Data Confidence Assessment

THE WEST OF SCOTLAND POSSIBLE MPA

AUGUST 2019

This data confidence assessment provides an overview of JNCC's confidence in the data underpinning presence and extent of the proposed protected features of the West of Scotland possible MPA (pMPA).

Should Scottish Ministers be minded to designate this pMPA, it is intended that in parallel the Rosemary Bank Seamount MPA be amalgamated into this current proposal to avoid overlapping designations. However, Anton Dohrn Seamount Special Area of Conservation (SAC) is to be left in place.

The following documents provide further information about the West of Scotland pMPA and should be read in conjunction with this Data Confidence Assessment:

Ecological Overview Document – provides an overview of our ecological understanding of the pMPA; both in terms of the proposed protected features and the geographic area more broadly with regards to its functional significance.

Conservation and Management Advice - provides an overview of the conservation objectives for the proposed protected features of the pMPA and the management measures considered necessary to best achieve those objectives.

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pMPA name	West of Scotland

1. Overview

The West of Scotland possible Marine Protected Area (pMPA) boundary is broadly defined by the 800m depth contour within the Rockall Trough to the far west of Scotland and tracks the European Union's deep-sea trawling ban expanding out to the edge of the UK Exclusive Economic Zone (Figure 1). The boundary excludes most of the existing MPAs within the Rockall Trough, but fully encompasses and amalgamates the Rosemary Bank Seamount MPA. As a designation type put in place under a different form of legislation, Anton Dohrn Seamount Special Area of Conservation (SAC) does fully overlap with the West of Scotland pMPA but will remain as an MPA designation in its own right.

The pMPA is recommended for the protection of deep-sea sedimentary habitats, which includes the Priority Marine Features (PMFs) offshore subtidal sands and gravels and offshore deep-sea muds. The pMPA also includes protection for the PMFs cold-water coral reefs, coral gardens, deep-sea sponge aggregations, seamount communities and burrowed mud, recognised in part or in full as Vulnerable Marine Ecosystems (VMEs) and under threat/subject to decline across the North-east Atlantic.

The pMPA is also being recommended for the protection of Seamounts as a large-scale feature, six deep-sea fish species: Blue ling (*Molva dypterygia*), Leafscale gulper shark (*Centrophorus squamosus*), Gulper shark (*Centrophorus granulosus*), Orange roughy (*Hoplostethus atlanticus*), Portuguese dogfish (*Centroscymnus coelolepis*), Round-nose grenadier (*Coryphaenoides rupestris*). There are a significant number of geological and geomorphological features representative of seven Key Geodiversity Areas within the West of Scotland pMPA (after Brooks *et al.,* 2011).

2. Proposed protected features

Biodiversity	The following Priority Marine Features (Figures 2-4): • Burrowed mud • Coral gardens • Cold-water coral reefs • Deep-sea sponge aggregations • Offshore deep-sea muds in the bathyal and upper abyssal regions • Offshore subtidal sands and gravels in the bathyal and upper abyssal regions • Seamount communities • Seamounts (large-scale feature) • Blue ling • Leafscale gulper shark • Gulper shark • Orange roughy • Portuguese dogfish • Round-nose grenadier	**Geodiversity**	Geological and Geomorphological features representative of the following Key Geodiversity Areas (after Brooks *et al.,* 2011) (Figure 5): • Anton Dohrn Seamount (and adjacent basin floor) • George Bligh Bank (and adjacent basin floor) • North-east Rockall Bank (and adjacent basin floor) • Rosemary Bank Seamount (and adjacent seafloor) • Summer Isles to Sula Sgeir Fan • The Barra Fan • The Peach Slide Complex

Proposed protected feature exclusions

Available data on seabirds, marine mammals, and other deep-water fish/elasmobranchs and seabed habitats in the pMPA were assessed as part of the development of this advice. These species and habitats did not meet the evidence standards set to be considered as proposed protected features of this pMPA. Details of the assessment process undertaken to reach this conclusion are provided in the associated methods document.

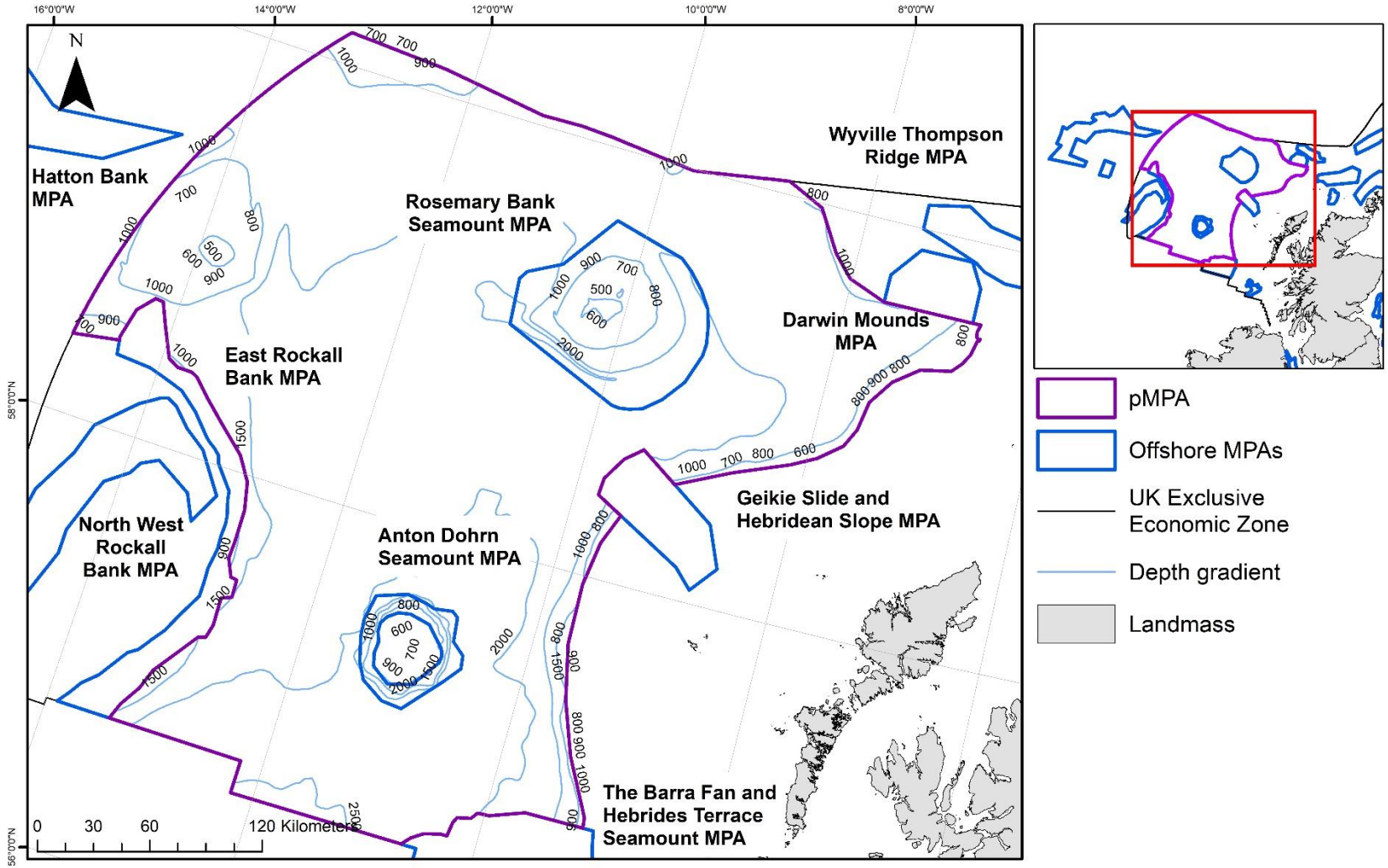

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Figure 1 Location of The West of Scotland pMPA

3. Data used in assessment

Version of **Geodatabase of Marine features in Scotland (GeMS)** holding feature data used to support site selection	Ver. 5 (2016)	**Other datasets used** (not in GeMS) [superscripts are used to reference these datasets in the following sections]	• [1] British Geological Survey (BGS) Marine Particle Size Analysis (PSA) dataset (2018) - data collected between 1984 and 2000 categorised according to the Folk scheme and subsequently to the EUNIS habitat classification by JNCC based on the BGS modified Folk scheme. • [2] Vulnerable Marine Ecosystems (VME) database (2018)- International Council for the Exploration of the Sea (ICES)/Northeast Atlantic Fisheries Organisation (NAFO) and Joint Working Group on Deepwater Ecology. • [3] OSPAR Threatened and/or Declining Habitats dataset (2017) • [4] UKSeaMap (2018) – modelled habitat map of UK seabed habitats (Manca *et al*., 2018). • [5] Anton Dohrn SEA/SAC survey (2009) - commissioned by JNCC and undertaken by the British Geological Survey, University of Plymouth and Marin Mättenik AB. The survey collected high quality acoustic and photographic 'ground-truthing'. These are additional records that are not in the above datasets. • [6] Cartopep project multibeam & backscatter data (1995) provided by IFREMER - collected within the framework of the European program PESCA. • [7] National Oceanography Centre (NOC) seabed substrate map derived by specialist interpretation of IFREMER multibeam & backscatter data[6] developed under the Memorandum of Agreement between the JNCC, BGS and NOC concerning the processing and interpretation of multibeam and backscatter in Scottish waters for MPA evidence and advice, 2013. (Sotheran *et al*., 2014) • [8] Anton Dohrn habitat map derived by specialist interpretation of Department of Trade and Industry (now Department for Business, Energy and Industrial Strategy) Strategic Environmental Assessment survey (2005), developed under a Memorandum of Agreement between the JNCC and University of Plymouth.

			• [9] Marine Scotland Science deep-water trawls (1997-2018). • [10] Multibeam data from (2003) RRS James Clark Ross survey JR99, British Antarctic Survey. • [11] Multibeam data from (2005) RV Kommandor Jack SEA survey for the Department of Trade & Industry (DTI), (now the Department for Business, Energy and Industrial Strategy). • [12] Multibeam data from (2006) MV Franklin survey for the Department of Trade & Industry (DTI), (now the Department for Business, Energy and Industrial Strategy).

4. Summary of data confidence assessment (see detailed assessment on following pages)

Confident in underpinning data	**Yes**	Cold-water coral reefs Seamount communities Seamounts Blue ling	**Partial**	Burrowed mud Coral gardens Deep-sea sponge aggregations Offshore deep-sea muds Offshore subtidal sands and gravels Leafscale gulper shark Gulper shark Orange roughy Portuguese dogfish Round-nose grenadier	**No**	**-**

Confident in presence of proposed protected features	✓ All features	**Data suitable to define extent of proposed protected features?**	**Yes**	**Partial**	**No**
			Cold-water coral reefs Seamount communities Seamounts Blue ling	Burrowed mud Coral Gardens Deep-sea sponge aggregations Offshore deep-sea muds Offshore subtidal sands and gravels Leafscale gulper shark Gulper shark Orange roughy Portuguese dogfish Round-nose grenadier	-

Summary	**Burrowed mud** JNCC have partial confidence in the data underpinning burrowed mud within the pMPA. The presence of burrowed mud habitat is supported by video/camera image data [GeMS Ver.5] and by records of sea-pens (an indicator of burrowed mud habitat) taken as by-catch during fishing trawl surveys[2]. One additional sea-pen record was recorded by video/camera image at Anton Dohrn Seamount[5]. JNCC has partial confidence in the extent and distribution of this proposed protected feature within the pMPA as the sampling coverage is relatively limited given the large extent of seabed sediments where burrowed mud (and sea-pens) could potentially occur (fine mud, sandy mud and muddy sand in water depths that may exceed 500m (Tyler-Walters *et al.,* 2016)). Overall, JNCC have partial confidence in the presence and extent of the proposed protected feature within the pMPA but acknowledge, on the basis of habitat suitability and sea-pen by-catch records, that the habitat may be present across the pMPA where suitable environmental conditions occur. **Cold-water coral reefs** JNCC are confident in the underpinning data used to confirm the presence of cold-water coral reefs within the pMPA. These have been derived from the analysis of video and still image data collected from survey (156 records [GeMS Ver.5, 2, 3, 5.]). JNCC have confidence that the data underpinning cold-water coral reefs are suitable to define the extent of this feature within the pMPA. These records occur at both seamounts, George Bligh Bank and in the north-east of the pMPA. A habitat map produced from acoustic data presents the distribution of cold-water coral reefs at Anton Dohrn Seamount[3]. Habitat suitability modelling (Ross *et al.,* 2015) indicates a strong correlation between slope steepness and the occurrence of cold-water coral reef. Areas with high habitat suitability within the pMPA were predicted around the seamounts, George Bligh Bank and some areas of the continental slope. Overall, JNCC are confident in the data used to support the inclusion of the proposed protected feature of the pMPA. The underlying datasets are considered to have been collected using appropriate methods to confirm the presence of cold-water coral reefs, and we have confidence in using these data to support our understanding of the extent and distribution of the habitat within the pMPA, supported by habitat suitability modelling. **Coral gardens** JNCC are confident in the underpinning data used to confirm the presence of coral gardens within the pMPA where they have been derived from the analysis of video and stills data collected from survey (98 records) [GeMS Ver.5, 2, 3]. Furthermore, data within the GeMS (Ver.5) dataset (81 records) have been validated by a JNCC contract (Henry & Roberts, 2014a) to develop a

Summary	technical definition for this feature and verify suspected records within UK waters. The presence of coral gardens within the pMPA is further supported with by-catch records taken during a Spanish multi-disciplinary deep-sea survey (four records) [GeMS Ver.5], but we have lower confidence in these data as by-catch is an extractive sampling method. JNCC have partial confidence in the extent of coral gardens across the pMPA. A habitat map produced from survey data presents the distribution of this feature at Anton Dohrn Seamount, and the distribution of records give an indication of the extent of this feature across the pMPA. However, the sampling coverage is relatively limited and coral gardens, particularly some sub-types of this feature such as the soft bottom bamboo coral gardens that occur in soft sediments (Henry & Roberts, 2014a), may occur more widely across the pMPA than is evident from the current sampling effort. Overall, JNCC are confident in the data used to support the inclusion of this proposed protected feature of the pMPA. The underlying datasets are considered to have been collected and analysed appropriately to confirm the presence of coral gardens, but we have partial confidence in the use of these data to support our understanding of the extent and distribution of the habitat within the pMPA. **Deep-sea sponge aggregations** JNCC are confident in the underpinning data used to confirm the presence of deep-sea sponge aggregations within the pMPA where they have been derived from the analysis of video and stills data collected from survey (20 records) [GeMS Ver.5, 3]. Furthermore, data from the GeMs (Ver.5) dataset (17 records) have been validated by a JNCC contract (Henry & Roberts, 2014b) to confirm whether or not they adhere to the definition of this habitat type. The presence of deep-sea sponge aggregations within the pMPA is further supported by a by-catch record taken during a Marine Scotland Science deep-water trawl survey [2], but we have lower confidence in this data as by-catch is an extractive sampling method. JNCC have partial confidence in the extent of deep-sea sponge aggregations across the pMPA. Deep-sea sponge aggregations seem to occur in environmental conditions similar to those inhabited by cold-water coral reefs and coral gardens but can occur on a broad range of substrata from mud and silt to boulders and cobbles (Henry & Roberts, 2014b). Therefore, this feature may occur more widely across the pMPA than is evident from the current sampling effort and we consider the available data only partially suitable to determine the extent and distribution of deep-sea sponge aggregations within the pMPA. Overall, JNCC are confident in the data used to support the inclusion of the proposed protected feature of the pMPA. The underlying datasets are considered to have been collected and analysed appropriately to confirm the presence of deep-sea sponge aggregations, but we have partial confidence in the use of this data to support our understanding of the extent and distribution of the habitat within the pMPA.

