

Planning Scotland's Seas

2013 Possible Nature Conservation Marine Protected
Areas Consultation Overview

Sustainability Appraisal

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marinescotland

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1.0 Introduction

- 1.1 The Scottish Government is committed to a clean, healthy, safe, productive and biologically diverse marine and coastal environment that meets the long term needs of its people and natural assets. In order to meet this commitment, Scotland's seas must be managed in a sustainable manner that balances the competing demands on marine resources and space. The biological and geological diversity within Scottish waters must be protected to ensure that the future marine ecosystem is capable of providing the economic and social benefits that it yields today.
- 1.2 The Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009 call for the designation of Nature Conservation Marine Protected Areas (MPAs) in Scottish waters, to protect marine biodiversity and geodiversity and to contribute to a UK and international network of MPAs. This will contribute towards achieving Good Environmental Status (GES) under the Marine Strategy Framework Directive (MSFD) and deliver Scotland's contribution to the ecologically coherent network of MPAs under the OSPAR convention on the protection of the marine environment in the North East Atlantic.
- 1.3 Work to satisfy these requirements has been underway since 2010. The Scottish Government received advice from the Joint Nature Conservation Committee (JNCC) and Scottish Natural Heritage (SNH) on 33 MPA proposals and four search locations in December 2012. SNH and JNCC have advised that between 29 and 33 of these locations should be included in the network.
- 1.4 The Scottish Government is proposing that these original 33 MPA proposals now be considered, through public consultation, as possible Marine Protected Areas (pMPAs) for designation to supplement existing protected areas for marine species and habitats, and to create a wider network of Marine Protected Areas¹. The pMPAs are located in both Scottish territorial waters (0-12 nautical miles) and offshore waters (12-200 nautical miles) (Figure 1).

Sustainability Appraisal

- 1.5 The Marine and Coastal Access Act 2009 (Schedule 6 s10) requires marine planning authorities to "*carry out an appraisal of the sustainability of its proposals for inclusion in the plan*". Whilst this applies to the statutory marine planning undertaken through the National Marine Plan process, the possible MPAs have also been subject to a Sustainability Appraisal (SA) for consistency in approach².
- 1.6 The possible MPAs have been subject to strategic environmental assessment (SEA) under the Environment Assessment (Scotland) Act 2005. Given that the possible MPAs are located in both Scottish territorial and offshore waters, it was decided that (on a voluntary basis) the SEA should also meet the

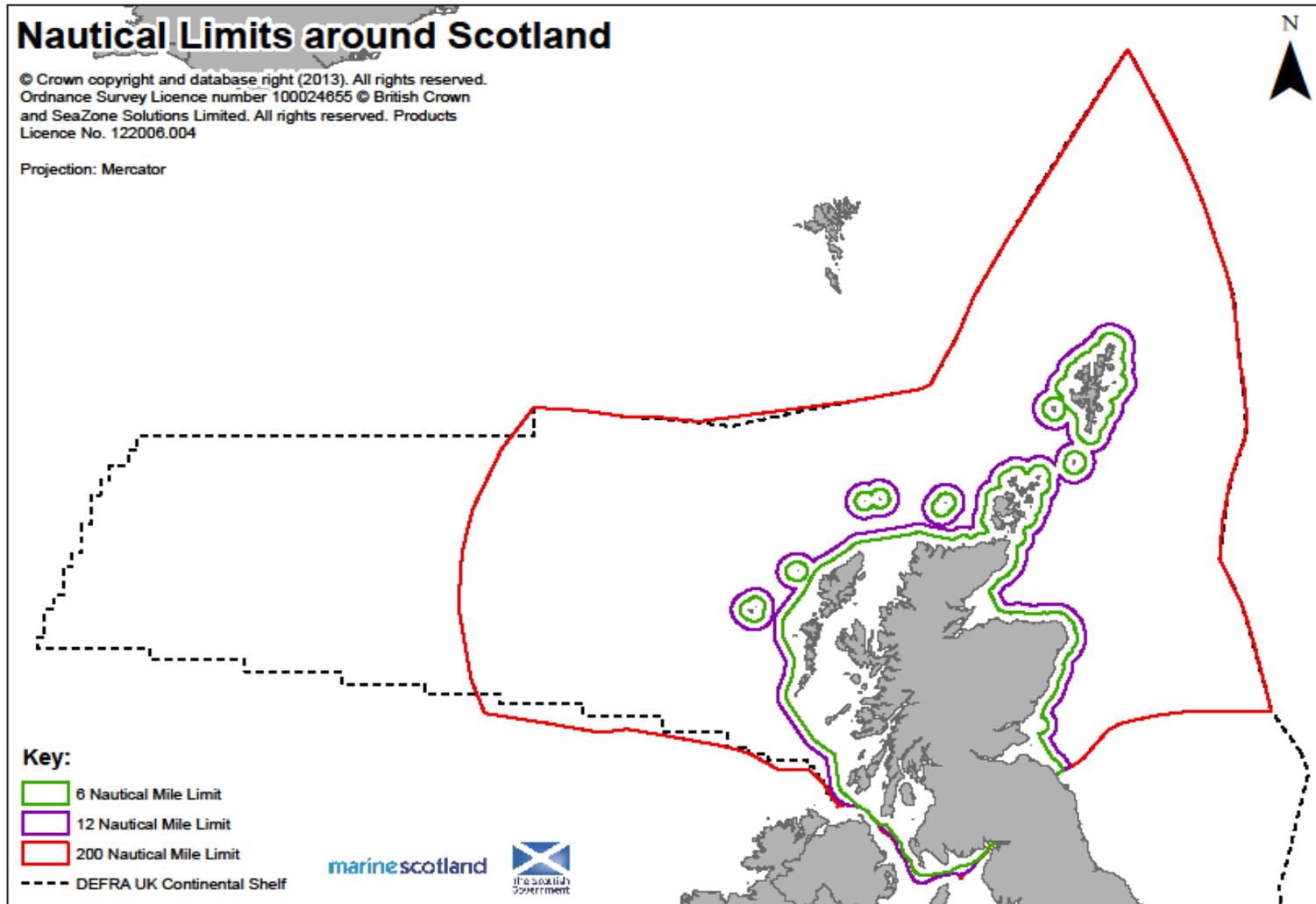
¹ <http://www.scotland.gov.uk/Publications/2013/07/2072>

² as have the non-statutory draft sectoral plans for offshore wind, wave and tidal energy

requirements of The Environmental Assessment of Plans and Programmes Regulations 2004.

- 1.7 A socio-economic assessment of the possible MPAs has been undertaken, both of the individual pMPAs and of the suite of pMPAs as a whole. This assessment was commissioned by Marine Scotland and undertaken by ABPMer and ettec.
- 1.8 A Business and Regulatory Impact Assessment (BRIA) has been undertaken to review the site-specific socio-economic impacts for each pMPA where the decision is either to designate or not to designate. A BRIA has also been undertaken for each of the sets of sites deemed to make an equal ecological contribution, or to be science-based alternatives. The BRIAs have drawn on the socio-economic assessments of the individual pMPAs
- 1.9 The SEA and the socio-economic assessment have been combined to provide an overall sustainability appraisal (SA) of the pMPAs, to accompany the possible MPA consultation document. The inputs from the SEA constitute the “environment” sections of the SA. The socio-economic assessment has informed the “population and health” and “economy and other marine users” sections of the SA. The focus has been on the overall effects of the suite of pMPAs.
- 1.10 The purpose of this report is to document the findings of the SA. The inputs from the SEA constitute the ‘environment’ sections of the SA. The socio-economic assessment has informed the ‘people and health’ and ‘economy and other marine users’ sections of this SA. The Environmental Report, BRIAs and socio-economic assessment reports are available at <http://www.scotland.gov.uk/Topics/marine/marine-consultation>.
- 1.11 The views of the public, the Consultation Authorities and the Consultation Bodies on the possible MPAs and the findings of this SA Report are now being sought.
- 1.12 The remainder of this report is structured as follows:
 - Section 2 provides information on the possible MPAs.
 - Section 3 discusses the approach to the SA and the methods used.
 - Section 4 sets out the results of the SA.
 - Section 5 considers the next steps.

Figure 1. Nautical Limits around Scotland



2.0 2013 Possible Nature Conservation Marine Protected Areas Consultation Overview

Introduction

2.1 As noted in the introduction, the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009 both contain powers to designate Marine Protected Areas (MPAs). These contribute to a range of measures to manage and protect Scotland's seas for current and future generations. The legislation also requires that a network of MPAs in UK seas is created to protect biodiversity and geodiversity. The network will contribute to agreements with international partners to create an ecologically coherent network of well-managed MPAs in the north-east Atlantic. The key overall objective of the MPA network is to safeguard the most important natural and cultural heritage features in Scottish waters, based on the principle of sustainable use³.

The Possible MPAs

2.2 Marine Scotland is working in partnership with Scottish Natural Heritage (SNH), the Joint Nature Conservation Committee (JNCC), the Scottish Environment Protection Agency (SEPA) and Historic Scotland (HS). SNH and JNCC have provided joint scientific advice (as statutory nature conservation bodies) on existing protected areas and other area-based measures that contribute to the network and have identified possible Nature Conservation MPAs that could form part of a network to protect biodiversity and geodiversity⁴. A significant part of the work underlying this advice has been based around ensuring that network and feature coverage satisfies the OSPAR principles of developing an ecologically coherent network.

2.3 Thirty-three possible Nature Conservation MPAs have been identified, and a further four MPA search locations remain to be fully assessed (Table 1 and Figure 2). The evolving MPA network in Scotland's seas builds on the existing network of protected areas (Figure 3), which includes Special Areas of Conservation (SACs); Special Protection Areas (SPAs); Sites of Special Scientific Interest (SSSIs), and fisheries management areas. More information on these other designations and sites is provided in the SNH/JNCC advice⁴.

2.4 Details of the protected features for each pMPA are provided in Table 2.

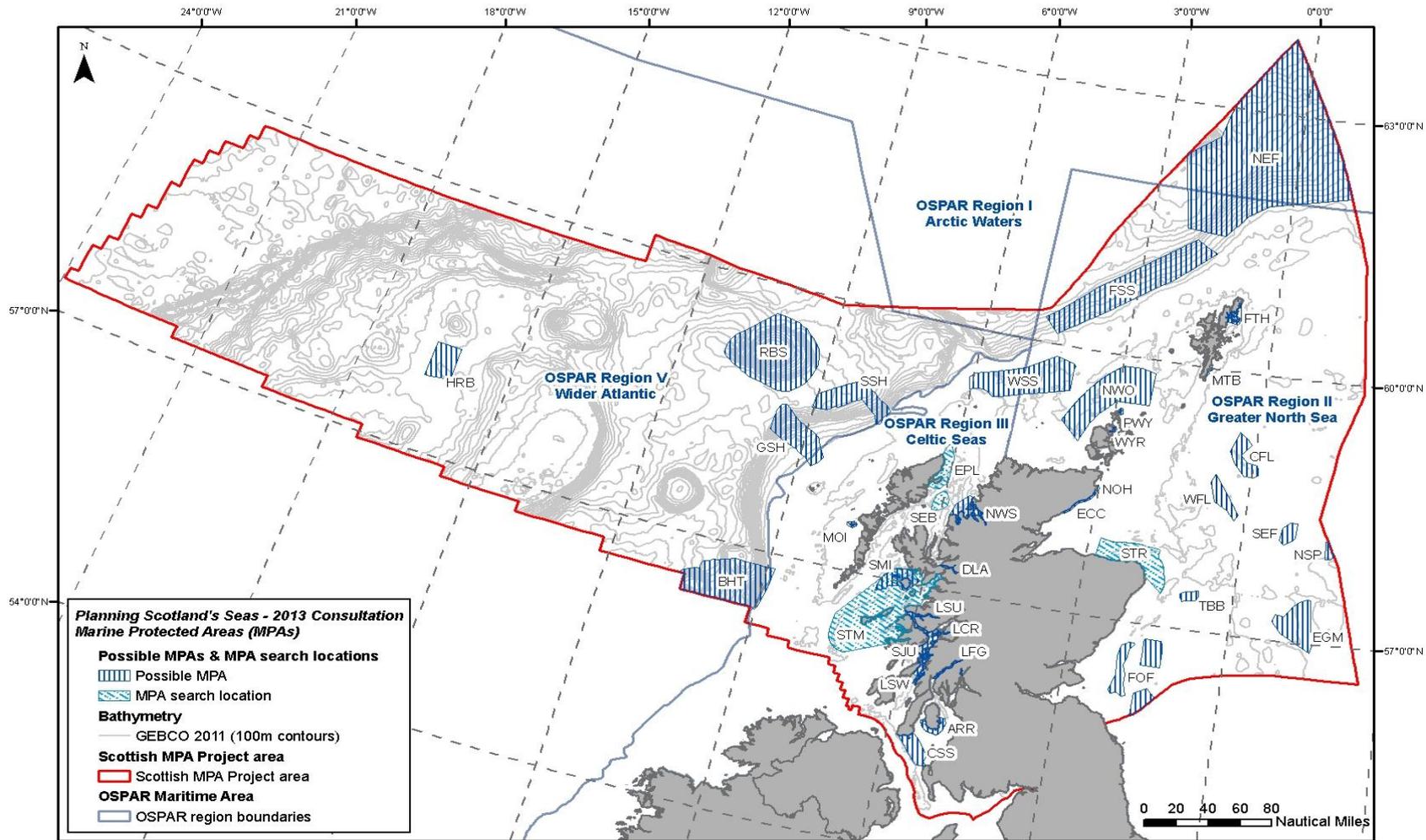
³ Marine Scotland. 2012. Report to the Scottish Parliament on Progress to Identify a Scottish Network of Marine Protected Areas, page 10.

⁴ Scottish Natural Heritage and the Joint Nature Conservation Committee. 2012. *Advice to the Scottish Government on the selection of Nature Conservation Marine Protected Areas (MPAs) for the development of the Scottish MPA network*. Scottish Natural Heritage Commissioned Report No. 547.

Table 1. Possible Nature Conservation MPAs and MPA search locations (*) in Scottish waters (by sea area)

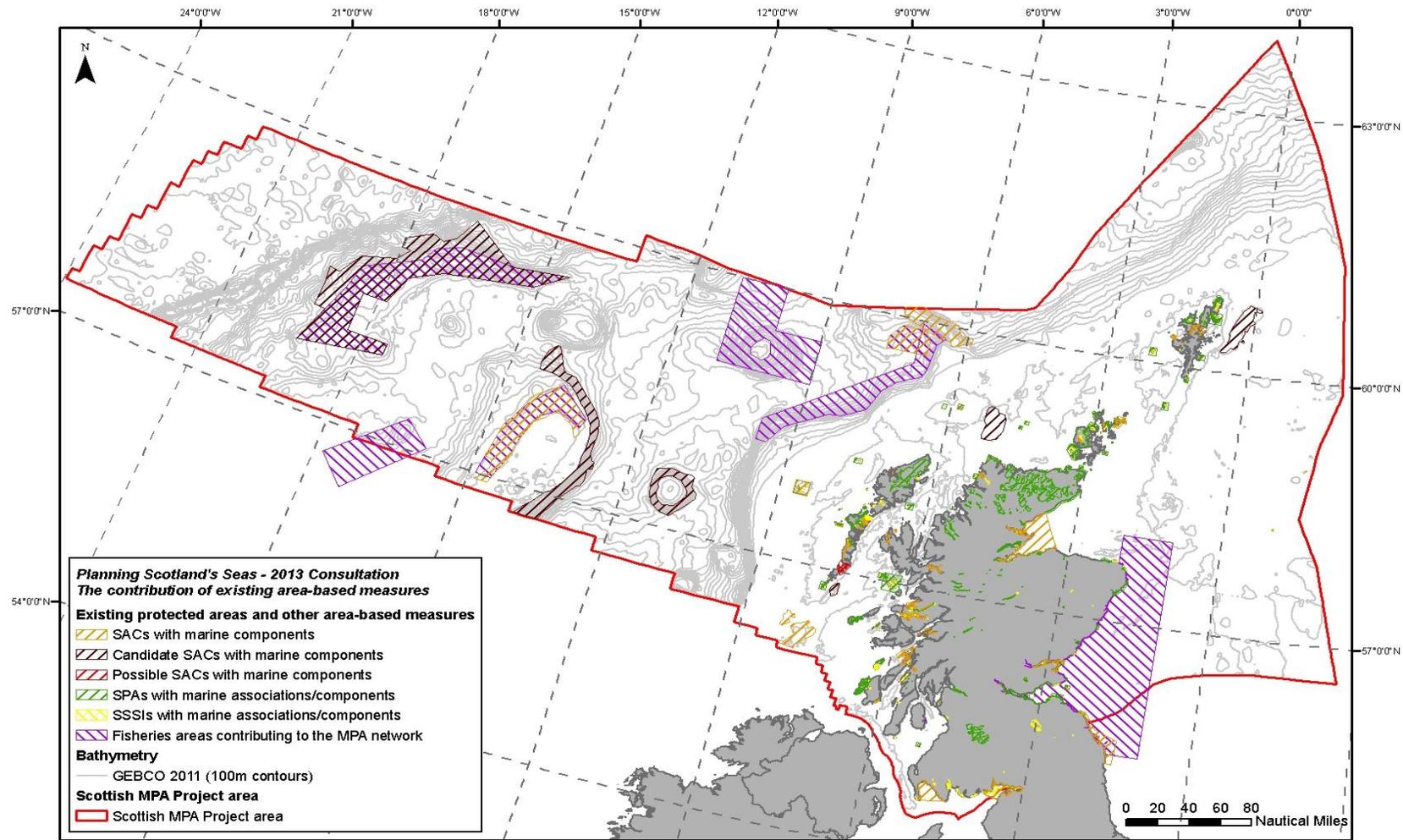
OSPAR Region(s)	Possible MPA/MPA search location	Code	Territorial / Offshore
I	Faroe-Shetland sponge belt	FSS	Offshore
I & II	North-east Faroe Shetland Channel	NEF	Offshore
II	Central Fladen	CFL	Offshore
	East Caithness Cliffs	ECC	Territorial
	East of Gannet and Montrose Fields	EGM	Offshore
	Fetlar to Haroldswick	FTH	Territorial
	Firth of Forth Banks Complex	FOF	Offshore
	Mousa to Boddam	MTB	Territorial
	North-west Orkney	NWO	Both
	Norwegian boundary sediment plain	NSP	Offshore
	Noss Head	NOH	Territorial
	Papa Westray	PWY	Territorial
	South-east Fladen	SEF	Offshore
	Southern Trench*	STR	Territorial
	Turbot Bank	TBB	Offshore
	Western Fladen	WFL	Offshore
	Wyre and Rousay Sounds	WYR	Territorial
II & III	West Shetland Shelf	WSS	Offshore
III	Clyde Sea Sill	CSS	Territorial
	Eye Peninsula to Butt of Lewis*	EPL	Territorial
	Loch Creran	LCR	Territorial
	Lochs Duich, Long and Alsh	DLA	Territorial
	Loch Sunart	LSU	Territorial
	Loch Sunart to the Sound of Jura	SJU	Territorial
	Loch Sween	LSW	Territorial
	Monach Isles	MOI	Territorial
	North-west sea lochs and Summer Isles	NWS	Territorial
	Shiant East Bank*	SEB	Territorial
	Skye to Mull*	STM	Territorial
	Small Isles	SMI	Territorial
	South Arran	ARR	Territorial
	Upper Loch Fyne and Loch Goil	LFG	Territorial
III & V	Geike Slide and Hebridean Slope	GSH	Offshore
	South-west Sula Sgeir and Hebridean Slope	SSH	Offshore
	The Barra Fan and Hebrides Terrace Seamount	BHT	Offshore
V	Hatton-Rockall Basin	HRB	Offshore
	Rosemary Bank Seamount	RBS	Offshore

Figure 2. Possible Nature Conservation MPAs and search locations in Scotland's seas



Map projected in Europe Albers Equal Area Conic (Modified Standard Parallels - Standard Parallel 1 = 50.2; Standard Parallel 2 = 58.5). 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). Coastline © Crown copyright and database right [2013]. All rights reserved. Ordnance Survey Licence number 100017906. Bathymetry © GEBCO. NOT TO BE USED FOR NAVIGATION. MPA network © SNH, JNCC and Marine Scotland. 03.07.13. All rights reserved.

Figure 3. The contribution of existing protected areas and other area-based measures to the MPA network



Map projected in Europe Albers Equal Area Conic (Modified Standard Parallels - Standard Parallel 1 = 50.2; Standard Parallel 2 = 56.5). 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). Coastline ©Crown copyright and database right [2013]. All rights reserved. Ordnance Survey Licence number 100017908. Bathymetry ©GEBCO. NOT TO BE USED FOR NAVIGATION. MPA network ©SNH, JNCC and Marine Scotland. 03.07.13. All rights reserved.

