

Arklow Bank Offshore Windfarm

Environmental Monitoring Benthic Ecology Survey

June 2009

A Report to Arklow Energy

February 2010





GE WIND ENERGY



ISLAND GROUP – Maritime & Shipping



AQUATIC SERVICES UNIT



ENVIRONMENTAL RESEARCH INSTITUTE
University College Cork

Table of Contents

1. Introduction		1
2. Methodology		4
2.1	Beam trawls	4
2.2	Anchor Dredge Sampling	4
2.3	Particle Size Analysis (PSA)	5
2.4	Data Analysis	7
3. Results		8
3.1	Beam Trawls	8
3.2	Anchor Dredge Samples	15
3.3	Biotope Classification	26
4. Discussion and Conclusions		28
7. References		30
6. Appendices		31
Appendix 6.1	Species List for Beam Trawl Survey; June 2009	31
Appendix 6.2	Species List for Anchor Dredge Survey; June 2009	33
Appendix 6.3	Total results from the Beam Trawl June 2009.	35
Appendix 6.4	Total fish numbers and lengths	39
Appendix 6.5	Anchor dredge raw data, June 2009	40
Appendix 6.6	Particle Size Analysis: June 2009.	47

1. INTRODUCTION

Aquatic Services Unit, University College Cork, was contracted by Island Shipping Ltd., on behalf of Arklow Energy Ltd., to undertake a benthic biological survey, as part of a post construction monitoring programme, for the Arklow Bank Offshore Windfarm. The following report outlines the work undertaken for this survey. Work for this report was undertaken from the 22nd & 23rd June, 2009.

The Arklow Bank Offshore Wind Farm lies 13 km east of Arklow town and consists of seven 3.6 MW turbines. Construction was begun in 2002 with the building of these seven turbines. However, it is a possibility that large numbers of additional turbines may be built in the general area in the future. A baseline survey of the Arklow Bank area and cable route was conducted in 2000–01 (pre-construction), consisting of three sampling periods: June 2000, September 2000 and April 2001. Various sampling techniques were used during the baseline survey; the first survey used otter trawls and anchor dredges, while the following two used Agassiz trawls and anchor dredges. Only qualitative data was produced from the anchor dredge samples and species were recorded as present/absent. Plankton was also sampled and temperature/salinity profiles were generated.

The initial surveys undertaken in June/July 2004 were taken using Day Grabs, and these encountered severe problems with the hard ground. Subsequent surveys were undertaken using semi-quantitative anchor dredges to assess the benthic infauna and associated sediments. In addition, semi-quantitative beam trawls were used to assess benthic epifauna and benthic fish communities.

The locations of the sampling positions of the current survey are consistent with previous monitoring surveys. These sampling locations were specified by the client and are presented in Figure 1.1 and as a table in Table 1.1. These positions are the same as those sampled in previous surveys. As reported in the previous survey, the positions of the current stations do not coincide with the positions of the baseline survey.

	Beam Trawl Co-ordinates			
	Trawl In		Trawl Out	
	Easting	Northing	Easting	Northing
Trawl 1	698359	5856785	698412	5857295
Trawl 2	703894	5857648	704089	5857041
Trawl 3	707072	5867619	707035	5867137
Trawl 4	708636	5858056	708394	5857306
Trawl 5	703313	5848402	703167	5849102
Trawl 6	702997	5836894	702935	5837503

	Anchor Dredge Co-ordinates			
	Dredge In		Dredge Out	
	Easting	Northing	Easting	Northing
D1	695339	5854449	695351	5854489
D2	698165	5854357	698032	5854345
D3	700701	5855481	700594	5855433
D4	702836	5861751	702705	5861722
D5	703194	5864506	703329	5864157
D6	704093	5863529	704114	5863634
D7	704718	5864318	704751	5864428
D8	707376	5866612	707338	5866490
D9	708170	5856805	708094	5856642
D10	708324	5851152	708208	5851135
D11	706982	5846581	707024	5846707
D12	704507	5844558	704534	5844573
D13	703773	5838719	703839	5838817
D14	702029	5844692	702053	5844783
D15	703271	5851157	703238	5851267
D16	706210	5853379	706205	5853412
D17	706231	5858166	706171	5858213
D18	700851	5858227	700709	5858199
D19	697063	5847621	697113	5847718
D20	703660	5857183	703746	5857113

Table 1.1. Positions of the sampling positions for the ongoing monitoring programme at the Arklow Bank Offshore Windfarm. All locations are presented in UTM CM 9°W. Zone UTM 29N.

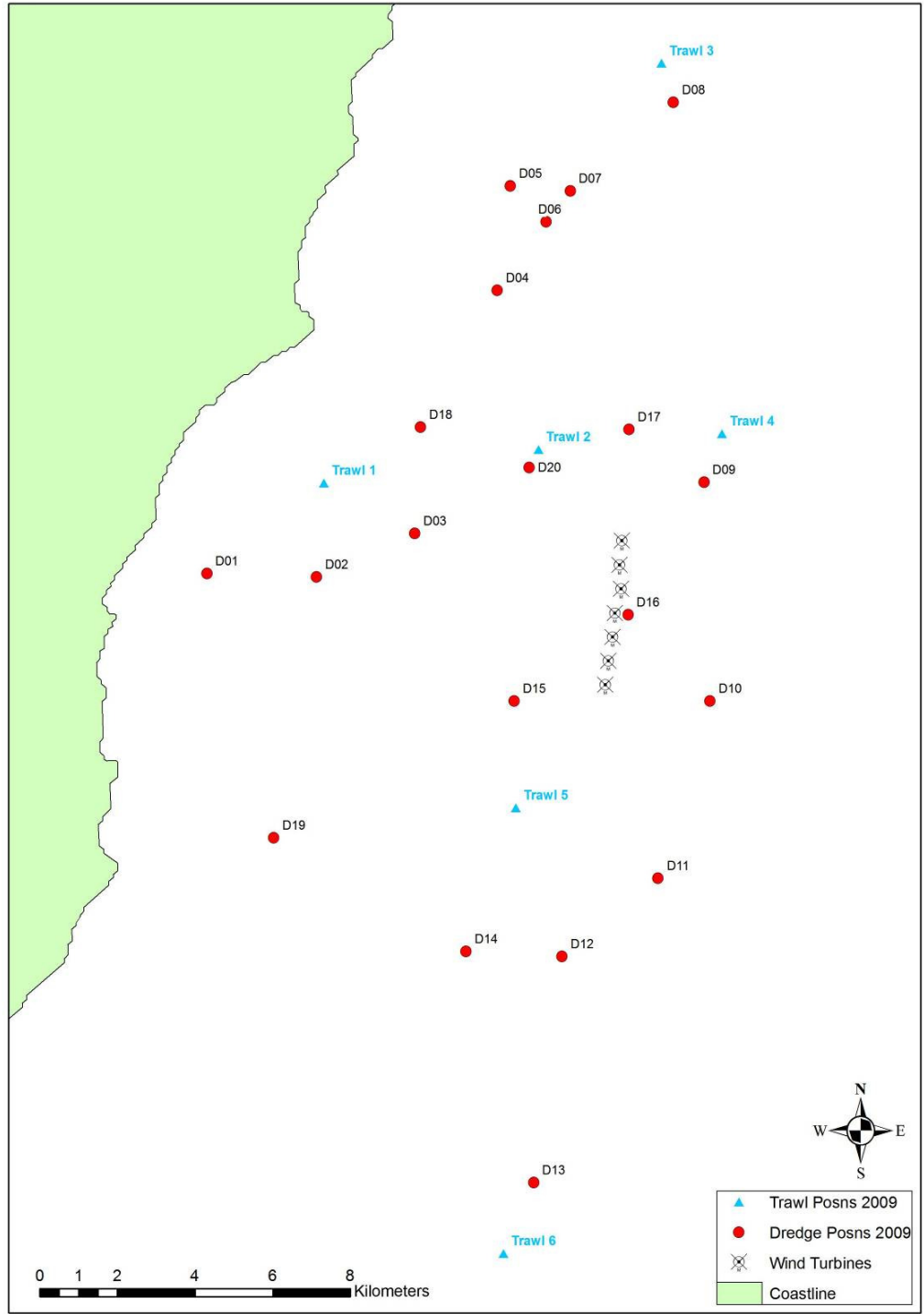


Figure 1.1 Anchor Dredge (● numbered D1 to D20) and Beam Trawl locations (▲ numbered Trawl 1 to Trawl 6) for the present monitoring survey (June 2009). These stations correspond to locations sampled in previous surveys.

2. METHODOLOGY

All sampling was undertaken from the M.T. Husky, based out of the Port of Arklow. The present survey was completed over the course of two days in June (22nd and 23rd) 2009.

2.1 Beam trawls

All trawls were taken using a 2 m Beam Trawl, equipped with tickler chains and a 4 mm mesh cod-end, as per previous surveys. All tows were 10 mins duration over the ground at a speed of 2/3 knots, with a warp of 3 times water depth. This equated to a distance of approximately 150-200 m depending on location. Once on board, the contents were placed into a sorting table and photographed prior to processing.

Fish species (both commercial and non-commercial) were separated and counted. Fish were measured using a graduated fish board before being returned. Colonial organisms (such as hydroids, bryozoans etc.) were marked present or absent.

Organisms were identified in the field, where possible. Organisms which were difficult to identify were retained in formalin for later processing. There was no sub-sampling undertaken in the present survey. Where samples were deemed to be too large, larger specimens were identified, counted and returned. All other specimens were retained for later identification and enumeration.

2.2 Anchor Dredge Sampling

At each sample station, a single anchor dredge sample was obtained with no replication of samples. The anchor dredge was deployed 20 m in advance of the target and sufficient warp was paid out. The dredge was then dragged through the target to 20 m beyond the target point. Where this proved unsuccessful, the process was repeated and the anchor dredge was dragged for a further distance.

After successful deployment and retrieval of the anchor dredge, the sample was transferred to a large container. The sample was labelled and photographed. Field notes were taken to include information such as sample number, date and time of sampling, a visual description of the sample, an estimate of the volume of the sample and any other relevant information in relation to the sampling effort.

A small sub-sample (~ 400 g) was removed and transferred to a labelled container for Particle Size Analysis (PSA). This sample was placed in a cooler box whilst aboard the vessel and transferred immediately to a freezer on return to the laboratory until processing.

The remaining dredge sample was then sub-divided into three identical sampling units. Each unit was sieved through a 1.0 mm mesh using a gentle puddling motion. Sediment which passed through the sieve was discarded, and the material retained on the sieve was transferred to a labelled container and fixed with 40% buffered formalin to a final concentration of 4% minimum. A waterproof label was then added to the sample bucket and the sample number was written in triplicate using a waterproof marker on the outside of each sample container.

As per previous surveys, only one of the three sampling units per site was processed and analysed. Samples were manually sorted by eye, using a binocular microscope where necessary. Sorted samples were then stored in 70% alcohol until identification. Samples were sent to qualified Here the samples were identified to species level, where possible, counted and logged. The remaining sub-samples are held in storage.

2.3 Particle Size Analysis (PSA)

On arrival at the laboratory, Particle Size Analysis (PSA) samples were immediately stored in a freezer until processing. Samples were dried to a constant weight at a temperature of 100°C. Prior to dry-sieving, samples were pre-treated using the methods employed by Buchanan and Kain (1984). Dried samples were then sieved through a series of nested sieves (Endecott BS410/1986) using an electronic sieve shaker. A list of sieves used is displayed in

Table 2.3.1

Sediment grainsize distribution and statistics were then calculated for each of the sediment samples using the GRADISTAT package (Blott & Pye, 2001). This package was used to determine the mean and median particle sizes and determination of sorting co-efficient. Each sample was ascribed to a sediment type (Figure 2.3.1) based on Folk (1954) with size division based on the Wentworth Scale (

Table 2.3.2). Sorting co-efficient terms are defined in Table 2.3.3.

Sieve Series Sizes (mm)							
4.0	2.0	1.0	0.5	0.25	0.125	0.63	<0.63

Table 2.3.1 Sieve series sizes (mm) used for particle size analysis (PSA).

Wentworth Scale (mm)	Phi units	Sediment types
>256 mm	<-8	Boulders
64 - 256 mm	-8 to -6	Cobble
4 - 64 mm	-6 to -2	Pebble
2 - 4 mm	-2 to -1	Granule
1 - 2 mm	-1 to 0	Very coarse sand
0.5 - 1 mm	0 - 1	Coarse sand
250 - 500 µm	1 - 2	Medium sand
125 - 250 µm	2 - 3	Fine sand
63 - 125 µm	3 - 4	Very fine sand
<63 µm	>4	Silt

Table 2.3.2 Classification used for defining sediment type (from Buchanan & Kain, 1984).

Standard Deviation of mean Phi	Classification
<0.35	Very well sorted
0.35 - 0.5	Well sorted
0.5 - 0.71	Moderately well sorted
0.71 - 1	Moderately sorted
1 - 2	Poorly sorted
2 - 4	Very poorly sorted
>4	Extremely poorly sorted

Table 2.3.3 Classification used defining degree of sediment sorting (from Buchanan & Kain, 1984).

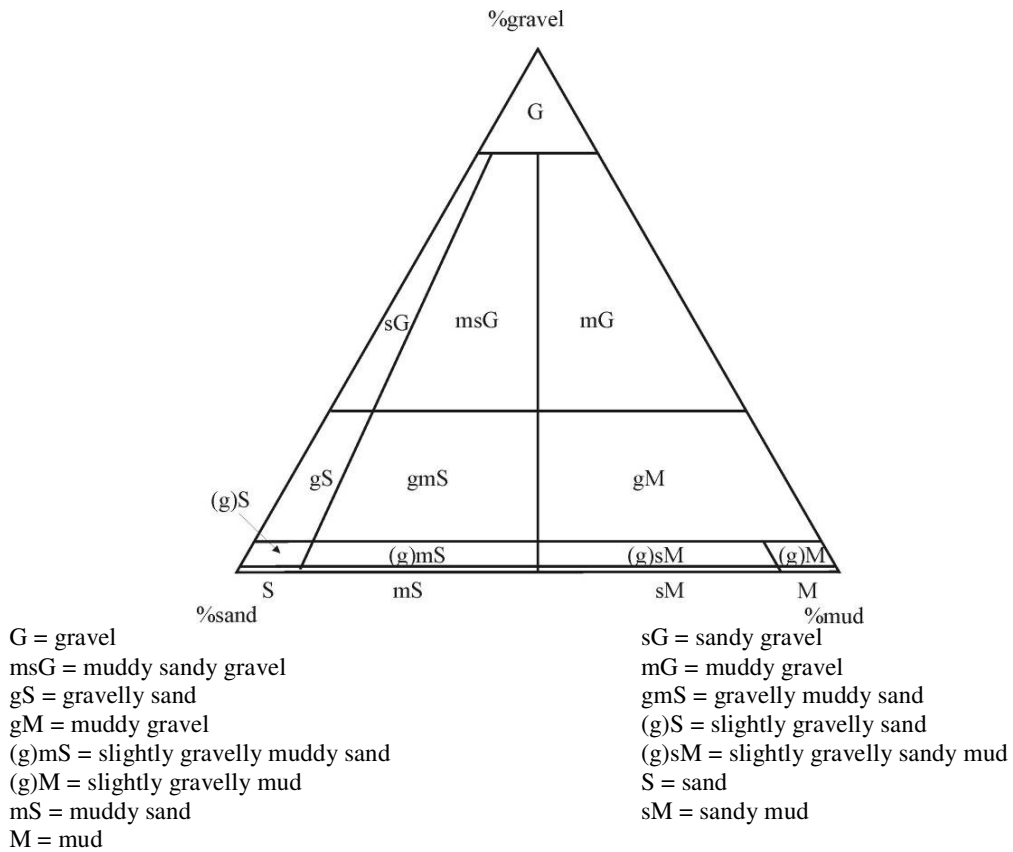


Figure 2.3.1 Sediment classification after Folk (1954) as also used by the BGS. "Gravel" is greater than 2 mm and "mud" is less than 63 µm.

2.4 Data Analysis

On completion of the sample processing and identification the data was analysed using a variety of univariate and multivariate analyses to determine community structure and assess change compared to previous surveys.

As stated in previous reports (Hydroserv, 2005 - 2008), different types of sampling gear have been used in previous surveys, as well as different levels of species identification. Therefore the present report will compare the current dataset against the previous five surveys (2004 - 2008). Statistical analysis between the previous surveys and the baseline survey has been undertaken in the previous surveys and will not be addressed in the current report. An assessment on the habitats identified in the present survey, and those identified in previous surveys will be made.

Multivariate analysis was performed on the raw datasets using PRIMER v 5 (Clarke & Warwick, 1994). The data was subjected to a variety of multivariate analyses, including non-metric Multi Dimensional Scaling (MDS).

2.4.1 Beam Trawls

In the present survey, as in previous surveys, a total of 6 beam trawls were taken across the survey area. Although this number of trawls is quite small and results from multivariate analysis can only be described as descriptive, it was considered a useful exercise to compare against the results of the previous surveys. Due to the difficult terrain encountered at the site of Trawl 3, the sample was removed from further analysis during the present survey.

Square-root transformations were performed on the abundance data with colonial organisms removed. In addition the beam trawl data was subjected to analysis on the presence/absence dataset including all identified taxa.

2.4.2 Anchor dredge samples

As in previous reports, a variety of univariate, multivariate and graphical techniques were used to provide the information concerning species diversity and community structure.

