss of profitability of fishing effort at the site. This is informed by data from the Marine Management Organisation on potential activity within the area and from the 2008 survey[69] on the profitability of fishing, which show that the net profit ratio does not exceed around 30% for any segments of the industry with most segments having much lower ratios[70].

Table 4.5 Summary of "minimum" and "maximum" management scenarios and assumptions made in estimating costs for the fisheries sector of designating the pSAC compared with not designating

"Minimum" scenario	*Assumptions*	*Change in costs*
Experimental closure of up to 15% of site to towed demersal fishing[71]	Loss of 15% of total net profit (profit estimated at 30% of UK landings (£2.71m))	£122k pa from 2011
"Maximum" scenario	*Assumptions*	*Change in costs*
Closure of the whole site to towed demersal fishing	Loss of total net profit (at 30% of landings from UK vessels (£2.71m))	£813k pa from 2011

Further analysis

The analysis carried out to inform this consultation IA was intended to provide an indication of economic impacts and their scale resulting from changes in fishing activity within the possible SAC. Further analysis would be needed to understand more precisely how vessels would respond to measures and the impacts of responses. The majority of the necessary data for the desired level of detail were not available to include in the IA. Information that would be desirable to add to this analysis and was requested through consultation:

- Identification of the number and types of UK vessel businesses that fish at Dogger Bank, including home port and fishing days within the SAC;
- How changes in landings at foreign ports might impact the UK economy;
- Views on how fishermen will respond to closure;

[68] 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

[69] SEAFISH 2010. 2008 Economic Survey of the UK Fishing Fleet. Seafish Industry Authority.

[70] GVA is often considered a better indicator than profitability in terms of the impact of reduced activity. However, given that the profitability ratio of 30% provides an upper bound for segment profitability, it was felt that including additional impacts on crew share would overstate the overall impact on the fishing sector.

[71] This is an arbitrary figure; the estimate depends on which areas are selected for the experimental closures, and whether alternative fishing grounds within or outside the SAC can be found.

- Where activity is displaced, difference in steam time, fuel costs, fishing levels and any other cost/profit information associated with displacement alternatives;
- Costs to not fish if site was designated and there were no suitable alternative sites such that site designation made some vessels unprofitable;
- Potential seasonal effects of designation;
- Any other data that would improve comparison of costs, earnings and profits for vessel businesses under the different scenarios; and
- Other sites for plaice catch, as well as level of catch at those sites and their sensitivity and importance for overall plaice stocks.

Some of this information was provided during the consultation, but most is still not available. Whether fishermen are able to fish at alternative sites will depend on a number of considerations, a key factor being the availability of suitable grounds. There may also be weather and other seasonal constraints to moving to alternative areas.

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

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

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

A further important issue is that any closures, even if undertaken unilaterally by the UK, would have to be agreed with other Member States of the European Union through the CFP. It is assumed that this process may take a minimum of a year to carry out and therefore that closures would not be in place until 2011. Although it may take longer than this to actually put measures in place, by using the minimum timeframe it ensures that the costs are not underestimated.

g) Administration costs to Government

Competent Authorities will incur costs in enforcing the regime as a result of:

i. *Requirements to review existing activities that may have impacts on the habitats for which sites have been designated.* It is assumed that no further work is necessary to assess the impacts of activities, but further work is necessary to develop, implement and communicate site specific management measures. MMO estimate that this may require 2 person-years of officer time plus related expenses[72]. Based on the costs of staff time in Defra this is estimated to cost £90.5k per FTE year, giving a total estimated cost as a one-off £181k[73].

[72] Juliette Hatchman, MFA, pers comm., 19/12/09.
[73] This is based on the full costs (includes e.g. overheads and pensions contributions) of a Senior Executive Officer for 6 months from Defra's 2007-08 Ready Reckoner of staff costs and £10k for communication and other costs (inflated to 2010 prices).

ii. *Requirements to assess the implications of any activity they consent.* As discussed above, the number of proposals the authorities will receive each year is predicted to involve over the next 10 years: gas – 2 surveys pa for new developments; aggregates – survey costs for two current application areas; and renewables – increased survey costs to inform AA[74]. Assessing proposals will generally require input from other advisory bodies as well as the Competent Authority. Some inputs from them may have been required under existing arrangements such as the EIA process, but SAC management is likely to lead to a greater work load. Each AA for an activity within the SAC is estimated to require 2 months of staff time to write and review. Overall this is likely to require at least 1 additional FTE member of staff DECC, and one additional FTE member of staff at the MMO. This is estimated (see i) to cost £90.5k per FTE year, or £181k per year in total. In addition to this, DECC estimate that additional costs of commissioning and managing survey work to monitor favourable conservation status for the energy sector as a result of the designation will be approximately £1.04m per annum[75]. This cost is assumed to commence from 2011.

iii. *Monitoring and enforcement.* The MMO assessed that an additional 3 days boat time and 6 hours air surveillance might be necessary per site to enforce measures effectively. This would cost £39.6k per annum[76]. It is assumed that administration of records and other activities is carried out as part of existing duties.

There are currently no estimates of how much monitoring and surveillance will be required to fulfil the assessment of the site for the Habitats Directive and no estimate of the costs.

This impact assessment assumes that the costs of Government enforcement are constant for both the min and max scenarios. Under the two scenarios the effectiveness of enforcement is varied to estimate impacts that represent the likely range of impacts from designating the site. The Government administration costs (other than enforcement, such as completing AAs) vary under the scenarios as they are dependent on the level of development (the numbers of applications by different sectors) brought forward at the site. The minimum impacts are the costs under i) and iii) above: one-off costs of £181k and annual costs of £39.6k from 2011. The maximum impacts are one-off costs of £181k, and annual costs of up to £1.26m.

4.3 Benefits of designating the site

Discussion is provided below of the impact of designating the site based on specific ecosystem services. The site feature “sandbanks which are slightly covered by seawater all the time” has been graded as II for “degree of conservation of structure” which indicates that the feature is not in pristine condition. As outlined, further information will be required to assess and monitor the condition of the interest feature in the pSAC.

a) Provisioning services

Fish, shellfish and other crustaceans for human consumption

A habitat to a wide variety of marine species, the Dogger Bank is also important as a spawning ground for a number of species, including plaice. Plaice spawn on these (and other) shallow water sandbanks and the eggs then drift and hatch as larvae that are ‘seeded’ to shallow water juvenile areas (e.g. major estuaries and the Wadden Sea)[77]. Later the fish migrate into deeper water where they are exploited generally over much of the North Sea. Reduction of demersal fishing would protect breeding fish stocks particularly during the spawning season. The UK portion of this site is particularly important as it is the south-western portion of Dogger Bank where large concentrations of plaice (and cod) eggs are located

[74] Juliette Hatchman, MFA, pers comm., 19/12/09.
[75] Phil Bloor, pers comm. 18/12/08, inflated to 2010 prices.
[76] This is based on costings provided by the MMO (pers comm., Dec 2010) of £9.1k per boat day and £2,050k for an hour of air surveillance.
[77] International Council for the Exploration of the Seas (ICES), *ICES-Fishmap Plaice*. http://www.ices.dk/marineworld/fishmap/ices/default.asp?id=Plaice

(Munka et al 2002). The region around Dogger Bank supports a number of fisheries targeting cod, haddock, plaice, sole, dab and sand-eel (**Error! Reference source not found.**).

The process through which fish recruit to fisheries is complex and, with many other variables to be taken into consideration, it is impossible to predict whether reduction in demersal fish catches on Dogger Bank would result in increased recruitment to stocks as a whole. Thus, while the possibility of increased catches must be considered, it is not possible to predict the scale of any economic benefits.

Extraction of fish that are both targeted by fisheries and caught as bycatch may be affected by designation, with the potential for both positive and negative effects. On the one hand, if fisheries are controlled within the site to conserve the sandbanks and their typical species then this could reduce the amount of fish caught from the site. These controls could contribute to sustainable management of some fish stocks at the site and as a result the abundance of fish may increase. On the other hand, controls could cause fishing effort to be displaced to other areas outside of the site, increasing pressure on the stocks in these areas, but not overall.

The control of commercial fishing on the site may extend the longevity of shellfish, and there may be greater numbers of larger individuals that can produce more young. This may contribute to a potentially larger population of fish in the future.

b) Regulating services

Regulating services are not mentioned further here as their value is considered to be minimal at a site level. Benefits arising from regulating services are likely to occur on a network level as discussed in Annex III.

c) Cultural services

Archaeology

During the last ice age, Dogger Bank ("Doggerland") connected Britain, The Netherlands, Germany and Denmark[78]. Bottom trawlers have recovered important archaeological pieces from the area in the past, including a barbed fish harpoon, as well as other prehistoric tools and weapons and lion and mammoth remains (Coles 1998; Gaffney *et al* 2009).

This area will continue to attract research interest as demonstrated by the formation of the North Sea History and Management Framework (2009)[79].

However, bottom trawlers also dislodge *in situ* records which make subsequent interpretation more difficult. Management of demersal fishing may provide a benefit to cultural services, but it is not possible to quantify this benefit.

d) Types of value

Option Values

Some people will gain from having the option to benefit in future from conservation of a good example of sandbank 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 sandbank habitat available to conserve in future. Also, some will gain from knowing that it is conserved in case future information reveals that the sandbank habitat provides important benefits that we are currently unaware 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

[78] http://huss.exeter.ac.uk/archaeology/research/rdoggerland.shtml
[79] Information provided by English Heritage during the formal consultation of Dogger Bank SAC (2010)

satisfaction from knowing that the sandbank 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 specific mammal species). Additionally, Beaumont et al (2006) estimate the non-use value of biodiversity of the UK marine environment at £0.5-1.1 billion per year across the UK population.

The effects of designation of the Dogger Bank for the provision of each of the ecosystem services described above is summarised in Table 4.6 below as the difference due to site designation compared to the baseline (no designation). There are four additional columns of information in the table to clarify our understanding of the qualitative changes in ecosystem services arising from (non-) designation:

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

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

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

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

Table 4.6 Potential significance of ecosystem services improvements for Dogger Bank pSAC

Services	Relevance to site	Baseline Decline	Option 1 Designate Min improvement	Option 1 Designate Max improvement	Value weighting	Scale of benefits	Confidence
Fish for human consumption	**High.** Spawning ground for commercially significant fish species including North Sea plaice. Important for shellfish.	**Mod.** Interruption of lifecycle processes could mean significant decline.	**Low.** Improvement on site likely to support species of human interest. Limited by fewer management measures and risk enforcement does not succeed.	**Mod.** Improvement on site likely to support species of human interest, especially plaice stocks in North Sea.	**Mod.** Sandbanks are of high value for N Sea fish, but relative importance of Dogger Bank is hard to judge.	**Low - Mod** Increase in stocks likely to be offset by declines elsewhere, but conservation of this spawning ground could improve plaice stocks throughout N Sea.	**Moderate.** Possible that taking same catch level outside site is not neutral on stocks overall
Fish for non-human consumption		**Low.** Probably not demersal spp, but could experience indirect decline.					
Aggregates	**Moderate**. Large potential resource, but little exploited.	**Nil.** No effect.	**Nil.** No effect	**Nil.** No effect.	**Moderate**. Significant value of resources.	**Nil**	**High**
Carbon sequestration	**Minimal.** Features are likely to have low effect and 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 likely to have a low effect and small area.	**Minimal.** Unlikely to affect assimilation functions.	**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 but uncertain if will regenerate.	**Low.** Continuing degradation, but may not have further adverse effect on sandbank value.	**Low.** Some recovery of biodiversity and community composition possible but enforcement may not succeed.	**Moderate.** Some recovery of biodiversity and community composition possible.	**Moderate.** All UK population is relevant but relatively low value per capita.	**Low - Moderate**	**Low.** Presence of charismatic marine mammals which may have higher non-use values.

Scientific research	**Low.** Some basic scientific value, but level of uniqueness is unclear.	**Low.** Continuing degradation removes scientific value.	**Low.** Some recovery but enforcement may not succeed.	**Moderate.** Some recovery of biodiversity and community composition.	**Moderate.** For sediment management & biological resources	**Low - Moderate**	**Moderate.**
Archaeology	**High.** Many sites on submerged Mesolithic landscape that some fisherman recover artefacts from.	**Low.** Fisherman continue to recover artefacts, decreasing the historical interest of site	**Low.** Fisherman deterred from recovering artefacts, slowing decrease in historical interest of site and disturbance of fauna.	**Moderate.** Fisherman prohibited from recovering artefacts, halting decrease in historical interest of site.	**High.** A lot of sites and of interest to public.	**Moderate.** Designation could allow management plan that does not permit informal recovery of historical artefacts.	**High.** Paleoarchaeology is well understood and sites are mapped.
Total value of changes in ecosystem services			**Low for min scenario, moderate for max scenarios**				**Moderate-High**

e) Benefits to economic activity

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

4.4 Summary of costs and benefits

Table 4.7 below summarises the potential costs and benefits of the site analysed in this section. The costs are analysed over a period of 10 years from designation in 2011, and are discounted at 3.5%. There are uncertainties in the assessment of costs, and some costs have not been quantified.

Table 4.7 Summary costs and benefits table for Option 1: Designate the site

	Minimum management scenario		Maximum management scenario	
	Costs	**Benefits**	**Costs**	**Benefits**
Assessed	**Sectors**	Low: possible impacts on archaeological, scientific and non-use values.	**Sectors**	Moderate: beneficial impacts on values of archaeological, scientific and non-use natural environment.
	Gas: £48k pa increased assessment costs		Gas: £240k pa increased assessment costs and £52k pa for time series monitoring	
	Fisheries: direct costs of £122k pa. after 2011		Fisheries: direct costs of £813k pa after 2011	
	Aggregates: £230k increased assessment costs		Aggregates: £1148k increased assessment	
	Renewables: £10m increased assessment costs, £1.8m increased appropriate assessment costs, both in 2011		Renewables: £100m sunk development costs in 2011; £57.42m per GW pa lost revenue costs from 2016 onwards	
	Government: Enforcement £181k one-off, up to £39.6k pa.		Government: Enforcement £181k one-off and up to £219k pa, survey costs up to £1.04m pa.	
Total average annual	£0.21 m	Low	£726.99m	Moderate
Total one-off	£12.29m	0	£101.33m	0
Total (PV)	£14.08m	Low	£5,660.16m	Moderate
Not assessed	- Costs if any projects are refused - Costs of vessel changes in gas sector - Costs from cumulative MPA impacts and beyond next 10 years	- Role of feature in wider ecosystem - Intrinsic value of biodiversity improvements - Ecosystem recovery beyond next 10 years	- Costs if any projects are refused - Costs of vessel changes in gas sector - Increased screening costs in aggregates sector - Costs from cumulative MPA impacts and beyond next 10 years - Possible loss of up to 13GW of renewable energy capacity in long term - Loss of asset to The Crown Estate	- Role of feature in wider ecosystem, including increase in plaice stocks - Possible benefits to fish stocks from protection of breeding grounds (e.g. plaice). - Intrinsic value of biodiversity improvements - Ecosystem recovery beyond next 10 years

a) Summary of risk of unintended consequences

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

- Designation might prevent further investment from oil and gas industry into area and prevent maximum returns on existing investment.
- Strategic impact on the UK's energy security and response to climate change, both in relation to development of renewables capacity and carbon and capture and storage.
- Risk that the UK will not meet its renewable energy targets if the site is designated though a) the designation does not rule out development for renewable energy, it just makes it subject to more conditions and potentially less extensive and b) there are other locations where renewable energy developments are ecologically feasible. Of the total advertised Round 3 area, 12% is required to achieve the target of 25GW from the round. In the long term, the designation could prevent the implementation of gas storage, or carbon capture and storage/sequestration (CCS), at the site. However, both these technologies would be cheaper, and therefore more likely, to be implemented at available sites closer to the shore.
- Fishermen may seek compensation for moving grounds[80].
- Displacement of fishing effort to alternative grounds may intensify fishing at those grounds to unsustainable levels, causing net damage to fish stocks overall.
- Increased requirements for assessment may potentially slow down development of offshore wind farms and hinder the delivery of UK targets on climate change.
- The proposed designation may significantly affect several important sources of income to the UK economy, the Treasury and The Crown Estate. It is assumed that revenues to the Treasury are displaced to alternative sources (e.g. of energy) with very low marginal impact. If the Crown Estate does not receive royalties from the specific natural assets, it would normally be expected that companies would seek alternative exploitation areas or that market demand would be met by other sources. This would be considered a transfer in the economy rather than a cost, and this is presumed to be the case over the next 10 years. If, however, total resources are constrained in the longer term then it may mean less income to the Crown Estate and UK plc. Should this happen it is assumed to be beyond the 10 year timescale of the assessment. For these reasons any risk of not being able to realise assets is not quantified in this assessment.

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, and by early and thorough consideration of the cumulative effects of designations on the scale appropriate to the industry concerned.

Infraction costs (either for not meeting Habitats Directive requirements, or for Government not meeting renewable energy targets) have not been included as Better Regulation Executive guidance specifies that such costs should not be included unless Government is seriously planning to pursue being fined.

Under the Offshore Habitats Regulations (which transpose the Habitats Directive), and following an AA, a Competent Authority can agree to a plan or project for imperative reasons of overriding public interest (IROPI), notwithstanding its adverse effect on site integrity, if there are no alternative solutions. It would be for the Competent Authority to decide whether to agree to a plan or project on IROPI grounds using guidance from the EU. The more strategically important the risks above are, the greater the likelihood of plans or projects being consented on IROPI grounds. Assessing such grounds would entail additional costs.

[80] This risk was acknowledged by the North Sea RAC following formal consultation (November 2010)

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 Dogger Bank SAC.

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

a) Competition assessment

This assessment, shown in Table 4.8 is restricted to the sectors where significant potential costs are identified in Table 4.7above, namely: fisheries, oil and gas, aggregates, and renewables. The table analyses the impact of the maximum potential management measures that may be required (which represent the maximum impact on activities in the site). The maximum scenario is used to assess whether any significant impact is likely. A more detailed assessment of likely impacts should also take into account the minimum scenario. Cumulative impacts of designation of Natura 2000 sites in the marine environment could have more significant effects on competition in some sectors. It is assumed that any management measures will apply to domestic and foreign operations.

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

Table 4.8 Competition assessment for Dogger Bank

Would the proposal:	*Fisheries, telecoms, renewables, oil and gas, and aggregates*
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 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 this should not be the case although if some fishing gear types are considered more damaging than others management measures may impose restrictions on them 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 fishing and wind farms.

In the fishing industry it is likely that the fishing vessels that may be impacted on by any additional management measures would be owned by SMEs and in most cases the company would not own more than one vessel[81]. 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.

[81] Based on expert opinion.

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.

Both positive and negative impacts on local and regional suppliers and contractors to the renewables industry could arise through restrictions or delays imposed on projects due to designation of the site. For example restrictions on the timing of construction and maintenance could result in increased contract lengths and standby rates being paid. Where additional surveys are required to assess the impacts of wind farms and export cables on interest features, this work is often carried out by or subcontracted to SMEs which may benefit financially from the additional work. Should wind farm developments not proceed as a result of the pSAC local ports and associated local businesses are likely to lose revenue that would have otherwise been gained through use of the ports as construction and servicing bases. It could also indirectly affect SMEs which are suppliers to the larger organisations that would be expected to be involved in these developments.

These effects on SMEs discussed above could be displaced, and therefore an impact on SMEs would only arise indirectly if the designation impacted on the overall development of capacity to generate electricity in the UK. Therefore these impacts are not considered further here.

c) Legal aid

Legal aid is available to individuals with an annual income of less than £12k or with income of between £12k and £21k and disposable income of less than £3.3k where the case is an interest of justice case. It is considered very unlikely that the designation of sites will lead to increased use of legal aid.

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.

In the event that aggregate extraction from certain licences has to cease prior to review of consents shortfalls in supply may be met from other licences in the region without impact on greenhouse gas emissions. In the event that the licences are revoked and the operator relocates in response, extraction would move further offshore resulting in increased emissions from longer steaming times. However this scenario is subject to considerable uncertainty.

If renewable developments from wind energy are significantly restricted, this could affect achievement of the UK's commitment to reducing greenhouse gas emissions. However it should be noted that there are alternative locations for generating renewable energy and other means to reduce such emissions.

