The following documents provide further information about the East of Gannet and Montrose Fields Marine Protected Area (MPA):

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

The documents are all available at www.jncc.defra.gov.uk/page-6478
### Document Distribution List and Version Control

<table>
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<tr>
<th>Format</th>
<th>Version</th>
<th>Issue date</th>
<th>Version development and review</th>
<th>Issued to</th>
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<tr>
<td>Electronic</td>
<td>2.0</td>
<td>11/04/2013</td>
<td>Internal drafting and review of pre-version 2.0 drafts by JNCC SMPA team and Grade 7 staff and editorial review prior to release to MPA Sub Group</td>
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<tr>
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<td>Review of document to take into account MPA Sub-Group comments by JNCC SMPA team prior to release to MPA Sub Group for sign-off</td>
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<td>Electronic</td>
<td>5.0</td>
<td>09/07/2014</td>
<td>Document update to align with designation status and text revised in response to consultation and independent review report</td>
<td>Delivery to Marine Scotland to support MPA designation and upload to JNCC website</td>
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Figure 1  Map of the East of Gannet and Montrose Fields MPA
The area was selected following a consideration of locations considered to be Least Damaged/More Natural (LD/MN) as described in Chaniotis et al. (2011); it has been derived from two LD/MN locations - East of Gannet Field and Montrose Field. Following application of the selection guidelines, it was concluded that the search location should be proposed as an MPA for the protection of ocean quahog (Arctica islandica) aggregations and offshore deep-sea muds. However, offshore subtidal sand and gravel habitat within the area considered suitable for colonisation of ocean quahog is also included as a proxy for the potential distribution of the species within the area. The boundary has been defined by the predicted extent of offshore deep-sea muds, the distribution of ocean quahog records, and an area of offshore subtidal sands and gravel habitat considered suitable for ocean quahog colonisation.

**Protected features**

| Biodiversity | Ocean quahog (OQ) (Arctica islandica) aggregations (including offshore subtidal sands and gravels suitable for ocean quahog colonisation) Offshore deep-sea muds (ODSM) on the continental shelf | Geodiversity | None |

**Feature exclusions** (MPA search features recorded within the MPA but excluded from the assessment with reasons)

None

**Data used in assessment**

<table>
<thead>
<tr>
<th>Version of GeMS holding feature data used to support site selection</th>
<th>Other datasets used (not in GeMS) [superscripts are used to reference these datasets in the following discussion]</th>
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</thead>
<tbody>
<tr>
<td>Ver.4</td>
<td>British Geological Survey (BGS) Marine particle size analysis (PSA) dataset (February 2012) - data collected between 1967 and 1987 categorised according to the Folk classification and subsequently to the EUNIS habitat classification by JNCC based on the BGS modified Folk scheme</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Marine Scotland Science <em>Nephrops</em> UWTV survey 2001 – 2011 Particle Size Analysis (PSA) data</td>
<td></td>
</tr>
<tr>
<td></td>
<td><em>^3</em>EuSeaMap habitat map derived from habitat models (Cameron and Askew, 2011). Note that the product used in the maps is the 2012_08 version, which is an improvement on that published in the 2011 report</td>
<td></td>
</tr>
</tbody>
</table>
### Summary of data confidence assessment (see detailed assessment on following pages)