Multivariate analysis was based on square-root transformed abundances of species present, which allows for a sensible balance between the rare and common species. Multi-Dimension Scaling (MDS) ordination was based on the Bray-Curtis similarity coefficient. Stress values are provided for each MDS plot. It is important to note that these stress values represent the relationship between the various samples. In brief, a stress value of <0.05 indicates that there is an excellent representation of the relationship between the various samples, <0.1 indicates good ordination and <0.2 indicates a potentially useful 2-dimensional picture (Clarke and Warwick, 1994). In order to investigate the effect of the environmental data on the stations, sample clustering determined from the above analysis was repeated with mean sediment particle size superimposed.

The initial monitoring report (Hydroserv, 2004) compared pooled replicates between the sites taken with a 0.1 m² Day Grab. This information was compared to information obtained in the baseline survey of 2000. Analysis indicates that comparisons between these two surveys were incompatible due to inherent differences in the sampling equipment used. A resurvey was undertaken in October 2004 using the current sampling methodology (anchor dredge and beam-trawl sampling methods). This report indicated that the assemblages reported in October 2004 were broadly similar to those identified in the baseline survey (Ecoserve, 2001), although direct comparisons were difficult due to the different sampling methods used (Hydroserv, 2005).

3. RESULTS

3.1 Beam Trawls

Raw data from the beam trawls are presented in Appendix 6.3, in addition to information on fish species and lengths (Appendix 6.4). A total of 132 taxa were identified in the present survey. Of these 132 taxa, 10 are fish species. Overall, the number of taxa identified is in keeping with previous surveys; the total number of taxa is higher than the June 2006 (98 taxa), June 2005 (47 taxa) and October 2004 (51 taxa) surveys, although it is lower than the May 2007 (177 taxa) and May 2008 (170 taxa).

The number of fish species and abundances found at each trawl location in the 2005 – 2008 surveys, as well as the present survey is presented in Figures 3.1.1 and 3.1.2. The total number of fish taxa identified in the present survey (10 taxa) is lower than previous surveys (12 – May 2008, 14 – June 2006, 13 – June 2005), but higher than the October 2004 (9 taxa) and May 2007 (7 taxa) surveys. In addition, the number of fish caught in the present survey (32 individuals) is similar to that caught in 2008 (33 individuals), although it is much lower than previous surveys (55 – June 2006, 74 – June 2005 and 80 – October 2004). In the present survey, the southern most station, Trawl 6, had the highest number of species (7) and the highest number of individuals (16). Overall, fish abundances are quite low, ranging from 1 individual in Trawl 1 to 16 individuals in Trawl 6.

Important commercial fish were limited to 7 Plaice (*Pleuronectes platessa*), 2 Whiting (*Merlangius merlangus*), 1 Dogfish (*Scyliorhinus caniculus*) and 1 Common Sole (*Solea solea*). Only a single elasmobranch was caught in the present survey (1 x *Scyliorhinus caniculus*) compared to 4 (May 2008), 3 (June 2006), 4 (June 2005), 3 (October 2004). No elasmobranchs were returned during the 2007 survey.

As mentioned in previous reports, the use of small (2 m) beam trawls is far from ideal as a survey method for fish sampling. However, it has been shown to be quite effective for most bottom dwelling fish species (ICES 2003). Results from the present survey concur with the findings of previous reports, that benthic fish populations are quite low in the surveyed area.

The beam trawl surveys yielded a total of 132 taxa, which is in keeping with previous surveys. Total numbers of countable organisms (1779) has increased from 2008 (898) back to levels identified in 2006. Although numbers identified in the present survey are still reduced from levels identified in 2007, this is related to the non-sampling of the *Sabellaria* reef identified in Trawl 3 that year. Fifteen taxa were found in numbers ≥ 20 over the whole survey area, compared with 9 taxa in 2008 and 19 taxa in 2007. Thus, in comparison with last year, the numbers of taxa have reduced slightly, but the numbers of individuals have increased. A complete list of the most countable faunal species identified in the present survey is presented in Table 3.1.1.

The highest numbers of taxa encountered at the trawl sites were found in Trawls 6 and 1 (66 and 53 taxa respectively). These stations also had the highest number of countable taxa (53 and 45 respectively). Trawls 1 and 4 recorded the highest abundances of the present survey with 772 and 399 individuals respectively. The most abundant species present in the survey area is the pink shrimp (*Pandalus montagui*) and the encrusting barnacle *Balanus crenatus*.

	June 2009	May 2008	May 2007	June 2006	June 2005	October 2004
<i>Pandalus montagui</i>	406	16	13	187	65	99
<i>Balanus crenatus</i>	245	68	34	0	0	0
<i>Doto pinnatifida</i>	134	0	3	0	0	0
<i>Crangon allmani</i>	124	68	52	53	0	0
<i>Acanthodoris pilosa</i>	113	0	0	0	0	0
<i>Pagurus bernhardus</i>	94	33	54	26	95	583
<i>Liocarcinus</i> (juv.)	76	87	39	19	0	0
<i>Pomatoceros lamarcki</i>	56	7	4	0	0	0
<i>Asterias rubens</i>	52	70	131	11	8	100
<i>Psammechinus miliaris</i>	40	13	53	60	162	564

Table 3.1.1 Numbers of the 10 most common countable faunal species found in June 2009 compared to abundances found in May 2008, May 2007, June 2006, June 2005 and October 2004 beam trawl surveys

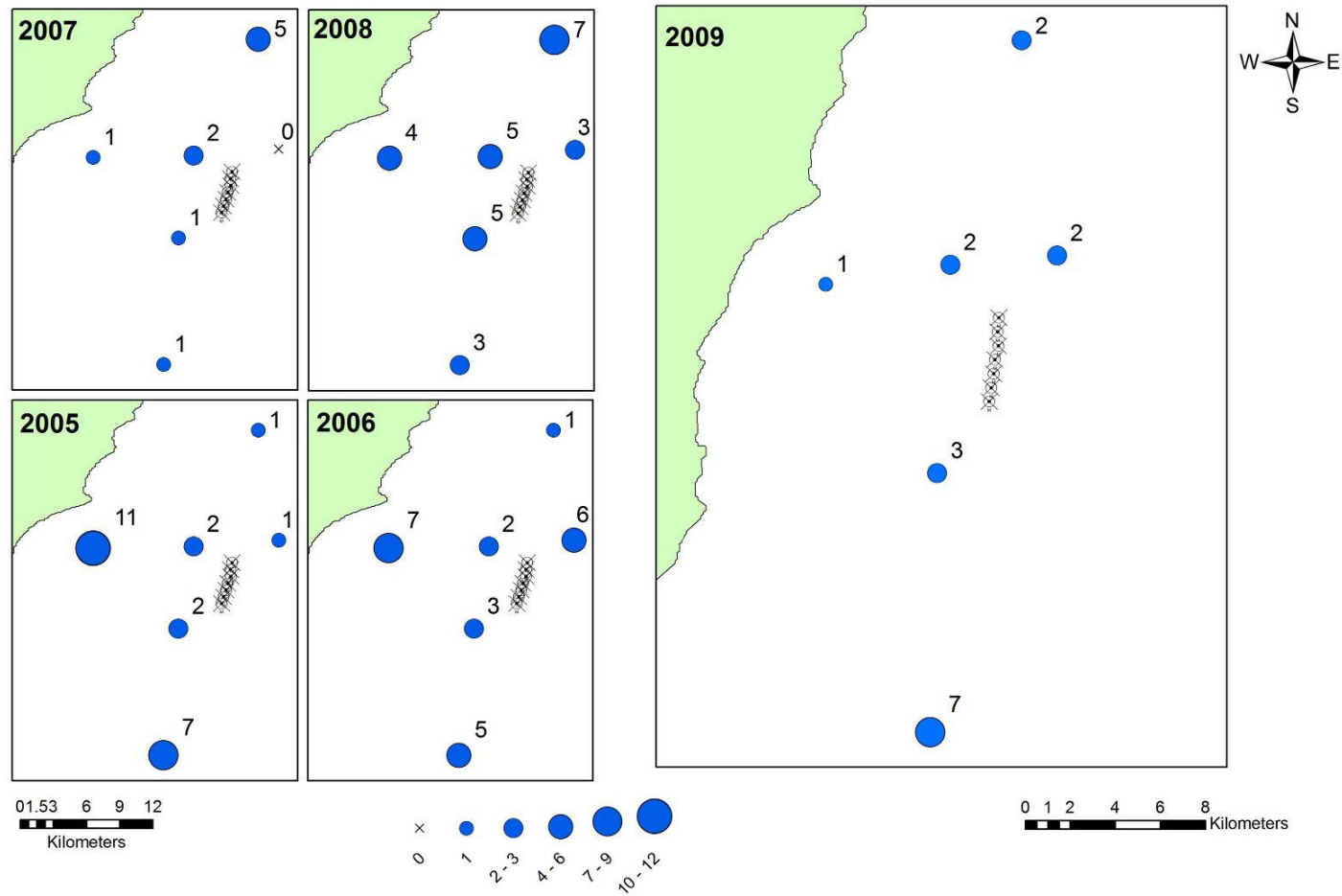


Figure 3.1.1 Total number of fish taxa per trawl site (June 2005, June 2006, May 2007, May 2008 & June 2009)

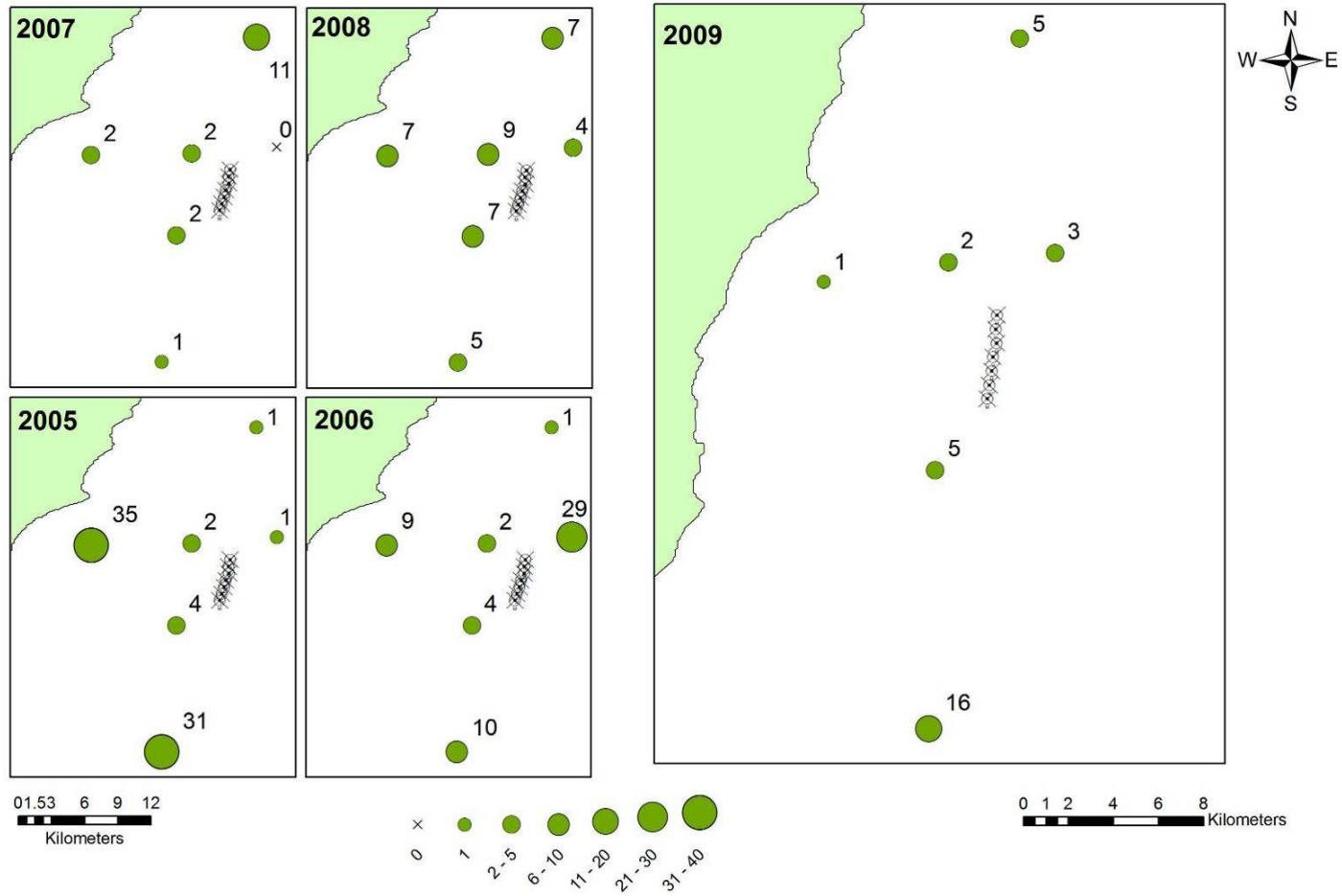


Figure 3.1.2 Total number of fish per trawl site (June 2005, June 2006, May 2007, May 2008 & June 2009)

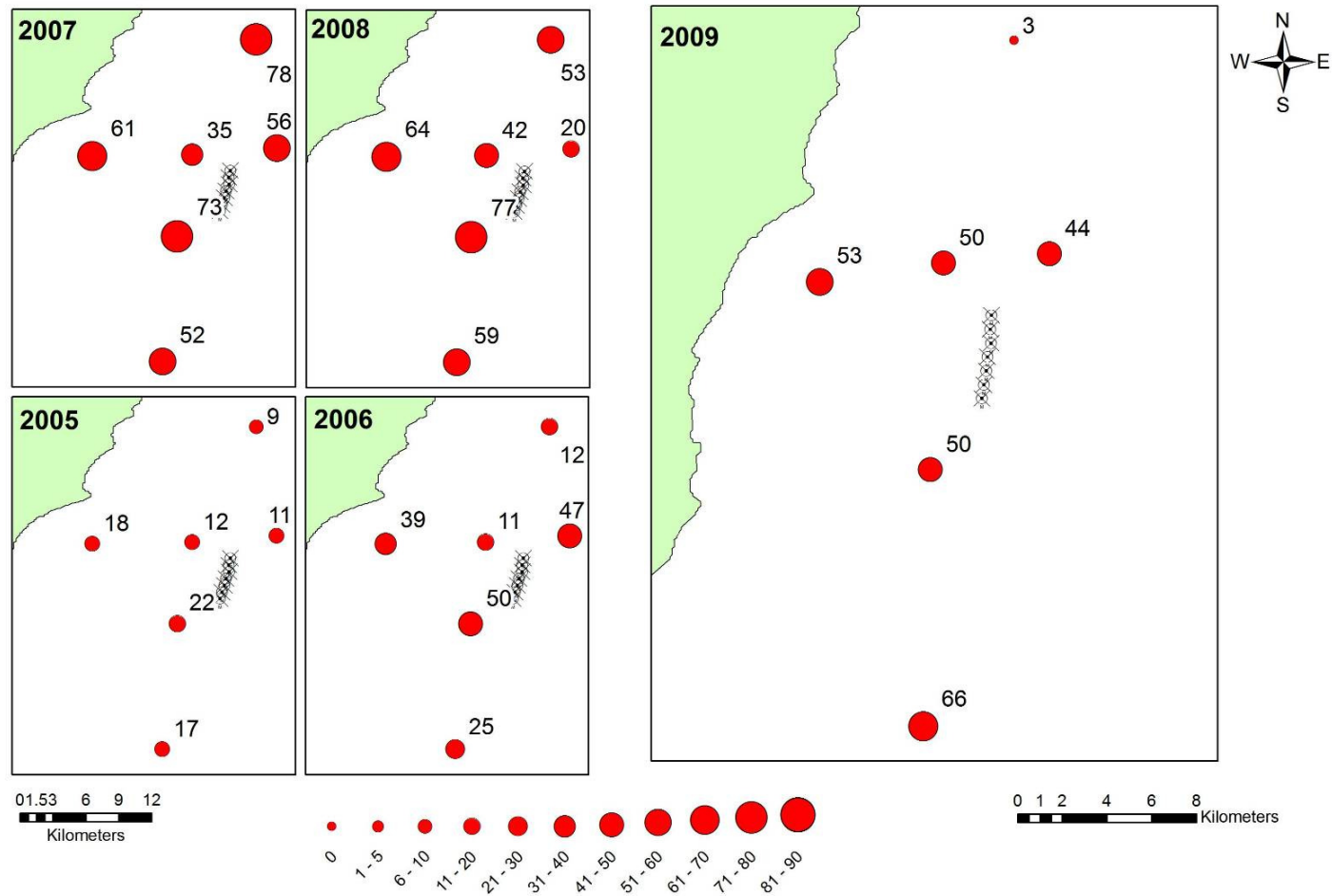


Figure 3.1.3 Total number of invertebrate taxa per trawl site (June 2005, June 2006, May 2007, May 2008 & June 2009)