Table 2. Protected Features – Biodiversity and Geodiversity – for each pMPA

Name	Code	Protected features	Conservation objective
Territorial waters			
Clyde Sea Sill	CSS	<i>Biodiversity protected features</i> - Black guillemot; circalittoral sand and coarse sediment communities; fronts <i>Geodiversity protected features</i> - Marine Geomorphology of the Scottish Shelf Seabed - sand banks, sand ribbon fields, sand wave fields	<i>conserve</i>
East Caithness Cliffs	ECC	<i>Biodiversity protected features</i> - Black guillemot	<i>conserve</i>
Fetlar to Haroldswick	FTH	<i>Biodiversity protected features</i> - Black guillemot; circalittoral sand and coarse sediment communities; horse mussel beds; kelp and seaweed communities on sublittoral sediments; maerl beds; shallow tide-swept coarse sands with burrowing bivalves <i>Geodiversity protected features</i> - Marine Geomorphology of the Scottish Shelf Seabed	<i>conserve</i>
Loch Creran	LCR	<i>Biodiversity protected features</i> - Flame shell beds <i>Geodiversity protected features</i> - Quaternary of Scotland	<i>conserve</i>
Lochs Duich, Long and Alsh	DLA	<i>Biodiversity protected features</i> - Burrowed mud, flame shell beds	<i>conserve</i>
Loch Sunart	LSU	<i>Biodiversity protected features</i> - Flame shell beds; northern feather star aggregations on mixed substrata; serpulid aggregations	<i>conserve</i>
Loch Sunart to the Sound of Jura	SJU	<i>Biodiversity protected features</i> - Common skate <i>Geodiversity protected features</i> - Quaternary of Scotland	<i>conserve</i>
Loch Sween	LSW	<i>Biodiversity protected features</i> - Burrowed mud; maerl beds; native oysters; sublittoral mud and mixed sediment communities	<i>conserve</i>
Monach Isles	MOI	<i>Biodiversity protected features</i> - Black guillemot <i>Geodiversity protected features</i> - Marine Geomorphology of the Scottish Shelf Seabed; Quaternary of Scotland - landscape of areal glacial scour	<i>conserve</i>
Mousa to Boddam	MTB	<i>Biodiversity protected features</i> - Sandeels <i>Geodiversity protected features</i> - Marine Geomorphology of the Scottish Shelf Seabed	<i>conserve</i>

Name	Code	Protected features	Conservation objective
North-west sea lochs and Summer Isles	NWS	<i>Biodiversity protected features</i> - Burrowed mud; circalittoral muddy sand communities; flame shell beds; kelp and seaweed communities on sublittoral sediments; maerl beds; maerl or coarse shell gravel with burrowing sea cucumbers; northern feather star aggregations on mixed substrata <i>Geodiversity protected features</i> - Marine Geomorphology of the Scottish Shelf Seabed - banks of unknown substrate; Quaternary of Scotland - glaciated channels/troughs, megascale glacial lineations, moraines; Seabed Fluid and Gas Seep - pockmarks; Submarine Mass Movement - slide scars	<i>recover flame shell beds and maerl beds</i> <i>conserve other features</i>
Noss Head	NOH	<i>Biodiversity protected features</i> - Horse mussel beds	<i>conserve</i>
Papa Westray	PWY	<i>Biodiversity protected features</i> - Black guillemot <i>Geodiversity protected features</i> - Marine Geomorphology of the Scottish Shelf Seabed - sand wave field	<i>conserve</i>
Small Isles	SMI	<i>Biodiversity protected features</i> - Black guillemot; burrowed mud, circalittoral sand and mud communities; fan mussel aggregations; horse mussel beds; northern feather star aggregations on mixed substrata; northern sea fan and sponge communities; shelf deeps; white cluster anemones <i>Geodiversity protected features</i> - Quaternary of Scotland - glaciated channels/troughs, glacial lineations, meltwater channels, moraines, rock basins, streamlined bedforms	<i>conserve</i>
South Arran	ARR	<i>Biodiversity protected features</i> - Burrowed mud; herring spawning grounds; kelp and seaweed communities on sublittoral sediments; maerl beds; maerl or coarse shell gravel with burrowing sea cucumbers; ocean quahog; seagrass beds; shallow tide-swept coarse sands with burrowing bivalves	<i>recover maerl beds</i> <i>conserve other features</i>
Upper Loch Fyne and Loch Goil	LFG	<i>Biodiversity protected features</i> - Burrowed mud; flame shell beds; horse mussel beds; ocean quahog; sublittoral mud and mixed sediment communities	<i>recover flame shell beds</i> <i>conserve other features</i>
Wyre and Rousay Sounds	WYR	<i>Biodiversity protected features</i> - Kelp and seaweed communities on sublittoral sediment; maerl beds <i>Geodiversity protected features</i> - Marine Geomorphology of the Scottish Shelf Seabed	<i>conserve</i>

Name	Code	Protected features	Conservation objective
Offshore waters			
Central Fladen	CFL	<i>Biodiversity protected features</i> - Burrowed mud <i>Geodiversity protected features</i> - Quaternary of Scotland - sub-glacial tunnel valley	<i>conserve</i>
East of Gannet and Montrose Fields	EGM	<i>Biodiversity protected features</i> - Ocean quahog aggregations (including sands and gravels as their supporting habitat); offshore deep sea muds	<i>conserve</i>
Faroe-Shetland sponge belt	FSS	<i>Biodiversity protected features</i> - Continental slope; deep-sea sponge aggregations; ocean quahog aggregations; offshore subtidal sands and gravels <i>Geodiversity protected features</i> - Marine Geomorphology of the Scottish Deep Ocean Seabed - sand wave field, sediment wave field; Quaternary of Scotland - continental slope channels; iceberg ploughmark fields, prograding wedges; Submarine Mass Movement - slide deposits	<i>conserve</i>
Firth of Forth Banks Complex	FOF	<i>Biodiversity protected features</i> - Ocean quahog aggregations; offshore subtidal sands and gravels; shelf banks and mounds <i>Geodiversity protected features</i> - Quaternary of Scotland - moraines	<i>conserve</i>
Geikie Slide and Hebridean slope	GSH	<i>Biodiversity protected features</i> - Burrowed mud; continental slope; offshore deep-sea muds, offshore subtidal sands and gravels <i>Geodiversity protected features</i> - Submarine Mass Movement - slide deposits, slide scars	<i>conserve</i>
Hatton-Rockall Basin	HRB	<i>Biodiversity protected features</i> – Deep-sea sponge aggregations; offshore deep-sea muds <i>Geodiversity protected features</i> - Marine Geomorphology of the Scottish Deep Ocean Seabed - sediment drifts; Polygonal fault systems	<i>conserve</i>
North-east Faroe Shetland Channel	NEF	<i>Biodiversity protected features</i> - Continental slope; deep-sea sponge aggregations; offshore deep-sea muds; offshore subtidal sands and gravels <i>Geodiversity protected features</i> - Cenozoic Structures of the Atlantic Margin - mud diapirs; Marine Geomorphology of the Scottish Deep Ocean Seabed - contourite sand/silt; Quaternary of Scotland - prograding wedge; Submarine Mass Movement - slide deposits	<i>conserve</i>
North-west Orkney	NWO	<i>Biodiversity protected features</i> – Sandeels <i>Geodiversity protected features</i> - Marine Geomorphology of the Scottish Shelf Seabed - sand bank, sand wave field, sediment wave fields	<i>conserve</i>

Name	Code	Protected features	Conservation objective
Norwegian boundary sediment plain	NSP	<i>Biodiversity protected features</i> - Ocean quahog aggregations (including sands and gravels as their supporting habitat), offshore subtidal sands and gravels	<i>conserve</i>
Rosemary Bank Seamount	RBS	<i>Biodiversity protected features</i> – Deep-sea sponge aggregations; seamount features; seamount communities <i>Geodiversity protected features</i> - Cenozoic Structures of the Atlantic Margin - Rosemary Bank Seamount; Marine Geomorphology of the Scottish Deep Ocean Seabed - scour moats, sediment drifts, sediment wave fields; Quaternary of Scotland - iceberg ploughmark field; Submarine Mass Movement - slide scars	<i>conserve</i>
South-east Fladen	SEF	<i>Biodiversity protected features</i> - Burrowed mud <i>Geodiversity protected features</i> - Seabed Fluid and Gas Seep - pockmarks	<i>conserve</i>
South-west Sula Sgeir and Hebridean slope	SSH	<i>Biodiversity protected features</i> - Burrowed mud; continental slope; offshore deep-sea muds; offshore subtidal sands and gravels <i>Geodiversity protected features</i> - Quaternary of Scotland - iceberg ploughmark fields, prograding wedges; Submarine Mass Movement - slide deposits	<i>conserve</i>
The Barra Fan and Hebrides Terrace Seamount	BHT	<i>Biodiversity protected features</i> - Burrowed mud; continental slope; offshore deep-sea muds; offshore subtidal sands and gravels; orange roughy; seamount; seamount communities <i>Geodiversity protected features</i> - Cenozoic Structures of the Atlantic Margin - continental slope, Hebrides Terrace Seamount; Marine Geomorphology of the Scottish Deep Ocean Seabed - scour moat; Quaternary of Scotland - iceberg ploughmark field, prograding wedges; Submarine Mass Movement - continental slope turbidite canyons, slide deposits	<i>conserve</i>
Turbot Bank	TBB	<i>Biodiversity protected features</i> – Sandeels, offshore subtidal sands and gravels, shelf banks and mounds	<i>conserve</i>
West Shetland Shelf	WSS	<i>Biodiversity protected features</i> - Offshore subtidal sands and gravels	<i>conserve</i>
Western Fladen	WFL	<i>Biodiversity protected features</i> - Burrowed mud <i>Geodiversity protected features</i> - Quaternary of Scotland - sub-glacial tunnel valleys	<i>conserve</i>

2.5 The Scottish MPA Selection Guidelines⁵ set out a five-stage process for the selection of Nature Conservation MPAs in Scotland's seas:

- Stage 1: Identification of search locations based on presence of key features
- Stage 2: Prioritisation of search locations based on the qualities of their features
- Stage 3: Assessment of the size an MPA needs to be, to be effective
- Stage 4: Assessment of the ability to manage features effectively
- Stage 5: Prioritising potential areas according to their contribution to the network

A full description of the process is set out in Marine Scotland's Report to the Scottish Parliament (2012)³.

2.6 The focus of the possible MPAs is to either:

- protect a range of biodiversity or geodiversity features in their current state for the future, or
- to allow them to recover to the state they should be to remain healthy and productive.

This is reflected in the conservation objective identified for each pMPA (Table 2).

2.7 The MPAs will be managed to achieve their conservation objectives, using the principle of sustainable use. This means that only activities that present a risk of hindering the achievement of the conservation objectives will have specific management measures implemented.

2.8 Management options papers have been produced for each of the pMPAs. These papers use a risk-based approach to identify management options, based on the protected features, the conservation objectives, and the activities which could affect their condition. Management options are a key element of the consultation, which provides opportunities for stakeholders to present their views, including their practical environmental knowledge and activity data.

Alternatives

2.9 Some of the 33 possible MPAs provide science-based alternatives to the features of the recommended possible MPAs, and others would provide equivalent ecological value for the same combinations of features. Table 3 outlines the alternative options for the MPA network.

⁵ available at <http://www.scotland.gov.uk/Topics/marine/marine-environment/mpanetwork/mpaguidelines>

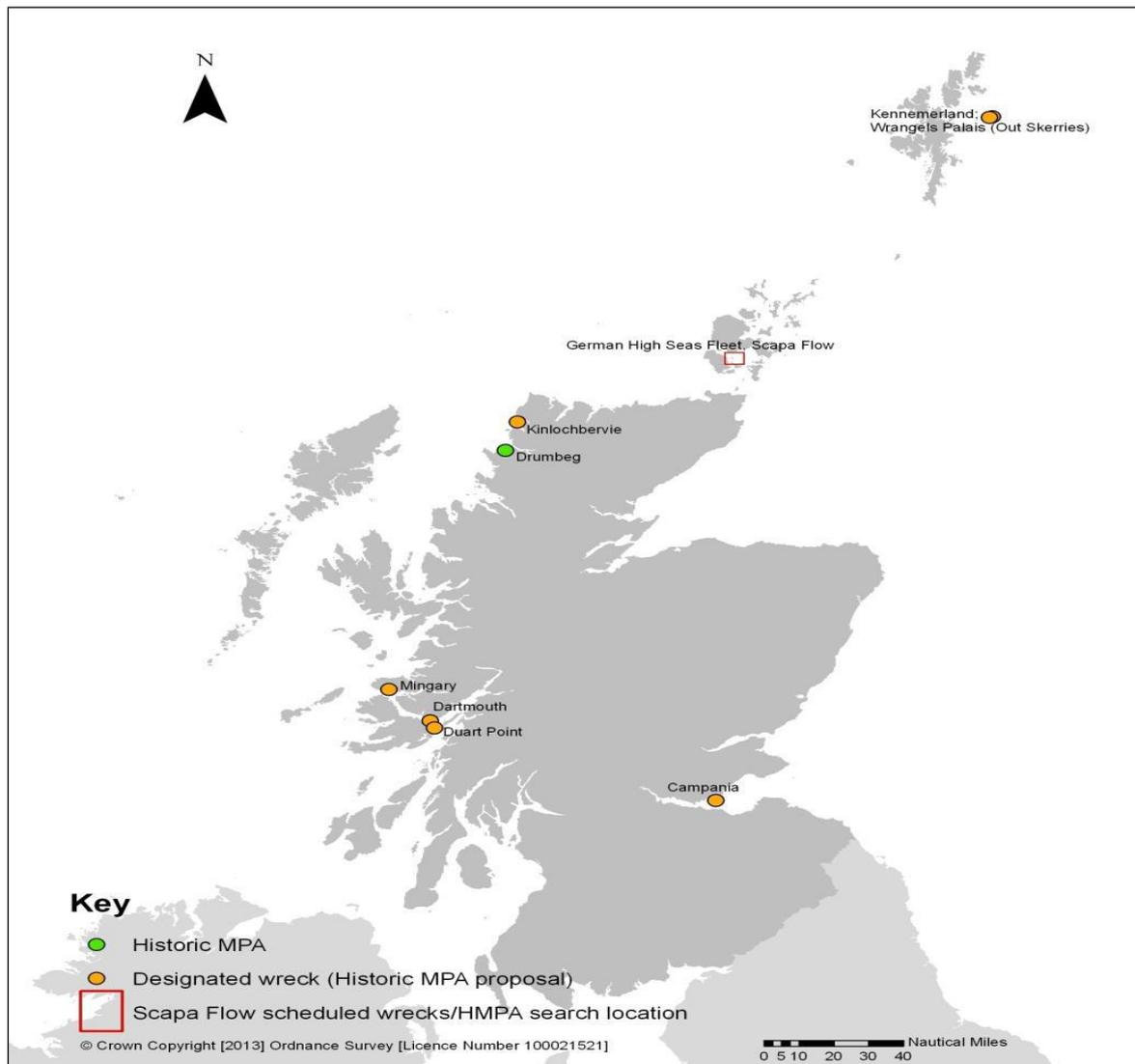
Table 3. Alternative options for the MPA network

Alternative Options	Description
South-West Sula Sgeir and Hebridean Slope or Geikie Slide and Hebridean Slope	The features within the South-west Sula Sgeir and Hebridean slope possible MPA, and the Geikie Slide Hebridean slope possible MPA are considered to offer an equivalent contribution to the MPA network. JNCC would recommend that only one of these two pMPAs needs to be designated to meet the MPA Selection Guidelines.
Central, Western or South-east Fladen	<p>JNCC have identified science-based alternatives to the representation of one component of burrowed mud within the Central Fladen possible MPA. These are Western and Southeast Fladen. JNCC recommend that the southern part of the Central Fladen possible MPA would need to be designated – as a CFL(core) - as it represents a different component of burrowed mud. However, there are options around the representation of seapens and burrowing megafauna, and representation could come from including the rest of Central Fladen OR Western Fladen OR South-east Fladen.</p> <p>Central Fladen (core) would be designated under all options. The alternatives relate to the designation of the additional CFL area, which does not incorporate CFL (core) in this assessment.</p>
Firth of Forth Banks Complex, Turbot Bank and Norwegian Boundary Sediment Plain	<p>Within the Firth of Forth Banks Complex, JNCC have identified science-based alternatives to the representation of:</p> <ul style="list-style-type: none"> • the ocean quahog - Norwegian Boundary Sediment Plain; and • offshore subtidalsands and gravels and shelf banks and mounds - Turbot Bank. Turbot Bank is also identified in its own right for sandeels. <p>There are therefore several scenarios:</p> <ul style="list-style-type: none"> • If Firth of Forth Banks Complex is not designated, then sands and gravels and shelf banks and mounds will need to be added to Turbot Bank as well as sandeels, and Norwegian boundary sediment plain will also need to be designated for ocean quahog; • If Firth of Forth Banks Complex is designated, then Turbot Bank will be recommended for sandeels only and Norwegian boundary sediment plain will not required to be designated.

Historic MPAs

- 2.10 Scotland's first Historic Marine Protected Area (HMPA) was designated on 18 March 2013, to protect an historic wreck close to the harbour of Drumbeg, Sutherland (Figure 4). On the same day, Historic Scotland also launched a consultation to make the Drumbeg designation permanent, and to designate a further six HMPAs. These comprise historic wreck sites currently designated under section 1 of the Protection of Wrecks Act 1973.
- 2.11 In 2013-14, Historic Scotland is progressing consideration of an HMPA for Scapa Flow's outstanding underwater heritage. This involves review and transition to HMPA status for the seven intact wrecks of the German High Seas Fleet scuttled in Scapa Flow in 1919, currently scheduled monuments, and consideration of any other underwater sites relating to Scapa Flow's wartime naval heritage for inclusion in an HMPA proposal for consultation in 2014 (Figure 4). A small number of other high priority sites may be considered for designation as HMPAs before 2015.

Figure 4. Historic MPAs (current and possible)



3. Approach to the Sustainability Appraisal

3.0.1 The following sections set out a brief overview of the processes used in the different assessments. Full details are provided in the reports of the SEA and the socio-economic assessment.

3.1 Approach to the SEA

3.1.1 The SEA was undertaken by the Scottish Government's Environmental Assessment Team, and was advised by a Project Advisory Group, which included national representatives of potentially affected marine industries, environmental Non-Governmental Organisations (NGOs), key agencies, and other national and strategic-level stakeholders.

3.1.2 The purpose of the SEA was to assess the potential effects of the possible MPAs on the environment. The SEA has not assessed the scientific or conservation effectiveness of the possible MPAs. For example, the SEA has not evaluated whether or not the pMPAs, alongside the existing measures, will achieve their conservation objectives. This has been undertaken by SNH and JNCC, as part of the MPA identification and selection process.

3.1.3 The SEA has assessed each of the possible MPA locations, as well as the potential for the cumulative effects of the nature conservation MPA network. This has not included the areas of search, as these remain the subject of further study. Assessment of any possible MPAs in these areas will be progressed, as required, once further information is available.

3.1.4 The possible MPAs include draft management options for each feature. These have been assessed, at a strategic level, for their potential to displace activities, and the effects that this may have in terms of activities in new areas or intensification of already-existing activities.

3.1.5 Historic MPA proposals have been treated as part of the environmental baseline, and included in the cumulative assessment.

Scope of the Environmental Topics Assessed

3.1.6 An initial review of the possible MPAs against the environmental topics set out in Schedule 3 of the Environmental Assessment (Scotland) Act 2005 suggested that potential effects would be focused on biodiversity, water, and climatic factors. The scoping report proposed that the SEA should focus on these factors, but sought advice as to whether cultural heritage and landscape/seascape should be included.

3.1.7 Several scoping responses suggested that the scope of the assessment should be wider than that proposed in the scoping report, and should include:

- geodiversity
- landscape/seascape
- cultural heritage
- different aspects of climatic factors to those proposed
- population and human health

3.1.8 These were considered and the resulting scope of the environmental topics used in the SEA comprises:

- biodiversity, flora and fauna. This will include the seabed strata and/or bottom sediments, and their contribution to the ecological/environmental status of water bodies;
- marine geodiversity
- climatic factors

Details are provided in the Environmental Report.

3.1.9 The following have been considered by the socio-economic assessment:

- social and economic effects, including health and safety;
- the effects of the possible MPAs on other users of the marine environment, both adverse and beneficial;
- where traditional fishing activity may be lost, as a potential social impact with effects on cultural heritage.

3.1.10 A set of key questions, known as SEA objectives (Table 4), was used to structure the assessment, and the pMPAs were assessed against these, in terms of:

- direct effects, e.g. benefits for biodiversity through changes to human activities progressed in certain locations
- indirect effects, e.g. the effects of displacement of fishing on previously unfished areas or the intensification of effort in existing fisheries

The results are provided in Appendix 1, and discussed in Section 4.

3.1.11 A key issue was the potential for displacement of marine activities, resulting from the implementation of possible management measures. The SEA reviewed the environmental implications of this potential displacement, by considering:

- the sensitivity of MPA features to marine activities;
- the recommended measures for management of these features, for each pMPA;
- the potential for displacement from implementation of management measures, for each feature. For example, the nature of some of these features is such that management could be zoned.

This information was then fed into the overall assessment.

3.1.12 At this stage, there is uncertainty around what form the management measures would take, and their application across each of the pMPAs. This uncertainty is discussed more fully in paragraph 3.2.7.

3.1.13 Management at a site level is being developed based on science and discussions with stakeholders. Participation is key to the successful delivery of a well-managed network. Stakeholders can provide higher-resolution local environmental knowledge and understanding of specific locations and the activities that take place, which will assist in providing greater certainty and fewer precautionary conclusions about management measures. These

recommendations for potential management measures act as the basis for these discussions around pMPA management. These will continue during and after the consultation period.