Summary	**Offshore deep-sea muds and offshore subtidal sands and gravels** JNCC are confident in the underpinning data used to confirm the presence of offshore subtidal sands and gravels and offshore deep-sea muds across the pMPA. The data used consists of Particle Size Analysis (PSA) of sediment samples[1] and data records held within GeMS (Ver. 5), which provide information on biological community interpretations of video and still images collected from survey. UKSeaMap 2018[4] supports JNCC's understanding of the extent of these proposed protected features within the pMPA. UKSeaMap 2018 is a predictive seabed habitat mapping product and therefore we have less confidence in the extent of these two proposed protected features within the pMPA. There is in general good agreement between point records taken from survey and the predicted distribution of these two proposed protected features across the pMPA (see Figure 3). Overall, JNCC are confident in the data used to support the inclusion of the proposed protected features of the pMPA. The underlying datasets are considered to have been collected and analysed appropriately to confirm the presence of the proposed protected features and both habitats types are recorded as being present across the full extent of the pMPA aside from small areas of deep-sea rock around Rosemary Bank Seamount and George Bligh Bank. **Seamount communities** JNCC are confident in the underpinning data used to confirm the presence of seamount communities within the pMPA. These data are predominantly derived from by-catch records taken during Marine Scotland Science deep-water trawl surveys (13 records)[2,3, GeMs (Ver.5)]. The presence of seamount communities is further supported by (6 records) collated from other surveys and cruise reports [(GeMS ver.5, 3)]. JNCC have confidence that the underpinning data are suitable to define the extent of this feature across the pMPA as seamount communities are restricted to the extent of the seamounts and we have full coverage multi-beam data identifying the extent of the seamounts[10, 11, 12]. Overall, JNCC are confident in the data used to support presence and extent of seamount communities across the pMPA. **Seamounts** JNCC are confident in the underpinning data used to confirm the presence and extent of the Rosemary Bank Seamount and Anton Dohrn Seamount features based on full coverage multibeam data[10, 11, 12]. The underlying (acoustic multibeam) datasets are considered to have been collected and analysed appropriately to confirm the presence and extent of seamounts.

Summary	**Blue ling** JNCC are confident in the underpinning data used to confirm the presence of Blue ling within the pMPA. These data have been collected during Marine Scotland Science trawl surveys[9, GeMS Ver.5] (94 records). JNCC are confident in the extent of areas considered to be important to the life-history of Blue ling within the pMPA. Data on the extent of spawning areas for Blue ling within the pMPA are from Large *et al.* (2010) [GeMS Ver.5]. Large *et al*. (2010) reported a depth range of 300 to 1500m for the southern stock off Scotland with peak abundance at 750 to 1000m depth. Overall, JNCC are confident in the data used to support presence and extent of areas important to the life history (spawning areas) of Blue ling across the pMPA. The underlying datasets are considered to have been collected and used appropriately to confirm the presence and extent of Blue ling within the pMPA. **Leafscale gulper shark/Gulper shark** JNCC are confident in the underpinning data used to confirm the presence of Leafscale Gulper shark/Gulper shark within the pMPA. These data (59 records) have been collected during Marine Scotland Science trawl surveys (1997-2018)[9]. JNCC have partial confidence that the underpinning data are suitable to define the extent of this feature across the pMPA. Leafscale gulper shark and gulper shark are found at depths between 415 – 2400m. Leafscale gulper shark is potentially resident throughout the deep-waters of the pMPA, with peak abundance at 800m (Tyler-Walters *et al.*, 2016 and Priede, 2018). The pMPA is one of only 17 locations world-wide where gulper shark has been recorded (Priede, 2018). The importance of the pMPA to the life cycle of Leafscale gulper shark/Gulper shark remains unclear due to a lack of juveniles and pregnant females in samples taken from this area (Moura *et al.,* 2014; Priede, 2018). Given that peak abundance of Leafscale gulper sharks is at around 800 m in the pMPA region (Neat *et al.,* 2015), a significant proportion of the population will fall outside of the pMPA boundary, particularly on the continental slope to the west of Scotland (Priede 2018). Overall, JNCC are confident in the data used to support presence of Leafscale gulper shark/Gulper shark across the pMPA. The underlying datasets are considered to have been collected appropriately to confirm the presence of Leafscale gulper shark/Gulper shark, but we have partial confidence in the use of this data to support our understanding of the extent and distribution of Leafscale gulper shark/Gulper shark within the pMPA. Evidence on the importance of the pMPA in the life cycle of Leafscale gulper shark/Gulper shark remains unclear and requires further research. **Orange roughy** JNCC are confident in the underpinning data used to confirm the presence of Orange roughy within the pMPA. These data have been collected during Marine Scotland Science trawl surveys[9, GeMS Ver.5] (53 records). One additional record of Orange roughy was collected at Anton Dohrn Seamount (2009)[5] from analysis of video/still imagery. JNCC have partial confidence that

Summary	the underpinning data are suitable to define the extent of this feature across the pMPA. In the Rockall Trough Orange roughy are found on slopes between 500-1750m and form large spawning aggregations around seabed features such as slopes and Seamounts (Tyler-Walters, 2016 and Priede, 2018). The pMPA includes habitat that is suitable for the life cycle of Orange roughy; namely areas of continental slope at suitable depths and topographic features such as seamounts (Priede, 2018), though spawning aggregations within the pMPA have not been confirmed. Overall, JNCC are confident in the data used to support presence of Orange roughy across the pMPA. The underlying datasets are considered to have been collected appropriately to confirm the presence of Orange roughy, but we have partial confidence in the use of these data to support our understanding of extent and distribution and areas important to the life history of Orange roughy within the pMPA requires further research. **Portuguese dogfish** JNCC are confident in the underpinning data used to confirm the presence of Portuguese dogfish within the pMPA. These data have been collected during Marine Scotland Science trawl surveys[9] (88 records). JNCC have partial confidence that the underpinning data are suitable to define the extent of this feature across the pMPA. Portuguese dogfish occur throughout the deep-waters to the west of Scotland where they have been reported from depths of 700 – 1900m, with a peak abundance at 1300 – 1400m (Tyler-Walters, 2016 and Priede, 2018). The pMPA contains suitable habitat for Portuguese dogfish and it is hypothesised it could be an important breeding area for this species (Priede, 2018). Overall, JNCC are confident in the data used to support presence of Portuguese dogfish across the pMPA. The underlying datasets are considered to have been collected appropriately to confirm the presence of Portuguese dogfish, but we have partial confidence in the use of these data to support our understanding of extent and distribution and areas important to the life history of Portuguese dogfish within the pMPA requires further research. **Round-nose grenadier** JNCC are confident in the underpinning data used to confirm the presence of Round-nose grenadier within the pMPA. These data have been collected during Marine Scotland Science trawl surveys[9] (183 records). JNCC have partial confidence that the underpinning data are suitable to define the extent of this feature across the pMPA and the location of areas important to the life history of this species. Round-nose grenadier can be considered resident within the pMPA and occur at a depth range of 750 -1,750m in the Rockall Trough, however the location of areas important to the life history of this species within the pMPA are unknown (Tyler-Walters, 2016 and Priede, 2018).

Summary	Overall, JNCC are confident in the data used to support presence of Round-nose grenadier across the pMPA. The underlying datasets are considered to have been collected appropriately to confirm the presence of Round-nose grenadier**,** but we have partial confidence in the use of these data to support our understanding of extent and distribution and areas important to the life history of Round-nose grenadier within the pMPA requires further research.

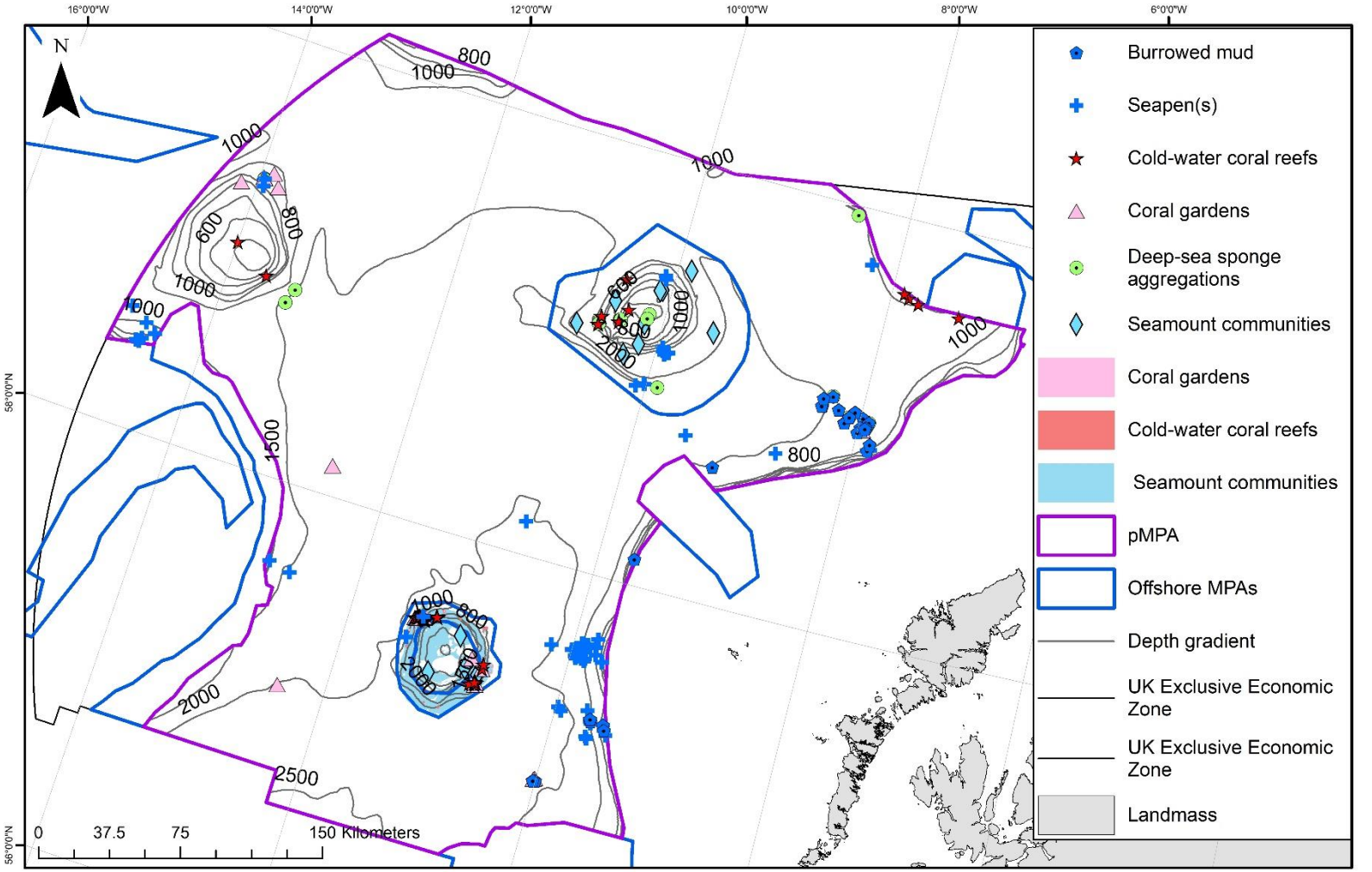

Figure 2 a) The West of Scotland pMPA and the distribution of proposed protected Vulnerable Marine Ecosystem (VME) features

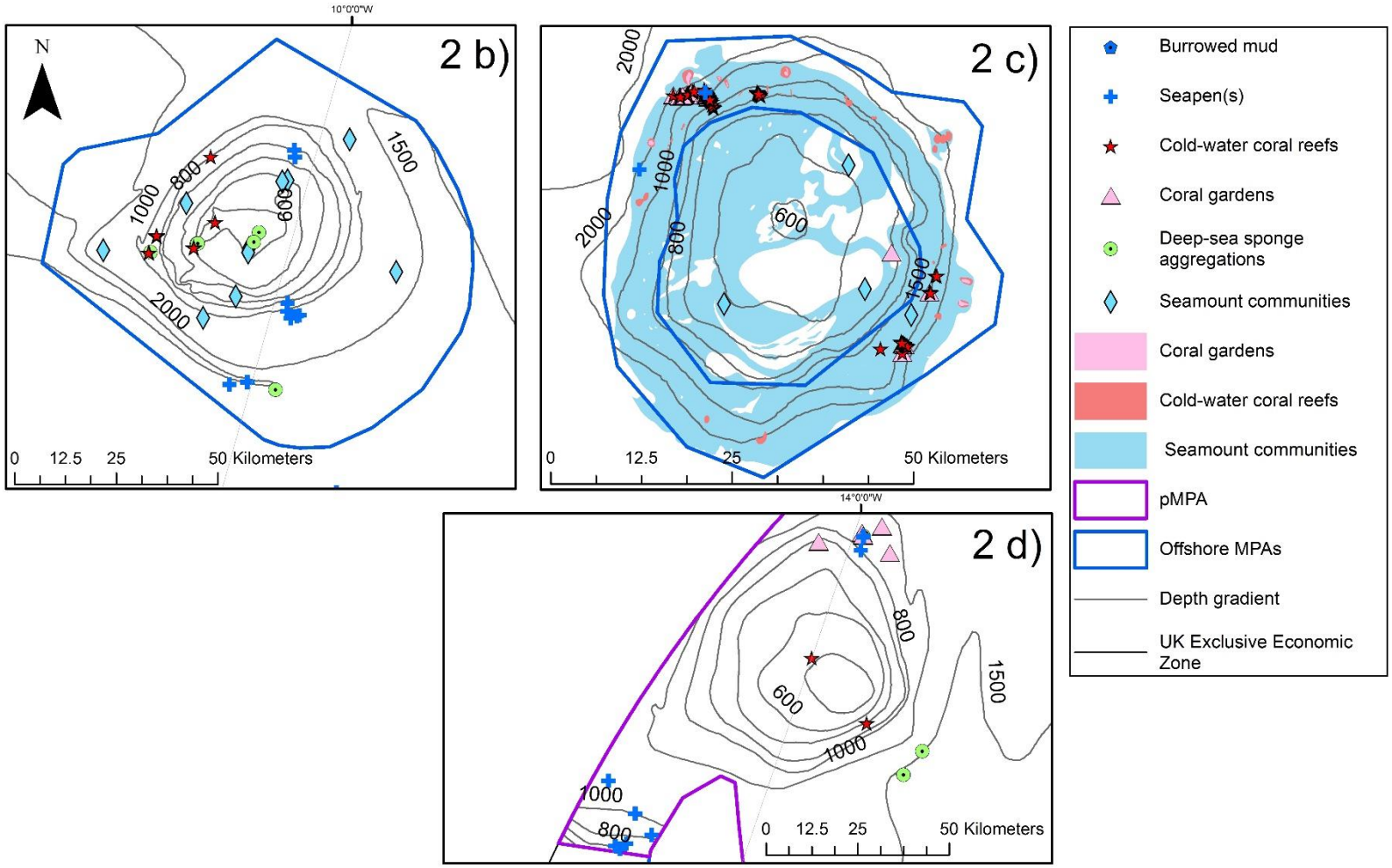

Figure 2 b), c), d) The West of Scotland pMPA and the distribution of proposed protected Vulnerable Marine Ecosystem (VME) features. 2 b) zoom of Rosemary Bank Seamount**,** 2 c) zoom of Anton Dohrn Seamount, 2 d) zoom of George Bligh Bank.