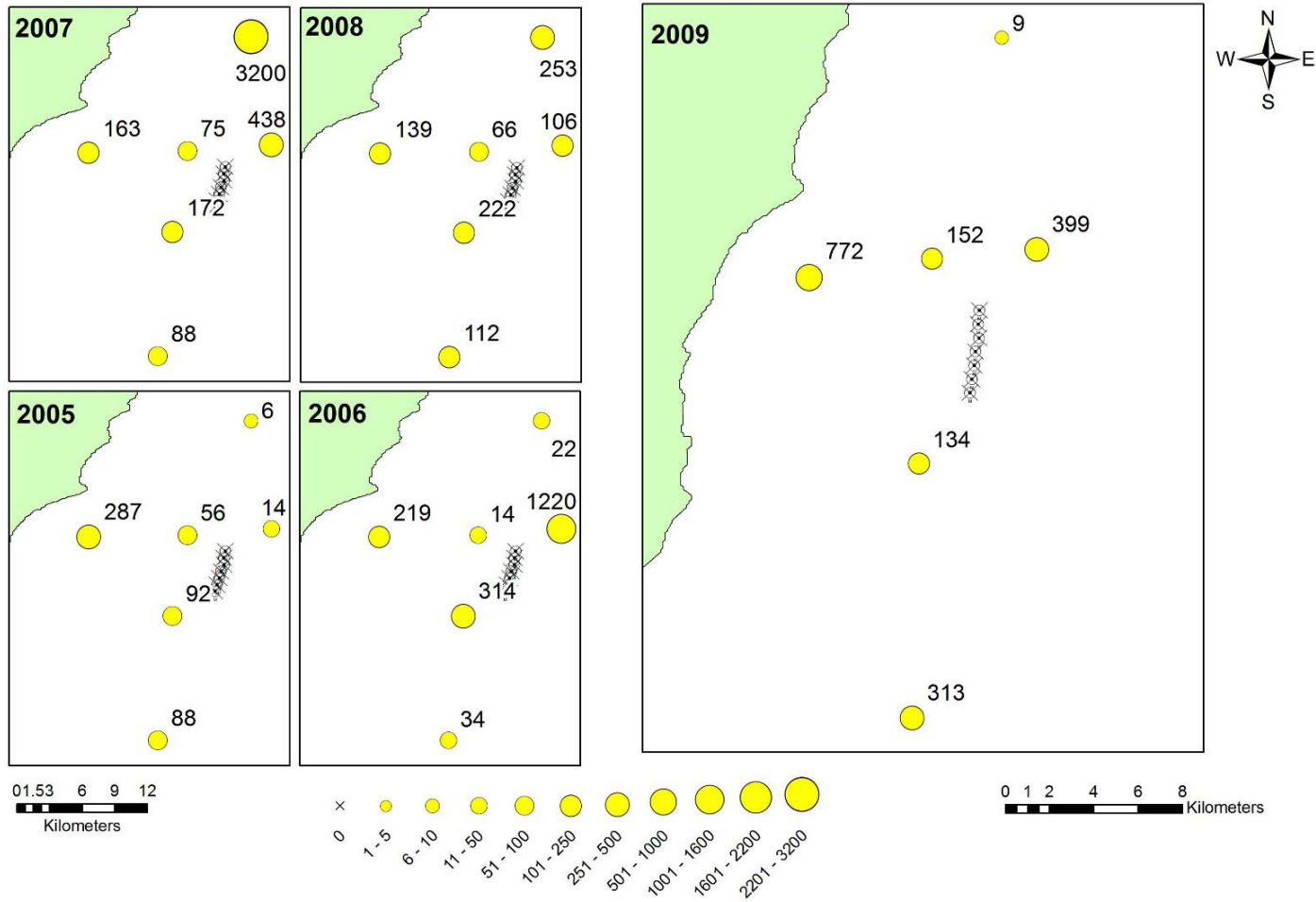


Figure 3.1.4 Total number of countable invertebrates per trawl site (June 2005, June 2006, May 2007, May 2008 & June 2009)

As with previous surveys multivariate analysis of the community structure reveals the presence of no distinct community structure, based on both the presence/absence dataset (Figure 3.2.5 a) and the dataset with colonial organisms removed (Figure 3.2.5 b).

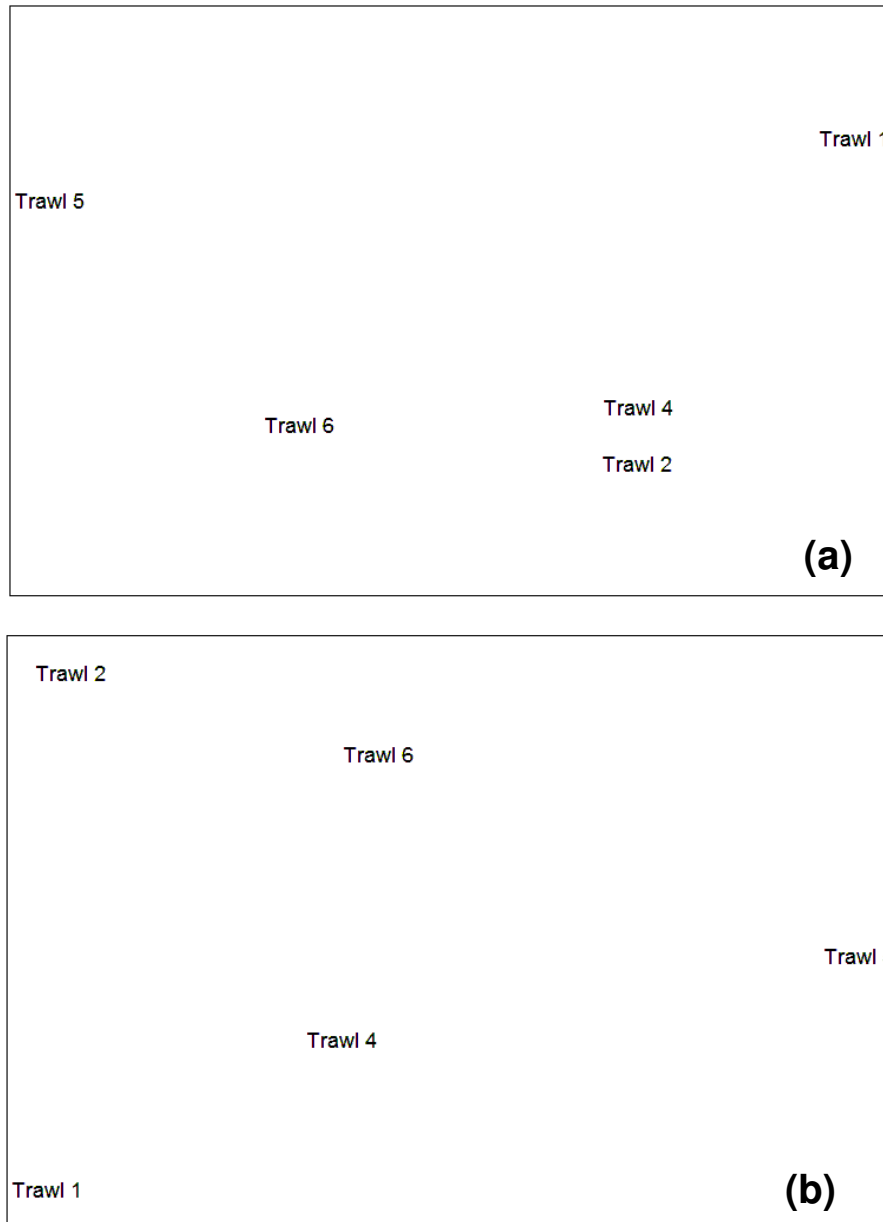


Figure 3.1.5 (a) Multivariate analysis (nMDS plot) on the 2009 trawl data, colonial data included (Stress = 0.01).
(b) Multivariate analysis of the countable fauna, colonial data removed (Stress = 0.01).

3.2 Anchor Dredge Samples

3.2.1 Particle Size Analysis

Data is presented in full for the Particle Size Analysis in Appendix 6.6. Table 3.2.1 presents a summary of the results and a visual assessment based on the onboard field notes. As can be seen from the results (Figure 3.2.1) there is an extensive range of sediment present in the study area with sediments ranging from 100% gravel (at two locations) to sand (at one station) with a range of types in between. Due to the heterogenous nature of the sediment at the site, there are some minor differences in the sediment distribution when compared to previous surveys. A distribution map of the sediment data is presented in Figure 3.2.2. As with previous surveys, the dominant sediment types present are sands and gravelly sands which are present across the Arklow Bank. The area to the east of the Arklow Bank is dominated by gravelly sands and the deeper sites along the inner margins of the Arklow Bank are dominated by Gravels. Four locations surrounding the Arklow Bank (Stations 10, 11, 14 & 17) and two sites to the north east (Stations 6 & 7) are classified as sandy gravels. Two sites (Station 5 & 18) are classified as gravels.

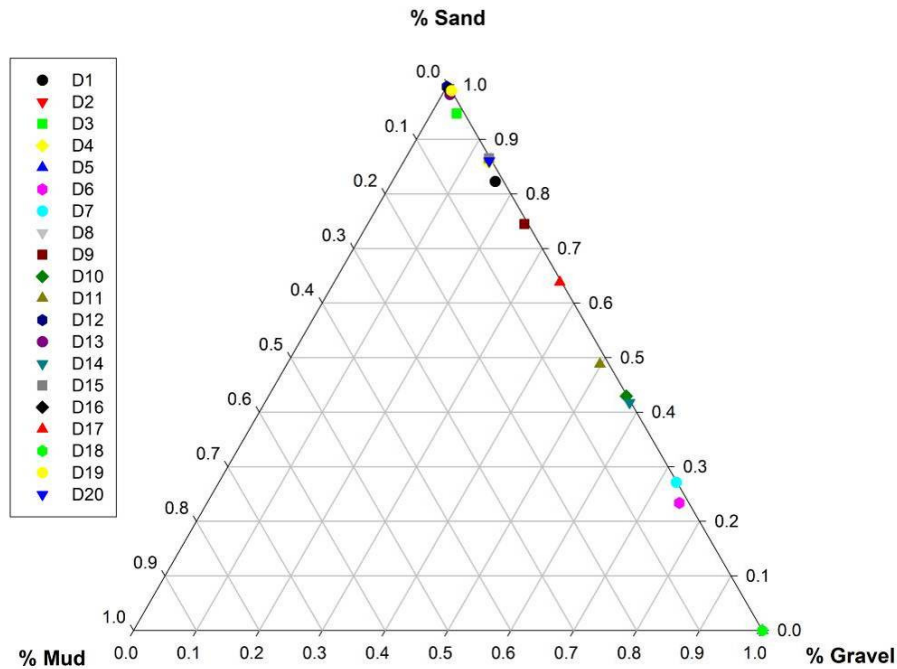


Figure 3.2.1 Ternary plot of PSA results from June 2009 survey.

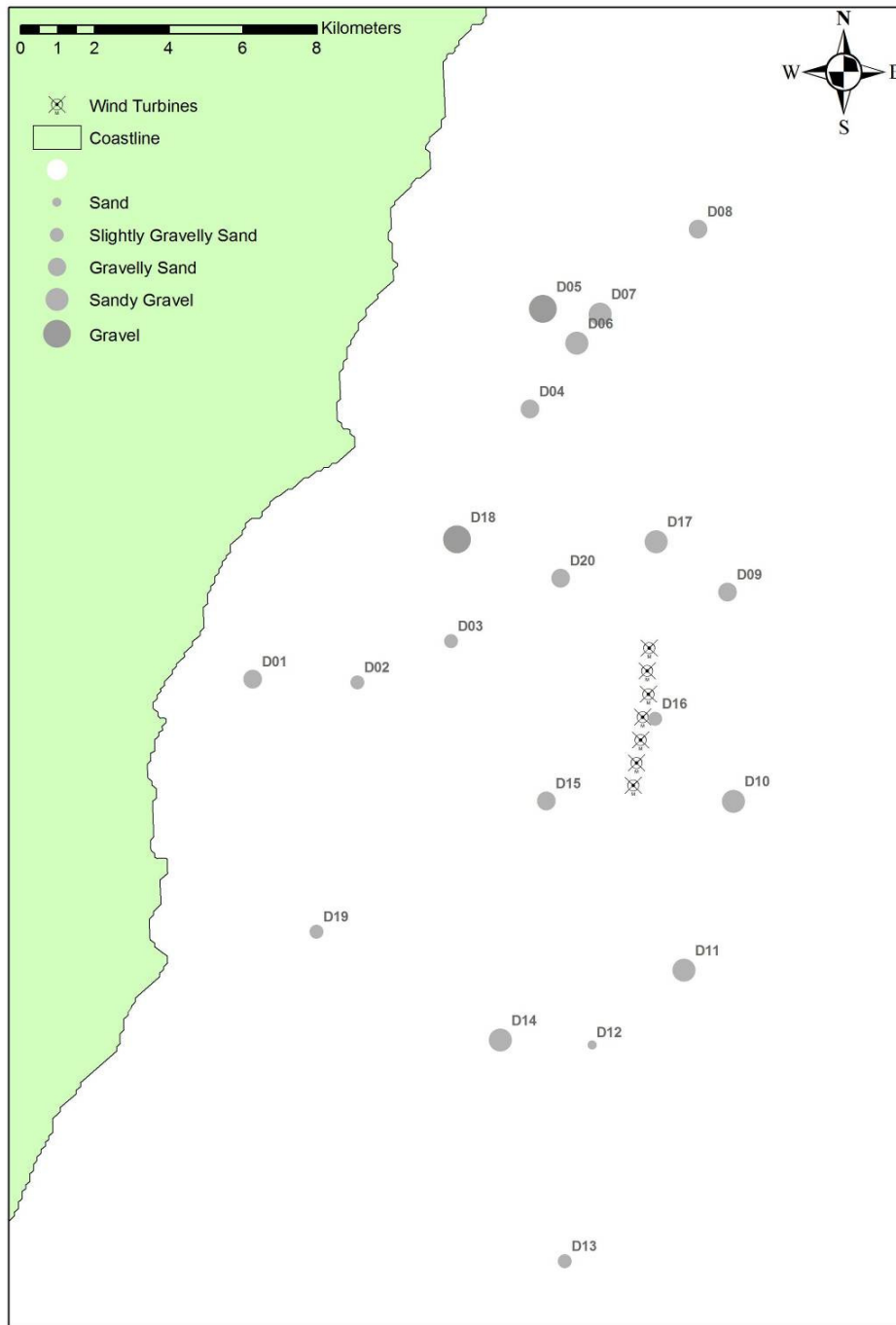


Figure 3.2.2 Distribution of sediment type as determine from the anchor dredge samples in June 2009. Site numbers are shown.

Site Code	Classification after Buchanan	Textural Group (June 2009)	Textural Group (May 2008)	Visual assessment
1	Very Fine Gravelly Fine Sand	Gravelly Sand [gS]	Gravelly Sand [gS]	Shell Gravel
2	Slightly Very Fine Gravelly Fine Sand	Slightly Gravelly Sand [(g)S]	Muddy Sandy Gravel [msG]	Gravelly Sand
3	Slightly Fine Gravelly Fine Sand	Slightly Gravelly Sand [(g)S]	Gravelly Sand [gS]	Sand
4	Very Fine Gravelly Medium Sand	Gravelly Sand [gS]	Gravel [G]	Sandy Gravel
5	Gravel	Gravel [G]	Gravel [G]	Gravel
6	Sandy Fine Gravel	Sandy Gravel [sG]	Gravel [G]	Mixed Cobble & Gravel with <i>Sabellaria</i> tubes
7	Sandy Fine Gravel	Sandy Gravel [sG]	Gravel [G]	Cobble with sand
8	Very Fine Gravelly Medium Sand	Gravelly Sand [gS]	Gravelly Sand [gS]	Gravelly Sand
9	Very Fine Gravelly Medium Sand	Gravelly Sand [gS]	Gravelly Sand [gS]	Gravelly Sand
10	Sandy Fine Gravel	Sandy Gravel [sG]	Slightly Gravelly Muddy Sand [(g)mS]	Sandy Gravel
11	Sandy Fine Gravel	Sandy Gravel [sG]	Gravel [G]	Mixed Gravel with <i>Sabellaria</i> tubes
12	Very Well Sorted Medium Sand	Sand [S]	Sand [S]	Sand
13	Slightly Very Fine Gravelly Medium Sand	Slightly Gravelly Sand [(g)S]	Slightly Gravelly Sand [(g)S]	Coarse Sand
14	Sandy Fine Gravel	Sandy Gravel [sG]	Muddy Sandy Gravel [msG]	Sandy Gravel
15	Fine Gravelly Medium Sand	Gravelly Sand [gS]	Gravelly Sand [gS]	Coarse shelly Sand
16	Slightly Very Fine Gravelly Medium Sand	Slightly Gravelly Sand [(g)S]	Slightly Gravelly Sand [(g)S]	Coarse Sand
17	Sandy Very Fine Gravel	Sandy Gravel [sG]	Slightly Gravelly Sand [(g)S]	Sandy Shell Gravel
18	Gravel	Gravel [G]	Gravel [G]	Gravel
19	Slightly Very Fine Gravelly Medium Sand	Slightly Gravelly Sand [(g)S]	Gravelly Sand [gS]	Sand
20	Very Fine Gravelly Medium Sand	Gravelly Sand [gS]	Gravelly Sand [gS]	Gravelly Sand

Table 3.2.1 Classification of sediment types at June 2009 grab stations according to methods after Buchanan & Kain and Folk & Ward, as used by BGS (see methods), together with visual assessment of sediments from notes taken at the time. Folk and Ward classification for the May 2008 survey is also given for comparison.

3.2.2 Biota

3.2.2.1 Abundance and diversity

A full taxonomic list of all species identified for the June 2009 survey is presented in Appendix 6.2. The full data matrix, including abundance data is presented in Appendix 6.5. In total, there were 12,564 individuals from 193 countable taxa recorded in the present survey. There were an additional 16 colonial taxa recorded, resulting in 209 taxa in total recorded in June 2009. These values are an increase in values obtained in the 2008 survey (7,651 individuals from 198 countable taxa), although these values remain low compared to other surveys (2007 – 17,800 individuals from 184 countable taxa; 2006 – 24,779 individuals from 262 countable taxa; 2005 – 49,811 individuals from 346 countable taxa; 2005 – 31,919 individuals from 300 taxa in October 2004).

In general across the survey area, numbers of individuals has decreased since 2004 (aside from an increase in 2006). It is difficult to say if this represents a true trend, or whether it is a result of local heterogeneity or some other external factor. For example, several species, which were present in large numbers in previous surveys, are absent, or much reduced in the present dataset.

