

Inshore and Offshore Special Area of Conservation: Pobie Bank Reef

SAC Selection Assessment Document



©DTI, 2003

Version 2.0 (27 October 2011)

*Cover photo illustrates Annex I bedrock reef with encrusting coralline algae and bryozoans and abundant soft corals (*Alcyonium digitatum*) at Pobie Bank Reef.

Introduction

This document provides detailed information about the Pobie Bank Reef site and evaluates its interest features according to the Habitats Directive selection criteria and guiding principles.

The advice contained within this document is produced to fulfil requirements of JNCC and SNH under Part 2 of the Offshore Marine Conservation (Natural Habitats, & c.) Regulations 2007 (as amended), relating to the conservation of natural habitat types and habitats of species through identification of Special Areas of Conservation (SACs) in UK offshore and inshore waters. Under these Regulations, JNCC and SNH have an obligation to provide certain advice to Scottish Government to enable the Secretary of State to fulfil his obligations under the Regulations, and to Competent Authorities to enable them to fulfil their obligations under the Regulations.

This document includes information required under Regulation 7 of the Offshore Marine Conservation (Natural Habitats, & c.) Regulations 2007 (as amended), to enable the Secretary of State to transmit to the European Commission the list of sites eligible for designation as Special Areas of Conservation (SACs). JNCC and SNH have been asked by Scottish Government to provide this information.

Sites eligible for designation as offshore marine SACs are selected on the basis of the criteria set out in Annex III (Stage 1) to the Habitats Directive and relevant scientific information. Sites are considered only if they host a Habitats Directive Annex I habitat or Annex II species. Moreover, sites for Annex II species that are highly mobile must contain a clearly identifiable area that presents physical and biological factors essential to these species' life and reproduction to be eligible. Socio-economic factors are not taken into account in the identification of sites to be proposed to the European Commission.

In addition to information on the Annex I habitats and/or Annex II species hosted within the site, this document contains i) a chart of the site, ii) its name, location and extent, and iii) the data resulting from application of the criteria specified in Annex III (Stage 1) to the Habitats Directive. This is in line with legal requirements outlined under Regulation 7. JNCC has adhered to the format established by the Commission for providing site information. This format is set out in the 'Natura 2000 Standard data form' (CEC, 1995) (prepared by the European Topic Centre for Biodiversity and Nature Conservation on behalf of the European Commission to collect standardised information on SACs throughout Europe).

Document Version Control

Version and issue date	Amendments made	Issued to and date
SAC SAD Version 2.0 (27.10.11)	Comments from Joint Committee incorporated, dates updated.	Scottish government
SAC SAD Version 1.0 (01.09.11)	Comments from MPA Sub Group incorporated and sent for Joint Committee endorsement	Joint Committee (intersessionally)
SAC SAD Version 0.4 (14.07.11)	Sent for MPA Sub Group approval and for information to UKMBPSG	UKMBPSG and MPA Sub Group
SAC SAD Version 0.3 (10.05.11)	Edits to text and maps after comments received from SNH.	MPA Technical Group 17/05/2011
SAC SAD version 0.2 (16.03.11)	Proposed boundary edited; Additions and edits to document content in preparation for review by SNH and Scottish Government.	SNH, Scottish Government 20/04/2011
SAC SAD version 0.1 (02.07.10)	Proposed site boundary defined; report drafted	02/07/2010

Further information

This document will be available as a PDF file on JNCC's website for download in due course (jncc.defra.gov.uk).

Please return comments or queries to:

Marine Natura Sites Manager
Marine Protected Sites Team
Joint Nature Conservation Committee
Monkstone House
Peterborough
Cambridgeshire
PE1 1JY

Email: offshore@jncc.gov.uk

Tel: +44 (0)1733 866905

Fax: +44 (0)1733 555948

Pobie Bank Reef SAC: Selection Assessment Document

1. Site name Pobie Bank Reef	2. Site centre location 60°31'23"N, 0°17'34"W (Datum: WGS 1984)
3. Site surface area 101,125 ha/1011 km ² (Datum: WGS 1984 UTM Zone 30 North, calculated in ArcGIS)	4. Biogeographic region Atlantic

