**Scottish MPA Project**

**Assessment against the MPA Selection Guidelines**

# FAROE-SHETLAND SPONGE BELT NATURE CONSERVATION MPA

*JULY 2014*

The following documents provide further information about the Faroe-Shetland Sponge Belt Marine Protected Area (MPA):

- Site Summary Document
- Data Confidence Assessment
- Management Options Paper

The documents are all available at www.jncc.defra.gov.uk/page-6479

| **Document Distribution List and Version Control** | | | | |
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## Background

This document provides details of JNCC's assessment of the Faroe-Shetland Sponge Belt Nature Conservation MPA (herein referred to as 'MPA') against the Scottish MPA Selection Guidelines. It presents an assessment for each of the protected features. We have used the terminology set out in the Selection Guidelines to describe the five main stages in the assessment process from the identification of MPA search locations through to an MPA.

*The main terms used are described below.*

MPA search feature - specified marine habitats, species and large-scale features which underpin the selection of Nature Conservation MPAs.

Geodiversity features - specified geodiversity interests of the Scottish seabed categorised under themed 'blocks' that are analogous to the MPA search features for biodiversity.

Protected feature - any feature (habitats, species, large-scale features and/or geodiversity features) which are specified in the MPA Designation Order.

MPA search location - this describes a location identified at stage 1 [of the Selection Guidelines] until it passes the assessment against stage 4.

Potential area for an MPA - if an MPA search location passes assessment against stage 4 it goes on to be considered at stage 5 as a potential area for an MPA.

Nature Conservation MPA – a location that has been approved by Ministers for designation.

Details of evidence supporting the designation of the Faroe-Shetland Sponge Belt MPA are provided in the Data Confidence Assessment document.

# FAROE-SHETLAND SPONGE BELT MPA - APPLICATION OF THE MPA SELECTION GUIDELINES

## Stage 1 - Identifying search locations that would address any significant gaps in the conservation of MPA search features

| | |
|---|---|
| **Summary of assessment** | **The MPA includes nine protected features: Deep sea sponge aggregations, ocean quahog aggregations, Atlantic and Arctic influenced slope offshore subtidal sand and gravel habitats, an area of the Faroe-Shetland Channel continental slope, and five geodiversity features representative of the West Shetland Margin paleo-depositional system and the West Shetland Margin Contourite Deposits Key Geodiversity Areas (Brooks *et al.,* 2013). Deep-sea sponge aggregations and ocean quahog aggregations are considered Threatened and/or Declining by the OSPAR Commission.**<br>**The Faroe-Shetland Channel slope more broadly is thought to have functional significance to the health and biodiversity of Scotland's seas in the way that it interacts with the five different water masses converging in the channel leading to enhanced vertical mixing and subsequently productivity in the area (Turrell *et al.,* 1999). This mixing serves to focus prey items (Pollock *et al.,* 2000, Weir *et al.,* 2001; Debes *et al.,* 2007) and may enhance foraging activity of top predators in the area. In addition, the Faroe-Shetland Channel is thought to be an important migratory pathway for cetaceans (Pollock *et al.,* 2000, Weir *et al.,* 2001, Swift *et al.* 2002, Macleod *et al.,* 2003, Reid *et al.,* 2003).**<br>**The geodiversity features representative of the West Shetland Margin paleo-depositional system Key Geodiversity Area form part of a system that was active during the last glacial period and considered representative examples of a distal, non-ice-contact glacial process transferring material from a former ice margin to a basinal depocentre. The geodiversity features representative of the West Shetland Margin Contourite Deposit Key Geodiversity Area form a complex of sandy bedforms that are unique to UK waters and have provided one of the first detailed studies of this scientifically important sedimentary facies. These deposits from previous interglacial periods also act as the failure plane for slides in offshore Scotland and Norway and therefore represent an important area for future studies (Brooks *et al.,* 2013).** |