The keelworm *Pomatoceros lamarcki* was much reduced in 2008 compared to previous years, and although there is an increase of nearly 40% in the current survey, the levels still do not match those identified in 2006 (18,317) & 2007 (14,758). In addition, the bivalve mollusc, *Mytilus edulis*, which was present in very high numbers in 2005 & 2006 remains absent from the current survey.

The reef forming polychaete *Sabellaria* spp. is present in significant numbers in 2009 (3,994) predominantly located across three sites (Stations 6, 10 & 11). This compares to only 51 specimens identified in 2008 and 491 in 2007. This variation in abundances can be explained by the heterogeneous nature of the seabed and the scattered distribution of these reefs across the survey sites.

Overall, the most abundant species in previous surveys are similar to the most abundant species present during the 2008 survey; however, abundances are lower than previous years. Ten species were present with greater than 70 individuals across the survey area compared to 7 in 2008, 11 in 2007 and 17 in 2006. This is lower than the figures reported in 2005 (35) and 2004 (19).

The highest recorded Margalef's species richness score in the present survey was found at Station 14 (11.8). Species richness scores increased in 7 of the 20 sites during the present survey. In addition, the number of countable fauna identified in the present survey increased at 15 locations during the present survey. The most significant increases occurred at the *Sabellaria* reef sites; Stations 7 (4,360 individuals from 907 individuals), 10 (1,470 individuals from 121 individuals) and 11 (2,610 individuals from 68 individuals).

However, significant decreases did occur at Stations 5 (754 individuals to 84 individuals) and 4 (4,670 individuals to 1,530 individuals). These decreases are related to reductions in the abundances of the keelworm *Pomatoceros lamarcki* at these sites.

3.2.2.2 Multivariate analysis

All multivariate analysis was undertaken using the statistical package PRIMER v 5.

Non-metric multi-dimensional scaling (MDS) analysis was performed on the 2009 dataset. The sandy sites across the survey area (sands and gravelly sands) tend to show no obvious relationship with each other. This is related to the reduced abundances present at these sites and the strong hydrodynamic nature of the site. There is some degree of similarity between the gravel and sandy gravel communities due to the large degree of similar species identified at these sites.

This is similar to the results obtained in the 2008 survey, where no obvious similarity existing between the sandy sites although some similarity was evident between the gravelly sites.

	Number of Taxa (S)	Number of Individuals (N)	Simpson's Dominance Index (d)	Shannon-Wiener Diversity Index (H')	Margalef's Species Richness (Dmg)
D1	41	380	0.144	2.68	6.73
D2	60	254	0.0806	3.16	10.7
D3	0	0	0	0	0
D4	45	1530	0.769	0.759	6
D5	12	84	0.623	1.01	2.48
D6	54	587	0.503	1.64	8.31
D7	47	4360	0.932	0.256	5.49
D8	2	3	0.556	0.637	0.91
D9	7	34	0.273	1.61	1.7
D10	46	1470	0.514	1.48	6.17
D11	60	2610	0.501	1.22	7.5
D12	5	31	0.711	0.657	1.16
D13	4	16	0.672	0.689	1.08
D14	66	243	0.101	3.24	11.8
D15	15	24	0.0972	2.52	4.41
D16	1	1	1	0	0
D17	1	2	1	0	0
D18	60	912	0.224	2.18	8.66
D19	9	17	0.218	1.87	2.82
D20	3	5	0.44	0.95	1.24

Table 3.2.2 Univariate descriptors of abundance and richness in the 20 dredge samples from June 2009.

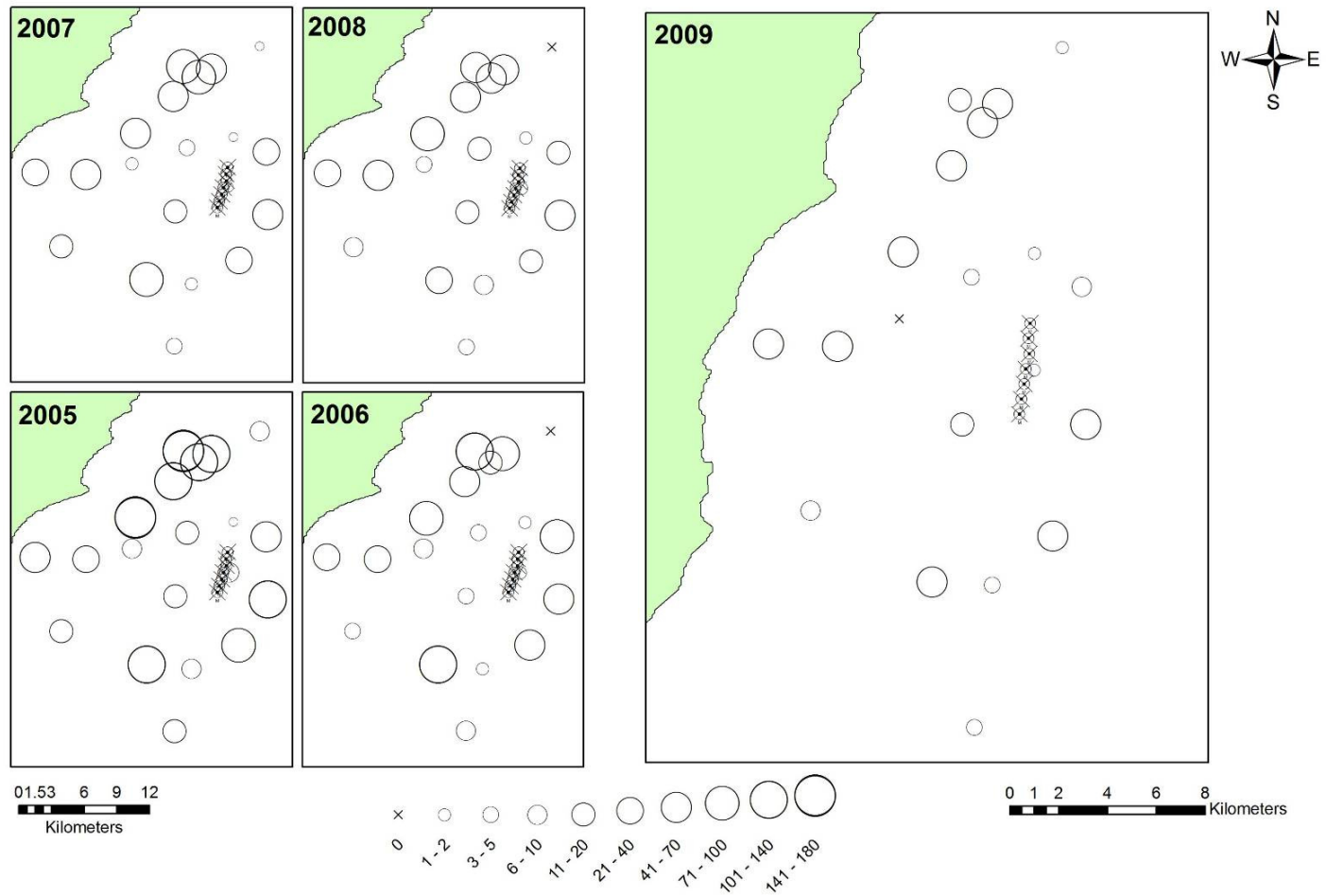


Figure 3.2.3 Total number of taxa per anchor dredge site (June 2005, June 2006, May 2007, May 2008 & June 2009)

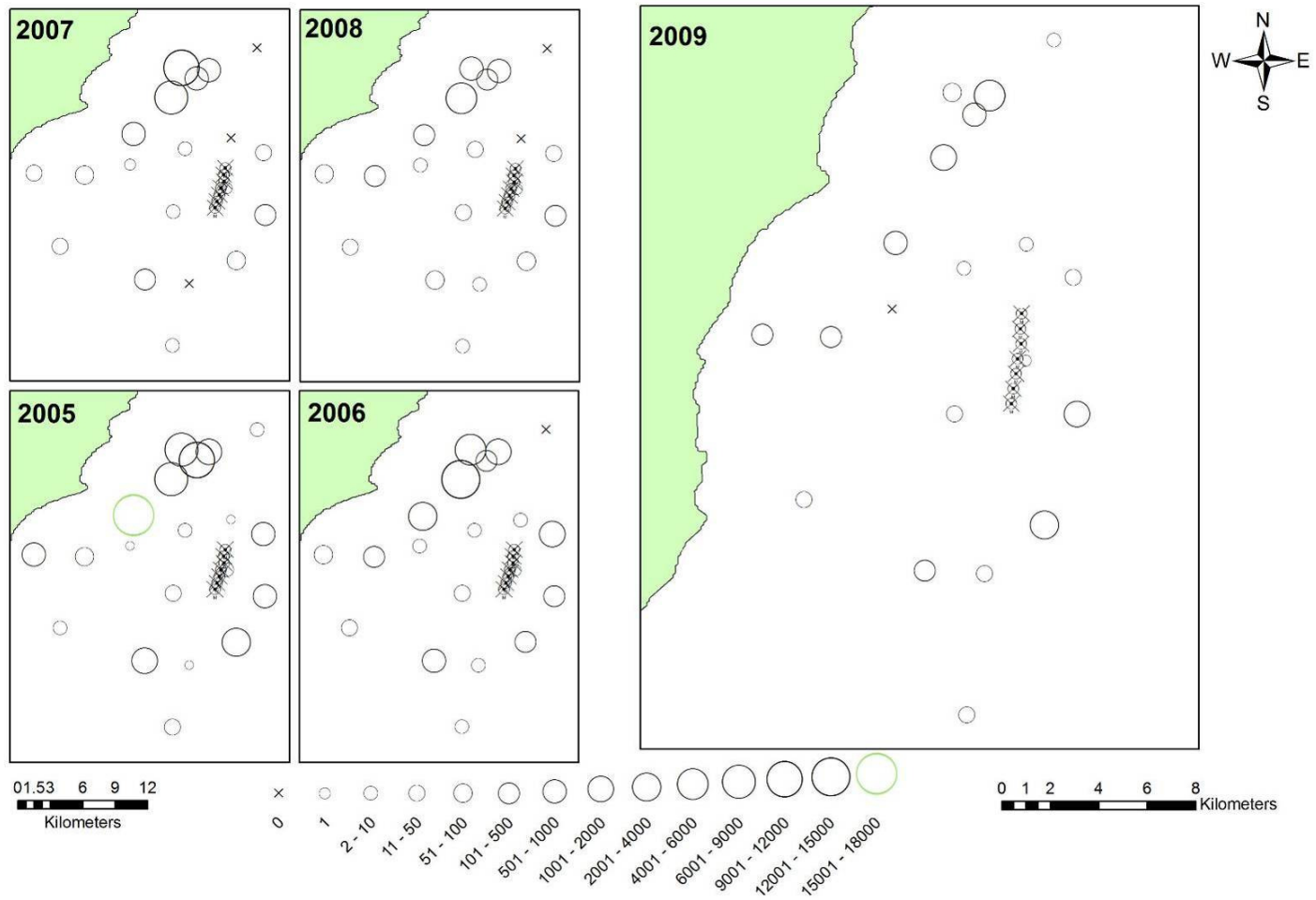


Figure 3.2.4 Total number of countable invertebrates per anchor dredge site (June 2005, June 2006, May 2007, May 2008 & June 2009)

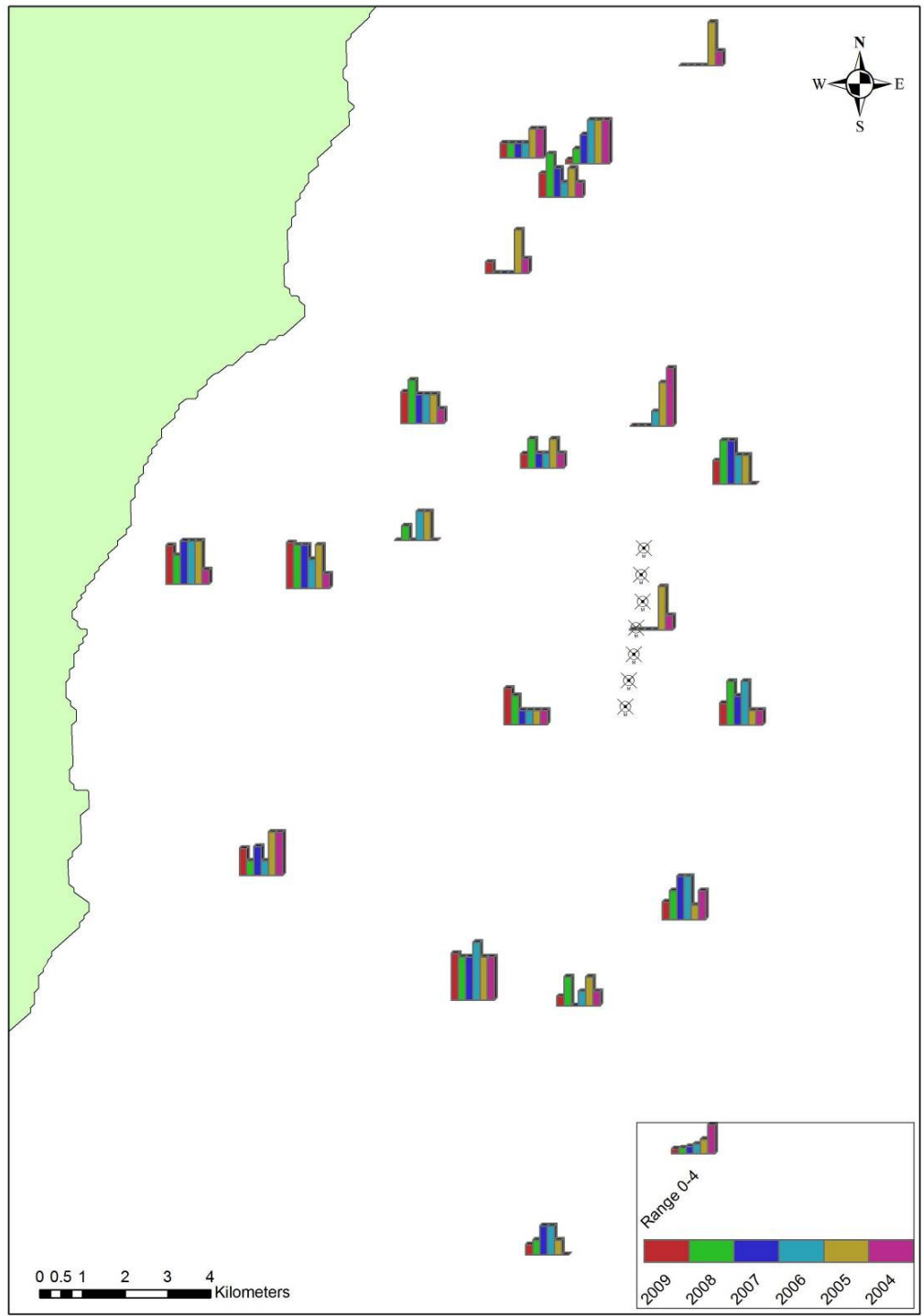


Figure 3.2.5 Shannon Wiener diversity indices per anchor dredge site (October 2004, June 2005, June 2006, May 2007, May 2008 & June 2009)

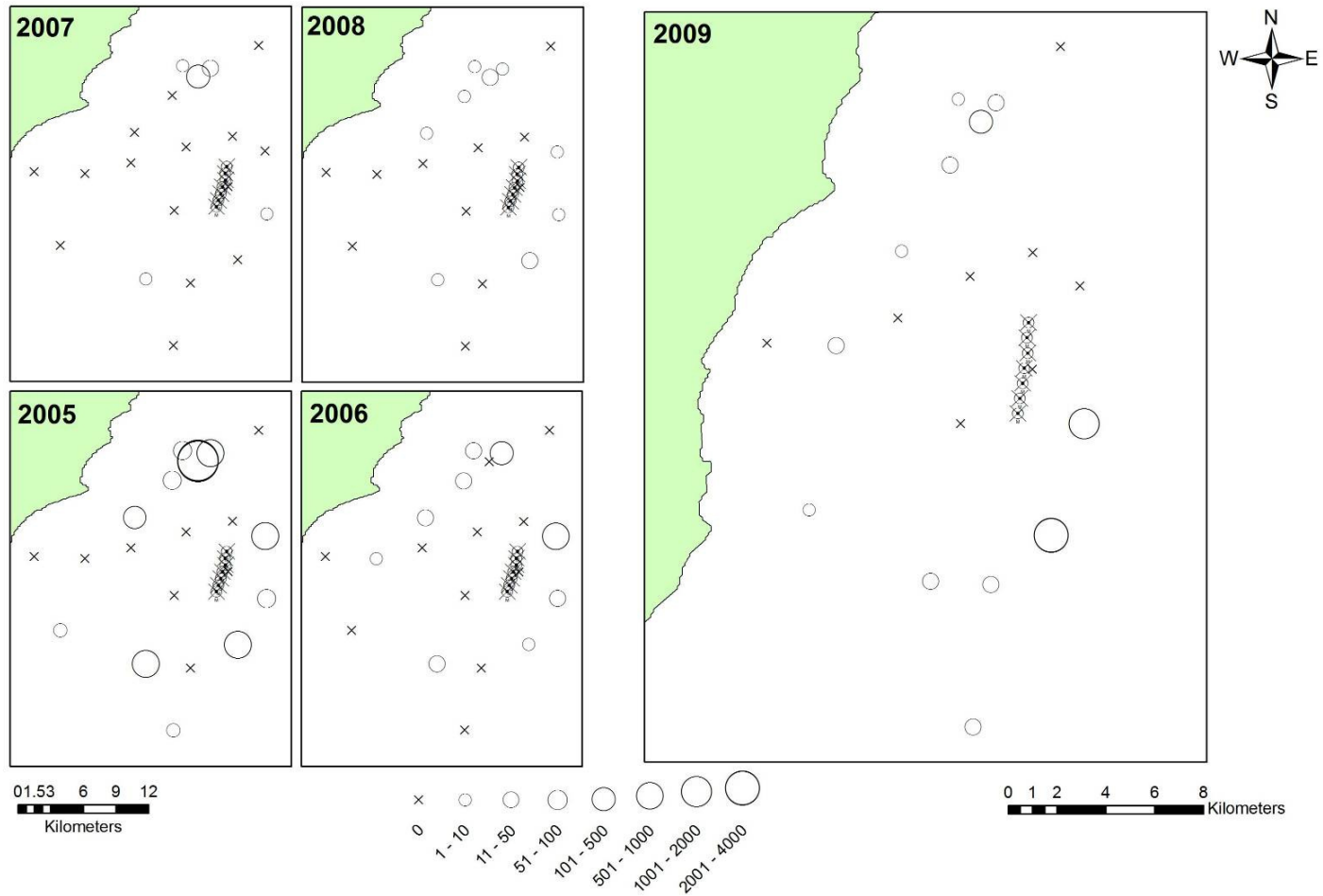


Figure 3.2.6 Total number of *Sabellaria* spp found at each dredge sample site (June 2005, June 2006, May 2007, May 2008 & June 2009).