5. Interest features under the EU Habitats Directive

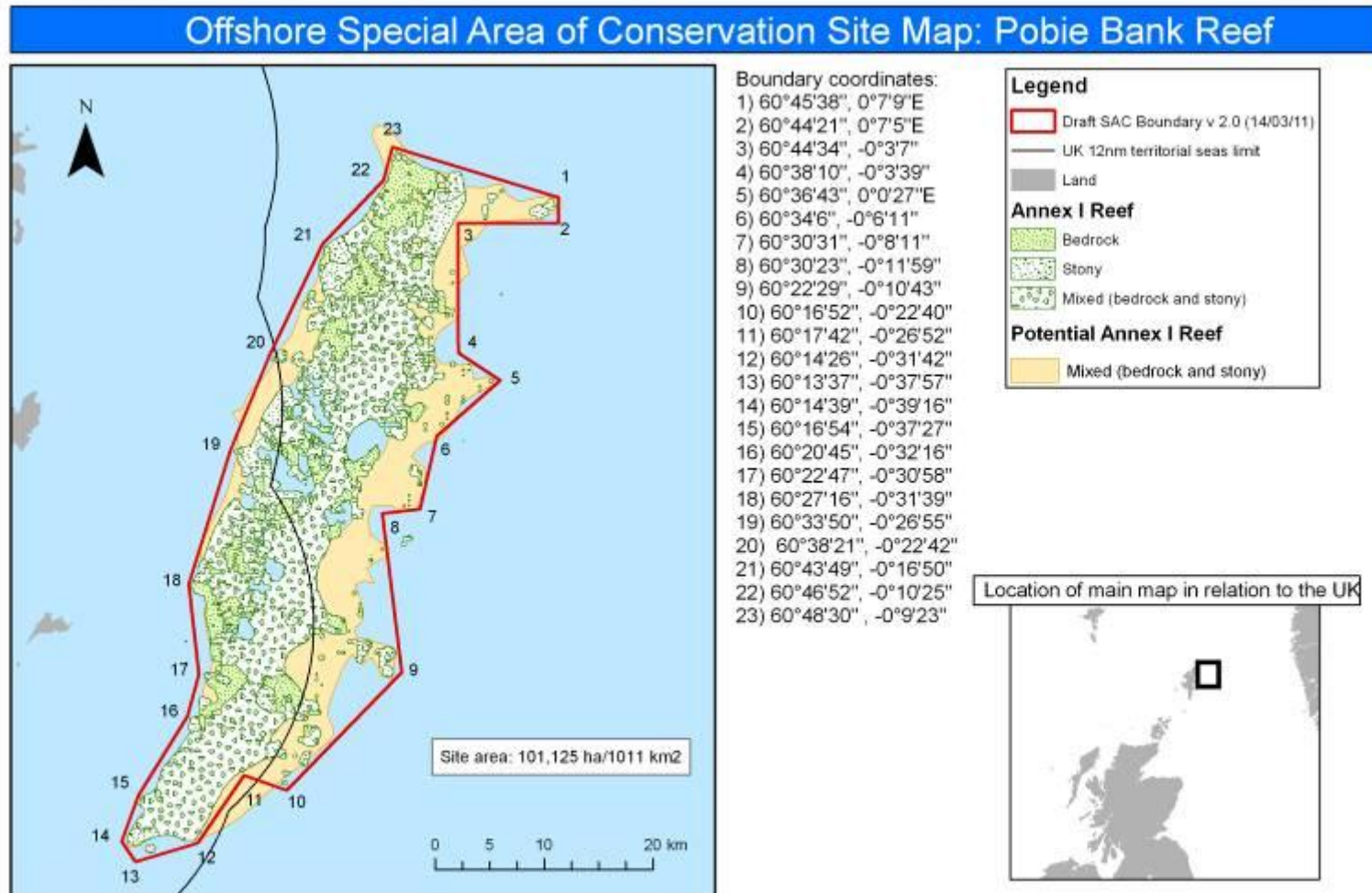
1170 Reefs

1135 Harbour porpoise (*Phocoena phocoena*) (Non-qualifying)

1364 Grey seal (*Halichoerus grypus*) (Non-qualifying)

1365 Harbour (common) seal (*Phoca vitulina*) (Non-qualifying)

6. Map of site



Map projected in UTM (Zone 30N, WGS84 datum). This product has been derived in part from material obtained from the UK Hydrographic Office with the permission of the Controller of Her Majesty's Stationery Office and UK Hydrographic Office (www.ukho.gov.uk). NOT TO BE USED FOR NAVIGATION. The exact limits of the UK Continental Shelf are set out in orders made under section 1(7) of the Continental Shelf Act 1964 (© Crown Copyright). World Vector Shoreline © US Defense Mapping Agency. Map copyright JNCC 2011. Map version 1.0. Author: LR 10/05/11

7. Site summary

Pobie Bank Reef is located in the North Sea, approximately 20km east of Unst, Fetlar and Whalsey in Shetland and is separated from Shetland by the Unst Basin. The proposed SAC is approximately 70km long (crest running NNE to SSW) and up to 21km wide. The depth within the proposed SAC ranges from 70m to over 100m; the average seabed depth within the site boundary is approximately 90m.

The reef is located on a bank of metamorphic and sedimentary rocks covered by a patchy veneer of sediment, ranging from sandy gravels to slightly gravelly sands. The bank overlays a flat plain of sedimentary rock, known as the East of Shetland Platform. The reef is composed of a combination of stony and bedrock reef which meet the definition of the Annex I habitat type 1170: Reef, under the EC Habitats Directive.

In the central section of the reef, very large, rugged bedrocks outcrop from areas of sand and this represents the most topographically complex area. In most areas these outcrops are surrounded by large boulders and cobbles in a sandy matrix. Towards the north and south of the reef, bedrock outcrops are smoother and integrated with extensive areas of stony reef.

The reef provides a habitat to an extensive community of encrusting and robust sponges and bryozoans, which are found throughout the site. In the shallowest areas the bedrock and boulders also support encrusting coralline algae. Axinellid cup sponges (*Axinella infundibuliformis*) are common on the bedrock and stony reef at depth ranges of 70m to over 100m. The bryozoan *Omalosecosa ramulosa* is also common on these reefs, but this species is rare in inshore sites in this regional sea. In the deepest areas (>100m), low-lying silty bedrock is commonplace, supporting small erect sponges, cup corals (*Caryophyllia smithii*) and the brittlestar *Ophiura albida*.

The site is located within the Northern North Sea Regional Sea (JNCC, 2004; Defra, 2004). There are four SACs within this regional sea for which reef is a qualifying feature. These are shown in the table below, along with their characteristic features. Pobie Bank Reef is very different in character to these sites due to its depth; there are no other marine Natura sites within this regional sea containing deep circalittoral bedrock and stony reef.

SAC	Noteable characteristics of reef interest feature
Berwickshire and North Northumberland Coast SAC	Bedrock reef of medium to high topographic complexity. The reef is located in intertidal to circalittoral waters with strong coastal influence and is exposed to moderate energy levels and full salinity waters.
Isle of May SAC	Bedrock reef of medium to high topographic complexity and stony reef in intertidal to circalittoral waters, with intermediate coastal influence. Exposed to moderate to high energy levels and full salinity waters.
Dornoch Firth and Morrich More SAC	Bedrock reef of low topographic complexity, stony reef and <i>Mytilus edulis</i> reef. The reef occurs in shallow (intertidal and infralittoral) waters with strong coastal influence. Exposed to variable energy levels and medium to low salinity waters.

Mousa SAC	Bedrock reef of medium to high topographic complexity, with stony and biogenic (<i>Modiolus modiolus</i>) reef. Located in intertidal to circalittoral waters and exposed to intermediate coastal influence, high to moderate energy levels and full salinity waters.
-----------	---

8. Site boundary

The proposed boundary for Pobie Bank Reef has been defined using JNCC's marine SAC boundary definition guidelines (JNCC, 2008). The proposed boundary is a relatively simple polygon enclosing the minimum area necessary to ensure protection of the Annex I habitat.

The Annex I reef feature has been interpreted from acoustic and groundtruthing data collected during surveys in 2003 and 2006. A confidence map was produced for the distribution of Annex I reef feature (Appendix 2). Regions of potential reef delineated using data types with the lowest confidence were excluded from the site boundary where there was no supplementary data of higher confidence covering the area.

