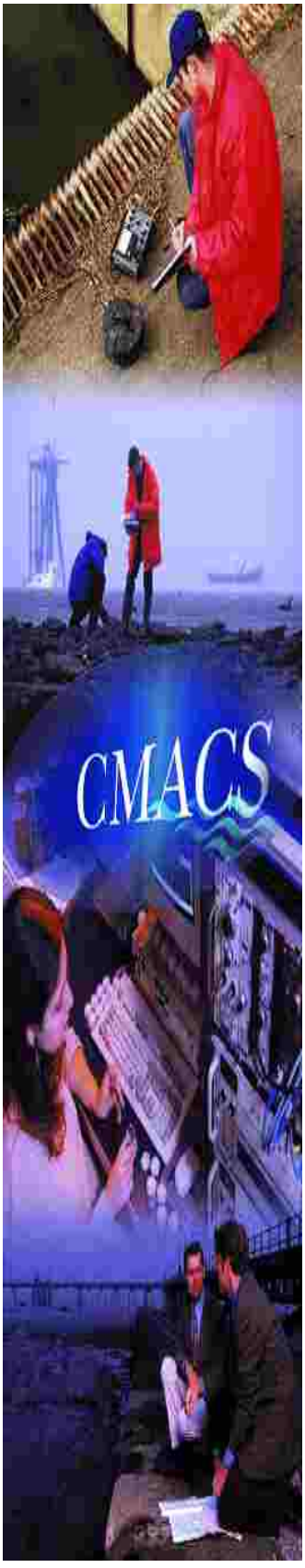

Rhyl Flats Offshore Wind Farm

Benthic Trawl Survey 2006

Monitoring Report

CMACS Project No: J3039

Doc Ref: J3039/04-07 v.1.0

Report to: **Carol Mitchell**

RWEnpower renewables

May 2007

Centre for Marine and Coastal Studies Ltd

Report Tracker:

Version	Date	Description	Prepared by	Checked by	Approved by
1.0	May 2007	Draft report	LG/SD	SWD	SWD

CMACS Ltd.
Cammell Lairds Waterfront Park
Campbeltown Road, Birkenhead
Wirral CH41 9HP

Tel 0151 650 2275
Fax 0151 650 2274
info@cmacsltd.co.uk

CMACS Ltd.
Port Erin Marine Laboratory
Breakwater Road, Port Erin
Isle of Man IM9 6JA

Tel 01624 831 018
Fax 01624 831 043

Centre for Marine and Coastal Studies Ltd.
Registered in England No. 4883990

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1 Introduction

Rhyl Flats Offshore Wind Farm (OWF) has consent for thirty turbines to be built within an area of approximately 10km^2 some 4 miles off the North Wales coastline within Liverpool Bay between Towyn and Rhôs-on-Sea. Construction is likely to begin at the site during 2007/08.

A beam trawl survey of the proposed development area was undertaken during September 2006 by the Centre for Marine and Coastal Studies (CMACS) Ltd. to provide information concerning the benthic populations as part of the benthic baseline survey program (see Figure 1 for site locations). The beam trawl site locations (see Figure 1) were first surveyed during September 2005 as part of the pre-construction benthic survey program and will be repeat surveyed both during and post-construction as part of the proposed monitoring required to comply with the conditions of the Food and Environmental Protection Act (FEPA) 1985: Part II (as amended) issued to 'npower renewables offshore Ltd' for Rhyl Flats OWF.

This report details the main findings of the September 2006 survey detailing information regarding individual species accounts and counts of the total numbers of demersal fish and epibenthic invertebrates present. This report also details a comparative analysis between the results of the September 2005 and this years (2006) monitoring survey results.