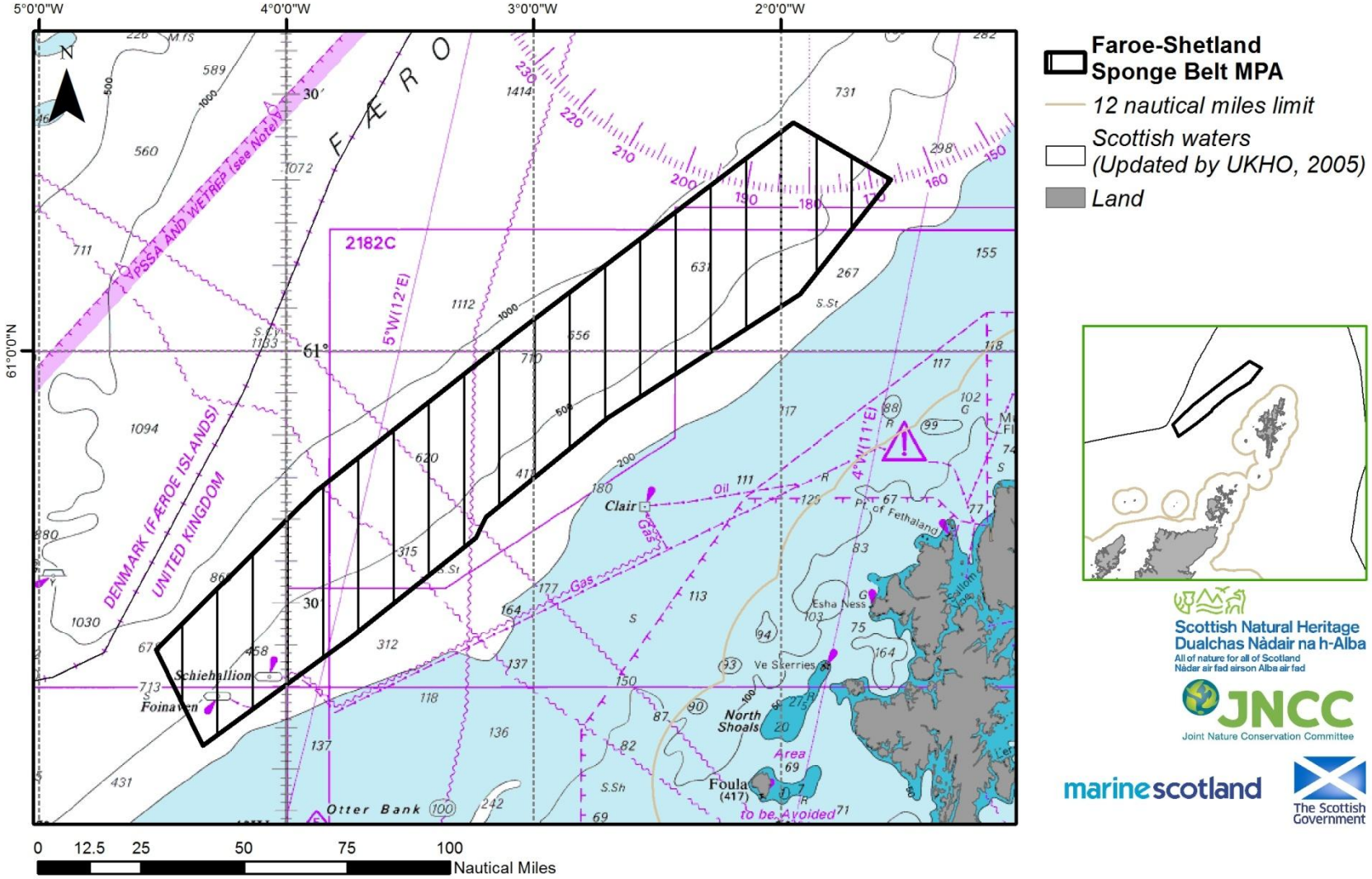
**Detailed assessment**

| **Protected features** | **Guideline 1a**<br>*Presence of key features*<br>[MPA search features and geodiversity equivalents] | **Guideline 1b**<br>*Presence of features under threat and/or subject to rapid decline* | **Guideline 1c**<br>*Functional significance for the overall health and diversity of Scottish seas* |
|---|---|---|---|
| *Biodiversity* | | | |
| Deep sea sponge aggregations | ✓ | ✓ **OSPAR T&D**[1] | |
| Ocean quahog aggregations | ✓ | ✓ **OSPAR T&D**[1] | |
| Offshore subtidal sands and gravels | ✓ | | |
| Continental slope | ✓ | | ✓ **hydrographic processes, foraging areas, migratory pathway** |

[1] OSPAR list of Threatened and/or Declining species and habitats (see OSPAR, 2008 a & b)

| *Geodiversity* | | | |
|---|---|---|---|
| Iceberg ploughmark fields and continental slope channels (Quaternary of Scotland) | ✓ | | **✓ settlement points for deep sea sponge aggregations** |
| Slide deposits (Submarine Mass Movement) | ✓ | | |
| Sediment wave fields and sand wave fields (Marine Geomorphology of the Scottish Deep Ocean Seabed) | ✓ | | |