As any bottom trawling that occurs in the area may pose a threat to the reef, the proposed boundary therefore includes a margin to allow for mobile gear on the seabed being at some distance from the location of a vessel at the sea surface. The maximum depth of water around the feature is approximately 100m; assuming a ratio of 3:1 fishing warp length to depth on the continental shelf (as per UK guidance described in (JNCC, 2008)), the proposed boundary is defined to include a margin of 300m from the bedrock and stony reef feature.

Note that the boundary proposed is for the SAC. Any future management measures which may be needed to meet the requirements of the Offshore Marine Conservation (Natural Habitats, & c.) Regulations 2007 (as amended) will be determined by Competent Authorities in consultation with JNCC, and may have different boundaries to the SAC site boundary.

9. Assessment of interest feature against selection criteria

9.1. Reefs

Annex III selection criteria (Stage 1A)

a) Representativity

Pobie Bank Reef is located in the Northern North Sea and represents hard bedrock and stony reef of medium to high topographic complexity, in deep, circalittoral waters. It is present in full salinity waters, subject to intermediate coastal influence and moderate to high energy levels.

The shallowest areas (~70m-85m) of bedrock and stony reef at Pobie Bank Reef support communities of encrusting coralline algae, with encrusting bryozoans, sponges, the soft coral *Alcyonium digitatum* and the tube worm *Pomatoceros triqueter*. In the deeper (>85m)

areas, silty bedrock reef supports communities of Axinellid cup sponges and the cup coral *Caryophyllia smithii*. The brittlestar, *Ophiura albida* commonly occurs on silty sediment surrounding the outcropping bedrock. The two main biotope complexes identified on these deeper areas of bedrock reef (CR.HCR.DpSp and a deeper variant of CR.MCR.EcCr) are not commonly found within this regional sea, largely due to the extremely limited distribution of the associated deep circalittoral rocky habitat.

For some of the biotopes described, variations on the representative species used to classify them have been accommodated (due to the appearance of rare, more northerly species in some areas). These variations include the sponge, *Phakellia rugosa*, the fish, *Icelus bicornis* and the serpulid worm *Ditrupa areatina*, which forms dense aggregations in some areas of Pobie Bank Reef.

The bedrock and stony reef is an excellent example of deep, circalittoral reef, and is the only known extensive example within inshore and offshore waters within this regional sea.

The grade for this feature is A: excellent representativity

b) Area of habitat

The reef feature is approximately 82,348ha (823km²) in area (flat mapped extent). This has been estimated from a study of multibeam data, backscatter data and seabed imagery. The data was interpreted and the reef extent was mapped accordingly.

An estimate of the entire Annex I reef resource (bedrock, cobble and biogenic reef) in UK waters is 7,180,000 hectares. This total extent figure gives the following thresholds for the grades of this criterion (CEC, 1995):

- A – extents between 1,077,000 and 7,180,000 ha (15-100% of total resource)
- B – extents between 143,600 and 1,077,000 ha (2-15% of total resource)
- C – extents less than 143,600 ha (0-2% of total resource)

This site's feature therefore falls within the "0-2%" bracket for Area of Habitat and is graded C.

c) Conservation of structure and functions

Degree of conservation of structure

Available evidence indicates bottom trawling is common in the region of Pobie Bank Reef and static gear is apparent in seabed imagery taken during a DTI (now DECC) survey of Pobie Bank in 2003. However, VMS data of fishing activity suggests that although the reef itself is avoided to protect gear from damage or loss, fishing vessels trawl very close to the reef feature and in some small localised areas, target pockets of sandy sediment that intersperse the reef feature.

Oil and gas exploration occurs to the west and north-east of the Shetland Islands, but this is located at some distance from the site. Further to this, two pipelines are located to the north-western edge of the site. These were installed in 2001 and are therefore unlikely to have any further impact on the site.

The grading for this sub-criterion is therefore II: structure well conserved.

Degree of conservation of functions

The prospects of this feature to maintain its structure in the future, taking into account unfavourable influences and reasonable conservation effort, are good. A mechanism is available through the European Commission's Common Fisheries Policy regulations to modify fishing activity in the area if this is deemed to be necessary. In addition, regulations are in place to regulate oil and gas activity in and around SACs in the UK Continental Shelf Designated Area. The laying of submarine cables and pipelines also requires regulatory consent which considers SACs. The reef is distant from terrestrial sources of pollution.

The grading is II: good prospects.

Restoration possibilities

Restoration of the biological communities in the Pobie Bank Reef would be possible, accepting that restoration methods in the offshore area focus on the removal of impacts which should allow recovery where the habitat has not been removed. It is likely that a similar community to that present now would develop if activities causing damage were removed.

The grading is II: restoration possible with an average effort

Overall grade

Due to the first sub-criterion of this criterion being graded II: structure well conserved, and second sub-criterion also being graded II: good prospects, the overall grading is B: good conservation, regardless of the third sub-criterion

d) Global assessment

The suggested grades for Stage 1A criteria (a) to (c) are A, C and B respectively. Taking all the above factors into consideration, the Global Assessment grade is B ('good conservation value')

Summary of scores for Stage 1a criteria

Habitat type	Representativity	Area of habitat	Structure and function	Global assessment
Pobie Bank Reef	A	C	B	B

9.2. Harbour porpoise (*Phocoena phocoena*) - Annex III selection criteria (Stage 1B)

a) Proportion of UK population

Harbour porpoise (*Phocoena phocena*) are found throughout the majority of UK continental shelf waters, with regular sightings around Shetland particularly in the summer months (Evans et al, 2003; Reid et al, 2003; SCANS 2008). At this time, however, it is not possible to estimate what proportion of the population utilises the area, or how important the area is with respect to the physical and biological factors essential to their life and reproduction. Due to the highly mobile nature of the species and the size of the proposed SAC, a grade D (non-significant population) is considered most appropriate. Therefore harbour porpoise is not a qualifying species for this site. As such, no other indication is required for the additional evaluation criteria concerning this species within the site. This assessment may change if new evidence becomes available.

