DATA CONFIDENCE ASSESSMENT

Outer Belfast Lough Marine Conservation Zone (MCZ)

Ocean quahog (*Arctica islandica)* on Subtidal sand

Department of Agriculture, Environment and Rural Affairs
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Contents

Summary **3**

Glossary of Terms and Acronyms **4**

Introduction **6**

MCZ name (Figure 1) 6

Protected features (Figure 2) 6

Data used in assessment 7

Summary of Data Confidence Assessment 7

Data Confidence Assessment **11**

Age of data (Figure 3) 11

Source of data (Figure 4) 11

Data coverage (Figures 3 to 6) 13

The Evidence Base (Figures) **17**

Data sources and Bibliography **19**

Figures

Figure 1 Location of Area of Search (AoS), initial proposed (p) boundary and designated boundary of Outer Belfast Lough MCZ 9

Figure 2 Distribution of the features in Outer Belfast Lough MCZ 10

Figure 3 Age of the feature data collected in Outer Belfast Lough MCZ 17

Figure 4 Source of the feature data collected in Outer Belfast Lough MCZ 17

Figure 5 Abundance and distribution of feature data collected in Outer Belfast Lough MCZ 18

Figure 6 Habitat Map of Outer Belfast Lough MCZ and surrounding seabed 18

Summary

The Data Confidence Assessment is a document produced as part of the consultation evidence base and, similar to other documents, follows the OSPAR design principles. The assessment details the Department's confidence in the data used to identify Areas of Search (AoS) and determine features proposed for protection within Marine Conservation Zones (MCZ). This includes data type, age, source and coverage.

This document provides details of the Data Confidence Assessment for Outer Belfast Lough MCZ. Additional information on Outer Belfast Lough MCZ and the MCZ process includes:

- Guidance on selection and designation of Marine Conservation Zones (MCZs) in the Northern Ireland Inshore Region
- Justification report for selection of proposed Marine Conservation Zone (pMCZ) features
- Guidance on the development of Conservation Objectives and Potential Management Options
- Site Summary Document for Outer Belfast Lough Marine Conservation Zone (MCZ)
- Conservation Objectives and potential Management Options for Outer Belfast Marine Conservation Zone (MCZ)
- Assessment against Selection Guidelines for Outer Belfast Lough Marine Conservation Zone (MCZ)

Glossary of Terms and Acronyms

AoS – Area of Search used to underpin the proposed Marine Conservation Zone

AFBI – Agri-food and Biosciences Institute

Benthic – The ecological region at the lowest level of a body of water such as an ocean or a lake including the sediment surface and some sub-surface layers

Biotope – The region of the habitat associated with a particular ecological community

Circalittoral – The subzone of the rocky sublittoral dominated by animals. No lower limit is defined but species composition changes below about 40m to 80m depth

Conservation objective – A statement of the desired ecological/geological state (quality) of a feature (habitat, species or geological) for which the MCZ is designated

DAERA – Department of Agriculture, Environment and Rural Affairs (also referred to as the Department in the text)

DOE – Department of the Environment (now lies within DAERA)

EUNIS – The European nature information system, is a habitat classification system used throughout Europe and covers all types of natural and artificial habitats, both aquatic and terrestrial

Infaunal – Aquatic animals such as clams or burrowing worms that live beneath the surface of a sea or lake floor

Infralittoral – Describes the zone from mean low water down to a depth where 1% of light can reach the seabed (JNCC). This zone is dominated by erect algae, typically Kelp species.

JNCC – Joint Nature Conservation Committee

MCZ – Marine Conservation Zone used to refer to MCZs designated under section 13 of the Marine Act (Northern Ireland) 2013 in the Northern Ireland inshore region and in section 116 of the Marine and Coastal Access Act 2009 in the Northern Ireland offshore region adjacent to Northern Ireland

MCZ Feature – Marine Conservation Zone feature(s) that underpins the MCZ designation

MPA – As a generic term Marine Protected Areas are a clearly defined geographical space, recognised, dedicated and managed through legal or other means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values. As a specific term it refers to a national designation in Scotland (equivalent to an MCZ)

OQ – Ocean quahog

OSPAR – OSPAR is the mechanism by which fifteen Governments of the western coasts and catchments of Europe, together with the European Union, cooperate to

protect the marine environment of the North-East Atlantic

OSPAR T&D – OSPAR List of Threatened and/or Declining Species and Habitats

PMF – Priority Marine Feature - collective term for those features (habitats, species and geological/geomorphological features) which are considered to be of conservation importance in the Northern Ireland inshore region

pMCZ – Proposed Marine Conservation Zone

pMCZ Feature – Proposed Marine Conservation Zone feature(s)

PSA – Particle size analysis

Spyball – Underwater drop camera operated by crew aboard a vessel to study submerged habitats and species.

SS – Subtidal (sublittoral) sand

SSNI – Sublittoral Survey Northern Ireland

VMS – Vessel Monitoring System

Introduction

MCZ name (Figure 1)	Outer Belfast Lough	Assessors	CA; CAA; JB; SB, NMcQ; LP.

Outer Belfast Lough MCZ is located at the entrance of the sea inlet, close to the southern shore of the Lough (North of Groomsport).

The MCZ contains dense populations of the long-lived Ocean quahog (*Arctica islandica*) (OQ) which is an OSPAR Threatened and/or Declining species (OSPAR, 2009). This low mobility species appears to be limited to a small area that is defined by the MCZ boundary. The density in the MCZ is high (4.5 individuals per m^2) with particular abundance in the northern section of the MCZ at around 22m depth (Ridgway *et al*., 2012). This is a relatively dense population for UK waters, and only in the northern North Sea have higher densities been reported (De Wilde! *et al*., 1986). High densities of OQ have been positively correlated with the presence of subtidal fine sands/muddy sands. Although it is unclear why areas with fine sediments favour high densities of OQ, it is suggested that the recruitment success might be related to larval dispersion and settlement in this sediment type (Witbaard and Bergman, 2003).