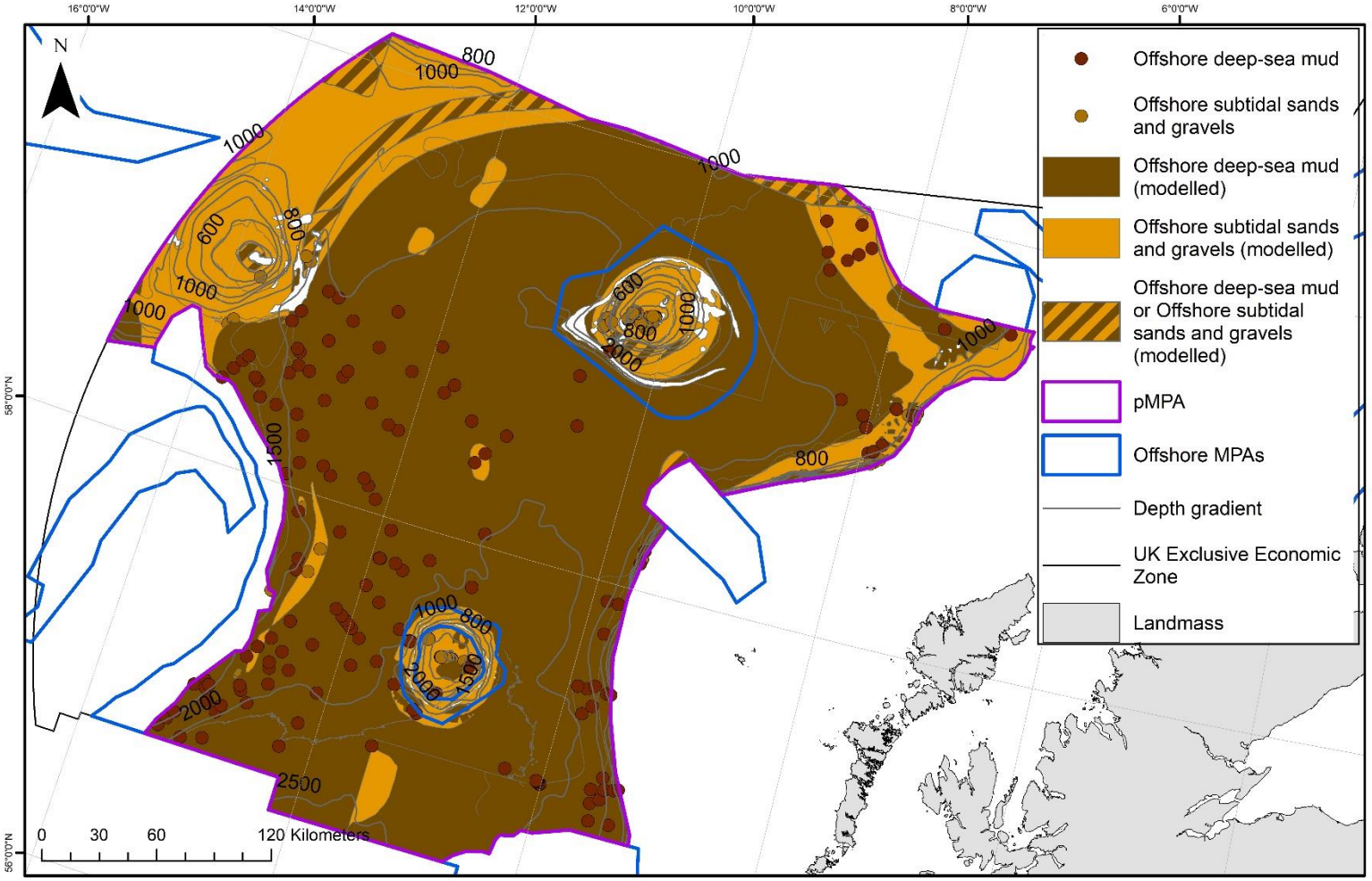

Figure 3 The West of Scotland pMPA and the distribution of proposed protected sedimentary habitat features.

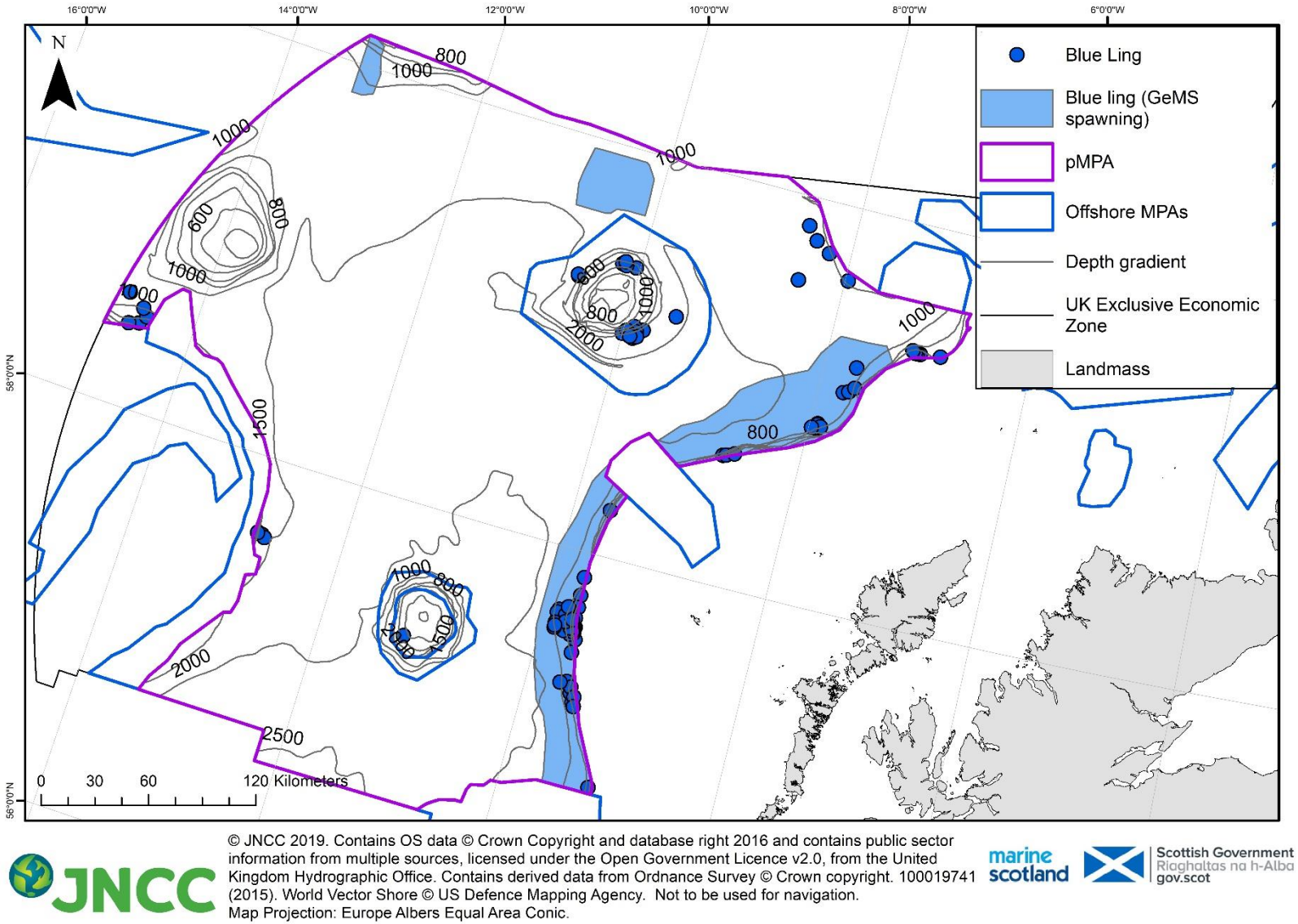

Figure 4 a) The West of Scotland pMPA and the distribution of proposed protected deep-water fish species: Blue ling.

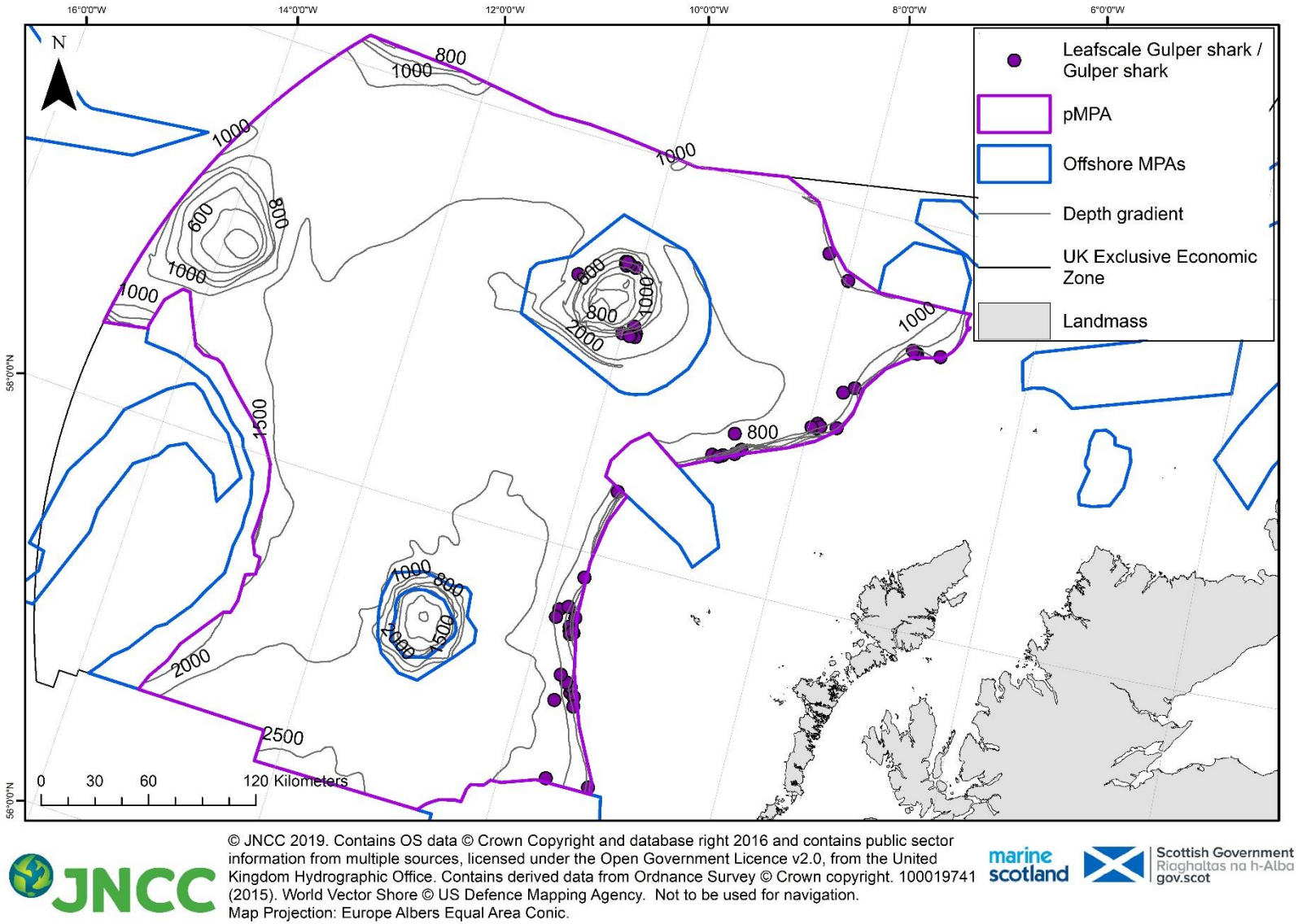

Figure 4 b) The West of Scotland pMPA and the distribution of proposed protected deep-water elasmobranch species: Leafscale Gulper shark / Gulper shark.

