

The background of the entire page is a close-up photograph of a large collection of marine shells and mollusk remains. The shells vary in size, shape, and color, including white, tan, brown, and blue. Some are whole, while others are broken or fragmented. The shells are densely packed and appear to be resting on a dark, pebbly surface.

# **SPECIES AND HABITAT DATA FOR MARINE CONSERVATION ZONE AREAS OF INTEREST: RATHLIN ISLAND; BALLYCASTLE BAY; OUTER BELFAST LOUGH**

Delivered under the Service Level Agreement between the Agri-Food and Biosciences Institute (AFBI) and the Department of Environment (DoE), Environment and Marine Group, Water Management Unit & Marine Division in respect of scientific and technical services (2014-2015)

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# 1. INTRODUCTION

AFBI has undertaken a number of surveys to support the provision of evidence for consideration in the Marine Conservation Zone (MCZ) designation process by the Department of the Environment (DOE). Surveys have concentrated on “Areas of Interest” (AoIs) as identified by DOE, using appropriate methods to sample the biological communities and capture habitat information.

This report describes the subtidal benthic communities, defined as the species living in and on the seabed, and the physical environment in which they exist at: (1) Rathlin Island; (2) Ballycastle Bay, and (3) Outer Belfast Lough. Species and habitats of conservation importance are highlighted where these are identified within these areas.

## 1.1 Habitats and species of known conservation interest

In Northern Ireland, species and habitats considered of conservation importance for inclusion in the MCZ designation process (following the Marine Act (Northern Ireland) 2013) were selected through the amalgamation of the following:

- The OSPAR list of Threatened and/or Declining Species and Habitats (OSPAR T&D);
- The UK Biodiversity Action Plan list (UK BAP);
- Northern Ireland List of Priority Habitats and Species (NI Priority);
- Species of Conservation Concern (SOCC), and
- Nationally Important Marine Features (NIMF).

The species and habitats identified through this process were then reviewed through stakeholder consultation. A resulting list of Priority Marine Features (species and habitats) was thus produced (see Tables 1.2 to 1.4, and Annex I)<sup>1,2</sup>. Table 1.2 below provides the Priority Marine Feature (PMF) Habitats for Northern Ireland that have been subsequently selected for specific inclusion in the MCZ designation process for the inshore region, and Tables 1.3 and 1.4 show the PMF species which have been selected. Other PMF habitats and species that are considered to be already adequately represented in existing Marine Protected Areas (MPAs, e.g. through marine SACs – Special Areas of Conservation) are detailed in Annex I. Note “pMCZ” means “proposed Marine Conservation Zone”.

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<sup>1</sup>[http://www.doeni.gov.uk/consultation\\_document\\_on\\_draft\\_guidance\\_on\\_selection\\_and\\_designation\\_of\\_marine\\_conservation\\_zones\\_mczs\\_in\\_ni\\_inshore\\_region.pdf](http://www.doeni.gov.uk/consultation_document_on_draft_guidance_on_selection_and_designation_of_marine_conservation_zones_mczs_in_ni_inshore_region.pdf)

<sup>2</sup>[http://www.doeni.gov.uk/justification\\_report\\_for\\_selection\\_of\\_pmczs\\_features-version1.0.pdf](http://www.doeni.gov.uk/justification_report_for_selection_of_pmczs_features-version1.0.pdf)



pMCZ Habitat	Component (sub-scale) habitats
Deep sea bed	<ul style="list-style-type: none"> <li>• Cold water coral reefs<sup>2</sup></li> </ul>
Low energy circalittoral (subtidal) rock	<ul style="list-style-type: none"> <li>• Estuarine rocky habitats</li> </ul>
Sublittoral (subtidal) biogenic reefs	<ul style="list-style-type: none"> <li>• Horse Mussel (<i>Modiolus modiolus</i>) beds</li> <li>• Blue Mussel (<i>Mytilus edulis</i>) beds</li> <li>• Brittlestar beds</li> </ul>
Sublittoral (subtidal) muds	<ul style="list-style-type: none"> <li>• Mud habitats in deep water</li> <li>• Sea-pen and burrowing megafauna communities</li> <li>• Blue Mussel (<i>Mytilus edulis</i>) beds</li> </ul>
Sublittoral (subtidal) sand	<ul style="list-style-type: none"> <li>• Circalittoral sand and gravel communities</li> <li>• Tide-swept channels</li> <li>• Native oyster (<i>Ostrea edulis</i>) beds</li> <li>• Brittlestar beds</li> </ul>
Sublittoral (subtidal) mixed sediments	<ul style="list-style-type: none"> <li>• Brittlestar beds</li> </ul>

Table 1.2. Proposed MCZ Habitats for the Northern Ireland MCZ designation process (including examples of component habitats).

pMCZ Limited/low mobility species
<i>Arctica islandica</i> (Ocean Quahog)
<i>Atrina fragilis</i> (Fan Mussel) <sup>4</sup>

Table 1.3. Proposed MCZ limited/low mobility species for the Northern Ireland MCZ designation process.

pMCZ Highly mobile species
<i>Dipturus batis</i> (Common Skate)
<i>Cephus grylle</i> (Black Guillemot)

Table 1.4. Proposed MCZ highly mobile species for the Northern Ireland MCZ designation process.

The identified pMCZ features provide a basis for identifying areas of interest for proposed MCZs, therefore a sound knowledge of the distribution and condition of these features is necessary to underpin the MCZ designation process.

Northern Ireland is revising the list of MNCR/EUNIS biotope complexes or biotopes (levels 4 or above) which form components of the pMCZ or PMF habitats, and a provisional list of EUNIS and MNCR habitats, biotope complexes and biotopes is included below in Table 1.5.

EUNIS level	EUNIS code 2007-11	EUNIS name 2007-11	JNCC 04.05 code	pMCZ broadscale habitat	pMCZ component habitat (NB. Not exhaustive)
3	A5.6	Sublittoral biogenic reefs	SS.SBR	Sublittoral (subtidal) biogenic reefs	Horse mussel beds, Blue mussel beds, Brittlestar beds
3	A5.1	Sublittoral coarse sediment	SS.SCS	Sublittoral (subtidal) sand (incorporates gravel communities)	Circolittoral sand and gravel communities
3	A5.3	Sublittoral mud	SS.SMu	Sublittoral (subtidal) muds	Mud habitats in deep water, Seapen and burrowing megafauna communities, Blue mussel beds
3	A5.4	Sublittoral mixed sediments	SS.SMx	Sublittoral (subtidal) mixed sediments	Brittlestar beds
3	A5.2	Sublittoral sand	SS.SSa	Sublittoral (subtidal) sand	Circolittoral sand and gravel communities, Tide-swept channels, Native oyster beds, Brittlestar beds
4	A5.62	Sublittoral mussel beds on sediment	SS.SBR.SMus	Sublittoral (subtidal) biogenic reefs	Blue mussel beds
4	A5.36	Circolittoral fine mud	SS.SMu.CFiMu	Sublittoral (subtidal) muds	
4	A5.35	Circolittoral sandy mud	SS.SMu.CSaMu	Sublittoral (subtidal) muds	
4	A5.34	Infralittoral fine mud	SS.SMu.IFiMu	Sublittoral (subtidal) muds	
4	A5.33	Infralittoral sandy mud	SS.SMu.ISaMu	Sublittoral (subtidal) muds	
4	A5.25	Circolittoral fine sand	SS.SSa.CFiSa	Sublittoral (subtidal) sand	Arctica islandica habitat
4	A5.26	Circolittoral muddy sand	SS.SSa.CMuSa	Sublittoral (subtidal) sand	Arctica islandica habitat
4	A5.23	Infralittoral fine sand	SS.SSa.IFiSa	Sublittoral (subtidal) sand	Arctica islandica habitat
4	A5.24	Infralittoral muddy sand	SS.SSa.IMuSa	Sublittoral (subtidal) sand	Arctica islandica habitat
5	A4.111	[Balanus crenatus] and [Tubularia indivisa] on extremely tide-swept circolittoral rock	CR.HCR.FaT.BaTub	Sublittoral (subtidal) sand	Tide-swept channels
5	A4.134	[Flustra foliacea] and colonial ascidians on tide-swept moderately wave-exposed circolittoral rock	CR.HCR.XFa.FluCoAs	Sublittoral (subtidal) sand	Tide-swept channels
5	A3.212	[Laminaria hyperborea] on tide-swept, infralittoral rock	IR.MIR.KR.LhypT	Sublittoral (subtidal) sand	Tide-swept channels
5	A3.213	[Laminaria hyperborea] on tide-swept infralittoral mixed substrata	IR.MIR.KR.LhypTX	Sublittoral (subtidal) sand	Tide-swept channels
5	A6.611	Deep-sea [Lophelia pertusa] reefs	SS.SBR.Crl.Lop	Deep sea bed - deeper than current "circolittoral" definition but not same as EUNIS level 2 "Deep-sea bed"	Cold water coral reefs (as yet not found)
5	A5.624	[Modiolus modiolus] beds with [Chlamys varia], sponges, hydroids and bryozoans on slightly tide-swept very sheltered circolittoral mixed substrata	SS.SBR.SMus.ModCvar	Sublittoral (subtidal) biogenic reefs	Horse mussel beds
5	A5.623	[Modiolus modiolus] beds with fine hydroids and large solitary ascidians on very sheltered circolittoral mixed substrata	SS.SBR.SMus.ModHAs	Sublittoral (subtidal) biogenic reefs	Horse mussel beds
5	A5.622	[Modiolus modiolus] beds on open coast circolittoral mixed sediment	SS.SBR.SMus.ModMx	Sublittoral (subtidal) biogenic reefs	Horse mussel beds
5	A5.621	[Modiolus modiolus] beds with hydroids and red seaweeds on tide-swept circolittoral mixed substrata	SS.SBR.SMus.ModT	Sublittoral (subtidal) biogenic reefs	Horse mussel beds
5	A5.625	[Mytilus edulis] beds on sublittoral sediment	SS.SBR.SMus.MytSS	Sublittoral (subtidal) biogenic reefs	Blue mussel beds
5	A5.361	Seapens and burrowing megafauna in circolittoral fine mud	SS.SMu.CFiMu.SpnMeg	Sublittoral (subtidal) muds	Seapen and burrowing megafauna communities
5	A5.343	[Philine aperta] and [Virgularia mirabilis] in soft stable infralittoral mud	SS.SMu.IFiMu.PhiVir	Sublittoral (subtidal) muds	
5	A5.444	[Flustra foliacea] and [Hydrallmania falcata] on tide-swept circolittoral mixed sediment	SS.SMx.CMx.FluHyd	Sublittoral (subtidal) mixed sediments	Tide-swept channels
5	A5.445	[Ophiothrix fragilis] and/or [Ophiocomina nigra] brittlestar beds on sublittoral mixed sediment	SS.SMx.CMx.OphMx	Sublittoral (subtidal) mixed sediments	Brittlestar beds
5	A5.445	[Ophiothrix fragilis] and/or [Ophiocomina nigra] brittlestar beds on sublittoral mixed sediment	SS.SMx.CMx.OphMx	Sublittoral (subtidal) mixed sediments	Tide-swept channels
5	A5.435	[Ostrea edulis] beds on shallow sublittoral muddy mixed sediment	SS.SMx.IMx.Ost	Sublittoral (subtidal) mixed sediments	Native oyster beds
6	A4.1122	[Alcyonium digitatum] with dense [Tubularia indivisa] and anemones on strongly tide-swept circolittoral rock	CR.HCR.FaT.CTub.Adig		Tide-swept channels
6	A4.1342	[Flustra foliacea], small solitary and colonial ascidians on tide-swept circolittoral bedrock or boulders	CR.HCR.XFa.FluCoAs.SmAs		Tide-swept channels
6	A4.3112	Dense brittlestars with sparse [Ascidia mentula] and [Cliona intestinalis] on sheltered circolittoral mixed substrata	CR.LCR.BrAs.AmenCio.Bri		Brittlestar beds
6	A5.5211	Red seaweeds and kelps on tide-swept mobile infralittoral cobbles and pebbles	SS.SMp.KSwSS.LsacR.CbPb	Sublittoral (subtidal) mixed sediments	Tide-swept channels

Table 1.5. Translation table between EUNIS and JNCC habitats, biotope complexes and biotopes and the equivalent Northern Ireland pMCZ habitats. Note that exact equivalency is not possible due to the nature of the existing classification systems, and this should only be used as a general guide.

## 1.2 Rationale for site selection

**Rathlin** is of interest to the DOE because of the depth of water and associated habitats, and the fact that the survey area is believed not to have been subjected to any form of intensive fishing by trawling or dredging. The reason for this is a probably a combination of water depth, strong currents, exposure and the proximity of a busy Traffic Separation Zone.

**Ballycastle Bay** is of interest to the DOE because it is a site in which large Common Skate are regularly caught by recreational sea anglers, and may be proposed as a potential MCZ in the

future if required to re-enforce the ecological coherence of the wider NI/UK Marine Protected Area network.

**Belfast Lough** pMCZ has been identified by DOE as a site with a known bed of Ocean Quahogs, and the Department needs additional information on the nature of the habitat in which the species is found to support the establishment of an appropriate MCZ boundary.

## 1.3 Physical conditions

### 1.3.1 Rathlin Island and Ballycastle Bay

Strong tidal flows occur through the Rathlin Sound and due to the complex bathymetry, there are several tidal races, overfalls and eddies that are subject to variations in current direction and force. Where the tidal wave is forced between Rathlin Island and the mainland current speeds can exceed  $3\text{ms}^{-1}$  on a spring tide and  $2\text{ms}^{-1}$  on a neap tide, with similar values occurring immediately offshore of major headlands, such as Fair Head (InYourFootsteps, 2011, as published in DETI, 2011). Maximum surface speeds that exceed  $4\text{ms}^{-1}$  have also been observed at this location. Over a tidal cycle on both spring and neap tides current speeds remain over  $1\text{ms}^{-1}$  for approximately 8hrs in this area (UKHO, 1995).

The north coast is exposed to strong Atlantic Ocean swell, with prevailing westerly winds, resulting in high wave exposure along the north coast of Rathlin Island. Ballycastle Bay is afforded some protection by Rathlin Island from the swell, although significant wave heights have been recorded within the Bay. Moderate to strong tidal currents result in mobile sedimentary bedforms which are a prevailing feature of the seabed, and result in a dominance of coarse substratum throughout much of the region (north, east and west of Rathlin Island, and within Ballycastle Bay).

Sediments within the local region include bedrock outcrops, boulders, mobile cobbles and coarse sands and gravels (of glacial and local origins), with sand and muddy sand also noted from broadscale British Geological Survey mapping (see Figure 1 below, taken from EU SeaMap Atlantic Habitats (harmonised)<sup>3</sup>, using UKSeaMap (2010) and BGS data). However, the Northern Ireland nearshore habitat mapping project Ballycastle Bay map (Mitchell and Service, 2004) did not find muddy sand sediments in this area, and instead identified only coarse sands and gravels, with small pockets of muddy gravel just offshore from the mouth of the Margy river which flows into Ballycastle Bay.