The habitat Subtidal (sublittoral) sand (SS) (EUNIS Habitat type A5.2) (JNCC, 2008) is included for its importance in supporting the ecosystem related to the OQ presence. The SS habitat is broadly distributed through the MCZ with sediments from coarse gravelly sand to stable infralittoral and circalittoral finer sands and patches of gravelly muddy sands.

Following the pMCZ public consultation, the Department reviewed all available evidence and amended the proposed boundary reducing the size of the MCZ from 5.76km^2 to 2.51km^2. The boundary of Outer Belfast Lough MCZ was drawn to encompass the extent of the OQ records (main feature) and includes a buffer equivalent to four times the depth (~25x4=100m) in accordance with Natural England & JNCC guidance (2010). This enables the MCZ to act as a functional whole, both conserving OQ while representing and maintaining the integrity of all features present. An area of 2.507km^2 is sufficient to be self-sustaining for SS and the majority of its diversity (Natural England & JNCC, 2010; Hill *et al*., 2010). The quantitative analysis of VMS data confirmed that the impact of designation on the fishing industry will be low. Within the initial pMCZ boundary the annual average fishing effort was 14.37hrs but this has now been reduced to 7.49hrs following the boundary amendment. This fishing effort is 11% of the total effort within ICES rectangle 38E4 and equates to 2.99hrs/km^2. The amended boundary was therefore considered appropriated for formal designation.

Protected features (Figure 2)

Biodiversity	• Ocean quahog (*Arctica islandica*) (OQ) • Subtidal (sublittoral) sand (SS)	Geodiversity	n/a

Data used in assessment			
Version of Marine recorder database	Update Nov2014	**Other datasets used (specify)**	- [1]Bangor University OQ in Belfast Lough - grab and dredge surveys June 2005, July 2008, September 2008 and April 2010. - [2]DOE North Channel disposal grounds monitoring programme 1990-2014 (Marine recorder database). - [3]Sublittoral Survey of Northern Ireland (SSNI) 2012 (Marine Recorder database). - [4]DOE Belfast grab survey (Marine Coastal Access Act) 2012 - [5]JNCC EU SeaMap predicted habitat maps 2014v8.3 - [6]JNCC UK SeaMap 2010. - [7]AFBI cruise CO0715 - video tows and grab survey 2015. - [8]DOE Outer Belfast Lough pMCZ spyball surveys 2015 – drop-camera underwater video/still images, infaunal grab samples and particle size analysis (PSA). - [9]DOE Outer Belfast Lough pMCZ diving survey 2015 – ground-truthing. - [10]DOE Outer Belfast Lough side-scan sonar survey 2015 - [11] Northern Ireland Sublittoral Survey (NISS) 1984 (Marine Recorder database)

Summary of Data Confidence Assessment							
Confident in underpinning data		**Yes**	✓	**Partial**		**No**	
Confident in presence of identified features?	✓	**Data suitable to define extent of individual protected features**		✓	**Partial**	✘	
				OQ	SS		

Summary	The Department has high confidence in the presence of the designated features and the supporting evidence within the MCZ. Most of the records for OQ were collected during dedicated surveys, delivered by Bangor University, which took place in June 2005, July 2008, September 2008 and April 2010 using beam trawl, grabs and tows as sampling methods[1]. Additionally, AFBI cruise CO0715[7] reported more evidence of OQ in the central area with one out of three total grab samples. DOE North channel monitoring surveys[2], SSNI[3] and DOE pMCZ spyball survey[8] also recorded multiple OQ records collected from several grabs during annual surveys. These datasets support high confidence in defining the extent of the MCZ boundary around the species records. The evidence for the presence of SS in the AoS is supported by the broad coverage of grab samples and PSA analysis carried out in different DOE monitoring programmes (DOE North Channel disposal grounds monitoring programme 1990- 2014[2]; DOE Belfast grab survey (Marine Coastal Access Act) 2012[4]; DOE Outer Belfast Lough pMCZ surveys 2015[8&9]). These all confirm the sediment types which underpin the predictive habitat mapping projects used in the assessment (UK and EU SeaMap habitat maps[5&6] and AFBI acoustic facies[7]). The survey work undertaken in 2015 by DOE[8&9] using the spyball (an underwater camera) confirmed the complexity of the sand dominated habitat with presence of sandy biotopes such as '*Amphiura brachiata* with *Astropecten irregularis* and other echinoderms in circalittoral muddy sand' (SS.SSa.CMuSa.AbraAirr). The footage also showed the presence of muddy patches including the biotopes 'Seapens and burrowing megafauna in circalittoral fine mud' (SS.SMu.CFiMu.SpnMeg) with high densities of burrows and mounds (frequent on the SACFOR scale) (JNCC, 2014) and occasional sea-pens and '*Virgularia mirabilis* and *Ophiura* spp with *Pecten maximus* on circalittoral sandy or shelly mud' (SS.SMu.CSaMu.VirOphPmax). These biotopes had been previously identified by AFBI cruise CO0715[7] earlier in 2015 using both grabs and video tow. Both surveys supported the boundary extent with the verification of suitable habitat (SS) for OQ. Side-scan images[10] clearly identified two distinct acoustic facies comprising smoother sediments to the north and rougher sediments to the south. This was verified during the dive survey[9] and corroborated by the grab samples, towed camera[7] and spyball[8] surveys.