The designation of the site however, may have a strategic influence on adaptation to and mitigation of climate change and energy issues, as discussed in preceding sections.

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.

4.6 Sensitivity assessment

The costs and benefits are analysed in this impact assessment over a period of ten years (see Section 1.3). However, the designation will have impacts beyond ten years. These are harder to predict, but an indication of their significance can be gained from sensitivity analysis that extends the analysis over 20 years. This requires a number of assumptions on the nature of costs and benefits over this period.

a) Costs

Assumptions are required about the timing of costs:

- Annual costs are assumed to continue to arise each year.
- One-off costs that arise at the start of the designation are assumed not to arise again.
- Costs that recur, but not every year, require assumptions specific to individual sectors assessed in Section 4.2:
    - Oil and gas – continue to assume two new developments pa based on 2009
    - Renewables – Forewind plan completion of Tranche A of their windfarm, providing 9GW, in 2020. Forewind state that they have a further objective to develop 13GW by 2023. Exactly when the windfarm comes onstream will obviously have huge implications for the maximum scenario. Potential loss of this further 4GW of capacity under the maximum scenario is valued according to the increased cost of alternative wind farm development locations used in Section 4: an annual additional cost from 2023 of £429m.
    - Aggregates – assume no applications for new licences. No change in assumptions.
    - Fisheries – activity continues based on predictions from current effort and landings data. No change in assumptions.
    - Administration costs to Government – no change in assumptions.

Assumptions are also needed about whether the costs identified over the first 10 year period of analysis used in Sections 4.1 and 4.2 continue at the same level over the second 10 year period. Two assumptions are used:

- Continuing cost scenario: That the recurring costs identified in the first 10 year period continue at the same level in the second 10 years.
- Declining cost scenario: The recurring costs decline in the second 10 years so that costs in year 20 are 50% of the costs in year 10. This assumption is based on the expectation that businesses will be able to adjust their activities in the long run (e.g. as capital equipment is renewed) to avoid some of the costs resulting from the potential management measures. It is calculated by reducing the values in each of year 11-20 by 5% of the value in year 10, cumulatively. So the costs in year 11 are 95% of the costs in year 10, and in year 12 at 90% of the costs in year 20, and so on, giving costs in year 20 at 50% of the costs in year 10.

The costs that arise are discounted at a rate of 3.5% per year.

Applying these assumptions results in an estimated PV of the costs:

- for the minimum management scenario of £15.0m – 15.4m
- for the maximum management scenario of £17.95bn – 22.44bn.

These results are 7 – 9% (minimum scenario) and 217 – 296% (maximum scenario) higher than the estimated costs of the potential measures over a 10 year timescale. In addition to these costs, the impacts from factors not quantified in the 10 year analysis (shown at the bottom of Table 4.7) may

become more or less significant. For example, the potential costs of impacts on renewable energy capacity may increase, with unintended consequences for the UK if capacity is constrained.

b) Benefits

The benefits of designation may also change over the second 10 year period. As the benefits are difficult to predict over the first 10-year period, analysis over the second 10 year period continues to produce uncertain results. However, it is highly likely that potential benefits will continue to increase due to potential continuing ecosystem recovery:

- Conservation of spawning grounds for plaice may have increased benefits to commercial fish stocks within the site over a longer time frame and possibly to stocks outside of the site, unless there are additional controls on fishing mortality.
- In the context of climate change, the non-use and scientific value of large areas of habitat that are protected from damage by human activities (and therefore potentially more resilient to indirect impacts such as climate change) may also increase. .

Sensitivity analysis of the impact of the designation shows that aggregate costs over a 20 year timescale costs may increase by an estimated 7 – 9% (minimum scenario) and 217 – 296% (maximum scenario), depending on whether the annual costs are assumed to remain constant or decline (the latter due to businesses being able to adapt to potential measures). Benefits from ecosystem recovery, on the other hand, are assumed to increase over a 20 year timescale, even though it is not possible to quantify these.

5 CONCLUSIONS

The purpose of this impact assessment is to provide information about the impacts of the designation of Dogger Bank SAC and is carried out in order to inform stakeholders and government about the options for the site. This is done by considering the impacts of Option 1 (designating the site) relative to the baseline (to not designate the site). The requirement for the UK to designate sufficient sandbank habitat to comply with the Habitats Directive makes pursuit of the baseline unlikely.

As the potential management measures for the site will only be known in detail after the site has been designated, it is necessary to make assumptions about what measures might be required for this site. This assessment analysed a range of impacts, relative to the baseline, defined through minimum and maximum management scenarios.

The minimum scenario involves the smallest change in activities that may be needed compared with the baseline and therefore presents the minimum potential effect on activities. The maximum scenario is at the other end of the scale: it entails the largest change in activities that may be needed compared with the baseline and thereby presents the maximum potential effect on activities.

As Table 4.3 above shows, under Option 1 (for the 10 years of impact assessment framework):

- For the minimum management scenario costs are relatively low (one-off costs of £12.29m and average annual costs of £0.21m) for such a large site, but expected benefits are also low; and
- There are potentially significant costs under the maximum management scenario (one-off costs of £101.33m and average annual costs of up to £726.99m), but this scenario also brings moderate expected benefits in relation to: conservation of fish spawning grounds; non-use values of the environment, such as scientific research and knowledge; and archaeological interests.

The low cost estimate is used here as a best estimate as the minimum management scenario is considered to represent the most realistic set of measures that will be required for the site. Complete exclusion of developments, such as renewables, and activities such as demersal fishing are not anticipated to be required in order to meet the conservation objectives of the site.

Sensitivity analysis of the impact of the designation shows that aggregate costs over a 20 year timescale costs may increase by an estimated 7 – 9% (minimum scenario) and 217 – 296% (maximum scenario), depending on whether the annual costs are assumed to remain constant or decline (the latter due to businesses being able to adapt to potential measures). Benefits from ecosystem recovery, on the other hand, are assumed to increase significantly over a 20 year timescale, even though it is not possible to quantify these.

In addition, a range of costs and benefits are possible through wider network and strategic effects. In terms of network benefits, designation of the proposed site will prevent degradation of areas of the marine environment and enable restoration where damage has occurred over the next ten years and beyond, which could potentially be of benefit to the wider ecosystem and enable increases in fish stocks. It has not been possible to assess these benefits. It should be noted that establishment of a network of protected sites is a key purpose of the policy (the Habitats Directive) stimulating the possible designation. This makes it important to consider the benefits of this site in the context of the value of the network of sites.

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ANNEXES

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

Description of known current and future activity relevant to the site

Note that fishing is carried out on a European level, by UK vessels, European and non-European vessels by agreement. Data on location and type of fishing is difficult to obtain comprehensively due to various issues. Also, fishing data from recent years is a reflection of fisheries already managed to an extent by total allowable catch (TAC) and species quotas. As there are no indications that these measures are likely to change within the timeframe of the IA, the current situation is taken as the baseline.

It is possible to obtain information on the distribution of fishing effort within the region for UK vessels (≥15m) that have vessel monitoring systems (VMS). These provide a vessels position, speed and heading either hourly or every two hours. Such information can be analysed spatially in relation to the site boundary. As vessels fish at characteristic speeds, VMS data can be processed to provide proxy patterns of 'active fishing'. The European Commission has passed a regulation requiring all member states to assure that VMS terminals in use on fishing vessels (≥15m) of its national fleet are secure[1]. Though VMS data only cover vessels of over 15m in length. However, there is no known activity of vessels <15m at the Dogger Bank[2]. Using a simple speed rule to partition active fishing from VMS is a coarse but effective means of estimating fishing effort (Mills *et al*. 2007).

Effort data were derived from work on a Defra marine biodiversity research programme (MB106)[3]. Estimations of fishing activity were derived from Vessel Monitoring System (VMS) data and are available for 2006-9. The derived surfaces represent activity from all vessels (both UK and non-UK registered vessels) of at least 15-m length. VMS data for UK vessels were linked to skipper logbook information in order to determine the fishing gear being employed. For non-UK registered vessels where logbook information is not available information on fishing gear employed has been obtained from 'primary gear' listed on the EU vessel register. Unprocessed VMS data have been filtered using a simple speed rule of between 1 and 6 knots to indicate fishing activity for all gear types. Date and time information attached to unprocessed VMS data were used to determine elapsed time between consecutive VMS locations for each vessel (usually 2 hours) and summarised at a cell resolution of 0.05 decimal degrees.

There are no landings data available specifically for the area which is proposed for designation. The Marine Management Organisation's Fisheries Activity Database (hereafter, FAD) compiles various data at the level of ICES rectangle. Catch data encompasses information for UK-registered vessels landing in UK and non-UK ports, and for non-UK registered vessels landing in UK ports. Data includes:

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

Note, the exception is for non-UK vessels that fish within territorial waters, but that land at non-UK ports; it is not possible to obtain weights and values of landings for these vessels. This impact assessment is concerned with the impacts of the UK's potential designation of Dogger Bank on UK businesses. However for fisheries, designations of other areas of the marine environment by other Member States are also relevant as there will also be effects on businesses in other countries.

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

Beam trawling

Landings from UK-registered vessels using beam trawls in the region of Dogger Bank[4]

	2006		2007		2008		2009		Average		Relative (%)	
ICES	**Weight (t)**	**Value (£k)**	**Weight (t)**	**Value (£k)**	**Weight (t)**	**Value (£k)**	**Weight (t)**	**Value (£k)**	**Weight (t)**	**Value (£k)**	**Weight**	**Value**
39F3	1,225	1,793	783	1,110	1,051	1,578	807	1,095	966	1,394	43.79	41.80
39F2	497	742	588	801	273	438	307	403	416	596	18.87	17.87
37F2	194	349	442	794	152	306	422	719	303	542	13.72	16.25
38F2	219	343	467	681	122	204	418	598	307	457	13.89	13.69
37F1	135	299	111	175	168	289	200	270	153	258	6.94	7.75
38F1	32	52	655	87	51	82	54	67	50	72	2.28	2.16
39F1	17	24	7	8	21	32	0	0	11	16	0.50	0.48
Total	**2,319t**	**£3,602k**	**2,462t**	**£3,655k**	**1,838t**	**£2,929k**	**2,208t**	**£3,152k**	**2,207t**	**£3,335k**	**100**	**100**

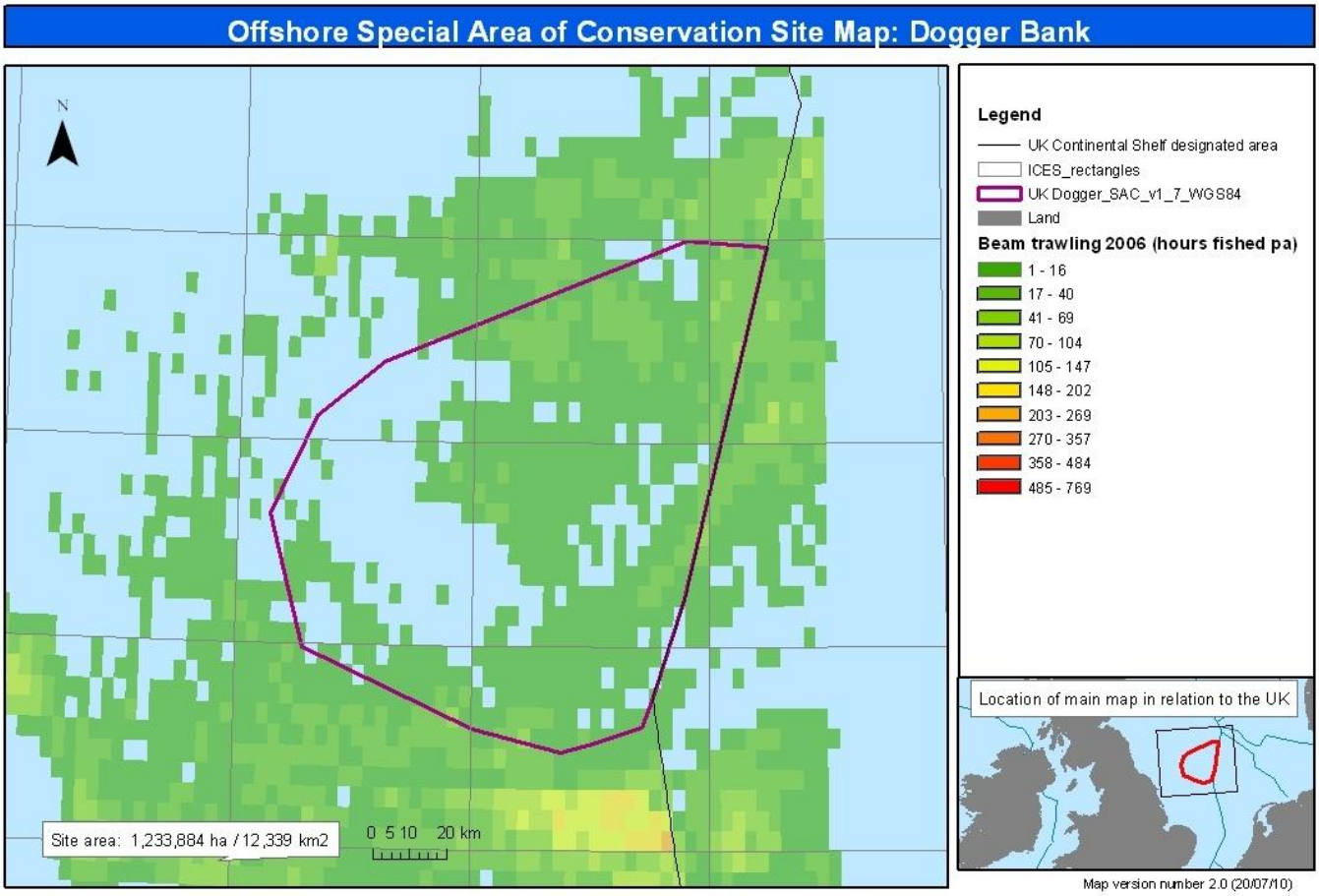
Effort data for UK-registered beam trawling from 2006-9[5]

	2006			2007			2008			2009		
	Total effort (hrs fished pa)	**Effort inside site (hrs fished pa)**	**Proportion of effort inside site (%)**	**Total effort (hrs fished pa)**	**Effort inside site (hrs fished pa)**	**Proportion of effort inside site (%)**	**Total effort (hrs fished pa)**	**Effort inside site (hrs fished pa)**	**Proportion of effort inside site (%)**	**Total effort (hrs fished pa)**	**Effort inside site (hrs fished pa)**	**Proportion of effort inside site (%)**
37F1	2664	234	8.8	3849	504	13.1	359	343	95.5	221	136	61.5
37F2	6730	491	7.3	11078	1363	12.3	396	157	39.6	690	331	48.0
38F1	332	202	60.8	775	431	55.6	103	101	98.1	159	149	93.7
38F2	1037	911	87.8	2883	2751	95.4	322	301	93.5	395	383	97.0
39F1	394	51	12.9	156	50	32.1	11	8	72.7	1	1	100.0
39F2	1900	1546	81.4	1812	1710	94.4	718	713	99.3	427	425	99.5
39F3	2277	836	36.7	1836	585	31.9	2852	314	11.0	1243	462	37.2

[4] MMO Nov 2010

[5] 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

Distribution of UK-registered beam trawl activity (hrs fished pa) (2006)



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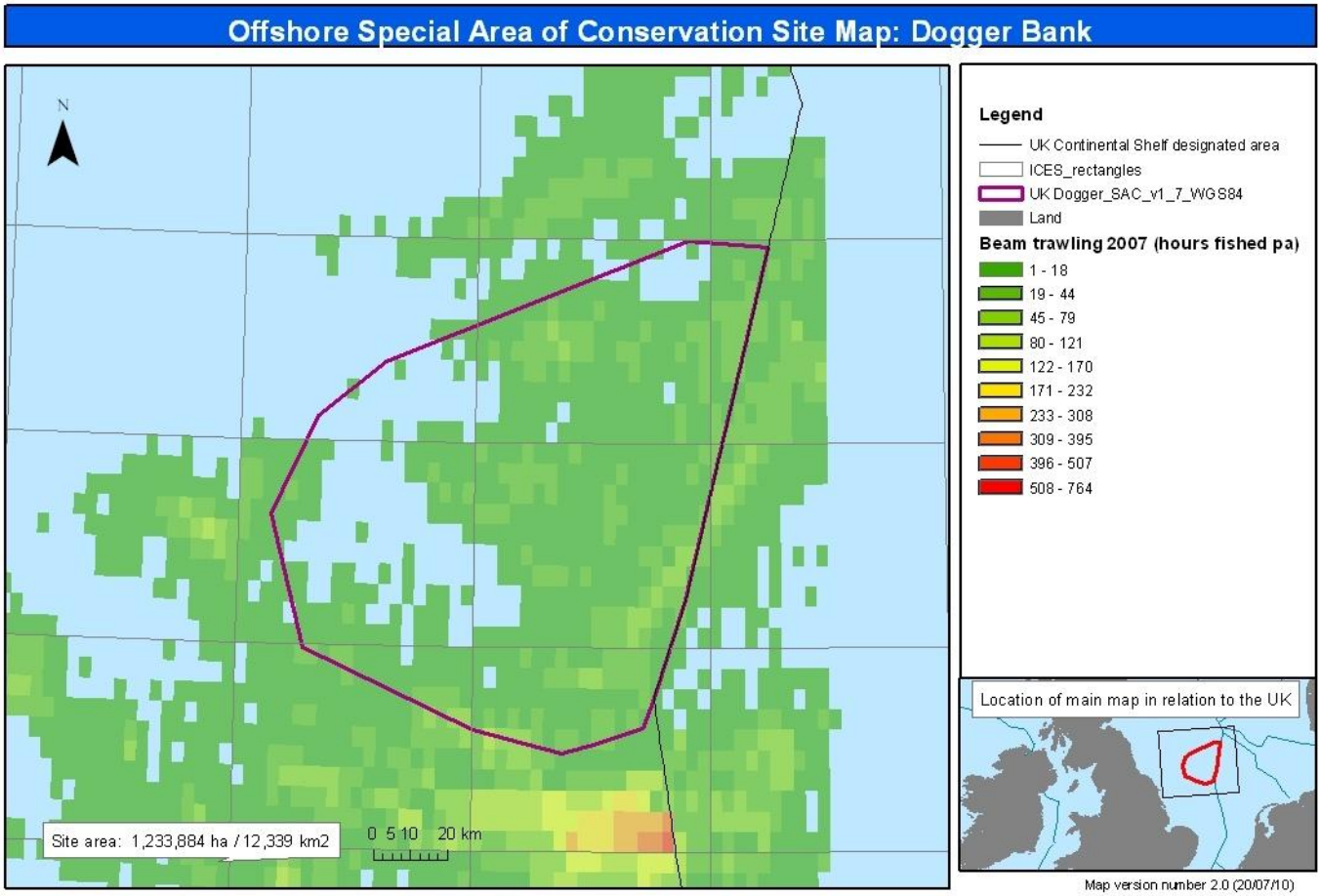
Beam trawl landings from UK-registered vessels within Dogger Bank SAC (2006)

	Landings from whole ICES rectangle		Proportion of effort within site	Landings from within site	
ICES	**Weight (t)**	**Value (£k)**		**Weight (t)**	**Value (£k)**
37F1	135	299	0.09	12	26
37F2	194	349	0.07	14	25
38F1	32	52	0.61	19	32
38F2	219	343	0.88	192	301
39F1	17	24	0.13	2	3
39F2	497	742	0.81	404	604
39F3	1,225	1,793	0.37	450	658
Total	**2,319t**	**£3,602k**		**1,094t**	**£1,650k**

Distribution of UK-registered beam trawl activity (hrs fished pa) (2007)