9.3. Bottlenose dolphin (*Tursiops truncatus*) - Annex III selection criteria (Stage 1B)

a) Proportion of UK population

This species is found in many parts of UK waters, on the Continental Shelf and further offshore (Evans *et al*, 2003; Reid *et al*, 2003; SCANS II, 2008). There are no records of bottlenose dolphin occurrences within the proposed boundary (Reid *et al*, 2003) therefore the species is not considered a feature of the site. However, they have been recorded in the vicinity of the site (Evans *et al*, 2003) and are highly mobile, so this assessment may change if new data become available.

9.4. Grey seal (*Halichoerus grypus*) and Harbour (common) seal (*Phoca vitulina*) - Annex III selection criteria (Stage 1B)

a) Proportion of UK Population

Both harbour and grey seals have haul out sites on the east coast of Shetland and, from satellite telemetry work, they appear to forage in or very near the area (Sharples *et al*, 2005; Matthiopoulos *et al*, 2004; Matthiopoulos, 2007; Duck, 2009; Duck & Thompson, 2009). At this time, however, it is not possible to estimate what proportion of either population utilises the area, or how important the area is with respect to the physical and biological factors essential to their life and reproduction. Therefore, both species are considered to be grade D (non-significant population). Therefore grey seal and harbour seal are not qualifying species for this site. This grading may be revised at a later date depending on the outcome of data analyses to be commissioned by JNCC that will enable a more detailed assessment of the importance of areas for seals at sea.

10. Sites to which this site is related

None

11. Supporting scientific documentation

Scientific information to support this SAC designation predominantly comes from the following sources:

- The Department of Trade and Industry (DTI) (now Department of Energy and Climate Change: DECC) Strategic Environmental Assessment (SEA) survey in 2003 for Area 5 (SEA5) and its associated survey reports (Black, 2003; McDougall, 2003);
- the Department of Trade and Industry (DTI) (now Department of Energy and Climate Change: DECC) SEA Special Area for Conservation survey in 2006 (SEA SAC 2006) and its associated report (Howell *et al*, 2007);
- a geological data interpretation of the Area of Search (AoS) by the British Geological Survey (BGS) (Green *et al*, 2008); and
- a biological analysis and interpretation of the SEA data (Foster-Smith *et al*, 2009).

Data was gathered under the SEA5 survey using two vessels in 2003; the *R/V Jean Charcot* acquired multibeam and sidescan sonar data, while groundtruthing data (seabed imagery and biological/sediment samples) were acquired using the *R/V Kommandor Jack*. Similar methods were undertaken for the SEA SAC 2006 survey aboard the *M/V Franklin* to gather

acoustic data and seabed imagery data (Figure 1 and 2). Although full coverage multibeam and sidescan data was not present for all locations where potential Annex I reef was indicated (Green *et al*, 2008), the available data has provided a good indication of the nature of Annex I reef habitat present within Pobie Bank Reef AoS.

Following these surveys, a desk study undertaken by BGS reviewed historic geophysical data to provide a more accurate determination of the spatial extent of Annex I reef habitat within the area of Pobie Bank Reef AoS. The following data sources were utilised in this interpretation:

- BGS paper archive records of offshore samples (over 400 BGS sea-bed sample records were reviewed) ;
- Paper archive records of side scan and transit sonar collected by the BGS;
- Paper sub-bottom (pinger and boomer) records collected by the BGS;
- Sea-bed sediment map sheets for Shetland and Halibut Bank, published at 1:250,000 (Chesher, 1984; Owens *et al*, 1984 and Stevenson and Ruckley, 1998);
- Unpublished maps of the Quaternary sea-bed morphology for the area covered by the Shetland 1:250,000 map sheet;
- Multibeam bathymetry, sea-bed photographs, video footage and particle size analysis from the SEA5 and SEA SAC 2006 surveys.

The resulting data layer, which showed the potential extent of outcropping rock (Figure 1), was used as the basis for the development of a broadscale habitat map for Pobie Bank Reef. A further detailed analysis and interpretation of SEA acoustic and biological data was undertaken by Foster-Smith *et al* (2009). A supervised classification and interpolation of the acoustic data was undertaken in IDRISITM with the seabed imagery being used to 'groundtruth' the resultant map (see Appendix I). Using this approach, a broadscale habitat map (Figure 2), mapped to biotope level within the Marine Habitat Classification for Britain and Ireland (Connor *et al*, 2004) and an Annex I habitat map (see site map) were developed.

Due to the variation in data used to create the Annex I habitat map, a confidence map was created to help understand the differences in data used across the Area of Search. This also allowed a more informed decision when identifying the potential boundary for the proposed SAC.

Confidence was split into 3 levels and categorised as follows:

1. Highest confidence. Annex I reef derived from acoustic data coverage and/or groundtruthing data.
2. Medium confidence. Annex I reef derived from data interpolation techniques using mapping software.
3. Low confidence. Potential Annex I reef derived by extension of the reef feature into potential reef areas identified by BGS.