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<sup>3</sup> Available from: <http://www.emodnet.eu/seabed-habitats>



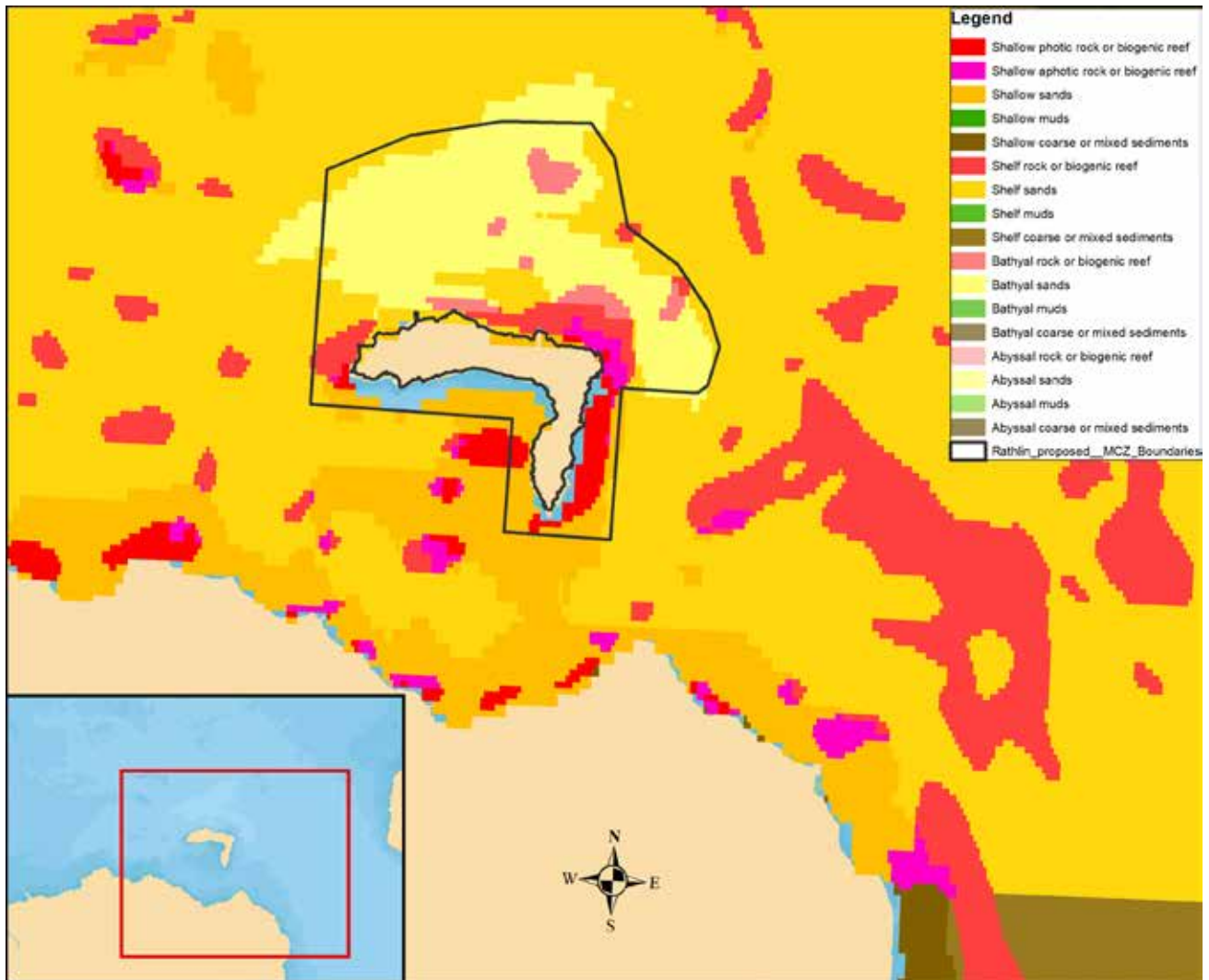


Figure 1. Predicted substrates/broadscale habitats as per EMODnet Seabed Habitats via EU SeaMap, based on British Geological Survey (BGS) data and JNCC modelling for the UK SeaMap (2010) project.

At a landscape level, the whole of the North Channel is considered as either a moderate or high energy environment with respect to benthic habitat classification (McBreen *et al.*, 2011).

### 1.3.2 Belfast Lough

Belfast Lough is a large semi-enclosed water body adjacent to the North Channel. The entrance to Belfast Lough lies more or less at right angles to the course of the tidal stream setting into or out of the North Channel to the Irish Sea. These streams run with considerable force across the mouth of the lough and have a marked effect on the water movement within the lough itself, particularly the area to the seaward of a line joining Grey Point and Kilroot Point where the tidal streams are particularly complex (Maxwell 1978). Sediments within the local region include bedrock outcrops, boulders, cobbles and coarse sands and gravels (of glacial and local origins), with fine sand and muds also noted from broadscale British Geological Survey mapping (see Figure 2 below, taken from EMODnet Seabed Habitats/EU SeaMap, based upon UKSeaMap (2010) and BGS data)

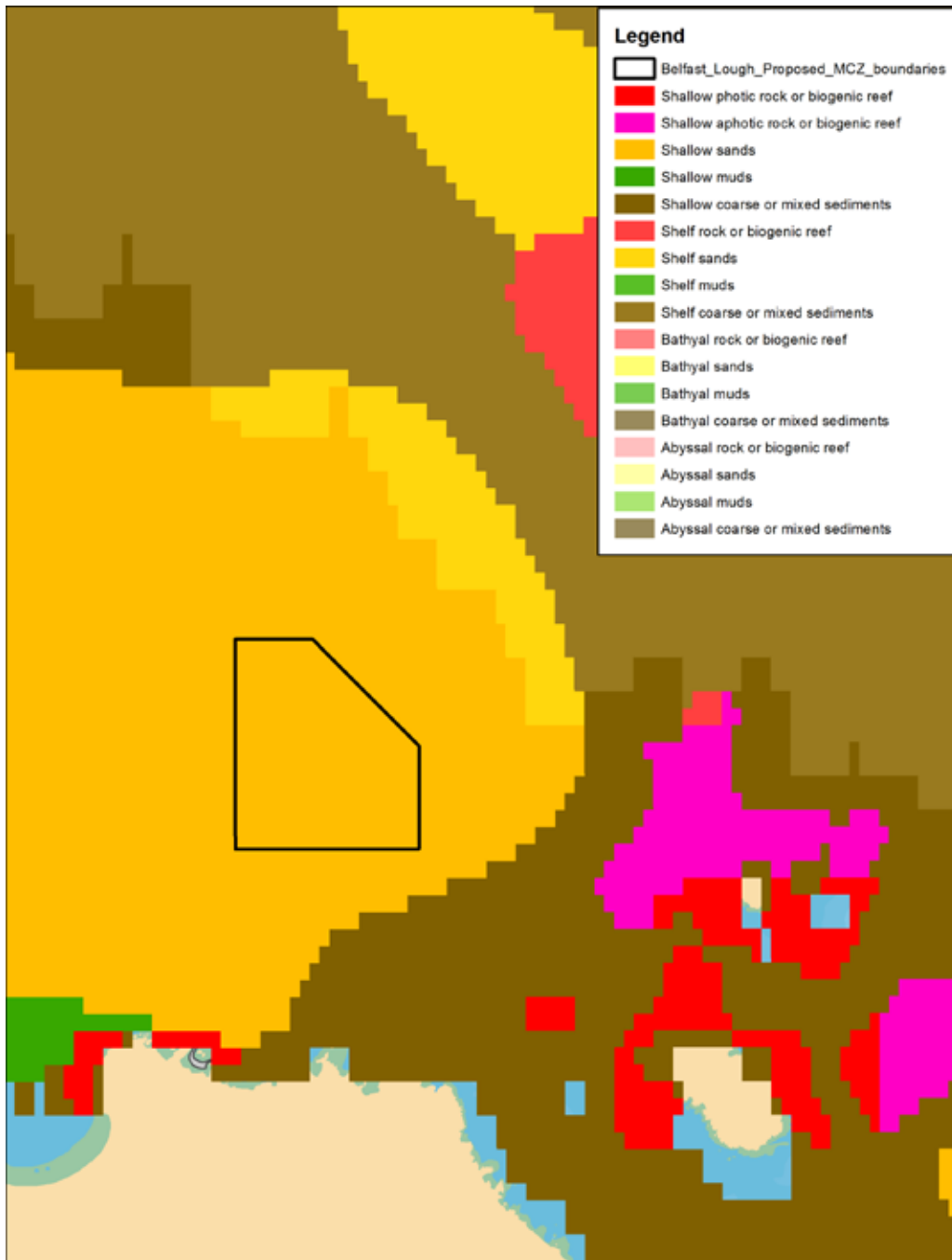


Figure 2. Predicted Belfast Lough substrates/broadscale habitats as published in EU SeaMap Atlantic Habitats (harmonised), using UKSeaMap (2010) and BGS data.

## 2. METHODOLOGY

Two survey campaigns were completed for the Rathlin Aol, and one campaign for Ballycastle Bay (Carrickmannanon Rock) Aol and Outer Belfast Lough Aol. Survey locations were determined based on (a) analysis of existing high resolution bathymetric and acoustic backscatter data from multibeam sonar (Joint Irish Bathymetric Survey (JIBS) data and AFBI data on the north coast, and AFBI data in Belfast Lough), and (b) DOE specified sites. All surveys were completed aboard the RV *Corystes* on the following cruises:

- CO2414 – sites surveyed over 18-20<sup>th</sup> June 2014 (SIC: Annika Clements)
- CO0715 – sites surveyed over 10-11<sup>th</sup> February 2015 (SIC: Annika Clements)

### 2.1. Video survey

The video system used was an Osprey camera deployed on an epibenthic sledge with halogen lights, fitted with an auxiliary Go-Pro video camera. The Osprey camera is angled for an oblique view, while the Go-Pro camera is deployed facing directly below, between the sledge runners. A dGPS overlay was recorded on the Osprey video footage, and notes taken of cable layback to allow estimation of the sledge's position on the seabed. An Ultra-Short Baseline (USBL) acoustic tracking system was also deployed (ORE LXT Tracker) on the sledge to allow accurate positioning. These data were saved on a laptop and corrected positions appended to video records. During the cruise CO0715 four lasers were also used on the sledge to facilitate accurate scaling of images. The field of view of the video camera is approximately 1m<sup>2</sup> when the sledge is in contact with the seafloor. The epibenthic sledge was chosen above the drop frame due to the very strong currents at the Rathlin and Ballycastle Bay sites, which led to the drop frame spinning in the vigorous hydrodynamic regime (worsened by the significant swell during CO0715). The epibenthic sledge proved to be a more stable platform for recording video footage. Modifications were made to the sledge to add further weight for the deep tows off the north of Rathlin Island and tows were attempted only on slack tides due to the strong tidal currents. Due to the depth of these sites, long video tows were practicable rather than many short tows, due to deployment and recovery time and dependency on slack tides.

### 2.2. Benthic grabs

A 0.1m<sup>2</sup> Day grab was deployed to assist with sampling of infaunal communities and sediment characterisation. Where adequate sediment was collected by the grab and particle size sub-sample was taken, and the remaining sample sieved using a 1mm sieve and residue stored in buffered formalin for faunal analysis. Due to the nature of the sediments at the Rathlin and Ballycastle Bay sampling stations, there was low success in grabbing adequate sediment for particle size analysis (PSA). The ground was heterogeneous and many cobbles were found in the coarse sand/gravel regions, which often blocked open the jaws of the Day grab resulting in loss of sediment upon reaching the survey vessel. Only six PSA samples and 10 infaunal samples were adequate for further processing from the CO2414 cruise, and only six PSA and infaunal samples

from the CO0715 cruise. The PSA samples from CO2414 were processed by Kenneth Pye Associates Ltd. and the infaunal samples containing more than single cobbles were processed by Fugro EMU Ltd. (NMBAQC accredited) to generate full abundance and biomass data for all species. The samples from CO0715 were analysed by DOE.

Grab sampling field notes are provided in Annex III. Results tables from the PSA and infaunal processing are included as Excel spreadsheets accompanying this report to DOE.

## 2.3 Video footage analysis

The footage was analysed following the “Recommended operating guideline” (Coggan *et al.*, 2007), allowing discrimination of biotopes through analysis of characterising substratum, seafloor relief and characterising species.

Due to the hydrodynamic regime at the sites, footage was sometimes faster than ideal, however conspicuous epibiota of ~2cm body size and larger were identified with adequate confidence for biotope assignment. Visibility during the February 2015 cruise was poorer than June 2014 possibly due to recent passage of storms in the area. At the Outer Belfast Lough site, visibility was greatly affected by the near passage of ferries, resulting in a sediment plume which reduced visibility to near zero for periods of minutes.

Where there appeared to be a notable change in substratum that persisted for more than 5m<sup>2</sup>, or a notable change in characterising species (such as *Ophiothrix fragilis*) persisting for more than 5m<sup>2</sup> the location was noted as a boundary between biotopes. Biotopes were classified according to the UK MNCR classification (Connor *et al.*, 2004), with a minimum of level 4 biotopes identified (“biotope complexes”), and, where data allowed, classification to levels 5 and 6 (“biotope” and “sub-biotope”).

In many footage segments it was clear that a mosaic of two or more biotopes co-existed spatially, for instance where boulders with epifaunal communities were surrounded by patches of coarse sediments with mobile cobbles. In these cases the biotopes were considered as a “matrix” and mapped as such.

Where time has allowed, all oblique angle video footage has been reviewed at least twice and Go Pro footage also reviewed, however due to time constraints in some instances only a first review (initial observations) has been possible. This is noted in the species tables for each site.

The locations of identified biotopes were plotted in a Geographical Information System (GIS) to overlay upon the multibeam data.

## 2.4 Benthic grab analysis

The infaunal data (both abundance and biomass of species) were examined in Excel and the data entered into a separate spreadsheet for processing in the statistical package PRIMER (Plymouth

Routines in Multivariate Ecological Research). A resemblance matrix was created from the data using the Bray-Curtis dissimilarity routine. A cluster analysis was then performed on these data, using a 90% cut off, and the resulting clusters stored as “factors” for further analysis. A multidimensional scaling plot was generated from the resemblance matrix showing the separation between samples. Finally the SIMPER routine was completed to extract the characterising species from each cluster. The results of this analysis are available in Annex I.



### 3. RESULTS

#### 3.1 Habitats: Identified Biotopes

Table 3.1 below details the biotopes identified from review of the video footage and grab sample data, and whether any of these are contained within the Northern Ireland pMCZ habitats. Where appropriate, mention is also made of whether a biotope could be an Annex I (EC Habitats Directive) habitat, following guidance regarding the classification of “stony reef” provided by Irving (2009).

