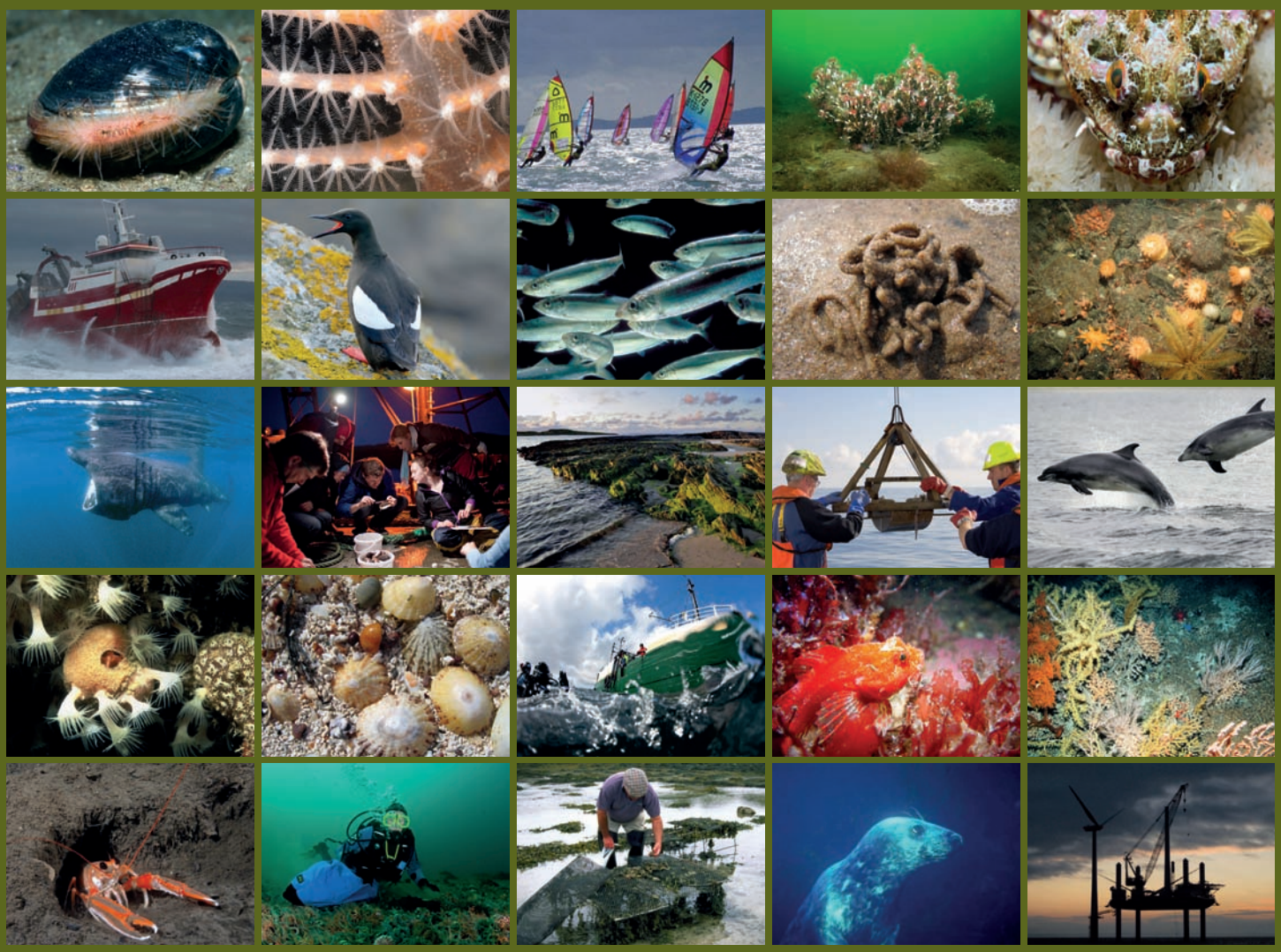
Scottish Natural Heritage
Commissioned Report No. 547

Joint Nature Conservation Committee

Advice to the Scottish Government on the selection of Nature Conservation Marine Protected Areas (MPAs) for the development of the Scottish MPA network



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Joint Nature Conservation Committee

ADVICE TO GOVERNMENT

Commissioned Report No. 547

Advice to the Scottish Government on the selection of Nature Conservation Marine Protected Areas (MPAs) for the development of the Scottish MPA network

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EXECUTIVE SUMMARY

Advice to the Scottish Government on the selection of Nature Conservation Marine Protected Areas (MPAs) for the development of the Scottish MPA network

Commissioned Report No. 547

Year of publication: 2012

Background

This document sets out the formal advice from SNH and JNCC to Marine Scotland on the identification of Nature Conservation Marine Protected Area (MPA) proposals to protect biodiversity and geodiversity in Scotland's seas. These MPA proposals will also help fulfil Scotland's contribution to wider networks of MPAs at a European and global scale. Where we use 'we', 'us' or 'our' in this advice we mean SNH and JNCC.

Scotland's marine environment is dynamic and varied and supports not only a wide diversity of animals and plants but also provides a range of vital ecosystem services including food, renewable energy, leisure and recreational opportunities.

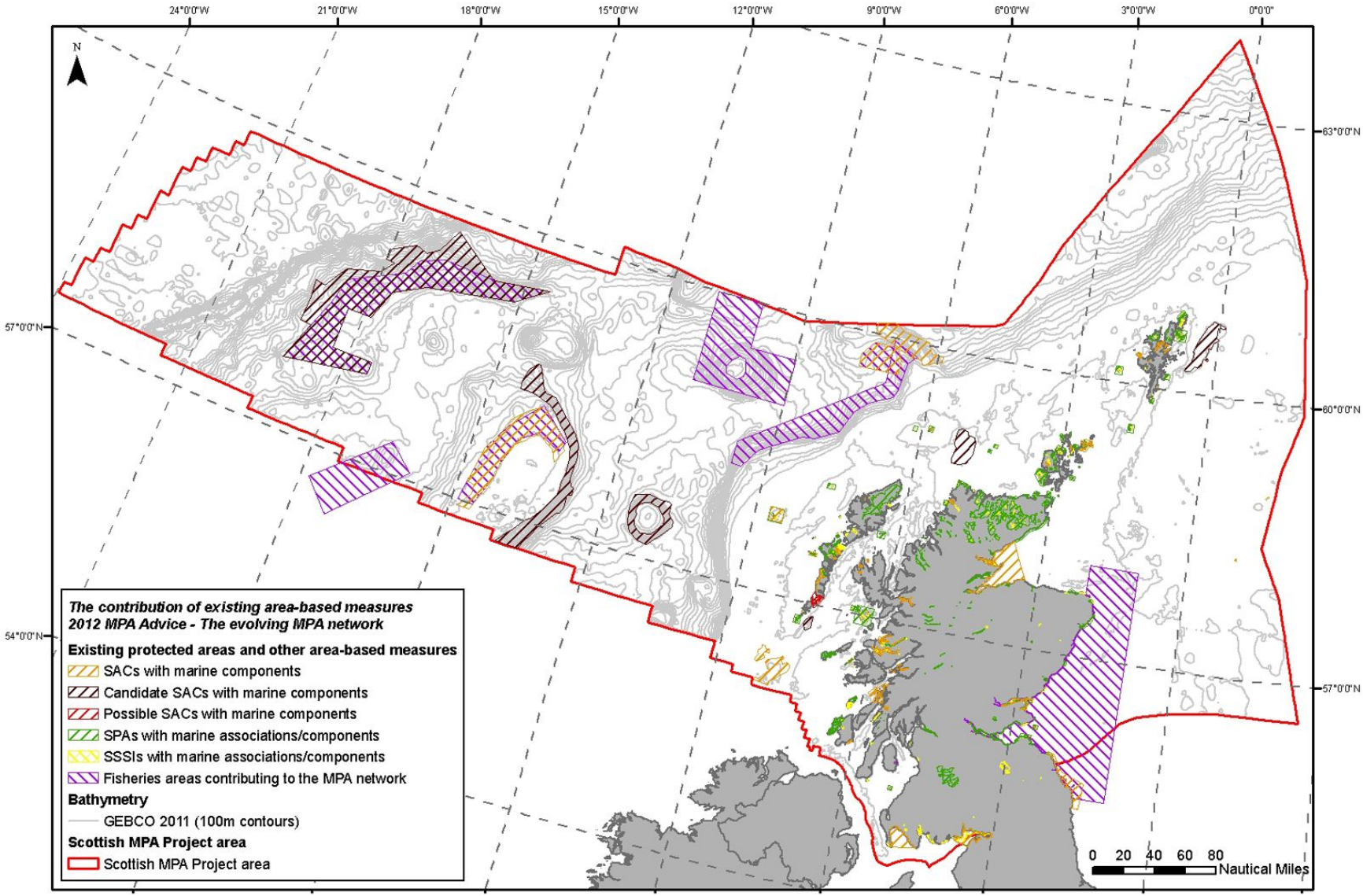
The Scottish MPA Project helps deliver the Scottish Government's commitment to delivering a '*clean, healthy, safe, productive and biologically diverse marine and coastal environment that meets the long term needs of people and nature*'. The Marine (Scotland) Act 2010 contains provisions to designate Nature Conservation MPAs, Demonstration and Research MPAs and Historic MPAs within territorial waters. The UK Marine and Coastal Access Act 2009 contains provisions to designate MPAs for the conservation of nationally important marine wildlife, habitats, geology and undersea landforms in offshore waters. This report addresses the selection of Nature Conservation MPAs in all of Scotland's seas, under both Acts. Our advice does not cover Historic MPAs or Demonstration and Research MPAs. Historic Scotland is providing advice on the former and Marine Scotland on the latter.

Our proposals for Nature Conservation MPAs build on the existing network of areas including Special Areas of Conservation (SAC), Special Protection Areas (SPA), Sites of Special Scientific Interest (SSSI) and existing fisheries restrictions (see Figure E1). Thirty-three Nature Conservation MPA proposals are recommended, with further work proposed for four MPA search locations where there is currently insufficient evidence to make firm proposals.

The approach for identifying Nature Conservation MPAs draws on the best available information, and has sought input from a wide range of stakeholders at key points in the project. A five-stage process set out in the Scottish MPA Selection Guidelines has been followed:

- **Stage 1** - Identification of MPA search locations based on the presence of key features.
- **Stage 2** - Prioritisation of MPA search locations based on the qualities of the features they contain.

Figure E1 Existing protected areas and other area-based measures that contribute to the protection of Scotland's marine environment (designated for habitats and species with marine associations / components)



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 [2012]. All rights reserved. Ordnance Survey Licence number 100017908. Bathymetry ©GEBCO. NOT TO BE USED FOR NAVIGATION. MPA network ©SNH, JNCC and Marine Scotland. 10.12.12. All rights reserved.

- **Stage 3** - Assessing the scale an MPA search location needs to be in order to maintain the integrity of the features it contains.
- **Stage 4** - Assessing the ability to manage features effectively within an MPA search location as part of a Nature Conservation MPA.
- **Stage 5** - Prioritising potential areas for MPAs according to their contribution to the MPA network.

The Scottish MPA Selection Guidelines listed 41 MPA search features of biodiversity importance in Scotland's seas for which MPAs were considered an appropriate protection measure and for which sufficient data were likely to be available.

The development of the MPA network followed a regional approach using the OSPAR regions. Scotland's seas fall into four OSPAR regions: Region I (Arctic waters), Region II (Greater North Sea), Region III (Celtic Seas), and Region V (Wider Atlantic).

In our view nine (all seabed habitats) of the 41 search features are adequately protected by existing protected areas. We consider other area-based measures afford adequate protection to one further MPA search feature (blue ling). There were insufficient data available to assess a further four (burrowing sea anemone aggregations, European spiny lobster, heart cockle aggregations and native oyster) in detail against the MPA Selection Guidelines. Consequently SNH and JNCC identified 27 of the original 41 MPA search features as priorities for identifying Nature Conservation MPA proposals in Scotland's seas.

Before applying the MPA Selection Guidelines more widely to Scotland's seas, we assessed what opportunies there were to enhance the protection of any of the MPA search features by overlaying a Nature Conservation MPA on to existing designations or other area-based measures. SNH and JNCC also used available data on recent human activities and developments to identify least damaged/more natural locations. These locations were examined to determine whether they contained records of MPA search features and should therefore be assessed against the MPA Selection Guidelines.

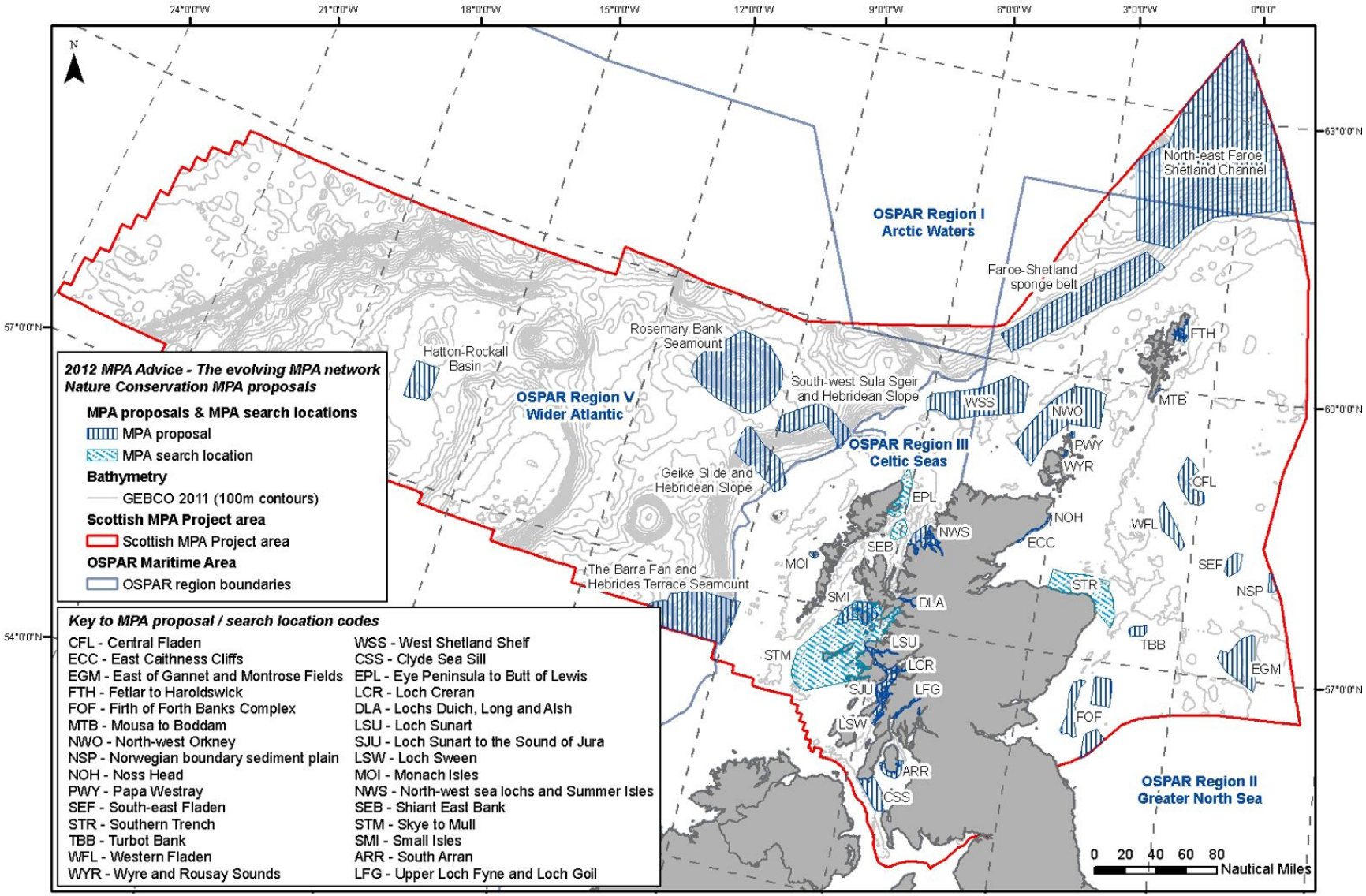
Following work on the 'enhancement opportunities' and least damaged/more natural locations, 12 MPA search features remained as priorities for completing the network. The focus of subsequent work was then on identifying MPA search locations to protect multiple MPA search features.

SNH and JNCC assessed all the MPA search locations against the Scottish MPA Selection Guidelines. Successful assessment determined that MPA search locations should be recommended as MPA proposals. Data confidence assessments also provide the evidence-base behind each Nature Conservation MPA proposal.

In total 33 Nature Conservation MPA proposals have been developed and a further four MPA search locations remain to be fully assessed (see Figure E2). Of these 37, 20 are from enhancement opportunities to existing measures, and twelve are derived from least damaged/more natural locations. Twenty-seven of the Nature Conservation MPA proposals and four of the MPA search locations are for multiple features.

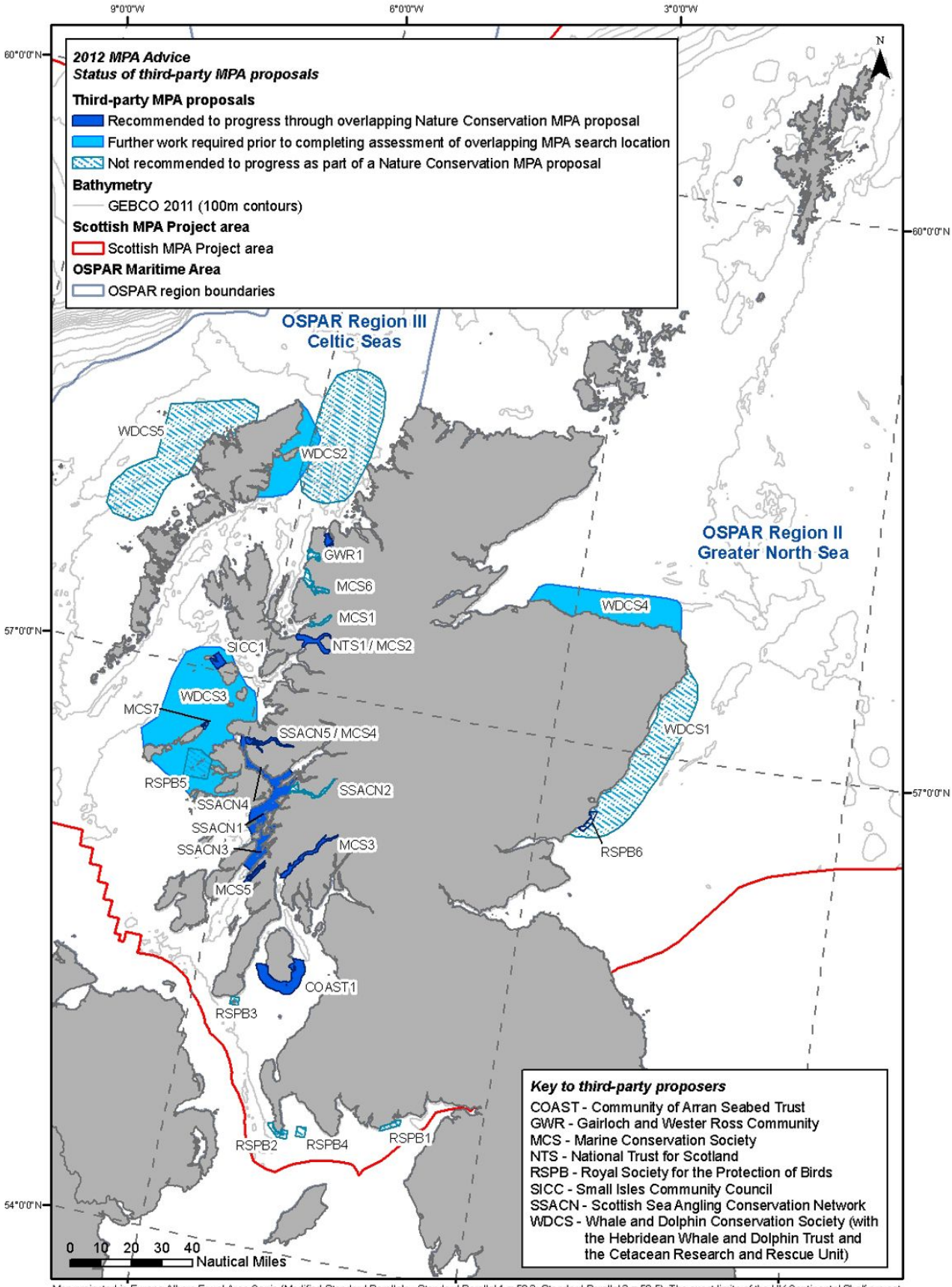
Stakeholder groups submitted 27 third-party proposals in territorial waters (see Figure E3). Twelve of these contributed to eight of the Nature Conservation MPA proposals. A further three have contributed to three of the remaining MPA search locations.

Figure E2 Nature Conservation MPA proposals and MPA 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 [2012]. All rights reserved. Ordnance Survey Licence number 100017908. Bathymetry ©GEBCO. NOT TO BE USED FOR NAVIGATION. MPA network ©SNH, JNCC and Marine Scotland. 07.12.12. All rights reserved.

Figure E3 Third-party Nature Conservation MPA proposals



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 [2012]. All rights reserved. Ordnance Survey Licence number 100017908. Bathymetry ©GEBCO. NOT TO BE USED FOR NAVIGATION. Third-party MPA proposals ©assorted as per map. 08.10.12. All rights reserved.

Following identification of the Nature Conservation MPA proposals and MPA search locations, SNH and JNCC assessed the adequacy of protection of the search features. We assessed the distribution and coverage of the MPA search features against Stage 5 of the Scottish MPA Selection Guidelines, i.e. representation, replication, geographic range and variation, linkages (where known / understood) and resilience of features within the network. These reflect the principles proposed by the OSPAR Commission's guidance for MPA networks.

Of the 41 MPA search features, three are not represented within the network (burrowing sea anemone aggregations, heart cockle aggregations and European spiny lobster). Insufficient data are available to inform the identification of Nature Conservation MPA proposals for these features. Of the remaining 38 MPA search features, 35 will be adequately protected within the evolving Scottish MPA network. The remaining three features (basking shark, common skate and white-beaked dolphin) will still not be adequately protected within the network. All three will be represented within one Nature Conservation MPA each, but in our view (on the basis of their occurrence and distribution in Scottish waters) that is not adequate according to the Selection Guidelines. Our assessment is based on progression of the recommended MPA proposals and remaining MPA search locations.

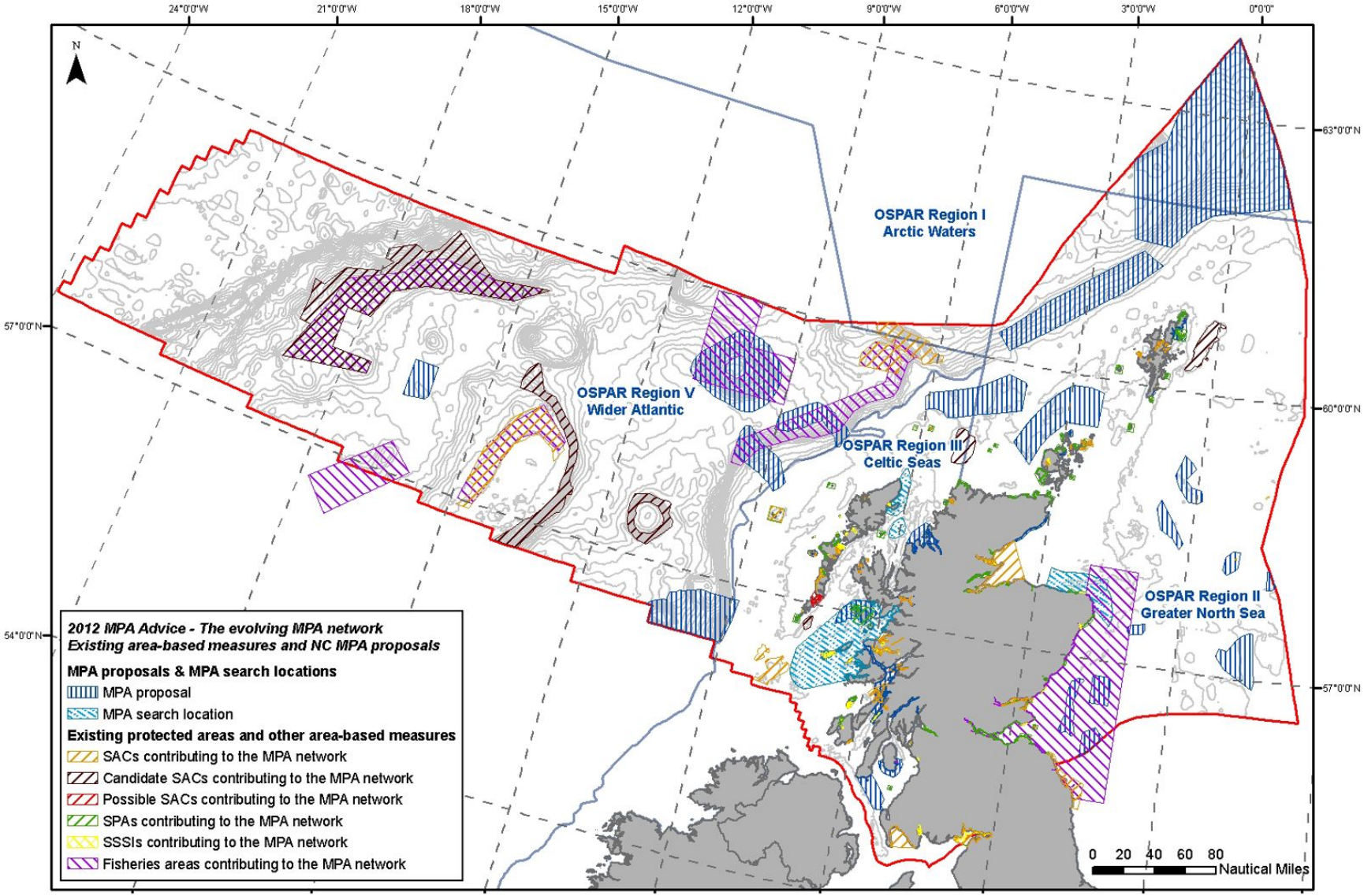
Survey and research work is underway to enable us to provide formal advice on the four search locations (in 2013 for the Southern Trench, Eye Peninsula to Butt of Lewis and the Shiant East Bank, and 2014 for Skye to Mull) and on how to achieve adequacy for the three remaining features in the future.

Our network advice provides an overview of the emerging Scottish MPA network (based on existing protected areas, other area-based measures and the Nature Conservation MPA proposals / MPA search locations) in relation to Scottish Government's wider policy obligations (see Figure E4). The overview describes the spatial distribution of the network and considers representation and replication of broadscale habitats and OSPAR Threatened and/or Declining features. It points out that work on linkages (understanding connectivity between features within the network) by Marine Scotland Science is ongoing.

In our view (provided the work on Natura sites and the work outlined in this advice is completed), the proposed MPA network in Scotland's seas is likely to be ecologically coherent. Furthermore, the representation and replication of features within these Nature Conservation MPA proposals and MPA search locations would satisfy the Scottish Government's duties relating to the creation of a network of conservation sites under the Scottish and UK Acts. In our view the evolving MPA network in Scotland would also make an appropriate contribution to the OSPAR Commission's aspiration to establish an ecologically coherent network at the wider NE Atlantic scale.

We make a series of recommendations to Scottish Ministers regarding the contribution of existing measures, the MPA proposals, ongoing work on MPA search locations, sites we consider to be of equivalent ecological value or which represent science-based alternatives, and future monitoring of the Scottish MPA network. We also advise that in our view the Scottish MPA Project complies with the recommendations on the use of evidence as set out in the UK Government's recent review of the evidence process for selecting marine Special Areas of Conservation (Graham-Bryce, 2011).

Figure E4 Combined view of existing protected areas, other area-based measures, Nature Conservation MPA proposals and MPA search locations that could contribute to the Scottish MPA network



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 [2012]. All rights reserved. Ordnance Survey Licence number 100017908. Bathymetry ©GEBCO. NOT TO BE USED FOR NAVIGATION. MPA network ©SNH, JNCC and Marine Scotland. 09.12.12. All rights reserved.

Version control

Build status:

Version	Date	Author(s)	Reason/Comments
0.1	30/07/2012	K. Gillham, B. James, O. McGrath, P. Chaniotis and M. Linwood	Drafting of sections of network advice; v0.1 seeking steer from Marine Scotland on coverage of key messages, level of detail, format, structure and tone.
0.2	07/08/2012	Pete Chaniotis	Read through and track changes to entire report.
0.3	10/08/2012	Ben James, Peter Chaniotis and Megan Linwood	Drafting of sub-sections within s3 and s8; addition of detailed supporting appendices.
0.4	13/08/2012	Megan Linwood, Peter Chaniotis, Ben James, Morven Carruthers and Owen McGrath	Updating of mapping; additions and refinements to appendices, text edits to several report sections.
0.5	15/08/2012	Peter Chaniotis, Katie Gillham, Ben James and Megan Linwood	Report restructuring and final drafting following discussions with SNH and JNCC managers.
0.6	15/08/2012	Katie Gillham, John Baxter, Ben James, Megan Linwood and Peter Chaniotis	Version to the CoP 15/08 with revised sections 2 and 4.2. Structural refinements throughout with material moved to appendices.
0.7	16/08/2012	Ben James, Katie Gillham, Peter Chaniotis and John Baxter	Revised version for review prior to submission of draft report to SNH and JNCC Directors.
0.8	16/08/2012	John Baxter, Katie Gillham, Ben James and Peter Chaniotis	Pre-release for SNH managers in advance of full version on 17/08.
1.0	17/08/2012	Katie Gillham, Ben James, Peter Chaniotis, Megan Linwood and John Baxter	Full version 1.0 for release to SNH and JNCC Directors for approval to start sign-off process.
1.1	20/08/2012	Susan Davies and John Baxter	SNH Director & Manager comments and edits.
1.2	20/08/2012	Ben James	Reformat images / figures and run through SNH manager track change edits. SNH Director comments left on for discussion with JNCC colleagues.
1.3	21/08/2012	Megan Linwood and Pete Chaniotis	Revision of Annexes and drafting of sections as discussed and agreed with SNH.
1.4	21/08/2012	Megan Linwood and Jon Davies	Revision of main body of text taking account of comments from Jon Davies.
1.5	22/08/2012	Ben James and Katie Gillham	Review of JNCC track change edits. Update of appendices and related tables in main report.

Version	Date	Author(s)	Reason/Comments
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1.7	23/08/2012	Ben James and Katie Gillham	Refinements to s7.5.2 and s9.3 and associated data appendices.
1.8	24/08/2012	Dominic Counsell, Katie Gillham, Ben James, Alistair Rennie and John Gordon	SNH manager review - track change edit incorporation. Addition of updated geodiversity sections and overview tables.
2.0	24/08/2012	Ben James and Katie Gillham	Release version for respective SNH and JNCC committees.
2.1	28/08/2012	Megan Linwood	Review incorporating comments from Jon Davies, and following discussion with Katie Gillham and Ben James.
3.0	29/08/2012	Megan Linwood, Jon Davies and John Goold	Release version for the JNCC MPA Sub-Group.
4.0	30/08/2012	Ben James and Katie Gillham	Updated Executive Summary, appendices and mapping. Release version for SNH Management Team and an update version for SNH Scientific Advisory Committee / Protected Areas Committee.
4.1	11/09/2012	Megan Linwood	Revision following meeting with SNH and JNCC on the 4/9/12.
4.2	12/09/2012	Ben James and Katie Gillham	Review of JNCC refinements; insertion of revised map E4 and additional references.
5.0	14/09/2012	Jon Davies, Ben James and Katie Gillham	Final comments before release to MPA Sub Group.
5.1	21/09/2012	Pete Chaniotis	Full review and response to comments from Jon Davies. Update to reference list.
5.2	28/09/2012	Ben James, Siobhan Mannion and Laura Clark	Updates to Appendices 1-3, 5, 7-9. Addition and integration of representative features into s7.5 and s9.
5.3	02/10/2012	Megan Linwood	Revisions in response to feedback from the MPA Sub Group.
5.4	08/10/2012	Ben James, Katie Gillham and James Dargie	SNH revisions to address feedback from the MPA Sub Group, SNH Scientific Advisory Committee, Management Team and Protected Areas Committee.
5.5	11/10/2012	Megan Linwood, Jon Davies and Pete Chaniotis	Responding to comments from SNH and reviewing feature representation following delivery of deep sea sponge aggregations contract.

Version	Date	Author(s)	Reason/Comments
6.0	12/10/2012	Ben James and Katie Gillham	Final review and SNH edits before release to Joint Committee.
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7.0	01/10/2012	SNH and JNCC	Final advice. Chairs of SNH and JNCC - clearance to issue.
7.1	06/12/2012	Megan Linwood	Revisions of text to reflect changes in proposals following new survey data and further QA of evidence.
7.2	10/12/2012	Megan Linwood	Review following feedback from SNH.
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7.5	12/12/2012	Dominic Counsell	Sign-off on behalf of SNH.
8.0	13/12/2012	John Goold	Final advice for publication. Clearance to issue.

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The lead authors wish to thank all those, too numerous to mention by name, who have contributed to the development of this advice, particularly those who have provided us with the information on biodiversity and geodiversity interests in Scotland's seas and for helping us to improve our understanding of where and how the marine environment around Scotland is used. The dedication and persistence shown by all involved in the numerous local and national stakeholder meetings and formal national stakeholder workshops has also been invaluable in formalising the outputs of the project.

We are grateful to the SNH Scientific Advisory Committee and the JNCC MPA Sub Group for their independent review of the draft advice. The SNH Protected Areas Committee also reviewed the advice as part of the SNH sign-off process. We also thank Marine Scotland for their support throughout the project.

1 PURPOSE OF THIS ADVICE

In September 2010, Scottish Ministers laid before the Scottish Parliament a Ministerial Statement on the creation of a network of Marine Protected Areas (MPAs). The statement committed Scottish Government to using the powers under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009 to develop a MPA network that delivers their priorities at Scottish, UK and international levels. In that statement the Scottish Government committed to ensuring that the network, which would include Natura sites, Sites of Special Scientific Interest (SSSIs) and the new Nature Conservation MPAs, would be ecologically coherent and would be substantially in place by the end of 2012. In basing their decisions on the best available evidence, Scottish Government would draw on the expertise of Scottish Natural Heritage (SNH) and the Joint Nature Conservation Committee (JNCC), together with other evidence from Marine Scotland Science, the wider scientific community and users of Scotland's seas.

The statement highlighted that Scottish Government intended to draw on the key design principles of an ecologically coherent network set out in the guidance developed under the OSPAR Convention (OSPAR Commission, 2006). The Scottish MPA Selection Guidelines were published by Marine Scotland in 2011 to be used alongside the Ministerial Statement by SNH and JNCC to guide the selection of Nature Conservation MPAs to complete the network (Marine Scotland, 2011b).

When establishing the Scottish MPA Project, Marine Scotland requested that SNH and JNCC provide formal advice on progress made towards the development of an ecologically coherent network of Marine Protected Areas by the end of 2012 (Marine Scotland *et al.,* 2011). The current document is SNH and JNCC's formal advice to Marine Scotland on the identification of Nature Conservation MPA proposals and their expected contribution to the evolving network of marine conservation sites in Scotland's seas. We make recommendations for Nature Conservation MPA proposals on the basis of the contribution that these areas could make to the emerging network. This advice has been jointly produced by both organisations; where we use 'we', 'us' or 'our' in this advice we mean SNH and JNCC.

Scottish Ministers, informed by the advice in this document, will report to Scottish Parliament in December 2012 outlining progress made in the development of an ecologically coherent network of Marine Protected Areas. Their report is in fulfilment of section 103 of the Marine (Scotland) Act 2010 and section 124 of the Marine and Coastal Access Act 2009 (noting that no designation orders have been made to date for MPAs under those Acts). An overview is also provided in relation to the network duties in section 79(3) of the 2010 Act and section 123(3) of the 2009 Act. Ministers will determine which of the Nature Conservation MPA proposals should be consulted upon publicly in 2013 with a view to subsequent formal designation under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009.

Completion of a network of sites to protect biodiversity and geodiversity interests will contribute to the delivery of a number of international and European commitments such as the Convention on Biological Diversity and the OSPAR Convention which call for the development of an ecologically coherent network of MPAs. The EC Marine Strategy Framework Directive (MSFD) reinforces these commitments by stating that Member States' Programmes of Measures to achieve Good Environment Status (GES) shall contribute to 'coherent and representative networks of MPAs'.

1.1 Content of this advice

This advice demonstrates how SNH and JNCC have compiled the evidence-base and applied it to the process detailed in the Scottish MPA Selection Guidelines (Marine Scotland, 2011b) to identify the Nature Conservation MPAs proposals presented in this document. Alongside the Nature Conservation MPA proposals we have also identified some MPA search locations. Our advice presents an overview of the work undertaken and provides references and links to supporting documents which provide more technical detail on the processes followed during the work. This advice relies in several places on our expert judgement, based on the best available evidence, taking account of what is contained in the Selection Guidelines and the comments of stakeholders.

The network advice should be viewed alongside the detailed material provided in three documents supporting each of the Nature Conservation MPA proposals:

- The data confidence assessment (published alongside this report)
- The detailed assessment against the Scottish MPA Selection Guidelines (to be published in 2013)
- The draft site consultation document (to be published in 2013)

Our advice summarises our assessment of the contribution that existing measures (protected areas and other area-based measures) make to an ecologically coherent network of MPAs in Scotland. Our advice also considers proposals for Nature Conservation MPAs submitted by third parties. All of this material contributes to the identification of the Nature Conservation MPA proposals and MPA search locations described in our advice.

In accordance with the Scottish MPA Selection Guidelines we have made recommendations for MPA proposals and MPA search locations by considering the relative contribution of different areas. The Scottish MPA Selection Guidelines provide for socio-economic information to be considered when determining between two or more proposals of equivalent ecological value. Marine Scotland has a lead role in considering socio-economic factors in the Scottish MPA Project. We have not taken into account socio-economic factors in our recommendations but we have identified areas we consider to have equivalent ecological value. Socio-economic factors may be considered in any decisions on which of these areas should be progressed further.

Our advice focuses on the Nature Conservation MPA proposals and MPA search locations we judge necessary to complete the MPA network. We do not provide advice on other types of existing protected area. We make references to ongoing work on Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) within the context of the wider MPA network. Advice on those workstreams, which are subject to further analyses under different timescales, will be provided by SNH and JNCC to Scottish Ministers separately. Similarly, our advice does not cover Historic MPAs or Demonstration and Research MPAs. Historic Scotland will provide advice on the former to Scottish Ministers, and Marine Scotland will determine the latter.

In this report, references to the MPA network include Nature Conservation MPA proposals and search locations, alongside other types of existing measures (e.g. Special Areas of Conservation, Special Protection Areas, Sites of Special Scientific Interest and relevant fisheries restrictions including closures for Vulnerable Marine Ecosystems).

2 SCOTLAND'S SEAS AT A GLANCE

The seas around Scotland and the spectacular wildlife they support (e.g. Figure 1) are one of our best kept secrets that only a very few have had the privilege to explore first hand, but

which we all depend on for our quality of life. Scotland is positioned at the edge of the continental shelf between subpolar and subtropical influences. The major ocean current known as the North Atlantic Current which brings the warm water from the Gulf of Mexico that washes the west coast of Scotland is responsible for our relatively mild winters, compared to other land at similar latitudes such as Nova Scotia in Canada. In the north these warm waters mix with the nutrient rich cold polar waters that support plankton, the building blocks of all life in our seas.

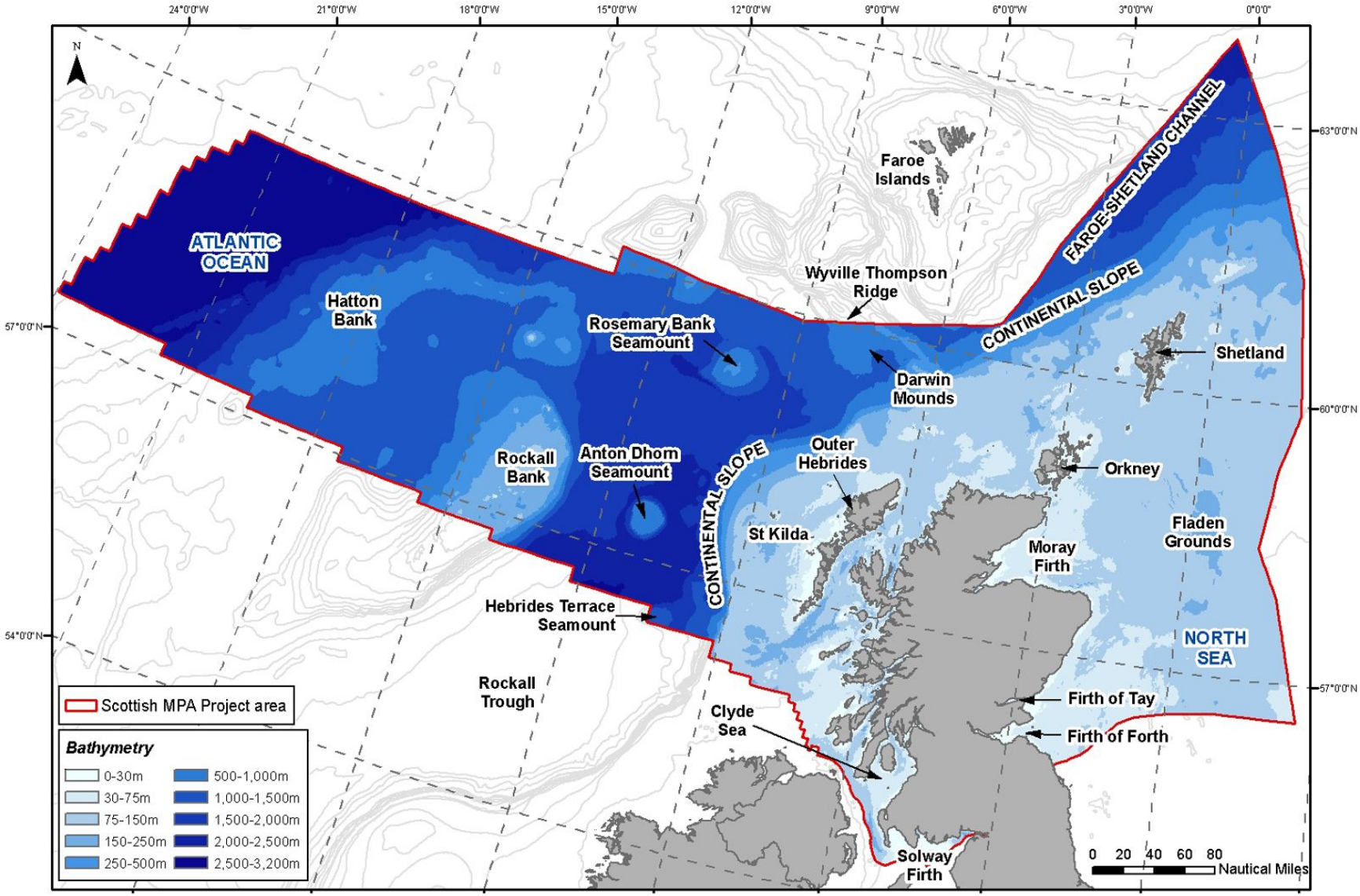
Scotland's seas account for a significant proportion of EU waters (~13%) and over 60% of UK waters, covering an area that is nearly six times our land mass. Our coastline is over 18,000 km in length (Baxter *et al*., 2011), the third longest in the EU (only Finland and Sweden are longer) and the 16th longest in the world. Our waters are dotted with over 900 islands of which 118 are inhabited. These include the three major archipelagos of Shetland, Orkney, and the Outer Hebrides; the awe-inspiring St Kilda, to others such as the Isle of Skye, Staffa and Iona with their links to our historical, cultural and religious heritage. The coastline itself is very varied.

Figure 1 Scotland's marine natural heritage

i) Northern gannet colony on Bass Rock © SNH; ii) A painted topshell with foliose red algae on a backdrop of vivid orange encrusting sponge © Paul Kay; iii) Sea view from Gallanch on the west coast © SNH; iv) Long-spined sea scorpion on a carpet of white tube sponge © Paul Kay

The east coast is dominated by the three major firths, the Firth of Forth, Firth of Tay and Moray Firth (see Figure 2) and is predominantly low lying, shelving into the sediment-laden waters of the North Sea. There are few islands along the east coast but some such as the Bass Rock and the Isle of May not only have a long and varied history but are also internationally important bird breeding sites. The Bass Rock is renowned for its northern gannet colony and has lent its name to the scientific name of the northern gannet (*Morus bassanus*).

Figure 2 Extent of Scotland's seas showing bathymetry and notable areas



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 [2012]. All rights reserved. Ordnance Survey Licence number 100017908. Bathymetry ©GEBCO. NOT TO BE USED FOR NAVIGATION. MPA network ©SNH, JNCC and Marine Scotland. 05.10.12. All rights reserved.

The Northern Isles of Orkney and Shetland are also quite different, separated as they are from mainland Scotland by the Pentland Firth, widely regarded as one of the most extreme marine environments in the world. The Orkney archipelago is a place of contrast from the towering sandstone cliffs of Hoy to the gentle low-lying northern islands of Sanday and Westray etc., together with the sheltered waters of Scapa Flow, the wave exposed western coast of the mainland and the tidal current areas between many of the islands. The Shetland Islands have a much more indented coastline cut by voes that offer shelter at their heads whilst the remainder of the coastline is exposed to the wind and waves of the North Atlantic.

The west coast of Scotland is quite different, characterised by a highly indented landscape, a legacy of the retreating glaciers at the end of the last ice age. The long narrow fjordic sea lochs provide shelter and deep water, in some lochs in excess of 200 m depth, close inshore that represent suitable habitat for many species of animals that would otherwise be found much further offshore. Offshore there are many islands and rocky skerries that confuse and confound the water creating tidal rips, whirlpools and the like. To the west of the Western Isles the offshore Scottish waters form an extensive shelf sea area down to depths of around 200 m but then at the shelf break it plunges to depths of greater than 2,000 m.

The deep ocean area has until quite recently been a very mysterious and inaccessible place. It is only with technological advances, many driven by the challenges faced by the oil industry in their exploration for reserves in ever deeper waters, that our appreciation of the diversity of the seabed topography and the life it supports has been realised. The sea bed on the deep ocean is not a uniform plain but rather has a complex bathymetry that is broken up by steep ridges (e.g. the Wyville Thomson Ridge), deep ocean seamounts (e.g. Anton Dohrn that rises from the seabed at around 2,100 m up to 600 m making it higher than Ben Nevis) and banks (e.g. Rockall Bank).

These landforms and deposits on the sea bed are an integral part of Scotland's geoheritage and are as impressive as any seen above the waves. They represent an asset of national and international importance and are fundamental to our understanding of the complex evolution of the NW European continental margin since the separation of Europe from North America and Greenland 55 million years ago. Such understanding has delivered critical insights into vital Earth system processes, including the links between plate tectonics, seabed topography, ocean circulation, climate change, glaciation, submarine landslides and sea level change (Gordon and Rennie, *in prep*.).

It is perhaps not surprising that such a dynamic and varied environment should support a wide diversity of animals and plants. There remains much to be discovered but best estimates suggest that there are around 6,500 species (Davison, 1996), excluding the microbial flora, in Scotland's seas. There are the large charismatic species such as the world's most northerly bottlenose dolphin population in the Moray Firth, one of over 20 species of cetacean that occur in Scotland. We are also host to large numbers of harbour and grey seals, holding around 32% of the world's population of the latter. We are constantly gaining greater knowledge of other remarkable creatures such as the basking shark, the world's second largest fish that is being recorded in greater numbers off our west coast. The highly productive waters support around 3.2 million breeding seabirds each year and over half a million waterbirds winter in Scotland, feeding on the mud and sandflats of our many estuaries. As well as these easily recognisable animals our seas support a diversity of other species and communities to rival those on land. The extensive kelp beds just below the low water mark support juveniles of many commercially fished species. In the deeper sheltered waters of the west coast the rocky underwater cliff faces of the sea lochs are festooned with life. All available space is colonised by sponges, sea firs, sea mats, barnacles, molluscs, echinoderms and other creatures. Where conditions are just right we can find horse mussel beds, maerl beds, and flame shell beds all of which support

communities of associated animals and plants. In deeper waters we now know that we have our own cold water coral reefs, as spectacular and fragile as the warm water coral reefs of the tropics.

Scotland's seas are precious. They are important not only for their inherent scientific value and the diversity of life they support but also for the wider ecosystem services they provide. They provide vital regulating services such as acting as a sink for carbon dioxide and other greenhouse gas emissions, and flood and coastal erosion protection. As well as this they provide key provisioning services (e.g. food from fish and shellfish, non-renewable and renewable energy resources), and other benefits including leisure/recreational opportunities, physical and mental health.

Figure 3 Scotland's seas and human activities

i) Diver in a kelp forest © Paul Kay; ii) The surface buoys on a mussel farm © Marine Scotland; iii) Beatrice Windfarm Demonstrator Project © Marine Scotland; iv) Fishing vessel hauling its nets © SNH

3 BACKGROUND TO THE SCOTTISH MPA PROJECT

Scottish Government is committed to a '*clean, healthy, safe, productive and biologically diverse marine and coastal environment that meets the long term needs of people and nature*'. The Marine (Scotland) Act 2010 and the UK Marine and Coastal Access Act 2009 complement existing legislation and provide new powers on marine planning, licensing, conservation and enforcement. They provide a framework to help balance competing demands on Scotland's seas. The powers in the Acts give Marine Scotland responsibility for marine planning and marine nature conservation in territorial waters and the offshore area.

3.1 The three-pillar approach to effective marine nature conservation

Within their Marine Nature Conservation Strategy (see Marine Scotland, 2011a), the Scottish Government takes a '3-pillar approach' to delivering its responsibilities for marine nature conservation. The three pillars are: i) species conservation (e.g. European Protected Species); ii) site protection (including MPAs); and iii) wider seas policies and measures, such as marine spatial planning. These build on current measures and initiatives for marine nature conservation.

3.2 The need for additional site-based protection

Existing protected areas are very important for the conservation of marine life in Scottish waters. Nonetheless, they do not protect the full range of marine life or features of conservation importance present in our seas. New MPAs are needed to complement existing protected areas. Together they will create an ecologically coherent network of MPAs in Scotland's seas that contributes effectively to wider networks across the UK, Europe and the wider north-east Atlantic.

3.3 New provisions for Marine Protected Areas

The Marine (Scotland) Act 2010 contains provisions to designate MPAs for the following purposes within Scottish territorial waters (i.e. within 12 nautical miles):

- **Nature Conservation MPAs** for the conservation of nationally important marine wildlife, habitats, geology and undersea landforms.
- **Demonstration/Research MPAs** to demonstrate or research sustainable methods of marine management or exploitation.
- **Historic MPAs** for features of historic/cultural importance such as shipwrecks and submerged landscapes.

The UK Marine and Coastal Access Act 2009 includes equivalent provisions for Scottish Ministers to designate MPAs for the conservation of marine wildlife, habitats, geology and undersea landforms in offshore waters (i.e. beyond 12 nautical miles) adjacent to Scotland. For consistency, they are collectively referred to as Nature Conservation MPAs.

3.4 The Scottish MPA Project

Work to identify the three types of MPAs outlined in Section 3.3 is being delivered through the Scottish MPA Project, a joint project between Marine Scotland, Scottish Natural Heritage, the Joint Nature Conservation Committee, Historic Scotland, and the Scottish Environment Protection Agency (SEPA). The aim of the Project is to provide advice to Scottish Ministers on the selection of MPAs in Scotland's seas.

Marine Scotland coordinates the Scottish MPA Project, looking to SNH and JNCC to provide guidance and scientific advice on the selection of Nature Conservation MPAs and the development of an ecologically coherent network. SNH advice on Nature Conservation MPA proposals is focused within Scottish territorial waters (within 12 nm) and JNCC advice on proposals within offshore waters adjacent to Scotland (outside 12 nm). Marine Scotland Science has played an important role in providing scientific advice. Historic Scotland is leading work on Historic MPAs and Marine Scotland is leading work on Demonstration and Research MPAs.

4 BUILDING THE NETWORK ON SOLID FOUNDATIONS

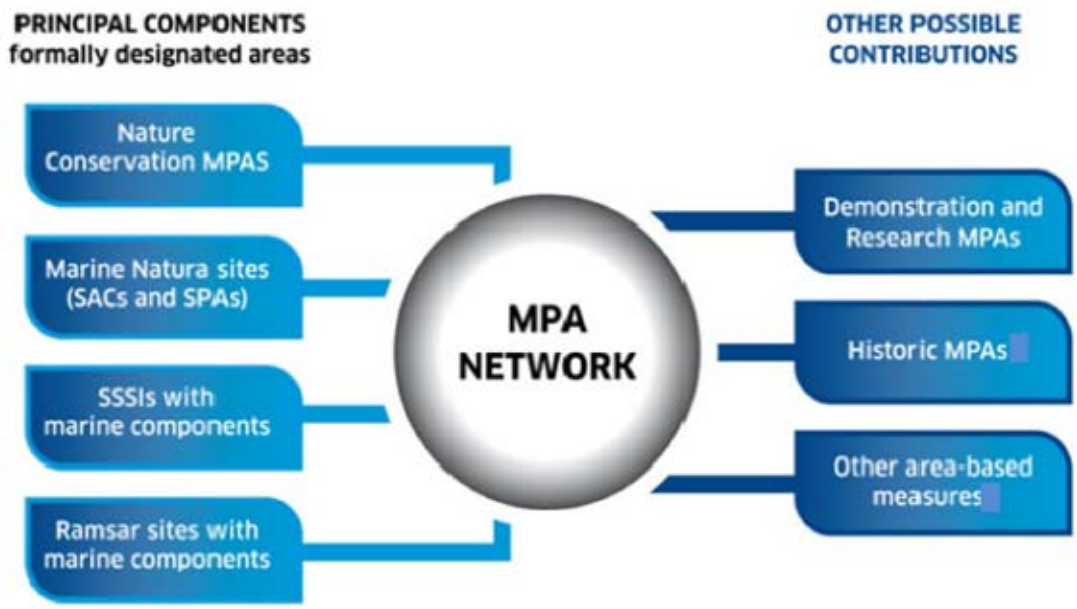
4.1 Composition of the MPA network

The Scottish MPA Selection Guidelines highlight the different types of areas that will contribute to the MPA network in Scotland's seas alongside Nature Conservation MPAs (Figure 4). These areas are the building blocks of the network and include:

- Special Areas of Conservation (SACs) designated under the EC Habitats Directive (Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora) to protect habitats and species of European importance;
- Special Protection Areas (SPAs) classified under the EC Birds Directive (Council Directive 2009/147/EC on the conservation of wild birds) to protect wild bird populations of European importance. The SPAs of relevance to the Scottish MPA network encompass marine ornithological components of Ramsar sites designated under the 1971 Convention of Wetlands of International Importance;
- marine components of Sites of Special Scientific Interest (SSSIs) notified under the Wildlife and Countryside Act 1981 and the Nature Conservation (Scotland) Act 2004. These SSSIs encompass the marine habitat components of Ramsar sites around the Scottish coastline; and,
- existing fisheries restrictions in place for nature conservation purposes (e.g. Lamlash Bay in territorial waters and measures to protect Vulnerable Marine Ecosystems - VMEs - in offshore waters).

New Nature Conservation MPAs will build on these existing measures to complete an ecologically coherent network in Scottish seas.

Figure 4 Building blocks of the MPA network in Scotland's seas (from Marine Scotland, 2011b)



Whilst Demonstration and Research MPAs, Historic MPAs and some other area-based measures may not be established for nature conservation, they may be recognised as contributing to the MPA network where they provide direct or indirect benefits for marine

biodiversity and/or geodiversity. Other area-based measures include, for example, Ministry of Defence ranges and areas with fisheries restrictions in place.

4.2 How the existing network components protect Scotland's marine life

Existing area-based conservation measures in Scotland's seas already make a significant contribution to the protection of our marine natural heritage. The individual areas comprising the building blocks of the Scottish network (Figure 5) are detailed in Appendix 1 and include Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC), Special Protection Areas (SPA), and Fisheries Restriction Areas. The current process aims to build on this legacy of existing protection.

SSSIs have been used to protect nationally important species, habitats and geological features in Scotland's seas down to mean low water spring mark (see Table A1.7 in Appendix 1 for details of notified habitat and species features of SSSIs). There are 188 SSSIs with marine associations / components in Scotland. Of these, 61 have some overlap with the intertidal (upon which one or more qualifying features depend) and are considered to contribute to the MPA network. The remainder are terrestrial SSSIs for bird interests associated with the marine environment (see Table A1.8 for details). Many of these SSSIs underpin and overlap with the Natura designations.

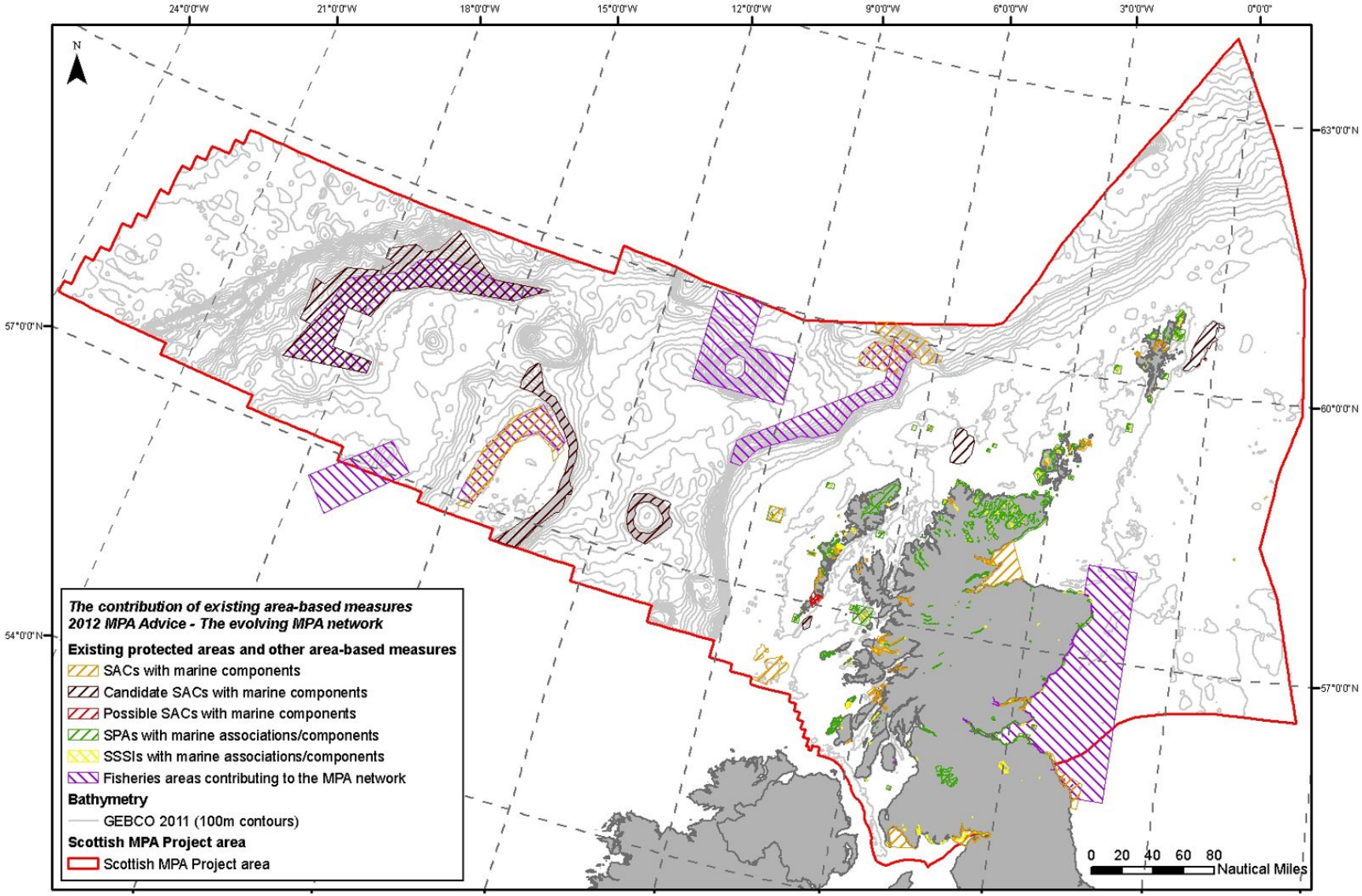
The Special Areas of Conservation (SAC) series has helped secure protection for a number of habitats in Scotland's seas considered to be of importance at the European level (see Table A1.1, Appendix 1 for details). This includes several habitats that make Scotland's marine environment special and distinctive such as the biogenic reef formations of the cold water-coral *Lophelia pertusa* (see Figure 6i) found on a number of the deep ocean rises (e.g. banks and seamounts) in waters to the west and north of Scotland and off Mingulay.

The SAC series also includes the range of biodiversity associated with areas of stony and bedrock reef which are prominent features of Scotland's nearshore and offshore marine environment. As well as these reef communities, coastal saline lagoons such as Loch Bee in the Western Isles, estuaries on the east and west coasts, and sandbanks with maerl and seagrass beds reliant on the clean, clear waters of Scotland's seas are represented in the series.

It is not only habitats of European importance that are given protection under the SAC series but also species - the Moray Firth SAC has been designated to provide protection for our most northerly resident population of bottlenose dolphins (*Tursiops truncatus*) and there are also several SACs for grey (*Halichoerus grypus*) and harbour (*Phoca vitulina*) seals for which Scotland is an important stronghold. In total 40 SACs, six candidate SACs and one possible SAC have been identified in Scotland's seas (see Tables A1.2 - A1.4 for details).

SPAs secure protection on a European basis for seabirds (auks, gulls, terns, cormorants, etc.) and marine waterfowl (divers, seaducks and grebes) assessed at a national and/or international level. These sites are selected as "…most suitable territories…" through the UK SPA Site Selection Guidelines, applicable both in the terrestrial and marine environments. At present representation is largely founded upon a suite of terrestrial sites, many of which have marine components. SPAs with marine components are defined as those sites with qualifying species (Annex I or regularly occurring migratory species) that are dependent on the marine environment (e.g. intertidal or sub-tidal habitats) for all or part of their life cycle (see Table A1.5 for relevant species).

Figure 5 Existing protected areas and other area-based measures that contribute to the protection of Scotland's marine environment (designated for habitats and species with marine associations/components)



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 [2012]. All rights reserved. Ordnance Survey Licence number 100017908. Bathymetry ©GEBCO. NOT TO BE USED FOR NAVIGATION. MPA network ©SNH, JNCC and Marine Scotland. 10.12.12. All rights reserved.

Figure 6 Features of Scotland's marine life covered in the existing network

i) Cold water coral reefs festooned with feather stars © JNCC; ii) A grey seal amongst boulders in shallow water © Sue Scott; iii) Sandflats in the Solway Firth © SNH; iv) A vibrant reef community with dead man's fingers, starfish, sea urchins and sponges on rock below a kelp forest © Paul Kay

Scotland's seas, especially the coastal waters, are important both nationally and internationally for seabirds and waterfowl. Scotland supports very large numbers of many species such as the auks, northern gannet, Manx shearwater (*Puffinus puffinus*) and black-legged kittiwake (*Rissa tridactyla*). For some e.g. Manx shearwater, storm petrel (*Hydrobates pelagicus*) and great skua (*Catharacta skua*) Scotland holds a very significant part of the world population. There are currently 85 terrestrial SPAs with marine associations in Scotland that afford protection to bird species dependent on the marine environment. Of these, 45 SPAs are either estuarine, truly coastal (i.e. they contain intertidal habitats upon which one or more of the qualifying bird species depend) or have been extended into the marine environment and are considered to contribute to the MPA network (see Table A1.6).

Recent SPA work has concentrated on protecting marine extensions to coastal seabird colonies. Thirty-one of Scotland's existing seabird breeding colony SPAs for species such as guillemot (*Uria aalge*), razorbill (*Alca torda*), Atlantic puffin (*Fratercula arctica*), northern gannet, northern fulmar (*Fulmarus glacialis*) and Manx shearwater have been extended into the marine environment to include the adjacent waters which are important for maintenance behaviours such as preening, loafing and feeding (see Table A1.6). Section 4.3 describes the ongoing SPA work in more detail.