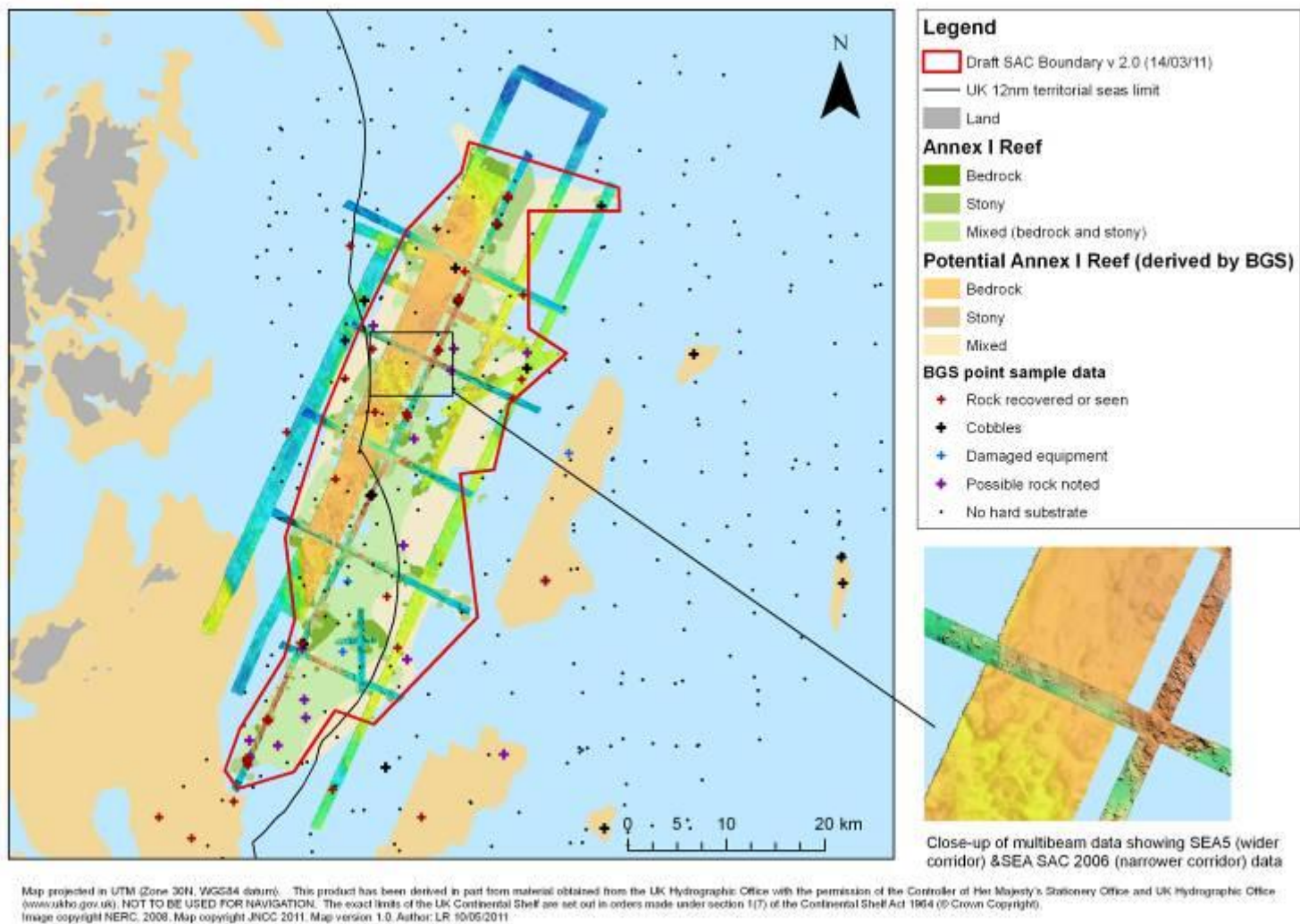


Figure 1. Data map showing multibeam data coverage from the SEA SAC 2006 survey and SEA5 2003 survey (blues and greens represent greater depths (>100m), oranges and yellows represent shallower depths (<100m)), plus the BGS potential spatial extent of Annex I reef habitat and locations of BGS sample points used to determine this extent.

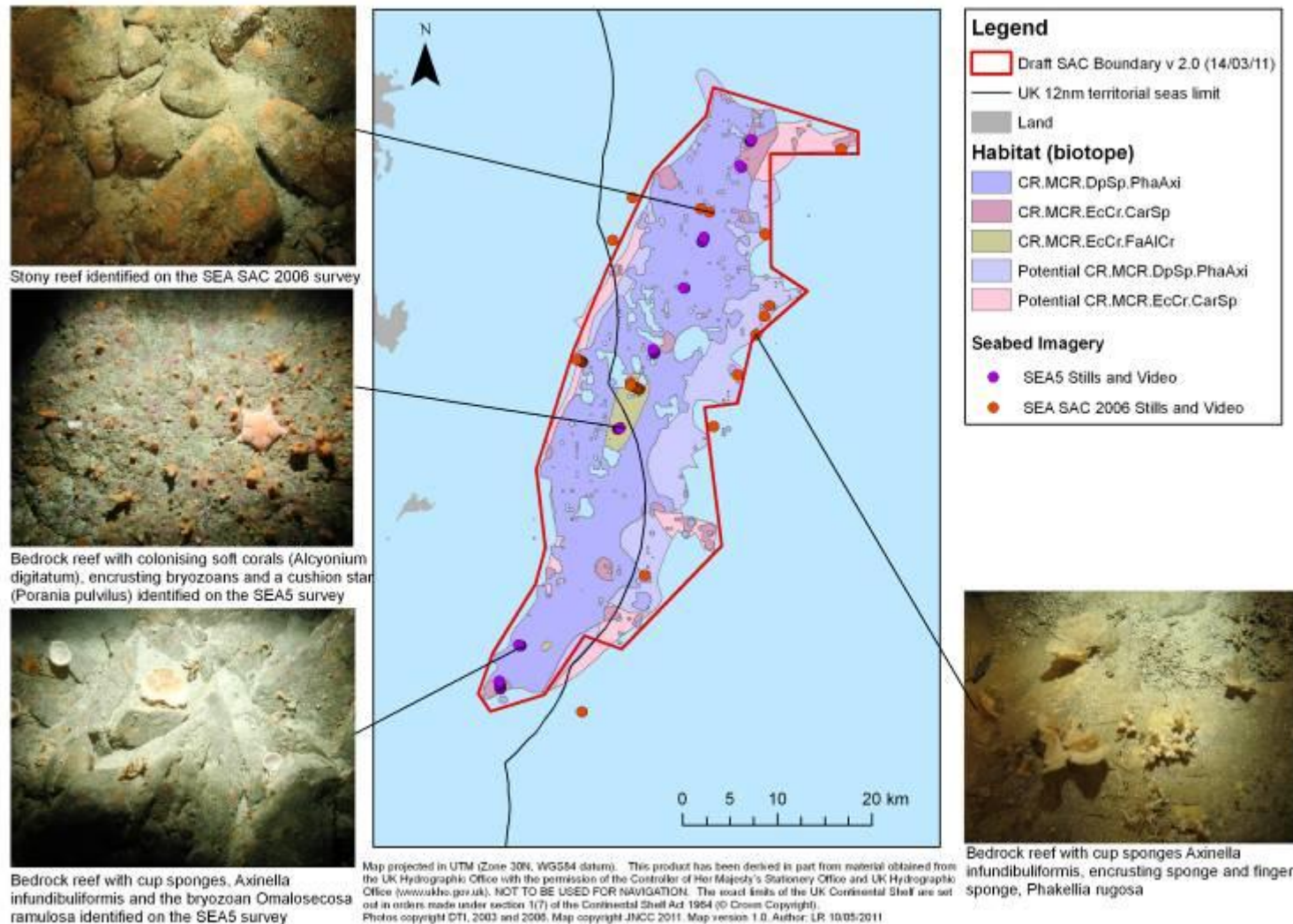


Figure 2. Broad-scale habitat map with images of *Phakellia ventilabrum* and Axinellid sponges on deep, wave- exposed circalittoral rock (CR.MCR.DpSp.PhaAxi); *Caryophyllia smithii*, sponges and crustose communities on wave-exposed circalittoral rock (CR.MCR.EcCr.CarSp); and Faunal and algal crusts on exposed to moderately wave-exposed circalittoral rock (CR.MCR.EcCr.FaAlCr) plus locations of video tows and stills. Due to problems with the onboard GPS, not all locations of image stills are mapped.