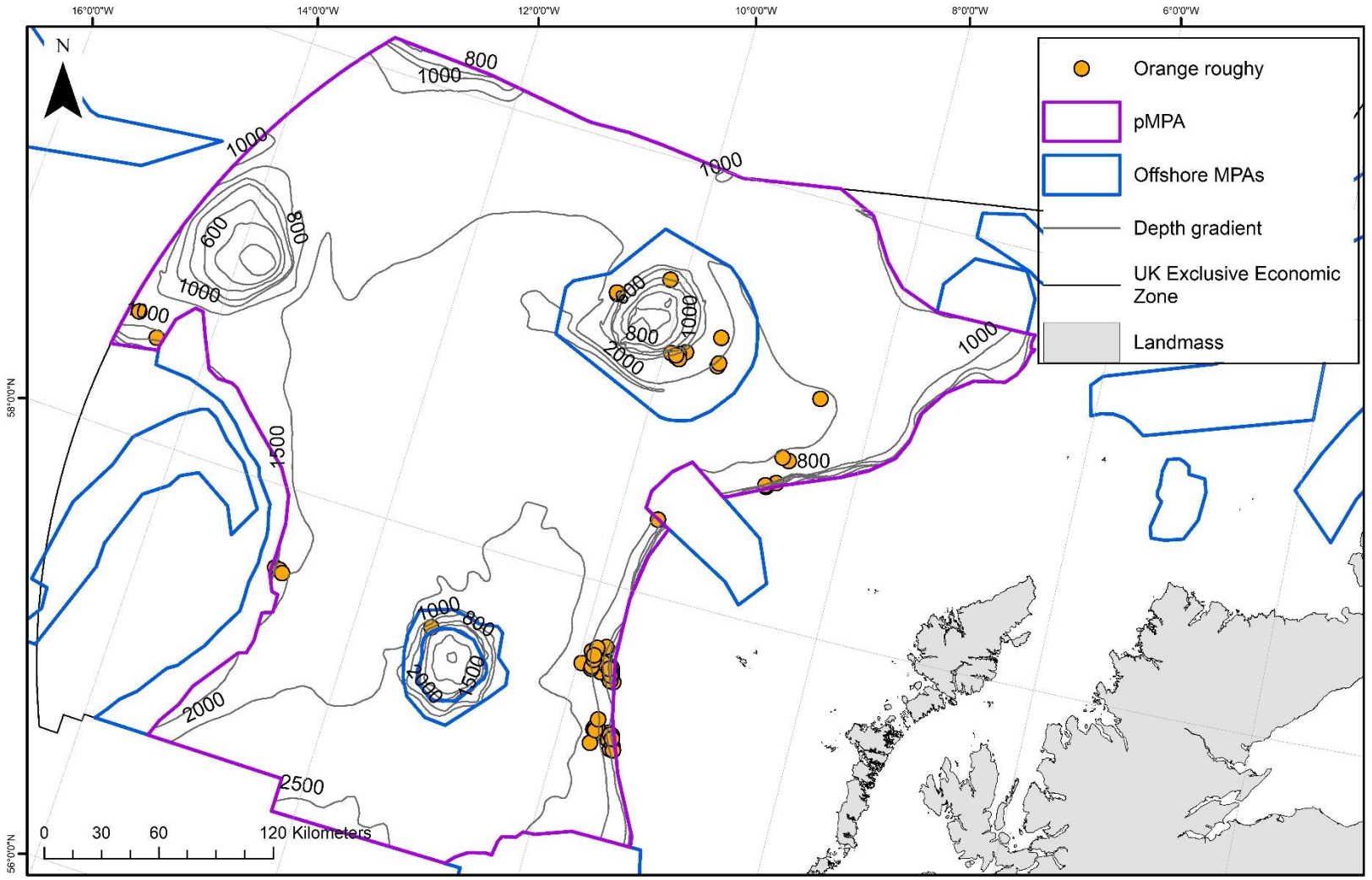

Figure 4 c) The West of Scotland pMPA and the distribution of proposed protected deep-water fish species: Orange roughy.

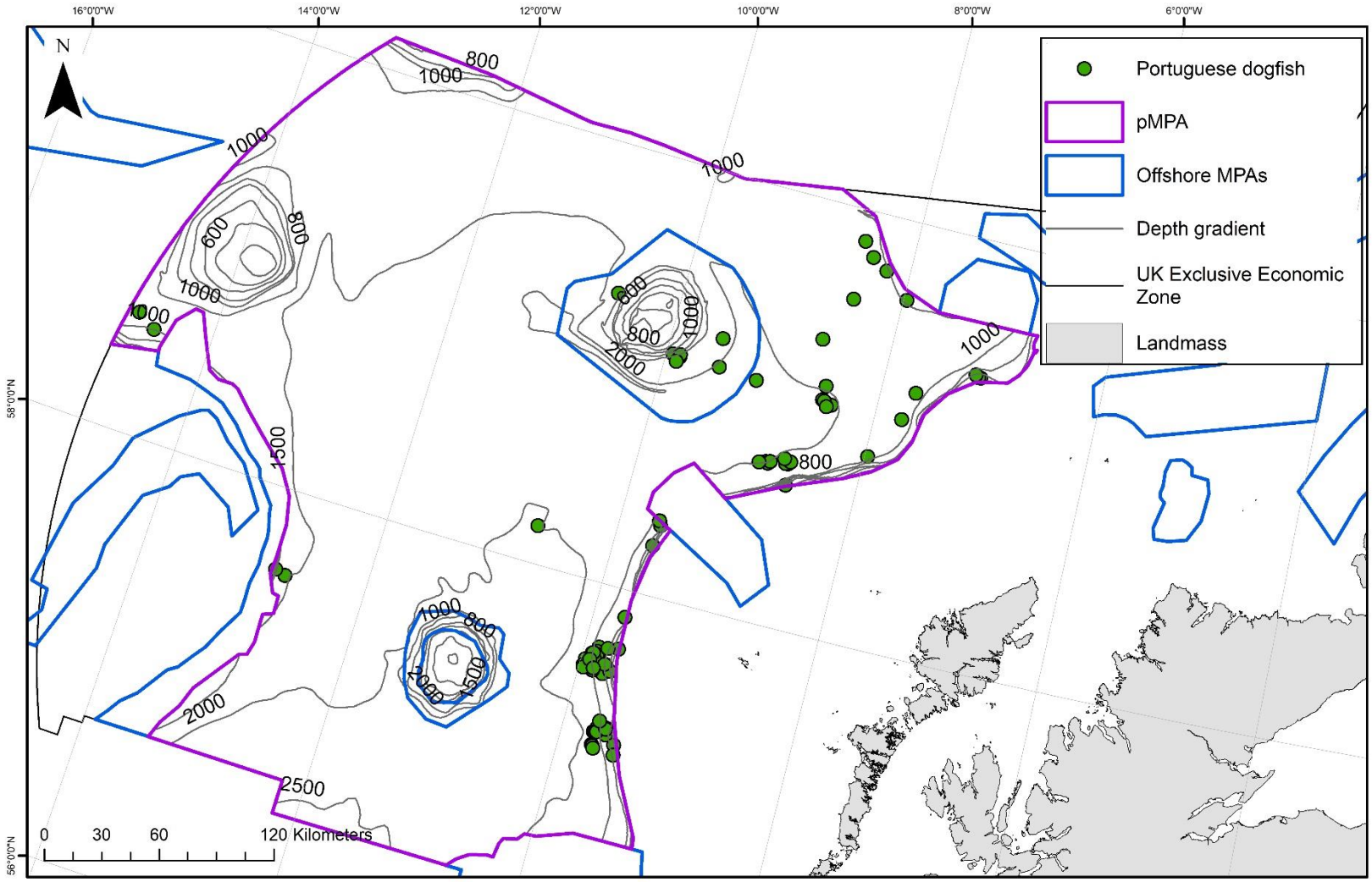

Figure 4 d) The West of Scotland pMPA and the distribution of proposed protected deep-water elasmobranch species: Portuguese dogfish.

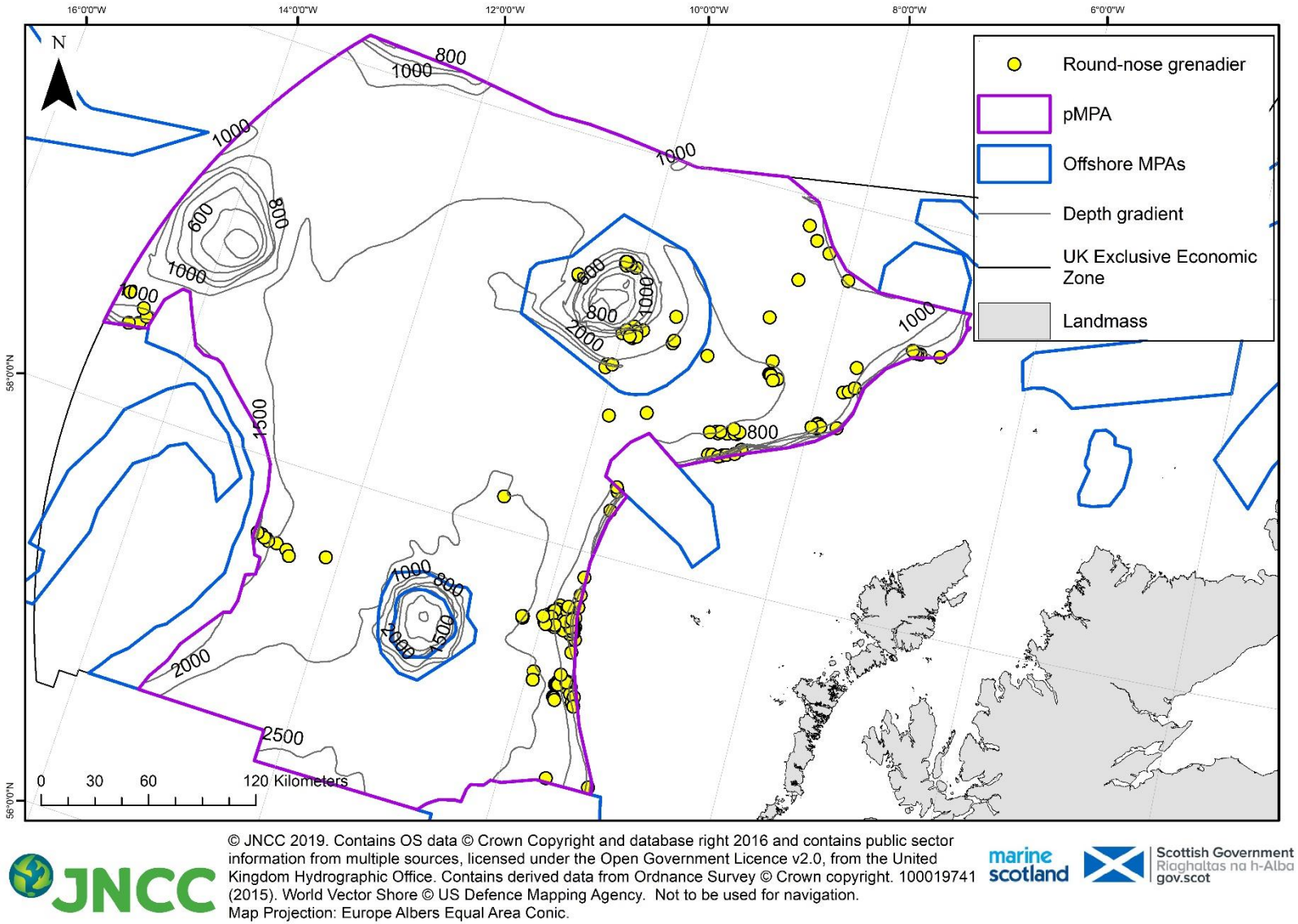

Figure 4 e) The West of Scotland pMPA and the distribution of proposed protected deep-water fish species: Round-nose grenadier.

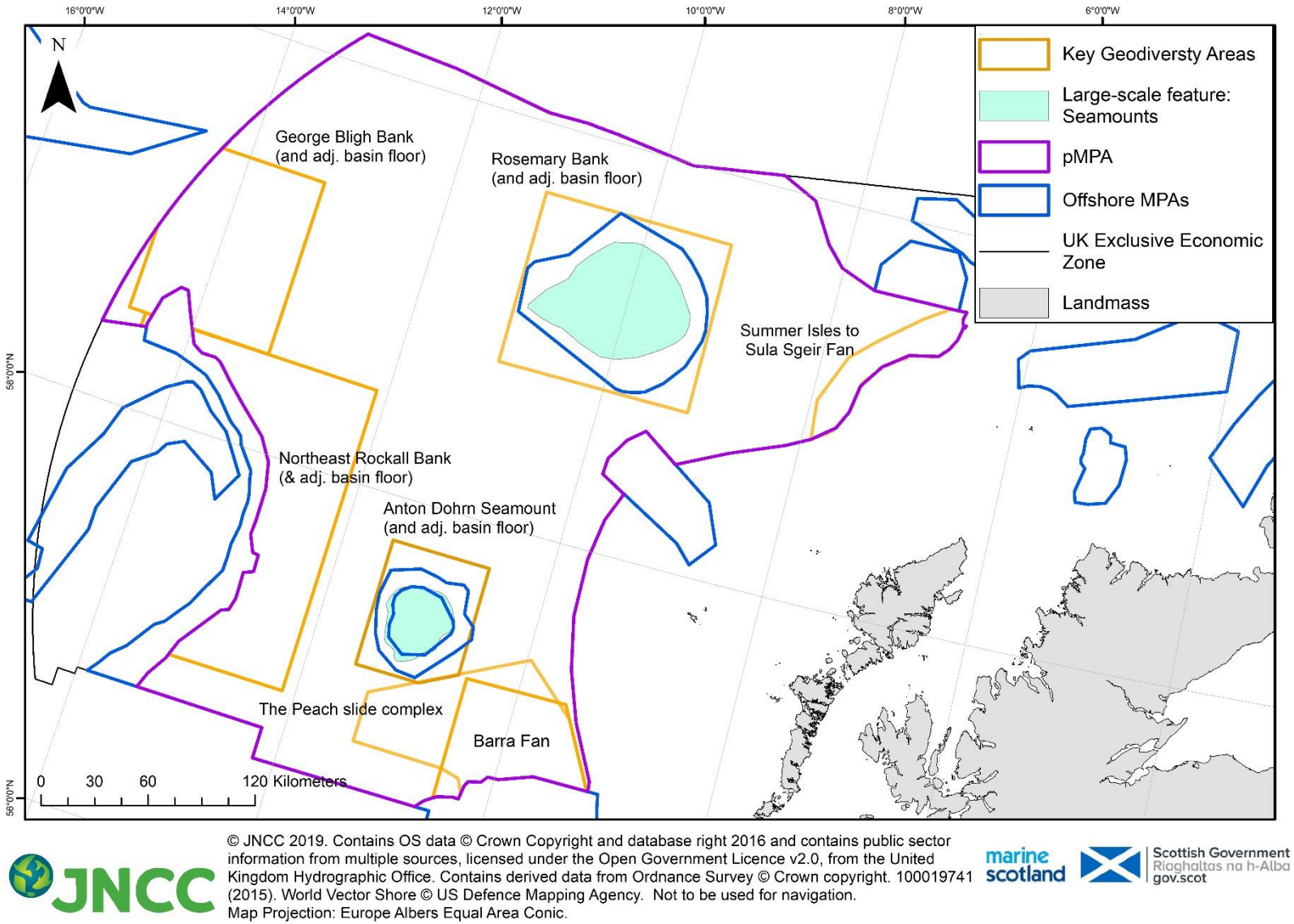

Figure 5 The West of Scotland pMPA and the distribution of proposed protected Key Geodiversity Areas, and large-scale features (seamounts).

5. 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 pMPA.

5.1 Age of data *(Figures 6, 7 & 8)*

Multiple or majority of records collected post 2008	Cold-water coral reefs Coral gardens Seamount communities Blue ling Leafscale gulper shark Gulper shark Orange roughy Portuguese dogfish Round-nose grenadier	**Multiple records collected pre 2008**	Burrowed mud Deep-sea sponge aggregations Offshore deep-sea muds Offshore subtidal sands and gravels Seamounts

Comments

Burrowed mud

The presence of burrowed mud is supported by still images (111 records) collected in 1988, 1996, 1998, and one record from video in 2006[GeMs Ver.5]. Records (98) of sea-pens (indicative of the presence of burrowed mud) were collected as by-catch from trawl surveys between 2007-2018[2, GeMs Ver.5], including two records of the tall sea-pen *Funiculina quadrangularis* collected in 2012 and 2015. One video / camera image of sea-pens at Anton Dohrn Seamount was collected in 2009[5].

