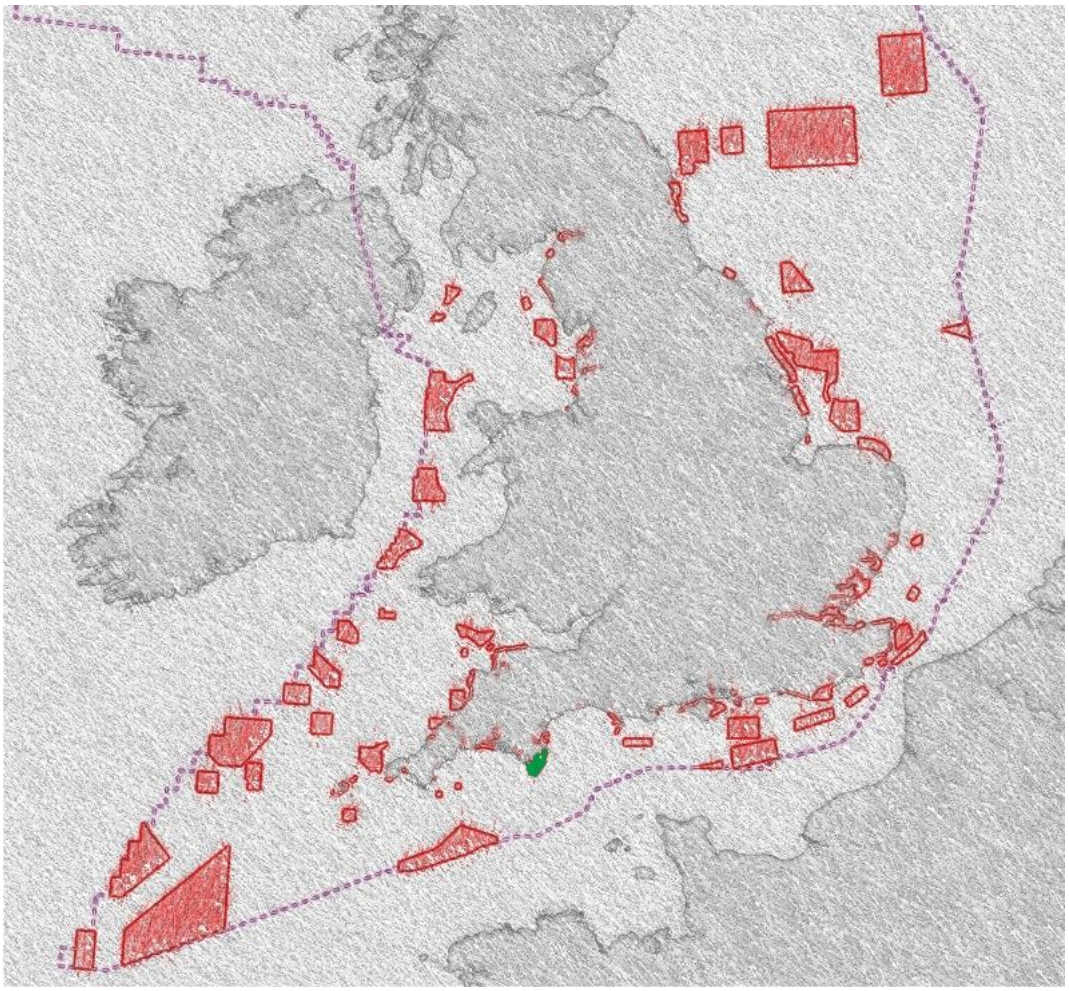
Centre for Environment
Fisheries & Aquaculture
Science

Skerries Bank and Surrounds MCZ
Biotope Report



NATURAL ENGLAND

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Table of Contents

Table of Contents i
List of Tables ii
List of Figures iii
1 Introduction 1
1.1 Location of the MCZ 1
1.2 Ground truth sample acquisition 2
2 Methods 4
2.1 Particle Size Analysis 4
2.2 Macrofauna 5
2.3 Video Interpretation 6
2.4 Combining Biotopes 6
3 Results 7
3.1 Particle Size Analysis 7
3.2 Infauna species composition 10
3.3 Multivariate analysis 11
3.4 Comparison of PSA and Macrofauna 13
3.5 Biotope assignment 14
3.6 Video and Stills interpretation 21
3.7 Combined Results 25
4 Discussion 29
5 Conclusions 30
5.1 Biotopes Present in the Skerries Bank and Surrounds MCZ by BSH 30
References 33
Data sources 34
Annexes 35
Annex 1. Broadscale habitat features listed in the ENG. 35
Annex 2. Habitat FOCI listed in the ENG. 36
Annex 3. Low or limited mobility species FOCI listed in the ENG. 37
Annex 4. Highly mobile species FOCI listed in the ENG. 38
Annex 5. Video and still image processing protocol 39
Appendices 41
Appendix 1. Clustered Φ Classes 41
Appendix 2. SIMPER Analysis 43
Appendix 2. Assigned Biotopes 47
Appendix 4. Species list 52

List of Tables

Table 1: Dominant taxa (by abundance) 10
Table 2: Biotopes identified from the sediment samples (PSA and macrofauna) 19
Table 3: Biotopes identified from the video transects and still images within the site 21
Table 4: Biotopes identified in the Skerries Bank and Surrounds MCZ 25

List of Figures

Figure 1. Location of the Skerries Bank and Surrounds MCZ. Bathymetry is from the Defra Digital Elevation Model (Astrium, 2011). 2

Figure 2: Location of ground truth sampling sites in the Skerries Bank and Surrounds MCZ. Bathymetry displayed is from Defra's Digital Elevation Model (Astrium, 2011)..... 3

Figure 3: Size scale and descriptions used for particle size analysis 4

Figure 4: Dendrogram of the multivariate clustering of the individual ϕ data for each station. A slice at a distance 25 reduces the number of clusters. 7

Figure 5: Spatial distribution of the multivariate clusters based on the PSA ϕ Classes 8

Figure 6: Average proportions of each ϕ class for each of the multivariate clusters... 9

Figure 7: Dendrogram showing the results of the cluster analysis on species abundance. A slice at 20% reduces the number clusters to 11. 12

Figure 8: Spatial distribution of the multivariate clusters derived from the species abundance. 13

Figure 9: Cross over between the macrofaunal clusters and the PSA clusters with comparison against BSH and mean grain size. 14

Figure 10: Distribution of the biotopes assigned to the sediment samples (PSA and macrofauna)..... 18

Figure 11: Spatial distribution of the biotopes assigned to the still images..... 24

Figure 12: Updated point biotope classifications overlying the updated broad scale habitat map. 28

1 Introduction

This report details the findings of an investigation into the biotopes present within the Skerries Bank and Surrounds Marine Conservation Zone (MCZ) based on the taxonomic and particle size analysis of the samples collected as part of dedicated seabed surveys carried out at the MCZ. The site has been included in a network of Marine Protected Areas (MPAs) in UK waters, designed to meet conservation objectives under the Marine and Coastal Access Act 2009. Biotopes were to be assigned based on the multivariate analysis of benthic communities present in the survey area and the corresponding particle size analysis (PSA) data in accordance with the EUNIS (European Nature Information System) habitat classification scheme (EUNIS, 2007).

The original data for this report was collected in 2012 as part of Defra's MCZ verification survey work. The Defra verification report was published in 2015. However, this only reported to broadscale habitat level as that was all that Defra required. In order to give advice on management, we required higher resolution information on the exact communities present. The original data collected would allow this, therefore Natural England commissioned Cefas to look at the data again and in turn produce this report.

1.1 Location of the MCZ

The Skerries Bank and Surrounds MCZ is located along the south Devon coast. The boundary encompasses an area of 249.69 km^2 and extends from the high water mark at Leek Cove (on the eastern side of the Salcombe-Kingsbridge estuary mouth); around Prawle Point and Start Point to the Torcross coastline. The seaward boundary aligns with the boundaries of the eastern portion of the Start Point Inshore Potting Agreement, excluding a corridor that is trawled all year, to depths of approximately 70 m (Figure 1).

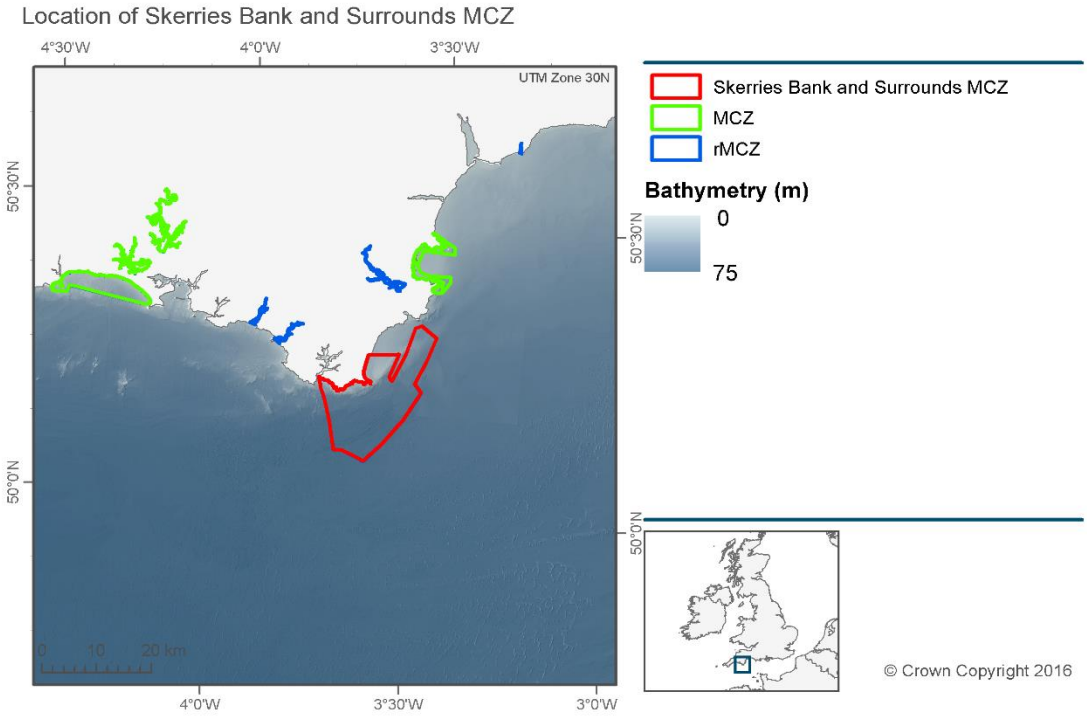

Figure 1. Location of the Skerries Bank and Surrounds MCZ. Bathymetry is from the Defra Digital Elevation Model (Astrium, 2011).

1.2 Ground truth sample acquisition

An underwater camera system was successfully deployed at 185 stations collecting video and still images of the seabed. Benthic grabs were used at 160 stations and subsampled for particle size analysis and benthic infauna (Figure 2). Full details of the ground truth sample acquisition are given in the Skerries Bank and Surrounds MCZ Summary Site Report (Curtis et al., 2015).

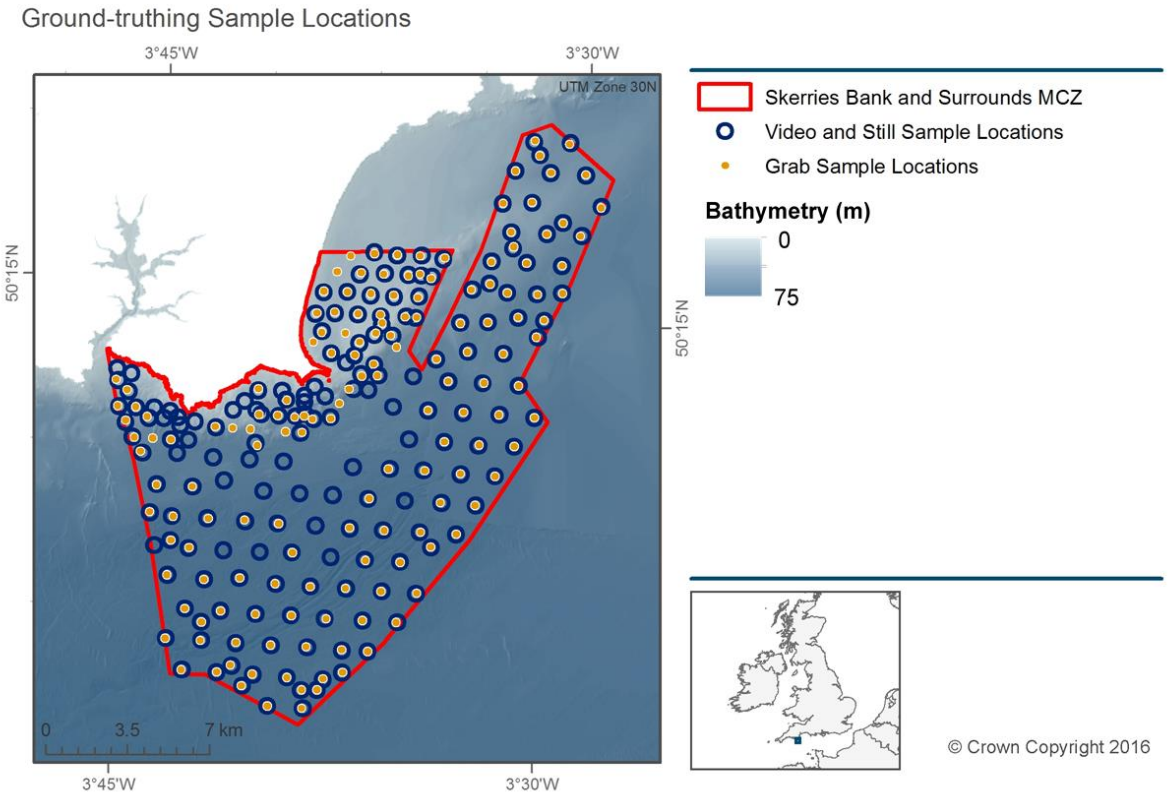

Figure 2: Location of ground truth sampling sites in the Skerries Bank and Surrounds MCZ. Bathymetry displayed is from Defra's Digital Elevation Model (Astrium, 2011).

2 Methods

2.1 Particle Size Analysis

Biotope classes are closely tied to the particle size distribution with different infaunal assemblages associated with different sediment types. Classifications of biotopes belonging to EUNIS level 4 and below for sedimentary habitats require a differentiation of the sediment type within the broadscale habitat. This requires greater interrogation of the particle size distribution into categories such as muddy sand or fine sand as opposed to the standard BSH categories of 'A5.2 Subtidal sand' or 'A5.3 Subtidal mud'.

Φ	Diameter	Unit	Descriptive	
-11	2048	mm	Very large	
-10	1024	mm	Large	
-9	512	mm	Medium	**Boulders**
-8	256	mm	Small	
-7	128	mm	Very small	
-6	64	mm	Very coarse	
-5	32	mm	Coarse	
-4	16	mm	Medium	**Gravel**
-3	8	mm	Fine	
-2	4	mm	Very fine	
-1	2	mm	Very coarse	
0	1	mm	Coarse	
1	500	µm	Medium	**Sand**
2	250	µm	Fine	
3	125	µm	Very fine	
4	63	µm	Very coarse	
5	31	µm	Coarse	
6	16	µm	Medium	**Mud**
7	8	µm	Fine	
8	4	µm	Very fine	
9	2	µm	Clay	**Clay**

Figure 3: Size scale and descriptions used for particle size analysis

2.1.1 Sample processing

The sub-sample of the grab taken for particle size distribution during the survey of the site was analysed according to the National Marine Biological Analytical Quality Control (NMBAQCs) Best Practice Guidance (Mason, 2011). A further sub-sample of particles <1 mm from each replicate was analysed using laser diffraction. Sediment >1 mm was dry sieved at 0.5 phi (Φ) intervals from 1 mm to 63 mm. The dry sieve and laser results were combined to give the full particle size distribution at 0.5 Φ intervals between 0.043 µm and 63 mm (14.5 Φ to -6 Φ). Units of Φ are described in terms of a range as each value is a measure of the particles with a diameter larger than or equal to that sieve size and below the diameter of the next sieve size up (Figure 3).

2.1.2 Multivariate Analysis

Multivariate analysis of the individual Φ class sizes using the SIMPROF algorithm within PRIMER v6.1.5 was undertaken to help identify groups/clusters of stations of similar sediment type based on the 0.5 Φ class particle size distribution (Clarke, 1993; Clarke & Warwick, 2001; Clarke & Gorley, 2006).

The results of the cluster analysis were then used to identify the sediment characteristics of each of the clusters of stations by utilising the mean Φ class sizes for each cluster. Where two clusters exhibited very similar sediment structures the clusters were merged. These clusters of stations with similar sediment attributes were used to help differentiate the biotopes at EUNIS level 3 and 4.

2.2 Macrofauna

2.2.1 Sample processing

The macrobenthic invertebrate sample processing following this survey was based on the recommendations made in the NMBAQC macrobenthic invertebrate sample processing requirements protocol and internal standard operating procedures (Worsfold et al., 2010). All fauna were identified to the lowest possible taxonomic level, usually species, and enumerated following the Taxonomic Discrimination Protocol (Worsfold et al., 2010). To ensure that the macrobenthic sample processing was carried out to the required standard, a random selection of 10% of the samples processed were reanalysed.

2.2.2 Macrofauna Species Abundance

Total abundance for each species from all of the stations was recorded and used to rank the species against those present across the site. Measures of how widespread taxa are, based on the number of stations the species was identified from, were also derived.

2.2.3 Multivariate Analysis

Multivariate analysis of the infauna data set was carried out using Primer v6.1.5. Hierarchical CLUSTER and SIMPROF analysis were used to determine significant grouping of samples to form clusters ($\rho < 0.05$). To reduce the impact of highly abundant species on the analysis the data were square root transformed before analysis.

A SIMPER test, using the SIMPROF clusters as factors was also be carried out on abundance data to identify which taxa contribute to similarity between stations within a cluster.

2.2.4 Biotope assignment.

Within this report the term ‘biotope’ has been used to describe any EUNIS classification of level 4 or below (e.g. A5.14 and A3.213) and covers descriptions of biotope complexes, biotopes and sub-biotopes.

Information from the multivariate analyses of the PSA and macrofaunal data were combined to aid the assignment of a biotope to each of the stations. As already stated, results of PSA analysis contributed to categorising the stations down to EUNIS level 3 and 4. Information on the photic zones is also required for classification at EUNIS Level 4 for sediments and Level 2 for rock habitats. The differences between areas of circalittoral and infralittoral rock are determined by the level of photosynthetically available radiation (Kd_{PAR}) at the seabed and the associated flora. Estimates for Kd_{PAR} can be made using satellite data such as that from the Medium Resolution Imaging Spectrometer instrument (MERIS) based aboard the European Envisat satellite. The level of Kd_{PAR} where the infralittoral ends and circalittoral begins is typically around 1% but can vary depending on local variations in environmental conditions and benthic flora (Saulquin et al., 2013). For the purposes of this investigation 1% Kd_{PAR} was used as the threshold for differentiation between the infra- and circalittoral zones.

Information on the macrofaunal assemblages of each cluster or station were then be used to identify any similarities or matches to EUNIS level 5 or below. When data are collected from a high number of stations, such as with the Skerries Bank and Surrounds MCZ, it is likely that some overlap will be seen between the PSA clusters and the Infaunal clusters. Faunal clusters are likely to correspond to several PSA clusters and vice versa. This could result in clusters that may be similar to several different biotopes and not fit into any single category.