## Map showing the location of the Faroe-Shetland Sponge Belt MPA

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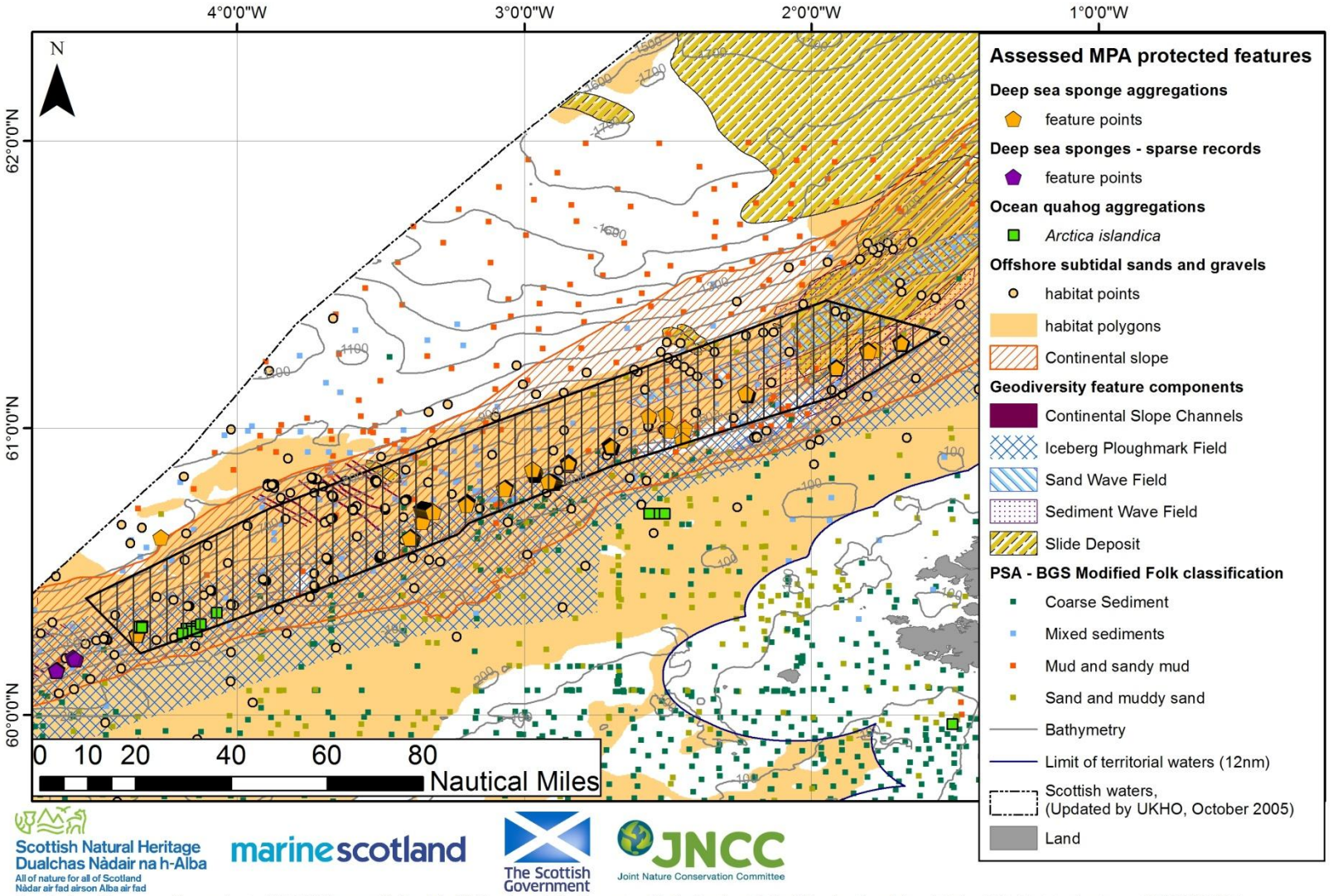
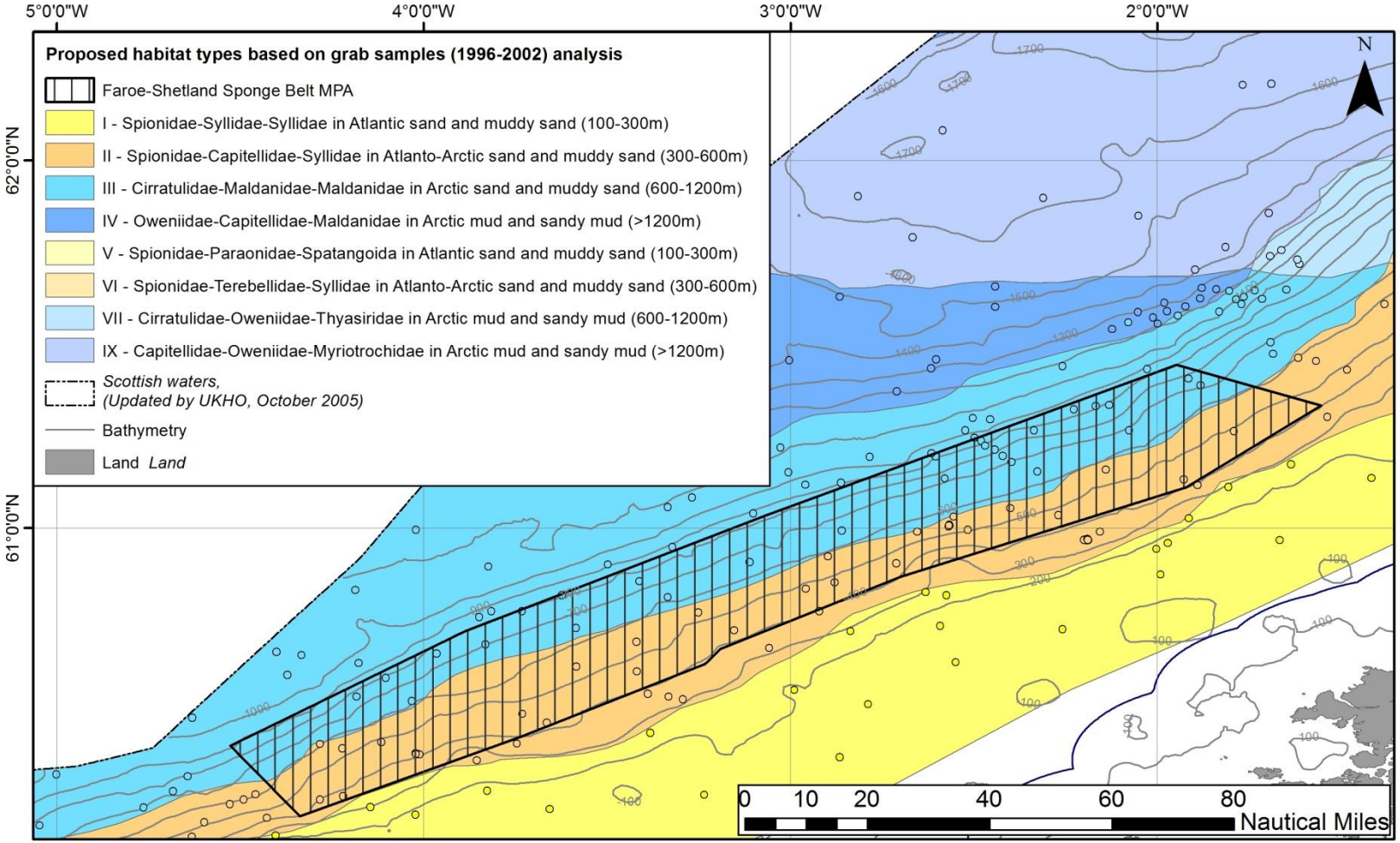
Map projected in Mercator (World) projection, geographic coordinate system WGS1984. The exact limits of the UK Continental Shelf are set out in the Continental Shelf (Designation of Areas) Order 2013, Statutory Instrument 2013/3162 (© Crown Copyright). Landmass, Ordnance Survey © Crown Copyright and database right 2011. All rights reserved. Scotland (Adjacent waters) Updated by the Law of the Sea Division, United Kingdom Hydrographic Office October 2005. MPA © JNCC and SNH, 2014. All rights reserved. Admiralty Chart © Crown Copyright, 2013. All rights reserved. License No. EK001-20130405.
NOT TO BE USED FOR NAVIGATION

**Map of the Faroe-Shetland Sponge Belt MPA showing the known distribution of protected features**




Map displayed in geographic coordinates WGS84.The exact limits of the UK Continental Shelf are set out in the Continental Shelf (Designation of Areas) Order 2013, Statutory Instrument 2013/3162 (© Crown Copyright). Scotland (Adjacent waters) Updated by the Law of the Sea Division, United Kingdom Hydrographic Office October 2005. Bathymetry © GEBCO, 2011. Bio data from Geodatabase of Marine features in Scotland (GeMS v4) © Crown copyright. MPA & geodiversity data © JNCC & SNH, 2014.