Table 4. SEA Objectives

SEA Topics	SEA Objective
Biodiversity, flora and fauna	<ul style="list-style-type: none"> • to safeguard (and, where appropriate, enhance) marine and coastal ecosystems, including species and habitats, and their interactions • to maintain or work towards good ecological/environmental status of water bodies • to maintain and protect the character and integrity of the seabed
Water	<ul style="list-style-type: none"> • see biodiversity
Soil: marine geodiversity	<ul style="list-style-type: none"> • to safeguard (and, where appropriate, enhance) geodiversity features
Soil: seabed	<ul style="list-style-type: none"> • seabed integrity: see biodiversity
Climatic factors	<ul style="list-style-type: none"> • to reduce GHG emissions from vessels

3.2 Approach to the Socio-Economic Assessment

3.2.1 The social and economic analyses in the Sustainability Appraisal are based on the findings of the socio-economic assessment commissioned by Marine Scotland and undertaken by ABPmer and ettec⁶. The project was steered by a Project Steering Group, comprising members of the Scottish Government, JNCC and SNH, and was advised by the Project Advisory Group (paragraph 3.1.1).

3.2.2 The purpose of the study was to assess the potential economic and social effects of the suite of possible MPAs in Scottish offshore and territorial waters. It investigated the potential economic benefits and costs, and associated potential social impacts, of designating each individual possible MPA. It also considered the potential economic benefits and costs, and associated potential social impacts, of designating the suite of possible MPAs as a whole.

3.2.3 This SA report sets out the findings of the socio-economic assessment at national level; the detailed site-specific analysis is reported in the Business and Regulatory Impact Assessments (BRIAs). The analysis at a national level has been built up from site-specific assessments of costs and benefits. Within this, assessment has also been made of the potential for cumulative impacts, including any economies or diseconomies of scale. Details of the methods and analytical approach employed are provided in Chapter 2 and Appendix B of the socio-economic assessment report.

⁶ *The Scottish Marine Protected Area Project – Developing the Evidence Base for Impact Assessments and the Sustainability Appraisal.*

- 3.2.4 The approach taken has been to assess the impacts of designation of possible MPAs against a 'do nothing' option. This option represents what could potentially occur within a given area were possible MPAs not to be taken forward. This allows a comparison of the impacts from designation of possible MPAs against what is expected to have occurred in the absence of designations.
- 3.2.5 It has been assumed that, should designation proceed, all sites are designated in 2014: this is the base year for the assessment. An assessment period of 20 years following designation has been selected as providing a reasonable time period within which the main impacts are likely to occur. The assessment period therefore runs from 2014 to 2033.
- 3.2.6 It has been assumed that where management measures are required to be implemented for unlicensed or non-spatially licensed activity (e.g. fishing licences), these are implemented between 2014 and 2016. Where management measures are required for spatially-licensed activities, these will be implemented at the time of application.
- 3.2.7 There are a number of factors associated with the designation of MPAs that influence the scale of potential impacts, including:
- The location and extent of MPA features within possible MPAs;
 - The location and scale of some new development activities over the assessment period (for example, offshore renewables and carbon capture and storage (CCS) infrastructure) and the extent to which these new developments might interact with MPA features;
 - The nature and scale of management measures that might be required to support achievement of conservation objectives for MPA features; and
 - The extent to which MPA features are already protected by existing policy commitments.
- 3.2.8 To address these uncertainties, three scenarios have been developed, which have been used to inform the range of possible costs and benefits at site level for each possible MPA. The scenarios do not take account of potential differences in the location and scale of new development activity as this would introduce an inconsistency into the future baseline between scenarios. The three scenarios have therefore focused on the following key factors:
- A 'lower' scenario where:
 - Requirements for management measures are at the lower end of a possible range of measures aimed at achieving MPA feature conservation objectives;
 - The spatial extent of the feature requiring protection is towards the lower end of the estimated range; and
 - It is assumed that no additional management measures are required for OSPAR/BAP features for activities with spatially based licences.
 - An 'intermediate' scenario where:
 - Requirements for management measures are based on SNH/JNCC's current best view on management options required to address the risks to features;

- The spatial extent of the feature requiring protection is towards the middle of the estimated range; and
- It is assumed that additional management measures are required for non-OSPAR/BAP features and different conditions on management for some OSPAR/BAP features for activities with spatially-based licences over and above current practice.

- A 'higher' scenario, where:
 - Requirements for management measures are at the upper end of a possible range of measures aimed at achieving MPA feature conservation objectives;
 - The spatial extent of the feature requiring protection is towards the upper end of the estimated range; and
 - It is assumed that additional management measures are required for non-OSPAR/BAP features and different conditions on management for some OSPAR/BAP features for activities with spatially-based licences over and above current practice.

Details of the approach to the development of scenarios are set out in more detail in Section 2.3.1. and Appendix C of the socio-economic assessment report.

3.2.9 The approach to identifying and assessing impacts is cognisant of the fact that the designation of MPAs will give rise to a range of potential costs and benefits:

- Impacts to activities:
 - Loss or displacement of current (or future) economic activity;
 - Increased operating costs of economic activity (additional costs of applying for licences, implementing in situ management measures); and
 - Benefits to activities (e.g. from enhanced user experience).
- Social impacts:
 - Social impacts arising as a result of cost impacts on economic activities, assessed through a distributional analysis which considers the distribution of the key quantified economic costs and identifies the social impacts that could be generated as a result.
- Costs to the public sector:
 - Preparation of Marine Management Schemes;
 - Preparation of Statutory Instruments;
 - Development of voluntary measures;
 - Site monitoring;
 - Compliance and enforcement;
 - Promotion of public understanding; and
 - Regulatory and advisory costs associated with licensing decisions.

- Benefits:
 - The contribution to the benefits of an ecologically-coherent network of MPAs;
 - The beneficial impacts of MPAs on the condition of the features that they have been designated to protect; and
 - The provision of ecosystem services (including benefits to activities and to wider society).

Estimation of Costs to Marine Activities

3.2.10 The extent to which cost impacts might be incurred by economic interests depends on the nature and scale of the potential interaction with MPA features and judgements on possible requirements for management measures. The assessment has been progressed through a number of steps, as follows:

1. Assessment of spatial overlap between MPA features and activities
2. Assessment of potential vulnerability of MPA features within possible MPAs to pressures associated with activities screened in on the basis of Step 1
3. Assessment of implications for activities giving rise to a potential vulnerability
4. Estimating the costs arising from management measures

3.2.11 Where appropriate, impacts to activities have been estimated in terms of changes to:

- Costs faced by industries (e.g. increased costs of EIA, additional survey costs, costs of mitigation measures, costs of delays and impacts on investor confidence);
- Gross Value Added (GVA⁷) and employment as a result of restrictions on their activities (e.g. changes to fishing grounds or development locations); and
- The distribution of economic activity in affected communities.

3.2.12 Costs have been quantified where possible. For most activities the potential costs of designation reflect potential increases in operating costs (e.g. additional costs of applying for licences, additional survey costs or additional mitigation costs). For some activities, the potential cost of designation is a loss or displacement of current (and future) economic activity. For commercial fisheries, for example, the potential cost of designation is a loss or displacement of current (and future) output, caused by spatial or temporal restrictions on fishing activities.

3.2.13 Consideration was also given to the potential for additional cost impacts to arise as a result of project delays or as a result of impacts on investor confidence. It is not possible to quantify the costs associated with potential delays during the consenting, licensing or permitting process or the impact of designation on investment decisions.

⁷ Gross Value Added is an income measure and measures the contribution which each producer, industry or sector makes to the economy.

3.2.14 Further detail on the approach taken is available in Section 2.3.2.1 and Appendix C of the socio-economic assessment report.

Estimation of Costs to Government

3.2.15 The Final Regulatory Impact Assessment for the Marine (Scotland) Bill identified various costs to the public sector associated with the designation of NC MPAs. Some of these costs have already been incurred or will have been incurred at the point at which decisions to designate individual sites are made (for example, site selection, survey costs, work to develop management options and consultation on site proposals). These are therefore 'sunk' costs and are not considered in this assessment. Additional costs that will be incurred as part of the designation process include the development and implementation of Marine Management Schemes and the preparation of Statutory Instruments for sites for which these are required. It is also possible that some costs could be associated with the development of guidance on voluntary measures for some sites.

3.2.16 Following designation, additional costs will be incurred in relation to on-going monitoring of the condition of features within designated sites and in enforcing management measures. Some costs may also be incurred in promoting public understanding of nature conservation MPAs.

3.2.17 Separately, regulatory bodies and their statutory advisors may incur additional costs associated with reviewing developer assessments of potential impacts to nature conservation features within MPAs as part of the licensing process. In addition, it is possible that public bodies such as The Crown Estate (TCE) could experience impacts on its revenues or that Scottish Water may incur some additional costs.

Estimation of Benefits

3.2.18 The benefits have been identified based on information contained in the SNH and JNCC advice⁴, which provides an assessment of the contribution of different sites and features to an ecologically-coherent network of MPAs, in terms of the representation, replication, geographic range and variation, resilience and equivalent ecological value of proposed protected features and sites.

3.2.19 The biodiversity features of a MPA contribute to the delivery of a range of ecosystem services. Designation of the MPA and its subsequent management may improve the quantity and quality of the beneficial services provided, which may, in turn, increase their value (contribution to economic welfare). Impacts on the value of ecosystem services may occur as a result of the designation, management and/or achievement of the conservation objectives of the MPA.

3.2.20 The ecosystem services analysis provides a qualitative description of the potential changes in ecosystem service provision associated with the implementation of management measures to support the achievement of

conservation objectives for individual features. The list of final ecosystem services that were considered is provided in Table 5.

Table 5. Ecosystem Services considered

General Ecosystem Service Categorisation	Final Ecosystem Services
Provisioning	Provision of fish and shellfish for human and non-human consumption
Cultural	Recreation Research and education Non-use
Regulating	Natural hazard protection Environmental resilience Gas and climate regulation Regulation of pollution

3.2.21 As part of the assessment the scope for monetising the benefits assessments has also been explored. This has made use of market value data where available and investigated value transfer to develop monetary values for the ecosystem services changes that cannot be valued directly through market prices. Value transfer has been considered in line with the best practice guidelines, including how to assess the robustness of value evidence transfer. This takes into account the relevance of the evidence in terms of the geography, the scale and timing of environmental change, the numbers and socio-economic groups of beneficiaries, and the decision-making context.

3.2.22 Most marine ecosystem services valuation studies have focused on developing methodologies and there are limited studies that value the benefits. Value transfer results are limited by the extent of this evidence base and uncertainty over ecosystem services impacts from MPAs. Limited quantitative data are available on marine ecosystem services changes. The assessment has therefore largely adopted a qualitative approach to assessing the potential benefits from designation of MPAs. On this basis, the combined ecosystem services benefits have been assessed by collating information from individual sites.

3.2.23 More detail on the approach to assessing benefits can be found in Section 2.3.2.4 and Chapter 6 of the socio-economic assessment report.

Assessment of Social Impacts

3.2.24 The social impacts generated by the designation of possible MPAs will be strongly connected to the nature, scale and distribution of the economic impacts. Any change in employment, for example, generated as a result of designation can have significant social impacts (e.g. on health, crime).

3.2.25 Economic and social impacts have been assessed through a distributional analysis. The distributional analysis focuses exclusively on the commercial fishing sector (and the fish processing sector) as this is the only sector where it has been possible to quantify the potential economic costs of designation

(on output, GVA and employment). It includes impacts on specific locations (including regions, districts and ports) and on specific groups within Scotland's population (including, for example, different age groups, genders, minority groups, and parts of Scotland's income distribution).

3.2.26 The social impact analysis identifies the key areas of social impact that could potentially be affected by the potential economic costs (quantified and non-quantified) generated by designation and assesses the potential significance of these impacts. The key areas of social impact identified include:

- Access to services;
- Crime;
- Culture and Heritage;
- Education;
- Employment;
- Environment; and
- Health.

3.2.27 The cumulative assessment within this work takes account both of the alternative options for designation and the combined impact of designating multiple sites at regional and national scales. For clarity of presentation, this cumulative assessment is integrated into all relevant sections where appropriate.

3.2.28 The starting point for such assessment has been to sum the estimated impacts for each NC possible MPA, taking account of possible alternative sites. For most sectors, the potential cost impacts are minor such that the combined impacts are likely to be additive. However, for sectors for which more substantial cost impacts have been identified, consideration has been given to the extent to which combined impacts may be more or less than the summed estimates and a qualitative description of the potential combined impacts is provided.

3.2.29 As noted in paragraph 2.9 and Table 3, some of the 33 possible MPAs comprise alternatives and it will not be necessary to designate all of the sites for which assessments have been prepared. The total costs and benefits of designating the suite of possible MPAs will therefore be less than the sum of the total for all sites. The impact of designating different combinations of site options is therefore also explored.

3.2.30 There remains a range of uncertainties and limitations with this analysis. The development and use of scenarios has sought to encompass some of these uncertainties, in particular:

- Where the spatial extent of MPA features for which management measures might be required is uncertain (and thus the spatial area over which management measures might need to be applied, and over which costs and benefits might accrue) the scenarios have used different estimates of the spatial extent of those features;
- Different assumptions have been used concerning the requirements for management measures within the scenarios to take account of uncertainty

in the management requirements. This influences the scale of costs and benefits across the scenarios;

- Different assumptions have been used within the scenarios concerning the extent to which management measures might already be necessary to deliver OSPAR/BAP requirements. This also influences the scale of costs and benefits across the scenarios.

3.2.31 As a result of incorporating these uncertainties within the scenarios, significant variations in the range of potential costs and benefits have been identified, with estimates of costs typically varying by around two orders of magnitude between the lower and upper scenarios. These differences are particularly driven by assumptions on management measure requirements, but in some instances cost estimates are also sensitive to assumptions about whether management measures might already be necessary to meet OSPAR/BAP requirements.

3.2.32 Other uncertainties and limitations include:

- Uncertainties in the location and nature of future marine activity.
- It has not been possible to provide quantified estimates of cost impacts for a number of potential management measures owing to a lack of data on the location of future activity or on the costs of management measures.
- It has not been possible to estimate the cost of potential consequential impacts associated with designation, for example the costs of delays to consenting processes or impact on investor opportunity.
- For commercial fisheries, the cost impacts have been based on GVA estimates of the value of potential landings foregone. These values will overestimate impacts to the commercial fisheries sector as they assume that all of the displaced effort will be lost, although in practice a proportion of the displaced effort will relocate and continue fishing in other areas.
- There is an uncertainty in the multipliers used to estimate GVA, which are not site specific.
- The main potential social impacts identified within the assessment relate to impacts on the commercial fishing sector. Given the uncertainties relating to commercial fishing impacts identified above, the social consequences of these impacts are also similarly uncertain.
- The assessment of benefits has largely been limited to a qualitative assessment owing to the very limited evidence on expected changes in ecosystem services and on the value of those changes.
- The assessment of benefits has also been hampered by the lack of knowledge of the baseline condition of many features in the MPAs, and the impact of management measures on features and ecosystem services within those sites.
- This combined assessment poses particular challenges owing to the complexity of such assessments and the limited scientific understanding of impacts. Within this study, combined effects have generally been assessed as the sum of the individual impacts of on individual sites, but the potential for combined cost impacts has been recognised, particularly in relation to commercial fisheries and possibly also for offshore renewables and oil and gas under the upper scenario.

4.0 Results of the Sustainability Appraisal

4.1 Environment

Biodiversity, Flora and Fauna

- 4.1.1 The pMPAs will have benefits for biodiversity, flora and fauna. This is their key purpose, with a focus on specific features (identified in Table 2), and the benefit of designation will primarily accrue to these features.
- 4.1.2 However, many of the existing pressures on marine biodiversity currently result from activities that have the potential to result in abrasion of and/or damage to the seabed. Examples include the effects of anchoring, bottom-contact mobile gear, or infrastructure which has a large seabed footprint. Reduction and/or removal of these pressures is likely to have benefits for other species which depend on this habitat.
- 4.1.3 For example, some species use benthic habitat for spawning (Ellis et al, 2012). Herring spawn on gravel and similar habitats (e.g. coarse sand, maerl, shell) with a low proportion of fine sediment and where there is well-oxygenated water. It is likely that the benefits to the pMPA features will also result in benefits for species (such as herring) that use benthic habitat for spawning. As well as South Arran pMPA, such benefits may accrue around Orkney and off the east coast of Scotland.
- 4.1.4 In general, species that use benthic habitat for growth and/or refuge will also benefit from the reduction and/or removal of these pressures. There are also likely to be benefits to biodiversity through increased nutrient cycling.

Displacement

- 4.1.5 The following marine activities have been reviewed for the SEA, in terms of the sensitivities of MPA features to these activities and the potential for management measures:
- marine disposal
 - commercial fishing (mobile gear; static gear; diver-operated gear)
 - infrastructure (renewables; oil and gas; cables)
 - aquaculture (finfish; shellfish)
 - moorings/ anchorages
- 4.1.6 A review of the sensitivity of biodiversity features to the marine activities identified in paragraph 4.1.5 and the potential to result in displacement has been undertaken. (Few, if any, measures have been recommended for the management of geodiversity features.) Figure 5 shows the results. Features which are highly sensitive to marine activities are shown as primarily blue, e.g. serpulid aggregations, seamount communities. Those with low sensitivity are shown as primarily green, e.g. white cluster anemones. Most features, however, are more sensitive to certain activities than others. Black guillemot, for example, are highly sensitive to a limited number of activities (in this case, the risk of entanglement in static fishing nets). Flame shell beds, maerl beds,

native oysters have a high sensitivity to some activities, medium sensitivity to others, and low sensitivity to the remainder.

4.1.7 Those features which are shown as highly sensitive have the greatest potential to result in displacement.

4.1.8 The key pressures associated with marine activities include:

- surface abrasion and damage. For example, in demersal fishing, mobile/active gear (trawls, dredges, etc) makes contact with and moves along the surface of the seabed and can result in surface abrasion and/or damage. Surface abrasion can also be caused by anchorages/moorings (recreational and commercial), although the effects tend to be more localised.
- siltation rate changes, e.g. associated with marine disposal of dredged material and with aquaculture
- contact with the seabed, e.g. fishing using static gear. Often the issue here is the intensity of the activity. The use of static gear at moderate intensity is not an issue for most features. The issue comes with high intensity and concentration of static gear, e.g. creels/pots.
- risk of injury and/or death to mobile species. For example, the use of set nets (e.g. fyke, gill, trammel or tangle) may entangle black guillemot. Of highest risk to black guillemot would be set nets around kelp forests which are widely used for feeding. Offshore renewable energy devices also pose a risk of collision to mobile species.
- organic enrichment, e.g. pressures associated with aquaculture

4.1.9 Review of the potential for displacement has demonstrated the following:

- Designation of some pMPA features does not appear to require management measures, and these would therefore not result in displacement.
- Many of the management measures can be zoned, so displacement is unlikely to occur in pMPAs where this can be progressed.
- For infrastructure (renewables, oil and gas, cables), MPA features will need to be considered in the course of project siting and design. For the purposes of this SEA, it has been assumed that such measures will be able to successfully mitigate adverse effects on these features, and that displacement will not occur.

The results of the review are summarised in Table 6, taking these factors into account.

4.1.10 The activities which appear to have the greatest potential to result in displacement comprise:

- commercial fishing using bottom-contact mobile gear, particularly hydraulic gear;
- commercial fishing using diver-operated hydraulic gear; and
- some use of static gear.