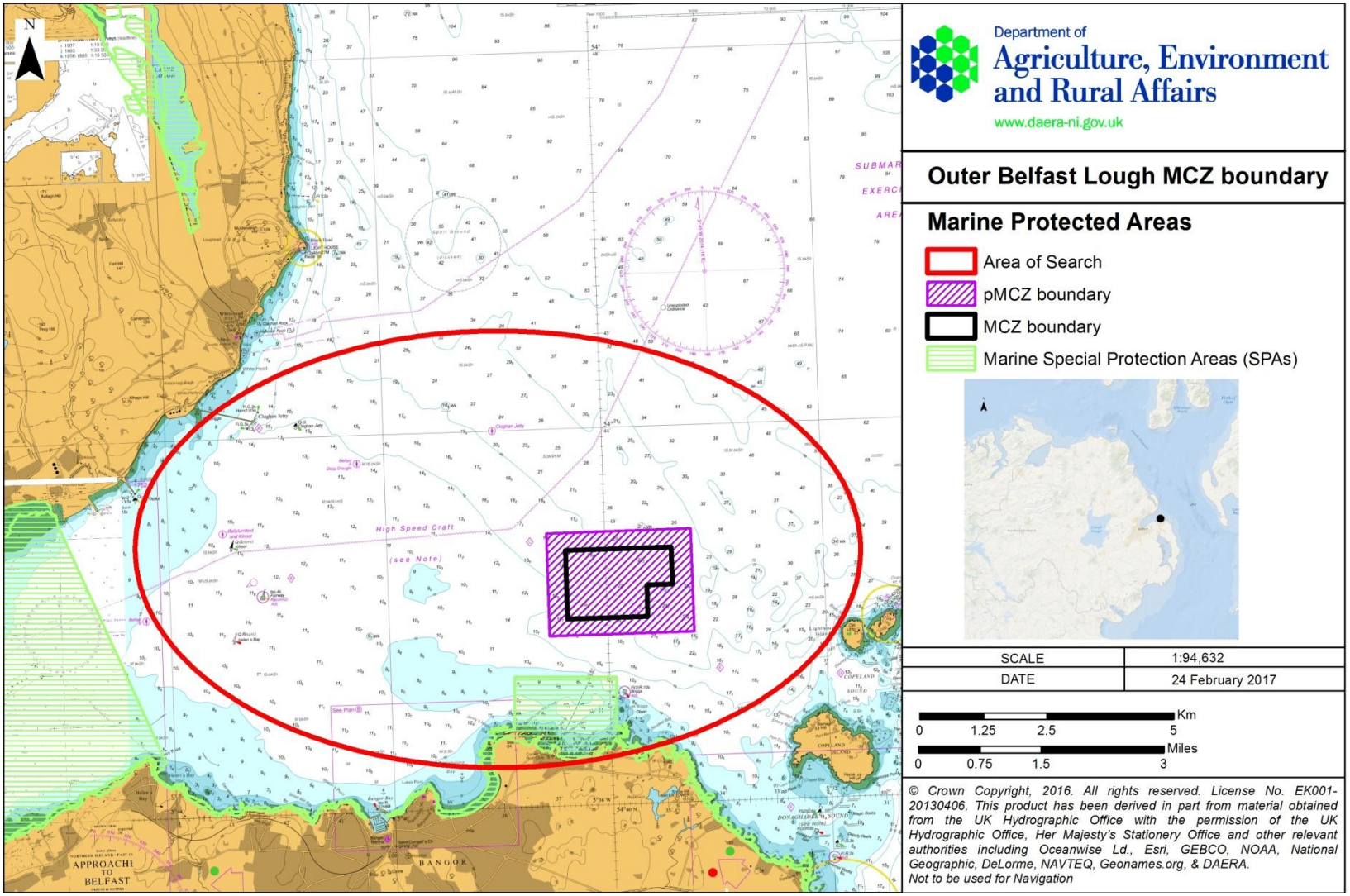

Figure 1 Location of Area of Search (AoS), initial proposed (p) boundary and designated boundary of Outer Belfast Lough MCZ