12. Site overview and conservation interest

Pobie Bank is located to the East of the Shetland Isles in the Northern North Sea regional sea. The bedrock in this area is composed of Devonian red sandstones and blue siltstones forming the East of Shetland Platform (Green *et al*, 2008). These are underlain in the northwest of the Area of Search (AoS) by protruding, rugged metamorphic basement rocks. Ridges most likely created by moraines, run ENE to WSW across the AoS and contain abundant cobbles on the crests (Green *et al*, 2008).

Pobie Bank Reef proposed SAC is approximately 70km long (crest running NNE to SSW) and up to 21km wide. The depth within the proposed SAC ranges from 70m to over 100m; the average seabed depth within the site boundary is approximately 90m. Digibath 250 bathymetric contour data reveals that the western edge of the bank slopes steeply to approximately 130m depth into the Unst Basin, as it follows the line of the Pobie Bank Fault, and more gradually on the eastern edge to the same depth. Interpreted acoustic data, gathered from the SEA5 and SEA SAC 2006 surveys, draped over a terrain model shows bedrock and boulders are the predominant substratum on the shallower ground of Pobie Bank to about the 100m contour (Figure 3). These rocky outcrops are very rugged with sand between outcrops. Sand predominates as the substratum below 100m on the eastern edge. Although this sand may only be a thin layer over underlying rock, it could reduce the scope for epifaunal growth to a few scattered rocky outcrops. Large gravel and sand waves occur in the Unst Basin on the western edge (Foster-Smith *et al*, 2009).

The bedrock and boulders provide reef habitat for a variety of species. Bedrock reef is more widespread on Pobie Bank Reef above 100m depth where the rugged rocky outcrops occur. Stony reef appears to predominate around the eastern margins of the bedrock, particularly in lower-lying ground between outcrops. Much of the AoS is most accurately described as a mixture of these two reef types.

Analysis of the SEA5 and SEA SAC 2006 video and stills data (Foster-Smith *et al*, 2009), reveal that the majority of biota on Pobie Bank Reef are faunal crust species and robust erect fauna. Encrusting bryozoan species are common including *Cellepora pumicosa* and *Smittina landsborovii* and encrusting sponges and hydroid and bryozoan turfs are also widespread. Serpulid worm species are present including *Protula tubularis*, *Pomatoceros triqueter* and *Serpula vermicularis* as well as spirorbid worms. The most widespread erect faunal species are the bryozoans, *Omalosecosa ramulosa*, the bracket sponge *Axinella infundibuliformis* and the branching sponges *Raspalia hispida* and *Stelligera stuposa*. The cup coral, *Caryophyllia smithii*, is also widespread. Other colonising species include the bryozoans, *Reteporella beaniana*, the gastropod, *Calliostoma zizyphinum*, the starfish *Stichastrella rosea* and *Solaster endeca* and the cushion star *Hippasteria phrygiana*. Silty sediment is only widespread on the eastern bank and this supports dense populations of *Ophiura albida*. Norway redfish *Sebastes viviparus* and Norway pout *Trisopterus esmarkii* are also in abundance in the region. Some rare species to the region were also present. This includes the sponge, *Phakellia rugosa* and one sighting of the fish, *Icelus bicornis* (Twohorn sculpin), both more common in Norway than in British waters, and the serpulid worm *Ditrupa areatina*, which forms dense aggregations in some areas of Pobie Bank Reef.

In the shallower regions of Pobie Bank Reef (around 70m - 85m), rugged bedrock and stony (mostly composed of boulders) reef are present with sufficient light to sustain encrusting coralline algae. Some locations also support *Alcyonium digitatum*. Otherwise the fauna is similar to other rocky habitats on Pobie Bank Reef with a preponderance of encrusting bryozoans, sponges and *Pomatoceros triqueter*. These shallower sites represent the biotope CR.MCR.EcCr.FaAICr. Where bedrock and stony reef occur in deeper waters (around 70m to 110m), the habitat is often mixed with sandy patches. Here the reef is largely dominated

by encrusting sponges, bryozoans and *Pomatoceros triqueter* with low densities of Axinellid sponges. This represents the biotope CR.HCR.DpSp.PhaAxi. At >100m water depth, the habitat is largely composed of low lying, flat bedrock with a substantial covering of silty sand. Large numbers of *Ophiura albida* are present in the silt whilst the underlying rock supports small erect sponges and small numbers of *Caryophyllia smithii*. This is representative of the biotope CR.MCR.EcCr.CarSp. The circalittoral sediment around the bedrock outcrops is coarse and shelly, often in waves with shell and small stones in the troughs, representing the biotope SS.SCS.CCS. At the deeper eastern ridge of Pobie Bank Reef, circalittoral muddy sand, SS.SSa.CMuSa, is widespread.