2.3 Video Interpretation

Video and still images were analysed for epifaunal species and sediment type following an established protocol developed and used by Cefas (Coggan and Howell, 2005; JNCC, in prep.; see Annex 5). Biotopes were assigned to each individual still image and to segments of the video where a clear change in biotope was observed. The biotope information for the video and still image data was utilised to create the updated BSH map of the Skerries Bank and Surrounds MCZ (Curtis et al., 2015).

2.4 Combining Biotopes

Assigning biotopes to each sample across the site required the information derived from the sediment samples (PSA and macrofauna) and the video data to be combined at each station. Where a conflict between the assigned biotopes and the two datasets existed, the confidence in the interpretation was used. For example, where the infauna assemblage was found to have a slight resemblance to the biotope ‘A5.261 *Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment’ but the video data clearly shows assemblages of epifauna resembling ‘A5.262 *Amphiura brachiata* with *Astropecten irregularis* and other echinoderms in circalittoral muddy sand’ the later biotope would be picked. Where no discernible biotope is identified the EUNIS level will either be decreased to a level which can be identified or a combination of biotopes used.

3 Results

3.1 Particle Size Analysis

The 0.5 Φ class information was analysed within PRIMER v6.1.5 to identify similarities between stations based on the full particle size distribution. Multivariate analysis identified 52 clusters at the 5% significance level. The groups identified by the SIMPROF analysis are much finer than is required for the classification of the different sediment types so clusters underwent an amalgamation based on the SIMPROF analysis. A slice at a Euclidian distance of 25 was taken to reduce the number of clusters to 10 (Figure 4). Full information on cluster assignments for each station is given in Appendix 3.

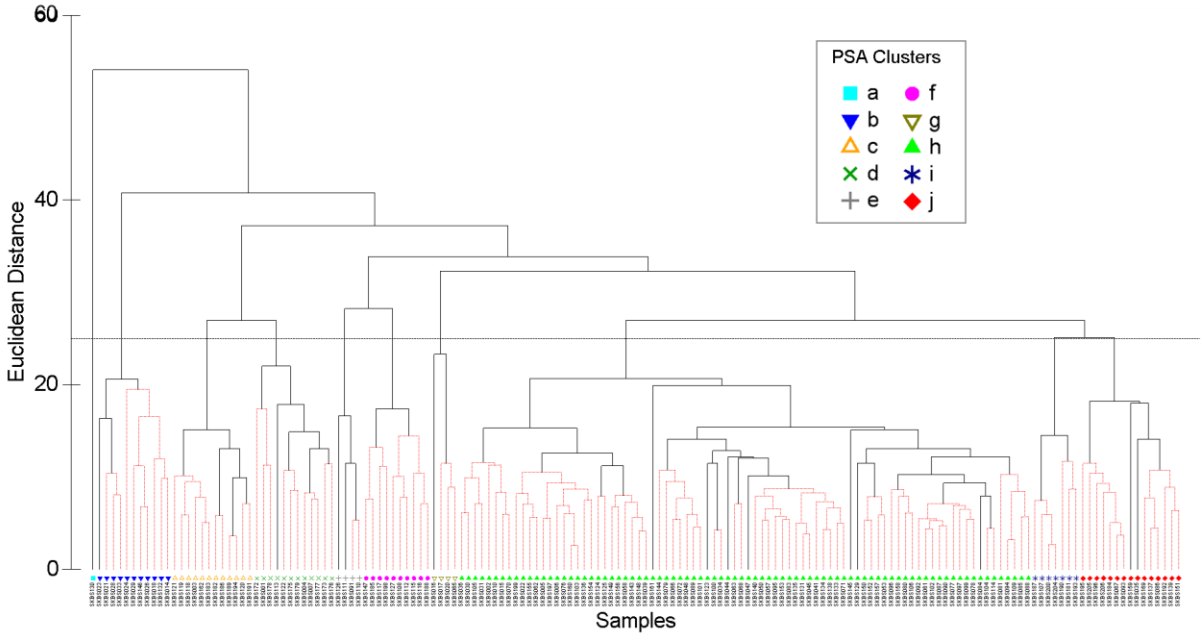

Figure 4: Dendrogram of the multivariate clustering of the individual ϕ data for each station. A slice at a distance of 25 reduces the number of clusters.

The spatial distribution of the multivariate clusters displays the variability in sediment types within the nearshore area and the homogeneous nature of the offshore areas of the site (Figure 5). The majority of stations within the offshore areas of the site belong to cluster h. Stations belonging to cluster j, f, b and a are also present but in much lower numbers. The area to the west of the site near the mouth of Kingsbridge Estuary are a mixture of stations belonging to clusters h, j, d and c. Directly to the south of Start Point a group of stations classified as cluster b are present surrounded by stations belonging to clusters h, g and j. Within Start Bay stations are grouped into different clusters, with stations belonging to cluster d being the most inshore followed by groups of stations belonging to clusters f, I, j and h moving offshore. Stations belonging to cluster f are also found in the north east of the site with stations belonging to clusters c, e d and h being present.

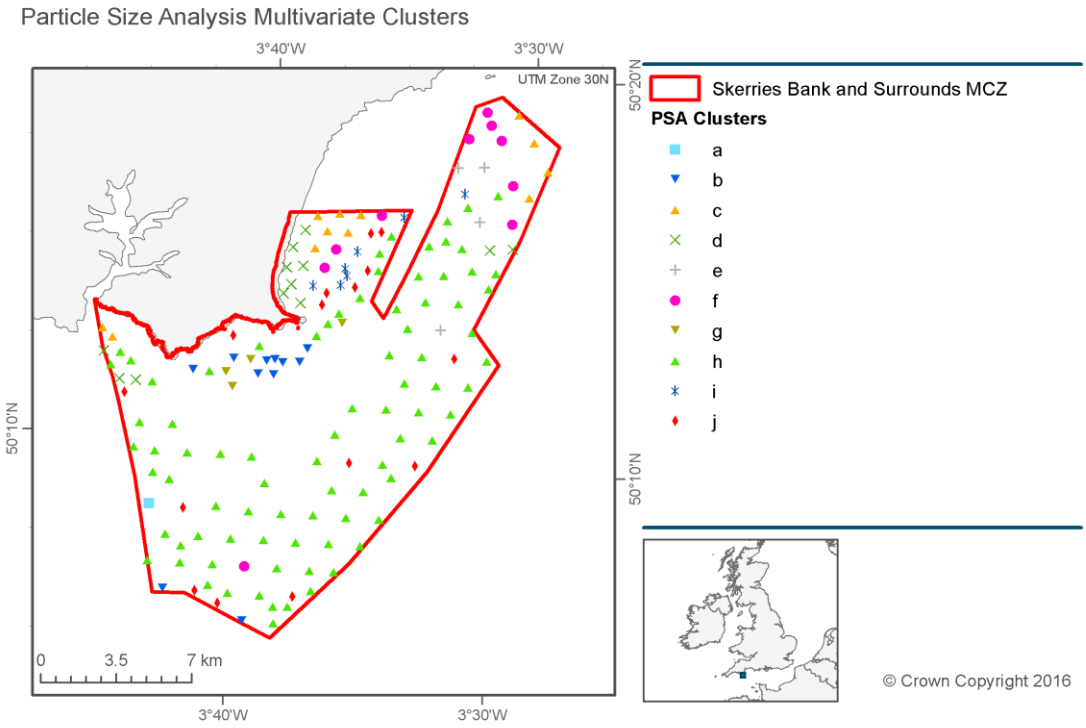

Figure 5: Spatial distribution of the multivariate clusters based on the PSA ϕ Classes

The average proportion of the Φ values within each cluster was calculated to give a better understanding of the sediment composition within each of the clusters (Figure 6, Appendix 1).

Cluster a is dominated by a high proportion of granules within the -6 to -5.5 ϕ class (15.6 to 22.1 µm) indicating the presence of very coarse gravel in the sample. The remainder is predominantly gravel and coarse sand. Cluster b is dominated by a wide peak between the 0.5 and -2.5 ϕ (0.7 to 5.6 mm) with an average grain size between 0 and -0.5 ϕ (1.0 to 1.4 mm). Cluster c peaks between 4 and 1 ϕ (62.5 µm to 0.5 mm) with no coarse material. Cluster d has a polymodal distribution with a low peak between 3 and 2.5 ϕ (0.1 to 0.2 mm), a low tail of gravels and coarse sand (1 to -4 Φ; 0.5 to 22.4 mm) and a low secondary peak between 8.5 and 7 ϕ (3.9 to 5.5 µm). Mean grain size is between 3 to 2.5 ϕ (0.1 to 0.2 mm). Cluster e displays a strong peak between 2.5 and 0 ϕ (0.2 to 1 mm).

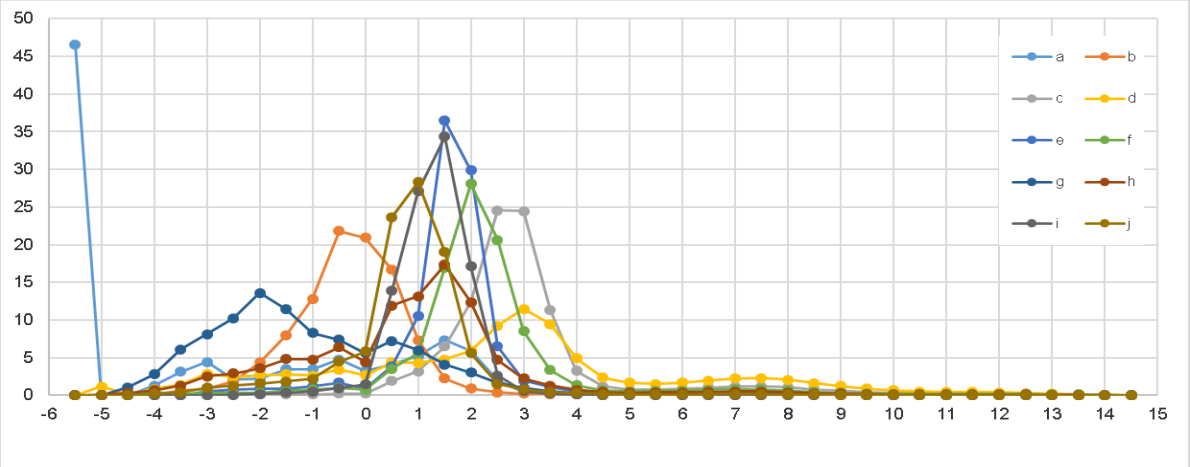

Figure 6: Average proportions of each ϕ class for each of the multivariate clusters.

Cluster f peaks between 3.5 and 0.5 ϕ (88.39 µm to 0.7 mm) with a very low tail of gravels. Cluster g displays a bimodal distribution with peaks at -2 to -2.5 ϕ (0.2 to 0.3 mm) and at 0.5 to 0 ϕ classes (0.7 to 1.0 mm). Cluster h peaks between 2.5 and 0 ϕ (0.2 to 1 mm) with a high tail of gravels (-0.5 to -4.5 Φ; 1.4 to 22.4 mm). Cluster i peaks between 2 and 0 ϕ (0.3 to 1mm) while cluster j also peaks between 2 and 0 ϕ (0.3 mm to 1 mm) but also contains a proportion of coarser sands and gravels (0 to -3.5 Φ; 1.0 to 11.2 mm).

Due to the similarity of the sediment distribution of several of the clusters, clusters a and h, e and i and c and f have been merged to form three new clusters (ah, ei and cf). Although clusters a and h have very different mean grain sizes this is associated with the presence of a cobble within the one station which makes up cluster a. Looking at the rest of the particle size distribution it follows a very similar pattern to cluster h.

3.2 Infauna species composition

Of the 160 sediment samples collected 156 samples were analysed for macrofauna. From these stations 2315 individuals were recorded belonging to 643 taxa. Within these, 25 dominant taxa contributed to 50% of the total abundance of infauna. These were ranked by abundance (Table 1). The most abundant taxa were the pea urchin, *Echinocyamus pusillus* (1387), and the polychaetes, *Mediomastus fragilis* (845), *Notomastus sp.* (807) and *Polygordius sp.* (805). The nine most abundant taxa accounted for 30% of the individuals recorded during the survey. The most widespread taxa were Nemertea worms, the polychaete, *Glycera lapidum*, sponges (Porifera) and the eunicid polychaete, *Lumbrineris cingulata* occurring at 120, 130, 95 and 92 stations respectively. No species FOCI were identified from the infaunal data.

Table 1: Dominant taxa (by abundance)

Taxa	Total Abundance	Mean Abundance	% of Total Abundance	Cumulative % of total abundance	No. of Stations	% of Samples
Echinocyamus pusillus	1387	8.89	6.66%	6.66%	89	57.05%
Mediomastus fragilis	845	5.42	4.06%	10.72%	80	51.28%
Notomastus sp.	807	5.17	3.88%	14.60%	79	50.64%
Polygordius sp.	805	5.16	3.87%	18.47%	42	26.92%
Lumbrineris cingulata	683	4.38	3.28%	21.75%	92	58.97%
Pisione remota	634	4.06	3.05%	24.79%	52	33.33%
Dendrodoa grossularia	555	3.56	2.67%	27.46%	55	35.26%
Hydroides norvegicus	519	3.33	2.49%	29.95%	79	50.64%
Nemertea	453	2.90	2.18%	32.13%	120	76.92%
Glycera lapidum	429	2.75	2.06%	34.19%	103	66.03%
Syllis hyalina	359	2.30	1.72%	35.92%	60	38.46%
Magelona johnstoni	358	2.29	1.72%	37.64%	16	10.26%
Spirobranchus triqueter	343	2.20	1.65%	39.28%	46	29.49%
Kurtiella bidentata	307	1.97	1.47%	40.76%	28	17.95%
Magelona filiformis	259	1.66	1.24%	42.00%	23	14.74%
Leptochiton asellus	211	1.35	1.01%	43.02%	44	28.21%
Syllis garciai	204	1.31	0.98%	44.00%	62	39.74%
Nematoda	179	1.15	0.86%	44.86%	58	37.18%
Sabellaria spinulosa	172	1.10	0.83%	45.68%	36	23.08%
Glycinde nordmanni	162	1.04	0.78%	46.46%	70	44.87%
Polycirrus medusa	161	1.03	0.77%	47.24%	53	33.97%
Actiniaria	160	1.03	0.77%	48.00%	51	32.69%
Cerianthus lloydii	151	0.97	0.73%	48.73%	23	14.74%
Amphipholis squamata	151	0.97	0.73%	49.45%	49	31.41%
Sphaerosyllis bulbosa	146	0.94	0.70%	50.16%	38	24.36%

3.3 Multivariate analysis

Hierarchical Cluster and SIMPROF analysis carried out on square root transformed infauna data for all 156 stations initially identified 40 clusters and four outlying stations. For the purposes of this investigation, amalgamation of these clusters was undertaken to investigate the broader groupings of the stations and reduce the effect of local scale variability. A slice taken at 20% Bray-Curtis similarity reduced the number of clusters to 11 (Figure 7). However, one of these was a single station cluster and not considered in further analyses (Figure 7). Full information on cluster assignments for each station is given in Appendix 3.

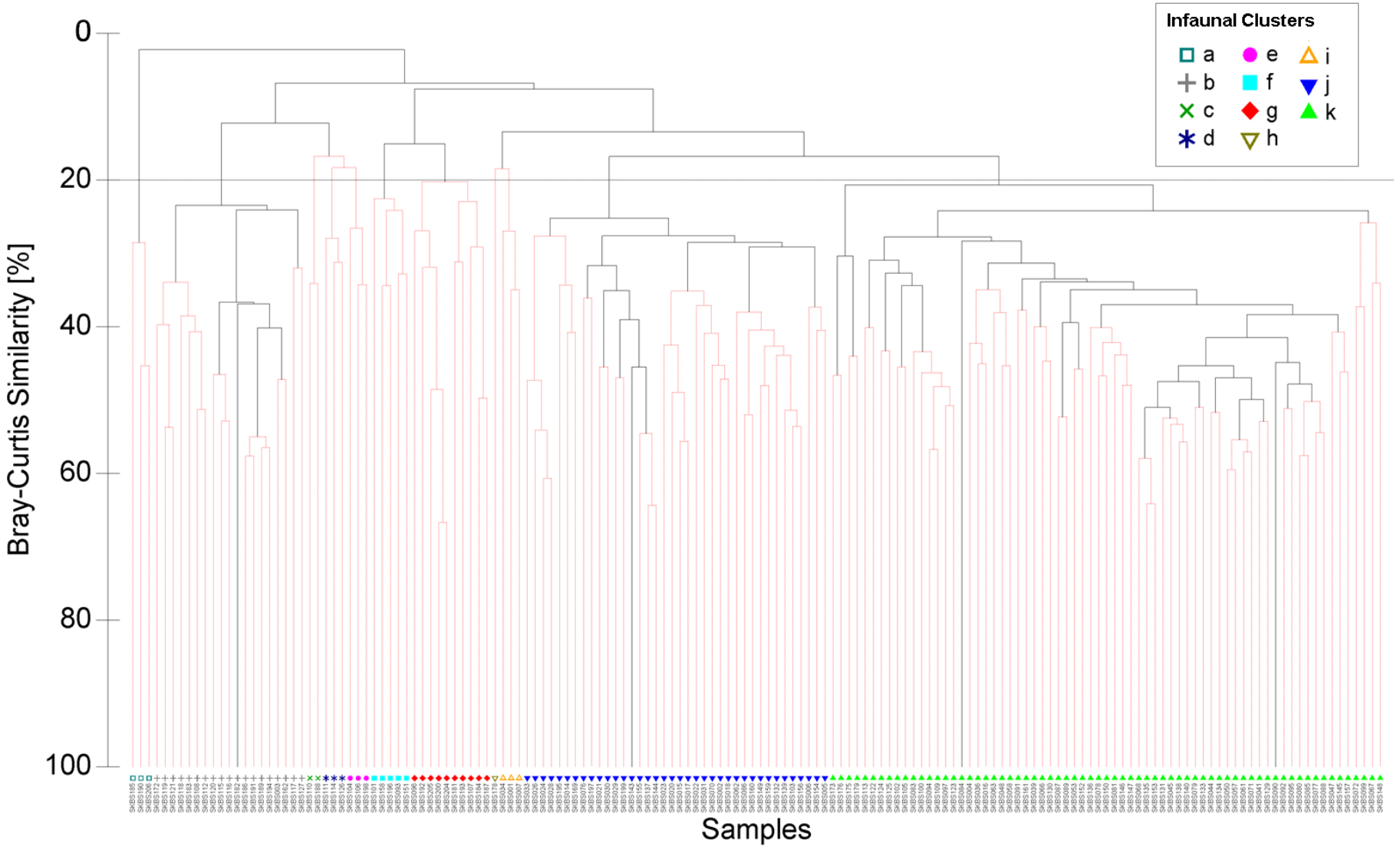

Figure 7: Dendrogram showing the results of the cluster analysis on species abundance. A slice at 20% reduces the number clusters to 11 (full information on cluster assignments for each station is given in Appendix 3).

The spatial distribution of the macrofaunal clusters displays distinct groupings of stations within each cluster (Figure 8). Stations within clusters j and k dominate the offshore areas of the site as well as the inshore areas to the west of Start Point (Figure 8). A small number of stations belonging to clusters b and I are found at the mouth of Kingsbridge Estuary (Figure 8). A higher variation of clusters was seen within Start Bay with stations from all of the clusters apart from cluster d (Figure 8). The area towards the mouth of the River Dart in the north-east of the site, was dominated by stations within cluster b and d (Figure 8). A good level of spatial correlation appears to exist within multivariate clusters. Grouping of stations that share a cluster class is evident with the exception of clusters f, c and the offshore samples within cluster j (Figure 8).