Increasingly organisations such as the European Union, advised by the International Council for the Exploration of the Seas (ICES), and the North-East Atlantic Fisheries Commission (NEAFC), are implementing measures for the protection of particularly sensitive marine

habitats. These include deep water sponges and corals. In many cases (e.g. the Rockall Haddock Box) the protection of these sensitive marine habitats is having a direct benefit for commercially important fish species such as juvenile haddock. These areas are listed in Table A1.9 (Appendix 1). A series of additional areas with existing fisheries restrictions in place is also considered to be contributing to the network (see Table A1.10 and refer to Section 6.2 for more details).

4.3 Ongoing work on marine SPAs and SACs

Work is continuing to identify additional SPAs for seabirds and waterbirds in the fully marine environment, rather than just their terrestrial breeding sites. The additional work to enable the requirements of the Birds Directive in the marine environment to be considered and fully addressed by the Scottish Government is being explored through five themes. The first four are concentrated in inshore waters and the fifth spreads right across Scotland's seas out to 200 nm.

Inshore waters around Scotland, especially the firths and bays but also open coasts, are important feeding grounds for seaduck, divers and grebes. During winter a large proportion of the UK's great northern divers (*Gavia immer*), an Annex I species, forage along the north and west coasts, including the island groups; over 1,400 individuals have been recorded off the west coasts of the Outer Hebrides alone. Whilst only about 12% of Great Britain's overwintering red-throated divers (*Gavia stellata*) occur in Scotland, during summer the inshore waters of northern Scotland and the island groups become very important to this species when nesting on the adjacent moorland. The firths are important areas for Scotland's seaduck, especially common scoter (*Melanitta nigra*), velvet scoter (*Melanitta fusca*), scaup (*Aythya marila*) and eiders (*Somateria mollissima*). Shetland has recently been shown to support a sub-species of eider distinct from those further south in Scotland and England but more akin to those in the Faroe Islands. The UK stronghold of the long-tailed duck (*Clangula hyemalis*) is northern Scotland in the eastern firths, together with Orkney and the Outer Hebrides. Five species of terns (*Sterna* spp. and *Sternula* spp.) that breed in Scotland during summer, forage extensively in the coastal waters, as do other seabirds. Until recently little has been known about the distributions or at-sea behaviour of any of these species.

The four themes which focus on inshore waters are:

- **Inshore aggregations of non-breeding waterfowl** - pursued through the detailed survey of specific Areas of Search. Fourteen potentially important Areas of Search have been identified to date.
- **Foraging areas for breeding red-throated divers** - based on modelling diver feeding behaviour to predict optimum feeding areas throughout the coastal range of the species.
- **Foraging areas for terns at sea** - a selection of tern colonies has been extensively surveyed with a view to building generic and colony-specific models of tern distribution at sea allowing prediction of the most important feeding areas around Britain.
- **Concentration of shags away from their colonies** - using the existing European Seabirds at Sea (ESAS) database, inshore aerial survey and site-specific data to identify a suite of the best-known aggregations of shags in Scottish waters.

Away from the coast out to 200 nm, analysis of the extensive European Seabirds at Sea (ESAS) database that holds over two million records, and tracking data from the RSPB's Future of the Atlantic Marine Environment (FAME) project, is being used in the identification

of important areas for classification as 'offshore' SPAs for species such as Atlantic puffin and great skua (see Kober *et al*., 2012).

We anticipate that the completion of work on these five themes (see Figures A1.5 and A1.6, Appendix 1), through the identification of any further important areas, will enable the UK to ensure that the full requirements of the Birds Directive are met in the marine environment. The aim is to have this work completed by the end of 2015.

SNH has submitted a report on the Sound of Barra possible SAC consultation to the Scottish Government. Subject to a Ministerial decision relating to the Sound of Barra pSAC, the SAC series in Scotland's seas is expected to be complete for features listed on Annex I of the Habitats Directive.

Work is still underway to identify important 'at sea' areas for seals as part of the SAC network. In 2013, further analysis will determine whether discrete and persistent areas of relatively high density of harbour porpoise and bottlenose dolphin exist in the UK marine area. All of this work is also expected to be completed in 2015.

5 APPROACH FOR IDENTIFYING NATURE CONSERVATION MPAs

The Nature Conservation MPA proposals are based on science, using best available evidence, with input from stakeholders at key points in the process. In contrast to Natura sites, where we advise Scottish Ministers under the Habitats Regulations (as amended), we advise Ministers on Nature Conservation MPAs under the Marine (Scotland) Act and the Marine and Coastal Access Act. This section briefly describes the starting points for the assessment carried out by SNH and JNCC.

5.1 Scottish MPA Selection Guidelines

The Scottish MPA Selection Guidelines (Marine Scotland, 2011b) set out a five-stage process for the selection of Nature Conservation MPAs in Scotland's seas:

- **Stage 1** - Identification of MPA search locations based on the presence of key features.
- **Stage 2** - Prioritisation of MPA search locations based on the qualities of the features they contain.
- **Stage 3** - Assessing the scale an MPA search location needs to be in order to maintain the integrity of the features it contains.
- **Stage 4** - Assessing the ability to manage features effectively within an MPA search location as part of a Nature Conservation MPA.
- **Stage 5** - Prioritising potential areas for MPAs according to their contribution to the MPA network.

Before applying these more detailed stages across Scotland's seas, the Selection Guidelines require that a series of reviews should determine:

- The potential contribution that existing protected areas could make to the protection of MPA search features.
- What other area-based measures could contribute to the network by offering protection to MPA search features.
- Which parts of Scotland's seas could be considered Least Damaged/More Natural, and whether they could potentially contribute to the network.

The reviews (Carruthers *et al*., 2011; Cunningham *et al*., 2011) highlighted opportunities to enhance the contribution of a number of existing protected areas and other area-based measures. Together these are referred to as existing measures. They also determined the potential contribution of the Least Damaged/More Natural locations (Chaniotis *et al*., 2011a - c). An initial series of MPA search locations was derived from these existing measures and from within locations identified as Least Damaged/More Natural. Additional MPA search locations were subsequently identified to encompass remaining MPA search features. The resultant suite of MPA search locations was refined during application of stages 2 to 4 of the MPA Selection Guidelines.

Stage 5 of the Scottish MPA Selection Guidelines considers representation, replication, geographic range and variation, linkages, and resilience. The following questions were used to interpret the Stage 5 guideline:

- **Representation** - Is the feature represented within the Scottish MPA network in the OSPAR regions considered to be important for the feature?
- **Replication** - Is there more than one example of each feature within the Scottish MPA network? If yes, is there replication across the OSPAR regions in which the feature is recorded?
- **Geographic range and variation** - Does protection for the feature reflect what is known about the geographic range (e.g. examples of the feature found in sea lochs as well as in areas away from the coast and further offshore) and ecological variation (e.g. examples of the same habitat with different key and characterising species) of the feature in Scotland's seas?
- **Linkages** - Only assessed where there is a good understanding of the relationship between features in different areas to help build connectivity into the network. For this work the focus has been on areas of importance to the life histories of mobile species.
- **Resilience** - Is it considered necessary to include a greater proportion of some particularly threatened and/or declining features within the network?

Stage 5 is where the OSPAR principles on the design of a network of MPAs (in OSPAR, 2006) are most closely reflected in the Scottish MPA process. If all parts of the Stage 5 guidelines listed above are considered to have been met then the MPA network is considered to be 'adequate'[1] for that feature. The assessment of adequacy was undertaken on a feature-by-feature basis. For some features it may not be possible to achieve replication within Scotland's seas. For example, there is only one known fan mussel aggregation. Given that this is the only known example we have concluded that inclusion of that fan mussel aggregation (i.e. 100% of the feature) within an MPA would adequately protect that feature within the network.

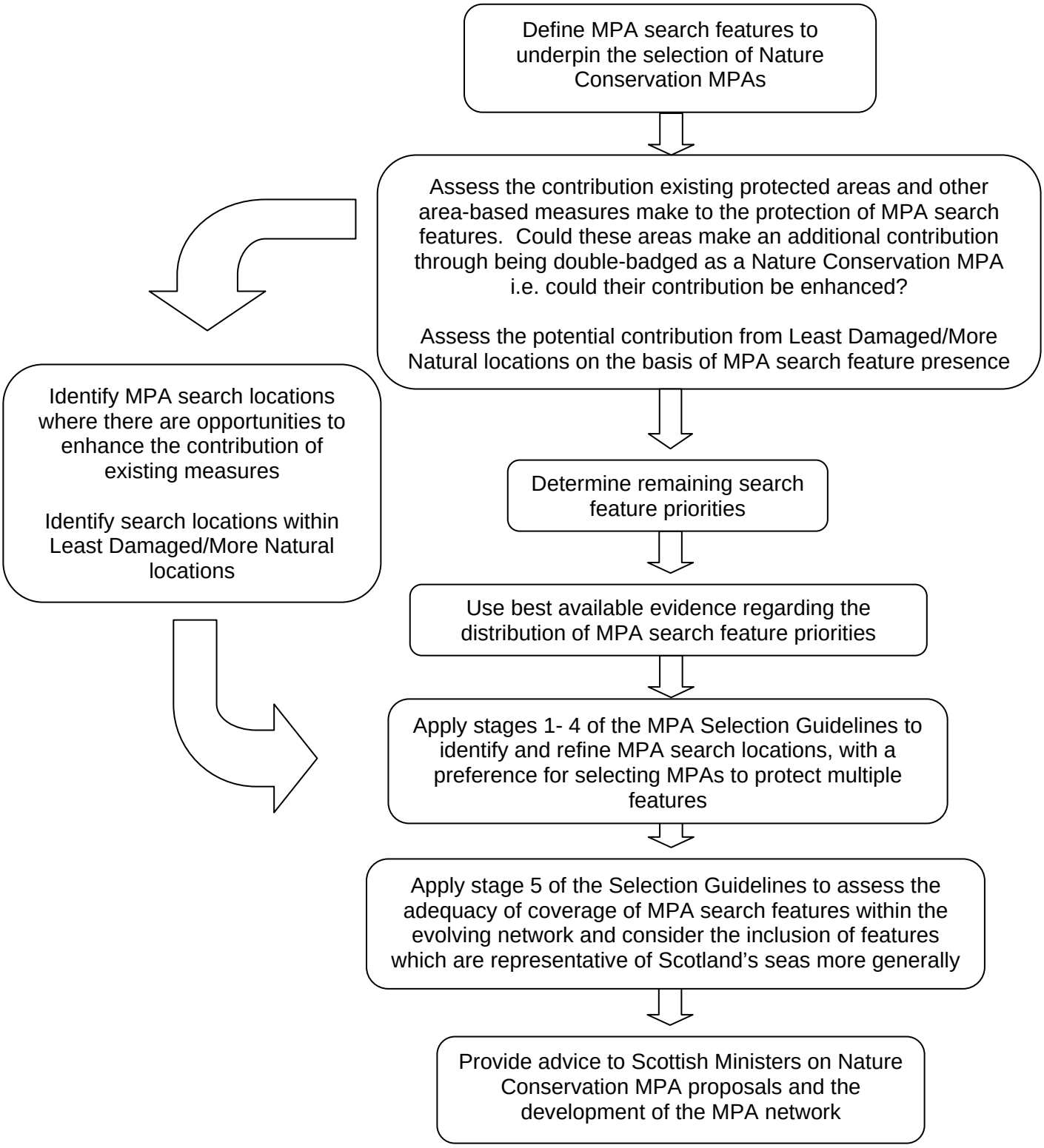
We also used the outcome of this adequacy assessment to determine the contribution that each Nature Conservation MPA proposal / search location could make to an ecologically coherent network in Scotland's seas.

At Stage 5, under 'representation' we have also considered what other features could be included within MPA proposals to achieve broader representativity (i.e. to make MPAs representative of Scotland's seas more generally, see Section 7.5). The MPA identification process is outlined in Figure 7.

[1] Our use of the term 'adequate' is different, and separate to, its definition in the background document to support the assessment of whether the OSPAR Network of Marine Protected Areas is ecologically coherent (OSPAR Commission, 2007)

The MPA Selection Guidelines also allow proposals from third parties to be submitted for consideration as Nature Conservation MPAs. Further details are provided in Section 7.4 and Appendix 4.

Figure 7 The MPA site selection process and the role of MPA search features



5.2 Role of MPA search features

Annex 3 of the Scottish MPA Selection Guidelines provides a list of 41 MPA search features; these are also listed in Table 1. The list includes a range of features of importance in Scotland's seas for which MPAs were considered to be an appropriate measure and for which sufficient data were likely to be available to support an assessment against the MPA Selection Guidelines. The MPA search features have been used to drive the selection of Nature Conservation MPAs. Their presence also serves as a guide or proxy to highlight areas of possible wider nature conservation interest. Further information on the MPA search features is provided in the Scottish MPA Selection Guidelines (Marine Scotland, 2011b).

Table 1 MPA search features used to underpin the selection of Nature Conservation MPAs in Scotland's seas

MPA search feature	
Habitats	*Scottish marine area*
Blue mussel beds	Territorial waters
Burrowed mud	Both
Carbonate mound communities	Offshore waters
Coral gardens	Offshore waters
Deep sea sponge aggregations	Offshore waters
Flame shell beds	Territorial waters
Horse mussel beds	Territorial waters
Inshore deep mud with burrowing heart urchins	Territorial waters
Kelp and seaweed communities on sublittoral sediment	Territorial waters
Low or variable salinity habitats	Territorial waters
Maerl beds	Territorial waters
Maerl or coarse shell gravel with burrowing sea cucumbers	Territorial waters
Native oysters	Territorial waters
Northern sea fan and sponge communities	Both
Offshore deep sea muds	Offshore waters
Offshore subtidal sands and gravels	Offshore waters
Seagrass beds	Territorial waters
Sea loch egg wrack beds	Territorial waters
Seamount communities	Offshore waters
Shallow tide-swept coarse sands with burrowing bivalves	Territorial waters
Tide-swept algal communities	Territorial waters
Low or limited mobility species	*Scottish marine area*
Burrowing sea anemone aggregations	Territorial waters
Fan mussel aggregations	Territorial waters
Heart cockle aggregations	Territorial waters
Northern feather star aggregations on mixed substrata	Both
Ocean quahog aggregations	Both

MPA search feature	
Mobile species	*Scottish marine area*
European spiny lobster	Territorial waters
Basking shark	Territorial waters
Blue ling	Offshore waters
Common skate	Territorial waters
Minke whale	Territorial waters
Orange roughy	Offshore waters
Risso's dolphin	Territorial waters
Sandeels	Both
White-beaked dolphin	Territorial waters
Black guillemot	Territorial waters
Large-scale features	*Scottish marine area*
Continental slope	Offshore waters
Seamounts	Offshore waters
Fronts	Both
Shelf banks and mounds	Both
Shelf deeps	Both

Following designation of a Nature Conservation MPA, MPA search features which are considered to make a contribution to the MPA network will then become protected features. Other features which are considered to add to the broader representativity of the network (see Section 7.5) may also be designated as protected features.

The list of MPA search features includes marine habitats and species such as flame shell beds, burrowed mud habitats and fan mussel aggregations which are described in more detail in the feature descriptions catalogue (Tyler-Walters *et al.,* 2012). It also includes large-scale features, for example, seamounts and shelf banks and mounds. The purpose of the large-scale features is to help build ecosystem function into the network (Marine Scotland, 2011b). Black guillemot is the only bird species included because it is distinctively Scottish but it is not protected under the EC Birds Directive as a qualifying species of SPAs. Where there is evidence to support the identification of essential areas in their life history, and where spatial protection is thought to be appropriate, a small number of mobile species such as orange roughy, blue ling and minke whales have also been included. Together with features which are already included within existing protected areas, we think protecting the MPA search features will help us to deliver wider commitments including achieving Good Environmental Status under the Marine Strategy Framework Directive.

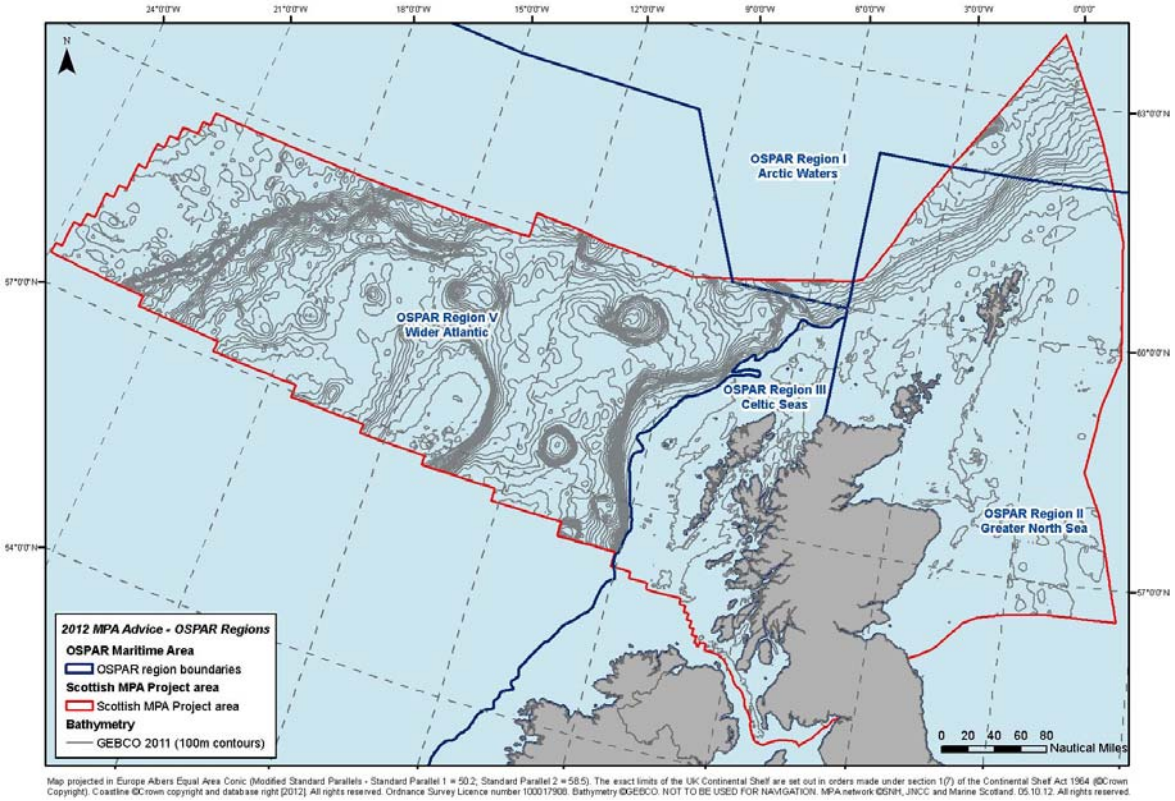
Key geodiversity areas and geodiversity blocks (equivalent to MPA search features) were also used to underpin the identification of Nature Conservation MPAs (see Section 8 and Appendices 2 and 7).

5.3 A regional approach for developing the network

The MPA network has been developed with a regional dimension to reflect known biogeographic differences across Scotland's seas. The OSPAR regions have been adopted as appropriate regions for this purpose. Scotland's seas fall across four OSPAR regions: Region I (Arctic waters); Region II (Greater North Sea); Region III (Celtic Seas); and Region V (Wider Atlantic) (Figure 8).

The OSPAR regions have also been used to support the assessment of adequacy at Stage 5 (see Section 8 and Tables A6.1 - A6.4, Appendix 6) and the overview of the contribution of conservation sites in Scotland's sea to wider networks (see Sections 9 and 10).

Figure 8 OSPAR regions in Scotland's seas



5.4 Collecting and applying evidence

5.4.1 Building the evidence-base

Application of the science-based process in the Scottish MPA Selection Guidelines required a robust scientific evidence-base for the biodiversity and geodiversity features present in Scotland's seas. Building the evidence-base involved mining the existing data held by SNH, JNCC and others, as well as undertaking new field surveys in areas where data needs were greatest. Stakeholder engagement helped to support data compilation efforts, facilitating data sharing and identifying opportunities for collaborative research.

An overview of how we have developed the evidence-base to support the identification of Nature Conservation MPAs is provided in Appendix 2. The evidence-base comprises a range of data including those collected through statutory monitoring programmes as well as volunteer-led initiatives such as the Marine Conservation Society's Seasearch diver programme.

5.4.2 Principles guiding the use of the scientific evidence-base

The best available scientific evidence has been used to identify proposals for Nature Conservation MPAs in Scotland's seas. What constitutes 'best available data' will vary by feature and by Nature Conservation MPA proposal, and is likely to be more detailed for areas closer to the coast than for offshore areas. The age, the source, and the type of data and its coverage all contribute to an evaluation of data quality.

SNH, JNCC and Marine Scotland identified the following principles for using evidence (Marine Scotland *et al., in prep*.):

1. We will use the best available evidence.
2. We will seek evidence from stakeholders, including users, of areas being considered as Nature Conservation MPAs and we will build on their knowledge where possible.
3. For some sites the requirement for detailed evidence could increase through the process, from selecting Nature Conservation MPAs to designation and management.
4. The level of evidence required to progress search locations to MPA proposals will vary depending on the nature of the search location and the features it supports.
5. More detailed data will be required for those features being used to delineate the boundary of a MPA.
6. The achievement of conservation objectives for protected features of Nature Conservation MPAs will be assessed through the implementation of a monitoring and surveillance strategy.
7. We will make our evidence available to others so as to ensure as much transparency as possible and maintain public confidence.
8. All evidence used to support Nature Conservation MPA selection will be subject to quality review before being incorporated into GeMS[2] (the Scottish MPA Project geodatabase).
9. We will use independent expert review at intervals during the project to examine the quality of the evidence and the scientific integrity of our gathering, synthesis and interpretation of evidence.
10. We will routinely publish background material and consultants' reports, to show how evidence has been gathered, analysed and applied (see Section 14 and Appendix 2).

These principles align with the conclusions of a Defra-commissioned independent review which looked at the use of scientific evidence in the selection of marine Special Areas of Conservation (Graham-Bryce, 2011).

SNH and JNCC used the best available evidence and supporting guidance on MPA search features, applying our expert judgement when assessing the MPA proposals against the Scottish MPA Selection Guidelines. Our judgements on whether the guidelines were met (for each MPA search feature), and a summary of the evidence that was used to support these assessments, are outlined in the *detailed assessment against the MPA Selection Guidelines* and the *data confidence assessment* documents that have been produced for each MPA proposal. The *data confidence assessments* also provide a description and an evaluation of the type, age, source and extent of evidence used to support each of the Nature Conservation MPA proposals / search locations.

5.4.3 Quality control and quality assurance

SNH and JNCC have a number of standard quality control and assurance processes in place. For example, the use of certified laboratories, standardised reporting requirements, clear internal and external review of reports before finalisation, and maintenance of an audit trail recording decisions resulting in changes to advice. This also includes the use of non-executive bodies to review and sign-off our advice on protected areas.

[2] Geodatabase of Marine features in Scotland (GeMS)

The site documents described above (in italics) record the assessment process for the proposed protected features within each MPA proposal / search location. The history of the development of each MPA proposal / search location is recorded within individual site audit documents.

5.5 Stakeholder engagement

Engagement with stakeholders has been, and continues to be, a key part of the approach. To date we have focused mostly on the national and international aspects of the project, inviting a range of representatives from industry sectors, regulators, academia and environmental interest groups to be involved.

We took the decision early on to involve stakeholders and include them both in the production of the MPA Selection Guidelines and throughout the development of the MPA network. We have engaged with stakeholders in three main ways -

- The Marine Strategy Forum, which represents national marine interests, is the main forum for strategic level engagement on MPA network development.
- Five national level stakeholder workshops have been used to provide opportunities for stakeholder interests to input scientific information and discuss proposed alternatives and the evolving shape of the network.
- Bilateral meetings with sectors or interest groups have provided opportunities for more detailed discussions, including with local interests. These meetings have been held on request.

Over 80 national stakeholder representatives were involved in the stakeholder workshop series, and some attended multiple bilateral meetings to discuss the progress in identifying MPAs in Scottish waters. In addition to the workshop series Marine Scotland, SNH and JNCC have used existing forums, sectoral meetings and various media to reach a range of organisations and other interested parties to encourage input into the process of MPA network development. Bilateral meetings with sectors or interest groups provided an opportunity for more detailed discussions at a local interest level. Regular meetings to discuss the developing network in areas bordering Scotland's seas took place throughout the process. Likewise, meetings with non-UK marine users were facilitated through existing committees or organisations to ensure the process was fair and transparent for all users of Scotland's seas.

There have been numerous requests from representatives to discuss specific issues relating to MPAs. The MPA Project partners have been able to respond to these requests, and these discussions have been very useful in sharing information regarding the development of the proposals.

Appendix 4 contains a fuller description of the national level stakeholder workshops. It also provides a brief summary of how SNH and JNCC analysed evidence supplied by stakeholders, and outlines how this information was used when assessing the Nature Conservation MPA proposals. All materials associated with the stakeholder workshops are available on the Marine Scotland website[3].

[3] See - http://www.scotland.gov.uk/Topics/marine/marine-environment/mpanetwork

6 ASSESSMENT OF THE CONTRIBUTION OF EXISTING MEASURES

A number of existing measures already contribute to the MPA network in Scotland's seas. These include existing protected areas and other area-based measures such as Ministry of Defence ranges and areas restricted for fisheries. To ensure the selection of Nature Conservation MPAs complements rather than duplicates these measures, SNH and JNCC assessed the contribution that existing protected areas and other area-based measures make to the protection of MPA search features.

6.1 Contribution of existing protected areas

Existing protected areas (SACs, SPAs, SSSIs and fisheries areas established for nature conservation purposes) were assessed for their contribution to the protection of MPA search features as reported in Carruthers *et al*. (2011).

The review was undertaken firstly by assessing the distribution of MPA search features within existing protected areas and fisheries areas established for nature conservation. This was based on data within GeMS. An assessment was then made of the protection afforded to MPA search features. This assessment was based on whether or not an MPA search feature was considered to be part of the feature(s) covered by the formal designation or the fisheries management. For those MPA search features we considered to have been afforded protection within one or more existing protected areas, a further assessment was made of whether the existing protection was adequate. This part of the assessment was carried out against the Stage 5 selection guideline and included consideration of representation, replication, linkages, geographic range and variation and resilience (see Section 5.1 for more detail). The full list of existing protected areas that we considered is provided in Appendix 1.

In total, we concluded that nine MPA search features are adequately protected by existing protected areas. These are all seabed habitats:

- Blue mussel beds
- Carbonate mound communities
- Coral gardens
- Kelp and seaweed communities on sublittoral sediment
- Maerl or coarse shell gravel with burrowing sea cucumbers
- Northern sea fan and sponge communities
- Seagrass beds
- Sea loch egg wrack beds
- Tide-swept algal communities

6.2 Contribution of other area-based measures

SNH and JNCC reviewed the different types of spatial management measures (referred to as 'other area-based measures') used in Scotland's seas. We identified four different types of other area-based measures that could potentially contribute to the protection of MPA search features:

- Voluntary Marine Nature Reserves.
- Ministry of Defence Areas (noise and degaussing ranges, firing danger areas / ranges).
- Areas with restrictions in place to support fisheries management (CFP / NEAFC closures and inshore fisheries restrictions under the Inshore Fishing (Scotland) Act).
- Safety exclusion zones around renewable developments.

We reviewed a range of factors to determine whether these other area-based measures contributed to the protection of MPA search features. These included whether the purpose of the measure could deliver conservation benefits (directly or indirectly), the permanency of the area, and the potential for management. Further details are provided in Cunningham *et al.* (2011).

We concluded that two of the measures together afford adequate protection to one MPA search feature (on the basis of assessment against Stage 5 of the MPA Selection Guidelines). These measures are considered permanent but subject to periodic review:

- Blue ling Management Area - edge of Rosemary Bank
- Blue ling Management Area - edge of continental slope

A small number of other existing measures also make a contribution to the protection of some MPA search features. The contribution these areas make (recognised in Tables A6.1 and A6.3, Appendix 6) was not considered to be adequate for any of the features, which were all kept as drivers in the MPA identification process (see Figure 7).

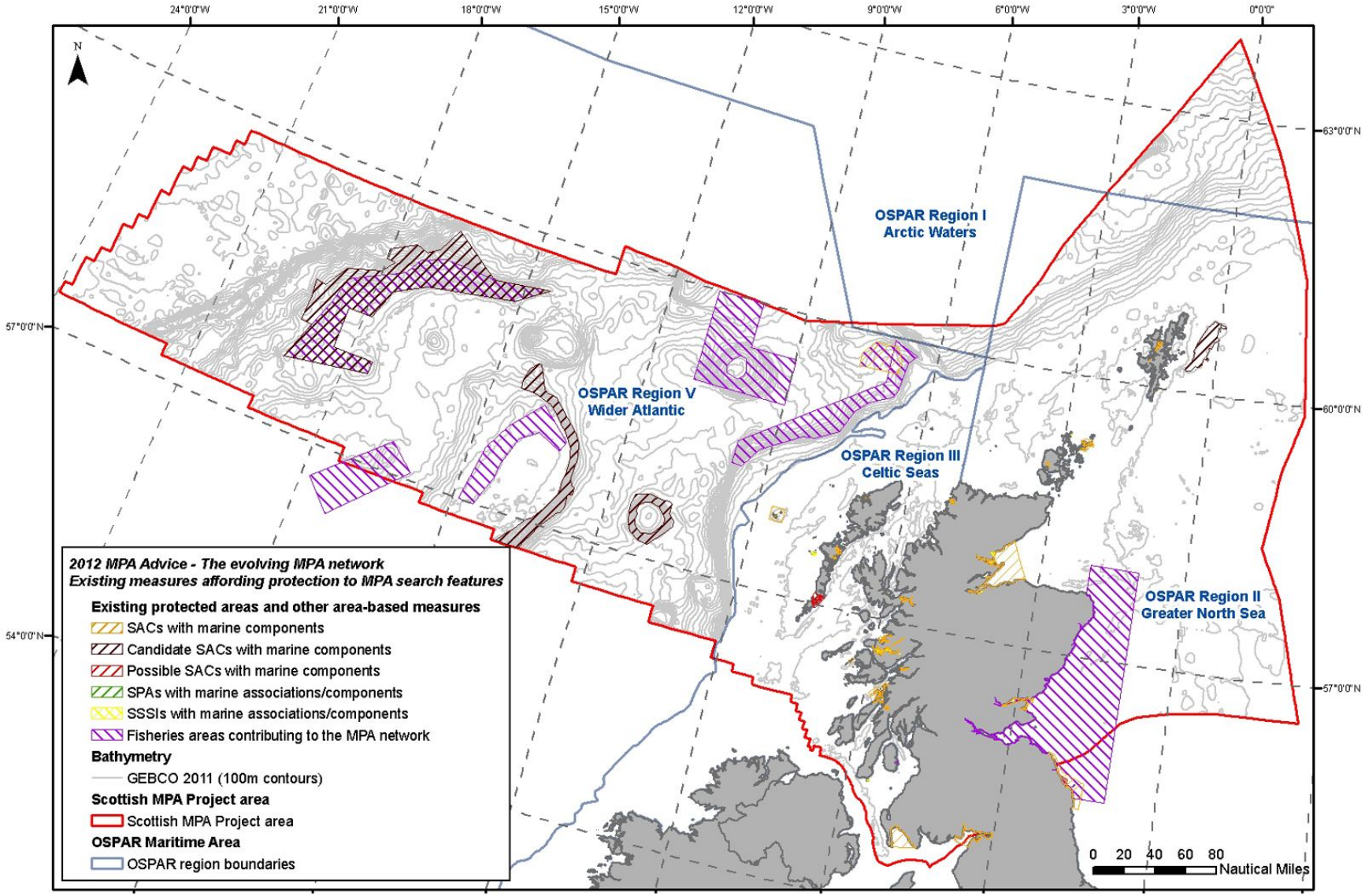
6.3 Summary of contributions of existing measures

The existing measures that contribute to the protection of MPA search features are listed in Appendix 3 and shown in Figure 9.

Nine MPA search features are considered adequately protected by existing protected areas, all of which are seabed habitats. An additional MPA search feature (blue ling) is adequately protected by other area-based measures. As part of these assessments, SNH and JNCC decided that there were insufficient data available in relation to a further four MPA search features (burrowing sea anemone aggregations, European spiny lobster, heart cockle aggregations and native oyster) to assess them against the Selection Guidelines. Therefore these features were not considered as drivers for the identification of MPAs. The presence of these features was reconsidered under the Stage 5 assessment of broader representativity (see Section 7.5).

As a result of these analyses, SNH and JNCC identified 27 of the original 41 MPA search features as priorities for completing the MPA network in Scotland's seas. The use of these priority MPA search features to support the identification of Nature Conservation MPA proposals is described in Section 7.

Figure 9 Existing measures considered to contribute to the protection of MPA search features 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 [2012]. All rights reserved. Ordnance Survey Licence number 100017908. Bathymetry ©GEBCO. NOT TO BE USED FOR NAVIGATION. MPA network ©SNH, JNCC and Marine Scotland. 10.12.12. All rights reserved.

7 IDENTIFICATION AND ASSESSMENT OF NATURE CONSERVATION MPAs

The following sections describe the results of various assessments undertaken to identify Nature Conservation MPA proposals / search locations. Throughout, references are provided to relevant published reports. The number of MPA proposals developed from these assessments (e.g. of Least Damaged/More Natural locations) is not the same as the number of MPA search locations originally identified, now that most of the MPA search locations have been assessed against the Scottish MPA Selection Guidelines. The focus is on those that are being recommended as Nature Conservation MPA proposals. Four remaining MPA search locations are also discussed below.

7.1 Enhancing the contribution of existing measures

The assessment of the contribution of existing protected areas and other area-based measures resulted in the identification of several opportunities for enhancing the contribution to the MPA network made by these existing measures. We identified opportunities where priority MPA search features either border or fall within existing measures but are not considered protected by them. We use the term 'enhance' to describe how designating a Nature Conservation MPA that overlaps spatially with an existing measure provides protection to features which do not form part of the existing formal designation or management measure and thereby augments that measure. For example, an SAC may be designated for 'reefs' but also contain flame shell beds which are not part of the 'reefs' feature. Overlaying it with an MPA designated to protect the flame shell beds presents an opportunity to enhance the protection provided by the SAC.

A summary of all enhancement opportunities is provided in the MPA search locations overview paper[4] presented at the 3rd national stakeholder workshop. Out of these, following assessment against the MPA Selection Guidelines, 20 are now being recommended as Nature Conservation MPA proposals / search locations. These comprise nine existing protected areas (four SACs and five SPAs) and 11 other area-based measures, all of which are areas with fisheries restrictions in place. One also overlaps with an MoD range.

7.2 What Least Damaged/More Natural locations could deliver

Least Damaged/More Natural locations were an attempt to identify areas of least interest to users and hence where features may potentially be in better condition. The locations identified as Least Damaged/More Natural were discussed at the 2nd national MPA stakeholder workshop. The workshop helped to improve the accuracy of the information we used to identify locations likely to be Least Damaged/More Natural so as to ensure that they best represented activity occurring in Scotland's seas. Details of how we identified the Least Damaged/More Natural locations are provided in Chaniotis *et al*. (2011a). Following the workshop we analysed data to determine the presence of viable examples of MPA search features within the Least Damaged/More Natural locations, and progressed those areas as MPA search locations.

In total, following assessment against the MPA Selection Guidelines, twelve Least Damaged/More Natural locations are now being recommended as Nature Conservation MPA proposals. A summary of all Least Damaged/More Natural locations considered is provided in Chaniotis *et al*. (2011b).

[4] Available online - http://www.scotland.gov.uk/Topics/marine/marine-environment/mpanetwork/location

7.3 Selecting new MPAs to protect multiple features

Following work on enhancing the contribution of existing measures and assessment of Least Damaged/More Natural locations, 12 MPA search features remained as priorities for completing the network:

- Basking shark
- Black guillemot
- Burrowed mud
- Common skate
- Fronts
- Minke whale
- Orange roughy
- Risso's dolphin
- Sandeels
- Shelf banks and mounds
- Shelf deeps
- White-beaked dolphin

The focus of subsequent work was on identifying MPA search locations which contained multiple MPA search features; although some were identified for single features. Position papers[5] were produced to describe the approach and recommended MPA search locations. These were discussed at the 4th national MPA stakeholder workshop in March 2012.

In total, following assessment against the MPA Selection Guidelines, 11 Nature Conservation MPA proposals / search locations not derived from either existing measures or Least Damaged/More Natural locations are being recommended. Ten are for multiple features and one for a single feature. Some of the MPA search feature priorities were also added to Nature Conservation MPA proposals derived from the earlier assessments (e.g. Least Damaged/More Natural locations).

7.4 Third-party proposals

The Marine (Scotland) Act 2010 provides for groups (referred to in this context as third parties) to submit proposals for Demonstration and Research and / or Nature Conservation MPAs within territorial waters. Third parties may include a local community living adjacent to a section of coast, an industry sector, a group of recreational users or other interests that work in an area but live elsewhere.

A total of 27 proposals for third-party Nature Conservation MPAs were received prior to closure of the submissions in early May 2012 (see Table A4.2 in Appendix 4). Of these, 12 proposals met all the relevant guidelines and have been recommended for further consideration. Three proposals have had their assessment deferred to enable completion of further work by SNH in 2013 (see Sections 8.4 and 8.5). These areas remain as MPA search locations. Twelve proposals were not recommended for further consideration, as these proposals did not meet the test of importance or were not considered to make a significant contribution to the network for the features for which they were proposed. The status of each proposal is shown in Figure A4.1 in Appendix 4.

To streamline the assessment process, third-party proposals were merged with other search locations. This was done either where there was a partial overlap or where the proposal was wholly contained within an MPA search location identified by SNH. The opportunity for groups to submit third-party proposals for consideration as Nature Conservation MPAs

[5] Available online - http://www.scotland.gov.uk/Topics/marine/marine-environment/mpanetwork/engagement/140312/searchfeature

closed in May 2012. While future submissions will be accepted they will not be considered until the next review of the network in 2018.

7.5 Contributing to broader representivity

MPA search features have driven the identification of the new Nature Conservation MPA proposals. However, to ensure that the MPA network is also representative of Scotland's seas more generally, and meets legislative and OSPAR obligations for MPAs, other features may also be formally designated as protected features of these new sites. For example, if they are considered to be good quality examples of other habitats and species, or if they are OSPAR Threatened and/or Declining (T&D) species and habitats. In addition, we have considered broader representativity of habitats at the scale of the OSPAR regions. The OSPAR guidance (OSPAR Commission, 2006) proposes use of EUNIS level 3 habitats as a proxy for representing the range of habitats in the OSPAR maritime area. Broad scale habitats at this EUNIS level have been recognised within our MPA proposals. We have assessed whether the EUNIS level 3 habitats and OSPAR T&D features are replicated (more than once) across the proposed network, and whether their representation reflects their presence across the OSPAR regions where they are known to occur. If necessary we have recommended their protection within MPA proposals to ensure representation of the range of broad scale habitats within the Scottish MPA network. The identification of such features takes place during application of Stage 5 of the MPA Selection Guidelines and applies to both biodiversity and geodiversity interests.

The inclusion of geodiversity interests has focused primarily on representation of features comprising key geodiversity areas in Scotland's seas outlined within Brooks *et al*. (2012) on the basis of the distribution of these features within the GeMS geodatabase (see Appendices 2 and 7). A small number of additional geodiversity interests have been recommended as proposed protected features (covered in Section 8 and see Appendix 5 for details).

The wider representation of biodiversity interests relating to mobile species and seabed habitats / low or limited mobility species is described below.

7.5.1 Mobile species

The identification of MPA proposals / search locations for mobile species MPA search features is described in Sections 7.3 and 8. We did not feel it was appropriate to consider adding other mobile species during the assessment of broader representativity largely because of a lack of data relating to, or understanding of, essential areas for key life cycle stages. The only exception to this was in the consideration of seabirds. Following discussion with Marine Scotland and stakeholders we agreed to assess seabirds, because they were not included on the original list of MPA search features and so hadn't been assessed earlier in the process. This ensured that a comprehensive assessment was made of seabird coverage within the existing network of protected sites and proposed new MPAs.

Five species of seabirds proposed by RSPB were used in this assessment; these were northern fulmar, Atlantic puffin, razorbill, northern gannet and Manx shearwater. We assessed the protection already afforded to these species by existing Special Protection Areas against the Stage 5 selection guideline. This assessment focused on the protection afforded to colonies, and included colony extensions where appropriate. On this basis we concluded that the existing network was adequate for these species (both within the OSPAR regions and the Scottish MPA network as a whole). Therefore, no additional seabird features are being recommended for inclusion within Nature Conservation MPA proposals as part of the Stage 5 assessment of broader representivity. Work is continuing to complete advice on the identification of SPAs for offshore aggregations of seabirds (see Section 4.3).

7.5.2 Seabed habitats / low mobility species

A number of broad sublittoral sediment habitats are only partially covered by the designated / notified features of existing protected areas and the MPA search features (see Tables A9.1 and A9.2 for details of this correlation). In offshore waters these are covered by broad MPA search feature categories such as '*offshore subtidal sands and gravels'* and '*offshore deep sea muds'*, but there are no equivalent MPA search feature categories in territorial waters.

Where notable (e.g. biologically diverse, unmodified, extensive, characteristic etc.) examples of these sediment habitats are found within the Nature Conservation MPA proposals / search locations, SNH considered adding them as protected features. Table 2 shows the seabed habitat types considered. As a result we have added examples to six MPA proposals and one MPA search location (see Tables A5.1 and A5.2, Appendix 5 for further details) to help represent Scotland's habitats more generally in the MPA network.

Table 2 Sublittoral sediment habitat types recommended for additional representation within Nature Conservation MPA proposals / search locations in Scottish territorial waters (OSPAR Regions II and III)

Seabed habitat types	**MPA proposals / search locations**
Circalittoral coarse sediment	Clyde Sea Sill; Fetlar to Haroldswick
Deep circalittoral coarse sediment	Clyde Sea Sill
Circalittoral fine sand	Clyde Sea Sill; Fetlar to Haroldswick
Circalittoral muddy sand	North-west sea lochs and the Summer Isles
Deep circalittoral sand	Clyde Sea Sill; Small Isles; Shiant East Bank
Infralittoral sandy mud	Loch Sween
Infralittoral fine mud	Loch Sween; Upper Loch Fyne and Loch Goil
Circalittoral sandy mud	Small Isles; Upper Loch Fyne and Loch Goil
Deep circalittoral mud	Upper Loch Fyne and Loch Goil
Infralittoral mixed sediments	Loch Sween
Circalittoral mixed sediments	Loch Sween; Upper Loch Fyne and Loch Goil; Shiant East Bank
Deep circalittoral mixed sediments	Shiant East Bank

We also assessed the four MPA search features which dropped out of the process at an earlier stage because of a lack of data (see Section 6.3). These features are burrowing sea anemone aggregations, native oysters, European spiny lobster and heart cockle aggregations. Of these we have recommended native oyster be added to two Nature Conservation MPA proposals. We consider that five SACs designated for Annex I 'reefs' provide some protection to European spiny lobster (see Carruthers *et al*., 2011 for details). We did not have sufficient data to support inclusion of European spiny lobster in any Nature Conservation MPA proposals. Likewise, for heart cockles and the burrowing sea anemone (*Arachnanthus sarsi*) there were insufficient data available on aggregations of these species to support their inclusion.

The only other species we considered adding to Nature Conservation MPA proposals was ocean quahog (an OSPAR Threatened and/or Declining species). We had not identified any proposals in territorial waters because of a lack of information on the presence of aggregations of the species. However, recent survey work in Loch Fyne and around Arran (Moore, 2012) has highlighted the presence of potential aggregations. Given the conservation importance of this species but current uncertainty regarding the alignment with the MPA search feature category, the species (as opposed to aggregations) has been included as a representative feature within the South Arran, and Upper Loch Fyne and Loch Goil Nature Conservation MPA proposals.

7.6 Summary of identification of Nature Conservation MPAs

In total, 33 Nature Conservation MPA proposals have been developed and a further four MPA search locations remain to be fully assessed. Of these 37 MPA proposals / search locations, 20 are from enhancement opportunities to existing measures and twelve from Least Damaged/More Natural locations. Twenty-seven third-party proposals were submitted of which twelve have contributed to the development of eight Nature Conservation MPA proposals. A further three have contributed to the development of three of the remaining MPA search locations. Twenty-seven of the Nature Conservation MPA proposals and all four MPA search locations are for multiple features.

8 THE NATURE CONSERVATION MPA PROPOSALS

8.1 Overview of Nature Conservation MPA proposals / MPA search locations

In total, we have identified 33 Nature Conservation MPA proposals that could contribute to the MPA network in Scotland's seas. These include options[6] for representing features from eight of the MPA proposals (see Sections 8.5 and 8.6).

Four MPA search locations remain to be fully assessed (see Section 8.3 for details). These have the potential to make a significant contribution to the network and should not be considered as substitutes for any of the recommended Nature Conservation MPA proposals. For example, the Southern Trench, and Skye to Mull MPA search locations have both been identified for minke whale. None of the existing MPA proposals are for this species. Table 3 provides a summary list of the MPA proposals / search locations, which are illustrated on Figure 10. Further details including the origins of these areas, their size, biodiversity and geodiversity interests and draft conservation objectives are provided in Appendix 5. A series of close-up maps of the nearshore proposals is also provided in Appendix 5 (see Figures A5.1 - A5.5).

Table 3 Nature Conservation MPA proposals and MPA search locations in Scottish waters (MPA search locations are marked with an asterisk)

OSPAR Region(s)	MPA proposal/MPA search location*	Code
I, II & V	Faroe-Shetland sponge belt	FSS
I & II	North-east Faroe Shetland Channel	NEF
II	Central Fladen	CFL
	East Caithness Cliffs	ECC
	East of Gannet and Montrose Fields	EGM
	Fetlar to Haroldswick	FTH
	Firth of Forth Banks Complex	FOF
	Mousa to Boddam	MTB
	North-west Orkney	NWO
	Norwegian boundary sediment plain	NSP
	Noss Head	NOH
	Papa Westray	PWY
	South-east Fladen	SEF
	Southern Trench*	STR
	Turbot Bank	TBB
	Western Fladen	WFL

[6] Options include Nature Conservation MPA proposals identified as being of equivalent ecological value as well as the science-based alternatives (see Sections 8.5 and 8.6 for discussion)

Table 3 cont.

OSPAR Region(s)	MPA proposal/MPA search location*	Code
II	Wyre and Rousay Sounds	WYR
II & III	West Shetland Shelf	WSS
III	Clyde Sea Sill	CSS
	Eye Peninsula to Butt of Lewis*	EPL
	Loch Creran	LCR
	Lochs Duich, Long and Alsh	DLA
	Loch Sunart	LSU
	Loch Sunart to the Sound of Jura	SJU
	Loch Sween	LSW
	Monach Isles	MOI
	North-west sea lochs and Summer Isles	NWS
	Shiant East Bank*	SEB
	Skye to Mull*	STM
	Small Isles	SMI
	South Arran	ARR
	Upper Loch Fyne and Loch Goil	LFG
III & V	Geike Slide and Hebridean Slope	GSH
	South-west Sula Sgeir and Hebridean Slope	SSH
	The Barra Fan and Hebrides Terrace Seamount	BHT
V	Hatton-Rockall Basin	HRB
	Rosemary Bank Seamount	RBS

8.2 The Nature Conservation MPA proposals at a glance

As explained above and in the Selection Guidelines, the new MPA proposals / search locations build on and enhance protected areas already in place, gain as much benefit as possible from locations considered to be least damaged/more natural, and give priority to areas containing multiple features. There is still some work to be done, particularly in relation to more mobile species.

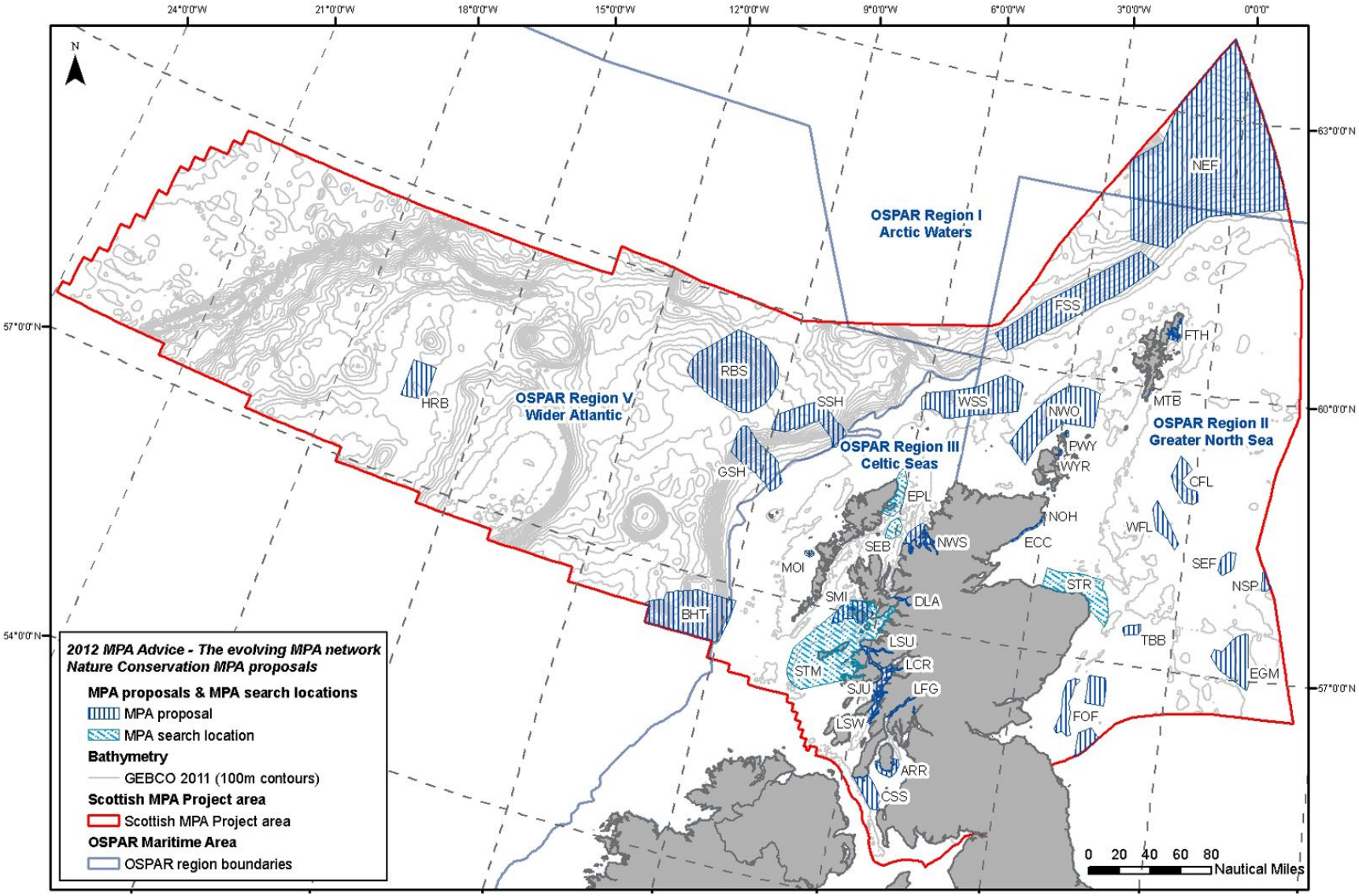
We expect the MPA proposals / search locations to contribute to the protection and conservation of Scotland's spectacular and diverse marine environment, so as to enhance the benefits it provides for generations to come.

The Nature Conservation MPA proposals would complement existing measures and help to ensure protection across the four OSPAR regions (I, II, III, and V) which relate to Scotland's seas. The contribution these proposals could make to the MPA network is outlined in the following sections.

8.2.1 OSPAR Region I

This is the only area of truly Arctic-influenced marine life in Scotland's seas and is in great contrast to the other seas around our coast. The surface North Atlantic waters are warmer than the deeper colder Arctic waters. The North-east Faroe-Shetland Channel MPA proposal is centred on the Faroe-Shetland Channel first explored by Charles Wyville Thomson 150 years ago at the dawn of deep sea research. The Channel is a deep scar on the sea bed. Starting at around 200 m depth it plummets to 1,900 m. The range of marine life living on and in the seafloor sediments experience a completely alien environment of total darkness and often sub-zero temperatures.

Figure 10 Nature Conservation MPA proposals and MPA search locations in Scotland's seas (refer to Table 3 for details)



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 [2012]. All rights reserved. Ordnance Survey Licence number 100017908. Bathymetry ©GEBCO. NOT TO BE USED FOR NAVIGATION. MPA network ©SNH, JNCC and Marine Scotland. 07.12.12. All rights reserved.

There are reminders of past climatic events with iceberg ploughmarks still evident on the sea bed where a range of strange and beautiful seabed invertebrates such as corals and sponges are to be found. In areas dominated by fine muds that have settled out of the water column over the millennia there are communities dominated by burrowing fauna.

8.2.2 OSPAR Region II

The various MPA proposals and one MPA search location in this region encompass a range of geodiversity features (e.g. moraines, pockmarks, glaciated troughs, sediment waves and sub-glacial tunnel valleys) as well as OSPAR Threatened and/or Declining habitats and species such as horse mussel beds and the ocean quahog. The region stretches from the cold northern waters that fringe the Arctic southwards throughout the North Sea basin. In the most northerly reaches deep sea sponges (see Figure 11i) occur in a belt from around 400 - 600 m depth across the Faroe-Shetland Channel. This is also an area where great water masses meet. The turbulence this creates, especially between the depths of 400 and 800 m, results in highly variable temperature fluctuations, increased productivity and a particularly diverse fauna. This is the only place where this type of deep sea sponge aggregation is known to occur in UK waters. The local name of 'ostur', meaning 'cheesy bottom', refers to the size, form and consistency of some of the sponges. In areas with ostur, up to 50 species of sponge can occur.

Figure 11 Features of Scotland's marine life that could be protected within Nature Conservation MPAs

i) An aggregation of deep sea sponges © JNCC; ii) A black guillemot or 'tystie' © Lorne Gill SNH; iii) Basking shark © Paul Naylor; iv) Fireworks anemones © Paul Kay

The sea bed of much of the Greater North Sea is covered by a range of sedimentary habitats. The fauna that live within are food for many commercially important fish species and other top predators. Sandeels, the staple diet of so many of our top predators including

seals and Atlantic puffins, would be protected through the Turbot Bank, North-west Orkney, and Mousa to Boddam MPA proposals. The ocean quahog which can live for up to 400 years would be protected across its range in the region through inclusion in MPA proposals for the Firth of Forth Banks Complex, East of Gannet and Montrose Fields, and Faroe-Shetland sponge belt where before it was only protected close to the coast within the Sullom Voe SAC. The submarine glacial ridges forming the banks of the Firth of Forth Banks Complex tell a story of the past, marking an ice limit near the end of the last Ice Age.

Other remarkable marine life includes the spectacular tall sea pens on the Fladen Grounds (Central Fladen MPA proposal). This animal can reach a height in excess of 2 m and is seldom recorded in this OSPAR region. The MPA proposal at Noss Head offers protection for the largest known horse mussel bed in Scottish waters, whilst those at Fetlar to Haroldswick (Shetland) and Wyre and Rousay Sounds (Orkney) would protect a mosaic of tide-swept habitats including maerl beds, kelp and seaweed communities on sublittoral sediments, and shallow tide-swept coarse sands with burrowing bivalves.

Black guillemot would be protected throughout its range within this region with the inclusion in the proposals of Fetlar to Haroldswick, Papa Westray and the East Caithness Cliffs. The Southern Trench, a deep gouge (150 m deep) formed during the last ice age in the otherwise relatively shallow waters of the southern Moray Firth remains to be fully assessed. It is considered important for its burrowed mud, fronts, shelf deeps, minke whales and white-beaked dolphins.

8.2.3 OSPAR Region III

The MPA proposals in this region encompass some of the many sea lochs that dissect the west coast as well as more exposed islands and areas away from the coast. The natural diversity of habitats and species in this area include a number of OSPAR Threatened and/or Declining habitats and species such as native oyster, common skate and seagrass beds. Seagrass beds are not only important as a habitat for many other species but are increasingly being recognised as an important carbon sink - a component of blue carbon. The spectacular diversity of life found within the sea lochs is reflected by the range of features contained in the series of proposals from North-west sea lochs and Summer Isles in the north to Upper Loch Fyne and Loch Goil in the south. Within these areas there is a dazzling array of features of national and international importance such as flame shell beds, northern feather star aggregations, native oyster, maerl beds and burrowed mud. Black guillemot (see Figure 11ii) would be afforded protection within the MPA proposals for the Clyde Sea sill, Monach Isles, and Small Isles. The common skate, a mobile OSPAR Threatened and/or Declining species which has shown declines across much of the rest of its historical range, is encompassed within the Loch Sunart to the Sound of Jura MPA proposal - an area where there is still a good population of this species.

In this region there also remain three MPA search locations that are not yet fully assessed. Eye Peninsula to Butt of Lewis is established as an important area for sandeels on the west coast of Scotland but the degree of dependence on the area by Risso's dolphins still needs to be clarified. Similarly, the wider functional significance of the Shiant East Bank is still being assessed. The Skye to Mull search location is notable for its shelf sea fronts and the associated elevated productivity. Further work is continuing on basking sharks and minke whales which are regularly sighted in the area (see also Section 8.3.1). This work will also determine the degree and scale of their reliance on these fronts and productivity associated with them.

8.2.4 OSPAR Region V

Region V extends from the shelf break out to the western limits of Scotland's waters and beyond, and provides an opportunity to enhance our understanding and the protection of the marine life in these more remote parts. The proposals that have been put forward for Rosemary Bank Seamount, and the Barra Fan and Hebrides Terrace Seamount mean that the majority of the deep ocean rises in the region would be afforded protection. These striking features which include gardens of soft and hard corals and aggregations of deep sea sponges are like nothing found anywhere else in our waters. A range of other species of marine life including various fish, sharks, rays and migrating cetaceans, aggregate on and near seamounts. It is not just the deep ocean rises that would be afforded protection by these proposals. The system of polygonal faults (an important geodiversity feature that resembles the dried mud plains of the Sahara and are colonised by aggregations of giant and glass sponges once thought to have been all but completely lost) would also be protected within these proposals.

8.3 Areas remaining as MPA search locations

Four areas that have yet to be assessed fully against the Scottish MPA Selection Guidelines remain as MPA search locations (see Figure 12). This is to enable further work to be completed on one or more of the relevant MPA search features before SNH provides its formal advice to Scottish Ministers. These areas are Southern Trench, Eye Peninsula to Butt of Lewis, Shiant East Bank and Skye to Mull. With the exception of the Shiant East Bank, the remaining work relates to mobile species features including minke whale, Risso's dolphin and basking shark. The work on cetaceans and basking sharks is described under Section 8.3.1.

Shiant East Bank has been identified for the shelf banks and mound feature. Survey work was carried out within the MPA search location in November 2011; however, further information is required before the detailed assessment against the Scottish MPA Selection Guidelines can be completed. This will include information on the habitats and species associated with the shelf bank and mound but also on the functional role that it plays within the North Minch. SNH will provide its formal advice on the Shiant East Bank MPA search location by the end of 2013.

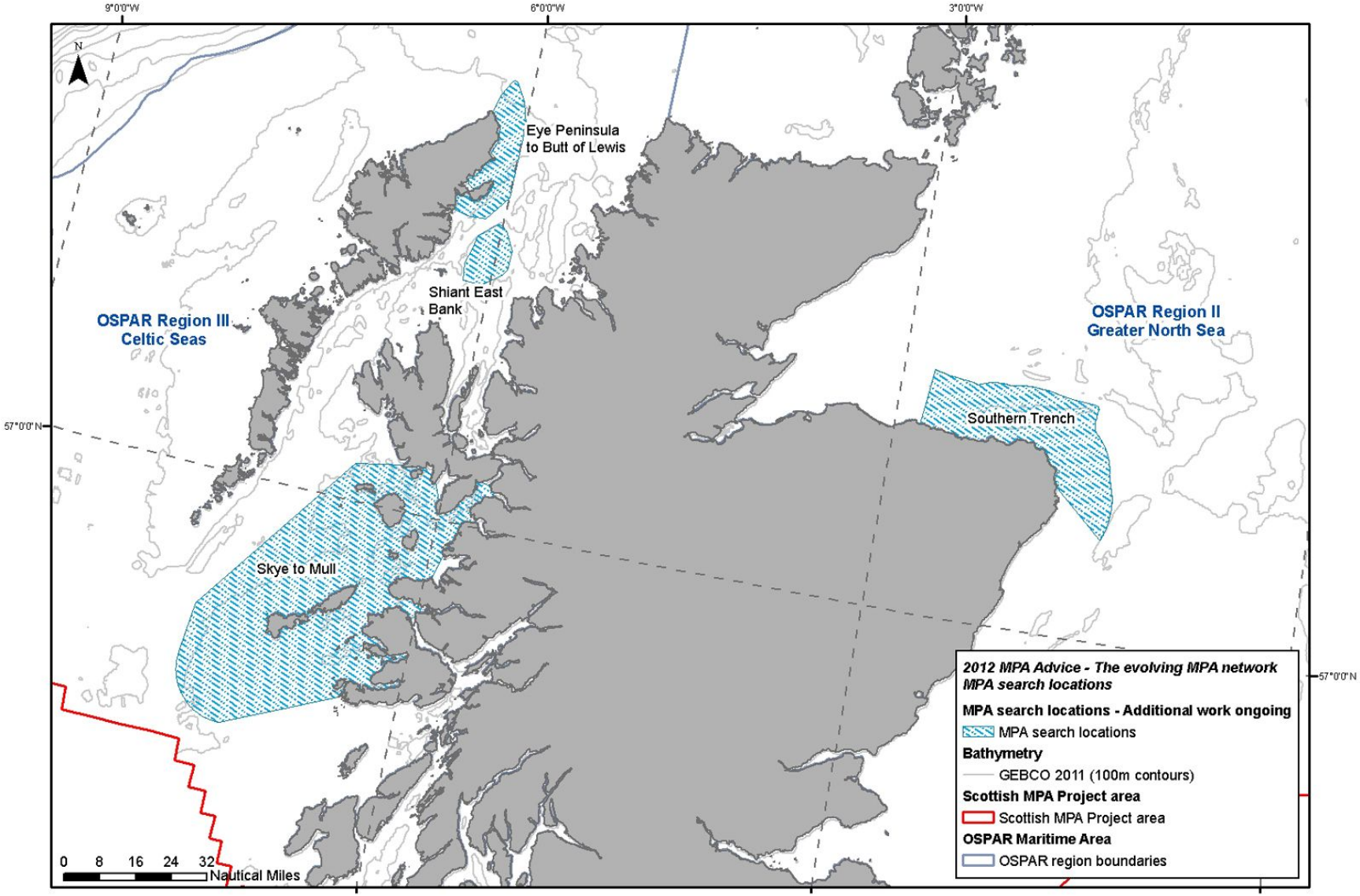
8.3.1 Work on cetaceans and basking sharks

In July 2012 SNH and the University of Exeter launched a basking shark tagging project[7], focused on the Skye to Mull MPA search location. The aim of the project is to understand more about the fine-scale use of the search location by these animals. Some results from this work will be available in early 2013, with the rest by the end of 2013. Alongside this, habitat modelling is underway for basking sharks and the three cetacean MPA search features, minke whale, Risso's dolphin and white-beaked dolphin.

The aim of the habitat modelling is to help understand more about the importance of the Eye Peninsula to Butt of Lewis, Skye to Mull and Southern Trench MPA search locations. The focus in identifying these search locations was on areas considered to be essential to key life stages (e.g. as nursery or feeding areas), based on the use of effort-corrected sightings data complemented by information on species behaviour / use of these areas. The habitat modelling will combine the sightings / tagging data with relevant environmental data to improve our understanding of what is driving the use of these areas by the different species. Following completion of this work, SNH will consider the results and provide advice to Scottish Ministers on whether these areas should be taken forward as Nature Conservation MPA proposals.