MNCR Biotope/Biotope complex	MNCR Title	EUNIS code	EUNIS level	EUNIS title	PMCZ habitat?	Annex I habitat?
CR.HCR.XFa	Mixed faunal turf communities	A4.13	4	Mixed faunal turf communities on circalittoral rock	Unlikely, except if considered as "deep sea bed"	Stony reef and bedrock reef
SS.SMX.OMx	Offshore circalittoral mixed sediment	A5.45	4	Deep circalittoral mixed sediments	Yes - Sublittoral (subtidal) mixed sediments broadscale habitat	No
SS.SSA.CMuSa	Circalittoral muddy sand	A5.26	4	Circalittoral muddy sand	Yes - Sublittoral (subtidal) sand broadscale habitat	No
CR.MCR.EcCr.FaAlCr	Faunal and algal crusts on exposed to moderately wave-exposed circalittoral rock	A4.214	5	Faunal and algal crusts on exposed to moderately wave-exposed circalittoral rock	Unlikely, except if considered as "deep sea bed"	Stony reef and bedrock reef
CR.MCR.EcCr.UrtScr	Urticina felina and sand-tolerant fauna on sand-scoured or covered circalittoral rock	A4.213	5	[Urticina felina] and sand-tolerant fauna on sand-scoured or covered circalittoral rock	Unlikely, except if considered as "deep sea bed"	Stony reef and bedrock reef
SS.SCS.CCS.PomB	Pomatoceros triqueter with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles	A5.141	5	[Pomatoceros triqueter] with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles	Yes - circalittoral sand and gravel communities	No
SS.SMU.CFiMu.SpnMeg	Seapens and burrowing megafauna in circalittoral fine mud	A5.361	5	Seapens and burrowing megafauna in circalittoral fine mud	Yes - seapen and burrowing megafauna communities	No
SS.SMU.CSaMu.VirOphPmax	Virgularia mirabilis and Ophiura spp. with Pecten maximus on circalittoral sandy or shelly mud	A5.354	5	[Virgularia mirabilis] and [Ophiura] spp. with [Pecten maximus] on circalittoral sandy or shelly mud	Yes - sublittoral muds broadscale habitat	No
SS.SMX.CMx.FluHyd	Flustra foliacea and Hydrallmania falcata on tide-swept circalittoral mixed sediment	A5.444	5	[Flustra foliacea] and [Hydrallmania falcata] on tide-swept circalittoral mixed sediment	Yes - circalittoral sand and gravel communities	No
SS.SMX.CMx.OphMx	Ophiothrix fragilis and/or Ophiocolina nigra brittlestar beds on sublittoral mixed sediment	A5.445	5	[Ophiothrix fragilis] and/or [Ophiocolina nigra] brittlestar beds on sublittoral mixed sediment	Yes - brittlestar beds	No
CR.HCR.FaT.CTub.Adig	Alcyonium digitatum with dense Tubularia indivisa and anemones on strongly tide-swept circalittoral rock	A4.1122	6	[Alcyonium digitatum] with dense [Tubularia indivisa] and anemones on strongly tide-swept circalittoral rock	Unlikely, except if considered as "deep sea bed"	Stony reef and bedrock reef
CR.MCR.EcCr.FaAlCr.Adig	Alcyonium digitatum, Pomatoceros triqueter, algal and bryozoan crusts on wave-exposed circalittoral rock	A4.2142	6	[Alcyonium digitatum], [Pomatoceros triqueter], algal and bryozoan crusts on wave-exposed circalittoral rock	Unlikely, except if considered as "deep sea bed"	Stony reef and bedrock reef
CR.MCR.EcCr.FaAlCr.Bri	Brittlestars on faunal and algal encrusted exposed to moderately wave-exposed circalittoral rock	A4.2144	6	Brittlestars on faunal and algal encrusted exposed to moderately wave-exposed circalittoral rock	Yes - brittlestar beds	Stony reef and bedrock reef
CR.MCR.EcCr.FaAlCr.Pom	Faunal and algal crusts with Pomatoceros triqueter and sparse Alcyonium digitatum on exposed to moderately wave-exposed circalittoral rock	A4.2145	6	Faunal and algal crusts with [Pomatoceros triqueter] and sparse [Alcyonium digitatum] on exposed to moderately wave-exposed circalittoral rock	Unlikely, except if considered as "deep sea bed"	Stony reef and bedrock reef

Table 3.1 Biotope complexes, biotopes and sub-biotopes identified from video review and sediment sample analysis.

The locations and survey dates of the video tows and grab samples which were successfully completed over the two research cruises and used in full biotope analysis are detailed below in Table 3.2. The biotopes identified from these video tows are presented in full detail in Table 3.3 below.



Site and Video Tow Segment (split by predominant biotope):	Ballycastle Bay_East Carrickmanan Rock_a	Ballycastle Bay_East Carrickmanan Rock_b	Rathlin Deeps_T1_a	Rathlin Deeps_T1_b	Rathlin Deeps_T1_c	Rathlin Deeps_T1_d	Rathlin Deeps_T2_a	Rathlin Deeps (East)_T3_e	Ballycastle Bay_T1_a	Ballycastle Bay_T1_b	Ballycastle Bay_T1_c	Ballycastle Bay_T1_d	Ballycastle Bay_T2_a	Ballycastle Bay_T2_b	Ballycastle Bay_T2_c	Ballycastle Bay_T2_d	Ballycastle Bay_T2_e	Ballycastle Bay_T2_f	Rathlin Deeps_T1_a	Rathlin Deeps_T1_b	Rathlin Deeps_T1_c	Rathlin Deeps_T2_a	Rathlin Deeps_T3_a	Rathlin Deeps_T3_b	Rathlin Deeps_T4_a	Rathlin Deeps_T4_b	Rathlin Deeps_T4_c	Rathlin Deeps_T5_a	Outer Belfast Lough_T1_a	Outer Belfast Lough_T1_b	Outer Belfast Lough_T1_c							
<b>Bedrock</b>								5																														
<b>Boulders_over1024mm</b>							1	6		3			1	1	1	1	1	2	2			1	2															
<b>Boulders_512to1024mm</b>	10					1	2	9		2			3	3	3	3	3	4	5			3	8		5													
<b>Boulders_256to512mm</b>	5	15		5		4	2	25		5	5	5	4	4	4	4	4	7	28			16	15		2		20											
<b>Cobbles 64mm to 256mm</b>	80	40		10		30	35	40		3	5	5	90	90	90	90	90	85	20	30	25	35			10		70											
<b>Pebbles 4mm to 64mm</b>	3	40	5	10	5	40	5	10	2	5	10	10	2	2	2	2	2	2	20	10	20		70	50	5	10												
<b>Shells Empty</b>																																						
<b>Granule 2mm to 4mm</b>	2	5		60	40	60	10	15	2	3									18	38	10	30			18	18	15	2										
<b>Shell 2mm to 16mm</b>			25	25	25	5	10	3	5	2									2	2	5	10		2	2	9	3	5		1	2							
<b>Sand 0.063mm to 2mm</b>			10	10	10	10	30		90	85	80	80							5	20	20		10	15	65	50	12	20	86	48	53							
<b>Mud less than 0.063mm</b>																									5	5	3	50	10	8	44							
<b>BIOTOPE</b>	CR/MCR/ECr/FaAcr/Br/SS.SMX.Cmk.OphMk	CR/MCR/ECr/FaAcr/Pom/SS.SCS.CCS.PomB	CR/MCR/ECr/UrScr/SS.SMX.Omk	SS.SMX.Cmk.FluHyd	SS.SMX.Omk/SS.SMX.Cmk.FluHyd	CR/MCR/ECr/UrScr/SS.SMX.Omk	SS.SMX.Cmk.FluHyd	CR/MCR/ECr/UrScr/SS.SMX.Omk	CR/MCR/ECr/UrScr/SS.SMX.Cmk.FluHyd	CR/MCR/ECr/FaAcr/Br/SS.SCS.CCS.PomB	CR/MCR/ECr/FaAcr/Pom	CR/MCR/ECr/FaAcr/Br/SS.SMX.Cmk.OphMk	CR/MCR/ECr/FaAcr/Br/SS.SMX.Cmk.OphMk	CR/MCR/ECr/FaAcr/Br/CR.HCR.XP.a	CR/MCR/ECr/FaAcr/Br/CR.HCR.XP.a	CR/MCR/ECr/FaAcr/Br/CR.HCR.XP.a	CR/MCR/ECr/UrScr/SS.SMX.Omk	SS.SMX.Omk/CR/MCR/ECr/FaAcr/Pom	CR/MCR/ECr/UrScr/SS.SMX.Omk	CR/MCR/ECr/UrScr/CR.HCR.FaT.Ctub.Adig	SS.SMX.Omk/SS.SMX.Cmk.FluHyd	CR/MCR/ECr/UrScr/SS.SMX.Omk	SS.SMX.Omk/SS.SMX.Cmk.FluHyd	CR/MCR/ECr/UrScr/CR.HCR.FaT.Ctub.Adig/SS.SMX.Omk	CR/MCR/ECr/UrScr/CR.HCR.FaT.Ctub.Adig/SS.SMX.Omk	CR/MCR/ECr/UrScr/SS.SSA.Cmk.Sa/SS.SMX.Cmk.FluHyd	SS.SMU.CS.Mk.Vr.OphPmax	SS.SMU.CF.Mk.SpmMeg										
<b>Species Name</b>																																						
<i>Aequipecten opercularis</i>																																						
<i>Alcyonidium gelatinosum?</i>	R	R	O		O																																	
<i>Alcyonidium diaphanum</i>			O	O																																		
<i>Alcyonium digitatum</i>	O	O																																				
<i>Anserapoda placenta</i>																																						
<i>Antedon bifida?</i>																																						
<i>Aplidium punctum?</i>			R		R																																	
<i>Asterias rubens</i>	R	R	R		R	R	O	O																														
<i>Axinellidae (cup sponge)</i>																																						
<i>Branching yellow sponge</i>																																						
<i>Stelligera stiposa?</i>			R		R																																	
<i>Bryozoan &amp; hydrozoan turf</i>																																						
<i>Buccinum undatum</i>																																						
<i>Bugula sp</i>			O	O	O	O	O	O																														
<i>Cancer pagurus</i>	R	R																																				
<i>Caryophyllia sp</i>																																						
<i>Ciona celata</i>																																						
<i>Crisidae</i>			R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
<i>Crossaster papposus</i>	R	R	O	O	O	R	O	O	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
<i>Echinus esculentus</i>	O	O	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
<i>Edone cirrhosa</i>																																						
<i>Encrusting bryozoans</i>	O	O	O	O	O	O	O	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
<i>Euratea loricata</i>	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	
<i>Filograna implexa</i>																																						
<i>Flustra foliacea</i>	F	F	F	C	C	C	A		R		O	C	R																									
<i>Henricia sp</i>																																						
<i>Hydrallmania falcata?</i>																																						
<i>Hymedesmia paupertas</i>																																						
<i>Hymedesmia sp</i>																																						
<i>Leucoraja naevus</i>																																						
<i>Liocarcinus sp</i>																																						
<i>Luidia ciliaris</i>	R	R																																				
<i>Luidia sarsi</i>			R																																			
<i>Macropodia sp</i>																																						
<i>Marthasterias glacialis</i>	R																																					
<i>Maxillopoda (Verrucidae &amp; Balanidae)</i>	O	O	O	O	O	O	O	A	R	R	O	O	A	A	C	C	C	C	F	R	F	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O		
<i>Molva molva</i>																																						
<i>Munida rugosa/Galathea sp?</i>			R																																			
<i>Nemertesia antennina</i>			R		R																																	
<i>Nephrops norvegicus</i>																																						
<i>Ophiocoma nigra</i>																																						
<i>Ophiotrix fragilis</i>	C	F																																				
<i>Pachymatisma johnstonia</i>	R																																					
<i>Pagurus sp</i>																																						
<i>Pecten maximus</i>																																						
<i>Polyastia boletiformis</i>	R																																					
<i>Porania pulvillus</i>	R																																					
<i>Raja clavata</i>																																						
<i>Raspailia ramosa?</i>																																						
<i>Sabella pavonina</i>			F	O	C	R	R	R																														
<i>Scyliorhinus canicula or stellaris?</i>																																						

Table 3.3. Species and substratum information and biotope classification from video tows. Video tows were broken into segments where there was notable change in substratum or major characterising species. Table also provided in Excel workbook with this report.

## 3.2 Rathlin Deeps

Figure 3 below shows the distribution of the biotopes identified from video analysis at the areas of interest, overlain on multibeam bathymetry where such data are available.

Figure 3 shows a distribution of deep mobile sediments, mostly shell debris, coarse sands and cobbles with boulders, with proportions of these varying across the site. Many of these areas could be considered as offshore mixed sediments (SS.CMX.OMx biotope complex), which may be considered as a component of “Deep- sea bed” pMCZ habitat, and harbour a range of species characteristic of scoured environments with little sediment deposition. In some areas, more stable cobbles and boulders support erect epifauna, including *Tubularia indivisa* and *Alcyonium digitatum*, but the majority of hard surfaces are encrusted by scour-tolerant fauna such as encrusting bryozoans, the keel worms *Spirobranchus triqueter* and barnacles. The dahlia anemone *Urticina* sp. was characteristic throughout the site, with some very high densities recorded particularly in the deepest areas. The Peacock worm, *Sabella pavonina*, was also observed throughout the site. This species is more commonly associated with shallower muddy sites. Deep accumulations of whole shell were noted, many of which were clearly *Modiolus modiolus*. In some areas there were patches of notable bryozoan turf, including clumps of *Flustra foliacea*; this was found where sediments appears more stable and there was less shell accumulated, with pebbles and cobbles providing attachment sites. *Flustra* is associated with areas of strong currents and can withstand sediment abrasion in such environments. The grab samples showed that even areas which appeared on the multibeam as possible sand megaripples are in fact shell and cobble ripples overlain on coarse sands. To the north and north-west of the site some finer sediments were noted mixed in with the sands, shell gravels and cobbles – in this area live *Modiolus modiolus* clumps were retrieved by the grab samples (sites 3 and 4, collected on CO0715) although living *Modiolus* clumps were not visible on the video footage (due possibly to visibility issues). At site 4, particle size analysis of the two grabs samples here revealed that the sediment is “sandy gravel” and “gravelly sand” (Folk classification), however due to the coarser sediments allowing some loss of material from the jaws of the grab, it is possible that finer sediments were washed out prior to grab retrieval as the grab was less than half full for all replicates at this site (whole shell debris was noted, which can partially jam open the grab jaws). Further review and processing of the Go Pro footage may allow better detection of *Modiolus* beds in this area. The cuckoo ray (*Leucoraja naevus*) was also found in this area.

Table 3.4 provides the full species list for Rathlin Deeps. It should be noted that the stage of analysis is also provided in the table; due to time constraints further analysis has not been possible yet. Table 3.3 above also provides the SACFOR abundances for each species and the substratum composition from the video analysis.

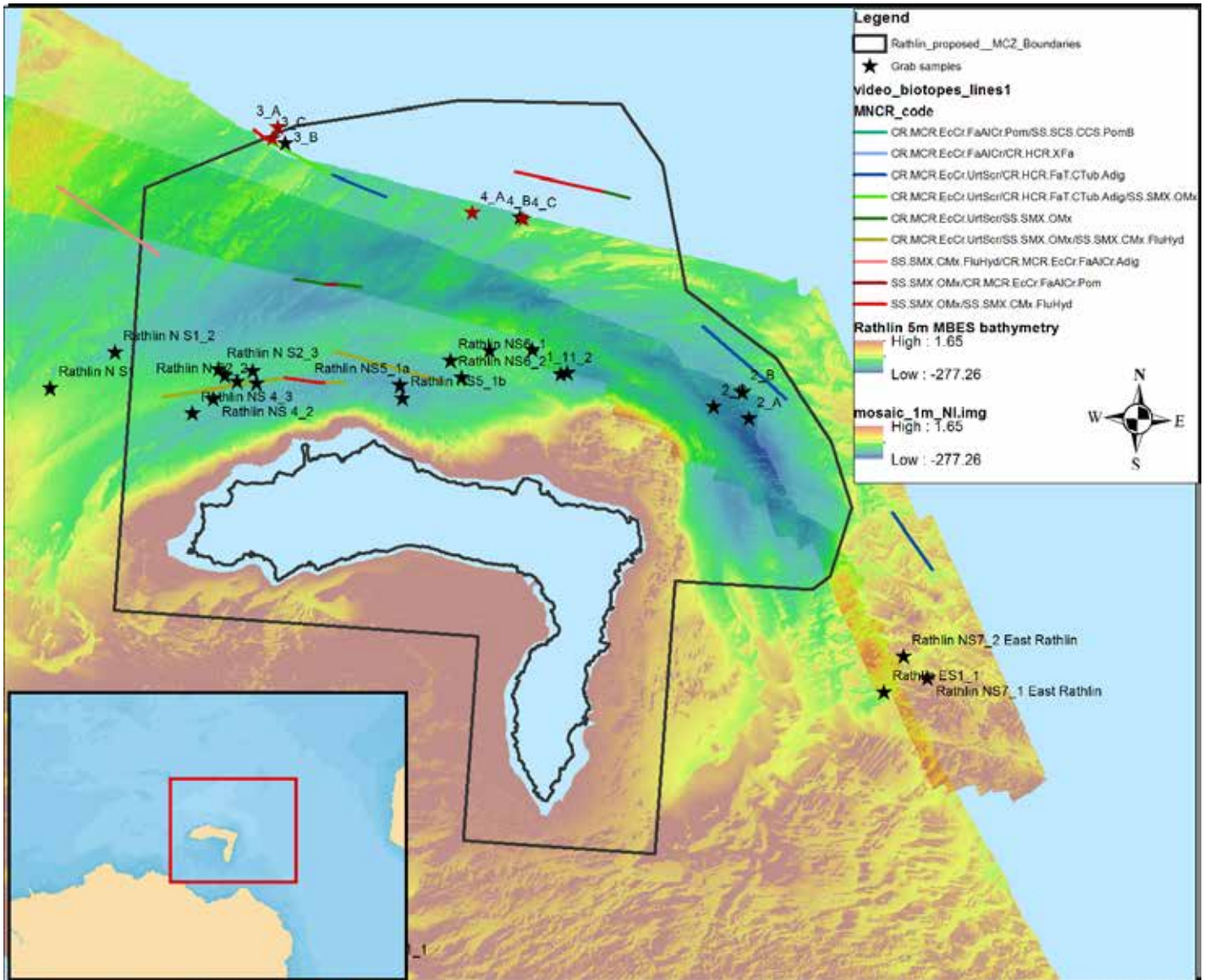


Figure 3. Spatial distribution of biotopes and biotope complexes over the Rathlin Area of Interest, overlain on multibeam bathymetry from JIBS and AFBI sources. Grab sample sites are shown as stars and labelled to facilitate cross-referencing with sample species lists. The grabs containing living *Modiolus modiolus* are shown as red stars (to the North-west of the study area).