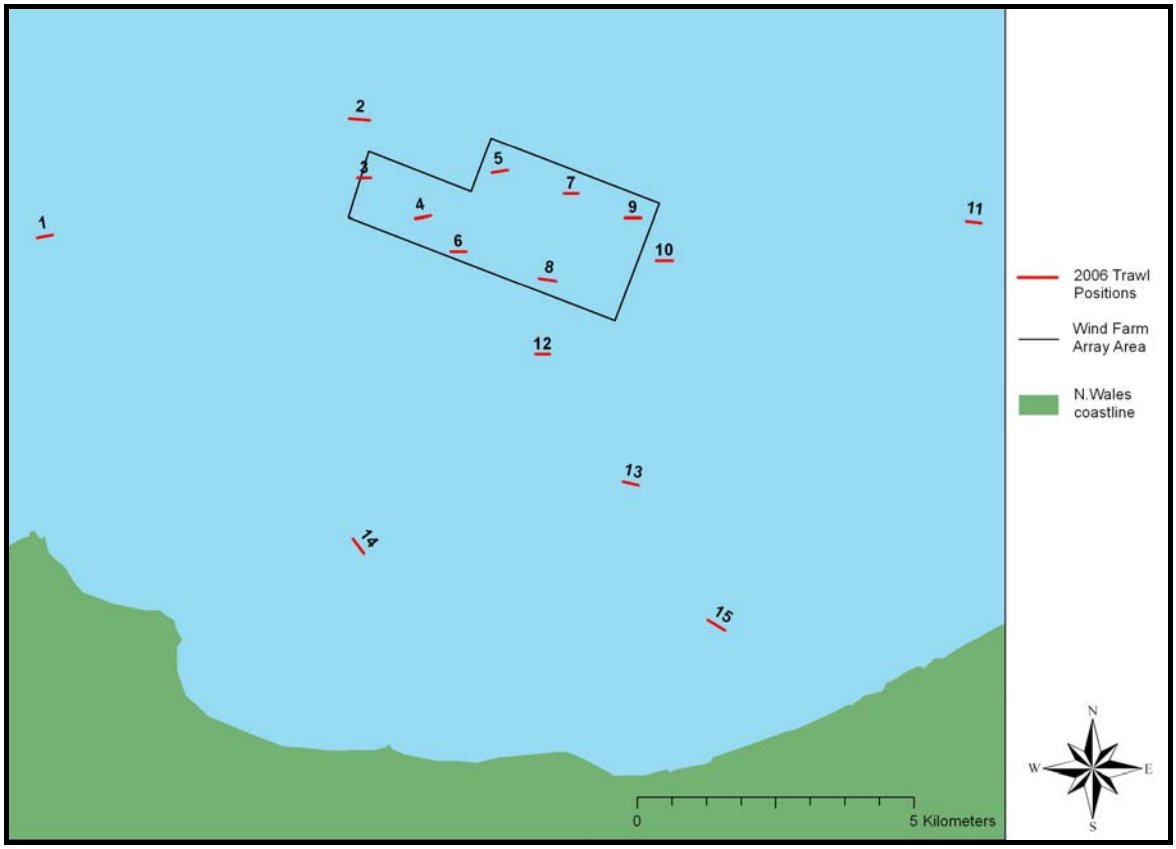


Figure 1 Rhyl Flats Offshore Wind Farm Beam Trawl Site Locations.

2 Methodology

The survey was conducted during September 2006 using the survey vessel RV 'Aquadynamic' operating out of Conwy marina and returning to berth on a daily basis (see Figure 2). Surveys were carried out using a standard CEFAS 2m beam trawl with a 4mm square mesh cod-end and chain matrix between the beam and foot-rope (see Figure 3). The 2m-beam trawls are used as they cause relatively limited damage to the seabed and are suitable for use within wind farm arrays, however this gear is not ideal for surveying the presence of large demersal fish, many of which frequently avoid capture and consequently only qualitative data can be interpreted for these fish taxa.

Figure 2 Survey vessel RV 'Aquadynamic'

A rope length attached to the beam trawl was paid out to a length approximately 3 times the depth of water. Trawling was undertaken for a period of 5-10 minutes over a distance of 300m into the prevailing current with a speed of approximately 2 knots over the ground. Once fished, the trawl was retrieved and the sample recovered on board into fish boxes.

A digital photograph was taken of each sample before any sorting or taxonomic identification took place (refer to Appendix 5.3). All commercial fish were identified to species level and measured (length, mm). The presence of any elasmobranch or rare fish taxa was also recorded, these individuals were also measured and where possible sexed. The numbers and taxonomic identification of all remaining fish taxa were also recorded. Epibenthic invertebrates were counted and identified to species level with colonies of hydroids, soft corals and bryozoans being recorded as present or absent or recorded by weight (g). Any invertebrates not identified in the field were retained and preserved for future taxonomic identification. Sub-sampling was also necessary where very large hauls or large numbers of individual species were obtained. On such occasions the haul was sorted initially to remove all fish taxa and any conspicuous/large epifauna, after which the remaining sample was divided up into an appropriate fraction, all organisms identified and counted, and then multiplied up by the necessary scaling factor.