[7] See - http://www.snh.gov.uk/about-scotlands-nature/species/fish/sea-fish/shark-tagging-project/

Figure 12 The four areas that have yet to be fully assessed against the MPA Selection Guidelines and remain as MPA search locations



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 [2012]. All rights reserved. Ordnance Survey Licence number 100017908. Bathymetry ©GEBCO. NOT TO BE USED FOR NAVIGATION. MPA network ©SNH, JNCC and Marine Scotland. 25.10.12. All rights reserved.

8.4 Assessment of adequacy

Adequacy is described in Section 5.1 and defined in the glossary (Section 13). We completed the assessment by MPA search feature (see Appendix 6 for summary by feature), then combined the results for each feature to determine the contribution to the network that would be made by each Nature Conservation MPA proposal / search location. Where relevant we took account of the contribution of existing protected areas and other area-based measures (see Section 6). **The assessment assumes that all four MPA search locations progress for the features specified in Appendix 5.**

The following summarises the conclusions against the Stage 5 guideline -

- *Representation* - 38 of the 41 MPA search features would be represented within the MPA network. The three which are not are burrowing sea anemone aggregations, heart cockle aggregations and European spiny lobster. Whilst the European spiny lobster may be afforded some protection by Special Areas of Conservation designated for Annex I reef habitat, this is only likely to relate to part of the species' life cycle and no sites have been identified specifically for this species. For all three of the MPA search features not represented, it was not possible to identify Nature Conservation MPA proposals because of a lack of information.

- *Replication* - 31 of the 38 MPA search features represented (see above) would be included more than once within the MPA network. Of these 31, 22 would be replicated across different OSPAR regions. This includes most of the seabed habitats, low mobility species such as ocean quahog, and mobile species including minke whale, black guillemot and sandeels.

  That would leave nine MPA search features replicated within a specific OSPAR region but not across different OSPAR regions. Four of the nine (coral garden communities, seamount communities, blue ling and seamounts) are only recorded in OSPAR Region V. Three (flame shell beds, inshore deep mud with burrowing heart urchins, and northern feather star aggregations) are only recorded in OSPAR Region III. For the remaining two (maerl on coarse gravel and native oysters) whilst their distribution is not restricted to OSPAR Region III, this is where the majority of records have been made.

  The seven MPA search features that would not be replicated within the MPA network comprise two habitats (carbonate mound communities and fan mussel aggregations) and five mobile species (basking sharks, common skate, orange roughy, Risso's dolphin and white-beaked dolphin). All the Scottish records of the two habitats are included within the respective MPA proposals, so we have assessed these features as adequate in spite of them not being replicated. The assessment of the mobile species is slightly different, partly because of the approach of focusing on essential areas for key life cycle stages. The contrasting assessments for Risso's dolphin and common skate are discussed overleaf. Both Risso's dolphin and orange roughy would be adequate despite only being represented once within the MPA network because there are no other known areas in Scotland's seas considered likely to be essential to key life cycle stages for these species.

- *Geographic range and variation* - The geographic range and variation of 34 of the 38 MPA search features represented would be reflected by the MPA network. The MPA search features for which this part of the assessment most significantly influenced the number and location of MPA proposals / search locations, include burrowed mud, horse mussel beds, maerl beds, offshore deep sea mud, offshore subtidal sands and gravels, black guillemot and sandeels (with the latter also significantly influenced by the results of modelling work completed by Marine Scotland Science).

In our view the geographic range and variation of one habitat (maerl on coarse gravel with burrowing sea cucumbers) and three mobile species (basking sharks, common skate and white-beaked dolphin) would not be reflected in the MPA network. The assessments for mobile species were based on considering whether the areas in Scotland's seas considered likely to be essential to key life cycle stages were reflected, rather than considering whether the MPA network would be likely to reflect the broader distribution of a species. There is no known ecological variation of mobile species across Scotland's seas and so no assessment could be made for these species.

- *Linkages* - to date linkages have only been assessed for some of the mobile species and large-scale features. These are summarised briefly below:
  - Black guillemot - the Clyde Sea Sill MPA proposal will help provide connectivity within the UK network through linking with populations in Northern Ireland.
  - Sandeels - modelling work completed by Marine Scotland Science identified areas considered to be acting as sources of sandeels across different parts of the Scottish continental shelf.
  - Cetaceans - MPA proposals / search locations have only been developed on the basis of essential areas for key life cycle stages e.g. for minke whale through inclusion of habitats of key prey species and for Risso's dolphin the inclusion of areas with high numbers of calves. The assessment highlights linkages to the wider population of the species.
  - Large-scale features - the assessment highlights the role that large-scale features play in supporting connectivity within Scotland's seas more generally e.g. through provision of migration corridors and/or increased productivity.

We have not yet assessed linkages for all MPA search features. See Section 10.1 for description of how we expect to complete this work.

- *Resilience* - This was based on a review of the assessments against the other parts of the Stage 5 guideline and the status of the MPA search feature to determine whether a greater proportion should be included within the MPA network. For two MPA search features (flame shell beds and northern feather star aggregations) that are only recorded in OSPAR Region III but are considered to be both threatened and/or declining and sensitive, we have recommended including these features within more than two Nature Conservation MPAs. For five MPA search features (horse mussel beds, maerl beds, ocean quahog aggregations, black guillemot and sandeels), the development of the MPA proposals was driven largely by the assessment of geographic range and variation. The assessment against resilience supported the inclusion of the greater proportion of these features within the MPA network that resulted from the prior assessment of geographic range and variation. Three MPA search features (burrowed mud, offshore deep sea muds, and offshore sands and gravels) have a much broader distribution within Scotland's seas. Therefore, we have recommended replicating these habitats within each of the OSPAR regions within which they are recorded to reflect the proportional importance of Scotland for these habitats.

Of the 41 MPA search features listed in the MPA Selection Guidelines, three are not represented within the network due to a lack of information. Of the remaining 38, 35 would be adequately protected by the evolving MPA network (subject to progression of the MPA proposals and all four of the MPA search locations). The remaining features (basking shark, common skate and white-beaked dolphin) would be represented within one or more Nature Conservation MPAs but in our view this is not adequate - on the basis of our current understanding of the occurrence and distribution of the features in Scottish waters.

For some MPA search features only one MPA proposal / search location has been identified, but this has not always resulted in the same conclusion with respect to adequacy. For

example Risso's dolphin is only identified within one MPA search location - Eye Peninsula to Butt of Lewis. This is the only area identified as essential to key life cycle stages for this species. We do not believe that there are any other locations that could constitute essential areas for this species in Scottish waters. Therefore we have assessed that Risso's dolphin would be adequately protected even though replication of this feature has not been achieved within the Scottish MPA network. In contrast, the Loch Sunart to Sound of Jura MPA proposal has been identified for common skate. Based on our current understanding it is possible that there are also essential areas for this species around Orkney and along parts of the continental slope. Therefore we have assessed that common skate would not be adequately protected by this one MPA proposal, subject to further research and assessment.

Work intended to address the adequacy of the remaining three features (basking shark, common skate and white-beaked dolphin) is outlined below:

- Basking shark - Tagging work is currently being carried out on basking sharks within the Skye to Mull MPA search location and habitat modelling work is also underway (see Section 8.3.1 for further details) but will not be complete until the results of the tagging work are available. A provisional reassessment of the underpinning data will be made by April 2013 with completion planned for April 2014. Further survey work may be required to address adequacy and the results will inform the first review of the Scottish MPA network in 2018.
- Common skate - Further tagging work is being carried out and there are plans to extend field work to include areas such as Orkney and parts of the continental slope. This is a continuing programme of work and the results are not likely to be available for several years. The findings will be assessed as part of the first review of the Scottish MPA network in 2018.
- White-beaked dolphin - Habitat modelling work is also underway for white-beaked dolphin (see Section 8.3.1 for further details). This is planned for completion by April 2013.

8.5 Science-based alternatives

At the request of Marine Scotland, JNCC has identified science-based alternatives to the features being considered for protection within the Firth of Forth Banks Complex Nature Conservation MPA proposal (see Appendix 4). Turbot Bank was proposed for sandeels. Further analysis identified that it would also represent an alternative option for the offshore subtidal sands and gravels feature and shelf banks and mounds within OSPAR Region II in Scotland's seas. Norwegian Boundary sediment plain represents an alternative for the representation of ocean quahog within OSPAR Region II in Scotland's seas.

JNCC concluded from assessment of the evidence that these two proposals do not make equivalent contributions to the network to that made by the Firth of Forth Banks Complex. The two alternative proposals do meet the guidelines for consideration as Nature Conservation MPAs. However, the lesser evidence-base for the two alternatives, and the lack of diversity indicated on the basis of predictive data, has led to our conclusion that they are of lower biodiversity and geodiversity conservation value than the Firth of Forth Banks Complex MPA proposal.

The Firth of Forth Banks Complex is JNCC's preferred proposal to go forward for designation. It would represent the range and diversity of offshore subtidal sands and gravel habitats present, as well as the ocean quahog (juvenile and adult) populations distributed across the area. There is evidence to support our view that the shelf bank and mound features present within the Firth of Forth Banks Complex are of functional significance to the overall health and diversity of Scotland's seas more widely. A key geodiversity area, the Wee Bankie Formation, also falls within this Nature Conservation MPA proposal, increasing

the potential representation of key geodiversity interest features within the network. Ministers may use their discretion under the Acts to decide which option, or combinations of these options, should be progressed to meet the network obligations. That discretion, and the way in which socio-economic factors are taken into account within the MPA selection process, is different to that within the marine SAC and SPA site selection process.

At the request of Marine Scotland, JNCC have also identified science-based alternatives to the Central Fladen proposal for the representation of the burrowed mud search feature in the Fladen Grounds in OSPAR Region II. The Central Fladen proposal represents two component features of the burrowed mud habitat; seapens and burrowing megafauna, and the tall seapen (*Funiculina quadrangularis*). Western Fladen and South-east Fladen options have been identified as science-based alternative proposals for the representation of the seapens and burrowing megafauna component only.

Although Central Fladen in its entirety was assessed as making a better contribution to the network, the key driver for selecting the areas was the quality of the burrowed mud feature. All three MPA proposals for the seapens and burrowing megafauna component of burrowed mud habitat were assessed as being of equivalent ecological value and would be treated in the same way as the areas discussed below (see Section 8.6).

The tall seapen (*Funiculina quadrangularis*) component of the burrowed mud feature within the Central Fladen MPA proposal is the only known location for that component within the Fladen Grounds. JNCC concluded that representation of the burrowed mud search feature in offshore waters in OSPAR Region II could be achieved by either taking forward the Central Fladen proposal in its entirety, or taking forward just the part of Central Fladen containing the tall seapens together with one of the two alternative locations for the seapens and burrowing megafauna component.

8.6 Equivalent contributions

In offshore waters JNCC identified some MPA proposals with the potential to make an equivalent contribution to the network for representation of features. Atlantic-influenced slope offshore subtidal sands and gravels, offshore deep sea mud, burrowed mud, and an area of the Hebridean continental slope at the northern extent of the range of these features in OSPAR Regions III and V could be represented by either the South-West Sula Sgeir and Hebridean slope or the Geikie slide and Hebridean slope.

8.7 Geodiversity representation

Eight geodiversity themes have been identified across Scotland's seas. These are located within 34 key geodiversity areas (see Appendix 2 for details). Five of the eight geodiversity themes are well represented within the evolving network of MPAs, and a further 16 of the 34 key geodiversity areas are incorporated within the MPA proposals / search locations. Of the remaining three geodiversity themes, two are partially represented and one has only a very little representation within the network (the Marine Geomorphology of the Scottish Shelf Seabed).

8.8 Conservation objectives

Conservation objectives describe the desired ecological / geological state (or quality) of the protected feature(s) within each Nature Conservation MPA. They reflect the purpose of a Nature Conservation MPA in the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009, which is '*for the conservation of marine flora or fauna, or for the conservation of marine habitats or geological/geomorphological features*'. The definition of 'conserve' in the Marine Acts includes enabling or facilitating recovery or increase of whatever is being conserved. Therefore conservation objectives will either be 'conserve' or

'recover'. A conservation objective set to recover signals an expectation that management is required. Some management may also be required for features with a conserve objective. Further information on the setting of conservation objectives and the recommended conservation objectives for each MPA proposal are provided in Appendix 5.

8.9 Summary

Our assessment against Stage 5 of the MPA Selection Guidelines (see Section 5.1 for details) concluded that all but three of the 38 MPA search features for which sufficient data were available to enable an assessment, would be adequately represented within the proposed network (subject to progression of the MPA proposals and all four of the MPA search locations). We have proposed additional work to address the shortfall in adequacy of the network.

Following application of the Stage 5 guideline, SNH and JNCC recommend 33 Nature Conservation MPA proposals that could make a significant contribution to the Scottish MPA network. Two scenarios have been identified where science-based alternatives exist. For those features in the Firth of Forth Banks Complex we are putting forward Norwegian Boundary Sediment Plain for ocean quahog aggregations. In addition to proposing Turbot Bank for sandeels, we have identified it as a science-based alternative for the shelf banks and mounds and offshore subtidal sands and gravels features in the Firth of Forth. We have assessed the Western Fladen and South-east Fladen proposals as ecologically equivalent to the Central Fladen proposal for the seapens and burrowing megafauna component of burrowed mud habitat (but not for the tall seapen within the Central Fladen proposal). Four areas remain as MPA search locations. These are shown in Figure 12.

Of the 33 Nature Conservation MPA proposals we recommend that a minimum of 29 be designated (subject to Ministerial decisions around science-based alternatives and ecologically equivalent areas). In our view, if the MPA proposals and the four remaining MPA search locations are protected, then all but three of the applicable 38 MPA search features will be adequately represented in the MPA network according to the MPA Selection Guidelines.

It may be possible to provide additional representation of these three features within existing MPA proposals or search locations. The actions and timeframes associated with completing additional work relating to these three features are summarised below:

- Common skate - further survey work is underway but results are unlikely to be available until the first review of the network in 2018.
- Basking shark - provisional re-assessment by April 2013 with completion in April 2014.
- White-beaked dolphin - further research underway, with assessment to be completed by April 2013.

As discussed above, we do not recommend the MPA search locations are treated as MPA proposals at this time, but are given more time to enable further work to be completed. This will improve confidence in the underpinning data and any advice we subsequently provide to Scottish Ministers.

9 OVERVIEW OF THE SCOTTISH MPA NETWORK

This section provides an assessment of how well the MPA network could represent the range of features present in Scottish waters, and it considers the contribution that the network could make to wider networks in the UK, Europe and north-east Atlantic**. In this section we have assumed the recommended Nature Conservation MPA proposals and all four of the MPA search locations yet to be fully assessed are designated for the protected features listed in Appendix 5[8].**

The 2010 Ministerial statement on the creation of a network of marine protected areas committed to ensuring that the network is ecologically coherent. That statement signalled the intention to consider the principles set out by the OSPAR Convention on the key design features associated with delivering an ecological coherent network of MPAs. These principles were subsequently reflected within the Scottish MPA Selection Guidelines.

There are duties to create a network of conservation sites within the UK Marine and Coastal Access Act (section 123) and Marine Scotland Act (section 79). These require -

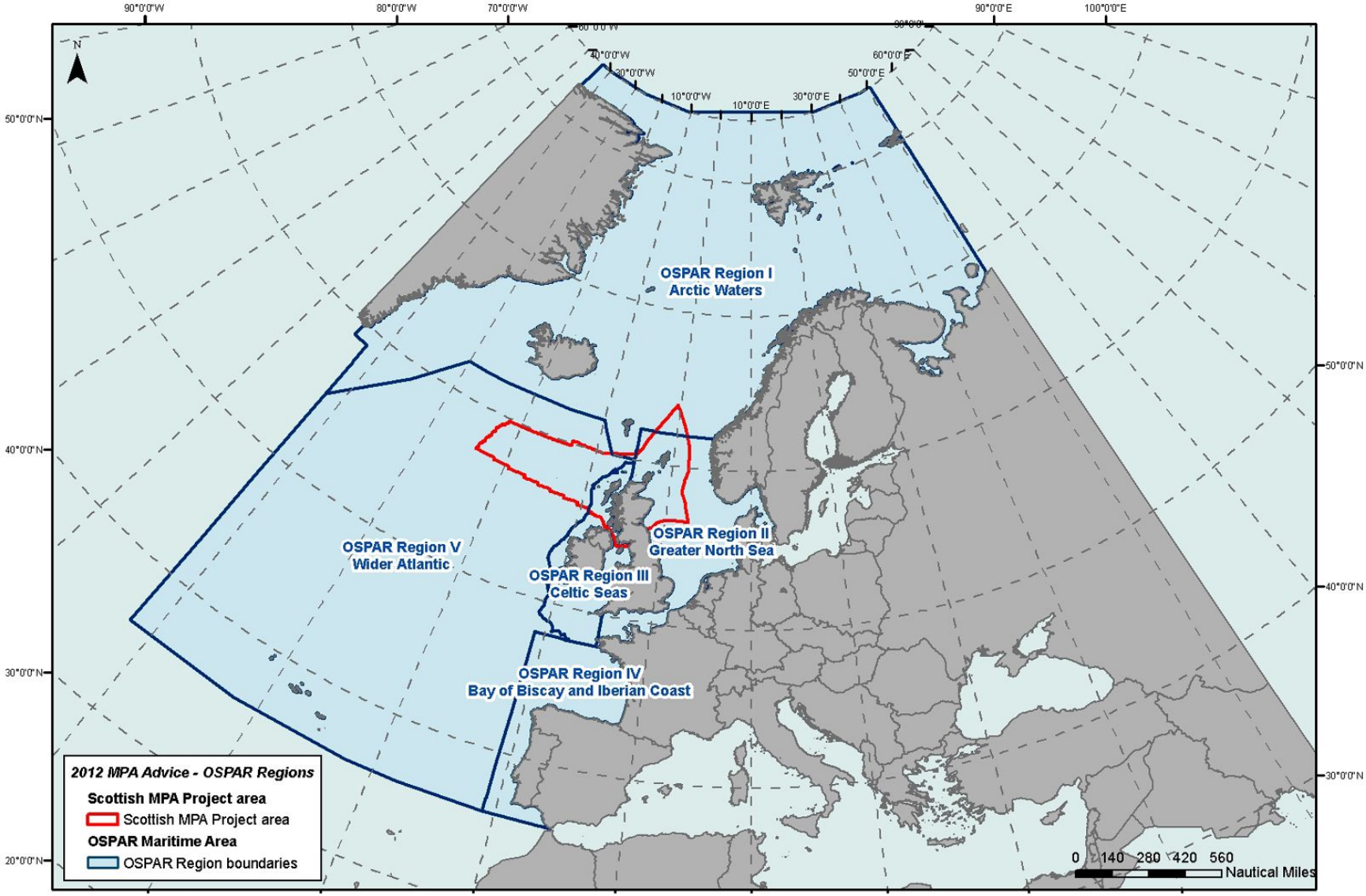
- that the features which are protected by the sites comprised in the network represent the range of features present in the UK marine area;
- that the conservation of a feature may require the designation of more than one site; and
- that the network contributes to the conservation or improvement of the marine environment in the UK marine area.

These duties provided a focus for assessing the structure of the proposed network (the distribution and coverage of contributing conservation sites within Scotland seas) in the context of the wider OSPAR maritime area. To determine how well the proposed MPA network in Scotland could contribute to wider networks, including the OSPAR network of MPAs, we evaluated the spatial distribution of the proposed network in Scotland's seas. The evaluation of spatial distribution was based on a descriptive approach noting whether the major divisions and seabed topographic features of Scotland's marine environment were reflected. We also assessed the representation and replication of broad-scale habitats and OSPAR Threatened and/or Declining features. This assessment was based on the number of MPAs within which the features would be protected. We understand that these factors will form the basis of future more detailed assessments of any ecologically coherent MPA networks.

Figure 13 shows the relationship between the Scottish MPA Project area and the OSPAR regions, to illustrate the Scottish MPA network within the context of the wider OSPAR maritime area. Figure 14 shows a combined view of existing protected areas and other area-based measures considered to be contributing to the network, together with the new Nature Conservation MPA proposals and MPA search locations.

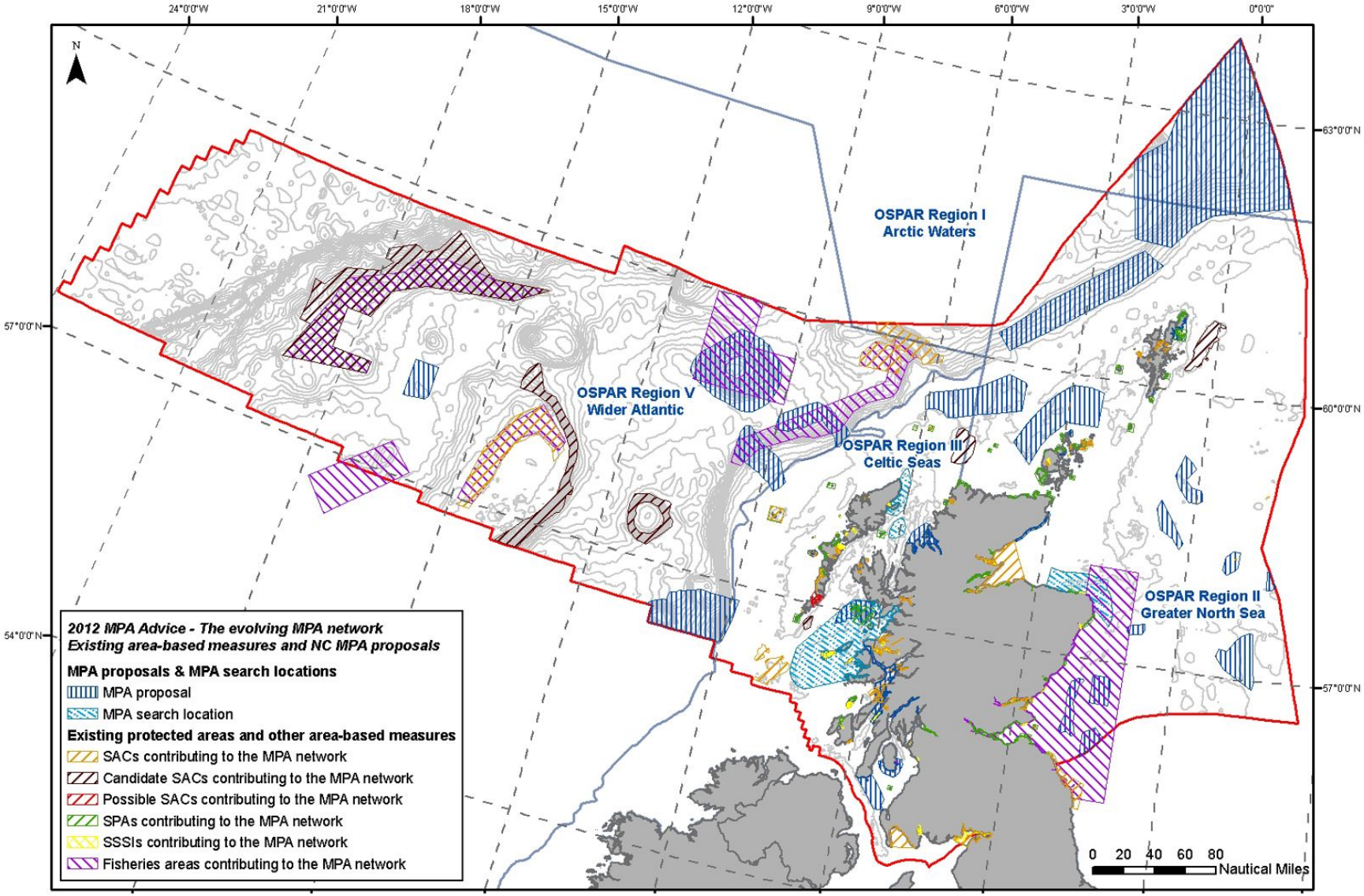
[8] Protected feature is the term used in the Scottish MPA Selection Guidelines to describe those features (habitats, wildlife, geology and landforms) which are formally designated as part of a MPA. In addition to MPA search features, other habitats, species, geology and landforms may be recognised as protected features where they can contribute to the network being ecologically coherent

Figure 13 The relationship between the Scottish MPA Project area and the OSPAR regions



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 [2012]. All rights reserved. Ordnance Survey Licence number 100017908. Bathymetry ©GEBCO. NOT TO BE USED FOR NAVIGATION. MPA network ©SNH, JNCC and Marine Scotland. 05.10.12. All rights reserved.

Figure 14 Combined view of existing protected areas, other area-based measures, Nature Conservation MPA proposals and MPA search locations that could contribute to the Scottish MPA network



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 [2012]. All rights reserved. Ordnance Survey Licence number 100017908. Bathymetry ©GEBCO. NOT TO BE USED FOR NAVIGATION. MPA network ©SNH, JNCC and Marine Scotland. 09.12.12. All rights reserved.

9.1 Network statistics

The evolving MPA network shown in Figure 14 comprises 152 existing protected areas (46 SACs, 45 SPAs and 61 SSSIs), one possible SAC, eight other area-based measures and 37 new Nature Conservation MPA proposals / search locations (see Appendix 1 for details).

The area covered by the Scottish MPA Project is ~608,000 km^2, comprising ~90,000 km^2 from Mean High Water Springs (MHWS) to the 12 nautical mile territorial limit and ~518,000 km^2 of offshore waters out to the limit of the UK Continental Shelf (UKCS). The 161 existing measures (existing / possible protected areas and other area-based measures) cover an area of just over 71,000 km^2 which represents ~12% of Scottish MPA Project area (of which ~37,000 km^2 is derived from existing protected areas).

For the remainder of this section we assume that a minimum of 29 of the 33 MPA proposals progress to designation, and that the four areas that remain as MPA search locations also make an essential contribution to the network. This combined suite of 33 MPA proposals / search locations overlaps with a number of the existing measures such that the addition of their combined area of approximately 76,000 km^2 would increase the total network coverage to ~23% of the Scottish MPA Project area. Table 4 outlines these summary statistics.

Table 4 Scottish MPA network statistics - the relative contributions of existing measures and a subset of 33 of the Nature Conservation MPA proposals / search locations

Overlapping areas have been merged to generate the values associated with the network. Analyses based on x29 MPA proposals (excludes the South-west Sula Sgeir and Hebridean Slope, South-east Fladen, Western Fladen and Norwegian Boundary Sediment Plain), all x4 remaining MPA search locations and the x161 existing measures. The network combined area of ~137,000 km^2 reflects the overlaps of the MPA proposals / search locations with existing measures (~10,600 km^2). The x29 MPA proposals and x4 MPA search locations therefore contribute an extra ~66,000 km^2 to the network.

No. of existing measures	Area of existing measures	% coverage Scottish MPA Project area	No. MPA proposals / SLs	Area of proposed MPAs/ SLs	Network - combined area	Network - % coverage of MPA Project area	
161	**71,200 km^2**	**12%**	**33**	**76,000 km^2**	**137,000 km^2**	**23%**	TW = 29% OW = 21%

Of the 23% coverage of the Scottish MPA Project area, approximately 81% (~112,000 km^2) is in offshore waters (comprising 18 existing measures and 12 MPA proposals plus a small part of Southern Trench that is primarily sited within the 12 nautical mile territorial limit). Approximately 19% (~27,000 km^2) of the 23% network coverage is between MHWS and the 12 nautical mile territorial limit (146 existing measures, 17 MPA proposals and 4 MPA search locations, plus parts of a further three MPA proposals that are primarily situated in offshore waters - namely West Shetland Shelf, North-West Orkney and the Firth of Forth Banks Complex). The numbers of individual existing measures include some overlaps between territorial and offshore waters.

9.2 Spatial distribution of the network of conservation sites

9.2.1 OSPAR Region I - Arctic waters

Scotland's seas make up a very small proportion of this OSPAR region and include waters to the north of the Wyville Thomson Ridge and off the far northern edge of the continental shelf. Scotland's seas form the most southerly part of this region. Within the part of the region including Scotland's seas there is one existing SAC. One Nature Conservation MPA proposal is also located within this region. Together, the SAC and the MPA proposal reflect the major features / divisions of the sea bed in the region including the continental slope, the Faroe-Shetland Channel and Wyville Thomson Ridge. They overlap with both parts of this

region found within Scotland's seas. The existing SAC and the MPA proposal are therefore considered to be spatially well-distributed within the Scottish part of OSPAR Region I.

9.2.2 OSPAR Region II - Greater North Sea

Region II covers most of Scotland's seas from a line east of Cape Wrath (with the exception of those covered by Region I). It covers waters around the Northern Isles and off the east coast of Scotland and into the central North Sea.

Existing protected areas in Region II are largely focused on, around, or close to the coast. They include the major features in the nearshore / coastal environment including firths, voes, lagoons, estuaries and coastal and offshore islands which in turn encompass a wide range of habitats and species. Fifteen Nature Conservation MPA proposals and one MPA search location are fully contained within this region.

A further two MPA proposals partially overlap with adjacent regions (one with Region I and one with Region III). Whilst approximately half are adjacent to the mainland or within the Northern Isles, the rest are focused further from the coast and include the continental slope and the sediment plains (comprising muds, sands and gravels) characteristic of the continental shelf.

Although the focus of existing protected areas is on the nearshore environment, the MPA proposals and the one MPA search location are present right across the shelf (e.g. reflecting the muddy sediment plains in the northern North Sea) and onto the continental slope. When considered together, the existing protected areas and MPA proposals are therefore considered to be spatially well-distributed within the Scottish part of OSPAR Region II.

9.2.3 OSPAR Region III - Celtic Seas

Region III covers the whole of the west coast of Scotland from Cape Wrath south. It extends beyond the Outer Hebrides to the edge of the continental slope. Scotland's seas form the most northerly part of this region.

As in Region II, existing protected areas are largely focused on, around, or close to the coast. They include the major features of the nearshore environment including cliffs, sea lochs, coastal and offshore islands, lagoons and sounds. There are 12 Nature Conservation MPA proposals and three MPA search locations in this region with a further three MPA proposals overlapping slightly from Region V and one MPA proposal in the north straddling the Region II boundary. About half of these proposals reflect the importance of this region for sea lochs and the habitats and species they contain, whilst others include the characteristic nearshore islands associated with the Inner and Outer Hebrides. The proposals also reflect the major divisions of the west coast including the area west of the Outer Hebrides, the Minches, the Sea of Hebrides and the Firth of Clyde.

Although the focus of existing protected areas is on the nearshore environment, the existing protected areas and Nature Conservation MPA proposals / search locations encompass the major features / divisions of the west coast. Together they are therefore considered to be spatially well-distributed within the Scottish part of OSPAR Region III.

9.2.4 OSPAR Region V - Wider Atlantic

Region V covers the most westerly parts of Scotland's seas from the edge of the continental slope to the deep sea. This region reaches its northerly limit in Scotland's seas to the south of the Wyville Thomson Ridge.

Two Nature Conservation MPA proposals lie wholly within Region V with a further three overlapping slightly with adjacent Region III. Both the existing protected areas and new proposals focus on the major features / divisions of the region including the continental

slope, seamounts and banks. When considered together, the existing protected areas and MPA proposals are therefore considered to be spatially well-distributed within the Scottish part of OSPAR Region V.

9.3 Representation and replication of the range of features in Scottish waters

As outlined in Section 9.1, in our view the existing measures, MPA proposals and MPA search locations are well-distributed within the Scottish part of the four OSPAR regions and represent the major physiographic features / divisions of each. Collectively, existing measures and the Nature Conservation MPA proposals / search locations adequately represent all but three of the MPA search features used to guide the development of the network. The remainder of this section presents the results of analyses undertaken to determine how well the proposed MPA network represents the broader range of seabed habitat and species features found in Scotland's seas. This assessment has considered broad-scale habitats and relevant OSPAR Threatened and/or Declining features (OSPAR Commission, 2006).

9.3.1 Coverage of seabed habitats

The broad-scale predictive habitat map of the UK continental shelf area produced under the UKSeaMap 2010 project (McBreen *et al*., 2011) was used to derive a list of the full range of seabed habitats present in Scotland's seas. The mapping, which is presented at level 3 of the EUNIS (European Nature Information System) habitat classification system (Davies *et al.*, 2004), describes the variation in biological character of the habitats present across UK waters. We have used the EUNIS classification to assess the range of habitats within the OSPAR regions, as proposed by guidance provided by the OSPAR Commission (2006) which identifies EUNIS as the primary system for characterising the marine environment in the north-east Atlantic.

On the basis of the predictive mapping (shown in Figure A9.1, Appendix 9) and, in territorial waters, on biological sampling records from the Marine Recorder database[9], we determined that there are 34 EUNIS level 3 seabed habitat types in Scottish waters (summarised in Table A9.1, Appendix 9).

We then assessed the degree of representation of these habitats within existing area-based measures. This required an understanding of the alignment between the EUNIS classes and the qualifying and notified features of SACs and SSSIs respectively (see Tables A1.1 and A1.7 in Appendix 1 for the marine features associated with these designations). The inter-relationship between these and the new MPA search features is summarised in Table A9.2, Appendix 9. The results of the assessment of representation of these 34 habitat classes are summarised in Table 5, with full details provided in Table A.9.3.

At level 3 in the classification all of the seabed habitat types are replicated across the network and represented within each OSPAR region in Scottish waters where they are considered 'characteristic'. We conclude that there would be no gaps in the representation and replication of seabed habitats across the network, subject to the progression of the Nature Conservation MPA proposals / search locations.

Table 5 provides an overview of the number of areas within which the EUNIS level 3 habitats would be considered to be protected within each OSPAR region. An OSPAR region is considered to be characteristic for a habitat type if the predicted area of that habitat exceeds 1% of the total Scottish regional sea area.

[9] The Marine Recorder database is the data repository used by the UK nature conservation agencies for all marine habitat and species sampling records. This data source was used as part of the EUNIS assessment to provide coverage of littoral and nearshore areas not covered by the predictive mapping

Table 5 Summary of representation and replication of EUNIS level 3 habitats within the Scottish MPA network

Numbers given reflect the areas within which the habitats are already / would be considered to be protected - including Nature Conservation MPA proposals and MPA search locations - see Appendix 9 for details. Numbers reflect the minimum number of proposals required to complete the network and do not include alternatives. Overlapping existing measures have been excluded from these analyses. A tick against replication denotes more than one example protected within the MPA network

EUNIS level 2	EUNIS level 3	OSPAR regions in Scottish waters where characteristic	Region I	Region II	Region III	Region V	Replication in network
A1 Littoral rock	A1.1	**II, III**		7	10		✓
	A1.2	**II, III**		5	11		✓
	A1.3	**II, III**		5	13		✓
	A1.4	**II, III**		6	9		✓
A2 Littoral sediment	A2.1	**II, III**		2	3		✓
	A2.2	**II, III**		4	7		✓
	A2.3	**II, III**		5	7		✓
	A2.4	**II, III**		4	8		✓
	A2.6	**II, III**		3	3		✓
	A2.7	**II, III**		2	5		✓
	A2.8	**II, III**		3	4		✓
A3 Infralittoral rock	A3.1	**II, III**		6	5		✓
	A3.2	**II, III**		3	8		✓
	A3.3	**II, III**		6	13		✓
	A3.7	**II, III**		5	3		✓
A4 Circalittoral rock	A4.1	**II, III**		6	13		✓
	A4.2	**II, III**		8	12		✓
	A4.3	**III**			6		✓
	A4.7	**III**			4		✓
A5 Sublittoral sediment	A5.1	**II, III**		8	12		✓
	A5.2	**II, III**		10	15		✓
	A5.3	**II, III**		6	14		✓
	A5.4	**II, III**		4	13		✓
	A5.5	**II, III**		9	15		✓
	A5.6	**II, III, V**		7	10	6	✓
	A5.7	**II**		2			✓
A6 Deep sea bed	A6.1	**V**				7	✓
	A6.2	**I, II, V**	1	2		4	✓
	A6.3 or 6.4	**I, II, V**	1	2		6	✓
	A6.5	**I, II, V**	2	1		6	✓
	A6.6	**II, V**		2		8	✓
	A6.7	**V**				7	✓
	NEW[10]	**I, II, V**	1	2		3	✓

Habitat classes A6.2 (deep sea mixed-substrata), A6.3 or A6.4[11] (deep sea sand or deep sea muddy sand) and deep sea coarse sediment[11] are represented only once in OSPAR Region I. However, this representation is from the North-east Faroe-Shetland Channel MPA

[10] Equates to deep sea coarse sediment but not yet included within the EUNIS classification
[11] Mapped as a mosaic within the UKSeaMap EUNIS level 3 predictive seabed habitat map

proposal which encompasses much of the mapped distribution of most of these level 3 habitats in this region.

9.3.2 Coverage of OSPAR Threatened and/or Declining habitats and species

Table 6 presents the conclusions of an assessment of potential representation and replication of OSPAR Threatened and/or Declining species (with limited home ranges) and habitats within the Scottish MPA network.

Table 6 Summary of potential representation and replication of OSPAR Threatened and/or Declining species (with limited home ranges) and habitats within the Scottish MPA network

Number of areas within the MPA network the OSPAR T&D species and habitats are already / would be considered to be protected within - see Appendix 8 for details. Numbers reflect the minimum number of proposals required to complete the network and do not include alternatives. Overlapping existing measures have been excluded from these analyses. OSPAR Region IV not listed - no coverage by Scottish waters

OSPAR T&D feature	OSPAR regions in Scotland where occurs and considered T&D (bold)	Region I	Region II	Region III	Region V	Replication in Network
Ocean quahog (*Arctica islandica*)	**II**, III		6	6		✓
Native oyster (*Ostrea edulis*)	**II**, III		0	2		✓
Carbonate mounds	**V**				1	✗
Coral gardens	**V**				3	✓
Deep-sea sponge aggregations	**II**, **V**		2		4	✓
Intertidal *Mytilus edulis* beds on mixed and sandy sediments	**II**, **III**		1	4		✓
Intertidal mudflats	**II**, **III**		9	11		✓
Littoral chalk communities	**II**, **III**		1	1		✓
Lophelia pertusa reefs	**III**, **V**			1	5	✓
Maerl beds	II, **III**		2	7		✓
Modiolus modiolus beds	**II**, **III**		5	6		✓
Ostrea edulis beds	[**II**], **III**		-	1		✗
Sabellaria spinulosa reefs	**III**			1		✗
Seamounts (seamount communities)	**V**				2[12]	✓
Sea-pen and burrowing megafauna communities	**II**, **III**, V		3	8	2	✓
Zostera beds	**II**, **III**		6	9		✓

[12] The Rosemary Bank and Hebrides Terrace Seamounts are fully contained within the MPA proposals. The cSAC around Anton Dohrn Seamount and the associated ICES advised fisheries closure will eventually provide partial protection to the benthic communities associated with the seamount through the protection afforded to biogenic reef under the SAC and Vulnerable Marine Ecosystems (VMEs) such as corals and sponges under the ICES advised fisheries closure

The assessment of potential representation and replication of this subset of non-mobile Threatened and/or Declining features is proposed in OSPAR (2008c). Species with 'limited home ranges' are those that in their adult life stage are either fixed in place (sessile), or generally range only over short distances (on a scale of hundreds of metres). Only ocean quahog and native oysters have been included from the initial list of OSPAR Threatened and/or Declining species (OSPAR, 2008a). This is because these occur in Scottish waters. The dog whelk (*Nucella lapillus*), a species often associated with Natura Annex I 'reefs', is not included because it is not considered to be under threat and/or in decline in Scottish waters (OSPAR, 2009). Appendix 8 provides further details on the assessment process.

Table 6 provides an overview of the number of areas within which the OSPAR Threatened and/or Declining feature would be considered to be protected. OSPAR regions where the feature is considered to be Threatened and/or Declining are highlighted. Our conclusion from this assessment is that the OSPAR Threatened and/or Declining features are represented within each OSPAR region in Scottish waters where they are considered 'characteristic'. Where possible these features are also replicated across the network.

The Hatton Bank cSAC and the NEAFC fisheries management measure across Hatton Bank provide protection to the only record of carbonate mounds in OSPAR Region V. As this is the only record of this feature replication is not possible within the Scottish waters of Region V.

Native oysters are represented within two Nature Conservation MPA proposals in OSPAR Region III and there are considered to be viable beds of this species in one of these proposals (*Ostrea edulis* beds are considered as a separate T&D feature). Whilst there have been sparse recent records of individual native oysters from OSPAR Region II (e.g. Firth of Forth), there are insufficient records to seek inclusion in any Nature Conservation MPA proposals here and there are no longer considered to be any extant beds of the species in this region. Similarly, in light of the low number and scattered distribution of records of littoral chalk communities in Scottish waters, SNH consider the representation afforded by existing protected areas to be adequate (Berwickshire and North Northumberland Coast SAC and, Luce Bay and Sands SAC).

The Mingulay Reef Complex cSAC affords protection to the only known extant record of *Lophelia pertusa* reefs in Scottish waters of OSPAR Region III. Replication for this feature is achieved across the network from its presence in SACs in Region V but is not possible within the Scottish waters of Region III. The Luce Bay and Sands SAC affords protection to the only confirmed reefs of *Sabellaria spinulosa* in Scottish waters.

10 SUMMARY OF NETWORK CONTRIBUTIONS

In Section 8 we conclude that the Scottish MPA search features are adequately represented in the existing and proposed protected areas as assessed against the principles discussed in Section 5.1. In Section 9 we describe how the component parts of the evolving MPA network would represent, and replicate, the broad-scale habitats and OSPAR threatened and/or declining features.

On the basis of these analyses it is our view that the Scottish MPA network would be likely to be ecologically coherent, and will fulfil the requirements of the two Acts regarding creation of a network of conservation sites within the UK, subject to the:

- designation and adequate protection of the MPA proposals;
- progression of the remaining MPA search locations for mobile species and large-scale features of functional significance through to designated MPAs;
- completion of the Natura work programme; and
- continued protection of features through existing measures.

The OSPAR principles, set out in their guidance on developing an ecologically coherent network of OSPAR marine protected areas (OSPAR Commission, 2006), were reflected in the Scottish MPA Selection Guidelines and helped to ensure that they were an integral component of network design. In the absence of an agreed approach to assessing whether the network would be ecologically coherent in OSPAR regions, in Section 9.2 we have provided a provisional assessment that considers the spatial distribution of the sites and the coverage of broadscale habitats and threatened and declining habitats and species. On this basis, we consider the network of sites would be spatially well distributed. We judge that the range of EUNIS level 3 habitats in Scotland's seas would be represented and replicated within the proposed network[13], as would be the OSPAR Threatened and/or Declining habitats and species. As our understanding of ecosystem processes and connectivity improve it will be possible to undertake a more sophisticated assessment of coherence, the conclusions of which will be presented when the network is reviewed in 2018. Subject to the designation of the proposed network of MPAs, our conclusion is that Scotland would be likely to make its expected contribution to ecologically coherent networks of MPAs within the OSPAR maritime area.

The OSPAR commitment relates not only to establishing the network, but ensuring that it is well managed. Contracting Parties have committed to achieving a 'well managed network' by 2016. Work is underway to develop guidance on management of MPAs to provide advice for individual Nature Conservation MPA proposals.

10.1 Future assessments of the ecological coherence of the network

One of the key OSPAR network principles relates to the connectivity between features within the MPAs comprising the network. To date this principle has only been assessed for some of the mobile species and large-scale features. These assessments have considered the relationship between the role a Nature Conservation MPA proposal may play (e.g. areas for feeding) and the wider connectivity with the network (e.g. export of larvae from MPAs), where this information is available. The results of modelling work undertaken by Marine Scotland Science will be considered in assessing linkages for seabed habitats and low or limited mobility species in 2013 (see Marine Scotland Science, 2012c).

The UK Government, the Devolved Administrations and the Statutory Nature Conservation Bodies are working towards a methodology for assessing the contribution the UK's MPAs make to international obligations for ecologically coherent network(s) of MPAs. We expect that the new proposals for MPAs in Scotland, in conjunction with existing components of the network in Scotland's seas, will form a significant part of the UK's contribution to meeting these international obligations - alongside new and existing MPAs in the rest of UK waters.

11 RECOMMENDATIONS TO SCOTTISH MINISTERS

Our advice contains 33 MPA proposals (including science-based alternatives and proposals of equivalent ecological value) and four MPA search locations.

[13] The network will comprise existing protected areas, Nature Conservation MPAs, and some area-based measures which are designed for purposes other than marine nature conservation

SNH and JNCC recommend at least 29 of the 33 Nature Conservation MPA proposals are designated (12 in offshore waters and 17 in territorial waters), along with MPAs derived from the remaining four MPA search locations in territorial waters, to meet the obligations under the two Marine Acts and make an appropriate contribution to wider policy aspirations for an ecologically coherent network of MPAs. We note that Ministers are able to take socio-economic information into account when deciding which of the science-based alternatives and ecologically equivalent proposals in offshore waters should be taken forward. When Ministers have considered our advice, we will provide more detailed site-based information on those proposals accepted for public consultation.

SNH recommends that work currently underway to support the assessment of the remaining four MPA search locations in territorial waters against the Scottish MPA Selection Guidelines is completed. The four MPA search locations are Southern Trench, Eye Peninsula to Butt of Lewis, Shiant East Bank and Skye to Mull. In our view these areas could make a significant contribution to the Scottish MPA network and we propose to provide advice in 2013 and 2014 to Scottish Ministers on whether to progress them. These locations should not be considered as substitutes for Nature Conservation MPAs already recommended. They are being assessed for features (primarily mobile species) that would otherwise not be adequately protected within the network according to the Selection Guidelines.

JNCC identified the Firth of Forth Banks Complex proposal for offshore subtidal sands and gravels features, ocean quahog, shelf banks and mounds, and to represent a range of geodiversity features. At the request of Marine Scotland, JNCC identified science-based alternatives for these features in OSPAR Region II. These alternatives are Turbot Bank and the Norwegian Boundary Sediment Plain. Our analysis of the evidence concludes that the Firth of Forth Banks Complex MPA proposal has higher biodiversity and geodiversity conservation value than the alternative proposals and it is therefore our preferred option for the protection of the features it contains. We note that the Ministers have the discretion offered under the Acts to use additional information to decide which option is progressed to meet the network obligations.

Based on application of the MPA Selection Guidelines and the best available evidence, JNCC recommend that Geikie Slide and the Hebridean Slope, and South-west Sula Sgeir and Hebridean Slope have equivalent ecological value in terms of their contribution to the MPA network in Scotland's seas and either option could be progressed. The Scottish MPA Selection Guidelines state that in such circumstances the Minister is able to take socio-economic information into account when choosing between areas that could make an equivalent contribution to the network.

JNCC recommend that the Central Fladen MPA proposal is progressed to protect the components of the burrowed mud feature known to occur in the Fladen Grounds. However, at the request of Marine Scotland, JNCC identified science-based alternative MPA proposals for a component of the burrowed mud habitat in the Central Fladen MPA proposal; these alternatives are the Western Fladen and the South-east Fladen MPA proposals.

JNCC recommend that although the Central Fladen Nature Conservation MPA proposal in its entirety was assessed as making a better contribution to the network the two alternative proposals could make an equivalent contribution to the network for the seapens and burrowing megafauna component of burrowed mud habitat. We note that the Scottish MPA Selection Guidelines suggest that in such circumstances, the Minister is able to take socio-economic information into account when choosing between areas that could make an equivalent contribution to the network.

We advise that 47 existing measures can contribute to the protection of MPA search features in Scotland's seas. We recommend that as part of the 6-yearly reporting cycles,

these existing measures, as well as the new MPA proposals, should be assessed to determine whether they continue to contribute to the network. We recommend that, in order to maintain the network's objectives, alternative protection measures should be identified at the same time that any existing protection measure for MPA search features is proposed for removal.

In making these recommendations, we have ensured this advice complies with the principles for the use of evidence as part of the Scottish MPA Project and with the recommendations on the use of scientific evidence set out in the review by Graham-Bryce (2011).

Data confidence assessments have been produced for each MPA proposal / search location and provide an accessible description and evaluation of the evidence used. They are published alongside this advice. We are working towards making relevant data available through a public-facing web portal to promote greater access and transparency to the supporting material used to support our recommendations.

12 THE WAY FORWARD

We expect the advice contained in this document to inform a report to Scottish Parliament in December 2012, outlining progress in the development of an ecologically coherent network of MPAs. We then expect Scottish Ministers to provide a steer on the next steps.

13 GLOSSARY

Additional features / add value - Reference to the inclusion and subsequent protection of other features (not restricted to MPA search features) which could benefit from site-based protection measures within an MPA. These features may be necessary to achieve coherence in the network and would be recognised as protected features (i.e. they would be formally designated as part of an MPA).

Adequate - The conclusion (*adequacy assessment* is the process) reached when the coverage of an MPA search feature within the Scottish MPA network meets the five parts of Stage 5 of the MPA Selection Guidelines: representation, replication, geographic range and variation, linkages and resilience. If all parts of the Stage 5 guidelines are met then the Scottish MPA network is assessed as adequate for that feature.

Area of Search (for SPAs) - Areas where further data analysis is being carried out to identify possible SPAs

Benthic - Describes animals and plants living in, or on, the sea bed.

Benthos - Community of plants and invertebrate animals that live on, in or near the sea bed, including the intertidal zone.

Best available evidence - Means scientific data, regardless of source, that are available to the MPA Project at the time of making decisions (e.g. to inform the identification of an MPA search location or subsequent refinements to boundaries during the application of the MPA Selection Guidelines) and that SNH, JNCC or Marine Scotland Science determine are the most accurate, reliable, and relevant for use in that decision.

Biogenic reef - Any structure that has been formed from living material. It can be applied to many fossilised structures, such as chalk cliffs, but is normally used to describe living structures such as those created by the cold-water coral *Lophelia pertusa*, colonial worms such as *Sabellaria* spp. and molluscs, including the horse mussel *Modiolus modiolus*.

Biogeographic zones or regions - Major subdivisions of the Earth's surface, encompassing plant and animal communities with common characteristics.

Connectivity - Measure of the extent to which the component MPAs in the network, and the features which they support, are connected to one another. As outlined in the MPA Selection Guidelines, the MPA network should take into account the linkages between marine ecosystems and the dependence of species and habitats on processes that occur outside the MPA concerned. The focus is more on mobile species.

Ecologically coherent - OSPAR states that an ecologically coherent network of MPAs:

i. Interacts with and supports the wider environment;
ii. Maintains the processes, functions and structures of the intended protected features across their natural range;
iii. Functions synergistically as a whole, such that the individual protected sites benefit from each other in order to achieve the other two objectives.

Additionally, an ecologically coherent network of MPAs may:

iv. Be designed to be resilient to changing conditions.

Ecological variation - The MPA Selection Guidelines (Stage 5) require that the range and geographic variation of features across Scotland's seas be reflected in the network of sites selected (see also **Geographic range**). Part of this involves consideration of the different environmental parameters to which features are subject and identifying examples of habitats that are present in different environmental conditions (with additional examples / sites identified as required to achieve this). For example, parameters such as depth zones, energy levels or substrate type influence the species that would be found within given examples of habitats.

Ecosystem services - Ecosystem services are the processes by which the environment produces resources utilised by humans, such as clean air, water, food and materials.

Essential areas for key life cycle stages - this applies to mobile species such as basking sharks and cetaceans. Essential areas are considered to include habitats known to be important for example, for feeding, reproduction and nursery stages. The focus of work on MPAs is on these essential areas considered to be persistent over time.

EUNIS - The European Nature Information System (EUNIS) habitat classification is a pan-European system, developed by the European Environment Agency (EEA) in collaboration with experts from throughout Europe. It covers all types of natural and artificial habitats, both aquatic and terrestrial.

Exposure - The degree to which marine habitats and species overlap geographically with pressures.

Geographic range - The MPA Selection Guidelines (Stage 5) apply the principle of ensuring that the geographic range of the search features across Scotland's seas is represented in the network of sites selected.

Habitat modelling - The process involves using data on different environmental variables (e.g. depth, slope, chlorophyll concentrations etc.) to understand more about the importance of an area for mobile species. The most significant variables can then be used to clarify why animals are in an area and / or better predict where they might be.

Insignificant - In relation to Nature Conservation MPAs, Section 82 of the Marine (Scotland) Act 2010 requires public authorities to exercise any function capable of affecting (other than insignificantly) any protected feature in a manner which helps achieve the stated conservation objectives for the site. These principles also apply at the MPA network level. Determining whether an impact is 'insignificant' is a judgement which will need to be made in each case.

Intertidal (also littoral) - The zone between the highest and lowest tides (also called the littoral zone).

Intertidal and subtidal zones - the intertidal (littoral) and subtidal (sublittoral) is divided into a number of zones or areas.

MPA search feature - The MPA search features are features of importance for nature conservation or ecosystem function in Scotland's seas that will benefit from spatial protection. They are mostly drawn from the list of Priority Marine Features, together with certain other features such as black guillemot, seamounts, shelf banks and mounds. MPA search features are being used to underpin the selection of MPAs. Together with features which are already included within existing protected areas, we think protecting the MPA search features will help us to deliver wider commitments including achieving Good Environmental Status under the Marine Strategy Framework Directive.

MPA search location - An area that is identified as a result of the application of the Stage 1 guidelines. An area remains a search location until it passes through Stage 4 of the guidelines (note some search locations are likely to drop out of the selection process during stages 2 - 4).

MPA proposal - The term MPA proposal refers to the package of advice submitted to Scottish Ministers outlining the case for the designation of an MPA. The Selection Guidelines allow for third parties to propose Demonstration & Research or Nature Conservation MPAs and these are referred to as MPA proposals once submitted for consideration (initially by the SCNBs or Marine Scotland respectively, prior to progression to the Minister). There will be a public consultation on each MPA proposal.

OSPAR - The Convention by which fifteen Governments of the western coasts and catchments of Europe, together with the European Community, cooperate to protect the marine environment of the North-East Atlantic.

Physiographic - Relating to physical features of the Earth's surface.

Pressure - A force acting upon the marine environment, for example smothering of seabed habitats and species or the introduction of barriers to species movements.

Pressure benchmark - A defined intensity at which a pressure is exerted.

Protected feature - Features which are formally protected by the designation order for a Nature Conservation MPA. May include MPA search features and other features which are considered to add to the broader representivity of the network (see Section 7.5). A conservation objective will be set for each protected feature on each Nature Conservation MPA.

Ramsar site - Protected wetland habitats used by important migratory bird species.

Representation - The MPA Selection Guidelines state that the sustainable use, protection and conservation of marine biological diversity and ecosystems mean areas which best represent the range of species, habitats and ecological processes (for which MPAs are a suitable measure) should be considered for inclusion in MPAs. Representation will be assessed primarily at the scale of Scotland's seas, with consideration given to the contribution to wider networks, particularly the UK.

Replication - Replication of features in separate MPAs in each biogeographic area is desirable where it is possible in order to contribute to the aims of the network. The Scottish MPA Selection Guidelines state that replication will be met if there is more than one example of each feature within the Scottish MPA network.

SACs - Special Areas of Conservation which protect habitats and species listed on the EC Habitats Directive, such as reefs, sandbanks and bottlenose dolphin. A possible SAC (pSAC) is a site that has had approval to go out to formal consultation. A site remains a pSAC until it is submitted to the European Commission when it becomes a candidate SAC (cSAC). A site remains a cSAC until it has been formally designated as a SAC by the UK Government, following approval as a Site of Community Importance (SCI) by the European Commission.

Sensitivity - The degree to which species or habitats are resilient and resistant to pressure.

Site - A catch-all expression referring to any Marine Protected Area formally designated by Scottish Ministers. Including, but not limited to, new MPAs identified under provisions in the Marine (Scotland) Act and UK Marine and Coastal Access Act, Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and Sites of Special Scientific Interest (SSSIs).

SPAs - Special Protection Areas, which protect wild birds listed on the EC Birds Directive, such as red-throated diver and common scoter.

SSSIs - Sites of Special Scientific Interest, which protect nationally important habitats, species and geological features and generally fall above the mean low water mark. Where they do extend into the marine environment, SSSIs can be used to protect lagoon or intertidal features such as beds of eelgrass and sealoch egg wrack.

Subtidal (or sublittoral) - The area just below the intertidal (or littoral) zone, which is submerged most of the time, exposed briefly during extreme low tides.

Third-party proposal - An MPA proposal submitted by a coastal community or marine interest group (essentially anyone other than the partners of the Scottish MPA Project e.g. Marine Scotland, SNH, JNCC, Historic Scotland and SEPA).

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Appendix 1 Lists of existing measures contributing to the MPA network in Scotland's seas

Special Areas of Conservation (SACs)

Table A1.1 Qualifying habitats and species features of marine Special Areas of Conservation

Annex I habitats	***Annex II species***
Estuaries	Bottlenose dolphin (*Tursiops truncatus*)
Lagoons	Harbour porpoise (*Phocoena phocoena*)
Large shallow inlets and bays	Grey seal (*Halichoerus grypus*)
Mudflats and sandflats not covered by seawater at low tide	Common seal (*Phoca vitulina*)
Reefs	
Sandbanks which are slightly covered by seawater all the time	
Submarine structures made by leaking gases	
Submerged or partially submerged sea caves	

Table A1.2 Possible[14] marine Special Areas of Conservation (pSACs) in Scottish waters

OSPAR Region	***Possible SAC name***	***Features***
III	Sound of Barra	Reefs, sandbanks which are slightly covered by seawater all the time, common seal

Table A1.3 Candidate marine Special Areas of Conservation (cSACs) in Scottish waters

OSPAR Region	***Candidate SAC name***	***Features***
II	Pobie Bank	Reefs
II & III	Solan Bank	Reefs
III	East Mingulay	Reefs
V	Anton Dhorn	Reefs
V	East Rockall Bank	Reefs
V	Hatton Bank	Reefs

Table A1.4 Marine Special Areas of Conservation (SACs) in Scottish waters

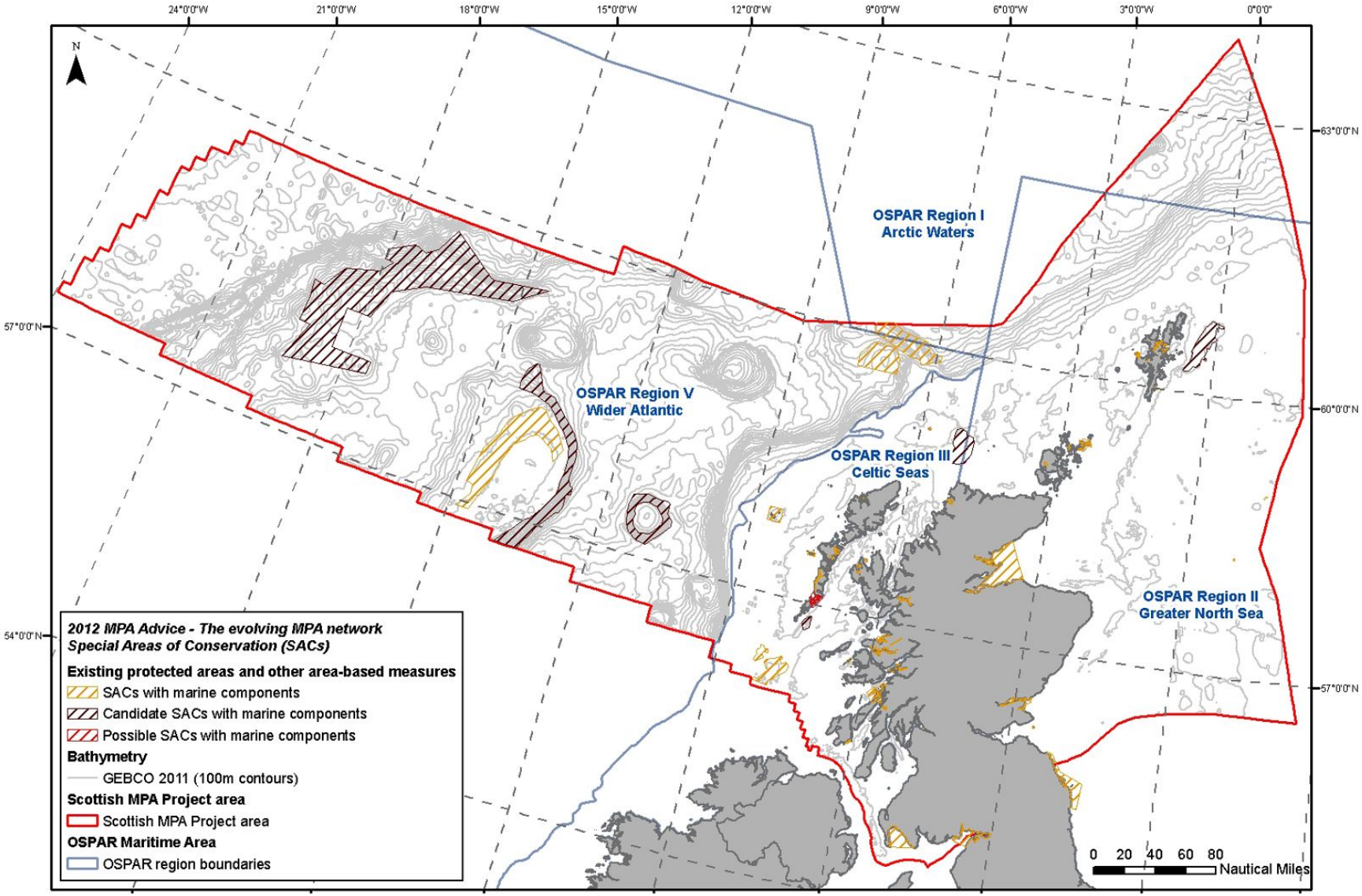
OSPAR Region	***SAC name***	***Features***
II	Berwickshire and North Northumberland Coast	Large shallow inlets and bays, mudflats and sandflats not covered by seawater at low tide, reefs, submerged or partially submerged sea caves, grey seal
II	Braemar Pockmarks	Submarine structures made by leaking gases
II	Dornoch Firth and Morrich More	Estuaries, mudflats and sandflats not covered by seawater at low tide, reefs, sandbanks which are slightly covered by seawater all the time, common seal
II	Faray and Holm of Faray	Grey seal
II	Firth of Tay and Eden Estuary	Estuaries, mudflats and sandflats not covered by seawater at low tide, sandbanks which are slightly covered by seawater all the time, common seal
II	Isle of May	Reefs, grey seal

[14] SNH consulted on the Sound of Barra pSAC between the 16 September 2011 - 16 January 2012

OSPAR Region	***SAC name***	***Features***
II	Loch of Stenness	Lagoons
II	Moray Firth	Sandbanks which are slightly covered by seawater all the time, bottlenose dolphin
II	Mousa	Reefs, submerged or partially submerged sea caves, common seal
II	Papa Stour	Reefs, submerged or partially submerged sea caves
II	Sanday	Mudflats and sandflats not covered by seawater at low tide, reefs, sandbanks which are slightly covered by seawater all the time, common seal
II	Scanner Pockmark	Submarine structures made by leaking gases
II	Sullom Voe	Lagoons, large shallow inlets and bays, reefs
II	The Vadills	Lagoons
II	Yell Sound Coast	Common seal
III	Ascrib, Isay and Dunvegan	Common seal
III	Eileanan agus Sgeiran Lios mor	Common seal
III	Firth of Lorn	Reefs
III	Loch Creran	Reefs
III	Lochs Duich, Long and Alsh Reefs	Reefs
III	Loch Laxford	Large shallow inlets and bays, reefs
III	Loch Moidart and Loch Shiel Woods	Mudflats and sandflats not covered by seawater at low tide
III	Loch nam Madadh	Large shallow inlets and bays, lagoons, mudflats and sandflats not covered by seawater at low tide, reefs, sandbanks which are slightly covered by seawater all the time
III	Loch Roag Lagoons	Lagoons
III	Luce Bay and Sands	Large shallow inlets and bays, mudflats and sandflats not covered by seawater at low tide reefs, sandbanks which are slightly covered by seawater all the time
III	Moine Mhor	Mudflats and sandflats not covered by seawater at low tide
III	Monach Islands	Grey seal
III	North Rona	Reefs, submerged or partially submerged sea caves, grey seal
III	Obain Loch Euphoirt	Lagoons
III	Solway Firth	Estuaries, mudflats and sandflats not covered by seawater at low tide, reefs, sandbanks which are slightly covered by seawater all the time
III	Sound of Arisaig (Loch Ailort to Loch Ceann Traigh)	Sandbanks which are slightly covered by seawater all the time
III	South Uist Machair	Lagoons
III	South-East Islay Skerries	Common seal
III	Stanton Banks	Reefs
III	St Kilda	Reefs, submerged or partially submerged sea caves

OSPAR Region	***SAC name***	***Features***
III	Sunart	Reefs
III	Treshnish Isles	Reefs, grey seal
V	Darwin Mounds	Reefs
V	North West Rockall Bank	Reefs
V	Wyville Thomson Ridge	Reefs

Figure A1.1 Marine Special Areas of Conservation (SACs) 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 [2012]. All rights reserved. Ordnance Survey Licence number 100017908. Bathymetry ©GEBCO. NOT TO BE USED FOR NAVIGATION. MPA network ©SNH, JNCC and Marine Scotland. 05.10.12. All rights reserved.