Site and Tow:	Rathlin Deeps_T1	Rathlin Deeps_T2	Rathlin Deeps (East)_T3	Rathlin Deeps_T1	Rathlin Deeps_T2	Rathlin Deeps_T3	Rathlin Deeps_T4	Rathlin Deeps_T5
Survey Date:	19/06/2014	19/06/2014	20/06/2014	10/02/2015	10/02/2015	10/02/2015	11/02/2015	11/02/2015
Depth at start of tow(m):	192	210	170	198	218	220	225	209
Video analysis stage	Review of DVD & Go Pro	Review of DVD	Review of DVD	Review of DVD	Review of DVD	Initial observations	Initial observations	Initial observations
Video-derived Species	Alcyonidium gelatinosum?	Alcyonium digitatum	Alcyonium digitatum	Alcyonium digitatum	Alcyonium digitatum	Alcyonium digitatum	Aequipecten opercularis	Alcyonium digitatum
	Alcyonium digitatum	Alyconidium diaphanum	Asterias rubens	Asterias rubens	Asterias rubens	Asterias rubens	Alcyonidium gelatinosum?	Asterias rubens
	Alyconidium diaphanum	Asterias rubens	Maxillopoda (Verrucidae & Balanidae)	Maxillopoda (Verrucidae & Balanidae)	Maxillopoda (Verrucidae & Balanidae)	Maxillopoda (Verrucidae & Balanidae)	Alcyonium digitatum	Maxillopoda (Verrucidae & Balanidae)
	Aplidium punctum?	Maxillopoda (Verrucidae & Balanidae)	Bryozoan turf	Bryozoan turf	Bryozoan turf	Bryozoan turf	Anseropoda placenta	Bryozoan turf
	Asterias rubens	Bryozoan turf	Buccinum undatum	Bugula sp	Bugula sp	Bugula sp	Asterias rubens	Bugula sp
	Branching yellow sponge - Stelligera stuposa?	Bugula sp	Bugula sp	Crossaster papposus	Cancer pagurus	Crossaster papposus	Maxillopoda (Verrucidae & Balanidae)	Crossaster papposus
	Bugula sp	Cancer pagurus	Crossaster papposus	Echinus esculentus	Crossaster papposus	Echinus esculentus	Bryozoan turf	Echinus esculentus
	Cancer pagurus	Crossaster papposus	Echinus esculentus	Encrusting bryozoans	Echinus esculentus	Encrusting bryozoans	Buccinum undatum	Encrusting bryozoans
	Crossaster papposus	Encrusting bryozoans	Encrusting bryozoans	Eucratea loricata	Encrusting bryozoans	Eucratea loricata	Bugula sp	Eucratea loricata
	Encrusting bryozoans	Eucratea loricata	Eucratea loricata	Flustra foliacea	Eucratea loricata	Flustra foliacea	Crisia sp	Flustra foliacea
	Eucratea loricata	Flustra foliacea	Flustra foliacea	Macropodia sp	Flustra foliacea	Luidia sarsi	Crossaster papposus	Modiolus clumps??
	Flustra foliacea	Henricia sp	Henricia sp	Munida rugosa/Galathea sp?	Henricia sp	Marthasterias glacialis	Echinus esculentus	Pagurus sp
	Henricia sp	Luidia ciliaris	Munida rugosa/Galathea sp?	Pagurus sp	Macropodia sp	Pagurus sp	Encrusting bryozoans	Leucoraja naevus
	Hymedesmia sp	Pagurus sp	Pagurus sp	Sabella pavonina	Molva molva	Sabella pavonina	Eucratea loricata	Sabella pavonina
	Luidia ciliaris	Polymastia boletiformis	Polymastia boletiformis	Scyliorhinus canicula or stellaris?	Pachymatisma johnstonia	Scyliorhinus canicula or stellaris?	Filograna implexa?	Securiflustra securifrons
	Luidia sarsi	Sabella pavonina	Raspailia ramosa?	Securiflustra securifrons	Pagurus sp	Spirobranchus triqueter	Flustra foliacea	Spirobranchus triqueter
	Nemertesia antennina	Scyliorhinus canicula or stellaris?	Sabella pavonina	Spirobranchus triqueter	Sabella pavonina	Suberites sp	Leucoraja naevus	Urticina sp
	Ophiothrix fragilis	Spirobranchus triqueter	Scyliorhinus canicula or stellaris?	Tubularia indivisa	Scyliorhinus canicula or stellaris?	Urticina sp	Molva molva	Vesicularia spinosa
	Pagurus sp	Urticina sp	Spirobranchus triqueter	Urticina sp	Spirobranchus triqueter	Vesicularia spinosa	Pagurus sp	
	Polymastia boletiformis	Vesicularia spinosa	Urticina sp	Vesicularia spinosa	Urticina sp		Porania pulvillus	
	Sabella pavonina	Yellow encrusting sponge	Vesicularia spinosa		Vesicularia spinosa		Leucoraja naevus	
	Securiflustra securifrons		Yellow encrusting sponge				Sabella pavonina	
	Spirobranchus triqueter						Spirobranchus triqueter	
	Urticina sp						Urticina sp	
	Vesicularia spinosa						Vesicularia spinosa	

Table 3.4. Species lists from video tows for the Rathlin Aol.

Following preliminary multivariate analysis, the grab sample data showed three distinct clusters, with sites “NS6” and one replicate of “NS3” most distinct from the other samples. These were located in the same geographical region and particle size analysis classified this (according to the Folk (1954) method) as very fine gravels and coarse sands respectively. The similarity in fauna was not great (<30%) but characterising species were those typical of scoured environments and represented mostly encrusting fauna that would be found on shell and stones. Sites “NS6” also harboured the holothurian *Leptosynapta minuta*, which was not identified at other sites. Site “NS3” showed very low diversity as was very clean coarse sand. The other sites showed higher diversity and also included many epifaunal encrusting species and scour tolerant bryozoans. *Sabellaria spinulosa* was notable in samples “NS1” to the west of the site.

### 3.3 Ballycastle Bay / Carrickmannan Rock

Figure 4 below shows the distribution of the biotopes identified from video analysis at the areas of interest, overlain on multibeam bathymetry.

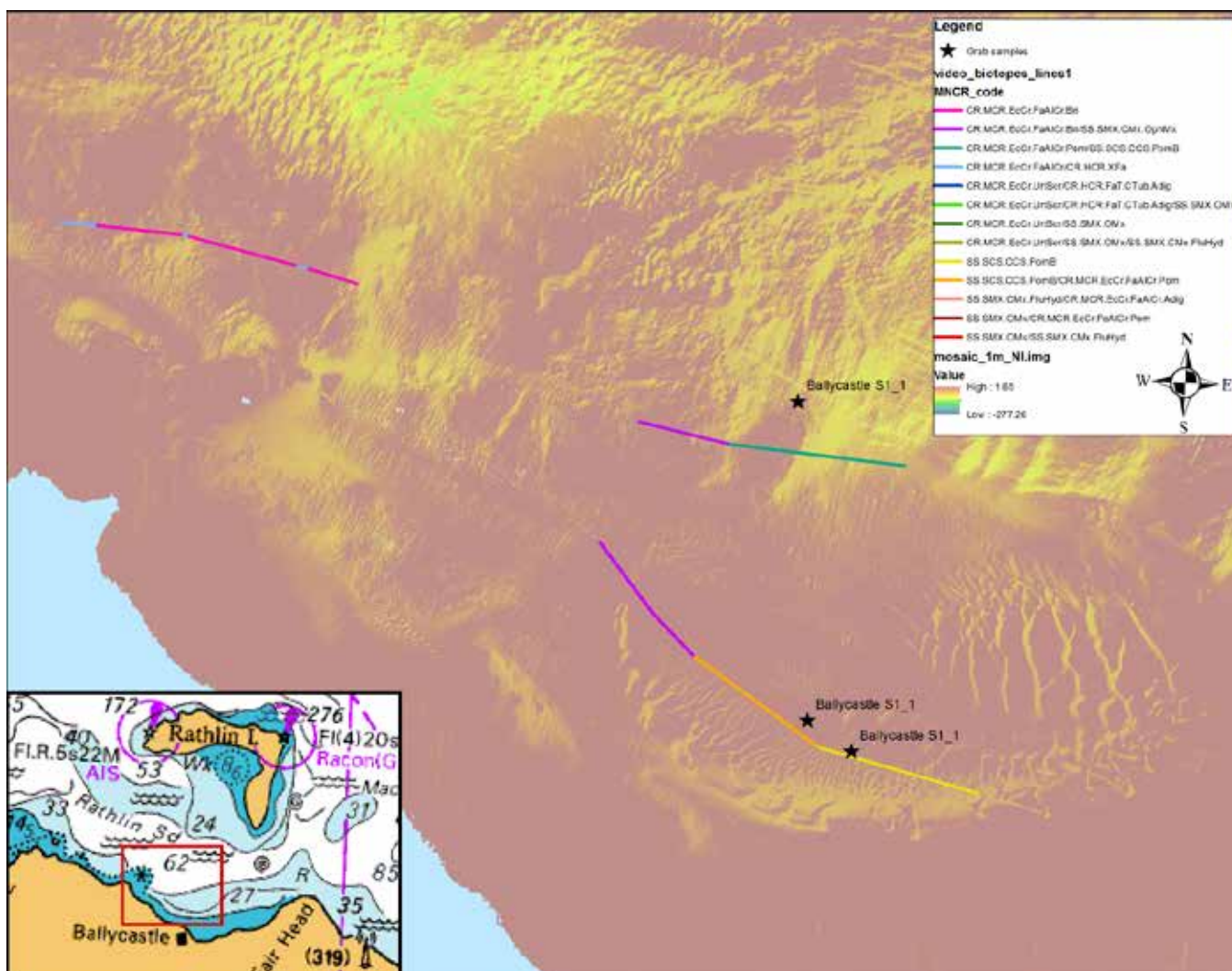


Figure 4. Spatial distribution of biotopes and biotope complexes over the Ballycastle Bay (Carrickmannan Rock) Area of Interest, overlain on multibeam bathymetry from JIBS sources. Grab sample sites are shown as stars and labelled to facilitate cross-referencing with sample species lists.

Figure 4 shows the notable distribution of brittlestar beds throughout the region. These were dominated by *Ophiothrix fragilis* at high densities. To the south-east of the area a region of mobile sediments is clear from the multibeam data, and this was verified by video as coarse sand waves with cobbles in the troughs. Due to the high mobility of the seabed here the cobbles supported very little epifauna with the exception of keel worms (*Spirobranchus triqueter*), barnacles and tiny encrustations of bryozoans. In this area a thornback ray was noted (*Raja clavata*). The more stable substratum to the west supported an increasing diversity of epifauna, including some erect, cup and cushion sponges, as well as the Ross coral (*Pentapora fascialis*).

Table 3.5 provides the full species list for Ballycastle Bay. It should be noted that the stage of analysis is also provided in the table; due to time constraints further analysis has not been possible yet. Table 3.3 above also provides the SACFOR abundances for each species and the substratum composition from the video analysis.

Only one grab sample from this Aol was processed, which following multivariate analysis clustered distinctly from the Rathlin Aol grab samples. The particle size analysis determined that this sediment type is moderately sorted coarse sand (Folk (1954) method from mean particle size), and had a low diversity of species mostly characterised by scour tolerant fauna such as encrusting bryozoans.

Site and Tow:	Ballycastle Bay_East Carrickmananon Rock	Ballycastle Bay T1	Ballycastle Bay T2
Survey Date:	18/06/2014	20/06/2014	20/06/2014
Depth at start of tow(m):	71	45	65
Video analysis stage	Initial observations	Review of DVD	Review of DVD
Video-derived Species	Alcyonium digitatum	Alcyonium digitatum	Alcyonium digitatum
	Asterias rubens	Maxillopoda (Verrucidae & Balanidae)	Anserapoda placenta
	Cancer pagurus	Bryozoan turf	Axinellidae (cup sponge)
	Echinus esculentus	Bugula sp	Maxillopoda (Verrucidae & Balanidae)
	Flustra foliacea	Cancer pagurus	Bugula sp
	Luidia ciliaris	Caryophyllia sp	Cancer pagurus
	Luidia sarsi	Crossaster papposus	Cliona celata
	Marthasterias glacialis	Echinus esculentus	Crossaster papposus
	Munida rugosa	Encrusting bryozoans	Echinus esculentus
	Ophiothrix fragilis	Eucratea loricata	Eledone cirrhosa
	Pachymatisma johnstonia	Flustra foliacea	Encrusting bryozoans
	Polymastia boletiformis	Henricia sp	Eucratea loricata
	Porania pulvillus	Hydrallmania falcata?	Flustra foliacea
	Spirobranchus triqueter	Luidia ciliaris	Henricia sp
	Suberites sp	Marthasterias glacialis	Hymedesmia paupertas
	Urticina sp.	Ophiocomina nigra	Luidia sarsi
	White encrusting sponge	Ophiothrix fragilis	Marthasterias glacialis
		Polymastia boletiformis	Ophiothrix fragilis
		Porania pulvillus	Pachymatisma johnstonia
		Raja clavata	Polymastia boletiformis
		Spirobranchus triqueter	Porania pulvillus
		Tubularia indivisa	Raspailia ramosa?
		Urticina sp	Scyliorhinus canicula or stellaris?
		Vesicularia spinosa	Sheet-like dark grey sponge
			Spirobranchus triqueter
			Tubularia indivisa
			Urticina sp
			Vesicularia spinosa
			White crater-like sponge (massive)
			Yellow encrusting sponge

Table 3.5. Species lists from video tows for the Ballycastle Bay/Carrickmannanon Rock AoI.



### 3.5 Outer Belfast Lough

Figure 5 below shows the distribution of the biotopes identified from video analysis at the areas of interest, overlain on multibeam bathymetry where such data are available.

