Joint Nature Conservation Committee

Scottish MPA Project

Data Confidence Assessments

NORTH-EAST FAROE-SHETLAND CHANNEL NATURE CONSERVATION MPA

JULY 2014

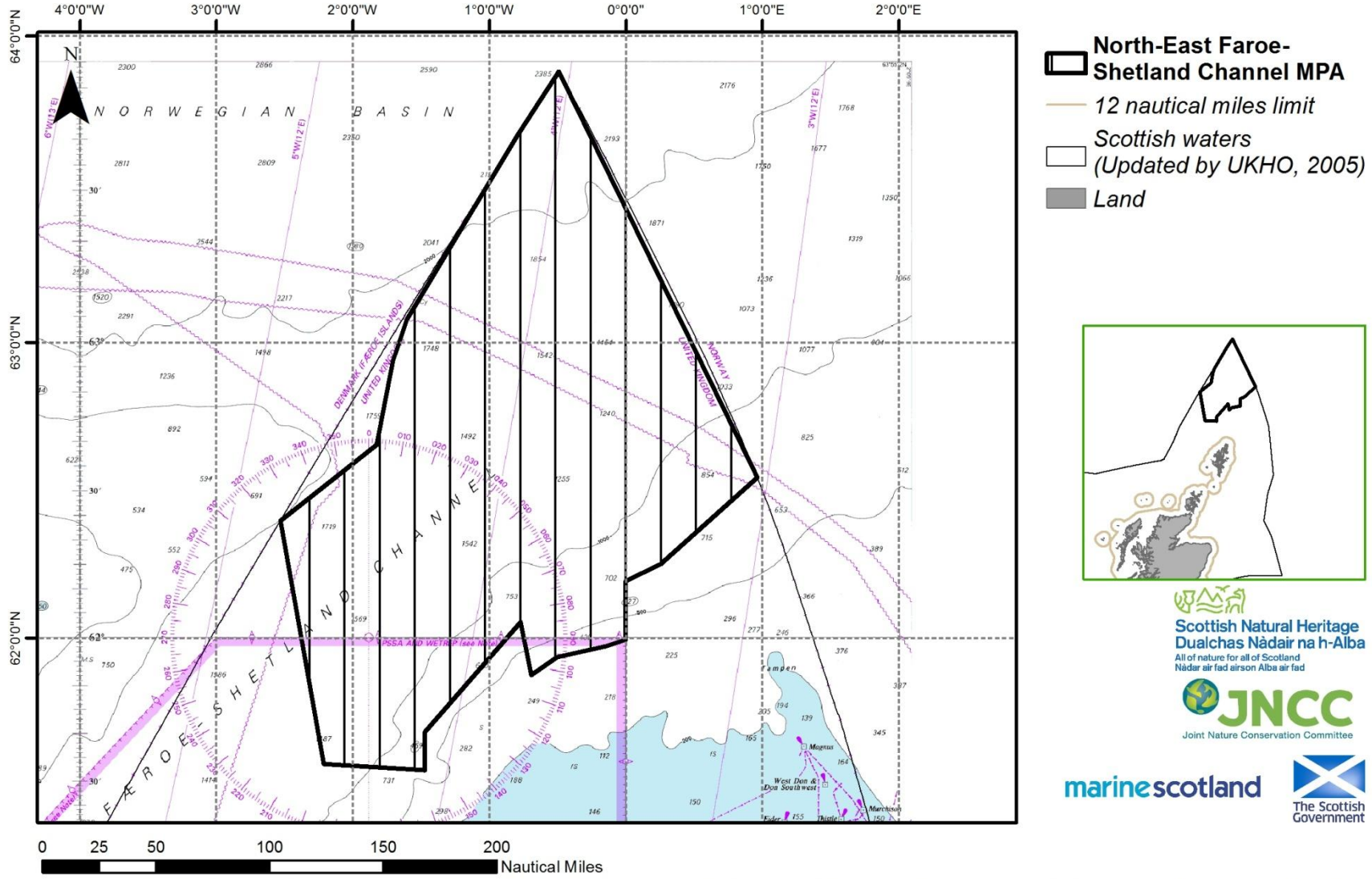
The following documents provide further information about the North-east Faroe-Shetland Channel Marine Protected Area (MPA):

- Site Summary Document
- Detailed assessment against the MPA Selection Guidelines
- Management Options Paper

The documents are all available at www.jncc.defra.gov.uk/page-6483

Document Distribution List and Version Control				
Format	**Version**	**Issue date**	**Version development and review**	**Issued to**
Electronic	2.0	11/04/2013	Internal drafting and review of pre-version 2.0 drafts by JNCC SMPA team and Grade 7 staff and editorial review prior to release to MPA Sub Group	MPA Sub Group
Electronic	3.0	10/06/2013	Review of document to take into account MPA Sub-Group comments by JNCC SMPA team prior to release to MPA Sub Group for sign-off	MPA Sub Group
Electronic	4.0	12/07/2013	Review of document to take into account MPA Sub-Group comments by JNCC SMPA team and editorial review before release of document for public consultation.	Uploaded to JNCC website
Electronic	5.0	17/07/2014	Document update to align with designation status and text revised in response to consultation and independent review report	Delivery to Marine Scotland to support MPA designation and upload to JNCC website

Figure 1 Map of the North-East Faroe-Shetland Channel MPA



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

MPA name	North-East Faroe-Shetland Channel	**Date of initial assessment**	31th July 2012	**Assessors**	ALR, NC, PC, ML, OCA
The North-East Faroe-Shetland Channel MPA is recommended for the protection of deep-sea sponge aggregations, Atlantic and Arctic influenced offshore subtidal sands and gravels on the slope and off the shelf, Arctic influenced offshore deep sea muds on the slope and off the shelf, and an area of the continental slope. The MPA also includes geodiversity features representing the North Sea Fan, Miller Slide, West Shetland Margin Contourite Deposits and the Pilot Whale Diapirs Key Geodiversity Areas (Brooks *et al.,* 2013). The area was selected following consideration of Least Damaged/More Natural locations (Faroe-Shetland Channel) as detailed in Chaniotis *et al.* (2011).					

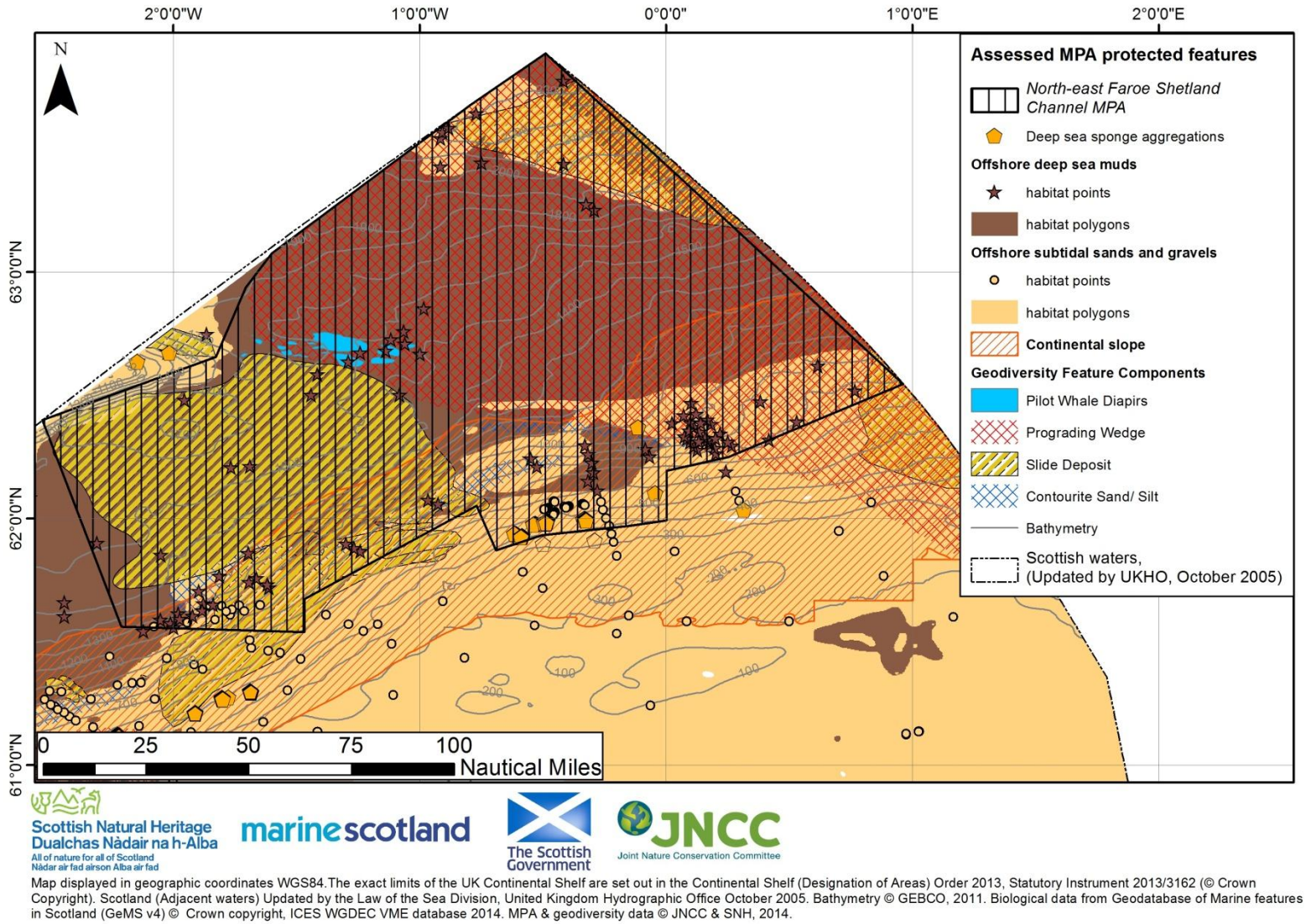
Protected features			
Biodiversity	Atlantic and Arctic influenced offshore subtidal sands and gravels (OSSG) on the slope and off-shelf Arctic influenced offshore deep-sea muds (ODSM) on the slope and off-shelf Deep-sea sponge aggregations (DSSA) Continental slope (CS)	**Geodiversity**	Overlaps with Key Geodiversity Areas – Prograding wedges from the Quaternary of Scotland Block Slide deposits from the Submarine Mass Movement Block Contourite sand/silt from the Marine Geomorphology of the Scottish Deep Ocean Seabed Block Mud diapirs from the Cenozoic Structures of the Atlantic Margin Block (Brooks *et al.,* 2013)
Feature exclusions (MPA search features recorded within the MPA but excluded from the assessment with reasons)			
None			