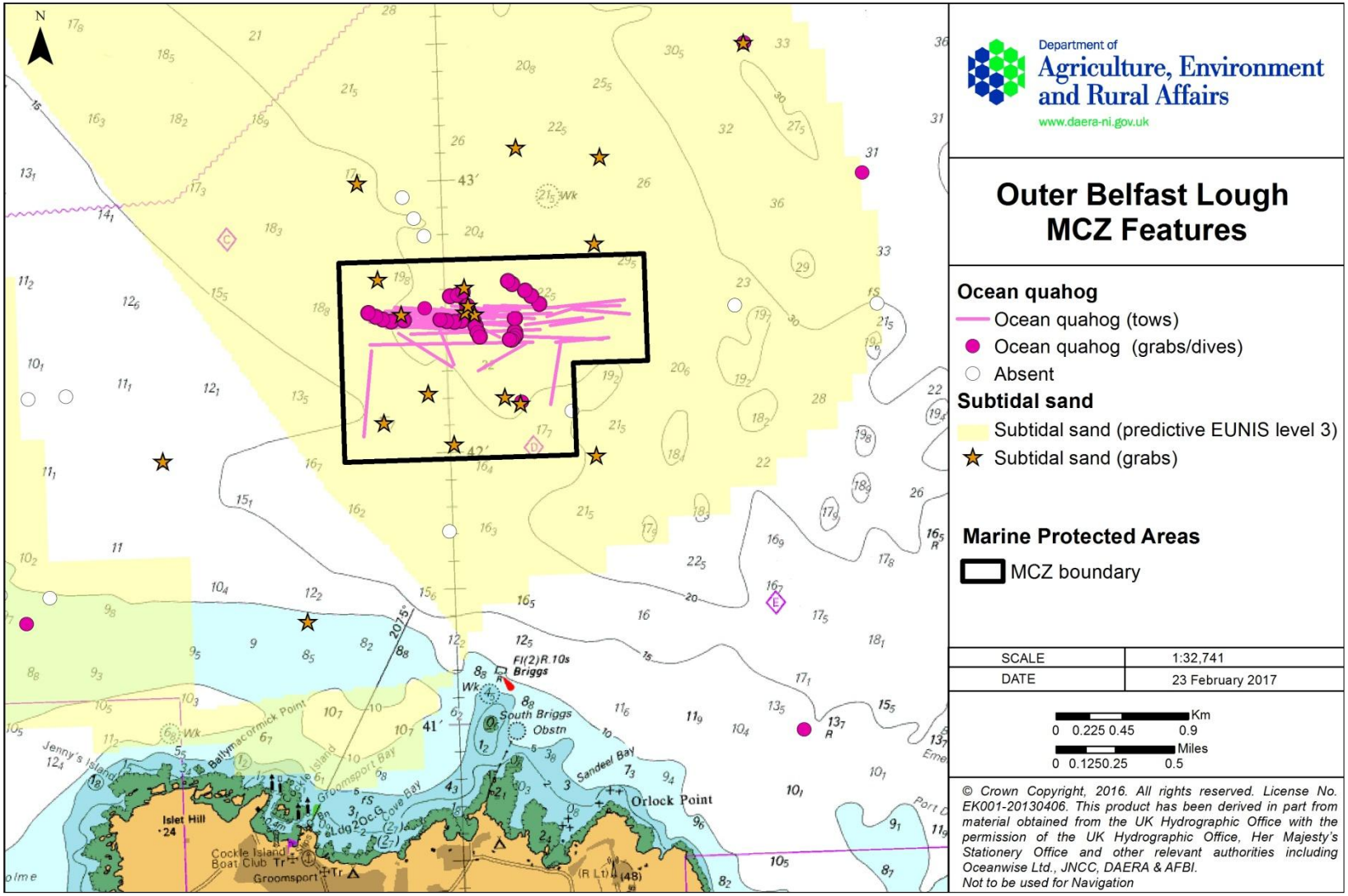

Figure 2 Distribution of the features in Outer Belfast Lough MCZ

Data Confidence Assessment

The assessment of data confidence is based on a consideration of the age and source of the data, the type of sampling methodologies used and the coverage across the overall MCZ.

Age of data (Figure 3)

Multiple records collected within last 10 years	OQ SS	**Multiple records collected 10-25 years ago**	OQ	**Multiple records >25 years old**	
Comments	Within the MCZ, the majority of data for OQ were collected during dedicated grab surveys in (2005, 2008 and 2010[1]). Older records for OQ were acquired from DOE disposal grounds monitoring grab surveys (1990, 1997, 1998, 1999, 2000, 2001, 2002, 2003 and 2004) [2] and SSNI (1984 and 2012)[3+11]. More recent evidence of both features (OQ and SS) was obtained in grabs and videos during the pMCZ support surveys in 2015[8&9] and DOE side scan sonar survey 2015[10]. Information on SS was derived from predicted habitat maps (2010[6], 2014[5]). PSA data confirming SS in the AoS were acquired from sediment samples collected in 2012[4], 2014[2] and 2015[8].				

Source of data (Figure 4)

Targeted data collection for nature conservation purposes	✓	**Statutory monitoring (marine licensing etc.)**	✓	**Fisheries survey work**	
Data collection associated with development proposals (EIA etc.)		**Recreational / volunteer data collection**		**Other** (specify) – EUNIS predictive maps, PSA data	✓
Comments	The majority of the feature records have been collected through targeted nature conservation-orientated surveys (Ridgway *et al.*,				

	2012[1]; SSNI[3]; DOE survey work 2015[8,9&10]; AFBI, 2015[7]). PSA data were obtained from sediment samples collected by DOE during several monitoring surveys. These were grabs collected as part of the disposal ground license programme[2] and Marine Coastal Access Act monitoring programme[4]. Additional PSA data were collected from AFBI cruise CO0715[7] and DOE survey 2015[8]. The UK SeaMap 2010[6] predicted habitat map used in this assessment was developed by JNCC (McBreen *et al*., 2011) while the EU SeaMap[5] was developed by The European Marine Observation and Data Network (EMODnet, 2014).

Sampling methods / resolution

Feature	Modelled	Acoustic / remote sensing	Remote video / camera	Infaunal - grab / core	Sediment sampling	Diving	Fisheries sampling
OQ			✓	✓	✓	✓	✓
SS	✓	✓	✓	✓	✓	✓	

Comments

A number of sampling methods have been used to collect information on the features of interest in the MCZ.

The predictive seabed habitat mapping projects UK SeaMap 2010[6] and EU SeaMap 2014[5] were developed by JNCC (McBreen *et al*., 2011) and EMODnet (2014) and provide us with modelled broad scale habitats in the MCZ.

Acoustic/remote sensing (side-scan sonar with single track bathymetry) was undertaken by DOE (2015)[10] adding more information about the type of sediments in the MCZ. AFBI have been involved in extensive multibeam mapping surveys of the North Channel-Irish Sea-Belfast Lough area.

Remote video and photographic imagery sampling (using a drop-down spyball camera) was undertaken by DOE across the wider AoS/pMCZ (RV Capitella), providing an overview of the composition and distribution of seabed habitats in the area[8].