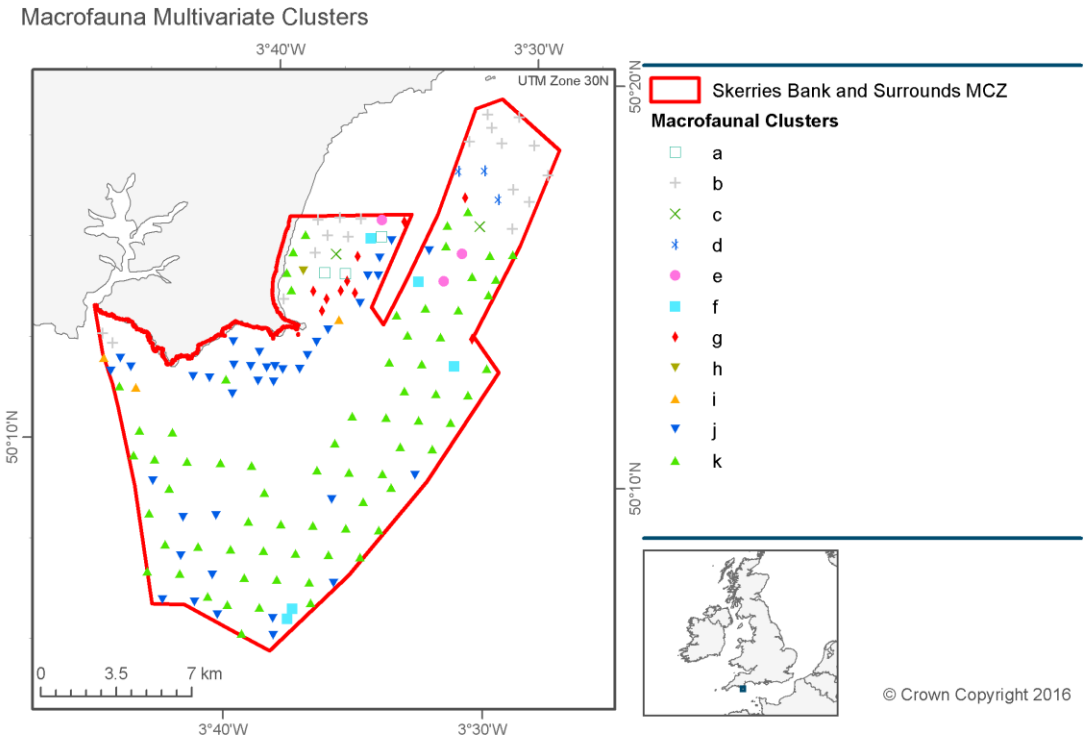

Figure 8: Spatial distribution of the multivariate clusters derived from the species abundance.

3.4 Comparison of PSA and Macrofauna

The faunal and sedimentary multivariate clusters were compared to identify areas of commonality. The macrofauna clusters were overlain onto the PSA clusters to identify the different sediment types which were inhabited by each of the identified macrofaunal assemblages (Figure 9). The PSA clusters were ranked according to mean grain size which ranged from -0.5 to -1 Φ (very coarse sand) to 3 to 2.5 Φ (fine sand). Information on the photic zone has also been added using the 1% Kd_{PAR} threshold derived from the bathymetry and MERIS satellite data.

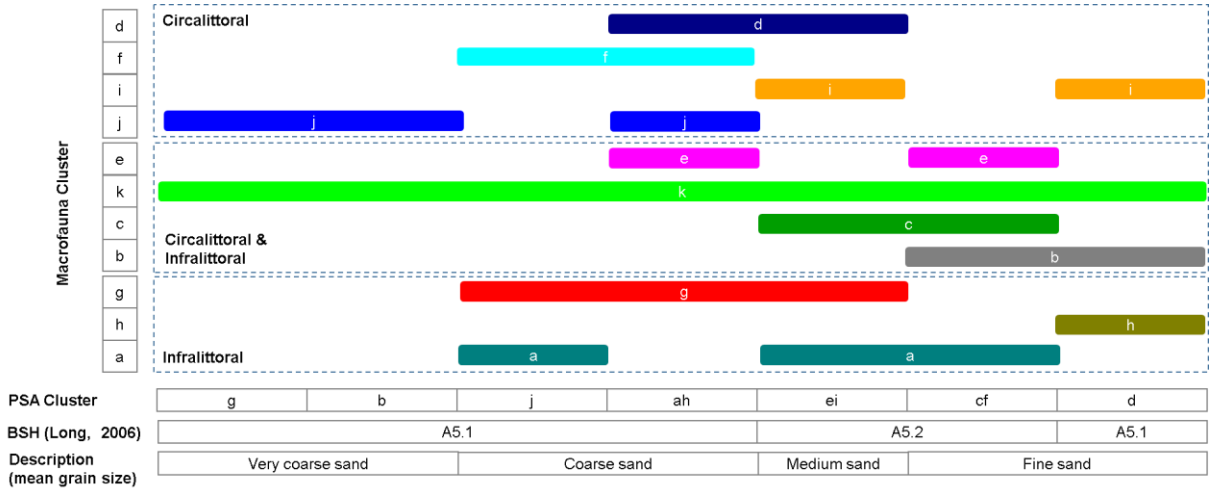

Figure 9: Cross over between the macrofaunal clusters and the PSA clusters with comparison against BSH and mean grain size.

The majority of the macrofaunal clusters were found to correspond to two or more PSA clusters (Figure 9). The most ubiquitous cluster was cluster k which contained stations belonging to all of the PSA clusters spanning both the 'A5.1 Subtidal coarse sediment' and 'A5.2 Subtidal sand' BSHs which were identified. Other clusters which ranged between the two different BSHs included stations belonging to macrofaunal clusters a, b, d, e, g, i and j. With the exception of clusters k and h the macrofaunal clusters only ranged over two or three of PSA clusters and mean grain sizes.

3.5 Biotope assignment

Biotopes were assigned to the clusters utilising information on the infaunal community structure, sedimentary information and information on the photic zones. In particular, characterising species for each macrofaunal cluster, derived from the SIMPER analysis, were used to designate biotopes by matching representative assemblages. Species contributing to a cumulative within cluster similarity of 75% for each cluster are displayed in Appendix 1. Where a suitable fit between the stations and biotope could not be found, additional biotopes were also suggested.

Cluster a – A5.23 and A5.13

The very low abundance of species for the three stations within cluster a (a total of 10 individuals) makes assigning a biotope at a level greater than EUNIS level 4 difficult. All stations within this cluster were found in the infralittoral zone above the 1% threshold for Kd_{PAR}. The stations within the cluster were found to overlap several different PSA clusters. The stations can therefore be split between the EUNIS level 4 biotopes 'A5.23 Infralittoral fine sand' and 'A5.13 Infralittoral coarse sediment' according to sediment type.

Cluster b – A5.242 and A5.261

Stations within infaunal cluster b were found to show similarities between two biotopes; 'A5.242 *Fabulina fabula* and *Magelona mirabilis* with venerid bivalves and amphipods in infralittoral compacted fine muddy sand' and 'A5.261 *Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment'. The faunal community within this cluster was characterised by the spionid polychaetes

Magelona filiformis and *Magelona johnstoni* and several species of bivalve including *Corbula gibba* and *Nucula nitidosa*. The stations within this cluster have been separated into the two different biotopes based the photic zones derived using the Kd_{PAR} levels with a cut off at 1%.

Cluster c – A5.25 and A5.233

Cluster c only contained two stations which were divided by the differences in photic zone. The macrofauna assemblage can tentatively be described by the biotope 'A5.233 *Nephtys cirrosa* and *Bathyporeia spp*. in infralittoral sand'. Samples from the stations were found to have relatively low abundances with 10 and 16 individuals (stations SKBS188 and SKBS110, respectively). Similarities were a result of the presence of only a few similar species, namely, *Nephtys cirrosa*, *Lumbrineris cingulata* and *Spiophanes bombyx*. Station SKBS188 was tentatively assigned to the biotope A5.233 whilst station SKBS110 which occurred in the circalittoral zone was assigned the biotope 'A5.25 Circalittoral fine sand'.

Cluster d – A5.142 and A5.25

Cluster d is another small group of stations with relatively low abundance. Some comparison of the infaunal assemblage can be made to the biotope 'A5.142 *Mediomastus fragilis*, *Lumbrineris spp.* and venerid bivalves in circalittoral coarse sand or gravel' with several species of bivalve and the polychaete *Lumbrineris cingulata* within the top characterising species. However, two of the stations within this cluster were found to have sandy sediments rather than coarse sediment and have been classified as a mixture of A5.142 and 'A5.25 Circalittoral fine sand'.

Cluster e – A5.14 and A5.251

The infaunal assemblage structure of stations within cluster e were found to have some similarities to the biotope 'A5.251 *Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand' with *Echinocyamus pusillus* and *Abra prismatica* being identified as charactering species following SIMPER analysis. Two of the stations within the cluster were found to have coarser sediment than described within A5.251 resulting in stations with a higher proportion of coarse material also being associated with the biotope 'A5.14 Circalittoral coarse sediment'.

Cluster f – A5.142

Stations within cluster f were classified as the biotope 'A5.142 *Mediomastus fragilis*, *Lumbrineris spp.* and venerid bivalves in circalittoral coarse sand or gravel'. This biotope is a relatively good match with strong similarities in both the sediment type and infaunal community structure. Characterising species identified from the SIMPER analysis include *Moerella pygmaea*, *Glycera lapidum* and *Echinocyamus pusillus*.

Cluster g – A5.135, A5.233 and A5.14

There are 10 stations within cluster g which are associated with a range of sediment types and sediment distributions. The infaunal assemblages were characterised by polychaetes in very low abundances. Using the sediment type and infaunal assemblage the stations were tentatively assigned to two biotopes 'A5.135 *Glycera lapidum* in impoverished infralittoral mobile gravel and sand' and 'A5.233 *Nephtys*

cirrosa and *Bathyporeia spp*. in infralittoral sand'. However, two of the stations are found in the deeper circalittoral areas of the site (Figure 10). As the assemblages at these stations did not match any of the existing biotopes within the classification scheme they were classified as 'A5.14 Circalittoral coarse sediment'.

Cluster h – A5.13

Cluster h contains only one station (SKBS178). The infaunal assemblage at this station did not correspond to an existing biotope so the station was classified as the biotope 'A5.13 Infralittoral coarse sediment'.

Cluster i - A5.142 and A5.444

Stations within cluster i were identified in the circalittoral areas where the seabed transitioned from exposed bedrock into sedimentary habitats (Figure 10). Similarities in the assemblage structure could be drawn between the biotopes 'A5.142 *Mediomastus fragilis*, *Lumbrineris spp.* and venerid bivalves in circalittoral coarse sand or gravel' and 'A5.444 *Flustra foliacea* and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment' with characterising species, identified from the SIMPER analysis, including *Mediomastus fragilis* and *Lumbrineris cingulata*.

Cluster j – A5.145 and A5.142

Cluster j, which contains the second largest number of stations, dominates the area around Start Point (Figure 10). It is also widely distributed in the offshore areas of the site. The infaunal assemblage shows a strong resemblance to that of the biotopes 'A5.145 *Branchiostoma lanceolatum* in circalittoral coarse sand with shell gravel' and A5.142 *Mediomastus fragilis*, *Lumbrineris spp.* and venerid bivalves in circalittoral coarse sand or gravel' being characterised by *Pisione remota*, Polygordius, *Glycera lapidum* and *Echinocyamus pusillus*. The lancelet *Branchiostoma lanceolatum* is the key species distinguishing the different biotopes, where *B. lanceolatum* is present the biotope is designated as A5.145 and where it is absent the biotope A5.142 is assigned.

Cluster k –, A5.142, A5.145 and A5.43

Stations within cluster k were the most widespread across the site occupying the majority of the offshore areas as well as inshore areas within Start Bay and the mouth of Kingsbridge Estuary (Figure 10). Stations within cluster k also occupied a large range of sediment types ranging from fine sand to fine gravel. This large variation has meant that assigning a single biotope to component stations was not possible. The cluster was dominated by the polychaetes *Hydroides norvegica Mediomastus fragilis, Lumbrineris cingulata, Nomastus, Glycera lapidum* and the pea urchin *Echinocyamus pusillus.* Analysis of the infaunal assemblage as well as the variations in sediment types between stations means the majority of stations can be classified as 'A5.142 *Mediomastus fragilis*, *Lumbrineris spp.* and venerid bivalves in circalittoral coarse sand or gravel'. The presence of the lancelet *B. lanceolatum* at ten of the stations with coarse sediment allows the assignment of the biotope 'A5.145 *Branchiostoma lanceolatum* in circalittoral coarse sand with shell gravel' to those stations.

Four stations from cluster k were found to be located in the infralittoral shallow area within Start Bay. The infauna of these stations is quite varied and although grouped

into cluster k, had quite a different epifaunal assemblage which did not match with either A5.142 or any infralittoral biotopes. Based on the sediment type of these four stations, a classification of ‘A5.43 Infralittoral mixed sediments’ was assigned to these stations (Figure 10).

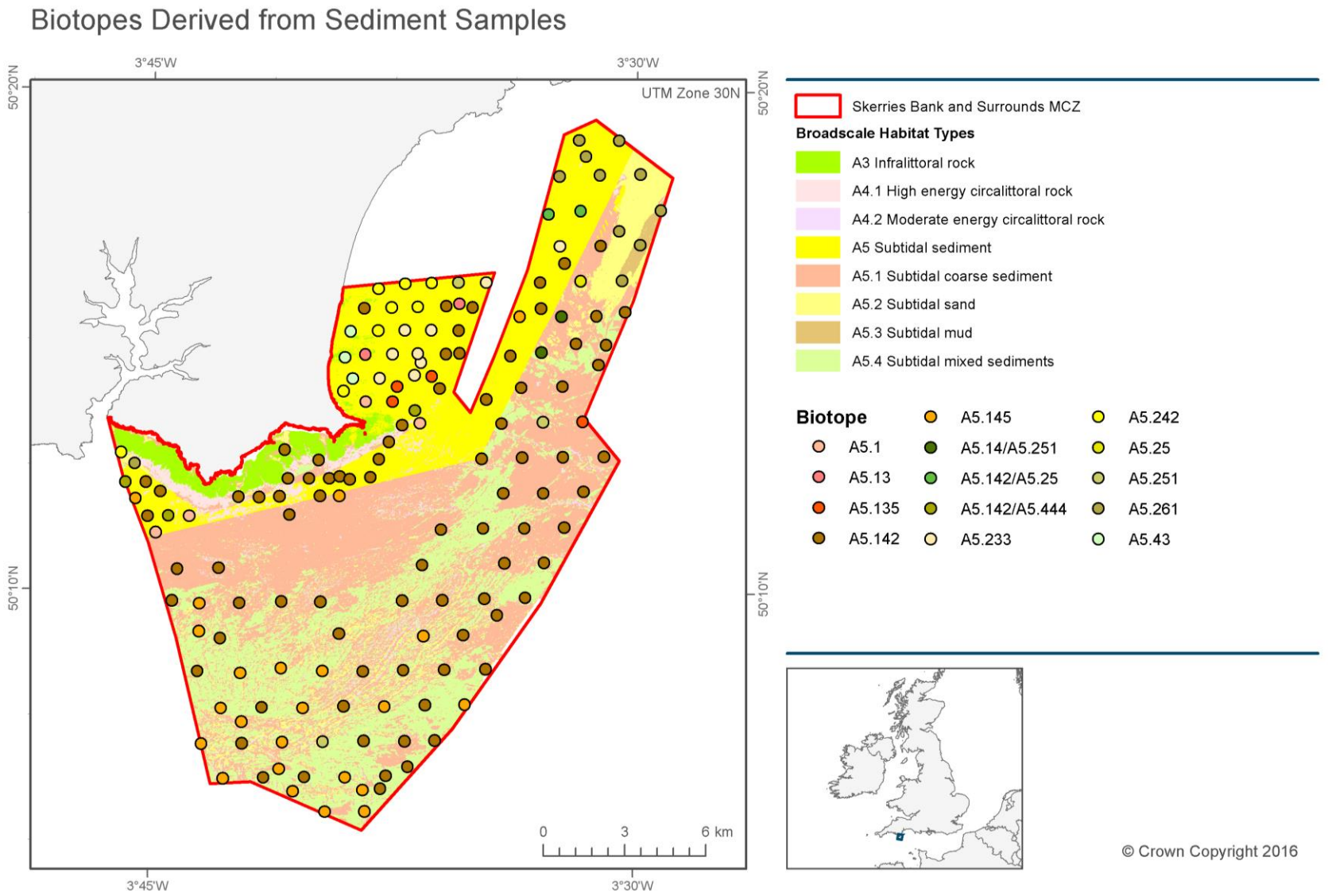

Figure 10: Distribution of the biotopes assigned to the sediment samples (PSA and macrofauna)

3.5.1 Broadscale habitats

The biotopes derived from the sediment data were overlain onto the habitat map produced by Curtis et al. (2015)(Figure 10). Based on their spatial distribution the biotopes were divided into BSH (Table 3). In places, there were disparities between the underlying BSH derived from the habitat map and the biotope identified from the sediment data. These disparities are highlighted in the table and are discussed further in Section 4.

A total of 14 biotopes were derived from PSA and macrofauna samples, falling under seven different BSHs. The BSH 'A5 Subtidal sediment' contained the highest number of biotopes with 12 biotopes, one at level 3, two at level 4 and nine at level 5. The BSH 'A5.2 Subtidal sand' contains the second highest number with six biotopes; one at level 4 and five at level 5. The BSH 'A5.1 Subtidal coarse sediment' contains the third highest number with four biotopes all at level 5. The other four BSHs represented at the site contained either one or two biotopes (Table 3).