<table>
<thead>
<tr>
<th>Confident in underpinning data</th>
<th>Yes</th>
<th>Partial</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>Confident in presence of identified features?</code></td>
<td>Yes</td>
<td>Partial</td>
<td>No</td>
</tr>
<tr>
<td>Data suitable to define extent of individual protected features</td>
<td>Yes</td>
<td>Partial</td>
<td>-</td>
</tr>
<tr>
<td>We have high confidence in the data recording the presence of ocean quahog within the MPA boundary. There are data from as recent as 2000 that record the presence of ocean quahog. Given that ocean quahog is a long-lived species, and that the MPA was derived from least damaged/more natural (LD/MN) locations, it is reasonable to assume the species will still be present within the boundary, providing that the viability of the population(s) has not been compromised by adverse pressures in the intervening years. Our knowledge of feature distribution in the area is influenced by the offshore industry survey design that generated the data showing ocean quahog occurrence. The dataset provided did not include records of where ocean quahog were not found. This means the sample data can only be used as an indicator of feature presence and distribution, rather than provide additional conclusive evidence of feature absence.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Ocean quahog is recorded at significantly different densities across its range, with densities between 16 and 100 per m² recorded in the northern North Sea (OSPAR, 2009). There is insufficient evidence available to quantify the density of the ocean quahog records within the MPA, further data would be required to verify the feature density. Although ocean quahog is not known to be characteristic of any particular habitat, they are known to occur in a range of sediments from coarse, clean, sand to muddy sand in the infralittoral, circalittoral, circalittoral offshore and bathybientic offshore environment. They can inhabit sediments at a range of water depths from 4 to 400m (Witbaard & Bergman, 2003; Sabatini & Pizzolla, 2008). We have used BGS PSA data¹, UKSeaMap 2010 and EU SeaMap data to verify the presence of potentially suitable habitat for colonisation of ocean quahog aggregations as a proxy to define the possible extent of the feature, particularly the eastern extent of the MPA boundary. Further survey throughout the MPA area would confirm the distribution and size of the existing ocean quahog aggregations.

We have high confidence in the presence of offshore deep-sea muds within the MPA boundary. The predicted distribution of the offshore deep-sea muds feature extends from the south-east to the north-west area of the boundary in a continuous band between ~2-7km² wide (UKSeaMap2010 (McBreen et al., 2011), EU SeaMap (Cameron & Askew, 2011)). Multiple sediment sample data points collected by the BGS² and Marine Scotland Science³ fall within the predicted area of the offshore deep-sea muds feature within the MPA. However there are also mud and sandy mud data points extending across the wider expanse of the MPA. Such contradictory evidence on the exact habitat present leads JNCC to have only partial confidence in the extent of the feature. We have partial confidence in the extent of offshore subtidal sands and gravel habitats that are suitable for colonisation of ocean quahog within the boundary based on UKSeaMap2010, EU SeaMap and BGS PSA data because suitable habitat is reported to extend beyond the MPA boundary. Future sampling in the MPA would better delineate the offshore deep-sea mud habitat and verify the extent of sediments suitable for the colonisation of ocean quahog. |

¹ BGS PSA data
² UKSeaMap 2010
³ EU SeaMap
Figure 2  The known distribution of protected features within the East of Gannet and Montrose Fields MPA

Assessed MPA protected features

Ocean quahog aggregations
- Arctica islandica

Offshore deep sea muds
- A5.37: Deep circalittoral mud

Supporting habitat

Offshore subtidal sands and gravels
- A5.14: Circalittoral coarse sediment
- A5.15: Deep circalittoral coarse sediment
- A5.25: Circalittoral fine sand or A5.26: Circalittoral muddy sand
- A5.27: Deep circalittoral sand

PSA - MSS Folk classification

Folk
- Mud
- Muddy Sand
- Sand
- Sandy Mud

PSA - BGS Modified Folk classification

Class
- Coarse Sediment
- Mixed sediments
- Mud and sandy mud
- Sand and muddy sand
- Bathymetry
### Data confidence assessment

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

<table>
<thead>
<tr>
<th>Age of data (Map A)</th>
<th>Multiple or majority of records collected post 2000</th>
<th>Multiple records collected pre 2000</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-</td>
<td>OQ ODSM</td>
<td></td>
</tr>
</tbody>
</table>

Approximately half of the ocean quahog records within the MPA were collected in 2000; the remainder have been collected since 1990. The Particle Size Analysis (PSA) records from samples collected in the area\textsuperscript{1,2} date from 1973-2005; there is no contextual evidence to suggest a major change in sediment type over the intervening period.

The underlying habitat map derived from habitat models was developed in 2010 (McBreen et al., 2011), and updated by the EUSeaMap Project in 2011 (Cameron & Askew, 2011).