Underwater camera techniques were previously used for OQ stock assessment based on the presence of their siphons on the seabed surface (Ragnarsson & Thórarinsdóttir, 2002).

Video tows were recorded by AFBI[7] (AFBI, 2015) using an Osprey camera and a Go-Pro camera in the southern area of the MCZ (RV Corystes).

Infaunal grab sampling has been used to provide a more detailed

	understanding of the quality, diversity and structure of the specific habitats[1,2&7]. The PSA data for SS are from sediment samples collected in different surveys[2,4,7&8]. SSNI (2012)[3] and DOE Outer Belfast Lough pMCZ diving survey 2015[9] were all conservation based diving surveys in the AoS and these provided photographic and video evidence of OQ and its habitat. The Bangor surveys used a rigid–toothed dredge designed to equally sample all size classes of OQ greater than 25mm height, deployed from RV Prince Madog in different surveys[1] (Bangor University 2005, 2008a, 2008b, 2010).

Data coverage (Figures 3 to 6)							
Across the MCZ							
Large numbers of feature records distributed across the MCZ		**Numerous feature records scattered across the MCZ with some clumping**	✓	**Numerous feature records possibly with some clumping.** **Boundary not defined solely by recorded feature distribution**		**Few or isolated feature records - possibly clumped**	
For Individual features							
Multiple records of individual features providing indication of extent and distribution throughout pMCZ?		**Few or scattered records of specific features making extent and broad distribution assessment difficult?**	✓ SS			**Few or isolated records of specific feature records**	
Are acoustic remote sensing data available to facilitate the development of a full coverage predictive seabed habitat map?	Publically acquired multibeam, backscatter and side-scan data[10] have been utilised in the production of detailed habitat maps for Outer Belfast Lough AoS.						

Comments	**Ocean quahog (*Arctica islandica*) (OQ) (Figure 5)** • 2005, 2008 & 2010 Bangor University Ocean quahog grab survey[1] – The grab and dredge surveys conducted in June 2005, July 2008, September 2008 and April 2010 showed that the OQ population at Belfast Lough appears to be limited to a small area at the mouth of the Lough. Total numbers of live OQ and dead shell were recorded for each tow (n=40). Where OQ was present grabs (n=20) were undertaken for quantitative assessment providing a population density of 4·5 individual per m^2. Relative abundance was found to be lower in autumn. The population age was estimated to range between 6 and 217 years old in the MCZ. • 2014 Marine Recorder[2&3] – There are some single records of OQ from dive surveys in the AoS, outside the designated boundary to the south-east (2012) and south-west (1984) of the MCZ recorded as part of the SSNI programme (Sublittoral Survey Northern Ireland[3]) and NISS programme (Northern Ireland Sublittoral Survey[11]). OQ was recorded in the diving data as occasional and rare on the SACFOR scale (JNCC, 2014). There are also multiple records for the presence of OQ from DOE disposal grounds monitoring grab surveys[2] both inside and outside the designated boundary (north and north-east of the boundary) for the years 1990-1991, 1997-2005 and 2007-2009. • 2015 AFBI CO0715 cruise[7] – Analysis of infaunal grab samples found juveniles and dead shells of OQ at one of the sites sampled within the middle of the MCZ. In the video footage some of the shell debris was identified as OQ. • 2015 DOE Outer Belfast Lough pMCZ spyball survey[8] – 14 stations were surveyed by the spyball camera and sediment grabs were taken at each station. Confidence in the presence of OQ is low as it was difficult to identify the presence of OQ *in situ* from the video footage. Some shell debris from the grabs was identified as OQ. It should be noted that the distribution of the species is likely to be significantly under-recorded because it is often missed by grab sampling while the surface signs of OQ within the sediment are difficult to identify from drop-down video footage (Lancaster *et a*l., 2014). • 2015 DOE Outer Belfast Lough pMCZ diving survey[9] –Two location points in the AoS were surveyed by DOE divers to ground-truth the habitat. The presence of one living OQ was recorded despite the difficulty in identifying siphons on the surface of the sediment. **Subtidal (sublittoral) sand (SS) (Figure 6)** • 1990-2014 DOE North Channel disposal grounds monitoring programme[2] – There are two sampling stations in the AoS and inside the MCZ (station F01). PSA analysis performed in 2014 classed (according to EUNIS/BGS (British Geological Survey)