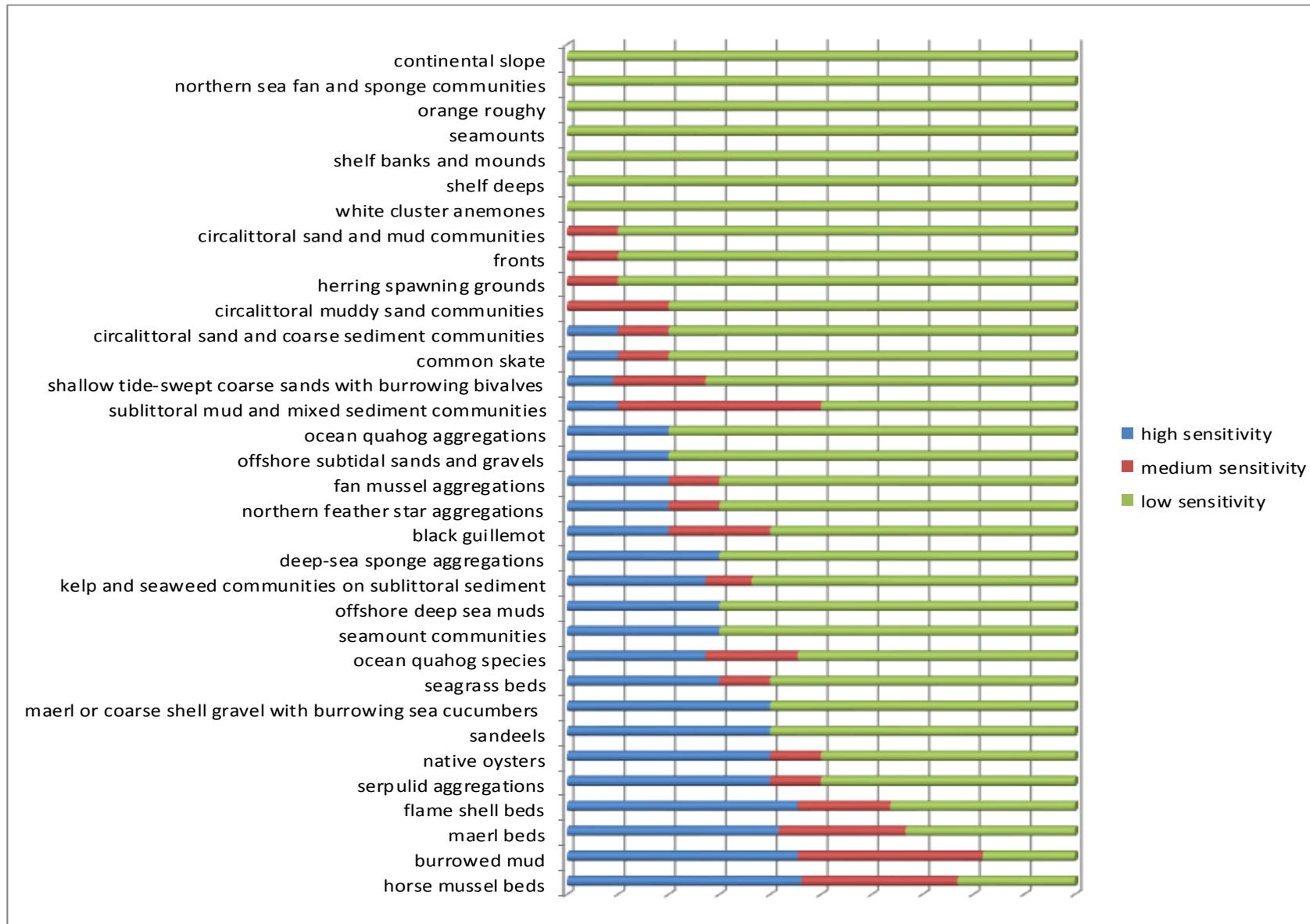
Figure 5. Sensitivity of pMPA features to marine activities (identified in paragraph 4.1.5)

Table 6. Potential for displacement (red = uncertain; blue = more likely)

MPA features	infrastructure									
	marine disposal	mobile gear	static gear	diver	renewables	oil and gas	cables	shellfish farms	finfish farms	anchors mooring
continental slope										
northern sea fan and sponge communities										
orange roughy										
seamounts										
shelf banks and mounds										
shelf deeps										
white cluster anemones										
circalittoral sand and mud communities		red								
fronts										
herring spawning grounds		red								
circalittoral muddy sand communities										
circalittoral sand and coarse sediment communities		red		blue						
common skate		red								
shallow tide-swept coarse sands with burrowing bivalves		red		blue						
sublittoral mud and mixed sediment communities										
ocean quahog aggregations		blue								
offshore subtidal sands and gravels		blue								
fan mussel aggregations	red									
northern feather star aggregations on mixed substrata		red								
black guillemot										
deep-sea sponge aggregations		blue	blue							
kelp and seaweed communities on sublittoral sediment		red		blue						
offshore deep sea muds		blue	blue							
seamount communities		blue	blue							
ocean quahog (species)		blue		blue						
seagrass beds		blue	red	blue						red
maerl or coarse shell gravel with burrowing sea cucumbers		blue		blue						
sandeels		blue		blue						
native oysters		blue	red	blue						blue
serpulid aggregations		blue	red							
flame shell beds		red	red	blue						red
maerl beds		red	red	blue						red
burrowed mud	red	blue	red							
horse mussel beds	red	red	red	blue						

4.1.11 Some uncertainties remain, particularly with features where the recommendation has been to reduce and/or limit the pressure. Much of this uncertainty focuses around the type of measure to be employed, be it spatial and/or temporal restriction, or changes to gear types or target species.

4.1.12 For those activities where displacement will occur, it is not possible at this stage to identify alternative locations. This will be the subject of discussion with stakeholders in the course of the consultation. We are therefore unable to assess the potential environmental effects of new and/or intensified activity, other than to note the following:

- moving activities to new areas that are currently unused or have low levels of use would likely result in effects on the seabed, e.g. abrasion, surface damage, etc. The significance of these effects would depend on the nature of the seabed affected and the sensitivity of the habitat.
- moving activities to areas that are already in use may intensify existing environmental effects, including pressures on benthic habitats, pressures on fish stocks, risk of injury through collision, etc. Again, the significance of these effects would depend on the area in question, the type of activity and the current level of activity.

Marine Geodiversity

4.1.13 As with biodiversity, the pMPAs will have benefits for geodiversity features. This is their key purpose, with a focus on specific features (identified in Table 2), and the benefit of designation will primarily accrue to these features.

4.1.14 Designation and protection of these geodiversity features may result in benefits to geodiversity features in other areas of the sea, through changes to existing marine activities and/or management practices.

Climatic Factors

Increased greenhouse gas emissions

4.1.15 Displacement of commercial fishing could result in longer journeys, with increased fuel consumption and therefore increased greenhouse gas emissions. However, at this stage, it is not possible to estimate the increase in journey length. As noted in paragraph 4.1.12, we do not know where displaced mobile and/or static gear, for example, would be likely to go. In consequence, other than to say there may be an increase in fuel consumption, it is not possible to provide estimates of such increased emissions, nor to ascertain how significant this may be in the overall context of the Scottish fleet.

4.1.16 It should be noted that the seas also offer us indirect benefits, such as nutrient cycling or reducing the effects of climate change. These are benefits that we currently gain no direct economic output from, but which provide services that would be very costly to manage ourselves if they disappeared. Habitats such as kelp forests and seagrass beds are not only important habitats for juvenile fish, but are also recognised by the United Nations Environment Programme

as important carbon sinks. Carbon sinks store carbon dioxide, helping to regulate climate and contribute to mitigating change, much as peat bogs do on land.

Cumulative Effects

4.1.17 The Environmental Assessment (Scotland) Act 2005 requires that the cumulative environmental effects of the possible MPAs are identified and evaluated. The cumulative effects of the pMPAs have been considered, in terms of:

- their combined effects (all the pMPAs working together); and
- in combination with other plans, programmes and/or strategies.

4.1.18 The assessment tables in Appendix 1 set out the environmental effects of each of the pMPAs. This includes the cumulative effect of having more than one feature in a pMPA.

4.1.19 Taken together, the pMPAs are likely to result in benefits to biodiversity, in terms of protection provided to the MPA features. However, there is also potential for adverse effects on biodiversity from displacement of commercial fishing activities. At this stage, for those activities where displacement is likely to occur, it is not possible to identify alternative locations. This will be the subject of discussion with stakeholders in the course of the consultation. We are therefore unable to assess the potential environmental effects of new and/or intensified activity, other than to note the following:

- moving activities to new areas that are currently unused or have low levels of use would likely result in effects on the seabed, e.g. abrasion, surface damage, etc. The significance of these effects would depend on the nature of the seabed affected and the sensitivity of the habitat.
- moving activities to areas that are already in use may intensify existing environmental effects, including pressures on benthic habitats, pressures on fish stocks, risk of injury through collision, etc. Again, the significance of these effects would depend on the area in question, the type of activity and the current level of activity.

4.1.20 In consequence, it is not possible at this stage to ascertain whether there may be cumulative effects, resulting from the effects of displacement of commercial fishing activities and the effects of other proposals for activity in the marine environment, including the Draft Sectoral Marine Plans for Offshore Renewable Energy in Scottish Waters (part of the Planning Scotland's Seas consultation).

4.1.21 The policy context within which the possible MPAs are being progressed includes the Marine Policy Statement and the (currently draft) National Marine Plan:

- The Marine Policy Statement sets out UK-level marine policy, and the policy framework in the draft National Marine Plan delivers these policies within the Scottish context.

- The National Marine Plan provides the overarching marine planning policy framework. This includes policy relating to activities where the marine planning and terrestrial systems overlap, for example those which occur on and around the coast or in coastal waters, such as aquaculture.

4.1.22 The focus of the possible MPAs, which is reflected in the conservation objectives, is to either:

- protect a range of biodiversity or geodiversity features in their current state for the future, or
- to allow them to recover to the state they should be to remain healthy and productive.

4.1.23 The possible MPAs will work together with the existing protection measures to provide protection to the biodiversity and geodiversity features in Scottish territorial and offshore waters. Taken together, this will be of benefit to those features.

4.1.24 In addition, the possible MPAs will contribute to meeting the objectives of the Marine Strategy Framework Directive, in terms of the achievement of good environmental status and in contributing to the objectives of good environmental status, such as the protection of seafloor systems (Qualitative Descriptor 6 of Annex I of the directive).

4.2 Economy and Other Marine Users

4.2.1 This section summarises the economic impacts on other and marine users as a result of designation of the possible MPAs. In particular, it looks at the aggregate and combined impacts on marine activities affected by MPA designations. Further detail is provided in sections 7.1 and 7.2 of the socio-economic assessment report.

National Impacts on Marine Activities

4.2.2 Potential quantified and non-quantified costs have been identified for nine activities/sectors.

4.2.3 For commercial fisheries, significant cost impacts are identified for most of the offshore sites and some inshore sites under the intermediate and upper scenarios, reflecting the impact of the management measures applied. Impacts are expected to be greatest in the North-east region (predominantly on over-15m nephrops and whitefish trawls) and West and North-west inshore regions (predominantly on over-15m and under-15m nephrops trawls, and over-15m dredges and whitefish trawls).

4.2.4 For the energy generation sector, the majority of cost impact under the upper scenario relates to proposed development within the Firth of Forth Round 3 Offshore Wind Zone which overlaps with the Firth of Forth Banks Complex possible MPA. On this basis the combined impact is unlikely to be any greater than the sum of the impacts on individual developments. However, should the additional costs deter some of the investment in the Firth of Forth

Round 3 Offshore Wind Zone, it is possible that this could affect investment decisions in the wider offshore wind supply chain. However, such impacts are unlikely because JNCC's current advice is that the intermediate scenario represents their best view on potential management requirements.

- 4.2.5 For oil and gas, significant cost impacts are identified under the intermediate and upper scenarios, based on the draft management measures proposed by JNCC. In the intermediate scenario, significant costs could be associated with required management measures to microsite infrastructure to avoid sensitive features for The Barra Fan & Hebrides Terrace Seamount and Western Fladen possible MPAs. Under the upper scenario, a number of further proposed MPAs could also experience cost impacts, particularly associated with the requirement to microsite new infrastructure and to skip and ship drill cuttings. While the scale of the potential impacts is large, the overall scale of investment in oil and gas projects is also large. The extent to which such additional costs might compromise individual investments under the upper scenario is currently unclear. This is likely to vary on a site by site basis depending on the scale of the potential oil and gas resource and the overall costs of its exploitation. Should a number of potential developments be deferred or cancelled, this could have the potential to give rise to more significant combined impact on the oil and gas sector as a whole. However, such impacts are unlikely because JNCC's current advice is that the intermediate scenario represents their best view on potential management requirements.
- 4.2.6 Each of the sectors for which quantified impacts have been identified above are looked at in more detail in the following sections.

Aquaculture - Finfish

- 4.2.7 There are nine inshore possible MPAs that have existing finfish farm sites within the proposed site boundary or within 1km of the site boundary.
- 4.2.8 Cost impacts to the finfish aquaculture sector may arise due to:
- Additional assessment and survey costs associated with planning applications or CAR licence applications;
 - Additional mitigation measures for new developments to support achievement of site conservation objectives;
 - Costs associated with delays during the consenting process; and
 - Loss of investor confidence (developments do not proceed).
- 4.2.9 Table 7 presents an estimate of the quantified costs impacts to the finfish aquaculture sector which takes account of potential additional assessment and survey costs associated with future CAR licence applications for possible MPAs, together with a national assessment of the potential additional assessment and survey costs associated with future planning applications for new or extended finfish aquaculture installations. The total quantified costs range from £0.36 million in the lower scenario to £0.61 million in the upper scenario. The intermediate estimate has been assessed as the same as the upper scenario.

Table 7. Present value (PV) in £ millions for quantified costs to finfish aquaculture (costs discounted over assessment period, 2012 prices)

NC MPA Proposal	Scenarios		
	Lower	Intermediate	Upper
Fetlar to Haroldswick	0.02	0.07	0.07
Loch Creran	0.01	0.01	0.01
Loch Sunart	<0.01	0.01	0.01
Loch Sunart to the Sound of Jura	0.02	0.08	0.08
Lochs Duich, Long and Aish	<0.01	0.01	0.01
North-west Sea Lochs & Summer Isles	0.01	0.02	0.02
South Arran	<0.01	<0.01	<0.01
Upper Loch Fyne & Loch Goil	<0.01	0.02	0.02
Wyre & Rousay Sounds	<0.01	0.01	0.01
Total for Inshore Sites	0.06	0.22	0.22
National Costs for Future Development	0.30	0.39	0.39
Total Quantified Costs	0.36	0.61	0.61

4.2.10 While it has not been possible to estimate the costs of mitigation measures, the costs of such measures, where required, are likely to be larger than the costs associated with additional assessments and surveys to inform licensing decisions. The quantified cost estimates presented in Table 7 may therefore underestimate the total cost impact to the finfish aquaculture sector.

4.2.11 There are significant uncertainties surrounding the assessment. In particular, the number and location of future finfish farm applications is uncertain and the assessment is sensitive to assumptions on future development activity. The requirements for mitigation measures are also uncertain and will vary at site level. Overall confidence in the quantified estimates is assessed as low.

Aquaculture - Shellfish

4.2.12 There are seven inshore proposed MPAs that have existing shellfish aquaculture sites within the proposed site boundary or within 1km of the site boundary.

4.2.13 Cost impacts to the shellfish aquaculture sector may arise due to:

- Additional assessment and survey costs associated with planning applications;
- Additional mitigation measures for new developments to support achievement of site conservation objectives;
- Costs associated with delays during the consenting process; and
- Loss of investor confidence (developments do not proceed).

4.2.14 Table 8 presents a national assessment of the potential additional assessment and survey costs associated with future planning applications for

new or extended shellfish aquaculture installations. The total quantified costs range from £0.14 million in the lower scenario to £0.19 million in the upper scenario. The intermediate estimate has been assessed as the same as the upper scenario.

Table 8. Present value (PV) in £ millions for quantified costs to shellfish aquaculture (costs discounted over assessment period, 2012 prices)

NC MPA Proposal	Scenarios		
	Lower	Intermediate	Upper
National Costs for Future Development	0.14	0.19	0.19

4.2.15 While it has not been possible to estimate the costs of mitigation measures, the costs of such measures, where required, are likely to be larger than the costs associated with additional assessments and surveys to inform licensing decisions. The quantified cost estimates presented in Table 8 may therefore underestimate the total cost impact to the shellfish aquaculture sector.

4.2.16 There are significant uncertainties surrounding the assessment. In particular, the number and location of future shellfish farm planning applications is uncertain and the assessment is sensitive to assumptions on future development activity. The requirements for mitigation measures are also uncertain and will vary at site level. Overall confidence in the quantified estimates is assessed as low.

Commercial Fisheries

4.2.17 The potential costs of designation on the commercial fisheries sector are different in nature from those faced by most other sectors. For most sectors the potential costs of designation reflect potential increases in operating costs (e.g. additional costs of applying for licences, additional survey costs). For commercial fisheries, however, the potential cost of designation is a loss or displacement of current (and future) output, caused by spatial or temporal restrictions on fishing activities required to protect vulnerable and sensitive MPA features.

4.2.18 Any decrease in output will, all else being equal, reduce the GVA generated by the commercial fishing sector; this is the direct effect. If the decrease in output reduces this sector's demand on suppliers, there will be knock-on effects on those industries that support commercial fishing vessels (e.g. diesel suppliers, equipment suppliers, boat manufacturers and repairers and transport providers); this is the indirect effect.

4.2.19 The potential costs on the commercial fisheries sector and its downstream supply chain have been estimated in terms of:

- Value of potential landings foregone;
- Reduction in direct GVA;
- Reduction in direct and indirect GVA; and
- Reductions in direct and indirect employment.

4.2.20 The latter two of these bullet points are picked up in the 'People, Population and Health' chapter, whilst full details on the methodology used to estimate the costs for commercial fisheries and the wider economy are set out in Section 3.6.1 and Appendix C of the socio-economic assessment report.

4.2.21 The cost impacts on commercial fisheries in terms of the value of landings affected, by possible MPA are presented in Table 9. The total impact in terms of landings values represents a very small percentage (approximately 0–2%) of the estimated total value of landings in 2011. It is also important to highlight that these estimates, particularly the upper scenario, represent a worst case and may overestimate the potential costs at some sites. The estimates are based on the assumption that all activity is lost, that is, there is no adaption or displacement of fishing activity. In reality, vessel owners are likely to try and adapt within the site (e.g. by changing gear type or target species) if that is possible, or, search for alternative fishing grounds, in an attempt to maintain profitability.

4.2.22 The economic impact of the possible MPAs in Scotland depends on:

- The contribution (current and potential) of the Scottish fishing industry to the Scottish Economy in terms of GVA and employment, and the extent to which that will be affected by the proposed designations; and
- The level of dependence of the Scottish fishing industry (and businesses and wider communities associated with the industry) on the landings that will be affected by the proposals.

4.2.23 Table 10 presents the potential total reduction in GVA over the period of analysis, by MPA. It is clear from this that there is a significant level of variation in the impact of designating different possible MPAs on GVA in the commercial fishing sector. The reduction in GVA ranges between £0- £5.28m under the intermediate scenario (with management measures at South-west Sula Sgeir & Hebridean Slope site responsible for the greatest potential reduction) and £0 - £7.06m under the upper scenario (with management measures at Geikie Slide & Hebridean Slope generating the greatest potential reduction).

Table 9. Average annual loss in value of landings, assuming zero displacement of fishing activity, in £ millions for commercial fisheries (2012 prices)

NC MPA Proposal	Scenarios		
	Lower	Intermediate	Upper
Inshore Sites			
Clyde Sea Sill	0.00	0.23	0.45
Fetlar to Haroldswick	0.00	0.00	0.00
Loch Sunart	0.00	0.00	0.01
Loch Sunart to the Sound of Jura	0.00	0.23	0.46
Loch Sween	0.00	0.01	0.02
Lochs Duich, Long and Aish	0.00	0.01	0.03
North-west Sea Lochs & Summer Isles	0.00	0.26	0.51
Noss Head	0.00	0.00	0.00
Small Isles	0.00	0.29	1.01
South Arran	0.00	0.25	0.79
Upper Loch Fyne & Loch Goil	0.00	0.01	0.02
Wyre & Rousay Sounds	0.00	0.00	0.00
Offshore Sites			
The Barra Fan & Hebrides Terrace Seamount	*	*	*
Central Fladen	0.00	0.56	1.12
Central Fladen (core)	0.00	0.12	0.21
East of Gannet & Montrose Fields	0.00	0.05	0.22
Faroe-Shetland Sponge Belt	0.06	0.36	0.87
Firth of Forth Banks Complex	0.00	0.52	0.62
Geikie Slide & Hebridean Slope	0.00	0.78	1.09
North-east Faroe-Shetland Channel	*	*	*
Norwegian Boundary Sediment Plain	0.00	0.00	0.00
Rosemary Bank Seamount	*	*	*
South-east Fladen	0.00	0.34	0.67
South-west Sula Sgeir & Hebridean Slope	0.00	0.80	1.00
Turbot Bank	0.00	0.00 - 0.07+	0.00-0.14+
Western Fladen	0.00	0.43	0.85
Total	0.07	5.55	10.65
* Annual average loss of landings not shown as they would be disclosive (less than 5 vessels)			
+ Range in value reflects whether Turbot Bank is designated for sandeel only or also for subtidal sands and gravels			

Table 10. Present value (PV) reduction in GVA (direct effect), assuming zero displacement of fishing activity, £millions (costs discounted over assessment period, 2012 prices)

NC MPA Proposal	Scenarios		
	Lower	Intermediate	Upper
	Direct Effect	Direct Effect	Direct Effect
Inshore Sites			
Clyde Sea Sill	0	1.62	3.23
Fetlar to Haroldswick	0	0	0.03
Loch Creran	0	0	< 0.01
Loch Sunart	<0.01	0.01	0.03
Loch Sunart to the Sound of Jura	0	1.45	3.44
Loch Sween	0.02	0.05	0.13
Lochs Duich, Long and Aish	0	0.05	0.18
North-west Sea Lochs & Summer Isles	0	1.56	3.12
Noss Head	<0.01	<0.01	0.01
Small Isles	0	1.68	6.15
South Arran	0.01	1.67	4.84
Upper Loch Fyne & Loch Goil	0	0.08	0.12
Wyre and Rousay Sounds	<0.01	<0.01	0.04
Offshore Sites			
The Barra Fan & Hebrides Terrace Seamount	0.04	2.88	3.68
Central Fladen	0	3.03	6.02
Central Fladen (core)	0	0.67	1.18
East of Gannet & Montrose Fields	0	0.25	1.23
Faroe-Shetland Sponge Belt	0.45	1.73	5.60
Firth of Forth Banks Complex	0	4.17	4.80
Geikie Slide & Hebridean Slope	0	4.94	7.06
North-east Faroe-Shetland Channel	0.05	1.66	4.30
Norwegian Boundary Sediment Plain	0	0	0.01
Rosemary Bank Seamount	0.07	1.42	2.60
South-east Fladen	0	1.91	3.83
South-west Sula Sgeir & Hebridean Slope	0	5.28	6.49
Turbot Bank	<0.01	0.39	0.56
Western Fladen	0	2.43	4.86
Total	0.64	38.92	73.53

Energy Generation

4.2.24 The energy generation sector includes coastal power stations, offshore renewables (offshore wind, wave and tidal energy) and marine biofuel production. However, the assessment focuses on offshore renewables as none of the four coastal power stations will be affected by currently possible MPAs and the marine biofuel industry is very much in its infancy and there is insufficient information to undertake a meaningful assessment.