Data used in assessment			
Version of GeMS holding feature data used to support site selection	Ver.4	**Other datasets used** (not in GeMS) [superscripts are used to reference these datasets in the following discussion]	• [1]British Geological Survey (BGS) Marine Particle Size Analysis (PSA) dataset (February 2012) - data collected between 1967 and 1987 categorised according to the Folk classification and subsequently to the EUNIS habitat classification by JNCC based on the BGS modified Folk scheme • [2]Multibeam data collected during the 2006 MV Franklin Strategic Environmental Assessment (SEA) – Special Area of Conservation (SAC) survey • [3]Multibeam data collected during the 2002 Kommandor Jack Strategic Environmental Assessment (SEA) survey, Leg 1. (Masson and Le Bas, 2002), • [4]British Geological Survey (BGS) interpretation of seabed sediments from multibeam/backscatter data (2006 MV Franklin SEA-SAC survey) • [5]International Council for the Exploration of the Sea (ICES)/Northeast Atlantic Fisheries Organisation (NAFO) Joint Working Group on Deep-water Ecology – Vulnerable Marine Ecosystems (VME) database (2014) – Marine Scotland Science (MSS) trawl by-catch data – indicators of VMEs. • [6]EuSeaMap predictive habitat modelling project habitat map (Cameron and Askew, 2011)

Summary of data confidence assessment (see detailed assessment on following pages)						
Confident in underpinning data		**Yes**	✓	**Partial**	-	**No**	-
Confident in presence of identified features?	✓ all features	**Data suitable to define extent of individual MPA protected features**		**Yes**	**Partial**	**No**
				-	OSSG ODSM DSSA CS	-

Summary of data confidence assessment (see detailed assessment on following pages)	
Summary	The habitat maps produced through the predictive habitat modelling projects UKSeaMap 2010 (McBreen *et al.,* 2011) and EUSeaMap (Cameron and Askew, 2011) used in this assessment show that within the North-East Faroe-Shetland Channel MPA offshore deep-sea mud habitat extends in a south-west to north-east band and roughly follows the base of the continental slope. In some areas the mud habitats extend onto the slope. The habitat map predicts that offshore subtidal sands and gravel habitats occur on the continental slope and extend onto the bathyal area in some places. Further offshore, subtidal sands and gravels occur in patches on the northern edge of the MPA boundary. Multiple survey data points (Bett, 2012) within the MPA, collected between 1996 and 2006, confirm the presence of offshore subtidal sands and gravels and offshore deep-sea muds within the predicted boundaries for these features and on both the continental slope and bathyal area. There are a number of data points that do not conform to the predicted distribution of habitats in some areas. These inconsistencies occur relatively close to the predicted boundary between these two habitats and probably reflect some uncertainty in the location of the boundary, or a patchy habitat distribution (see Cameron and Askew (2011) for further discussion on confidence in determining habitat boundaries). There is some overlap between the point data for offshore deep-sea mud (which lie mainly at the base of the slope and on the bathyal area) and the predicted area of offshore subtidal sands and gravels (predominantly on the slope). JNCC have greater confidence that these point data offer a more reliable indication of the extent of these features. In summary we can be confident in the presence as well as in the general extent of these features within the MPA. JNCC have high confidence in the presence of deep-sea sponge aggregations based on multiple survey records collected in 2006 and 2011. Henry & Roberts (2014) confirm the presence of the boreal ostur type of deep-sea sponge aggregation habitat within the MPA with predominantly high confidence (one record has medium confidence based on a lack of supporting data on associated biological diversity). The shape of the boundary for this MPA was designed to ensure the range and diversity of habitat and biological community variation described by Bett (2012) were well represented for this part of the Faroe-Shetland Channel. It was also developed to include the distribution of deep-sea sponge aggregations in this part of the Faroe-Shetland Channel that have been verified with high or medium confidence (Howell *et al.,* 2010; Henry & Roberts, 2014) and includes the International Council for Exploration of the Sea Working Group on Deep-water Ecology (ICES, 2013) recommended closure for these features (Vulnerable Marine Ecosystems). The MPA boundary captures the wide range of key geodiversity features present within the Faroe-Shetland Channel (Brooks *et al.,* 2013).

Figure 2 Map of the known distribution of protected features within the North-East Faroe-Shetland Channel MPA[1]



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. Biological data from Geodatabase of Marine features in Scotland (GeMS v4) © Crown copyright, ICES WGDEC VME database 2014. MPA & geodiversity data © JNCC & SNH, 2014.

[1] **Note that the DSSA records to the south-west of the MPA are represented in the Faroe-Shetland sponge belt MPA**

Data confidence assessment	JNCC's assessment of data confidence considered the age and source of the data, the type of sampling methodologies used and the overall coverage of data across the MPA

Age of data (Map A)			
Multiple or majority of records collected post 2000	DSSA OSSG ODSM CS	**Multiple records collected pre 2000**	ODSM DSSA
Comments	The majority of data for offshore subtidal sands and gravels and offshore deep-sea muds were collected between 1996 and 2002, with some samples collected in 2006. The BGS sediment type dataset[1] of PSA samples collected between 1978 and 1986 provide further data for the presence and distribution of offshore subtidal sands and gravels and offshore deep-sea muds (Maps A – C). However the dataset extends north only as far as the 62° parallel of latitude, which cuts across the MPA in the south-west. The majority of data for deep-sea sponge aggregations are available from 2006 and 2011[5]. There is an isolated record from a survey conducted in 1999. The polygon for the continental slope was digitised by experts from the National Oceanography Centre (NOC) in 2009.		