	modified Folk class) the sediment as 'gravelly muddy sand' (EUNIS 5.2) inside the MCZ and gravelly sand outside the MCZ (to the north-east of the boundary). • 2010 UK SeaMap JNCC[6] – The habitat map predicts subtidal sands occur across the entire pMCZ. Circalittoral fine sand (SS.SSa.CFiSa - A5.25), infralittoral fine sand (SS.SSa.IFiSa - A5.23), circalittoral muddy sand (SS.SSa.CMuSa - A5.26) and infralittoral muddy sand (SS.SSa.IMuSa - A5.24) are all predicted to occur in the area. • 2012 DOE Belfast grab survey (Marine Coastal Access Act)[4] – PSA analysis of the two sample stations in the AoS to the south-west of the MCZ boundary were classed as 'gravelly muddy sand' and 'gravelly sand' (EUNIS 5.2). • 2014 JNCC EU SeaMap predicted habitat maps[5] – The habitat map predicts subtidal sand occur across the entire pMCZ. Circalittoral fine sand (SS.SSa.CFiSa - A5.25), infralittoral fine sand (SS.SSa.IFiSa - A5.23), Circalittoral muddy sand (SS.SSa.CMuSa - A5.26) and infralittoral muddy sand (SS.SSa.IMuSa - A5.24) are predicted to occur in the area. • 2015 AFBI CO0715 cruise[7] – Three sediment samples were collected during the survey and PSA was carried out. These grabs were collected in areas with high densities of OQ. All the sediments were recorded as 'muddy sand' (EUNIS 5.2). The tow deployed in this survey of the MCZ recorded the presence of Circalittoral muddy sand (SS.SSA.CMuSa). Moreover, the following biotopes were recorded in the tow showing the complexity of the sediments in the MCZ: *Flustra foliacea* and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment (SS.SMx.CMx.FluHyd), *Virgularia mirabilis* and *Ophiura* spp. with *Pecten maximus* on circalittoral sandy or shelly mud (SS.SMu.CSaMu.VirOphPmax) and Seapens and burrowing megafauna in circalittoral fine mud (SS.SMu.CFiMu.SpnMeg). Sea-pen *Virgularia mirabilis* was recorded in the tow as occasional on the SACFOR scale (JNCC, 2014)) together with *Nephrops norvergicus* burrows (common) and other smaller burrows. • 2015 DOE Outer Belfast Lough pMCZ spyball survey[8] – There were 14 sediment samples collected by the Department in the AoS and MCZ. PSA was carried out on all samples for sediment characterization. Of the 14 sediment samples, there were 12 records of 'gravelly sand' (EUNIS 5.2) and 2 records of 'sandy gravel' (EUNIS 5.1). Results are also consistent with the UK BAP Priority Habitat Descriptions for SS and gravels (JNCC, 2008). All stations within the AoS were also filmed with the spyball remotely controlled from RV Capitella on 2015. The video footage was viewed using freeze-frame; slow motion and standard play speed as necessary to enable the identification of as many conspicuous species as possible and a determination of broad substrate type.

	The video footage showed the SS habitat with muddy patches and clear burrowing activity in most of the stations sampled in the AoS. Burrows were recorded as frequent on the SACFOR scale (JNCC, 2014). Sea-pens were also identified in several stations inside the MCZ. • 2015 DOE Outer Belfast Lough pMCZ diving survey[9] – DOE divers, using an underwater camera, confirmed the presence of SS habitat suitable for OQ with sandy biotopes such as *Amphiura brachiata* with *Astropecten irregularis* and other echinoderms in circalittoral muddy sand' (SS.SSa.CMuSa.AbraAirr). This survey also confirmed the biotopes identified previously by AFBI in 2015. • DOE SSS[10] – side-scan sonar clearly illustrated that large areas, particularly within the southern sector were subject to mobile fishing gear resulting in a coarser sediment.

The Evidence Base (Figures)