<table>
<thead>
<tr>
<th>Source of data (Map B)</th>
<th>Targeted data collection for nature conservation purposes</th>
<th>-</th>
<th>Statutory monitoring (marine licensing etc.)</th>
<th>-</th>
<th>Fisheries survey work</th>
<th>-</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OQ</td>
<td>-</td>
<td>Recreational / volunteer data collection</td>
<td>-</td>
<td>Other (specify) – EUSeaMap, British Geological Survey (BGS) survey data and Marine Scotland Science (MSS) survey data</td>
<td>ODSM</td>
</tr>
</tbody>
</table>

The underlying habitat maps are the result of work undertaken by JNCC to combine physical data describing the marine environment with information from biological sampling, generating habitat models that produce a broad-scale predictive map of seabed habitats (UKSeaMap 2010, McBreen et al., 2011). These models were updated by the EUSeaMap project in 2011 (Cameron & Askew, 2011). The sample records of mud habitats originate from surveys conducted by MSS and BGS (the latter underpins the substrate map that fed into the habitat models). The majority of sample records for offshore subtidal sand and gravel habitats originate from BGS survey data that suggest the sediments are suitable for colonisation by ocean quahog and so provide a proxy for the presence of the feature.

The ocean quahog records originate from samples collected from oil and gas Environmental Impact Assessment surveys, accessed from the UKOOA (UK Offshore Operators Association, now Oil & Gas UK) database. Multiple records from BP and Shell verify the presence and provide information on the distribution of ocean quahog.
Sampling methods / resolution

<table>
<thead>
<tr>
<th>Feature</th>
<th>Modelled</th>
<th>Acoustic / remote sensing</th>
<th>Remote video / camera</th>
<th>Infaunal - grab / core</th>
<th>Fisheries trawl</th>
<th>Diving</th>
<th>Sediment sampling</th>
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</thead>
<tbody>
<tr>
<td>OQ</td>
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<td></td>
<td>✓</td>
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<tr>
<td>ODSM</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments
The ground-truthing data for offshore deep-sea mud habitats, and offshore subtidal sands and gravel habitats considered suitable for colonisation of ocean quahog originate from Particle Size Analysis (PSA) of grab and core samples taken during surveys conducted by the British Geological Survey and Marine Scotland Science (for offshore deep-sea muds). They underpin the habitat maps from the UK SeaMap2010 and EU SeaMap habitat models. It is acknowledged that the spatial accuracy of older PSA records may be limited in places where the Decca Main Chain or similar types of positioning systems will have been used that could produce poorer spatial accuracy by modern standards. Sub-surface PSA results from cores have not been reported here. Infaunal benthic grab sampling methods were used during oil and gas Environmental Impact Assessment surveys conducted by BP and Shell providing the evidence on the distribution of ocean quahog. The seabed habitat modelling projects UKSeaMap2010 and EUSEaMap 2011 habitat maps used in this assessment were developed by JNCC (McBreen et al, 2011; Cameron & Askew, 2011).

Data coverage (Maps A to C)

Across MPA
Numerous protected feature records evenly distributed across MPA? - Numerous protected feature records scattered across the MPA with some clumping? ✓ Few or isolated protected feature records - possibly clumped? -

Individual features
Multiple records of individual protected features providing indication of extent and distribution throughout MPA? OSDM Few or scattered records of specific protected features making extent and broad distribution assessment difficult? OQ Few or isolated records of specific protected feature records -

Are acoustic remote sensing data available to facilitate the development of a full coverage predictive seabed habitat map? No

Comments
Offshore deep-sea muds (ODSM) on the continental shelf
- UKSeaMap 2010 (in GeMS v4) - The original habitat map predicts that offshore deep-sea muds, specifically EUNIS level 4 A5.37 Deep circalittoral mud, extends from the south-east to the north-west of the MPA in a continuous band approximately 2-7km² wide. The EU SeaMap project updated the UK SeaMap 2010 product in 2011. Cross-checking of the outputs from both products suggests no differences in the EUNIS habitat type predicted to occur across the MPA in the more recent product.
### Data coverage (Maps A to C)