Source of data (Map B)					
Targeted data collection for nature conservation purposes	✓	**Statutory monitoring (marine licensing etc.)**	✓	**Fisheries survey work**	✓
Data collection associated with development proposals (EIA etc.)	✓	**Recreational / volunteer data collection**	-	**Other** (specify) – BGS PSA data, UKSeaMap 2010 & EUSeaMap	✓
Comments	The majority of data for deep-sea sponge aggregations were generated through the analysis by Plymouth University of video and still image data collected on the MV Franklin SEA survey in 2006 (Howell *et al.,* 2010). The MPA encompasses these data. The easterly point in the MPA is a 2011 trawl by-catch record from an MSS survey (SCO_0411S)[5]. There is an isolated record situated further down the slope from the rest originating from the SEA 'White Zone' Environmental Survey (OSPAR habitat database, 2014). Confidence in the degree to which deep-sea sponge records constitute deep-sea sponge aggregations as per the OSPAR description for the habitat was undertaken by Heriott-Watt University (Henry & Roberts, 2014). Evidence for the presence and extent of offshore deep-sea muds and offshore subtidal sands and gravels comes from the predictive seabed modelling project UKSeaMap 2010 (McBreen *et al.,* 2011). JNCC cross-checked this against EUSeaMap, which supersedes UKSeaMap 2010, and verified that the same components and extents of EUNIS Level 3 habitat types are predicted to be present within the site boundary (Cameron and Askew, 2011). Ground-truthing data for offshore subtidal sands and gravels and offshore deep-sea muds were collected on a number of different surveys carried out in the SEA4 area between 1996 and 2002. Biotope identification and characterisation of these data was undertaken by NOC (Bett, 2012). The first two surveys (1996 and 1998) were undertaken on behalf of AFEN (Atlantic Frontier Environmental Network), a consortium of oil companies, UK government environmental advisers (JNCC, Fisheries Research Services (Now Marine Scotland Science (MSS)) and the UK Department for Trade and Industry [DTI (offshore programme of work now under DECC)]. A further three surveys (1999, 2000, 2002) were carried out as part of DECC's SEA process of which data from 2000 and 2002 lie within the MPA. Feature data were also generated through the analysis of the video and stills images collected on the 2006 SEA survey on the MV Franklin undertaken by the University of Plymouth (UoP). Linked to this data collection was the expert interpretation by BGS of the multibeam and backscatter data also collected on this survey to derive updated seabed substrate information[4] for a relatively small area of the MPA. PSA data were sourced from BGS[1]. However the dataset extends north only as far as the 62° parallel of latitude, which cuts across the MPA in the south-west (Maps A – C). The polygon for the continental slope was digitised by experts from the NOC as part of work completed for Defra in support of the national MPA projects to further a deep-sea habitat classification scheme (Jacobs & Porritt 2009). The feature was digitised through the analysis of the GEBCO digital atlas (**http://www.gebco.net/**) and other acoustic survey datasets (TOBI sidescan, multibeam bathymetry and backscatter).This polygon is from the physiographic feature dataset which fed into the SNH-JNCC contract to characterise and identify Key Geodiversity Areas in Scottish waters (Brooks *et al.,* 2013).				

Sampling methods / resolution							
Feature	**Modelled**	**Acoustic / remote sensing**	**Remote video / camera**	**Infaunal - grab / core**	**Fisheries trawl**	**Diving**	**Sediment sampling**
OSSG	✓	✓	✓	✓			✓
ODSM	✓		✓	✓			
DSSA		✓	✓		✓		
CS	✓	✓					
Comments	NOC determined biotopes from samples collected using the Megacore, box core and Day grab-sampling gears as appropriate to local seabed conditions on the 1996-2002 surveys. Photographic imagery (video and still images) captured on these surveys also informed the descriptions of the final biotope proposals (Bett, 2012). These data are distributed evenly throughout the predicted distribution of the features (UKSeaMap 2010; EUSeaMap). PSA[1] data from core samples collected by the BGS for both features are available in the south-west of the MPA and lie on the bathyal area, except for four data points falling on the slope. JNCC acknowledge that the spatial accuracy of older PSA records may be limited where the Decca Main Chain or similar types of positioning systems will have been used that could produce poor spatial accuracy by modern standards. Sub-surface PSA results from cores have not been reported here. A trawl by-catch record from MSS in the central part of the MPA (ICES WGDEC VME database, 2014) and video and still image data from the 2006 MV Franklin SEA survey (in GeMS v4) confirm the presence of the protected features within the area.						

Data coverage (Maps A to I)					
Across the MPA					
Numerous protected feature records evenly distributed across MPA?	-	**Numerous protected feature records scattered across MPA with some clumping?**	✓	**Few or isolated protected feature records - possibly clumped?**	-
For Individual features					
Multiple records of individual protected features providing indication of extent and distribution throughout MPA?	OSSG ODSM	**Few or scattered records of specific protected features making extent and broad distribution assessment difficult?**	DSSA	**Few or isolated records of specific protected feature records**	-
Are acoustic remote sensing data available to facilitate the development of a full coverage predictive seabed habitat map?		No, partial coverage with multibeam data from 2006 and 2002 SEA surveys[2&3] (Map F & G)			
Comments	**Continental Slope (CS)** • Major Cenozoic Structures SNH-JNCC contract to characterise and identify Key Geodiversity Areas in Scottish waters (Brooks *et al.,* 2013) - The polygon for the continental slope was digitised by experts from the NOC as part of work completed for Defra in support of the national MPA projects to further a deep-sea habitat classification scheme (Jacobs & Porritt 2009). The feature was digitised through the analysis of the GEBCO digital atlas (http://www.gebco.net/) and other acoustic survey datasets (TOBI sidescan,				

Data coverage (Maps A to I)	
Across the MPA	
	multibeam bathymetry and backscatter). The upper slope edge of this dataset aligns with the general habitat classification principles (i.e. limit of the deep/offshore circalittoral biological zone) that were used in predictive mapping of the UKSeaMap 2010 and EUSeaMap projects, and therefore provide spatial agreement with the broad-scale habitat data used to predict the extent of features. **Deep-Sea Sponge Aggregations (DSSA)** • MoA between JNCC, UoP, BGS, NOC & SAMS concerning the PhD entitled "Identification of areas of nature conservation importance in deep waters of the UK continental shelf, to contribute towards spatial planning and the development of an ecologically coherent network of MPAs in the North-East Atlantic" project (referred to in Map B as: 2006 MVFranklin SEA-SAC survey) (in GeMS v4) – Clusters of survey records from the 2006 SEA survey in the central/southern area of the MPA confirmed the presence of live deep-sea sponge aggregations on the slope, in the area predicted to be offshore subtidal sands and gravels. All records were determined as 'certain'. • OSPAR database of threatened and/or declining habitats (2014-02-18 release) (in GeMS v4) – The database holds an isolated record of deep-sea sponges, lying between the 1000m and 1100m contours. It originates from a SEA survey conducted in 1999. This record has been determined as uncertain as to whether it represents the aggregation. • International Council for the Exploration of the Sea (ICES)/Northeast Atlantic Fisheries Organisation (NAFO) Joint Working Group on Deep-water Ecology (ICES WGDEC)– Vulnerable Marine Ecosystems (VME) database (2014)[5] – Marine Scotland Science (MSS) trawl by-catch data – indicators of VMEs – the easterly DSSA point in the MPA originates as a trawl by-catch record from Marine Scotland Science. Over a tonne of deep-sea sponges (*Geodia* sp. from the Demospongiae class) were recovered from the trawl on the SCO_0411S cruise in 2011 (referred to in Map B as: 2011_04_RVScotia_0411S). ICES WGDEC has recommended to the ICES Advisory Committee (ACOM) that there be a closure to bottom fishing around these records for deep sea sponges together with the records from the 2006 survey. • There are 3 records of the feature lying outside the MPA as determined by Henry & Roberts (2014) during a DSSA data verification contract. One lies to the south-east of the MPA on the 400m contour; a WASP photographic imagery sample from a 1996 SEA survey. The other two are situated on the Faroese Plateau on the north side of the Faroe Shetland Channel. These are also WASP images collected on an SEA survey in 1999. Henry & Roberts (2014) assigned low confidence to these records as to whether they met the OSPAR feature working definition for the feature. **Offshore subtidal sands and gravels (OSSG)** • UKSeaMap 2010 (in GeMS v4) - The habitat map predicts that offshore subtidal sands and gravel habitats occur on the slope and extend onto the bathyal area in some places (particularly in the east). Additional offshore subtidal sands and gravel habitats occur in patches at the northern edge of the boundary. The following offshore subtidal sands and gravel habitats are predicted to occur: Arctic lower bathyal mixed sediment, Arctic mid bathyal coarse sediment, Arctic mid bathyal mixed sediment, Arctic mid bathyal sand and muddy sand, Arctic slope coarse sediment, Arctic slope mixed sediment, Arctic slope sand and muddy sand, Arctic upper bathyal coarse sediment, Arctic upper bathyal mixed sediment, Arctic upper bathyal sand and muddy sand, Atlantic slope coarse sediment, Atlantic slope mixed sediment, and Atlantic slope sand and muddy sand.