Table 2: Biotopes identified from the sediment samples (PSA and macrofauna)

BSH	Biotope	Level	Description
A4.1 High energy circalittoral rock	A5.142*	5	*Mediomastus fragilis, Lumbrineris spp*. and venerid bivalves in circalittoral coarse sand or gravel
A4.2 Moderate energy circalittoral rock	A5.145*	5	*Branchiostoma lanceolatum* in circalittoral coarse sand with shell gravel'
A5 Subtidal sediment	A5.1	3	Sublittoral coarse sediment
A5 Subtidal sediment	A5.13	4	Infralittoral coarse sediment
A5 Subtidal sediment	A5.135	5	*Glycera lapidum* in impoverished infralittoral mobile gravel and sand
A5 Subtidal sediment	A5.142	5	*Mediomastus fragilis*, *Lumbrineris spp*. and venerid bivalves in circalittoral coarse sand or gravel
A5 Subtidal sediment	A5.142/ A5.25	5	'*Mediomastus fragilis, Lumbrineris spp*. and venerid bivalves in circalittoral coarse sand or gravel' and 'Circalittoral fine sand'
A5 Subtidal sediment	A5.142/ A5.444	5	'*Mediomastus fragilis, Lumbrineris spp*. and venerid bivalves in circalittoral coarse sand or gravel' and *'Flustra foliacea* and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment'
A5 Subtidal sediment	A5.145	5	*Branchiostoma lanceolatum* in circalittoral coarse sand with shell gravel'
A5 Subtidal sediment	A5.233	5	*Nephtys cirrosa* and *Bathyporeia spp*. in infralittoral sand
A5 Subtidal sediment	A5.242	5	*Fabulina fabula* and *Magelona mirabilis* with venerid bivalves and amphipods in infralittoral compacted fine muddy sand
A5 Subtidal sediment	A5.251	5	*Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand
A5 Subtidal sediment	A5.261	5	*Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment
A5 Subtidal sediment	A5.43	4	Infralittoral mixed sediments

BSH	Biotope	Level	Description
A5.1 Subtidal coarse sediment	A5.135	5	*Glycera lapidum* in impoverished infralittoral mobile gravel and sand
A5.1 Subtidal coarse sediment	A5.14/ A5.251	5	'Circalittoral coarse sediment' and *'Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand'
A5.1 Subtidal coarse sediment	A5.142	5	*Mediomastus fragilis, Lumbrineris spp*. and venerid bivalves in circalittoral coarse sand or gravel
A5.1 Subtidal coarse sediment	A5.145	5	*Branchiostoma lanceolatum* in circalittoral coarse sand with shell gravel'
A5.2 Subtidal sand	A5.14/ A5.251	5	'Circalittoral coarse sediment' and *'Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand'
A5.2 Subtidal sand	A5.142*	5	*Mediomastus fragilis*, *Lumbrineris spp*. and venerid bivalves in circalittoral coarse sand or gravel
A5.2 Subtidal sand	A5.145*	5	*Branchiostoma lanceolatum* in circalittoral coarse sand with shell gravel'
A5.2 Subtidal sand	A5.242	5	*Fabulina fabula* and *Magelona mirabilis* with venerid bivalves and amphipods in infralittoral compacted fine muddy sand
A5.2 Subtidal sand	A5.25	4	Circalittoral fine sand
A5.2 Subtidal sand	A5.261	5	*Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment
A5.3 Subtidal mud	A5.261*	5	*Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment
A5.4 Subtidal mixed sediments	A5.142*	5	*Mediomastus fragilis*, *Lumbrineris spp*. and venerid bivalves in circalittoral coarse sand or gravel
A5.4 Subtidal mixed sediments	A5.145*	5	*Branchiostoma lanceolatum* in circalittoral coarse sand with shell gravel'

*Disparity between the biotope identified from the sediment data and the BSH derived from the habitat map.

3.6 Video and Stills interpretation

3.6.1 Biotope assignment

Following analysis of the video and photographic stills data a total of 20 different biotopes were identified across the site falling under eight different BSHs derived from the habitat map produced by Curtis et al. (2015)(Table 3). Disparities between the biotopes and the underlying habitat map are highlighted within the table and discussed further in Section 4.

The BSH 'A5.1 subtidal coarse sediment' contains the highest number of biotopes with 11 biotopes; one at level 2, two at level 3, five at level 4 and one at level 6. The BSH 'A5 Subtidal sediment' contained the second highest number with 10 biotopes, one at level 2, one at level 3, six at level 4 and one at level 5. The other four BSHs represented at the site contained six or less biotopes (Table 3).

Table 3: Biotopes identified from the video transects and still images within the site

BSH	Biotope	Level	Description
A3 Infralittoral rock	A3.12	4	Sediment-affected or disturbed kelp and seaweed communities
A3 Infralittoral rock	A3.125	5	Mixed kelps with scour-tolerant and opportunistic foliose red seaweeds on scoured or sand-covered infralittoral rock
A3 Infralittoral rock	A3.21	4	Kelp and red seaweeds (moderate energy infralittoral rock)
A3 Infralittoral rock	A3.2142	6	*Laminaria hyperborea* park and foliose red seaweeds on moderately exposed lower infralittoral rock
A3 Infralittoral rock	A5.13*	4	Infralittoral coarse sediment
A3 Infralittoral rock	A5.14*	4	Circalittoral coarse sediment
A4.1 High energy circalittoral rock	A4	2	Circalittoral rock and other hard substrata
A4.1 High energy circalittoral rock	A4.13	4	Mixed faunal turf communities on circalittoral rock
A4.1 High energy circalittoral rock	A4.131	5	Bryozoan turf and erect sponges on tide-swept circalittoral rock
A4.1 High energy circalittoral rock	A4.213*	5	*Urticina felina* and sand-tolerant fauna on sand-scoured or covered circalittoral rock
A4.1 High energy circalittoral rock	A5.14*	4	Circalittoral coarse sediment
A4.1 High energy circalittoral rock	A5.44*	4	Circalittoral mixed sediments
A4.2 Moderate energy circalittoral rock	A4.212	5	*Caryophyllia smithii* sponges and crustose communities on wave-exposed circalittoral rock
A4.2 Moderate energy circalittoral rock	A5.14*	4	Circalittoral coarse sediment
A5 Subtidal sediment	A4*	1	Circalittoral rock and other hard substrata
A5 Subtidal sediment	A4.13*	4	Mixed faunal turf communities on circalittoral rock
A5 Subtidal sediment	A4.213*	5	*Urticina felina* and sand-tolerant fauna on sand-scoured or covered circalittoral rock
A5 Subtidal sediment	A5.14	4	Circalittoral coarse sediment
A5 Subtidal sediment	A5.141	5	*Pomatoceros triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles
A5 Subtidal sediment	A5.2	3	Sublittoral sand

BSH	Biotope	Level	Description
A5 Subtidal sediment	A5.26	4	Circalittoral muddy sand
A5 Subtidal sediment	A5.35	4	Circalittoral sandy mud
A5 Subtidal sediment	A5.43	4	Infralittoral mixed sediments
A5 Subtidal sediment	A5.44	4	Circalittoral mixed sediments
A5.1 Subtidal coarse sediment	A3.21*	4	Kelp and red seaweeds (moderate energy infralittoral rock)
A5.1 Subtidal coarse sediment	A4*	2	Circalittoral rock and other hard substrata
A5.1 Subtidal coarse sediment	A4.2*	3	Atlantic and Mediterranean moderate energy circalittoral rock
A5.1 Subtidal coarse sediment	A4.21*	4	Echinoderms and crustose communities on circalittoral rock
A5.1 Subtidal coarse sediment	A4.212*	5	*Caryophyllia smithii* sponges and crustose communities on wave-exposed circalittoral rock
A5.1 Subtidal coarse sediment	A4.213*	5	*Urticina felina* and sand-tolerant fauna on sand-scoured or covered circalittoral rock
A5.1 Subtidal coarse sediment	A4.2144*	6	Brittlestars on faunal and algal encrusted exposed to moderately wave-exposed circalittoral rock
A5.1 Subtidal coarse sediment	A5.13	4	Infralittoral coarse sediment
A5.1 Subtidal coarse sediment	A5.14	4	Circalittoral coarse sediment
A5.1 Subtidal coarse sediment	A5.2*	3	Sublittoral sand
A5.1 Subtidal coarse sediment	A5.44*	4	Circalittoral mixed sediments
A5.2 Subtidal sand	A4.2*	3	Atlantic and Mediterranean moderate energy circalittoral rock
A5.2 Subtidal sand	A5.14*	4	Circalittoral coarse sediment
A5.2 Subtidal sand	A5.2	3	Sublittoral sand
A5.2 Subtidal sand	A5.26	4	Circalittoral muddy sand
A5.2 Subtidal sand	A5.35*	4	Circalittoral sandy mud
A5.3 Subtidal mud	A5.26*	4	Circalittoral muddy sand
A5.3 Subtidal mud	A5.35	4	Circalittoral sandy mud
A5.4 Subtidal mixed sediments	A4.13*	4	Mixed faunal turf communities on circalittoral rock
A5.4 Subtidal mixed sediments	A4.21*	4	Echinoderms and crustose communities on circalittoral rock
A5.4 Subtidal mixed sediments	A5.14*	4	Circalittoral coarse sediment
A5.4 Subtidal mixed sediments	A5.2*	3	Sublittoral sand
A5.4 Subtidal mixed sediments	A5.44	4	Circalittoral mixed sediments

*Disparity between the biotope identified from the still images and the BSH derived from the habitat map.

A distinct pattern is visible from the spatial distribution of the biotopes across the site (Figure 11) with the majority of stations being classified as ‘A5.14 Circalittoral coarse sediment’, particularly in the offshore areas to the south and immediately east of Start Point. In the offshore areas two of stations have been classified as ‘A5.44 Circalittoral mixed sediments’ and two as ‘A5.26 Circalittoral muddy sand’. In the

middle of the site three stations have been classified as ‘A4.21 Echinoderms and crustose communities on circalittoral rock’. Two still images from two stations in the offshore areas contained a high abundance of brittlestars and were characterised within the EUNIS level 6 biotope ‘A4.2144 Brittlestars on faunal and algal encrusted exposed to moderately wave-exposed circalittoral rock’.

The inshore areas to the west of Start Point were a mixture of biotopes falling under the ‘A3.1 Atlantic and Mediterranean high energy infralittoral rock’ and ‘A3.2 Atlantic and Mediterranean moderate energy infralittoral rock’ in addition to areas of ‘A5.13 Infralittoral coarse sediment’ and ‘A5.2 Sublittoral sand’ and associated biotopes. Dense areas of kelp meant that it was possible to classify many of these areas down to both EUNIS level 5 and 6. Observed biotopes included ‘A3.2142 *Laminaria hyperborea* park and foliose red seaweeds on moderately exposed lower infralittoral rock’ and ‘A3.125 Mixed kelps with scour-tolerant and opportunistic foliose red seaweeds on scoured or sand-covered infralittoral rock’. The presence of the Dahlia anemone *Urticinia felina* also allowed the designation of several images as ‘A4.213 *Urticina felina* and sand-tolerant fauna on sand-scoured or covered circalittoral rock’.

The area within Start Bay and to the east of the site were classified down to EUNIS level 4. The predominant biotopes were ‘A5.2 Sublittoral sand’ or ‘A5.43 Infralittoral mixed sediments’. Four stations to the north of the site were identified as ‘A5.35 Circalittoral sandy mud’. Two images from station SKBS180 were classified down to EUNIS level 5 ‘A5.141 *Pomatoceros triqueter* with barnacles and bryozoan crusts on unstable circalittoral cobbles and pebbles’.

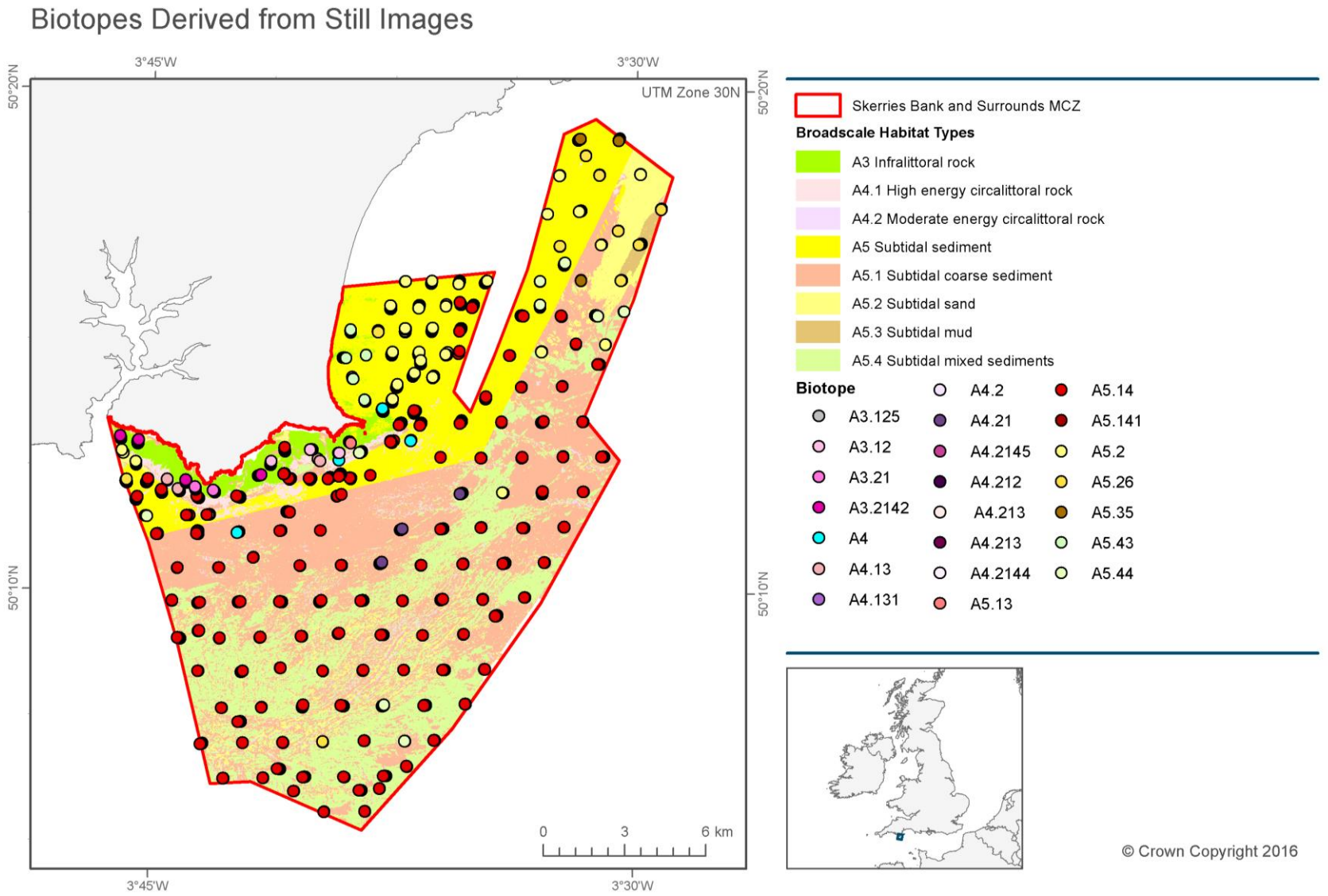

Figure 11: Spatial distribution of the biotopes assigned to the still images.

3.7 Combined Results

After combining the results of the biotope analysis of the sediment data (PSA and macrofauna) and the video and stills data, a total of 23 biotopes were identified across the site falling under eight BSHs (Table 4) derived from the underlying habitat map produced by Curtis et al. (2015). Disparities between the biotopes and the underlying habitat map are highlighted within the table and discussed further in Section 4. A full list of the biotopes assigned to each station is given in Appendix 2.

The BSH 'A5 Subtidal sediment' was found to contain the highest number of different biotopes with 12 biotopes. The BSH 'A5.1 Subtidal coarse sediment' and 'A5.2 Subtidal sand' both contained the second highest number of different biotopes with seven each. The remaining six BSHs were found to contain six or less biotopes (Table 4). The most widespread BSH was 'A5 Subtidal sediment' which was represented in 57 stations. The second most widespread was the BSH 'A5.1 Subtidal coarse sediment' containing 56 stations. The third most widespread was 'A5.4 Subtidal mixed sediments' containing 35 stations. All other BSHs were associated with 14 or less stations.

Table 4: Biotopes identified in the Skerries Bank and Surrounds MCZ

BSH	Biotope	Level	Description	Count
A3 Infralittoral rock	A3.12	4	Sediment-affected or disturbed kelp and seaweed communities	4
A3 Infralittoral rock	A3.21	4	Kelp and red seaweeds (moderate energy infralittoral rock)	3
A3 Infralittoral rock	A3.2142	6	*Laminaria hyperborea* park and foliose red seaweeds on moderately exposed lower infralittoral rock	3
A4.1 High energy circalittoral rock	A4	2	Circalittoral rock and other hard substrata	2
A4.1 High energy circalittoral rock	A4.13	4	Mixed faunal turf communities on circalittoral rock	4
A4.1 High energy circalittoral rock	A4.213*	5	*Urticina felina* and sand-tolerant fauna on sand-scoured or covered circalittoral rock	1
A4.1 High energy circalittoral rock	A5.14*	4	Circalittoral coarse sediment	1
A4.1 High energy circalittoral rock	A5.142*	5	*Mediomastus fragilis*, *Lumbrineris spp*. and venerid bivalves in circalittoral coarse sand or gravel	2
A4.1 High energy circalittoral rock	A5.44*	4	Circalittoral mixed sediments	1
A4.2 Moderate energy circalittoral rock	A5.145*	5	*Branchiostoma lanceolatum* in circalittoral coarse sand with shell gravel'	2
A5 Subtidal sediment	A5.1	3	Sublittoral coarse sediment	3
A5 Subtidal sediment	A5.13	4	Infralittoral coarse sediment	1
A5 Subtidal sediment	A5.14	4	Circalittoral coarse sediment	3
A5 Subtidal sediment	A5.142	5	*Mediomastus fragilis*, *Lumbrineris spp*. and venerid bivalves in circalittoral coarse sand or gravel	22

BSH	Biotope	Level	Description	Count
A5 Subtidal sediment	A5.145	5	*Branchiostoma lanceolatum* in circalittoral coarse sand with shell gravel’	2
A5 Subtidal sediment	A5.142/ A5.444	5	*‘Mediomastus fragilis*, *Lumbrineris spp*. and venerid bivalves in circalittoral coarse sand or gravel' and *'Flustra foliacea* and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment’	2
A5 Subtidal sediment	A5.142/ A5.25	5	‘*Mediomastus fragilis*, *Lumbrineris spp*. and venerid bivalves in circalittoral coarse sand or gravel' and 'Circalittoral fine sand’	2
A5 Subtidal sediment	A5.233	5	*Nephtys cirrosa* and *Bathyporeia spp.* in infralittoral sand	8
A5 Subtidal sediment	A5.242	5	*Fabulina fabula* and *Magelona mirabilis* with venerid bivalves and amphipods in infralittoral compacted fine muddy sand	5
A5 Subtidal sediment	A5.251	5	*Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand	1
A5 Subtidal sediment	A5.261	5	*Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment	5
A5 Subtidal sediment	A5.43	4	Infralittoral mixed sediments	3
A5.1 Subtidal coarse sediment	A5.135	5	*Glycera lapidum* in impoverished infralittoral mobile gravel and sand	1
A5.1 Subtidal coarse sediment	A5.14	4	Circalittoral coarse sediment	11
A5.1 Subtidal coarse sediment	A5.142	5	*Mediomastus fragilis*, *Lumbrineris spp*. and venerid bivalves in circalittoral coarse sand or gravel	35
A5.1 Subtidal coarse sediment	A5.145	5	*Branchiostoma lanceolatum* in circalittoral coarse sand with shell gravel’	6
A5.1 Subtidal coarse sediment	A5.14/ A5.251	5	‘Circalittoral coarse sediment' and *'Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand’	1
A5.1 Subtidal coarse sediment	A4.2144*	6	Brittlestars on faunal and algal encrusted exposed to moderately wave-exposed circalittoral rock	1
A5.1 Subtidal coarse sediment	A5.251*	5	*Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand	1
A5.2 Subtidal sand	A5.142*	5	*Mediomastus fragilis*, *Lumbrineris spp*. and venerid bivalves in circalittoral coarse sand or gravel	2
A5.2 Subtidal sand	A5.145*	5	*Branchiostoma lanceolatum* in circalittoral coarse sand with shell gravel’	4

BSH	Biotope	Level	Description	Count
A5.2 Subtidal sand	A5.14/ A5.251	5	'Circalittoral coarse sediment' and *'Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand'	1
A5.2 Subtidal sand	A5.242	5	*Fabulina fabula* and *Magelona mirabilis* with venerid bivalves and amphipods in infralittoral compacted fine muddy sand	1
A5.2 Subtidal sand	A5.25	4	Circalittoral fine sand	1
A5.2 Subtidal sand	A5.251	5	*Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand	1
A5.2 Subtidal sand	A5.261	5	*Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment	4
A5.3 Subtidal mud	A5.261*	5	*Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment	2
A5.4 Subtidal mixed sediments	A5.14*	4	Circalittoral coarse sediment	4
A5.4 Subtidal mixed sediments	A5.142*	5	*Mediomastus fragilis, Lumbrineris spp.* and venerid bivalves in circalittoral coarse sand or gravel	21
A5.4 Subtidal mixed sediments	A5.145*	5	*Branchiostoma lanceolatum* in circalittoral coarse sand with shell gravel'	9
A5.4 Subtidal mixed sediments	A5.44	4	Circalittoral mixed sediments	1

*Disparity between the biotope identified from the still images and the BSH derived from the habitat map.