Table3.2.3 List of the most abundant taxa (where >60 individuals were recorded across the survey area) in descending order of abundance from the anchor dredge survey of June 2009.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
ANNELIDA	<i>Pomatoceros lamarcki</i>	0	30	0	1340	66	5	4203	0	0	78	27	0	0	7	1	0	0	384	0	0	6141
ANNELIDA	<i>Sabellaria spinulosa</i>	0	32	0	26	2	20	17	0	0	1050	1765	26	13	14	0	0	0	9	7	0	2981
ANNELIDA	<i>Sabellaria alveolata</i>	0	0	0	0	0	415	5	0	0	40	550	2	1	0	0	0	0	0	0	0	1013
SIPUNCULA	<i>Nephasoma minutum</i>	0	13	0	30	1	12	1	0	0	30	13	0	0	3	0	0	0	129	0	0	232
ANNELIDA	<i>Clymenura johnstoni</i>	12	25	0	22	0	2	42	0	0	14	7	0	0	69	0	0	0	2	1	0	196
MOLLUSCA	<i>Abra alba</i>	124	0	0	1	0	4	0	0	0	28	18	0	0	0	0	0	0	0	0	0	175
MOLLUSCA	<i>Leptochiton asellus</i>	0	46	0	8	2	0	0	0	0	32	46	0	0	1	0	0	0	10	0	0	145
MOLLUSCA	<i>Nucula nucleus</i>	0	0	0	4	2	0	0	0	0	0	0	0	0	2	0	0	0	101	0	0	109
ANNELIDA	<i>Polydora caeca</i>	0	0	0	17	0	0	0	0	0	0	5	0	0	0	0	0	0	73	0	0	95
MOLLUSCA	<i>Nucula hanleyi</i>	0	0	0	4	2	0	0	0	0	0	0	0	0	0	0	0	0	75	0	0	81
ANNELIDA	<i>Praxillella affinis</i>	52	0	0	3	0	0	1	0	0	4	0	0	0	5	0	0	0	0	0	0	65
ANNELIDA	<i>Lumbrineris gracilis</i>	2	1	0	0	0	2	1	0	0	20	15	1	0	19	1	0	0	0	0	0	62

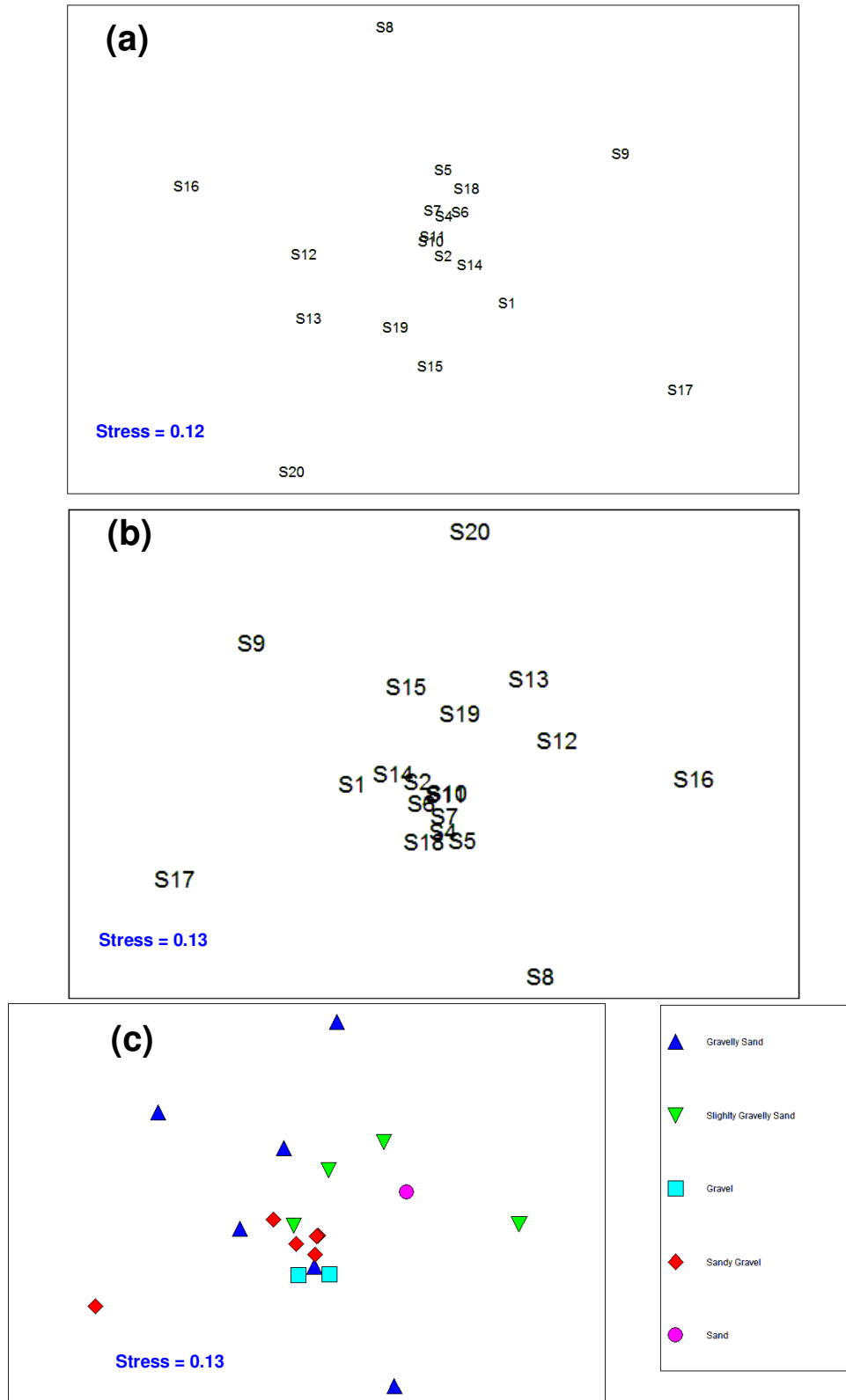


Figure 3.2.7 Multi-dimensional scaling plot of faunal data from the anchor dredge survey, June 2009. [(a) Presence/Absence data; (b) Abundance data, colonial organisms removed; (c) Rotated nMDS plot of dredge dataset (abundance data; No colonial's), with sedimentary environment superimposed]

3.3 Biotope Classification

Because of the nature of the current monitoring survey and the inherent differences in sampling protocol undertaken in both study types, direct comparison of the datasets is difficult. As such, it is easier to assess the communities identified in each of the surveys to assess potential change in the benthos compared to the baseline survey. The baseline survey undertaken in 2000 identified six separate biotopes within the survey (Ecoserve 2001) area using the 1997 JNCC classification system (Connor *et al*, 1997). These are presented in Table 3.3.1.

Biotope Classification	Description of Biotope	Approximate location within the survey area
IGS.Mob	Sparse fauna in infralittoral mobile clean sand	Along the Arklow Bank and to the south-west of the survey area. Small presence closer inshore near Arklow.
IGS.Scup.Hyd	<i>Sertularia cupressina</i> and <i>Hydrallmania falcata</i> on tide swept sublittoral cobbles or pebbles in coarse sand	Immediately surrounding the Arklow Bank, and also dominating the north-east corner of the survey area
MCR.CSab	Cirralittoral <i>Sabellaria</i> reefs	Present north-west of the survey area. Also small patches located to the west of the survey area towards Arklow.
MCR	Cirralittoral rock or mixed substrata in moderately exposed environments.	Immediately to the east of the Arklow Bank.
MCR.Flu	<i>Flustra foliacea</i> and other hydroid/bryozoan turf species on slightly scoured cirralittoral rock or mixed substrata	To the north-west of the survey area surrounding MCR.CSab
IMS	Infralittoral clean or muddy sand	Immediately within the vicinity of Arklow Town.

Table 3.3.1 Biotope classifications identified in baseline survey (Ecoserve, 2001)

The current data is presented in Table 3.3.2 with the sampling positions broadly classified using the JNCC classification scheme for marine biotopes. To facilitate comparison with the baseline data, the 1997 JNCC classification was used (Connor *et al.*, 1997).

Biotope Classification		Biotope Classification	
Station 1	IGS.FaS.Scup.Hyd <i>Serularia cupressina</i> and <i>Hydrallmania flacata</i> on tide- swept sublittoral cobbles or pebbles in coarse sand [No Change.]	Station 11	MCR.CSAb Circalittoral <i>Sabellaria</i> reefs. [Previously MCR Circalittoral rock or mixed substrata in moderately exposed environments.]
Station 2	MCR Circalittoral rock or mixed substrata in moderately exposed environments. [No Change]	Station 12	IGS.Mob Sparse fauna in infralittoral mobile clean sand [No Change]
Station 3	IGS.Mob Sparse fauna in infralittoral mobile clean sand [No Change]	Station 13	IGS.Mob Sparse fauna in infralittoral mobile clean sand [No Change]
Station 4	MCR.Flu.SerHyd <i>Sertularia argentea</i> , <i>S.</i> <i>cupressina</i> and <i>Hydrallmania</i> <i>falcata</i> on tide swept circalittoral cobbles and pebbles [No Change]	Station 14	MCR Circalittoral rock or mixed substrata in moderately exposed environments. [No Change]
Station 5	MCR Circalittoral rock or mixed substrata in moderately exposed environments. [Previously MCR.Flu.SerHyd <i>Sertularia argentea</i> , <i>S.</i> <i>cupressina</i> and <i>Hydrallmania</i> <i>falcata</i> on tide swept circalittoral cobbles and pebbles]	Station 15	IGS.Mob Sparse fauna in infralittoral mobile clean sand [No Change]
Station 6	MCR.CSAb Circalittoral <i>Sabellaria</i> reefs. [Previously MCR.Flu.Flu (<i>Flustra</i> <i>foliacea</i> on slightly scoured silty circalittoral rock or mixed substrata)]	Station 16	IGS.Mob Sparse fauna in infralittoral mobile clean sand [No Change]
Station 7	MCR Circalittoral rock or mixed substrata in moderately exposed environments. [No Change]	Station 17	IGS.Mob Sparse fauna in infralittoral mobile clean sand [No Change]
Station 8	IGS.Mob Sparse fauna in infralittoral mobile clean sand [No Change]	Station 18	MCR.Flu.Flu <i>Flustra foliacea</i> on slightly scoured silty circalittoral rock or mixed substrata. [No Change]
Station 9	MCR.Flu.Flu (<i>Flustra foliacea</i> on slightly scoured silty circalittoral rock or mixed substrata). [No Change]	Station 19	IGS.Mob Sparse fauna in infralittoral mobile clean sand [No Change]
Station 10	MCR.CSAb Circalittoral <i>Sabellaria</i> reefs. [Previously MCR Circalittoral rock or mixed substrata in moderately exposed environments.]	Station 20	IGS.Mob Sparse fauna in infralittoral mobile clean sand [No Change]

Table 3.3.2 Biotope classifications identified in the present survey (June 2009).

4. DISCUSSION AND CONCLUSIONS

Similar to previous surveys, the 2009 survey area is characterised by a range of sediments from sands to gravels, and this is reflected in the fish and invertebrate species identified.

Previous scientific reviews have shown that the fish species expected to be found in these habitats are quite characteristic. In sandy areas <50m depth species diversity is reported to be pretty high with many elasmobranchs, gadoids, wrasses and flatfish. This is similar to species found in gravel areas <50m depth (Nash, 1990). The fish species which were found in the present survey are consistent with those found in previous surveys. Overall fish species and abundances are similar to those observed in 2008. These have increased on 2006 & 2007 surveys, and are similar in nature to the abundances and diversity on the 2004 and 2005 surveys. In addition, all species identified during the present and in previous trawl surveys are considered common throughout the survey area and within the Irish Sea (Ellis *et al.*, 2000).

There have been no records in the present survey of rare or unusual species. This is concurrent with findings in previous surveys with no rare or unusual species recorded in the survey area.

The important reef communities, identified in previous surveys were again identified at three locations in the present survey. These biogenic reefs are very important and are listed under Annex I of the EU Habitats Directive (Code 1170: Reefs). They play an important role in stabilising sediments, in addition to improving species diversity and community stability (Holt *et al.*, 1998). In the present survey reef forming communities were identified at Stations 6, 10 & 11. Previous surveys have identified the presence of these communities at Dredge sites 7, 9 & 11 and also at Trawl sites 3 & 4. These reef communities were not identified in 2008. The reason for this is the scattered nature of these communities in the locality.

A detailed look of the biotopes present reveals a similar pattern to that found in the baseline survey. The Arklow Bank samples (dredge stations 8, 12, 16 & 17), in addition to the samples located to the south and west of the bank (dredge stations 3, 13, 15, 19 & 20), are all classified as IGS.Mob (Sparse fauna in infralittoral mobile clean sand). This agrees with the results of the baseline survey which showed similar distribution patterns for this community type (although it was interspersed with IGS.Scup.Hyd [*Sertularia cupressina* and *Hydrallmania falcata* on tide swept sublittoral cobbles or pebbles in coarse sand]). This is similar to results obtained in last year's study.

Like 2008, the innermost station (Station 1) has been tentatively classified IGS.Scup.Hyd (*Sertularia cupressina* and *Hydrallmania falcata* on tide swept sublittoral cobbles or pebbles in coarse sand) in the present survey, whereas it had tentatively been identified as MCR (Circalittoral rock or mixed substrata in moderately exposed environments) in 2006 & 2007.

A single station (Station 9) along the east of the bank is classified as MCR.Flu.Flu (*Flustra foliacea* on slightly scoured silty circalittoral rock or mixed substrata). Another inner shore site (Station 18) is also classified as MCR.Flu.Flu. This corresponds to findings observed in 2008. A further four stations (Stations 2, 5, 7 & 14) are all classified as MCR. This corresponds to findings in the baseline survey which show coarse sediments across the western part of the Arklow Bank.

A single site has been classified as *Sertularia argentea*, *S. cupressina* and *Hydrallmania falcata* on tide swept circalittoral cobbles and pebbles. This classification remains unchanged from the 2008 survey.

Reef communities were identified at three sites during the course of the 2009 survey. Stations 6 and 11 have previously shown large numbers of *Sabellaria* during the course of previous surveys. Station 11 has returned significant increases in numbers during the present survey compared to previous surveys. However, it should be noted that the reefs in the vicinity of the Arklow Bank are very patchy in nature and this is reflected in the varied abundances identified at these sites across the years. As previously reported reefs formed by

Sabellaria spp. consolidate the sediment and allow the settlement of other species not found in adjacent habitats, leading to a diverse community of epifaunal and infaunal species. The largest number of reef sites identified within the survey area was in 2005, a total of 5. In 2004, three reef sites were identified; 2006 two sites; 2007 one site; 2008, 0 reef sites and 2009 3 reef sites were identified. The identification of three reef communities in the present survey has resulted in a slight increase in taxa numbers during the present survey compared to 2008 (585 in 2009 compared to 527 in 2008).

Although there has been an increase in the number of countable fauna in the present survey compared to 2008 (12,564 in 2009 compared to 7,651 in 2008) the numbers are still reduced compared to other surveys. As identified in 2008, this is directly related to a single species, *Pomatoceros* spp. whose numbers have increased in the current survey, although remain reduced compared to the surveys of 2004 – 2007. This may be attributed to small scale, local patchiness, typical of heterogeneous subtidal benthic communities.

A total of 132 taxa were identified in the present survey. Of these 132 taxa, 10 are fish species. Overall, the number of taxa identified is in keeping with previous surveys; the total number of taxa is higher than the June 2006 (98 taxa), June 2005 (47 taxa) and October 2004 (51 taxa) surveys, although it is lower than the May 2007 (177 taxa) and May 2008 (170 taxa).

Total numbers of countable organisms in the trawl (1779) has increased from 2008 (898) to similar levels identified in 2006. Although numbers identified in the present survey are still reduced from levels identified in 2007, this is related to the non-sampling of the *Sabellaria* reef identified in Trawl 3 that year.

Overall results from the present survey indicate that there is very little variation at the community level between the communities recorded in the present survey and the communities recorded in the baseline survey. The decreases in faunal abundance identified in 2008 have been reversed in the current survey, reflecting the heterogeneous nature of the seabed in the vicinity of the Arklow Bank. Reef communities which were marked absent in 2008 have been identified at three locations and the keelworm, *Pomatoceros* spp. abundances have increased on 2008 levels.