**Map of the Faroe-Shetland Sponge Belt MPA showing the distribution of proposed sedimentary biotopes as defined by Bett (2012)**

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## Stage 2 - Prioritisation of search locations according to the qualities of the MPA search features they contain

| | |
|---|---|
| **Summary of assessment** | The MPA contains combinations of protected features and there is evidence to suggest that the interaction between converging water masses and the sloping edges of the channel leads to the presence of environmental conditions suitable for the settlement of deep-sea sponge aggregations at a similar depth boundary as the intermediate water masses (400-600m) (Bett, 2001, Axelsson, 2003). There is general evidence to indicate that offshore subtidal sand and gravel habitats may be functionally linked with ocean quahog aggregations in the MPA based on what is known about habitat preferences of ocean quahog (Witbaard & Bergman, 2003; Sabatini & Pizzolla, 2008). As well as functional linkages between the protected features of the MPA, there is evidence that the unique conditions along the Faroe-Shetland Channel slope supports the health and biodiversity of Scotland's seas by enhancing overall productivity of the area. The records of deep-sea sponge aggregations conform to the boreal ostur variant of the habitat, with typical densities of sponges in line with the OSPAR Commission definition of the habitat (OSPAR, 2010). We therefore conclude that the deep-sea sponge aggregations have high natural biological diversity. All known verified records in this part of the Faroe-Shetland Channel fall within the MPA boundary and the habitat itself is thought to be persistent but the sponges themselves may exhibit seasonal changes and sporadic reproductive periods. We consider the MPA has a coherent example of deep-sea sponge aggregations. The MPA includes offshore subtidal sand and gravel habitats representative of those present in this part of the Faroe-Shetland Channel (Bett, 2012). We consider the MPA includes a coherent example of offshore subtidal sand and gravel habitats, but there is insufficient information available with which to compare levels of natural biological diversity between the MPA and areas beyond. The size of the MPA and the inclusion of sediment types suitable for ocean quahog colonisation means that the MPA may be considered to include a coherent, as opposed to a fragmented, example of the protected feature based on the extent of suitable habitat for ocean quahog colonisation. However, the extent of aggregations of the species within the site is uncertain.<br><br>There is no information on the condition of the protected features within the MPA, but information on their sensitivity to pressures associated with activities to which they are exposed suggest that all biodiversity protected features and the iceberg ploughmark fields geodiversity protected feature may have been modified by human activity. Within the MPA Region[2] there is considered to be a high risk of significant damage from human activities to deep-sea sponge aggregations and ocean quahog aggregations. For offshore subtidal sand and gravel habitats there is a range in the risk of being significantly damaged by human activity in the MPA Region. This variance in risk reflects the range in sensitivity shown by different types of this habitat to pressures associated with activities to which they are exposed. Iceberg ploughmark fields are considered to be at medium risk of damage and continental slope channels, slide deposits, sediment wave fields and sand wave fields at low risk of damage across Scotland's seas.<br><br>**Three of the five parts of the stage 2 guidelines have been met (2a, 2c and 2e). We are uncertain as to whether the 2b guideline has been met for offshore subtidal sands and gravels. The 2d guideline has not been met for the biodiversity protected features or the iceberg ploughmark fields geodiversity feature.** |

[2] North (Offshore) MPA Region as described in the Scottish MPA Selection Guidelines

| **Detailed assessment** | |
|---|---|
| **Guideline 2a** | **The search location contains combinations of features, rather than single isolated features, especially if those features are functionally linked** |

There are combinations of protected features within the MPA, with evidence to suggest that the deep-sea sponge aggregations and the continental slope may be functionally linked through the interaction between the continental slope and five different water masses converging in the Channel. This layering of water at different temperatures and densities, with its interaction with the sloping edges of the channel generates an area of deep water mixing between 350 and 650m known as the intermediate water masses (Sherwin, 1991). Here, enhanced current speeds with the availability of hard substrata (cobbles and boulders associated with iceberg ploughmark fields) in the deep water mixing zone provides ideal settlement conditions for deep-sea sponge aggregations, which are known to occur between 400 and 600m (Bett, 2001, Axelsson, 2003). This evidence further suggests that the geodiversity feature iceberg ploughmarks may be functionally linked with the deep-sea sponge aggregations by providing a point of settlement for the sponges of the feature, an observation made by Axelsson (2003). Ocean quahog is known to occur in a range of sediments from coarse clean sand to muddy sand in the infralittoral, circalittoral, circalittoral offshore and bathybenthic offshore environment in water depths of 4 to 400m (Witbaard & Bergman, 2003; Sabatini & Pizzolla, 2008). These preferred sediment types include those offshore subtidal sand and gravel habitats present within the MPA.