Special Protection Areas (SPAs)

Table A1.5 List of bird species dependent on the marine environment that are qualifying interests/notified features of SPAs and/or SSSIs in Scotland

Species name	***Species name***
Arctic skua (*Stercorarius parasiticus*)	Lesser black-backed gull (*Larus fuscus*)
Arctic tern (*Sterna paradisaea*)	Light-bellied brent goose (*Branta bernicla hrota*)
Atlantic puffin (*Fratercula arctica*)	Little tern (*Sternula albifrons*)
Bar-tailed godwit (*Limosa lapponica*)	Long-tailed duck (*Clangula hyemalis*)
Black guillemot (*Cepphus grylle*)	Manx shearwater (*Puffinus puffinus*)
Black-headed gull (*Larus ridibundus*)	Northern pintail (*Anas acuta*)
Black-legged kittiwake (*Rissa tridactyla*)	Oystercatcher (*Haematopus ostralegus*)
Black-tailed godwit (*Limosa limosa*)	Purple sandpiper (*Calidris maritima*)
Black-throated diver (*Gavia arctica*)	Razorbill (*Alca torda*)
Common gull (*Larus canus*)	Red-breasted merganser (*Mergus serrator*)
Common scoter (*Melanitta nigra*)	Red-necked phalarope (*Phalaropus lobatus*)
Common tern (*Sterna hirundo*)	Redshank (*Tringa tetanus*)
Cormorant (*Phalacrocorax carbo*)	Red-throated diver (*Gavia stellata*)
Curlew (*Numenius arquata*)	Ringed plover (*Charadrius hiaticula*)
Dunlin (*Calidris alpina alpine*)	Roseate tern (*Sterna dougallii*)
Eider (*Somateria mollissima*)	Sanderling (*Calidris alba*)
Northern fulmar (*Fulmarus glacialis*)	Sandwich tern (*Sterna sandvicensis*)
Northern gannet (*Morus bassanus*)	Scaup (*Aythya marila*)
Golden plover (*Pluvialis apricaria*)	Shag (*Phalacrocorax aristotelis*)
Goldeneye (*Bucephala clangula*)	Shelduck (*Tadorna tadorna*)
Goosander (*Mergus merganser*)	Slavonian grebe (*Podiceps auritus*)
Great black-backed gull (*Larus marinus*)	Storm petrel (*Hydrobates pelagicus*)
Great crested grebe (*Podiceps cristatus*)	Teal (*Anas crecca*)
Great skua (*Stercorarius skua*)	Turnstone (*Arenaria interpres*)
Greenshank (*Tringa nebularia*)	Velvet scoter (*Melanitta fusca*)
Grey plover (*Pluvialis squatarola*)	Whimbrel (*Numenius phaeopus*)
Guillemot (*Uria aalge*)	Wigeon (*Anas penelope*)
Herring gull (*Larus argentatus*)	***Species assemblages -***
Knot (*Calidris canutus*)	Seabird assemblage
Leach's petrel (*Oceanodroma leucorhoa*)	Waterfowl assemblage

Table A1.6 Special Protection Areas (SPAs) supporting bird species that are dependent upon Scotland's marine environment (marine associations / components)

Sites marked with an * overlap with the intertidal zone (x45 SPAs) and are either estuarine or truly coastal (i.e. they contain intertidal habitats upon which one or more of the qualifying bird species depend) or have been extended into the marine environment. This subset of 45 sites are considered to contribute to the Scottish MPA network and through ongoing processes have been recommended for progression as OSPAR MPAs. Also highlighted are the x49 SPAs for seabirds (marked with a #) and the subset of x31 of these SPAs that have been extended into the marine environment (marked with a @)

OSPAR Region	***SPA***	***Features***
II	Auskerry#	Arctic tern (breeding), storm petrel (breeding)
II	Buchan Ness to Collieston Coast* # @	Fulmar (breeding), guillemot (breeding), herring gull (breeding), kittiwake (breeding), shag (breeding), seabird assemblage (breeding)
II	Calf of Eday* # @	Cormorant (breeding), fulmar (breeding), great black-backed gull (breeding), guillemot (breeding), kittiwake (breeding), seabird assemblage (breeding)
II	Copinsay* # @	Fulmar (breeding), great black-backed gull (breeding), guillemot (breeding), kittiwake (breeding), seabird assemblage (breeding)
II	Cromarty Firth* #	Bar-tailed godwit (non-breeding), common tern (breeding), curlew (non-breeding), dunlin (non-breeding), knot (non-breeding), northern pintail (non-breeding), oystercatcher (non-breeding), red-breasted merganser (non-breeding), redshank (non-breeding), scaup (non-breeding), wigeon (non-breeding), waterfowl assemblage (non-breeding)
II	Dornoch Firth and Loch Fleet*	Bar-tailed godwit (non-breeding), curlew (non-breeding), dunlin (non-breeding), oystercatcher (non-breeding), teal (non-breeding), wigeon (non-breeding), waterfowl assemblage (non-breeding)
II	East Caithness Cliffs* # @	Cormorant (breeding), fulmar (breeding), great black-backed gull (breeding), guillemot (breeding), herring gull (breeding), kittiwake (breeding), puffin (breeding), razorbill (breeding), shag (breeding), seabird assemblage (breeding)
II	East Sanday Coast*	Bar-tailed godwit (non-breeding), purple sandpiper (non-breeding), turnstone (non-breeding)
II	Fair Isle* # @	Arctic skua (breeding), Arctic tern (breeding), fulmar (breeding), gannet (breeding), great skua (breeding), guillemot (breeding), kittiwake (breeding), puffin (breeding), razorbill (breeding), shag (breeding), seabird assemblage (breeding)
II	Fetlar* # @	Arctic skua (breeding), Arctic tern (breeding), dunlin (breeding), fulmar (breeding), great skua (breeding), red-necked phalarope (breeding), whimbrel (breeding), seabird assemblage (breeding)

OSPAR Region	***SPA***	***Features***
II	Firth of Forth*	Bar-tailed godwit (non-breeding), common scoter, cormorant (non-breeding), curlew (non-breeding), dunlin (non-breeding), eider (non-breeding), golden plover (non-breeding), goldeneye (non-breeding), great crested grebe (non-breeding), grey plover (non-breeding), knot (non-breeding), long-tailed duck (non-breeding), oystercatcher (non-breeding), red-breasted merganser (non-breeding), redshank (non-breeding), red-throated diver (non-breeding), ringed plover (non-breeding), sandwich tern (passage), scaup (non-breeding), shelduck (non-breeding), Slavonian grebe (non-breeding), turnstone (non-breeding), velvet scoter (non-breeding), wigeon (non-breeding), waterfowl assemblage (non-breeding)
II	Firth of Tay and Eden Estuary* #	Bar-tailed godwit (non-breeding), black-tailed godwit (non-breeding), common scoter (non-breeding), cormorant (non-breeding), dunlin (non-breeding), eider (non-breeding), goldeneye (non-breeding), goosander (non-breeding), grey plover (non-breeding), little tern (breeding), long-tailed duck (non-breeding), oystercatcher (non-breeding), red-breasted merganser (non-breeding), redshank (non-breeding), sanderling (non-breeding), shelduck (non-breeding), velvet scoter (non-breeding), waterfowl assemblage (non-breeding)
II	Forth Islands* # @	Arctic tern (breeding), common tern (breeding), cormorant (breeding), fulmar (breeding), gannet (breeding), guillemot (breeding), herring gull (breeding), kittiwake (breeding), lesser black-backed gull (breeding), puffin (breeding), razorbill (breeding), roseate tern (breeding), sandwich tern (breeding), shag (breeding), seabird assemblage (breeding)
II	Foula* # @	Arctic skua (breeding), Arctic tern (breeding), fulmar (breeding), great skua (breeding), guillemot (breeding), kittiwake (breeding), Leach's petrel (breeding), puffin (breeding), razorbill (breeding), red-throated diver (breeding), shag (breeding), seabird assemblage (breeding)
II	Fowlsheugh* # @	Fulmar (breeding), guillemot (breeding), herring gull (breeding), kittiwake (breeding), razorbill (breeding), seabird assemblage (breeding)
II	Hermaness, Saxa Vord & Valla Field* # @	Fulmar (breeding), gannet (breeding), great skua (breeding), guillemot (breeding), kittiwake (breeding), puffin (breeding), red-throated diver (breeding), shag (breeding), seabird assemblage (breeding)
II	Hoy* # @	Arctic skua (breeding), fulmar (breeding), great black-backed gull (breeding), great skua (breeding), guillemot (breeding), kittiwake (breeding), puffin (breeding), red-throated diver (breeding), seabird assemblage (breeding)
II	Imperial Dock Lock, Leith	Common tern (breeding)

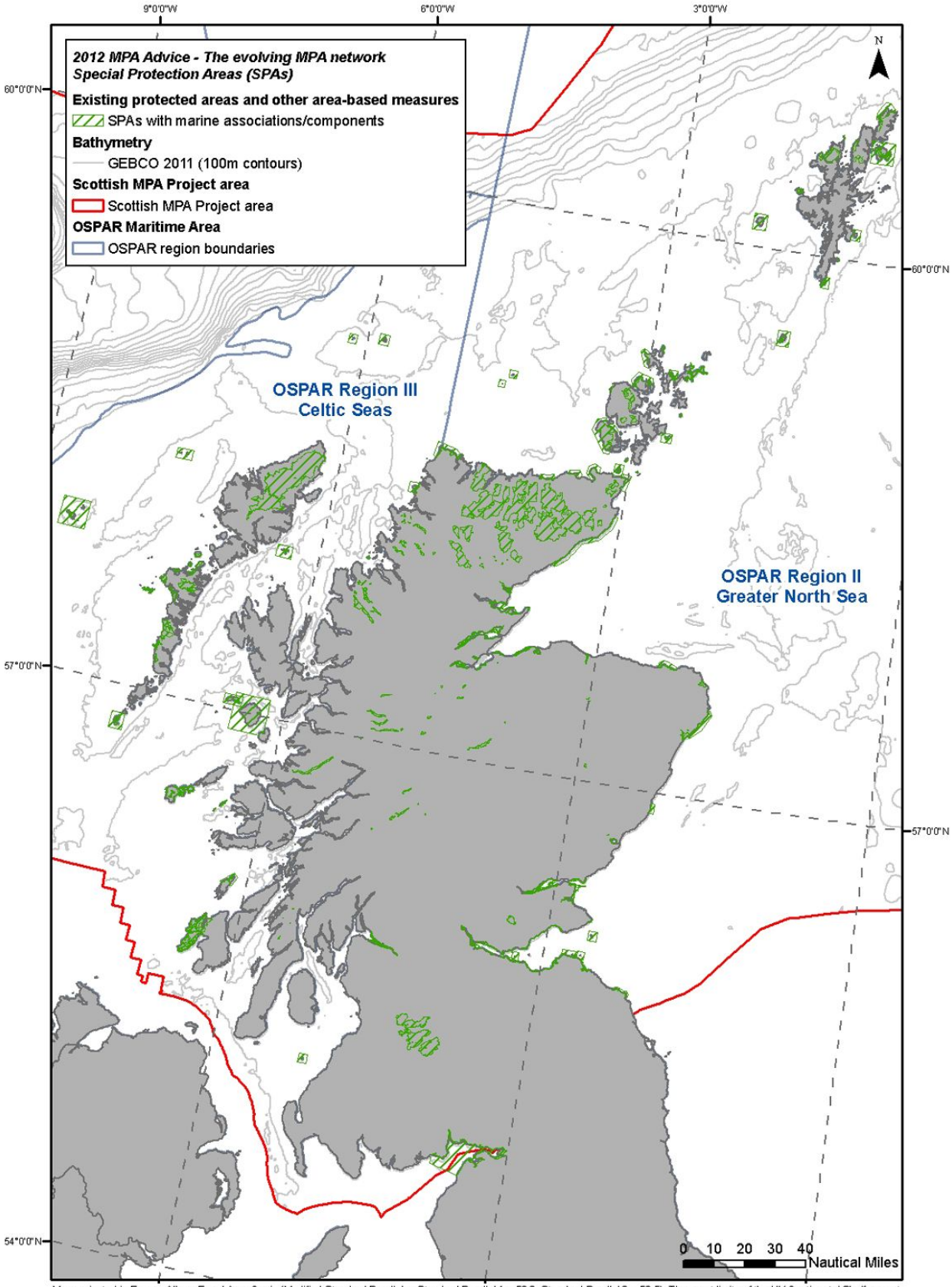
OSPAR Region	***SPA***	***Features***
II	Inner Moray Firth* #	Bar-tailed godwit (non-breeding), common tern (breeding), cormorant (non-breeding), curlew (non-breeding), goldeneye (non-breeding), goosander (non-breeding), oystercatcher (non-breeding), red-breasted merganser (non-breeding), redshank (non-breeding), scaup (non-breeding), wigeon (non-breeding), teal (non-breeding), waterfowl assemblage (non-breeding)
II	Lairg & Strath Brora Lochs	Black throated diver (breeding)
II	Loch Ashie	Slavonian grebe (breeding and non-breeding)
II	Loch Flemington	Slavonian grebe (breeding)
II	Loch Leven	Cormorant (non-breeding), goldeneye (non-breeding), teal (non-breeding), waterfowl assemblage (non-breeding)
II	Loch of Strathbeg#	Sandwich tern (breeding), teal (non-breeding), waterfowl assemblage (non-breeding)
II	Loch Ruthven	Slavonian grebe (breeding)
II	Loch Vaa	Slavonian grebe (breeding)
II	Marwick Head* # @	Guillemot (breeding), kittiwake (breeding), seabird assemblage (breeding)
II	Montrose Basin*	Dunlin (non-breeding), eider (non-breeding), knot (non-breeding), oystercatcher (non-breeding), redshank (non-breeding), shelduck (non-breeding), wigeon (non-breeding), waterfowl assemblage (non-breeding)
II	Moray and Nairn Coast*	Bar-tailed godwit (non-breeding), common scoter (non-breeding), dunlin (non-breeding), long-tailed duck (non-breeding), oystercatcher (non-breeding), red-breasted merganser (non-breeding), redshank (non-breeding) velvet scoter (non-breeding), wigeon (non-breeding), waterfowl assemblage (non-breeding)
II	Mousa#	Arctic tern (breeding), storm petrel (breeding)
II	Muir of Dinnet	Waterfowl assemblage (non-breeding)
II	North Caithness Cliffs* # @	Fulmar (breeding), guillemot (breeding), kittiwake (breeding), puffin (breeding), razorbill (breeding), seabird assemblage (breeding)
II	North Inverness Lochs	Slavonian grebe (breeding)
II	Noss* # @	Fulmar (breeding), gannet (breeding), great skua (breeding), guillemot (breeding), kittiwake (breeding), puffin (breeding), seabird assemblage (breeding)
II	Orkney Mainland Moors	Red-throated diver (breeding)
II	Otterswick and Graveland	Red-throated diver (breeding)
II	Papa Stour* #	Arctic tern (breeding), ringed plover (breeding)
II	Papa Westray (North Hill and Holm)#	Arctic skua (breeding), Arctic tern (breeding)
II	Pentland Firth Islands#	Arctic tern (breeding)
II	Ramna Stacks & Gruney#	Leach's petrel (breeding)
II	Rannoch Lochs	Black-throated diver (breeding)
II	Ronas Hill - North Roe and Tingon#	Great skua (breeding), red-throated diver (breeding)

OSPAR Region	***SPA***	***Features***
II	Rousay* # @	Arctic skua (breeding), Arctic tern (breeding), fulmar (breeding), guillemot (breeding), kittiwake (breeding), seabird assemblage (breeding)
II	St Abb's Head to Fast Castle* # @	Guillemot (breeding), herring gull (breeding), kittiwake (breeding), razorbill (breeding), shag (breeding), seabird assemblage (breeding),
II	Sule Skerry and Sule Stack* # @	Gannet (breeding), guillemot (breeding), Leach's petrel (breeding), puffin (breeding), shag (breeding), storm petrel (breeding), seabird assemblage (breeding)
II	Sumburgh Head* # @	Arctic tern (breeding), fulmar (breeding), guillemot (breeding), kittiwake (breeding), seabird assemblage (breeding)
II	Tips of Corsemaul and Tom Mor#	Common gull (breeding)
II	Troup, Pennan and Lion's Head* # @	Fulmar (breeding), guillemot (breeding), herring gull (breeding), kittiwake (breeding), razorbill (breeding), seabird assemblage (breeding)
II	West Westray* # @	Arctic skua (breeding), Arctic tern (breeding), fulmar (breeding), guillemot (breeding), kittiwake (breeding), razorbill (breeding), seabird assemblage
II	Ythan Estuary, Sands of Forvie and Meikle Loch#	Common tern (breeding), eider (non-breeding), little tern (breeding), redshank (non-breeding), sandwich tern (breeding), waterfowl assemblage (non-breeding)
II & III	Caithness and Sutherland Peatlands	Black-throated diver (breeding), common scoter (breeding), dunlin (breeding), golden plover (breeding), greenshank (breeding), red-throated diver (breeding), wigeon (breeding)
II & III	Loch Knockie and Nearby Lochs	Slavonian grebe (breeding)
II & III	River Spey-Insh Marshes	Wigeon (breeding)
III	Ailsa Craig* # @	Gannet (breeding), guillemot (breeding), herring gull (breeding), kittiwake (breeding), lesser black-backed gull (breeding), seabird assemblage (breeding)
III	Assynt Lochs	Black-throated diver (breeding)
III	Canna and Sanday* # @	Guillemot (breeding), herring gull (breeding), kittiwake (breeding), puffin (breeding), shag (breeding), seabird assemblage (breeding)
III	Cape Wrath* # @	Fulmar (breeding), guillemot (breeding), kittiwake (breeding), puffin (breeding), razorbill (breeding), seabird assemblage (breeding)
III	Flannan Isles* # @	Fulmar (breeding), guillemot (breeding), kittiwake (breeding), Leach's petrel (breeding), puffin (breeding), razorbill (breeding), seabird assemblage (breeding)
III	Glas Eileanan#	Common tern (breeding)
III	Gruinart Flats*	Light-bellied Brent goose (passage)
III	Handa* # @	Fulmar (breeding), great skua (breeding), guillemot (breeding), kittiwake (breeding), razorbill (breeding), seabird assemblage (breeding)

OSPAR Region	***SPA***	***Features***
III	Inner Clyde*	Redshank (non-breeding)
III	Inverpolly, Loch Urigill & nearby lochs	Black-throated diver (breeding)
III	Knapdale Lochs	Black-throated diver (breeding)
III	Lewis Peatlands	Black-throated diver (breeding), dunlin (breeding), golden plover (breeding), greenshank (breeding), red-throated diver (breeding)
III	Loch Maree	Black-throated diver (breeding)
III	Loch Shiel	Black-throated diver (breeding)
III	Mingulay and Berneray* [#] [@]	Fulmar (breeding), guillemot (breeding), kittiwake (breeding), puffin (breeding), razorbill (breeding), shag (breeding), seabird assemblage (breeding)
III	Mointeach Scadabhaigh	Black-throated diver (breeding), red-throated diver (breeding)
III	Monach Isles[#]	Common tern (breeding), little tern (breeding)
III	Muirkirk and North Lowther Uplands	Golden plover (breeding)
III	North Colonsay and Western Cliffs* [#] [@]	Guillemot (breeding), kittiwake (breeding), seabird assemblage (breeding)
III	North Rona and Sula Sgeir* [#] [@]	Fulmar (breeding), gannet (breeding), great black-backed gull (breeding), guillemot (breeding), kittiwake (breeding), Leach's petrel (breeding), puffin (breeding), razorbill (breeding), storm petrel (breeding), seabird assemblage (breeding)
III	North Uist Machair and Islands*	Dunlin (breeding), oystercatcher (breeding), purple sandpiper (non-breeding), redshank (breeding), ringed plover (breeding and non-breeding), turnstone (non-breeding)
III	Priest Island[#]	Storm petrel (breeding)
III	Rinns of Islay	Common scoter (breeding)
III	Rum* [#] [@]	Guillemot (breeding), kittiwake (breeding), Manx shearwater (breeding), red-throated diver (breeding), seabird assemblage (breeding)
III	Shiant Isles* [#] [@]	Fulmar (breeding), guillemot (breeding), kittiwake (breeding), puffin (breeding), razorbill (breeding), shag (breeding), seabird assemblage (breeding)
III	Sleibhtean agus Cladach Thirodh	Dunlin (breeding), oystercatcher (breeding), redshank (breeding), ringed plover (breeding and non-breeding), turnstone (breeding)
III	South Uist Machair and Lochs* [#]	Dunlin (breeding), little tern (breeding), oystercatcher (breeding), redshank (breeding), ringed plover (breeding and non-breeding), sanderling (non-breeding)
III	St Kilda* [#] [@]	Fulmar (breeding), gannet (breeding), great skua (breeding), guillemot (breeding), kittiwake (breeding), Leach's petrel (breeding), Manx shearwater (breeding), puffin (breeding), razorbill (breeding), storm petrel (breeding), seabird assemblage (breeding)
III	Treshnish Isles[#]	Storm petrel (breeding)

OSPAR Region	***SPA***	***Features***
III	Upper Solway Flats and Marshes*****	Bar-tailed godwit (non-breeding), cormorant (non-breeding), curlew (non-breeding), dunlin (non-breeding), goldeneye (non-breeding), golden plover (non-breeding), grey plover (non-breeding), great crested grebe (non-breeding), knot (non-breeding), northern pintail (non-breeding), oystercatcher (non-breeding), redshank (non-breeding), ringed plover (non-breeding and passage), scaup (non-breeding), shelduck (non-breeding), waterfowl assemblage (non-breeding)
III	West Inverness-shire Lochs	Black-throated diver (breeding), common scoter (breeding)
III	Wester Ross Lochs	Black-throated diver (breeding)

Figure A1.2 Special Protection Areas (SPAs) supporting bird species that are dependent upon Scotland's marine environment (marine associations)



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 [2012]. All rights reserved. Ordnance Survey Licence number 100017908. Bathymetry ©GEBCO. NOT TO BE USED FOR NAVIGATION. MPA network ©SNH, JNCC and Marine Scotland. 05.10.12. All rights reserved.

Sites of Special Scientific Interest (SSSIs)

Table A1.7 Marine notified habitats and species features of Sites of Special Scientific Interest (SSSIs) around the Scottish coastline
For list of applicable bird species refer to Table A1.5

Habitats	***Species***
Eel grass bed	Brackish water cockle (*Cerastoderma lamarki*)
Mudflats	Egg wrack (*Ascophyllum nodosum* ecad *mackaii*)
Rocky shore	Common seal (*Phoca vitulina*)
Saline lagoon	Grey seal (*Halichoerus grypus*)
Sandflats	Stonewort (*Lamprothamnium papulosum*)
Sea caves	Vascular plant assemblage [covers eel grass communities in some sites]
Tidal rapids	

Table A1.8 Sites of Special Scientific Interest (SSSIs) contributing to the protection of habitats and species dependent upon Scotland's marine environment
Sites marked with an * support bird species that are dependent upon Scotland's marine environment (marine associations / components) and overlap with the intertidal (x24 SSSIs). These SSSIs are either estuarine or truly coastal (i.e. they contain intertidal habitats upon which one or more of the qualifying bird species depend). Sites marked with a # support marine habitat or species notified features (marine components - x53 sites). A total of x61 SSSIs (allowing for sites with marine habitat / species and bird interests) are considered to contribute to the MPA network

OSPAR Region	***SSSI***	***Features***
II	A' Mhoine	Dunlin (breeding), golden plover (breeding), greenshank (breeding)
II	Alvie	Goldeneye (breeding)
II	Auskerry	Arctic tern (breeding), storm petrel (breeding)
II	Badanloch Bogs	Golden plover (breeding), greenshank (breeding)
II	Balnagrantach	Slavonian grebe (breeding)
II	Bass Rock	Gannet (breeding), seabird colony (breeding)
II	Beauly Firth*	Goosander (non-breeding), red-breasted merganser (non-breeding)
II	Bemersyde Moss	Black-headed gull (breeding)
II	Ben Griams	Golden plover (breeding), greenshank (breeding)
II	Berriedale Cliffs	Fulmar (breeding), guillemot (breeding), kittiwake (breeding), razorbill (breeding), shag (breeding), seabird colony (breeding)
II	Berwickshire Coast (intertidal)#	Rocky shore, sea caves
II	Bullers of Buchan Coast	Guillemot (breeding), kittiwake (breeding), shag (breeding), seabird colony (breeding)
II	Calf of Eday	Cormorant (breeding)
II	Coir' an Eoin	Golden plover (breeding)
II	Collieston to Whinnyfold Coast	Fulmar (breeding), guillemot (breeding), kittiwake (breeding), razorbill (breeding), seabird colony (breeding)
II	Copinsay	Guillemot (breeding), kittiwake (breeding), seabird colony (breeding)
II	Correen Hills	Common gull (breeding)

OSPAR Region	***SSSI***	***Features***
II	Craig Hammel to Sgaps Geo	Guillemot (breeding), kittiwake (breeding), razorbill (breeding), seabird colony (breeding)
II	Cromarty Firth* #	Mudflats, sandflats, bar-tailed godwit (non-breeding), red breasted merganser (non-breeding), redshank (non-breeding), wigeon (non-breeding)
II	Crussa Field and the Heogs	Arctic skua (breeding), whimbrel (breeding)
II	Dalsetter	Arctic tern (breeding)
II	Doomy and Whitemaw Hill	Arctic skua (breeding), whimbrel (breeding)
II	Dornoch Firth* #	Eel grass beds, bar-tailed godwit (non-breeding), wigeon (non-breeding)
II	Dubh Lochs	Slavonian grebe (breeding)
II	Dunbeath Peatlands	Dunlin (breeding), golden plover (breeding), greenshank (breeding)
II	Duncansby Head	Fulmar (breeding), guillemot (breeding), kittiwake (breeding), seabird colony (breeding)
II	Dunnet Head	Guillemot (breeding), seabird colony (breeding)
II	East Halladale	Dunlin (breeding), golden plover (breeding)
II	East Sanday Coast* #	Rocky shore, sandflats, common seal, bar-tailed godwit (non-breeding), purple sandpiper (non-breeding), ringed plover (non-breeding), sanderling (non-breeding), turnstone (non-breeding & passage)
II	Eden Estuary* #	Mudflats, bar-tailed godwit (non-breeding), black-tailed godwit (non-breeding), common scoter (non-breeding), eider (non-breeding), grey plover (non-breeding), oystercatcher (non-breeding), red-breasted merganser (non-breeding), redshank (non-breeding), ringed plover (non-breeding), scaup (non-breeding), shelduck (non-breeding), velvet scoter (non-breeding)
II	Eilean Hoan	Great black-backed gull (breeding)
II	Eynhallow#	Common seal
II	Fair Isle	Arctic skua (breeding), fulmar (breeding), great skua (breeding), guillemot (breeding), kittiwake (breeding), razorbill (breeding), shag (breeding), seabird colony (breeding)
II	Faray and Holm of Faray#	Grey seal
II	Firth of Forth* #	Saline lagoon, bar-tailed godwit (non-breeding), common scoter (non-breeding), cormorant (non-breeding), curlew (non-breeding), dunlin (non-breeding), eider (breeding and non-breeding), goldeneye (non-breeding), golden plover (non-breeding), great crested grebe (non-breeding), grey plover (non-breeding), knot (non-breeding), long-tailed duck (non-breeding), oystercatcher (non-breeding), red-breasted merganser (non-breeding), red-throated diver (non-breeding), redshank (non-breeding), ringed plover (breeding and non-breeding), sandwich tern (passage), scaup (non-breeding), shelduck (breeding and non-breeding), Slavonian grebe (non-breeding), turnstone (non-breeding), velvet scoter (non-breeding), wigeon (non-breeding)

OSPAR Region	***SSSI***	***Features***
II	Forsinard Bogs	Common scoter (breeding), golden plover (breeding), greenshank (breeding)
II	Forth Islands	Cormorant (breeding), puffin (breeding), seabird colony (breeding)
II	Foula	Arctic skua (breeding), fulmar (breeding), great skua (breeding), guillemot (breeding), kittiwake (breeding), Leach's petrel (breeding), puffin (breeding), razorbill (breeding), shag (breeding), storm petrel (breeding), seabird colony (breeding)
II	Fowlsheugh	Fulmar (breeding), guillemot (breeding), kittiwake (breeding), puffin (breeding), razorbill (breeding), seabird colony (breeding)
II	Gamrie and Pennan Coast	Fulmar (breeding), gannet (breeding), guillemot (breeding), kittiwake (breeding), puffin (breeding) razorbill (breeding), seabird colony (breeding)
II	Graveland	Red-throated diver (breeding)
II	Hascosay	Dunlin (breeding)
II	Hermaness	Fulmar (breeding), gannet (breeding), great skua (breeding), guillemot (breeding), puffin (breeding), seabird colony (breeding)
II	Hill of Colvadale and Sobul	Arctic skua (breeding), whimbrel (breeding)
II	Holm of Papa Westray	Black guillemot (breeding)
II	Hoy	Arctic skua (breeding), fulmar (breeding), great black-backed gull (breeding), great skua (breeding), guillemot (breeding), red-throated diver (breeding), seabird colony (breeding)
II	Inchmickery	Fulmar (breeding), herring gull (breeding), lesser black-backed gull (breeding), shag (breeding)
II	Inner Tay Estuary*	Cormorant (non-breeding), goldeneye (non-breeding)
II	Isle of May* [#]	Grey seal, eider (breeding), guillemot (breeding), kittiwake (breeding), puffin (breeding), purple sandpiper (non-breeding), shag (breeding), seabird colony (breeding), turnstone (non-breeding)
II	Knockie Lochs	Slavonian grebe (breeding)
II	Lairg and Strath Brora Lochs	Black-throated diver (breeding)
II	Lamb Hoga	Arctic skua (breeding), great skua (breeding), Manx shearwater (breeding), storm petrel (breeding)
II	Loch Ashie	Slavonian grebe (non-breeding)
II	Loch Fleet* [#]	Eel grass bed, sandflats, eider (non-breeding)
II	Loch Leven	Cormorant (non-breeding), goldeneye (non-breeding), teal (non-breeding)
II	Loch of Isbister and the Loons	Northern pintail (breeding)
II	Loch of Skene	Common gull (non-breeding), goldeneye (non-breeding)
II	Loch of Strathbeg	Goldeneye (non-breeding)
II	Loch Ruthven	Slavonian grebe (breeding)
II	Loch Vaa	Slavonian grebe (breeding), goldeneye (breeding)

OSPAR Region	***SSSI***	***Features***
II	Lochs of Harray and Stenness* #	Saline lagoon, goldeneye (non-breeding), scaup (non-breeding)
II	Lon a' Chuil	Greenshank (breeding)
II	Long Craig Island	Roseate tern (breeding)
II	Longman and Castle Stuart Bays* #	Eel grass beds, mudflats, cormorant (non-breeding), goldeneye (non-breeding), red-breasted merganser (non-breeding), redshank (non-breeding), wigeon (non-breeding)
II	Marwick Head	Guillemot (breeding), kittiwake (breeding), seabird colony (breeding)
II	Mill Loch	Red-throated diver (breeding)
II	Monifieth Bay*	Sanderling (non-breeding)
II	Montrose Basin* #	Mudflats, eider (breeding and non-breeding), knot (non-breeding), oystercatcher (non-breeding), redshank (non-breeding), wigeon (non-breeding)
II	Moorfoot Hills	Golden plover (breeding)
II	Morrich More*	Bar-tailed godwit (non-breeding), curlew (non-breeding), teal (non-breeding), wigeon (non-breeding)
II	Morton Lochs	Teal (non-breeding)
II	Mound Alderwoods#	Saline lagoon
II	Mousa#	Common seal, Arctic tern (breeding), black guillemot (breeding), storm petrel (breeding)
II	Muckle and Little Green Holm#	Grey seal
II	Munlochy Bay* #	Mudflats, wigeon (non-breeding)
II	North Fetlar#	Common seal, grey seal, Arctic skua (breeding), Arctic tern (breeding), great skua (breeding), red-necked phalarope (breeding), whimbrel (breeding)
II	North Hill	Arctic skua (breeding), Arctic tern (breeding)
II	Noss	Arctic skua (breeding), gannet (breeding), great skua (breeding), guillemot (breeding), kittiwake (breeding), seabird colony (breeding)
II	Otterswick	Red-throated diver (breeding)
II	Papa Stour* #	Rocky shore, Arctic skua (breeding), Arctic tern (breeding), ringed plover (breeding)
II	Pentland Firth Islands	Arctic tern (breeding)
II	Pool of Virkie#	Mudflats
II	Ramna Stacks and Gruney	Guillemot (breeding), Leach's petrel (breeding), seabird colony (breeding)
II	Rannoch Lochs	Black-throated diver (breeding)
II	Red Point Coast	Guillemot (breeding)
II	Ronas Hill - North Roe	Red-throated diver (breeding)
II	Rosehearty to Fraserburgh Coast*	Curlew (non-breeding), eider (non-breeding), purple sandpiper (non-breeding), turnstone (breeding)
II	Rosemarkie to Shandwick Coast	Cormorant (breeding)

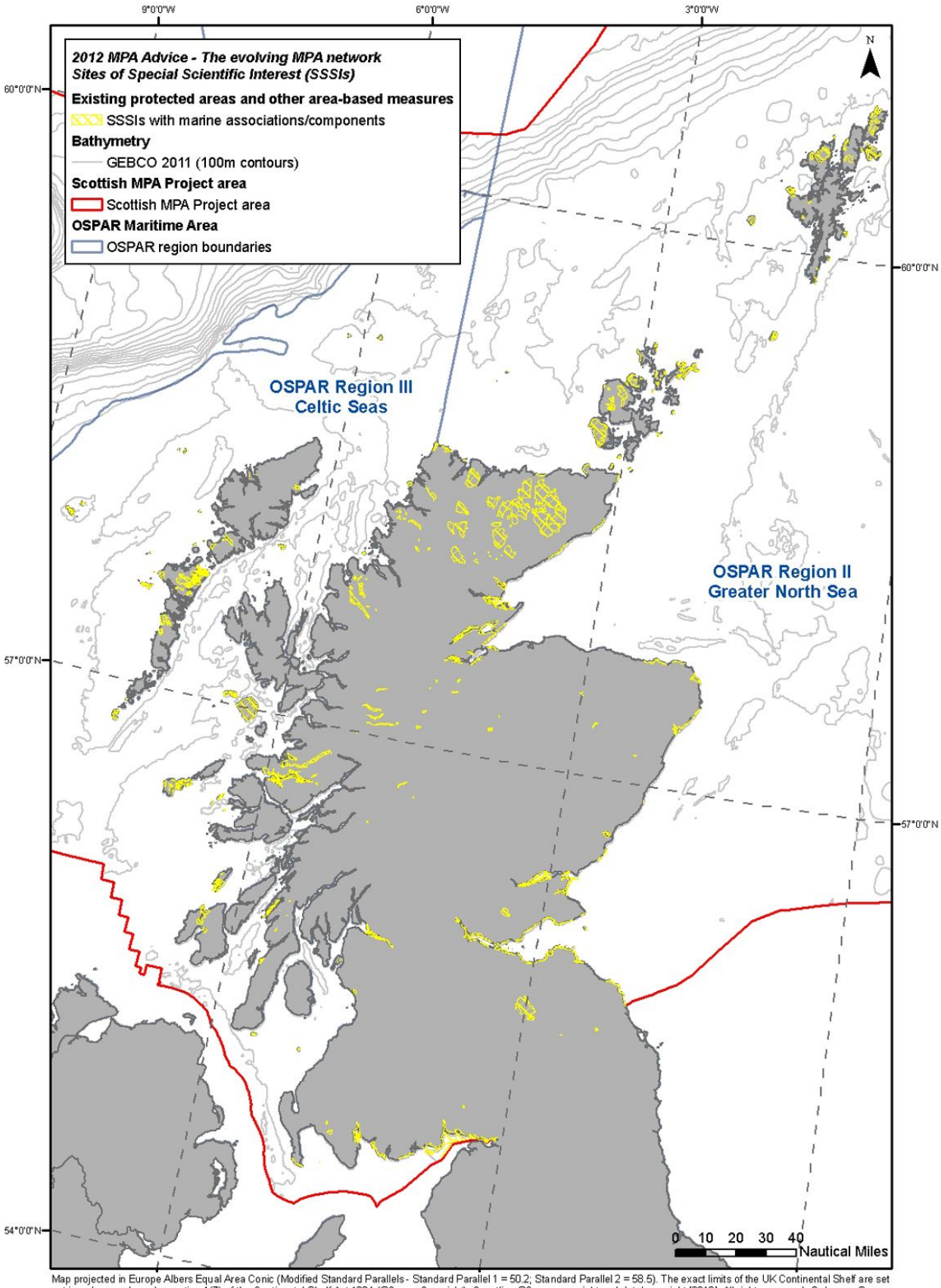
OSPAR Region	***SSSI***	***Features***
II	Rousay	Arctic skua (breeding), Arctic tern (breeding), guillemot (breeding), kittiwake (breeding), seabird colony (breeding)
II	Rumsdale Peatlands	Dunlin (breeding), golden plover (breeding), greenshank (breeding)
II	Sandness Coast#	Rocky shore
II	Sands of Forvie and Ythan Estuary	Arctic tern (breeding), common tern (breeding), eider (non-breeding and breeding), little tern (breeding), sandwich tern (breeding)
II	Saxa Vord	Fulmar (breeding), guillemot (breeding), seabird colony (breeding)
II	Skinsdale Peatlands	Dublin (breeding), golden plover (breeding), greenshank (breeding)
II	Sletill Peatlands	Common scoter (breeding), dunlin (breeding), golden plover (breeding), greenshank (breeding)
II	St Abb's Head to Fast Castle	Guillemot (breeding), kittiwake (breeding), seabird colony (breeding)
II	Strathmore Peatlands	Common scoter (breeding), dunlin (breeding), golden plover (breeding), greenshank (breeding), wigeon (breeding)
II	Stroma	Arctic tern (breeding), guillemot (breeding), sandwich tern (breeding), seabird colony (breeding)
II	Sule Skerry	Puffin (breeding), shag (breeding), storm petrel (breeding), seabird colony (breeding)
II	Sule Stack	Gannet (breeding)
II	Sumburgh Head	Guillemot (breeding), puffin (breeding), seabird colony (breeding), shag (breeding)
II	Syre Peatlands	Black-throated diver (breeding), greenshank (breeding), wigeon (breeding)
II	Tayport - Tenstmuir Coast* #	Mudflats, common seal, bar-tailed godwit (non-breeding), common scoter (non-breeding), eider (non-breeding), goosander (non-breeding), long-tailed duck (non-breeding), red-breasted merganser (non-breeding)
II	The Hirsel	Goosander (non-breeding)
II	The Vadills#	Egg wrack, saline lagoon, tidal rapids
II	Tingon	Red-throated diver (breeding), whimbrel (breeding)
II	Tips of Corsemaul and Tom Mor	Common gull (breeding)
II	Trona Mires	Arctic tern (breeding), red-necked phalarope (breeding)
II	Truderscaig	Greenshank (breeding)
II	Valla Field	Great skua (breeding), red-throated diver (breeding)
II	Ward of Culswick	Arctic skua (breeding), whimbrel (breeding)
II	West Halladale	Black-throated diver (breeding), common scoter (breeding)
II	West Mainland Moorlands	Red-throated diver (breeding)

OSPAR Region	***SSSI***	***Features***
II	West Westray	Arctic skua (breeding), Arctic tern (breeding), guillemot (breeding), kittiwake (breeding), razorbill (breeding), seabird colony (breeding)
II	Whiteness Head* #	Mudflats, bar-tailed godwit (non-breeding), knot (non-breeding)
II	Whiting Ness - Ethie Haven*	Fulmar (breeding), kittiwake (breeding), puffin (breeding), purple sandpiper (non-breeding), shag (breeding), turnstone (non-breeding)
II & III	Glendoe Lochans	Common scoter (breeding), Slavonian grebe (breeding)
III	Abbey Burn Foot to Balcary Point	Cormorant (breeding), fulmar (breeding), guillemot (breeding), kittiwake (breeding), razorbill (breeding)
III	Ailsa Craig	Gannet (breeding), seabird colony (breeding)
III	Assynt Lochs	Black-throated diver (breeding)
III	Ballochmartin Bay#	Sandflats
III	Balranald Bog and Loch nam Feithean#	Mudflats
III	Bogside Flats#	Mudflats
III	Borgue Coast	Common gull (breeding), great black-backed gull (breeding)
III	Bridgend Flats#	Sandflats
III	Canna and Sanday	Shag (breeding), seabird colony (breeding)
III	Cape Wrath	Guillemot (breeding), kittiwake (breeding), puffin (breeding), razorbill (breeding), seabird colony (breeding)
III	Castle Loch	Goosander (non-breeding)
III	Cnoc an Alaskie	Greenshank (breeding)
III	Cree Estuary#	Mudflats
III	Derskelpin Moss	Dunlin (breeding)
III	Druim nam Bad	Dunlin (breeding), golden plover (breeding), greenshank (breeding)
III	Flannan Isles	Fulmar (breeding), guillemot (breeding), kittiwake (breeding), Leach's petrel (breeding), puffin (breeding), razorbill (breeding), seabird colony (breeding)
III	Glas Eileanan	Common tern (breeding)
III	Grudie Peatlands	Dunlin (breeding), golden plover (breeding), greenshank (breeding)
III	Gruinart Flats* #	Mudflats, light-bellied Brent goose (passage)
III	Handa Island	Artic skua (breeding), guillemot (breeding), kittiwake (breeding), razorbill (breeding), seabird colony (breeding)
III	Howmore Estuary, Lochs Roag and Fada#	Saline lagoon
III	Inner Clyde*	Cormorant (non-breeding), eider (non-breeding), goldeneye (non-breeding), oystercatcher (non-breeding), red-breasted merganser (non-breeding), red-throated diver (non-breeding), redshank (non-breeding)
III	Kames Bay#	Sandflats

OSPAR Region	***SSSI***	***Features***
III	Kentra Bay and Moss#	Mudflats
III	Knapdale Lochs	Black-throated diver (breeding)
III	Loch an Duin#	Saline lagoon, tidal rapids, brackish water cockle
III	Loch Awe and Loch Ailsh	Black-throated diver (breeding)
III	Loch Bee#	Saline lagoon, brackish water cockle
III	Loch Bee Machair	Dunlin (breeding)
III	Loch Caluim Flows	Dunlin (breeding), golden plover (breeding), greenshank (breeding)
III	Loch Maree	Black-throated diver (breeding)
III	Loch Moidart#	Mudflats
III	Loch nam Madadh#	Mudflats, rocky shore, saline lagoons, stoneworts, tidal rapids
III	Loch Obisary#	Saline lagoon
III	Loch Shiel	Black-throated diver (breeding)
III	Loch Siadar#	Saline lagoon, tidal rapids
III	Loch Stack and River Laxford	Black-throated diver (breeding)
III	Loch Urigill	Black-throated diver (breeding)
III	Lochs at Clachan#	Saline lagoon
III	Luskentyre Banks and Saltings#	Sandflat
III	Mingulay and Bernaray	Fulmar (breeding), guillemot (breeding), kittiwake (breeding), razorbill (breeding), seabird colony (breeding)
III	Mointeach Scadabhaigh	Black-throated diver (breeding), red-throated diver (breeding)
III	Monach Isles	Black guillemot (breeding)
III	Mochrum Lochs	Cormorant (breeding)
III	Mull of Galloway	Fulmar (breeding), kittiwake (breeding), razorbill (breeding)
III	North Rona and Sula Sgeir#	Grey seal, fulmar (breeding), gannet (breeding), great black-backed gull (breeding), guillemot (breeding), kittiwake (breeding), Leach's petrel (breeding), puffin (breeding), razorbill (breeding), seabird colony (breeding), storm petrel (breeding)
III	Northton Bay#	Saline lagoon, sandflats
III	Obain Loch Euphoirt#	Saline lagoon, stoneworts
III	Oronsay and South Colonsay#	Grey seal
III	Port o' Warren	Cormorant (breeding)
III	Priest Island	Storm petrel (breeding)
III	Rhunahaorine Point	Little tern (breeding)
III	Rum	Manx shearwater (breeding)
III	Sanda Islands	Black guillemot (breeding), cormorant (breeding), fulmar (breeding), great black-backed gull (breeding), guillemot (breeding), kittiwake (breeding), Manx shearwater (breeding), puffin (breeding), razorbill (breeding), shag (breeding), storm petrel (breeding)

OSPAR Region	***SSSI***	***Features***
III	Scare Rocks	Gannet (breeding), guillemot (breeding), shag (breeding)
III	Shiant Islands	Fulmar (breeding), guillemot (breeding), puffin (breeding), razorbill (breeding), shag (breeding), seabird colony (breeding)
III	Sleibhtean agus Cladach Thiriodh*	Dunlin (breeding), oystercatcher (breeding), purple sandpiper (non-breeding), redshank (breeding), ringed plover (breeding and non-breeding), sanderling (non-breeding), turnstone (non-breeding)
III	Small Seal Islands#	Grey seal
III	St Kilda	Gannet (breeding), guillemot (breeding), Leach's petrel (breeding), puffin (breeding), razorbill (breeding), storm petrel (breeding), seabird colony (breeding)
III	Staffa	Fulmar (breeding), puffin (breeding), shag (breeding)
III	Strath Duchally	Dunlin (breeding), golden plover (breeding), greenshank (breeding)
III	Sunart#	Eel grass bed, egg wrack, rocky shore
III	Taynish Woods#	Rocky shore, tidal rapids
III	Tob Valasay#	Saline lagoon, tidal rapids
III	Tong Saltings#	Mudflats
III	Treshnish Isles#	Grey seal, seabird colony (breeding)
III	Ulva, Danna and the McCormaig Isles#	Mudflats, saline lagoon, tidal rapids, vascular plant assemblage, cormorant (breeding), shag (breeding)
III	Upper Solway Flats and Marshes* #	Mudflats, bar-tailed godwit (non-breeding), curlew (non-breeding), dunlin (non-breeding), golden plover (non-breeding), goldeneye (non-breeding), grey plover (non-breeding), knot (non-breeding), northern pintail (non-breeding), oystercatcher (non-breeding), redshank (non-breeding), ringed plover (non-breeding), sanderling (non-breeding), scaup (non-breeding), shelduck (non-breeding)
III	West Colonsay Seabird Cliffs	Guillemot (breeding), kittiwake (breeding), razorbill (breeding), seabird colony (breeding)
III	West Inverness-shire Lochs	Black-throated diver (breeding), common scoter (breeding)
III	Wester Ross Lochs	Black-throated diver (breeding)

Figure A1.3 Sites of Special Scientific Interest (SSSIs) with marine associations / components



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 [2012]. All rights reserved. Ordnance Survey Licence number 100017908. Bathymetry ©GEBCO. NOT TO BE USED FOR NAVIGATION. MPA network ©SNH, JNCC and Marine Scotland. 10.12.12. All rights reserved.

Other area-based measures

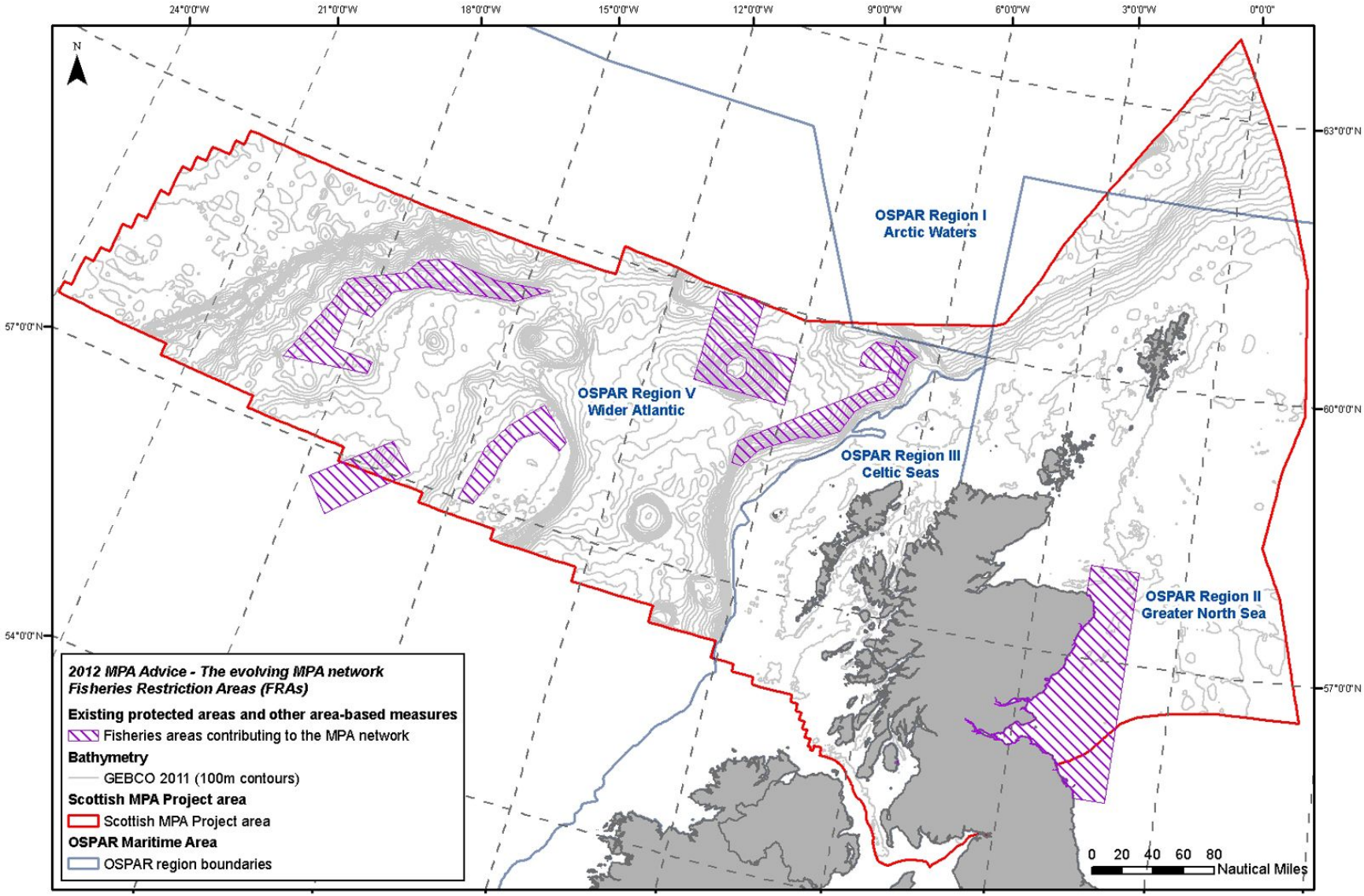
Table A1.9 Fisheries areas established for nature conservation purposes considered to be contributing to the Scottish MPA network

OSPAR Region	Fisheries restriction area	Restriction summary
II	North-east UK sandeel closure (CA1)	Year round closure on sandeel fishing with the exception of a commercial monitoring fishery with a precautionary Total Allowable Catch. Sandeel fishery. EC No. 40/2008
III	Lamlash Bay	Year round prohibition of all fishing for sea fish within Lamlash Bay, Isle of Arran, regardless of the method of fishing employed. SSI No. 317/2008
V	North West Rockall	Vessels are prohibited from bottom trawling and fishing with static gear, including bottom set gill-nets and long-lines, for the protection of vulnerable deep-sea habitats such as corals and sponges. EC regulation No. 40 2008
V	Darwin Mounds	Vessels are prohibited from using any bottom trawl or similar towed nets operating in contact with the bottom of the sea for the protection of deepwater coral reefs. EC regulation No. 602/2004
V	West Rockall Mound	Vessels are prohibited from bottom trawling and fishing with static gear, including bottom set gill-nets and long-lines, for the protection of vulnerable deep-sea habitats such as corals and sponges. EC regulation No. 40 2008
V	Hatton Bank	

Table A1.10 Other existing fisheries restriction areas considered to be contributing to the Scottish MPA network

OSPAR Region	Fisheries restriction area	Restriction summary
V	Blue Ling Management Area - edge of Rosemary Bank (FRA)	Restriction of blue ling catch during the spawning season
V	Blue Ling Management Area - edge of continental slope (FRA)	Restriction of blue ling catch during the spawning season

Figure A1.4 Other area-based measures considered to afford protection to marine habitats and species



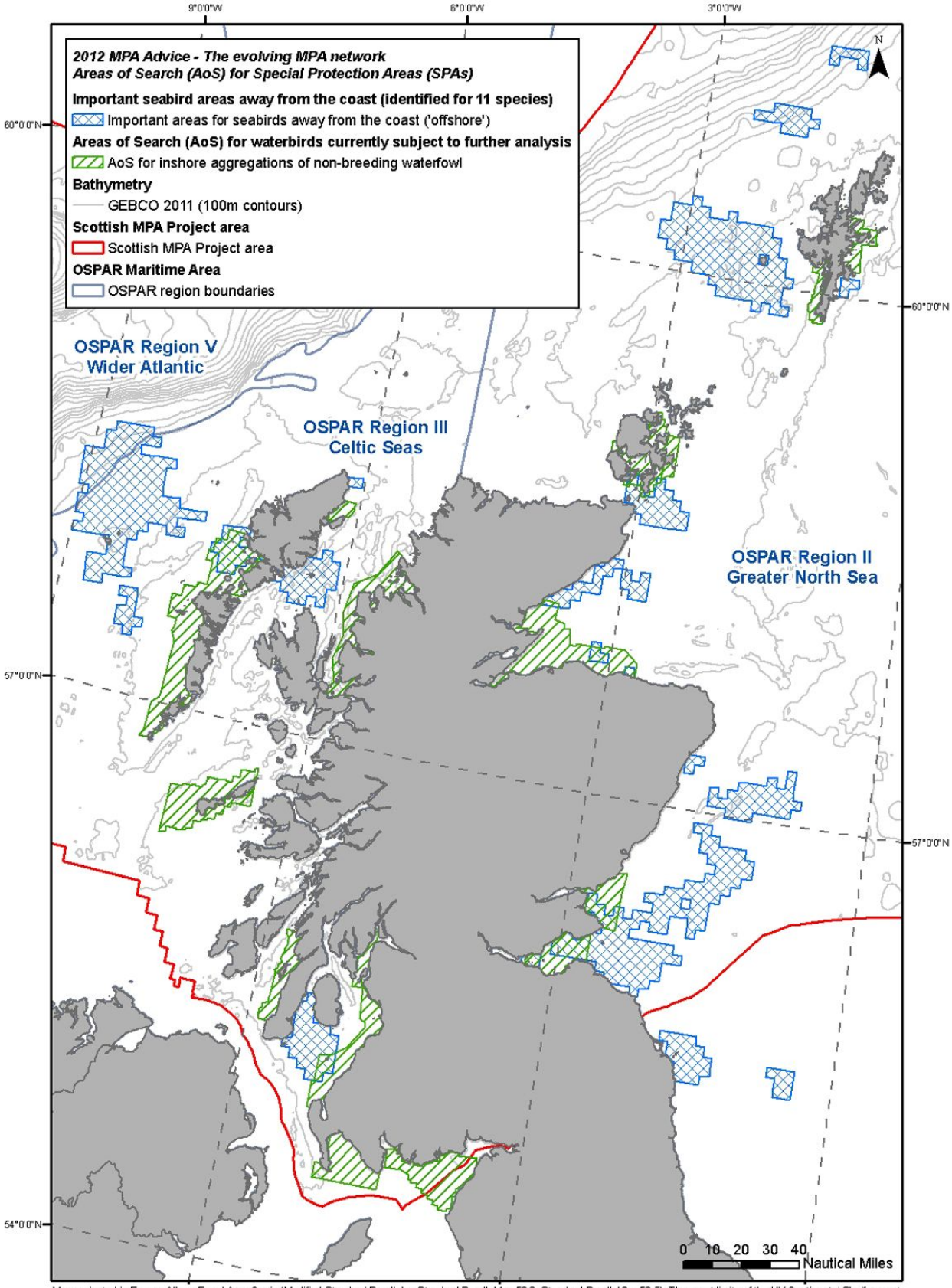
Map projected in Europe Albers Equal Area Conic (Modified Standard Parallels - Standard Parallel 1 = 50.2; Standard Parallel 2 = 58.5). The exact limits of the UK Continental Shelf are set out in orders made under section 1(7) of the Continental Shelf Act 1964 (©Crown Copyright). Coastline ©Crown copyright and database right [2012]. All rights reserved. Ordnance Survey Licence number 100017908. Bathymetry ©GEBCO. NOT TO BE USED FOR NAVIGATION. MPA network ©SNH, JNCC and Marine Scotland. 05.10.12. All rights reserved.

Areas of Search for existing seabird and waterfowl SPAs which facilitate consideration of the location of potential marine SPAs

It is UK Government policy that SPAs in the marine environment are a fundamental part of the MPA network in Scotland and elsewhere in the UK.

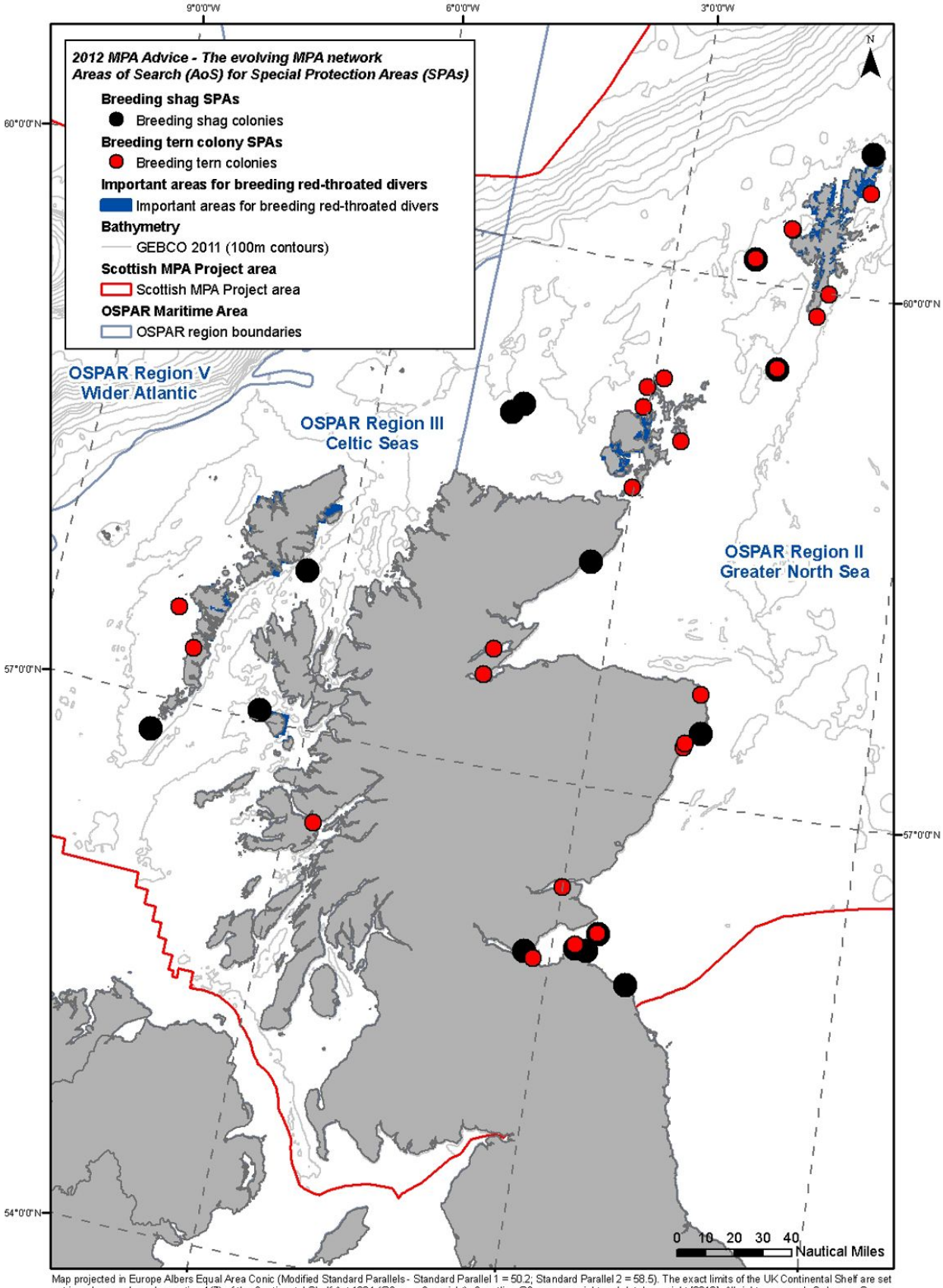
Whilst there is a substantial SPA suite in the terrestrial environment, few areas (extensions to breeding seabird colony SPA are the exception) have yet been identified in the marine environment to meet the requirements of the Birds Directive. Work is ongoing to identify the best areas and give advice to the Scottish Government (see Section 4.3). Whilst the finalisation of that advice is still some way off, some Areas of Search are available and these are shown in Figures A1.5 and A1.6.

Figure A1.5 Areas of Search (AoS) for inshore aggregations of non-breeding waterbirds and important 'offshore' seabird concentrations (based on the top 1% of the most aggregated, highest densities)



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 [2012]. All rights reserved. Ordnance Survey Licence number 100017908. Seabird data inl. AoS ©JNCC [JNCC Report nos. 431 and 461]. Bathymetry ©GEBCO. NOT TO BE USED FOR NAVIGATION. 29.10.12. All rights reserved.

Figure A1.6 Breeding shag SPAs, breeding tern SPAs and important areas for red-throated divers



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 [2012]. All rights reserved. Ordnance Survey Licence number 100017908. Seabird data incl. AoS ©JNCC [JNCC Report no. 431+]. Bathymetry ©GEBCO. NOT TO BE USED FOR NAVIGATION. 30.10.12. All rights reserved.

Appendix 2 An overview of work undertaken to develop the scientific evidence-base

Building the evidence-base

Application of the Scottish MPA Selection Guidelines to select areas as Nature Conservation MPA proposals required a robust scientific evidence-base detailing the distribution of biodiversity and geodiversity features in Scotland's seas. Building the evidence-base has involved mining a wealth of existing data held by SNH, JNCC and others as well as undertaking new field surveys in areas where data needs were greatest. Stakeholder engagement helped to support data compilation efforts, facilitating data sharing and identifying opportunities for future collaborative work.

This appendix provides an overview of how we have developed the evidence-base to support the selection of Nature Conservation MPA proposals to contribute to an ecologically coherent network.

Geodatabase of Marine Features in Scotland

Data on the MPA search features and geodiversity features have been collated within a GIS database - the Geodatabase of Marine Features in Scotland (GeMS). The foundations for GeMS were the outputs from a Defra-led research project (MB0102[15]) (Marine Scotland was a project partner). GeMS is not a static database, it will continue to be populated with new data which will support the continual improvement of the evidence available for the proposals as they progress to designation, the development of management measures and the ongoing monitoring of achievement of conservation objectives. SNH, JNCC and Marine Scotland owned data within GeMS will be made publicly available.

Biodiversity data within GeMS has been sourced from 721 separate surveys. These surveys often contain records relating to several different features of conservation interest. The majority of historical survey effort demonstrates a near-shore territorial waters bias. Due to the wide variety of data sources and the diverse relationship of surveys to the features represented in GeMS it is not practical, on a feature by feature basis, to list all of the surveys which have contributed to each MPA search feature within territorial waters. Analysis of the geodatabase is possible as required.