Data coverage (Maps A to I)	
Across the MPA	
	• EUSeaMap (Cameron and Askew, 2011) – JNCC checked whether the more recent EUSeaMap habitat model has significantly changed the previous predicted distribution of habitats from UKSeaMap 2010. Note that the Atlantic and Arctic biogeographic regions which UKSeaMap2010 incorporates are not a parameter of the EUSeaMap model. Therefore when comparing the two models JNCC included these biogeographic regions into the EUSeaMap model to assess the differentiation of habitats. Improved bathymetry datasets in EUSeaMap meant there was a minor alteration to the biological zone boundaries. In the deep-sea, the implications for OSSG were that there was a change in the extent of mid-bathyal coarse sediment habitat predicted resulting in an increase in the area predicted for upper-bathyal and slope coarse sediment. The UKSeaMap and EUSeaMap models used the same substrate input layer (for UK waters), although the EUSeaMap project used these data at a reduced spatial resolution. As the substrate type is a key driver in determining the distribution of offshore subtidal sand and gravel habitat Maps A, B and C reflect the finer resolution UKSeaMap2010 data. • NOC biotope analysis of SEA4 AFEN and DTI data (Bett, 2012) (in GeMS v4) [referred to by contributing surveys in Map B; 1996 RRS Charles Darwin (101) survey Leg 2, 1998 RRS Charles Darwin (112) survey, 2000 RRS Charles Darwin (123) survey, 2002 SV Kommandor Jack leg2 survey] - Clusters of survey records from 1996 – 2002 identified offshore subtidal sands and gravels to be present across the southern area of the MPA where these data points intersect with the area predicted to be offshore subtidal sands and gravels on the slope. Bett (2012) described the SEA4 region as being portioned into eight primary (proposed) biotopes. Six are sand and muddy sand biotopes, of which three are included within the MPA; *Spionidae-Terebellidae-Syllidae* in Atlanto-Arctic sand and muddy sand (300-600m), *Spionidae-Capitellidae-Syllidae* in Atlanto-Arctic sand and muddy sand (300-600m) and *Cirratulidae-Maldanidae-Maldanidae* in Arctic sand and muddy sand (600-1200m). Bett's results are presented in Map I illustrating the indicative extent of the proposed biotopes. The extent of Bett's biotopes differ to the extent of habitats of the predictive models; in Bett's study the sandy habitats give way to the muddy sediments higher up the continental slope, particularly in the east of the MPA and notably in the deepest part of the MPA to the north. Some of the data points in the south-west identified as offshore subtidal sands and gravel habitats extending from the slope onto the bathyal area fall within an area predicted to be offshore deep-sea muds. This difference can be explained by the fact that the predictive maps give a broad distribution based on sediment samples taken from different locations to those taken for the analysis carried out by Bett (2012). The seabed samples analysed by Bett (2012) give a more complete picture of the communities and the habitat at specific locations. • MoA between JNCC, UoP, BGS, NOC & SAMS concerning the PhD entitled –"Identification of areas of nature conservation importance in deep waters of the UK continental shelf, to contribute towards spatial planning and the development of an ecologically coherent network of MPAs in the North-East Atlantic" project (in GeMS v4) (referred to in Map B as: 2006_MVFranklin_SEA-SAC_survey) – Several clusters of data points in close proximity to one another confirm the presence of offshore subtidal sands and gravels in the central/southern portion of the MPA on the slope and overlap with the area predicted to be offshore subtidal sands and gravels. Proposed biotopes/classes identified in this work may be considered, alongside those from other work streams, in the development of the Deep Sea section of the Marine Habitat Classification of Britain & Ireland. • BGS interpretation of seabed sediments from multibeam/backscatter data (2006 MV Franklin SEA-SAC survey)[4] – BGS mapped sand and gravel habitats (classed as mixed sediments according to the modified Folk class scheme) through expert interpretation of the block of multibeam and backscatter data from the 2006 survey (Map H). • British Geological Survey (BGS) Marine Particle Size Analysis (PSA) dataset (February 2012) - These data comprise sediment

Data coverage (Maps A to I)	
Across the MPA	
	sampling campaigns between 1967 and 1987 across the UK waters in which the PSA results were categorised according to Folk and subsequently to EUNIS categories/BGS modified Folk classification. Note these data underpin the BGS substrate map used in the predictive habitat map from the seabed habitat modelling projects UKSeaMap2010 and EUSeaMap[1]. BGS collected 77 sediment samples in 1986 within the south-western region of the MPA boundary. Of these, 30 intersect with the predicted distribution of offshore subtidal sands and gravels on the slope and record the presence of the following modified Folk class/EUNIS: 'sand and muddy sand' (x3) 'mixed sediments' (x13), 'mud and sandy mud' (x14). Note this latter class is not considered part of the OSSG habitat and indicates a transitional area between sandy mud and muddy sand habitat. Note, the majority of the data points lie on the slope, except for five data points that record modified Folk class/EUNIS 'mixed sediments' (x1) and 'mud and sandy mud' (x4) on the bathyal region close to the predicted transition to offshore deep-sea muds. **Offshore deep-sea muds (ODSM)** • UKSeaMap 2010 (in GeMS v4) - The habitat map predicts that a band of offshore deep-sea mud habitat extends in a south-west to north-east direction through the area, and roughly follows the base of the continental shelf slope. In some areas the mud habitats extend onto the continental slope. The following offshore deep-sea mud habitats are predicted to occur: Arctic slope mud and sandy mud, Arctic upper-bathyal mud and sandy mud, Arctic mid-bathyal mud and sandy mud and Arctic lower-bathyal mud and sandy mud. • EUSeaMap (Cameron and Askew, 2011) – JNCC checked whether the more recent EUSeaMap habitat model has significantly changed the previous predicted distribution of habitats from UKSeaMap 2010. Note that the Atlantic and Arctic biogeographic regions used in UKSeaMap 2010 are not a parameter of the EUSeaMap model. Therefore these regions were factored into the comparative analysis of the 2 models. Improved bathymetry datasets in EUSeaMap meant there was a minor alteration to the biological zone boundaries. In the deep-sea, the implications for ODSM were that there were minor changes in the predicted extent of lower-bathyal mud and sandy mud and an increase in the area predicted for mid-, upper-bathyal and slope mud and sandy mud. The UKSeaMap and EUSeaMap models used the same substrate input layer (for UK waters), although the EUSeaMap project used these data at a reduced spatial resolution. As the substrate type is a key driver in determining the distribution of offshore deep sea muds, Maps A, B and C reflect the finer resolution of UKSeaMap2010 data • NOC biotope analysis of SEA4 AFEN and DTI data (Bett, 2012) (in GeMS v4) [referred to by contributing surveys in Map B; 1996 RRS Charles Darwin (101) survey Leg 2, 1998 RRS Charles Darwin (112) survey, 2000 RRS Charles Darwin (123) survey, 2002 SV Kommandor Jack leg2 survey] - A broad distribution of data points from 1996 - 2002 fall across the MPA (focused mainly towards the middle - lower area of the slope and on the bathyal region) and record the presence of offshore deep-sea mud. These data points intersect with the areas predicted to be offshore deep-sea muds, particularly on the bathyal region and also on the slope. Bett (2012) described the SEA4 region as being portioned into eight primary (proposed) biotopes: three are mud and sandy mud biotopes and all three of these are included within the MPA, *Oweniidae-Capitellidae-Maldanidae* in Arctic mud and sandy mud (>1200m), *Cirratulidae-Oweniidae-Thyasiridae* in Arctic mud and sandy mud (600-1200m) and *Capitellidae-Oweniidae-Myriotrochidae* in Arctic mud and sandy mud (>1200m). These data are presented in Map I illustrating the indicative extent of the proposed biotopes. Some of the data points intersect with an area predicted to be offshore subtidal sands and gravels, on both the slope and in the bathyal region in what is a transitional area between 'sandy mud' and 'muddy sand' either side of the EUNIS

Data coverage (Maps A to I)	
Across the MPA	
	classes. This discrepancy is probably due to the spatial resolution difference between the grab sampling and the 1:250k substrate mapping by BGS which fed into the UKSeaMap2010 model. • British Geological Survey (BGS) Marine Particle Size Analysis (PSA) dataset (February 2012) - These data comprise sediment sampling campaigns between 1967 and 1987 across the UK waters from which the PSA results were categorised according to Folk and subsequently to EUNIS categories/BGS modified Folk classification. Note these data underpin the BGS substrate map used in the predictive habitat map of seabed habitat mapping projects UKSeaMap2010 and EUSeaMap[1]. There are 77 sediment samples collected in 1986 within the MPA (Maps A-C), 47 of the data points (collected in 1986) record the modified Folk class/EUNIS 'mud and sandy mud' within the predicted extent of offshore deep-sea mud habitats, verifying the predicted extent of the habitat. Note, the majority of these data points lie in the bathyal area except for four data points on the slope (see section on offshore subtidal sands and gravels above). **Geodiversity** • Geodiversity features representing Key Geodiversity Areas in Scotland's seas span the entirety of the MPA. To the north-west, the boundary of the MPA has been drawn to ensure the entirety of the slide deposits from the Submarine Mass Movement block representative of the Miller Slide Key Geodiversity Area are included (Maps D & E). To the east of the MPA, the large expanse of a prograding wedge from the Quaternary of Scotland block, and contourite sand/silt deposits from the Marine Geomorphology of the Scottish Deep Ocean Seabed block, have been included, representative of the North Sea Fan and the West Shetland Margin Contourite Deposit Key Geodiversity Areas respectively. In the centre of the MPA Pilot Whale Diapirs are also included, representative of the Pilot Whale Diapirs Key Geodiversity Area that falls under the Cenozoic Structures of the Atlantic Margin block (Brooks *et al.,* 2013).