As well as functional linkages between the protected features of the MPA, there is general evidence to support the role of the Faroe-Shetland Channel slope in the health and biodiversity of Scotland's seas. The layering of water at different temperatures and densities in the channel permits internal wave formation, which are important in the provision of food to benthic invertebrates such as cold-water corals (Frederiken *et al*., 1992). More generally, the diversity and abundance of the species present has been shown to be linked with the mixing zone present at the intermediate water masses. Benthic fauna for instance show a maximum diversity and abundance at the intermediate water masses (Bett, 2000, 2001; Narayanaswamy *et al.,* 2005, 2010). The same phenomena are true for fish assemblages (Bullough *et al.,* 1998; Gordon, 2001). Dependent on depth, a wide range of sediment types may be present on the continental slope that provide suitable habitat for a range of benthic species. These habitats range from cobbles and boulders in shallower areas of the slope to finer sands and muds in deeper areas (Bett, 2000). The interaction between hydrographic processes and the continental slope may enhance feeding conditions through the aggregation of prey items (e.g. squid, herring, blue whiting and krill) for several species of cetacean, including sperm whale, minke whale, killer whale, fin whale, long-finned pilot whale and Atlantic white-sided dolphin (Macleod, 2004; Macleod *et al.,* 2006; Stone, 1988; Swift *et al*., 2002; Weir *et al.,* 2001). The topographic nature of the Faroe-Shetland Channel slope and wider channel is thought to have functional significance as a migratory pathway/corridor for several cetacean species. Of these, fin and sperm whales are the most regular users of the route based on the data available. These cetacean species seem to use the channel as a passage way to move through into colder, temperate waters to the north to feed in the early summer months, with some remaining in the channel (e.g. Macleod *et al,.* 2006) before travelling.

| **Guideline 2b** | **The search location contains example(s) of features with a high natural biological diversity (for habitats only)** |
|---|---|
| Deep sea sponge aggregations | There are clusters of records of deep sea sponges focussed between the 400 and 600m isobaths within the MPA. Records of deep-sea sponge aggregations within the MPA were derived from the Atlantic Frontier Environmental Network survey programme (1997), Strategic Environmental Assessment (SEA) surveys that took place in 2006 (Howell *et al.,* 2007, 2010) and the 2012 FRV Scotia survey (1512S) of the Wyville-Thomson Ridge Site of Community Importance (SCI) and the Faroe-Shetland Sponge Belt pMPA (Morris *et al.,* 2014).<br><br>The majority of the data from 1997 and 2006 have been verified as conforming to the habitat definition for deep-sea sponge aggregations as defined by the OSPAR commission (OSPAR, 2010). Specifically, the area is thought to represent the boreal 'ostur' variant of the habitat which comprises dense aggregations of desmosponges (Klitgaard *et al.,* 1997; Henry & Roberts, 2014). We consider deep-sea sponge aggregations to be of high natural biological diversity within the MPA. |
| Offshore subtidal sands and gravels | Information for offshore subtidal sand and gravel habitats within the MPA has been drawn from National Oceanography Centre biotope analysis of data points collected during the SEA4 surveys (Bett, 2012). Infaunal analysis of data from surveys conducted between 1996 and 2002 across the whole Faroe-Shetland Channel area resulted in the identification of eight primary biotopes (Bett, 2012). These biotopes are distinguished by their underlying substrate, the depth at which they are found and their characterising infaunal species. Five of these biotopes are sand and gravel-based habitats.<br><br>The Faroe-Shetland Sponge Belt MPA includes examples of two of the five offshore subtidal sand and gravel based primary biotopes identified by Bett (2012), but reflect all the offshore subtidal sand and gravel biotopes found in this part of the Faroe-Shetland Channel:<br><br>• *Spionidae-Capitellidae-Syllidae in Atlanto-Arctic sand and muddy sand (300-600m)*, which is distinguished from the other biotopes by the abundance of Syllidae, and<br>• *Cirratulidae-Maldanidae-Maldanidae in Arctic sand and muddy sand (600-1200m)*, which is distinguished from the other biotopes by the abundance of Maldanidae.<br><br>The Faroe-Shetland Sponge Belt MPA, in combination with the North-east Faroe-Shetland Channel MPA, are considered to represent the range of natural biological diversity associated with the sand and gravel habitats of the whole Faroe-Shetland Channel. Overall, JNCC recognise there is insufficient information to conduct a comparative assessment on the natural levels of biological diversity for these habitat types and thus it is not possible to conclude whether or not offshore subtidal sands and gravels meet the stage 2b guideline. |