4.2.25 There are eight inshore and two offshore possible MPAs that have existing, planned or potential future offshore renewables development within the proposed site boundary or within 5km of the site boundary. One site, Wyre and Rousay Sound, overlaps with a Draft Plan Option area for tidal energy development being considered for inclusion in the Scottish Government's Tidal Energy Plan. North West Orkney overlaps with similar Draft Plan Options for offshore wind and wave energy development. The Firth of Forth Banks Complex overlaps with the Firth of Forth Round 3 offshore wind lease area for which two applications for offshore wind development were submitted in 2012 and for which further applications are planned. Other possible MPAs overlap with or are in close proximity to proposed or possible export cable routes for planned or possible future offshore wind, wave or tidal development.

4.2.26 Cost impacts to the offshore renewables sector may arise due to:

- Additional assessment and survey costs associated with consent applications;
- Additional mitigation measures for new developments to support achievement of site conservation objectives;
- Costs associated with delays during the consenting process; and
- Loss of investor confidence (developments do not proceed).

4.2.27 Table 11 presents a national assessment of the potential additional assessment and survey costs associated with future consent applications for new offshore renewables arrays and export cables. It also includes the cost of mitigation measures, where these are considered to be required. The total quantified costs range from £0.2m in the lower scenario to over £47m in the upper scenario. The intermediate estimate cost is approximately £2.7m.

4.2.28 It is not possible to quantify the costs associated with potential delays during the consenting process or the impact of designation on investment decisions

4.2.29 There are significant uncertainties surrounding the assessment. In particular, the number and location of future offshore renewables developments is uncertain and the assessment is sensitive to assumptions on future development activity and cable routes. The requirements for mitigation measures are also uncertain and will vary at site level. Overall confidence in the quantified estimates is assessed as low.

Table 11. Present value (PV) in £ millions for quantified costs to energy generation (costs discounted over assessment period, 2012 prices)

NC MPA Proposal	Scenarios		
	Lower	Intermediate	Upper
Inshore Sites			
Clyde Sea Sill	0.01	0.02	0.02
Loch Sunart to the Sound of Jura	0.04	0.23	0.23
Moussa to Boddam	0.01	0.01	0.04
North-west Sea Lochs & Summer Isles	0.01	2.17	2.31
Noss Head	0.01	0.02	0.02
Papa Westray	0.01	0.01	0.11
South Arran	0.01	0.04	1.05
Wyre & Rousay Sounds	0.01	0.02	0.07
Offshore Sites			
Firth of Forth Banks Complex	0.07	0.07	43.44
North West Orkney	0.03	0.06	0.06
Total Quantified Costs	0.20	2.66	47.34

Military Activities

4.2.30 Military activities and exercises occur in three offshore and 12 inshore possible MPAs. A wide range of different activities occur within individual areas including general practice areas, submarine exercise areas, live firing, acoustic trials, mine laying and air combat practice.

4.2.31 It has not been possible to identify potential cost impacts to the military defence sector at site level, but a cost estimate has been made at national level. To assist in meeting its environmental obligations, the MoD has developed a Maritime Environmental Sustainability Appraisal Tool (MESAT). This will include operational guidance to reduce significant impacts of military activities on MPAs. For the purposes of this assessment, it has been assumed that MoD will incur additional costs under all three scenarios in adjusting MESAT and other MoD environmental assessment tools in order to consider whether its activities will impact on the conservation objectives of MPAs. It will also incur additional costs in adjusting electronic charts to consider MPAs. These costs are summarised in Table 12.

Table 12. Present value (PV) in £ millions for quantified costs to military activities (costs discounted over assessment period, 2012 prices)

NC MPA Proposal	Scenarios		
	Lower	Intermediate	Upper
National Total	0.19	0.19	0.19

Oil and Gas

4.2.32 There are eleven offshore proposed MPAs that have existing or planned exploration and/or development activity. A number of other sites have historic exploration activity such as the presence of abandoned wells, but there is no current or planned exploration or development activity for these sites.

4.2.33 It is estimated that around 15 oil and gas fields that intersect with possible MPAs will bring forward decommissioning plans over the assessment period. The locations of these fields cannot be disclosed for reasons of commercial confidentiality.

4.2.34 Cost impacts to the oil and gas sector may arise due to:

- Additional assessment and survey costs associated with licence and permit applications for new exploration development and decommissioning;
- Additional mitigation measures for new developments or decommissioning activities to support achievement of site conservation objectives;
- Costs associated with delays during the licensing and permitting process; and
- Loss of investor confidence (developments do not proceed).

4.2.35 Table 13 presents a national assessment of the potential additional assessment costs associated with future licence and permit applications for oil and gas exploration and development, as well as additional survey and mitigation costs. It also includes a national assessment of potential additional assessment costs associated with oil & gas decommissioning.

4.2.36 It is not possible to quantify the costs associated with potential delays during the consenting process or the impact of designation on investment decisions.

4.2.37 There are significant uncertainties surrounding the assessment. In particular, the number and location of future oil and gas developments (including decommissioning) is uncertain, particularly in the longer term. The requirements for mitigation measures are also uncertain and will vary at site level. Overall confidence in the quantified estimates is therefore assessed as low.

Table 13. Present value (PV) in £ millions for quantified costs to oil and gas (costs discounted over assessment period, 2012 prices)

NC MPA Proposal	Scenarios		
	Lower	Intermediate	Upper
Offshore Sites			
The Barra Fan & Hebrides Terrace Seamount	0.07	1.56	5.79
Central Fladen	0.03	0.60	2.22
Central Fladen (core)	0.03	0.78	2.90
East of Gannet & Montrose Fields	0.23	0.23	35.02
Faroe-Shetland Sponge Belt	0.49	0.49	27.93
North-east Faroe-Shetland Channel	0.44	0.44	37.62
Norwegian Boundary Sediment Plain	0.02	0.02	1.15
North West Orkney	0.07	0.07	0.07
Turbot Bank*	0.01	0.01	0.01 - 0.54
West Shetland Shelf	0.02	0.02	2.17
Western Fladen	0.06	3.91	7.77
Decommissioning Costs	0.02	0.02	0.02
Total	1.49	8.15	122.67 - 123.20
* Range of quantified total costs (present value) due to alternative options for the designation of MPA features. The lower estimate relates to designation of sandeels only.			

Ports and Harbours

4.2.38 There are ten inshore possible MPAs within which minor ports are present or adjacent to the site boundaries. No major ports are located within or adjacent to possible MPAs. One open disposal site is located within the North West Sea Lochs and Summer Isles possible MPA. There is no overlap between possible MPAs and Chamber of Shipping anchorage areas. Seven possible MPAs have one or more anchorages or mooring areas within them, which may come under the jurisdiction of harbour authorities.

4.2.39 Cost impacts to the ports and harbours sector may arise due to:

- Additional assessment and survey costs associated with consent applications for new developments or dredge material disposals;
- Additional mitigation measures for new developments, dredge material disposal activities or commercial anchorages to support achievement of site conservation objectives;
- Loss of income associated with loss of trade;
- Costs associated with delays during the consenting process; and
- Loss of investor confidence (developments do not proceed).

4.2.40 Table 14 presents a national assessment of the potential additional assessment costs associated with future consent applications for new developments or dredge material disposal licences. No additional costs have

been identified related to requirements for additional surveys to support consent applications or for mitigation measures as part of consent applications. The total quantified costs range from £0.14m in the lower scenario to around £0.16m in the upper scenario. The intermediate estimate cost is around £0.14m.

Table 14. Present value (PV) in £ millions for quantified costs to ports and harbours (costs discounted over assessment period, 2012 prices)

NC MPA Proposal	Scenarios		
	Lower	Intermediate	Upper
Inshore Sites			
Clyde Sea Sill	0	0	0.01
East Caithness Cliffs	0.02	0.02	0.02
Fetlar to Haroldswick	0.01	0.01	0.01
Loch Sunart	0	0	0.01
Loch Sunart to the Sound of Jura	0.05	0.05	0.05
Loch Sween	0	0	0.01
Lochs Duich, Long and Aish	0.01	0.01	0.01
North-west Sea Lochs & Summer Isles	0.04	0.03	0.04
Small Isles	0.01	0.01	0.01
Upper Loch Fyne & Loch Goil	0.01	0.01	0.01
Total	0.14	0.14	0.16

4.2.41 It has not been possible to quantify the potential loss of income associated with loss of trade, nor costs associated with potential delays during the consenting process or the impact of designation on investment decisions.

4.2.42 There are significant uncertainties surrounding the assessment. In particular, the number and location of future port developments is uncertain and the assessment is sensitive to assumptions on future development activity. The requirements for mitigation measures are also uncertain. Overall confidence in the quantified estimates is assessed as low.

Recreational Boating

4.2.43 Cost impacts may arise to the recreational boating sector if existing anchorages or moorings are closed or relocated. Potentially adverse interactions between recreational anchorages or moorings and MPA features have been identified within eight possible MPAs.

4.2.44 It has not been possible to quantify the cost impact of possible closure or relocation of recreational anchorages or moorings as more detailed site specific discussions are required on whether management measures were needed for individual anchorages or moorings. However, given the small

number of anchorages and moorings likely to be affected, the cost impact is considered to be at worst minor.

Telecommunication Cables

4.2.45 There are two inshore and seven offshore possible MPAs that have existing telecom cables transiting the site. In addition one existing cable is within 1km of an inshore site. There is no information on potential future telecom cables. It is likely that most new development will comprise replacement of existing cables along existing routes. The asset life of a telecom cable is notionally 25 years. It is possible that some telecom cables will therefore require replacement within the assessment period. No licensing is required for cables beyond 12nm.

4.2.46 Cost impacts to the telecom cable sector may arise due to:

- Additional assessment and survey costs associated with licence applications within the 12nm limit;
- Additional mitigation measures for new developments to support achievement of site conservation objectives;
- Costs associated with delays during the consenting process; and
- Loss of investor confidence (developments do not proceed).

4.2.47 Table 15 presents a national assessment of the potential additional assessment and survey costs associated with future marine licence applications for new telecom cables within 12nm. The total quantified costs range from £0.01m in the lower scenario to £0.75m in the upper scenario. The intermediate (best) estimate has been assessed as the same as the lower scenario.

Table 15. Present value (PV) in £ millions for quantified costs to telecom cables (costs discounted over assessment period, 2012 prices)

NC MPA Proposal	Scenarios		
	Lower	Intermediate	Upper
Inshore Sites			
Arran	0.01	0.01	0.74
Clyde Sea Sill	0.01	0.01	0.01
Total	0.01	0.01	0.75

4.2.48 It is not possible to quantify the costs associated with potential delays during the consenting process or the impact of designation on investment decisions.

4.2.49 There are significant uncertainties surrounding the assessment. In particular, the number and location of future telecom cables is uncertain and the assessment is sensitive to assumptions on future development activity. The requirements for mitigation measures are also uncertain and will vary at site level. Overall confidence in the quantified estimates is assessed as low.

Combined Cost Impacts

4.2.50 Potential quantified and non-quantified costs have been identified for nine activities/sectors (Table 16). The ranges represent the possible variation in cost impact depending on which options might be selected. The most significant potential costs may be incurred by the oil and gas sector, the commercial fisheries sector (note costs are expressed in terms of impacts to direct GVA, based on the estimated value of landings affected), and the energy generation sector.

Table 16. Present value (PV) in £ millions for national cost impacts to human activities (costs discounted over assessment period, 2012 prices)

Human Activity	Scenarios		
	Lower	Intermediate	Upper
Aquaculture - finfish	0.36	0.61	0.61
Aquaculture - shellfish	0.14	0.19	0.19
Commercial fisheries (direct GVA)	0.64	24.03 – 38.92	50.70 – 73.53
Energy generation	0.13 – 0.20	2.59 - 2.66	3.90 - 47.34
Military activities	0.19	0.19	0.19
Oil and gas	1.38 – 1.49	3.63 – 8.15	122.67 – 123.20
Port and harbours	0.14	0.14	0.16
Recreational boating	Not quantified	Not quantified	Not quantified
Telecom cables	0.01	0.01	0.75

4.2.51 For many of the activities and sectors affected – finfish and shellfish aquaculture, military activities, ports and harbours, recreational boating and telecom cables - both the site-level and combined impacts are likely to be very small therefore no significant combined impacts are expected.

4.2.52 Table 17 presents a summary of the potential combined quantified cost impacts for non-fisheries activities, including and taking account of alternative options for some of the offshore sites:

- South-west Sula Sgeir and Hebridean Slope (SSH) vs. Geikie Slide and Hebridean Slope (GSH);
- Central (CFL), Western (WFL) and South-east Fladen (SEF) (Central Fladen (core) would be designated under all options - the alternatives relate to the designation of the additional CFL area, which does not incorporate CFL (core) in this assessment); and
- Firth of Forth Banks Complex (FOF), Turbot Bank (TBB) (addition of subtidal sands and gravels feature if FOF not designated) and Norwegian Boundary Sediment Plain (NSP).

4.2.53 In total, based on these alternatives, there are 12 possible combinations of options.

4.2.54 For the lower scenario, the quantified cost estimates for non-fisheries activities are broadly comparable across the 12 options. For the intermediate scenario, the estimated costs for options involving Western Fladen are around 50% higher than for other options, reflecting the potential requirement for micrositing of new oil and gas infrastructure in this possible MPA. For the upper scenario, options which include the Firth of Forth Banks Complex possible MPA are significantly more costly, owing to the potential cost impact of mitigation measures for proposed offshore wind energy development. No potential non-fisheries costs have been identified for South-west Sula Sgeir and Hebridean Slope (SSH) or Geikie Slide and Hebridean Slope (GSH). Therefore, there is no difference in the cost estimates for these alternatives.

Table 17. Present value (PV) in £ millions for quantified cost impacts to non-fisheries activities for combinations of sites (costs discounted over assessment period, 2012 prices)

Combination of MPA Options	Scenarios		
	Lower	Intermediate	Upper
GSH plus FOF plus CFL	2.45	8.03	162.95
GSH plus FOF plus SEF	2.42	7.43	160.73
GSH plus FOF plus WFL	2.49	11.34	168.50
GSH plus TBB feature and NSP plus CFL	2.40	7.98	121.19
GSH plus TBB feature and NSP plus SEF	2.37	7.38	118.97
GSH plus TBB feature and NSP plus WFL	2.43	11.28	126.74
SSH plus FOF plus CFL	2.45	8.03	162.95
SSH plus FOF plus SEF	2.42	7.43	160.73
SSH plus FOF plus WFL	2.49	11.34	168.50
SSH plus TBB feature and NSP plus CFL	2.40	7.98	121.19
SSH plus TBB feature and NSP plus SEF	2.37	7.38	118.97
SSH plus TBB feature and NSP plus WFL	2.43	11.28	126.74

4.2.55 Table 18 presents a summary of potential impacts to direct GVA for fisheries activities within inshore and offshore sites. The cost impacts range from £0.6m in the lower scenario to around £24m to £29m in the intermediate scenario and £51m to £58m in the upper scenario. The differences are largely accounted for by differences between the impacts associated with the Fladen options (estimated impact to direct GVA ranges between £2–3m and £4–6m under the intermediate and upper scenarios, respectively, with the highest cost impacts relating to CFL) and inclusion of the Firth of Forth Banks Complex (estimated impact around £5m greater than alternative option).

Table 18. Impacts to GVA in £ millions for quantified cost impacts to commercial fisheries for combinations of sites (costs discounted over assessment period, 2012 prices)

Combination of MPA Options	Scenarios		
	Lower	Intermediate	Upper
GSH plus FOF plus CFL	0.64	28.93	57.69
GSH plus FOF plus SEF	0.64	27.82	55.50
GSH plus FOF plus WFL	0.64	28.33	56.52
GSH plus TBB feature and NSP plus CFL	0.64	25.14	53.46
GSH plus TBB feature and NSP plus SEF	0.64	24.03	51.26
GSH plus TBB feature and NSP plus WFL	0.64	24.55	52.29
SSH plus FOF plus CFL	0.64	29.27	57.13
SSH plus FOF plus SEF	0.64	28.16	54.93
SSH plus FOF plus WFL	0.64	28.67	55.96
SSH plus TBB feature and NSP plus CFL	0.64	25.49	52.89
SSH plus TBB feature and NSP plus SEF	0.64	24.38	50.70
SSH plus TBB feature and NSP plus WFL	0.64	24.89	51.73

Impacts on Marine Activities from Inshore Site Proposals (0-12nm)

4.2.56 Table 19 presents a summary of potential quantified cost impacts for non-fisheries activities within inshore sites, together with estimated additional costs for finfish and shellfish aquaculture planning application costs which could only be estimated at national level. The scale of estimated quantified costs is generally very low for all possible MPAs except for North-west Sea Lochs and Summer Isles under the intermediate and upper scenarios and for South Arran under the upper scenario. For these proposed sites/scenarios, higher levels of cost impact were identified associated with a potential requirement to re-route export power cables from Draft Plan Option Areas currently being considered for possible future offshore energy generation. There is therefore a high level of uncertainty concerning whether such costs might need to be incurred

Table 19. Present value (PV) in £ millions for cost impacts to non-fisheries activities for inshore sites (costs discounted over assessment period, 2012 prices)

NC MPA Proposal	Scenarios		
	Lower	Intermediate	Upper
Clyde Sea Sill	0.01	0.02	0.03
East Caithness Cliffs	0.02	0.02	0.02
Fetlar to Haroldswick	0.03	0.08	0.08
Loch Creran	0.01	0.01	0.02
Loch Sunart	0.00	0.01	0.01
Loch Sunart to the Sound of Jura	0.11	0.36	0.36
Loch Sween	0.00	0.00	0.00
Lochs Duich, Long and Aish	0.01	0.02	0.02
Monach Isles	0.00	0.00	0.00
Mousa to Boddam	0.01	0.01	0.04
North-west Sea Lochs & Summer Isles	0.05	2.23	2.36
Noss Head	0.01	0.02	0.02
Papa Westray	0.01	0.01	0.11
Small Isles	0.00	0.00	0.00
South Arran	0.02	0.05	1.76
Upper Loch Fyne & Loch Goil	0.01	0.03	0.03
Wyre & Rousay Sounds	0.01	0.03	0.08
National costs (finfish and shellfish aquaculture planning application costs)	0.44	0.58	0.58
Total	0.76	3.48	5.50

4.2.57 Table 20 presents a summary of potential quantified impacts on direct GVA for commercial fisheries within inshore sites. No cost impacts are estimated for five inshore sites and very low costs are estimated for all sites under the lower scenario. Relatively minor cost impacts are estimated for five sites under the intermediate and upper scenarios. More substantial cost impacts are estimated for Clyde Sea Sill, Loch Sunart to the Sound of Jura, North-west Sea Lochs and Summer Isles, Small Isles and South Arran under the intermediate and upper scenarios. Total cost impacts for the inshore sites under the intermediate and upper scenarios are estimated to be £8.17m and £21.31m (direct GVA, discounted over assessment period) respectively.

Table 20. Impacts to GVA in £ millions for commercial fisheries for inshore sites (costs discounted over assessment period, 2012 prices)

NC MPA Proposal	Scenarios		
	Lower	Intermediate	Upper
Inshore Sites			
Clyde Sea Sill	-	1.62	3.23
East Caithness Cliffs	-	-	-
Fetlar to Haroldswick	-	-	0.03
Loch Creran	-	-	<0.01
Loch Sunart	<0.01	0.01	0.03
Loch Sunart to the Sound of Jura	-	1.45	3.44
Loch Sween	0.02	0.05	0.13
Lochs Duich, Long and Aish	-	0.05	0.18
Monach Isles	-	-	-
Mousa to Boddam	-	-	-
North-west Sea Lochs & Summer Isles	-	1.56	3.12
Noss Head	<0.01	<0.01	0.01
Papa Westray	-	-	-
Small Isles	-	1.68	6.15
South Arran	0.01	1.67	4.84
Upper Loch Fyne & Loch Goil	-	0.08	0.12
Wyre & Rousay Sounds	<0.01	<0.01	0.04
Total	0.03	8.17	21.31

Impacts on Marine Activities from Offshore Site Proposals (12-200nm)

4.2.58 Table 21 presents a summary of potential quantified cost impacts for non-fisheries activities within offshore sites, together with estimated quantified costs associated with oil & gas decommissioning and military activities which could only be estimated at national level. The scale of estimated quantified costs in the lower and intermediate scenarios is generally very low for all possible MPAs except for The Barra Fan & Hebrides Terrace Seamount and Western Fladen in the intermediate scenario where higher estimated costs arise as a result of additional management measures for new oil & gas exploration and development activity. In the upper scenario, a number of additional sites could potentially experience significant additional costs as a result of additional management measures for new oil & gas exploration and development activity. Additional costs could be experienced by the offshore renewables sector associated with management measures for the Firth of Forth Banks Complex possible MPA.