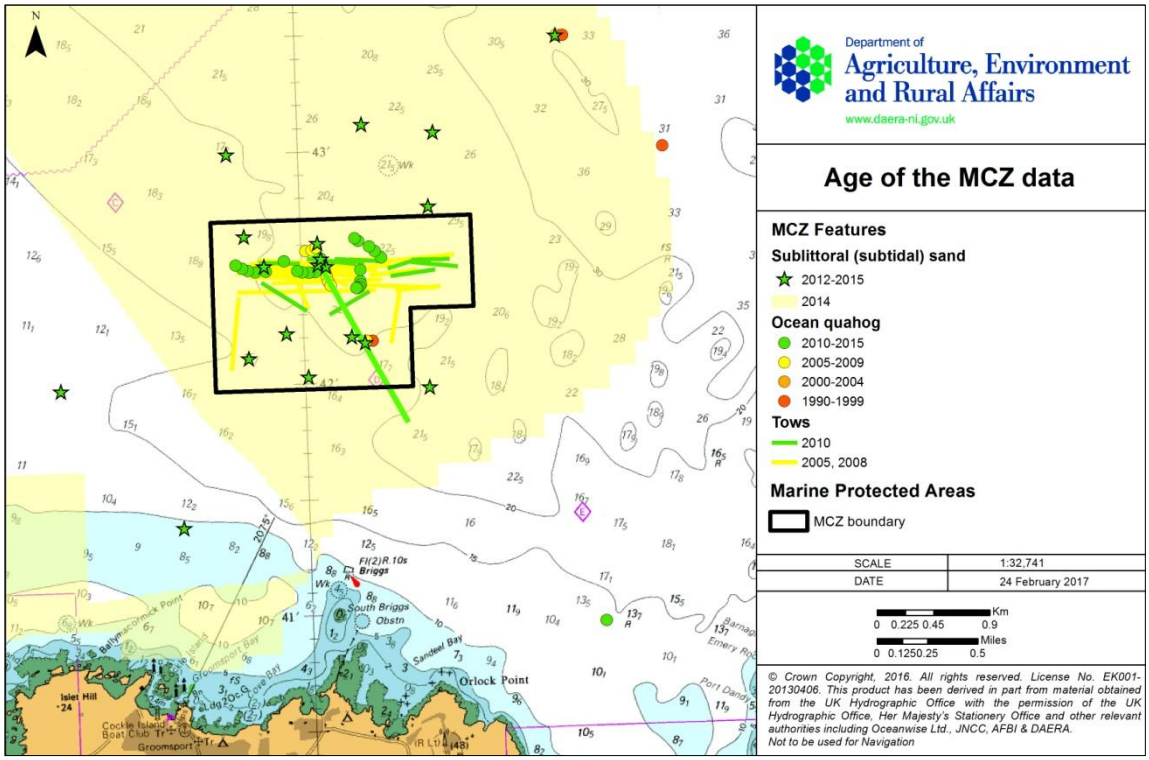

Figure 3 Age of the feature data collected in Outer Belfast Lough MCZ

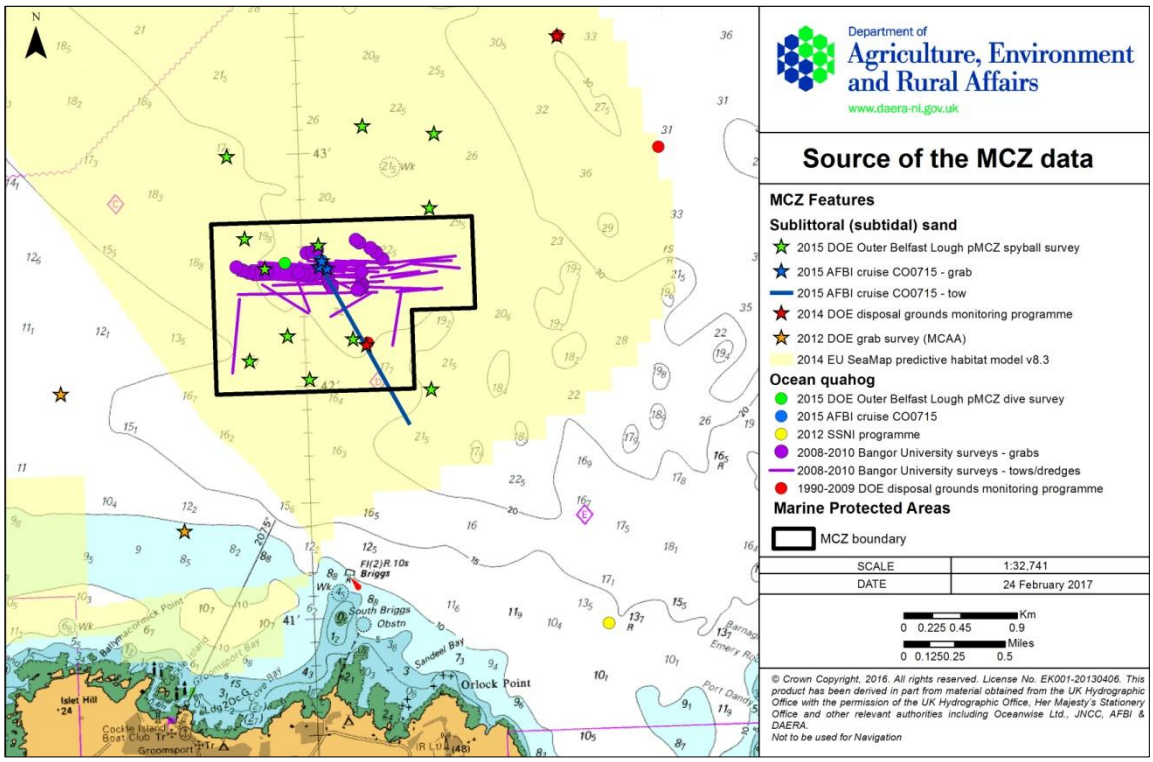

Figure 4 Source of the feature data collected in Outer Belfast Lough MCZ

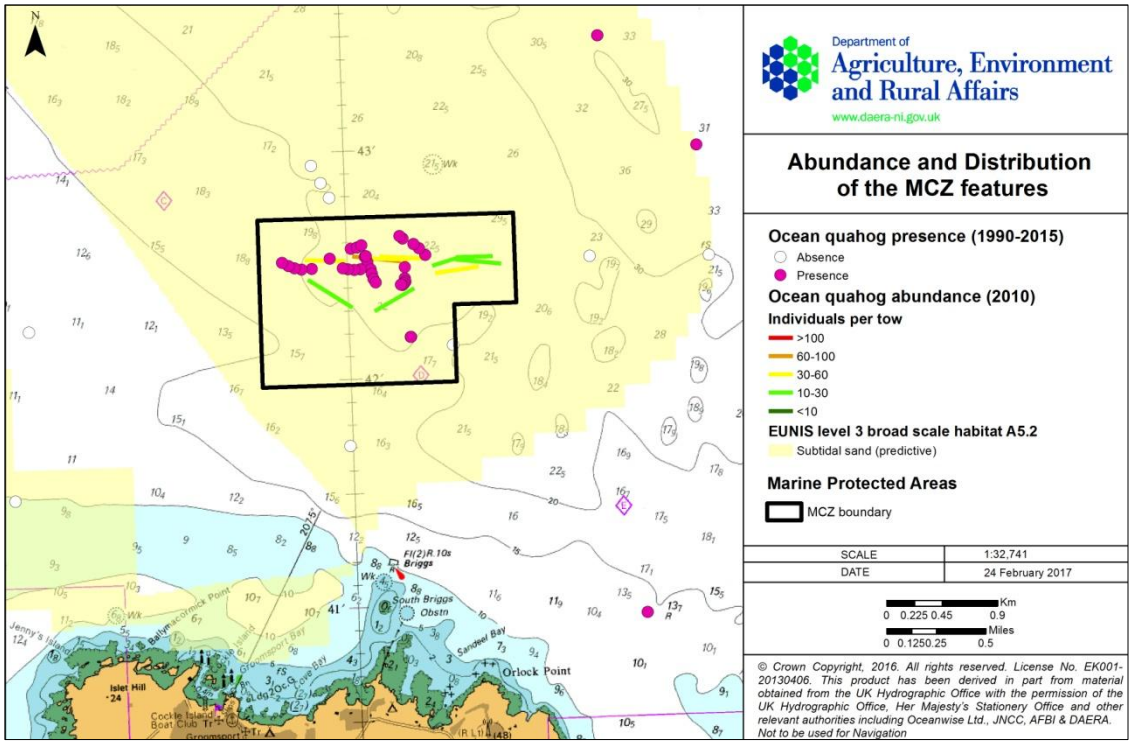

Figure 5 Abundance and distribution of feature data collected in Outer Belfast Lough MCZ