By total number of classified stations the biotope 'A5.142 *Mediomastus fragilis*, *Lumbrineris* spp. and venerid bivalves in circalittoral coarse sand or gravel' was found to be the most widespread with 82 stations containing this biotope. This biotope dominated the offshore areas of the site and the central part south of Start Point (Figure 12). The second most widespread biotope was 'A5.145 *Branchiostoma lanceolatum* in circalittoral coarse sand with shell gravel' with 23 stations which were mostly found in the southern of the site alongside stations classified as A5.142. The biotope 'A5.14 Circalittoral coarse sediment' was the third most widespread with 19 stations. These stations were mostly found in the central area of the site. The fourth most widespread biotope was 'A5.261 *Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment' which was mostly found in the far north east of the site towards the mouth of the River Dart.

The inshore part of the site to the west and north of Start Point was much more varied with biotopes belonging to the BSHs 'A3.1 High energy infralittoral rock', 'A3.2 Moderate energy infralittoral rock', 'A4.1 High energy circalittoral rock', 'A4.2 Moderate energy circalittoral rock', 'A5.1 Subtidal coarse sediment' and 'A5.2 Subtidal sand' (Figure 12).

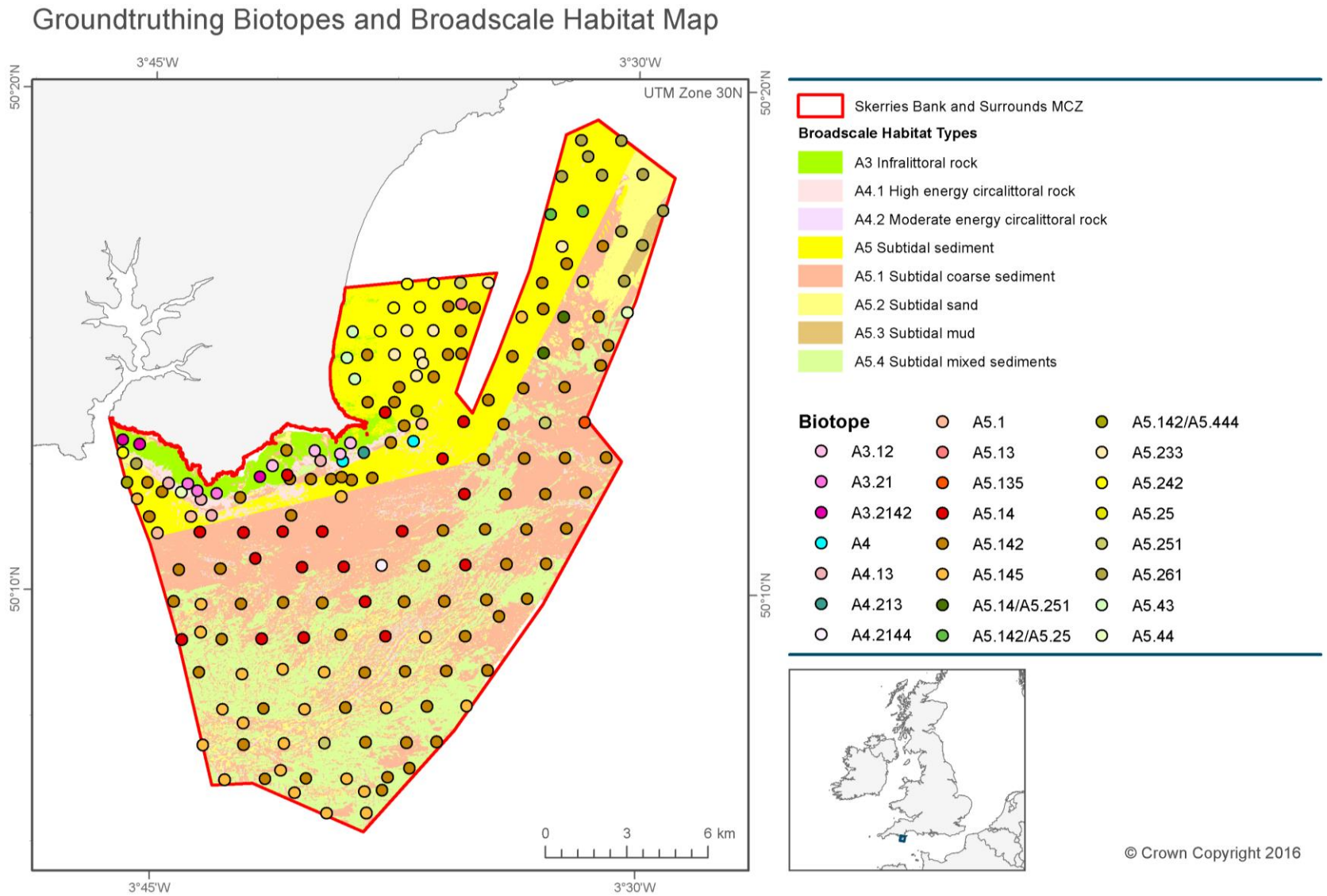

Figure 12: Updated point biotope classifications overlying the updated broad scale habitat map.

4 Discussion

Agreement between the biotopes derived from this report and the habitat map from Curtis et al. (2015) was generally good. Out of the 187 stations which were assigned a biotope, 71% (133) of stations corresponded directly to the updated BSH map. The stations which did not correspond to the updated BSH were affected by several different factors. The most substantial factor is likely to be the relative similarity in composition of sediments belonging to the BSH 'A5.1 Sublittoral coarse sediment' and 'A5.4 Sublittoral mixed sediments'. Out of the 54 stations which did not correspond to the updated BSH map, 34 were where a biotope had been assigned to a station belonging to the BSH 'A5.1 Sublittoral coarse sediment' and was overlying an area classified as 'A5.4 Sublittoral mixed sediments'

Investigations into the proportions of sand, mud and gravel at stations classified as biotopes belonging to these two BSH found that the differences in particle distribution was extremely small with difference of around 1% in the proportions leading to a difference in the BSH. These very small differences explain why neither the PSA or macrofaunal clusters could discriminate the differences between BSHs in some areas of the site.

Another factor may involve the differences between the spatial resolution of the updated BSH and the station distribution. The updated BSH map was created through the interpretation of acoustic data utilising the ground-truthing points. The method of mapping used in Curtis et al. (2015) produces precise locations for the boundaries between the BSHs. In nature, these boundaries are unlikely to be so abrupt with two BSH tending to gently grade across the boundary. This is especially true for boundaries between similar sediment types such as the BSHs 'A5.1 Sublittoral coarse sediment' and 'A5.4 Sublittoral mixed sediments' which are extremely similar at this site.

The assigning of each station point with a biotope may also cause small errors in the classification due to positional errors of the samples. Where there was low confidence in the sediment sample biotope or where there was no sediment sample the biotope derived from the video and still images only was used. The still images and the video data across this site were collected along transects which were meant to be centred on the station location. The biotopes interpreted from the stills and video data was then combined to produce a single biotope for that station based on the mode biotope. However, the video transects rarely bisected the centre point of the station. This may mean that the actual centre location may be a different biotope to that recorded predominantly during the video transect. Despite this potential for variation, agreement between the biotope classification from the still and video analysis and the biotopes assigned to the sediment samples was considered very good with 81% of stations in agreement indicating that this is likely to only effect a very small number of stations at this site.

5 Conclusions

Across the Skerries Bank and Surrounds MCZ a total of 22 biotopes were identified from the groundtruthing data falling under eight different BSHs. Utilising the macrofauna and PSA data from the sediment samples and the epifaunal data from the video and still images it was possible to assign the EUNIS biotopes to varying levels ranging from EUNIS level 2 to EUNIS Level 6. Where a good fit could not be found, a combination of biotopes was used to give an accurate picture of the sediments and faunal communities.

The majority of biotopes assigned to the samples agreed with the CEFAS updated habitat map and are thought to give a good representation of the biotopes present across the Skerries Bank and Surrounds MCZ.

5.1 Biotopes Present in the Skerries Bank and Surrounds MCZ by BSH

5.1.1 Infralittoral rock

- 4 sample stations were designated as 'A3.12 Sediment-affected or disturbed kelp and seaweed communities'.
- 3 sample stations were designated as 'A3.21 Kelp and red seaweeds (moderate energy infralittoral rock)'.
- 3 sample stations were designated as 'A3.2142 *Laminaria hyperborea* park and foliose red seaweeds on moderately exposed lower infralittoral rock'.

5.1.2 High energy circalittoral rock

- 2 sample stations were designated as 'A4 Circalittoral rock and other hard substrata'.
- 4 sample stations were designated as 'A4.13 Mixed faunal turf communities on circalittoral rock'.
- 1 sample stations were designated as 'A4.213 *Urticina felina* and sand-tolerant fauna on sand-scoured or covered circalittoral rock'.
- 1 sample stations were designated as 'A5.14 Circalittoral coarse sediment'.
- 2 sample stations were designated as'A5.142 *Mediomastus fragilis*, *Lumbrineris* spp. and venerid bivalves in circalittoral coarse sand or gravel'.
- 1 sample stations were designated as 'A5.44 Circalittoral mixed sediments'.

5.1.3 Moderate energy circalittoral rock

- 2 sample stations were designated as 'A5.145 *Branchiostoma lanceolatum* in circalittoral coarse sand with shell gravel''.

5.1.4 Subtidal sediment

- 3 sample stations were designated as 'A5.1 Sublittoral coarse sediment'.
- 1 sample stations were designated as 'A5.13 Infralittoral coarse sediment'.
- 3 sample stations were designated as 'A5.14 Circalittoral coarse sediment'.
- 22 sample stations were designated as 'A5.142 *Mediomastus fragilis*, *Lumbrineris* spp. and venerid bivalves in circalittoral coarse sand or gravel'.
- 2 sample stations were designated as 'A5.142/A5.25 *Mediomastus fragilis*, *Lumbrineris* spp. and venerid bivalves in circalittoral coarse sand or gravel' and 'Circalittoral fine sand'.
- 2 sample stations were designated as 'A5.142/A5.444 *Mediomastus fragilis*, *Lumbrineris* spp. and venerid bivalves in circalittoral coarse sand or gravel' and *'Flustra foliacea* and *Hydrallmania falcata* on tide-swept circalittoral mixed sediment'.
- 2 sample stations were designated as 'A5.145 *Branchiostoma lanceolatum* in circalittoral coarse sand with shell gravel'.
- 8 sample stations were designated as 'A5.233 *Nephtys cirrosa* and *Bathyporeia* spp. in infralittoral sand'.
- 5 sample stations were designated as 'A5.242 *Fabulina fabula* and *Magelona mirabilis* with venerid bivalves and amphipods in infralittoral compacted fine muddy sand'.
- 1 sample stations were designated as 'A5.251 *Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand'.
- 5 sample stations were designated as 'A5.261 *Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment'.
- 3 sample stations were designated as 'A5.43 Infralittoral mixed sediments'.

5.1.5 Subtidal coarse sediment

- 1 sample stations were designated as 'A4.2144 Brittlestars on faunal and algal encrusted exposed to moderately wave-exposed circalittoral rock'.
- 1 sample stations were designated as 'A5.135 *Glycera lapidum* in impoverished infralittoral mobile gravel and sand'.
- 11 sample stations were designated as 'A5.14 Circalittoral coarse sediment'.
- 35 sample stations were designated as 'A5.142 *Mediomastus fragilis*, *Lumbrineris* spp. and venerid bivalves in circalittoral coarse sand or gravel'.
- 1 sample stations were designated as 'A5.14/A5.251 Circalittoral coarse sediment' and *'Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand'.

- 6 sample stations were designated as 'A5.145 *Branchiostoma lanceolatum* in circalittoral coarse sand with shell gravel’.
- 1 sample stations were designated as 'A5.251 *Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand'.

5.1.6 Subtidal sand

- 1 sample stations were designated as 'A5.14/A5.251 Circalittoral coarse sediment' and *'Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand’.
- 2 sample stations were designated as 'A5.142 *Mediomastus fragilis*, *Lumbrineris* spp. and venerid bivalves in circalittoral coarse sand or gravel'.
- 4 sample stations were designated as 'A5.145 *Branchiostoma lanceolatum* in circalittoral coarse sand with shell gravel’.
- 1 sample stations were designated as 'A5.242 *Fabulina fabula* and *Magelona mirabilis* with venerid bivalves and amphipods in infralittoral compacted fine muddy sand'.
- 1 sample stations were designated as 'A5.25 Circalittoral fine sand'.
- 1 sample stations were designated as 'A5.251 *Echinocyamus pusillus*, *Ophelia borealis* and *Abra prismatica* in circalittoral fine sand'.
- 4 sample stations were designated as 'A5.261 *Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment'.

5.1.7 Subtidal mud

- 2 sample stations were designated as 'A5.261 *Abra alba* and *Nucula nitidosa* in circalittoral muddy sand or slightly mixed sediment'

5.1.8 Subtidal mixed sediments

- 4 sample stations were designated as 'A5.14 Circalittoral coarse sediment'
- 21 sample stations were designated as 'A5.142 *Mediomastus fragilis*, *Lumbrineris* spp. and venerid bivalves in circalittoral coarse sand or gravel'
- 9 sample stations were designated as 'A5.145 *Branchiostoma lanceolatum* in circalittoral coarse sand with shell gravel"
- 1 sample stations were designated as 'A5.44 Circalittoral mixed sediments'

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Data sources

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Annexes

Annex 1. Broadscale habitat features listed in the ENG.

Broadscale Habitat Type	EUNIS Level 3 Code
High energy intertidal rock	A1.1
Moderate energy intertidal rock	A1.2
Low energy intertidal rock	A1.3
Intertidal coarse sediment	A2.1
Intertidal sand and muddy sand	A2.2
Intertidal mud	A2.3
Intertidal mixed sediments	A2.4
Coastal saltmarshes and saline reed beds	A2.5
Intertidal sediments dominated by aquatic angiosperms	A2.6
Intertidal biogenic reefs	A2.7
High energy infralittoral rock*	A3.1
Moderate energy infralittoral rock*	A3.2
Low energy infralittoral rock*	A3.3
High energy circalittoral rock**	A4.1
Moderate energy circalittoral rock**	A4.2
Low energy circalittoral rock**	A4.3
Subtidal coarse sediment	A5.1
Subtidal sand	A5.2
Subtidal mud	A5.3
Subtidal mixed sediments	A5.4
Subtidal macrophyte-dominated sediment	A5.5
Subtidal biogenic reefs	A5.6
Deep-sea bed***	A6

**** Infralittoral rock includes habitats of bedrock, boulders and cobble which occur in the shallow subtidal zone and typically support seaweed communities***
***** Circalittoral rock is characterised by animal dominated communities, rather than seaweed dominated communities***
****** The deep-sea bed*** **broadscale habitat** ***encompasses several different habitat sub-types, all of which should be protected within the MPA network. The*** **broadscale habitat** ***deep-sea bed habitat is found only in the south-west of the MCZ project area and MCZs identified for this*** **broadscale habitat** ***should seek to protect the variety of sub-types known to occur in the region.***

Annex 2. Habitat FOCI listed in the ENG.

Habitat Features of Conservation Importance (FOCI)
Blue Mussel Beds (including Intertidal Beds on Mixed and Sandy Sediments)**
Cold-Water Coral Reefs ***
Coral Gardens***
Deep-Sea Sponge Aggregations***
Estuarine Rocky Habitats
File Shell Beds***
Fragile Sponge and Anthozoan Communities on Subtidal Rocky Habitats
Intertidal Underboulder Communities
Littoral Chalk Communities
Maerl Beds
Horse Mussel (*Modiolus modiolus*) Beds
Mud Habitats in Deep Water
Sea-Pen and Burrowing Megafauna Communities
Native Oyster (*Ostrea edulis*) Beds
Peat and Clay Exposures
Honeycomb Worm (*Sabellaria alveolata*) Reefs
Ross Worm (*Sabellaria spinulosa*) Reefs
Seagrass Beds
Sheltered Muddy Gravels
Subtidal Chalk
Subtidal Sands and Gravels
Tide-Swept Channels

**** Habitat FOCI have been identified from the 'OSPAR List of Threatened and/or Declining Species and Habitats' and the 'UK List of Priority Species and Habitats (UK BAP)'.***
***** Only includes 'natural' beds on a variety of sediment types. Excludes artificially created mussel beds and those which occur on rocks and boulders.***
****** Cold-Water Coral Reefs, Coral Gardens, Deep-Sea Sponge Aggregations and File Shell Beds currently do not have distributional data which demonstrate their presence within the MCZ project area.***

Annex 3. Low or limited mobility species FOCI listed in the ENG.

Group	Scientific name	Common Name
Brown Algae	*Padina pavonica*	Peacock's Tail
Red Algae	*Cruoria cruoriaeformis* *Grateloupia montagnei* *Lithothamnion corallioides* *Phymatolithon calcareum*	Burgundy Maerl Paint Weed Grateloup's Little-Lobed Weed Coral Maerl Common Maerl
Annelida	*Alkmaria romijni*** *Armandia cirrhosa***	Tentacled Lagoon-Worm** Lagoon Sandworm**
Teleostei	*Gobius cobitis* *Gobius couchi* *Hippocampus guttulatus* *Hippocampus hippocampus*	Giant Goby Couch's Goby Long Snouted Seahorse Short Snouted Seahorse
Bryozoa	*Victorella pavida*	Trembling Sea Mat
Cnidaria	*Amphianthus dohrnii* *Eunicella verrucosa* *Haliclystus auricula* *Leptopsammia pruvoti* *Lucernariopsis campanulata* *Lucernariopsis cruxmelitensis* *Nematostella vectensis*	Sea-Fan Anemone Pink Sea-Fan Stalked Jellyfish Sunset Cup Coral Stalked Jellyfish Stalked Jellyfish Starlet Sea Anemone
Crustacea	*Gammarus insensibilis*** *Gitanopsis bispinosa* *Pollicipes pollicipes* *Palinurus elephas*	Lagoon Sand Shrimp** Amphipod Shrimp Gooseneck Barnacle Spiny Lobster
Mollusca	*Arctica islandica* *Atrina pectinata* *Caecum armoricum*** *Ostrea edulis* *Paludinella littorina* *Tenellia adspersa***	Ocean Quahog Fan Mussel Defolin's Lagoon Snail** Native Oyster Sea Snail Lagoon Sea Slug**

**** Species FOCI have been identified from the 'OSPAR List of Threatened and/or Declining Species and Habitats', the 'UK List of Priority Species and Habitats (UK BAP)' and Schedule 5 of the Wildlife and Countryside Act.***

***** Those lagoonal species FOCI may be afforded sufficient protection through coastal lagoons designated as SACs under the EC Habitats Directive. However, this needs to be assessed by individual regional projects.***

Annex 4. Highly mobile species FOCI listed in the ENG.

Group	Scientific name	Common Name
Teleostei	*Osmerus eperlanus* *Anguilla anguilla*	Smelt European Eel
Elasmobranchii	*Raja undulata*	Undulate Ray

**** Species FOCI have been identified from the 'OSPAR List of Threatened and/or Declining Species and Habitats', the 'UK List of Priority Species and Habitats (UK BAP)' and Schedule 5 of the Wildlife and Countryside Act.***

Annex 5. Video and still image processing protocol.