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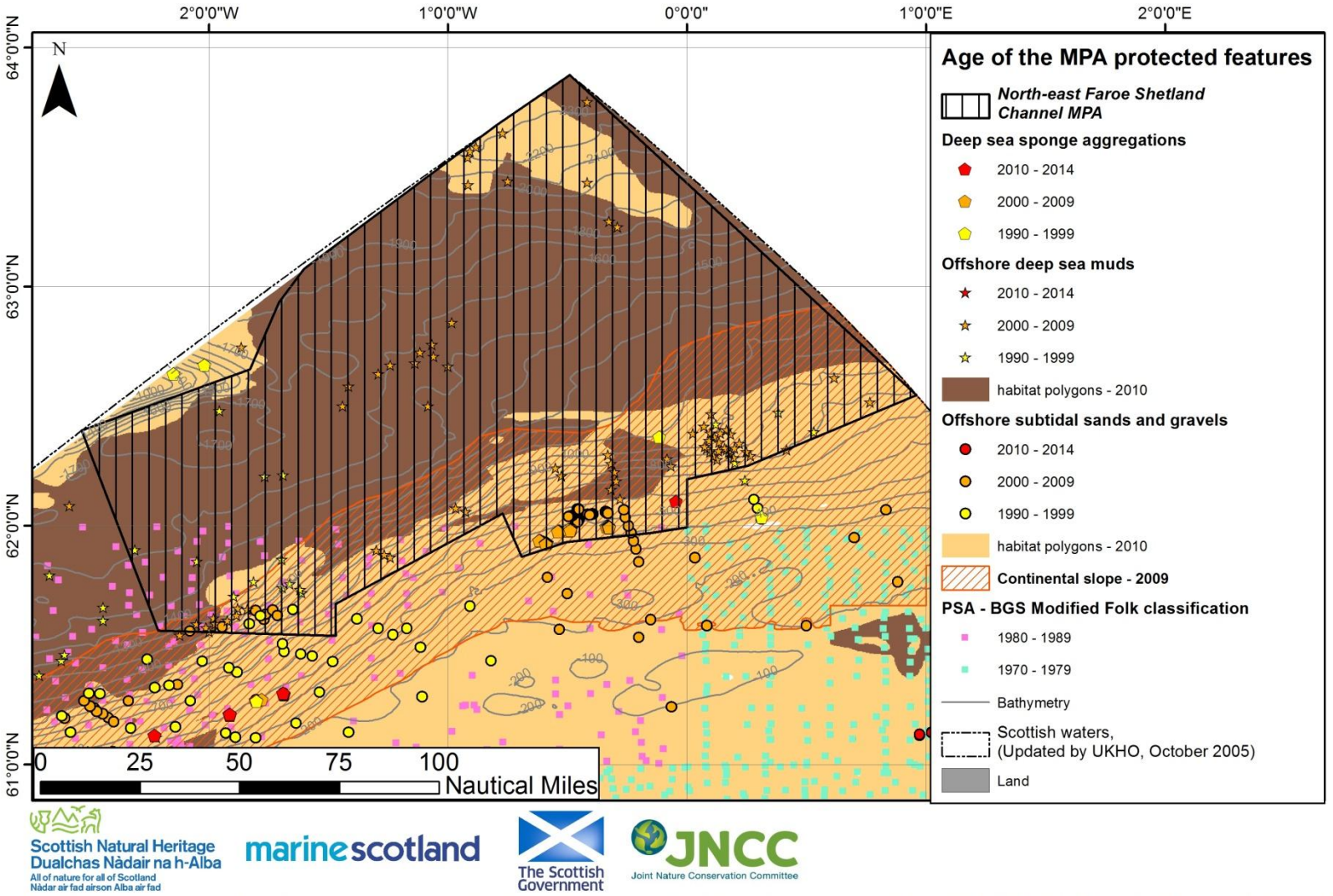

Map displayed in geographic coordinates WGS84.The exact limits of the UK Continental Shelf are set out in the Continental Shelf (Designation of Areas) Order 2013, Statutory Instrument 2013/3162 (© Crown Copyright). Landmass Ordnance Survey © Crown Copyright and database right 2011. All rights reserved.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

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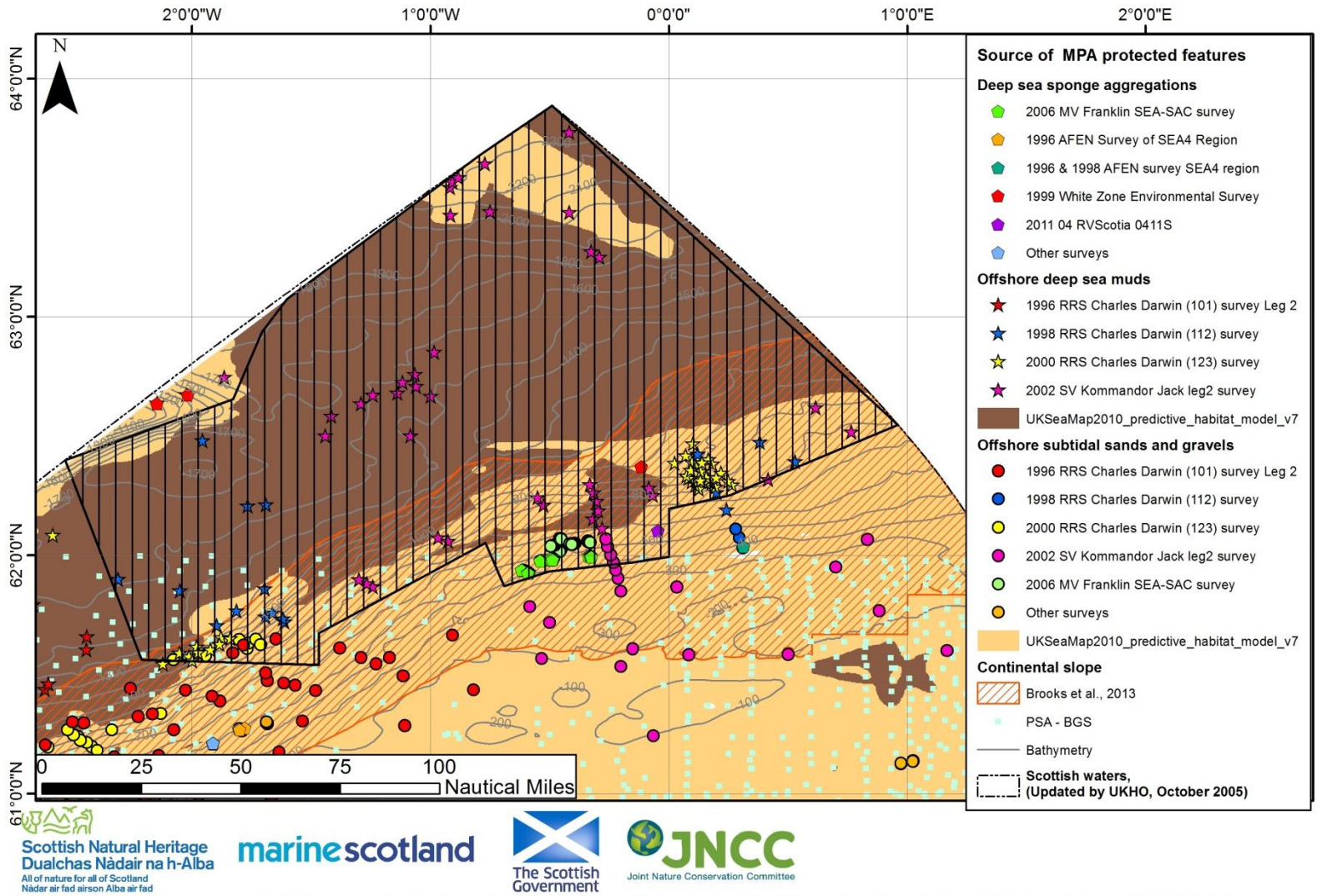