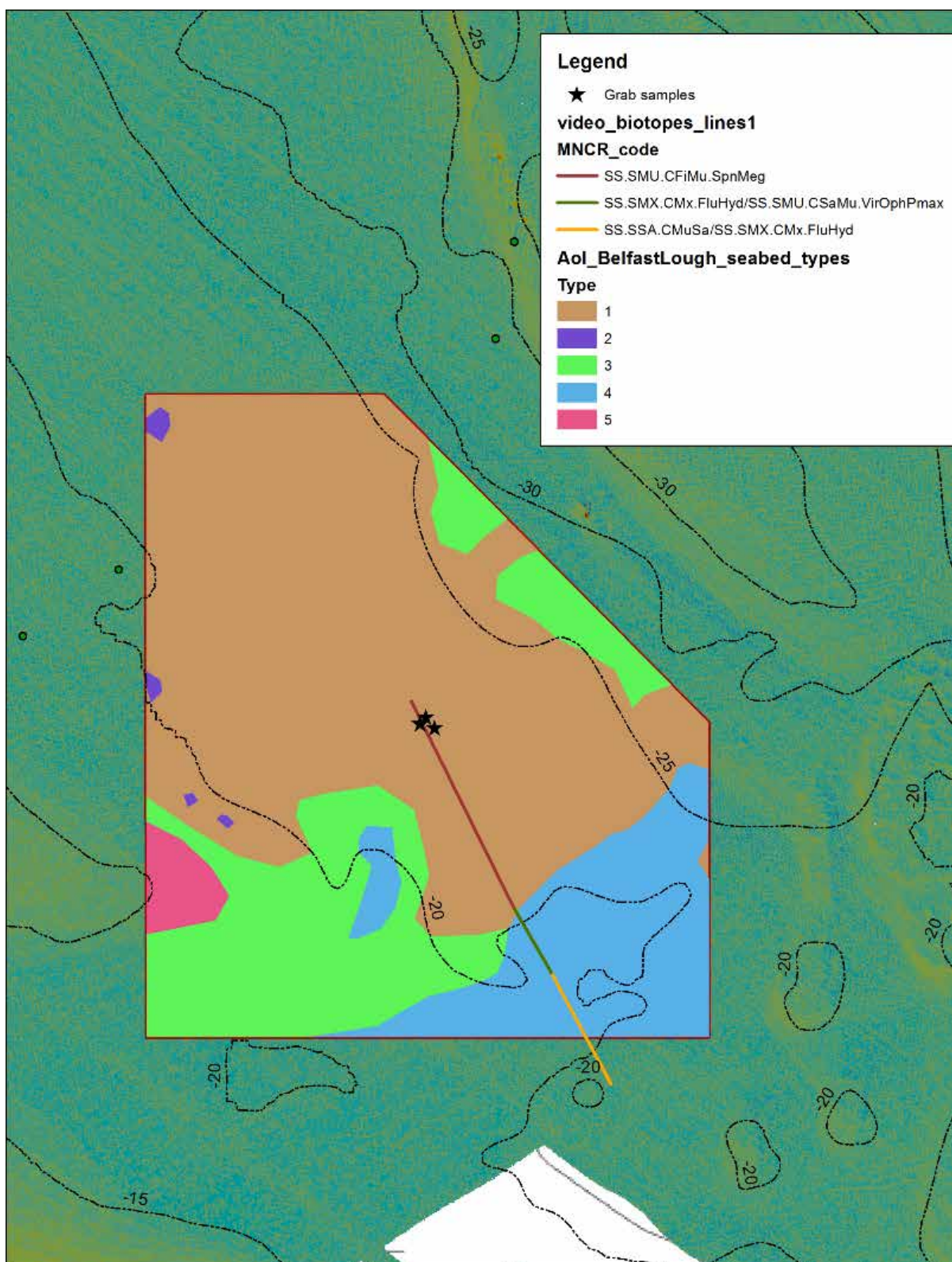




Figure 5. Spatial distribution of biotopes and biotope complexes over the Outer Belfast Lough Area of Interest, overlain on multibeam bathymetry. Grab sample sites are shown as stars. A number of acoustic facies/'seabed-types' have been mapped across the site. Bathymetric contour lines are also shown based on UKHO data.

The Outer Belfast Lough is a far shallower, smaller site than the other Areas of Interest reported here, and harbours a less complex matrix of biotopes. To the south-east of the area cobbles and small boulders, surrounded by fine sands/muddy sand characterise the region. The cobbles and boulders support bryozoans and hydrozoan turf, including *Flustra foliacea*. Due to visibility it was difficult to distinguish many species from the video footage. Some king scallop (*Pecten maximus*) shells were observed and a more recent DOE diver survey found scallops in this area (J. Breen., pers.comm.) There is a clear boundary both on the video footage and existing multibeam data from the mixed substratum to stable sediments, which have a notable fines component (grading from fine sands to sandy muds). The three grab samples taken in the centre of the area had a sediment classification of “slightly gravelly muddy sand” following particle size analysis (Folk classification). This finer sediment area is characterised by *Nephrops norvegicus* burrows and smaller burrows (possibly from other mud-burrowing shrimps or polychaetes). The seapen *Virgularia mirabilis* is also notable in this area. Some shell debris could be identified as *Arctica islandica*. The assigned biotope is “Seapens and burrowing megafauna in circalittoral fine mud” although from inspection of the grab samples it is likely the sediment is sandy mud rather than fine mud, but the species component of this biotope is consistent with that identified from the video footage. The grabs also yielded broken *Arctica islandica* shell and juvenile *Arctica islandica*. As *Arctica islandica* is mostly infaunal it was impossible to see these on the video footage.

Table 3.6 provides the full species list for Outer Belfast Lough Aol. It should be noted that the stage of analysis is also provided in the table; due to time constraints further analysis has not been possible yet. Table 3.3 above also provides the SACFOR abundances for each species and the substratum composition from the video analysis.

Site:	Outer Belfast Lough
Date:	11/02/2015
Depth (m) at start of tow:	21
Video analysis stage	Initial observations
Video-derived Species	Alcyonium digitatum
	Antedon bifida?
	Asterias rubens
	Cancer pagurus
	Crossaster papposus
	Flustra foliacea
	Henricia sp
	Liocarcinus sp
	Nemertesia antennina
	Nephrops norvegicus
	Pagurus sp
	Pecten maximus
	Urticina sp
	Virgularia mirabilis

Table 3.6. Species lists from video tows for the Outer Belfast Lough Aol.

Grab sample infauna collected from this Aol have yet to be processed; however the turrit shell *Turritella communis* was clearly identifiable, which is characteristic of muddy sediments in shallow water, along with a juvenile *Arctica islandica*.

## 4. DISCUSSION

The sites examined by the two survey campaigns have yielded species and habitat data which may be used to support assessment of their conservation value. The 'Rathlin Deeps' area is a considerable challenge to survey due to the exceptionally strong tidal currents and exposure to Atlantic swell; survey effort is therefore limited to targeting neap tides and undertaking video tows during slack tide.

The Rathlin Aol harbours large areas of deep "offshore mixed sediment", with stony reef interspersed where local hydrodynamic conditions and sediment stability permit growth of notable epifauna. There are quite likely bedrock outcrops just below the "stony reef" areas, which have been overlain by a veneer of coarse sediments and deep accumulations of shell. To the far east of the site (outside of the Aol) bedrock is exposed, and harbours a greater erect epifaunal community, with the greatest densities of *Alcyonium digitatum*.

To the immediate north of Rathlin Island, close inshore but in deep water, coarser sediments dominate with grab samples showing the presence of *Saballaria spinulosa*. It is not possible from these samples to ascertain whether *S. spinulosa* forms dense aggregations in this area, and it wasn't visible on the video footage. Further north and north-west, some finer sediments were evident mixed with the cobbles, shell and sands, and here grab sampling confirmed the presence of living *Modiolus modiolus*. The dahlia anemone *Urticina* sp. was characterising throughout the area, along with *Sabella pavonina* and on larger boulders the hydroid *Tubularia indivisa* and soft coral *Alcyonium digitatum*. It is of interest that *Sabella pavonina* was found so frequently in deep waters, and on fairly coarse substratum, and would be useful to sample this species if possible to confirm its identification. *S. pavonina* was also noted during a DOE Remotely Operated Video dive in 2009 at the base of Rathlin Island North Wall in 173m depth, in a pocket of sediment between bedrock (Breen *et al.*, 2009).

Large starfish, including *Luidia sarsi*, *Luidia ciliaris* and *Marthasterias glacialis*, were often noted in the Rathlin Aol. Ling (*Molva molva*) and cuckoo rays (*Leucoraja naevus*) were also found in the area.

The Ballycastle Bay Aol encompasses a range of habitats from clean coarse megarrippled sands, with cobbles in the troughs, to cobbles and boulders representing stony reef, with a significant diversity of epifauna including some erect sponges, and often covered by extensive areas of dense brittlestars (*Ophiothrix fragilis*). The cuckoo ray (*Raja clavata*) was found over the clean sand area. Such habitat may also be considered as potentially suitable Common Skate (*Dipturus batis*) habitat, according to this species' known habitat preferences (e.g. MARLIN Biological Traits Information Catalogue<sup>4</sup>).

The Outer Belfast Lough Aol harbours a large area of bioturbated stable, muddy sands, characterised by *Nephrops norvegicus* and the seapen *Virgularia mirabilis*. The ocean quahog, *Arctica islandica*, is also clearly present on the same habitat. To the southeast of the site, the substratum becomes more mixed with a notable proportion of cobbles and associated increase in epifauna (mostly bryozoan and hydroid turf). The visibility at this site is greatly affected by the passing of ferries which result in a prolonged sediment plume; consequently towed video could not

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<sup>4</sup> <http://www.marlin.ac.uk/biotic/browse.php?sp=4257>

detect siphon holes of *A. islandica* at the site, although further analysis of the Go Pro footage may improve this. A recent DOE diver survey has identified live *A. islandica* at this site (J. Breen., *pers. comm.*).

A number of the species identified during these surveys are Priority Marine Features (PMFs) not included on the pMCZ features list, and these are therefore not discussed in depth here, however reference should be made to the PMF list provided in Annex I for further consideration.

## 5. REFERENCES

Breen J, Hanna, J.E., and Harrison, T. 2006. A survey of the marine environment of Rathlin Island. DOE Internal Report (unpublished).

Coggan, R., Mitchell, A., White, J. and Golding, N. 2007. Recommended operating guidelines (ROG) for underwater video and photographic imaging techniques. MESH project, available online: [http://www.emodnet-seabedhabitats.eu/PDF/GMHM3\\_Video\\_ROG.pdf](http://www.emodnet-seabedhabitats.eu/PDF/GMHM3_Video_ROG.pdf)

Connor, D.W., Allen, J.H., Golding, N., Howell, K.L., Lieberknecht, L. M., Northen, K.O. and Reker, J.B. 2004. The Marine Habitat Classification for Britain and Ireland Version 04.05 JNCC, Peterborough. ISBN 1 861 07561 8 (internet version).  
[www.jncc.defra.gov.uk/MarineHabitatClassification](http://www.jncc.defra.gov.uk/MarineHabitatClassification)

DETI, 2011. Regional Locational Guidance (RLG) for Offshore Renewable Energy Developments in NI Waters.

Folk, R. L., 1954. The distinction between grain size and mineral composition in sedimentary rock nomenclature. *Journal of Geology*, 62, 344-359.

Irving, R., 2009. The identification of the main characteristics of stony reef habitats under the Habitats Directive. Summary report of an inter-agency workshop 26-27 March 2008. *JNCC Report* No. 432

Maxwell, T.H. 1978. The plankton of Belfast Lough. PhD Thesis, Queen's University Belfast.

Mitchell, A.J. and Service, M., 2004. Northern Ireland Nearshore Subtidal Habitat Mapping Project: QUB / DARD Report to EHS.

McBreen, F., Askew, N., Cameron, A., Connor, D., Ellwood, H. and Carter, A. 2011. UKSeaMap 2010: Predictive mapping of seabed habitats in UK waters. *JNCC Report*, No. 446.

UKHO, 1995. Tidal stream atlas (United Kingdom Hydrographic Office).

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## ANNEX I: Priority Marine Features (Northern Ireland) not included on pMCZ features list<sup>5</sup>

**Table 1.1** Priority Marine Feature (PMF) Habitats considered to be afforded protection under existing MPA network in the Northern Ireland inshore region - these cover the range of representative and threatened, rare or declining habitats in Northern Irish waters.

HABITAT	CONSERVATION STATUS	JUSTIFICATION
Coastal saltmarsh	UK BAP NI Priority	This habitat is currently afforded protection under Bann Estuary SAC, Murlough SAC, North Antrim Coast SAC and Strangford Lough SAC (notified features are Annex I 'Atlantic salt meadows [ <i>Glauco-Puccinellietalia maritima</i> ]' and ' <i>Salicornia</i> and other annuals colonising mud and sand').
Fragile sponge and anthozoan communities on subtidal rocky habitats	UK BAP NI Priority	This habitat is currently afforded protection under Rathlin Island SAC, Maidens cSAC and the Skerries and Causeway cSAC (notified feature is Annex I 'Reef').
Blue mussel beds (intertidal)	OSPAR T&D UK BAP NI Priority	Although this habitat is currently present within existing ASSIs and is afforded indirect protection, the ASSI feature list will be amended to include this habitat as a notified feature.
Intertidal mudflats	OSPAR T&D UK BAP NI Priority	This habitat is currently afforded protection under Ballymacormick Point ASSI, Carlingford Lough ASSI, Killough Bay & Strand Lough ASSI, Outer Ards ASSI, Tyrella & Minerstown ASSI, Murlough SAC and Strangford Lough SAC (notified feature is Annex I 'Mudflats and sandflats not covered by seawater all of the time').
Intertidal under-boulder communities	UK BAP NI Priority	Although this habitat is currently present within existing ASSIs and is afforded indirect protection, the ASSI feature list will be amended to include this habitat as a notified feature.
Littoral chalk communities	OSPAR T&D UK BAP NI Priority	Although this habitat is currently present within existing ASSIs and is afforded indirect protection, the ASSI feature list will be amended to include this habitat as a notified feature.
Maerl beds	OSPAR T&D UK BAP NI Priority	This habitat is currently afforded protection under Red Bay and Rathlin Island SACs (notified feature is Annex I 'Sandbanks slightly covered by seawater all of the time').

HABITAT	CONSERVATION STATUS	JUSTIFICATION
<i>Sabellaria alveolata</i> reefs	UK BAP NI Priority	This habitat is currently afforded protection under Tyrella & Minerstown ASSI (notified feature is 'Intertidal mudflats and sandflats').
Saline lagoons	UK BAP NI Priority	This habitat is currently afforded protection through the existing ASSI network (Inner Belfast Lough, Killough Bay & Strand Lough, Larne Lough, Lough Foyle, Strangford Lough Parts 1&3).
Seagrass ( <i>Zostera</i> ) beds	OSPAR T&D UK BAP NI Priority	This habitat is currently afforded protection under the existing MPA network (Skerries & Causeway, Rathlin Island, Strangford Lough SACs; notified features are Annex I 'Sandbanks which are slightly covered by seawater all of the time' and 'Mudflats and sandflats not covered by seawater at low tide' and Lough Foyle and Carlingford Lough ASSIs; notified feature is 'Intertidal mudflats').
Sheltered muddy gravels	UK BAP NI Priority	Although this habitat is currently present within existing ASSIs and is afforded indirect protection, the ASSI feature list will be amended to include this habitat as a notified feature.
Subtidal chalk	OSPAR T&D UK BAP NI Priority	This habitat is currently afforded protection under Rathlin Island SAC and the Skerries and Causeway cSAC (notified feature is Annex I 'Reef').
Tide-swept channels	UK BAP NI Priority	This habitat is currently afforded protection under Rathlin Island SAC, Maidens cSAC and the Skerries and Causeway cSAC (notified feature is Annex I 'Reef'). However, this does not consider the tide-swept sand/gravel habitat types which will be covered by the PMF Habitat of Sublittoral Sand.

<sup>5</sup> [http://www.doeni.gov.uk/justification\\_report\\_for\\_selection\\_of\\_pmczs\\_features-version1.0.pdf](http://www.doeni.gov.uk/justification_report_for_selection_of_pmczs_features-version1.0.pdf)

**Table 1.2** Priority Marine Feature (PMF) Limited/low mobility species considered to be afforded protection under the existing MPA network (SAC, ASSI) in the Northern Ireland inshore region. These cover the range of representative and threatened, rare or declining species in Northern Irish waters.