7. REFERENCES

- Blott, S.J. & Pye, K., 2001. Gradstat: A grain size distribution and statistics package for the analysis of unconsolidated sediments. *Earth Surface Processes and Landforms*, **26**: 1237-1248
- Buchanan, J.D. & Kain, J.M. 1984 Measurement of the physical and chemical environment. In: N. L. Holme & A. D. McIntyre (Eds.), *Methods for the study of marine benthos*. Blackwell Scientific Publications, Oxford: 30–50.
- Clark, K.R. & Warwick, R.M. 1994. *Change in Marine Communities: An Approach to Statistical Analysis and Interpretation*. Natural Environment Research Council and Plymouth Marine Laboratory: 144 pp.
- Connor, D.W., Dalkin, M.J., Hill, T.O., Holt, R.H.F. & Sanderson, W.G. 1997. Marine Nature Conservation Review: marine biotope classification for Britain and Ireland. Volume 2. Sublittoral biotopes. Version 97.06. JNCC Report, No. 230.
- Ecoserve, 2001. A marine ecological study of the Arklow Bank for a proposed off-shore wind park development. Chapter 1. Baseline survey. April 2001.
- Ellis, J.R., Rogers, S.I. & Freeman, S.M. 2000 Demersal Assemblages in the Irish Sea, St. Georges Channel and Bristol Channel. *Estuarine, Coastal and Shelf Science*, **51**: 299-315
- Folk, R.L. 1954. The distinction between grain size and mineral composition in sedimentary-rock nomenclature. *Journal of Geology*, **62**, 344-359.
- Holt, T.J., Rees, E.I., Hawkins, S.J., & Seed, R., 1998. Biogenic Reefs (volume IX). An overview of dynamic and sensitivity characteristics for conservation management of marine SACs. Scottish Association for Marine Sciences (UK Marine SACs Project), Oban, Scotland, UK; 170 pages
- Hydroserv. 2004. Arklow Bank Offshore Windfarm Environmental Monitoring Benthic Ecology Survey Report. Spring/Summer 2004. Report to Arklow Energy Ltd.
- Hydroserv. 2005. Arklow Bank Offshore Windfarm Environmental Monitoring Benthic Ecology Survey Report. October 2004. Report to Arklow Energy Ltd.
- Hydroserv. 2006. Arklow Bank Offshore Windfarm Environmental Monitoring Benthic Ecology Survey Report. June 2005. Report to Arklow Energy Ltd.
- Island Group, 2007. Arklow Bank Offshore Wind farm Environmental Monitoring Benthic Ecology Survey Report. June 2006. Report to Arklow Energy Ltd.
- Island Group, 2008. Arklow Bank Offshore Wind farm Environmental Monitoring Benthic Ecology Survey Report. May 2007. Report to Arklow Energy Ltd.
- Island Group, 2009. Arklow Bank Offshore Wind farm Environmental Monitoring Benthic Ecology Survey Report. June 2008. Report to Arklow Energy Ltd.
- ICES 2003. Study Group on Survey Trawl Gear for the IBTS Western and Southern Areas. ICES CM 2003/B:01. 21pp.
- Nash, R.D.M. 1990 Fish assemblages in the Irish Sea in *the Irish Sea, An Environmental Review. Part One: Nature Conservation*. Liverpool University Press.

6. APPENDICES

Appendix 6.1 Species List for Beam Trawl Survey; June 2009

ANNELIDA	<i>Schizomavella auriculata</i>	ECHINODERMATA
<i>Subadyte pellucida</i>	<i>Turbicellepora avicularis</i>	<i>Crossaster papposus</i>
<i>Harmothoe impar</i>	CHELICERATA	<i>Asterias rubens</i>
<i>Lepidonotus squamatus</i>	<i>Nymphon brevirostre</i>	<i>Ophiothrix fragilis</i>
<i>Polynoe scolopendrina</i>	CNIDARIA	<i>Psammechinus miliaris</i>
<i>Sthenelais boa</i>	<i>Tubulariidae</i>	<i>Henricia sanguinolenta</i>
<i>Eumida sanguinea</i>	<i>Hydractinia echinata</i>	<i>Ophiura albida</i>
<i>Syllis armillaris</i>	<i>Halecium</i>	MOLLUSCA
<i>Eusyllis blomstrandii</i>	<i>Hydrallmania falcata</i>	<i>Leptochiton asellus</i>
<i>Exogone naidina</i>	<i>Nemertesia</i>	<i>Buccinum undatum</i>
<i>Autolytus alexandria</i>	<i>Plumularia setacea</i>	<i>Buccinum undatum (juv)</i>
<i>Nereis pelagica</i>	<i>Clytia hemisphaerica</i>	NUDIBRANCHIA (eggs)
<i>Sabellaria alveolata</i>	<i>Alcyonium digitatum</i>	<i>Mytilus edulis (juv)</i>
<i>Sabellaria spinulosa</i>	ACTINIARIA	<i>Spisula solida</i>
<i>Lanice conchilega</i>	<i>Sertularia cupressina</i>	<i>Hiatella arctica</i>
<i>Thelepus cincinnatus</i>	CRUSTACEA	<i>Sepiola atlantica</i>
<i>Thelepus setosus</i>	<i>Balanus crenatus</i>	<i>Abra nitida</i>
<i>Pomatoceros lamarcki</i>	<i>Gastrosaccus spinifer</i>	<i>Astarte sulcata</i>
<i>Ampharete lindstroemi</i>	<i>Gammarellus homari</i>	<i>Calliostoma zizyphinum</i>
<i>Aphrodita aculeata</i>	<i>Cressa dubia</i>	<i>Gibbula cineraria</i>
<i>Eupolymnia nesidensis</i>	<i>Iphimedia minuta</i>	<i>Heteranomia squamula</i>
<i>Jasmineira elegans</i>	<i>Atylus swammerdamei</i>	<i>Lacuna crassior</i>
<i>Kefersteinia cirrata</i>	<i>Ampelisca spinipes</i>	<i>Limacia clavigera</i>
<i>Lumbrineris gracilis</i>	<i>Aoridae (female)</i>	<i>Modiolarca subpicta</i>
<i>Nicolea venustula</i>	<i>Astacilla</i>	<i>Modiolus modiolus</i>
<i>Nicolea zostericola</i>	<i>Pandalus montagui</i>	<i>Natica catena (eggmass)</i>
<i>Oriopsis armandi</i>	<i>Philocheras sculptus</i>	<i>Onchidoris depressa</i>
<i>Phyllochaetopterus sp.</i>	<i>Philocheras trispinosus</i>	<i>Sepietta oweniana</i>
<i>Polydora flava</i>	<i>Crangon allmanni</i>	<i>Sphenia binghami</i>
<i>Proceraea sp. indet.</i>	<i>Pagurus bernhardus</i>	<i>Tritonia hombergi</i>
<i>Sabella pavonina</i>	<i>Hyas coarctatus</i>	<i>Acanthodoris pilosa</i>
<i>Sphaerosyllis taylori</i>	<i>Macropodia rostrata</i>	<i>Doto pinnatifida</i>
<i>Terebellidae indet.</i>	<i>Eurynome aspera</i>	<i>Eubranchus</i>
<i>Tubificoides benedii</i>	<i>Liocarcinus (juv)</i>	<i>Eubranchus farrani</i>
BRYOZOA	<i>Liocarcinus corrugatus</i>	<i>Eubranchus sp.</i>
<i>Alcyonidium diaphanum</i>	<i>Aora gracilis</i>	Nudibranch indet.
<i>Alcyonidium parasiticum</i>	<i>Corophium sp.</i>	NEMERTIA
<i>Vesicularia spinosa</i>	<i>Hippolyte varians</i>	<i>Nemertea sp.</i>
<i>Electra pilosa</i>	<i>Porcellana longicornis</i>	<i>Cerebratulus sp. 1</i>
<i>Flustra foliacea</i>	<i>Schistomysis sp. Indet.</i>	<i>Tubulanus polymorphus</i>
<i>Bugula avicularia</i>	<i>Xantho incisus</i>	
<i>Bicellariella ciliata</i>		
<i>Scrupocellaria scruposa</i>		

PISCES

Trisopterus luscus (juv)
Agonus catophractus
Echiichthys vipera
Ammodytes tobianus
Callionymus lyra
Pleuronectes platessa (juv)
Merlangius merlangus
Pomatoschistus minutus
Scyliorhinus caniculus
Solea solea
Syngnathus acus

PORIFERA

PORIFERA

Sycon sp.

TUNICATA

Didemnidae
Ascidella scabra
Molgula manhattensis

SIPUNCULA

Phascolion strombus

TUNICATA

Didemnidae
Ascidella scabra
Molgula manhattensis

TURBELLARIA

Turbellaria sp.

Appendix 6.2 Species List for Anchor Dredge Survey; June 2009

Annelid		
<i>Adyte pellucida</i>	<i>Glycera lapidum</i>	<i>Pholoe synophthalmica</i>
<i>Ampharete indet.</i>	<i>Glycera oxycephala</i>	<i>Phyllochaetopterus sp.</i>
<i>Ampharete lindstroemi</i>	<i>Glycera tridactyla</i>	<i>Phyllodoce groenlandica</i>
<i>Anobothrus gracilis</i>	<i>Glycinde nordmanni</i>	<i>Phyllodoce rosea</i>
<i>Aonides oxycephala</i>	<i>Goniada maculata</i>	<i>Phyllococidae indet.</i>
<i>Aonides paucibranchiata</i>	<i>Harmothoe indet.</i>	<i>Poecilochaetus serpens</i>
<i>Aphelochaeta marioni</i>	<i>Harmothoe sp. 1</i>	<i>Polycirrus indet.</i>
<i>Apomatus similis</i>	<i>Hesionura elongata</i>	<i>Polycirrus medusa</i>
<i>Aricidea catherinae</i>	<i>Hydroides norvegicus</i>	<i>Polycirrus norvegicus</i>
<i>Armandia polyophthalma</i>	<i>Jasmineira elegans</i>	<i>Polydora caeca</i>
<i>Asclerocheilus sp. 1</i>	<i>Kefersteinia cirrata</i>	<i>Polydora caulleryi</i>
<i>Autolytus alexandri</i>	<i>Lagis koreni</i>	<i>Polydora flava</i>
<i>Autolytus brachycephalus</i>	<i>Lanice conchilega</i>	<i>Polydora indet.</i>
<i>Autolytus indet.</i>	<i>Laonice bahusiensis</i>	<i>Polynoe scolopendrina</i>
<i>Capitella capitata complex</i>	<i>Lepidonotus squamatus</i>	<i>Pomatoceros lamarcki</i>
<i>Caulleriella alata</i>	<i>Lumbrineris gracilis</i>	<i>Praxillella affinis</i>
<i>Caulleriella zetlandica</i>	<i>Lysilla loveni</i>	<i>Prionospio fallax</i>
<i>Chaetozone sp.</i>	<i>Macrochaeta helgolandica</i>	<i>Proceraea sp. indet.</i>
<i>Chone filicaudata</i>	<i>Malacoceros tetracerus</i>	<i>Protodorvillea kefersteini</i>
<i>Cirratulidae indet.</i>	<i>Maldanidae indet.</i>	<i>Pseudopolydora pulchra</i>
<i>Clymenura johnstoni</i>	<i>Mediomastus fragilis</i>	<i>Pseudopotamilla reniformis</i>
<i>Clymenura tricirrata</i>	<i>Nematoneis unicornis</i>	<i>Raphitoma purpurea</i>
<i>Dodecaceria sp.</i>	<i>Nephtys caeca</i>	<i>Sabella pavonina</i>
<i>Ehlersia ferruginea</i>	<i>Nephtys cirrosa</i>	<i>Sabellaria alveolata</i>
<i>Eteone longa</i>	<i>Nephtys juv. indet.</i>	<i>Sabellaria spinulosa</i>
<i>Euclymene lombricoides</i>	<i>Nereis elitoralis</i>	<i>Sabellidae indet.</i>
<i>Euclymene oerstedii</i>	<i>Nereis juv. indet.</i>	<i>Scalibregma celticum</i>
<i>Eulalia aurea</i>	<i>Nereis longissima</i>	<i>Scalibregma inflatum</i>
<i>Eulalia bilineata</i>	<i>Nereis pelagica</i>	<i>Schistomeringos rudolphi</i>
<i>Eulalia expusilla</i>	<i>Nereis zonata</i>	<i>Scoloplos armiger</i>
<i>Eulalia ornata</i>	<i>Nicolea venustula</i>	<i>Serpulidae indet.</i>
<i>Eulalia viridis</i>	<i>Nicolea zostericola</i>	<i>Sphaerosyllis taylori</i>
<i>Eumida ockelmanni</i>	<i>Nicomache personata</i>	<i>Spio armata</i>
<i>Eumida sanguinea</i>	<i>Notocirrus scoticus</i>	<i>Spio decorata</i>
<i>Eunicidae indet.</i>	<i>Notomastus latericeus</i>	<i>Spio martinensis</i>
<i>Eupolymnia nesidensis</i>	<i>Odontosyllis fulgurans</i>	<i>Spionidae indet.</i>
<i>Eusyllis blomstrandii</i>	<i>Ophelia borealis</i>	<i>Spiophanes bombyx</i>
<i>Euzonus flabelligerus</i>	<i>Ophelina acuminata</i>	<i>Spiophanes kroyeri</i>
<i>Exogone hebes</i>	<i>Oriopsis armandi</i>	<i>Sthenelais boa</i>
<i>Exogone verugera</i>	<i>Owenia fusiformis</i>	<i>Sthenelais limicola</i>
<i>Galathowenia oculata</i>	<i>Paradoneis lyra</i>	<i>Streblosoma intestinalis</i>
<i>Gattyana cirrosa</i>	<i>Paraonidae indet.</i>	<i>Streptosyllis sp. 1</i>
	<i>Pholoe inornata</i>	<i>Syllides japonica</i>

Annelid (contd)	Crustacea	Mollusc
<i>Syllidia armata</i>	<i>Anthura gracilis</i>	<i>Abra alba</i>
<i>Syllis armillaris</i>	<i>Aora gracilis</i>	<i>Aequipecten opercularis</i>
<i>Syllis indet.</i>	<i>Corophium sp.</i>	<i>Bela nebula</i>
<i>Syllis sp. D</i>	<i>Gammaridea indet.</i>	<i>Chrysallida truncatula</i>
<i>Syllis sp. E</i>	<i>Harpinia</i>	<i>Donax vittatus</i>
<i>Syllis sp. H</i>	<i>Janira maculosa</i>	<i>Gibbula cineraria</i>
<i>Syllis variegata</i>	<i>Maera othonis</i>	<i>Gibbula magus</i>
<i>Terebellidae indet.</i>	<i>Microdeutopus versiculatus</i>	<i>Heteranomia squamula</i>
<i>Terebellides stroemi</i>	<i>Pinnotheres pisum</i>	<i>Hiatella arctica</i>
<i>Tharyx killariensis</i>	<i>Unciola</i>	<i>Jujubinus montagui</i>
<i>Thelepus cincinnatus</i>	<i>Urothoe elegans</i>	<i>Lacuna crassior</i>
<i>Thelepus setosus</i>	Echinodermata	<i>Leptochiton asellus</i>
<i>Travisia forbesii</i>	<i>Amphipholis squamata</i>	<i>Modiolus modiolus</i>
<i>Tubificidae indet.</i>	<i>Amphiura brachiata</i>	<i>Musculus discors</i>
Bryozoa	<i>Crassoster paposus</i>	<i>Mya truncata</i>
<i>Alcyonidium diaphanum</i>	Hemichordata	<i>Mysella bidentata</i>
<i>Alcyonidium mytili</i>	<i>Saccoglossus indet.</i>	<i>Mytilus edulis</i>
<i>Scruparia chelata</i>	Nemertea	<i>Nucella lapillus</i>
<i>Conopeum reticulum</i>	<i>Cerebratulus sp. 1</i>	<i>Nucula hanleyi</i>
<i>Electra monostachys</i>	<i>Nemertea indet.</i>	<i>Nucula nucleus</i>
<i>Electra pilosa</i>	<i>Tubulanus polymorphus</i>	<i>Nudibranchia</i>
<i>Flustra foliacea</i>	Phoronida	<i>Ocenebra erinaceus</i>
<i>Bicelliariella ciliata</i>	<i>Phoronis indet.</i>	<i>Oenopota rufa</i>
<i>Escharella immersa</i>	Platyhelminthes	<i>Pelecypoda</i>
<i>Escharella ventricosa</i>	<i>Platyhelminthes indet.</i>	<i>Phaxas pellucidus</i>
<i>Cellepora pumicosa</i>	Porifera	<i>Scutopus robustus</i>
<i>Turbicellepora avicularis</i>	<i>Porifera</i>	<i>Spisula elliptica</i>
Chelicerata	Sipuncula	<i>Timoclea ovata</i>
<i>Nymphon brevirostre</i>	<i>Golfingia vulgaris</i>	<i>Tricolia pullus</i>
<i>Anoplodactylus petiolatus</i>	<i>Nephasoma minutum</i>	<i>Trophonopsis barvicensis</i>
Cnidaria	<i>Phascolion strombus</i>	
<i>Actiniaria indet.</i>	<i>Sipuncula juv. indet.</i>	
<i>Edwardsia claparedii</i>	Tunicata	
<i>Hydrallmania falcata</i>	<i>Dendrodoa grossularia</i>	
<i>Sertularia</i>	<i>Molgulidae</i>	
	<i>Tunicata</i>	

Appendix 6.3 Total results from the Beam Trawl June 2009.*Trawl Description*

	Trawl 1	Trawl 2	Trawl 3	Trawl 4	Trawl 5	Trawl 6
Description	Good Trawl Sample	Good Trawl Sample	No Sample retained for analysis. Trawl returned on two spate occasions filled with shell gravel and bryozoans as it had sampled through a bank of large sandwaves. Sample processing wasn't possible.	Good Trawl Sample	Good Trawl Sample	Good Trawl Sample
Date of hauling	22/06/2009	22/06/2009	23/06/2009	23/06/2009	22/06/2009	22/06/2009
Time of hauling	1637	1750	1044	1140	1502	1307
Layback/warp (m)	75	125	125	150	175	200
Speed of Vessel (kts)	2.7	2.4	2.5	2.6	2.5	2.2
Vessel Bearing	0°	180°	220°	180°	0°	0°

Table of Contents for the Beam Trawls taken during the course of the June 2009 Survey.