The purpose of the analysis of the video and still images is to identify which habitats exist in a video record, provide semi-quantitative data on their physical and biological characteristics and to note where one habitat changes to another. A minimum of 10% of the videos should be re-analysed for QA purposes.

Video Analysis

- The video record is initially viewed rapidly (at approximately 4x normal speed) in order to segment it into sections representing different habitats. The start and end points of each segment are logged, and each segment subsequently subject to more detailed analysis. Brief changes in habitat type lasting less than one minute of the video record are considered as incidental patches and are not logged.

- For each segment, note the start and end time and position from the information on the video overlay. View the segment at normal or slower than normal speed, noting the physical and biological characteristics, such as substrate type, seabed character, species and life forms present. For each taxon record an actual abundance (where feasible) or a semi quantitative abundance (e.g. SACFOR scale).

- Record the analyses on the video pro-forma provided (paper and/or electronic), which is a modified version of the Sublittoral Habitat Recording Form used in the Marine Nature Conservation Review (MNCR) surveys.

- When each segment has been analysed, review the information recorded and assign the segment to one of the broadscale habitat (BSH) types or habitat FOCI listed in the Ecological Network Guidance (as reproduced in Annexes 1 and 2 above). Note also any species FOCI observed (as per Annex 3 above).

Still image analysis

- Still images should be analysed separately, to supplement and validate the video analysis, and provide more detailed (i.e. higher resolution) information than can be extracted from a moving video image.

- For each segment of video, select three still images that are representative of the BSH or FOCI to which the video segment has been assigned. For each image, note the time and position it was taken, using information from the associated video overlay.

- View the image at normal or greater than normal magnification, noting the physical and biological characteristics, such as substrate type, seabed character, species and life forms present. For each taxon record an actual abundance (where feasible) or a semi quantitative abundance (e.g. SACFOR scale).

- Record the analysis on the stills pro-forma provided (paper and/or electronic), which is a modified version of the Sublittoral Habitat Recording Form used in the MNCR surveys. Assign each still image to the same BSH or habitat FOCI as its ‘parent’ segment in the video.

Taxon identification

In all analyses, the identification of taxa should be limited to a level that can be confidently achieved from the available image. Hence, taxon identity could range from the 'life form' level (e.g. sponge, hydroid, anemone) to the species level (e.g. *Asterias rubens*, *Alcyonium digitatum*). Avoid the temptation to guess the species identity if it cannot be determined positively from the image. For example, *Spirobranchus* sp. would be acceptable, but *Spirobranchus triqueter* would not, as the specific identification normally requires the specimen to be inspected under a microscope.

Appendices

Appendix 1. Clustered Φ Classes

		Clusters									
Φ	**Diameter**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**
-5.50	45mm	46.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-5.00	31.5mm	0.00	0.00	0.00	1.19	0.00	0.00	0.00	0.03	0.00	0.00
-4.50	22.4mm	0.00	0.00	0.00	0.11	0.00	0.00	1.08	0.30	0.00	0.00
-4.00	16mm	1.27	0.05	0.02	0.84	0.32	0.43	2.81	0.67	0.00	0.22
-3.50	11.2mm	3.14	0.69	0.00	1.41	0.00	0.14	6.08	1.26	0.00	0.39
-3.00	8mm	4.42	0.88	0.05	2.86	0.50	0.27	8.09	2.52	0.01	0.97
-2.50	5.6mm	2.11	1.85	0.10	2.45	0.74	0.25	10.22	2.89	0.07	1.29
-2.00	4mm	2.19	4.37	0.14	2.69	0.85	0.34	13.56	3.60	0.16	1.57
-1.50	2.8mm	3.44	8.00	0.11	2.82	0.88	0.59	11.42	4.82	0.30	1.82
-1.00	2mm	3.44	12.83	0.11	2.61	1.15	0.77	8.27	4.77	0.50	2.20
-0.50	1.4mm	4.74	21.81	0.21	3.42	1.70	1.02	7.40	6.40	0.95	4.45
0.00	1000µm	3.25	20.90	0.21	2.68	0.88	0.72	5.57	4.40	1.47	5.79
0.50	707.1µm	4.08	16.66	1.91	4.34	3.87	3.50	7.20	11.92	13.93	23.68
1.00	500µm	5.19	7.33	3.18	4.30	10.51	5.60	5.98	13.13	27.11	28.33
1.50	353.6µm	7.33	2.26	6.50	4.72	36.47	16.95	4.06	17.35	34.35	19.05
2.00	250µm	5.85	0.88	12.34	5.92	29.87	28.09	2.99	12.36	17.12	5.61
2.50	176.8µm	1.93	0.39	24.55	9.25	6.46	20.66	1.68	4.67	2.61	1.49
3.00	125µm	0.39	0.23	24.45	11.46	1.93	8.52	0.94	2.23	0.55	0.75
3.50	88.39µm	0.19	0.14	11.32	9.47	1.09	3.33	0.52	1.30	0.20	0.44
4.00	62.5µm	0.09	0.09	3.22	4.93	0.51	1.32	0.26	0.75	0.10	0.31
4.50	44.19µm	0.07	0.06	1.19	2.32	0.24	0.68	0.15	0.43	0.06	0.17
5.00	31.25µm	0.04	0.05	0.74	1.69	0.15	0.51	0.13	0.33	0.04	0.12
5.50	22.097µm	0.05	0.05	0.72	1.49	0.17	0.58	0.11	0.36	0.04	0.10
6.00	15.625µm	0.04	0.06	0.84	1.69	0.16	0.63	0.17	0.38	0.04	0.13
6.50	11.049µm	0.03	0.06	0.98	1.98	0.19	0.72	0.19	0.44	0.04	0.14
7.00	7.813µm	0.03	0.06	1.16	2.23	0.23	0.81	0.22	0.50	0.04	0.15
7.50	5.524µm	0.02	0.06	1.19	2.26	0.24	0.78	0.21	0.49	0.04	0.14
8.00	3.906µm	0.02	0.05	1.05	2.04	0.20	0.64	0.18	0.40	0.03	0.12
8.50	2.762µm	0.01	0.04	0.80	1.63	0.14	0.46	0.12	0.29	0.03	0.09
9.00	1.953µm	0.01	0.03	0.59	1.22	0.10	0.31	0.09	0.20	0.02	0.07
9.50	1.381µm	0.01	0.02	0.44	0.88	0.07	0.22	0.07	0.14	0.03	0.06
10.00	0.977µm	0.01	0.02	0.32	0.64	0.06	0.16	0.05	0.10	0.03	0.05
10.50	0.691µm	0.01	0.02	0.26	0.51	0.05	0.14	0.04	0.08	0.03	0.05
11.00	0.488µm	0.01	0.02	0.25	0.46	0.05	0.14	0.04	0.08	0.03	0.05
11.50	0.345µm	0.01	0.01	0.25	0.43	0.05	0.15	0.03	0.09	0.03	0.05
12.00	0.244µm	0.01	0.01	0.25	0.37	0.05	0.16	0.03	0.09	0.02	0.04
12.50	0.173µm	0.01	0.01	0.22	0.29	0.05	0.14	0.02	0.08	0.02	0.03
13.00	0.122µm	0.01	0.01	0.18	0.21	0.04	0.12	0.02	0.07	0.02	0.02
13.50	0.086µm	0.00	0.01	0.12	0.13	0.03	0.09	0.01	0.04	0.01	0.01

		Clusters									
Φ	**Diameter**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**
14.00	0.061μm	0.00	0.00	0.05	0.05	0.01	0.04	0.00	0.02	0.01	0.01
14.50	0.043μm	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00

Appendix 2. SIMPER Analysis

Species contributing to 75% similarity for each cluster created during the multivariate analysis of the macrofauna data.

Cluster a

Average similarity: 34.14

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Eurydice spinigera	1.14	34.14	3.16	100.00	100.00

Cluster b

Average similarity: 29.91

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Magelona filiformis	3.11	5.15	1.47	17.21	17.21
Magelona johnstoni	3.13	3.67	0.69	12.27	29.48
Chamelea striatula	1.37	2.14	1.10	7.16	36.64
Corbula gibba	1.35	1.38	0.68	4.63	41.27
Phaxas pellucidus	1.28	1.29	0.73	4.31	45.58
Amphiura filiformis	1.52	1.24	0.49	4.14	49.72
Lovenella clausa	0.68	1.18	0.89	3.96	53.67
NEMERTEA	0.93	1.18	0.86	3.95	57.62
Nucula nitidosa	1.15	1.16	0.74	3.87	61.49
Lumbrineris cingulata	1.24	1.09	0.60	3.65	65.15
Amphictene auricoma	1.02	0.85	0.56	2.85	68.00
Kurtiella bidentata	1.62	0.66	0.35	2.19	70.19
Gari fervensis	0.64	0.59	0.49	1.98	72.17
Spiophanes bombyx	0.72	0.59	0.49	1.98	74.15
Bathyporeia tenuipes	0.59	0.50	0.43	1.67	75.82

Cluster c

Average similarity: 34.13

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Nephtys cirrosa	1.93	14.14	-	41.42	41.42
Lumbrineris cingulata	1.00	10.00	-	29.29	70.71
Spiophanes bombyx	1.00	10.00	-	29.29	100.00

Cluster d

Average similarity: 29.05

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Lumbrineris cingulata	1.82	10.48	2.33	36.07	36.07
Ophelia borealis	1.33	7.41	2.33	25.51	61.58
Urothoe brevicornis	0.67	1.92	0.58	6.62	68.20
Lepidepecreum longicornis	0.67	1.92	0.58	6.62	74.82
Dosinia	0.91	1.92	0.58	6.62	81.44

Cluster e

Average similarity: 29.13

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%

Nephtys cirrosa	1.52	5.15	6.16	17.67	17.67
PORIFERA	1.00	3.64	6.16	12.50	30.17
Vesicularia spinosa	1.00	3.64	6.16	12.50	42.66
Echinocyamus pusillus	1.68	1.99	0.58	6.84	49.51
Abra prismatica	0.94	1.49	0.58	5.12	54.63
NEMERTEA	1.00	1.43	0.58	4.92	59.55
Glycera alba	0.67	1.43	0.58	4.92	64.47
Dosinia	1.22	1.43	0.58	4.92	69.40
Crisia	0.67	1.43	0.58	4.92	74.32
Kurtiella bidentata	1.15	1.15	0.58	3.95	78.27

Cluster f
Average similarity: 25.39

Species	**Av.Abund**	**Av.Sim**	**Sim/SD**	**Contrib%**	**Cum.%**
Moerella pygmaea	1.68	7.92	3.10	31.19	31.19
Pisione remota	1.08	3.47	1.06	13.67	44.86
Glycera lapidum	0.89	2.24	0.61	8.82	53.68
Echinocyamus pusillus	0.77	1.94	0.54	7.65	61.32
Glycera oxycephala	0.75	1.86	0.61	7.33	68.65
Lumbrineris cingulata	0.60	1.63	0.59	6.42	75.06

Cluster g
Average similarity: 25.56

Species	**Av.Abund**	**Av.Sim**	**Sim/SD**	**Contrib%**	**Cum.%**
Nephtys cirrosa	0.88	9.61	1.06	37.59	37.59
NEMERTEA	0.81	6.66	0.83	26.06	63.64
Glycera oxycephala	0.57	4.93	0.47	19.30	82.94

Cluster h
Less than 2 samples in group

Cluster i
Average similarity: 29.64

Species	**Av.Abund**	**Av.Sim**	**Sim/SD**	**Contrib%**	**Cum.%**
Mediomastus fragilis	6.39	16.72	2.85	56.42	56.42
Lumbrineris cingulata	1.88	4.48	3.26	15.12	71.55
Notomastus	1.41	1.63	0.58	5.50	77.04

Cluster j
Average similarity: 29.29

Species	**Av.Abund**	**Av.Sim**	**Sim/SD**	**Contrib%**	**Cum.%**
Pisione remota	3.28	4.42	1.24	15.08	15.08
Polygordius	3.45	3.72	1.05	12.70	27.78
Glycera lapidum	2.06	3.06	1.80	10.46	38.24
Sphaerosyllis bulbosa	1.46	1.43	0.97	4.87	43.11
NEMATODA	1.30	1.19	0.80	4.07	47.17
Syllis pontxioi	1.14	1.18	0.81	4.03	51.21
Echinocyamus pusillus	2.04	1.17	0.51	3.98	55.19
NEMERTEA	1.11	1.08	0.93	3.69	58.88
Malmgreniella ljungmani	0.99	0.87	0.74	2.98	61.87

PORIFERA	0.66	0.74	0.82	2.54	64.41
Syllis garciai	0.80	0.54	0.52	1.84	66.25
Polycirrus medusa	0.81	0.50	0.53	1.72	67.96
Glycera oxycephala	0.56	0.44	0.50	1.50	69.46
Protodorvillea kefersteini	0.59	0.39	0.38	1.33	70.79
Crisia	0.42	0.35	0.42	1.18	71.97
Notomastus	0.78	0.33	0.40	1.14	73.11
Cellaria	0.39	0.31	0.39	1.04	74.15
Microporella ciliata	0.42	0.27	0.44	0.93	75.08

Cluster k

Average similarity: 31.40

Species	**Av.Abund**	**Av.Sim**	**Sim/SD**	**Contrib%**	**Cum.%**
Echinocyamus pusillus	3.21	2.00	1.48	6.36	6.36
NEMERTEA	2.03	1.55	2.08	4.92	11.28
Hydroides norvegica	2.27	1.32	1.57	4.19	15.47
Mediomastus fragilis	2.28	1.24	1.14	3.96	19.43
Lumbrineris cingulata	2.30	1.23	0.99	3.92	23.36
Notomastus	2.45	1.17	0.97	3.72	27.08
Glycera lapidum	1.57	1.01	1.35	3.23	30.30
Glycinde nordmanni	1.19	0.74	1.09	2.35	32.66
PORIFERA	0.88	0.73	1.60	2.33	34.99
Syllis hyalina	1.67	0.73	0.96	2.33	37.32
Dendrodoa grossularia	1.93	0.70	0.66	2.24	39.56
Leptochiton asellus	1.26	0.48	0.76	1.52	41.07
Schizomavella	0.71	0.44	0.93	1.39	42.46
Eumida sanguinea	1.03	0.43	0.79	1.37	43.83
Spirobranchus triqueter	1.40	0.43	0.61	1.36	45.19
Syllis garciai	1.02	0.43	0.64	1.36	46.55
Escharella ventricosa	0.67	0.41	0.81	1.32	47.87
Chorizopora brongniartii	0.65	0.39	0.78	1.25	49.11
ACTINIARIA	0.96	0.37	0.69	1.19	50.31
Ampelisca spinipes	0.95	0.37	0.62	1.17	51.48
Sertularia	0.65	0.36	0.81	1.15	52.63
Polycirrus denticulatus	0.97	0.36	0.63	1.14	53.77
Aonides paucibranchiata	0.87	0.35	0.61	1.12	54.89
Epizoanthus couchii	0.64	0.35	0.77	1.11	56.00
Sertularella gayi/polyzonias	0.59	0.30	0.69	0.96	56.96
Timoclea ovata	0.84	0.29	0.53	0.94	57.90
Sabellaria spinulosa	0.91	0.26	0.46	0.84	58.73
Modiolula phaseolina	0.86	0.26	0.49	0.82	59.55
Polycirrus medusa	0.78	0.25	0.49	0.80	60.35
Diplodonta rotundata	0.71	0.25	0.52	0.78	61.14
Owenia fusiformis	0.57	0.23	0.47	0.73	61.86
Hydrallmania falcata	0.51	0.23	0.56	0.72	62.58
Microporella ciliata	0.51	0.22	0.54	0.71	63.29
Amphipholis squamata	0.75	0.22	0.50	0.70	63.99
Hippoporina pertusa	0.51	0.22	0.56	0.69	64.67
Tubulipora liliacea	0.51	0.21	0.54	0.68	65.35

Phoronis	0.66	0.21	0.42	0.66	66.02
Dipolydora flava	0.64	0.20	0.49	0.64	66.66
Chaetozone zetlandica	0.59	0.19	0.46	0.62	67.28
Pista bansei	0.60	0.19	0.46	0.61	67.89
Cellaria	0.45	0.19	0.46	0.61	68.50
Moerella donacina	0.56	0.18	0.46	0.57	69.07
Alcyonium digitatum	0.48	0.18	0.52	0.56	69.64
Cellepora pumicosa	0.46	0.17	0.49	0.55	70.19
Phisidia aurea	0.67	0.17	0.45	0.55	70.73
Lysidice unicornis	0.52	0.17	0.45	0.54	71.27
Chone dunerificta	0.71	0.17	0.38	0.53	71.81
Urothoe elegans	0.60	0.16	0.39	0.52	72.33
Escharella immersa	0.45	0.16	0.47	0.52	72.85
Puellina innominata	0.43	0.16	0.45	0.50	73.35
Eteone longa	0.49	0.15	0.43	0.49	73.84
Cerianthus lloydii	0.72	0.15	0.29	0.49	74.33
NEMATODA	0.52	0.15	0.42	0.48	74.81
Lysilla nivea	0.60	0.15	0.37	0.48	75.29

Appendix 3. Assigned Biotopes

STNCODE	MPACODE	AREACODE	Macrofaunal Clusters	PSA Phi clusters	Biotope	EUNIS Level	Latitude	Longitude
SKBS001	SKBS	FS 24	i	d	A5.142/A5.444	5	50.20247	-3.76337
SKBS002	SKBS	FS 24	j	h	A5.145	5	50.19700	-3.75816
SKBS003	SKBS	FS 24	b	c	A5.261	5	50.20873	-3.75870
SKBS004	SKBS	FS 24	k	d	A5.142	5	50.19113	-3.75186
SKBS005	SKBS	FS 24	j	h	A5.142	5	50.20263	-3.75276
SKBS006	SKBS	FS 24	j	h	A5.142	5	50.19940	-3.74545
SKBS008	SKBS	FS 24	-	-	A4.13	4	50.20235	-3.74199
SKBS009	SKBS	FS 24	-	-	A5.44	4	50.19941	-3.73546
SKBS010	SKBS	FS 24	-	h	A5.1	3	50.19130	-3.73034
SKBS011	SKBS	FS 24	-	-	A4.13	4	50.19697	-3.72523
SKBS012	SKBS	FS 24	-	-	A4.13	4	50.19183	-3.71964
SKBS014	SKBS	FS 24	j	b	A5.142	5	50.19782	-3.70485
SKBS017	SKBS	FS 24	j	g	A5.142	5	50.19202	-3.67853
SKBS018	SKBS	FS 24	j	b	A5.142	5	50.20398	-3.67948
SKBS020	SKBS	FS 24	j	g	A5.142	5	50.20416	-3.66837
SKBS022	SKBS	FS 24	j	h	A4.13	4	50.21034	-3.66347
SKBS023	SKBS	FS 24	j	b	A5.142	5	50.20411	-3.65807
SKBS024	SKBS	FS 24	j	b	A5.145	5	50.19845	-3.65275
SKBS025	SKBS	FS 24	-	-	A4	2	50.21018	-3.65220
SKBS026	SKBS	FS 24	j	b	A5.142	5	50.20394	-3.64754
SKBS027	SKBS	FS 24	-	-	A4.213	6	50.21314	-3.64117
SKBS028	SKBS	FS 24	j	b	A5.142	5	50.20470	-3.63676
SKBS030	SKBS	FS 24	j	h	A5.142	5	50.21653	-3.62738
SKBS031	SKBS	FS 24	j	h	A5.142	5	50.22207	-3.62068
SKBS032	SKBS	FS 24	-	-	A4	2	50.21700	-3.61577
SKBS033	SKBS	FS 24	j	b	A5.142	5	50.20490	-3.65269
SKBS034	SKBS	FS 24	i	h	A5.142/A5.444	5	50.22688	-3.61414
SKBS035	SKBS	FS 24	-	j	A5.1	3	50.18577	-3.74765
SKBS037	SKBS	FS 24	-	-	A5.14	4	50.18626	-3.72561
SKBS038	SKBS	FS 24	-	-	A5.14	4	50.18626	-3.70315
SKBS040	SKBS	FS 24	-	-	A5.14	4	50.18656	-3.68268
SKBS046	SKBS	FS 24	-	-	A5.14	4	50.18674	-3.66244
SKBS065	SKBS	FS 24	-	g	A5.1	3	50.22274	-3.61145
SKBS069	SKBS	FS 24	-	-	A5.14	4	50.21127	-3.60060
SKBS075	SKBS	FS 24	-	-	A5.14	4	50.22356	-3.58987
SKBS076	SKBS	FS 24	j	h	A5.142	5	50.24619	-3.59119
SKBS162	SKBS	FS 24	b	c	A5.242	5	50.21231	-3.76584
SKBS163	SKBS	FS 24	-	-	A3.2142	6	50.21517	-3.75718
SKBS164	SKBS	FS 24	-	-	A5.14	4	50.20543	-3.68059
SKBS165	SKBS	FS 24	-	-	A3.21	4	50.20216	-3.73203
SKBS166	SKBS	FS 24	-	-	A3.21	4	50.19908	-3.71698
SKBS167	SKBS	FS 24	-	-	A3.2142	6	50.20467	-3.69479