Marine Recorder was a significant source of relevant survey records including data under the custodianship of the Statutory Nature Conservation Bodies (SNCBs). The Marine Recorder contribution to the Scottish MPA Project has ensured that appropriate records from Marine Nature Conservation Review (MNCR), broadscale mapping and Site Condition Monitoring surveys (in support of Natura processes), as well as data from the MCS SeaSearch volunteer recording initiative have reached GeMS. The Marine Recorder dataset also plays an important role in highlighting locations where sampling has taken place but features of conservation interest have not been recorded.

Improving the evidence base for biodiversity features

SNH, JNCC and Marine Scotland-led / commissioned data mining and survey projects undertaken to develop the biodiversity data within GeMS are listed in Table A2.1. Additional datasets identified per MPA search feature, that were accessed and used to inform the work of the Scottish MPA Project, are detailed in Table A2.2. These datasets cover both seabed habitats and mobile species interests and were derived from statutory monitoring and surveillance projects (including fisheries stock assessments), academic / research studies, commercial impact assessment work and a number of volunteer-led / citizen science

[15] MB0102 project deliverables available at - http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=16368&FromSearch=Y&Publisher=1&SearchText=MB0102&SortString=ProjectCode&SortOrder=Asc&Paging=10

initiatives. We are extremely grateful to all those who have provided data, they have made a significant contribution to the development of the MPA proposals / search locations.

The programme of new survey work, which started in 2010, has significantly enhanced the scientific evidence-base. Over 20 surveys have taken place across Scottish waters. Highlights of the survey programme included sampling within the Sound of Canna which identified what is now believed to be the most extensive fan mussel beds in UK waters; and a remote operated vehicle survey to 2,000 m on the Hebrides Terrace seamount which provided us with an amazing insight into the diversity of life in Scotland's deep seas, confirming the presence of communities of cold water corals and deep water sponges. The different surveys have collected data using a variety of techniques including remote video and photography, *in situ* diver observations, benthic grab sampling, acoustic mapping, fish trawls, and marine mammal observations.

SNH and JNCC also established a number of projects to process data collected for other purposes to derive information on MPA search feature presence and distribution. Project examples include the analysis of photographic samples from the Hebridean slope to determine the presence of the deep sea mud search feature; the analysis of Marine Scotland Science *Nephrops* stock assessment video data to determine the presence of different burrowed mud search features; and, the analysis of multibeam backscatter data to support the production of seabed habitat maps.

As well as improving our understanding of where MPA search features are found in Scotland's seas, work to improve the evidence-base for biodiversity features also focused on collating information on the ecology of these features. For example, what does a typical example of a flame shell bed look like? What are the typical levels of species diversity associated with coral gardens? Are records of burrowed mud uniform in their presence across Scotland's seas or do some areas of burrowed mud exhibit different key or characterising species which make them ecologically distinct from one another? This culminated in the production of Detailed Ecological Guidance (Lancaster *et al., in prep*.) which has been used to help support application of the MPA Selection Guidelines.

SNH and JNCC have used the best available evidence when identifying the Nature Conservation MPA proposals. All datasets have been subject to review and quality checking before incorporating into GeMS. Data confidence assessments will accompany each of the Nature Conservation MPA proposals. These provide a full description of the data used to support the application of the MPA Selection Guidelines for each location, providing a view on parameters including: data coverage (across discrete MPA search features and the MPA search location more generally); data age (when collected); data origins (who collected the data and for what purposes); and the type of data (what sampling methods were used).

<u>Improving the evidence base for Geodiversity features</u>

Nationally and internationally important sites for geodiversity in the terrestrial environment have been identified through the scientific framework of the GCR (Ellis, 2011). The sites selected make a special contribution to the understanding and appreciation of Britain's geoheritage through their international importance or inclusion of exceptional features, or they are representative of fundamental features, events and processes in the geological history of Britain. An analogous approach was adopted to identify key geodiversity features in Scottish waters. For the purposes of identifying MPA search locations, the concept of 'importance' included features considered to be under threat as well as areas of the seabed considered to be critical to the overall functioning of the marine ecosystem (see Marine Scotland, 2011b).

A key element of the supporting role of geodiversity centres on the linkages between the distribution of Scottish geodiversity and biodiversity interests. For the most part, therefore, the assessment of geological and geomorphological interests has focused on features on the seabed. In addition, such features are likely to be more vulnerable than sub-seafloor interests.

The starting point was a categorisation of thematic subject 'blocks' that incorporate the range of marine geodiversity interests on the Scottish seabed. The large-scale physiography of the Scottish seabed comprises: the continental shelf; continental slope; deep-ocean basin; and deep-ocean bathymetric rises. At a more local scale, wide variations in seabed topography and sediments are influenced by the structure and composition of the underlying bedrock, the configurations and properties of features originating at former terrestrial and submarine ice-sheet margins and beds, submarine mass movements, carbonate biological sedimentary input, and past and present near-bed currents. However, this variety of interests and processes can be broadly categorised into eight main geological themes or 'blocks' (Table A2.3). Together, these represent the geological and geomorphological processes that have shaped the evolution and present geomorphology of the Scottish seabed and continue to modify it. Like the blocks of the terrestrial GCR, they include interests and areas of national and international importance, form an integral part of Scotland's geoheritage and in many cases support important biodiversity interests. Two of the blocks, Quaternary of Scotland and Coastal Geomorphology of Scotland, correspond with terrestrial GCR blocks, reflecting common processes that have shaped both the terrestrial landscape and the seabed. However, other geodiversity interests on the Scottish seabed have formed from processes that are unique to the marine environment. The eight blocks represent the MPA search features for geodiversity described as being developed in the MPA Selection Guidelines (p. 21) and they incorporate the three specified criteria (p. 15) - nationally and/or internationally important features, exceptional and/or threatened features and features representative of key aspects of the marine geodiversity of UK waters (Marine Scotland, 2011b).

A significant consideration in geoconservation assessment is that scientific importance is often determined not simply by the presence or absence of a particular interest, but rather the assemblage of interests and the interpretation(s) placed upon them. For example, an assemblage of landforms (lineations, moraines and trough mouth fan) indicating the presence of a fast-flowing palaeo-ice stream will generally be more important than individual landforms, for example in revealing the dynamics of the last British Ice Sheet. Similarly, a well-dated moraine or assemblage of moraines indicating a particular event, such as the limits of the last British Ice Sheet on the continental edge west of Shetland and the Outer Hebrides or a significant retreat phase, will have greater significance than other undated or unattributed features.

The scientific framework was used in a desk-based study to identify key Scottish marine geodiversity areas which satisfy the MPA Selection Guidelines (Brooks *et al*., 2012). A provisional list of key geodiversity areas was initially compiled using expert judgement and existing published information from a GIS database of previously identified geological and geomorphological seabed features (ABPmer, 2009; which formed the foundations for the geo-content of the GeMS geodatabase), as well as unpublished information. This was then tested and refined at a workshop attended by invited Earth scientists with expertise and knowledge of the marine geology and geomorphology of the Scottish seabed, including Quaternary glacial geomorphology; coastal geomorphology and shallow marine seabed processes; slope instability and associated submarine mass movement processes and deep-offshore seabed processes. Following the workshop, the list of key geodiversity areas was revised in the light of the recommendations of the expert group, re-circulated for further comment, and then finalised. There was a consensus on both the category blocks and the key geodiversity areas. Together these areas represent a coherent national network of

marine geodiversity interests based on current knowledge. Note, however, that intertidal and nearshore extensions to existing Coastal Geomorphology GCR sites were not considered in the assessment because of a lack of information on the extent of physical processes that would enable the system boundaries to be defined. Some of these key beach, dune and machair coastal sites are part of wider geomorphological systems and their dynamics and future evolution depend on sediment supply and pathways outside the existing terrestrial site boundaries.

Thirty-four key geodiversity areas were identified as being of national or international importance (see Table A2.4 and Figure A2.1). These are grouped according to their main subject block (see Brooks *et al*. (2012) for further details including descriptions of each of the key geodiversity areas). However, many of the key areas contain additional supporting interests spanning multiple blocks. The largest number of sites (10) falls within the Quaternary of Scotland block. This reflects the diversity of features representing Scotland's glacial legacy. In some cases, the prime interest lies in individual landforms (e.g. the Scanner and Scotia Pockmarks), but in others it is not simply the presence of particular landforms but rather the assemblage of landforms, their context and the interpretations placed upon them (e.g. the palaeo-ice stream landform assemblage represented by the Summer Isles to Sula Sgeir Fan key area).

The boundaries around each key area were drawn to capture the main landforms / assemblages of landforms for which the area was prioritised. The accuracy with which this has been achieved is variable and constrained by the extent of existing surveys. In a number of cases, this is a key information gap. Supporting statements include scientific assessments and literature reviews (Brooks *et al*., 2012). The boundaries for these key areas comprise another key datalayer within the GeMS geodatabase. The focus on the MPA process and context and the emphasis on seabed features means that not all locations of scientific importance were included (e.g. some sub-seabed sedimentary sequences and bedrock features). It is also highly probable that future seabed mapping will reveal additional geodiversity interests of high scientific importance under the assessment methodology developed here. Also, additional areas with important biodiversity support functions may emerge in due course[16].

Information on marine activities in Scotland's seas

Although a science led approach, the Scottish MPA Project has made the best use of available information to support knowledge of where and how the marine environment is used in Scotland's seas. This drew on the Defra datalayers Project MB0106[17] as a starting point. Through stakeholder engagement as part of the Scottish MPA Project, SNH and JNCC have verified and improved our understanding of the activities occurring across Scotland's seas. This has helped to improve the Least Damaged / More Natural layer which fed into the initial identification of MPA search locations. See Chaniotis *et al.* (2011c) for information on the range of activities data collated through the Scottish MPA Project.

[16] One additional candidate key geodiversity area, the Small Isles, has since been identified following the completion of new multibeam survey (see also Table A2.1)

[17] MB0106 project deliverables available at - http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=16415

Table A2.1 Data mining and survey projects undertaken to develop the scientific evidence-base to support delivery of the Scottish MPA Project

Project title	**Purpose / summary**
2010	
Acoustic data processing and interpretation Memorandum of Agreement	A collaborative project between SNH. MS. MSS, JNCC, BGS, and NOC for the processing and interpretation of multibeam backscatter data for Scotland's seas and other parts of marine waters off the United Kingdom to develop detailed geological maps and broadscale seabed habitat data layers. Areas within Scottish waters include the Small Isles (HI1297 block 5 and HI1299 block 2), Solan Bank to the Fair Isle channel (HI1071), Eastern Approaches to Sanday & Stronsay (HI1137 blocks 2 and 3), approaches to the Firth of Forth (HI1151), Wee Bankie to Gourdon (HI1152), Orkneys eastern approaches to Sanday and Stronsay (HI1137) and also data sets collected around Fair Isle (MSS) and Rockall (MSS).
Analysis of remote video samples - 2010, 2011 and 2012	A series of research contracts to analyse video imagery of seabed habitats collected using drop-down, towed or remotely operated video camera systems. The video samples were generated primarily by Marine Scotland, Marine Scotland Science and SNH commissioned survey projects - some directly linked to the Scottish MPA Project (analysing samples collected through surveys listed in this appendix) but others arising from Marine Renewables-related surveys. In the case of the latter, samples were also kindly provided for analysis by other stakeholders (e.g. Scottish and Southern Energy). The video samples were analysed to identify habitats and species of nature conservation interest. The results of the assorted analyses were collated and fed into the Marine Recorder database with relevant records then migrated into GeMS and used to inform the work of both the Scottish MPA Project and under the other pillars of the Scottish Governments 3-pillar approach to nature conservation. Moore, C.G. and Roberts, J. M. (2011). An assessment of the conservation importance of species and habitats identified during a series of recent research cruises around Scotland. *Scottish Natural Heritage Commissioned Report No. 446* Moore, C.G. (2012). An assessment of the conservation importance of benthic epifaunal species and habitats identified during a series of research cruises around NW Scotland and Shetland in 2011. *Scottish Natural Heritage Commissioned Report No. 507*. Moore, C.G. and Atkinson, R.J.A. (2012). Biological analyses of underwater video from research cruises in the Clyde Sea, Loch Torridon and the Inner Sound, the North Minch, Loch Eriboll and off Orkney. *Scottish Natural Heritage Commissioned Report No. 536* (available on request).

Project title	Purpose / summary
Benthic biotoping of SEA4 and SEA7 areas	Biotope analysis of archived stills from surveys undertaken in the SEA7 region of Scotland's seas from 1988-1998, and statistical analysis of infaunal samples from the SEA4 region of Scotland's seas 1996-2002. Bett, B.J. (2012). Seafloor biotope analysis of the deep waters of the SEA4 region of Scotland's seas. A report for the Joint Nature Conservation Committee. *JNCC Report.* 99 pages (available on request). Hughes, D.J., Nickell, T. and Gontarek, S. (2011). Biotope analysis of archived stills from the SEA7 region of Scotland's seas. A report by the Scottish Association for Marine Science (SAMS) for the Joint Nature Conservation Committee. *JNCC Report.* 54 pages (available on request).
Biotope tagging of Seasearch seabed habitat records (1999 - 2007)	A small study commissioned to assign biotope codes to seabed habitat records collected through Seasearch dives undertaken in Scottish waters from 1999 to 2007. This process enables direct comparison with the MPA search feature seabed habitat categories. The contents of 368 forms and 1,016 biotopes were 'tagged' and entered into an updated Seasearch dataset for Scotland (in Marine Recorder format) together with all of the 2009 Seasearch data. Relevant records were subsequently incorporated into GeMS.
Burrowed mud data mining projects - Marine Scotland Science *Nephrops* stock assessment video tow analyses	Processed towed video data from Marine Scotland Science to investigate the distribution of seapens and burrowing megafauna across Scotland's seas. Greathead, C., Demain, D., Dobby, H., Allan, L. and Weetman, A. (2011). Quantitative assessment of the distribution and abundance of the burrowing megafauna and large epifaunal community in the Fladen fishing ground, Northern North Sea. *Scottish Marine and Freshwater Science*, 2(2). Marine Scotland Science. ISSN: 2043-7222.
Cetacean MPA search features - key areas and research / survey priorities	This study informed the listing of cetacean species as MPA search features, identified broad areas of interest for these species within Scottish territorial waters and made recommendations on a proposed programme of work that should be undertaken to support the identification of MPAs for cetaceans. Weir, C.R. (*in prep*.). Advice on developing a programme of survey work to underpin the selection of Marine Protected Areas for cetaceans in Scottish territorial waters. *Scottish Natural Heritage Commissioned Report* (available on request).

Project title	Purpose / summary
Clyde Sea and sea lochs seabed habitat survey 2010	A broad-scale seabed habitat survey commissioned to validate historical records of MPA search features within the Clyde Sea area (including adjoining sea lochs - Loch Fyne; Kyles of Bute; Lochs Riddon, Striven, Goil and Long; Holy Loch and Gareloch) and to enhance the existing knowledge-base on the distribution of seabed habitats more generally across the area. Sampling methodologies included drop-down video, infaunal grabs and diving. A series of infaunal grab samples collected on an opportunistic basis by SEPA in 2010 from locations within the Clyde were also analysed and reported on as part of this project. Allen, C., Axelsson, M., Dewey, S., and Clark, L. (*in prep*.). Marine biological survey to establish the distribution of Priority Marine Features within the Clyde Sea area. *Scottish Natural Heritage Commissioned Report No. 437* (available on request).
Fair Isle geophysical and seabed habitat survey 2010	In 2010 Marine Scotland Science completed targeted multibeam and remote video sampling in waters around Fair Isle to improve the understanding of the distribution of seabed habitats. The acoustic data was processed as part of the acoustic data processing MoA whilst the drop down video was analysed as part of the 2010 video review.
Loch Sween literature review and seabed habitat grab sampling survey 2010	A study commissioned to detail the occurrence and distribution of MPA search features within Loch Sween. This involved analysis of benthic data from 19 historical surveys within Marine Recorder, an assessment of MPA search feature alignment and occurrence and a review of information from existing literature. As series of infaunal grab samples collected on an opportunistic basis by SEPA in 2010 from locations within the loch were also analysed and reported on as part of this project. Allen, J.H. and Birkett, S.R. (*in prep*.). A review of existing and new benthic data to ascertain the current marine nature conservation value of Loch Sween (Argyll) and inform the need for new survey work. *Scottish Natural Heritage Commissioned Report No. 493* (available on request).
Scoping immediate priorities for MPA-related benthic biological survey work in Scottish territorial waters	Study commissioned to identify immediate priorities for benthic MPA-related survey work in Scottish territorial waters in 2010. These priorities were determined on the basis of gaps in existing nature conservation provision (in terms of coverage of geographic areas and biodiversity features) taking cognisance of a range of draft guidance materials (e.g. the draft Scottish MPA Selection Guidelines) and GIS mapping products. Areas recommended for targeted survey effort included the Sound of Canna, Loch Fyne, the Ullapool approaches, Loch Sween, and inshore waters around Shapinsay, Orkney. Moore, C.G. and James, B.D. (2011). Scoping immediate priorities for MPA-related benthic marine biological survey work in Scottish territorial waters. *Scottish Natural Heritage Commissioned Report No. 381*.

Project title	Purpose / summary
Sound of Canna seabed survey 2010	A comprehensive seabed habitat survey commissioned within the Sound of Canna, with a particular emphasis on the population of fan mussels recorded here by Marine Scotland Science in 2009. Sampling methodologies included drop-down video, infaunal grabs and diving. The Sound of Canna was found to be a small but unusually biologically diverse area, supporting ten MPA search features including the largest confirmed aggregation of fan mussels in UK waters. Howson, C.M., Clark, L., Mercer, T.S. and James, B. (2012). Marine biological survey to establish the distribution and status of fan mussels *Atrina fragilis* and other Marine Protected Area (MPA) search features within the Sound of Canna, Inner Hebrides. *Scottish Natural Heritage Commissioned Report No. 438*.
Ullapool Approaches seabed survey 2010	A broad-scale seabed habitat survey commissioned to validate historical records of MPA search features within the Ullapool Approaches area and to enhance the existing knowledge-base on the distribution of seabed habitats more generally across the area. Sampling methodologies included drop-down video, infaunal grabs and diving. Moore, C.G., Harries, D.B., Trigg, C., Porter, J.S. and Lyndon, A.R. (2011). The distribution of Priority Marine Features and MPA search features within the Ullapool Approaches: a broadscale validation survey. *Scottish Natural Heritage Commissioned Report No. 422*.
0810S Herring acoustic NS - opportunistic (MSS)	Analysis of opportunistic video/stills and grab samples collected by JNCC during the downtime of the survey at stations across the northern North Sea. All data have been biotoped. Moore, J.J., Bunker, F. and Jones, J. (2011). Analysis of drop-down video and stills. A report by Aquatic Survey & Monitoring Ltd. for the Joint Nature Conservation Committee. *JNCC Report.* 68 pages (available on request).
2011	
Coral gardens and deep sea sponge aggregation data verification	Improved technical definition of the OSPAR habitats and application of the definitions to provide a degree of confidence of the extent to which suspected records in Scotland's seas could be classed as coral gardens or deep sea sponge aggregations. Henry, L-A. and Roberts, M. (*in prep*.). Developing an interim technical habitat definition of coral gardens and its subsequent application to verify suspected records in UK waters. *JNCC Report.* Henry, L-A. and Roberts, M. (*in prep*.). Verification of suspected records of deep sea sponge aggregations in Scotland's seas. *JNCC Report.*

Project title	Purpose / summary
Firth of Forth Polestar 2011	Analysis of video/stills samples collected by JNCC during a dedicated survey to the Firth of Forth banks complex in October 2011. Video/still samples have been biotoped. Infaunal data processing completed but biotope assignment pending. Axelsson, M., Dewey, S. and Allen, C. (2012c). Analysis of seabed imagery from the 2011 survey of the Firth of Forth Banks Complex, the 2011 IBTS Q4 survey and additional deep-water sites from Marine Scotland Science surveys. A report by Seastar Survey Ltd. for the Joint Nature Conservation Committee. *JNCC Report.* 67 pages (available on request).
IBTS Q3 (North Sea) and Q4 (West Coast) - opportunistic surveys (MSS)	Analysis of opportunistic video/stills and grab samples collected by JNCC during the downtime of the International Bottom Trawl Surveys. Video/still samples have been biotoped. Infaunal data processing completed but biotope assignment pending. Axelsson, M., Dewey, S. and Allen, C. (2012c). Analysis of seabed imagery from the 2011 survey of the Firth of Forth Banks Complex, the 2011 IBTS Q4 survey and additional deep-water sites from Marine Scotland Science surveys. A report by Seastar Survey Ltd. for the Joint Nature Conservation Committee. *JNCC Report.* 67 pages (available on request). Goudge, H. and Morris, L. (2012). Seabed imagery analysis from three Scottish offshore towed video surveys: 2011 MSS IBTSQ3 survey, 2011 1111s FRV Scotia Rona-Windsock survey & 2011 MSS Rockall survey. *JNCC Report.* 79 pages (available on request).
Lochs Linnhe, Etive, Leven and Eil seabed habitat survey 2011	A series of seabed habitat surveys commissioned to validate historical records of MPA search features within the Lochs Linnhe, Etive, Leven and Eil and to enhance the existing knowledge-base on the distribution of seabed habitats within these areas. Sampling methodologies included drop-down video, infaunal grabs and diving. Nickell, T.D., Hughes, D.J, Hausrath, J. and Gontarek, S. (*in prep*.). The distribution of Priority Marine Features and MPA search features within Lochs Linnhe, Eil, Leven and Etive: a broadscale validation survey. *Scottish Natural Heritage Commissioned Report No. 501* (available on request). Moore, C.G., Harries, D.B. and Trigg, C. (2012). The distribution of selected MPA search features within Lochs Linnhe, Etive, Leven and Eil: a broadscale validation survey (Part B). *Scottish Natural Heritage Commissioned Report No.502*.
MSS coral bycatch records collated from trawl surveys 2000-2009	Records of epifauna (hard and soft corals, sponges and seapens) collated from analysis of by-catch from MSS deepwater trawl surveys from 2000 to 2009.

Project title	Purpose / summary
North and Little Minch survey 2011	A seabed habitat survey undertaken in collaboration with Marine Scotland Science to enhance the knowledge-base on the broad-scale distribution of benthic habitats on the Shiant East Bank and in the Little Minch. Sampling methodologies included drop-down video, infaunal grabs and fish traps. The results of the video analyses are presented in Moore (2011). Axelsson, M., Allen, C. and Dewey, S. (2012). Infaunal analysis of grab samples collected from the North Minch area, 2011. *Scottish Natural Heritage Commissioned Report No. 503*.
Orkney waters seabed habitat survey 2011	A broad-scale seabed habitat survey commissioned to validate historical records of MPA search features (with a focus on maerl and horse mussel beds) within Orkney waters (Rousay to Copinsay including Eday Sound and points in Scapa Flow) and to enhance the existing knowledge-base on the distribution of seabed habitats across these areas. Sampling methodologies included drop-down video, infaunal grabs and diving. Hirst, N.E., Cook, R.L., James, B., Kent, F.E.A., Loxton, J.L., Porter, J.S. and Sanderson, W.G. (*in prep*.). The distribution of Priority Marine Features and MPA search features in Orkney waters: Rousay to Copinsay including Eday Sound and points in Scapa Flow. *Scottish Natural Heritage Commissioned Report No. 509* (available on request).
Plymouth University PhD - Identification of areas of nature conservation importance in deep waters of the UK continental shelf	Analysis of video/stills samples collected during SEA and SEA-SAC surveys. Biotopes proposed including deep sea sponge aggregations and seamount communities.
Rockall deep water surveys 2011 - opportunistic (MSS)	A swathe bathymetry system was used to map the seabed at a series of locations on the Rockall Plateau. A second survey entailed a series of towed video transects. Data processed to habitat types.
Small Isles geophysical and seabed habitat surveys 2011	Multibeam data were collected by the Northern Lighthouse Board and British Geological Survey (commissioned via an MoU with Marine Scotland) to supplement existing data collected through the civil hydrography programme to provide full coverage of the Small Isles MPA proposal. These data were analysed through the acoustic data processing and interpretation MoA. The multibeam survey was followed up by a programme of seabed habitat sampling (using remote video and grab sampling methodologies) in collaboration with SEPA and building upon the 2010 Sound of Canna survey. The results of the video analyses are presented in Moore (2012). Axelsson, M., Allen, C. and Dewey, S. (2012). Infaunal analysis of grab samples collected from Canna, Small Isles, in June 2011. *Scottish Natural Heritage Commissioned Report No. 504*.

Project title	Purpose / summary
Southern Trench and Noss Head geophysical and seabed habitat surveys 2011	Multibeam data were collected by the Northern Lighthouse Board and British Geological Survey (commissioned via an MoU with Marine Scotland) to supplement existing data to provide full coverage of the Southern Trench and Noss Head MPA proposals. These data were analysed through the acoustic data processing and interpretation MoA. The multibeam surveys in these two locations were followed up by a programme of seabed habitat sampling (using remote video and grab sampling methodologies) completed in collaboration with Marine Scotland Science. Hirst, N.E., Clark, L. and Sanderson, W.G. (*in prep*.). The distribution of selected MPA search features and Priority Marine Features off the NE coast of Scotland. *Scottish Natural Heritage Commissioned Report No. 500* (available on request).
2011 RV *Scotia* survey to Rona & Windsock	Analysis of video/stills samples collected by JNCC during a dedicated survey to the 'Windsock' (now named West Shetland Shelf) in 2011. Video/still samples have been biotoped. Infaunal data processing completed but biotope assignment pending. Goudge, H. and Morris, L. (2012). Seabed imagery analysis from three Scottish offshore towed video surveys: 2011 MSS IBTSQ3 survey, 2011 1111s FRV Scotia Rona-Windsock survey & 2011 MSS Rockall survey. *JNCC Report.* 79 pages (available on request).
2011 RRS *James Cook* cruise JC60	Cruise to investigate the benthic habitats and the impact of human activities in Rockall Trough, on Rockall Bank and in Hatton-Rockall Basin. Huvenne, V.A.I. (2011). *Benthic habitats and the impact of human activities in Rockall Trough, on Rockall Bank and in Hatton Basin*. Cruise Report No. 034. RRS James Cook Cruise 60. National Oceanagraphic Centre, Southampton. Available from: <http://eprints.soton.ac.uk/193835/> (available on request).
2012	
Basking shark tagging project 2012	A joint project between SNH and the University of Exeter, using satellite tagging of basking sharks to further our understanding of how the species utilises sea areas on the west coast of Scotland. A total of 20 basking sharks were tagged in 2012 around Coll and Tiree, and between Hyskeir and Canna. The project, which started in July 2012 and is set to run until March 2014, will add confidence to existing data and help refine our knowledge on basking shark behaviour, movements and habitat use during the summer. The project will also show where basking sharks go in the winter, when records of surface sightings of basking sharks in Scotland dramatically reduce. The data derived from this study will inform the future assessment of the Skye to Mull MPA search location against the MPA Selection Guidelines. Further information on the project, including updates on shark movements, is available online at - http://www.wildlifetracking.org/baskingsharks.

Project title	Purpose / summary
Cetacean and basking shark habitat modelling	A research project commissioned in September 2012. The work entails scoping our approach to habitat modelling for cetacean and basking shark MPA search features; undertaking a review of evidence collated in support of search locations for minke whale; and investigating whether habitat modelling for key prey species can be used to help identify essential areas for Risso's dolphin. Contracts to undertake the actual habitat modelling for each of minke whale, Risso's dolphin, white-beaked dolphin and basking shark will be tendered later in 2012, once an approach has been agreed.
Clyde Sea Sill, South Arran and Loch Fyne remote video and grab sampling survey, 2012	A seabed habitat survey undertaken through collaboration between SNH and SEPA with funding from Marine Scotland. The main objective of this work was to supplement existing data on seabed habitats situated within the three MPA proposals in the Clyde Sea area (Clyde Sea Sill, South Arran and Upper Loch Fyne and Loch Goil). Remote video and grab sampling methodologies were used. The results of the video analyses are presented in Moore (2012). The results of the infaunal analyses are due in mid-September, 2012.
Fetlar to Haroldswick seabed habitat survey 2012	A research project commissioned by Marine Scotland in August 2012. Targeted seabed habitat sampling to ascertain the continued presence, extent and status of a specified MPA search features within the Fetlar to Haroldswick MPA proposal and to improve our existing knowledge-base on the wider distribution of seabed habitats in this area. Sampling methodologies include drop-down video, diving, infaunal grabs, core samples and the collection of the horse mussel clump samples.
JC073 Mingulay/Rockall/Hebrides 2012	Seabed imagery from the Hebrides Terrace seamount was gathered using a remotely operated vehicle (ROV) system (being supplied by the Marine Institute, Ireland under contract to NERC) which was on board for the duration of the JC073 survey.
Loch Creran flame shell bed survey 2012	Research commissioned by Marine Scotland in August 2012 to provide details on the extent and status of two discrete flame shell beds within Loch Creran (an existing SAC and an MPA proposal). Work linked to Upper Loch Fyne and Lochs Duich, Long and Alsh 2012 surveys.
Lochs Duich, Long and Alsh seabed habitat survey 2012	Research commissioned by Marine Scotland in August 2012 to provide details on the extent and status of burrowed mud, inshore deep mud with burrowing heart urchins, and flame shell bed MPA search features within the Lochs Duich, Long and Alsh MPA proposal (also an existing SAC). Preliminary findings confirmed the presence of what is believed to be the largest flame shell bed in Scottish waters. Linked to related studies in Loch Creran and Upper Loch Fyne studying the flame shell beds feature.
MSS sandeel data	Presence/absence data, larval data, sediment suitability information with respect to sandeels and coastal and offshore sandeel fishing grounds. Wright, P.J. and Bailey, M.C. (1996). Timing of hatching in *Ammodytes marinus* from Shetland waters and its significance to early growth and survivorship. *Marine Biology* **126**: 145-152. Jensen, H., Rindorf, A., Wright, P.J. and Mosegaard. H. (2011). Inferring the location and scale of mixing between habitat areas of lesser sandeel through information from the fishery. *ICES Journal of Marine Science* **68**: 43-51.

Project title	Purpose / summary
Refinement of seasonal frequent front mapping based on satellite data on sea surface temperature (Defra-led MB0102 project outputs)	Project to prepare seasonal frequent front layers that can be incorporated into GeMS. Generated from the Defra-led MB0102 frequent front mapping deliverables which are based on sea surface temperature data.
Seasonal frequent front mapping using ocean colour (chlorophyll-a)	A research project commissioned to generate seasonal frequent front maps based on MERIS 300 m and MODIS 1 km resolution ocean colour data (chl-a). The mapping outputs will be incorporated into GeMS. The report which provides a description and interpretation of the mapping outputs is nearing completion. Miller, P. (*in prep*.) Seasonal shelf-sea front mapping using satellite ocean colour to support development of the Scottish MPA network. *SNH Commissioned Report No. 538* (available on request).
Upper Loch Fyne diver survey 2012	Research commissioned by Marine Scotland in August 2012 to confirm the continued presence and status of flame shell and maerl beds in the vicinity of the Otter Narrows in Upper Loch Fyne (within the Upper Loch Fyne and Loch Goil MPA proposal). Preliminary results have confirmed the presence of flame shell beds. Linked to similar studies in Loch Creran and Lochs Duich, Long and Alsh in 2012.
1512S Wyville Thomson Ridge 2012	This survey is scheduled for October 2012. The survey will focus upon collecting multibeam, video/stills and grab samples data from the Wyville Thomson Ridge cSAC, and within the Faroe-Shetland Sponge Belt MPA proposal.

Table A2.2 Key additional datasets used to supplement outputs from the Defra datalayers research projects and the subsequent SNH and JNCC data mining review undertaken by MarLIN. Data products referenced to specific MPA search features

The details of datasets used to underpin the assessment of each individual MPA proposal is provided in the relevant data confidence paper. A (-) indicates a supplied dataset that is not accompanied by a published report

Feature	Dataset title	Data provider	Summary	Reference
Basking sharks	Basking shark effort corrected sightings data 2003-2011	Hebridean Whale and Dolphin Trust (HWDT)	Effort (km) and Sharks Per Unit Effort data within 0.05 latitude and longitude grid squares; data collected via boat based surveys using trained volunteers between April and October of each year.	-
	Basking shark effort corrected sightings data 2003-2006.	Colin Speedie (The Wildlife Trusts Basking Shark Project)	Data reanalysed from orginal work in 2009 to allow comparison to HWDT dataset.	Speedie *et al.* (2009)
Burrowed mud	MSS *Nephrops* stock assessment video tow analysis 2004	Marine Scotland Science	Processed towed video data to investigate the distribution of seapens and burrowing megafauna.	Greathead *et al*. (2011)

Feature	**Dataset title**	**Data provider**	**Summary**	**Reference**
	MSS *Nephrops* stock assessment video tow analyses 2008 - 2010	Marine Scotland Science	Processed towed video data to improve characterisation of burrowed mud distribution from across the Fladen Grounds, Devil's Hole, and Scottish coastal waters.	-
	MSS coral bycatch records collated from trawl surveys 2000-2009	Marine Scotland Science	Records of epifauna (hard and soft corals, sponges and sea pens) collated from analysis of by-catch from MSS deep water trawl surveys from 2000 to 2009.	-
	MSS deep water towed video survey records 2000-2009	Marine Scotland Science	Summarised towed video data to improve characterisation of burrowed mud distribution from MSS deep water towed video surveys.	-
	Selection of MSS deep water towed video surveys 2007-2009	Marine Scotland Science	Analysis of a selection of MSS deep water towed video data to improve characterisation of burrowed mud distribution. The epifauna were identified in the video & stills samples leading to the assignment of biotopes based on the communities and substratum observed.	Axelsson *et al.* (2011) - draft report available on request
	Biotope analysis of archived stills from surveys undertaken in the SEA7 Region of Scotland's seas	Scottish Association of Marine Science	Biotoping archived stills captured on the Hebridean slope between1988 and 1998 from surveys to the north-west of Lewis, the north-west of St Kilda and from the Land-Ocean Interaction Study - Shelf Edge Study.	Hughes *et al.* (2011) - draft report available on request
	2011International Bottom Trawl Survey Quarter 3	Marine Scotland Science	Analysis of opportunistic video/stills samples collected by JNCC during the downtime of the IBTS at stations across the central and northern North Sea. The epifauna were identified in the video & stills samples leading to the assignment of biotopes based on the communities and substratum observed.	Goudge, H. and Morris, L. (2011) - draft report available on request
	2011 Firth of Forth Banks Complex survey	Scottish MPA Project commissioned survey	Analysis of video/stills samples collected by JNCC during a dedicated survey to the Firth of Forth banks complex in October 2011. The epifauna were identified in the video & stills samples leading to the assignment of biotopes based on the communities and substratum observed.	Axelsson *et al.* (2011) - draft report available on request

Feature	**Dataset title**	**Data provider**	**Summary**	**Reference**
Cetaceans	Cetacean effort corrected sightings data 1979-1997	JNCC Cetacean Atlas data	Minke whale, white-beaked dolphin and Risso's dolphin sightings per unit effort (km) within ¼ ICES rectangles (15' latitude by 30'longitude). Data is collated from three main sources - European Seabirds At Sea database, Sea Watch Foundation database, and the SMRU SCANS (Small Cetacean Abundance in the North Sea) survey.	Reid *et al*. (2003)
	Cetacean effort corrected sightings data 2003-2011	Hebridean Whale and Dolphin Trust	Effort (km) and Ceteceans Per Unit Effort data within 0.05 latitude and longitude grid squares; data collected via boat based surveys using trained volunteers between April and October.	-
Common skate	MSS trawl survey data	Marine Scotland Science	Provides data for the west coast available from 1925. A total of 1,580 hauls recorded common skate. The frequency, time of year and types of survey gears and methods were variable over this period until 1986 when the International Bottom Trawl quality standard was introduced providing consistent data collection. The data used are from the period 1986-2008.	Marine Scotland Science West coast Bottom Trawl Survey 1986-2008
	Tag re-capture programme	Glasgow Museum and SSACN	Extensive tag-recapture programme that has been ongoing since 1970s. The tag-recapture data provides strong evidence for a high degree of residency with very occasional exchange between areas.	Marine Scotland Science (2012b)
	A series of inshore trawl surveys in west Scotland	Marine Scotland Science	From 2003-2005 a series of inshore trawl surveys were undertaken by MSS to provide important information in those inshore areas (including sea lochs) not covered by the IBTS surveys.	Marine Scotland Science (2012b)
	SISP partnership gear survey	Scottish Association for Marine Science/ Scottish Industry Science Partnership	In 2010 an *ad-hoc* survey in the Firth of Lorn area was undertaken to provide important information in those inshore areas (including sea lochs) not covered by the IBTS surveys.	Marine Scotland Science (2012b)
	Electronic tagging programme Loch Sween	Marine Biological Association	An electronic tagging programme involving transmitter tags and an array of receivers.	Wearmonth, V.J. and Sims, D.W. (2009)

Feature	**Dataset title**	**Data provider**	**Summary**	**Reference**
Coral gardens	Verification of suspected coral garden records in Scotland's seas	Lea-Anne Henry and Murray Roberts	Improved technical definition of the OSPAR habitat and application of the definition to provide a degree of confidence of the extent to which suspected records could be classed as coral gardens.	Henry, L-A and Roberts, M. (*in prep*.) - draft report available on request
Deep sea sponge aggregations	Plymouth University PhD - Identification of areas of nature conservation importance in deep waters of the UK continental shelf	University of Plymouth - MoA between JNCC, UoP, SAMS, NERC (BGS) and NERC (NOC)	Analysis of video/stills samples collected during SEA and SEA-SAC surveys. Biotopes proposed including the Boreal Ostur community.	-
	2011 RRS James Cook Cruise JC60	National Oceanographic Centre	Cruise to investigate the benthic habitats and the impact of human activities in Rockall Trough, on Rockall Bank and in Hatton-Rockall Basin. The polygonal faults in the Hatton-Rockall Basin were targeted resulting in 2 tows being undertaken in which *Pheronema carpenteri* fields were observed.	Huvenne, V. (2011)
	Verification of suspected deep sea sponge aggregation records in Scotland's seas	Lea-Anne Henry and Murray Roberts	Application of OSPAR definition to data mined suspected records of deep sea sponge aggregations and commentary on the degree of confidence of the extent to which suspected records could be classed as deep sea sponge aggregations.	Henry, L-A and Roberts, M. (*in prep*.) draft report available on request
Northern sea fan and sponge communities	2011RV *Scotia* survey to Rona & Windsock	Scottish MPA Project commissioned survey	Analysis of video/stills samples collected by JNCC during a dedicated survey to the 'Windsock' (now named West Shetland Shelf) in 2011. The epifauna were identified in the video & stills samples leading to the assignment of biotopes based on the communities and substratum observed. Deep sponge communities (circalittoral) component identified with low confidence based on a proposed sub-biotope.	Goudge, H. and Morris, L. (2011) - draft report available on request

Feature	**Dataset title**	**Data provider**	**Summary**	**Reference**
	West Hebrides Biotope Mapping Project	Agri-Food and Biosciences Institute, Northern Ireland (AFBI) and Queens University, Belfast (QUB)	MESH project commissioned mapping using remote-sensed data and ground-truthing.	Mitchell (2008)
	Offshore Reef Areas: Blackstone Banks	Agri-Food and Biosciences Institute, Northern Ireland (AFBI) and Queens University, Belfast (QUB)	MESH project commissioned mapping using remote-sensed data and ground-truthing.	Mitchell *et al.* (2009)
	Biological data interpretation of the Reef East of Shetland Isles Area of Search	JNCC and SNH	Offshore Natura project commissioned mapping using remote-sensed data and ground-truthing from Natura survey.	Foster-Smith *et al.* (2009)
Ocean quahog aggregations	2011 Firth of Forth Banks Complex survey	Scottish MPA Project commissioned survey	Taxonomic analysis on grab samples collected during the NLV Pole Star survey 2011.	-
Sandeels	Presence / absence data of adult sandeels	Marine Scotland Science	Presence / absence data of adult sandeels from MSS trawl surveys from 1927 to 2010.	Wright, P.J. and Begg, G.S. (1997) Wright, P.J. (*unpubl.* data)
	Sandeel larval density	Marine Scotland Science	Sandeel larval density maps from across the Scottish waters.	Proctor *et al*. (1998)
	Suitable sandeel habitat presence/absence data	Marine Scotland Science	Analysis of predicted presence from GAM modelling of sediment preferences using BGS sediment maps.	Wright *et al*. (2000)
	Sandeel coastal fishing grounds	Marine Scotland Science	Location of Scottish grounds determined from fishing records (Gauld, 1989). Location of Shetland grounds confirmed using RoxAnn in 2000 and trawl surveys	Marine Scotland Scienc (*unpubl. data)*
	Sandeel offshore fishing grounds	Marine Scotland Science	Offshore areas identified as important for the sandeel fishery active in North Sea waters.	Jensen *et al*. (2011)

Feature	**Dataset title**	**Data provider**	**Summary**	**Reference**
Offshore deep sea muds	Biotope analysis of archived stills from surveys undertaken in the SEA7 Region of Scotland's seas	Scottish Association of Marine Science	Biotoping archived stills captured on the Hebridean slope between1988 and 1998 from surveys to the north-west of Lewis, the north-west of St Kilda and the from the Land-Ocean Interaction Study - Shelf Edge Study.	Hughes *et al.* (2011) - draft report available on request
	2010 Herring Acoustic NS Scotia Survey 0810S	Marine Scotland Science	Analysis of opportunistic video/stills samples collected by JNCC during the downtime of the survey at stations across the northern North Sea. The epifauna were identified in the video & stills samples leading to the assignment of biotopes based on the communities and substratum observed. Grab samples biotoped by the taxa and particle size analysis.	Curtis, M. (2011) & Moore, J. *et al.* (2011)
	Seafloor biotope analysis of the deep waters of the SEA4 region of Scotland's seas	National Oceanographic Centre	Statistical analysis of the infaunal samples collected from AFEN & SEA surveys undertaken in the SEA4 region from 1996-2002. Cluster analysis derived biotopes defined from across the Atlantic and Arctic influenced waters.	Bett, B.J. (2012) - draft report available on request
	2011 Firth of Forth Banks Complex survey	Scottish MPA Project commissioned survey	Analysis of video/stills samples collected by JNCC during a dedicated survey to the Firth of Forth Banks Complex in October 2011. The epifauna were identified in the video and stills samples leading to the assignment of biotopes based on the communities and substratum observed.	Axelsson, M. *et al.* (2011) - draft report available on request
	2011 International Bottom Trawl Survey Quarter 3	Marine Scotland Science	Analysis of opportunistic video/stills samples collected by JNCC during the downtime of the IBTS at stations across the central and northern North Sea. The epifauna were identified in the video & stills samples leading to the assignment of biotopes based on the communities and substratum observed.	Goudge, H. and Morris, L. (2012) - draft report available on request
Offshore subtidal sands and gravels	Biotope analysis of archived stills from surveys undertaken in the SEA7 Region of Scotland's seas	Scottish Association of Marine Science	Biotoping archived stills captured on the Hebridean slope between1988 and 1998 from surveys to the north-west of Lewis, the north-west of St Kilda and the from the Land-Ocean Interaction Study - Shelf Edge Study.	Hughes, D. *et al.* (2011) - draft report available on request

Feature	**Dataset title**	**Data provider**	**Summary**	**Reference**
	2010 Herring Acoustic NS Scotia Survey 0810S	Marine Scotland Science	Analysis of opportunistic video/stills samples collected by JNCC during the downtime of the survey at stations across the northern North Sea. The epifauna were identified in the video & stills samples leading to the assignment of biotopes based on the communities and substratum observed. Grab samples biotoped by the taxa and particle size analysis.	Curtis, M. (2011) & Moore, J. *et al.* (2011)
	2011International Bottom Trawl Survey Quarter 3	Marine Scotland Science	Analysis of opportunistic video/stills samples collected by JNCC during the downtime of the IBTS at stations across the central and northern North Sea. The epifauna were identified in the video & stills samples leading to the assignment of biotopes based on the communities and substratum observed.	Goudge, H. and Morris, L. (2012) - draft report available on request
	2011 International Bottom Trawl Survey Quarter 4	Marine Scotland Science	Analysis of opportunistic video/stills samples collected by JNCC during the downtime of the IBTS at stations across the north-west and northern Scottish seas.	Axelsson, M. *et al.* (2011) - draft report available on request
	2011 RV *Scotia* survey to Rona & Windsock	Scottish MPA Project commissioned survey	Analysis of video/stills samples collected by JNCC during a dedicated survey to the 'Windsock' (now named West Shetland Shelf) in 2011. The epifauna were identified in the video and stills samples leading to the assignment of biotopes based on the communities and substratum observed.	Goudge, H. and Morris, L. (2012) - draft report available on request
	Seafloor biotope analysis of the deep waters of the SEA4 region of Scotland's seas	National Oceanographic Centre	Statistical analysis of the infaunal samples collected from AFEN & SEA surveys undertaken in the SEA4 region from 1996-2002. Cluster analysis derived biotopes defined from across the Atlantic and Arctic influenced waters.	Bett, B. (2012) - draft report available on request
	MSS coral bycatch records collated from trawl surveys 2000-2009	Marine Scotland Science	Records of soft corals and sponges encrusting coarse substratum collated from analysis of by-catch from MSS deepwater trawl surveys from 2009 to 2009.	-

Feature	**Dataset title**	**Data provider**	**Summary**	**Reference**
	2011 Firth of Forth Banks Complex survey	Scottish MPA Project commissioned survey	Analysis of video/stills samples collected by JNCC during a dedicated survey to the Firth of Forth Banks Complex in October 2011. The epifauna were identified in the video and stills samples leading to the assignment of biotopes based on the communities and substratum observed.	Axelsson, M. *et al.*, (2011) - draft report available on request
Seamount communities	Plymouth University PhD - Identification of areas of nature conservation importance in deep waters of the UK continental shelf	University of Plymouth - MoA between JNCC, SAMS, NERC (BGS), NERC (NOC) and UoP	Analysis of video/stills samples collected during SEA and SEA-SAC surveys to the prominent ocean rises, including transects on Rosemary Bank and Anton Dohrn.	-

Table A2.3 Search features, or thematic blocks, representing the key geodiversity interests of the Scottish seabed and their scientific importance

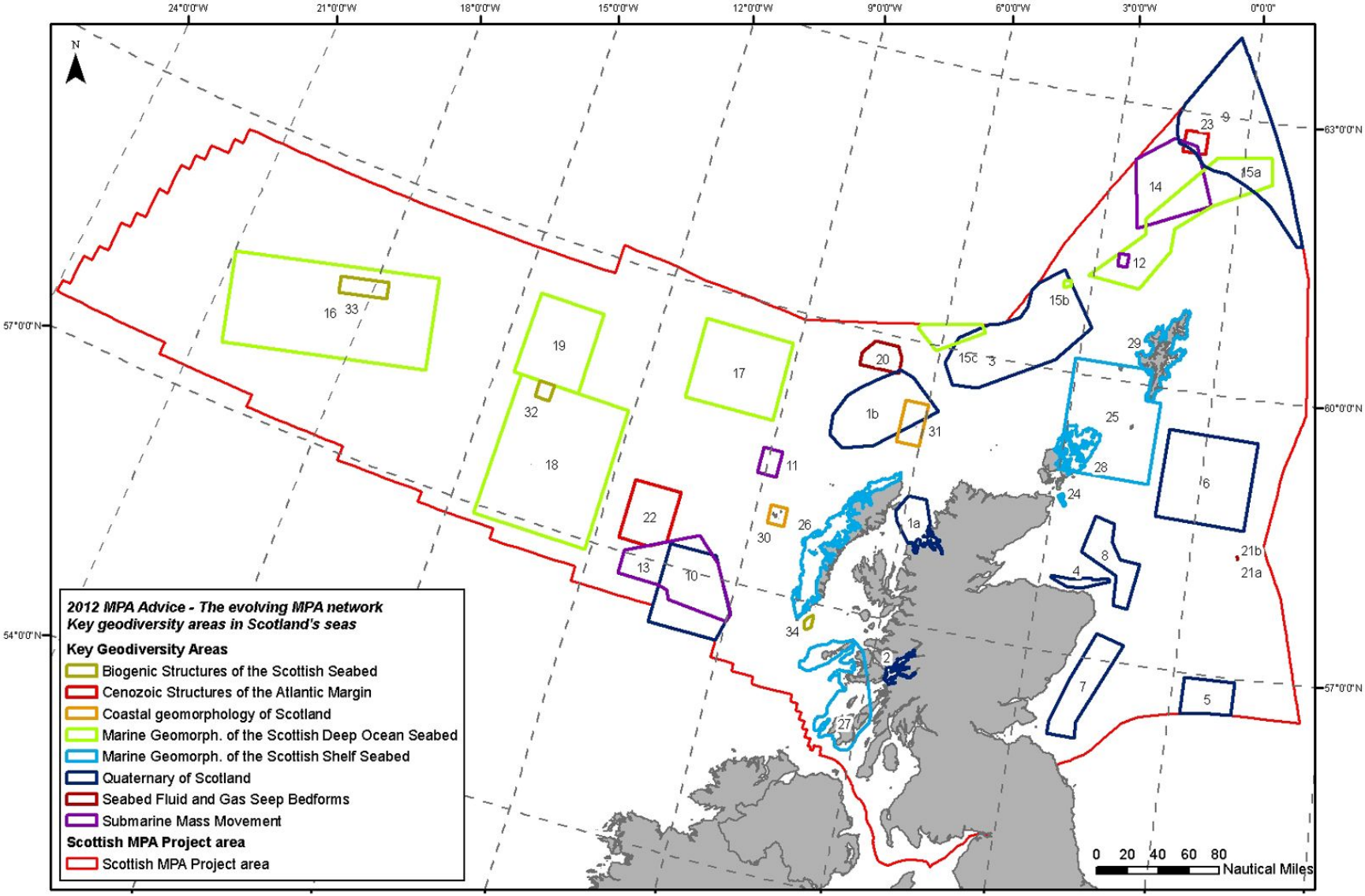
	Features / thematic blocks	**Interests of scientific importance**
1	The Quaternary of Scotland	A range of landforms and deposits associated with the last and earlier British Ice Sheet(s) (BIS), important for: • understanding the dynamics of palaeo-ice streams and marine-based ice sheets and the links to climate forcing and sea-level; • insights into the coupling of ice sheet dynamics, ocean processes, climate, the rheology of the upper mantle, glacio-isostatic adjustment and relative sea-level change; • geomorphological and sedimentary records that augment the terrestrial evidence for the later stages of deglaciation of the last BIS and the subsequent re-expansion of glaciers in the north and west Highlands during the Loch Lomond Stade; • the length and continuity of palaeoenvironmental archives that elucidate regional-scale changes in palaeoceanography and climate variations, fluctuations in the timing and extent of the last BIS and changing sedimentation patterns and processes.
2	Submarine Mass Movement	Submarine slides of different ages and morphology, important for understanding: • the geological evolution and processes that have shaped the continental slope; • geohazards associated with the thick sediment accumulations on the continental slope.
3	Marine Geomorphology of the Scottish Deep Ocean Seabed	Contourites, sediment drifts and erosional features associated with deep-ocean currents, important for understanding: • past and present processes associated with ocean currents; • links between sedimentation patterns, palaeoceanographic changes and past climate change.

	Features / thematic blocks	Interests of scientific importance
4	Seabed Fluid and Gas Seep	Pockmarks and sand volcanoes, important for understanding: • syn-/post- depositional processes associated with thick sediment accumulations on the seafloor; • bedforms associated with gas seepage from the seafloor.
5	Cenozoic Structures of the Atlantic Margin	Large structural blocks (seamounts) and mud diapirs, important for understanding: • the history and dynamic evolution of a 'passive' continental margin, part of the North Atlantic Volcanic Province; • sub-surface fluid migration pathways.
6	Marine Geomorphology of the Scottish Shelf Seabed	Internationally important examples of non-tropical shelf carbonate systems and bedforms, including horse-mussel reefs and banks of coralline algal gravels (maerl) important for: • sources of sediment for machair systems; • understanding shelf processes and relationships between currents and bedform development.
7	Coastal Geomorphology of Scotland	Submerged coastal landforms, important for: • recording past changes in sea-level • understanding processes of shore platform formation.
8	Biogenic Structures of the Scottish Seabed	Biogenic sediment mounds and cold-water corals, important for understanding: • the formation and evolution of cold-water coral growth and carbonate mound development.

Table A2.4 Categorisation of marine geodiversity blocks in Scottish territorial and offshore waters and associated numbers of key geodiversity areas

Thematic block	Key geodiversity area name	Ref. no
The Quaternary of Scotland [x10]	Summer Isles to Sula Sgeir Fan	1a & b
	Loch Linnhe and Loch Etive	2
	West Shetland Margin Palaeo-depositional System	3
	The Southern Trench	4
	Devil's Hole	5
	Fladen Deeps	6
	Wee Bankie	7
	Bosies Bank	8
	North Sea Fan (Scottish sector)	9
	The Barra Fan	10
Submarine Mass Movement [x4]	Geikie Slide	11
	The Afen Slide and Palaeo-Afen Slide	12
	The Peach Slide Complex	13
	Miller Slide	14
Marine Geomorphology of the Scottish Deep Ocean Seabed [x5]	West Shetland Margin Contourite Deposits	15a - c
	Central Hatton Bank (and adjacent basin floor)	16
	Rosemary Bank Seamount (and adjacent basin floor)	17
	North-East Rockall Bank (and adjacent basin floor)	18
	George Bligh Bank (and adjacent basin floor)	19
Seabed Fluid and Gas Seep [x2]	Darwin Mounds	20
	Scanner - Scotia - Challenger Pockmark Complex	21a & b
Cenozoic Structures of the Atlantic Margin [x2]	Anton Dohrn Seamount (and adjacent basin floor)	22
	The Pilot Whale Diapirs	23
Marine Geomorphology of the Scottish Shelf Seabed [x6]	Sandy Riddle Bank (south-east of Pentland Skerries)	24
	Fair Isles Strait Marine Process Bedforms	25
	Outer Hebrides Carbonate Production Area	26
	Inner Hebrides Carbonate Production Area	27
	Orkney Carbonate Production Area	28
	Shetland Carbonate Production Area	29
Coastal Geomorphology of Scotland [x2]	St Kilda Archipelago Submerged Landforms	30
	Sula Sgeir Submerged Platforms	31
Biogenic Structures of the Scottish Seabed [x3]	Rockall Bank Biogenic Sediment Mounds	32
	Hatton Bank Carbonate Mounds	33
	Mingulay Reef	34

Figure A2.1 Key geodiversity areas identified on the Scottish seabed (see Table A2.4 for area names and thematic blocks)



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 [2012]. All rights reserved. Ordnance Survey Licence number 100017908. Key geodiversity areas in Scotland's seas from SNH commissioned research - Report no. 431 ©SNH and JNCC. 05.10.12. All rights reserved.

Appendix 3 Summary of existing measures considered to afford protection to MPA search features

Special Areas of Conservation (SACs)

Table A3.1 Possible marine Special Areas of Conservation (pSACs) in Scottish waters considered to afford protection to MPA search features

OSPAR Region	***Possible SAC name***	***MPA search feature(s) that would be considered protected should the SAC progress***
III	Sound of Barra	Maerl beds, seagrass beds, shallow tide-swept coarse sands with burrowing bivalves

Table A3.2 Candidate marine Special Areas of Conservation (cSACs) in Scottish waters considered to afford protection to MPA search features

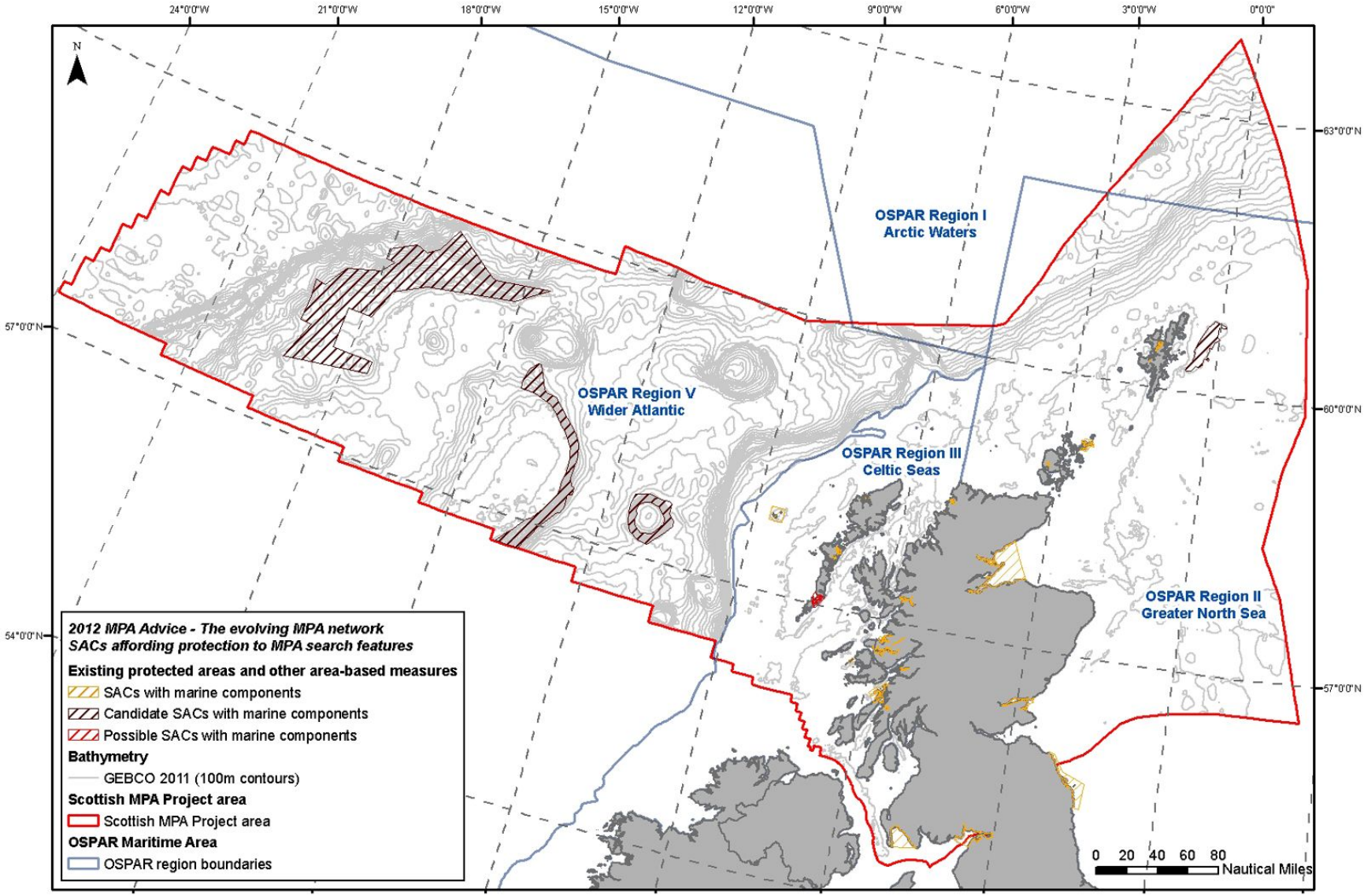
OSPAR Region	***Candidate SAC name***	***MPA search feature(s) considered protected***
II	Pobie Bank	Northern sea fan and sponge communities
V	Anton Dhorn	Coral gardens, seamount communities
V	East Rockall Bank	Coral gardens; deep sea sponge aggregations
V	Hatton Bank	Carbonate mound communities; coral gardens; deep sea sponge aggregations

Table A3.3 Marine Special Areas of Conservation (SACs) in Scottish waters considered to afford protection to MPA search features

OSPAR Region	***SAC name***	***MPA search feature(s) considered protected***
II	Berwickshire and North Northumberland Coast	Ocean quahog, European spiny lobster
II	Dornoch Firth and Morrich More	Blue mussel beds, seagrass beds
II	Firth of Tay and Eden Estuary	Blue mussel beds, seagrass beds, ocean quahog
II	Loch of Stenness	Seagrass beds
II	Moray Firth	Blue mussel beds, horse mussel beds, kelp and seaweed communities on sublittoral sediment, seagrass beds, ocean quahog
II	Sanday	Horse mussel beds, kelp and seaweed communities on sublittoral sediment, low or variable salinity habitats, seagrass beds, tide-swept algal communities
II	Sullom Voe	Blue mussel beds, burrowed mud, horse mussel beds, kelp and seaweed communities on sublittoral sediment, tide-swept algal communities, ocean quahog
II	The Vadills	Kelp and seaweed communities on sublittoral sediment, maerl beds, seagrass beds, tide-swept algal communities
III	Firth of Lorn	Northern sea fan and sponge communities, tide-swept algal communities, European spiny lobster, shelf deeps
III	Loch Creran	Horse mussel beds, low or variable salinity habitats
III	Lochs Duich, Long and Alsh Reefs	Horse mussel beds, low or variable salinity habitats, tide-swept algal communities

OSPAR Region	***SAC name***	***MPA search feature(s) considered protected***
III	Loch Laxford	Blue mussel beds, burrowed mud, horse mussel beds, inshore deep mud, kelp and seaweed communities on sublittoral sediment, low or variable salinity habitats, maerl beds, maerl or coarse shell gravel with burrowing sea cucumbers, sea loch egg wrack beds, tide-swept algal communities, northern feather star aggregations on mixed substrata, ocean quahog, European spiny lobster
III	Loch Moidart and Loch Shiel Woods	Sea loch egg wrack beds
III	Loch nam Madadh	Burrowed mud, kelp and seaweed communities on sublittoral sediment, low or variable salinity habitats, maerl beds, maerl or coarse shell gravel with burrowing sea cucumbers, northern sea fan and sponge communities, seagrass beds, tide-swept algal communities
III	Loch Roag Lagoons	Seagrass beds, tide-swept algal communities
III	Luce Bay and Sands	Blue mussel beds, kelp and seaweed communities on sublittoral sediment, tide-swept algal communities, ocean quahog
III	Moine Mhor	Seagrass beds
III	Obain Loch Euphoirt	Low or variable salinity habitats, seagrass beds
III	Solway Firth	Blue mussel beds
III	Sound of Arisaig (Loch Ailort to Loch Ceann Traigh)	Kelp and seaweed communities on sublittoral sediment, maerl beds, maerl or coarse shell gravel with burrowing sea cucumbers, seagrass beds, ocean quahog
III	St Kilda	Northern sea fan and sponge communities, European spiny lobster
III	Sunart	Horse mussel beds, low or variable salinity habitats, northern sea fan and sponge communities, tide-swept algal communities, European spiny lobster
III	Treshnish Isles	Tide-swept algal communities

Figure A3.1 Special Areas of Conservation (SACs) in Scotland's seas considered to afford protection to MPA search features



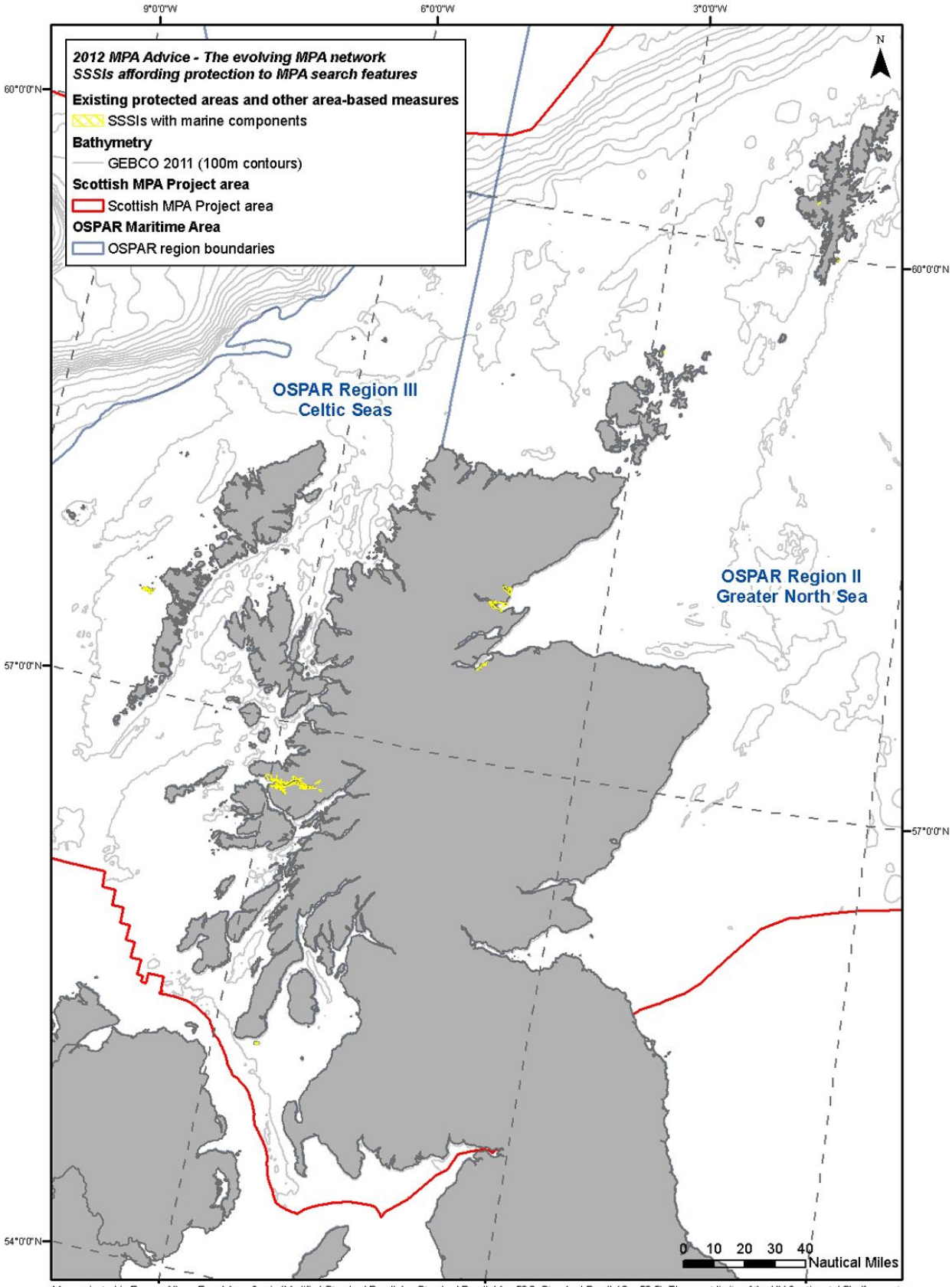
Map projected in Europe Albers Equal Area Conic (Modified Standard Parallels - Standard Parallel 1 = 50.2; Standard Parallel 2 = 58.5). The exact limits of the UK Continental Shelf are set out in orders made under section 1(7) of the Continental Shelf Act 1964 (©Crown Copyright). Coastline ©Crown copyright and database right [2012]. All rights reserved. Ordnance Survey Licence number 100017908. Bathymetry ©GEBCO. NOT TO BE USED FOR NAVIGATION. MPA network ©SNH, JNCC and Marine Scotland. 29.10.12. All rights reserved.