- **British Geological Survey (BGS) Marine particle size analysis (PSA) dataset (February 2012)** - These data comprise sediment samples collected between 1967 and 1987 across the UK waters in which the PSA results were categorised according to Folk and subsequently to EUNIS categories/BGS modified Folk classification. Note these data underpin the BGS substrate map used in the seabed habitat modelling project UKSeaMap2010 habitat map. Of the 15 surface samples collected by the BGS (collection dates range between 1973 and 1981) within the predicted area of offshore deep-sea muds (AS.37 Deep circumlittoral mud), 9 record the presence of the modified Folk/EUNIS class ‘mud and sandy mud’ and are distributed relatively evenly within the predicted mud habitat, within the MPA boundary. The remaining six points record the presence of the modified Folk/EUNIS class ‘sand and muddy sand’ which is not typically a class associated with this mud feature. The discrepancy may be explained by the fact the data points are distributed principally along the fringes of the predicted extent of mud habitat and there is a likelihood the points set the limits for the extent of the mud.

- **There are five further BGS data points that record the presence of the modified Folk/EUNIS class ‘mud and sandy mud’ within the area predicted by UKSeaMap 2010 to be offshore subtidal sands and gravels (Map C). The exact extent of the offshore deep-sea mud feature is therefore uncertain, given the occurrence of mud and sandy mud outside the predicted boundary for the offshore deep-sea mud feature.**

- **Marine Scotland Science (MSS) 2001 – 2011 particle size analysis (PSA) data** – There is one sediment sample collected by MSS in 2005 which records the Folk class ‘muddy sand’ in the south-eastern area of the predicted distribution of offshore deep-sea mud habitat within the MPA boundary. The ‘muddy sand’ record is not directly transferable to the modified Folk/EUNIS class ‘sand and muddy sand’ without information on percentage mud content as the threshold between this category and the ‘mud and sandy mud’ category is part way through the muddy sand Folk class. In the context of the BGS PSA data in the immediate vicinity of the MSS data point (the majority of which are ‘mud and sandy mud’) a likely scenario is that the MSS sample is closest to the Folk class ‘mud and sandy mud’.

- **There are no biotope records available to confirm the biological diversity of offshore deep-sea muds in the MPA.**

### Ocean quahog aggregations (*Arctica islandica*) (OQ) (species records)

- Clusters of ocean quahog records were found during benthic grab surveys conducted in the following surveys in the north-western area of the MPA. The status of the specimens (i.e. alive or dead at the point of sample collection, juvenile or adult) is not described. The determination of all the records is listed as certain.
  - 1990 - IOE - Gannet C Shell (in GeMS v4) – There are four clusters of data entries recording the presence of ocean quahog in the western part of the MPA on predicted offshore subtidal sands and gravels.
  - 1990 - IOE - Gannet D Shell (in GeMS v4) – There are four clusters of data entries recording the presence of ocean quahog in the northern part of the MPA on predicted offshore subtidal sands and gravels.
  - 1994 - ERT - Gannet A Shell (in GeMS v4) – There are three clusters of data entries recording presence of ocean quahog in the western part of the MPA on predicted offshore subtidal sands and gravels.
  - 2000 - ERT - Cayley Cayley BP (in GeMS v4) – There are multiple clusters of data entries recording the presence of ocean quahog in the northern part of the MPA on predicted offshore subtidal sands and gravels.
  - 2000 - ERT - Montrose BP (in GeMS v4) – There are multiple clusters of data entries recording the presence of ocean quahog in the northern part of the MPA on predicted offshore subtidal sands and gravels.
### Data coverage (Maps A to C)