STNCODE	MPACODE	AREACODE	Macrofaunal Clusters	PSA Phi clusters	Biotope	EUNIS Level	Latitude	Longitude
SKBS168	SKBS	FS 24	-	-	A3.12	4	50.20850	-3.68853
SKBS169	SKBS	FS 24	j	j	A5.142	5	50.21361	-3.68112
SKBS170	SKBS	FS 24	-	-	A3.12	4	50.21362	-3.66662
SKBS171	SKBS	FS 24	-	-	A3.12	4	50.21249	-3.65338
SKBS173	SKBS	FS 24	k	d	A5.43	4	50.24437	-3.65048
SKBS174	SKBS	FS 24	-	-	A3.12	4	50.21625	-3.64822
SKBS175	SKBS	FS 24	k	d	A5.43	4	50.23734	-3.64644
SKBS176	SKBS	FS 24	k	d	A5.43	4	50.25310	-3.64764
SKBS177	SKBS	FS 24	-	d	A5.142	5	50.22978	-3.63955
SKBS178	SKBS	FS 24	h	d	A5.142	5	50.24548	-3.63998
SKBS180	SKBS	FS 24	-	-	A5.14	4	50.22644	-3.63050
SKBS182	SKBS	FS 24	b	c	A5.242	5	50.25349	-3.63343
SKBS184	SKBS	FS 24	g	j	A5.142	5	50.22987	-3.62569
SKBS185	SKBS	FS 24	a	f	A5.233	5	50.24569	-3.62588
SKBS186	SKBS	FS 24	b	c	A5.242	5	50.26118	-3.62649
SKBS187	SKBS	FS 24	g	i	A5.233	5	50.23875	-3.61450
SKBS188	SKBS	FS 24	c	f	A5.233	5	50.25374	-3.61957
SKBS189	SKBS	FS 24	b	c	A5.242	5	50.26901	-3.61953
SKBS190	SKBS	FS 24	a	i	A5.233	5	50.24595	-3.61278
SKBS191	SKBS	FS 24	b	c	A5.242	5	50.26145	-3.61294
SKBS192	SKBS	FS 24	g	j	A5.142	5	50.23832	-3.60544
SKBS193	SKBS	FS 24	g	i	A5.233	5	50.25369	-3.60583
SKBS194	SKBS	FS 24	b	c	A5.242	5	50.26934	-3.60585
SKBS195	SKBS	FS 24	j	j	A5.142	5	50.24584	-3.59810
SKBS196	SKBS	FS 24	f	j	A5.142	5	50.26178	-3.59817
SKBS197	SKBS	FS 24	j	h	A5.142	5	50.25371	-3.59158
SKBS198	SKBS	FS 24	e	f	A5.251	5	50.26957	-3.59211
SKBS199	SKBS	FS 24	j	h	A5.142	5	50.26139	-3.58467
SKBS200	SKBS	FS 24	g	i	A5.233	5	50.26965	-3.57767
SKBS201	SKBS	FS 24	-	-	A3.2142	6	50.21652	-3.76583
SKBS202	SKBS	FS 24	-	-	A3.21	4	50.19996	-3.72703
SKBS204	SKBS	FS 24	g	i	A5.233	5	50.24293	-3.61103
SKBS205	SKBS	FS 24	g	j	A5.142	5	50.23481	-3.62342
SKBS206	SKBS	FS 24	a	j	A5.13	4	50.26259	-3.59141
SKBS036	SKBS	FS 24	k	h	A5.142	5	50.17373	-3.73617
SKBS039	SKBS	FS 24	k	h	A5.142	5	50.16314	-3.68233
SKBS041	SKBS	FS 24	k	h	A5.145	5	50.12781	-3.67088
SKBS042	SKBS	FS 24	-	-	A5.14	4	50.15158	-3.67157
SKBS043	SKBS	FS 24	-	-	A5.14	4	50.17494	-3.67264
SKBS044	SKBS	FS 24	k	h	A5.145	5	50.14013	-3.66087
SKBS045	SKBS	FS 24	k	h	A5.142	5	50.16316	-3.66213
SKBS047	SKBS	FS 24	k	h	A5.142	5	50.12857	-3.64964
SKBS048	SKBS	FS 24	k	h	A5.142	5	50.15255	-3.65238

STNCODE	MPACODE	AREACODE	Macrofaunal Clusters	PSA Phi clusters	Biotope	EUNIS Level	Latitude	Longitude
SKBS049	SKBS	FS 24	-	-	A5.14	4	50.17520	-3.65111
SKBS050	SKBS	FS 24	k	h	A5.142	5	50.14013	-3.63993
SKBS051	SKBS	FS 24	-	-	A5.14	4	50.16365	-3.64007
SKBS053	SKBS	FS 24	k	h	A5.145	5	50.12851	-3.62862
SKBS054	SKBS	FS 24	-	-	A5.14	4	50.15220	-3.62936
SKBS055	SKBS	FS 24	-	-	A4.2144	6	50.17579	-3.63161
SKBS057	SKBS	FS 24	k	h	A5.142	5	50.14066	-3.61905
SKBS058	SKBS	FS 24	k	h	A5.142	5	50.16378	-3.61978
SKBS059	SKBS	FS 24	-	-	A5.14	4	50.18707	-3.62119
SKBS061	SKBS	FS 24	k	h	A5.142	5	50.12915	-3.60757
SKBS062	SKBS	FS 24	j	h	A5.145	5	50.15205	-3.60865
SKBS063	SKBS	FS 24	k	h	A5.142	5	50.17562	-3.60971
SKBS066	SKBS	FS 24	k	h	A5.142	5	50.14085	-3.59790
SKBS067	SKBS	FS 24	k	j	A5.142	5	50.16406	-3.59906
SKBS068	SKBS	FS 24	k	h	A5.142	5	50.18747	-3.60004
SKBS071	SKBS	FS 24	k	h	A5.145	5	50.12944	-3.58712
SKBS072	SKBS	FS 24	k	h	A5.142	5	50.15249	-3.58816
SKBS073	SKBS	FS 24	-	-	A5.14	4	50.17607	-3.58831
SKBS074	SKBS	FS 24	-	-	A5.14	4	50.19953	-3.58926
SKBS077	SKBS	FS 24	k	h	A5.142	5	50.14118	-3.57658
SKBS078	SKBS	FS 24	k	h	A5.142	5	50.16462	-3.57745
SKBS079	SKBS	FS 24	k	h	A5.142	5	50.18800	-3.57823
SKBS080	SKBS	FS 24	k	h	A5.142	5	50.21116	-3.57941
SKBS081	SKBS	FS 24	k	h	A5.142	5	50.23087	-3.57724
SKBS083	SKBS	FS 24	k	h	A5.142	5	50.17649	-3.56728
SKBS084	SKBS	FS 24	k	h	A5.142	5	50.19967	-3.56804
SKBS085	SKBS	FS 24	k	h	A5.142	5	50.22282	-3.56913
SKBS086	SKBS	FS 24	j	j	A5.142	5	50.16500	-3.55633
SKBS087	SKBS	FS 24	k	h	A5.142	5	50.18811	-3.55700
SKBS088	SKBS	FS 24	k	h	A5.142	5	50.21156	-3.55837
SKBS089	SKBS	FS 24	k	h	A5.142	5	50.17667	-3.54671
SKBS090	SKBS	FS 24	k	h	A5.142	5	50.19973	-3.54735
SKBS091	SKBS	FS 24	k	e	A5.142	5	50.22345	-3.54769
SKBS092	SKBS	FS 24	k	h	A5.142	5	50.18843	-3.53640
SKBS093	SKBS	FS 24	f	j	A5.142	5	50.21177	-3.53730
SKBS094	SKBS	FS 24	k	h	A5.142	5	50.23523	-3.53770
SKBS095	SKBS	FS 24	k	h	A5.142	5	50.20037	-3.52662
SKBS096	SKBS	FS 24	g	h	A5.135	5	50.22361	-3.52716
SKBS097	SKBS	FS 24	k	h	A5.142	5	50.21200	-3.51606
SKBS099	SKBS	FS 24	k	h	A5.142	5	50.15922	-3.57082
SKBS100	SKBS	FS 24	k	h	A5.142	5	50.24257	-3.51927
SKBS101	SKBS	FS 24	f	h	A5.142	5	50.24543	-3.56488
SKBS102	SKBS	FS 24	k	h	A5.142	5	50.23480	-3.55908

STNCODE	MPACODE	AREACODE	Macrofaunal Clusters	PSA Phi clusters	Biotope	EUNIS Level	Latitude	Longitude
SKBS103	SKBS	FS 24	j	h	A5.145	5	50.25851	-3.56007
SKBS104	SKBS	FS 24	e	h	A5.14/A5.251	5	50.24665	-3.54890
SKBS105	SKBS	FS 24	k	h	A5.142	5	50.26979	-3.54975
SKBS106	SKBS	FS 24	e	h	A5.14/A5.251	5	50.25854	-3.53853
SKBS107	SKBS	FS 24	g	i	A5.233	5	50.28185	-3.53961
SKBS108	SKBS	FS 24	b	f	A5.261	5	50.30516	-3.54021
SKBS109	SKBS	FS 24	k	h	A5.142	5	50.24953	-3.53083
SKBS110	SKBS	FS 24	c	e	A5.25	4	50.27033	-3.52869
SKBS111	SKBS	FS 24	d	e	A5.142/A5.25	5	50.29368	-3.52892
SKBS112	SKBS	FS 24	b	f	A5.261	5	50.31713	-3.52997
SKBS113	SKBS	FS 24	k	d	A5.142	5	50.25882	-3.52042
SKBS114	SKBS	FS 24	d	h	A5.142	5	50.28214	-3.51843
SKBS115	SKBS	FS 24	b	f	A5.261	5	50.30566	-3.51907
SKBS116	SKBS	FS 24	b	f	A5.261	5	50.27065	-3.50742
SKBS117	SKBS	FS 24	b	f	A5.261	5	50.28697	-3.50902
SKBS118	SKBS	FS 24	b	c	A5.261	5	50.31705	-3.50933
SKBS119	SKBS	FS 24	b	c	A5.261	5	50.28249	-3.49806
SKBS120	SKBS	FS 24	b	c	A5.261	5	50.30595	-3.49807
SKBS121	SKBS	FS 24	b	c	A5.261	5	50.29404	-3.48740
SKBS122	SKBS	FS 24	k	d	A5.44	4	50.26012	-3.50576
SKBS123	SKBS	FS 24	k	h	A5.142	5	50.24918	-3.51526
SKBS124	SKBS	FS 24	k	h	A5.142	5	50.26121	-3.54931
SKBS125	SKBS	FS 24	k	h	A5.142	5	50.27622	-3.53715
SKBS126	SKBS	FS 24	d	e	A5.142/A5.25	5	50.29242	-3.54566
SKBS127	SKBS	FS 24	b	f	A5.261	5	50.31179	-3.52646
SKBS128	SKBS	FS 24	-	-	A5.14	4	50.15063	-3.73456
SKBS129	SKBS	FS 24	k	h	A5.145	5	50.11566	-3.72304
SKBS130	SKBS	FS 24	k	a	A5.142	5	50.13975	-3.72532
SKBS131	SKBS	FS 24	k	h	A5.145	5	50.16225	-3.72476
SKBS132	SKBS	FS 24	j	b	A5.145	5	50.10428	-3.71170
SKBS133	SKBS	FS 24	k	h	A5.145	5	50.12748	-3.71300
SKBS134	SKBS	FS 24	k	h	A5.142	5	50.15080	-3.71372
SKBS135	SKBS	FS 24	k	h	A5.142	5	50.17408	-3.71499
SKBS136	SKBS	FS 24	k	h	A5.142	5	50.11599	-3.70205
SKBS137	SKBS	FS 24	j	j	A5.145	5	50.13922	-3.70322
SKBS138	SKBS	FS 24	k	h	A5.142	5	50.16259	-3.70395
SKBS139	SKBS	FS 24	j	j	A5.142	5	50.10456	-3.69080
SKBS140	SKBS	FS 24	k	h	A5.142	5	50.12786	-3.69182
SKBS141	SKBS	FS 24	-	-	A5.14	4	50.15114	-3.69323
SKBS142	SKBS	FS 24	-	-	A5.14	4	50.17768	-3.69673
SKBS143	SKBS	FS 24	j	h	A5.145	5	50.11639	-3.68112
SKBS144	SKBS	FS 24	j	h	A5.145	5	50.14106	-3.68214
SKBS145	SKBS	FS 24	k	h	A5.142	5	50.10493	-3.66958

STNCODE	MPACODE	AREACODE	Macrofaunal Clusters	PSA Phi clusters	Biotope	EUNIS Level	Latitude	Longitude
SKBS146	SKBS	FS 24	k	b	A5.145	5	50.09342	-3.65891
SKBS147	SKBS	FS 24	k	f	A5.142	5	50.11667	-3.66029
SKBS148	SKBS	FS 24	k	h	A5.145	5	50.10483	-3.64879
SKBS149	SKBS	FS 24	j	h	A5.145	5	50.09366	-3.63842
SKBS150	SKBS	FS 24	k	h	A5.142	5	50.11705	-3.63917
SKBS151	SKBS	FS 24	f	j	A5.142	5	50.10549	-3.62771
SKBS152	SKBS	FS 24	k	h	A5.142	5	50.11712	-3.61814
SKBS153	SKBS	FS 24	k	h	A5.142	5	50.16318	-3.73878
SKBS154	SKBS	FS 24	j	h	A5.145	5	50.12313	-3.70232
SKBS155	SKBS	FS 24	j	h	A5.145	5	50.15307	-3.72482
SKBS156	SKBS	FS 24	j	h	A5.145	5	50.10063	-3.63959
SKBS157	SKBS	FS 24	k	h	A5.145	5	50.10753	-3.68288
SKBS158	SKBS	FS 24	f	h	A5.142	5	50.10126	-3.63041
SKBS159	SKBS	FS 24	j	j	A5.145	5	50.10011	-3.67553
SKBS160	SKBS	FS 24	j	h	A5.142	5	50.11744	-3.60250
SKBS161	SKBS	FS 24	k	h	A5.142	5	50.10859	-3.61630

Appendix 4. Species list

Species list for grab samples (Species FOCI indicated by grey shading, if present). Percentage occurrence was calculated as the 'Number of samples where the species occurs/total number of samples' x 100.

Taxa	% Occurrence
SPONGES	
Porifera	61
Leucosolenia	12
HYDROIDS, CORALS, JELLYFISH, ANEMONES	
Actiniaria	33
Sertularia	33
Epizoanthus couchii	32
Sertularella	30
Hydrallmania falcata	24
Alcyonium digitatum	21
Bougainvilliidae	18
Diphasia	17
Halecium	17
Cerianthus lloydii	15
Eudendrium	12
Campanularia hincksii	11
Abietinaria abietina	10
Caryophyllia smithii	10
Lovenella clausa	10
Obelia dichotoma	10
Clytia hemisphaerica	9
Tamarisca tamarisca	9
Nemertesia	8
Calycella syringa	8
Sarcodictyon roseum	8
Filellum serpens	6
Thuiaria thuja	6
Clytia paulensis	5
Merona cornucopiae	4
Lafoea dumosa	3
Edwardsia	3
Halopteris catharina	3
Leuckartiara octona	3
Sertularella tenella	3
Adamsia	2
Campanulina pumila	2
Clytia gracilis	1
Eudendrium ramosum	1
Kirchenpaueria pinnata	1
Lytocarpia myriophyllum	1
Sphenotrochus andrewianus	1
FLATWORMS	
Platyhelminthes	7
RIBBON WORMS	
Nemertea	77

Taxa	% Occurrence
NEMATODES	
Nematoda	37
ENTOPROCTS	
Pedicellina	13
Barentsia	1
ARROW WORMS	
Chaetognatha	4
PEANUT WORMS	
Golfingiidae	19
Golfingia elongata	11
Phascolion strombus	4
Aspidosiphon muelleri	1
SPOON WORMS	
Maxmuelleria lankesteri	12
SEGMENTED WORMS	
Glycera lapidum (agg)	66
Lumbrineris cingulata (agg)	59
Mediomastus fragilis	51
Hydroides norvegicus	51
Notomastus	51
Glycinde nordmanni	45
Syllis garciai	40
Syllis hyalina	38
Aonides paucibranchiata	37
Glycera oxycephala	35
Eumida sanguinea	34
Polycirrus medusa	34
Pisione remota	33
Spirobranchus triqueter	29
Syllis pontxioi	29
Malmgrenia ljungmani	29
Nephtys cirrosa	28
Owenia fusiformis	28
Polygordius	27
Polycirrus denticulatus	26
Polycirrus	24
Sphaerosyllis bulbosa	24
Eulalia mustela	24
Poecilochaetus serpens	23
Sabellaria spinulosa	23
Eteone longa (agg)	22
Chone dunerificta	22
Chaetozone zetlandica	21
Dipolydora flava	21
Phisidia aurea	21
Pseudonotomastus southerni	21
Lysidice unicornis	21
Pista bansei	21
Ampharete lindstroemi	20
Eunereis longissima	20

Taxa	% Occurrence
Aurospio banyulensis	19
Lysilla nivea	19
Pholoe inornata (sensu Petersen)	19
Protodorvillea kefersteini	19
Caulleriella alata	17
Goniadella gracilis	16
Spiophanes bombyx	16
Magelona filiformis	15
Nephtys	15
Paradoneis lyra	14
Pholoe baltica (sensu Petersen)	14
Amphitritides gracilis	13
Clymenura johnstoni	13
Malmgrenia	13
Grania	13
Dipolydora caulleryi	12
Eunice vittata	12
Podarkeopsis capensis	12
Malmgrenia andreapolis	12
Terebellides stroemi	12
Amphictene auricoma	11
Nephtys caeca	11
Syllidia armata	11
Lanice conchilega	10
Magelona alleni	10
Magelona johnstoni	10
Marphysa	10
Petaloproctus	10
Spirobranchus	10
Aponuphis bilineata	10
Clymenura tricirrata	10
Glycera alba	10
Trypanosyllis coeliaca	10
Autolytus edwarsi	9
Dipolydora coeca	9
Eusyllis blomstrandi	9
Heteroclymene robusta	9
Praxillella affinis	9
Autolytus inermis	8
Eumida	8
Glycera fallax	8
Odontosyllis fulgurans	8
Pista malmgreni	8
Scalibregma celticum	8
Sphaerosyllis hystrix	8
Spirobranchus lamarcki	8
Thelepus cincinnatus	8
Anaitides lineata	8
Aonides oxycephala	8
Maldanidae	8