Cold-water coral reefs

The presence of cold-water coral reefs is supported by 156 video and still records, 97 of these were collected since 2008. The records are from 2006 [GeMS Ver.5], 2009 [2,3,5,], and 1868, 1983 and 1998. The survey date is unknown for two records (collated by Max Wisshak & Andre Freiwald / IPAL Erlangen)[3].

Comments	**Coral gardens** The presence of coral gardens is supported by 98 video and still records; 90 of these were collected since 2008. The records are from 1996, 1998, 2005 and 2009[2,3, GeMS Ver.5]. The presence of the proposed protected feature is supported by four additional by-catch records from 2005[(GeMS Ver.5)]. **Deep-sea sponge aggregations** The presence of deep-sea sponge aggregations is supported by 20 video and still records; three of these were collected since 2008. The records are from 1996, 1998, 1999, 2005, 2006, and 2011[3, GeMS Ver.5]. The presence of the proposed protected feature is supported by one additional by-catch record from 2017[2]. **Offshore deep-sea muds** The presence of offshore deep-sea muds is supported by British Geological Survey Particle Size Analysis data[1] from between 1984 and 2000 (232 records), and 123 records from the biological community analysis of video and stills data collected from surveys in 1988, 1998 and 2005[GeMS Ver.5]. **Offshore subtidal sands and gravels** The presence of offshore subtidal sands and gravels is supported by British Geological Survey Particle Size Analysis data[1] from between 1985 and 1994 (36 records), and 1,588 records from the biological community analysis of video and stills data collected from surveys in 1988, 1998, 2005, 2006 and 2007[GeMS Ver.5]. **Seamount communities** The presence of Seamount communities is supported by 19 records; 10 of these were collected since 2008. By-catch data were collected from trawl surveys in 2005, 2006, 2009, 2011, 2012 and 2017[2, GeMS Ver.5] and there are records collated from survey reports in 1987 and four records of unknown date[3, GeMS Ver.5]. **Seamounts** The presence of Rosemary Bank Seamount and Anton Dohrn Seamount is supported by full coverage multibeam data collected in 2003 (British Antarctic Survey)[10], 2005 and 2006 (SEA survey, Department of Trade and Industry, now Department for Business, Energy and Industrial Strategy)[11, 12].

Comments	**Blue ling** The presence of Blue ling is supported by 95 records collected by Marine Scotland Science deep-water trawl surveys between 1997 and 2018[9, GeMS Ver.5]. Sixty-two of these records were from 2008 or more recent surveys. Blue ling spawning locations have been identified by Large *et al*. (2010); the data analysed were from commercial fisheries logbook data pre-2008. **Leafscale gulper shark/gulper shark** The presence of Leafscale gulper shark/gulper shark is supported by 59 records collected during Marine Scotland Science deep-water trawl surveys between 1997 and 2018[9]. Thirty-six of these records were from 2008 or more recent surveys. **Orange roughy** The presence of Orange roughy is supported by 69 records collected during Marine Scotland Science deep-water trawl surveys between 2000 and 2018[9, GeMS Ver.5]. Sixty-two of these records were from 2008 or more recent surveys. One additional record was collected in 2009 from Anton Dohrn Seamount with video/still image survey[5]. **Portuguese dogfish** The presence of Portuguese dogfish is supported by 88 records collected during Marine Scotland Science deep-water trawl records from between 1997 and 2018[9]. Sixty-two of these records were from 2008 or more recent surveys. **Round-nose grenadier** The presence of Round-nose grenadier is supported by 183 records collected during Marine Scotland Science deep-water trawl surveys from between 1997 and 2018[9]. One hundred and thirty-five records were from 2008 or more recent surveys.

5.2 Source of data *(Figures 9 and 10)*					
Targeted data collection for nature conservation purposes	✓	**Statutory monitoring (marine licensing etc.)**	-	**Fisheries survey work**	✓
Data collection associated with development proposals (EIA etc.)	✓	**Predictive mapping products**	✓	**Other** (specify) – PhD research project, British Geological Survey Particle Size Analysis data	✓

Comments	**Burrowed mud** Data supporting the presence of burrowed mud are from still images analysed by the Scottish Association for Marine Science from oil and gas exploration surveys of the Hebridean Slope North-west of Lewis, and from NERC Land-Ocean Interaction Study Shelf Edge Study (LOIS-SES) across Hebridean Shelf break and Barra Fan GeMS Ver.5. Sea-pen by-catch records (indicative of the presence of burrowed mud) are from Marine Scotland Science trawl surveys. These sea-pen by-catch records were verified as VME indicator species by the ICES Working Group on Deep-water Ecology (ICES, 2015). Two video records of sea-pens are from a Marine Scotland Science underwater video survey for Nephrops GeMS Ver.5 and a survey of Anton Dohrn Seamount[5]. **Cold-water coral reefs** Data supporting the presence of cold-water coral reefs are from video and still images collected from a Strategic Environmental Assessment survey (2006) at Rosemary Bank Seamount GeMS Ver.5, a (2009) survey of Anton Dohrn Seamount[2,3,5], and records collated from survey reports[3]. Data supporting the extent of cold-water coral reefs comes from habitat mapping polygons produced by JNCC in 2014 based on survey data from Anton Dohrn Seamount (2005).

Comments	**Coral gardens** Data supporting the presence of coral gardens are from the following surveys: NERC Land-Ocean Interaction Study - Shelf Edge Study (LOIS-SES) (1995-1996), NERC Biogeochemistry in the Deep Ocean Benthic Boundary (BENBO) (1997-1999), oil and gas exploration surveys of the Hebridean Slope North-west of Lewis (1998), Department of Trade and Industry (now Department for Business, Energy and Industrial Strategy) Strategic Environmental Assessment surveys (2005 and 2006), and a survey of Anton Dohrn Seamount (2009)[2,3,GeMS Ver.5]. Data from GeMs (Ver.5) conform to the habitat definition for coral gardens produced by a JNCC-commissioned contract (Henry and Roberts, 2014a), records from the ICES Vulnerable Marine Ecosystem database[2] are coral garden sub-types as defined by ICES (2015). By-catch records from ECOVUL/ARPA (Spanish Multidisciplinary Deep-Sea Surveys) deep-sea trawl surveys (2005) provide additional supporting evidence for the presence of coral gardens [GeMS Ver.5]. The predicted extent of coral gardens at Anton Dohrn Seamount is provided by a habitat map produced by the University of Plymouth (2009) based on interpreted data from the Strategic Environmental Assessment surveys (2005) commissioned by the Department of Trade and Industry (now Department for Business, Energy and Industrial Strategy). **Deep-sea sponge aggregations** Data supporting the presence of deep-sea sponge aggregations are from the following surveys: AFEN Strategic Environmental Assessment survey (1996), oil & gas exploration environmental surveys of the Hebridean Slope North-west of Lewis (1998); Department of Trade and Industry (now Department for Business, Energy and Industrial Strategy) Strategic Environmental Assessment surveys (2005 and 2006), and a deep-water video survey by Marine Scotland Science (2011)[3,GeMS Ver.5]. Data from GeMs (Ver.5) conform to the habitat definition for deep-sea sponge aggregations produced by a JNCC-commissioned contract (Henry and Roberts, 2014b), records from the ICES Vulnerable Marine Ecosystem database[2] are deep-sea sponge aggregations as defined by ICES (2015). One by-catch record from Marine Scotland Science deep-sea trawling survey in 2017[2] provides additional supporting evidence for the presence of deep-sea sponge aggregations. **Offshore deep-sea muds and Offshore subtidal sands and gravels** The presence of offshore subtidal sands and gravels and offshore deep-sea muds is supported by Particle Size Analysis (PSA) data collected during British Geological Surveys[1]. Biological community analysis of videos and stills also support the presence of these proposed features and were collected during the following surveys: Department of Trade and Industry (now Department for Business, Energy and Industrial Strategy) Strategic Environmental Assessment surveys (2005 and 2006), Challenger survey of the Hebridean Slope North-west of St. Kilda (1988), oil and gas exploration

surveys of the Hebridean Slope North-west of Lewis in February 1998, and Marine Scotland Science video survey (2007)[GeMS Ver.5].

Habitat maps produced using acoustic survey data (Strategic Environmental Assessment 2005[8] and IFREMER, 2005[6]) were available for areas around Anton Dohrn Seamount[8] and the Barra Fan (Sotheran *et al.,* 2014)[7], these maps were used along with UKSeaMap 2018[4] to support our understanding of the extent of offshore deep-sea muds and offshore subtidal sands and gravels.

Seamount communities

Data supporting the presence of seamount communities are from the following surveys: Marine Scotland Science by-catch records from deep-sea trawl surveys in 2005, 2006, 2009, 2011, 2012 and 2016[2, GeMS Ver.5]; a cruise report (Marine Report 87/43) from the British Geological Survey, Marine Geology Research Programme (1987) [GeMS Ver.5]; and data collated by Max Wisshak & Andre Freiwald / IPAL Erlangen)[3].

The predicted extent of seamount communities at Anton Dohrn Seamount was modelled by the University of Plymouth, based on interpretation of data from Department of Trade and Industry (now Department for Business, Energy and Industrial Strategy) Strategic Environmental Assessment surveys (2005)[8 in GeMS Ver.5].

The extent of seamount communities is considered equivalent to the extent of the seamount, therefore acoustic data available for Anton Dohrn and Rosemary Bank Seamount provide the best available data source to indicate the extent of seamount communities (see 'Seamounts' below for acoustic data sources).

Seamounts

Data supporting the presence and extent of seamounts are available from full coverage multibeam survey data. At Rosemary Bank Seamount these acoustic data were collected by the British Antarctic Survey in 2003 during the RRS James Clark Ross (survey JR99), and from Department of Trade and Industry (now Department for Business, Energy and Industrial S) Strategic Environmental Assessment surveys (2005 and 2006)[10, 11, 12]. At Anton Dohrn Seamount full coverage multibeam data were collected from the Department of Trade and Industry (now Department for Business, Energy and Industrial Strategy) Strategic Environmental Assessment survey (2005), and Anton Dohrn survey (2009)[5].

	Blue Ling Data supporting the presence of Blue ling are from Marine Scotland Science deep-water fisheries trawl surveys between 1997 and 2018[9, GeMS Ver.5]. Data on the extent of spawning areas for Blue ling within the pMPA are from Large *et al.,* (2010) [GeMS Ver.5]. **Leafscale gulper shark/Gulper shark** Data supporting the presence of Leafscale gulper shark / Gulper shark are from Marine Scotland Science deep-water fisheries trawl data collected between 1997 and 2018[9]. Tyler-Walters *et al.* (2016) and Priede (2018) provide a description of the species distribution and extent. **Orange roughy** Data supporting the presence of Orange roughy are from Marine Scotland Science trawl survey data collected between 2000 and 2018[9, GeMS Ver.5]. One additional record of Orange roughy was collected at Anton Dohrn Seamount (2009)[5], derived from analysis of video/still imagery. Tyler-Walters *et al.* (2016) and Priede (2018) provide a description of the species distribution and extent. **Portuguese dogfish** Data supporting the presence of Portuguese dogfish are from Marine Scotland Science deep-water fisheries trawl data collected between 1997 and 2018[9]. Tyler-Walters *et al.* (2016) and Priede (2018) provide a description of the species distribution and extent. **Round-nose grenadier** Data supporting the presence of Round-nose grenadier are from Marine Scotland Science deep-water fisheries trawl data collected between 1997 and 2018[9]. Tyler-Walters *et al.* (2016) and Priede (2018) provide a description of the species distribution and extent.

5.3 Sampling methods						
Feature	**Modelled**	**Acoustic**	**Video / camera**	**Infaunal - grab / core**	**Fisheries trawl/by-catch**	**Sediment sampling**
Burrowed mud			✓		✓	
Cold-water coral reefs	✓	✓	✓		✓	
Coral gardens	✓	✓	✓		✓	
Deep-sea sponge aggregations			✓		✓	
Offshore deep-sea muds	✓	✓	✓			✓
Offshore subtidal sands and gravels	✓	✓	✓			✓
Seamount communities	✓		✓		✓	
Seamounts		✓				
Blue ling	✓				✓	
Leafscale gulper shark / Gulper shark	✓				✓	
Orange roughy	✓		✓		✓	
Portuguese dogfish	✓				✓	
Round-nose grenadier	✓				✓	
Comments	The evidence collated to support the presence and extent of the proposed protected features of the pMPA includes a range of sampling methods: video / camera images [(GeMS Ver. 5),2,3,5], Particle Size Analysis of sediment samples[1], fisheries trawl data[(GeMS Ver. 5),2,9], modelled habitat data[4, 7, 8] and acoustic multibeam data[6,9] (British Antarctic Survey, 2003; Department of Trade and Industry (now Department for Business, Energy and Industrial Strategy) Strategic Environmental Assessment surveys (2005 and 2006)[10, 11, 12].					

Comments	The presence of the following proposed protected features: burrowed mud, cold-water coral reefs, coral gardens, deep-sea sponge aggregations, offshore deep-sea muds and offshore subtidal sands and gravels are confirmed from analysis of video / camera images. Video / camera images the best source of data to verify the presence of burrowed mud, cold-water coral reefs, coral gardens, deep-sea sponge aggregations. Acoustic data would assist in determining the extent of cold-water coral reefs, some of the sub-types of coral garden and the proposed protected sedimentary habitats (offshore deep-sea muds and offshore subtidal sands and gravels). Supporting evidence is available from fisheries trawl by-catch records for the following proposed protected features: burrowed mud, coral gardens, deep-sea sponge aggregations and seamount communities, however we have assigned lower confidence to these records as it is an extractive sampling method and the proposed protected feature is no longer present. In addition, the location accuracy from trawl data are lower as the feature may have been collected at any point along the trawl and the habitat definitions for many of these features include criteria such as density and patch extent which cannot be determined from by-catch data alone. The presence of offshore deep-sea muds and offshore subtidal sands and gravels is confirmed from the Particle Size Analysis (PSA) of sediment samples from the British Geological Survey dataset[1]. Sediment sampling is considered the best source of data for verifying the presence of sedimentary habitats such as offshore deep-sea muds and offshore subtidal sands and gravels. Additional data are available from biotope analysis of video / camera images [GeMS Ver.5]. Whilst this helps support the assessment of the biological communities associated with these proposed protected features, determination of sediment type from visual images is less reliable than PSA of sediment samples. The distribution and extent of these features is supported by full coverage modelled habitat data from UKSeaMap 2018[4], along with habitat maps produced from acoustic survey data around Anton Dohrn Seamount[8] and north of The Barra Fan[6,7]. UKSeaMap2018 uses acoustic data where it is available, along with seabed substrate data (including BGS data[1]) and other physical parameters to produce a predictive seabed habitat map. The presence of deep-sea fish constituting proposed protected features of the pMPA (Blue ling, Leafscale gulper shark/Gulper shark, Orange roughy, Portuguese dogfish and Round-nose grenadier) are confirmed from Marine Scotland Science deep-water fisheries trawls[9, GeMS Ver.5], and Large *et al*., (2010)[GeMS Ver.5] for the spawning locations of Blue ling. Tyler-Walters *et al.* (2016) and Priede (2018) provide a description of the species distribution and extent. Video/still image data were also available for Orange Roughy at Anton Dohrn Seamount[5]. Evidence for the presence and extent of the two seamounts (Anton Dohrn Seamount and Rosemary Bank Seamount) is provided by full coverage multibeam data at these locations[10, 11, 12], enabling the delineation of the seamount features.