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B

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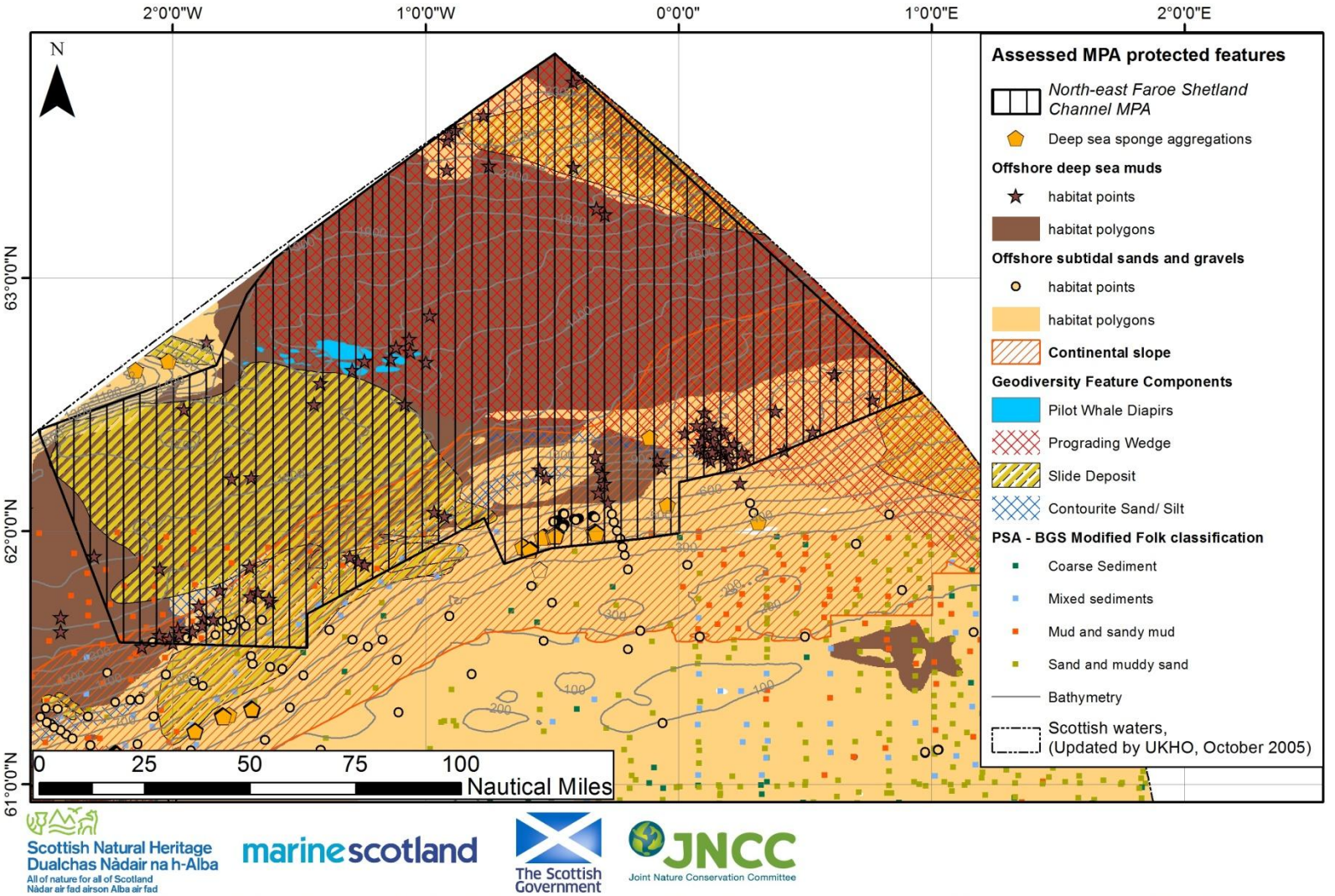

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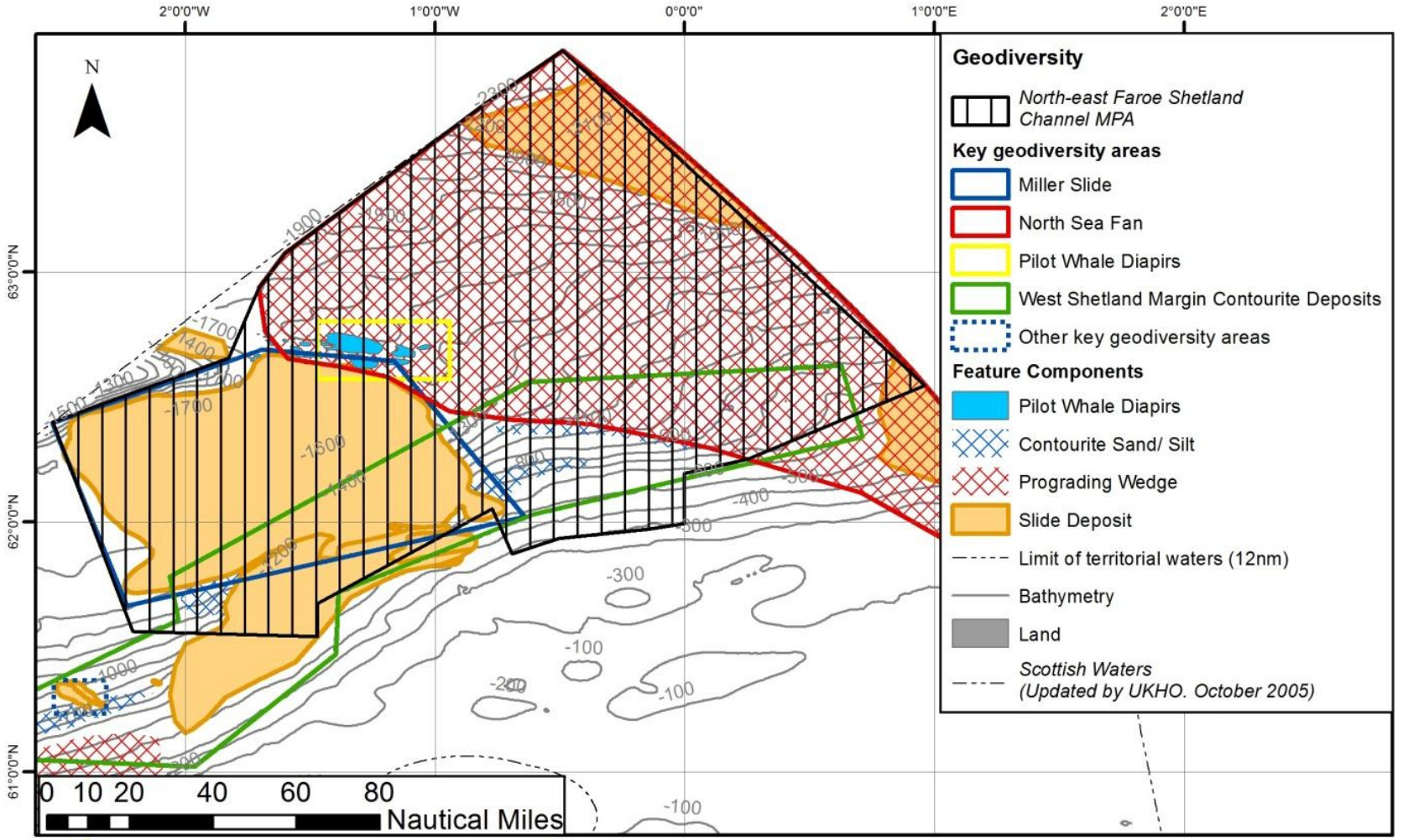

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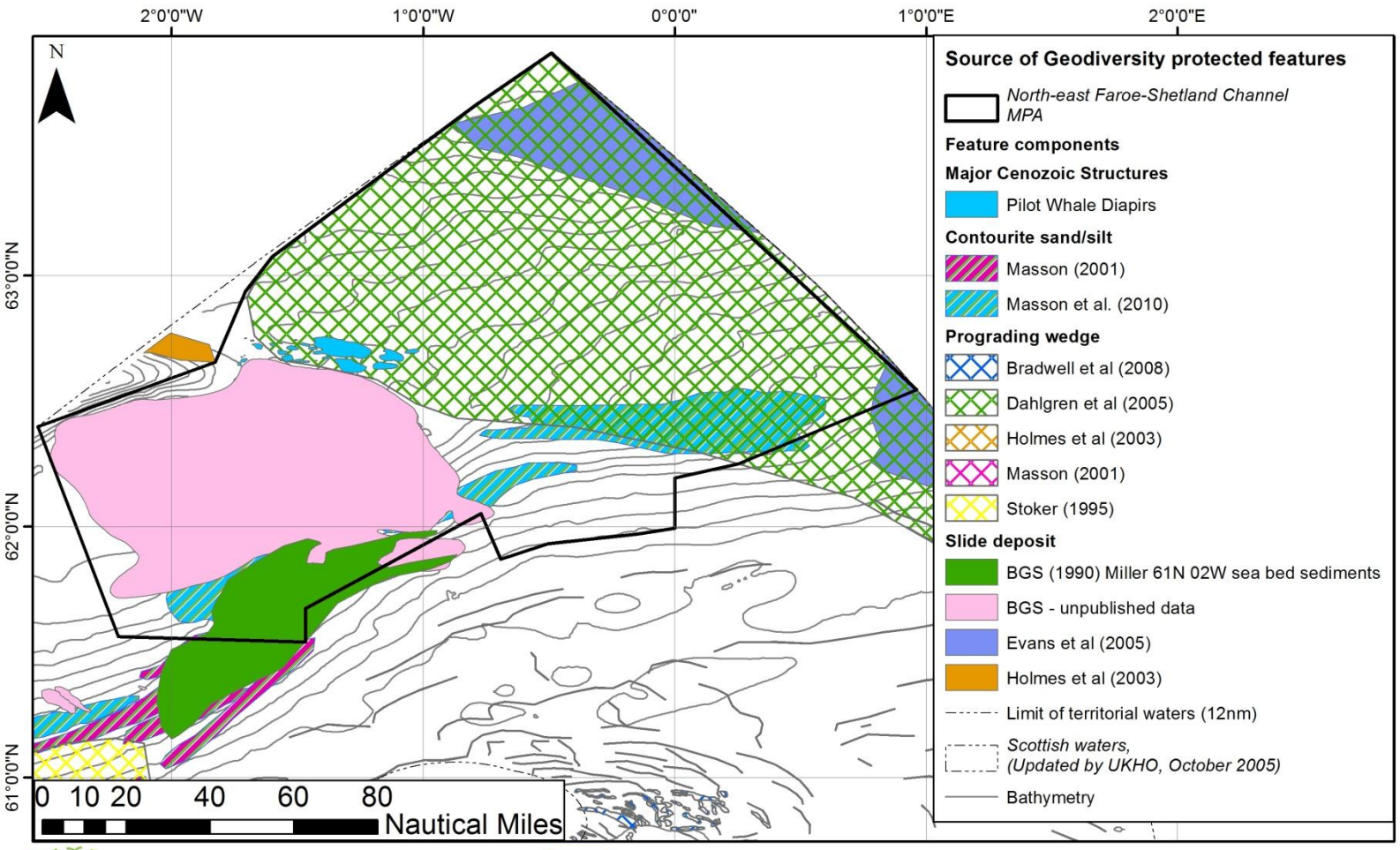