Table 21. Present value (PV) in £ millions for quantified cost impacts to non-fisheries activities for offshore sites (costs discounted over assessment period, 2012 prices)

NC MPA Proposal	Scenarios		
	Lower	Intermediate	Upper
Offshore Sites			
The Barra Fan & Hebrides Terrace Seamount	0.07	1.56	5.79
Central Fladen	0.03	0.60	2.22
Central Fladen (core)	0.03	0.78	2.90
East of Gannet & Montrose Fields	0.23	0.23	35.02
Faroe-Shetland Sponge Belt	0.49	0.49	27.93
Firth of Forth Banks Complex	0.07	0.07	43.44
Geikie Slide & Hebridean Slope	0.00	0.00	0.00
Hatton-Rockall Basin	0.00	0.00	0.00
North-east Faroe-Shetland Channel	0.44	0.44	37.62
North-west Orkney	0.10	0.13	0.13
Norwegian Boundary Sediment Plain	0.02	0.02	1.15
Rosemary Bank Seamount	0.00	0.00	0.00
South-east Fladen	0.00	0.00	0.00
South-west Sula Sgeir & Hebridean Slope	0.00	0.00	0.00
Turbot Bank	0.01	0.01	0.01 – 0.54*
West Shetland Shelf	0.02	0.02	2.17
Western Fladen	0.06	3.91	7.77
National costs (oil & gas decommissioning)	0.02	0.02	0.02
National costs (military activities)	0.19	0.19	0.19
* depending on whether Turbot Bank is designated for sandeel or also for subtidal sand and gravel habitats			

4.2.59 Table 22 presents a summary of potential quantified impacts on direct GVA for commercial fisheries within offshore sites. No or very limited cost impacts are estimated for four offshore sites – Hatton Rockall Basin, Norwegian Boundary Sediment Plain, North West Orkney and West Shetland Shelf under all of the scenarios reflecting the lack of fishing activity in the first two sites and no requirement for additional fisheries management measures for the latter two sites. Very low cost impacts are estimated for all sites under the lower scenario, except Faroe-Shetland Sponge Belt, reflecting the assumed low requirement for management measures in this scenario. For the remaining sites, impacts to direct GVA in the intermediate and upper scenarios range from £0 to £0.6m (Turbot Bank – depending on the features for which the site may be designated) respectively, up to £4.9 to £7.1m (Geikie Slide and Hebridean Slope) (discounted over assessment period) respectively.

Table 22. Impacts to direct GVA in £ millions for quantified impacts to commercial fisheries for offshore sites (costs discounted over assessment period, 2012 prices)

NC MPA Proposal	Scenarios		
	Lower	Intermediate	Upper
Offshore Sites			
The Barra Fan & Hebrides Terrace Seamount	0.04	2.88	3.68
Central Fladen	-	3.03	6.02
Central Fladen (core)	-	0.67	1.18
East of Gannet & Montrose Fields	-	0.25	1.23
Faroe-Shetland Sponge Belt	0.45	1.73	7.10
Firth of Forth Banks Complex	-	4.17	4.80
Geikie Slide & Hebridean Slope	-	4.94	7.06
Hatton-Rockall Basin	-	-	-
North-east Faroe-Shetland Channel	0.05	1.66	4.30
North-west Orkney	-	-	-
Norwegian Boundary Sediment Plain	-	-	0.01
Rosemary Bank Seamount	0.07	1.44	2.60
South-east Fladen	-	1.91	3.83
South-west Sula Sgeir & Hebridean Slope	-	5.28	6.49
Turbot Bank	-	0 - 0.39	0 - 0.56
West Shetland Shelf	-	-	-
Western Fladen	-	2.43	4.86

4.3 People, Population and Health

4.3.1 This section summarises the potential distributional and social impacts of designating MPAs that could arise from impacts on other marine activities. It also includes potential costs to government, as these are costs borne by society as a whole. More detail on this analysis can be found in Chapters 4 and 5, as well as Appendix C, of the socio-economic assessment report.

4.3.2 This section also summarises the results of benefits assessments. These are categorised according to the ecosystem services framework. They include both 'direct use' (values placed on goods and services provided by the marine environment that humans make use of) and 'non-use' (value society places on existence of features, ability for others to use them, or for future generations to use them) values, compared against the situation under the 'Do Nothing' scenario. These results are drawn from Chapter 6 and section 7.5 of the socio-economic assessment report.

Distributional / Social Analysis

4.3.3 The analysis has demonstrated that designation of the possible MPAs, under the intermediate and/or upper scenarios, could generate potentially significant socio-economic impacts on the following sectors and/or the businesses, communities or individuals that depend on them:

- Commercial fisheries;
- Energy generation; and
- Oil and gas.

4.3.4 For commercial fisheries, implementation of the management measures required to protect the features of some MPAs (under the intermediate and upper scenarios), would result in a reduction or displacement of current and future output. It has been possible to quantify the potential loss of output and the associated impacts on GVA and employment for the sector and the economy as a whole. Although the GVA and employment impacts are relatively small at the Scottish economy and sectoral level, they could have potentially significant economic and, hence, social consequences depending on the specific regions/ports, individuals and communities that are affected.

4.3.5 Table 23 presents the impact which the management measures could have on the GVA generated by the fishing sector in Scotland and GVA generated by the fishing sector and its downstream supply chain, under the assumption of zero displacement.

Table 23. Impact on GVA for the commercial fishing sector (direct impact and direct plus indirect impact) assuming zero displacement of fishing activity, £ million

GVA Impact	Scenarios		
	Lower	Intermediate	Upper
Direct Impact:			
Average annual reduction in GVA, £m/yr (PV)	0.03	2.02	3.76
Total reduction in GVA (2014-2033), £m(PV)	0.64	38.92	73.53
Direct plus Indirect Impact:			
Average annual reduction in GVA, £m/yr (PV)	0.05	2.61	4.97
Total reduction in GVA (2014-2033), £m(PV)	0.96	52.25	99.53

4.3.6 Table 24 demonstrates that the designation of all possible MPAs is estimated to lead to between 2 and 131 full-time equivalent jobs being lost directly and indirectly throughout the Scottish Economy, across the scenarios. This represents between 0–2% of total full-time equivalent jobs created directly and indirectly by the Scottish fishing industry.

Table 24. Average (mean) number of direct and indirect jobs affected assuming zero displacement of fishing activity, year-on-year over 2014–2033, FTEs

Reduction in Employment	Scenarios		
	Lower	Intermediate	Upper
Direct and Indirect:			
Average (mean) number of jobs affected ¹ (year on year over 2014-2033)	1	69	131
Notes: The total impact on employment has been estimated as the average (mean) number of jobs affected, (rather than the sum of jobs affected), over the 20 year period. This is because it is likely that it would be the same jobs that are affected, year-on year and hence summing the jobs would provide a misleading total.			

4.3.7 These estimates suggest that, under the lower scenario, the economic impact of designation would be minimal. While the estimated loss of GVA under the intermediate and upper scenarios would clearly have a negative impact, the impact at the Scottish economy and sectoral level, is relatively small. Even under the upper scenario, the impact represents less than 2% of the sector's GVA and employment. Furthermore, these estimates are considered to overestimate the likely impacts as they assume that all fishing effort and associated landings is lost rather than being displaced (even although some displacement is likely).

4.3.8 Tables 25 and 26 present the potential total reduction in GVA over the period of analysis and the potential impact of designation on employment, by MPA, respectively.

4.3.9 The distributional analysis presented in this section considers the distribution of the potential economic (and hence social) costs of designating the entire suite of possible MPAs. Six different aspects are assessed as part of the distributional analysis:

- Location;
- Age groups;
- Gender groups;
- Fishing groups;
- Income group; and
- Social groups.

4.3.10 The key results of the distributional analysis are summarised in Tables 27 and 28. For some aspects, the distribution of costs (e.g. across different Scottish regions and ports, categories of vessel and species type) has been assessed quantitatively. For others (i.e. age, gender, income and social groups), the analysis indicates whether designation of the possible MPAs is likely to impact on these groups, and, if so, whether the impact is anticipated to be minimal, negative, or significantly negative.

Table 25. Present value (PV) reduction in GVA (direct effect and the combined direct and indirect), assuming zero displacement of fishing activity, £millions (costs discounted over assessment period, 2012 prices)

MPA Proposal	Scenarios					
	Lower		Intermediate		Upper	
	Direct Effect	Direct and Indirect	Direct Effect	Direct and Indirect	Direct Effect	Direct and Indirect
Inshore Sites						
Clyde Sea Sill	0	0	1.62	2.42	3.23	4.85
Fetlar to Haroldswick	0	0	0	0	0.03	0.04
Loch Creran	0	0	0	0	< 0.01	< 0.01
Loch Sunart	<0.01	< 0.01	0.01	0.01	0.03	0.04
Loch Sunart to the Sound of Jura	0	0	1.45	2.17	3.44	5.16
Loch Sween	0.02	0.03	0.05	0.08	0.13	0.19
Lochs Duich, Long and Aish	0	0	0.05	0.08	0.18	0.27
North-west Sea Lochs & Summer Isles	0	0	1.56	2.34	3.12	4.67
Noss Head	<0.01	<0.01	<0.01	<0.01	0.01	0.02
Small Isles	0	0	1.68	2.53	6.15	9.23
South Arran	0.01	0.01	1.67	2.51	4.84	7.26
Upper Loch Fyne & Loch Goil	0	0	0.08	0.12	0.12	0.18
Wyre and Rousay Sounds	<0.01	<0.01	<0.01	<0.01	0.04	0.05
Offshore Sites						
The Barra Fan & Hebrides Terrace Seamount	0.04	0.06	2.88	3.75	3.68	4.78
Central Fladen	0	0	3.03	3.93	6.02	7.83
Central Fladen (core)	0	0	0.67	0.87	1.18	1.53
East of Gannet & Montrose Fields	0	0	0.25	0.33	1.23	1.59
Faroe-Shetland Sponge Belt	0.45	0.68	1.73	2.25	5.60	7.28
Firth of Forth Banks Complex	0	0	4.17	5.43	4.80	5.93
Geikie Slide & Hebridean Slope	0	0	4.94	6.42	7.06	9.18
North-east Faroe-Shetland Channel	0.05	0.07	1.66	2.16	4.30	5.59
Norwegian Boundary Sediment Plain	0	0	0	0	0.01	0.01
Rosemary Bank Seamount	0.07	0.11	1.42	1.84	2.60	3.37
South-east Fladen	0	0	1.91	2.49	3.83	4.98
South-west Sula Sgeir & Hebridean Slope	0	0	5.28	6.87	6.49	8.44
Turbot Bank	<0.01	<0.01	0.39	0.51	0.56	0.72
Western Fladen	0	0	2.43	3.16	4.86	6.31
Total	0.64	0.96	38.92	52.25	73.53	99.53

Table 26. Average (Mean) number of direct and indirect jobs affected assuming zero displacement of fishing activity (year on year, 2014–2033), by MPA, FTEs

MPA Proposal	Scenarios		
	Lower	Intermediate	Upper
	Direct and Indirect	Direct and Indirect	Direct and Indirect
Inshore Sites			
Clyde Sea Sill	0.00	2.58	5.16
East Caithness Cliffs			
Fetlar to Haroldswick			
Loch Creran			
Loch Sunart	0.00	0.02	0.07
Loch Sunart to the Sound of Jura	0.00	2.65	5.30
Loch Sween	0.04	0.08	0.20
Lochs Duich, Long and Aish	0.00	0.08	0.14
Monach Isles			
Mousa to Boddam			
North-west Sea Lochs & Summer Isles	0.00	2.93	5.86
Noss Head			
Papa Westray			
Small Isles	0.00	3.25	11.50
South Arran	0.02	2.87	8.67
Upper Loch Fyne & Loch Goil	0.00	0.13	0.21
Wyre and Rousay Sounds	0.00	0.00	0.05
Offshore Sites			
The Barra Fan & Hebrides Terrace Seamount	0.06	4.36	5.71
Central Fladen	0.00	6.37	12.74
Central Fladen (core)	0.00	1.34	2.34
East of Gannet & Montrose Fields	0.00	0.53	2.56
Faroe-Shetland Sponge Belt	0.70	4.14	9.93
Firth of Forth Banks Complex	0.00	5.94	7.08
Geikie Slide & Hebridean Slope	0.00	8.91	12.43
Hatton-Rockall Basin			
North-east Faroe-Shetland Channel	0.08	2.61	6.42
Norwegian Boundary Sediment Plain	0.00		0.02
North-west Orkney			
Rosemary Bank Seamount	0.10	2.00	4.14
South-east Fladen	0.00	3.85	7.70
South-west Sula Sgeir & Hebridean Slope	0.00	9.09	11.43
Turbot Bank	0.00	0.79	1.57
West Shetland Shelf	0.00	0.00	0.00
Western Fladen	0.00	4.86	9.71
Total	1.0	69.3	130.9
Notes: The total impact on employment has been estimated as the average (mean) number of jobs affected, (rather than the sum of jobs affected), over the 20 year period. This is because it is likely that it would be the same jobs that are affected, year-on year and hence summing the jobs would provide a misleading total.			

Table 27. Distribution of quantified economic costs for commercial fisheries and fish processors (assuming zero displacement of fishing activity) - location, age, gender

Sector/ Impact	Location			Age			Gender	
	Regions	Port (s)	Rural, Urban, Coastal or Island	Children	Working Age	Pension- able Age	Male	Female
Commercial Fisheries Reduction in landed value, GVA and employment	Share of total costs for vessels >15 m under Intermediate and Upper Scenario: North-east: over 50% West: 20% . North-west: 12-14% North: 4% East:1%	Largest employment impacts in: Fraserburgh: 18-32 FTE job losses Peterhead: 5-9 FTE job losses Mallaig: 3-8 FTE job losses Ayr: 4-6 FTE job losses Campbeltown: 2-7 job losses Largest relative impact on total landings to port: Buckie: 6- 14% of total landings affected	xx Impacts concentrated in coastal areas; urban in North-East, rural in West and North-west	xxx Potentially significant negative effect if parent loses job/ becomes unemployed	xxx	xx Potential negative effect if retirees own affected vessels or live in households affected by unemployment	xxx 2-131 FTE job losses	xxx Potentially significant negative effect if member of household loses job/becomes unemployed.

Sector/ Impact	Location			Age			Gender	
	Regions	Port (s)	Rural, Urban, Coastal or Island	Children	Working Age	Pension- able Age	Male	Female
Fish Processors Reduction in local landings at landing ports	x North-east and North-west regions most significantly affected	In most ports affected landings represent a very low proportion (0–3%) of total landings: x Mallaig: xx affected landings represent 2–7% of total landings to the port; Kinlochbervie: xx affected landings represent 3–5% of total landings to the port, under intermediate and upper scenarios	x Impacts concentrated in coastal areas; urban in North-East, rural in North-west	x	x	0	x 60% of processors male	x 40% of processors female
Impacts: xxx : significant negative effect; xx : possible negative effects; x: minimal negative effect, if any; 0: no noticeable effect expected.								

Table 28. Distribution of quantified economic costs for commercial fisheries and fish processors (assuming zero displacement of fishing activity) - Fishing groups, income groups and social groups

Sector/Impact	Fishing Groups		Income Group			Social Groups		
	Vessel Category <15m >15m	Gear Types/Sector	10% Most Deprived	Middle 80%	10% Most Affluent	Crofters	Ethnic Minorities	With Disability or Long-Term Sick
Commercial fisheries Reduction in landed value, GVA and employment	Under lower scenario – main impact on <15m vessels Under intermediate and upper scenarios – main impact on >15m vessels	Main gear types affected for vessels <15m are nephrops trawlers Main gear types affected for vessels >15m are whitefish and nephrops trawls followed by dredges No impact on pelagic vessels	xx Possible negative impact on 10% most deprived	xx Possible negative impact on middle income group	x Information only available on average incomes, not the distribution of income. Not clear, therefore, whether this group will be affected	0	No breakdown of fisherman employment by social group	0 No employment data but unlikely to be employed in fisheries

Sector/Impact	Fishing Groups		Income Group			Social Groups		
	Vessel Category <15m >15m	Gear Types/Sector	10% Most Deprived	Middle 80%	10% Most Affluent	Crofters	Ethnic Minorities	With Disability or Long-Term Sick
Fish Processors Reduction in local landings at landing ports		<p>Impacts on species type:</p> <p>Lower scenario – approx. 80% of affected landings are demersal and 20% shellfish</p> <p>Intermediate and upper scenarios – almost 60% of affected landings are shellfish and the remainder demersal</p> <p>Impact on different types of processing units:</p> <p>Shellfish & demersal fish processing units that cannot offset reductions in local landings with imported fish: xx</p> <p>Shellfish & demersal fish processing units that can offset reductions in local landings with imported fish: x</p> <p>Pelagic-only processing units: 0</p>	x	x	0	0	No breakdown of fish processing employment data available by social group	No breakdown of fish processing employment data available by social group
<p>Impacts: xxx : significant negative effect; xx : possible negative effects; x: minimal negative effect, if any; 0: no noticeable effect expected</p>								

4.3.11 Table 29 presents the annual loss of landings affected by region and home port, for vessels greater than 15m. It is not possible to present the analysis for the total annual loss of landings as data on landings affected by home port are not available for smaller vessels (i.e. less than 15m). Over 65% of the landings affected under the intermediate and upper scenarios are lost by larger vessels. The analysis presented below therefore captures a high proportion of the landings affected, although it is recognised that the distribution of impacts across ports may be different between the larger-scale and smaller-scale vessels. It is clear from Table 29 that the costs of designating the entire suite of possible MPAs would fall disproportionately on the North-east region.

4.3.12 In order to assess the significance of the potential impacts on specific Scottish districts/ports, Table 30 presents data on two key indicators for all Scottish districts/ports:

- The value of landings affected (from over-15m vessels) as a percentage of the total value of landings to ports; and
- The potential number of jobs lost as a percentage of the total number of fishermen employed at each district/port.

4.3.13 It is clear from Table 30 that the value of landings lost as a result of designating the suite of possible MPAs represents a very small proportion of total landings for the large majority of Scotland's districts and ports. At most districts/ports, the affected landings represent less than 1% of total landings under the intermediate and upper scenarios. At some ports - Fraserburgh, Ayr, Campbeltown, Mallaig and Oban - affected landings account for a higher proportion (ranging between 1.5% and 5.5%) of the value of total landings, but are still relatively low. The largest job losses are expected in Fraserburgh. Under the intermediate and upper scenarios, it is estimated that the proposals could put between 18 and 32 jobs at risk; this represents a 3–5% reduction in the number of fishermen employed on vessels based in Fraserburgh.

4.3.14 Further detail on the distribution of impacts can be found in Section 5.1 of the socio-economic assessment report.

4.3.15 The social impacts generated by the designation of MPAs will be strongly connected to the nature, scale and distribution of the economic impacts. Table 31 identifies the areas of social impact that are likely to be affected by the quantified and non-quantified economic costs identified for the commercial fisheries, energy generation, and oil and gas, and assesses their potential significance.

4.3.16 Further detail on the social impacts of MPA designation can be found in Section 5.2 of the socio-economic assessment report.

Table 29. Annual average value (£ million) and percentage of landings affected by region and home port, for >15m vessels, assuming zero displacement of fishing activity (costs discounted over the assessment period) 2012 prices

Region/District/Port	Scenarios					
	Lower		Intermediate		Upper	
	Total value of landings affected at port	As % of total value of landings affected across all ports	Total value of landings affected at port	As % of total value of landings affected across all ports	Total value of landings affected at port	As % of total value of landings affected across all ports*
NORTH EAST:						
Fraserburgh	0.00	18	1.17	40	2.07	36
Buckie	0.00	0	0.15	5	0.32	6
Aberdeen	0.00	0	0.01	0	0.02	0
Peterhead	0.00	26	0.32	11	0.61	11
North East Total	0.00	44	1.65	56	3.02	53
NORTH:						
Kirkwall	0.00	32	0.10	3	0.16	3
Scrabster	0.00	0	0.01	1	0.02	0
Lerwick	0.00	0	0.01	0	0.01	0
North Total	0.00	32	0.12	4	0.20	4
WEST:						
Campbeltown	0.00	19	0.15	5	0.43	8
Oban	0.00	0	0.18	6	0.35	6
Ayr	0.00	0	0.26	9	0.39	7
West Total	0.00	19	0.59	20	1.16	20
NORTH WEST:						
Stornoway	0.00	0	0.03	1	0.08	1
Lochinver	0.00	0	0.05	2	0.06	1
Portree	0.00	0	0.00	0	0.01	0
Mallaig	0.00	0	0.19	7	0.49	9
Ullapool	0.00	0	0.07	2	0.16	3
Kinlochbervie	0.00	0	0.01	0	0.02	0
North West Total	0.00	0	0.35	12	0.83	14
EAST						
Eyemouth	0.00	0	0.01	0	0.02	0
Pittenweem	0.00	0	0.01	0	0.01	0
East Total	0.00	0	0.02	1	0.04	1
TOTAL	0.01		2.73		5.25	
* The value of total landings affected (i.e. across all ports) is different under the three scenarios. The value of landings affected at one port as a percentage of the total value of landings across all ports, therefore, can be lower under the upper scenario than it is under the intermediate scenario.						