5.4 Data coverage					
Across pMPA					
Numerous proposed protected feature records evenly distributed across pMPA?	**-**	**Numerous proposed protected feature records scattered across the pMPA with some clumping?**	✓	**Few or isolated proposed protected feature records - possibly clumped?**	**-**
Individual proposed protected features					
Multiple records of individual proposed protected features providing indication of extent and distribution throughout pMPA?	Cold water coral reefs Seamount communities Seamounts	**Few or scattered records of specific proposed protected features making extent and broad distribution assessment difficult?**	Offshore deep-sea muds Offshore subtidal sands and gravels Blue ling Leafscale gulper shark Gulper shark Orange roughy Portuguese dogfish Round-nose grenadier	**Few or isolated records of specific proposed protected feature records**	Burrowed mud Coral gardens Deep-sea sponge aggregations
Are acoustic sensing data available to facilitate the development of a full coverage predictive seabed habitat map?			No. Full coverage acoustic remote sensing data are available for Rosemary Bank Seamount and Anton Dohrn Seamount as components of the pMPA.		

Comments	Due to the scale of the pMPA there are large areas that have not been surveyed and sampling effort across the pMPA varies between proposed protected features. **Burrowed mud** The majority of records supporting the presence and extent of burrowed mud (including sea-pen by-catch data as an indicator of the habitat) are from the Hebridean slope area to the east of the pMPA. There are however scattered records from across Anton Dohrn Seamount, Rosemary Bank Seamount and George Bligh Bank and a small number of records from within the Rockall Trough that support the presence of the proposed protected feature. The majority of the pMPA is considered to constitute muddy habitat (particularly the deeper areas of the Rockall Trough). As such, it is conceivable that burrowed mud is much more widely distributed within the boundary of the pMPA than is possible to identify from current survey effort. **Cold-water coral reefs** Records supporting the presence and extent of cold-water coral reefs are clustered on the topographic features of Anton Dohrn Seamount, Rosemary Bank Seamount and George Bligh Bank. There are also a few records in the North-east corner of the pMPA. A modelled habitat map produced by JNCC in 2014 indicates the extent of cold-water coral reefs at Anton Dohrn Seamount[3]. Habitat Suitability Modelling (Ross *et al.,* 2015) supports the observation from verified data records that cold-water coral reef shows a strong association with topographic features such as seamounts. Therefore, we are confident in the distribution and extent of this proposed protected feature within the pMPA. **Coral gardens** The majority of records supporting the presence and extent of coral gardens within the pMPA occur on Anton Dohrn Seamount and George Bligh Bank. However, there are scattered records within the Rockall Trough and on the Hebridean slope that support the presence of the proposed protected feature. A modelled habitat map[8] indicates the extent of coral gardens at Anton Dohrn Seamount. The habitat definition for coral gardens (Henry and Roberts 2014a, and ICES, 2015) include a number of sub-types of coral garden which can occur on both hard and soft substrate. It is possible therefore that the sub-types of coral garden that occur in soft sediments (e.g. *Acanella normani*, soft-bottom bamboo coral gardens) may be much more widely distributed within the pMPA than it is possible to identify from the current sampling effort, as the majority of the pMPA is considered to constitute muddy habitat. **Deep-sea sponge aggregations** The majority of records supporting the presence and extent of deep-sea sponge aggregations within the pMPA occur on Rosemary Bank Seamount, George Bligh Bank and the Hebridean slope north-west of Lewis. One record occurs in the north-east of the pMPA.

Comments	The habitat definition for deep-sea sponge aggregations (Henry and Roberts 2014b, and ICES, 2015) includes a number of sub-types of deep-sea sponge aggregations. Deep-sea sponge aggregations have similar habitat preferences to cold-water corals, and hence are often found at the same location; they may be found on soft substrata or hard substrata, such as boulders and cobbles which may lie on sediment (OSPAR, 2010). As such it is conceivable that deep-sea sponge aggregations may be more widely distributed within the pMPA than it is possible to identify from the current sampling effort. **Offshore deep-sea muds** There are 233 records collected between 1984-2000 from the British Geological Survey (BGS) Particle Size Analysis (PSA)[1] dataset supporting the presence and extent of offshore deep-sea mud within the pMPA. The majority of records are in the western area of the pMPA between Anton Dohrn and George Bligh Bank; records also occur along the continental slope and the north-east corner of the pMPA, but there is a large area in the north of the Rockall Trough without any data points. Additional records (123) GeMS Ver.5 from the biological analysis of video / camera images are clustered on the continental slope north-west of Lewis, with a few records on Anton Dohrn and close to the western boundary of the pMPA. Our understanding of the extent of offshore deep-sea muds within the pMPA is supported by habitat maps around Anton Dohrn Seamount[8], the south-east of the pMPA north of the Barra Fan[7] and the modelled habitat map UKSeaMap 2018[4]. These habitat maps predict the presence of offshore deep-sea muds across most of the Rockall Trough, excluding the seamounts, the western part of the pMPA around George Bligh Bank and the north-east of the pMPA along the continental slope. There is good agreement between the data points where they occur and the predicted extent of offshore deep-sea muds from the habitat maps. **Offshore subtidal sands and gravels** There are 35 records collected between 1985-1994 from the British Geological Survey (BGS) Particle Size Analysis (PSA)[1] dataset supporting the presence and extent of offshore subtidal sands and gravels within the pMPA. The majority of records are along the western boundary of the pMPA south of George Bligh Bank; records also occur on the seamounts and the south-east corner of the pMPA, but there is a large area in the north of the Rockall trough without any data points. Additional records (1588) GeMS Ver.5 from the biological analysis of video / camera images are clustered on the seamounts and the northern half of the continental slope. Our understanding of the extent of offshore subtidal sands and gravels within the pMPA is supported by habitat maps around Anton Dohrn Seamount[8], the south-east of the pMPA north of the Barra Fan[7] and the modelled habitat map UKSeaMap 2018[4]. These habitat maps predict the presence of offshore subtidal sands and gravels on the seamounts, the western part of the pMPA around George Bligh Bank and the north-east of the pMPA along the continental slope. There is good agreement between the data points where they occur and the predicted extent of offshore subtidal sands and gravels from the habitat maps.

Comments	**Seamount communities** The presence of seamount communities is supported by 15 records on Rosemary Bank Seamount and four records on Anton Dohrn seamount. At Rosemary Bank Seamount the records are well spread across the Seamount and at Anton Dohrn the records occur on the south and east flanks of the Seamount. The extent of both seamounts (and by inference seamount communities) is supported by full coverage acoustic multibeam data (British Antarctic Survey, 2003[10]; Department of Trade and Industry (now Department for Business, Energy and Industrial Strategy) Strategic Environmental Assessment surveys, 2005[11], 2006[12]; and Anton Dohrn, 2009[5]) **Seamounts** The presence and extent of Rosemary Bank Seamount is clearly shown in the British Antarctic Survey (National Environment Research Council) multibeam data (2003)[10], supplemented by the 2005 and 2006 Department of Trade and Industry (now Department for Business, Energy and Industrial Strategy) Strategic Environmental Assessment surveys multibeam datasets[11, 12]. These data were used to digitise the extent of the seamount for the purposes of delineating a boundary at Rosemary Bank Seamount MPA (JNCC, 2014). The presence and extent of Anton Dohrn Seamount can be seen from full coverage multibeam data collected by the Department of Trade and Industry (now Department for Business, Energy and Industrial Strategy) Strategic Environmental Assessment surveys (2005)[11], supplemented by acoustic data from the Anton Dohrn survey (2009)[5]. The extent of Anton Dohrn Seamount was digitised by JNCC in 2012 to delineate the Anton Dohrn Seamount MPA boundary and a digitise polygon was also produced by the University of Plymouth in 2016[3]. **Deep-sea fish species** Overall the distribution of records supporting the six deep-sea fish species is considered as few or scattered records making extent and broad distribution difficult to assess. There are multiple records supporting each of these features, however their extent across the pMPA is limited due to the distribution of survey effort. Information on the range and extent of species is supported by a review of the literature (Priede, 2018) and Priority Marine Feature descriptions in Tyler-Walters *et al.* (2016). **Blue ling** The presence and extent of Blue ling is supported by 95 records collected between 1997 and 2018[9, GeMS Ver.5] from Marine Scotland Science deep-water trawl surveys. The majority of records are distributed along the continental slope, the seamounts and south of George Bligh Bank. Spawning locations for Blue ling, identified by Large *et al*., (2010), occur along the continental slope, north of Rosemary Bank Seamount and in the north-west corner of the pMPA. An indication of the extent and distribution of Blue ling across

Comments	the pMPA is provided by Tyler-Walters *et al.* (2016) and Priede (2018), Blue ling are reported at a depth range of 300 to 1500m for the southern stock off Scotland with peak abundance at 750 to 1000m depth. **Leafscale gulper shark/Gulper shark** The presence and extent of Leafscale gulper shark / Gulper shark is supported by 59 records collected between 1997 and 2018[9] from Marine Scotland Science deep-water trawl surveys. The majority of records are distributed along the continental slope and at Rosemary Bank Seamount. However, the distribution of records is limited by the spatial extent of survey effort. An indication of the extent and distribution of Leafscale gulper shark / Gulper shark across the pMPA is provided by Tyler-Walters *et al.* (2016) and Priede (2018). Leafscale gulper shark and gulper shark are found at depths between 415 – 2400m and Leafscale gulper shark is potentially resident throughout the deep-waters of the pMPA, with peak abundance at 800m. The pMPA is one of only 17 locations world-wide where gulper shark has been recorded (Priede, 2018). **Orange roughy** The presence and extent of Orange roughy is supported by 69 records collected between 2000 and 2018[9, GeMS Ver.5] from Marine Scotland Science deep-water trawl surveys and one from a video survey at Anton Dohrn seamount (2009)[5]. The majority of records are distributed along the continental slope, over the seamounts and south of George Bligh Bank. However, the distribution of records is limited by the spatial extent of survey effort. An indication of the extent and distribution of Orange roughy across the pMPA is provided by Tyler-Walters *et al.* (2016) and Priede (2018). In the Rockall Trough Orange roughy are found on slopes between 500-1750m and form large spawning aggregations around seabed features such as slopes and Seamounts. **Portuguese dogfish** The presence and extent of Portuguese dogfish is supported by 88 records collected between 1997 and 2018 from Marine Scotland Science deep-water trawl surveys[9]. The majority of records are distributed along the continental slope and the north-east of the pMPA, over Rosemary Bank Seamount and south of George Bligh Bank. However, the distribution of records is limited by the spatial extent of survey effort. An indication of the extent and distribution of Portuguese dogfish across the pMPA is provided Tyler-Walters *et al.* (2016) and Priede (2018). Portuguese dogfish occur throughout the deep-waters to the west of Scotland where they have been reported from depths of 700 – 1900m, with a peak abundance at 1300 – 1400m. **Round-nosed grenadier** The presence and extent of Round-nose grenadier is supported by 183 records collected between 1997 and 2018 from Marine Scotland Science deep-water trawl surveys[9]. The majority of records are distributed along the continental slope and the north-east

Comments	of the pMPA, over Rosemary Bank Seamount and south of George Bligh Bank. However, the distribution of records is limited by the spatial extent of survey effort. An indication of the extent and distribution of Round-nose grenadier across the pMPA is provided Tyler-Walters *et al.* (2016) and Priede (2018). Round-nose grenadier can be considered resident within the pMPA and occur at a depth range of 750-1,750m in the Rockall Trough, however the location of areas important to the life history of this species within the pMPA are unknown. **Geological/geomorphological features** Geological and geomorphological features associated with the following Key Geodiversity Areas (Brooks *et al*., 2011) fall within the pMPA and are recommended for protection – Anton Dohrn Seamount (and adjacent basin floor), George Bligh Bank (and adjacent basin floor), North-east Rockall Bank (and adjacent basin floor), Rosemary Bank Seamount (and adjacent seafloor), Summer Isles to Sula Sgeir Fan, The Barra Fan, and The Peach Slide Complex.