Sites of Special Scientific Interest (SSSIs)

Table A3.4 Sites of Special Scientific Interest (SSSIs) considered to afford protection to MPA search features

OSPAR Region	***SSSI name***	***MPA search feature(s) considered protected***
II	Dornoch Firth	Seagrass beds
II	Holm of Papa Westray	Black guillemot
II	Loch Fleet	Seagrass beds
II	Longman and Castle Stuart Bays	Seagrass beds
II	Mousa	Black guillemot
II	The Vadills	Sea loch egg wrack beds
III	Monach Isles	Black guillemot
III	Sanda Island	Black guillemot
III	Sunart	Sea loch egg wrack beds, seagrass beds
III	Ulva, Danna and the McCormaig Isles	Seagrass beds

Figure A3.2 Sites of Special Scientific Interest (SSSIs) around the coast of Scotland considered to afford protection to MPA search features



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 [2012]. All rights reserved. Ordnance Survey Licence number 100017908. Bathymetry ©GEBCO. NOT TO BE USED FOR NAVIGATION. MPA network ©SNH, JNCC and Marine Scotland. 05.10.12. All rights reserved.

Other area-based measures

Table A3.5 Fisheries areas established for nature conservation purposes in Scottish waters considered to afford protection to MPA search features

OSPAR Region	***Fisheries restriction area***	***MPA search feature(s) considered protected***
II	East Coast Scotland FRA (CA1)	Sandeels
III	Lamlash Bay	Kelp and seaweed communities on sublittoral sediment, maerl beds, shallow tide-swept coarse sands with burrowing bivalves
V	North West Rockall	Offshore subtidal sands and gravels (Atlantic influenced off-shelf)
V	West Rockall Mound	Offshore deep sea muds (Atlantic influenced off-shelf)
V	Darwin Mounds	Offshore subtidal sands and gravels; offshore deep sea muds (both Atlantic influenced off-shelf)
V	Hatton Bank	Carbonate mound communities; coral gardens; deep sea sponge aggregations; offshore subtidal sands and gravels (Atlantic influenced off-shelf)

Table A3.6 Other fisheries restriction areas in Scottish waters considered to afford protection to MPA search features

OSPAR Region	***Fisheries restriction area***	***MPA search feature(s) considered protected***
V	Blue Ling Management Area - edge of Rosemary Bank (FRA)	Blue ling (spawning grounds)
V	Blue Ling Management Area - edge of continental slope (FRA)	Blue ling (spawning grounds)

NB The list of sites provided here is the same as that outlined in Tables A1.9 & A1.10 (Appendix 1). Please refer to Figure A1.4 for the mapped distribution of these sites.

Appendix 4 Stakeholder engagement in the Scottish MPA Project [including feedback received from stakeholders on the Nature Conservation MPA proposals] and details of the third-party Nature Conservation MPA proposals

Stakeholder engagement

Over the past 18 months 80 national stakeholder representatives have been involved in a stakeholder workshop series and attended multiple bilateral meetings to discuss the progress in identifying MPAs in Scottish waters.

The main purpose of this early engagement was to draw on the considerable knowledge and expertise held by marine users and involve them in open dialogue on the process being used to develop the MPA network. The goal of the workshop series was to deliver transparency on the decisions, evidence-base and processes being used to identify MPAs. It provided stakeholders with an opportunity to contribute to the level of evidence available for the project and challenge the evidence-base and decisions being made on site selection. It also provided the opportunity to demonstrate to stakeholders how their contributions were being considered and deliver back to them the results of their feedback. A series of post workshop reports were produced to record the changes being made as a result of stakeholder input. The changes relating to the Nature Conservation MPA proposals are summarised in Table A4.1.

The series of five workshops covered a range of topics which correlated to the stage of development of the MPA network at the time. Workshop 1 focused on data mining and evidence, working with stakeholders to identify additional data which could be useful in the selection of MPAs. At workshop 2, we focused on identifying marine areas where there is the least human activity and the underlying data which helps to identify the levels of activity. The areas defined through this work helped feed into the development of the initial MPA search locations. At workshops 3 and 4 we focused on presenting MPA search locations identified for the protection of MPA search features, and at Workshop 5 presented an overview of the shape of the network and the approach proposed to help define management options. All materials produced to support the workshop series were made publically available prior to the workshop via Marine Scotland's MPA web pages[18] to ensure the process was transparent to all with an interest in the development of the MPA network.

The workshop series has formed a valuable feedback loop with stakeholder representatives over the development of the MPA network. Whilst the process to date has focused on the engagement of marine users, local community groups have also played a key role in shaping the network through the submission of third-party proposals. Three coastal community groups submitted proposals for the Sound of Canna, waters around South Arran and Loch Gairloch and Wester Loch Ewe. These submissions have underpinned the development of MPA proposals, either in part of in full, that are recommended for progression within this advice. A total of 27 third-party proposals were submitted in Scottish territorial waters with the remaining 24 originating from environmental NGOs and recreational angling groups (see Table A4.2 and Figure A4.1 for details). In total 15 of the third-party proposals have contributed to the development of eight of the MPA proposals and three of the remaining five MPA search locations. Representatives from third parties who submitted proposals for Nature Conservation MPAs attended the workshop series where their proposals were displayed and discussed as an integral part of developing the MPA network.

A full list of stakeholders invited the Marine Scotland workshops on Scottish Marine Protected Areas is available on the Marine Scotland website (see http://www.scotland.gov.uk/Resource/0039/00396820.doc).

[18] See - http://www.scotland.gov.uk/Topics/marine/marine-environment/mpanetwork

Table A4.1 Summary of feedback received from stakeholders on the Nature Conservation MPA proposals and how these comments have influenced the scientific decision-making process

This table summarises feedback and actions arising from the stakeholder workshops. The full set of proposed protected features is listed in Appendix 5. The recommended boundaries of the MPA proposals and search locations are set out in the data confidence assessments published alongside this document. Any differences between the details provided in this appendix and the final MPA proposals / search locations are the result of further analysis post workshop 5

Name	Code	Comments received	Action taken
Faroe-Shetland sponge belt	FSS	Search location was first discussed at workshop 3. Stakeholders requested that the southern extent of the boundary be drawn more tightly around the features of interest.	This proposal was formed from the previous Faroe-Shetland Channel (FSC) search location which has been divided into two MPA proposals. The Faroe-Shetland sponge belt (FSS) focuses on Atlantic influenced sediments and deep sea sponge aggregations, while the North-east Faroe Shetland Channel (NEF) focuses on Arctic influenced sediments and deep sea sponge aggregations. Using the database and maintaining the scientific integrity of the site, the southern extent of the proposal boundary was re-drawn to closely track the shallow limit of deep sea sponge aggregation records using the 400 m depth contour.
North-east Faroe-Shetland Channel	NEF	Search location was first discussed at workshop 3. Stakeholders requested that the southern extent of the boundary be drawn more tightly around the features of interest.	This proposal was formed from the previous Faroe-Shetland Channel (FSC) search location which has been divided into two MPA proposals. The Faroe-Shetland sponge belt (FSS) focuses on Atlantic influenced sediments and deep sea sponge aggregations, while the North-east Faroe Shetland Channel (NEF) focuses on Arctic influenced sediments and deep sea sponge aggregations.
Central Fladen	CFL	Discussed at workshop 4, representatives from the fishing sector expressed concern over the degree of overlap between the proposal and *Nephrops* fishing grounds.	As a result of concern from the fishing sector, Marine Scotland requested that JNCC identify science-based alternatives for representation of those features for which Central Fladen is being considered. JNCC recommend that a core area to the south of the proposal will need to be recommended to Ministers for the tall seapen records of the burrowed mud habitat, but that for the seapens and burrowing megafauna component science-based alternatives were available from the Fladen Grounds. This resulted in the identification of Western Fladen and South-east Fladen as options for the representation of the seapens and burrowing megafauna component of the burrowed mud habitat in Central Fladen.

Name	Code	Comments received	Action taken
East Caithness Cliffs	ECC	First discussed at workshop 4. There was some debate at the workshops regarding this site and whether or not it met the minimum threshold for selection of supporting at least 1% of the black guillemot population. There was general acceptance of the approach adopted for identifying sites for black guillemot including the East Caithness Cliffs proposal. Stakeholders also sought clarity regarding the potential future management implications of these locations. Further survey work was recommended by some stakeholders to underpin development of the proposals due to the age of the data used for assessments.	Subsequent to these discussions the data were reviewed and we are confident that the East Caithness Cliffs MPA proposal meets the 1% threshold. However, we have lower confidence in the data supporting this proposal compared to the other MPA proposals for black guillemot. Further survey work is planned for April 2013 during the black guillemot breeding season.
East of Gannet and Montrose Fields	EGM	First discussed at workshop 3. Stakeholders raised concerns about the prawn fishing interests to the south-east extent of the proposal, as well as oil and gas interests in the area.	No changes made in relation to the socio-economic concerns raised at the workshop but minor boundary changes to better reflect distribution of offshore deep sea muds and ocean quahog aggregations.

Name	Code	Comments received	Action taken
Fetlar to Haroldswick	FTH	First discussed at workshop 3. Renewables and aquaculture industry representatives asked for further consideration of the relationship between the MPA search features / the extent of the search location and their activities. The importance of this area for black guillemot was highlighted. There was general acceptance of the approach adopted for identifying sites for black guillemot. Stakeholders sought clarity regarding the potential future management implications of these locations. Some stakeholders requested that additional locations in the Northern Isles, particularly those with large populations be considered. Further survey work was recommended by some stakeholders to underpin development of the proposals due to the age of the data used for black guillemot assessments. Stakeholder meetings were held in Shetland to discuss the MPA Project and this MPA search location in particular. This included a range of fisheries, aquaculture, renewables and community interests.	During workshop 3 this MPA search location was extended further north to include additional records of the tide-swept coarse sands with burrowing bivalves MPA search feature. A predictive habitat mapping dataset used within GeMS was deemed to be of unreliable quality following discussions with NAFC and access to additional ground-truthing data from the Shetland SSMEI project. The GeMS mapping dataset, derived from point samples collected through the MNCR surveys, was subsequently removed from the database. To better define the extent of the seabed habitat features of interest, and improve the evidence-base across the whole area, additional 'opportunistic' remote video sampling was undertaken by Marine Scotland Science in 2011. Further survey work using more detailed diver and infaunal sampling was commissioned in 2012. Following workshop 3, sandeels were removed from consideration on advice of MSS. The grounds are considered to be of local importance but not wider. This led to the northern and western boundaries of the site being reduced. This change removed potential overlap with planned renewables activity in Bluemull Sound. Part of the approach to developing the MPA network is to look at opportunities for increasing the contribution that could be made by existing protected areas. For black guillemot, the focus has been on looking at opportunities for increasing the contribution that could be made by existing Special Protection Areas. Our advice is that developing the network in this way leads to a network which is adequate for black guillemot. We acknowledge that there are other areas which could equally make a contribution to the network but our assessment of adequacy (against Stage 5 of the MPA Selection Guidelines) is that these are not required. The black guillemot data associated with Fetlar to Haroldswick are more comprehensive than those associated with some of the other black guillemot proposals. This is because black guillemot counts are carried out regularly in Shetland by the University of Abderdeen as part of the Shetland Oil Terminal Environmental Advisory Group's work. Following workshop 4, the boundary was realigned more closely with the 50m depth contour to the east. This was to better reflect black guillemot foraging activity.

Name	Code	Comments received	Action taken
Firth of Forth Banks Complex	FOF	First discussed at workshop 3. At the third stakeholder workshop, representatives from the renewables sector expressed concern over the degree of overlap between the proposal and the Firth of Forth Round 3 windfarm zone.	As a result of concern from the renewables sector, Marine Scotland requested that JNCC identify science-based alternatives for the representation of those features for which the Firth of Forth Banks Complex is being considered. This resulted in the identification of Norwegian Boundary Sediment Plain as an option for ocean quahog aggregations and Turbot Bank as an option for offshore subtidal sands and gravels and shelf banks and mounds (see Section 8.6 for full discussion). Small boundary changes to better reflect distribution of the search feature offshore subtidal sands and gravels.
Mousa to Boddam	MTB	First discussed at workshop 4. Stakeholders raised concerns over the overlaps and potential implications for industry (fisheries) which needed to be clarified. Overall stakeholders considered that the search locations for sandeels provided good replication and representation for key life-cycle stages.	The name was changed from Mousa to Lambhoga Head to Mousa to Boddam to avoid confusion with another, better known, Lambhoga in Shetland.
North-west Orkney	NWO	First discussed at workshop 4. Stakeholders raised concerns over the overlaps and potential implications for industry (fisheries and renewables) which needed to be clarified. Stakeholders recognised the importance of sandeels in the food chain and there was general acceptance of the approach adopted. Stakeholders considered that the search locations provided good replication and representation for key life-cycle stages.	Minor changes were made to the shape of the boundary to better reflect the distribution of sandeel larvae data from Marine Scotland Science. In discussion with stakeholders, confirmed that there was no overlap with renewables interests.

Name	Code	Comments received	Action taken
Norwegian boundary sediment plain	NSP	First discussed at workshop 3. Stakeholders noted that the area could be extended to the west to represent burrowed mud feature interests.	On extending the proposal to the west, this was found to encompass the mud burrowing amphipod *Maera loveni* - a species component of the burrowed mud habitat. On scientific grounds, it was subsequently considered innappropriate to use *Maera loveni* as a driver in the identification of proposals for burrowed mud. This was due to the short longevity of the feature and the likelihood that it is a characterising species of most examples of burrowed mud habitat in Scotland's seas but is under recorded. As such, the proposal was reduced in size to focus in on ocean quahog aggregations. Note the area is recommended as a science-based alternative to representation of ocean quahog aggregations in the Firth of Forth Banks Complex (see Firth of Forth Banks Complex entry).
Noss Head	NOH	First discussed at workshop 3. No comments were received on the evidence base but some stakeholders queried the relationship between the existing fisheries restriction and the location of the horse mussel bed. This related partly to understanding implications for future management.	The MPA proposal shape was aligned to the horse mussel bed feature after additional review of survey data from 2011. The name was changed from Sinclair Bay to Noss Head to reflect the location more accurately. Sinclair Bay was used originally because that was the name of the adjacent fisheries restriction but there is only a partial overlap with the horse mussel bed.
Papa Westray	PWY	First discussed at workshop 4. Stakeholders requested that the boundary be checked with regard to queries over SW corner and overlap with the existing SPAs. There was general acceptance of the approach adopted for identifying sites for black guillemot including Papa Westray proposal. Some stakeholders requested that additional locations in the Northern Isles, particularly those with large populations be considered. Stakeholders also sought clarity regarding the potential future management implications of these locations. Further survey work was recommended by some stakeholders to underpin development of the proposals due to the age of the data used for assessments.	The boundary was devised by using a 2 km extension from the existing SPAs (Papa Westray and Holm of Papa Westray). This resulted in an area that held more than 1% of the black guillemot population. Therefore there was no requirement to extend the boundary around the whole of Papa Westray. Part of the approach to developing the MPA network is to look at opportunities for increasing the contribution that could be made by existing protected areas. For black guillemot, the focus has been on looking at opportunities for increasing the contribution that could be made by existing Special Protection Areas. Our advice is that developing the network in this way leads to a network which is adequate for black guillemot. We acknowledge that there are other areas which could equally make a contribution to the network but our assessment of adequacy (against Stage 5 of the MPA Selection Guidelines) is that these are not required.

Name	Code	Comments received	Action taken
South-east Fladen	SEF	First discussed at workshop 5. Identified as an alternative to Central Fladen - New MPA proposal identified as a science-based alternative to seapens and burrowing megafauna within the Fladen grounds.	None
Turbot Bank	TBB	First discussed at workshop 4. Identified as a science-based alternative after fourth workshop. No comments were recieved in relation to this site that warranted a change to the search location.	None, but note the area is recommended as a science-based alternative to representation of shelf banks and mounds and offshore subtidal sands and gravels in the Firth of Forth Banks Complex (see Firth of Forth Banks Complex entry). Minor shape changes to better reflect habitats of importance for sandeels. Further work is required regarding significance for sandeels.
Western Fladen	WFL	First discussed at workshop 5. Identified as an alternatives to Central Fladen - New potential areas for an MPA identified as a science-based alternative to seapens and burrowing megafauna within the Fladen grounds.	None
Wyre and Rousay Sounds	WYR	First discussed at workshop 5, although not directly the subject of any of the discussion groups. Questions from stakeholders focused on understanding why the proposal had been put forward at this point in the process. No comments were made on the supporting evidence.	The site was identified because the assessment of adequacy highlighted maerl beds as a gap in the Northern Isles. This was done using data from survey work in 2011. The shape discussed at workshop 5 was quite broad. Following the workshop, the boundary was refined to match the distribution of the maerl beds more closely, including in the south-eastern part of the proposed MPA.
West Shetland Shelf	WSS	First discussed at workshop 3. Stakeholders suggested that the search location should be extended southwards to encompass two additional shelf deeps.	Relatively little is known about the ecological value of the shelf deep so the search location was not been modified to include these features. However, there was a minor shape change to exclude the deep feature to the north-east of the location.

Name	Code	Comments received	Action taken
Clyde Sea Sill	CSS	First discussed at workshop 4. Stakeholders suggested that we needed to critically assess the linkages and functional role of the MPA search features identified in this location including the large-scale fronts feature. There was a suggestion that we should liaise with Northern Ireland in relation to black guillemot.	Following workshop 4, further work has been undertaken to understand the importance of fronts. This has involved discussions with the Scottish Association for Marine Science which built on earlier work (a contract carried out to improve our data on surface fronts by Plymouth University and a Marine Alliance for Science and Technology workshop which focused more generally on large-scale features). As a result, new information on fronts has been incorporated into the large-scale feature position paper and into the detailed application of the guidelines for the Clyde Sea Sill. The process for developing the MPA network in Northern Ireland is at an earlier stage than in Scotland and so it is too early to determine whether black guillemot will be included. Liaison will continue through regular meetings between Defra and the devolved administrations. We have recommended including black guillemot because the Clyde Sea Sill provides representation in south-west Scotland. By doing this, a linkage is provided between black guillemots in the rest of Scotland and those in Northern Ireland and England.
Loch Creran	LCR	First discussed at workshop 3. Stakeholders expressed concerns regarding preliminary recommendations to take forward only a small number of the sea lochs (max. 2 - 3 of possible options in West MPA region), although it was recognised that these were in part related to potential conflict arising from the double-badging of non-Natura features within existing SACs (relevant to the Loch Sunart, Loch Creran, and Lochs Duich, Long and Alsh MPA search locations). At workshop 5, some stakeholders suggested that because of the rarity of flame shell beds and the proportional importance of Scotland for them, we should consider including all examples of flame shell beds within the MPA network.	A sea lochs position paper was presented to Workshop 4 which set out options for including MPA search features associated with sea lochs. Loch Creran was recommended for further assessment.

Name	Code	Comments received	Action taken
Lochs Duich, Long and Alsh	DLA	First discussed at workshop 3. Submitted as a third-party proposal by both Marine Conservation Society and the National Trust for Scotland. Stakeholders were broadly content with the recommendations taken to workshops 3 & 4 but some further comparative analyses were requested in relation to specific search locations including Lochs Duich, Long and Alsh and the representation of specific features (e.g. burrowed mud, flame shell beds). There was general support for refining proposals and / or seeking alternative locations as appropriate. Stakeholders expressed concerns regarding preliminary recommendations to take forward only a small number of the sea lochs (max. 2 - 3 of the possible options in West MPA region), although it was recognised that these were in part related to potential conflict arising from the double-badging of non-Natura features within existing SACs (relevant to the Loch Sunart, Loch Creran, and Lochs Duich, Long and Alsh MPA search locations). It was noted that fishing activity was of lower intensity within Loch Long and Loch Duich than within Loch Alsh.	A sea lochs position paper was presented to workshop 4 which set out options for including MPA search features associated with sea lochs. Lochs Duich, Long and Alsh was not recommended for further assessment. This location was reintroduced following workshop 4 where stakeholders requested further review of science based alternatives for sea lochs. The relative merits of the Lochs Duich, Long and Alsh MPA search location were examined in further detail following workshop 4. Lochs Duich, Long and Alsh contain records of burrowed mud and inshore deep mud whereas Loch Sunart only contained the former. Following a review of the quality of these mud habitats, we recommended that both features should be assessed further as part of the Lochs Duich, Long and Alsh MPA search location and not as part of Loch Sunart. However, there were uncertainties relating to the inshore deep mud records and the flame shell bed records. Additional survey work was commissioned in 2012 to help resolve these. This work has confirmed the presence of the largest flame shell bed in Scottish waters within Lochs Duich, Long and Alsh. Infaunal samples for inshore deep mud from these surveys are being analysed and results will be available in 2013. Fully encompasses two third-party proposals made for Lochs Duich, Long, Alsh (and Beg).

Name	Code	Comments received	Action taken
Loch Sunart	LSU	First discussed at workshop 3. Subsequently, two submissions for third-party proposals were made by the Marine Conservation Society for benthic features and the Scottish Sea Angling Conservation Network for common skate. Further work requested on sea loch MPA search location options to determine how the relevant MPA search features can be best represented. Stakeholders expressed concerns regarding preliminary recommendations to take forward only a small number of the sea lochs (max. 2 - 3 of possible options in West MPA region). Stakeholders raised concerns over double badging as activities (e.g. aquaculture) are already managed in accordance with the SAC features and MPA designation could affect this. It was also suggested that greater replication and resilience within the network could be achieved by looking at locations outwith existing protected areas. Stakeholders raised concerns regarding management of non-Natura features.	Loch Sunart was discussed as part of the sea lochs position paper presented to workshop 4. Loch Sunart was recommended for further assessment. Additional review of the sealoch options subsequent to workshop 4 resulted in burrowed mud being removed from further consideration within Loch Sunart (see Lochs Duich, Long and Alsh for more detail). Following assessment of the third-party proposals for common skate, this feature was also removed from the Loch Sunart MPA proposal. Common skate is now being considered as part of Loch Sunart to Sound of Jura MPA proposal (see below). Loch Sunart is now being recommended for flame shell beds and northern feather star aggregations. Fully encompasses Loch Sunart third-party proposal.

Name	Code	Comments received	Action taken
Loch Sunart to the Sound of Jura	SJU	First discussed (as two separate parts - Loch Sunart and Loch Sween and the Sound of Jura) at workshop 3. Four separate proposals for Nature Conservation MPAs were made by the Scottish Sea Anglers Conservation Network (SSACN) covering Loch Sunart, Sound of Mull, Firth of Lorn and the Sound of Jura. During discussions at workshop 3, stakeholders recommended adding common skate (and shelf deeps) to the Loch Sween MPA search location. This meant extending to include the whole width of the Sound of Jura. Workshop 4 attendees were generally content with the proposals for common skate and recognised the limited evidence currently available for the Northern Isles (the reason why it was not possible to identify proposals there). Some questions were raised regarding the basis for inclusion of, and comparative quality of the evidence-base for, the Sound of Mull and Firth of Lorn search locations and the potential management implications of the common skate proposals more generally.	Common skate was added to the Loch Sween MPA search location following discussions at workshop 3, which became the Loch Sween and Sound of Jura MPA search location. In response to stakeholder feedback, Marine Scotland Science (MSS) prepared a common skate position paper to determine whether common skate should be recommended for inclusion as a protected feature of existing potential areas for MPAs and/or whether additional MPA search locations should be identified. This was presented at workshop 4. Discussions with MSS following workshop 4 confirmed that the quality of data (in terms of data type) were the same for the Sound of Mull and Firth of Lorn as for the other areas discussed. The boundary of the four separated proposals made by SSACN were almagamated to form a single boundary to better represent the extent of the area considered to be essential for common skate.

Name	Code	Comments received	Action taken
Loch Sween	LSW	First discussed at workshop 3. Submitted as a third-party proposal by the Marine Conservation Society. A number of options were discussed in relation to this search location at workshop 3 and 4. These included: the original extent (following Marine Consultation Area); reducing the search location to just Loch Sween; and, extending the search location along the open coast to include shelf deeps and common skate.	After discussion at workshop 3, the site was expanded out into the Sound of Jura to include common skate and shelf deeps. A sea lochs position paper was presented to workshop 4 which set out options for including MPA search features associated with sea lochs. Loch Sween and the Sound of Jura was recommended for further assessment. A literature review was carried out in 2010 which translated older records of habitats and species into biotopes so that they could be matched to MPA search features. This confirmed the presence of multiple features within the sea loch. Due to a third-party proposal coming into the process at Workshop 4 it was decided to roll back the extension made for common skate and concentrate on the seabed habitats within Loch Sween (see Loch Sunart to the Sound of Jura for further discussion of common skate). The modified location fully encompasses the third-party proposal for Loch Sween.
Monach Isles	MOI	First discussed at workshop 4. There was general acceptance of the approach adopted for identifying sites for black guillemot. Stakeholders sought clarity regarding the potential future management implications of these locations. Further survey work was recommended by some stakeholders to underpin development of the proposals due to the age of the data used for assessments.	Progressed as agreed following workshop 4. Data considered sufficient to support development of an MPA proposal. The boundary was refined to provide tighter alignment with the 2 km buffer around the SPA.

Name	Code	Comments received	Action taken
North-west sea lochs and Summer Isles	NWS	Part of this (Little Loch Broom) was first discussed at workshop 3. Further work was requested on the options for sea loch MPA search locations to determine how the relevant MPA search features could be best represented. There were no comments from stakeholders on the evidence.	The sea lochs position paper was presented to workshop 4 which set out options for including MPA search features associated with sea lochs. The North-west sea lochs and Summer Isles search location was recommended for further assessment. This search location was modified post workshop 3 and 4 to take account of the Quaternary of Scotland key geodiversity area and features. The resulting location has been renamed North-west sea lochs and Summer Isles. Subsequent to workshop 4 the search location shape was extended to the west to encompass burrowed mud on the open coast. The adequacy assessment revealed that burrowed mud on the open coast did not need to be represented in both the Shiant East Bank and the North-west sea lochs and Summer Isles. A decision was taken to keep burrowed mud within the North-west sea lochs and Summer Isles because removing the burrowed mud from this area would leave an MPA with patchily distributed habitats. Removing it from the Shiant East Bank would still leave the shelf bank and mound feature intact. A further extension to this search location was made to encompass Loch Ewe after further consideration of the Gairloch and Wester Loch Ewe third-party proposal. This also enabled better coverage of geodiversity interests.

Name	Code	Comments received	Action taken
Small Isles	SMI	First discussed at workshop 3. An area encompassing the Sound of Canna was submitted as a third-party proposal by the Small Isles Community Council. There was discussion at the workshop about the coverage of mobile versus benthic features. These discussions also had a bearing on the Coll and Tiree search location. Stakeholders recommended that basking sharks and minke whales be included as part of a wider review of these species. They also recommended that this review should be based on the use of effort-correct sightings data. Aquaculture industry representatives asked for further consideration of the relationship between the MPA search features / the extent of the search location and their activities.	Discussions at workshop 3 resulted in the addition of waters around Muck and Eigg. Following workshop 3, further changes led to inclusion of the Muck Deep and geodiversity features. Basking sharks and minke whales were removed from consideration from the Small Isles and from Coll and Tiree following discussion at workshop 3. A new MPA search location, Skye to Mull, was developed which focussed only on these two species. As a result, the shape of the Small Isles was changed to reflect the seabed habitats, geodiversity features and black guillemot. Following workshop 4, the shape of the search location was refined to reflect more closely the records of MPA search features and geodiversity features. This included a 2 km buffer around much of Rum to reflect black guillemot foraging activity. The boundary to the north and west followed the geodiversity interests and the rest followed records of seabed habitats. Fully encompasses the Sound of Canna third-party proposal.

Name	Code	Comments received	Action taken
South Arran	ARR	First discussed at workshop 3 as part of the wider Clyde sea lochs and Arran MPA search location. Submitted as a third-party proposal by the Community of Arran Seabed Trust. At workshop 3 this search location formed part of the wider Clyde sea lochs and Arran MPA search location. A number of options were discussed in relation to this search location. These included: keeping the original extent; reducing the search location to focus on Loch Fyne; and, a third option that would see the Clyde sea lochs and Arran progressing without burrowed mud, with representation of this MPA search feature being provided by the Loch Goil and Loch Long search location. Entirely new locations were also suggested to replace this search location. Prior to workshop 4 a third-party proposal was submitted covering the south coast of Arran. Also prior to workshop 4, discussions were held with the Clyde Fishermen's Association. These revolved around a number of areas in the Clyde (and beyond) both from the perspective of their potential nature conservation value and in relation to concerns over likely overlaps with fishing activity.	Post workshop 3, the original MPA search location was split in two: one search location around Arran the other search location refined to only extend down to the mouth of the sea lochs. Subsequent to the submission of the third-party proposal by COAST for the south coast of Arran, further work was completed to assess the contribution of the area and the combination of features covered in other search locations, particularly those of the adjacent Clyde sea lochs. More shape changes were made based on the presence and combination of features. Additional survey and desktop studies have been undertaken in 2012 to confirm the presence and distribution of features in the South Arran area. Following discussion with the Clyde Fishermen's Association, we have agreed to continue discussions over recommended proposals in the Firth of Clyde and adjacent waters, particularly in relation to management. Fully encompasses the third-party proposal.

Name	Code	Comments received	Action taken
Upper Loch Fyne and Loch Goil	LFG	First discussed at workshop 3. Upper Loch Fyne submitted as a third-party proposal by the Marine Conservation Society. At workshop 3 a number of options were discussed in relation to this search location. These included: keeping the original extent; reducing the search location to focus on Loch Fyne; and, a third option that would see the Clyde sea lochs and Arran progressing without burrowed mud, with representation of this MPA search feature being provided by the Loch Goil and Loch Long search location. Entirely new locations were also suggested to replace this search location. Prior to workshop 4, discussions were also held with the Clyde Fishermen's Association. These revolved around a number of areas in the Clyde (and beyond) both from the perspective of their potential nature conservation value and in relation to concerns over likely overlaps with fishing activity. Further comparative analyses were requested in relation to the representation of specific features (e.g. burrowed mud). There was general support for refining proposals and / or seeking alternative locations as appropriate.	Post workshop 3, the area around Isle of Arran was removed (see under South Arran) and the search location boundary refined to only extend down to the mouth of the sea lochs. Post workshop 4, a new search location was formed from the Clyde sea lochs and Loch Goil and Loch Long MPA search locations. The boundary within Loch Fyne was moved up to the otter spit and this was combined with Loch Goil (i.e. Loch Long and Lochs Striven and Ridden were removed from the MPA search locations). Following discussion with the Clyde Fishermen's Association, we have agreed to continue discussions over recommended proposals in the Firth of Clyde and adjacent waters, particularly in relation to management. The recommended boundary fully encompasses the third-party proposal.
Geikie Slide and Hebridean slope	GSH	First discussed at workshop 3. Scientific advice at workshop 3 included that MPA proposals were over-representing the range of habitats and species of the Hebridean slope, emphasising that it would be important to revise the location focusing on capturing the variation of biological communities with varying depth.	The southern location was extended vertically up the slope to the 200 m depth contour to encompass the entire extent of the Geikie Slide. The resulting location has been renamed Geikie Slide and Hebridean Slope. The boundary of the proposal was further refined to capture a depth corridor of sediments on the Hebridean slope.
South-west Sula Sgeir and Hebridean slope	SSH	First discussed at workshop 3. Scientific advice at workshop 3 included that MPA proposals were over-representing the range of habitats and species of the Hebridean slope, emphasising that it would be important to revise the location focusing on capturing the variation of biological communities with varying depth.	On review of geodiversity features, the northern location was extended into the Rockall Trough to encompass the entire extent of the SW Sula Sgeir Slide, an area also represented by the least damaged / more natural data layer. Along the eastern edge, the location was trimmed to the 300 m depth contour. The resulting location has been renamed South-west Sula Sgeir and Hebridean Slope.

Name	Code	Comments received	Action taken
The Barra Fan and Hebrides Terrace Seamount	BHT	First discussed at workshop 3. This location was not initially recommended by JNCC for further assessment. Workshop attendees used the need to increase resilience for seamount communities in Scotland's seas as grounds for reintroducing this proposal for further consideration.	Following discussion with experts at workshop 3, it was concluded that the Hebrides Terrace Seamount should be subject to a more detailed assessment given the low resilience of seamount communities and the wider ecological significance of seamounts. The original search location was reduced to the north to follow the extent of the Barra Fan geodiversity feature alongside the Hebrides Terrace Seamount. Along the eastern edge, the location was trimmed to track the 300 m depth contour and the extent of the Atlantic slope coarse sediment. The original location has changed name to become The Barra Fan and Hebrides Terrace Seamount.
Hatton-Rockall Basin	HRB	First discussed at workshop 3. No comments were recieved in relation to this site that warranted a change to the search location.	None
Rosemary Bank Seamount	RBS	First discussed at workshop 3. Comments were noted on the permanency of the blue ling closure from which this search location is partially derived. No comments were received in relation to this site that warranted making a change to the search location.	None

Name	Code	Comments received	Action taken
Southern Trench	STR	First discussed at workshop 4. Submitted as a third-party proposal jointly by the Whale and Dolphin Conservation Society (WDCS), the Hebridean Whale and Dolphin Trust and the Cetacean Research and Rescue Unit. Uncertainties were raised by some stakeholders in relation to the role of MPAs for all three cetaceans on the MPA search feature list, although there was support for exploring this role further. Some stakeholders highlighted the importance of using data from the Joint Cetacean Protocol (JCP) although they also raised concerns regarding the implications arising from possible delays to that project. There was general support for the progression of habitat modelling work outlined within the cetacean position paper at workshop 4, although there were concerns that this work would not be completed in time for stakeholders to be able to comment upon the findings before SNH and JNCC provide their advice to Marine Scotland at the end of 2012. WDCS submitted results of their own habitat modelling carried out for minke whales in the Southern Trench MPA search location. Their view is that this provides all the information required to support development of an MPA proposal. Alongside this, they have also expressed concern that the threshold (in terms of levels of evidence required) is being set too high for mobile species.	The JCP work covering this MPA search location is being carried out at a much coarser resolution than the Phase 2 work covering the west coast of Scotland and should be available in the autumn 2012. This will be used to complement the habitat modelling work. We have undertaken a review of the WDCS minke whale habitat modelling for the Southern Trench. It was undertaken using Maxent which is not our preferred method for habitat modelling. Whilst the WDCS habitat modelling has provided some useful information and undoubtedly moves the discussion forward, our view is that we need to continue with the planned programme of work. A short summary has been produced of the review and a paper detailing the evidence requirements for mobile species is also being prepared. This is to help ensure that our use of evidence and decision-making is consistent and transparent. The name has been changed from Southern Trench and Smiler's Holes to Southern Trench. It is now focused in territorial waters. It has not been possible to complete the habitat modelling work to feed into the end of 2012 advice. We expect to complete this work in April 2013 and provide advice shortly thereafter. Therefore this location remains as an MPA search location. We have agreed to keep renewables interests and NGOs updated on progress with the habitat modelling work. This location remains as an MPA search location.

Name	Code	Comments received	Action taken
Eye Peninsula to Butt of Lewis	SPL	First discussed at workshop 4. Submitted as a third-party proposal jointly by the Whale and Dolphin Conservation Society (WDCS), the Hebridean Whale and Dolphin Trust and the Cetacean Research and Rescue Unit. Uncertainties were raised by some in relation to the role of MPAs for all three cetaceans on the MPA search feature list, although there was support for exploring this role further. Some stakeholders highlighted the importance of using data from the Joint Cetacean Protocol. There was general support for the progression of habitat modelling work outlined within the cetacean position paper at workshop 4, although there were concerns that this work would not be completed in time for stakeholders to be able to comment upon the findings before SNH and JNCC provide their advice to Marine Scotland at the end of 2012. Stakeholders suggested that the data on Risso's dolphins be checked to assess the southerly extent of the search location boundary (which was felt by some to be too far south).	The JCP Phase II estimates have been checked. This confirmed that the whole search location is within an area of predicted high density for Risso's dolphin. Therefore the boundary has not been modified to reflect comments about it extending too far south. Some work on modelling the distribution of prey species of Risso's dolphin in inshore waters has been completed. This will feed into the wider habitat modelling for this MPA search location. The aim is to complete the work by April 2013 and we expect to provide advice shortly thereafter. We will also take account of the results of WDCS survey work on Risso's dolphins within the MPA search location for the last three summers (to update work done in the 1990s). This will be available in Spring 2013. We have agreed to keep NGOs updated on progress with the habitat modelling work. This location remains as an MPA search location.

Name	Code	Comments received	Action taken
Shiant East Bank	SEB	First discussed at workshop 4. Additional clarity was sought regarding the definition of the burrowed mud MPA search feature (and the different types in Scottish waters) and the role of *Nephrops* as a component of the burrowing megafauna. Clarity was also sought on the requirements for completing the network in terms of how much of different features needed to be included. The multiple feature approach was challenged with support for seeking alternative locations / revisions to existing search locations to provide better representation. There was a request to consider alternatives for the burrowed mud feature which was considered by some stakeholders to be peripheral to the search location and heavily fished. There was also request from others to increase the amount of burrowed mud habitat included within the site. This was because the proportion made up of burrowed mud was considered to be very small in comparison to the overall size of the MPA search location. No comments were received on the shelf bank feature.	After workshop 4, work on assessing the adequacy of the MPA network was undertaken. To achieve adequacy, we did not consider it necessary to include burrowed mud within both the Shiant East Bank and North-west sea lochs and Summer Isles. From the perspective of developing sites that 'make sense', we decided to remove mud from Shiant East Bank which still retains its focus on the bank. This allowed mud to be retained within the North-west sea lochs and Summer Isles where it helped to maintain the integrity of the MPA search location. Following this, the shape of the search location was changed to reflect more closely the extent of the shelf bank and mound feature. Further work needs to be completed on the functional role played by the shelf bank and mound feature. This location remains as an MPA search location.

Name	Code	Comments received	Action taken
Skye to Mull	STM	First discussed at workshop 4. Submitted as a third-party proposal jointly by the Whale and Dolphin Conservation Society (WDCS), the Hebridean Whale and Dolphin Trust and the Cetacean Research and Rescue Unit. It was agreed at workshop 3 that basking sharks and minke whales should be removed from consideration as features of both the Coll and Tiree and Small Isles MPA search locations. This was so that a review could be undertaken of these species within the wider area. It was also agreed that effort-corrected data (as opposed to uncorrected sightings data) should be used in future work on these species. Concern has been raised about the potential impact of this MPA search location on proposed marine developments. In particular, stakeholders are concerned about investor confidence, but also about potential constraints on their development. They have asked for as much clarity as possible to be provided throughout the process. At workshop 4, the Skye to Mull MPA search location was considered as part of the cetacean position paper. Stakeholders proposed a disaggregation of basking shark from minke whale within the newly formed MPA search location. This was so that each species could be considered on its own merits. Some also suggested a possible return to the Coll and Tiree and Small Isles search locations. Identification of discrete key areas selected on the basis of consistent presence over a number of years, requiring a more detailed analysis of the recently acquired effort-corrected data, was also suggested by some stakeholders. Questions were raised over whether the evidence, particularly for basking sharks, was good enough to support the development of an MPA proposal. There was general support for the progression of habitat modelling work, although there were concerns that this work would not be completed in time for stakeholders to be able to comment upon the findings before SNH and JNCC provide their advice to Marine Scotland at the end of 2012.	As a result of feedback at workshop 3, the Coll and Tiree location was dropped and a wholly new Skye to Mull search location proposed for minke whale and basking shark. These features are therefore no longer considered under the Small Isles MPA search location. To help satisfy queries that had been raised about the evidence base, a new basking shark tagging project is now underway. 20 sharks have been tagged within the MPA search location and the results will be available in April 2014. Habitat modelling work (for basking shark and minke whale) is also underway. The aim is to complete the work by April 2013 and we expect to provide advice shortly thereafter. We have agreed to keep renewables interests and NGOs updated on progress with the habitat modelling work. To help provide clarity to stakeholders a basking shark and renewables position paper was produced to identify likely issues and ways forward. This location remains as an MPA search location.

Table A4.2 List of third-party MPA proposals

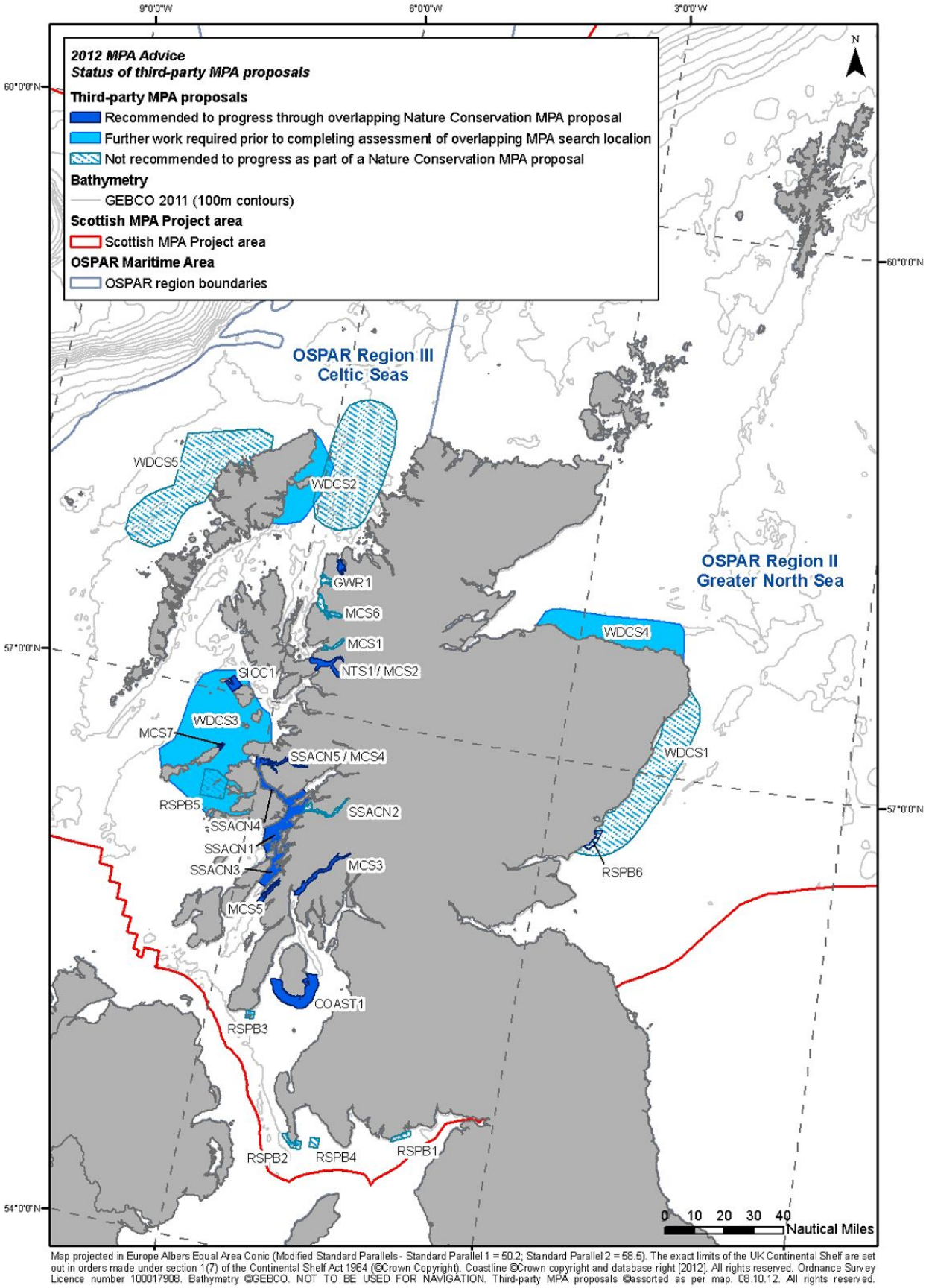
The details of proposed protected features within associated Nature Conservation MPA proposals are provided in Appendix 5 (Tables A5.1 and A5.2). The reasons for any feature exclusions from overlapping third-party proposals are provided within relevant detailed site assessment documentation (application of the MPA Selection Guidelines)

Submitter	Code	Region	NC MPA proposal name	Features identified as the basis for the proposed NC MPA (MPA search feature priorities in bold)	Overlapping MPA proposal	Progression
Small Isles Community Council (SICC)	SICC1	III	Sound of Canna	It is proposed that the Sound of Canna is designated for its benthic communities, notably its deep **burrowed mud** (**fan mussel**, burrowing anemone and **northern feather star**), maerl and infralittoral reefs.	Small Isles	Yes
Community of Arran Seabed Trust (COAST)	COAST1	III	Isle of Arran	The proposed MPA will protect priority marine features including habitats such as maerl beds, seagrass beds and **burrowed mud** substrates and the species reliant upon these habitats	South Arran	Yes
Scottish Sea Angling Conservation Network (SSACN)	SSACN1	III	Firth of Lorn	Proposal is made for **common skate**.	Loch Sunart to Sound of Jura	Yes
	SSACN2	III	Loch Etive	Proposal is made for spurdog.	-	No
	SSACN3	III	Sound of Jura	Proposal is made for **common skate.**	Loch Sunart to Sound of Jura	Yes
	SSACN4	III	Sound of Mull	Proposal is made for **common skate**.	Loch Sunart to Sound of Jura	Yes
	SSACN5	III	Loch Sunart	Proposal is made for **common skate** and spurdog.	Loch Sunart to Sound of Jura	Yes
Marine Conservation Society (MCS)	MCS1	III	Loch Carron	The purpose of this Marine Protected Area would be to protect the following features in Loch Carron: **flame shell beds**, horse mussel beds, maerl beds, and **burrowed mud** communities.	-	No
	MCS2	III	Lochs Duich, Long, Alsh, Beg.	The purpose of this Marine Protected Area would be to protect the excellent example of **burrowed mud** communities.	Lochs Duich, Long and Alsh	Yes
	MCS3	III	Upper Loch Fyne	The purpose of this Marine Protected Area would be to protect the following features in Loch Fyne: **burrowed mud**, **flame shell beds**, maerl beds and reefs.	Upper Loch Fyne and Loch Goil	Yes
	MCS4	III	Loch Sunart	The purpose of this Marine Protected Area proposal is to ensure the protection of the following features in Loch Sunart: **flame shell beds,** northern sea fan and sponge communities.	Loch Sunart & Loch Sunart to Sound of Jura	Yes

Submitter	Code	Region	NC MPA proposal name	Features identified as the basis for the proposed NC MPA (MPA search feature priorities in bold)	Overlapping MPA proposal	Progression
Marine Conservation Society (MCS)	MCS5	III	Loch Sween	The purpose of this Marine Protected Area would be to protect the unusual assemblages of marine life found in the various arms and narrows of Loch Sween including the following MPA search features: **burrowed mud, inshore deep mud with burrowing heart urchins,** maerl beds**,** seagrass beds**, native oysters.**	Loch Sween	Yes
	MCS6	III	Loch Torridon	The purpose of this Marine Protected Area proposal is to ensure that information is included that can contribute to the protection of the following features in Loch Torridon: maerl beds, **burrowed mud**, seagrass beds.	-	No
	MCS7	III	Isle of Coll	The purpose of this Marine Protected Area would be provide protection to an excellent example of the following MPA search features: kelp and seaweed communities on sublittoral sediment, tide-swept algal communities (kelp and seaweed communities in tide-swept sheltered conditions) and seagrass beds.	Skye to Mull	Not in this format - further work is ongoing on the Skye to Mull search location but for mobile species only
Whale & Dolphin Conservation Society (WDCS) & Hebridean Whale and Dolphin Trust (HWDT) & Cetacean Research and rescue Unit (CRRU)	WDCS1	II	Aberdeenshire coast	The proposal is being put forward for the protection of **white-beaked dolphin.**	-	No - but this proposal will be considered as part of a regional review for cetaceans
	WDCS2	III	Northern Minch	The proposal is being put forward for the protection of **Risso's dolphin and white-beaked dolphin.**	Eye Peninsula to Butt of Lewis	Yes - further work ongoing on this MPA search location
	WDCS3	III	Southern Hebrides	This proposal put forward for the protection of **minke whale.**	Skye to Mull & Small Isles	Yes - further work ongoing on this MPA search location
	WDCS4	II	Southern Moray Firth	The proposal is being put forward for the protection of **minke whale.**	Southern Trench	Yes - further work ongoing on this MPA search location
	WDCS5	III	Outer Hebrides	The proposal is being put forward for the protection of **white-beaked dolphin.**	-	No

Submitter	Code	Region	NC MPA proposal name	Features identified as the basis for the proposed NC MPA (MPA search feature priorities in bold)	Overlapping MPA proposal	Progression
Royal Society for the Protection of Birds (RSPB)	RSPB1	III	Abbey Burn Foot to Balcary Pt	The proposal is made for bird species including fulmar, guillemot and razorbill.	-	No
	RSPB2	III	Mull of Galloway	The proposal is made for bird species fulmar and razorbill.	-	No
	RSPB3	III	Sanda Islands	The proposal is made for bird species razorbill.	Clyde Sea Sill	Not for razorbill - for black guillemot and fronts
	RSPB4	III	Scare Rocks	The proposal is made for bird species gannet	-	No
	RSPB5	III	Treshnish Isles	The proposal is made for bird species manx shearwater, puffin, razorbill, guillemot and fulmar.	Skye to Mull	Not in this format - further work is ongoing on the Skye to Mull search location but for cetacean and basking shark only
	RSPB6	II	Whiting Ness to Ethie Haven	The proposal is made for bird species fulmar and puffin.	-	No
National Trust for Scotland (NTS)	NTS1	III	Lochs Duich, Long and Alsh	Proposal is made for benthic habitats including blue mussel beds, **burrowed mud**, tall sea-pen, fireworks anemone, **inshore deep mud with burrowing heart urchins**, horse mussel beds, low or variable salinity habitats, maerl beds, **northern sea fan, flame shell beds**, kelp and seaweed communities in tide-swept sheltered conditions, **northern feather star, fan mussel**, and **ocean quahog.**	Lochs Duich, Long and Alsh	Yes
Gairloch and Wester Ross Community	GWR1	III	Gairloch & Loch Ewe	Harbour seal, **sandeels**, grey seal, European spiny lobster, **common skate**, **black guillemot**, **northern feather star, ocean quahog**, **native oysters**, seagrass beds, kelp and seaweed communities on sublittoral sediment, tide-swept algal communities, sea loch egg wrack**, burrowed mud**, **northern sea fan and sponge communities**, maerl beds, **horse mussel beds**, blue mussel beds, herring spawning grounds, **basking shark, minke whale**, harbour porpoise, terns, black-throated divers, red-throated divers, great northern diver.	North-west sea lochs and Summer Isles	Yes (in part - Loch Ewe but not Loch Gairloch)

Figure A4.1 Map of third-party MPA proposals



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 [2012]. All rights reserved. Ordnance Survey Licence number 100017908. Bathymetry ©GEBCO. NOT TO BE USED FOR NAVIGATION. Third-party MPA proposals ©assorted as per map. 08.10.12. All rights reserved.

Appendix 5 The Nature Conservation MPA proposals (including protected features and draft conservation objectives) and an introduction to conservation objective definitions

Table A5.1 The suite of Nature Conservation MPA proposals with proposed protected features and their respective conservation objectives

A series of maps illustrating the Nature Conservation MPA proposals and MPA search locations in nearshore waters follow Table A5.2

Name	**Code**	**OSPAR**	**Size** (km^2)	**Origins**	**Protected features**	**Draft conservation objectives**
Faroe-Shetland sponge belt	FSS	**I, II & V**	**6,503**	**LD/MN location**	**Biodiversity** *MPA search features*: Deep sea sponge aggregations; offshore subtidal sands and gravels; ocean quahog aggregations; continental slope *Other features*: None **Geodiversity** *Features and components:* Quaternary of Scotland - continental slope channels; iceberg ploughmark fields, prograding wedges; Submarine Mass Movement - slide deposits; Marine Geomorphology of the Scottish Deep Ocean Seabed - sand wave field, sediment wave field	**Conserve (uncertain) - all features**
North-east Faroe Shetland Channel	NEF	**I & II**	**26,807**	**LD/MN location**	**Biodiversity** *MPA search features*: Deep sea sponge aggregations; offshore deep sea muds; offshore subtidal sands and gravels; continental slope *Other features*: None **Geodiversity** *Features and components:* Quaternary of Scotland - prograding wedge; Submarine Mass Movement - slide deposits; Marine Geomorphology of the Scottish Deep Ocean Seabed - contourite sand/silt; Cenozoic Structures of the Atlantic Margin - mud diapirs	**Conserve (uncertain) - all features**
Central Fladen	CFL	**II**	**709**	**New area**	**Biodiversity** *MPA search features*: Burrowed mud *Other features*: None **Geodiversity** *Features and components:* Quaternary of Scotland - sub-glacial tunnel valley	**Conserve (uncertain) - all features**

Name	Code	OSPAR	Size (km^2)	Origins	Protected features	Draft conservation objectives
East Caithness Cliffs	ECC	**II**	**117**	**Existing protected area**	**Biodiversity** *MPA search features*: Black guillemot *Other features*: None **Geodiversity** *Features and components:* None	**Conserve (uncertain)**
East of Gannet and Montrose Fields	EGM	**II**	**1,838**	**LD/MN location**	**Biodiversity** *MPA search features*: ; Offshore deep sea muds, offshore subtidal sands and gravels, ocean quahog aggregations *Other features*: None **Geodiversity** *Features and components:* None	**Conserve (uncertain) - all features**
Fetlar to Haroldswick	FTH	**II**	**241**	**Existing protected area**	**Biodiversity** *MPA search features*: Kelp and seaweed communities on sublittoral sediment, horse mussel beds, maerl beds, shallow tide-swept coarse sands with burrowing bivalves, black guillemot *Other features*: Circalittoral sand and coarse sediment communities **Geodiversity** *Features and components:* Marine Geomorphology of the Scottish Shelf Seabed (components to be confirmed)	**Conserve - all features**
Firth of Forth Banks Complex	FOF	**II**	**2,130**	**Other area-based measure** **LD/MN location**	**Biodiversity** *MPA search features*: Ocean quahog aggregations; offshore subtidal sands and gravels; shelf banks and mounds *Other features*: None **Geodiversity** *Features and components:* Quaternary of Scotland - moraines	**Conserve (uncertain) - all features**
Mousa to Boddam	MTB	**II**	**13**	**Existing protected area**	**Biodiversity** *MPA search features*: Sandeels *Other features*: None **Geodiversity** *Features and components:* Marine Geomorphology of the Scottish Shelf Seabed (components to be confirmed)	**Conserve - all features**

Name	Code	OSPAR	Size (km^2)	Origins	Protected features	Draft conservation objectives
North-west Orkney	NWO	**II**	**4,388**	**New area**	**Biodiversity** *MPA search features*: Sandeels *Other features*: None **Geodiversity** *Features and components:* Marine Geomorphology of the Scottish Shelf Seabed - sand bank, sand wave field, sediment wave fields	**Conserve (uncertain) - all features**
Norwegian boundary sediment plain	NSP	**II**	**161**	**LD/MN location**	**Biodiversity** *MPA search features*: Offshore subtidal sands and gravels, ocean quahog aggregations *Other features*: None **Geodiversity** *Features and components:* None	**Conserve (uncertain)**
Noss Head	NOH	**II**	**9**	**Other area-based measure**	**Biodiversity** *MPA search features*: Horse mussel beds *Other features*: None **Geodiversity** *Features and components:* None	**Conserve**
Papa Westray	PWY	**II**	**35**	**Existing protected area**	**Biodiversity** *MPA search features*: Black guillemot *Other features*: None **Geodiversity** *Features and components:* Marine Geomorphology of the Scottish Shelf Seabed - sand wave field	**Conserve - all features**
South-east Fladen	SEF	**II**	**416**	**New area**	**Biodiversity** *MPA search features*: Burrowed mud *Other features*: None **Geodiversity** *Features and components:* Seabed Fluid and Gas Seep - pockmarks	**Conserve (uncertain) - all features**

Name	Code	OSPAR	Size (km^2)	Origins	Protected features	Draft conservation objectives
Turbot Bank	TBB	**II**	**233**	**New area**	**Biodiversity** *MPA search features*: Offshore subtidal sands and gravels, shelf banks and mounds, sandeels *Other features*: None **Geodiversity** *Features and components:* None	**Conserve (uncertain)**
Western Fladen	WFL	**II**	**723**	**New area**	**Biodiversity** *MPA search features*: Burrowed mud *Other features*: None **Geodiversity** *Features and components:* Quaternary of Scotland - sub-glacial tunnel valleys	**Conserve (uncertain) - all features**
Wyre and Rousay Sounds	WYR	**II**	**18**	**New area**	**Biodiversity** *MPA search features*: Kelp and seaweed communities on sublittoral sediment, maerl beds *Other features*: None **Geodiversity** *Features and components:* Marine Geomorphology of the Scottish Shelf Seabed (components to be confirmed)	**Conserve - all features**
West Shetland Shelf	WSS	**II & III**	**4,047**	**Other area-based measure**	**Biodiversity** *MPA search features*: Offshore subtidal sands and gravels *Other features*: None **Geodiversity** *Features and components:* None	**Conserve (uncertain) - all features**
Clyde Sea Sill	CSS	**III**	**714**	**Other area-based measure**	**Biodiversity** *MPA search features*: Black guillemot, fronts *Other features*: Circalittoral sand and coarse sediment communities **Geodiversity** *Features and components:* Marine Geomorphology of the Scottish Shelf Seabed - sand banks, sand ribbon fields, sand wave fields	**Conserve - all features**

Name	Code	OSPAR	Size (km^2)	Origins	Protected features	Draft conservation objectives
Loch Creran	LCR	**III**	**12**	**Existing protected area**	**Biodiversity** *MPA search features*: Flame shell beds *Other features*: None **Geodiversity** *Features and components:* Quaternary of Scotland (components to be confirmed)	**Conserve**
Lochs Duich, Long and Alsh	DLA	**III**	**43**	**Existing protected area** **LD/MN location** **Third-party proposal**	**Biodiversity** *MPA search features*: Burrowed mud, inshore deep mud with burrowing heart urchins, flame shell beds *Other features*: None **Geodiversity** *Features and components:* None	**Conserve** - burrowed mud, flame shell beds **Conserve (uncertain) -** inshore deep mud with burrowing heart urchins
Loch Sunart	LSU	**III**	**55**	**Existing protected area** **Third-party proposal**	**Biodiversity** *MPA search features*: Flame shell beds, northern feather star aggregations on mixed substrata *Other features*: Serpulid aggregations **Geodiversity** *Features and components:* None	**Conserve - all features**
Loch Sunart to the Sound of Jura	SJU	**III**	**795**	**Third party proposal** **New area**	**Biodiversity** *MPA search features*: Common skate *Other features*: None **Geodiversity** *Features and components:* Quaternary of Scotland - glaciated channels/troughs (other components to be confirmed)	**Conserve - all features**

Name	Code	OSPAR	Size (km^2)	Origins	Protected features	Draft conservation objectives
Loch Sween	LSW	**III**	**40**	**Other area-based measure** **LD/MN location** **Third-party proposal**	**Biodiversity** *MPA search features*: Burrowed mud, inshore deep mud with burrowing heart urchins, maerl beds, native oysters *Other features*: Sublittoral mud and mixed sediment communities **Geodiversity** *Features and components:* None	**Conserve - all features**
Monach Isles	MOI	**III**	**68**	**Existing protected area**	**Biodiversity** *MPA search features*: Black guillemot *Other features*: None **Geodiversity** *Features and components:* Quaternary of Scotland - landscape of areal glacial scour; Marine Geomorphology of Scottish Shelf (components to be confirmed)	**Conserve**
North-west sea lochs and Summer Isles	NWS	**III**	**612**	**Other area-based measure**	**Biodiversity** *MPA search features*: Burrowed mud, flame shell beds, kelp and seaweed communities on sublittoral sediment, maerl beds, maerl or coarse shell gravel with burrowing sea cucumbers, native oysters, northern feather star aggregations on mixed substrata *Other features*: Circalittoral muddy sand communities **Geodiversity** *Features and components:* Quaternary of Scotland - glaciated channels/troughs, megascale glacial lineations, moraines; Submarine Mass Movement - slide scars; Seabed Fluid and Gas Seep - pockmarks; Marine Geomorphology of the Scottish Shelf Seabed - banks of unknown substrate	**Conserve -** burrowed mud, flame shell beds, kelp and seaweed communities on sublittoral sediment, maerl or coarse shell gravel with burrowing sea cucumbers, native oysters, northern feather star aggregations on mixed substrata **Recover** - maerl beds

Name	Code	OSPAR	Size (km^2)	Origins	Protected features	Draft conservation objectives
Small Isles	SMI	**III**	**922**	**Existing protected area**	**Biodiversity** *MPA search features*: Burrowed mud, horse mussel beds, northern sea fan and sponge communities, fan mussel aggregations, northern feather star aggregations on mixed substrata, black guillemot and shelf deeps *Other features*: White cluster anemone, circalittoral sand and mud communities **Geodiversity** *Features and components:* Quaternary of Scotland - glaciated channels/troughs, glacial lineations	**Conserve - all features**
South Arran	ARR	**III**	**286**	**Other area-based measure** **(not considered an enhancement because of the difference in scale between the fisheries restriction and the resultant MPA proposal)**	**Biodiversity** *MPA search features*: Burrowed mud, kelp and seaweed communities, maerl beds, maerl or coarse shell gravel with burrowing sea cucumbers, seagrass beds, shallow tide-swept coarse sands with burrowing bivalves *Other features*: Ocean quahog (species), herring spawning grounds **Geodiversity** *Features and components:* None	**Conserve** - kelp and seaweed communities on sublittoral sediments, seagrass beds and shallow tide-swept sands with burrowing bivalves **Conserve (uncertain)** - herring spawning grounds **Recover** - burrowed mud, maerl beds, maerl or coarse shell gravel with burrowing sea cucumbers