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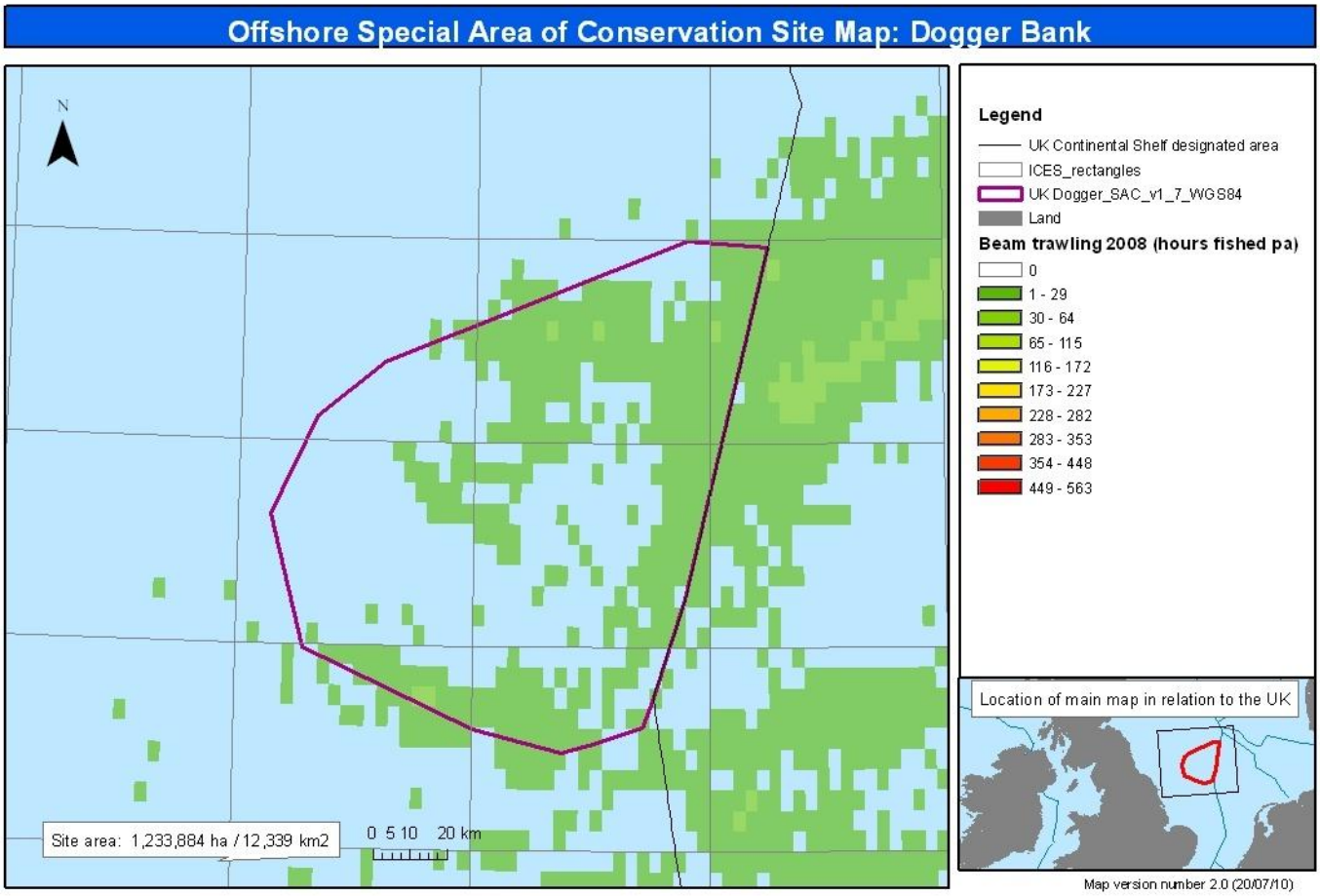
Beam trawl landings from UK-registered vessels within Dogger Bank SAC (2007)

	Landings from whole ICES rectangle		Proportion of effort within site	Landings from within site	
ICES	**Weight (t)**	**Value (£k)**		**Weight (t)**	**Value (£k)**
37F1	111	175	0.13	14	23
37F2	442	794	0.12	54	98
38F1	65	87	0.56	36	49
38F2	467	681	0.95	446	650
39F1	7	8	0.32	2	3
39F2	588	801	0.94	555	756
39F3	783	1,110	0.32	249	354
Total	**2,462t**	**£3,655k**		**1,357t**	**£1,931k**

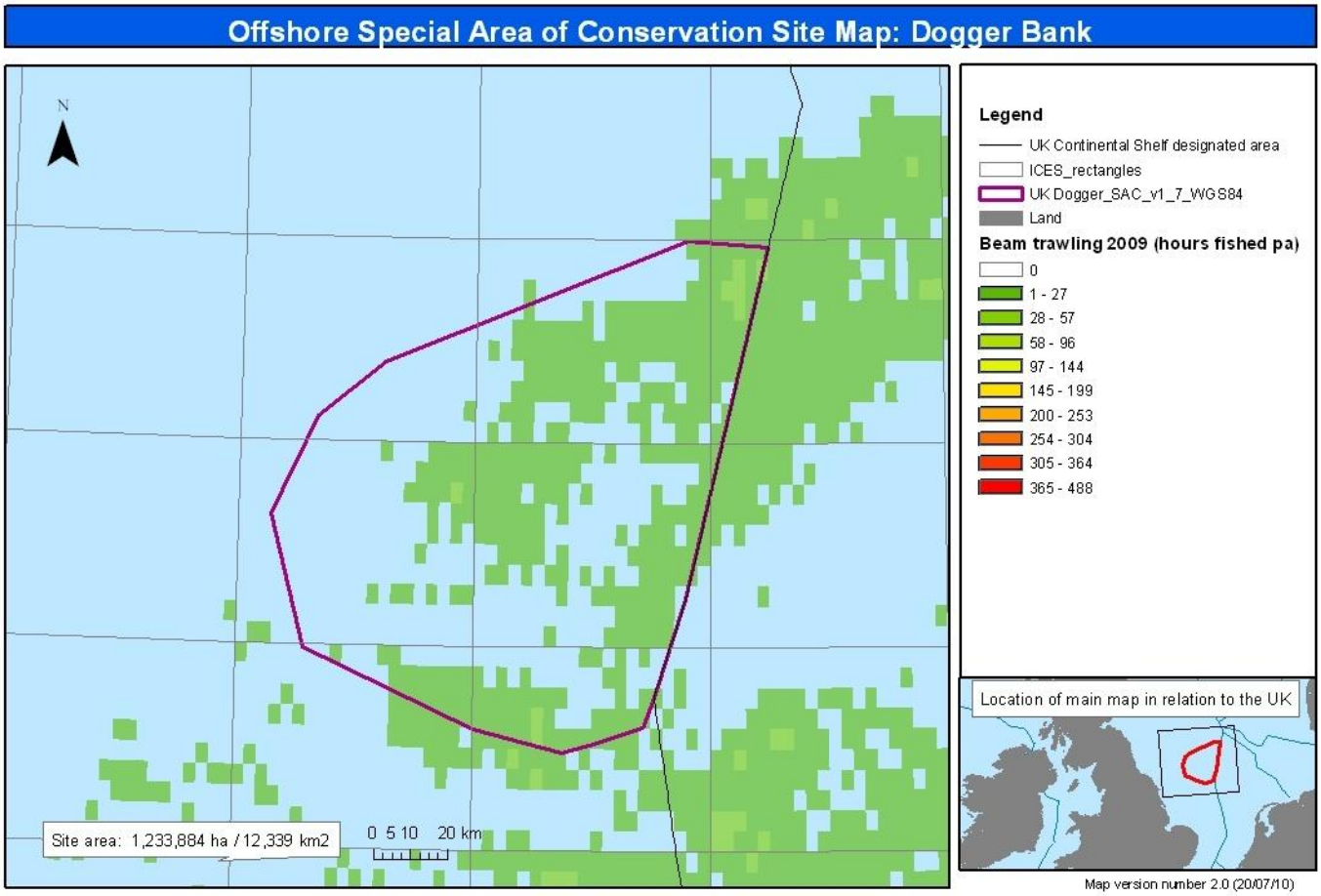
Distribution of UK-registered beam trawl activity (hrs fished pa) (2008)



Beam trawl landings from UK-registered vessels within Dogger Bank SAC (2008)

	Landings from whole ICES rectangle		Proportion of effort within site	Landings from within site	
ICES	**Weight (t)**	**Value (£k)**		**Weight (t)**	**Value (£k)**
37F1	168	289	0.96	160	276
37F2	152	306	0.40	60	121
38F1	51	82	0.98	50	80
38F2	122	204	0.93	114	191
39F1	21	32	0.73	16	24
39F2	273	438	0.99	271	435
39F3	1,051	1,578	0.11	116	174
Total	**1,838t**	**£2,929k**		**787t**	**£1,301k**

Distribution of UK-registered beam trawl activity (hrs fished pa) (2009)



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Beam trawl landings from UK-registered vessels within Dogger Bank SAC (2009)

	Landings from whole ICES rectangle		Proportion of effort within site	Landings from within site	
ICES	**Weight (t)**	**Value (£k)**		**Weight (t)**	**Value (£k)**
37F1	200	270	0.62	123	166
37F2	422	719	0.48	203	345
38F1	54	67	0.94	51	63
38F2	418	598	0.97	405	580
39F1	0	0	1.00	0	0
39F2	307	403	1.00	306	401
39F3	807	1095	0.37	300	407
Total	**2,208t**	**£3,152k**		**1,387t**	**£1,962k**

Otter trawls (unspecified)

Landings from UK-registered vessels using unspecified otter trawls in the region of Dogger Bank[6]

	2006		2007		2008		2009		Average		Relative (%)	
ICES	**Weight (t)**	**Value (£k)**	**Weight (t)**	**Value (£k)**	**Weight (t)**	**Value (£k)**	**Weight (t)**	**Value (£k)**	**Weight (t)**	**Value (£k)**	**Weight**	**Value**
37F1	127	209	151	266	188	308	184	261	163	261	21.36	23.81
37F2	28	65	246	424	318	487	285	387	219	341	28.81	31.10
38F1	6	7	36	48	65	88	58	71	41	54	5.40	4.89
38F2	13	8	116	165	264	342	408	525	200	260	26.35	23.73
39F1	21	34	13	20	5	8	3	4	10	17	1.37	1.51
39F2	11	17	5	7	24	32	3	4	11	15	1.41	1.36
39F3	7	8	68	86	126	167	265	335	116	149	15.31	13.59
Total	**213t**	**£348k**	**636t**	**£1,016k**	**989t**	**£1,433k**	**1,205t**	**£1,588k**	**761t**	**£1,096k**	**100**	**100**

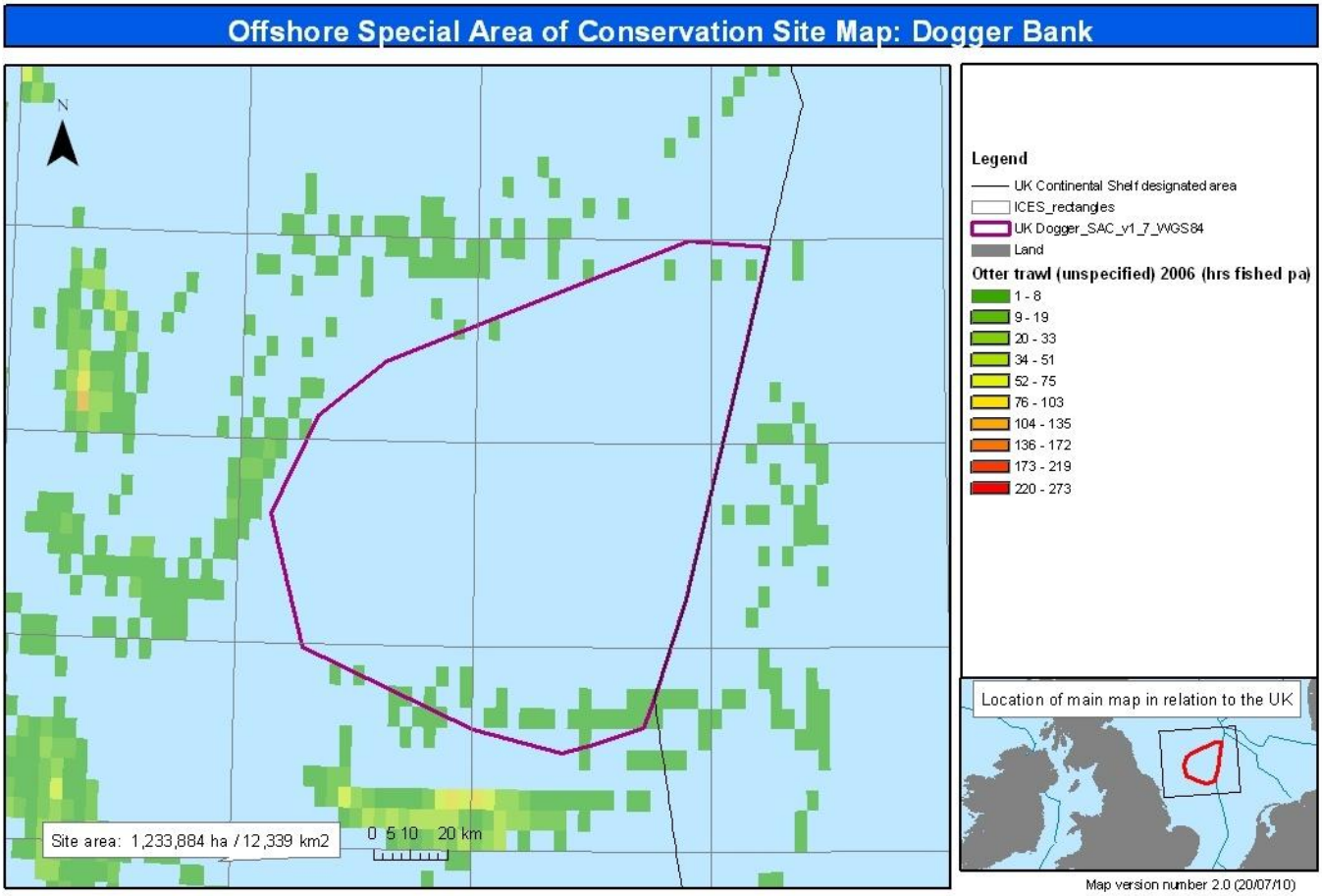
Effort data for UK-registered unspecified otter trawls from 2006-9[7]

	2006			2007			2008			2009		
	Total effort (hrs fished pa)	**Effort inside site (hrs fished pa)**	**Proportion of effort inside site (%)**	**Total effort (hrs fished pa)**	**Effort inside site (hrs fished pa)**	**Proportion of effort inside site (%)**	**Total effort (hrs fished pa)**	**Effort inside site (hrs fished pa)**	**Proportion of effort inside site (%)**	**Total effort (hrs fished pa)**	**Effort inside site (hrs fished pa)**	**Proportion of effort inside site (%)**
37F1	862	24	2.8	1271	66	5.2	1583	71	4.5	1135	168	14.8
37F2	555	50	9.0	2192	355	16.2	2211	232	10.5	1364	561	41.1
38F1	57	0	0.0	177	14	7.9	193	70	36.3	243	159	65.4
38F2	0	0	-	662	609	92.0	870	846	97.2	960	926	96.5
39F1	111	2	1.8	58	4	6.9	21	1	4.8	47	0	0.0
39F2	30	6	20.0	26	4	15.4	44	27	61.4	26	26	100.0
39F3	22	4	18.2	169	42	24.9	303	6	2.0	722	17	2.4

[6] MMO Nov 2010

[7] 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

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



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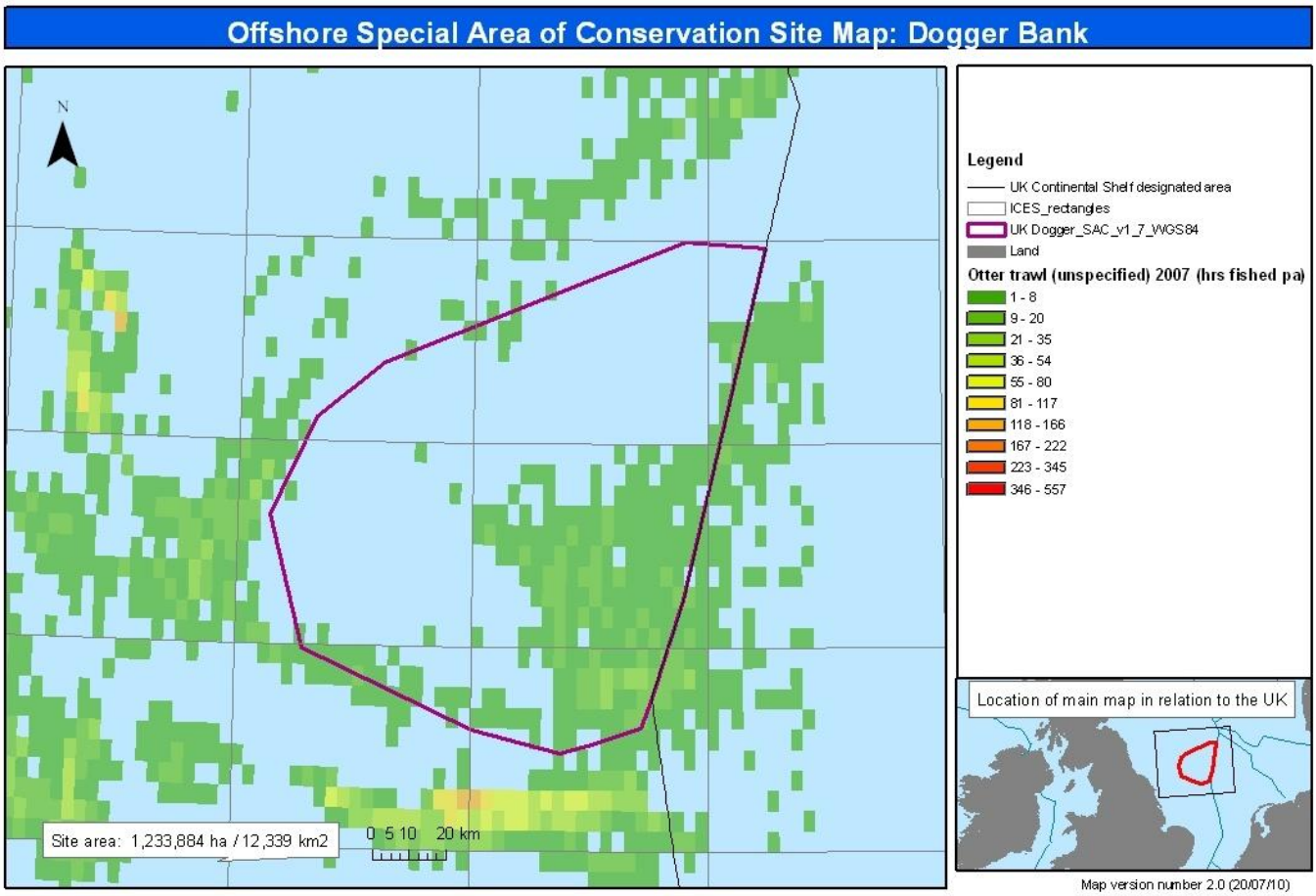
Otter trawl (unspecified) landings from UK-registered vessels within Dogger Bank SAC (2006)

	Landings from whole ICES rectangle		Proportion of effort within site	Landings from within site	
ICES	**Weight (t)**	**Value (£k)**		**Weight (t)**	**Value (£k)**
37F1	127	209	2.78	4	6
37F2	28	66	9.01	3	6
38F1	6	7	0.00	0	0
38F2	13	8	0.00	0	0
39F1	21	34	1.80	0	0
39F2	11	17	20.00	2	3
39F3	7	8	18.18	1	1
Total	**213t**	**£348k**		**10t**	**£17k**