5.5 Additional figures

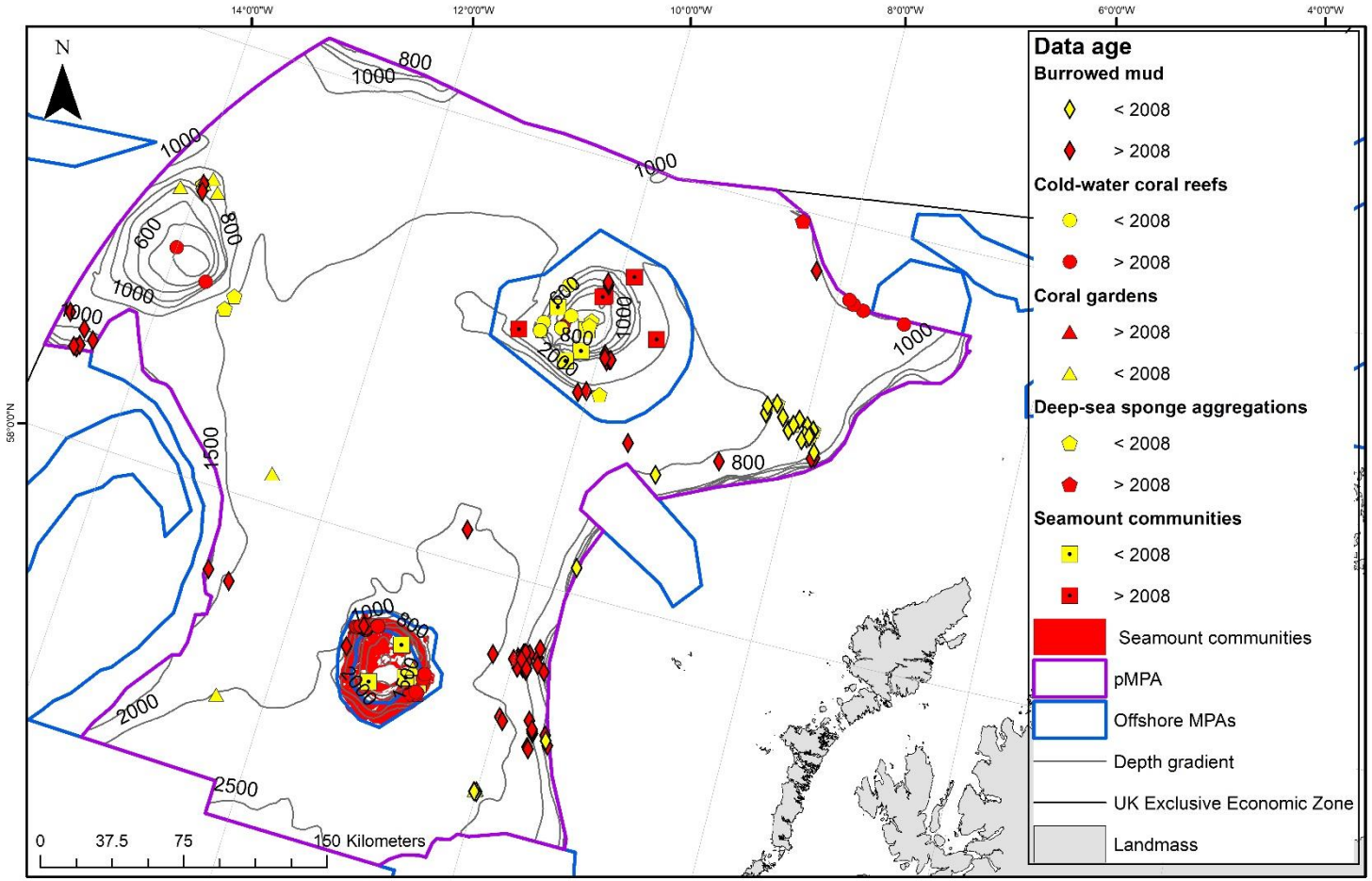

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Figure 6. Age of data proposed protected VME features

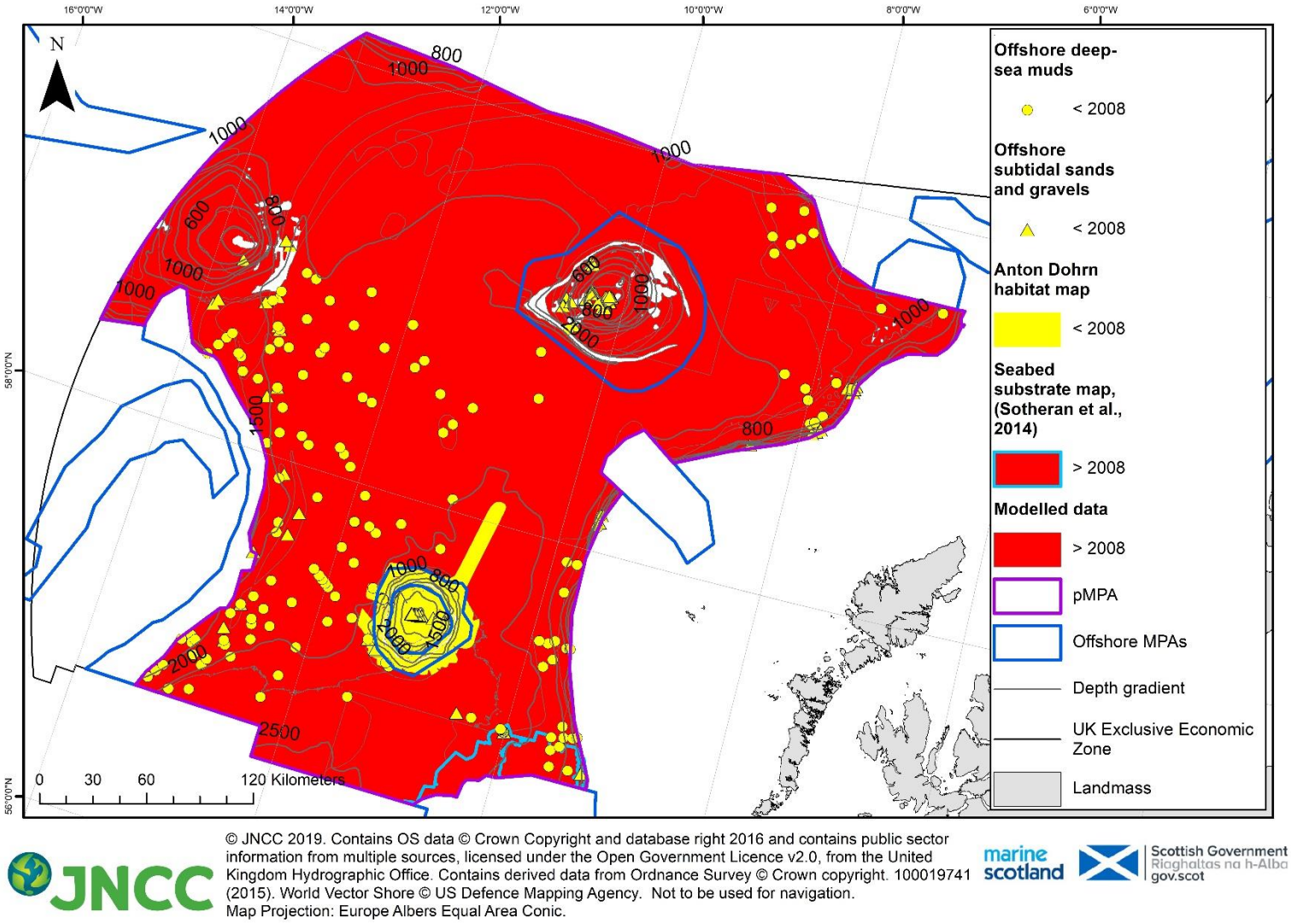

Figure 7. Age of data proposed protected sedimentary features

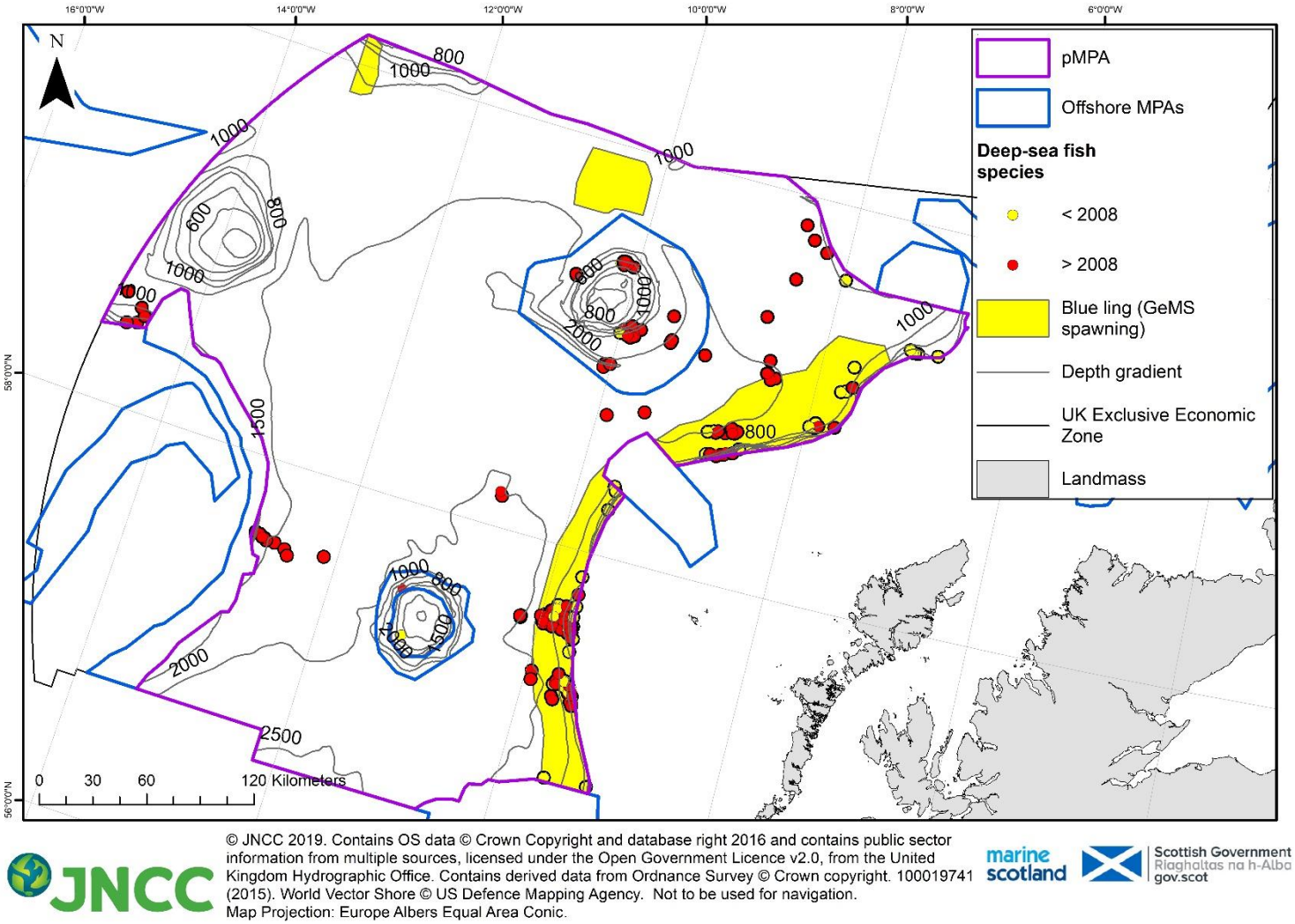

Figure 8. Age of data proposed protected deep-water fish and elasmobranch species