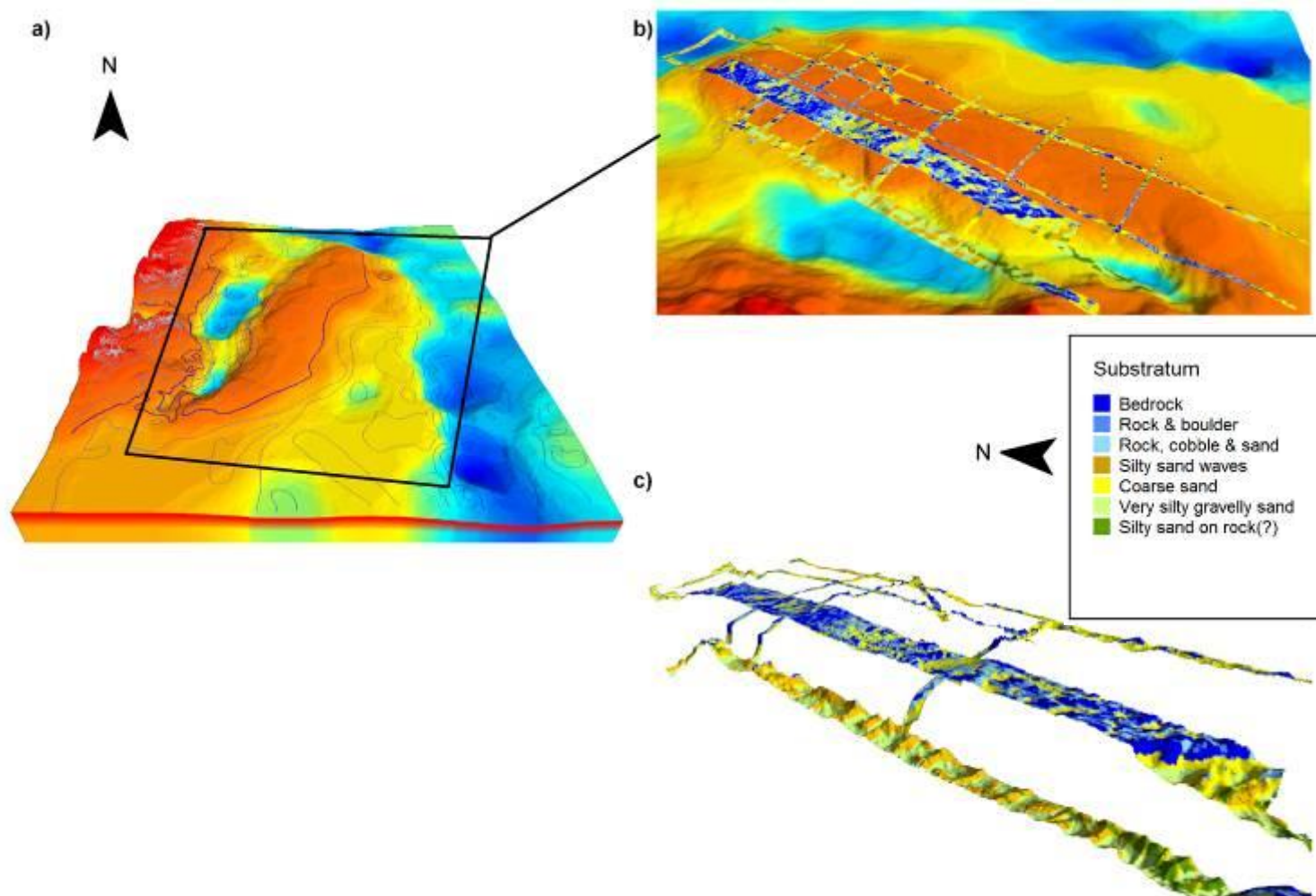


Figure 3 a) A shaded terrain model of Pobie Bank derived from the Digibath250 bathymetric data with 10m contours superimposed. The thicker dark blue line shows the 100m contour. The Unst Basin (blue) separates the mainland (to the left) from Pobie Bank **b)** Interpreted data from 2003 and 2006 draped over the terrain model, viewed from the east looking towards Mainland **c)** Similar view to b) of the interpreted data from 2006 draped over the terrain model from the 2006 swath bathymetry data.