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



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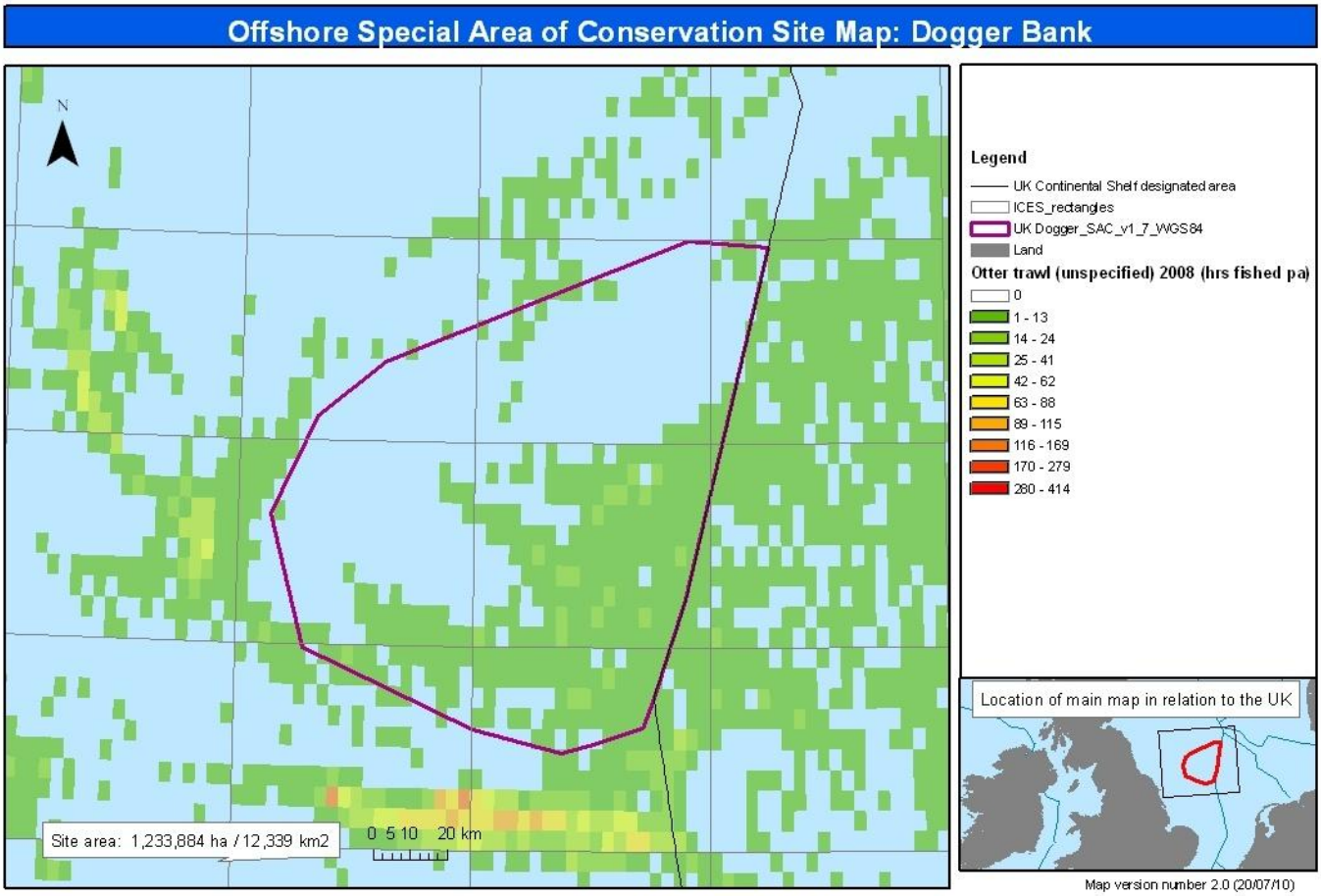
Otter trawl (unspecified) landings from UK-registered vessels within Dogger Bank SAC (2007)

	Landings from whole ICES rectangle		Proportion of effort within site	Landings from within site	
ICES	**Weight (t)**	**Value (£k)**		**Weight (t)**	**Value (£k)**
37F1	151	266	5.19	8	14
37F2	246	424	16.20	40	69
38F1	36	48	7.91	3	4
38F2	116	165	91.99	107	152
39F1	13	20	6.90	1	1
39F2	5	7	15.38	1	1
39F3	68	86	24.85	17	21
Total	**636t**	**£1,016k**		**176t**	**£262k**

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



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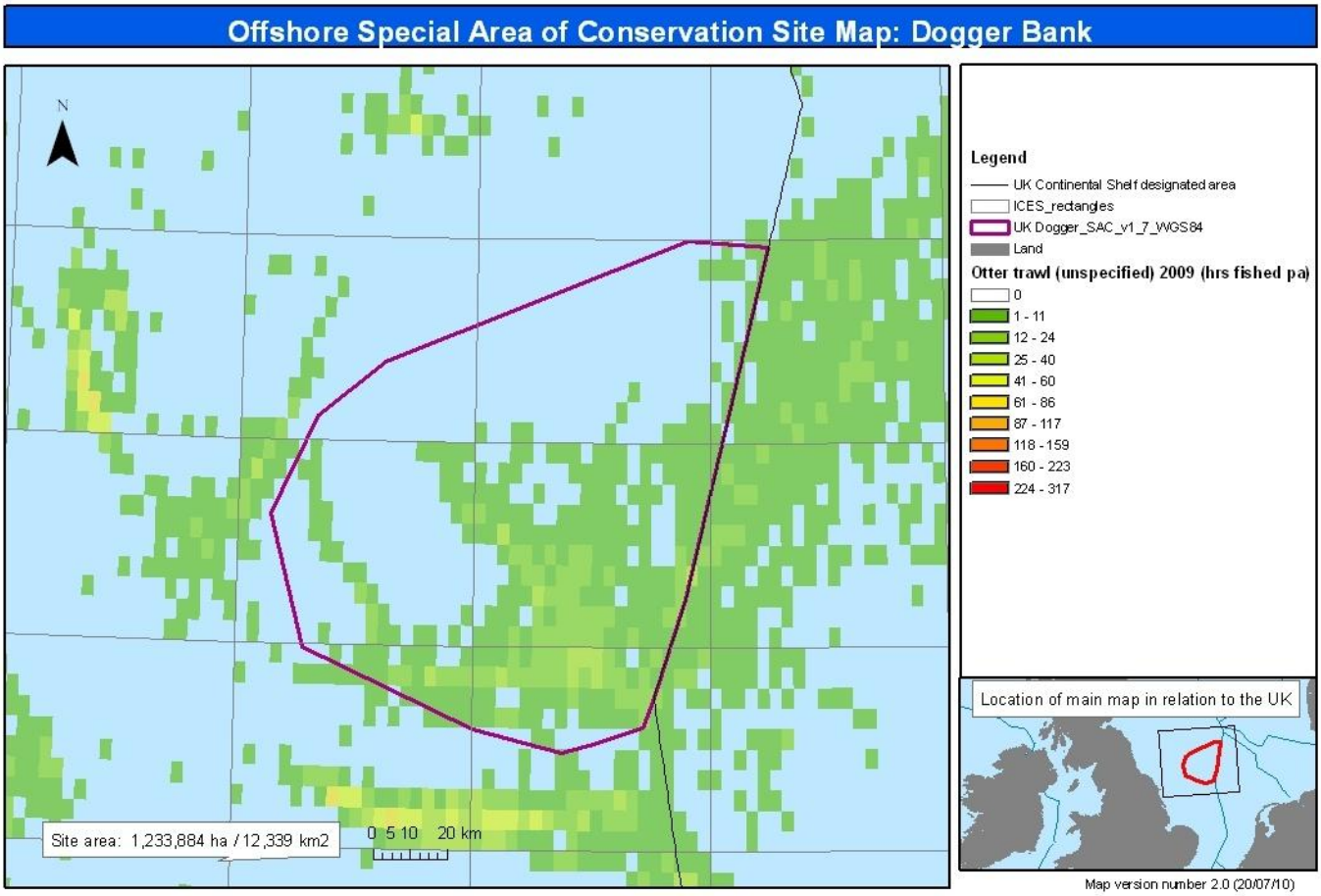
Otter trawl (unspecified) landings from UK-registered vessels within Dogger Bank SAC (2008)

2008	Landings from whole ICES rectangle		Proportion of effort within site	Landings from within site	
ICES	**Weight (t)**	**Value (£k)**		**Weight (t)**	**Value (£k)**
37F1	188	308	4.49	8	14
37F2	318	487	10.49	33	51
38F1	65	88	36.27	24	32
38F2	264	342	97.24	257	333
39F1	5	8	4.76	0	0
39F2	24	32	61.36	14	20
39F3	126	167	1.98	2	3
Total	**989t**	**£1,433k**		**339t**	**£453k**

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



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Otter trawl (unspecified) landings from UK-registered vessels within Dogger Bank SAC (2009)

	Landings from whole ICES rectangle		Proportion of effort within site	Landings from within site	
ICES	**Weight (t)**	**Value (£k)**		**Weight (t)**	**Value (£k)**
37F1	184	261	14.80	27	39
37F2	285	387	41.13	117	159
38F1	58	71	65.43	38	47
38F2	408	525	96.46	394	507
39F1	3	4	0.00	0	0
39F2	3	4	100.00	3	4
39F3	265	335	2.35	6	8
Total	**1,205t**	**£1,588**		**585t**	**£763k**

Nephrops trawls

Landings from UK-registered vessels using nephrops trawls in the region of Dogger Bank[8]

	2006		2007		2008		2009		Average		Relative (%)	
ICES	**Weight (t)**	**Value (£k)**	**Weight (t)**	**Value (£k)**	**Weight (t)**	**Value (£k)**	**Weight (t)**	**Value (£k)**	**Weight (t)**	**Value (£k)**	**Weight**	**Value**
37F2	109	242	296	621	310	574	122	173	209	403	68.09	66.37
37F1	136	304	73	173	66	124	39	59	78	165	25.52	27.16
39F1	42	87	1	2	6	13	3	7	13	27	4.24	4.50
38F1	5	8	1	1	8	15	0	0	3	6	1.10	1.02
38F2	0	0	6	10	7	12	0	0	3	6	1.05	0.96
39F2	0	0	0	0	0	0	0	0	0	0	0.00	0.00
39F3	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Total	**292t**	**£641k**	**377t**	**£808k**	**396t**	**£739k**	**164t**	**£239k**	**308t**	**£607k**	**100**	**100**

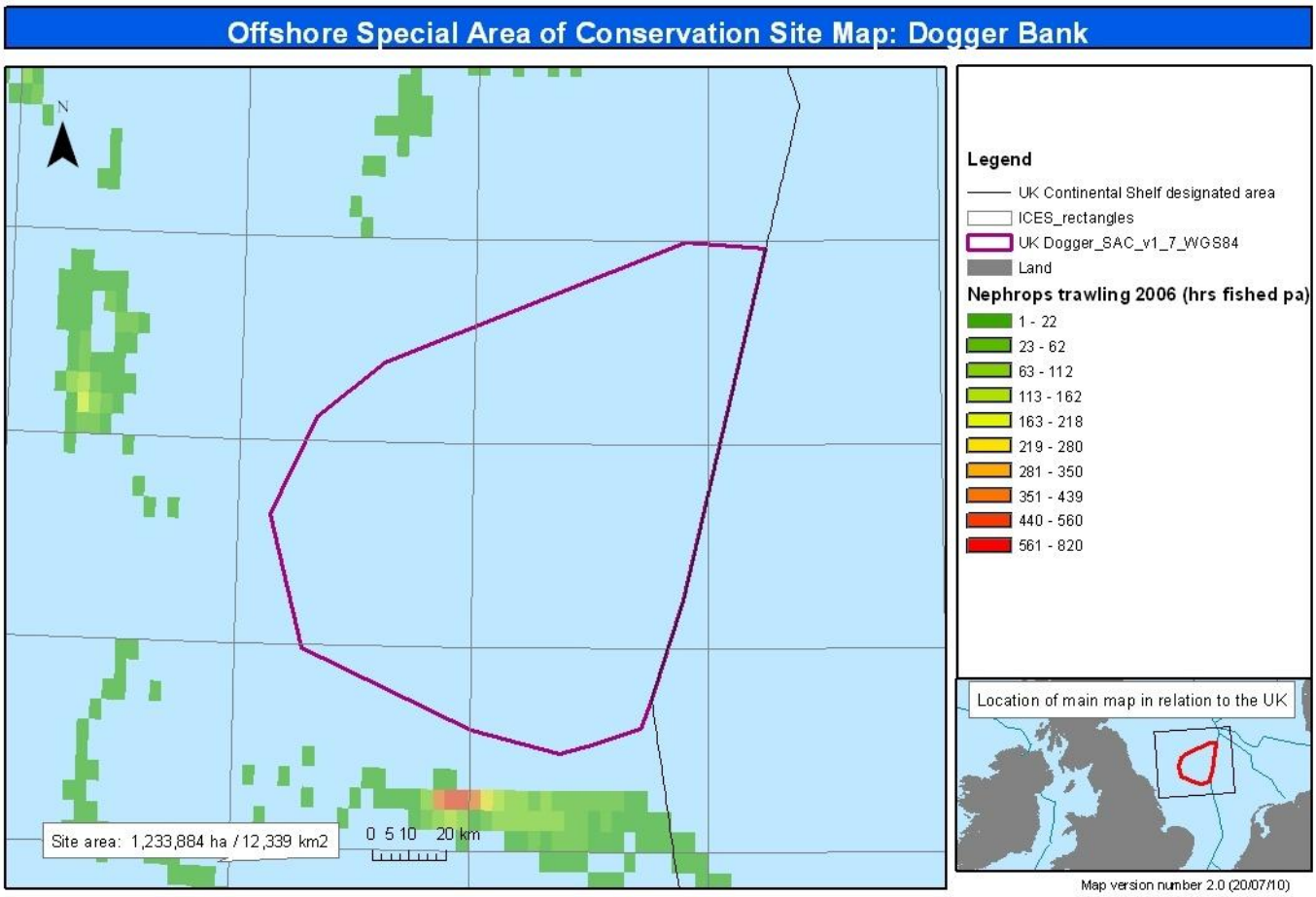
Effort data for UK-registered nephrops trawls from 2006-9[9]

	2006			2007			2008			2009		
	Total effort (hrs fished pa)	**Effort inside site (hrs fished pa)**	**Proportion of effort inside site (%)**	**Total effort (hrs fished pa)**	**Effort inside site (hrs fished pa)**	**Proportion of effort inside site (%)**	**Total effort (hrs fished pa)**	**Effort inside site (hrs fished pa)**	**Proportion of effort inside site (%)**	**Total effort (hrs fished pa)**	**Effort inside site (hrs fished pa)**	**Proportion of effort inside site (%)**
37F1	1790	0	0.0	942	0	0.0	1015	12	1.2	689	0	0.0
37F2	2346	0	0.0	3347	2	0.1	3284	4	0.1	1666	0	0.0
38F1	0	0	-	2	0	0.0	0	0	-	0	0	-
38F2	0	0	-	0	0	-	5	5	100.0	0	0	-
39F1	0	0	-	32	0	0.0	3	0	0.0	0	0	-
39F2	0	0	-	0	0	-	0	0	-	0	0	-
39F3	0	0	-	0	0	-	0	0	-	0	0	-

[8] MMO Nov 2010

[9] 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

Distribution of UK-registered nephrops trawl activity (hrs fished pa) (2006)



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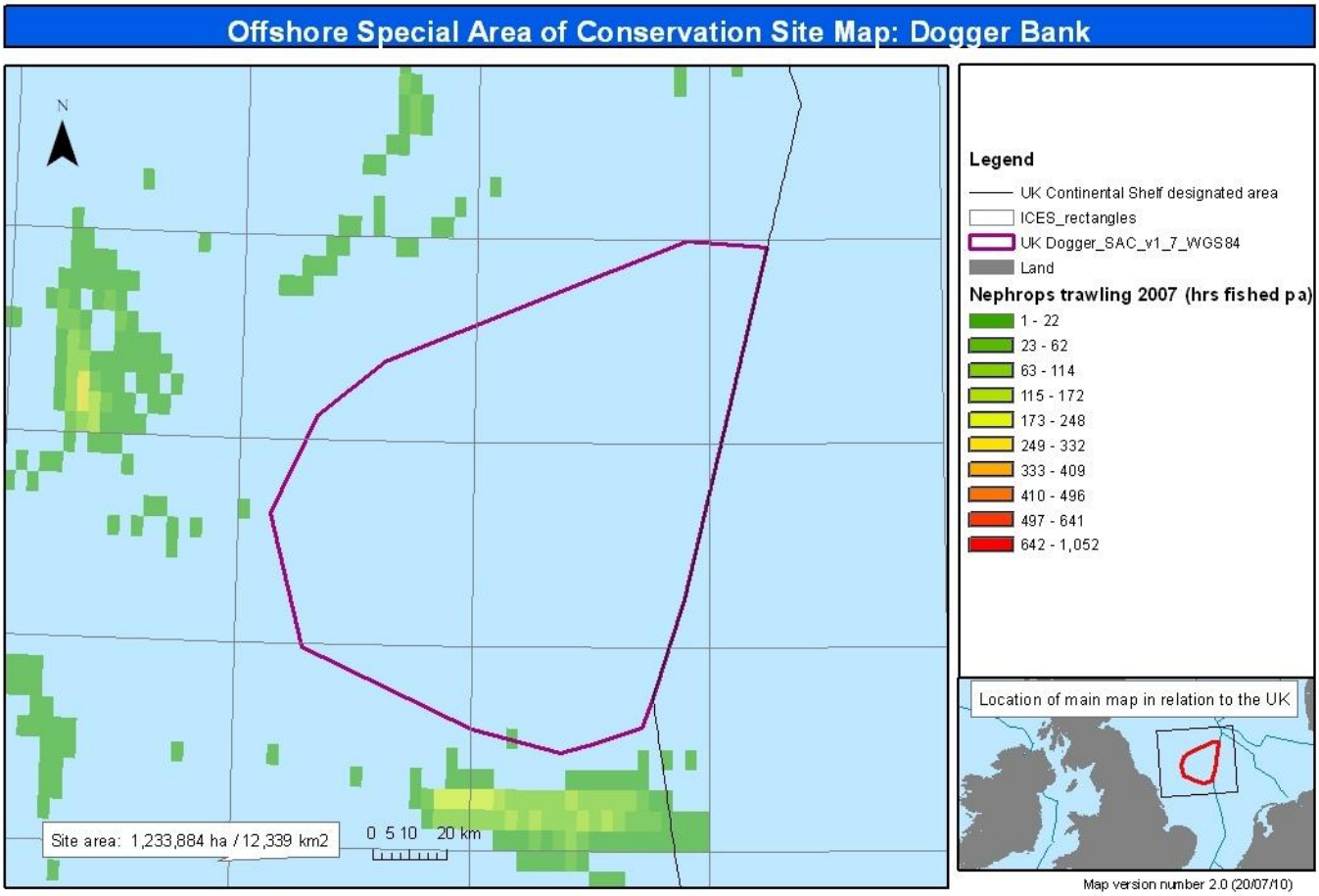
Nephrops trawl landings from UK-registered vessels within Dogger Bank SAC (2006)

	Landings from whole ICES rectangle		Proportion of effort within site	Landings from within site	
ICES	**Weight (t)**	**Value (£k)**		**Weight (t)**	**Value (£k)**
37F1	136	304	0.00	0	0
37F2	109	242	0.00	0	0
38F1	5	8	-	none	none
38F2	0	0	-	none	none
39F1	42	87	-	none	none
39F2	0	0	-	none	none
39F3	0	0	-	none	none
Total	**292t**	**£641k**		**0**	**0**

Distribution of UK-registered nephrops trawl activity (hrs fished pa) (2007)