Taxa	% Occurrence
Nephtys hombergii	8
Notoproctus	8
Protula tubularia	8
Schistomeringos neglecta	8
Scolelepis korsuni	8
Aglaophamus agilis	7
Eulalia aurea	7
Harmothoe	7
Nothria hyperborea	7
Peresiella clymenoides	7
Anaitides longipes	6
Dioplosyllis cirrosa	6
Euclymene lombricoides	6
Gyptis propinqua	6
Hesionura elongata	6
Malacoceros jirkovi	6
Malmgrenia darbouxi	6
Pseudomystides limbata	6
Scoletoma magnidentata	6
Syllis parapari	6
Aphelochaeta	6
Euclymene droebachiensis	6
Lagis koreni	6
Lepidonotus squamatus	6
Ophelia borealis	6
Paranaitis kosteriensis	6
Pista elongata	6
Sthenelais limicola	6
Aricidea cerrutii	5
Asclerocheilus intermedius	5
Autolytus langerhansi	5
Nephtys assimilis	5
Spiochaetopterus typicus	5
Euclymene	4
Eupolymnia nesidensis	4
Loimia	4
Nephtys kersivalensis	4
Nicolea venustula	4
Syllis variegata	4
Diplocirrus glaucus	4
Exogone naidina	4
Gattyana cirrhosa	4
Goniada maculata	4
Lanassa venusta	4
Laonice bahusiensis	4
Lumbrineriopsis paradoxa	4
Pista	4
Schistomeringos rudolphi	4
Streptodonta pterochaeta	4
Apomatus similis	3

Taxa	% Occurrence
Branchiomma bombyx	3
Chaetopterus variopedatus	3
Chaetozone christiei	3
Exogone hebes	3
Filograna implexa	3
Nereis zonata	3
Polycirrus aurantiacus	3
Prosphaerosyllis chauseyensis	3
Psamathe fusca	3
Brania swedmarki	3
Chaetozone gibber	3
Galathowenia oculata	3
Lumbrinerides amoureuxi	3
Metavermilia multicristata	3
Mystides caeca	3
Ophelia	3
Palposyllis prosostoma	3
Procerastea	3
Pseudopotamilla reniformis	3
Spio symphyta	3
Syllis	3
Tubificidae	3
Amaeana trilobata	2
Autolytus alexandri	2
Circeis spirillum	2
Dodecaceria	2
Euclymene oerstedii	2
Eurysyllis tuberculata	2
Fimbriosthenelais zetlandica	2
Glycera tridactyla	2
Harmothoe glabra	2
Jasmineira caudata	2
Jasmineira elegans	2
Melinna palmata	2
Monticellina	2
Myrianida	2
Nereididae	2
Notocirrus scoticus	2
Paradoneis armata	2
Prionospio cirrifera	2
Saccocirrus papillocercus	2
Scalibregma inflatum	2
Scolelepis bonnieri	2
Scoloplos armiger	2
Spirorbis cuneatus	2
Syllis columbretensis	2
Tharyx killariensis	2
Anaitides groenlandica	1
Aphrodita aculeata	1
Capitella capitata (agg)	1

Taxa	% Occurrence
Chitinopoma serrula	1
Euchone rubrocincta	1
Eulalia	1
Exogone verugera	1
Fabricia stellaris	1
Flabelligera affinis	1
Haplosyllis spongicola	1
Hermonia hystrix	1
Lumbrineridae	1
Lumbrineris futilis	1
Lysilla loveni	1
Polycirrus plumosus	1
Proceraea scapularis	1
Pseudopolydora pulchra	1
Serpulidae	1
Sigalion	1
Sphaerodorum gracilis	1
Streptodonta exsulis	1
Streptosyllis	1
Subadyte pellucida	1
Syllis cornuta	1
Travisia forbesii	1
Vermiliopsis striaticeps	1
Anaitides rosea	1
Aricidea minuta	1
Atherospio guillei	1
Diplocirrus stopbowitzi	1
Dipolydora	1
Dorvillea erucaeformis	1
Drilonereis filum	1
Euphrosine foliosa	1
Eusyllis lamelligera	1
Harmothoe impar	1
Hesionidae	1
Hesiospina similis	1
Heteromastus filiformis	1
Hypereteone foliosa	1
Malmgrenia castanea	1
Myrianida covolutus	1
Nereiphylla rubiginosa	1
Nothria	1
Notophyllum foliosum	1
Ophelia celtica	1
Ophelia roscoffensis	1
Ophelina acuminata	1
Ophiodromus pallidus	1
Parathelepus collaris	1
Parougia caeca	1
Phyllodoce mucosa	1
Prionospio fallax	1

Taxa	% Occurrence
Protodrilus	1
Sabella pavonina	1
Scoletoma	1
Sigalion mathildae	1
Sige fusigera	1
Spiophanes kroyeri	1
Streptosyllis campoyi	1
Syllides	1
Trichobranchus glacialis	1
Tubificoides amplivasatus	1
SEA SPIDERS	
Anoplodactylus petiolatus	10
Achelia echinata	8
Nymphon brevirostre	3
Callipallene tiberi	2
Callipallene brevirostris	1
Callipallene spectrum	1
Pycnogonum littorale	1
CRUSTACEANS	
Ampelisca spinipes	28
Urothoe elegans	18
Verruca stroemia	17
Copepoda	17
Leptocheirus hirsutimanus	15
Ebalia tuberosa	14
Othomaera othonis	13
Abludomelita obtusata	12
Maerella tenuimana	12
Nototropis vedlomensis	12
Upogebia deltaura	11
Pisidia longicornis	10
Liocarcinus pusillus	10
Anapagurus hyndmanni	9
Photis longicaudata	8
Eurynome	6
Gnathia oxyuraea	6
Scalpellum scalpellum	6
Bathyporeia tenuipes	5
Unciola crenatipalma	5
Atylus falcatus	4
Cheirocratus	4
Eurydice truncata	4
Socarnes erythrophthalmus	4
Balanus crenatus	4
Bodotria scorpioides	4
Eurydice spinigera	4
Galathea intermedia	4
Hyas	4
Anthura gracilis	3
Conilera cylindracea	3

Taxa	% Occurrence
Gnathia	3
Lepidepecreum longicorne	3
Leucothoe procera	3
Pagurus bernhardus	3
Ampelisca tenuicornis	3
Atelecyclus rotundatus	3
Balanidae	3
Guernea coalita	3
Orchomenella nana	3
Phtisica marina	3
Anapagurus laevis	2
Astacilla	2
Callianassa subterranea	2
Diastylis laevis	2
Harpinia antennaria	2
Inachus	2
Janira maculosa	2
Leucothoe incisa	2
Pagurus prideaux	2
Pseudoprotella phasma	2
Acidostoma obesum (sensu Stoddart & Lowry)	1
Ampelisca brevicornis	1
Anchialina agilis	1
Animoceradocus semiserratus	1
Bathyporeia elegans	1
Cheirocratus sundevallii	1
Ebalia	1
Eurydice inermis	1
Eurynome aspera	1
Gammaropsis cornuta	1
Gammaropsis lobata	1
Gastrosaccus spinifer	1
Macropodia deflexa	1
Macropodia linaresi	1
Microcharon harrisi	1
Monodaeus couchii	1
Nebalia bipes	1
Perioculodes longimanus	1
Pseudoparatanais batei	1
Sarsinebalia typhlops	1
Stenothoe marina	1
Urothoe brevicornis	1
Ampelisca diadema	1
Amphilochus manudens	1
Amphilochus spencebatei	1
Bathyporeia guilliamsoniana	1
Bodotria	1
Cheirocratus assimilis	1
Corystes cassivelaunus	1
Cressa dubia	1

Taxa	% Occurrence
Ebalia tumefacta	1
Euphausiidae	1
Gammaropsis maculata	1
Iphimedia spatula	1
Jassa	1
Megaluropus agilis	1
Microdeutopus versiculatus	1
Monoculodes carinatus	1
Mysidae	1
Natatolana gallica	1
Orchomene similis	1
Paguridae	1
Pontophilus spinosus	1
Siphonoecetes kroyeranus	1
Synchelidium maculatum	1
Tanaopsis graciloides	1
Thia scutellata	1
MOLLUSCS	
Timoclea ovata	31
Leptochiton asellus	28
Diplodonta rotundata	25
Modiolula phaseolina	22
Moerella donacina	22
Kurtiella bidentata	18
Moerella pygmaea	18
Thracia villosiuscula	17
Euspira nitida	17
Corbula gibba	15
Chamelea striatula	13
Hiatella arctica	13
Anomiidae	13
Phaxas pellucidus	13
Abra alba	11
Nucula nitidosa	10
Leptochiton cancellatus	9
Aeolidiidae	8
Dosinia	8
Gari fervensis	8
Abra prismatica	8
Nucula hanleyi	8
Nucula nucleus	8
Glycymeris glycymeris	7
Spisula	7
Gibbula tumida	6
Spisula elliptica	6
Thracia phaseolina	6
Clausinella fasciata	6
Kellia suborbicularis	6
Tellimya ferruginosa	6
Thyasira flexuosa	6

Taxa	% Occurrence
Parvicardium scabrum	5
Onchidoris	4
Polititapes rhomboides	4
Cylichna cylindracea	4
Aequipecten opercularis	3
Hedylopsis	3
Onchidoris muricata	3
Parvicardium pinnulatum	3
Acteon tornatilis	3
Arcopagia crassa	3
Calliostoma zizyphinum	3
Crepidula fornicata	3
Gari tellinella	3
Lucinoma borealis	3
Montacuta substriata	3
Musculus subpictus	3
Mya truncata	3
Pectinidae	3
Striarca lactea	3
Acanthodoris pilosa	2
Barnea parva	2
Dosinia exoleta	2
Ensis	2
Hemilepton nitidum	2
Hinia incrassata	2
Hinia reticulata	2
Palliolum tigerinum	2
Pholadidea loscombiana	2
Acanthocardia echinata	1
Circomphalus casina	1
Doto hystrix	1
Doto pinnatifida	1
Emarginula fissura	1
Eulima bilineata	1
Fabulina fabula	1
Gouldia minima	1
Hinia pygmaea	1
Limaria loscombi	1
Philine angulata	1
Solenogastres	1
Acanthochitona crinitus	1
Antalis entalis	1
Brachystomia eulimoides	1
Buccinum undatum	1
Capulus ungaricus	1
Colus gracilis	1
Dosinia lupinus	1
Doto lemchei	1
Doto tuberculata	1
Ensis magnus	1

Taxa	% Occurrence
Euspira catena	1
Gastropoda	1
Goniodorididae	1
Goodallia triangularis	1
Jujubinus montagui	1
Limatula subauriculata	1
Lomanotus	1
Lyonsia norwegica	1
Mangelia nebula	1
Mysia undata	1
Neomenia carinata	1
Onchidoris depressa	1
Pecten maximus	1
Polycera faeroensis	1
Raphitoma linearis	1
Rissoa parva	1
Scaphander lignarius	1
Simnia patula	1
Spisula subtruncata	1
Thracia	1
Tritonia	1
Trophonopsis muricata	1
LAMP SHELLS	
Brachiopoda	4
BRYOZOA	
Chorizopora brongniartii	40
Schizomavella	35
Cellaria	33
Microporella ciliata	33
Crisia	33
Escharella ventricosa	32
Tubulipora liliacea	31
Puellina innominata	29
Scrupocellaria scruposa	28
Disporella hispida	27
Escharella immersa	26
Cellepora pumicosa	24
Hippoporina pertusa	24
Escharina johnstoni	20
Aetea anguina	19
Alcyonidioides mytili	19
Fenestrulina malusii	19
Neolagenipora collaris	19
Annectocyma major	18
Electra pilosa	18
Reptadeonella violacea	18
Vesicularia spinosa	18
Hippothoa divaricata	17
Puellina	17
Scrupocellaria scrupea	17

Taxa	% Occurrence
Parasmittina trispinosa	16
Scruparia ambigua	16
Turbicellepora avicularis	16
Bicellariella ciliata	15
Crassimarginatella solidula	15
Alcyonidium diaphanum	14
Alcyonidium parasiticum	14
Smittina cheilostoma	14
Crisidia cornuta	13
Callopora discreta	12
Phylactella labrosa	12
Collarina balzaci	11
Celleporella hyalina	10
Flustra foliacea	10
Omalosecosa ramulosa	10
Schizotheca fissa	10
Eucratea loricata	9
Figularia figularis	9
Celleporina decipiens	8
Escharella variolosa	8
Escharina hyndmanni	8
Hippothoa flagellum	8
Pyripora catenularia	8
Chartella papyracea	8
Pentapora fascialis	8
Beania mirabilis	7
Callopora lineata	7
Eurystrotos compacta	7
Lagenipora lepralioides	7
Palmiskenea skenei	7
Schizomavella linearis	7
Plagioecia patina	6
Stomatoporina incurvata	6
Ammatophora nodulosa	6
Callopora dumerilii	5
Hagiosynodos latus	5
Micropora normani	5
Porella minuta	5
Trypostega venusta	5
Porella concinna	4
Scrupocellaria reptans	3
Tubulipora	3
Arthropoma cecilii	3
Bowerbankia	3
Plagioecia sarniensis	3
Rhynchozoon bispinosum	3
Escharoides	2
Micropora coriacea	2
Nolella	2
Schizotheca divisa	2

Taxa	% Occurrence
Scruparia chelata	2
Aetea sica	1
Alderina imbellis	1
Escharoides coccinea	1
Rosseliana rosselii	1
Bugula plumosa	1
Bugula turbinata	1
Celleporina hassallii	1
Cheilostomatida	1
Codonellina lacunata	1
Haplopoma impressum	1
Liripora amphorae	1
Membraniporella nitida	1
Schizomavella cristata	1
Schizomavella discoidea	1
Schizomavella hastata	1
Schizoporella patula	1
Setosella vulnerata	1
Smittina crystallina	1
HORSESHOE WORMS	
Phoronis	24
SEA STARS, URCHINS, SEA CUCUMBERS	
Echinocyamus pusillus	57
Amphipholis squamata	31
Ophiura	21
Ophiothrix fragilis	12
Ophiactis balli	11
Amphiura filiformis	9
Ophiura albida	8
Amphiuridae	7
Echinocardium cordatum	4
Echinoidea	4
Psammechinus miliaris	4
Spatangus purpureus	4
Neopentadactyla mixta	3
Acrocnida brachiata	3
Amphiura securigera	3
Leptosynapta	3
Leptosynapta bergensis	3
Leptosynapta minuta	3
Ophiura ophiura	3
Thyone fusus	3
Echinocardium	2
Leptosynapta decaria	2
Spatangus	2
Asterias rubens	1
Echinocardium flavescens	1
Labidoplax digitata	1
Ocnus brunneus	1
Ophiocten affinis	1

Taxa	% Occurrence
Asteroidea	1
Echinocardium pennatifidum	1
Holothurioidea	1
Ophiopsila annulosa	1
ACORN WORMS	
Rhabdopleura compacta	3
Enteropneusta	2
SEA SQUIRTS	
Dendrodoa grossularia	35
Didemnidae	14
Ascidiacea	1
Molgula	1
Molgula oculata	1
Polycarpa fibrosa	1
LANCELETS	
Branchiostoma lanceolatum	16
FISH	
Gobiesocidae	1
Gymnammodytes semisquamatus	1

Species list for video samples (Species FOCI indicated by grey shading, if present). Percentage occurrence was calculated as the 'Number of samples where the species occurs/total number of samples' x 100.

Taxa	% Occurrence
SPONGES	
Porifera	24
Cliona celata	4
Polymastia penicillus	2
Hemimycale columella	2
Raspailia ramosa	2
Amphilectus fucorum	1
Ciocalypta penicillus	1
Suberites ficus	1
HYDROIDS, CORALS, JELLYFISH, ANEMONES	
Hydrozoa	55
Alcyonium digitatum	40
Nemertesia	32
Nemertesia antennina	28
Actiniaria	27
Urticina	22
Sertularia	14
Abietinaria abietina	11
Hydrallmania falcata	11
Caryophyllia smithii	11
Nemertesia ramosa	10
Mesacmaea mitchelli	9

Taxa	% Occurrence
Sagartia troglodytes	7
Sagartia	5
Cerianthus lloydii	4
Tubularia indivisa	4
Sagartiidae	3
Corynactis viridis	2
Eunicella verrucosa	2
Actinothoe sphyrodeta	2
Cerianthidae	2
Metridium senile	2
Diphasia	1
Halcampoides elongatus	1
Obelia geniculata	1
SEGMENTED WORMS	
Spirobranchus	60
Serpulidae	11
Sabella pavonina	3
Lanice conchilega	3
Bispira volutacornis	1
Terebellidae	1
CRUSTACEANS	
Paguridae	52
Majidae	21
Ebalia	14
Brachyura	12
Caridea	9
Maja squinado	4
Thoracica	4
Corystes cassivelaunus	3
Decapoda	2
Macropodia	2
Galatheidae	2
Cancer pagurus	1
MOLLUSCS	
Aequipecten opercularis	24
Pecten maximus	18
Pectinidae	13
Calliostoma zizyphinum	9
Trochidae	9
Polyplacophora	4
Sepia officinalis	3
Buccinum undatum	2
Crepidula fornicata	1
Gastropoda	1
Bivalvia	1
Teuthida	1
LAMP SHELLS	
Brachiopoda	1
BRYOZOANS	
Bryozoa	38

Taxa	% Occurrence
Cellaria	14
Pentapora foliacea	7
Alcyonidium diaphanum	4
Flustra foliacea	2
Membranipora membranacea	2
Crisiidae	2
SEA STARS, URCHINS, SEA CUCUMBERS	
Ophiura	29
Asterias rubens	21
Ophiothrix fragilis	13
Ophiura albida	11
Asteroidea	10
Echinus esculentus	7
Antedon bifida	6
Ophiocomina nigra	5
Ophiura ophiura	4
Crossaster papposus	3
Marthasterias glacialis	3
Ophiuroidea	2
Astropecten irregularis	2
Luidia ciliaris	1
SEA SQUIRTS	
Stolidobranchia	4
Ascidiacea	1
Didemnidae	1
FISH	
Teleostei	33
Trisopterus luscus	11
Gadidae	10
Scyliorhinus canicula	4
Chelidonichthys cuculus	3
Triglidae	3
Callionymus lyra	2
Pleuronectiformes	2
Ammodytidae	1
Chelidonichthys lucerna	1
Limanda limanda	1
Pleuronectes platessa	1
ALGAE	
Rhodophyta	7
Corallinaceae	5
Laminaria	5
Laminaria hyperborea	3
Laminaria ochroleuca	1
Phycodrys rubens	1

Further information

Natural England evidence can be downloaded from our **Access to Evidence Catalogue**. For more information about Natural England and our work see **Gov.UK**. For any queries contact the Natural England Enquiry Service on 0300 060 3900 or e-mail **enquiries@naturalengland.org.uk** .

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