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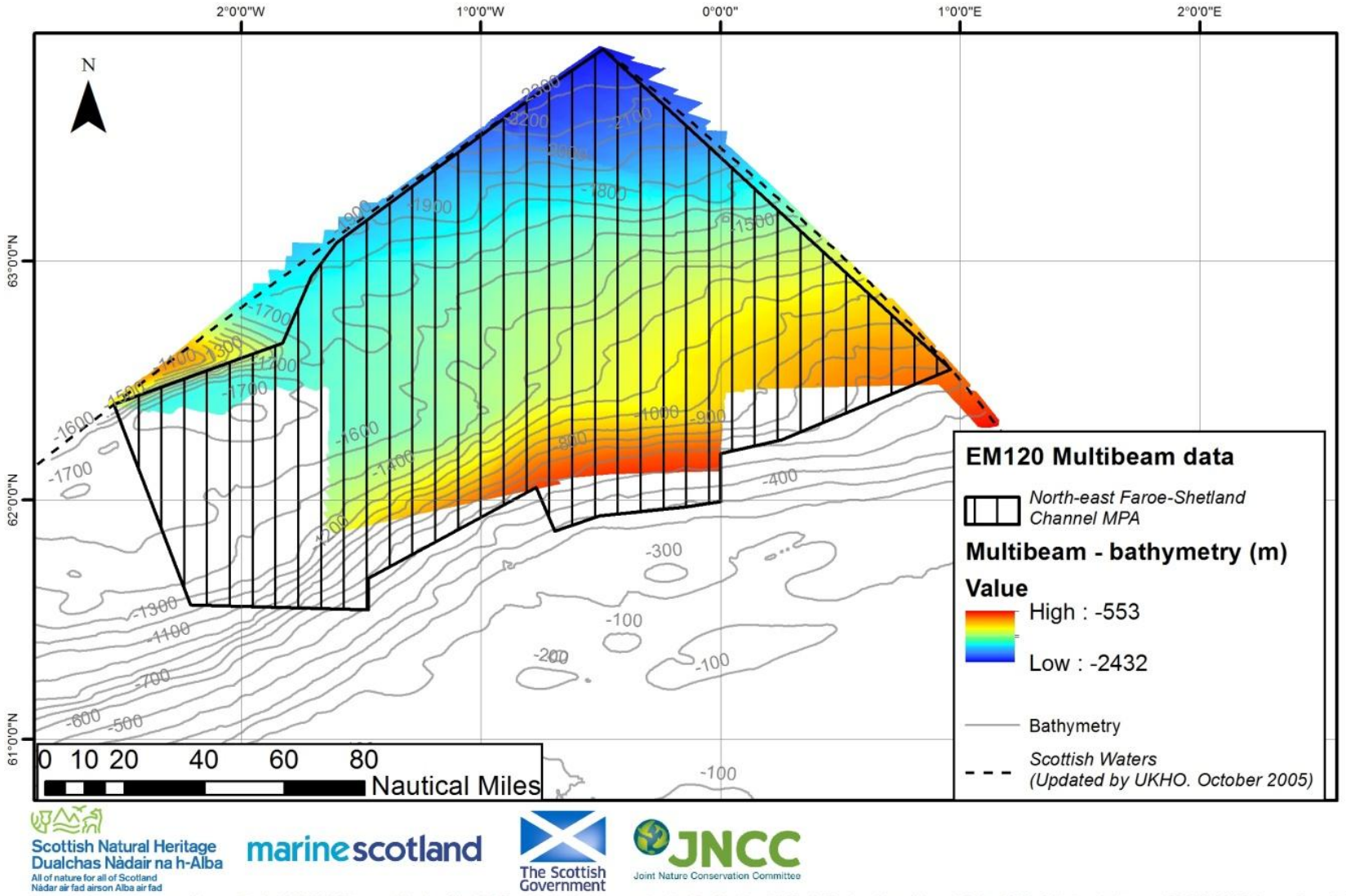

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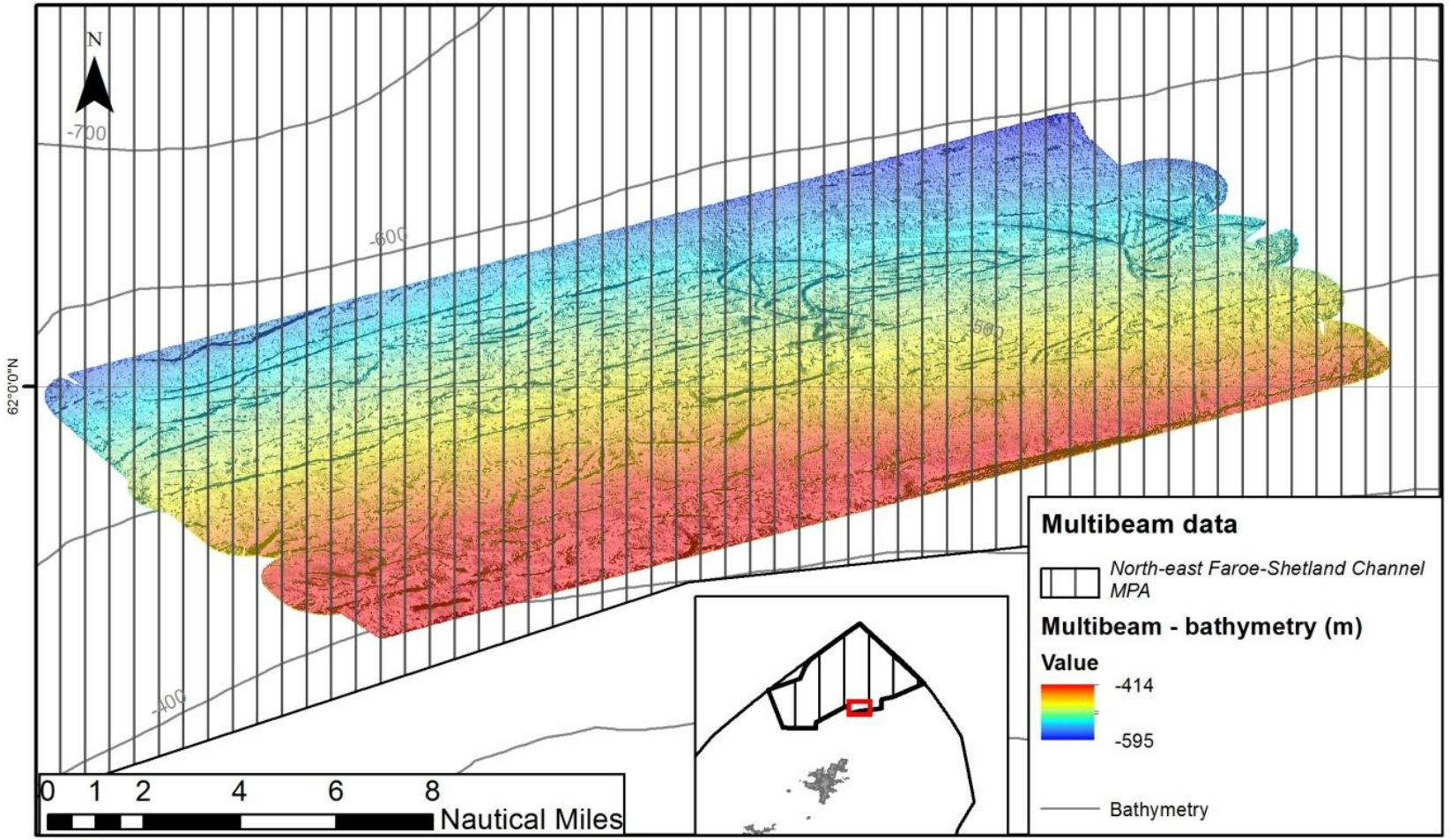