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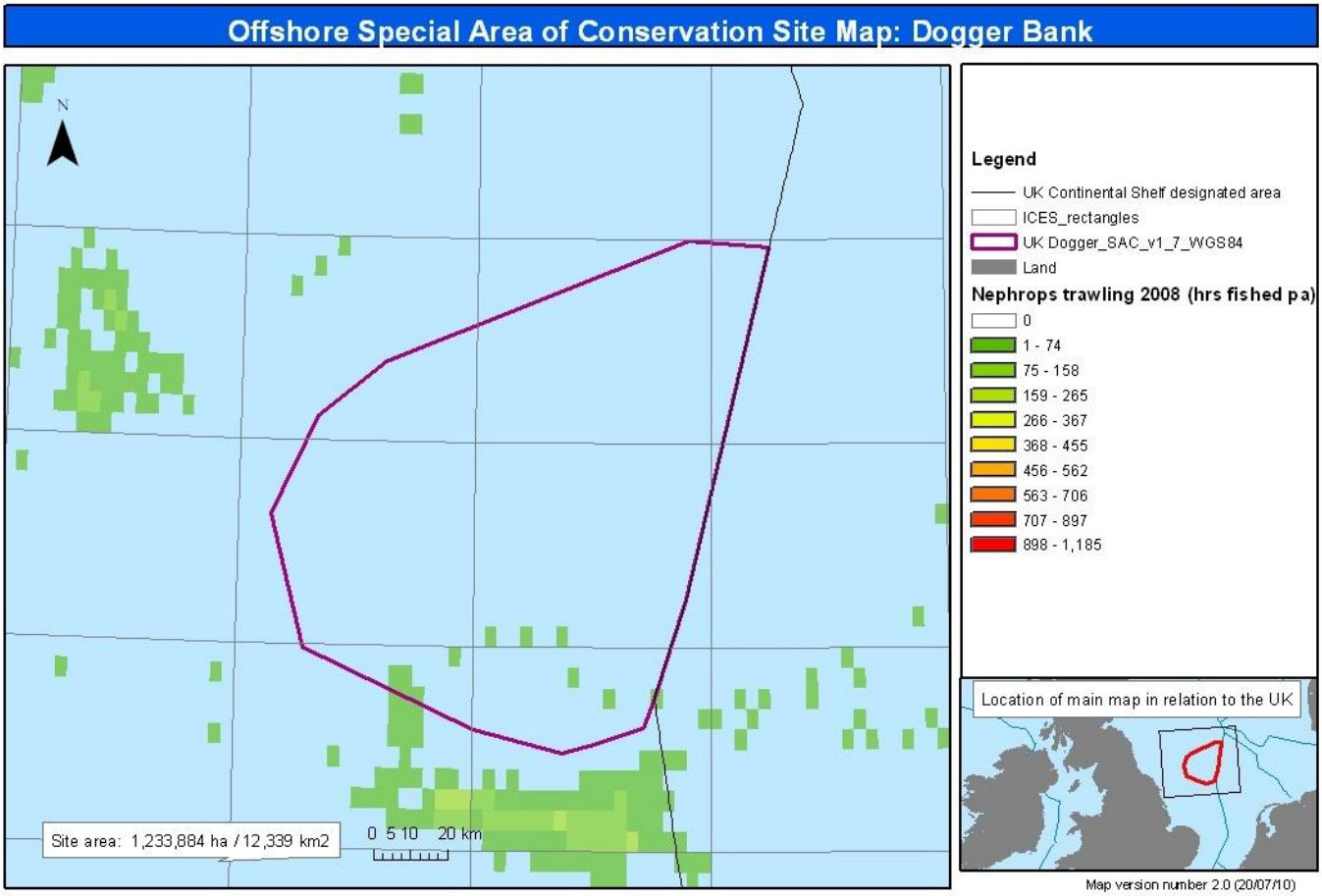
Nephrops trawl landings from UK-registered vessels within Dogger Bank SAC (2007)

	Landings from whole ICES rectangle		Proportion of effort within site	Landings from within site	
ICES	**Weight (t)**	**Value (£k)**		**Weight (t)**	**Value (£k)**
37F1	73	173	0.00	0	0
37F2	296	621	0.06	0	0
38F1	1	1	0.00	0	0
38F2	6	11	-	none	none
39F1	1	2	0.00	0	0
39F2	0	0	-	none	none
39F3	0	0	-	none	none
Total	**377t**	**£808k**		**0**	**0**

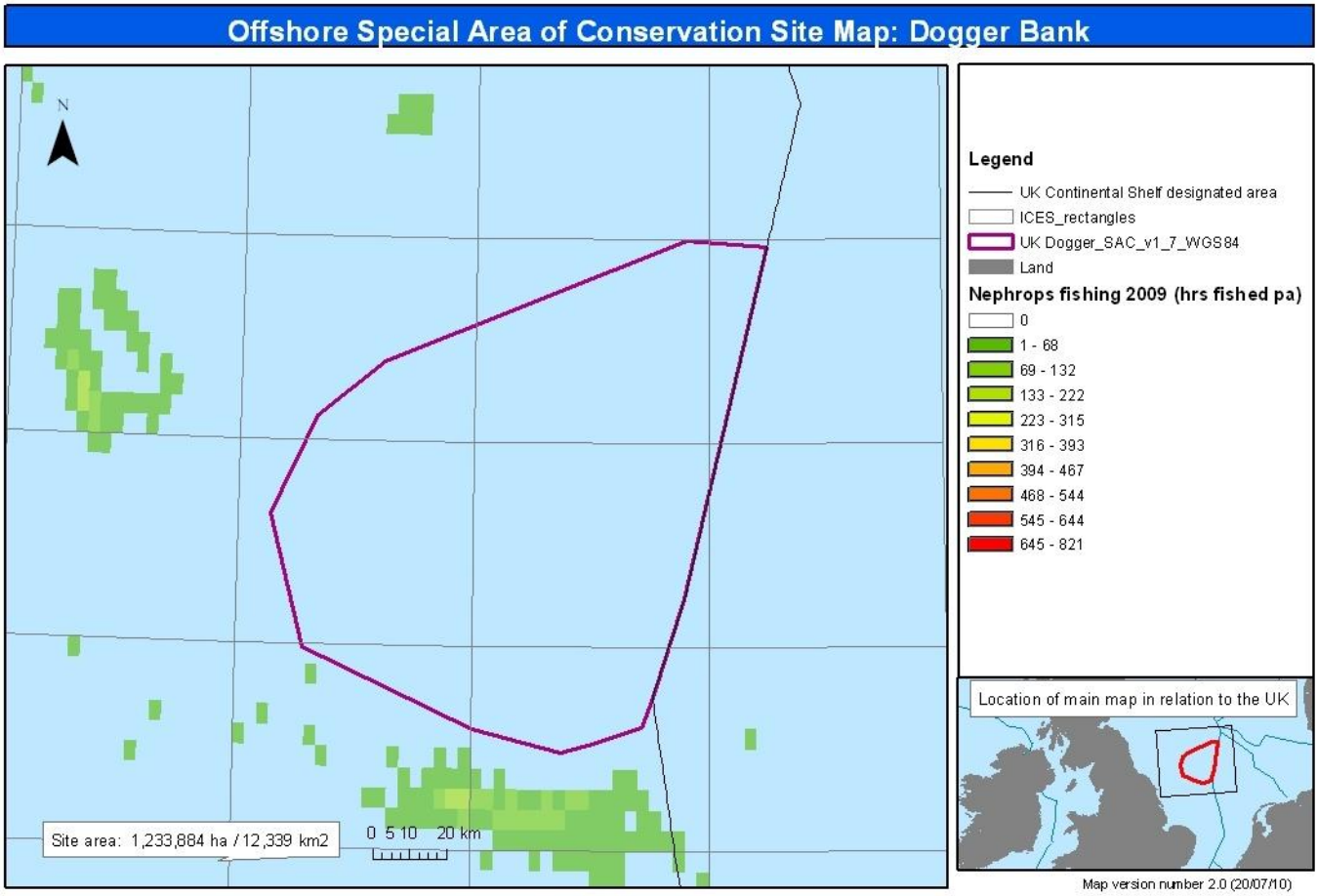
Distribution of UK-registered nephrops trawl activity (hrs fished pa) (2008)



Nephrops trawl landings from UK-registered vessels within Dogger Bank SAC (2008)

	Landings from whole ICES rectangle		Proportion of effort within site	Landings from within site	
ICES	**Weight (t)**	**Value (£k)**		**Weight (t)**	**Value (£k)**
37F1	66	124	1.18	1	1
37F2	310	574	0.12	0	1
38F1	8	15	-	None	None
38F2	7	12	100.00	7	12
39F1	6	13	0.00	0	0
39F2	0	0	-	None	None
39F3	0	0	-	None	None
Total	**396t**	**£739k**		**8t**	**£15k**

Distribution of UK-registered nephrops trawl activity (hrs fished pa) (2009)



Nephrops trawl landings from UK-registered vessels within Dogger Bank SAC (2009)

	Landings from whole ICES rectangle		Proportion of effort within site	Landings from within site	
ICES	**Weight (t)**	**Value (£k)**		**Weight (t)**	**Value (£k)**
37F1	39	59	0.00	0	0
37F2	122	173	0.00	0	0
38F1	0	0	-	none	none
38F2	0	0	-	none	none
39F1	3	7	-	none	none
39F2	0	0	-	none	none
39F3	0	0	-	none	none
Total	**164t**	**£239k**		**0**	**0**

Otter trawl (bottom)

Landings from UK-registered vessels using otter trawls (bottom) in the region of Dogger Bank[10]

	2006		2007		2008		2009		Average		Relative (%)	
ICES	**Weight (t)**	**Value (£k)**	**Weight (t)**	**Value (£k)**	**Weight (t)**	**Value (£k)**	**Weight (t)**	**Value (£k)**	**Weight (t)**	**Value (£k)**	**Weight**	**Value**
37F2	7	17	17	35	969	299	228	340	305	173	13.5	29.59
37F1	582	102	7	19	25	43	1652	356	566	130	25.04	22.24
39F3	0	0	34	49	55	81	253	340	86	117	3.79	20.12
39F1	16	36	1	2	2396	145	618	66	758	62	33.49	10.63
38F2	11	16	0	0	134	18	433	174	144	52	6.37	8.91
39F2	28	49	0	0	816	54	13	21	214	31	9.46	5.36
38F1	138	8	51	13	86	5	481	47	189	18	8.35	3.16
Total	**781t**	**£228k**	**111t**	**£119k**	**4,479t**	**£645k**	**3,679t**	**£1,344k**	**2,263t**	**£584k**	**100**	**100**

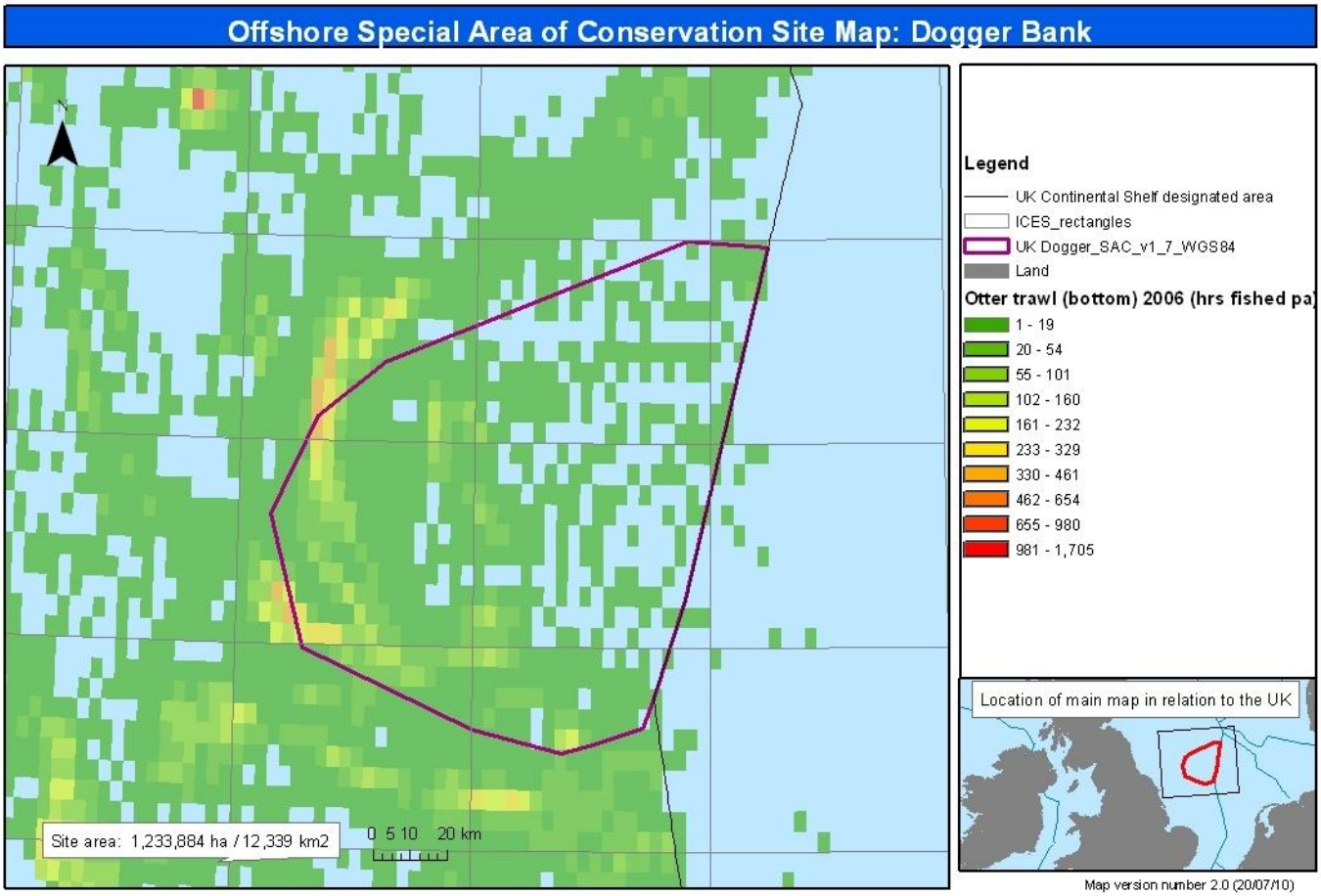
Effort data for UK-registered otter trawls (bottom) from 2006-9[11]

	2006			2007			2008			2009		
	Total effort (hrs fished pa)	**Effort inside site (hrs fished pa)**	**Proportion of effort inside site (%)**	**Total effort (hrs fished pa)**	**Effort inside site (hrs fished pa)**	**Proportion of effort inside site (%)**	**Total effort (hrs fished pa)**	**Effort inside site (hrs fished pa)**	**Proportion of effort inside site (%)**	**Total effort (hrs fished pa)**	**Effort inside site (hrs fished pa)**	**Proportion of effort inside site (%)**
37F1	4009	1254	31.3	6140	3583	58.4	205	2	1.0	1124	60	5.3
37F2	3950	1137	28.8	8746	5656	64.7	1481	17	1.1	1234	165	13.4
38F1	6823	5194	76.1	3077	1958	63.6	26	2	7.7	41	28	68.3
38F2	844	842	99.8	135	132	97.8	16	15	93.8	351	301	85.8
39F1	7341	2020	27.5	4340	902	20.8	36	0	0.0	20	5	25.0
39F2	306	228	74.5	352	29	8.2	9	0	0.0	21	19	90.5
39F3	85	85	100.0	32	13	40.6	24	0	0.0	597	88	14.7

[10] MMO Nov 2010

[11] 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

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



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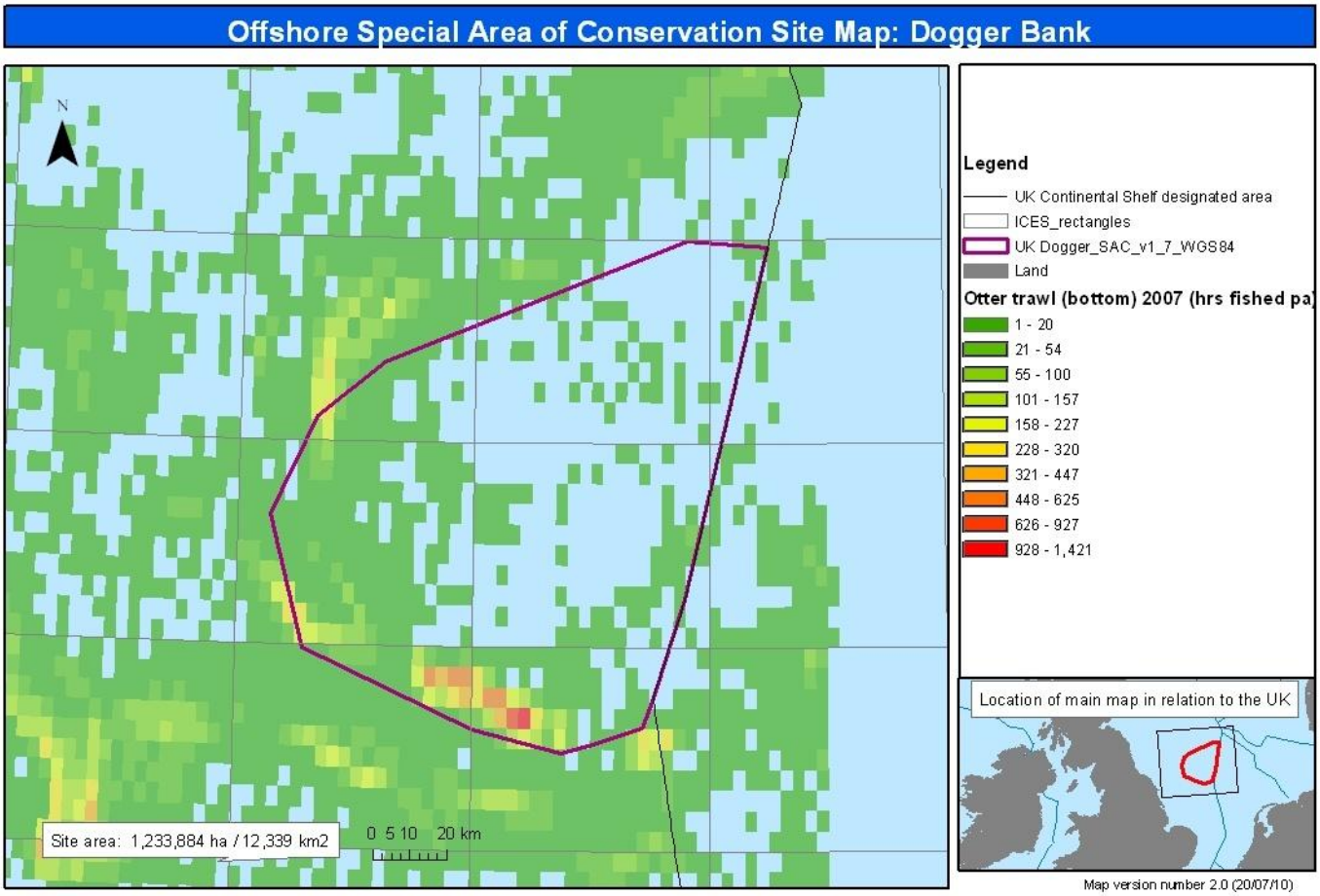
Otter trawl (bottom) landings from UK-registered vessels within Dogger Bank SAC (2006)

	Landings from whole ICES rectangle		Proportion of effort within site	Landings from within site	
ICES	**Weight (t)**	**Value (£k)**		**Weight (t)**	**Value (£k)**
37F1	582	102	31.28	182	32
37F2	7	17	28.78	2	5
38F1	138	8	76.12	105	6
38F2	11	16	99.76	11	16
39F1	16	36	27.52	4	10
39F2	28	49	74.51	21	37
39F3	0	0	100.00	0	0
Total	**781t**	**£228k**		**325t**	**£105k**