Table 30. Landings affected (assuming zero displacement of fishing activity) as a percentage of total landings and job losses as a percentage of the total number of fishermen employed, by district/port

Scottish Region/Port	Scenarios								
	Lower			Intermediate			Upper		
	Affected landings as % of total	Estimated reduction in employment	In employment as % of total employed in	Affected landings as % of total	Estimated reduction in employment	In employment as % of total employed in	Affected landings as % of total	Estimated reduction in employment	In employment as % of total employed in
Aberdeen	0	0	0.0	0.2	0	0.3	0.4	0	0.5
Buckie	0	0	0.0	6.4	2	1.4	13.6	5	2.9
Eyemouth	0	0	0.0	0.2	0	0.1	0.5	0	0.3
Fraserburgh	0	0	0.0	3.1	18	2.8	5.5	32	4.9
Peterhead	0	0	0.0	0.3	5	1.3	0.7	9	2.6
Pittenweem	0	0	0.0	0.2	0	0.1	0.4	0	0.2
Scrabster	0	0	0.0	0.1	0	0.1	0.1	0	0.2
Orkney	0	0	0.0	-	-	-	-	-	-
Shetland	0	0	0.0	-	-	-	-	-	-
Stornoway	0	0	0.0	0.4	0	0.0	1.0	0	0.0
Ayr	0	0	0.0	3.2	4	0.8	4.6	6	1.2
Campbeltown	0	0	0.0	1.5	2	0.8	4.2	7	2.5
Kinlochbervie	0	0	0.0	0.1	0	0.4	0.3	0	0.9
Lochinver	0	0	0.0	0.2	1	4.0	0.3	1	5.3
Mallaig	0	0	0.0	2.8	3	2.9	7.0	8	7.2
Oban	0	0	0.0	3.0	3	1.1	5.9	5	2.2
Portree	0	0	0.0	0.0	0	0.0	0.1	0	0.0
Ullapool	0	0	0.0	0.6	1	0.5	1.4	3	1.2

Table 31. Social impacts associated with quantified and non-quantified economic impacts

Sector	Potential Economic Impacts	Economic Costs	Area of Social Impact Affected	Mitigation	Significance of Social Impact
Commercial Fishing	Loss of traditional fishing grounds with consequent loss in landings, value of landings and hence GVA	Annual average loss in value of landings, assuming zero displacement of fishing activity: £0.1m–£10.1m Annual average reduction in GVA (direct plus indirect) assuming zero displacement of fishing activity: £0.05 – £4.9m	<ul style="list-style-type: none"> ▪ Culture and heritage – impact on traditions from loss of fishing grounds. 		xx
	If the loss in GVA significant enough, risk of job losses (direct plus indirect)	Job losses, assuming zero displacement of fishing activity: <ul style="list-style-type: none"> ▪ Direct and indirect: 2–131 FTE jobs 	<p>A reduction in employment can generate a wide range of social impacts:</p> <ul style="list-style-type: none"> ▪ Health (increase in illness, mental stress, loss of self esteem and risk of depression); ▪ Increase in crime; ▪ Reduction in future employment prospects/future earnings. <p>Which, in turn, can generate a range of short and long term costs for wider society and the public purse.</p>	Support to retrain those affected and for the promotion of new small businesses in fisheries dependent areas	xxx
	Displacement Effects	Not quantified	<p>Quantified impact on jobs assume worst case scenario (i.e. no redistribution of effort). In reality displacement effects likely to occur with socio-economic consequences:</p> <ul style="list-style-type: none"> • Employment – reduced employment due to changes in costs and earnings 		xx

Sector	Potential Economic Impacts	Economic Costs	Area of Social Impact Affected	Mitigation	Significance of Social Impact
			<p>profile of vessels (e.g. increased fuel costs, gear development and adaption costs, additional quota costs).</p> <ul style="list-style-type: none"> ▪ Conflict/Loss of social cohesion – diminishing fishing grounds may increase conflict with other vessels/gear types, increase social tensions within fishing communities and lead to a loss of social cohesion among fleets. Could also lead to increased operating costs as a result of lost or damaged gear. Equally, gear conflict could reduce where gears are restricted/prohibited. ▪ Health - increased risks to the safety of fishers and vessels and increased stress due to moving to lesser known areas. ▪ Environmental – increased impact in targeting new areas, longer streaming times and increased fuel consumption. ▪ Culture and heritage – change in traditional fishing patterns/ activities. 		
Energy Generation	Additional mitigation measures for new developments to support achievement of site conservation objectives	<p>Quantified Cost Impact:</p> <p>Total PV cost: £0m – £47m</p>	<ul style="list-style-type: none"> • Future employment opportunities – if increased operational costs associated with management measures render projects unviable or restrict project size there will be a negative impact on economic activity and job creation in this sector. 		<p>xxx</p> <p>(under upper scenarios)</p>

Sector	Potential Economic Impacts	Economic Costs	Area of Social Impact Affected	Mitigation	Significance of Social Impact
	<p>Costs associated with delays during the consenting process.</p> <p>Loss of investor confidence (developments do not proceed).</p>	Not quantified	<ul style="list-style-type: none"> • Future employment opportunities – if the delays deter investments there will be a negative impact on economic activity and future job creation in this sector. • Environment – possible negative impact in relation to climate change and the ability of the Scottish Government to meet its 2020 renewables targets, decarbonisation targets and climate change targets. There would also be consequent financial implications of climate change impacts. 		<p>xxx</p> <p>(under upper scenarios)</p>
Oil and Gas	Additional mitigation measures for new developments or decommissioning activities to support achievement of site conservation objectives	Total PV cost: £0m - £120m	<ul style="list-style-type: none"> • Future employment opportunities – reduced future employment opportunities if costs significant and render development projects unviable. 		<p>xxx</p> <p>(under upper scenarios)</p>
	<p>Costs associated with delays during the licensing and permitting process.</p> <p>Loss of investor confidence (developments do not proceed).</p>	Not Quantified	<ul style="list-style-type: none"> • Employment – reduced future employment opportunities if delays deter investments 		<p>xxx</p> <p>(under upper scenarios)</p>

Sector	Potential Economic Impacts	Economic Costs	Area of Social Impact Affected	Mitigation	Significance of Social Impact
<p>Notes: The likely areas of social impact are based on the key areas identified by the GES/GSR Social Impacts Taskforce</p> <p>Ratings:</p> <ul style="list-style-type: none"> x x x : significant negative effect; x x : possible negative effect; x: minimal negative effect, if any; 0: no noticeable effect expected 					

Costs to Government

4.3.17 Following a decision to designate individual sites, costs will be incurred by the public sector in the following broad areas, it should however be noted that not all measures listed will be needed at all sites, i.e. these requirements will be site specific:

- Preparation of Marine Management Schemes;
- Preparation of Statutory Instruments;
- Development of voluntary measures;
- Site monitoring;
- Compliance and enforcement;
- Promotion of public understanding; and
- Regulatory and advisory costs associated with licensing decisions.

Marine Management Schemes

4.3.18 For the purposes of this assessment, it has been assumed that a management scheme will be required for certain inshore sites within 6 nautical miles where there are multiple activities taking place over a significant proportion of the site. This includes sea lochs, where there is a significant community of interest. SNH has advised that sites for which black guillemot is the only feature will not require a Management Scheme. On this basis six sites have been tentatively identified as potentially requiring Management Schemes:

- North West Sea Lochs and Summer Isles;
- Lochs Duich, Long and Alsh;
- Upper Loch Fyne and Loch Goil;
- Loch Sunart;
- Loch Sunart to the Sound of Jura; and
- South Arran.

4.3.19 The cost associated with preparing a Management Scheme has been assumed to be £24,500 (at 2012 prices) per site. It is assumed that these Schemes are developed in 2014 and 2015 with the costs split equally across these 2 years. On this basis the one-off PV cost (2012 prices discounted at 3.5% over the assessment period) for these Schemes is £0.14 million.

Statutory Instruments

4.3.20 A number of different mechanisms may be used to restrict or regulate works or activities potentially affecting nature conservation MPAs:

- Marine Conservation Orders (under the Marine (Scotland) Act 2010);
- Fisheries management measures within 12nm under the Inshore Fishing (Scotland) Act 1984; and
- Fisheries management measures beyond 12nm under the Common Fisheries Policy.

4.3.21 Marine Conservation Orders (MCOs) may be required to regulate activities that take place within a designated MPA where and when required. The cost

associated with the making of such Orders has been assumed to be £3,500 (at 2009 prices). The initial management options papers developed by SNH have not identified any specific requirements for MCOs at this stage. Given the uncertainty surrounding the future requirement for MCOs, no specific costs have been identified to the public sector within this assessment.

- 4.3.22 Should fisheries management measures be required in inshore waters, it is likely that these will be pursued under fisheries legislation rather than through MCOs. For the purposes of this assessment, it has been assumed that an Order will be required for each MPA which is wholly or partially within 6nm for which new fisheries management restrictions may be required under one or more of the assessment scenarios. The cost associated with the making of such Orders (or modifying existing Orders) has been assumed to be £3,500 (at 2009 prices). Based on the assumptions on management options used in the site specific assessments, it is estimated that five to twelve sites will require new or modified fisheries Orders to support achievement of the conservation objectives, depending on the scenario. It is assumed that these Orders and amendments to fisheries licences will be made in 2014, representing a one-off cost of between £0.02 million and £0.05 million (Present Value, 2012 prices discounted at 3.5% over the assessment period).
- 4.3.23 For sites wholly or partly between 6 to 12nm where UK vessels have exclusive access, it has been assumed that any required fisheries management measures will be implemented through amendments to licence conditions for individual vessels. It is assumed that amendments to fisheries licences will be made in 2014, but will not represent a significant additional cost to the public sector. For sites wholly or partly between 6 to 12nm where non-UK vessels have historic fishing rights, measures to manage non-UK vessels would need to be pursued under the CFP.
- 4.3.24 Should fisheries management measures be required in offshore waters, these would need to be pursued through the CFP in consultation with the European Commission. For the purposes of this assessment, it has been assumed that CFP measures will be required for each MPA which is wholly or partially beyond 12nm for which new fisheries management restrictions may be required under one or more of the assessment scenarios. The cost associated with negotiating such measures has been assumed to be £5,000 per site (at 2012 prices), although there is no available evidence on which to base this estimate. Under the lower scenario, CFP measures could be required at 5 offshore sites, rising to 10 to 11 sites under the intermediate and high scenarios depending on choices about alternative site options. Assuming these measures are developed during 2015 and 2016 with the cost spread evenly over these 2 years, the one-off PV cost (2012 prices discounted at 3.5% over the assessment period) for these measures ranges from £0.03 million (lower scenario) to £0.05 million (intermediate and upper scenarios).

Voluntary Measures

4.3.25 For some sites, it may be appropriate for public bodies to develop voluntary measures to manage certain types of recreational activity. This may be particularly appropriate for remote coastal sites where the scale of impact is unlikely to be severe and where there is little possibility of cost-effective enforcement. The cost associated with developing and publicising voluntary measures is uncertain, but considered likely to be similar to the costs of preparing Orders (assumed to be £3,500 (at 2009 prices)). Given the uncertainty surrounding the future requirement for voluntary measures, no specific costs to the public sector have been identified within this assessment.

Site Monitoring

4.3.26 The costs of site surveys to characterise potential nature conservation MPAs in advance of designation have been treated as sunk costs because the expenditure has already occurred or has been budgeted. Following designation, there will be an ongoing requirement to undertake monitoring within nature conservation MPAs, both to improve understanding of the distribution of features and to monitor the condition of features to assess achievement of the feature-specific conservation objectives. It is assumed that sites will be monitored based on a 6-year reporting cycle.

4.3.27 The costs of monitoring individual MPAs will vary depending on their location, with higher costs likely to be associated with surveys for offshore sites, owing to the requirement for larger vessels. For the purposes of this assessment, the following assumptions have been applied:

- Inshore sites with seabed habitat features (sites mainly within 12nm) - current levels of expenditure on benthic habitat and species surveys for inshore sites will continue (approximately £300k p.a. at 2012 prices);
- Inshore sites with only black guillemot feature (Monach Isles, Papa Westray, East Caithness Cliffs) – assume total cost of £30k (2012 prices) every 6 years; and
- Offshore sites (sites mainly beyond 12nm):
 - Fladen survey work undertaken simultaneously;
 - Shallow water sites at a cost of £272 per sq km;
 - Deep water sites at a cost of £25,000 per day = £350,000 per survey (assuming average 14 day survey) as deeper and more expensive than relatively shallower sites; and
 - Cost of North-east Faroe-Shetland Channel survey doubled due to size to £700,000.

4.3.28 The expenditure on inshore sites equates to around £1.83m per 6 year reporting cycle, or approximately £110,000 per site. For the offshore sites, Table 32 presents estimated survey costs for individual sites. Depending on the alternative options selected, there may be between 12 and 13 offshore sites. Assuming monitoring is undertaken on a 6 year cycle, this would equate to a total annual cost of £0.92 million to £1.01 million, although it is possible that a lower frequency of monitoring could be applied to offshore sites.

Table 32. Estimated survey costs – offshore sites

Name	Site Type	Sq km Area	Cost Per Survey (£m)
Turbot Bank	Shallow	233.45	0.06
Fladen Group	Shallow	723.33 (upper value)	0.20
East of Gannet and Montrose Fields	Shallow	1837.76	0.50
Firth of Forth Banks Complex	Shallow	2130.06	0.58
West Shetland Shelf	Shallow	4047.30	1.10
North-west Orkney	Shallow	4388.46	1.19
Norwegian Boundary Sediment Plain	Shallow	160.79	0.04
Faroe-Shetland Sponge Belt	Deep	6378.74	0.35
Hatton-Rockall Basin	Deep	1264.64	0.35
South-west Sula Sgeir and the Hebridean Slope	Deep	2093.45	0.35
Geikie Slide and Hebridean Slope	Deep	2269.04	0.35
Rosemary Bank Seamount	Deep	7413.13	0.35
The Barra Fan and Hebrides Terrace Seamount	Deep	4700.83	0.35
North-east Faroe-Shetland Channel	Deep	26,967.71	0.70

4.3.29 The estimated PV cost (2012 prices discounted at 3.5% over the assessment period) for the suggested level of future monitoring required is £18.6 million to £20.0 million.

Compliance and Enforcement

4.3.30 Where management measures are necessary to support the achievement of conservation objectives for individual features within MPAs, a level of compliance and enforcement activity will be required. For licensable activities, this is likely to primarily entail scrutiny of monitoring returns provided by operators in fulfilment of conditions in their licences and in most cases is likely to impose only a minimal administrative burden on regulators. For unlicensed activity, some additional site based monitoring could be required. It is estimated that potential additional inspection requirements for MPAs will be prioritised within existing resources and will not therefore lead to any significant increase in existing costs.

4.3.31 For inshore sites, where spatial management measures are required for commercial fishing activities, it will also be possible to measure compliance by >12m vessels with any spatial closures using VMS data. For vessels <12m, it may be necessary to establish alternative compliance mechanisms, for example, using local VMS systems based on mobile phone technology, which have successfully been used to monitor compliance with spatial closures in Lyme Bay. Should such systems be considered necessary for inshore MPAs,

it is unlikely that the total cost of implementing, monitoring and enforcing such systems would exceed £5k per site p.a. It has been assumed that three such systems are established from 2016 (high scenario only). The estimated PV cost (2012 prices discounted at 3.5% over the assessment period) is £0.20m.

4.3.32 For other types of unlicensed activity, it is unlikely that formal compliance monitoring will be required unless specific local issues arise. For inshore sites, additional information on compliance is likely to be provided by members of the public.

Promoting Public Understanding

4.3.33 Once designated, a level of promotion of the MPAs and their management plans will be undertaken. This may take a variety of forms including provision of information via the internet, including within Marine Scotland Interactive, and for inshore sites, local public education activity and possibly the provision of signage at key access points. The costs associated with these activities are generally considered to be part of normal corporate activity for Marine Scotland, SNH and JNCC and for the purposes of this assessment it has therefore been assumed that no additional costs will be incurred. There could be a maximum one-off cost of £50,000 to Marine Scotland associated with developing public information on the internet, assumed to be incurred in 2014.

Regulatory and Advisory Costs Associated with Licensing Decisions

4.3.34 Where licensed development is proposed in the vicinity of features protected within nature conservation MPAs, developers may be required to provide an assessment of the potential impacts of the development on those features as part of their overall development application. Under the Marine (Scotland) Act 2010 and Marine and Coastal Access Act 2009, where it is concluded that a proposed development is capable of affecting other than insignificantly a protected feature of an NC MPA, a more detailed assessment of the potential impact is required.

4.3.35 The main areas identified where additional costs may be incurred in reviewing licensing and consent applications include:

- Planning applications for new or extended finfish and shellfish aquaculture installations (local authorities, particularly Western Isles, Argyll & Bute, Highland and Shetland Councils) - £0.04 million PV (all scenarios);
- CAR licences for use of chemical therapeutants in finfish aquaculture installations (SEPA) - £0.01 million (all scenarios) PV;
- Oil and gas licences and permits for new oil & gas exploration and development (DECC) - £0.14 million to £0.15 million (PV) (all scenarios), depending on offshore options chosen; and
- Marine licences for new development activity (multiple sectors) (Marine Scotland) - £0.03 million to £0.04 million PV (lower scenario) to £0.04 million to £0.05 million PV (upper scenario), depending on combination of alternative sites selected.

4.3.36 Table 33 summaries the estimated potential costs to the public sector. There are a number of uncertainties surrounding the estimates of costs to the public sector, in particular, the frequency with which offshore biological surveys will be carried out, the requirement for and costs of compliance and enforcement of any inshore fisheries management measures and the costs associated with securing CFP measures.

Table 33. Present value (PV) in £ millions for public sector costs (costs discounted over assessment period, 2012 prices)

Activity	Scenarios		
	Lower	Intermediate	Upper
Marine Management Schemes	0.14	0.14	0.14
Statutory Instruments – Inshore Measures	0.02	0.04	0.05
Statutory Instruments – Offshore Measures	0.03	0.05	0.05
Voluntary Measures	-	-	-
Site Monitoring – Inshore	4.63	4.63	4.63
Site Monitoring - Offshore	18.62 to 19.99	18.62 to 19.99	18.62 to 19.99
Compliance and Enforcement	-	-	0.20
Promoting Public Understanding	0.05	0.05	0.05
Regulatory and Advisory Costs			
▪ Planning applications – aquaculture	0.04	0.04	0.04
▪ CAR licences – finfish aquaculture	0.01	0.01	0.01
▪ Oil & gas licensing	0.14 to 0.15	0.14 to 0.15	0.14 to 0.15
▪ Marine licensing	0.03 to 0.04	0.04	0.04 to 0.05
Total	23.71 to 25.10	23.76 to 25.14	23.97 to 25.36

Benefits

4.3.37 This section considers the range of benefits that could arise from the proposed designation of MPAs. These benefits are assessed based on the implementation of the potential management measures used to consider the likely costs in previous sections. As with the costs, a range of management scenarios is used to reflect the range of likely future management approaches.

4.3.38 The analysis of benefits adopts an ecosystem services approach. It is important to note that it assesses the expected changes in ecosystem services as a result of designation and management – it is not an assessment of the total ecosystem services arising from the proposed sites. The change in ecosystem services is assessed relative to the baseline of the expected condition of the sites in the absence of designation and management. This is

a source of considerable uncertainty, as the extent and condition of the features of the proposed sites, and their response to management measures, are not well understood.

- 4.3.39 Treating marine protected areas as a collection of individual and separate features providing separate ecosystem services potentially ignores any network effects that could occur from a set of continuous set of marine protected areas. In marine conservation a number of adjacent marine reserves may demonstrate network effects, i.e. the benefit from the networks may be greater (or less) than the sum of the benefits from the individual MPAs. These effects are potentially of great importance in marine protected areas because of the lack of barriers and mobility of species. Network effects are considered highly relevant to identifying the benefits of the MPAs, but cannot be quantified.
- 4.3.40 Table 34 shows a summary of the cumulative ecosystem services impacts of the proposed sites. In addition to these final ecosystem services from the proposed sites, the network of sites could cumulatively have an effect on supporting services. Including the value of the services can in some cases double-count the final services they support. However, they should be considered because they can have additional value through supporting final services from outside the network of sites and through their contribution to the resilience of marine ecosystems and levels of marine ecosystem services.
- 4.3.41 Many features in the proposed sites are associated with a wide range of supporting marine ecosystem services. Therefore, it is reasonable to assume that designating the proposed network of sites will make a contribution to the resilience of ecosystem services from the Scottish marine environment. However, currently available evidence does not allow any quantification of this benefit.
- 4.3.42 Further discussion and information on the benefits of MPA designation is presented in Chapters 6 and 7 of the socio-economic assessment report.

Value Transfer for Non-User Benefits of MPA Network

- 4.3.43 This section details a value transfer to measure the non-use value of designating a network of Marine Protect Areas in Scotland. Value transfer is a process by which readily-available economic valuation evidence is applied in a new context for which valuation is required. However, it should be noted that the process of value transfer is rarely perfect: some adjustment of the available evidence (the 'source study') is needed to apply it to another context. This adjustment introduces uncertainties into the valuation evidence produced, and these are reflected in the range of values obtained. Further detail on this process can be found in Section 7.5.1 of the socio-economic assessment.