| **Guideline 2c** | **The search location contains coherent examples of features, rather than smaller, potentially more fragmented ones** |
|---|---|
| Deep sea sponge aggregations | There is little information pertaining to the typical levels of fragmentation of the protected feature; however, sponges from the class Hexactinellida have been reported at densities of 4-5$m^{-2}$, whilst 'massive' growth forms of sponges from class Demospongia have been reported at densities of 0.5-1$m^{-2}$ (OSPAR, 2008a). Records present within the MPA are considered to conform to these densities (Henry & Roberts, 2014) and all records verified with high or medium confidence within this part of the Faroe-Shetland Channel have been included within the MPA boundary. The MPA is assessed as being of the appropriate size to support the protected feature as the larval phase of many sponge species is thought to be short lived (Konnecker, 2002), with high settlement observed close to adult sponges (Maldonado & Riesgo, 2008; Nichols & Barnes, 2005). Evidence suggests that the dominant species associated with this habitat type are slow growing and may take several decades to reach sizes which are commonly encountered (Klitgaard & Tendal, 2004) and that sponge aggregations can persist for a long time in the absence of disturbance (Hill *et al*., 2010). Hexactinellid sponges may experience seasonality which influences their growth rate and perhaps reproductive period (Leys & Lauzon, 1998). Overall, we consider that the MPA includes a coherent as opposed to a fragmented example of the deep-sea sponge aggregations habitat. |
| Ocean quahog aggregations | Ocean quahog are typically found below the surface of medium- to fine-grained sand, sandy mud and silty-sand (Sabatini & Pizzolla, 2008) and in water depths of 4 to over 400m (Witbaard & Bergman, 2003). Survey data from the MPA confirm that ocean quahog are present within the depth range and sediment types in which they are expected to occur. We consider that with the size of the MPA large areas of the sediment types suitable for ocean quahog colonisation could support a coherent example of the protected feature. However, the extent to which aggregations of the species are actually present is uncertain. |
| Offshore subtidal sands and gravels | Analysis of infaunal sampling data from surveys conducted between 1996 and 2002 across the whole Faroe-Shetland Channel area resulted in the identification of eight primary biotopes (Bett, 2012). The Faroe-Shetland Sponge Belt MPA represents the biotopes identified in this part of the Faroe-Shetland Channel, with habitat maps indicating extensive areas of offshore subtidal sands and gravels. Overall, we consider that offshore subtidal sand and gravel habitats in the MPA are likely to be a coherent example of the habitat. |
| Continental slope | There is general evidence to support the role of the Faroe-Shetland Channel slope in supporting the health and biodiversity of Scotland's seas. The layering of water at different temperatures and densities in the channel allows internal waves to form, which are important in the provision of food to benthic invertebrates such as cold-water corals (Frederiken *et al*., 1992). The diversity and abundance of species present has been linked to the presence of the mixing zone at the intermediate water masses. For example, benthic fauna show a diversity and abundance maximum at the intermediate water masses (Bett, 2000, 2001, Narayanaswamy *et al.,* 2005, 2010). The same is true for fish assemblages (Bullough *et al.,* 1998; Gordon, 2001). Dependent on depth, a range of sediment types may be present on the continental slope, from cobbles and boulders in shallower areas of the slope to finer-grained sands and muds in deeper areas (Bett, 2000), providing habitat for a range of benthic species. The interaction between hydrographic processes and the continental slope may enhance feeding conditions through the aggregation of principle prey items (e.g. squid, herring, blue whiting and krill) for several species of cetacean, including sperm whale, minke whale, killer whale, fin whale, long-finned pilot whale and Atlantic white-sided dolphin (Macleod, 2004; Macleod *et al.,* 2006, Stone, 1988; Swift *et al*., 2002; Weir *et al.,* 2001). The topography of the Faroe-Shetland Channel slope and wider channel is thought to be of functional significance as a migratory pathway/corridor for several cetacean species. Of these, based on the data available, fin and sperm whales are the most regular users of the route. These cetacean species seem to use the channel as a passageway to move through into colder, temperate waters to the north to feed in the early summer months whilst some remain in the channel (e.g. Macleod *et al.,* 2006) before |

| Guideline 2c | The search location contains coherent examples of features, rather than smaller, potentially more fragmented ones |
|---|---|
| | travelling. |

| Guideline 2d | The search location contains features considered least damaged / more natural, rather than those heavily modified by human activity[3] |
|---|---|
| Deep sea sponge aggregations | There is no information on the ecological condition of deep-sea sponge aggregations within the MPA. Consequently, the possible condition of this protected feature has been inferred from information on exposure to activities associated with those pressures to which it is considered to be sensitive (Marine Scotland, 2013). Rasterised Vessel Monitoring System (VMS) data from fishing vessels from 2006-2009, which have a coarse resolution, VMS point data from 2009-2011, and pipeline and telecommunications cable information sourced from UK DEAL and UK SubSea Cables, indicates that almost all records of the feature are exposed to activities (otter trawling and set netting, and to a lesser extent pipeline and telecommunications cables) linked to pressures to which the feature has a high sensitivity. Consequently, there is a risk that deep sea sponge aggregations may have been modified by human activity. |
| Ocean quahog aggregations | There is no information on the ecological condition of ocean quahog aggregations within the MPA. Consequently, the possible condition of the protected feature has been inferred from information on exposure to activities associated with pressures to which the feature is considered to be sensitive (Marine Scotland, 2013). Rasterised Vessel Monitoring System (VMS) data from fishing vessels from 2006-2009, which have a coarse resolution, VMS point data from 2009-2011, and oil and gas industry activity information sourced from UK DEAL indicates that all survey stations where ocean quahog have been recorded, and approximately half of the habitat where ocean quahog could be present are exposed to activities (otter trawling and oil and gas activity) linked to pressures to which the feature has a high to medium sensitivity. Consequently, there is a risk that ocean quahog aggregations may have been modified by human activity. |
| Offshore subtidal sands and gravels | There is no information on the ecological condition of offshore subtidal sand and gravel habitats within the MPA. Consequently, the possible condition of the proposed protected feature has been inferred from information on exposure to activities associated with pressures to which the feature is considered to be sensitive (Marine Scotland, 2013). Rasterised Vessel Monitoring System (VMS) data from fishing vessels from 2006-2009, which have a coarse resolution, VMS point data from 2009-2011, and pipeline and telecommunications cable information sourced from UK DEAL and UK SubSea Cables, indicates that approximately a third of ground-truthed data points are exposed to activities (otter trawling and set netting, and to a lesser extent pipeline and telecommunications cables) linked to pressures to which the feature has a sensitivity ranging from not sensitive to highly sensitive. This range of sensitivity varies according to the energy regime (high to low energy) that creates local sub-types of offshore subtidal sands and gravels. Hydrographic studies of the area (e.g. Sherwin, 1991) suggest relatively high energy levels at the seabed that suggest a likely sensitivity at the lower range for the feature, but given the range in sensitivity the ecological significance of such modification is uncertain. |

[3] The Least damaged/more natural stage 2d assessment considers protected feature exposure to activities associated with pressures to which the features are sensitive. This is distinct from the work outlined in Chaniotis *et al.* (2011), which mapped available activities data at the scale of Scotland's seas to identify broad areas of low/no activity from which to identify MPA search locations in the initial phase of the MPA selection process. Unlike the stage 2d assessment Chaniotis *et al.* (2011) did not consider the location of features or their sensitivity to pressures.