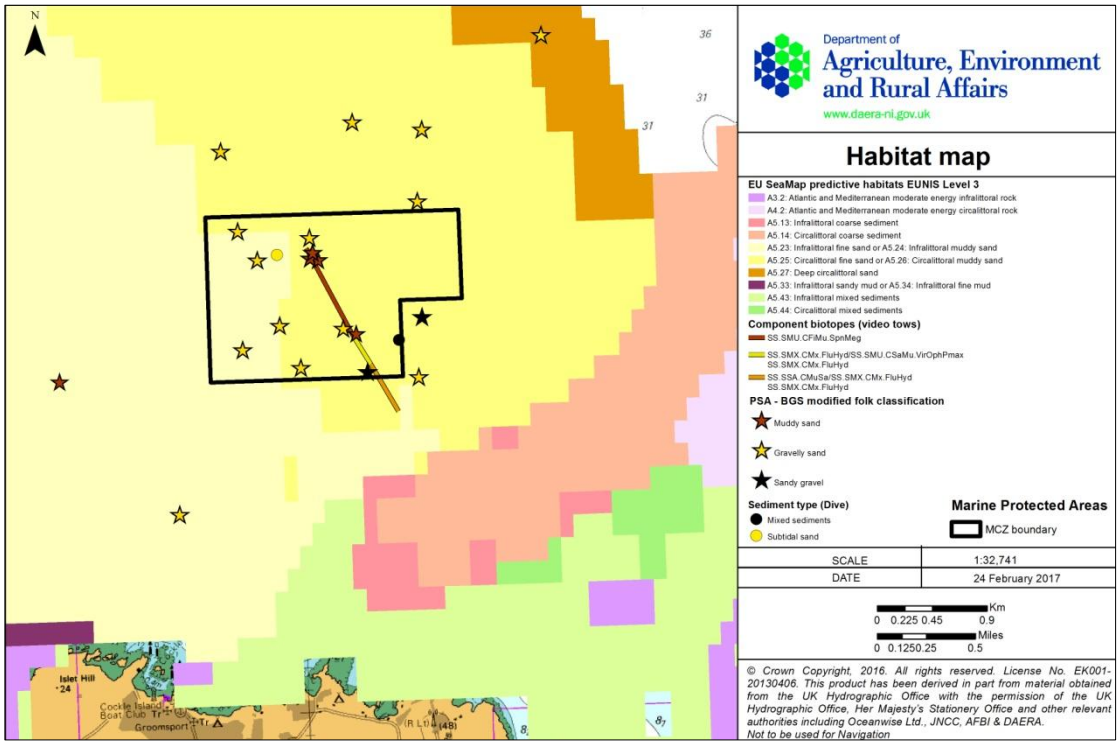

Figure 6 Habitat Map of Outer Belfast Lough MCZ and surrounding seabed

Data sources and Bibliography		
Data Sources (used in assessment)	**Reference**	**Features covered**
[1]Bangor University Ocean quahog in Belfast Lough - grab and dredge surveys June 2005, July 2008, September 2008 and April 2010	Bangor University. *Arctica islandica* collection cruise Irish Sea and Belfast Lough. June 2005. Cruise report PD23/05 https://www.bodc.ac.uk/data/information_and_inventories/cruis e_inventory/report/6750/	OQ
	a.Bangor University. *Arctica islandica* collection cruise. Irish Sea and Belfast Lough. July 2008. Cruise report PD21/08 https://www.bodc.ac.uk/data/information_and_inventories/cruis e_inventory/report/8594/	
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[2]DOE North Channel disposal grounds monitoring programme 1990-2014 (DOE-Marine Recorder database)	N/A	SS
[3]Sublittoral Survey of Northern Ireland 2012 (Marine Recorder database).	Goodwin, C., Picton, B., Breen, J., Edwards, H. and Nunn, J. 2011. Sublittoral Survey Northern Ireland (2006 – 2008). Northern Ireland Environment Agency Research and Development Series No. 11/01 https://www.daera-ni.gov.uk/publications/sublittoral-survey-northern-ireland-2006-2012	OQ
[4]DOE Belfast grab survey (Marine Coastal Access Act) 2012	N/A	SS
[5]JNCC EU SeaMap predicted habitat maps 2014 v8.3	EU SeaMap. A broadscale physical habitat map for European Seas. 2014c. EMODnet. EUSeaMap: A broad-scale physical habitat map for European Seas.	SS
[6]UK SeaMap 2010	McBreen F., Askew N., Cameron A., Connor D., Ellwood H. & Carter A. 2011. UKSeaMap 2010: Predictive mapping of seabed habitats in UK waters. JNCC Report, No. 446. http://jncc.defra.gov.uk/ukseamap	SS
[7]AFBI cruise CO0715 - video tows and grab survey 2015	AFBI. 2015. Species and habitat data for Marine Conservation Zone Areas of Interest. Rathlin Island, Ballycastle Bay and Outer Belfast Lough. Report to the Department of the Environment.	OQ SS
[8]DOE Outer Belfast Lough pMCZ spyball surveys 2015 – drop- camera	N/A	OQ SS

[9]DOE Outer Belfast Lough pMCZ diving survey 2015 – ground truthing	N/A	OQ SS
[10]DOE Outer Belfast Lough Side-scan sonar survey 2015	N/A	OQ SS
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