<table>
<thead>
<tr>
<th>Data Source</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UKSeaMap 2010 (in GeMS v4)</strong> - The habitat map based on the EUNIS classification scheme predicts that A5.27 Deep circalittoral sand extends across the MPA and beyond. This habitat type is considered suitable for supporting ocean quahog populations (Witbaard &amp; Bergman, 2003; Sabatini &amp; Pizzolla, 2008). There is also an area of A5.15 Deep circalittoral coarse sediment in the south-west of the MPA but this is very small in size (&lt;0.5 sq km) and so is not considered viable.</td>
<td></td>
</tr>
<tr>
<td><strong>British Geological Survey (BGS) Marine Particle Size Analysis (PSA) dataset</strong> (February 2012) - These data represent sediment sampling between 1967 and 1987 across the UK waters in which the PSA results were categorised according to the Folk classification and subsequently to the EUNIS habitat classification by JNCC based on the BGS modified Folk scheme. Note these data underpin the BGS substrate map used in the seabed habitat modelling project UKSeaMap2010 habitat map – Of the 58 surface samples present throughout the area predicted to be offshore subtidal sands and gravels, 52 record the presence of ‘sand and muddy sand’ and one records the presence of ‘coarse sediment’. Both types are considered suitable habitat type for ocean quahog colonisation (Witbaard &amp; Bergman, 2003; Sabatini &amp; Pizzolla, 2008). The remaining five data points recorded as ‘mud and sandy mud’ (mentioned above) indicate that there is likely to be a degree of transition from one feature to another, demonstrating that the area predicted to be deep circalittoral sand may be heterogeneous.</td>
<td></td>
</tr>
<tr>
<td><strong>Marine Scotland Science (MSS) 2001 – 2011 particle size analysis (PSA) data</strong> – There are two sediment samples collected by MSS in 2009 and 2010 which record the Folk class ‘muddy sand’ in the predicted distribution of offshore subtidal sands and gravel habitats within the boundary of the MPA.</td>
<td></td>
</tr>
</tbody>
</table>
THE EVIDENCE BASE

Age of MPA protected features

Ocean quahog aggregations
- 2005 - 2010
- 1999 - 2004
- 1994 - 1998
- 1984 - 1993
- 1954 - 1983

Offshore deep sea muds - 2010

Supporting habitat
- Offshore subtidal sands and gravels

PSA-MSS
- 2007 - 2011
- 2001 - 2006

PSA - BGS
- 1984 - 1993
- 1967 - 1983

Bathymetry

Map displayed in geographic coordinates WGS84. The exact limits of the UK Continental Shelf are set out in the Continental Shelf (Designation of Areas) Order 2013, Statutory Instrument 2013/3162 (© Crown Copyright).

Landmark Ordnance Survey © Crown Copyright and database right 2011. All rights reserved. Scotland (Adjacent waters) Updated by the Law of the Sea Division, United Kingdom Hydrographic Office October 2006.

Bathymetry © EBCO, 2011. Biological data from Geodatabase of Marine features in Scotland (GeoMS v4) © Crown Copyright, MPA © JNCC and SNH 2014. All rights reserved. PSA data © BGS and MSS.
THE EVIDENCE BASE

Source of MPA protected features

Ocean quahog aggregations
- 1990 - IOE - Gannet Gannet C Shell
- 1990 - IOE - Gannet Gannet D Shell
- 1994 - ERT - Gannet Gannet A Shell
- 1995 - Gardline - Nelson Nelson Enterprise
- 1996 - Gardline - Bligh 21/20A-5 Enterprise
- 1997 - Sage - Nelson Nelson Enterprise
- 2000 - ERT - Cayley Cayley BP
- 2000 - ERT - Montrose Montrose BP

Offshore deep sea muds
- UKSeaMap2010 predictive habitat model v7

Supporting habitat
- UKSeaMap2010 predictive habitat model v7
- Offshore subtidal sands and gravels

PSA
- MSS
- BGS
- Bathymetry
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<th>Title</th>
<th>Features covered</th>
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<td>ODSM OQ</td>
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<tr>
<td>2001-2011</td>
<td>Marine Scotland Science Nephrops UWTV survey 2001 – 2011 particle size analysis (PSA) data (dates refer to data collection period for the entire dataset)</td>
<td>ODSM</td>
</tr>
<tr>
<td>1967-1988</td>
<td>British Geological Survey particle size analysis (PSA) data (dates refer to data collection period for the entire dataset)</td>
<td>ODSM OQ</td>
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