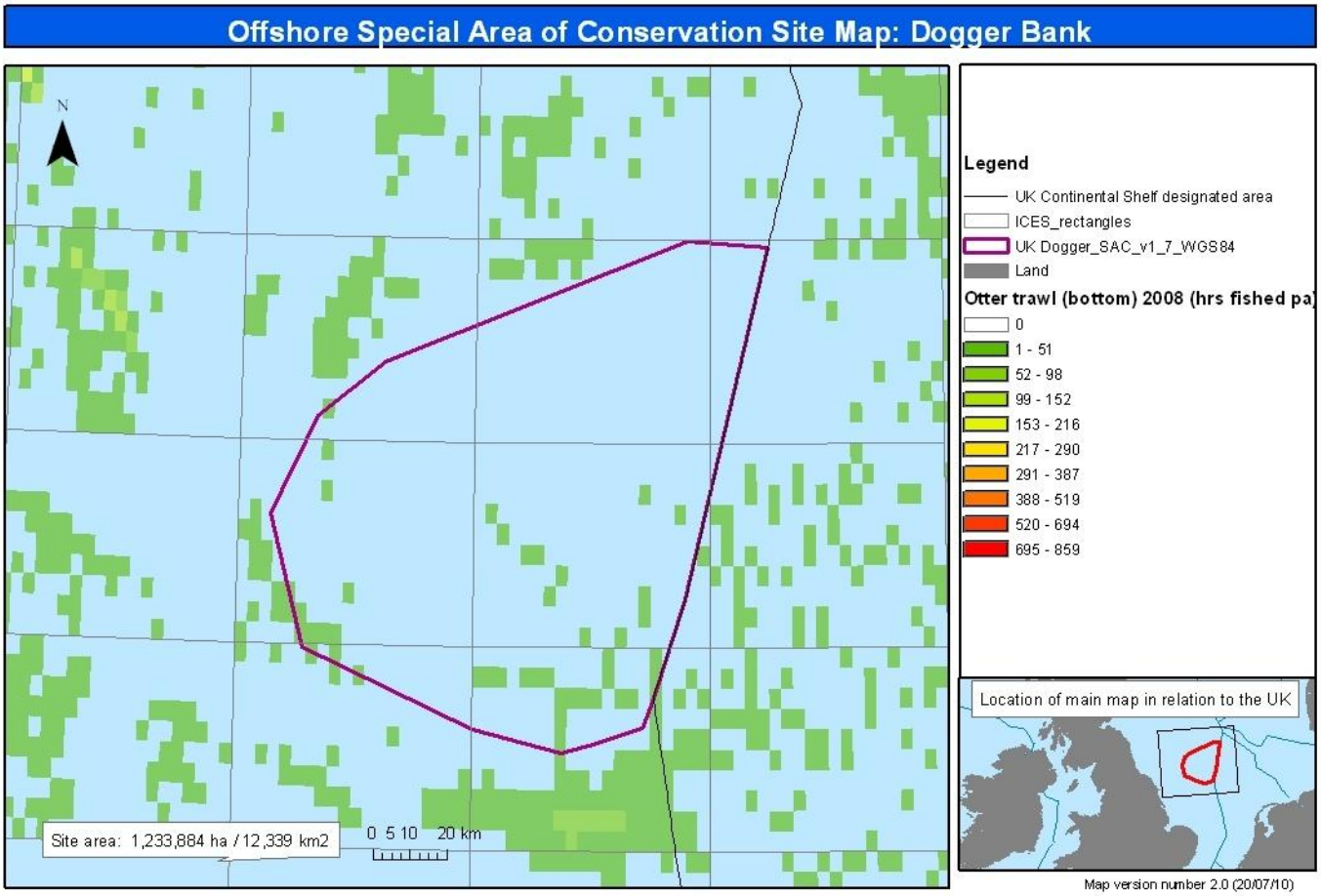
Distribution of UK-registered otter trawl (bottom) activity (hrs fished pa) (2007)



Otter trawl (bottom) landings from UK-registered vessels within Dogger Bank SAC (2007)

	Landings from whole ICES rectangle		Proportion of effort within site	Landings from within site	
ICES	**Weight (t)**	**Value (£k)**		**Weight (t)**	**Value (£k)**
37F1	7	19	58.36	4	11
37F2	17	35	64.67	11	23
38F1	51	13	63.63	33	8
38F2	0	0	97.78	0	0
39F1	1	2	20.78	0	0
39F2	0	0	8.24	0	0
39F3	34	49	40.63	14	20
Total	**111t**	**£119k**		**62t**	**£63k**

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



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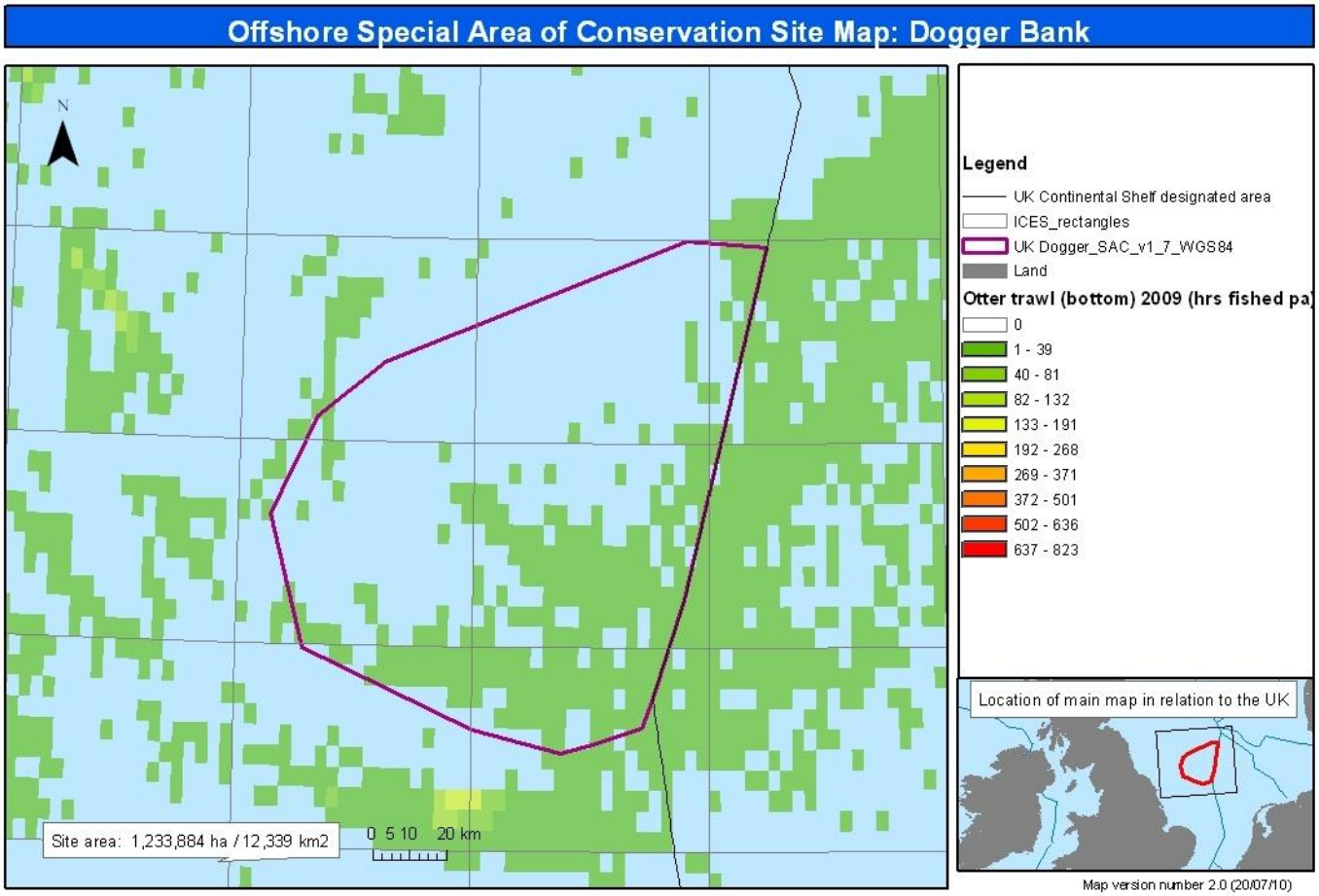
Otter trawl (bottom) landings from UK-registered vessels within Dogger Bank SAC (2008)

	Landings from whole ICES rectangle		Proportion of effort within site	Landings from within site	
ICES	**Weight (t)**	**Value (£k)**		**Weight (t)**	**Value (£k)**
37F1	25	43	0.98	0	0
37F2	969	299	1.15	11	3
38F1	86	5	7.69	7	0
38F2	134	18	93.75	125	17
39F1	2,396	145	0.00	0	0
39F2	816	54	0.00	0	0
39F3	55	81	0.00	0	0
Total	**4,479t**	**£645k**		**143t**	**£21k**

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



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Otter trawl (bottom) landings from UK-registered vessels within Dogger Bank SAC (2009)

	Landings from whole ICES rectangle		Proportion of effort within site	Landings from within site	
ICES	**Weight (t)**	**Value (£k)**		**Weight (t)**	**Value (£k)**
37F1	1,652	356	5.34	88	19
37F2	228	340	13.37	31	45
38F1	481	47	68.29	328	32
38F2	433	174	85.75	371	149
39F1	618	66	25.00	155	16
39F2	13	21	90.48	12	19
39F3	253	340	14.74	37	50
Total	**3,679t**	**£1,344k**		**1,022t**	**£332k**

Danish seine net

Landings from UK-registered vessels using Danish seine nets in the region of Dogger Bank[12]

	2006		2007		2008		2009		Average		Relative (%)	
ICES	**Weight (t)**	**Value (£k)**	**Weight (t)**	**Value (£k)**	**Weight (t)**	**Value (£k)**	**Weight (t)**	**Value (£k)**	**Weight (t)**	**Value (£k)**	**Weight**	**Value**
37F1	14	13	20	30	4	6	0	0	9	12	3.1	2.82
37F2	25	35	55	73	43	96	137	191	65	99	21.49	23.05
38F1	150	208	111	152	148	207	142	191	138	189	45.54	44.21
38F2	21	30	43	52	93	148	87	119	61	87	20.18	20.42
39F1	8	9	7	9	10	14	2	3	7	9	2.16	2.05
39F2	13	15	20	28	7	10	28	45	17	24	5.61	5.72
39F3	8	9	4	5	0	1	11	15	6	7	1.92	1.74
Total	**239t**	**£319k**	**259t**	**£349k**	**303t**	**£481k**	**407t**	**£564k**	**302t**	**£428k**	**100**	**100**

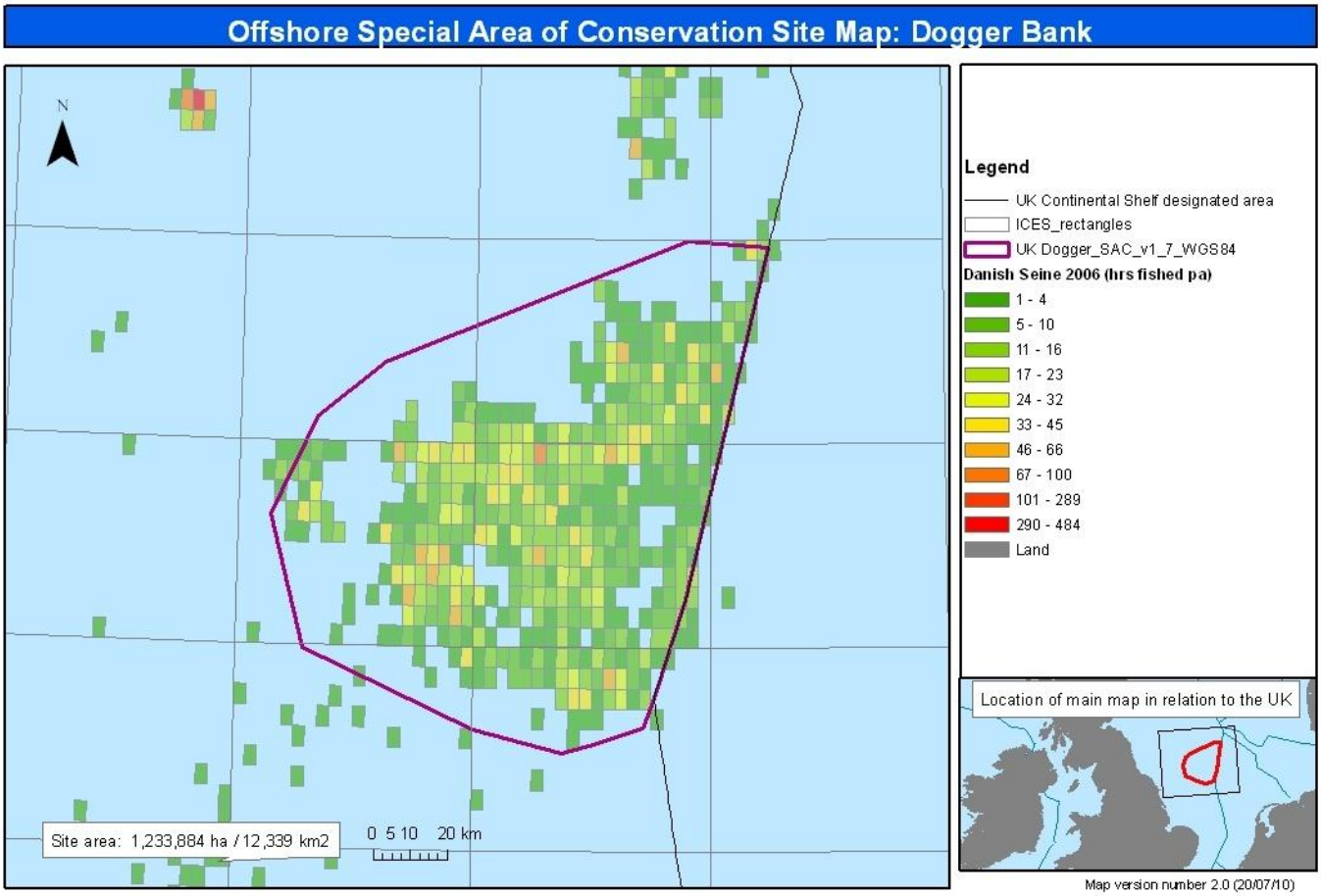
Effort data for UK-registered Danish seine nets from 2006-9[13]

	2006			2007			2008			2009		
	Total effort (hrs fished pa)	**Effort inside site (hrs fished pa)**	**Proportion of effort inside site (%)**	**Total effort (hrs fished pa)**	**Effort inside site (hrs fished pa)**	**Proportion of effort inside site (%)**	**Total effort (hrs fished pa)**	**Effort inside site (hrs fished pa)**	**Proportion of effort inside site (%)**	**Total effort (hrs fished pa)**	**Effort inside site (hrs fished pa)**	**Proportion of effort inside site (%)**
37F1	65	42	64.6	1100	1078	98.0	22	18	81.8	31	23	74.2
37F2	470	467	99.4	1598	1434	89.7	350	315	90.0	660	660	100.0
38F1	1413	1386	98.1	832	828	99.5	713	713	100.0	606	605	99.8
38F2	1961	1945	99.2	1718	1678	97.7	473	473	100.0	516	513	99.4
39F1	62	62	100.0	39	39	100.0	88	88	100.0	15	15	100.0
39F2	901	901	100.0	659	659	100.0	35	35	100.0	328	328	100.0
39F3	214	214	100.0	127	101	79.5	2	0	0.0	17	16	94.1

[12] MMO Nov 2010

[13] 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

Distribution of UK-registered Danish seine net activity (hrs fished pa) (2006)



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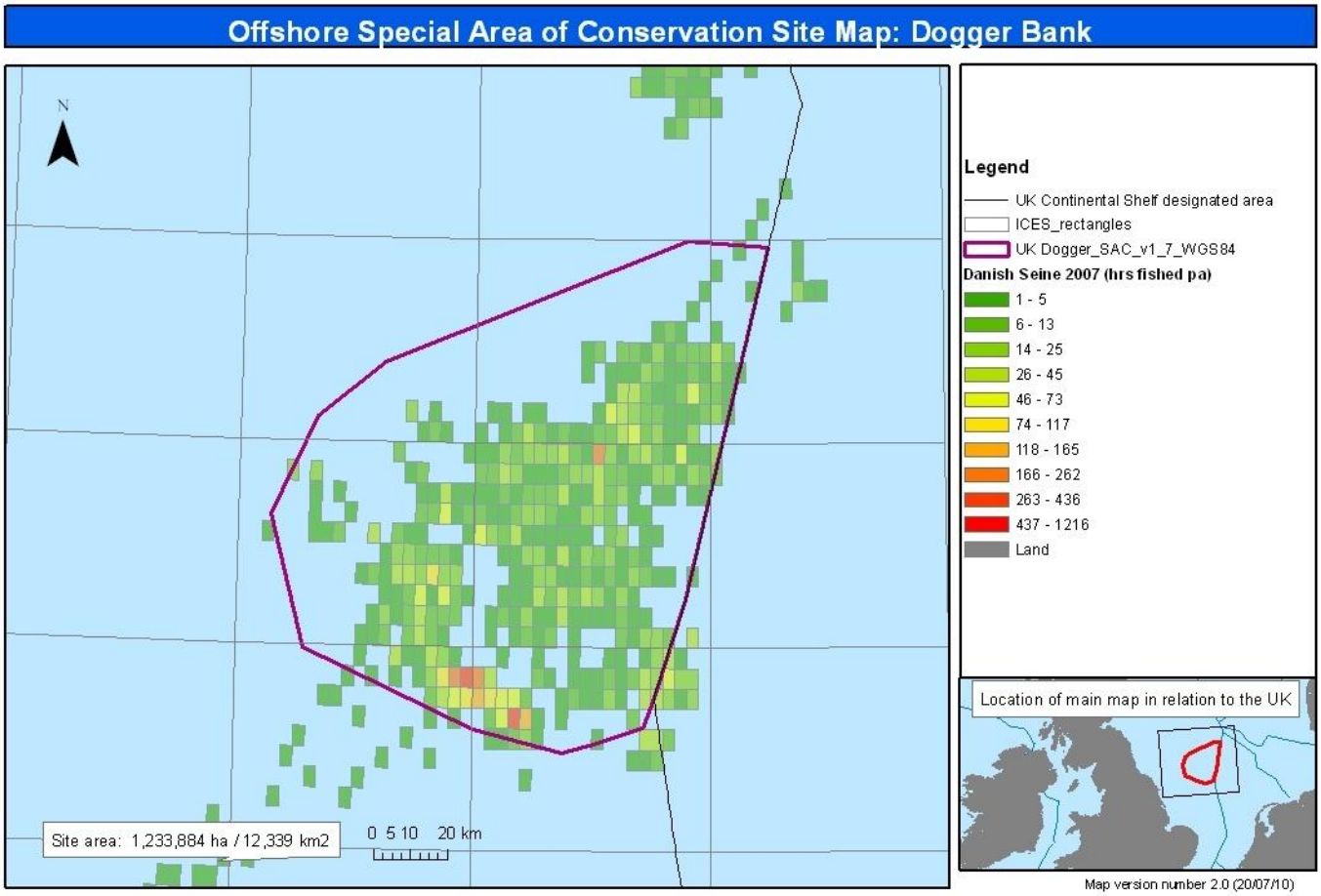
Danish seine landings from UK-registered vessels within Dogger Bank SAC (2006)

	Landings from whole ICES rectangle		Proportion of effort within site	Landings from within site	
ICES	**Weight (t)**	**Value (£k)**		**Weight (t)**	**Value (£k)**
37F1	14	13	64.6	9	8
37F2	25	35	99.4	25	35
38F1	150	208	98.1	147	204
38F2	21	30	99.2	21	30
39F1	8	9	100.0	8	9k
39F2	13	15	100.0	13	15k
39F3	8	9	100.0	8	9k
Total	**239t**	**£319k**		**231t**	**£310k**

Distribution of UK-registered Danish seine net activity (hrs fished pa) (2007)



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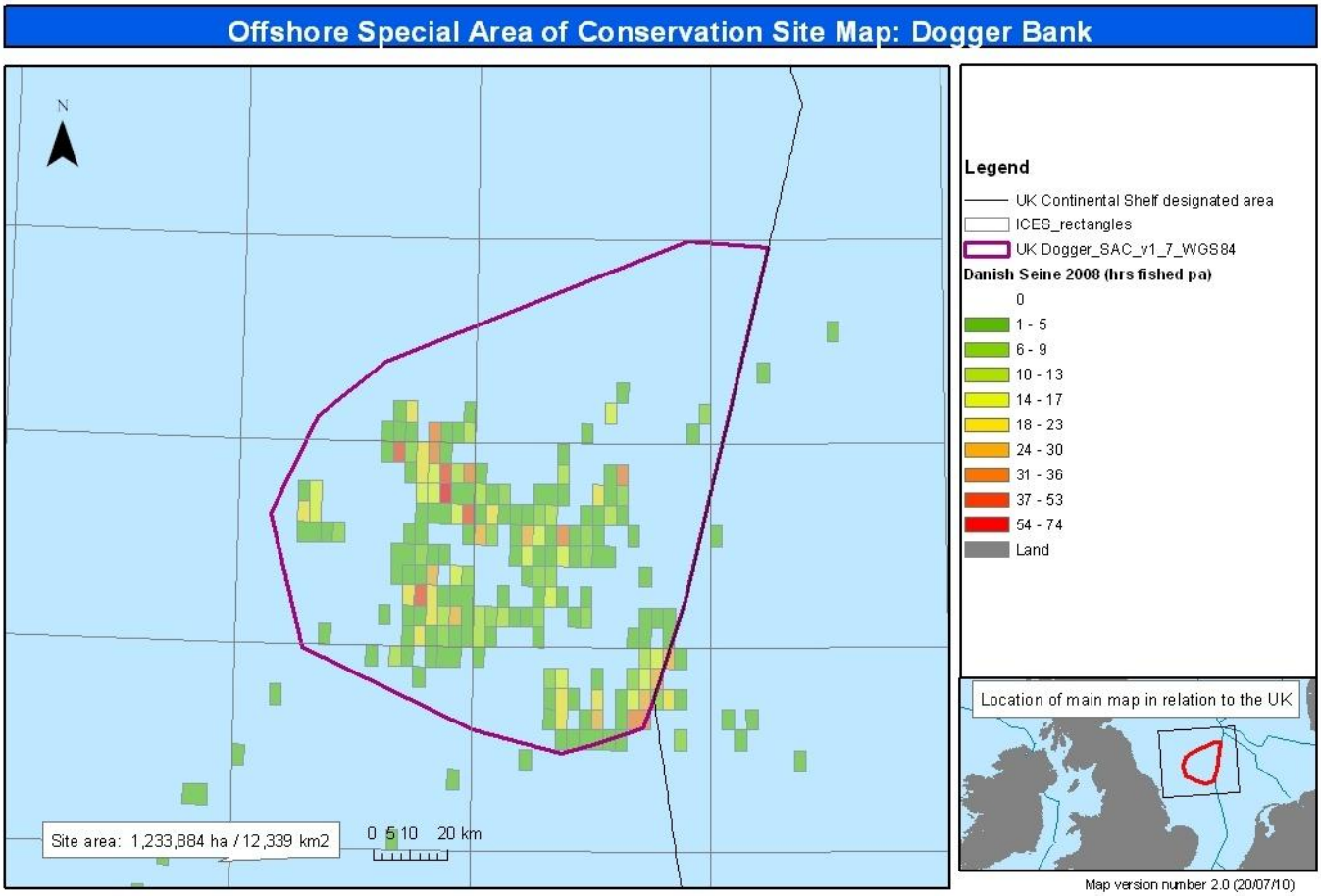
Danish seine landings from UK-registered vessels within Dogger Bank SAC (2007)