SPECIES	GROUP	CONSERVATION STATUS	JUSTIFICATION
<i>Ascophyllum nodosum ecad var mackayi (mackaii)</i>	Alga – Brown	NI Priority	Although this species is currently present within an existing ASSI (Strangford Lough Parts 2&3) and is afforded indirect protection, the ASSI feature list will be amended to include this as a notified feature.
<i>Carpomitra costata</i>	Alga – Brown	SOCC	This species is already afforded protection under the existing MPA network (Rathlin Island and The Maidens SACs; notified feature is Annex I 'Reef').
<i>Desmarestia dresnayi</i>	Alga – Brown	NI Priority NIMF	This species is already afforded protection under the existing MPA network (Rathlin Island and The Maidens SACs; notified feature is Annex I 'Sandbanks slightly covered by seawater all of the time').
<i>Atractophora hypnoides</i>	Alga – Red	SOCC	Although this species is ephemeral and rare it is associated with craline algae. It is mainly a western species in the British Isles with records from the Inner Hebrides of Scotland, Galway and County Cork in the south of Ireland, a few records from Wales and south-western England. There are only four records from Northern Ireland: County Antrim from Rathlin Island SAC and Loughan Bay (Torr Head) and in County Down at Greenore Point and near the entrance of Strangford Lough (SAC/MCZ) and five from the Republic of Ireland.
<i>Cruoria cruoriaeformis</i>	Alga – Red	UK BAP NI Priority NIMF	This species is already afforded protection under the existing MPA network (Rathlin Island and Red Bay SACs; notified feature is Annex I habitat 'Sandbanks which are slightly covered by seawater all of the time').
<i>Schmitzia hiscockiana</i>	Alga – Red	SOCC NIMF	This species is already afforded protection under the existing MPA network (Rathlin Island and The Maidens SACs; notified feature is Annex I 'Sandbanks slightly covered by seawater all of the time').
<i>Schmitzia neapolitana</i>	Alga – Red	SOCC	This species is already afforded protection under the existing MPA network (Red Bay SAC; notified feature is Annex I 'Sandbanks slightly covered by seawater all of the time').

SPECIES	GROUP	CONSERVATION STATUS	JUSTIFICATION
<i>Stenogramme interrupta</i>	Alga – Red	SOCC	This species is already afforded protection under the existing MPA network (Rathlin Island, Red Bay, The Maidens and Strangford Lough SACs; notified features are Annex I 'Sandbanks slightly covered by seawater all of the time' and 'Reef').
<i>Sabellaria alveolata</i>	Annelida	SOCC NIMF	This species is already afforded protection under the existing MPA network (Tyrella & Minerstown and Mournes Coast ASSIs; notified feature is 'Intertidal sandflats and mudflats').
<i>Bugula turbinata</i>	Bryozoa – an erect bryozoan	SOCC	This species is already afforded protection under the existing MPA network (Skerries & Causeway, Rathlin Island, The Maidens and Strangford Lough SACs; notified feature is Annex I 'Reefs').
<i>Pentapora foliacea</i>	Bryozoa – Ross coral/Potato crisp bryozoan	NI Priority	This species is already afforded protection under the existing MPA network (Skerries & Causeway and Rathlin Island SACs; notified feature is Annex I 'Reefs').
<i>Alcyonium hibernicum</i>	Cnidaria – Soft coral	SOCC NIMF	This species is already afforded protection under the existing MPA network (Rathlin Island SAC; notified feature is Annex I 'Reefs').
<i>Arachnanthus sarsi</i>	Cnidaria – Anemone	NI Priority UK BAP NIMF	This species is already afforded protection under the existing MPA network (Rathlin Island SAC; notified feature is Annex I 'Sandbanks slightly covered by seawater all of the time'). Are we content with this?
<i>Aureliania heterocera</i>	Cnidaria – Emperor/Imperial anemone	SOCC	This species is already afforded protection under the existing MPA network (Rathlin Island, The Maidens and Strangford Lough SACs; notified features are Annex I 'Sandbanks which are slightly covered by seawater all of the time' and 'Large shallow inlets and bays').
<i>Caryophyllia inornata</i>	Cnidaria – Cup coral	NI Priority NIMF	This species is already afforded protection under the existing MPA network (Rathlin Island SAC; notified feature is Annex I 'Reefs').
<i>Caryophyllia smithii</i>	Cnidaria – Cup coral	NIMF	This species is already afforded protection under the existing MPA network (Skerries & Causeway, Rathlin Island, The Maidens and Strangford Lough SACs; notified feature is Annex I 'Reefs').

SPECIES	GROUP	CONSERVATION STATUS	JUSTIFICATION
<i>Diphasia alata</i>	Cnidaria – Hydroid	NI Priority NIMF	This species is already afforded protection under the existing MPA network (Rathlin Island and The Maidens SACs; notified feature is Annex I 'Reefs').
<i>Diphasia nigra</i>	Cnidaria – Hydroid	NI Priority NIMF	This species is already afforded protection under the existing MPA network (Rathlin Island and The Maidens SACs; notified feature is Annex I 'Reefs').
<i>Edwardsia timida</i>	Cnidaria – Anemone	NI Priority UK BAP NIMF	This species is already afforded protection under the existing MPA network (Rathlin Island and Strangford Lough SACs; notified feature is Annex I 'Sandbanks slightly covered by seawater all of the time').
<i>Halecium plumosum</i>	Cnidaria – Hydroid	SOCC	This species is already afforded protection under the existing MPA network (Skerries & Causeway, Rathlin Island, The Maidens and Strangford Lough SACs; notified feature is Annex I 'Reefs'). This has also been removed from the NI Priority List.
<i>Haliclystus auricula</i>	Cnidaria – Stalked jellyfish	UK BAP NI Priority NIMF	This species is already afforded protection under the existing MPA network (Skerries & Causeway, Rathlin Island SACs; notified feature is Annex I 'Reefs').
<i>Lytocarpia myriophyllum</i>	Cnidaria – Hydroid	NI Priority	This species is already afforded protection under the existing MPA network (Rathlin Island and The Maidens SACs; notified feature is Annex I 'Reefs').
<i>Parazoanthus anguicomus</i>	Cnidaria – Anemone	SOCC NIMF	This species is already afforded protection under the existing MPA network (Rathlin Island and The Maidens SACs; notified feature is Annex I 'Reefs').
<i>Parazoanthus axinellae</i>	Cnidaria – Yellow trumpet anemone	NI Priority	This species is already afforded protection under the existing MPA network (Rathlin Island SAC; notified feature is Annex I 'Reef').
<i>Polyplumaria flabellata</i>	Cnidaria – Hydroid	NI Priority NIMF	This species is already afforded protection under the existing MPA network (Rathlin Island and The Maidens SACs; notified feature is Annex I 'Reefs').
<i>Stomphia coccinea</i>	Cnidaria – Anemone	NI Priority	This species is already afforded protection under the existing MPA network (Rathlin Island and Strangford Lough SACs; notified feature is Annex I 'Reefs').

SPECIES	GROUP	CONSERVATION STATUS	JUSTIFICATION
<i>Tamarisca tamarisca</i>	Cnidaria – Hydroid	SOCC	This species is already afforded protection under the existing MPA network (Rathlin Island and Strangford Lough SACs; notified feature is Annex I 'Reefs').
<i>Atelecyclus rotundatus</i>	Crustacea – Circular crab	NI Priority	This species is already afforded protection under the existing MPA network (Skerries & Causeway, Rathlin Island and Strangford Lough SACs; notified features are Annex I 'Sandbanks slightly covered by seawater all of the time' and 'Large shallow inlets and bays').
<i>Cestopagurus timidus</i>	Crustacea – Hermit crab	NI Priority	This species is already afforded protection under the existing MPA network (Rathlin Island SAC; notified features are Annex I 'Reef' and 'Sandbanks which are slightly covered by seawater all of the time').
<i>Corystes cassivelaunus</i>	Crustacea – Masked crab	SOCC	This species is already afforded protection under the existing MPA network (Skerries & Causeway, Rathlin Island and Red Bay SACs; notified feature is Annex I 'Sandbanks which are slightly covered by seawater all of the time').
<i>Homarus gammarus</i>	Crustacea – European lobster	SOCC	This species is already afforded protection under the existing MPA network (Skerries & Causeway, Rathlin Island, The Maidens and Strangford Lough SACs; notified feature is Annex I 'Reefs'). This is also protected by fisheries management measures and populations are currently stable.
<i>Inachus leptochirus</i>	Crustacea – Spider crab	NI Priority	This species is already afforded protection under the existing MPA network (Rathlin Island and Strangford Lough SACs; notified features are Annex I 'Reefs' and 'Sandbanks which are slightly covered by seawater all of the time'). There are no recent records – this has been attributed to the difficulty of identification <i>in situ</i> .
<i>Munida rugosa</i>	Crustacea – Squat lobster	NI Priority	This species is already afforded protection under the existing MPA network (Rathlin Island, The Maidens and Strangford Lough SACs; notified feature is Annex I habitat of 'Reef').



SPECIES	GROUP	CONSERVATION STATUS	JUSTIFICATION
<i>Palinurus elephas</i>	Crustacea – Spiny lobster	NI Priority UK BAP NIMF WANE	This species is already afforded protection under the existing MPA network (Rathlin Island SAC; notified feature is Annex I 'Reef'). In addition, this species is protected under the WANE Act and there are fishery protection measures in place (minimum landing size).
<i>Anseropoda placenta</i>	Echinodermata – Goosefoot starfish	NI Priority	This species is already afforded protection under the existing MPA network (Red Bay and The Maidens SACs; notified feature is Annex I 'Sandbanks which are slightly covered by seawater all of the time').
<i>Antedon petasus</i>	Echinodermata – Feather star	NIMF	This species is already afforded protection under the existing MPA network (Skerries & Causeway and Rathlin Island SACs; notified feature is Annex I 'Reefs').
<i>Asterina phylactica</i>	Echinodermata – Cushion star	SOCC NIMF	This species is already afforded protection under the existing MPA network (Strangford Lough SAC; notified feature is Annex I 'Large shallow inlets and bays').
<i>Astropecten irregularis</i>	Echinodermata – Starfish	NI Priority	This species is already afforded protection under the existing MPA network (Rathlin Island and Murlough SACs; notified feature is Annex I 'Sandbanks which are slightly covered by seawater all of the time').
<i>Labidoplax media</i>	Echinodermata – Sea cucumber	NI Priority	This species is recorded in one site in the existing MPA network although records are poor (only 3 records exist for this species from 1982-1985). It is likely that this species is already afforded protection through the existing MPA network (Strangford Lough SAC; notified feature is Annex I 'Large shallow inlets and bays').
<i>Leptasterias muelleri</i>	Echinodermata – Starfish	SOCC	This species is already afforded protection under the existing MPA network (Skerries & Causeway, Rathlin Island, The Maidens, Strangford Lough and Murlough SACs; notified features are Annex I 'Reefs' and 'Sandbanks which are slightly covered by seawater all of the time'). This has already been removed from the NI Priority List.

SPECIES	GROUP	CONSERVATION STATUS	JUSTIFICATION
<i>Leptosynapta bergensis</i>	Echinodermata – Sea cucumber	NI Priority	This species is already afforded protection under the existing MPA network (Strangford Lough SAC; notified feature is Annex I 'Large shallow inlets and bays').
<i>Paracucumaria hyndmani</i>	Echinodermata – Hyndman's sea cucumber	NI Priority	This species is already afforded protection under the existing MPA network through association with <i>Modiolus</i> beds (Skerries & Causeway and Strangford Lough SACs; notified feature is Annex I 'Reefs').
<i>Porania pulvillus</i>	Echinodermata – Cushion star	SOCC	This species is already afforded protection under the existing MPA network (Rathlin Island and The Maidens SACs; notified feature is Annex I 'Reefs').
<i>Solaster endeca</i>	Echinodermata – Sunstar	NI Priority	This species is already afforded protection under the existing MPA network (Strangford Lough SAC; notified features are Annex I 'Reefs' and 'Large shallow inlets and bays').
<i>Thyonidium drummondii</i>	Echinodermata – Sea cucumber	NI Priority	This species is already afforded protection under existing MPA network (Strangford Lough SAC; notified features are Annex I 'Reef' and 'Large shallow inlets and bays'). <i>Thyonidium drummondii</i> is associated with Horse Mussel ( <i>Modiolus modiolus</i> ) beds.
<i>Glossobalanus sarniensis</i>	Hemichordata – Acorn worm	NI Priority	This species is already afforded protection under the existing MPA network (Strangford Lough SAC; notified feature is Annex I 'Large shallow inlets and bays').
<i>Aequipecten opercularis</i>	Mollusca – Queen scallop	None	This species is already afforded protection under the existing MPA network (Rathlin Island, Red Bay, The Maidens and Strangford Lough SACs, notified features are Annex I 'Reefs', 'Sandbanks which are slightly covered by seawater all of the time' and 'Large shallow inlets and bays').
<i>Cerastoderma glaucum</i>	Mollusca - Brackish cockle	SOCC	This species is already afforded protection under the existing MPA network (Glynn ASSI and has recently been recorded in Strangford Lough SAC).
<i>Chlamys varia</i>	Mollusca – Variegated scallop	NI Priority	This species is already afforded protection under existing MPA network (Strangford Lough SAC; notified feature are Annex I 'Reef' and 'Large shallow inlets and bays').

SPECIES	GROUP	CONSERVATION STATUS	JUSTIFICATION
<i>Crenella decussata</i>	Mollusc – Bivalve mussel	SOCC	This species is already afforded protection under the existing MPA network (Strangford Lough SAC; notified feature is Annex I 'Large shallow inlets and bays').
<i>Cumanotus beaumonti</i>	Mollusca – Nudibranch	NI Priority	Although this species is ephemeral and rare it is indirectly protected through its food source. It feeds on the solitary hydroid <i>Corymorpha nutans</i> , which is already afforded protection under the existing MPA network (Rathlin Island, The Maidens and Murlough SACs; notified feature is Annex I 'Sandbanks which are slightly covered by seawater all of the time').
<i>Cuthona concinna</i>	Mollusca – Nudibranch	SOCC	This species is already afforded protection under the existing MPA network (Rathlin Island and Strangford Lough SACs; notified feature is Annex I 'Reefs'). In addition, this species feeds on the bryozoans <i>Sertularia argentea</i> , which is already afforded protection under the existing MPA network (Skerries & Causeway, Rathlin Island, The Maidens and Strangford Lough SACs; notified feature is Annex I 'Reefs').
<i>Erato voluta</i>	Mollusca – Egg cowrie	NI Priority	This species is already afforded protection under the existing MPA network (Rathlin Island SAC; notified feature is Annex I 'Reefs').
<i>Eubranchus doriae</i>	Mollusca – Nudibranch	NI Priority	Although this species is ephemeral it is indirectly protected through its food source. It feeds on the hydroid <i>Kirchenpaueria similis</i> , which is present under the existing MPA network (Skerries & Causeway SAC; notified feature is Annex I 'Reefs').
<i>Palio dubia</i>	Mollusca – Nudibranch	NI Priority	Although this species is ephemeral and rare (this has not been recorded in Northern Ireland since the original record in 1978) it is indirectly protected through its food source. It feeds on the bryozoan <i>Eucratea loricata</i> , which is already afforded protection under the existing MPA network (Skerries & Causeway, Rathlin Island and Strangford Lough SACs; notified features are Annex I 'Reefs' and 'Sandbanks which are slightly covered by seawater all of the time').