Table 34. Cumulative view of final Ecosystem Services

General Ecosystem Service Categorisation	Final Ecosystem Services to be Used	Observations from Site Analysis
Provisioning	Provision of fish and shellfish for human and non-human consumption	High uncertainty in response of fish and shellfish populations to protection of benthic habitats. Changes to primary productivity are complex and interactions between species uncertain. Furthermore, the designation may enhance levels of commercial and non-commercial species, but simultaneously make them less accessible to commercial fishing activities.
Cultural	Recreation	Most inshore sites have some recreational activities (e.g. angling, diving, boating routes and anchorages), and these are likely to be enhanced if participants can encounter increased levels of biodiversity, and/or if they feel the quality of the marine environment is less likely to be degraded.
	Research and education	The value of individual sites for research is not well understood. Research and education opportunities are enhanced through protection of healthy marine ecosystems, but the value of this is uncertain at individual sites due to the availability of substitutes. The value of the network in this respect is greater, as there is no substitute for the proposed network.
	Non-use	Non-use values are potentially very substantial over the 20 year assessment period, but also uncertain. See discussion below.
Regulating	Natural hazard protection	No benefits are identified in terms of hazard protection, as the proposed network is assessed not to have any interaction with coastal defences.
	Environmental resilience	This service was not considered for individual sites as it is regarded as something that operates at a larger scale (i.e. the network level). The MPA network will contribute to increased resilience of marine ecosystems through protection of marine biodiversity. Worm (2006) identified that more ecologically diverse marine ecosystems were more resilient to external pressures and disturbances.
	Gas and climate regulation	Carbon sequestration within marine environments is more significant where there is primary productivity from benthic vegetation. Relevant habitats are present in some possible MPAs, but they are an extensive feature of the proposed network, and some are already subject to protection. Therefore the additional value of the network in this respect is considered low.
	Regulation of pollution	Waste assimilation services are provided by some sites' protected features (e.g. Maerl beds), but actions under the Water Framework Directive (WFD) are assumed to be dealing with any significant impacts on coastal water quality, any so benefits of designations in to improve water quality in excess of WFD requirements are assumed to be very low.

4.3.44 The source study for this value transfer is McVittie and Moran (2008). This is considered a suitable, and the most relevant, study for value transfer due to the similarity of the following factors in this study and in the possible Scottish MPA designations:

- The good considered: a non-market good based on government action;
- The change: designation of a national scale network of marine protected areas (MPAs) subject to management measures that protect biodiversity;
- The population: the national population (a Scottish subsample is identified);
- The context: new marine protection legislation; and
- Timing: although economic conditions have changed, the data is relatively recent.

4.3.45 The source study estimates benefits derived from the implementation of the nature conservation measures in the draft Marine Bill, specifically, MCZs in the UK.

4.3.46 The value transfer produces a range for the non-use value of the designation of a network of MPAs in Scotland. The first part of the range is identified by scaling total non-use value expressed by Scottish households for all UK marine waters down, to only account for Scottish waters. Both values can be thought to represent the non-use value of Scottish waters by Scottish households. The former value assumes that households in Scotland only value marine conservation in Scottish waters whilst the latter assumes that they value marine conservation evenly across UK waters.

4.3.47 A second part of the range of plausible values is then identified by adjusting for the possibility of a lag in the benefits of marine conservation. Table 35 summarises the range of values that the adjustments in this value transfer lead to. The non-use value of Scottish households, with such assumptions made on the scale of Scottish marine waters and possible time-lag in the benefits from designation, are estimated at between £239 million and £583 million, at 2012 prices discounted over 20 years, from 2014.

Table 35. Range of non-use values of Scottish waters by Scottish households

Adjustment	Estimated Value (2012 prices)
Scottish Households value for UK MPAs	£583 million
Adjusted for size of the Scottish marine environment	£355 million
Adjusted for benefits time lag	£392 million
Adjusted for benefits time lag AND size of the Scottish marine environment	£239 million

5.0 Next Steps

- 5.1 The consultation on the possible nature conservation MPAs and the accompanying Environmental Report, Sustainability Appraisal Report and BRIAs is now open, and will close on 13 November 2013. Views on this Environmental Report, and the possible nature conservation MPAs, are now invited.
- 5.2 Following the consultation period, the responses received will be analysed, and the findings from this analysis will be taken into account in the finalisation of the possible MPAs. Once the MPAs have been “adopted”, i.e. through designation orders under section 67 of the Marine (Scotland) Act 2010, a Post-Adoption Statement will be prepared, reflecting on the findings of the assessment and the consultation, and outlining how the issues raised have been addressed.
- 5.3 Copies of the consultation document (2013 Possible Nature Conservation Marine Protected Areas Consultation Overview), the Environmental Report, the Sustainability Appraisal Report and the BRIAs are available for viewing during office hours at the Scottish Government library at Saughton House, Edinburgh (K Spur, Saughton House, Broomhouse Drive, Edinburgh, EH11 3XD).
- 5.4 Please send your [comments, including a Respondent Information Form](#), to the Marine Scotland MPA team, by 13 November 2013.

By email to: [Marine Environment Mailbox@scotland.gsi.gov.uk](mailto:Marine_Environment_Mailbox@scotland.gsi.gov.uk) or

By post, to:

MPA Network Consultation
Scottish Government
Marine Planning and Policy Division
Area 1-A South
Victoria Quay
Edinburgh EH6 6QQ

- 5.5 If you have any inquiries please send them to [Marine Environment Mailbox@scotland.gsi.gov.uk](mailto:Marine_Environment_Mailbox@scotland.gsi.gov.uk) or telephone Sebastian Howell on 0131 244 5301, Michael McLeod on 0131 244 5562 or Paul Cook on 0131 244 0381.

Appendix 1. Environmental Assessment Tables

SEA Objectives	
<i>Biodiversity, flora and fauna</i>	Key: environmental effects
Obj 1: to safeguard (and, where appropriate, enhance) marine and coastal ecosystems, including species and habitats, and their interactions	
Obj 2: to maintain or work towards good ecological/environmental status of water bodies	Work against SEA objective
Obj 3: to maintain and protect the character and integrity of the seabed	No change
<i>Geodiversity</i>	Mixed effects
Obj 4: to safeguard (and, where appropriate, enhance) geodiversity features	Promote SEA objective
<i>Climatic factors</i>	Uncertain
Obj 5 – To reduce greenhouse gas emissions from vessels	

Possible MPA	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
Territorial waters					
Clyde Sea Sill (CSS) <i>Biodiversity protected features - black guillemot; circalittoral sand and coarse sediment communities; fronts</i> <i>Geodiversity protected features - Marine Geomorphology of the Scottish Shelf Seabed</i>	protection of MPA features	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is uncertain.			
East Caithness Cliffs (ECC) <i>Biodiversity protected features - black guillemot</i>	protection of MPA features	not applicable	not applicable	not applicable	not applicable
Fetlar to Haroldswick (FTH) <i>Biodiversity protected features - black guillemot; circalittoral sand and coarse sediment communities; horse mussel beds; kelp and seaweed communities on sublittoral sediments; maerl beds; shallow tide-swept coarse sands with burrowing bivalves</i> <i>Geodiversity protected features - Marine Geomorphology of the Scottish Shelf Seabed</i>	protection of MPA features	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is uncertain.			

Possible MPA	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
Loch Creran (LCR) <i>Biodiversity protected features - flame shell beds</i> <i>Geodiversity protected features - Quaternary of Scotland</i>	protection of MPA features	protection of MPA features	protection of MPA features	protection of MPA features	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is uncertain.
	Potential for displacement of diver-operated hydraulic gear from <i>flame shell beds</i> may result in adverse effects on benthic species/habitat in another location. Alternative locations remain to be identified. Significance is therefore uncertain.				
Lochs Duich, Long and Alsh (DLA) <i>Biodiversity protected features - burrowed mud, flame shell beds</i>	protection of MPA features	protection of MPA features	protection of MPA features	not applicable	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is uncertain.
	Potential for displacement of diver-operated hydraulic gear from <i>burrowed mud</i> and <i>flame shell beds</i> and mobile gear from <i>burrowed mud</i> may result in adverse effects on benthic species/habitat in another location. Alternative locations remain to be identified. Significance is therefore uncertain.				
Loch Sunart (LSU) <i>Biodiversity protected features - flame shell beds; northern feather star aggregations on mixed substrata; serpulid aggregations</i>	protection of MPA features	protection of MPA features	protection of MPA features	not applicable	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is uncertain.
	Potential for displacement of mobile gear from <i>serpulid aggregations</i> and diver-operated hydraulic gear from <i>flame shell beds</i> may result in adverse effects on benthic species/habitat in another location. Alternative locations remain to be identified. Significance is therefore uncertain.				
Loch Sunart to the Sound of Jura (SJU) <i>Biodiversity protected features - common skate</i> <i>Geodiversity protected features - Quaternary of Scotland</i>	protection of MPA features	protection of MPA features	protection of MPA features	protection of MPA features	not applicable
Loch Sween (LSW) <i>Biodiversity protected features - burrowed mud; maerl beds; native oysters; sublittoral mud and mixed sediment communities</i>	protection of MPA features	protection of MPA features	protection of MPA features	not applicable	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is uncertain.
	Potential for displacement of mobile gear from <i>burrowed mud</i> and <i>native oysters</i> and diver-operated hydraulic gear from <i>burrowed mud</i> , <i>maerl beds</i> , <i>native oysters</i> and <i>sublittoral mud and mixed sediment communities</i> may result in adverse effects on benthic species/habitat in another location. Alternative locations remain to be identified. Significance is therefore uncertain.				

Possible MPA	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
Monach Isles (MOI) <i>Biodiversity protected features - black guillemot</i> <i>Geodiversity protected features - Marine Geomorphology of the Scottish Shelf Seabed; Quaternary of Scotland</i>	protection of MPA features	not applicable	not applicable	protection of MPA features	not applicable
Mousa to Boddam (MTB) <i>Biodiversity protected features – sandeels</i> <i>Geodiversity protected features - Marine Geomorphology of the Scottish Shelf Seabed</i>	protection of MPA features	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is uncertain.			
North-west sea lochs and Summer Isles (NWS) <i>Biodiversity protected features - burrowed mud; circalittoral muddy sand communities; flame shell beds; kelp and seaweed communities on sublittoral sediments; maerl beds; maerl or coarse shell gravel with burrowing sea cucumbers; northern feather star aggregations on mixed substrata</i> <i>Geodiversity protected features - Marine Geomorphology of the Scottish Shelf Seabed; Quaternary of Scotland; Seabed Fluid and Gas Seep; Submarine Mass Movement</i>	protection of MPA features	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is uncertain.			
Noss Head (NOH) <i>Biodiversity protected features - horse mussel beds</i>	protection of MPA features	protection of MPA features	protection of MPA features	not applicable	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is uncertain.

Possible MPA	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
Papa Westray (PWY) <i>Biodiversity protected features - black guillemot</i> <i>Geodiversity protected features - Marine Geomorphology of the Scottish Shelf Seabed</i>	protection of MPA features	not applicable	not applicable	protection of MPA features	not applicable
Small Isles (SMI) <i>Biodiversity protected features - black guillemot; burrowed mud, circalittoral sand and mud communities; fan mussel aggregations; horse mussel beds; northern feather star aggregations on mixed substrata; northern sea fan and sponge communities; shelf deeps; white cluster anemones</i> <i>Geodiversity protected features - Quaternary of Scotland</i>	protection of MPA features	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is uncertain.			
South Arran (ARR) <i>Biodiversity protected features - burrowed mud; herring spawning grounds; kelp and seaweed communities on sublittoral sediments; maerl beds; maerl or coarse shell gravel with burrowing sea cucumbers; ocean quahog; seagrass beds; shallow tide-swept coarse sands with burrowing bivalves</i>	protection of MPA features	protection of MPA features	protection of MPA features	not applicable	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is uncertain.
Upper Loch Fyne and Loch Goil (LFG) <i>Biodiversity protected features - burrowed mud; flame shell beds; horse mussel beds; ocean quahog; sublittoral mud and mixed sediment communities</i>	protection of MPA features	protection of MPA features	protection of MPA features	not applicable	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is uncertain.

Possible MPA	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
Wyre and Rousay Sounds (WYR) <i>Biodiversity protected features - kelp and seaweed communities on sublittoral sediment; maerl beds</i> <i>Geodiversity protected features - Marine Geomorphology of the Scottish Shelf Seabed</i>	protection of MPA features	protection of MPA features	protection of MPA features	protection of MPA features	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is uncertain.
	Potential for displacement of diver-operated hydraulic gear from <i>kelp and seaweed communities on sublittoral sediment, maerl beds</i> may result in adverse effects on benthic species/habitat in another location. Alternative locations remain to be identified. Significance is therefore uncertain.				
Offshore waters					
Central Fladen (CFL) <i>Biodiversity protected features - burrowed mud</i> <i>Geodiversity protected features - Quaternary of Scotland</i>	protection of MPA features	protection of MPA features	protection of MPA features	protection of MPA features	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is uncertain.
	Potential for displacement of mobile gear from <i>burrowed mud</i> may result in adverse effects on benthic species/habitat in another location. Alternative locations remain to be identified. Significance is therefore uncertain.				
East of Gannet and Montrose Fields (EGM) <i>Biodiversity protected features - ocean quahog aggregations (including sands and gravels as their supporting habitat); offshore deep sea muds</i>	protection of MPA features	protection of MPA features	protection of MPA features	not applicable	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is uncertain.
	Potential for displacement of mobile gear from <i>ocean quahog aggregations (including sands and gravels as their supporting habitat)</i> and of mobile and static gear from <i>offshore deep sea muds</i> may result in adverse effects on benthic species/habitat in another location. Alternative locations remain to be identified. Significance is therefore uncertain.				
Faroe-Shetland sponge belt (FSS) <i>Biodiversity protected features - continental slope; deep-sea sponge aggregations; ocean quahog aggregations; offshore subtidal sands and gravels</i> <i>Geodiversity protected features - Marine Geomorphology of the Scottish Deep Ocean Seabed; Quaternary of Scotland; Submarine Mass</i>	protection of MPA features	protection of MPA features	protection of MPA features	protection of MPA features	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is uncertain.
	Potential for displacement of mobile gear from <i>deep-sea sponge aggregations; ocean quahog aggregations; offshore subtidal sands and gravels</i> and static gear from <i>deep-sea sponge aggregations</i> may result in adverse effects on benthic species/habitat in another location. Alternative locations remain to be identified. Significance is therefore uncertain.				

Possible MPA	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
Firth of Forth Banks Complex (FOF) <i>Biodiversity protected features - ocean quahog aggregations; offshore subtidal sands and gravels; shelf banks and mounds</i> <i>Geodiversity protected features - Quaternary of Scotland</i>	protection of MPA features	protection of MPA features	protection of MPA features	protection of MPA features	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is uncertain.
	Potential for displacement of mobile gear from <i>ocean quahog aggregations; offshore subtidal sands and gravels</i> may result in adverse effects on benthic species/habitat in another location. Alternative locations remain to be identified. Significance is therefore uncertain.				
Geikie Slide and Hebridean slope (GSH) <i>Biodiversity protected features - burrowed mud; continental slope; offshore deep-sea muds, offshore subtidal sands and gravels</i> <i>Geodiversity protected features - Submarine Mass Movement</i>	protection of MPA features	protection of MPA features	protection of MPA features	protection of MPA features	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is uncertain.
	Potential for displacement of mobile gear from <i>burrowed mud, offshore deep-sea muds, offshore subtidal sands and gravels</i> and static gear from <i>offshore deep-sea muds</i> may result in adverse effects on benthic species/habitat in another location. Alternative locations remain to be identified. Significance is therefore uncertain.				
Hatton-Rockall Basin (HRB) <i>Biodiversity protected features - deep-sea sponge aggregations; offshore deep-sea muds</i> <i>Geodiversity protected features - Marine Geomorphology of the Scottish Deep Ocean Seabed</i>	protection of MPA features	protection of MPA features	protection of MPA features	protection of MPA features	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is uncertain.
	Potential for displacement of mobile and static gear from <i>deep-sea sponge aggregations, offshore deep-sea muds</i> may result in adverse effects on benthic species/habitat in another location. Alternative locations remain to be identified. Significance is therefore uncertain.				
North-east Faroe Shetland Channel (NEF) <i>Biodiversity protected features - continental slope; deep-sea sponge aggregations; offshore deep-sea muds; offshore subtidal sands and gravels</i> <i>Geodiversity protected features - Cenozoic Structures of the Atlantic Margin; Marine Geomorphology of the Scottish Deep Ocean Seabed; Quaternary of Scotland; Submarine Mass Movement</i>	protection of MPA features	protection of MPA features	protection of MPA features	protection of MPA features	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is uncertain.
	Potential for displacement of mobile and static gear from <i>deep-sea sponge aggregations, offshore deep-sea muds</i> and mobile gear from <i>offshore subtidal sands and gravels</i> may result in adverse effects on benthic species/habitat in another location. Alternative locations remain to be identified. Significance is therefore uncertain.				

Possible MPA	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
<p>North-west Orkney (NWO) <i>Biodiversity protected features – sandeels</i></p> <p><i>Geodiversity protected features - Marine Geomorphology of the Scottish Shelf Seabed</i></p>	protection of MPA features	protection of MPA features	protection of MPA features	protection of MPA features	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is uncertain.
	Potential for displacement of mobile and diver-operated hydraulic gear from <i>sandeels</i> may result in adverse effects on benthic species/habitat in another location. Alternative locations remain to be identified. Significance is therefore uncertain.				
<p>Norwegian boundary sediment plain (NSP) <i>Biodiversity protected features - ocean quahog aggregations (including sands and gravels as their supporting habitat), offshore subtidal sands and gravels</i></p>	protection of MPA features	protection of MPA features	protection of MPA features	not applicable	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is uncertain.
	Potential for displacement of mobile gear from <i>ocean quahog aggregations; offshore subtidal sands and gravels</i> may result in adverse effects on benthic species/habitat in another location. Alternative locations remain to be identified. Significance is therefore uncertain.				
<p>Rosemary Bank Seamount (RBS) <i>Biodiversity protected features - deep-sea sponge aggregations; seamount features; seamount communities</i></p> <p><i>Geodiversity protected features - Cenozoic Structures of the Atlantic Margin; Marine Geomorphology of the Scottish Deep Ocean Seabed; Quaternary of Scotland; Submarine Mass Movement</i></p>	protection of MPA features	protection of MPA features	protection of MPA features	protection of MPA features	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is uncertain.
	Potential for displacement of mobile and static gear from <i>deep-sea sponge aggregations, seamount communities</i> may result in adverse effects on benthic species/habitat in another location. Alternative locations remain to be identified. Significance is therefore uncertain.				
<p>South-east Fladen (SEF) <i>Biodiversity protected features - burrowed mud</i></p> <p><i>Geodiversity protected features - Seabed Fluid and Gas Seep</i></p>	protection of MPA features	protection of MPA features	protection of MPA features	protection of MPA features	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is uncertain.
	Potential for displacement of mobile gear from <i>burrowed mud</i> may result in adverse effects on benthic species/habitat in another location. Alternative locations remain to be identified. Significance is therefore uncertain.				

Possible MPA	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
<p>South-west Sula Sgeir and Hebridean slope (SSH)</p> <p><i>Biodiversity protected features - burrowed mud; continental slope; offshore deep-sea muds; offshore subtidal sands and gravels</i></p> <p><i>Geodiversity protected features - Quaternary of Scotland; Submarine Mass Movement</i></p>	protection of MPA features	protection of MPA features	protection of MPA features	protection of MPA features	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is uncertain.
	Potential for displacement of mobile gear from <i>burrowed mud, offshore subtidal sands and gravels</i> and of mobile and static gear from <i>offshore deep-sea muds</i> may result in adverse effects on benthic species/habitat in another location. Alternative locations remain to be identified. Significance is therefore uncertain.				
<p>The Barra Fan and Hebrides Terrace Seamount (BHT)</p> <p><i>Biodiversity protected features - burrowed mud; continental slope; offshore deep-sea muds; offshore subtidal sands and gravels; orange roughy; seamount; seamount communities</i></p> <p><i>Geodiversity protected features - Cenozoic Structures of the Atlantic Margin; Marine Geomorphology of the Scottish Deep Ocean Seabed; Quaternary of Scotland; Submarine Mass Movement</i></p>	protection of MPA features	protection of MPA features	protection of MPA features	protection of MPA features	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is uncertain.
	Potential for displacement of mobile gear from <i>burrowed mud, offshore subtidal sands and gravels</i> and of mobile and static gear from <i>offshore deep-sea muds, seamount communities</i> may result in adverse effects on benthic species/habitat in another location. Alternative locations remain to be identified. Significance is therefore uncertain.				
<p>Turbot Bank (TBB)</p> <p><i>Biodiversity protected features - sandeels, offshore subtidal sands and gravels, shelf banks and mounds</i></p>	protection of MPA features	protection of MPA features	protection of MPA features	not applicable	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is uncertain.
	Potential for displacement of mobile gear and diver-operated hydraulic gear from <i>sandeels</i> and of mobile gear from <i>offshore subtidal sands and gravels</i> may result in adverse effects on benthic species/habitat in another location. Alternative locations remain to be identified. Significance is therefore uncertain.				
<p>West Shetland Shelf (WSS)</p> <p><i>Biodiversity protected features - offshore subtidal sands and gravels</i></p>	protection of MPA features	protection of MPA features	protection of MPA features	not applicable	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is
	Potential for displacement of mobile gear from <i>offshore subtidal sands and gravels</i> may result in adverse effects on benthic species/habitat in another location. Alternative locations remain to be identified. Significance is therefore uncertain.				

Possible MPA	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
					uncertain.
Western Fladen (WFL) <i>Biodiversity protected features - burrowed mud</i> <i>Geodiversity protected features - Quaternary of Scotland</i>	protection of MPA features	protection of MPA features	protection of MPA features	protection of MPA features	There is potential for increased GHG emissions from increased journey lengths, should these occur. Significance of such increases is uncertain.
	Potential for displacement of mobile gear from <i>burrowed mud</i> may result in adverse effects on benthic species/habitat in another location. Alternative locations remain to be identified. Significance is therefore uncertain.				



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