	Landings from whole ICES rectangle		Proportion of effort within site	Landings from within site	
ICES	**Weight (t)**	**Value (£k)**		**Weight (t)**	**Value (£k)**
37F1	20	30	98.0	20	29
37F2	55	73	89.7	49	66
38F1	111	152	99.5	111	151
38F2	43	52	97.7	42	51
39F1	7	9	100.0	7	9
39F2	20	28	100.0	20	28
39F3	4	5	79.5	3	4
Total	**259t**	**£349k**		**231t**	**£309k**

Distribution of UK-registered Danish seine net activity (hrs fished pa) (2008)



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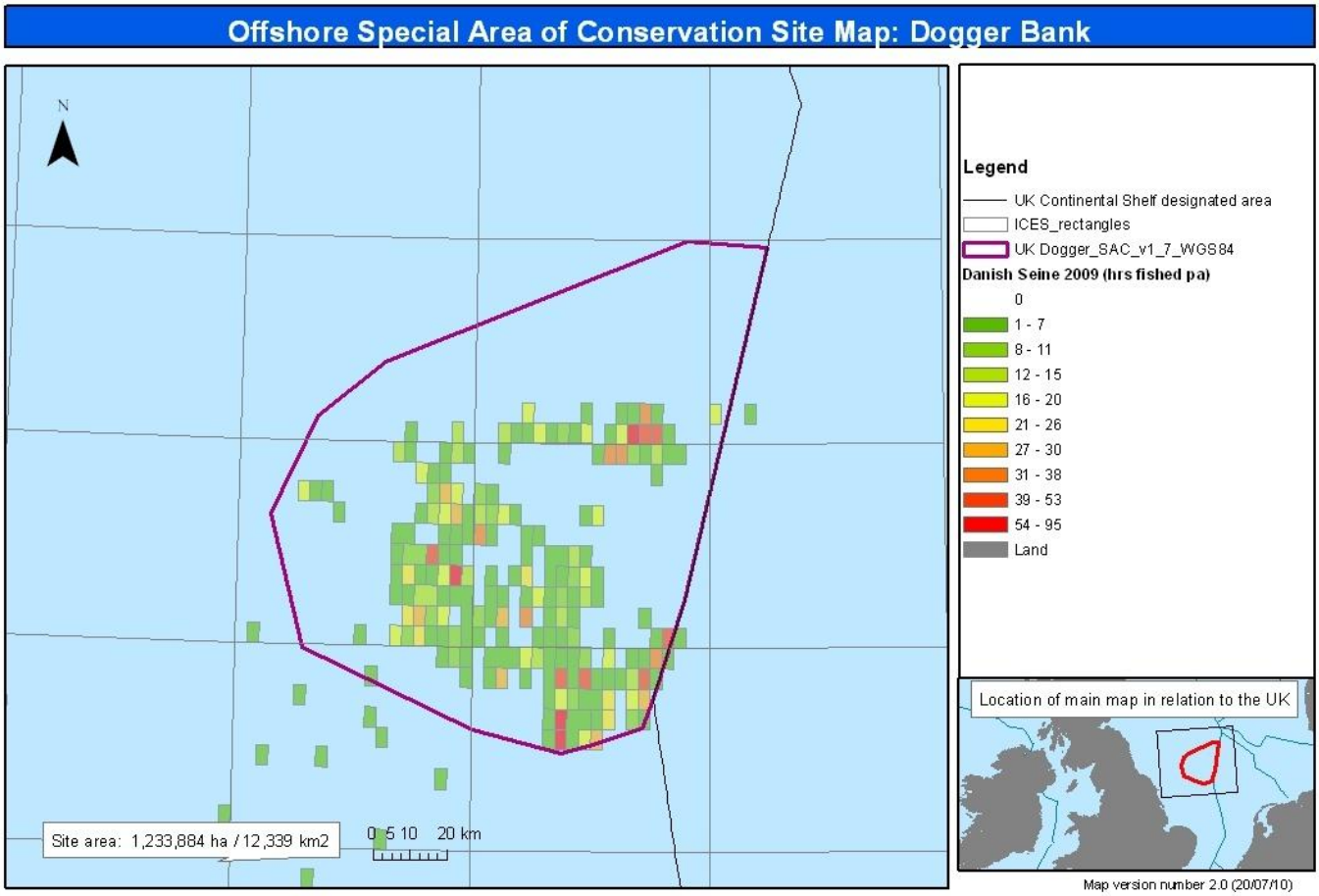
Danish seine landings from UK-registered vessels within Dogger Bank SAC (2008)

	Landings from whole ICES rectangle		Proportion of effort within site	Landings from within site	
ICES	**Weight (t)**	**Value (£k)**		**Weight (t)**	**Value (£k)**
37F1	4	6	81.8	3	5
37F2	43	96	90.0	39	86
38F1	148	207	100.0	148	207
38F2	93	148	100.0	93	148
39F1	10	14	100.0	10	14
39F2	7	10	100.0	7	10
39F3	0	1	0.0	0	0
Total	**303t**	**£481k**		**298t**	**£470k**

Distribution of UK-registered Danish seine net activity (hrs fished pa) (2009)



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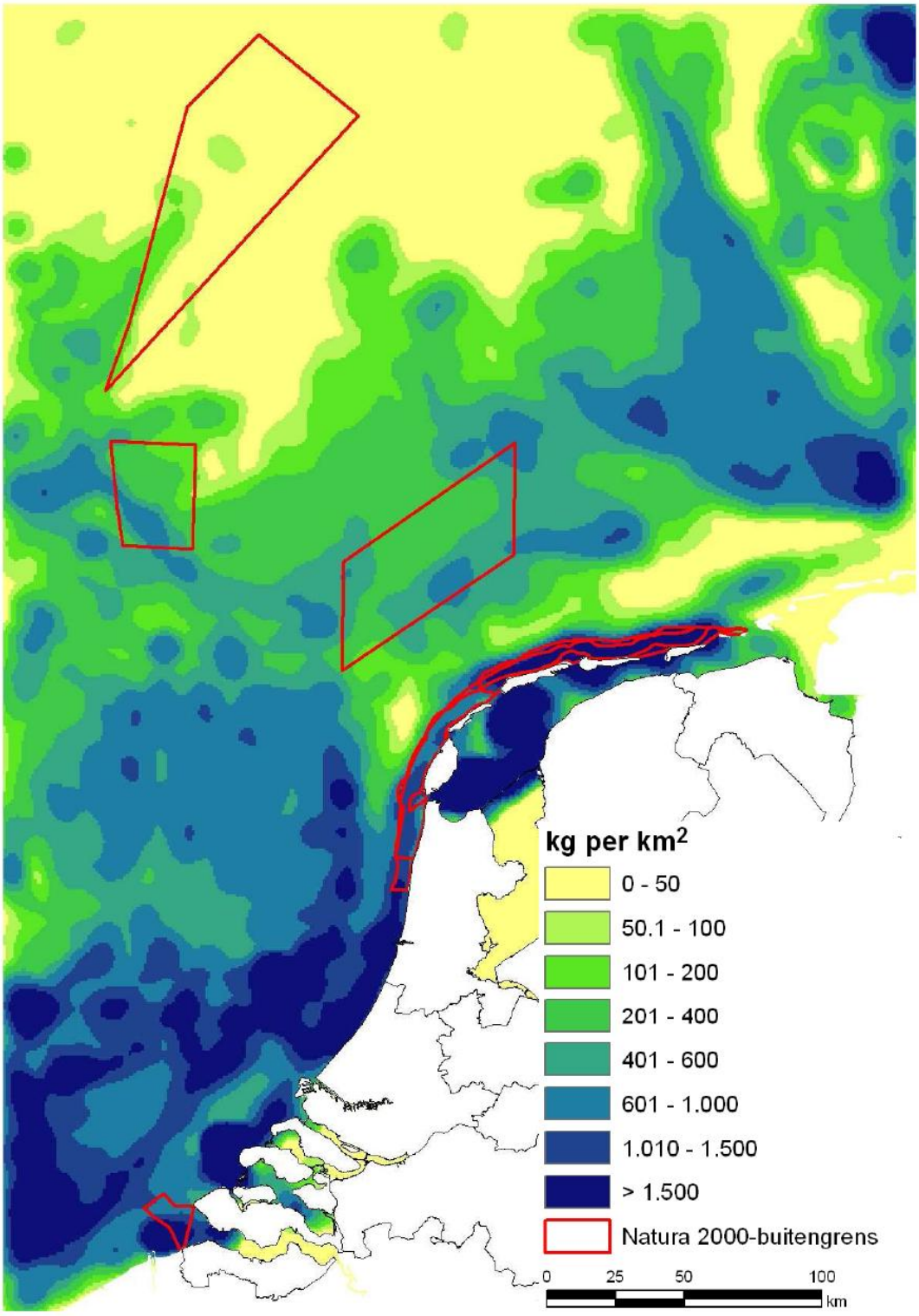
Danish seine landings from UK-registered vessels within Dogger Bank SAC (2009)

	Landings from whole ICES rectangle		Proportion of effort within site	Landings from within site	
ICES	**Weight (t)**	**Value (£k)**		**Weight (t)**	**Value (£k)**
37F1	0	0	74.2	0	0
37F2	137	191	100.0	137	191
38F1	142	191	99.8	142	191
38F2	87	119	99.4	86	119
39F1	2	3	100.0	2	3
39F2	28	45	100.0	28	45
39F3	11	15	94.1	10	14
Total	**407t**	**£564k**		**405t**	**£562k**

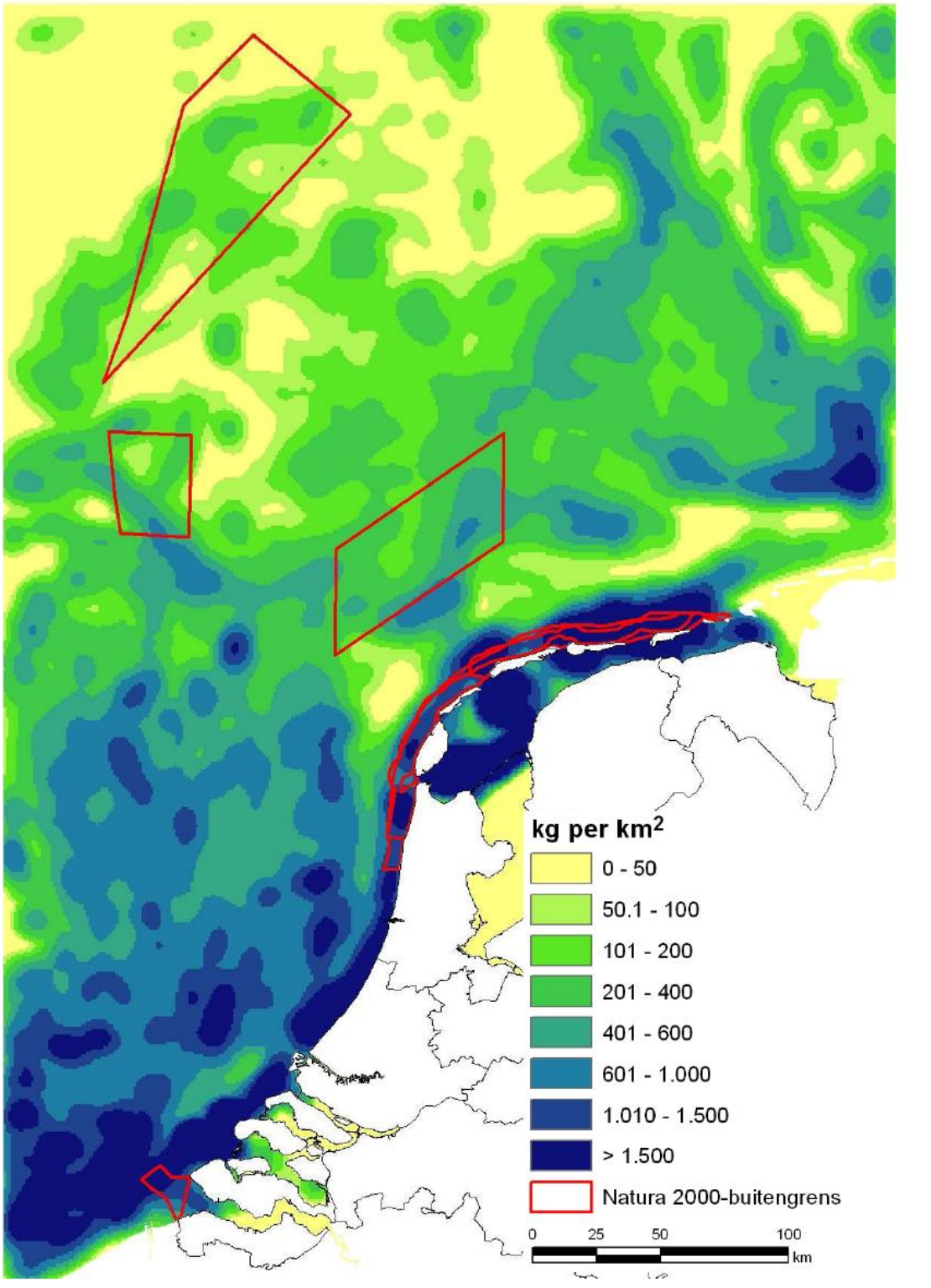
ANNEX II: DUTCH FISHING EFFORT IN THE DOGGER BANK REGION

Catch of the Dutch fleet in 2007 (in €/km^2)
Source: Oostenbrugge et al, 2010.-verspreidingskaarten voor de Noordzeevisserij; Methodiek en toepasssing Natura 2000-gebieden. LEI-rapport 2010-066



Bron: Logboekdata en VMS-data, bewerkt door LEI.

Catch of the Dutch fleet in 2007 (in €/km^2)
Source: Oostenbrugge et al, 2010.-verspreidingskaarten voor de Noordzeevisserij; Methodiek en toepasssing Natura 2000-gebieden. LEI-rapport 2010-066



Bron: Logboekdata en VMS-data, bewerkt door LEI.

ANNEX III: METHODS OF ASSESSING ECOSYSTEM SERVICES

Benefits

The approach adopted for identifying marine ecosystem services is described in Section 3.3 of the impact assessments, and is repeated below. Examples of ecosystem services provided by the marine environment are set out in Figure A3.1.

Identification of Marine Ecosystem Services

The potential benefits of the recommended sites primarily arise from an increase in nature conservation and the ecosystem processes associated[14]. These benefits are analysed using an ecosystem services framework[15] based on various studies of the ecosystem services[16] of the UK marine environment[17].

For these Impact Assessments undertaken for Natural England and JNCC during 2009, the framework used includes all the main categories in the Millennium Ecosystem Assessment (2005a) which are also used in Defra (2007). The categorisation was further informed by the categorisation of ecosystem services provided by the UK marine environment in Beaumont *et al*. (2006). The MEA's ecosystem service classification falls into four overarching categories:

- Provisioning services (such as generation of resources used as food and fuel);
- Regulating services (such as regulation of air quality, control of pests and diseases);
- Cultural services (such as spiritual/artistic inspiration, institutions surrounding resources); and
- Supporting services (such as photosynthesis, nutrient cycling).

The MEA notes that "supporting services are those that are necessary for the production of all other ecosystem services". Here, and following Defra's guidance on the valuation of ecosystem services, the relevant benefits gained from supporting services are viewed as essentially being captured by the other benefits listed and so are not further examined. For example, phytoplankton fix carbon dioxide through photosynthesis and 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.

A list of the ecosystem service categories that are relevant to marine sites was developed in eftec's Methodology Report to JNCC (eftec, 2008). Here that list is revised to also appropriately describe ecosystem services relevant to inshore SACs and SPAs. *Relevant* means that the designation of the SAC would have a noticeable impact on the benefits derived from the service. The categories currently included are those known to be relevant at this stage, but may be subject to change should new information arise during public consultation. From the list of relevant ecosystem service categories, the specific products and services arising from the site that the UK population potentially benefit from were identified (Figure A3.1).

[14] Heritage benefits, such as conservation of archaeological site, are the only benefits identified that arguably sit outside the scope of nature conservation. Such benefits are still included.
[15] As described in Parliamentary Office for Science and Technology (20007) and Defra (2007) and applied by eftec in the Offshore SAC work for JNCC found at <http://www.jncc.gov.uk/page-3995> and in Defra's IA of the proposed fisheries closure at Lyme Bay found at <http://defraweb/marine/pdf/biodiversity/lymebay-ia-final.pdf>.
[16] Ecosystem services are the goods (such as flows of freshwater) and services (such as removing pollution from the air) provided by the natural environment that benefit humans.
[17] This draws on the following references: Beaumont *et al.*, 2006; Eftec, 2006; and Frid, 2008.

MEA Categories		Relevant Categories		Example of Product or Service
Provisioning services	→	Food	→	Fish for human consumption
				Fish used in animal feeds
		Fibre		Aggregates
		Biochemicals, pharmaceuticals & natural medicines		Fish oil
Regulating services	→	Gas & climate	→	Carbon sequestration
		Bioremediation of waste		Waste remediation, water purification
		Natural hazard		Protection from natural hazard
Cultural services	→	Knowledge & education	→	Scientific knowledge of ecosystem functions, genetic information, and potential for chemical/therapeutics discovery
		Recreation		Recreational sea angling Nature-based recreation Scuba Diving
		Spiritual & religious		Artistic work based on the marine environment
		Cultural & social		Protection of iconic sites or archaeological features
		Aesthetic & inspiration		
		Non-use and option values		Altruistic/Bequest/Existence/Option/Quasi-option values
Supporting services	→	Primary production	→	(Not directly analysed to avoid double counting)
		Photosynthesis		
		Nutrient cycling		
		Biologically-mediated habitat		
		Resilience & resistance		

Figure A3.1: Categorisation of ecosystem services relevant to the UK marine environment and the specific products and services potentially found within dSACs and pSPAs.

In addition to these categories it is recognised by many that biodiversity has an intrinsic value. This value is viewed as an inherent characteristic of biodiversity, rather than a something that benefits humans. Therefore, intrinsic value cannot be assessed using economic valuation techniques[18], and as this IA is concerned with the costs and benefits to people in the UK, is not analysed further here. However, this does not mean that intrinsic value is regarded as unimportant.

The goods and services in the right hand column of Figure A4.1 were considered for analysis for each site. The actual analysis in each IA was limited to the ecosystem services that would be affected by the designation of the site, based on the available information.

[18] This is referred to for example on page 7 of Section 2 of Millennium Ecosystem Assessment (2005b).