| **Guideline 2d** | **The search location contains features considered least damaged / more natural, rather than those heavily modified by human activity[3]** |
|---|---|
| Iceberg ploughmark fields, continental slope channels, slide deposits, sediment wave fields, sand wave fields | There is no information on the condition of the geodiversity protected features representative of the West Shetland Margin paleo-depositional system and the West Shetland Margin Contourite Deposit Key Geodiversity Areas within the MPA. Consequently, the possible condition of the protected features has been inferred from information on exposure to activities associated with pressures to which the features are considered to be sensitive (Brooks, 2013). Rasterised Vessel Monitoring System (VMS) data from fishing vessels from 2006-2009, which have a coarse resolution, VMS point data from 2009-2011, and pipeline and telecommunications cable information sourced from UK DEAL and UK SubSea Cables indicates that approximately three quarters of the extent of iceberg ploughmarks, approximately half the extent of the sediment wave fields, approximately a quarter of the extent of the slide deposit feature, and less than ten percent of the extent of sand wave fields are exposed to activities associated with pressures to which the features have a medium sensitivity. About a quarter of the extent of the continental slope channels are exposed to activities associated with pressures to which the feature has a low sensitivity.<br><br>Sediment and sand wave fields represent features under the Marine Geomorphology of the Deep Ocean Seabed Geodiversity Block (Brooks *et al.,* 2013). These features are predominantly formed by the action of deep ocean currents. As long as current patterns and flow rates are maintained, these features are likely to be maintained over time even if subject to physical disturbance. There is no evidence to suggest a change in deep-water current patterns or flow rates within the MPA and so we consider these features are unlikely to have been significantly modified by human activity. For the slide deposit feature and continental slope channels, we consider that the degree of exposure to activities to which they are sensitive or the level of sensitivity of the features to pressures associated with activities is not significant and therefore these features are unlikely to have been significantly modified by human activity. However, we consider that the iceberg ploughmarks geodiversity feature may have been modified by human activity. |

| **Guideline 2e** | **The search location contains features considered to be at risk[4] of significant damage by human activity** |
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| Deep sea sponge aggregations | The protected feature is considered to be at high risk in the MPA Region (Chaniotis *et al.,* 2014). This risk is primarily driven by the pressures associated with otter trawling and set (fixed) netting. |
| Ocean quahog aggregations | The protected feature is considered to be at high risk in the MPA Region (Chaniotis *et al.,* 2014). This risk is primarily driven by the pressures associated with extraction for oil and gas, installation of marine infrastructure, otter trawling and scallop dredging. |
| Offshore subtidal sands and gravels | The protected feature is considered to have a low to high risk of damage in the MPA Region (Chaniotis *et al.,* 2014). This range in risk is due to the range in sensitivity of the different sub-types of offshore subtidal sand and gravel habitats to the pressures associated with activities to which they are exposed. Sensitivity of the different sub-types of offshore subtidal sand and gravel habitats depends on the biological communities present in the habitat. This risk is primarily associated with bottom-contact fishing activity and the installation and maintenance of marine infrastructure. |

[4] Information on the sensitivity of the biodiversity protected features to pressures and their associated activities was taken from Marine Scotland (2013). The degree to which a feature is exposed to activities associated with pressures to which it is sensitive in each MPA Region (as defined in the Scottish MPA Selection Guidelines) was assessed to provide a qualitative measure of the risk of damage. Risk assessments for the various activities were examined to produce an overall qualitative risk assessment by MPA Region. The conclusions do not reflect the level of risk at the scale of the MPA. The sensitivity of the geodiversity protected features to pressures and their associated activities was taken from Brooks (2013) and an assessment of risk was undertaken at the national level.

| **Guideline 2e** | **The search location contains features considered to be at risk[4] of significant damage by human activity** |
|---|---|
| Iceberg ploughmark fields, continental slope channels, slide deposits, sediment wave fields, sand wave fields | Iceberg ploughmark fields are considered to be at medium risk of damage across Scotland's seas (Brooks, 2013). This risk is primarily driven by the pressures associated with otter trawling. Continental slope channels, slide deposits, sediment wave fields and sand wave fields are considered to be at low risk of damage across Scotland's seas. This risk is primarily driven by the pressures associated with otter trawling. |

## Stage 3 - Assessment of the appropriate scale of the search location in relation to the search features it contains

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| **Summary of assessment** | **The MPA boundary reflects the full extent of records of deep-sea sponge aggregations on the slope in this part of the Faroe-Shetland Channel and includes the depth band at which the habitat is likely to occur. It also represents the diversity associated with the offshore subtidal sand and gravel habitats in this part of the Faroe-Shetland Channel, the distribution of survey records of ocean quahog, and the inclusion of suitable sediments for colonisation by ocean quahog.** |

| **Detailed assessment** | |
|---|---|
| **The size of the search location should be adapted where necessary to ensure it is suitable for maintaining the integrity of the features for which the MPA is being considered. Account should also be taken where relevant of the need for effective management of relevant activities** | |
| Deep sea sponge aggregations | The MPA boundary encompasses all ground-truthed records of deep sea sponge aggregations in this part of the Faroe-Shetland Channel. The isobaths used to draw the MPA boundary encompass the 400-600m depth band where deep sea sponge aggregations are typically recorded in the wider Faroe-Shetland Channel (Axxelson, 2003; Howell *et al.,* 2007). |
| Ocean quahog aggregations | The MPA boundary encompasses the locations where ocean quahog has been recorded in this part of the Faroe-Shetland Channel. The delineation of the boundary also focussed on the inclusion of viable examples of offshore subtidal sand and gravel habitats that are considered the appropriate type to support ocean quahog aggregations (Sabatini & Pizzolla, 2008). |
| Offshore subtidal sands and gravels | The MPA boundary captures the variation in benthic biological diversity with depth highlighted by Bett (2012). The 400-800m depth band used for the boundary largely reflects the range of hydrographic conditions within the Faroe-Shetland Channel, including the warm North-east Atlantic waters at depths <300m, to the high dynamic and varied water masses at 300-600m, to the Arctic waters where temperatures can be sub-zero at >600m. It also encompasses the benthic diversity and abundance maximum present at the intermediate water masses between 400 and 700m (Bett, 2000, 2001; Narayanaswamy *et al.,* 2005, 2010). |
| Geodiversity features | Geodiversity features were not used to refine the size and shape of the MPA, but the boundary does encompass geodiversity features representative of the West Shetland Margin paleo-depositional system and the West Shetland Margin Contourite Deposits Key Geodiversity Areas (Brooks *et al.,* 2013). |