Name	Code	OSPAR	Size (km^2)	Origins	Protected features	Draft conservation objectives
Upper Loch Fyne and Loch Goil	LFG	**III**	**94**	**Other area-based measure**	**Biodiversity** *MPA search features*: Burrowed mud, flame shell beds, horse mussel beds, low or variable salinity habitats *Other features*: Sublittoral mud and mixed sediment communities, ocean quahog (species) **Geodiversity** *Features and components:* None	**Conserve** - low or variable salinity habitats, scattered horse mussels with burrowing anemones and sea cucumbers in mixed circalittoral sediment, ocean quahog **Recover** - burrowed mud, horse mussel beds **TBC** - flame shell beds
Geikie Slide and Hebridean slope	GSH	**III & V**	**2,269**	**Other area-based measure** **LD/MN location**	**Biodiversity** *MPA search features*: Burrowed mud; offshore subtidal sands and gravels; offshore deep sea muds; continental slope *Other features*: None **Geodiversity** *Features and components:* Submarine Mass Movement - slide deposits, slide scars	**Conserve (uncertain) - all features**
South-west Sula Sgeir and Hebridean slope	SSH	**III & V**	**2,093**	**Other area-based measure** **LD/MN location**	**Biodiversity** *MPA search features*: Burrowed mud; offshore subtidal sands and gravels; offshore deep sea muds; continental slope *Other features*: None **Geodiversity** *Features and components:* Quaternary of Scotland - iceberg ploughmark fields, prograding wedges; Submarine Mass Movement - slide deposits	**Conserve (uncertain) - all features**

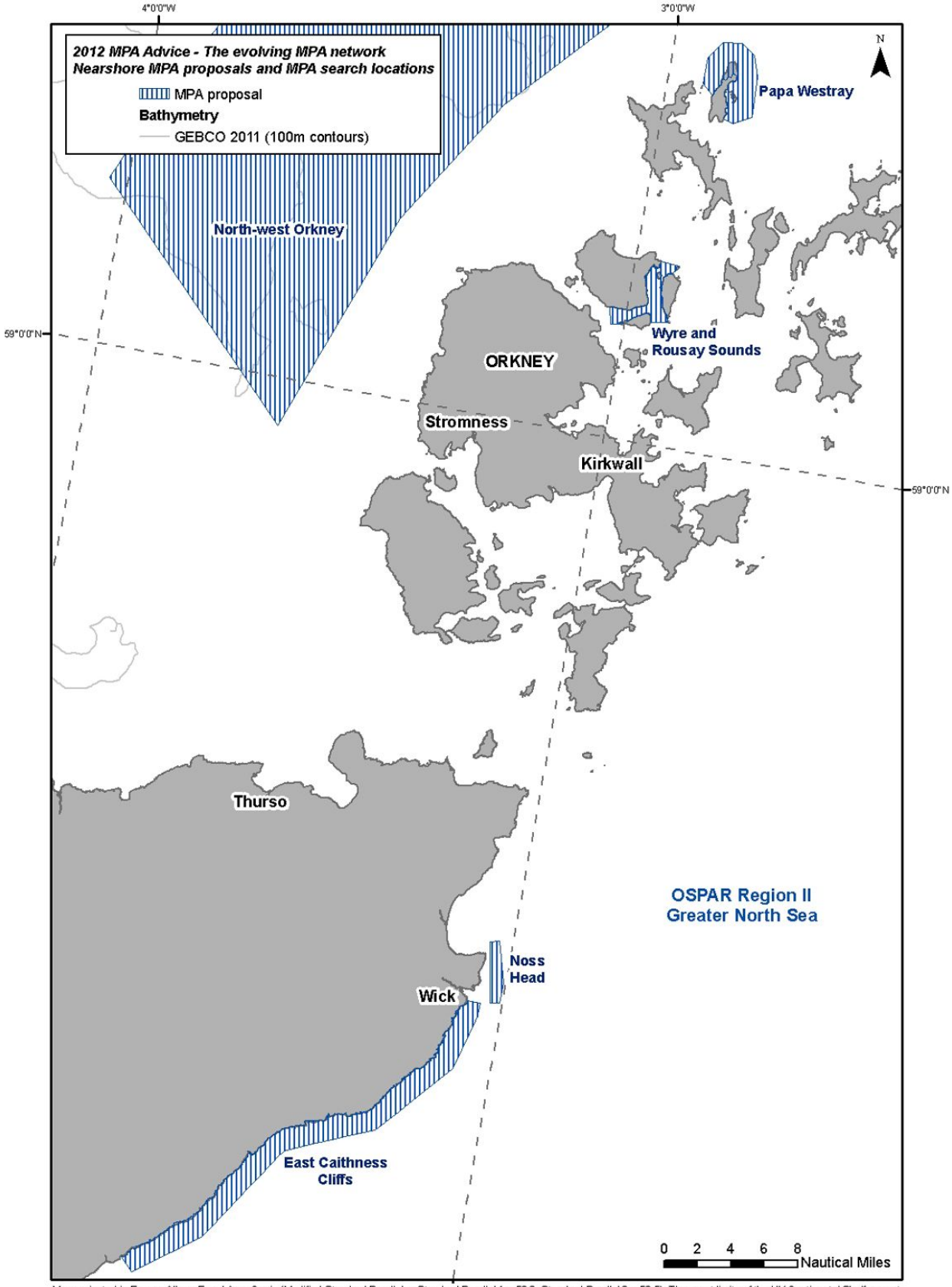
Name	Code	OSPAR	Size (km^2)	Origins	Protected features	Draft conservation objectives
The Barra Fan and Hebrides Terrace Seamount	BHT	**III & V**	**4,701**	**Other area-based measure** **LD/MN location**	**Biodiversity** *MPA search features*: Burrowed mud; coral gardens (suspected); offshore subtidal sands and gravels; offshore deep sea muds; orange roughy; seamount communities (suspected); continental slope; seamounts *Other features*: None **Geodiversity** *Features and components:* Quaternary of Scotland - iceberg ploughmark field, prograding wedges; Submarine Mass Movement - continental slope turbidite canyons, slide deposits; Marine Geomorphology of the Scottish Deep Ocean Seabed - scour moat; Cenozoic Structures of the Atlantic Margin - continental slope, Hebrides Terrace Seamount	**Conserve (uncertain) - all features**
Hatton-Rockall Basin	HRB	**V**	**1,265**	**LD/MN location**	**Biodiversity** *MPA search features*: Deep sea sponge aggregations; offshore deep sea muds *Other features*: None **Geodiversity** *Features and components:* Marine Geomorphology of the Scottish Deep Ocean Seabed - sediment drifts *Other interests:* polygonal fault systems	**Conserve (uncertain) - all features**
Rosemary Bank Seamount	RBS	**V**	**7,413**	**Other area-based measure** **LD/MN location**	**Biodiversity** *MPA search features*: Deep sea sponge aggregations; seamount communities; seamounts *Other features*: None **Geodiversity** *Features and components:* Quaternary of Scotland - iceberg ploughmark field; Submarine Mass Movement - slide scars; Marine Geomorphology of the Scottish Deep Ocean Seabed - scour moats, sediment drifts, sediment wave fields; Cenozoic Structures of the Atlantic Margin - Rosemary Bank Seamount	**Conserve (uncertain) - all features**

Table A5.2 The proposed protected features for those MPA search locations that have not been fully assessed against the MPA Selection Guidelines. Preliminary conservation objectives are given for component parts of multi-feature proposals features that have been assessed

Name	Code	OSPAR	Size (km^2)	Origins	Proposed protected features	Draft conservation objectives
Southern Trench	STR	**II**	**2,293**	**New area** **Third-party proposal**	**Biodiversity** *MPA search features*: Burrowed mud, fronts, shelf deeps, minke whale, white-beaked dolphin *Other features*: None **Geodiversity** *Features and components:* Quaternary of Scotland - sub-glacial tunnel valleys and moraines; Submarine Mass Movement - slide scars	**Conserve** - Burrowed mud, fronts, shelf deeps, geodiversity features **Not assessed yet** - minke whale, white-beaked dolphin
Eye Peninsula to Butt of Lewis	EPL	**III**	**667**	**New area** **Third-party proposal**	**Biodiversity** *MPA search features*: Risso's dolphin, sandeels *Other features*: None **Geodiversity** *Features and components:* Quaternary of Scotland - glaciated channel/troughs, landscape of areal glacial scour, megascale glacial lineations; Marine Geomorphology of the Scottish Shelf Seabed - longitudinal bedform field	**Conserve** - Sandeels, geodiversity features **Not assessed yet** - Risso's dolphin
Shiant East Bank	SEB	**III**	**348**	**New area**	**Biodiversity** *MPA search features*: Northern sea fan and sponge communities, shelf banks and mounds *Other features*: Circalittoral sands and mixed sediment communities **Geodiversity** *Features and components:* Quaternary of Scotland (components to be confirmed)	**Conserve** - Northern sea fan and sponge communities, circalittoral sands and mixed sediment communities, geodiversity features **Not assessed yet** - Shelf banks and mounds

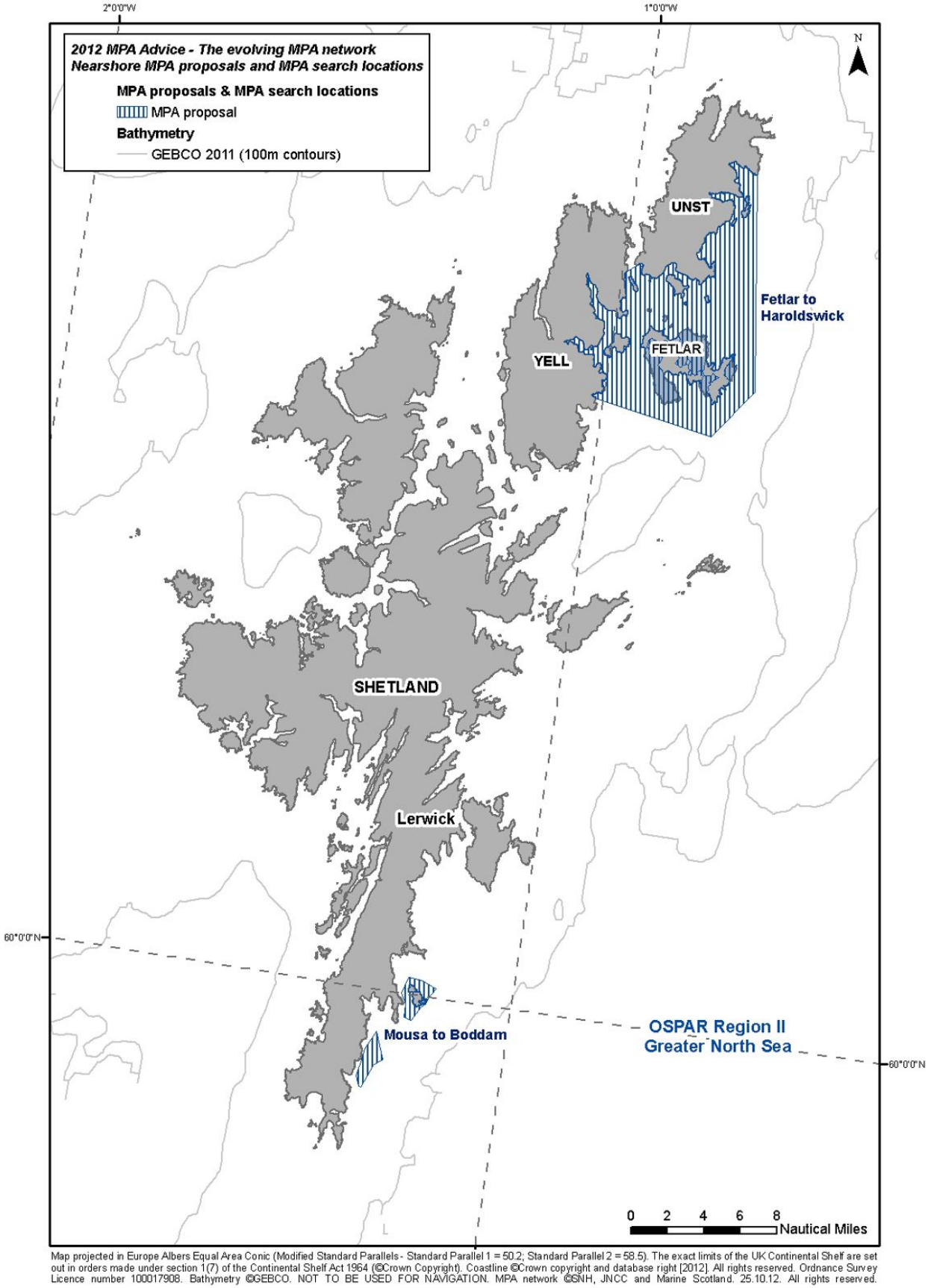
Name	Code	OSPAR	Size (km^2)	Origins	Proposed protected features	Draft conservation objectives
Skye to Mull	STM	**III**	**7,219**	**New area** **Third-party proposal**	**Biodiversity** *MPA search features*: Basking shark, minke whale, fronts *Other features*: None **Geodiversity** *Features and components:* Marine Geomorphology of the Scottish Shelf Seabed (components to be confirmed)	**Conserve** - Fronts **Not assessed yet** - Basking shark, minke whale

Figure A5.1 MPA proposals in nearshore waters off the north-east coast of Scotland and in Orkney waters



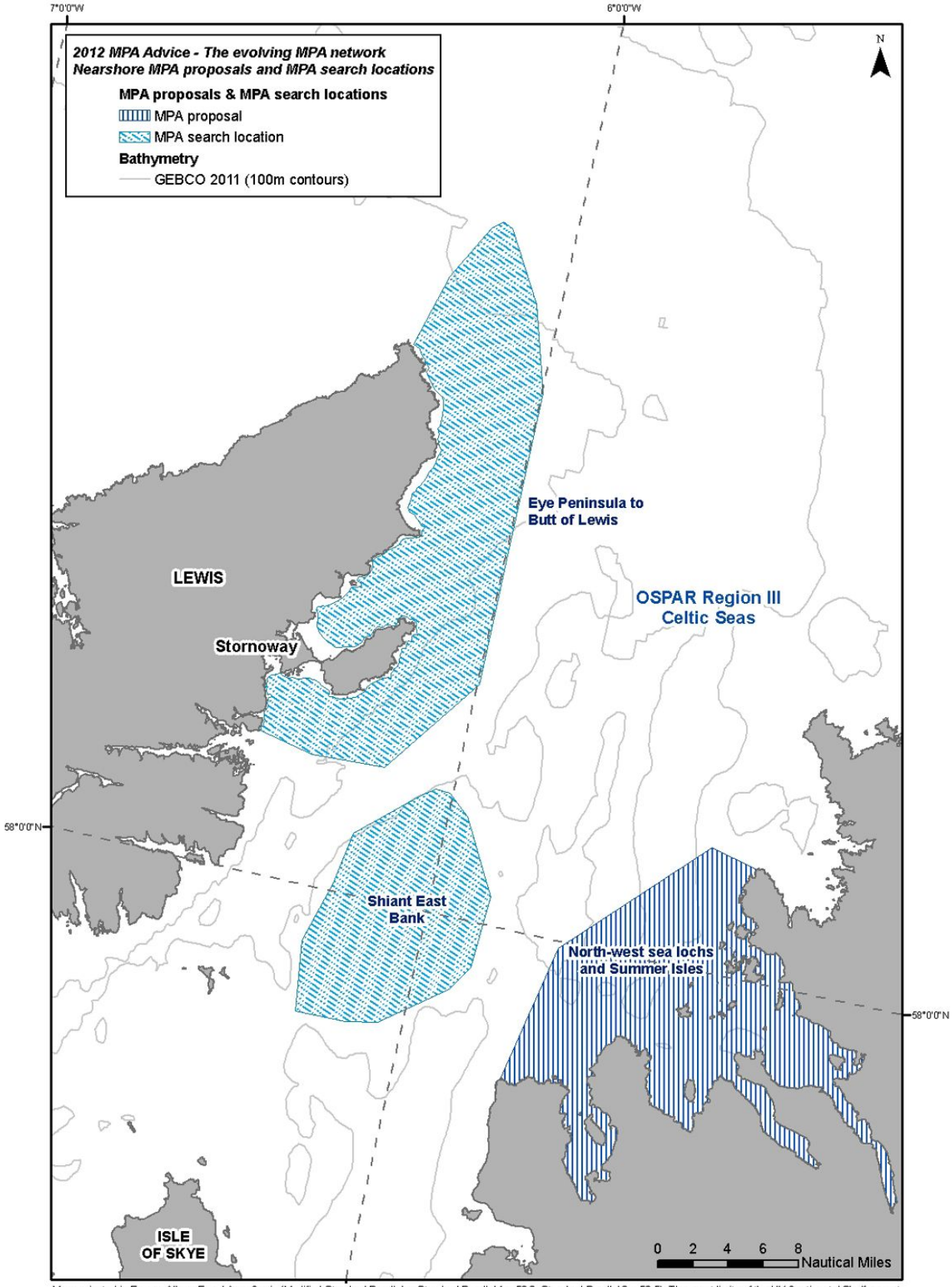
Map projected in Europe Albers Equal Area Conic (Modified Standard Parallels - Standard Parallel 1 = 50.2; Standard Parallel 2 = 58.5). The exact limits of the UK Continental Shelf are set out in orders made under section 1(7) of the Continental Shelf Act 1964 (©Crown Copyright). Coastline ©Crown copyright and database right [2012]. All rights reserved. Ordnance Survey Licence number 100017908. Bathymetry ©GEBCO. NOT TO BE USED FOR NAVIGATION. MPA network ©SNH, JNCC and Marine Scotland. 25.10.12. All rights reserved.

Figure A5.2 MPA proposals in the waters around Shetland



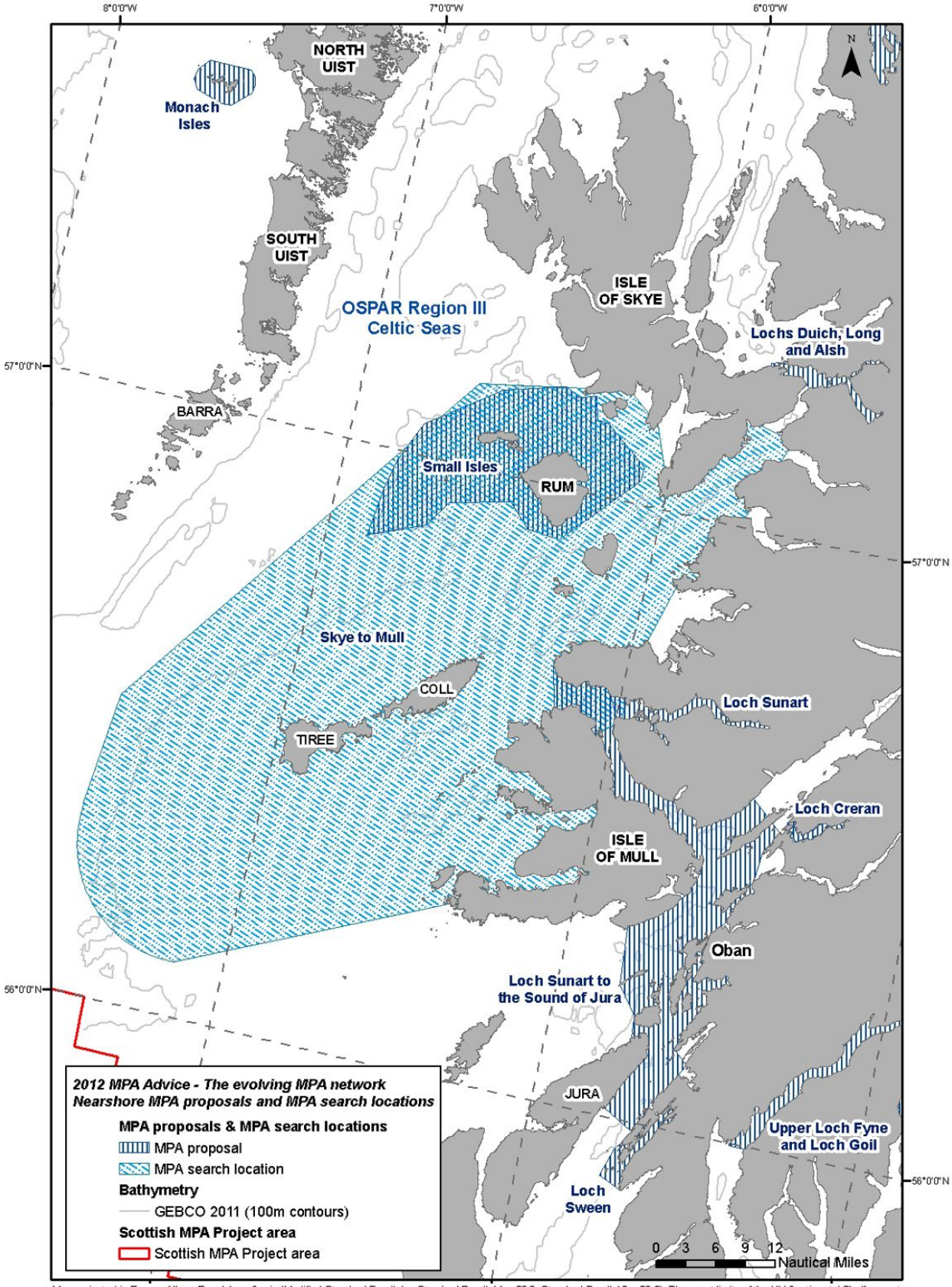
Map projected in Europe Albers Equal Area Conic (Modified Standard Parallels - Standard Parallel 1 = 50.2; Standard Parallel 2 = 58.5). The exact limits of the UK Continental Shelf are set out in orders made under section 1(7) of the Continental Shelf Act 1964 (©Crown Copyright). Coastline ©Crown copyright and database right [2012]. All rights reserved. Ordnance Survey Licence number 100017908. Bathymetry ©GEBCO. NOT TO BE USED FOR NAVIGATION. MPA network ©SNH, JNCC and Marine Scotland. 25.10.12. All rights reserved.

Figure A5.3 MPA proposals and MPA search locations in the North Minch on the west coast of Scotland



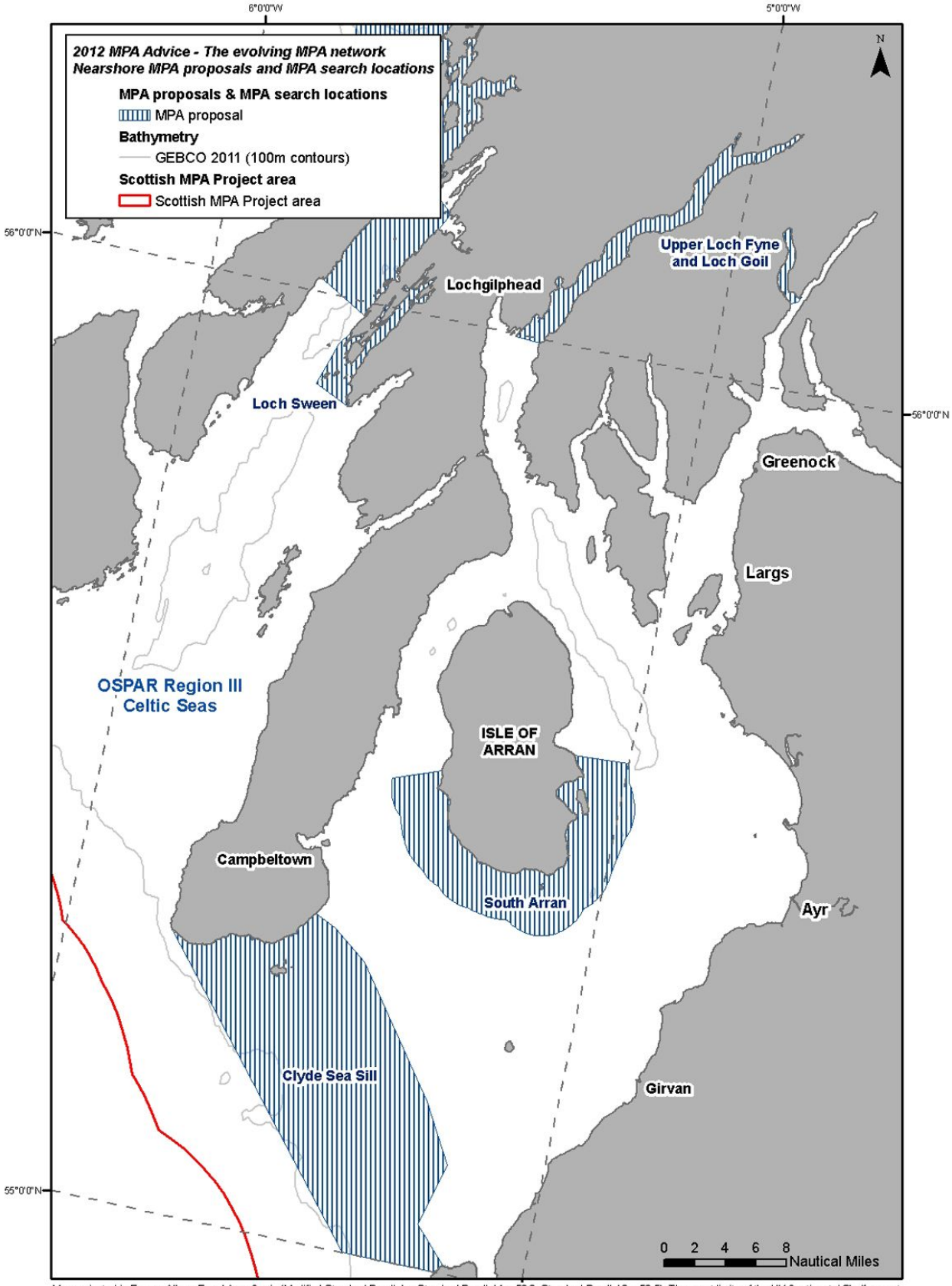
Map projected in Europe Albers Equal Area Conic (Modified Standard Parallels - Standard Parallel 1 = 50.2; Standard Parallel 2 = 58.5). The exact limits of the UK Continental Shelf are set out in orders made under section 1(7) of the Continental Shelf Act 1964 (©Crown Copyright). Coastline ©Crown copyright and database right [2012]. All rights reserved. Ordnance Survey Licence number 100017908. Bathymetry ©GEBCO. NOT TO BE USED FOR NAVIGATION. MPA network ©SNH, JNCC and Marine Scotland. 25.10.12. All rights reserved.

Figure A5.4 MPA proposals and MPA search locations in nearshore waters around the Inner and Outer Hebrides on the west coast of Scotland



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 [2012]. All rights reserved. Ordnance Survey Licence number 100017908. Bathymetry ©GEBCO. NOT TO BE USED FOR NAVIGATION. MPA network ©SNH, JNCC and Marine Scotland. 25.10.12. All rights reserved.

Figure A5.5 MPA proposals in the Clyde Sea area



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 [2012]. All rights reserved. Ordnance Survey Licence number 100017908. Bathymetry ©GEBCO. NOT TO BE USED FOR NAVIGATION. MPA network ©SNH, JNCC and Marine Scotland. 25.10.12. All rights reserved.

Conservation objectives and future site management

Conservation objectives describe the desired ecological/geological state (or quality) of the protected feature(s) within each Nature Conservation MPA. They will either be conserve or recover as described below.

A Conserve conservation objective will be used:

- where evidence exists that a protected feature of an MPA is in good condition; OR
- where limited evidence exists and therefore there is uncertainty concerning the condition of a feature. This uncertainty will be qualified within the conservation objective. This will be determined on a case by case basis, especially for cases where there is limited evidence due to the rarity of a feature.

A Recover objective will be used where evidence exists that a feature of an MPA is declining[19] and/or has been damaged, such that it is not considered to be in good condition.

The consideration of conservation objectives for features will take account of the current understanding of the influence of natural variability in feature condition.

The certainty we have in the assessment of feature condition and the resulting conservation objective will be driven by a number of considerations. Is there a description of good condition for the feature, and do we have direct evidence that the feature meets this description? Do we understand the interaction between a feature and the activities that may impact its condition and the tolerance of the feature to pressures caused by activities? Do we have good information on the activities taking place across the feature, and is there evidence that these activities are damaging the feature? When we can't support the answers to these questions with robust evidence then our certainty in the condition of the feature and the corresponding conservation objective is less. It is appropriate that this uncertainty is expressed in the conservation objective defined for the protected feature in the MPA.

The default position for protected features of Nature Conservation MPAs is conserve, acknowledging where there is uncertainty regarding current feature condition. This is a starting point for the specification of conservation objectives for discussion with stakeholders and does not preclude the conservation objective be set to recover on a case-by-case scientific basis. Draft conservation objectives have been recommended within this advice for recommended protected features within the Nature Conservation MPAs proposals (see Section 8).

A default position of conserve does not establish a baseline condition for the desired quality of the feature, nor assume existing levels of activity are acceptible, but initiates an assessment of what we understand about the ecological responses of features to activities. Our assessment will be informed by any evidence we have on the feature's current condition, but our understanding of the desired condition of the feature may change as direct evidence comes to light over coming years.

Table A5.1 in Appendix 5 lists the proposed protected features for all Nature Conservation MPA proposals, and recommends a draft conservation objective for these features. For the few MPA search locations that have not been fully assessed against the MPA Selection Guidelines preliminary conservation objectives have been identified for the component parts of multi-feature proposals for features that have been assessed. These are provided in

[19] Subject to natural change

Table A5.2. Recommendations for conservation objectives for the remaining features in the areas listed in Table A5.2 will be made once the location has been fully assessed against the MPA Selection Guidelines, if it is concluded that the area should progress as a Nature Conservation MPA proposal for those features.

Management implications of conserve and recover conservation objectives

Conservation objectives identify the conservation aims for the features in the protected area. Management measures will be applied when it is identified that they will be required for the conservation objectives to be achieved. Further detail on the process that will be used to determine whether management measures are likely to be required in order to achieve the conservation objectives for protected features is available in the *Marine Protected Areas - Management Handbook* (Marine Scotland *et al*., *in prep*.).

The risk-based approach used to identify potential management measures will involve an assessment of the vulnerability of the protected feature based on the risk of exposure to pressures to which the feature is sensitive. Information collected on activities which are known to take place in the area will be used to assess the likely risk. For a given protected feature within a Nature Conservation MPA, there are likely to be a range of management options that may be considered to facilitate achievement of the conserve or recover conservation objective set.

Appendix 6 Coverage of MPA search features within the MPA network with an assessment of adequacy against Stage 5 of the MPA Selection Guidelines

Table A6.1 Seabed habitats: MPA search feature coverage within existing protected areas, other area-based measures and Nature Conservation MPA proposals / search locations

MPA search feature	Existing measure	MPA proposals/MPA search locations where proposed as a protected feature	Notes - incl. any further work required to support development of MPA proposals	Summary of Stage 5 assessment
Blue mussel beds	OSPAR Region II • Dornoch Firth and Morrich More SAC • Firth of Tay and Eden Estuary SAC • Moray Firth SAC • Sullom Voe SAC OSPAR Region III • Loch Creran SAC • Loch Laxford SAC • Lochs Duich, Long and Alsh Reefs SAC • Luce Bay and Sands SAC • Solway Firth SAC • Sunart SAC	n/a	Feature considered well represented within the existing protected area network (Carruthers *et al*., 2011).	**Adequate**

MPA search feature	Existing measure	MPA proposals/MPA search locations where proposed as a protected feature	Notes - incl. any further work required to support development of MPA proposals	Summary of Stage 5 assessment
Burrowed mud	OSPAR Region II • Sullom Voe SAC[20] OSPAR Region III • Loch Laxford SAC • Loch nam Madadh SAC	OSPAR Region II • Central Fladen • Southern Trench OSPAR Region III • Lochs Duich, Long and Alsh • Loch Sween • North-west sea lochs and Summer Isles • Small Isles • South Arran • Upper Loch Fyne and Loch Goil OSPAR Region III & V • South-west Sula Sgeir and Hebridean slope **OR** Geikie Slide and Hebridean slope • The Barra Fan and Hebrides Terrace Seamount	The burrowed mud MPA search feature comprises two habitats and three component species[21]. Scotland is of proportional importance for burrowed mud. The seapen and burrowing megafauna biotope is also included on the OSPAR T&D list and is considered to be threatened and/or declining in Scotland's seas. To achieve resilence it is recommended that the OSPAR T&D habitat is replicated within each of the OSPAR Regions. Three of the proposals contain good quality examples of tall seapen and two have good quality examples of fireworks anemone.	**Adequate - pending decision on options in Region II**

[20] All three of the SACs considered to be contributing to the protection of burrowed mud were designated for the Annex I qualifying habitat large shallow inlets and bays. The burrowed mud within these SACs is included as part of a broader mosaic of habitats. Given the qualities of the burrowed mud in these locations (in terms of diversity, extent, etc.) the SACs would not have been selected for the burrowed mud feature in their own right

[21] The component biotopes are seapens and burrowing megafauna, and burrowing megafauna and the mud volcano worm. The component species are tall seapens, fireworks anemone and a burrowing amphipod (*Maera loveni*). The latter was removed from use as a driver in the identification of proposals for burrowed mud due to its short longevity and it's widespread distribution in burrowed mud habitats

MPA search feature	Existing measure	MPA proposals/MPA search locations where proposed as a protected feature	Notes - incl. any further work required to support development of MPA proposals	Summary of Stage 5 assessment
Carbonate mound communities	OSPAR Region V • Hatton Bank cSAC & NEAFC fisheries closure	n/a	There is only one known example of carbonate mound communities in Scotland's seas. As a result, it has not been possible to achieve replication. If additional records are identified in the future, consideration should be given to including at least one more example of the feature within the network to ensure that the replication and resilience parts of this guideline can be met.	**Adequate - pending future review**
Coral gardens	OSPAR Region V • Anton Dhorn cSAC and ICES fisheries closure • East Rockall Bank cSAC and ICES fisheries closure • Hatton Bank cSAC & NEAFC fisheries closure	OSPAR Region V • The Barra Fan and Hebrides Terrace Seamount (suspected)[22]	An OSPAR Threatened and/or Declining habitat only recorded in OSPAR Region V. Existing measures are considered to provide good representation for the different ecological types of coral gardens recorded in Scotland's seas across the features range and provide for greater resilience of the feature within the network. Records are suspected from Hebrides Terrace Seamount and so may be considered at a later date once data have been processed for The Barra Fan and Hebrides Terrace Seamount.	**Adequate - pending future review**

[22] Data collected aboard a survey of the Hebrides Terrace Seamount suggest coral gardens may also be present within The Barra Fan and Hebrides Terrace proposal

MPA search feature	Existing measure	MPA proposals/MPA search locations where proposed as a protected feature	Notes - incl. any further work required to support development of MPA proposals	Summary of Stage 5 assessment
Deep sea sponge aggregations	OSPAR Region V • East Rockall Bank cSAC and ICES fisheries closure • Hatton Bank cSAC & NEAFC fisheries closure	OSPAR Region II • Faroe-Shetland sponge belt • North-east Faroe-Shetland Channel OSPAR Region V • Hatton-Rockall Basin • Rosemary Bank Seamount	An OSPAR Threatened and/or Declining habitat recorded in OSPAR Regions II & V. Two existing measures and four MPA proposals are considered to provide representation for the range of types of deep sea sponge aggregations present in Scotland's seas (such as boreal ostur and fields of the bird's nest sponge *Pheronema carpentari*) and there is replication both within and between OSPAR regions increasing resilience for the feature in the network.	**Adequate**

MPA search feature	Existing measure	MPA proposals/MPA search locations where proposed as a protected feature	Notes - incl. any further work required to support development of MPA proposals	Summary of Stage 5 assessment
Flame shell beds	n/a	OSPAR Region III • Loch Sunart • Loch Creran • Lochs Duich, Long and Alsh • North-west sea lochs and Summer Isles • Upper Loch Fyne and Loch Goil	All Scottish records of flame shell beds are from OSPAR Region III. Scotland is proportionately important for flame shell beds and is considered to be threatened and/or declining in Scotland's seas. This was highlighted through recent survey work in Loch Linnhe which suggested a potentially significant decline in the previously estimated extent of flame shell beds (Moore *et al*., 2012). Further survey work in Upper Loch Fyne and Loch Goil, Lochs Duich, Long and Alsh and Loch Creran is required to confirm the quality of the reported flame shell beds. The fieldwork will be completed in September 2012. Preliminary results will be used to support completion of the Parliamentary report. It is recommended that five proposals are required to achieve adequacy for this feature.	**Adequate**

MPA search feature	Existing measure	MPA proposals/MPA search locations where proposed as a protected feature	Notes - incl. any further work required to support development of MPA proposals	Summary of Stage 5 assessment
Horse mussel beds	OSPAR Region II • Moray Firth SAC • Sanday SAC • Sullom Voe SAC OSPAR Region III • Loch Creran SAC • Lochs Duich, Long and Alsh Reefs SAC • Loch Laxford SAC • Loch Sunart SAC	OSPAR Region II • Fetlar to Haroldswick (see comment about work by SSMO) • Noss Head OSPAR Region III • Small Isles • Upper Loch Fyne and Loch Goil (horse mussel beds are not required to achieve adequacy but recommended as a protected feature to add to the integrity of the proposal)	Scotland is of proportional importance for horse mussel beds. Horse mussel beds are also included on the OSPAR Threatened and/or Declining list. There are a number of examples covered by existing measures, however, the three recommended to achieve adequacy complement these. Noss Head is the largest horse mussel bed in Scotland's seas whilst the Small Isles contains the deepest known bed. The bed in the Small Isles is also unique in that is in part interspersed with the fan mussel aggregation. The Shetland Shellfish Management Organisation has identified horse mussel beds as a sensitive habitat and has proposed closed areas. This reflects the identification of horse mussel beds within the Shetland marine spatial plan. On the basis of such measures being adopted, the Fetlar to Haroldswick site would still be recommended but possibly not for horse mussel beds (or maerl beds - see below).	**Adequate**

MPA search feature	Existing measure	MPA proposals/MPA search locations where proposed as a protected feature	Notes - incl. any further work required to support development of MPA proposals	Summary of Stage 5 assessment
Inshore deep mud with burrowing heart urchins	n/a	OSPAR Region III • Lochs Duich, Long & Alsh • Loch Sween	There are few records of this habitat around Scotland (~25). A number of older records have not been validated (re-found) in recent surveys within areas being recommended as MPA proposals (e.g. North-west sea lochs and Summer Isles). Equally, inshore deep mud was previously recorded in Loch Laxford SAC (in 1991) but has not been recorded in more recent monitoring work. Survey work took place in August 2012 to determine the validity of historical records of this seabed habitat within Lochs Duich, Long and Alsh. Further survey work is required in Loch Sween. Our view is that this habitat is likely to still be present within at least two of the recommended MPA proposals in Region III which would enable adequacy for inshore deep mud to be achieved.	**Adequate - pending results of survey work**

MPA search feature	Existing measure	MPA proposals/MPA search locations where proposed as a protected feature	Notes - incl. any further work required to support development of MPA proposals	Summary of Stage 5 assessment
Kelp and seaweed communities on sublittoral sediment	OSPAR Region II • Moray Firth SAC • Sanday SAC • Sullom Voe SAC • The Vadills SAC OSPAR Region III • Loch Laxford SAC • Loch nam Madadh SAC • Luce Bay and Sands SAC • Sound of Arisaig (Loch Ailort to Loch Ceann Traigh) SAC • Lamlash Bay Fisheries Area	OSPAR Region II • Fetlar to Haroldswick • Wyre and Rousay Sounds OSPAR Region III • North-west sea lochs and Summer Isles • South Arran (all records are within the existing Lamlash Bay Fisheries Area) [Kelp and seaweed communities are not required to achieve adequacy but are being recommended as protected features because of the quality of the examples and to add to the integrity of the proposals]	Feature considered well represented within the existing protected area network (Carruthers *et al*., 2011).	**Adequate**
Low or variable salinity habitats	OSPAR Region II • Sanday SAC OSPAR Region III • Loch Creran SAC • Lochs Duich, Long and Alsh Reefs SAC • Loch Laxford SAC • Loch nam Madadh SAC • Obain Loch Euphoirt SAC • Sunart SAC • Ulva, Danna and the McCormaig Isles SSSI	OSPAR Region III • Upper Loch Fyne and Loch Goil	Upper Loch Fyne and Loch Goil is being proposed to represent this feature within the south-west of Scotland.	**Adequate**

MPA search feature	Existing measure	MPA proposals/MPA search locations where proposed as a protected feature	Notes - incl. any further work required to support development of MPA proposals	Summary of Stage 5 assessment
Maerl beds	OSPAR Region III • Loch Laxford SAC • Loch nam Madadh SAC • Sound of Arisaig (Loch Ailort to Loch Ceann Traigh) SAC • Sound of Barra pSAC • Lamlash Bay Fisheries Area	OSPAR Region II • Fetlar to Haroldswick • Wyre and Rousay Sounds OSPAR Region III • Loch Sween • North-west sea lochs and Summer Isles • South Arran (overlaps with and extends the Lamlash Bay Fisheries Area)	Scotland is of proportional importance for maerl beds and maerl is also included on the OSPAR Threatened and/or Declining List. The Shetland Shellfish Management Organisation has identified maerl beds as a sensitive habitat and has proposed closed areas. This reflects the identification of maerl beds within the Shetland marine spatial plan. Subject to implementation of these measures, the Fetlar to Haroldswick site would still be recommended but possibly not for maerl beds (or horse mussel beds - see above).	**Adequate**
Maerl on coarse shell gravel with burrowing sea cucumbers	OSPAR Region III • Loch nam Madadh SAC • Sound of Arisaig (Loch Ailort to Loch Ceann Traigh) SAC	OSPAR Region III • North-west sea lochs and Summer Isles • South Arran	Additional data mining is being undertaken in relation to this feature within South Arran. The results of that work will help determine whether the feature will remain listed as a proposed protected feature. This feature was previously recorded in Loch Laxford SAC (in 1991) but has not been recorded in more recent monitoring work (see Moore *et al*., 2010). The two records within Loch nam Madadh SAC are from 1990. The situation is the same for the North-west sea lochs and Summer Isles. The feature was recorded as present but uncertain in 2010 (Moore *et al*., 2011).	**Adequate**

MPA search feature	Existing measure	MPA proposals/MPA search locations where proposed as a protected feature	Notes - incl. any further work required to support development of MPA proposals	Summary of Stage 5 assessment
Native oysters	n/a	OSPAR Region III • Loch Sween • North-west sea lochs and Summer Isles	Native oysters are included on the OSPAR Threatened and/or Declining List. Their numbers and geographic distribution are known to have declined significantly in Scotland's seas. Native oysters were removed from the MPA identification process as drivers because of insufficient data. However, given their status, they have been included within two MPA proposals to achieve representation and replication within the network.	**Adequate**
Northern sea fan and sponge communities	OSPAR Region II • Pobie Bank cSAC OSPAR Region III • Firth of Lorn SAC • Loch nam Madadh SAC • St Kilda SAC • Sunart SAC	OSPAR Region III • Shiant East Bank • Small Isles [The northern sea fan and sponge communities are not required to achieve adequacy because of the protection already provided by existing measures. However, the examples within the Small Isles MPA proposal and the Shiant East Bank MPA search location are being recommended because they are good quality and add to the integrity of these proposals]	Feature considered well represented within the existing protected area network (Carruthers *et al*., 2011). The recommended inclusion of northern sea fan and sponge communities within the Shiant East Bank and Small Isles complements existing protection in Region III.	**Adequate**

MPA search feature	Existing measure	MPA proposals/MPA search locations where proposed as a protected feature	Notes - incl. any further work required to support development of MPA proposals	Summary of Stage 5 assessment
Offshore deep sea muds	OSPAR Region V • Darwin Mounds Fisheries Area • North-west Rockall Mound Fisheries Area	OSPAR Region I • North-east Faroe-Shetland Channel OSPAR Region II • East of Gannet and Montrose Fields • North-east Faroe-Shetland Channel OSPAR Region V • South-west Sula Sgeir and Hebridean slope **OR** Geikie Slide and Hebridean slope • The Barra Fan and Hebrides Terrace Seamount • Hatton-Rockall Basin	Existing measures and potential areas for MPAs provide representation of the different physical settings (on the continental shelf, on the continental slope and off the shelf) and replication in each OSPAR Region in which the feature is recorded in Scotland's seas	**Adequate**

MPA search feature	Existing measure	MPA proposals/MPA search locations where proposed as a protected feature	Notes - incl. any further work required to support development of MPA proposals	Summary of Stage 5 assessment
Offshore subtidal sands and gravels	OSPAR Region V • Darwin Mounds Fisheries Measure • Hatton Bank NEAFC fisheries closure • North-west Rockall Mound Fisheries Area	OSPAR Region I • Faroe-Shetland sponge belt • North-east Faroe-Shetland Channel OSPAR Region II • East of Gannet and Montrose Fields • Faroe-Shetland sponge belt • Firth of Forth Banks Complex • North-east Faroe-Shetland Channel • Norwegian Boundary Sediment Plain[23] • Turbot Bank[23] • West Shetland Shelf OSPAR Region III • The Barra Fan and Hebrides Terrace Seamount • West Shetland Shelf OSPAR Region V • South-west Sula Sgeir and Hebridean slope **OR** Geikie Slide and Hebridean slope • The Barra Fan and Hebrides Terrace Seamount	Existing measures and potential areas for MPAs provide representation of the different physical settings (on the continental shelf, on the continental slope and off the shelf) and replication in each OSPAR Region in which the feature is recorded in Scotland's seas. The protection of ocean quahog within the East of Gannet and Montrose Fields and the Norwegian Boundary Sediment Plain MPA proposals requires the protection of its supporting habitat; offshore subtidal sands and gravels.	**Adequate**

[23] Note that Turbot Bank is a science-based alternative to offshore subtidal sands and gravels should the Firth of Forth Banks Complex not be considered further. Sands and gravels are included in Norwegian Bounary Sediment Plain as a science-based alternative to protect the habitat for ocean quahog should the Firth of Forth Banks Complex not be considered further

MPA search feature	Existing measure	MPA proposals/MPA search locations where proposed as a protected feature	Notes - incl. any further work required to support development of MPA proposals	Summary of Stage 5 assessment
Seagrass beds	OSPAR Region II • Dornoch Firth and Morrich More SAC (& SSSI) • Firth of Tay and Eden Estuary SAC • Loch Fleet SSSI • Loch of Stenness SAC • Longman and Castle Stuart Bays SSSI • Moray Firth SAC • Sanday SAC • The Vadills SAC OSPAR Region III • Loch nam Madadh SAC • Loch Roag Lagoons SAC • Moine Mhor SAC • Obain Loch Euphoirt SAC • Sound of Arisaig (Loch Ailort to Loch Ceann Traigh) SAC • Sound of Barra pSAC • Sunart SSSI • Ulva, Danna and the McCormaig Isles SSSI	OSPAR Region III • South Arran	Feature considered well represented within the existing protected area network (Carruthers *et al*., 2011). The seagrass beds within South Arran are not required to achieve adequacy because of the protection already provided by existing measures. However, the bed within Whiting Bay is believed to be the largest seagrass bed within the Firth of Clyde and adds to the integrity of the MPA proposal. Further work is being undertaken to compare the extent of this seagrass bed to others within the Clyde.	**Adequate**

MPA search feature	Existing measure	MPA proposals/MPA search locations where proposed as a protected feature	Notes - incl. any further work required to support development of MPA proposals	Summary of Stage 5 assessment
Sea loch egg wrack beds	OSPAR Region II • The Vadills SSSI OSPAR Region III • Loch Laxford SAC • Loch Moidart and Loch Shiel Woods SAC • Sunart SSSI	n/a	Feature considered well represented within the existing protected area network (Carruthers *et al*., 2011). No Nature Conservation MPA proposals have been identified for this feature.	**Adequate**
Seamount communities	n/a[24]	OSPAR Region V • Rosemary Bank Seamount • The Barra Fan and Hebrides Terrace Seamount (suspected)	An OSPAR Threatened and/or Declining habitat only recorded in OSPAR Region V. The new MPA proposals are considered to adequately represent the feature in the MPA network.	**Adequate**
Shallow tide swept coarse sands with burrowing bivalves	OSPAR Region III • Sound of Barra pSAC • Lamlash Bay Fisheries Area	OSPAR Region II • Fetlar to Haroldswick OSPAR Region III • South Arran (encompasses Lamlash Bay FRA)	Survey work was undertaken in September 2012 within the Fetlar to Haroldswick MPA proposal to improve confidence in the supporting data for this feature.	**Adequate**

[24] Anton Dohrn Seamount SAC and the associated ICES advised fisheries closure is likely to provide partial protection to the range benthic communities associated with the seamount. This is through the protection afforded to biogenic reef under the SAC and Vulnerable Marine Ecosystems (VMEs) such as corals and sponges under the ICES advised fisheries closure. The other communities present on the seamount will not be afforded protection under these measures

MPA search feature	Existing measure	MPA proposals/MPA search locations where proposed as a protected feature	Notes - incl. any further work required to support development of MPA proposals	Summary of Stage 5 assessment
Tide-swept algal communities	OSPAR Region II • Sanday SAC • Sullom Voe SAC • The Vadills SAC OSPAR Region III • Firth of Lorn SAC • Loch Laxford SAC • Loch nam Madadh SAC • Loch Roag Lagoons SAC • Lochs Duich, Long and Alsh Reefs SAC • Luce Bay and Sands SAC • Sunart SAC • Treshnish Isles SAC • Ulva, Danna and the McCormaig Isles SSSI	n/a	Feature considered well represented within the existing protected area network (Carruthers *et al*., 2011). No Nature Conservation MPA proposals have been identified for this feature.	**Adequate**

Table A6.2 Low or limited mobility species: MPA search feature coverage within existing protected areas, other area-based measures and Nature Conservation MPA proposals / search locations

MPA search feature	Existing measure	Potential areas for MPAs/MPA search locations where proposed as a protected feature	Notes - incl. any further work required to support development of MPA proposals	Summary of Stage 5 assessment
Burrowing sea anemone aggregations	n/a	n/a	Throughout the process we have reviewed data on burrowing sea anemones and have not found any examples of aggregations - only scattered individuals. Therefore no Nature Conservation MPA proposals have been identified for this feature.	**n/a**
Fan mussel aggregations	n/a	OSPAR Region III • Small Isles	There is only one known example of a fan mussel aggregation. As a result, it has not been possible to achieve replication. If additional aggregations are recorded in the future, consideration should be given to including at least one more example of the feature within the network to ensure that the replication and resilience parts of this guideline can be met.	**Adequate - pending future review**
Heart cockle aggregations	n/a	n/a	Throughout the process we have reviewed data on heart cockles and have not found any examples of aggregations - only scattered individuals. Therefore no Nature Conservation MPA proposals have been identified for this feature.	**n/a**

MPA search feature	Existing measure	Potential areas for MPAs/MPA search locations where proposed as a protected feature	Notes - incl. any further work required to support development of MPA proposals	Summary of Stage 5 assessment
Northern feather star aggregations on mixed substrata	OSPAR Region III • Loch Laxford SAC	OSPAR Region III • Loch Sunart • North-west sea lochs and Summer Isles • Small Isles	Only recorded within OSPAR Region III. The feature is recommended for inclusion within three MPA proposals because it is not possible to achieve replication between regions and because of its sensitivity.	**Adequate**
Ocean quahog aggregations	OSPAR Region II[25] • Sullom Voe SAC OSPAR Region III • Loch Laxford SAC • Sound of Arisaig (Loch Ailort to Loch Ceann Traigh) SAC	OSPAR Region II[26] • Faroe-Shetland sponge belt • Firth of Forth Banks Complex **OR** Norwegian Boundary Sediment Plain • East of Gannet and Montrose Fields	Potential areas for MPAs in OSPAR Region II provide increased resilience for the feature on the grounds of the status of the feature as Threatened and/or Declining in the Region. Within territorial waters, no examples of ocean quahog aggregations have been confirmed[29]. However, given that this feature is included on the OSPAR Threatened and/or Declining List, two potential aggregations are being recommended to help achieve broader representivity (see Section 7.5). These are within the South Arran and Upper Loch Fyne and Loch Goil MPA proposals.	**Adequate**

[25] Carruthers *et al*. (2011) note uncertainties / assumptions made regarding assignment of the MPA search feature category to records in these three SACs

[26] Note that Norwegian Boundary Sediment Plain is a science-based alternative that would need to be considered for ocean quahog aggregations should the Firth of Forth Banks Complex not be considered further

Table A6.3 Mobile species: MPA search feature coverage within existing protected areas, other area-based measures and Nature Conservation MPA proposals / search locations

MPA search feature	Existing measure	Potential areas for MPAs/MPA search locations where proposed as a protected feature	Notes - incl. any further work required to support development of MPA proposals	Summary of Stage 5 assessment
Basking shark	n/a	OSPAR Region III • Skye to Mull	Only one MPA search location has been identified. Basking sharks are on the OSPAR T&D list. Should additional information suggest places that could be considered as essential areas, consideration should be given to identifying additional MPA search locations for assessment against the MPA Selection Guidelines. Tagging work within the Skye to Mull search location and habitat modelling work are being completed before SNH provides formal advice on this MPA search location.	**Not adequate - pending results of further research and assessment**
Black guillemot	OSPAR Region II • Holm of Papa Westray SSSI • Mousa SSSI OSPAR Region II • Monach Isles SSSI • Sanda Island SSSI	OSPAR Region II • Clyde Sea Sill • East Caithness Cliffs • Fetlar to Haroldswick • Monach Isles • Papa Westray • Small Isles	Six MPA proposals are being recommended for black guillemot. These complement the protection already afforded by SSSI by extending protection to include nearshore foraging areas.	**Adequate**
Blue ling	OSPAR Region V • Blue ling protection area - edge of Rosemary Bank • Blue ling protection area - edge of continental slope	n/a	There is replication for the protection of important areas for the life history of the species in the only OSPAR Region important areas for the species have been recorded - OSPAR Region V.	**Adequate**

MPA search feature	Existing measure	Potential areas for MPAs/MPA search locations where proposed as a protected feature	Notes - incl. any further work required to support development of MPA proposals	Summary of Stage 5 assessment
Common skate	n/a	OSPAR Region III • Loch Sunart to the Sound of Jura	Loch Sunart to the Sound of Jura is the only MPA proposal for this species within Scotland's seas. It includes areas where large mature individuals are believed to be resident (based on the results of tagging work). Common skate is included on the OSPAR T&D list. Should additional information suggest places that could be deemed essential areas, consideration should be given to identifying additional MPA search locations for assessment against the MPA Selection Guidelines.	**Not adequate - pending further research**
European spiny lobster	OSPAR Region II • Berwickshire and North Northumberland Coast SAC OSPAR Region II • Firth of Lorn SAC • Loch Laxford SAC • St Kilda SAC • Sunart SAC	n/a	There were insufficient data to identify any Nature Conservation MPA proposals for this species. Some protection is likely to be afforded by existing measures for Annex I reefs although it is recognised that this protection is only for part of their life cycle and that the sites were not identified specifically for European spiny lobster.	**n/a**
Minke whale	n/a	OSPAR Region II • Southern Trench OSPAR Region III • Skye to Mull	Habitat modelling currently underway will inform the detailed application of the MPA Selection Guidelines in due course. SNH will then provide formal advice on whether these areas should be recommended as MPA proposals.	**Adequate - pending further research and assessment**

MPA search feature	Existing measure	Potential areas for MPAs/MPA search locations where proposed as a protected feature	Notes - incl. any further work required to support development of MPA proposals	Summary of Stage 5 assessment
Orange roughy	n/a	OSPAR Region V • The Barra Fan and Hebrides Terrace Seamount	The only known location of importance to the life history of the species (for spawning aggregations) in Scotland's seas falls within the Barra Fan and Hebrides Terrace Seamount proposed area (ICES, 2010). The feature was previously considered to be adequately protected in the area by an Orange Roughy Protection Area implemented under the EC Common Fisheries Policy, but these Protection Areas have since been discontinued. Although current regulations place a zero Total Allowable Catch on the species across European waters, orange roughy have been included as a feature in this location because spawning aggregations are considered to be potentially vulnerable to incidental capture (e.g. as part of a mixed fishery in the area). Other areas in Scotland's seas are important for juveniles and adults outside the spawning period but, since they do not form discrete spatial aggregations, they are not considered suitable for protection in MPAs. If additional information on important areas for aggregations of the species comes to light, consideration should be given to including at least one more area of importance to the feature within the network to ensure that the replication and resilience parts of this guideline can be met.	**Adequate - pending future review**

MPA search feature	Existing measure	Potential areas for MPAs/MPA search locations where proposed as a protected feature	Notes - incl. any further work required to support development of MPA proposals	Summary of Stage 5 assessment
Risso's dolphin	n/a	OSPAR Region III • Eye Peninsula to Butt of Lewis	Modelling work is currently being carried out on the distribution of the prey species of Risso's dolphins. Habitat modelling will be completed before a more detailed application of the MPA Selection Guidelines is undertaken. SNH will then provide formal advice on whether this area should be recommended as an MPA proposal.	**Adequate - pending further research and assessment**
Sandeels	OSPAR Region II • North-east UK sandeel fisheries closure (CA1)	OSPAR Region II • Mousa to Boddam • North-west Orkney • Turbot Bank OSPAR Region III • Eye Penninsula to Butt of Lewis	There is replication and representation of key areas of importance to the life history of the species with a focus placed on source (as opposed to sink) populations. The results of modelling work from MSS, suggest that the Scottish continental shelf is divided into discrete regions in terms of sandeel production and distribution. One proposal has been identified in each of these regions, except for the south-east where this is provided by the North-east sandeel fisheries closure.	**Adequate**
White-beaked dolphin	n/a	OSPAR Region II • Southern Trench	Habitat modelling will be completed before a more detailed application of the MPA Selection Guidelines is undertaken. Should additional information suggest places that could be deemed essential areas, consideration should be given to identifying additional MPA search locations for assessment.	**Not adequate - pending further research and assessment**

Table A6.4 Large-scale features: MPA search feature coverage within existing protected areas, other area-based measures and Nature Conservation MPA proposals / search locations

MPA search feature	Existing measure	Potential areas for MPAs/MPA search locations where proposed as a protected feature	Notes - incl. any further work required to support development of MPA proposals	Summary of Stage 5 assessment
Continental slope	n/a	OSPAR Regions I & II • North-east Faroe-Shetland Channel **OR** Faroe-Shetland sponge belt OSPAR Region V • South-west Sula Sgeir and Hebridean Slope **OR** The Geikie Slide and Hebridean Slope **OR** The Barra Fan and Hebrides Terrace Seamount	Areas of both the Faroe-Shetland Channel slope and Hebridean slope of functional significance to the overall health and biodiversity of Scotland's seas are included as part of MPA proposals	**Adequate**
Fronts	n/a	OSPAR Region II • Southern Trench OSPAR Region III • Clyde Sea Sill • Skye to Mull	MPA search locations / potential areas for MPAs have been identified in both OSPAR Regions covering shelf seas. Therefore replication would be provided within the network. These are considered to be functionally significant examples.	**Adequate**
Seamounts	n/a	OSPAR Region V • Rosemary Bank Seamount • The Barra Fan and Hebrides Terrace Seamount	An OSPAR Threatened and/or Declining habitat only recorded in OSPAR Region V. The Nature Conservation MPA proposals are considered to adequately represent the feature in the MPA network.	**Adequate**
Shelf banks and mounds	n/a	OSPAR Region II • Firth of Forth Banks Complex **OR** Turbot Bank[27] OSPAR Region III • Shiant East Bank	There is representation and replication between OSPAR Regions of shelf bank and mound features considered to be of functional significance to the health and biodiversity of Scotland's seas.	**Adequate**

[27] Note that Turbot Bank is a science-based alternative that would be considered for shelf banks and mounds should the Firth of Forth Banks Complex not be considered further

MPA search feature	Existing measure	Potential areas for MPAs/MPA search locations where proposed as a protected feature	Notes - incl. any further work required to support development of MPA proposals	Summary of Stage 5 assessment
Shelf deeps	OSPAR Region II • Firth of Lorn SAC	OSPAR Region II • Southern Trench OSPAR Region III • The Small Isles	There is representation and replication between OSPAR Regions of shelf deep features considered to be of functional significance to the health and biodiversity of Scotland's seas. The shelf deep within the existing Firth of Lorn SAC is the only known example of a tidally scoured deep in Scottish waters. Therefore the MPA proposals complement existing protection.	**Adequate**

Appendix 7 Coverage of key geodiversity areas and thematic blocks within the Scottish MPA network

Contribution to the conservation of geodiversity - coverage within existing protected areas and Nature Conservation MPA proposals

Examples of most, if not all, of the individual landforms, or parts of them, present in Scottish waters are included within the Nature Conservation MPA proposals and existing protected areas. However, as noted in Appendix 2, it is the assemblages of features in the key geodiversity areas and the interpretations placed upon them that to a significant degree determines the national and international scientific importance of the key areas in Scottish waters. Of the MPA proposals, five fully include geodiversity features representing key geodiversity areas (see Figure A7.1 and Table A7.1): South-east Fladen, North-east Faroe Shetland Channel, Rosemary Bank Seamount, Geikie Slide and Hebridean Slope, and the Southern Trench; in addition, the Small Isles fully includes geodiversity features representing a proposed key geodiversity area identified since the original assessment. Furthermore, two of the MPA proposals contain at least 75% by area of geodiversity features representing additional key geodiversity areas (Table A7.1): Faroe-Shetland Sponge Belt and North-east Faroe Shetland Channel; while four others include more partial overlaps (25-75%) with other key geodiversity areas: Faroe-Shetland Sponge Belt, Firth of Forth Banks Complex, the Barra Fan and Hebrides Terrace Seamount, and Loch Sunart to Sound of Jura. Although the North-west sea lochs and Summer Isles includes <25% of the Summer Isles part of the Summer Isles to Sula Sgeir Fan key geodiversity area, it does contain a particularly important part of this area. The Eye Peninsula to Butt of Lewis also includes important features (mega-scale glacial lineations) that are part of this same key geodiversity area. In the case of all these Nature Conservation MPA proposals, the presence of the geodiversity features provides significant additional scientific justification for their selection.

Existing protected areas (SACs, SPAs and Fisheries Areas) incorporate all, or a significant (>75%) part of, a further seven key geodiversity areas (see Table A7.1 for details).

In terms of coverage of geodiversity features within the Nature Conservation MPA proposals and existing protected areas, the breakdown by key thematic block is as follows.

Quaternary of Scotland

Quaternary of Scotland feature interests overall are relatively well represented in the MPA proposals and within existing protected areas, although there are some notable gaps or examples of partial coverage (Table A7.1). In terms of scientific importance they are particularly well represented in North-east Faroe Shetland Channel, Faroe-Shetland Sponge Belt, the Southern Trench, Firth of Forth Banks Complex, the Barra Fan and Hebrides Terrace Seamount. Together, these areas incorporate key elements of the footprint of the last British Ice Sheet and its associated landforms and deposits, including ice stream lineations, ice sheet limit moraines, trough-mouth fans, recessional moraines, iceberg ploughmarks, debris flow deposits and channels and tunnel valleys. Notwithstanding this correspondence, however, seven of the MPA proposal boundaries cut across the landform assemblages in the geodiversity key areas. Consequently integral parts of the key interests are excluded. Existing protected areas however, overlap significantly with two of these key geodiversity areas.

Submarine Mass Movement

Submarine Mass Movement feature interests are represented in the North-east Faroe Shetland Channel (Miller Slide) and Geikie Slide and Hebridean Slope (Geikie Slide). A small part of the Peach Slides Complex lies within the Barra Fan and Hebrides Terrace Seamount MPA proposal. The Afen and Palaeo-Afen Slides are not included within any MPA proposals or existing protected areas.