13. References

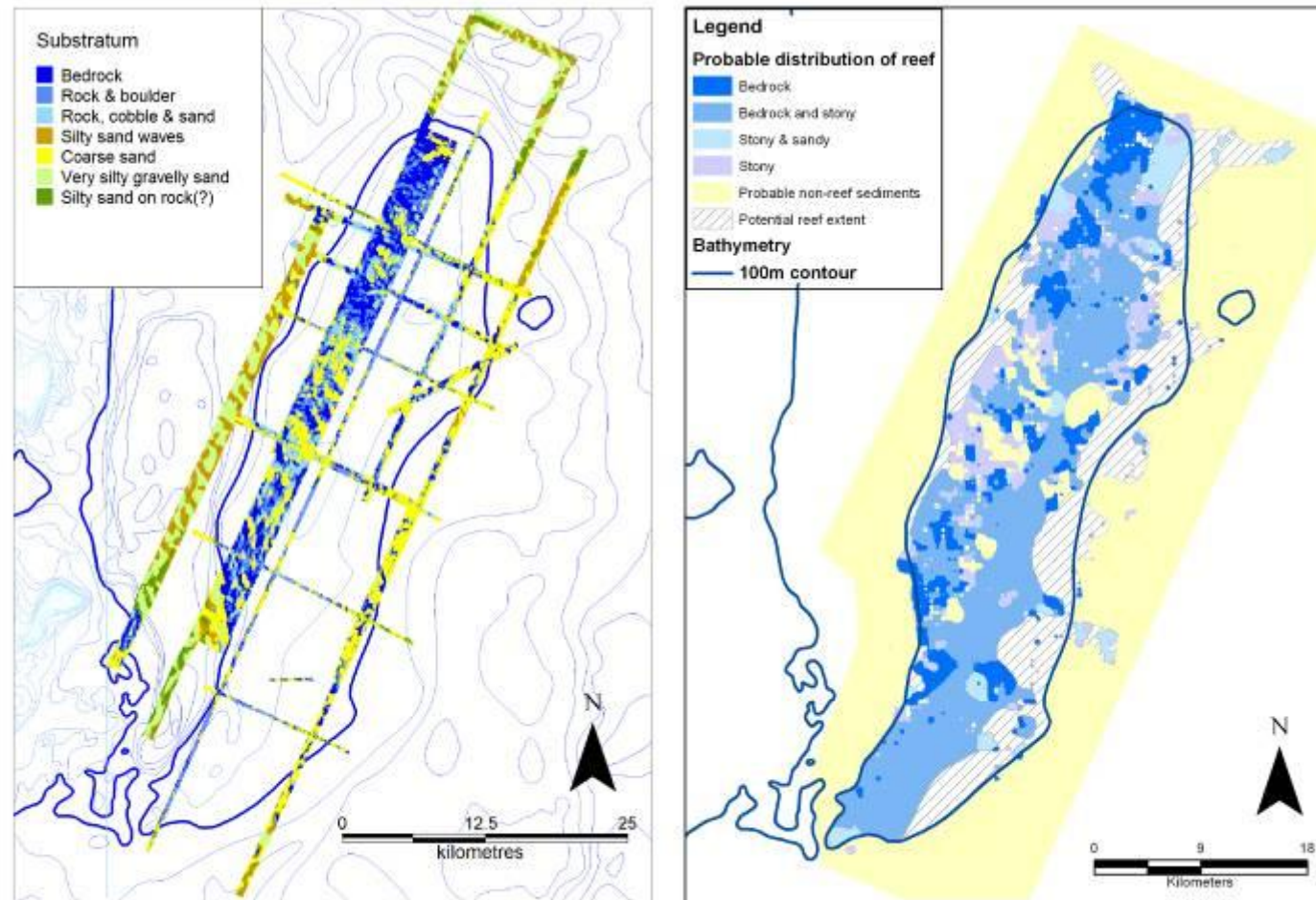
- CHESSER, J.A. 1984. *Shetland Sheet 60°N-02°W Sea Bed Sediments and Quaternary Geology 1:250,000*. British Geological Survey.
- COMMISSION OF THE EUROPEAN COMMUNITY (CEC). 1995. *Natura 2000 Standard Data Form: Explanatory Notes*. Brussels: European Commission DG Environment.
- CONNOR, D.W., ALLEN, J.H., GOLDING, N., HOWELL, K.L., LIEBERKNECHT, L.M., NORTHEN, K.O., REKER, J.B. 2004. *The Marine Habitat Classification for Britain and Ireland Version 04.05*. Peterborough: JNCC. ISBN 1 861 07561 8. Available from: www.jncc.gov.uk/MarineHabitatClassification [Accessed March 2011]
- DEFRA. 2004. *Review of Marine Nature Conservation*. Working Group Report to Government [online] London: Defra.
- DUCK, C. 2009. *Grey seal pup production in Great Britain and Ireland in 2008*. SCOS briefing paper 09/1.
- DUCK, C. & THOMPSON, D. 2009. *The status of British common seal population in 2008*. SCOS briefing paper 09/03.
- EVANS, P.G.H., ANDERWALD, P. & BAINES, M.E. 2003. *UK Cetacean Status Review*. Report to English Nature and the Countryside Council for Wales.
- FOSTER-SMITH, R., BENSON, A. & FOSTER-SMITH, J. 2009. *Interpretation of Pobie Bank East of Shetland for Annex I Reef*. JNCC Report No. 433.
- GREEN, S., LONG, D. AND COOPER, R. 2008. *Geological Data Interpretation of the Reef East of Shetland (Pobie Bank) Area of Search (AoS)*. British Geological Survey Commercial Report, CR/08/128. 43pp.
- JNCC. 2004. *The Irish Sea Pilot Final Report*. Report to Defra by The Joint Nature Conservation Committee. Peterborough: JNCC. Available from: <http://www.jncc.gov.uk/page-2767#download> [Accessed March 2011]
- JNCC. 2008. *UK Guidance on defining boundaries for marine SACs for Annex I habitat sites fully detached from the coast*. Peterborough: JNCC.
- OWENS, R., GRAHAM, C., MCMILLAN, M., and RISE, L. 1984. *Halibut Bank Sheet 60°N-00° Sea Bed Sediments 1:250,000*. British Geological Survey and Continental Shelf Institute, Norway.
- MATTHIOPOULOS, J. 2007. *Preliminary methods for designing marine SACs for UK pinnipeds on the basis of space use*. SCOS 2007 Briefing Paper 07/8.
- MATTHIOPOULOS, J., MCCONNELL, B., DUCK, C. & FEDAK, M. 2004. *Using satellite telemetry and aerial counts to estimate space use by grey seals around the British Isles*. Journal of Applied Ecology, 41, 476-491.
- REID, J.B., EVANS, P.G.H. & NORTHRIDGE, S.P. 2003. *Atlas of cetacean distribution in north-west European waters*. Peterborough: JNCC. Available from: <http://www.jncc.gov.uk/page-2713> [Accessed March 2011]

SCANS II, 2008. *Small Cetaceans in the European Atlantic and North Sea. Final Report submitted to the European Commission under project LIFE04NAT/GB/000245.* Available from <http://biology.st-andrews.ac.uk/scans2/inner-finalReport.html> [Accessed March 2011]

SHARPLES, R.J., CUNNINGHAM, L. & HAMMOND, P.S., 2005. *Distribution and movement of harbour seals around the UK.* SCOS Briefing paper 05/5.

STEVENSON, AG, and RUCKLEY, NA. 1998. *Shetland Sheet 60°N-02°W Sea Bed Sediments, 1:250,000.* British Geological Survey.

Appendix 1: a) Supervised classification of the acoustic data from 2003 and 2006 superimposed on bathymetric contours. The dark blue line represents the 100m contour. b) The distribution of Annex I habitat types within the area of search, generated using analysis of acoustic data and interpolation techniques.



Map projected in UTM (Zone 30N, WGS84 datum). This product has been derived in part from material obtained from the UK Hydrographic Office with the permission of the Controller of Her Majesty's Stationery Office and UK Hydrographic Office (www.ukho.gov.uk). NOT TO BE USED FOR NAVIGATION. The exact limits of the UK Continental Shelf are set out in orders made under section 1(7) of the Continental Shelf Act 1964 (© Crown Copyright). Bathymetry © BGS; Dgibath250, License no: 2009/037DB. Map copyright JNCC 2011. Version 2.0. Author: LR 10/05/2011

Appendix 2: Confidence in Annex I habitat map based on differences in data used to develop the Annex I habitat map. Confidence was split into 3 levels and categorised as follows: 1) High - Annex I reef derived from acoustic data coverage and/or groundtruthing data; 2) Medium - Annex I reef derived from data interpolation techniques using mapping software; and 3) Low - Potential Annex I reef derived by extension of the reef feature into potential reef areas identified by BGS.