	Trawl 1	Trawl 2	Trawl 3	Trawl 4	Trawl 5	Trawl 6
<i>Abra nitida</i>	0	0	0	0	0	1
<i>Acanthodoris pilosa</i>	14	2	0	94	0	3
<i>Actiniaria indet.</i>	0	0	0	0	1	0
<i>Adyte pellucida</i>	1	0	0	0	0	1
<i>Agonus cataphractus</i>	0	0	0	0	2	2
<i>Alcyonidium diaphanum</i>	0	P	0	P	P	P
<i>Alcyonidium parasiticum</i>	P	P	0	0	0	0
<i>Alcyonium digitatum</i>	0	0	0	0	P	0
<i>Ammodytes tobianus</i>	0	0	0	0	0	2
<i>Ampharete lindstroemi</i>	0	0	0	0	1	0
<i>Anemone Indet</i>	0	0	0	0	1	0
<i>Aora gracilis</i>	1	0	0	0	0	0
<i>Aoridae</i>	0	0	0	0	0	1
<i>Aphrodita aculeata</i>	1	0	0	1	0	0
<i>Asciidiella scabra</i>	P	P	0	P	0	0
<i>Astacilla longicornis</i>	0	0	0	1	0	0
<i>Astarte sulcata</i>	2	0	0	0	0	0
<i>Asterias rubens</i>	18	2	0	10	1	21
<i>Atylus swammerdami</i>	0	1	0	0	0	0
<i>Autolytus alexandri</i>	0	0	0	0	0	1
<i>Autolytus indet.</i>	0	0	0	0	1	0

	Trawl 1	Trawl 2	Trawl 3	Trawl 4	Trawl 5	Trawl 6
<i>Balanus crenatus</i>	157	7	0	11	6	64
<i>Bicellaria bicellata</i>	0	P	0	0	0	P
<i>Buccinum undatum</i>	9	0	4	1	1	2
<i>Bugula avicularia</i>	0	P	0	0	0	0
<i>Callionymus lyra</i>	0	1	2	2	0	2
<i>Calliostoma zizyphinum</i>	0	0	0	2	0	2
<i>Cerebratulus sp. 1</i>	1	0	0	0	0	0
<i>Clythia hemisphaerica</i>	0	0	0	P	0	0
<i>Corophium sp.</i>	1	0	0	0	0	0
<i>Crangon allmani</i>	0	8	0	77	19	20
<i>Cressa dubia</i>	3	0	0	0	0	0
<i>Crossaster papposus</i>	6	0	0	4	0	2
<i>Didemnidae</i>	P	P	0	P	0	0
<i>Doto pinnatifida</i>	101	28	0	0	0	5
<i>Echiichthys vipera</i>	0	0	3	0	0	3
<i>Electra pilosa</i>	0	P	0	0	P	P
<i>Eubranchus</i>	0	0	0	0	0	1
<i>Eubranchus farrani</i>	4	0	0	0	0	0
<i>Eubranchus sp.</i>	1	0	0	0	0	0
<i>Eumida sanguinea</i>	0	0	0	0	1	0
<i>Eupolymnia nesidensis</i>	0	0	0	0	0	1
<i>Eurynome aspersa</i>	1	0	0	1	0	0
<i>Eusyllis blomstrandii</i>	2	5	0	0	0	10
<i>Exogone naidina</i>	0	2	0	0	0	0
<i>Flustra foliacea</i>	P	P	0	P	P	P
<i>Gammarellus homari</i>	0	0	0	0	1	0
<i>Gastrosaccus spinifer</i>	0	0	0	0	0	2
<i>Gibbula cineraria</i>	0	0	0	1	0	0
<i>Halecium</i>	0	P	0	P	P	0
<i>Harmothoe indet.</i>	4	0	0	0	3	2
<i>Henricia sanguinolenta</i>	1	0	0	0	0	0
<i>Heteranomia squamula</i>	0	0	0	2	1	5
<i>Hiatella arctica</i>	1	0	0	0	0	10
<i>Hippolyte varians</i>	3	1	0	3	2	2
<i>Hyas coarctatus</i>	0	0	0	0	0	9
<i>Hydractinia echinata</i>	P	0	0	0	P	P
<i>Hydrallmania falcata</i>	0	P	0	0	P	P
<i>Iphimedia minuta</i>	0	0	0	0	0	1
<i>Jasmineira elegans</i>	1	0	0	0	1	0
<i>Kefersteinia cirrata</i>	0	0	0	0	0	2
<i>Lacuna crassior</i>	24	0	0	1	0	0
<i>Lanice conchilega</i>	0	2	0	0	0	1
<i>Lepidonotus squamatus</i>	3	0	0	6	6	6

	Trawl 1	Trawl 2	Trawl 3	Trawl 4	Trawl 5	Trawl 6
<i>Leptochiton asellus</i>	1	0	0	8	21	0
<i>Limacia clavigera</i>	0	0	0	0	1	0
<i>Liocarcinus (juv.)</i>	0	24	0	23	10	19
<i>Liocarcinus corrugatus</i>	0	1	0	1	0	0
<i>Lumbrineris gracilis</i>	0	1	0	0	0	0
<i>Macropodia rostrata</i>	17	7	0	1	3	1
<i>Merlangius merlangus</i>	0	0	0	1	0	1
<i>Modiolarca subpicta</i>	2	1	0	0	0	1
<i>Modiolus modiolus</i>	0	1	0	2	1	5
<i>Molgula manhattensis</i>	P	0	0	P	0	0
<i>Mytilus edulis</i>	1	1	0	3	0	6
<i>Natica catena (eggmass)</i>	0	0	0	0	0	P
<i>Nemertea indet.</i>	0	0	0	0	0	1
<i>Nemertesia</i>	0	P	0	P	0	P
<i>Nereis pelagica</i>	0	0	0	1	0	4
<i>Nicolea venustula</i>	0	0	0	0	1	0
<i>Nicolea zostericola</i>	0	0	0	0	0	1
<i>Nudibranch indet.</i>	3	0	0	0	0	0
<i>Nymphon brevirostre</i>	1	0	0	0	0	0
<i>Onchidoris depressa</i>	0	0	0	0	1	0
<i>Ophiothrix fragilis</i>	0	0	0	2	1	0
<i>Ophiura albida</i>	1	0	0	0	1	0
<i>Oriopsis armandi</i>	0	1	0	0	0	0
<i>Pagurus bernhardus</i>	25	10	0	21	8	30
<i>Pandalus montagui</i>	289	7	0	90	7	13
<i>Phascolion strombus</i>	0	0	0	0	1	0
<i>Philocheras sculptus</i>	0	0	0	0	1	0
<i>Philocheras trispinosus</i>	0	1	0	0	0	1
<i>Phyllochaetopterus sp.</i>	0	0	0	0	4	0
<i>Pleuronecta platessa (juv)</i>	0	0	0	0	2	5
<i>Plumularia setacea</i>	0	0	0	0	0	P
<i>Polydora flava</i>	1	0	0	0	1	0
<i>Polynoe scolopendrina</i>	5	2	0	0	0	0
<i>Pomatoceros lamarcki</i>	34	13	0	2	3	4
<i>Pomatoschistus minutus</i>	1	0	0	0	0	0
<i>Porcellana longicornis</i>	1	0	0	17	0	0
<i>Porifera</i>	0	P	0	0	P	P
<i>Proceraea sp. indet.</i>	0	1	0	0	0	0
<i>Psammechinus miliaris</i>	17	1	0	6	7	9
<i>Sabella pavonina</i>	0	6	0	0	0	0
<i>Sabellaria alveolata</i>	2	1	0	0	0	0
<i>Sabellaria spinulosa</i>	4	6	0	0	1	5
<i>Schistomysis sp. Indet.</i>	0	0	0	0	0	3

	Trawl 1	Trawl 2	Trawl 3	Trawl 4	Trawl 5	Trawl 6
<i>Schizomavella auriculata</i>	0	P	0	0	0	0
<i>Scrupocellaria scruposa</i>	0	0	0	0	P	P
<i>Scylliorhinus caniculus</i>	0	0	0	0	1	0
<i>Sepietta oweniana</i>	0	1	0	1	0	1
<i>Sepiola atlantica</i>	0	2	0	1	0	0
<i>Sertularia cupressina</i>	P	P	0	P	0	0
<i>Solea solea</i>	0	1	0	0	0	0
<i>Sphaerosyllis taylori</i>	0	0	0	0	1	0
<i>Sphenia binghami</i>	0	0	0	0	0	1
<i>Spisula elliptica</i>	0	0	0	2	0	1
<i>Sthenelais boa</i>	0	0	0	0	1	1
<i>Sycon so.</i>	P	0	0	0	0	0
<i>Syllis sp. D</i>	0	0	0	0	1	0
<i>Syngnathus acus</i>	0	1	0	0	0	0
<i>Terebellidae indet.</i>	1	0	0	P	0	0
<i>Thelepus cincinnatus</i>	2	1	0	0	5	14
<i>Thelepus setosus</i>	2	0	0	0	0	0
<i>Trisopterus luscus</i>	0	0	0	0	0	1
<i>Tritonia hombergi</i>	2	1	0	0	0	0
<i>Tubificoides benedii</i>	0	1	0	0	0	0
<i>Tubulanus polymorphus</i>	0	0	0	0	0	1
<i>Tubulariidae</i>	0	0	0	0	0	P
<i>Turbicellopora sp.</i>	0	0	0	0	0	P
<i>Vesicularia spinosa</i>	0	0	0	P	0	0
<i>Xantho incisus</i>	0	0	0	0	2	0

Appendix 6.4 Total fish numbers and lengths

	Trawl 1	Trawl 2	Trawl 3	Trawl 4	Trawl 5	Trawl 6
<i>Ammodytes tobianus</i>	0	0	0	0	0	2 [90, 100]
<i>Echiichthys vipera</i>	0	0	3 [x]	0	0	3 [140, 120, 120]
<i>Agonus cataphractus</i>	0	0	0	0	2 [<50, <50]	2 [x]
<i>Callionymus lyra</i>	0	1 [200]	2 [x]	2 [200, 140]	0	2 [x]
<i>Merlangius merlangus</i>	0	0	0	1 [100]	0	1 [60]
<i>Pleuronecta platessa (juv)</i>	0	0	0	0	2 [150; x,j]	5 [x, j]
<i>Pomatoschistus minutus</i>	1 [70]	0	0	0	0	0
<i>Scyliorhinus caniculus</i>	0	0	0	0	1 [480]	0
<i>Solea solea</i>	0	1 [150]	0	0	0	0
<i>Trisopterus luscus</i>	0	0	0	0	0	1 [x]

Measurements in mm (where possible) of all fish species; June 2009. [x – Denotes where no measurements were taken; j – indicates juveniles]

Appendix 6.5 Anchor dredge raw data, June 2009

		S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20
Annelida	<i>Adyte pellucida</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Annelida	<i>Aricidea catherinae</i>	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Ampharete indet.</i>	4	2	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0
Annelida	<i>Ampharete lindstroemi</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Anobothrus gracilis</i>	0	0	0	0	0	0	0	0	0	2	1	0	0	8	0	0	0	0	0	0
Annelida	<i>Aonides oxycephala</i>	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Annelida	<i>Aonides paucibranchiata</i>	2	4	0	1	0	0	4	0	0	0	0	0	0	3	0	0	0	0	0	0
Annelida	<i>Aphelochaeta marioni</i>	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Apomatus similis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	P	0	0	0	0	0
Annelida	<i>Armandia polyopphthalma</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Annelida	<i>Asclerocheilus sp. 1</i>	0	0	0	3	0	1	1	0	0	0	0	0	0	0	0	0	0	8	0	0
Annelida	<i>Autolytus alexandri</i>	0	2	0	3	0	2	1	0	0	0	0	0	0	0	0	0	0	3	0	0
Annelida	<i>Autolytus brachycephalus</i>	0	1	0	2	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
Annelida	<i>Autolytus indet.</i>	0	0	0	2	0	1	0	0	0	4	0	0	0	1	0	0	0	1	0	0
Annelida	<i>Capitella capitata complex</i>	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Cautleriella alata</i>	12	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	1	0
Annelida	<i>Cautleriella zetlandica</i>	10	1	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0
Annelida	<i>Chaetozone sp.</i>	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
Annelida	<i>Chone filicaudata</i>	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Annelida	<i>Cirratulidae indet.</i>	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
Annelida	<i>Clymenura johnstoni</i>	12	25	0	22	0	2	42	0	0	14	7	0	0	69	0	0	0	2	1	0
Annelida	<i>Clymenura tricirrata</i>	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
Annelida	<i>Dodecaceria sp.</i>	0	0	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0
Annelida	<i>Ehlersia ferruginea</i>	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	2	0	0
Annelida	<i>Eteone longa</i>	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
Annelida	<i>Euclymene lombricoides</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Annelida	<i>Euclymene oerstedii</i>	4	5	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1	0
Annelida	<i>Eulalia aurea</i>	0	0	0	0	0	4	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Annelida	<i>Eulalia bilineata</i>	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Annelida	<i>Eulalia expusilla</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Annelida	<i>Eulalia ornata</i>	0	1	0	0	0	7	7	0	0	4	18	0	0	0	0	0	0	0	0	0
Annelida	<i>Eulalia viridis</i>	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Annelida	<i>Eumida juv. indet.</i>	4	0	0	0	1	4	14	0	0	0	1	0	0	2	0	0	0	0	0	0
Annelida	<i>Eumida ockelmanni</i>	0	1	0	5	0	3	0	0	0	4	23	1	0	0	0	0	0	0	0	0
Annelida	<i>Eumida sanguinea</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

		S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20
Annelida	<i>Eunicidae indet.</i>	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Eupolymnia nesidensis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Eusyllis blomstrandii</i>	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0
Annelida	<i>Euzonus flabelligerus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Annelida	<i>Exogone hebes</i>	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Exogone verugera</i>	0	4	0	0	0	4	0	0	0	4	8	0	0	3	0	0	0	1	0	0
Annelida	<i>Galathowenia oculata</i>	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Gattyana cirrosa</i>	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Glycera lapidum</i>	0	1	0	1	0	0	1	0	0	0	2	0	0	1	4	0	0	0	1	0
Annelida	<i>Glycera oxycephala</i>	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3
Annelida	<i>Glycera tridactyla</i>	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Glycinde nordmanni</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Annelida	<i>Goniada maculata</i>	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Harmothoe indet.</i>	0	3	0	3	1	4	2	2	0	2	15	0	0	1	0	0	0	4	0	0
Annelida	<i>Harmothoe sp. 1</i>	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0
Annelida	<i>Hesionura elongata</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	1
Annelida	<i>Hydroides norvegicus</i>	0	0	0	0	0	0	1	0	0	8	3	0	0	0	0	0	0	1	0	0
Annelida	<i>Jasmineira elegans</i>	0	0	0	5	1	10	2	0	0	10	10	0	0	0	0	0	0	3	0	0
Annelida	<i>Kefersteinia cirrata</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Annelida	<i>Lagis koreni</i>	P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Lanice conchilega</i>	32	7	0	0	0	0	0	0	0	6	4	0	0	3	0	0	0	1	0	0
Annelida	<i>Laonice bahusiensis</i>	0	2	0	0	0	0	1	0	0	8	2	0	0	13	0	0	0	0	0	0
Annelida	<i>Lepidonotus squamatus</i>	0	0	0	3	0	2	0	0	0	2	0	0	0	0	0	0	0	1	0	0
Annelida	<i>Lumbrineris gracilis</i>	2	1	0	0	0	2	1	0	0	20	15	1	0	19	1	0	0	0	0	0
Annelida	<i>Lysilla loveni</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
Annelida	<i>Macrochaeta helgolandica</i>	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Malacoceros tetracerus</i>	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Maldanidae indet.</i>	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0
Annelida	<i>Mediomastus fragilis</i>	16	2	0	2	0	2	1	0	0	0	1	0	0	2	0	0	0	1	0	0
Annelida	<i>Nematoneris unicornis</i>	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
Annelida	<i>Nephtys caeca</i>	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Nephtys cirrosa</i>	0	1	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
Annelida	<i>Nephtys juv. indet.</i>	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Nereis elitoralis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Annelida	<i>Nereis juv. indet.</i>	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Nereis longissima</i>	0	1	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Nereis pelagica</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Nereis zonata</i>	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Nicolea venustula</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