SPECIES	GROUP	CONSERVATION STATUS	JUSTIFICATION
<i>Pecten maximus</i>	Mollusca – King scallop	SOCC	This species is already afforded protection under existing MPA network (Skerries & Causeway, Rathlin Island, The Maidens and Strangford Lough SACs; notified features are Annex I 'Reef', 'Sandbanks which are slightly covered by seawater all of the time' and 'Large shallow inlets and bays').
<i>Thecacera pennigera</i>	Mollusca – Nudibranch	SOCC	Although this species is ephemeral with few NI records it is indirectly protected through its food source. It feeds on the bryozoan <i>Bugula plumosa</i> , which is widespread and already afforded protection under the existing SAC network (Skerries & Causeway, Rathlin Island, The Maidens and Strangford Lough SACs; notified features are Annex I 'Reefs' and 'Sandbanks which are slightly covered by seawater all of the time').
<i>Tonicella marmorea</i>	Mollusca – Chiton	NI Priority	This species is already afforded protection under the existing MPA network (Strangford Lough SAC, notified feature is Annex I 'Large shallow inlets and bays'). In particular it is found under stones and boulders on muddy gravel).
<i>Amphilectus ovulum</i>	Porifera – Sponge	SOCC	This species is already afforded protection under the existing MPA network (Strangford Lough SAC; notified feature is Annex I 'Reefs').
<i>Antho brattgardii</i>	Porifera – Sponge	NI Priority	This species is already afforded protection under the existing MPA network (Rathlin Island and The Maidens SACs; notified feature is Annex I 'Reefs').
<i>Axinella damicornis</i>	Porifera – Sponge	SOCC NIMF	This species is already afforded protection under the existing MPA network (Skerries & Causeway and Rathlin Island SACs; notified feature is Annex I 'Reefs').
<i>Axinella dissimilis</i>	Porifera – Sponge	SOCC	This species is already afforded protection under the existing MPA network (Skerries & Causeway, Rathlin Island and The Maidens SACs; notified feature is Annex I 'Reefs').
<i>Biemna variantia</i>	Porifera – Sponge	SOCC	This species is already afforded protection under the existing MPA network (Strangford Lough SAC; notified features are Annex I 'Reef' and 'Large shallow inlets and bays').
<i>Clathria barleei</i>	Porifera – Sponge	NI Priority NIMF	This species is already afforded protection under the existing MPA network (Rathlin Island and The Maidens SACs; notified feature is Annex I 'Reefs').

SPECIES	GROUP	CONSERVATION STATUS	JUSTIFICATION
<i>Eurypon coronula</i>	Porifera – Sponge	NI Priority	This species is already afforded protection under the existing MPA network (Strangford Lough SAC; notified feature is Annex I 'Reefs').
<i>Hymedesmia cohesibacilla</i>	Porifera – Sponge	NI Priority	This species is already afforded protection under the existing MPA network (Rathlin Island and The Maidens SACs; notified feature is Annex I 'Reefs').
<i>Hymedesmia rathlinia</i>	Porifera – Sponge	NI Priority	This species is already afforded protection under the existing MPA network (Rathlin Island and The Maidens SACs; notified feature is Annex I 'Reefs').
<i>Hymerhabdia typica</i>	Porifera – Sponge	NI Priority	This species is already afforded protection under the existing MPA network (Rathlin Island and The Maidens SACs; notified feature is Annex I 'Reefs').
<i>Iophon hydmani</i>	Porifera – Sponge	SOCC	This species is already afforded protection under the existing MPA network (Rathlin Island, The Maidens and Strangford Lough SACs; notified feature is Annex I 'Reefs'). It has also been removed from the NI Priority List.
<i>Lissodendoryx jenjonesae</i>	Porifera – Sponge	NI Priority	This species is already afforded protection under the existing MPA network (Rathlin Island and The Maidens SACs; notified feature is Annex I 'Reefs').
<i>Microciona elliptichela</i>	Porifera – Sponge	NI Priority	This species is already afforded protection under the existing MPA network (Rathlin Island and The Maidens SACs; notified feature is Annex I 'Reefs').
<i>Mycale cf. contarenii</i>	Porifera – Sponge	NI Priority	This species is already afforded protection under the existing MPA network (Strangford Lough SAC, notified features are Annex I 'Reefs' and 'Large shallow inlets and bays').
<i>Mycale lingua</i>	Porifera – Sponge	SOCC	This species is already afforded protection under the existing MPA network (Rathlin Island SAC; notified feature is Annex I 'Reefs').
<i>Mycale similaris</i>	Porifera – Sponge	SOCC NIMF	This species is already afforded protection under the existing MPA network (Strangford Lough SAC; notified features are Annex I 'Reefs' and 'Large shallow inlets and bays'). It has also been removed from the NI Priority List.
<i>Myxilla cf. rosacea</i>	Porifera – Sponge	SOCC	This species is already afforded protection under the existing MPA network (Skerries & Causeway, Rathlin Island, The Maidens and Strangford Lough SACs; notified feature is Annex I 'Reefs').
<i>Plocamiancora armáti</i>	Porifera – Sponge	SOCC	This species is already afforded protection under the MPA network (Rathlin Island and The Maidens SACs; notified feature is Annex I 'Reefs').

SPECIES	GROUP	CONSERVATION STATUS	JUSTIFICATION
<i>Pyura microcosmus</i>	Porifera – Sponge	NI Priority NIMF SOCC	This species is already afforded protection under the existing MPA network (Skerries & Causeway, Rathlin Island and Strangford Lough SACs; notified feature is Annex I 'Reefs').
<i>Spanioplon armatum</i>	Porifera – Sponge	NI Priority	This species is already afforded protection under the existing MPA network (Rathlin Island and The Maidens SACs; notified feature is Annex I 'Reefs').
<i>Spongionella pulchella</i>	Porifera – Sponge	SOCC NIMF	This species is already afforded protection under the existing MPA network (Rathlin Island and The Maidens SACs; notified feature is Annex I 'Reefs').
<i>Stelletta grubii</i>	Porifera – Sponge	SOCC	This species is already afforded protection under the existing MPA network (Rathlin Island SAC; notified feature is Annex I 'Reefs').
<i>Stryphnus ponderasus</i>	Porifera – Sponge	SOCC	This species is already afforded protection under the existing MPA network (Rathlin Island SAC; notified feature is Annex I 'Reefs').
<i>Tethya hibernica</i>	Porifera – Sponge	NI Priority	This species is already afforded protection under the existing MPA network (Rathlin Island and The Maidens SACs; notified feature is Annex I 'Reefs').
<i>Archidistoma aggregatum</i>	Tunicata – Sea squirt	SOCC	This species is already afforded protection under the existing MPA network (Rathlin Island and The Maidens SACs; notified feature is Annex I 'Sandbanks which are slightly covered by seawater all of the time').
<i>Boltenia echinata</i>	Tunicata – Sea squirt	SOCC	This species is already afforded protection under the existing MPA network (Rathlin Island and The Maidens SACs; notified feature is Annex I 'Reefs').
<i>Diazona violacea</i>	Tunicata – Football sea squirt	NIMF	This species is already afforded protection under the existing MPA network (Rathlin Island SAC; notified feature is Annex I 'Reefs').
<i>Pycnoclavella stolonialis</i>	Tunicata – Sea squirt	NI Priority	This species is already afforded protection under the existing MPA network (Skerries & Causeway, Rathlin Island, The Maidens and Strangford Lough SACs; notified feature is Annex I 'Reefs').
<i>Synoicum incrustatum</i>	Tunicata – Sea squirt	SOCC NIMF	This species is already afforded protection under the existing MPA network (Skerries & Causeway, Rathlin Island and The Maidens SACs; notified feature is Annex I 'Reefs').

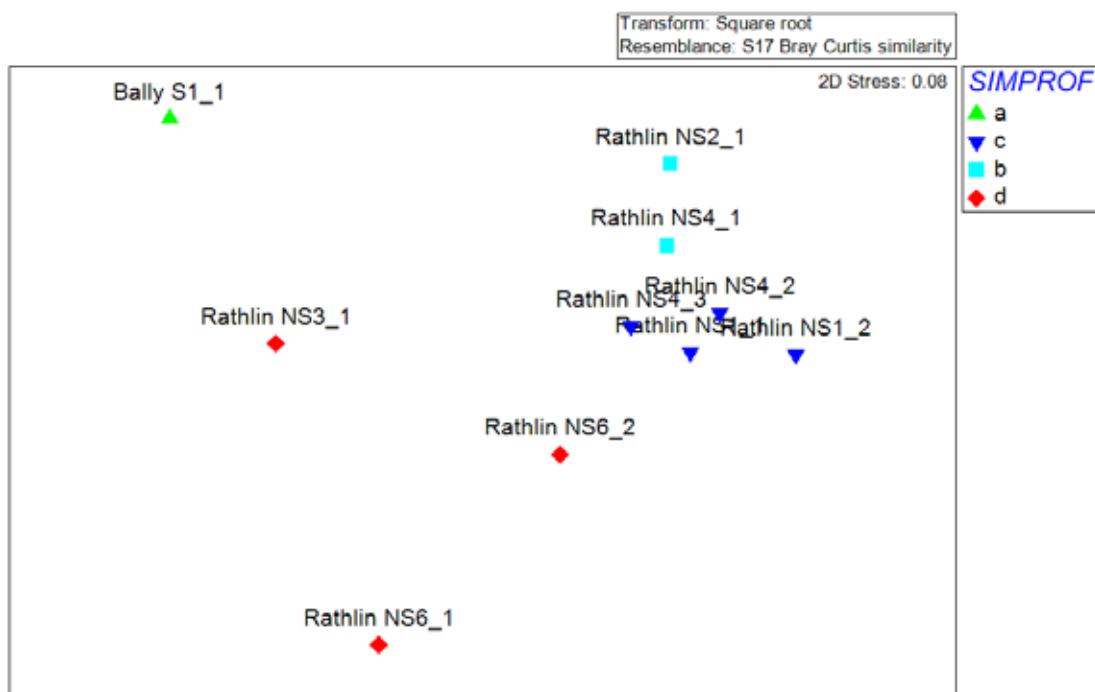
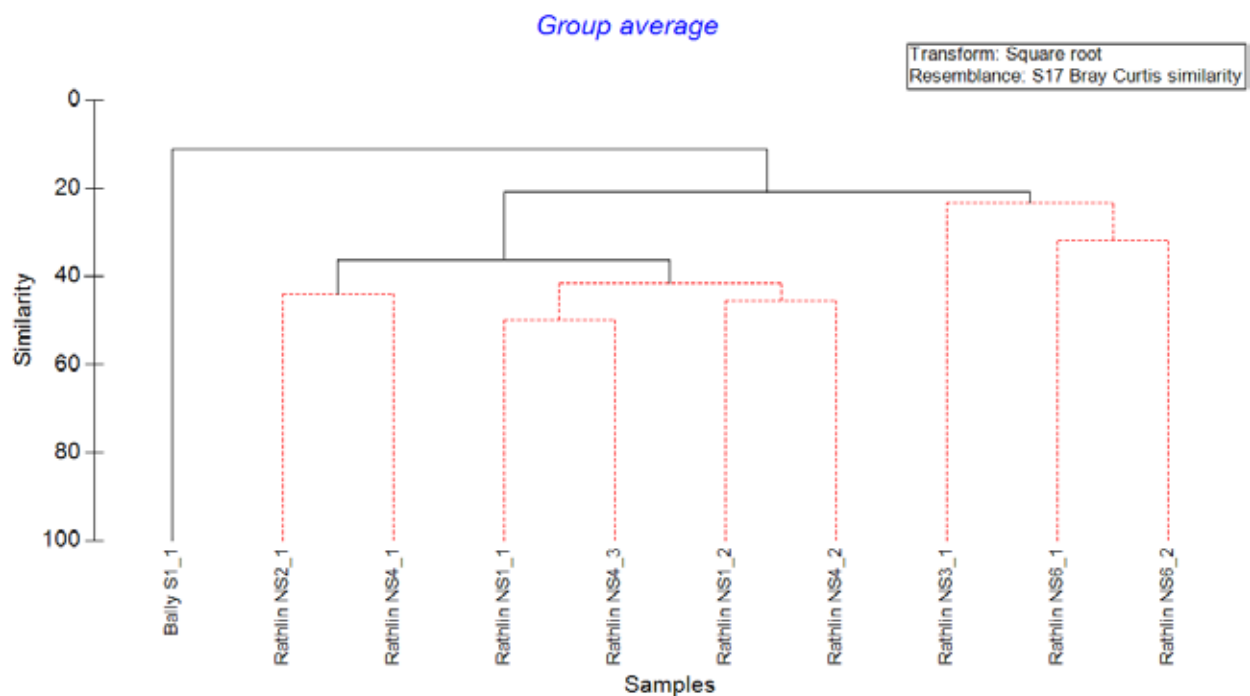


**Table 1.3** Priority Marine Feature (PMF) Limited/low mobility species excluded from consideration as a focus for MCZ designation and justification for exclusion. These cover the range of representative and threatened, rare or declining species in Northern Irish waters.

SPECIES	GROUP	CONSERVATION STATUS	JUSTIFICATION
<i>Ahnfeltiopsis devoniensis</i>	Alga – Red	NI Priority	This species has been excluded as originally was thought to be a type locality but is now known that it originates from Canada.
<i>Gelidiella calcicola</i>	Alga – Red	NIMF SOCC	This species has been excluded as there is only one record from 1980s for this species and this lies outside the existing MPA network. Further work on its current status and distribution is needed before consideration as an MCZ feature.
<i>Anemonactis mazeli</i>	Cnidaria – Anemone	NIMF SOCC	This species has been excluded as there is only one record from NISS (1982-85). The site was re-surveyed in 2006-08 and the species was not found.
<i>Lucernariopsis campanulata</i>	Cnidaria – Stalked jellyfish	UK BAP NI Priority NIMF	This species has been excluded as there are only two records from 1980s for this species and these lie outside the existing MPA network.
<i>Arrhis phyllonyx</i>	Crustacea – Amphipod	UK BAP NI Priority NIMF	This species has been excluded as it is a pelagic species thought to inhabit deep offshore waters. There is limited knowledge on its distribution in Northern Irish waters making site based protection likely to be unsuitable.
<i>Amphiura securigera</i>	Echinodermata – Brittle star	SOCC	Records of distribution are limited (only three records exist for this species from 1982-1985 and all are outside the MPA network). Further work on its current status and distribution is needed before consideration as an MCZ feature.
<i>Hippocampus guttulatus</i>	Fish – Spiny seahorse	UK BAP NI Priority OSPAR WANE Schedule 5, 6 & 7	This species has been excluded as there are no recent records of its presence in Northern Irish waters. There are two historical records for this species – a female in 1893 and a male in 1961.

SPECIES	GROUP	CONSERVATION STATUS	JUSTIFICATION
<i>Hippocampus hippocampus</i>	Fish – Short snouted seahorse	UK BAP NIMF OSPAR T&D WANE Schedule 5, 6 & 7	This species has been excluded as there are no records (recent or historical) of its presence in Northern Irish waters.
<i>Philinoglossa helgolandica</i>	Mollusca – Opisthobranch	SOCC	This species has been excluded as there is limited information on its distribution (this is a tiny shell-less mollusc found in shell gravel and is a meiofaunal community constituent). There are no records of this species on Marine Recorder for Northern Ireland.
<i>Embletonia pulchra</i>	Mollusca – Nudibranch	SOCC	This species has been excluded as it is under-recorded, ephemeral and rare and is not associated with a particular habitat or food source therefore site based protection is likely to be unsuitable. There are no records of this species on Marine Recorder.
<i>Hero formosa</i>	Mollusca – Nudibranch	SOCC	This species has been excluded as it is ephemeral and rare therefore site based protection is likely to be unsuitable. It is believed that the most recent record for this was 1988 however there are no records of this species on Marine Recorder.
<i>Phakellia rugosa</i>	Porifera – Sponge	SOCC	This species has been excluded as there are only rare and historic records for its presence and may no longer be present in Northern Ireland. This species is at the southern extent of its range in Northern Ireland therefore site based protection is likely to be unsuitable. No records of this species on Marine Recorder.