Marine Geomorphology of the Scottish Deep Ocean Seabed

Marine Geomorphology of the Scottish Deep Ocean Seabed feature interests are covered by several MPA proposals - the Rosemary Bank Seamount (Rosemary Bank) and the Faroe-Shetland sponge belt (West Shetland Margin Contourite Deposits) - and existing protected areas - North-west Rockall Bank SAC and East Rockall Bank cSAC (North-East Rockall Bank and adjacent sea floor) and Hatton Bank cSAC and associated fisheries area (Central Hatton Bank and adjacent sea floor). The only key area not covered is George Bligh Bank.

Seabed Fluid and Gas Seep

Seabed Fluid and Gas Seep interest features are fully covered by the South-east Fladen MPA proposal (Scanner-Scotia-Challenger Pockmark Complex) and Darwin Mounds SAC (Darwin Mounds). However, South-east Fladen is a science-based alternative currently being considered alongside Central and Western Fladen MPA proposals and may not progress. Should this be the final conclusion, 50% of the Scanner-Scotia-Challenger Pockmark Complex would still be considered adequately protected by the Scanner Pockmark SAC.

Cenozoic Structures of the Atlantic Margin

Cenozoic Structures of the Atlantic Margin feature interests are fully covered in North-east Faroe-Shetland Channel (Pilot Whale Diapirs) and to a significant extent in Anton Dohrn Seamount cSAC (Anton Dohrn).

Marine Geomorphology of the Scottish Shelf Seabed

Marine Geomorphology of the Scottish Shelf Seabed feature interests are not well represented. The Sandy Riddle key geodiversity area is excluded and the dynamic landforms and processes in the Fair Isle Strait Marine Process Bedforms are poorly represented in the MPA proposals and existing protected areas. The important and extensive shelf carbonate production areas of Shetland, Orkney and the Outer Hebrides are also poorly represented to any significant extent within the MPA proposals and existing protected areas (details of partial coverage outlined in Table A7.1).

Coastal Geomorphology of Scotland

Coastal Geomorphology of Scotland feature interests are represented in existing protected areas in the St Kilda World Heritage Site and SAC (St Kilda Archipelago Submerged landforms), but the North Rona and Sula Sgeir SPA includes only a small part of the Sula Sgeir submerged platforms.

Biogenic Structures of the Scottish Seabed

Biogenic Structures of the Scottish Seabed feature interests are mainly covered by existing protected areas: Hatton Bank cSAC and Fisheries Area entirely contain Hatton Bank Carbonate Mounds, and East Mingulay cSAC entirely contains the Mingulay Reef key geodiversity area. The East Rockall Bank cSAC covers a significant part of the Rockall Bank Biogenic Sediment Mounds.

Conclusions

Overall, therefore, a large proportion of geodiversity feature interests are well represented by the evolving MPA network in Scotland's seas, although as noted above, there are some significant key area omissions or partial inclusions relating particularly to Quaternary of Scotland, Submarine Mass Movement and Marine Geomorphology of the Scottish Shelf Seabed features.

The following Nature Conservation MPA proposals / MPA search locations have no overlap with key geodiversity areas (but may encompass examples of geodiversity features under the eight thematic blocks or other regional geo.- interests) -

- East of Gannet and Montrose Fields
- Turbot Bank
- Norwegian boundary sediment plain
- Noss Head
- West Shetland Shelf
- Loch Duich, Long and Alsh
- Loch Sunart
- Loch Sween
- Clyde Sea Sill
- South Arran
- Upper Loch Fyne and Loch Goil
- East Caithness Cliffs

The presence of key geodiversity features provides significant additional scientific justification for the selection of 14 of the 37 Nature Conservation MPA proposals / MPA search locations.

Of the eight geodiversity thematic blocks, the interests of five could be very well represented in the network (subject to the progression of the MPA proposals and MPA search locations). In the three other cases, Quaternary of Scotland, Submarine Mass Movement and Marine Geomorphology of the Scottish Shelf Seabed, the coverage is more variable. Overall, 16 of the 34 key geodiversity areas are significantly incorporated (>75% by area) within the Nature Conservation MPA proposals and existing protected areas.

Recommendations

Given the importance of the Shelf Carbonate Production Areas as a source of shell sand for the internationally important machair habitats and their poor representation in the Nature Conservation MPA proposals and existing protected areas, research is required to identify any particularly critical areas within the present extensive boundaries of the geodiversity key areas that require protection and management.

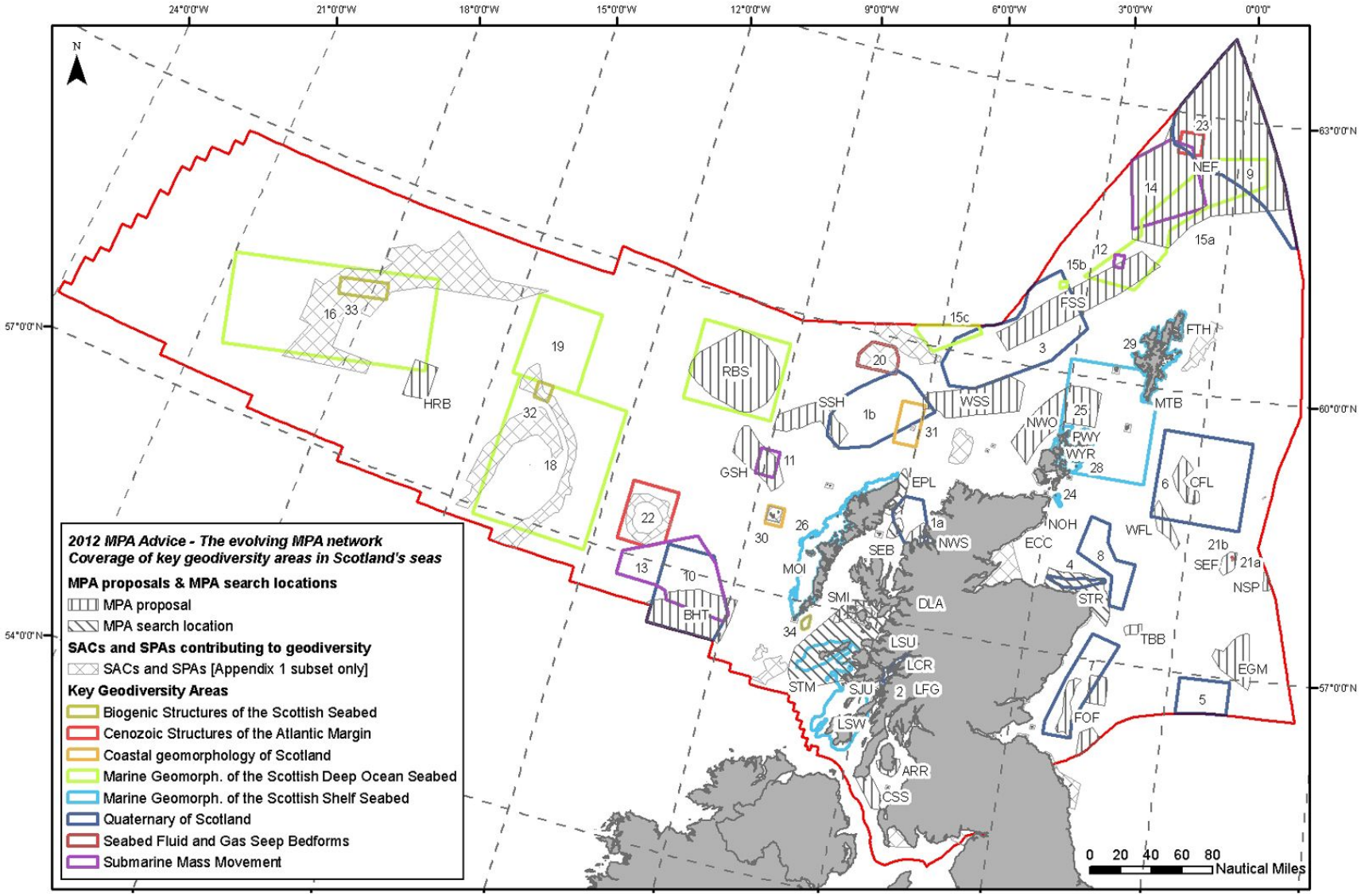
Site specific assessment of vulnerabilities and management requirements is required for all the key geodiversity areas in order to: 1) help prioritise any future actions in relation to the partial omissions and gaps; and 2) inform the management of geodiversity interests already included in the MPA network.

A further requirement is to evaluate the extent to which Marine Spatial Planning might address the conservation and management needs of the geodiversity key areas or parts of them not included in the MPA proposals and existing protected sites.

Functional links between the geodiversity backdrop and associated biodiversity remain to be analysed at a site-specific scale. The potential application of the Norwegian ‘nature areas’ mapping type of approach in the marine environment could offer promising new insights into the functional links between marine geodiversity and biodiversity and provide a basis for informing marine spatial planning (Dolan *et al*., 2009; Thorsnes *et al*., 2009).

Figure A7.1 Coverage of geodiversity areas within Nature Conservation MPA proposals / search locations and existing protected areas

Key geodiversity areas numbered (see Table A2.4 for details) with MPA proposals and MPA search locations labelled by three-letter code (see Table 2 for details). Existing protected areas (SACs and SPAs) shown but not labelled (see Tables A1.2 to A1.5 for details). Other area-based measures not mapped



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 [2012]. All rights reserved. Ordnance Survey Licence number 100017908. Key geodiversity areas in Scotland's seas and the MPA network components ©SNH, JNCC and Marine Scotland. 07.12.12. All rights reserved.

Table A7.1 Summary of overlaps of key geodiversity areas with Nature Conservation MPA proposals / search locations and existing measures (SACs, SPAs and other area-based measures)

Geo Site #	Key Geodiversity Area	Proportion of geodiversity areas within MPA proposals (100%, >75%, 75-25%, <25%, 0%)	Proportion of geodiversity areas within existing measures (SACs, SPAs, Fisheries Areas) (100%, >75%, 75-25%, <25%, 0%)	Features within key areas should become a protected feature of MPA proposals	Scale of coverage of existing measures warrants further assessment of protection afforded	Key areas & component features not adequately covered in MPA and existing measures
The Quaternary of Scotland						
1a	Summer Isles	<25% (North-west sea lochs and Summer Isles, Shiant East Bank, Eye Peninsula to Butt of Lewis)	<25% (Priest Island SPA)	Y	Y	Y
1b	Sula Sgeir Fan	<25% (South-west Sula Sgeir and Hebridean Slope, West Shetland Shelf)	<25% (Edge of Scottish continental shelf blue ling protection area Fisheries Area)	-	Y	Y
2	Loch Linnhe and Loch Etive	25-75% (Loch Sunart to the Sound of Jura, Loch Creran)	<25% (Eileanan agus Sgeiran Lios mor SAC, Loch Creran SAC, Firth of Lorn SAC)	Y	Y	Y
3	West Shetland Margin Palaeo-depositional System	<25% (Faroe-Shetland Sponge Belt)	0%	Y	-	Y
4	The Southern Trench	100% (The Southern Trench)	25% - 75% (East Coast of Scotland sandeel closure Fisheries Area)	Y	-	-
5	Devil's Hole	0%	0%	-	-	Y
6	Fladen Deeps	<25% (Central Fladen, Western Fladen)	0%	Y	-	Y
7	Wee Bankie	25-75% (Firth of Forth Banks Complex)	100% (East Coast of Scotland sandeel closure Fisheries Area)	Y	-	-
8	Bosies Bank	0%	25% - 75% (East Coast of Scotland sandeel closure Fisheries Area)	-	-	Y
9	North Sea Fan (Scottish sector)	>75% (North-east Faroe-Shetland Channel)	0%	Y	-	Y[28]

[28] Much of the North Sea Fan extends beyond UK waters, of the area within UK waters >75% are contained within the North-east Faroe-Shetland Channel MPA

Geo Site #	Key Geodiversity Area	Proportion of geodiversity areas within MPA proposals (100%, >75%, 75-25%, <25%, 0%)	Proportion of geodiversity areas within existing measures (SACs, SPAs, Fisheries Areas) (100%, >75%, 75-25%, <25%, 0%)	Features within key areas should become a protected feature of MPA proposals	Scale of coverage of existing measures warrants further assessment of protection afforded	Key areas & component features not adequately covered in MPA and existing measures
10	The Barra Fan	25-75% (The Barra Fan and Hebrides Terrace Seamount)	0%	Y	-	Y
Submarine Mass Movement						
11	Geikie Slide	100% (Geikie Slide and Hebridean Slope)	0%	Y	-	-
12	The Afen Slide and Palaeo-Afen Slide	0%	0%	-	-	Y
13	The Peach Slide Complex	<25% (The Barra Fan and Hebrides Terrace Seamount)	0%	Y	-	Y
14	Miller Slide	100% (North-east Faroe-Shetland Channel)	0%	Y	-	-
Marine Geomorphology of the Scottish Deep Ocean Seabed						
15a	West Shetland Margin Contourite Deposits	>75% (Faroe-Shetland Sponge Belt, North-east Faroe-Shetland Channel)	0%	Y	-	Y
15b - c	West Shetland Margin Contourite Deposits	0%	0%	-	-	Y
16	Central Hatton Bank (and adjacent basin floor)	<25% (Minor overlap in Hatton-Rockall Basin)	25 - 75% (Hatton Bank cSAC and Fisheries Area)	-	Y	Y
17	Rosemary Bank Seamount (and adjacent basin floor)	100% (Rosemary Bank Seamount)	>75% (Edge of Rosemary Bank blue ling protection Fisheries Area)	Y	-	-
18	North-East Rockall Bank (and adjacent basin floor)	0%	25 - 75% (NW Rockall Bank SAC, East Rockall Bank cSAC, North West Rockall Fisheries Area)	-	Y	Y
19	George Bligh Bank (and adjacent basin floor)	0%	0%	-	-	Y
Seabed Fluid and Gas Seep						
20	Darwin Mounds	0%	100% (Darwin Mounds SAC and Fisheries Area)	-	Y	-

Geo Site #	Key Geodiversity Area	Proportion of geodiversity areas within MPA proposals (100%, >75%, 75-25%, <25%, 0%)	Proportion of geodiversity areas within existing measures (SACs, SPAs, Fisheries Areas) (100%, >75%, 75-25%, <25%, 0%)	Features within key areas should become a protected feature of MPA proposals	Scale of coverage of existing measures warrants further assessment of protection afforded	Key areas & component features not adequately covered in MPA and existing measures
21a & b	Scanner - Scotia - Challenger Pockmark Complex	100% (South-east Fladen)	25 - 75% (Scanner Pockmark SAC)	Y	Y	-
Cenozoic Structures of the Atlantic Margin						
22	Anton Dohrn Seamount (and adjacent basin floor)	0%	>75% (Anton Dohrn Seamount cSAC)	-	Y	-
23	The Pilot Whale Diapirs	100% (North-east Faroe-Shetland Channel)	0%	Y	-	-
Marine Geomorphology of the Scottish Shelf Seabed						
24	Sandy Riddle Bank (south-east of Pentland Skerries)	0%	0%	-	-	Y
25	Fair Isle Strait Marine Process Bedforms	<25% (North-west Orkney, Papa Westray, Wyre and Rousay Sounds)	<25% (Foula SPA, Fair Isle SPA, East Coast of Sanday SAC, Calf of Eday SPA, Faray and Holm of Faray SAC, Rousay SPA, West Westray SPA)	Y	Y	Y
26	Outer Hebrides Carbonate Production Area	<25% (Monach Islands)	<25% (Loch Roag Lagoons SAC, North Uist Machair and Islands SPA, Monach Islands SAC, South Uist Machair SAC, Mingulay and Berneray SPA)	Y	Y	Y
27	Inner Hebrides Carbonate Production Area	<25% (Skye to Mull)	<25% (Rinns of Islay SPA, North Colonsay and Western Cliffs SPA)	Y	Y	Y
28	Orkney Carbonate Production Area	<25% (Papa Westray, Wyre and Rousay Sounds)	<25% (East Coast of Sanday SAC, Calf of Eday SPA, Faray and Holm of Faray SAC, Rousay SPA, West Westray SPA)	Y	Y	Y

Geo Site #	Key Geodiversity Area	Proportion of geodiversity areas within MPA proposals (100%, >75%, 75-25%, <25%, 0%)	Proportion of geodiversity areas within existing measures (SACs, SPAs, Fisheries Areas) (100%, >75%, 75-25%, <25%, 0%)	Features within key areas should become a protected feature of MPA proposals	Scale of coverage of existing measures warrants further assessment of protection afforded	Key areas & component features not adequately covered in MPA and existing measures
29	Shetland Carbonate Production Area	<25% (Fetlar to Haroldswick, Mousa to Boddam)	<25% (Mousa SAC, Papa Stour SAC, Sullom Voe SAC, The Vadills SAC, Yell Sound Coast SAC, Hermaness, Saxa Vord and Valla Field SPA, Ramna Stacks and Gruney SPA, Otterswick and Graveland SPA, Fetlar SPA, Ronas Hill - North Roe and Tingon SPA, Papa Stour SPA, Noss SPA, Fetlar SPA, Hermaness, Saxa Vord and Valla Field SPA, Mousa SPA, Sumburgh Head SPA)	Y	Y	Y
stal Geomorphology of Scotland						
30	St Kilda Archipelago Submerged Landforms	0%	100% (St Kilda SAC & SPA)	-	Y	-
31	Sula Sgeir Submerged Platforms	0%	<25% (North Rona and Sula Sgeir SPA)	-	Y	Y
genic Structures of the Scottish Seabed						
32	Rockall Bank Biogenic Sediment Mounds	0%	>75% (East Rockall Bank cSAC)	-	Y	-
33	Hatton Bank Carbonate Mounds	0%	100% (Hatton Bank cSAC and Fisheries Area)	-	Y	-
34	Mingulay Reef	0%	100% (East Mingulay cSAC)	-	Y	-

Appendix 8 A preliminary assessment of representation of OSPAR Threatened and / or Declining (T&D) species (with limited home ranges) and habitats within the Scottish MPA network

Table A8.1 Correlation table between OSPAR Threatened and/or Declining habitats (and low mobility species) and existing Habitats Directive Annex I habitat categories, SSSI notified features and MPA search features

Note that for the purpose of assessing the representation of OSPAR T&D habitats (and low mobility species) within the existing network, SACs have been considered to provide protection when the OSPAR T&D feature equates to, or is contained within the qualifying feature. SSSIs have only been considered to provide protection where the relevant feature is specifically listed as a notified interest (as outlined in the table). It is recognised that some notified interests of SSSIs could also encompass OSPAR T&D features, however this wider connection has not been taken into account. For example, the *Zostera* beds T&D habitat has been considered to be protected in SSSIs notified for eel grass beds, but not SSSIs notified for sandflats, of which it is recognised that *Zostera* could be a characterising species.

SAC qualifying features	OSPAR T&D feature	SSSI notified features	MPA search features
	Low mobility species		
Large shallow inlets and bays; Sandbanks which are slightly covered by seawater all the time	Ocean quahog (*Arctica islandica*)	-	Ocean quahog aggregations
Estuaries; Lagoons; Large shallow inlets and bays; Mudflats and sandflats not covered by seawater at low tide	Native oyster (*Ostrea edulis*)	-	Native oysters
	Habitats		
-	Carbonate mounds	-	Carbonate mound communities
Reefs	Coral gardens	-	Coral gardens
Reefs	Deep-sea sponge aggregations	-	Deep-sea sponge aggregations
Estuaries; Lagoons; Large shallow inlets and bays; Mudflats and sandflats not covered by seawater at low tide	Intertidal *Mytilus edulis* beds on mixed and sandy sediments	-	Blue mussel beds
Estuaries; Lagoons; Large shallow inlets and bays; Mudflats and sandflats not covered by seawater at low tide	Intertidal mudflats	Mudflats	-
Large shallow inlets and bays; Reefs[29]	Littoral chalk communities	Rocky shore	-
Reefs	*Lophelia pertusa* reefs	-	
Sandbanks which are slightly covered by seawater all the time	Maerl beds	-	Maerl beds
Estuaries; Large shallow inlets and bays; Reefs; Sandbanks which are slightly covered by seawater all the time	*Modiolus modiolus* beds	-	Horse mussel beds

[29] Where intertidal reef is contiguous with qualifying subtidal reef habitat

SAC qualifying features	OSPAR T&D feature	SSSI notified features	MPA search features
Estuaries; Lagoons; Large shallow inlets and bays; Mudflats and sandflats not covered by seawater at low tide	*Ostrea edulis* beds	-	Native oysters
Large shallow inlets and bays; Reefs	*Sabellaria spinulosa* reefs	-	-
-	Seamounts	-	Seamounts, seamount communities
Large shallow inlets and bays	Sea-pen and burrowing megafauna communities	-	Burrowed mud
Estuaries; Lagoons; Large shallow inlets and bays; Mudflats and sandflats not covered by seawater at low tide; Sandbanks which are slightly covered by seawater all the time	*Zostera* beds	Eel grass beds	Seagrass beds

Table A8.2 Representation of OSPAR Threatened and/or Declining species (with limited home ranges) and habitats within existing area-based measures and Nature Conservation MPA proposals / search locations

x3 OSPAR species with limited home ranges have been excluded from the assessment, namely - the Azorean barnacle *Megabalanus azoricus* & Azorean limpet *Patella ulyssiponensis aspera* which are considered to be endemic to the Azores Archipelago; and, the dog whelk *Nucella lapillus* which is not considered under threat and/or in decline in Scottish waters. Similarly the Oceanic ridges with hydrothermal vents/fields T&D habitat is not present in Scottish waters. Presence within duplicating measures (overlapping with same protected feature basis) only recorded as single 'event' (e.g. Firth of Tay and Eden Estuary SAC and the Tayport - Tentsmuir SSSI both contain the same mudflats and only the SAC is listed).

OSPAR T&D feature	**OSPAR Regions within Scottish waters where feature occurs / [is under threat and/or in decline]**	**Existing measures (SACs, cSACs, pSACs, SSSIs and fisheries areas established for nature conservation)**	**Nature Conservation MPA proposals & search locations**
Invertebrates			
Ocean quahog (*Arctica islandica*)	II, III **[II]**	OSPAR Region II • Firth of Tay and Eden Estuary SAC • Moray Firth SAC • Sullom Voe SAC OSPAR Region III • Loch Laxford SAC • Luce Bay and Sands SAC • Sound of Arisaig (Loch Ailort to Loch Ceann Traigh) SAC • Sound of Barra pSAC	OSPAR Region II • East of Gannet and Montrose Fields • Faroe-Shetland sponge belt • Firth of Forth Banks Complex • Norwegian boundary sediment plain (option) OSPAR Region III • South Arran[30] • Upper Loch Fyne and Loch Goil
Native oyster (*Ostrea edulis*)	II[31], III **[II]**	-	OSPAR Region III • Loch Sween • North-west sea lochs and Summer Isles

[30] Ocean quahog is proposed as a protected feature within the South Arran and Upper Loch Fyne and Loch Goil Nature Conservation MPA proposals. Survey work in 2012 recorded the species within a number of grab samples in both areas and the analysis of drop-down video work suggests that there may be aggregations of the species but until validated the feature has not been classified under the MPA search feature category but recognised as an OSPAR T&D species that is representative of Scotland's seas more generally

[31] There are scattered historical and more recent records of native oysters in Region II but they are widely and sparsely distributed

OSPAR T&D feature	OSPAR Regions within Scottish waters where feature occurs / [is under threat and/or in decline]	Existing measures (SACs, cSACs, pSACs, SSSIs and fisheries areas established for nature conservation)	Nature Conservation MPA proposals & search locations
Habitats			
Carbonate mounds	V **[V]**	OSPAR Region V • Hatton Bank cSAC & Hatton Bank NEAFC Fisheries Area (only example in UK waters)	n/a
Coral gardens	V **[All where they occur]**	OSPAR Region V • Anton Dohrn cSAC & ICES Fisheries Area • East Rockall Bank cSAC • Hatton Bank cSAC & NEAFC Fisheries Area	OSPAR Region V • The Barra Fan and Hebrides Terrace Seamount[32]
Deep-sea sponge aggregations	II, V **[All where they occur]**	OSPAR Region V • East Rockall Bank cSAC • Hatton Bank cSAC & NEAFC Fisheries Area	OSPAR Region II (only examples in Region) • Faroe-Shetland sponge belt • North-east Faroe-Shetland Channel OSPAR Region V • Hatton-Rockall Basin • Rosemary Bank
Intertidal *Mytilus edulis* beds on mixed and sandy sediments	II, III **[All where they occur]**	OSPAR Region II • Dornoch Firth and Morrich More SAC OSPAR Region III • Lochs Duich Long and Alsh Reefs SAC • Luce Bay and Sands SAC • Solway Firth SAC • Sunart SAC	n/a

[32] Data collected aboard a survey of the Hebrides Terrace Seamount suggest coral gardens may also be present within The Barra Fan and Hebrides Terrace proposal

OSPAR T&D feature	OSPAR Regions within Scottish waters where feature occurs / [is under threat and/or in decline]	Existing measures (SACs, cSACs, pSACs, SSSIs and fisheries areas established for nature conservation)	Nature Conservation MPA proposals & search locations
Intertidal mudflats	II, III **[All where they occur]**	OSPAR Region II • Cromarty Firth SSSI • Dornoch Firth and Morrich More SAC • Firth of Tay and Eden Estuary SAC • Loch of Stenness SAC • Longman and Castle Stuart Bays SSSI • Montrose Basin SSSI • Munlochy Bay SSSI • Pool of Virkie SSSI • Whiteness Head SSSI OSPAR Region III • Bogside Flats SSSI • Cree Estuary SSSI • Gruinart Flats SSSI • Kentra Bay and Moss SSSI • Loch Laxford SAC • Loch Moidart and Loch Shiel Woods SAC • Loch nam Madadh SAC • Moine Mhor SAC • Solway Firth SAC • Tong Saltings SSSI • Ulva, Danna and the McCormaig Isles SSSI	n/a
Littoral chalk communities	II, III **[All where they occur]**	OSPAR Region II • Berwickshire and North Northumberland Coast SAC OSPAR Region III • Luce Bay and Sands SAC	n/a

OSPAR T&D feature	OSPAR Regions within Scottish waters where feature occurs / [is under threat and/or in decline]	Existing measures (SACs, cSACs, pSACs, SSSIs and fisheries areas established for nature conservation)	Nature Conservation MPA proposals & search locations
Lophelia pertusa reefs	III, V **[All where they occur]**	OSPAR Region III • East Mingulay SAC (only example in Region) OSPAR Region V • Anton Dohrn cSAC & ICES Fisheries Area • Darwin Mounds SAC • East Rockall Bank cSAC • Hatton Bank cSAC & NEAFC Fisheries Area • North-west Rockall Bank SAC & Fisheries Area	n/a
Maerl beds	II, III **[III]**	OSPAR Region III • Loch Laxford SAC • Loch nam Madadh SAC • Sound of Arisaig (Loch Ailort to Loch Ceann Traigh) SAC • Sound of Barra pSAC • Lamlash Bay Fisheries Area	OSPAR Region II • Fetlar to Haroldswick • Wyre and Rousay Sounds OSPAR Region III • Loch Sween • North-west sea lochs and Summer Isles • South Arran (fully encompasses the Lamlash Bay Fisheries Area)
Modiolus modiolus beds	II, III **[All where they occur]**	OSPAR Region II • Moray Firth SAC • Sanday SAC • Sullom Voe SAC OSPAR Region III • Loch Creran SAC • Loch Laxford SAC • Lochs Duich, Long and Alsh Reefs SAC • Sunart SAC	OSPAR Region II • Fetlar to Haroldswick • Noss Head OSPAR Region III • Small Isles • Upper Loch Fyne and Loch Goil
Ostrea edulis beds	III[33] **[All where they occur]**	n/a	OSPAR Region III • Loch Sween

[33] There are no longer considered to be any extant native oyster beds in OSPAR Region II

OSPAR T&D feature	OSPAR Regions within Scottish waters where feature occurs / [is under threat and/or in decline]	Existing measures (SACs, cSACs, pSACs, SSSIs and fisheries areas established for nature conservation)	Nature Conservation MPA proposals & search locations
Sabellaria spinulosa reefs	III **[III]**	OSPAR Region III • Luce Bay and Sands SAC	n/a
Seamounts (seamount communities)	V **[All where they occur]**	n/a[34]	OSPAR Region V • Rosemary Bank Seamount • The Barra Fan and Hebrides Terrace Seamount
Sea-pen and burrowing megafauna communities	II, III, V **[II, III]**	OSPAR Region II • Sullom Voe SAC OSPAR Region III • Loch Laxford SAC • Loch nam Madadh SAC	OSPAR Region II • Central Fladen • South-west Fladen (option) • Southern Trench • Western Fladen (option) OSPAR Region III • Lochs Duich, Long and Alsh • Loch Sween • North-west sea lochs and Summer Isles • Small Isles • South Arran • Upper Loch Fyne and Loch Goil OSPAR Region V • South-west Sula Sgeir and Hebridean slope **OR** Geikie Slide and Hebridean slope • The Barra Fan and Hebrides Terrace Seamount

[34] Anton Dohrn Seamount cSAC and the associated ICES advised fisheries closure is likely to provide partial protection to the range benthic communities associated with the seamount. This is through the protection afforded to biogenic reef under the SAC and Vulnerable Marine Ecosystems (VMEs) such as corals and sponges under the ICES advised fisheries closure. The other communities present on the seamount will not be afforded protection under these measures

OSPAR T&D feature	OSPAR Regions within Scottish waters where feature occurs / [is under threat and/or in decline]	Existing measures (SACs, cSACs, pSACs, SSSIs and fisheries areas established for nature conservation)	Nature Conservation MPA proposals & search locations
Zostera beds	II, III **[All where they occur]**	OSPAR Region II • Dornoch Firth and Morrich More SAC • Firth of Tay and Eden Estuary SAC • Loch Fleet SSSI • Longman and Castle Stuart Bays SSSI • Moray Firth SAC • Sanday SAC OSPAR Region III • Loch nam Madadh SAC • Loch Roag Lagoons SAC • Moine Mhor SAC • Obain Loch Euphoirt SAC • Sound of Arisaig (Loch Ailort to Loch Ceann Traigh) SAC • Sound of Barra pSAC • Sunart SSSI • Ulva, Danna and the McCormaig Isles SSSI	OSPAR Region III • South Arran

Appendix 9 A preliminary assessment of the representation of EUNIS level 3 seabed habitats within the Scottish MPA network

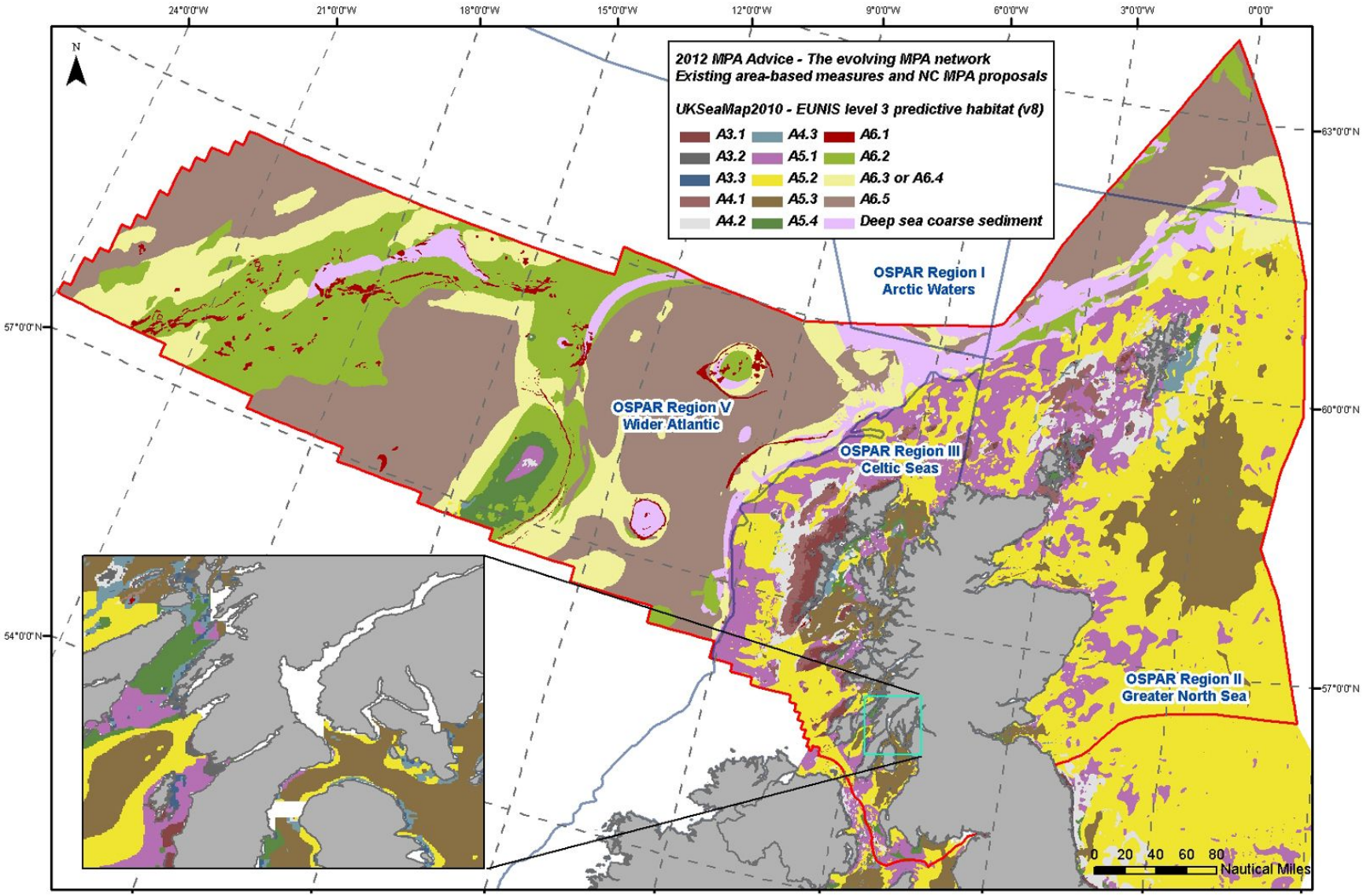
Table A9.1 A list of EUNIS level 3 habitats occurring in Scottish waters (adapted from OSPAR, 2008d)

Categories A2.5 'Coastal saltmarshes and saline reedbeds'; A3.4 - A3.6 & A4.4 - A4.6 (x3 categories of infralittoral and circalittoral rock in the Baltic region respectively) were not considered

Broad habitat type (EUNIS Level 2)	EUNIS Level 3 habitat type	Code
Littoral rock (A1) Littoral rock includes habitats of bedrock, boulders and cobbles which occur in the intertidal zone (the area of the shore between high and low tides) and the splash zone.	High energy littoral rock	A1.1
	Moderate energy littoral rock	A1.2
	Low energy littoral rock	A1.3
	Features of littoral rock	A1.4
Littoral sediment (A2) Littoral sediment includes habitats of shingle (mobile cobbles and pebbles), gravel, sand and mud or any combination of these which occur in the intertidal zone.	Littoral coarse sediment	A2.1
	Littoral sand and muddy sand	A2.2
	Littoral mud	A2.3
	Littoral mixed sediments	A2.4
	Littoral sediments dominated by aquatic angiosperms	A2.6
	Littoral biogenic reefs	A2.7
	Features of littoral sediment	A2.8
Infralittoral rock (A3) Infralittoral rock includes habitats of bedrock, boulders and cobbles which occur in the shallow subtidal zone and typically support seaweed communities.	High energy infralittoral rock	A3.1
	Moderate energy infralittoral rock	A3.2
	Low energy infralittoral rock	A3.3
	Features of infralittoral rock	A3.7
Circalittoral rock (A4) Circalittoral rock includes habitats of bedrock, boulders and cobbles which occur in the subtidal zone, and are characterised by animal dominated communities (a departure from the algae dominated communities in the infralittoral zone).	High energy circalittoral rock	A4.1
	Moderate energy circalittoral rock	A4.2
	Low energy circalittoral rock	A4.3
	Features of circalittoral rock	A4.7
Sublittoral sediment (A5) Sediment habitats in the sublittoral near shore zone (i.e. covering the infralittoral and circalittoral zones), typically extending from the extreme lower shore down to the edge of the bathyal zone (200m). Sediment ranges from boulders and cobbles, through pebbles and shingle, coarse sands, sands, fine sands, muds, and mixed sediments.	Subtidal coarse sediment	A5.1
	Subtidal sand	A5.2
	Subtidal mud	A5.3
	Subtidal mixed sediments	A5.4
	Subtidal macrophyte-dominated sediment	A5.5
	Subtidal biogenic reefs	A5.6
	Features of sublittoral sediments	A5.7
Deep sea bed (A6) Includes habitats of rock and mixed substrata through to sand and muddy sediments in the deep sea (below depths of 200 m). The deep sea bed classification also includes bioherms such as coral and sponge communities and characteristic bathymetric rises such as seamounts, ridges and banks.	Deep sea rock	A6.1
	Deep sea mixed-substrata	A6.2
	Deep sea sand	A6.3
	Deep sea muddy sand	A6.4
	Deep sea mud	A6.5
	Deep sea bioherms (coral and sponge communities)	A6.6
	Raised features of the deep sea bed (such as oceanic ridges and seamounts)	A6.7
	Deep sea coarse sediment	-[35]

[35] Yet to be included in the EUNIS classification

Figure A9.1 EUNIS level 3 predictive seabed habitat distribution mapping with an inset box showing an example of gaps in data coverage in coastal waters, embayments and sea lochs (adapted from McBreen et al.*, 2011). Littoral habitats (A1 & A2) not mapped*



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 [2012]. All rights reserved. Ordnance Survey Licence number 100017908. Seabed habitat mapping derived from UKSeaMap2010 version 8 (JNCC Report no. 446). 05.10.12. All rights reserved.

Table A9.2 Correlation between EUNIS level 3 habitats and the qualifying / notified features in existing protected areas and the MPA search features

Broad habitat type EUNIS level 2 (with level 3 components)	**Correlation between EUNIS level 3 habitat categories and designated / notified features of existing protected areas and MPA search features**
A1 - Littoral rock (A1.1 - A1.4)	**SAC features** - *Reefs*[36] (A1.1 - A1.4); *Large shallow inlets and bays* (A1.1, A1.3); *Estuaries* (A1.3); *Submerged or partially submerged sea caves* (A1.4) **SSSI features** - *Tidal rapids* (A1.1 - A1.2); *Rocky shore* (A1.1 - A1.4); *Egg wrack* (A1.3); *Sea caves* (A1.4) **MPA search features** - *Tide-swept algal communities* (A1.1); *Sea loch egg wrack beds* (A1.3)
A2 - Littoral sediment (A2.1 - A2.4; A2.6 - A2.8)	**SAC features** - *Mudflats and sandflats not covered by seawater at all times* (A2.1 - A2.4, A2.6 - A2.8); *Estuaries* (A2.1 - A2.4; A2.6 - A2.8); *Large shallow inlets and bays* (A2.1 - A2.4; A2.6 - A2.8); *Reefs* (A2.7 - A2.8) **SSSI features** - *Sandflats* (A2.1, 2.2, A2.4, A2.6 - A2.8); *Mudflats* (A2.3 - A2.4, A2.6 - A2.8); *Eel grass bed* (A2.6); *Saline lagoons* (A2.6) **MPA search features** - *Blue mussel beds* (A2.7); *Seagrass beds* (A2.6)
A3 - Infralittoral rock (A3.1 - A3.3, A3.7)	**SAC features** - *Reefs* (A3.1 - A3.3, A3.7); *Large shallow inlets and bays* (A3.2 - A3.3); *Estuaries* (A3.2 - A3.3); *Lagoons* (A3.2 - A3.3); *Submerged or partially submerged sea caves* (A3.7) **SSSI features** -*Tidal rapids* (A3.1 - A3.2); *Saline lagoons* (A3.3) **MPA search features** - *Tide-swept algal communities* (A3.1 & A3.2); *Low or variable salinity habitats* (A3.3)
A4 - Circalittoral rock (A4.1 - A4.3, A4.7)	**SAC features** - *Reefs* (A4.1 - A4.3, A4.7); *Large shallow inlets and bays* (A4.2 - A4.3); *Lagoons* (A4.2 - A4.3); *Submerged or partially submerged sea caves* (A4.7) **SSSI features** -*Saline lagoons* (A4.2 - A4.3) **MPA search features** - *Northern sea fan and sponge communities* (A4.1 & A4.2)
A5 - Sublittoral sediment (A5.1 - 5.7)	**SAC features** - *Subtidal sandbanks* (A5.1 - A5.2, A5.4 - 5.6); *Estuaries* (A5.1 - A5.6); *Lagoons* (A5.1 - A5.5); *Large shallow inlets and bays* (A5.1 - A5.6); *Reefs* (A5.6); *Mudflats and sandflats not covered by seawater at low tide* (A5.5); *Submarine structures made by leaking gases* (A5.7) **SSSI features** - *Saline lagoons* (A5.1 - A5.5); *Tidal rapids* (A5.1, A5.2, A5.4 - A5.5); *Eel grass beds* (A5.5) **MPA search features** - *Shallow tide-swept coarse sands with burrowing bivalves* (A5.1); *Maerl or coarse shell gravel with burrowing sea cucumbers* (A5.1), *Offshore subtidal sands and gravels* (A5.1, A5.2, A5.4), *Inshore deep mud with burrowing heart urchins* (A5.3), *Offshore deep sea muds* (A5.3); *Burrowed mud* (A5.3); *Native oysters* (A5.4); *Flame shell beds* (A5.4); *Maerl beds* (A5.5); *Kelp and seaweed communities on sublittoral sediment* (A5.5); *Seagrass beds* (A5.5); *Horse mussel beds* (A5.6)
A6 - Deep sea bed (A6.1 - 6.7)	**SAC features** - *Reefs* (A6.1 & A6.6) **MPA search features** - *Offshore subtidal sands and gravels* (A6.2 - A6.4); *Offshore deep sea muds* (A6.5); *Deep sea sponge aggregations* (A6.6); *Coral gardens* (A6.6)*; Carbonate mound communities* (A6.7); *Seamount communities* (A6.7)

[36] Where intertidal reef is contiguous with qualifying subtidal reef habitat

Table A9.3 EUNIS level 3 habitat representation (considered to be afforded protection) within existing protected areas (SACs and SSSIs) and the new Nature Conservation MPA proposals / search locations

x4 EUNIS level 3 habitats have been excluded from the assessment, namely 'A2.5 Coastal saltmarshes and saline reedbeds' and 'A3.4 - A3.6 & A4.4 - A4.6' (x3 categories of infralittoral and circalittoral rock in the Baltic region respectively)

EUNIS Level 3 habitat type	Code	OSPAR Regions where representative	Existing measures	Nature Conservation MPA proposals & search locations	Replication in Scotland's Seas
High energy littoral rock	A1.1	**II, III**	OSPAR Region II • Berwickshire and North Northumberland Coast SAC • Isle of May SAC • Mousa SAC • Papa Stour SAC • Sanday SAC • Sullom Voe SAC • The Vadills SAC OSPAR Region III • Firth of Lorn SAC • Loch Laxford SAC • Loch nam Madadh SAC • Loch Roag Lagoons SAC • Lochs Duich, Long, and Alsh Reefs SAC • Luce Bay and Sands SAC • Sunart SAC • Taynish Woods SSSI • Treshnish Isles SAC • Ulva, Danna and the McCormaig Isles SSSI	n/a	✓

EUNIS Level 3 habitat type	Code	OSPAR Regions where representative	Existing measures	Nature Conservation MPA proposals & search locations	Replication in Scotland's Seas
Moderate energy littoral rock	A1.2	**II, III**	OSPAR Region II • Berwickshire and North Northumberland Coast SAC • Isle of May SAC • Mousa SAC • Sanday SAC • Sullom Voe SAC OSPAR Region III • Firth of Lorn SAC • Loch Creran SAC • Loch Laxford SAC • Loch nam Madadh SAC • Lochs Duich, Long, and Alsh Reefs SAC • Luce Bay and Sands SAC • Solway Firth SAC • Sunart SAC • Taynish Woods SSSI • Treshnish Isles SAC • Ulva, Danna and the McCormaig Isles SSSI	n/a	✓

EUNIS Level 3 habitat type	Code	OSPAR Regions where representative	Existing measures	Nature Conservation MPA proposals & search locations	Replication in Scotland's Seas
Low energy littoral rock	A1.3	**II, III**	OSPAR Region II • Berwickshire and North Northumberland Coast SAC • Dornoch Firth and Morrich More SAC • Isle of May SAC • Sanday SAC • Sullom Voe SAC OSPAR Region III • Firth of Lorn SAC • Loch Creran SAC • Loch Laxford SAC • Loch nam Madadh SAC • Loch Roag Lagoons SAC • Lochs Duich, Long, and Alsh SAC • Luce Bay and Sands SAC • Obain Loch Euphoirt SAC • Solway Firth SAC • South Uist Machair SAC • Sunart SAC • Taynish Woods SSSI • Treshnish Isles SAC	n/a	✓

EUNIS Level 3 habitat type	Code	OSPAR Regions where representative	Existing measures	Nature Conservation MPA proposals & search locations	Replication in Scotland's Seas
Features of littoral rock	A1.4	**II, III**	OSPAR Region II • Berwickshire and North Northumberland Coast SAC • Isle of May SAC • Mousa SAC • Papa Stour SAC • Sanday SAC • Sullom Voe SAC OSPAR Region III • Firth of Lorn SAC • Loch Laxford SAC • Loch nam Madadh SAC • Lochs Duich, Long and Alsh Reefs SAC • Luce Bay and Sands SAC • Solway Firth SAC • Sunart SAC • Taynish Woods SSSI • Treshnish Isles SAC	n/a	✓
Littoral coarse sediment	A2.1	**II, III**	OSPAR Region II • Cromarty Firth SSSI • [Moray and Narin Coast Ramsar][37] OSPAR Region III • Loch Laxford SAC • Luce Bay and Sands SAC • Solway Firth SAC	n/a	✓

[37] A more detailed investigation of the distribution of this EUNIS level 3 category clarified that there are additional records within the Moray and Narin Coast Ramsar site where the EUNIS habitat is represented under the Ramsar qualifying feature 'Intertidal mudflats and sandflats'. Ramsar sites have not been included in the remainder of this assessment but the overlapping SPA and its ornithological features are listed within Table A1.5. How representative OSPAR Region II actually is for this EUNIS class is still under consideration

EUNIS Level 3 habitat type	Code	OSPAR Regions where representative	Existing measures	Nature Conservation MPA proposals & search locations	Replication in Scotland's Seas
Littoral sand and muddy sand	A2.2	**II, III**	OSPAR Region II • Cromarty Firth SSSI • Dornoch Firth and Morrich More SAC • Firth of Tay and Eden Estuary SAC • Sanday SAC OSPAR Region III • Bridgend Flats SSSI • Loch Laxford SAC • Loch Moidart and Loch Shiel Woods SAC • Luce Bay and Sands SAC • Moine Mhor SAC • Solway Firth SAC • South Uist Machair SAC	n/a	✓
Littoral mud	A2.3	**II, III**	OSPAR Region II • Cromarty Firth SSSI • Dornoch Firth and Morrich More SAC • Firth of Tay and Eden Estuary SAC • Montrose Bay SSSI • Munlochy Bay SSSI OSPAR Region III • Gruinart Flats SSSI • Kentra Bay and Moss SSSI • Loch Laxford SAC • Loch Moidart and Loch Shiel Woods SAC • Moine Mhor SAC • Solway Firth SAC • Ulva, Danna and the McCormaig Isles SSSI	n/a	✓

EUNIS Level 3 habitat type	Code	OSPAR Regions where representative	Existing measures	Nature Conservation MPA proposals & search locations	Replication in Scotland's Seas
Littoral mixed sediments	A2.4	**II, III**	OSPAR Region II • Cromarty Firth SSSI • Longman and Castle Stuart Bays SSSI • Munlochy Bay SSSI • Sullom Voe SAC OSPAR Region III • Cree Estuary SSSI • Gruinart Flats SSSI • Loch Laxford SAC • Loch Moidart and Loch Shiel Woods SAC • Lochs Duich, Long and Alsh SAC • Luce Bay and Sands SAC • Moine Mhor SAC • Solway Firth SAC	n/a	✓
Littoral sediments dominated by aquatic angiosperms	A2.6	**II, III**	OSPAR Region II • Dornoch Firth and Morrich More SAC • Loch Fleet SSSI • Longman and Castle Stuart Bays SSSI OSPAR Region III • Moine Mhor SAC • Ulva, Danna and the McCormaig Isles SSSI	OSPAR Region III • South Arran	✓
Littoral biogenic reefs	A2.7	**II, III**	OSPAR Region II • Dornoch Firth and Morrich More SAC • Firth of Tay and Eden Estuary SAC OSPAR Region III • Loch Laxford SAC • Lochs Duich, Long and Alsh Reefs SAC • Luce Bay and Sands SAC • Solway Firth SAC • Sunart SAC	n/a	✓

EUNIS Level 3 habitat type	Code	OSPAR Regions where representative	Existing measures	Nature Conservation MPA proposals & search locations	Replication in Scotland's Seas
Features of littoral sediment	A2.8	**II, III**	OSPAR Region II • East Sanday Coast SSSI • Isle of May SAC • Sullom Voe SAC OSPAR Region III • Loch Roag Lagoons SAC • Luce Bay and Sands SAC • Obain Loch Euphoirt SAC • Solway Firth SAC	n/a	✓
High energy infralittoral rock	A3.1	**II, III**	OSPAR Region II • Berwickshire and North Northumberland Coast SAC • Isle of May SAC • Mousa SAC • Papa Stour SAC • Sanday SAC • Solan Bank cSAC OSPAR Region III • Firth of Lorn SAC • Loch Laxford SAC • Lochs Duich, Long and Alsh Reefs SAC • Luce Bay and Sands SAC • Taynish Woods SSSI	n/a	✓

EUNIS Level 3 habitat type	Code	OSPAR Regions where representative	Existing measures	Nature Conservation MPA proposals & search locations	Replication in Scotland's Seas
Moderate energy infralittoral rock	A3.2	**II, III**	OSPAR Region II • Berwickshire and North Northumberland Coast SAC • Isle of May SAC • The Vadills SAC OSPAR Region III • Firth of Lorn SAC • Loch Creran SAC • Loch Laxford SAC • Loch nam Madadh SAC • Loch Roag Lagoons SAC • Lochs Duich, Long and Alsh Reefs SAC • Luce Bay and Sands SAC • Ulva, Danna and the McCormaig Isles SSSI	n/a	✓

EUNIS Level 3 habitat type	Code	OSPAR Regions where representative	Existing measures	Nature Conservation MPA proposals & search locations	Replication in Scotland's Seas
Low energy infralittoral rock	A3.3	**II, III**	OSPAR Region II • Berwickshire and North Northumberland Coast SAC • Isle of May SAC • Lochs of Stenness SAC • Sanday SAC • Sullom Voe SAC • The Vadills SAC OSPAR Region III • Firth of Lorn SAC • Loch Bee SSSI • Loch Creran SAC • Loch Laxford SAC • Loch nam Madadh SAC • Loch Roag Lagoons SAC • Lochs at Clachan SSSI • Lochs Duich, Long and Alsh Reefs SAC • Luce Bay and Sands SAC • Obain Loch Euphoirt SAC • South Uist Machair SAC • Ulva, Danna and the McCormaig Isles SSSI	OSPAR Region III • Upper Loch Fyne and Loch Goil	✓

EUNIS Level 3 habitat type	Code	OSPAR Regions where representative	Existing measures	Nature Conservation MPA proposals & search locations	Replication in Scotland's Seas
Features of infralittoral rock	A3.7	**II, III**	OSPAR Region II • Berwickshire and North Northumberland Coast SAC • Isle of May SAC • Mousa SAC • Papa Stour SAC • Sanday SAC OSPAR Region III • Loch Laxford SAC • Lochs Duich, Long and Alsh Reefs SAC • St Kilda SAC	n/a	✓
High energy circalittoral rock	A4.1	**II, III**	OSPAR Region II • Berwickshire and North Northumberland Coast SAC • Isle of May SAC • Mousa SAC • Pobie Bank cSAC • Sanday SAC • Solan Bank cSAC OSPAR Region III • Firth of Lorn SAC • Loch Creran SAC • Loch Laxford SAC • Loch nam Madadh SAC • Lochs Duich, Long and Alsh Reefs SAC • Luce Bay and Sands SAC • Solan Bank cSAC • St Kilda SAC • Stanton Banks SAC • Sunart SAC • Treshnish Isles SAC	OSPAR Region III • Shiant East Bank • Small Isles	✓

EUNIS Level 3 habitat type	Code	OSPAR Regions where representative	Existing measures	Nature Conservation MPA proposals & search locations	Replication in Scotland's Seas
Moderate energy circalittoral rock	A4.2	**II, III**	OSPAR Region II • Berwickshire and North Northumberland Coast SAC • Isle of May SAC • Mousa SAC • Papa Stour SAC • Pobie Bank cSAC • Sanday SAC • Solan Bank cSAC • Sullom Voe SAC OSPAR Region III • Firth of Lorn SAC • Loch Laxford SAC • Loch nam Madadh SAC • Lochs Duich, Long and Alsh Reefs SAC • Luce Bay and Sands SAC • Solan Bank cSAC • Stanton Banks SAC • St Kilda SAC • Sunart SAC • Treshnish Isles SAC	OSPAR Region III • Shiant East Bank • Small Isles	✓
Low energy circalittoral rock	A4.3	**III**	OSPAR Region III • Firth of Lorn SAC • Loch Creran SAC • Loch Laxford SAC • Loch nam Madadh SAC • Lochs Duich, Long and Alsh Reefs SAC • Sunart SAC	n/a	✓

EUNIS Level 3 habitat type	Code	OSPAR Regions where representative	Existing measures	Nature Conservation MPA proposals & search locations	Replication in Scotland's Seas
Features of circalittoral rock	A4.7	**III**	OSPAR Region III • Firth of Lorn SAC • Loch nam Madadh SAC • St Kilda SAC • Sunart SAC	n/a	✓
Subtidal coarse sediment	A5.1	**II, III**	OSPAR Region II • Dornoch Firth and Morrich More SAC • Moray Firth SAC • Sanday SAC • Sullom Voe SAC OSPAR Region III • Loch Laxford SAC • Loch nam Madadh SAC • Luce Bay and Sands SAC • Solway Firth SAC • Sound of Arisaig (Loch Ailort to Loch Ceann Traigh) SAC • Sound of Barra pSAC	OSPAR Region II • East of Gannet and Montrose Fields • Fetlar to Haroldswick • Firth of Forth Banks Complex • Norwegian Boundary Sediment Plain (science-based alternative to support ocean quahog) • Turbot Bank (science-based alternative) • West Shetland Shelf OSPAR Region III • Clyde Sea Sill • Geikie slide and Hebridean slope (option) • North-west sea lochs and Summer Isles • South-west Sula Sgeir and Hebridean slope (option) • South Arran • The Barra Fan and Hebrides Terrace Seamount • West Shetland Shelf	✓

EUNIS Level 3 habitat type	Code	OSPAR Regions where representative	Existing measures	Nature Conservation MPA proposals & search locations	Replication in Scotland's Seas
Subtidal sand	A5.2	**II, III**	OSPAR Region II • Dornoch Firth and Morrich More SAC • Firth of Tay and Eden Estuary SAC • Moray Firth SAC • Sanday SAC • Sullom Voe SAC • The Vadills SAC OSPAR Region III • Lochs at Clachan SSSI • Loch Laxford SAC • Loch nam Madadh SAC • Luce Bay and Sands SAC • Mound Alderwoods SSSI • Northton Bay SSSI • Solway Firth SAC • Sound of Arisaig (Loch Ailort to Loch Ceann Traigh) SAC • Sound of Barra pSAC	OSPAR Region II • East of Gannet and Montrose Fields • Fetlar to Haroldswick • Firth of Forth Banks Complex • Norwegian Boundary Sediment Plain (science-based alternative) • Turbot Bank (science-based alternative) • West Shetland Shelf OSPAR Region III • Clyde Sea Sill • Geikie slide and Hebridean slope (option) • North-west sea lochs and Summer Isles • Shiant East Bank • Small Isles • West Shetland Shelf	✓

EUNIS Level 3 habitat type	Code	OSPAR Regions where representative	Existing measures	Nature Conservation MPA proposals & search locations	Replication in Scotland's Seas
Subtidal mud	A5.3	**II, III**	OSPAR Region II • Dornoch Firth and Morrich More SAC • Firth of Tay and Eden Estuary SAC • Sullom Voe SAC • The Vadills SAC OSPAR Region III • Loch an Duin SSSI • Loch Laxford SAC • Loch nam Madadh SAC • Lochs at Clachan SSSI • Luce Bay and Sands SAC • Obain Loch Euphoirt SAC • Solway Firth SAC • Ulva, Danna and the McCormaig Isles SSSI	OSPAR Region II • Central Fladen (tall seapen area and option) • East of Gannet and Montrose Fields • South-east Fladen (option) • Western Fladen (option) OSPAR Region III • Loch Sween • Lochs Duich, Long and Alsh • North-west sea lochs and Summer Isles • Small Isles • South Arran • Upper Loch Fyne and Loch Goil	✓
Subtidal mixed sediments	A5.4	**II, III**	OSPAR Region II • Moray Firth SAC • Sanday SAC • Sullom Voe SAC • The Vadills SAC OSPAR Region III • Loch Laxford SAC • Loch nam Madadh SAC • Luce Bay and Sands SAC • Sound of Arisaig (Loch Ailort to Loch Ceann Traigh) SAC • Sound of Barra pSAC • Ulva, Danna and the McCormaig Isles SSSI	OSPAR Region III • Loch Creran • Loch Sunart • Loch Sween • Lochs Duich, Long and Alsh • North-west sea lochs and Summer Isles • Shiant East Bank • Upper Loch Fyne and Loch Goil	✓

EUNIS Level 3 habitat type	Code	OSPAR Regions where representative	Existing measures	Nature Conservation MPA proposals & search locations	Replication in Scotland's Seas
Subtidal macrophyte-dominated sediment	A5.5	**II, III**	OSPAR Region II • Dornoch Firth and Morrich More SAC • Firth of Tay and Eden Estuary SAC • Loch Stenness SAC • Moray Firth SAC • Sanday SAC • Sullom Voe SAC • The Vadills SAC OSPAR Region III • Loch Laxford SAC • Loch nam Madadh SAC • Loch Roag Lagoons SAC • Lochs at Clachen SSSI • Luce Bay and Sands SAC • Obain Loch Euphoirt SAC • Sound of Arisaig (Loch Ailort to Loch Ceann Traigh) SAC • Sound of Barra pSAC • South Uist Machair SAC • Sunart SAC • Taynish Woods SSSI • Ulva, Danna and the McCormaig Isles SSSI	OSPAR Region II • Fetlar to Haroldswick • Wyre and Rousay Sounds OSPAR Region III • Loch Sween • North-west sea lochs and Summer Isles • South Arran	✓

EUNIS Level 3 habitat type	Code	OSPAR Regions where representative	Existing measures	Nature Conservation MPA proposals & search locations	Replication in Scotland's Seas
Subtidal biogenic reefs	A5.6	**II, III, V**	OSPAR Region II • Moray Firth SAC • Pobie Bank cSAC • Sanday SAC • Solan Bank cSAC • Sullom Voe SAC OSPAR Region III • East Mingulay SAC • Loch Creran SAC • Loch Laxford SAC • Lochs Duich, Long and Alsh Reefs SAC • Solan Bank cSAC • Stanton Banks SAC • Sunart SAC OSPAR Region V • Anton Dohrn cSAC and ICES Fisheries Area • Darwin Mounds SAC • East Rockall Bank cSAC • Hatton Bank cSAC and NEAFC Fisheries Area • North-west Rockall Bank SAC and associated Fisheries Area • Wyville Thomson Ridge SAC	OSPAR Region II • Fetlar to Haroldswick • Noss Head OSPAR Region III • Loch Sunart • Small Isles • Upper Loch Fyne and Loch Goil	✓
Features of sublittoral sediments	A5.7	**II**	OSPAR Region II • Braemar pockmarks SAC • Scanner pockmarks SAC	n/a	✓

EUNIS Level 3 habitat type	Code	OSPAR Regions where representative	Existing measures	Nature Conservation MPA proposals & search locations	Replication in Scotland's Seas
Deep sea rock	A6.1	**V**	OSPAR Region V • Anton Dohrn cSAC and associated Fisheries Area • East Rockall Bank cSAC • Hatton Bank cSAC and associated NEAFC Fisheries Area • North-west Rockall Bank SAC and associated Fisheries Area • Wyville Thomson Ridge SAC	OSPAR Region V • Geikie slide and Hebridean slope (option) • Rosemary Bank Seamount	✓
Deep sea mixed-substrata	A6.2	**I, II, V**	OSPAR Region V • North-west Rockall Fisheries Area • Hatton Bank Fisheries Area	OSPAR Region I • North-east Faroe-Shetland Channel OSPAR Region II • Faroe-Shetland sponge belt • North-east Faroe-Shetland Channel OSPAR Region V • Rosemary Bank Seamount • The Barra Fan and Hebrides Terrace Seamount	✓ *(not possible to replicate in Region I)*

EUNIS Level 3 habitat type	Code	OSPAR Regions where representative	Existing measures	Nature Conservation MPA proposals & search locations	Replication in Scotland's Seas
Deep sea sand or deep sea muddy sand	A6.3 or A6.4	**I, II, V**	OSPAR Region V • North-west Rockall Fisheries Area • Hatton Bank Fisheries Area	OSPAR Region I • North-east Faroe-Shetland Channel OSPAR Region II • Faroe-Shetland sponge belt • North-east Faroe-Shetland Channel OSPAR Region V • Faroe-Shetland sponge belt • Rosemary Bank Seamount • South-west Sula Sgeir and Hebridean slope (option) • The Barra Fan and Hebrides Terrace Seamount • The Geikie Slide and Hebridean slope (option)	✓ *(not possible to replicate in Region I)*
Deep sea mud	A6.5	**I, II, V**	OSPAR Region V • North-west Rockall Fisheries Area • West Rockall Mound Fisheries Area	OSPAR Region I • North-east Faroe-Shetland Channel OSPAR Region II • North-east Faroe-Shetland Channel • Faroe-Shetland sponge belt OSPAR Region V • Hatton-Rockall Basin • Rosemary Bank Seamount • The Barra Fan and Hebrides Terrace Seamount • The Geikie Slide and Hebridean slope (option) • South-west Sula Sgeir and Hebridean slope (option)	✓ *(not possible to replicate in Region I or II)*

EUNIS Level 3 habitat type	Code	OSPAR Regions where representative	Existing measures	Nature Conservation MPA proposals & search locations	Replication in Scotland's Seas
Deep sea bioherms (coral and sponge communities)	A6.6	**II, V**	OSPAR Region V • Anton Dohrn cSAC and ICES Fisheries Area • Darwin Mounds SAC • East Rockall Bank cSAC • Hatton Bank cSAC and associated NEAFC Fisheries Area • North-west Rockall Bank cSAC and associated Fisheries Area	OSPAR Region II • Faroe-Shetland sponge belt • North-east Faroe-Shetland Channel OSPAR Region V • Hatton-Rockall Basin • Rosemary Bank Seamount • The Barra Fan and Hebrides Terrace Seamount	✓
Raised features of the deep sea bed (such as oceanic ridges and seamounts)	A6.7	**V**	OSPAR Region V • Darwin Mounds SAC • East Rockall Bank cSAC • Hatton Bank cSAC • North-west Rockall Bank SAC • Wyville Thomson Ridge SAC	OSPAR Region V • Rosemary Bank Seamount • The Barra Fan and Hebrides Terrace Seamount	✓

EUNIS Level 3 habitat type	Code	OSPAR Regions where representative	Existing measures	Nature Conservation MPA proposals & search locations	Replication in Scotland's Seas
Deep sea coarse sediment	-[38]	**I, II, V**	n/a	OSPAR Region I • North-east Faroe-Shetland Channel OSPAR Region II • Faroe-Shetland sponge belt • North-east Faroe-Shetland Channel OSPAR Region V • Rosemary Bank Seamount • South-west Sula Sgeir and Hebridean slope (option) • The Barra Fan and Hebrides Terrace Seamount • The Geikie Slide and Hebridean slope (option)	✓ *(not possible to replicate in Region I)*

[38] Yet to be included in the EUNIS classification

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