## Stage 4 - Assessing the potential effectiveness of managing features within a search location as part of a Nature Conservation MPA

| | |
|---|---|
| **Summary of assessment** | **Mechanisms exist through the EU Common Fisheries Policy to introduce spatial and/or temporal fisheries management measures to conserve the protected features of the MPA. For licensed activities, JNCC consider any potential impacts could be addressed through the Environmental Impact Assessment (EIA) process. There is therefore potential for management measures to be implemented successfully so the protected features may achieve their conservation objectives in the MPA.** |

### Detailed assessment

**There is a high probability that management measures, and the ability to implement them, will deliver the objectives of the MPA**

The conservation objectives of the protected features are to 'conserve – feature condition uncertain' within the MPA. This uncertainty is a consequence of the lack of direct evidence currently available to confirm the features' condition. We consider that the biodiversity protected features and the iceberg ploughmark fields geodiversity protected feature may have been modified by human activity (see 2d), but that there is potential for these features to be conserved.

Mechanisms exist through the EU Common Fisheries Policy to introduce spatial and/or temporal fisheries measures to conserve the full range of features within the MPA. For licensed activities, JNCC consider any potential impacts could be addressed through the Environmental Impact Assessment (EIA) process. There is therefore potential for management measures to be implemented successfully to achieve the conservation objectives of the protected features of the MPA.

Further discussion concerning management of the protected features of the MPA is provided in the Faroe-Shetland Sponge Belt Management Options Paper.

## Stage 5 - Assessment of the contribution of the potential area to the MPA network

| | |
|---|---|
| **Summary of assessment** | **The MPA makes a contribution to the MPA network for the boreal ostur variant of deep-sea sponge aggregations in OSPAR Region II in Scotland's seas – the only region where this type of the feature has been recorded in Scotland's seas. It also makes a contribution to the protection of ocean quahog (an OSPAR Threatened and Declining species) at the northern extent of its range in OSPAR Region II for Scotland's seas, and Atlantic and Arctic influenced slope offshore subtidal sands and gravel habitats in OSPAR Region II. The MPA also makes a contribution to a number of key geodiversity features.** |

**Detailed assessment**

**The potential area contributes significantly to the coherence of the MPA network in the seas around Scotland**

***Assessment of biodiversity features***

| Feature | Summary |
|---|---|
| Deep sea sponge aggregations | The MPA provides representation for the boreal ostur variant of deep sea sponge aggregations in OSPAR Region II – the only region where this type of the feature has been recorded in Scotland's seas. As an OSPAR Threatened and/or Declining species, it is considered important to have greater replication for the feature on the grounds of increasing resilience against the risk of damage. The MPA makes a contribution to one of at least three recommended areas for deep sea sponge aggregations in the MPA network and a different ecological type of the habitat in comparison to other examples present in OSPAR Region V. Further information is provided in the deep sea sponge aggregations adequacy assessment (SNH and JNCC, 2014). |
| Ocean quahog aggregations | The MPA provides representation for ocean quahog aggregations in OSPAR Region II. As an OSPAR Threatened and/or Declining species in OSPAR Region II, it is considered important to have greater replication for the feature on the grounds of increasing resilience against the risk of damage. The MPA makes a contribution to one of at least three recommended areas for ocean quahog aggregations and at the northern extent of its range in OSPAR Region II. Further information is provided in the ocean quahog aggregations adequacy assessment (SNH and JNCC, 2014). |
| Offshore subtidal sands and gravels | The MPA provides representation for Atlantic and Arctic influenced slope offshore subtidal sands and gravel habitats in OSPAR Region II, It represents one of two recommended examples of the feature to be protected in OSPAR Region II. Further information is provided in the offshore subtidal sands and gravels adequacy assessment (SNH and JNCC, 2014). |
| Continental slope | The MPA provides representation for one of two recommended areas of the Scottish continental slope to be included within the MPA network. The Faroe-Shetland Channel slope is considered ecologically and hydrographically distinct to the Hebridean slope and so meets the recommendation for at least one example of each area of the slope to be included within the network. Further information is provided in the continental slope adequacy assessment (SNH and JNCC, 2014). |

| ***Assessment of geodiversity features*** | |
|---|---|
| Geodiversity features[5] | The MPA includes a number of geodiversity features representative of the West Shetland Margin paleo-depositional system Key Geodiversity Area. They form part of a palaeo-depositional system that was active during the last glacial period and are representative of a distal, non-ice-contact glacial process transferring material from a former ice margin to a basinal depocentre (Brooks *et al.,* 2013).<br><br>The MPA also includes geodiversity features representative of the West Shetland Margin Contourite Deposits Key Geodiversity Area. The contourite deposits to the west of Shetland together form a complex of sandy bedforms that are unique to UK waters and have provided one of the first detailed studies of this scientifically important sedimentary facies. These deposits from previous interglacial periods also act as the failure plane for slides offshore Scotland and Norway and therefore represent an important area for future studies (Brooks *et al.,* 2013). |

[5] For geodiversity the stage 5 assessment primarily considers the contribution of the MPAs to the principal 'networks' of marine geodiversity interests present in Scottish waters (representation). The MPA Selection Guidelines propose that there should be minimal duplication of geodiversity features at a national level.

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