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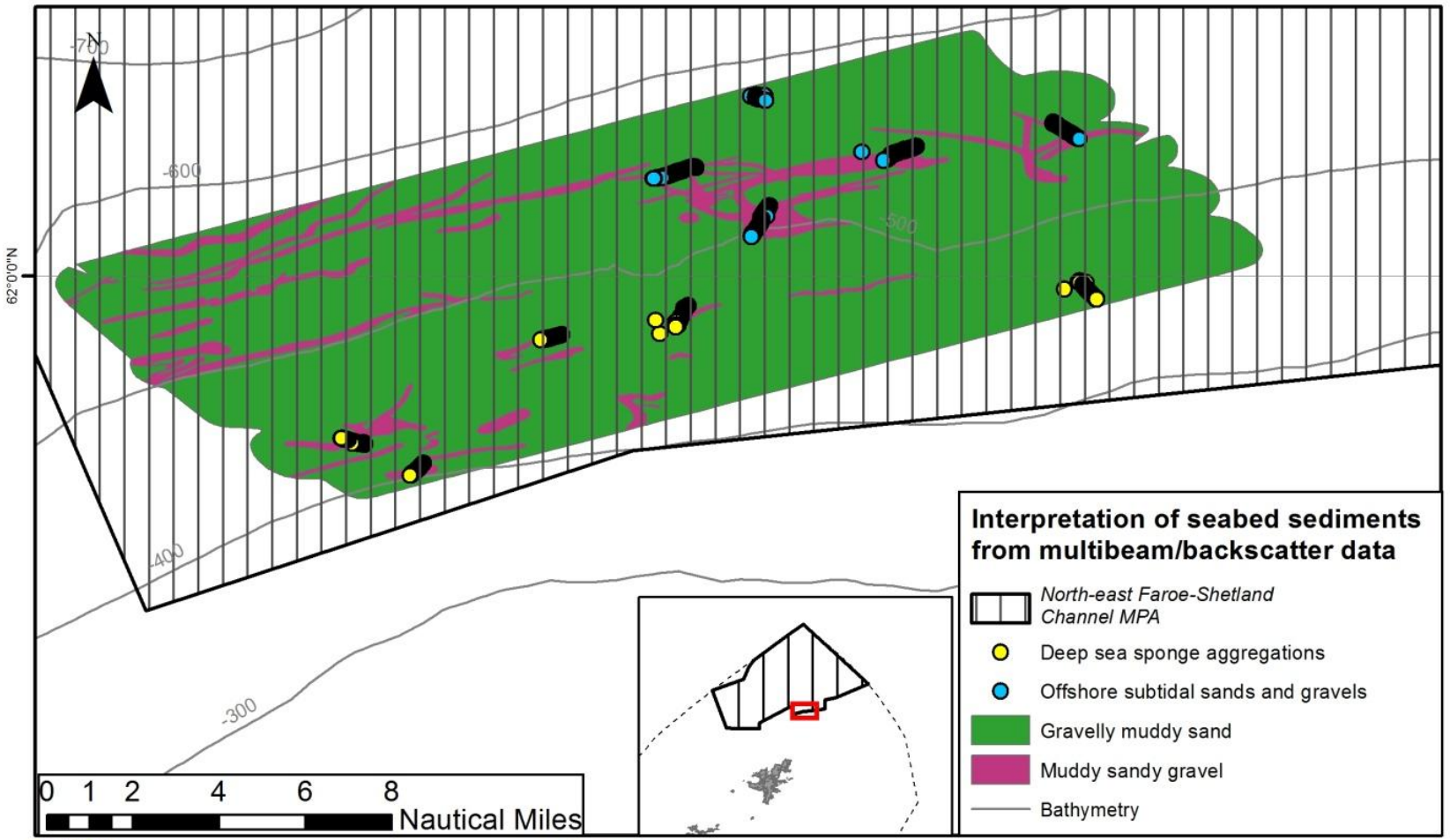

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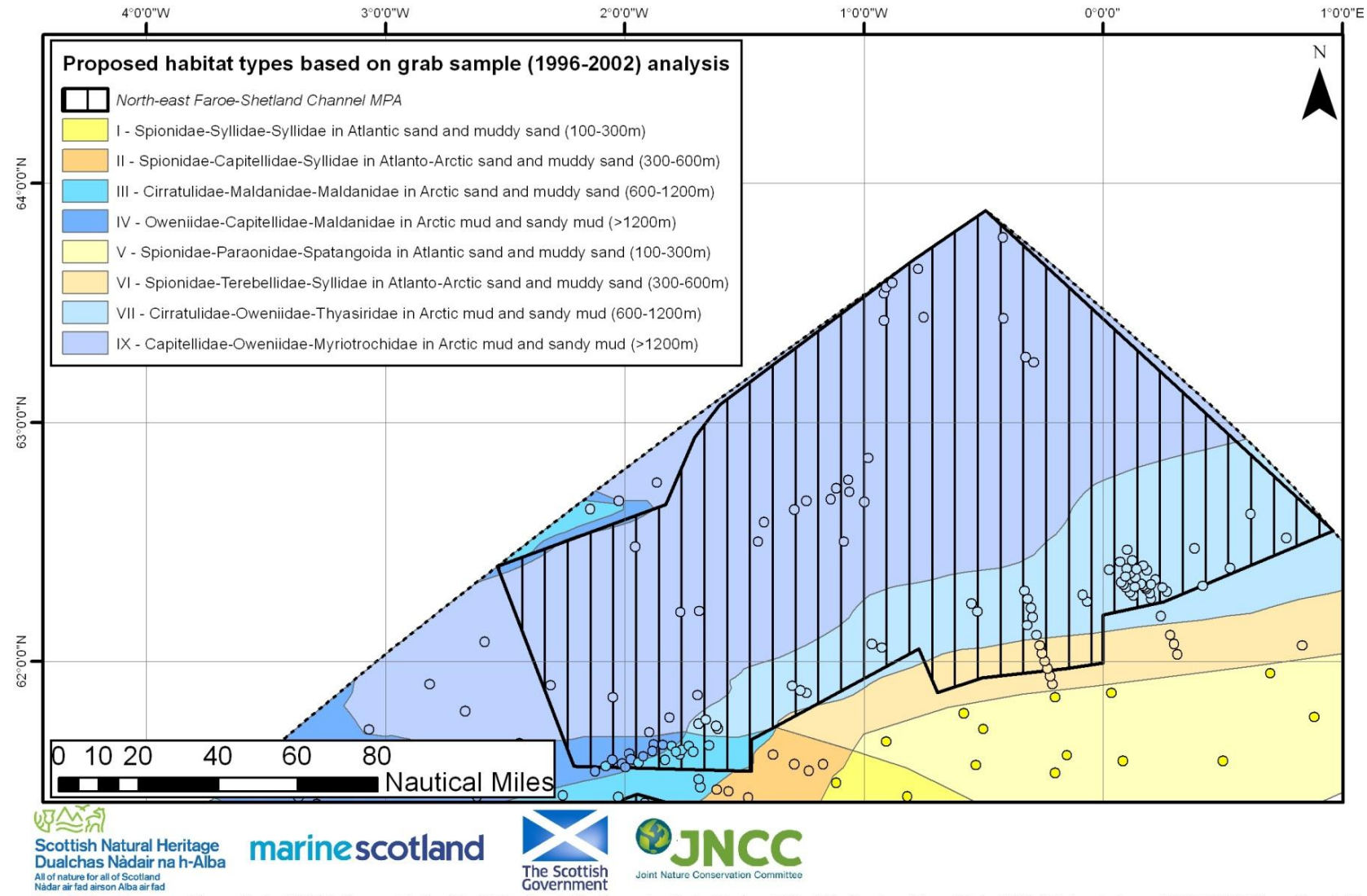

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Year	**Title**	**Features covered**
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2014	Henry, L-A & Roberts, M. (2014). Applying the OSPAR habitat definition of deep-sea sponge aggregations to verify suspected records of the habitat in UK waters. JNCC Report 508.	DSSA
2012	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 472, 99 pages.	OSSG, ODSM
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2011	McBreen, F., Askew, N., Cameron, A., Connor, D., Ellwood, H. and Carter, A., (2011). UK SeaMap 2010 Predictive mapping of seabed habitats in UK waters, JNCC Report 446, ISBN 0963 8091.	OSSG
2010	Howell, K., Davies, J., Narayanaswamy, B., (2010). Identifying deep-sea megafaunal epibenthic assemblages for use in habitat mapping and marine protected area network design. *Journal of the Marine Biological Association of the United Kingdom*, **90(1):** 33-68.	DSSA
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