Valuing Marine Ecosystem Services

Marine sites feature a complexity of environmental attributes from which a range of market and non-market goods and services may be derived. An ecosystem services approach, as described above, provides an appropriate framework for describing these attributes.

However, the use of this ecosystem services approach to value individual sites is hampered by several factors. Firstly, it is often difficult to specify and quantify the service being provided due to uncertainty in ecosystem functioning which arises from its complexity and lack of defining barriers (for example, species are not restricted to the site boundary).

Secondly, assuming that the ecosystem service can be defined, it is difficult to accurately define and quantify the change in the provision of the services as a result of designation. The expected change in a site from designation is, according to its conservation objective, either restoration to or maintenance at favourable condition, that is the state in which the site is considered to making its appropriate contribution to the conservation status[19] of the Natura 2000 network.

The benefits of designating the site are determined by comparing this outcome against what would might be anticipated to happen if the site was not designated (the baseline). If it was not designated, the Habitats Regulations would not apply as a matter of law to new plans and projects (for example, for construction of wind farms or gas pipelines) in the site. Such projects could potentially have adverse impacts on features of European importance in the sites. Without recourse to the Habitats Regulations it would be less straight forward for the statutory nature conservation advisers to influence the consenting of these activities to ensure that significant damage to the features is avoided. Consequently, there is greater risk that the condition of habitats and species in the site will deteriorate. Therefore the baseline that is used for comparison is business as usual (BAU), which entails continued potential damage from economic activities. Overall, the benefit of designating the site is equal to environmental benefits provided over and above the BAU scenario.

Thirdly, at the monetisation stage it is difficult to identify the human population that will benefit from any changes to ecosystem services provided by the site.

Given the lack of quantitative data a monetary assessment has not been possible at this stage. The assessment of the environmental change in provision of the ecosystem services following designation is therefore limited to a **qualitative determination**. The analysis is based on the following:

- Baseline – based on our understanding of the detrimental impact of economic activities on vulnerable habitats and species.
- Favourable conservation status - although categorical, the definition of favourable conservation status specifically requires maintenance or augmentation of healthy habitat.
- The resultant environmental benefit – application of the Habitats Regulations should control potentially damaging impacts of human activities on features of the site, allowing habitats and species to be maintained at or recover to favourable conservation condition. This has been shown in many similar contexts to have ecological benefits and to be of benefit to humans.

[19] Favourable conservation status is defined in Article 1 of the Habitats Directive. “The conservative status of a natural habitat will be taken as "favourable" when:

- its natural range and areas it covers within that range are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable as defined in (i);

(i) The conservation status will be taken as "favourable" when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.”

The difficulty in quantifying the expected benefits of designating a dSAC or pSPA restricts the monetary estimation of the benefits, either via benefits transfer[20] or through an original study. However, review of existing valuation evidence has identified a selection of relevant studies.

Existing Valuation Studies

A number of studies have valued specific marine sites. A useful categorisation in the context of the Impact Assessments is:

i). Valuation of a single ecosystem service - Studies focused on a single service of the marine environment, such as water quality;
ii). Valuation of a specific use - Studies that cover multiple services, but are focused on the use and willingness to pay (WTP) of a very well-defined affected population (for example, scuba divers' WTP for a specific dive site); or
iii). Valuation of a large area of marine habitat – Studies focused on the benefits of a large area of marine habitat, some looking at an overall network of conservations sites, rather than a specific site.

Although studies under i) and ii) exist, there are problems in applying them to sites in UK waters. They refer to non-UK locations (for example, the Mediterranean or California), and their findings are highly dependent on substitute sites and network effects. It is also very difficult to aggregate these studies, as they can relate to overlapping benefits. For example, provision of a certain water quality may be a regulating service in itself, but can also be a supporting service in allowing recreational enjoyment of the environment by divers. This makes avoiding double-counting extremely difficult.

Studies within (iii) are relevant to the Marine Natura 2000 (SPA and SAC) network that the sites covered by the Impact Assessments will contribute to. Specifically a series of recent studies have been commissioned by Defra to value the benefits of the UK marine habitat, focused on a network of UK Marine Conservation Zones (MCZs) that will be provided under the Marine Bill. These studies include:

- Marine biodiversity: An economic valuation (Beaumont et al., 2006);
- Developing Scenarios for a Network of Marine Protected Areas: Building the evidence base for the Marine Bill (Richardson et al., 2006);
- The Marine Bill – Marine Nature Conservation Proposals – Valuing the Benefits (Moran et al., 2007); and
- Determining monetary values for use and non-use goods and services – Marine Biodiversity – primary valuation (McVittie and Moran, 2008).

The studies deal with a network of marine sites or a large area of marine habitat that implicitly encompasses many 'sites' important to marine biodiversity. The positive value of a single site within such an area or network is only fully realised when it is part of a functioning network of sites. In other words, the value of a single site is dependent on positive network effects (Box 1). Equally, network effects may reduce a single site's value, because the availability of close substitutes may mean the site has lower value to people than would be the case if it was an isolated example. In this context 'close' and 'isolated' are used in the geographical and/or in an environmental (e.g. ecological) sense.

[20] For further details see: https://statistics.defra.gov.uk/esg/evri/evri/Benefits%20transfer.htm

Box 1: Positive network effects

- A network effect is a positive externality arising from the presence of one additional good in the economy. The classic example is the telephone. When one user buys a telephone it is valuable to them, but it also makes everyone else's telephone more valuable because they can now contact more people than they could before.
- Network effects are important for all ecosystems, and this is the case for the marine environment which lacks many physical barriers, meaning that species are often highly mobile and dependent on numerous sites through their lifecycle.
- Additionally, some ecosystem services do not originate from a particular source, but originate throughout the marine environment in a nearly continuous manner (such as the carbon sequestration capacity of the open ocean).

Beaumont *et al*. (2006) draws on various studies that used different methods to estimate the value of a number of ecosystem services arising from biodiversity in the UK marine environment. Although the authors are cautious about aggregating the separate ecosystem services values, the research indicates that the UK marine environment is worth many billions (£).

Following that initial research, Richardson *et al*. (2006) developed hypothetical scenarios for a network of MCZs in UK waters that were used as the basis for two separate valuation studies to value the benefits of the Marine Bill. The second study suggests that the benefit of the MCZ network to the entire UK population is £0.5bn to £1.2bn per year.

Importantly, Beaumont *et al*. (2006) used the ecosystem approach across the entirety of UK waters, while Richardson *et al.* looked specifically at a network of sites within UK waters. The latter is a much smaller area that will be selected to make an effective contribution to protecting UK marine biodiversity.

It is tempting to disaggregate the benefits of the entire UK marine environment or MCZ network to a single site. However, there are two main reasons, one methodological and one conceptual, why this would be a difficult, and inappropriate use of benefits transfer:

- Methodological - The relevant literature only provides aggregate values of ecosystem services, meaning that assumptions have to be made on apportioning a given level of ecosystem service to a particular marine habitat type (for example, reefs compared to sandbanks) or sites, for which no relevant quantitative data was identified, and
- Conceptual - The value of a single site standing alone is potentially very different to the value of that site within a network due to network effects. These may be positive or negative (as discussed above).

In the case of the UK marine environment, the importance of accounting for network effects has already been clearly illustrated in the studies related to the Marine Bill. The value of a single site carried out through benefits transfer could be a huge underestimate, which looked at in isolation would seem negligible. Perhaps an even bigger concern is that the value would be very uncertain. A network of sites covers all areas deemed scientifically necessary to conserve, but this raises the question as to whether some are more important than others. For example, if a site provides important spawning grounds for a few species of fish, would those species find another suitable site or would the stocks collapse if the site was lost?

The tranche of dSACs and pSPAs are being proposed as contributions to the network of Natura 2000 sites. However, the network effect of these sites is not known.

There is a high likelihood of arriving at a significantly underestimated value for a single site, especially where there is scientific uncertainty of the importance of an individual site and its network effects. For the above reasons benefit transfer is not considered possible in this case.

Qualitative Evaluation of Impacts

In place of benefits transfer and monetary valuation a qualitative approach is used to categorise the change in ecosystem service provision if the site were designated, compared to BAU of not designating the site. Based on expert judgement, the change in ecosystem service under each scenario was assigned a level: 'nil', 'minimal', 'low', 'moderate', or 'high' in the impact assessments. The analysis included consideration of:

- The relevance of each ecosystem service to the site;
- A value weighting (a valuation of the ecosystem service);
- The scale of benefits geographically; and
- The level of confidence in our knowledge of each ecosystem service.

Ecosystem services considered to be only marginally relevant to a site were removed from the analysis. The change in each ecosystem service was evaluated separately. An overall impact was then decided upon through expert guidance and will be subject to public consultation.

The review of the existing valuation literature highlights the need to explain the value of a single marine site within the context of a network of sites (as discussed above). As such, the IAs of proposed sites include discussions on the designation of any given site in the context of the cumulative impacts of site designation, which may be negative as well as positive.

Summary

Designating marine protected areas such as pSPAs and dSACs can provide a complex range of potential benefits which have been described in the impact assessments in terms of ecosystem services. This has been used to define which goods and services will be impacted by the designation of a site.

Information on various ecosystem services arising from the UK marine environment is available, but it is not feasible to apply it individually or collectively to the proposed tranche of pSPAs and dSACs. The physical and monetary information available does not support accurate benefits transfer. Therefore, the literature on valuation of the marine environment is used in the impact assessments as a guide to the types of values that may arise from designation.

In the absence of monetary values, a framework for qualitative analysis of ecosystem services has been applied in the impact assessments to analyse the benefits of designating the pSPAs and dSACs. Investigation is warranted into the possibility of undertaking further valuation studies to derive values of protecting sites in the marine environment, both individually and collectively, especially at sub-national scales.

ANNEX IV: COSTS OF DESIGNATION OF DOGGER BANK SAC BY SECTOR

FISHERIES

Fisheries							
Description			One-off Cost		Annual Cost		
Scenario	***Cost Item***	***Type***	***Cost £k***	***Year Experienced***	***Cost £k***	***Year Commencing***	***Average***
MINIMUM	Closure of up to 15% of site to fishing	Policy			122	2011	122.00
							-
							-
							-
							-
							-
Total		***Admin***	0		0		-
		Policy	0		122		122.00
		Both	0		122		122.00

	Inflation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Discount	100.0%	96.6%	93.4%	90.2%	87.1%	84.2%	81.4%	78.6%	75.9%	73.4%
		0	1	2	3	4	5	6	7	8	9
Cost £k	***Present Value***	***2011***	***2012***	***2013***	***2014***	***2015***	***2016***	***2017***	***2018***	***2019***	***2020***
	1050.14	122.00	117.87	113.89	110.04	106.32	102.72	99.25	95.89	92.65	89.52
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Admin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Policy	1050.14	122.00	117.87	113.89	110.04	106.32	102.72	99.25	95.89	92.65	89.52
Both	1050.14	122.00	117.87	113.89	110.04	106.32	102.72	99.25	95.89	92.65	89.52

MAXIMUM	Closure of entire site to fishing	Policy			813	2011	813.00
							-
							-
							-
							-
							-
Total		***Admin***	0		0		-
		Policy	0		813		813.00
		Both	0		813		813.00

Cost £k	***Present Value***	***2011***	***2012***	***2013***	***2014***	***2015***	***2016***	***2017***	***2018***	***2019***	***2020***
	6998.05	813.00	785.51	758.94	733.28	708.48	684.52	661.38	639.01	617.40	596.52
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Admin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Policy	6998.05	813.00	785.51	758.94	733.28	708.48	684.52	661.38	639.01	617.40	596.52
Both	6998.05	813.00	785.51	758.94	733.28	708.48	684.52	661.38	639.01	617.40	596.52

ENFORCEMENT

Enforcement							
Description			One-off Cost		Annual Cost		
Scenario	*Cost Item*	*Type*	*Cost £k*	*Year Experienced*	*Cost £k*	*Year Commencing*	*Average*
MINIMUM	Review activities for impacts on habitats	Policy	181	2011			-
	MFA monitoring and enforcement	Policy			39.6	2011	39.60
							-
							-
							-
							-
Total		***Admin***	0		0		-
		Policy	181		39.6		39.60
		Both	181		39.6		39.60

	Inflation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Discount	100.0%	96.6%	93.4%	90.2%	87.1%	84.2%	81.4%	78.6%	75.9%	73.4%
		0	1	2	3	4	5	6	7	8	9
Cost £k	***Present Value***	***2011***	***2012***	***2013***	***2014***	***2015***	***2016***	***2017***	***2018***	***2019***	***2020***
	181.00	181.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	340.86	39.60	38.26	36.97	35.72	34.51	33.34	32.21	31.13	30.07	29.06
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Admin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Policy	521.86	220.60	38.26	36.97	35.72	34.51	33.34	32.21	31.13	30.07	29.06
Both	521.86	220.60	38.26	36.97	35.72	34.51	33.34	32.21	31.13	30.07	29.06

MAXIMUM	Review activities for impacts on habitats	Policy	181	2011			-
	MFA monitoring and enforcement	Policy			39.6	2014	27.72
	Survey work to monitor favourable conservation status	Policy			1043	2011	1,043.00
	Appropriate estimates of consented activities	Policy			181	2011	181.00
							-
							-
Total		***Admin***	0		0		-
		Policy	181		1264		1,251.72
		Both	181		1264		1,251.72

Cost £k	***Present Value***	***2011***	***2012***	***2013***	***2014***	***2015***	***2016***	***2017***	***2018***	***2019***	***2020***
	181.00	181.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	226.04	0.00	0.00	0.00	35.72	34.51	33.34	32.21	31.13	30.07	29.06
	8977.82	1043.00	1007.73	973.65	940.73	908.91	878.18	848.48	819.79	792.07	765.28
	1557.99	181.00	174.88	168.97	163.25	157.73	152.40	147.24	142.26	137.45	132.81
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Admin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Policy	10942.84	1405.00	1182.61	1142.62	1139.69	1101.15	1063.92	1027.94	993.18	959.59	927.14
Both	10942.84	1405.00	1182.61	1142.62	1139.69	1101.15	1063.92	1027.94	993.18	959.59	927.14

OIL AND GAS EXPLORATION AND STORAGE

Oil and Gas Exploration and Storage							
Description			One-off Cost		Annual Cost		
Scenario	***Cost Item***	***Type***	***Cost £k***	***Year Experienced***	***Cost £k***	***Year Commencing***	***Average***
MINIMUM	Increased costs relating to appropriate assessment	Admin			48	2011	48.00
		Admin					-
							-
							-
							-
							-
Total		***Admin***	0		48		48.00
		Policy	0		0		-
		Both	0		48		48.00
MAXIMUM	Increased costs relating to appropriate assessment	Admin			240	2011	240.00
	Time series monitoring	admin			52	2011	52.00
							-
							-
							-
							-
Total		***Admin***	0		292		292.00
		Policy	0		0		-
		Both	0		292		292.00

	Inflation	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Discount	100.0%	96.6%	93.4%	90.2%	87.1%	84.2%	81.4%	78.6%	75.9%	73.4%
		0	1	2	3	4	5	6	7	8	9
Cost £k	***Present Value***	***2011***	***2012***	***2013***	***2014***	***2015***	***2016***	***2017***	***2018***	***2019***	***2020***
	413.17	48.00	46.38	44.81	43.29	41.83	40.41	39.05	37.73	36.45	35.22
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Admin	413.17	48.00	46.38	44.81	43.29	41.83	40.41	39.05	37.73	36.45	35.22
Policy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Both	413.17	48.00	46.38	44.81	43.29	41.83	40.41	39.05	37.73	36.45	35.22

Cost £k	***Present Value***	***2011***	***2012***	***2013***	***2014***	***2015***	***2016***	***2017***	***2018***	***2019***	***2020***
	2065.84	240.00	231.88	224.04	216.47	209.15	202.07	195.24	188.64	182.26	176.10
	447.60	52.00	50.24	48.54	46.90	45.31	43.78	42.30	40.87	39.49	38.15
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Admin	2513.44	292.00	282.13	272.59	263.37	254.46	245.86	237.54	229.51	221.75	214.25
Policy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Both	2513.44	292.00	282.13	272.59	263.37	254.46	245.86	237.54	229.51	221.75	214.25

AGGREGATES

Aggregates							
Description			One-off Cost		Annual Cost		
Scenario	*Cost Item*	*Type*	*Cost £k*	*Year Experienced*	*Cost £k*	*Year Commencing*	*Average*
MINIMUM	Increased cost of EIA	Admin	115	2011			-
	Increased cost of EIA	Admin	115	2014			-
							-
							-
							-
							-
Total		***Admin***	230		0		-
		Policy	0		0		-
		Both	230		0		-
MAXIMUM	Increased cost of EIA	Admin	574	2011			-
	Increased cost of EIA	Admin	574	2014			-
							-
							-
							-
							-
Total		***Admin***	1148		0		-
		Policy	0		0		-
		Both	1148		0		-

Inflation		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Discount		100.0%	96.6%	93.4%	90.2%	87.1%	84.2%	81.4%	78.6%	75.9%	73.4%
		0	1	2	3	4	5	6	7	8	9
Cost £k	***Present Value***	***2011***	***2012***	***2013***	***2014***	***2015***	***2016***	***2017***	***2018***	***2019***	***2020***
	115.00	115.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	103.72	0.00	0.00	0.00	103.72	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Admin	218.72	115.00	0.00	0.00	103.72	0.00	0.00	0.00	0.00	0.00	0.00
Policy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Both	218.72	115.00	0.00	0.00	103.72	0.00	0.00	0.00	0.00	0.00	0.00

Cost £k	***Present Value***	***2011***	***2012***	***2013***	***2014***	***2015***	***2016***	***2017***	***2018***	***2019***	***2020***
	574.00	574.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	517.72	0.00	0.00	0.00	517.72	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Admin	1091.72	574.00	0.00	0.00	517.72	0.00	0.00	0.00	0.00	0.00	0.00
Policy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Both	1091.72	574.00	0.00	0.00	517.72	0.00	0.00	0.00	0.00	0.00	0.00

RENEWABLES - WIND

Renewables - Wind							
Description			One-off Cost		Annual Cost		
Scenario	*Cost Item*	*Type*	*Cost £k*	*Year Experienced*	*Cost £k*	*Year Commencing*	*Average*
MINIMUM	Increase in survey costs	Policy	10000	2011			-
	Increase in costs of appropriate assessments	Policy	1881	2011			-
Total		***Admin***	0		0		-
		Policy	11881		0		-
		Both	11881		0		-
MAXIMUM	Sunk development costs	Policy	100000.00	2011			-
	Increased costs of alternative Wind Power	Policy			241,546	2016	120,773.00
	Increased costs of alternative Wind Power	Policy			483,092	2017	193,236.80
	Increased costs of alternative Wind Power	Policy			724,638	2018	217,391.40
	Increased costs of alternative Wind Power	Policy			966,184	2019	193,236.80
Total		***Admin***	0		0		-
		Policy	100000		2415460		724,638.00
		Both	100000		2415460		724,638.00

Inflation		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Discount		100.0%	96.6%	93.4%	90.2%	87.1%	84.2%	81.4%	78.6%	75.9%	73.4%
		0	1	2	3	4	5	6	7	8	9
Cost £k	***Present Value***	***2011***	***2012***	***2013***	***2014***	***2015***	***2016***	***2017***	***2018***	***2019***	***2020***
	10000.00	10000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1881.00	1881.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Admin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Policy	11881.00	11881.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Both	11881.00	11881.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Cost £k	***Present Value***	***2011***	***2012***	***2013***	***2014***	***2015***	***2016***	***2017***	***2018***	***2019***	***2020***
	100000.00	100000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	950388.65	0.00	0.00	0.00	0.00	0.00	203375	196498	189853	183433	177230
	1494026.81	0.00	0.00	0.00	0.00	0.00	0	392996	379706	366866	354460
	1651546.73	0.00	0.00	0.00	0.00	0.00	0	0	569559	550298	531689
	1442650.42	0.00	0.00	0.00	0.00	0.00	0	0	0	733731	708919
Admin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Policy	5638612.62	100000.00	0.00	0.00	0.00	0.00	203375	589493	1139118	1834328	1772298
Both	5638612.62	100000.00	0.00	0.00	0.00	0.00	203375	589493	1139118	1834328	1772298