## ANNEX II: Multivariate analysis of infaunal data from CO2414 Rathlin and Ballycastle grab samples



### SIMPER

Similarity Percentages - species contributions

### One-Way Analysis

#### Parameters

Resemblance: S17 Bray Curtis similarity

Cut off for low contributions: 90.00%

Factor Groups

Sample	SIMPROF
Bally S1_1	a
Rathlin NS1_1	c
Rathlin NS1_2	c
Rathlin NS4_2	c
Rathlin NS4_3	c
Rathlin NS2_1	b
Rathlin NS4_1	b
Rathlin NS3_1	d
Rathlin NS6_1	d
Rathlin NS6_2	d

Group a

Less than 2 samples in group

Group c

Average similarity: 43.66

Species	Av. Abund	Av. Sim	Sim/SD	Contrib%	Cum. %
Verruca stroemia	6.64	4.06	3.08	9.29	9.29
NEMATODA	3.06	2.43	4.03	5.58	14.87
Sabellaria spinulosa	3.94	1.98	1.69	4.52	19.39
Thelopus cincinatus	1.82	1.28	4.79	2.94	22.33
Notoproctus	2.17	1.28	0.73	2.92	25.25
Golfingiidae (juv.)	1.46	1.22	2.99	2.80	28.05
Hiatella arctica	1.35	1.05	5.56	2.42	30.47
POLYCHAETA	1.00	0.99	5.73	2.28	32.75
Plagioecia patina	1.00	0.99	5.73	2.28	35.02
Disporella hispidata	1.00	0.99	5.73	2.28	37.30
Electra pilosa	1.00	0.99	5.73	2.28	39.58
Pyripora catenularia	1.00	0.99	5.73	2.28	41.85
Flustriidae	1.00	0.99	5.73	2.28	44.13
Flustra foliacea	1.00	0.99	5.73	2.28	46.40
Scrupocellaria	1.00	0.99	5.73	2.28	48.68
Hippothoa divaricata	1.00	0.99	5.73	2.28	50.96
Escharella immersa	1.00	0.99	5.73	2.28	53.23
Escharella ventricosa	1.00	0.99	5.73	2.28	55.51
Leptochiton asellus	1.32	0.78	0.90	1.80	57.31
Modiolula phaseolina	1.98	0.78	0.87	1.79	59.09
Amphipholis squamata	1.35	0.67	0.88	1.54	60.63
Phisiadia aurea	1.12	0.63	0.88	1.45	62.07
Polycirrus medusa	0.96	0.62	0.90	1.42	63.50
Anomidae (juv.)	1.14	0.62	0.91	1.42	64.91
Notomastus	0.75	0.55	0.90	1.27	66.18
Fenestrulina malusii	0.75	0.55	0.90	1.27	67.46
Turbicellepora avicularis	0.75	0.55	0.90	1.27	68.73
Dipolydora flava	1.00	0.52	0.89	1.20	69.92
Alcyonidium diaphanum	0.75	0.52	0.89	1.20	71.12
Amphiblestrum flemingii	0.75	0.52	0.89	1.20	72.32
Cellaria fistulosa	0.75	0.52	0.89	1.20	73.52
Diemniidae	0.75	0.52	0.89	1.20	74.72
PORIFERA	0.75	0.47	0.90	1.08	75.80
Sertularia	0.75	0.47	0.90	1.08	76.88
Tubuliporidae	0.75	0.47	0.90	1.08	77.96
Cellaria	0.75	0.47	0.90	1.08	79.04
Cliona (agg.)	0.75	0.44	0.91	1.00	80.05
Eudendrium	0.75	0.44	0.91	1.00	81.05
Nephasoma minutum	0.85	0.44	0.91	1.00	82.05
Syllis variegata	0.93	0.44	0.91	1.00	83.05
Crisia	0.75	0.44	0.91	1.00	84.06
Schizomavella linearis	0.75	0.44	0.91	1.00	85.06
Aphelochaeta "species A"	0.71	0.30	0.41	0.69	85.75
Sycon ciliatum	1.00	0.26	0.41	0.60	86.35
Laonice bahusensis	0.85	0.25	0.41	0.58	86.93
ASCIDIACEA	1.06	0.25	0.41	0.58	87.51
Echinocyamus pusillus	0.71	0.23	0.41	0.52	88.03
Sphaerosyllis bulbosa	0.60	0.21	0.41	0.49	88.52
ASCIDIACEA (juv.)	1.10	0.21	0.41	0.48	89.00

Glycera lapidum	0.68	0.18	0.41	0.41	89.41
Odontosyllis fulgurans	0.60	0.18	0.41	0.41	89.82
Aonides paucibranchiata	0.68	0.18	0.41	0.41	90.24

Group b

Average similarity: 44.03

Species	Av. Abund	Av. Sim	Sim/SD	Contrib%	Cum. %
Leptochiton asellus	1.98	3.30	#####	7.48	7.48
Modiolula phaseolina	1.83	2.69	#####	6.11	13.59
PORIFERA	1.00	1.90	#####	4.32	17.91
Cliona (agg.)	1.00	1.90	#####	4.32	22.23
Hydrallmania falcata	1.00	1.90	#####	4.32	26.55
Sertularia	1.00	1.90	#####	4.32	30.87
NEMERTEA	1.00	1.90	#####	4.32	35.19
NEMATODA	1.50	1.90	#####	4.32	39.52
Aonides paucibranchiata	1.37	1.90	#####	4.32	43.84
Sabellaria spinulosa	1.37	1.90	#####	4.32	48.16
Verruca stroemia	2.30	1.90	#####	4.32	52.48
Glycymeris glycymeris	1.72	1.90	#####	4.32	56.80
Tubuliporidae	1.00	1.90	#####	4.32	61.12
Disporella hispidata	1.00	1.90	#####	4.32	65.44
Electra pilosa	1.00	1.90	#####	4.32	69.76
Pyripora catenularia	1.00	1.90	#####	4.32	74.08
Amphiblestrum flemingii	1.00	1.90	#####	4.32	78.40
Escharella immersa	1.00	1.90	#####	4.32	82.72
Escharella ventricosa	1.00	1.90	#####	4.32	87.04
Phylactella labrosa	1.00	1.90	#####	4.32	91.36

Group d

Average similarity: 26.28

Species	Av. Abund	Av. Sim	Sim/SD	Contrib%	Cum. %
Polygordius	4.64	3.68	3.68	14.00	14.00
Disporella hispidata	1.00	2.98	2.53	11.35	25.35
Electra pilosa	1.00	2.98	2.53	11.35	36.70
Puellina bifida	1.00	2.98	2.53	11.35	48.04
Verruca stroemia	2.61	1.98	0.58	7.52	55.56
Glycera lapidum	0.67	1.44	0.58	5.48	61.04
Socarnes erythropthalmus	1.05	0.99	0.58	3.76	64.80
Crisidia cornuta	0.67	0.84	0.58	3.21	68.01
Crisia	0.67	0.84	0.58	3.21	71.22
Tubuliporidae	0.67	0.84	0.58	3.21	74.42
Pyripora catenularia	0.67	0.84	0.58	3.21	77.63
Scrupocellaria	0.67	0.84	0.58	3.21	80.84
Amphipholis squamata	0.80	0.84	0.58	3.21	84.05
Goodallia triangularis	0.80	0.70	0.58	2.66	86.70
Plagioecia patina	0.67	0.70	0.58	2.66	89.36
Cellaria fistulosa	0.67	0.70	0.58	2.66	92.02

## ANNEX III: Grab sampling notes: CO2414 and CO0715

Grab_ID	Rep No.	Date	Time	Latitude (decimal degrees)	Longitude (decimal degrees)	Depth (m)	Sample Description	Comment
Rathlin N S1	1	19/06/2014	12:42	55.31655	-6.31985	187	Coarse Sediment, Piece of Ammonite, Broken Shell including Modiolus Shell	Infaunal sample, No PSA. Grab 1/6 full
Rathlin N S1_2	2	19/06/2014	13:47	55.32222	-6.303983	197	Alcyonidium gelatinosum, small yellow sponge, Stones-cobbles; Hydroids, Pomatoceros, Ophiopholis, Cellaria, Bryozoan Crust, Tiny Ascidians (A. conchilega), Tiny crab - maybe Hyas, Some broken Shell	Infaunal sample, No PSA. Grab 1/6 full
Rathlin N S2_1	1	19/06/2014	14:22	55.3195	-6.27595	197	Whole Shell (incl. Modiolus), Pebbles & shell fragments	Infaunal sample, No PSA. Grab 1/5 full
Rathlin N S2_2	2	19/06/2014	14:31	55.31863	-6.26785	197	No sample	No sample
Rathlin N S2_3	3	19/06/2014	14:56	55.32042	-6.277617	200	2 stones in mouth of grab.	
Rathlin NS 3_1	1	19/06/2014	15:45	55.32493	-6.209383	186	Broken shell & gravel	Infaunal sample (4.5kg of 9.15kg fixed) & PSA sample taken. Grab 80% full.
Rathlin NS 3_2	2	19/06/2014	15:54	55.32533	-6.198667	180	No sample, grab empty	
Rathlin NS 4_1a	1	19/06/2014	19:00	55.3204	-6.268933	210	No sample, two small stones with Keel worm and chiton	
Rathlin NS 4_1b	1	19/06/2014	19:11	55.31877	-6.272733	210	Sand (medium & coarse) & shell	Infaunal sample taken; No PSA. Grab 1/5 full
Rathlin NS 4_2	2	19/06/2014	19:23	55.31617	-6.278583	210	Medium & coarse sand; Whole shell & Shell gravel; Polychaetes; Bivalves; Hydroids	Infaunal & PSA samples taken. Grab 1/3 full
Rathlin NS 4_3	3	19/06/2014	19:30	55.31398	-6.2837	180	Medium & coarse sand; Whole shell & Shell gravel.	Infaunal & PSA samples taken. Grab 1/5 full
Rathlin NS5_1a	1	19/06/2014	20:01	55.31935	-6.231667	228	No sample, grab empty	
Rathlin NS5_1b	2	19/06/2014	20:15	55.31752	-6.230883	228	6 Stones with Hydroids & brittlestars (Ophiotrix fragilis, Ophiocomina nigra)	No infaunal or PSA sample taken, photos taken of biota on stones & brittlestars
Rathlin NS6_1	1	19/06/2014	20:25	55.32322	-6.21915	186	Shell, shell fragments & whole shell	Infaunal sample (4.5kg of 9.15kg fixed) & PSA sample taken. Grab 80% full.
Rathlin NS6_2	2	19/06/2014	20:43	55.32083	-6.2161	191	Shell, shell fragments & whole shell	Infaunal sample (5kg of 10.2kg fixed) & PSA sample taken. Grab 90% full.
Rathlin NS7_1 East Rathlin	1	20/06/2014	08:15	55.28068	-6.095183	140	Shells, pebbles with hydroid. Very small sample	Very small sample so discarded. No PSA sample taken either.
Rathlin NS7_2 East Rathlin	2	20/06/2014	08:22	55.2836	-6.101467	155	Single basaltic cobble, Pomatoceros, hydroids.	Very small sample so discarded. No PSA sample taken either.
Rathlin ES1_1	3	20/06/2014	08:46	55.27842	-6.106	150	1 cobble with biota attached - Cellaria ?fistulosa?; Pomatoceros, Ophiotrix, Unknown pale white-beige mass; Nemertesia	No infaunal or PSA sample taken, photos taken of biota on cobble
Ballycastle S1_1	1	20/06/2014	12:30	55.23527	-6.245467	80	1 stone and brittlestar. Sample too small to retain	Very small sample so discarded. No PSA sample taken either.
Ballycastle S1_1	2	20/06/2014	12:54	55.2234	-6.2439	53	Coarse sand & broken shell but too little to process (stone must have wedged in jaws of grab)	Tiny sample so discarded. No PSA taken either
Ballycastle S1_1	3	20/06/2014	13:00	55.22232	-6.240933	55	Coarse sand with comminuted shell & whole shell gravel. Some medium sand. No obvious fauna.	Infaunal & PSA samples taken. Grab 80% full. No subsample

Station	Grab_code	Date	Time	Depth_m	PSA	C_N	Infauna_1mm	Photos	Prop_full	Notes	LatDD	LongDD
Outer Belfast Lough	1_A	12/02/2015	00:47	24	Y	Y	Y	Y	3/4	Muddy sand or sandy mud? Tusk shells, some comminuted shell	54.70845	-5.59715
Outer Belfast Lough	1_B	12/02/2015	01:01	25	Y	Y	Y	Y	3/4	Muddy sand or sandy mud? Tusk shells, some comminuted shell	54.70858	-5.59795
Outer Belfast Lough	1_C	12/02/2015	01:11	25	Y	Y	Y	Y	3/4	Muddy sand or sandy mud? Dead Arctica shell; possibly juvenile Arctica (photos taken)	54.7088	-5.59763
Rathlin1	1_1	10/02/2015	10:55	200	N	N	N	Y	1/10	Samples not retained as small sample and jaws had jammed open; clean pebbles of various lithologies (sedimentary and igneous), 1 broken shell; Spirobranchus sp., enc bryozoans	55.32218	-6.18957
Rathlin1	1_2	10/02/2015	11:18	200	N	N	N	Y	Scraped stones	No proper sample- looks like scraped off cobbles; Tubularia indivisa, bryozoan and hydrozoan turf, Alcyonium digitatum	55.32202	-6.19118
Rathlin2	2_A	10/02/2015	15:58	260	N	N	N	Y	Scraped stones	No proper sample- looks like scraped off cobbles; Tubularia indivisa, bryozoan and hydrozoan turf, Filograna implexa?, Rissoid gastropod?, Crisia sp.	55.31687	-6.14313
Rathlin2	2_B	10/02/2015	16:02	250	N	N	N	Y	2 cobbles	2 cobbles; Tubularia indivisa, Anomia sp., enc bryozoa, Surpulid worms, Ophiolithrix fragilis, Omalosecosa ramulosa, Crisia sp., Rissoid gastropod? (photos taken)	55.32063	-6.14515
Rathlin2	2_C	10/02/2015	16:38	260	N	N	N	Y	Scraped stones	No proper sample- looks like scraped off cobbles; Ophiolithrix fragilis, Tubularia indivisa, Alcyonium digitatum, Cellaria sp., Modiolula sp	55.3184	-6.15222
Rathlin3	3_A	11/02/2015	10:15	210	N	N	N	Y	1 cobble & 1 pebble	Cobble and pebble retained only plus one living Modiolus (retained); chitons, bryozoan turf, Crisia sp., Cellaria sp., Nemertesia sp., Anomia sp., Spirobranchus sp., Ophiolithrix fragilis, Ophiopholis sp.	55.35568	-6.26548
Rathlin3	3_B	11/02/2015	10:58	220	N	N	N	Y	Few pebbles & cobbles	Pebbles and cobbles, Pandalus sp., Surpulid worms, Spirobranchus sp., encrusting bryozoans, bryozoan and hydrozoan turf	55.3534	-6.26343
Rathlin3	3_C	11/02/2015	11:26	210	N	N	N	Y	1 boulder	1 small boulder and dead shell clump with living Modiolus (attached to shells by byssus threads; retained and frozen); surpulid worms, Spirobranchus, A. digitatum, enc bryozoans	55.35403	-6.26672
Rathlin4	4_A	11/02/2015	13:01	227	Y	N	Y	Y	1/4	Coarse sand/comminuted shell with some finer sand; whole dead shell (Modiolus inc); clumped living Modiolus; hydroid/bryo turf; surpulid worms; Anomia sp; Ophiolithrix fragilis; Circomphalus casina	55.34463	-6.21537
Rathlin4	4_B	11/02/2015	13:22	230	Y	N	Y	Y	1/2	Coarse sand/shell gravel; some fines but most washed out, cobbles, whole dead shell (much Modiolus); Circomphalus casina, other bivalves, Surpulid worms, enc bryozoans	55.34432	-6.20328
Rathlin4	4_C	11/02/2015	13:43	229	Y	N	Y	Y	1/4	Coarse sand/shell gravel; some fines but most washed out, cobbles, whole dead shell (much Modiolus); 1 crushed living Modiolus, Ophiolithrix fragilis, Surpulid worms, enc bryozoans	55.3441	-6.20247