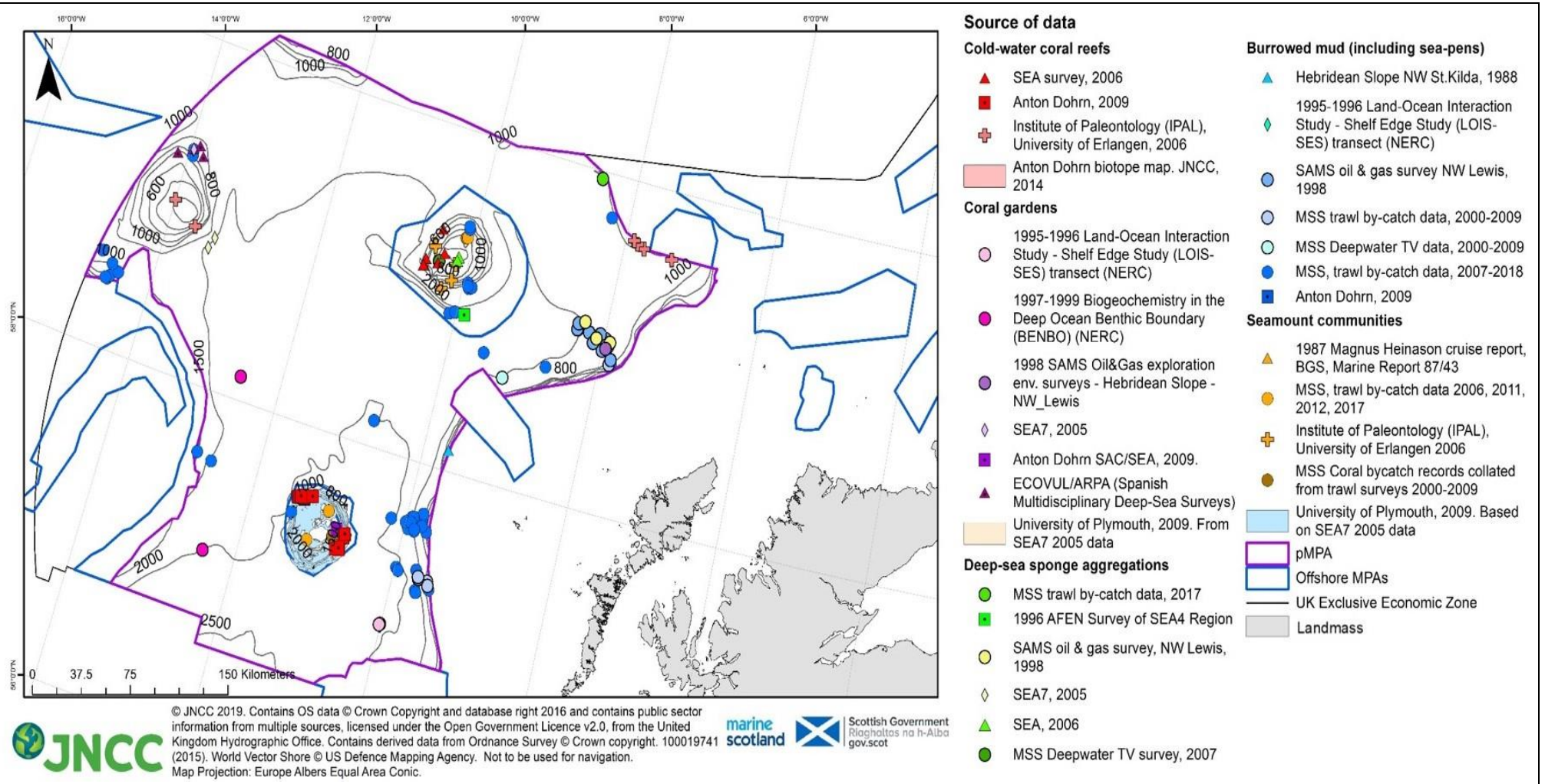

Figure 9. Source of data proposed protected VME features

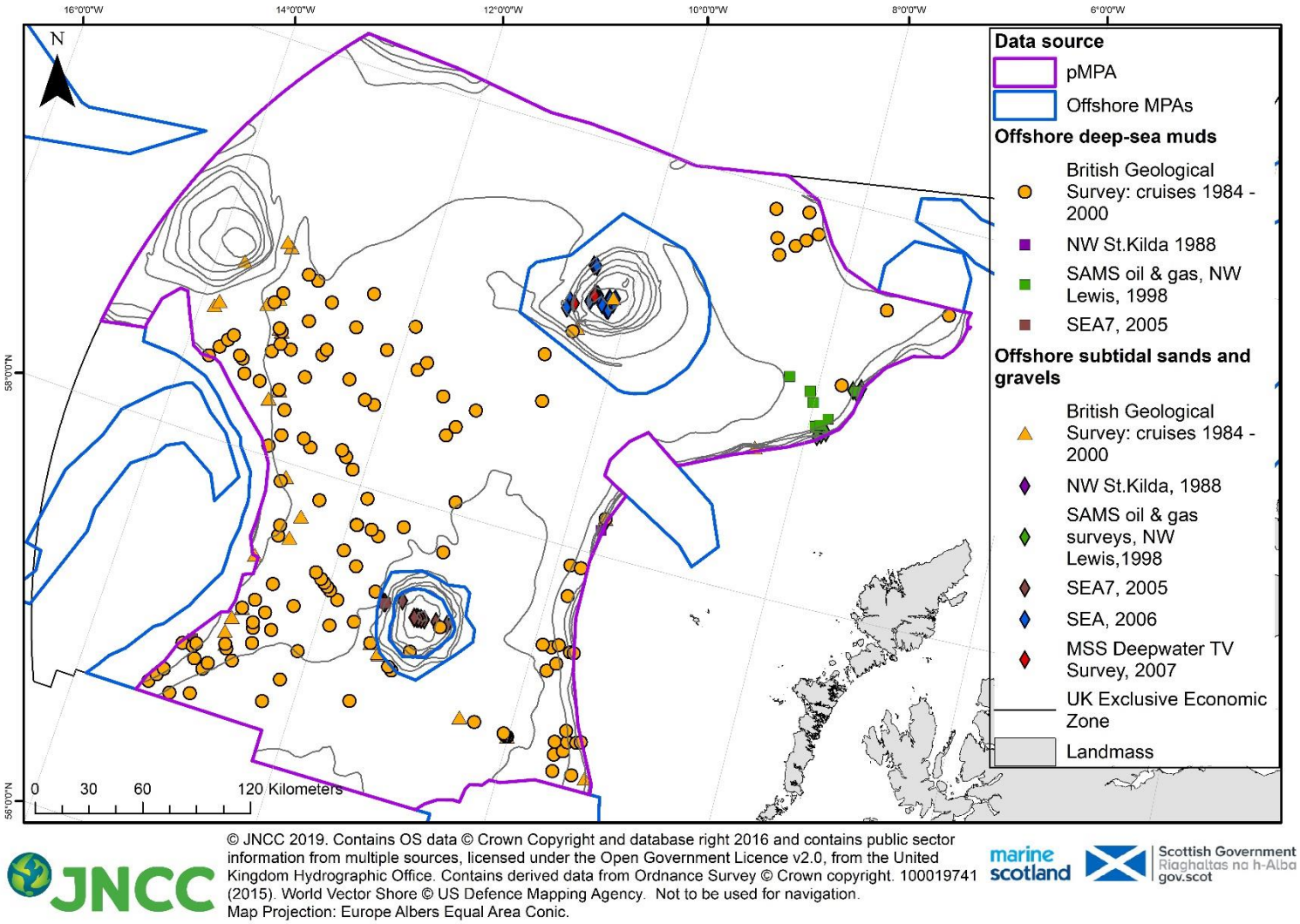

Figure 10. Source of data proposed protected sedimentary features

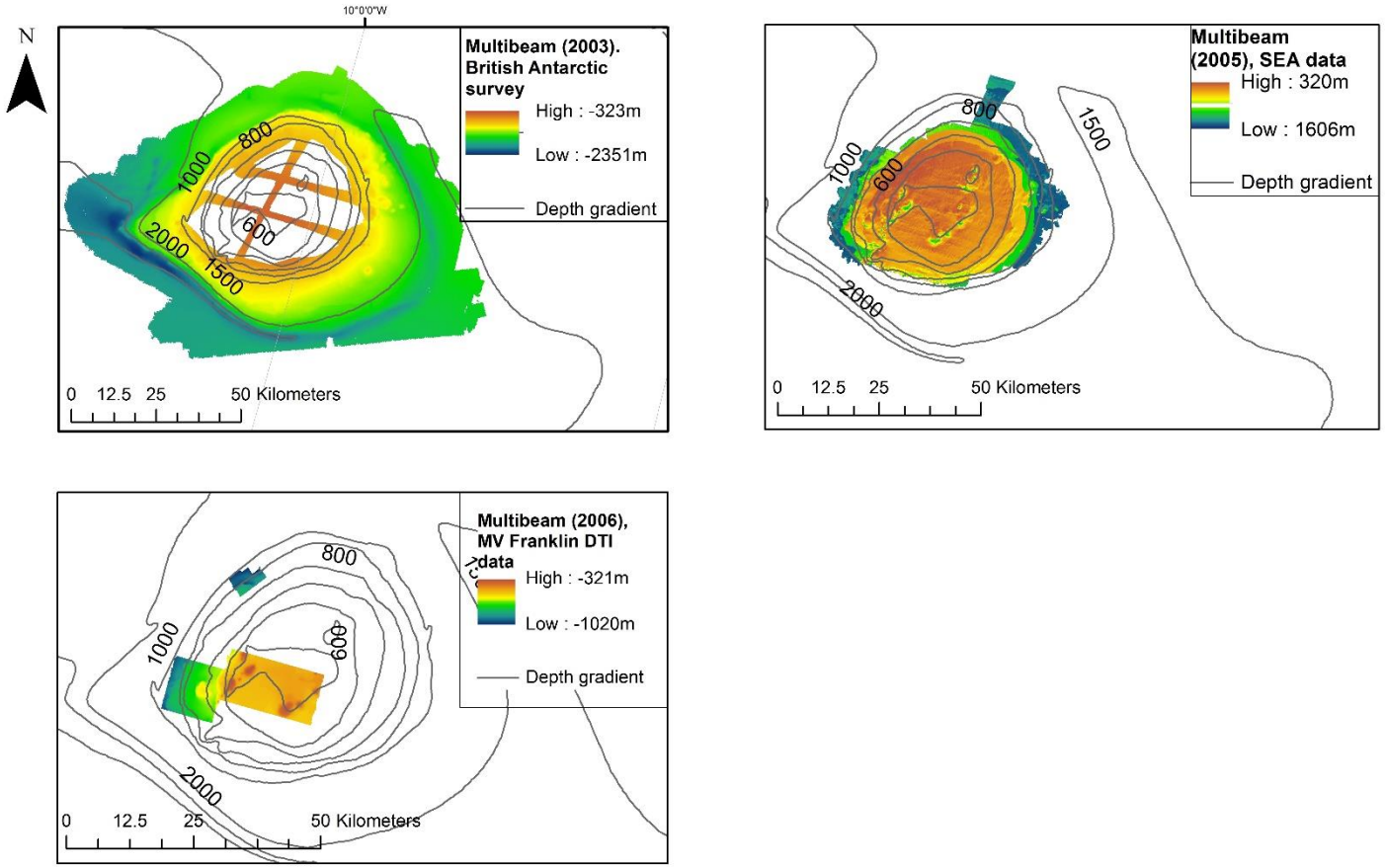

Figure 11. Multibeam data at Rosemary Bank Seamount

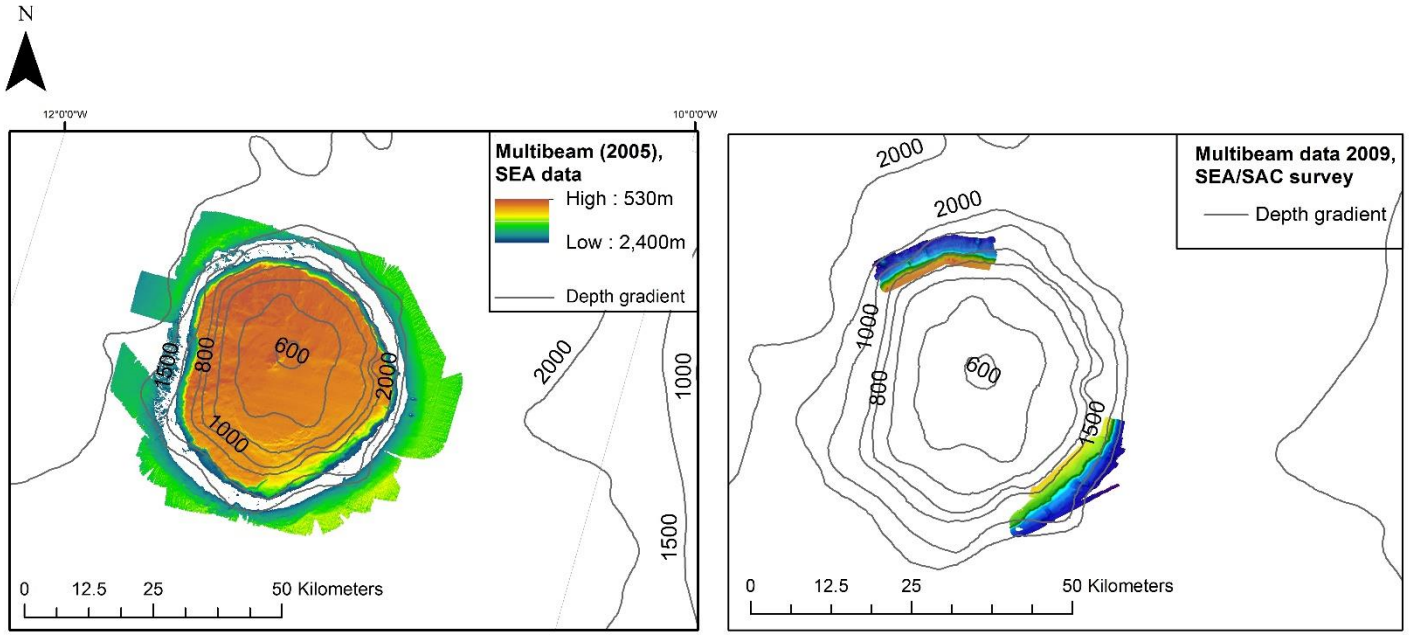

Figure 12. Multibeam data at Anton Dohrn Seamount

6 Bibliography

Year	Title	Features covered
2018	Doggett, M., Baldock, B. & Goudge, H. (2018). A review of the distribution and ecological importance of seabed communities in the deep waters surrounding Scotland. JNCC Report No. 625, JNCC, Peterborough, ISSN 0963-8091. Available online at: http://jncc.defra.gov.uk/page-2132	Burrowed mud Offshore deep-sea mud · Offshore subtidal sands and gravels
2018	ICES (2018). Report of the ICES/NAFO Joint Working Group on Deep-water Ecology (WGDEC), 5–9 March 2018, Dartmouth, Nova Scotia, Canada. ICES CM 2018/ACOM:26. 126 pp. Available online at: http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2018/WGDEC/WGDEC_2018.pdf	Burrowed mud Cold-water coral reefs Coral gardens Deep-sea sponge aggregations
2018	Manca *et al*., (2018). UKSeaMap2018 - modelled habitat map of UK seabed habitats. Further information available at: http://jncc.defra.gov.uk/ukseamap	Offshore deep-sea muds Offshore subtidal sands and gravels
2018	Priede, I.G. (2018) Deep-sea Fishes Literature Review. JNCC Report No. 619. JNCC, Peterborough. ISSN 0963-8091. Available online at: http://jncc.defra.gov.uk/page-2132	Blue ling Leafscale gulper shark Gulper shark Orange roughy Portuguese dogfish Round-nose grenadier
2016	Tyler-Walters, H., James, B., Carruthers, M. (eds.), Wilding, C., Durkin, O., Lacey, C., Philpott, E., Adams, L., Chaniotis, P.D., Wilkes, P.T.V., Seeley, R., Neilly, M., Dargie, J. & Crawford-Avis, O.T. (2016). Descriptions of Scottish Priority Marine Features (PMFs). Scottish Natural Heritage Commissioned Report No. 406. Available online at: http://jncc.defra.gov.uk/PDF/PMF_final_descriptions_report.pdf	

6 Bibliography

Year	Title	Features covered
2015	ICES, (2015). Report of the Workshop on Vulnerable Marine Ecosystem Database (WKVME), 10–11 December 2015, Peterborough, UK. ICES CM 2015/ACOM:62. 42 pp. Available online at: http://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/acom/2015/WKVME/wkvme_2015.pdf	Burrowed mud Cold-water coral reefs Coral gardens Deep-sea sponge aggregations
2015	Neat, F.C., Burns, F., Jones, E. & Blasdale, T. (2015). The diversity, distribution and status of deep-water elasmobranchs in the Rockall Trough, north-east Atlantic Ocean. *Journal of Fish Biology* **87**: 1469–1488 doi:10.1111/jfb.12822	Leafscale gulper shark Gulper shark
2015	Ross LK, Ross RE, Stewart HA, Howell KL (2015). The Influence of Data Resolution on Predicted Distribution and Estimates of Extent of Current Protection of Three 'Listed' Deep-Sea Habitats. *PLoS ONE* **10**(10): e0140061. Available from: https://doi.org/10.1371/journal.pone.0140061	Cold-water coral reefs
2014a	Henry, L-A and Roberts, M. (2014). Developing an interim technical definition for coral gardens specific for UK waters and its subsequent application to verify suspected records. Report for the Joint Nature Conservation Committee, JNCC Report No. 507. Available from: http://jncc.defra.gov.uk/PDF/507_web.pdf	Coral gardens
2014b	Henry, L.A. & Roberts, J.M. (2014). Applying the OSPAR habitat definition of deep-sea sponge aggregations to verify suspected records of the habitat in UK waters. JNCC Report No. 508. Available from: http://jncc.defra.gov.uk/PDF/508_web.pdf	Deep-sea sponge aggregations
2014	Hughes, D., Nickell, T. & Gontarek, S. (2014). Biotope analysis of archived stills from the SEA7 region of Scotland's seas (2011). JNCC Report, No. 502. Available from: http://jncc.defra.gov.uk/PDF/502_web.pdf	Offshore deep-sea muds Offshore subtidal sands and gravels

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Year	Title	Features covered
2014	Moura, T., Jones, E., Clarke, M.W., Cotton, C.F., Crozier, P., Daley, R.K., Diez, G., Dobby, H., Dyb, J.E., Fossen, I., Irvine, S.B., Jakobsdottir, K., López-Abellán, L.J., Lorance, P., Pascual-Alayón, P., Severino, R.B. & Figueiredo, I. (2014). Large- scale distribution of three deep-water squaloid sharks: integrating data on sex, maturity and environment. *Fisheries Research*, **157**: 47–61.	Leafscale gulper shark Gulper shark
2014	Sotheran, I., A. Benson & Crawford-Avis, O. (2014). Mapping habitats and biotopes to strengthen the information base of Marine Protected Areas in Scottish waters, Phase 2 (Barra Fan and Hebrides Terrace Seamount Area), pp 28. JNCC Report, No. 527. Available from: http://jncc.defra.gov.uk/page-6816	Offshore deep-sea mud Offshore subtidal sands and gravels
2011	Brooks, A.J. Kenyon, N.H. Leslie, A., Long, D. & Gordon, J.E. (2011). Characterising Scotland's marine environment to define search locations for new Marine Protected Areas. Part 2: The identification of key geodiversity areas in Scottish waters (interim report July 2011). Scottish Natural Heritage Commissioned Report No.430. Available from: https://www.researchgate.net/publication/279440166	Geological/geomporphological features
2010	Large, P. A., Diez, G., Drewery, J., Laurans, M., Pilling, G. M., Reid, D. G., Reinert, J., South, A. B., and Vinnichenko, V. I. (2010). Spatial and temporal distribution of spawning aggregations of blue ling (Molva dypterygia) west and northwest of the British Isles. – *ICES Journal of Marine Science*, **67**: 494–501.	Blue ling
2010	OSPAR Commission (2010). Background Document for Deep-sea sponge aggregations.	Deep-sea sponge aggregations