		S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20
Annelida	<i>Nicolea zostericola</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Nicomache personata</i>	0	0	0	0	0	0	0	0	0	46	4	0	0	1	0	0	0	0	0	0
Annelida	<i>Notocirrus scoticus</i>	2	1	0	0	0	0	0	0	0	2	1	0	0	1	0	0	0	0	0	0
Annelida	<i>Notomastus latericeus</i>	2	2	0	0	0	0	1	0	0	0	0	0	0	2	1	0	0	0	2	0
Annelida	<i>Odontosyllis fulgurans</i>	2	1	0	0	0	1	2	0	0	2	0	0	0	3	0	0	0	0	0	0
Annelida	<i>Ophelia borealis</i>	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
Annelida	<i>Ophelina acuminata</i>	0	0	0	0	0	0	0	0	0	4	3	0	0	1	0	0	0	0	0	0
Annelida	<i>Oriopsis armandi</i>	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Owenia fusiformis</i>	2	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Paradoneis lyra</i>	0	3	0	0	0	0	0	0	0	2	5	0	0	3	1	0	0	0	0	0
Annelida	<i>Paraonidae indet.</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Annelida	<i>Pholoe inornata</i>	2	1	0	1	0	1	2	0	0	2	2	0	0	0	0	0	0	3	0	0
Annelida	<i>Pholoe synophthalmica</i>	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Phyllochaetopterus sp.</i>	0	2	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0
Annelida	<i>Phyllodoce groenlandica</i>	6	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Annelida	<i>Phyllodoce rosea</i>	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Phyllococidae indet.</i>	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Poecilochaetus serpens</i>	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Polycirrus indet.</i>	0	0	0	0	0	1	0	0	2	0	0	0	0	4	0	0	0	0	0	0
Annelida	<i>Polycirrus medusa</i>	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Annelida	<i>Polycirrus norvegicus</i>	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Polydora caeca</i>	0	0	0	17	0	0	0	0	0	0	5	0	0	0	0	0	0	73	0	0
Annelida	<i>Polydora caulleryi</i>	0	0	0	0	0	8	0	0	4	0	1	0	0	0	0	0	0	10	0	0
Annelida	<i>Polydora flava</i>	0	2	0	3	0	0	1	0	0	0	0	0	0	0	0	0	0	18	0	0
Annelida	<i>Polydora indet.</i>	2	2	0	0	1	0	0	0	0	4	2	0	0	1	0	0	0	0	0	0
Annelida	<i>Polynoe scolopendrina</i>	0	1	0	5	0	0	1	0	0	0	0	0	0	0	0	0	0	3	0	0
Annelida	<i>Pomatoceros lamarcki</i>	0	30	0	1340	66	5	4203	0	0	78	27	0	0	7	1	0	0	384	0	0
Annelida	<i>Praxillella affinis</i>	52	0	0	3	0	0	1	0	0	4	0	0	0	5	0	0	0	0	0	0
Annelida	<i>Prionospio fallax</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Annelida	<i>Proceraea sp. indet.</i>	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Annelida	<i>Protodorvillea kefersteini</i>	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
Annelida	<i>Pseudopolydora pulchra</i>	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Pseudopotamilla reniformis</i>	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Raphitoma purpurea</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Annelida	<i>Sabella pavonina</i>	0	1	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Sabellaria alveolata</i>	0	0	0	0	0	415	5	0	0	40	550	2	1	0	0	0	0	0	0	0
Annelida	<i>Sabellaria spinulosa</i>	0	32	0	26	2	20	17	0	0	1050	1765	26	13	14	0	0	0	9	7	0
Annelida	<i>Sabellidae indet.</i>	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
Annelida	<i>Scalibregma celticum</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0

		S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20
Annelida	<i>Scalibregma inflatum</i>	2	0	0	0	0	0	0	0	0	0	2	0	0	9	0	0	0	0	0	0
Annelida	<i>Schistomeringos rudolphi</i>	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	0	0	0	0	0
Annelida	<i>Scoloplos armiger</i>	0	0	0	0	0	0	0	0	0	6	10	0	0	3	0	0	0	0	0	0
Annelida	<i>Serpulidae indet.</i>	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Sphaerosyllis taylori</i>	0	0	0	0	0	0	1	0	4	0	1	0	0	0	0	0	0	1	0	0
Annelida	<i>Spio armata</i>	0	3	0	4	0	1	4	0	0	2	2	0	0	0	0	0	0	0	2	0
Annelida	<i>Spio decorata</i>	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Spio martinensis</i>	4	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Annelida	<i>Spionidae indet.</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Annelida	<i>Spiophanes bombyx</i>	26	6	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0
Annelida	<i>Spiophanes kroyeri</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Annelida	<i>Sthenelais boa</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Sthenelais limicola</i>	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Streblosoma intestinalis</i>	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0
Annelida	<i>Streptosyllis sp. 1</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
Annelida	<i>Syllides japonica</i>	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Syllidia armata</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Annelida	<i>Syllis armillaris</i>	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0
Annelida	<i>Syllis indet.</i>	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annelida	<i>Syllis sp. D</i>	0	0	0	0	0	1	0	0	0	0	1	0	0	2	0	0	0	2	0	0
Annelida	<i>Syllis sp. E</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0
Annelida	<i>Syllis sp. H</i>	0	2	0	0	0	0	0	0	16	0	0	0	0	1	1	0	0	0	0	0
Annelida	<i>Syllis variegata</i>	0	1	0	3	0	13	4	0	0	0	1	0	0	0	0	0	0	2	0	0
Annelida	<i>Terebellidae indet.</i>	0	0	0	1	0	0	1	0	0	0	1	0	0	2	0	0	0	0	0	0
Annelida	<i>Terebellides stroemi</i>	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0
Annelida	<i>Tharyx killariensis</i>	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Annelida	<i>Thelepus cincinnatus</i>	0	2	0	0	0	1	4	0	0	2	0	0	0	1	0	0	0	0	0	0
Annelida	<i>Thelepus setosus</i>	0	0	0	3	4	0	4	0	0	0	0	0	0	0	0	0	0	7	0	0
Annelida	<i>Travisia forbesii</i>	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Annelida	<i>Tubificidae indet.</i>	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bryozoa	<i>Alcyonidium diaphanum</i>	P	P	0	0	P	P	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bryozoa	<i>Alcyonidium mytili</i>	0	0	0	P	0	P	P	0	0	0	0	0	0	0	0	0	0	0	0	0
Bryozoa	<i>Bicellariella ciliata</i>	0	0	0	P	P	P	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bryozoa	<i>Cellepora pumicosa</i>	0	0	0	0	P	P	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bryozoa	<i>Conopeum reticulum</i>	0	0	0	0	0	P	P	0	0	0	0	0	0	0	0	0	0	0	0	0
Bryozoa	<i>Electra monostachys</i>	0	0	0	0	0	P	P	0	0	0	0	0	0	0	0	0	0	0	0	0
Bryozoa	<i>Electra pilosa</i>	P	0	0	P	P	P	P	0	0	P	0	0	0	0	0	0	0	P	0	0
Bryozoa	<i>Escharella immersa</i>	0	0	0	0	P	P	P	0	P	0	P	0	0	0	0	0	0	P	0	0
Bryozoa	<i>Escharella ventricosa</i>	0	0	0	0	P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

		S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20
Bryozoa	<i>Flustra foliacea</i>		0	0	0	0	P	0	0	P	P	0	0	0	0	0	0	0	P	0	0
Bryozoa	<i>Scruparia chelata</i>	0	0	0	0	P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bryozoa	<i>Turbicellepora avicularis</i>	0	0	0	0	P	0	P	0	0	0	0	0	0	0	0	0	0	0	0	0
Chelicerata	<i>Anoplodactylus petiolatus</i>	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Chelicerata	<i>Nymphon brevirostre</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cnidaria	<i>Actinaria indet.</i>	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0
Cnidaria	<i>Edwardsia claparedii</i>	0	0	0	0	0	0	0	0	0	6	0	0	0	1	0	0	0	0	0	0
Cnidaria	<i>Hydrallmania falcata</i>	P	0	0	0	P	0	0	0	0	0	0	0	0	0	0	0	0	P	0	0
Cnidaria	<i>Sertularia</i>	P	0	0	p	0	0	0	0	P	0	0	0	0	0	0	0	0	0	0	0
Crustacea	<i>Anthura gracilis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Crustacea	<i>Aora gracilis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea	<i>Corophium</i>	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea	<i>Gammaridea indet.</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Crustacea	<i>Harpinia</i>	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea	<i>Janira maculosa</i>	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea	<i>Maera othonis</i>	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea	<i>Microdeutopus versiculatus</i>	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea	<i>Pinnotheres pisum</i>	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Crustacea	<i>Unciola</i>	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Crustacea	<i>Urothoe elegans</i>	0	0	0	2	0	0	5	0	0	0	0	0	0	0	0	0	0	3	0	0
Echinodermata	<i>Amphipholis squamata</i>	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Echinodermata	<i>Amphiura brachiata</i>	P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Echinodermata	<i>Crassoster paposus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Hemichordata	<i>Saccoglossus indet.</i>	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Mollusca	<i>Abra alba</i>	124	0	0	1	0	4	0	0	0	28	18	0	0	0	0	0	0	0	0	0
Mollusca	<i>Aequipecten opercularis</i>	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Mollusca	<i>Bela nebula</i>	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0
Mollusca	<i>Chrysallida trunactula</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Mollusca	<i>Donax vittatus</i>	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca	<i>Gibbula cineraria</i>	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca	<i>Gibbula magus</i>	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca	<i>Heteranomia squamala</i>	0	0	0	2	0	4	0	0	0	6	4	0	0	0	0	0	0	6	0	0
Mollusca	<i>Hiatella arctica</i>	0	0	0	3	0	3	0	0	0	6	2	0	0	2	0	0	0	2	1	0
Mollusca	<i>Jujubinus montagui</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Mollusca	<i>Lacuna crassior</i>	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca	<i>Lacuna crassior</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca	<i>Leptochiton asellus</i>	0	46	0	8	2	0	0	0	0	32	46	0	0	1	0	0	0	10	0	0
Mollusca	<i>Modiolus modiolus</i>	0	0	0	1	0	2	0	0	0	0	6	0	0	1	0	0	0	3	0	0
Mollusca	<i>Musculus discors</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0

		S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20
Mollusca	<i>Mya truncata</i>	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Mollusca	<i>Mysella bidentata</i>	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca	<i>Mytilus edulis</i>	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca	<i>Nucella lapillus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Mollusca	<i>Nucula hanleyi</i>	0	0	0	4	2	0	0	0	0	0	0	0	0	0	0	0	0	75	0	0
Mollusca	<i>Nucula nucleus</i>	0	0	0	4	2	0	0	0	0	0	0	0	2	0	0	0	0	101	0	0
Mollusca	<i>Nudibranchia</i>	0	1	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca	<i>Ocenebra erinaceus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Mollusca	<i>Oenopota rufa</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0
Mollusca	<i>Pelecypoda</i>	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Mollusca	<i>Phaxas pellucidus</i>	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca	<i>Phaxas pellucidus</i>	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca	<i>Scutopus robusus</i>	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
Mollusca	<i>Spisula elliptica</i>	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mollusca	<i>Timoclea ovata</i>	4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0
Mollusca	<i>Tricolia pullus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0
Mollusca	<i>Trophonopsis barvicensus</i>	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nemertea	<i>Cerebratulus sp. 1</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Nemertea	<i>Nemertea indet.</i>	0	9	0	1	1	4	1	0	0	6	9	0	0	9	3	0	0	2	0	0
Nemertea	<i>Tubulanus polymorphus</i>	8	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Phoronida	<i>Phoronis indet.</i>	0	1	0	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Platyhelminthes	<i>Platyhelminthes indet.</i>	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Porifera	<i>Porifera</i>	0	0	0	0	P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sipuncula	<i>Golfingia vulgaris</i>	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0
Sipuncula	<i>Nephasoma minutum</i>	0	13	0	30	1	12	1	0	0	30	13	0	0	3	0	0	0	129	0	0
Sipuncula	<i>Phascolion strombus</i>	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sipuncula	<i>Sipuncula juv. indet.</i>	2	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0
Tunicata	<i>Dendrodoa grossularia</i>	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tunicata	<i>Molgulidae</i>	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tunicata	<i>Tunicata</i>	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0

	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20
<i>Total number of Taxa (June 2009)</i>	47	61	0	49	22	63	53	2	10	48	61	5	4	66	16	1	1	64	9	3
<i>Total number of Individuals (June 2009)</i>	380	254	0	1529	84	587	4355	3	34	1474	2613	31	16	243	24	1	2	912	17	5
<i>Total number of Taxa (May 2008)</i>	24	42	3	49	52	64	50	0	20	48	17	6	3	34	13	1	1	83	6	11
<i>Total number of Individuals (May 2008)</i>	94	144	2	4666	737	306	891	0	26	115	65	7	3	73	21	1	0	471	12	17
<i>Total number of Taxa (May 2007)</i>	40	45	2	44	83	73	51	1	31	55	38	2	5	74	13	1	1	67	13	4
<i>Total number of Individuals (May 2007)</i>	50	71	1	6158	9061	796	573	0	25	169	74	0	5	169	5	1	0	594	45	3
<i>Total number of Taxa (June 2006)</i>	39	56	11	94	131	17	102	0	94	83	64	2	8	128	5	1	2	116	4	4
<i>Total number of Individuals (June 2006)</i>	68	179	8	12896	4531	347	1433	0	1159	374	200	2	9	742	13	1	3	2793	17	4
<i>Total number of Taxa (June 2005)</i>	95	38	6	121	155	128	129	8	96	117	108	7	19	125	13	9	5	167	13	15
<i>Total number of Individuals (June 2005)</i>	816	67	1	7872	7806	9669	1887	2	590	897	2216	1	12	1584	39	5	1	16324	8	14
<i>Total number of Taxa (Oct 2004)</i>	74	40	9	102	113	106	76	1	70	116	99	4	4	115	3	5	3	125	7	5
<i>Total number of Individuals (Oct 2004)</i>	450	101	21	5154	2126	3919	3247	1	1818	1176	4071	6	7	998	3	10	3	8972	9	5

Appendix 6.6 Particle Size Analysis: June 2009.

Site Code	4mm	2mm	1mm	0.5mm	0.25mm	0.125mm	0.063mm	<0.063mm	Mean phi	skewness	kurtosis	Classification after Buchanan	Folk Triangles after BGS
D01	4.4%	12.0%	6.5%	8.2%	23.7%	42.6%	1.2%	1.35%	1.238	-0.515	0.865	Poorly sorted gravelly sand	Gravelly Sand
D02	0.0%	1.0%	0.7%	1.4%	14.0%	74.9%	7.6%	0.56%	2.538	-0.294	2.475	Moderately well sorted slightly gravelly sand	Slightly Gravelly Sand
D03	3.5%	0.5%	0.3%	0.3%	32.0%	61.5%	0.6%	1.29%	2.381	-0.498	0.613	Moderately well sorted slightly gravelly sand	Slightly Gravelly Sand
D04	4.6%	9.0%	3.4%	2.5%	55.3%	23.3%	1.4%	0.64%	1.442	-0.413	1.925	Poorly sorted gravelly sand	Gravelly Sand
D05	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.00%	-2.243	0.000	0.738	Gravel	Gravel
D06	61.8%	13.4%	3.3%	2.0%	12.5%	5.3%	0.2%	1.54%	-0.937	0.864	1.635	Poorly sorted sandy gravel	Sandy Gravel
D07	59.0%	13.7%	4.6%	4.0%	10.0%	8.2%	0.4%	0.14%	-0.933	0.858	1.038	Poorly sorted sandy gravel	Sandy Gravel
D08	0.0%	13.5%	4.5%	33.9%	44.1%	3.8%	0.0%	0.28%	0.875	-0.262	1.164	Poorly sorted gravelly sand	Gravelly Sand
D09	7.5%	17.4%	19.9%	18.6%	31.2%	4.6%	0.2%	0.61%	0.405	-0.210	0.887	Poorly sorted gravelly sand	Gravelly Sand
D10	36.4%	20.5%	5.6%	6.9%	14.6%	15.0%	0.9%	0.18%	-0.320	0.529	0.563	Poorly sorted sandy gravel	Sandy Gravel
D11	36.0%	13.8%	4.1%	5.0%	26.0%	12.8%	0.9%	1.45%	-0.248	0.204	0.550	Poorly sorted sandy gravel	Sandy Gravel
D12	0.0%	0.0%	0.0%	0.5%	92.4%	6.7%	0.0%	0.36%	1.765	0.280	1.674	Very well sorted sand	Sand
D13	0.0%	1.2%	2.4%	27.8%	67.1%	0.9%	0.0%	0.60%	1.415	-0.548	0.635	Moderately well sorted slightly gravelly sand	Slightly Gravelly Sand
D14	40.1%	17.9%	5.5%	6.6%	18.1%	9.8%	1.8%	0.27%	-0.542	0.513	0.566	Poorly sorted sandy gravel	Sandy Gravel
D15	9.6%	3.6%	3.0%	8.3%	73.8%	1.3%	0.1%	0.22%	1.177	-0.807	5.036	Poorly sorted gravelly sand	Gravelly Sand
D16	0.0%	0.6%	1.4%	3.6%	87.0%	7.0%	0.2%	0.27%	1.752	0.020	2.450	Well sorted slightly gravelly sand	Slightly Gravelly Sand
D17	15.5%	20.3%	10.9%	6.6%	42.9%	3.3%	0.1%	0.33%	0.374	-0.377	0.588	Poorly sorted sandy gravel	Sandy Gravel
D18	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.00%	-2.243	0.000	0.738	Gravel	Gravel
D19	0.0%	1.1%	1.6%	4.0%	90.4%	2.7%	0.2%	0.00%	1.736	-0.291	1.763	Very well sorted slightly gravelly sand	Slightly Gravelly Sand
D20	3.5%	10.1%	7.6%	4.8%	66.0%	7.5%	0.2%	0.45%	1.097	-0.638	1.736	Poorly sorted gravelly sand	Gravelly Sand