Figure 3 2m Beam Trawl

3 Results

3.1 Fish

Full data on fish abundance from the 2006 beam trawl survey are provided in Table 1 (see Appendix 5.1); with the measured lengths data in Table 2 (see Appendix 5.2). In total 954 fish from 23 fish taxa were recorded (see Figure 4), with the largest numbers of individuals recorded at sites 12 and 13 (243 and 159 fish respectively) on the planned cable route and site 2 (174 fish) located to the northwest of the wind farm area. Trawl sites on the southern edge of the wind farm area (sites 6 and 8) and control sites in the east (site 11) and southwest (site 14) produced moderate fish catches. Lower numbers were recorded from both the remaining sites inside the proposed development area, and from site 15 inshore on the planned cable route. Very low numbers of fish were recorded from site 1 (located directly west of the project area and no fish recorded from site 3 (northwest corner of the planned array).

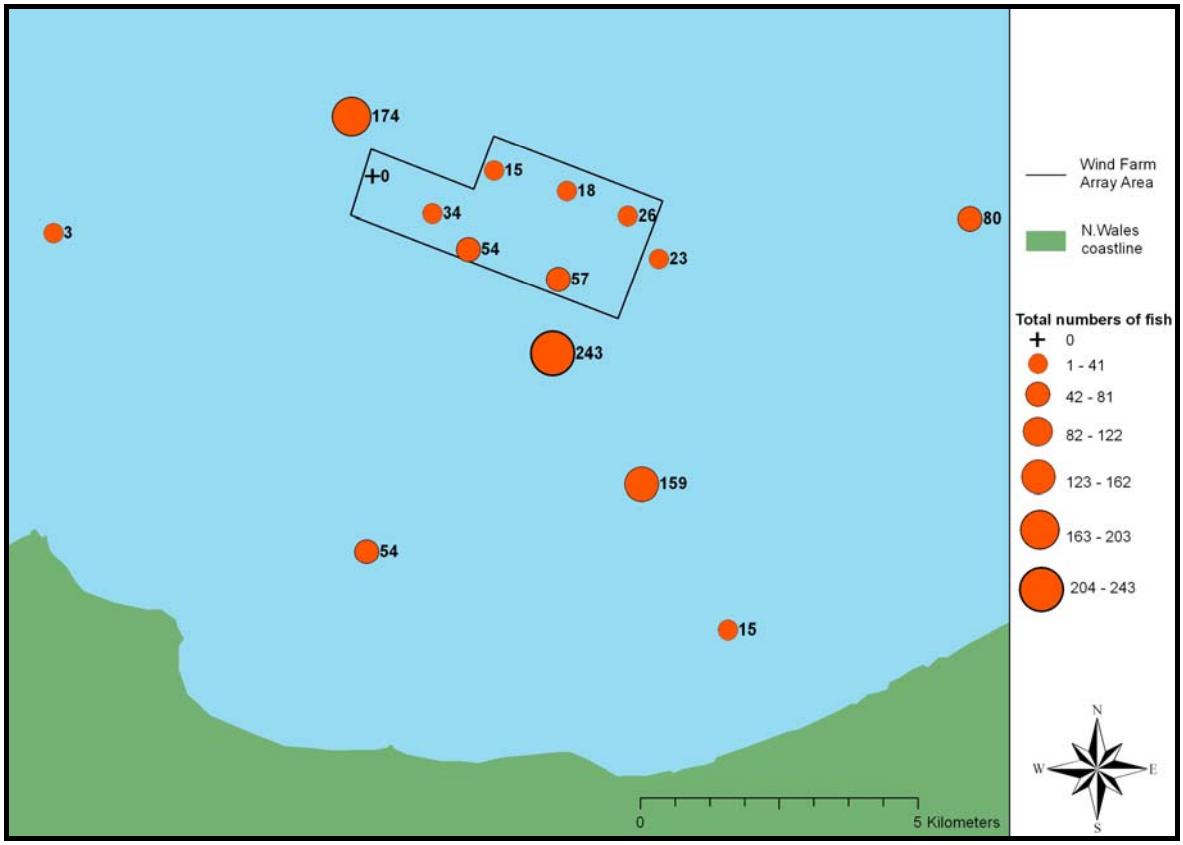


Figure 4 Total numbers of Fish (see Figure 1 for site locations).

The largest number of different fish taxa were recorded along the designated cable route at site 12, just outside the immediate development area (see Figure 5). Sites both within the array area and outside, including control sites in the east (site 11) and southwest (site 14) and on the cable route (site 13) were relatively diverse. However, few fish taxa were caught from trawling the control site directly west of the array (site 1) inshore on the designated cable route (site 15). No fish were recorded from site 3 located inside the array.

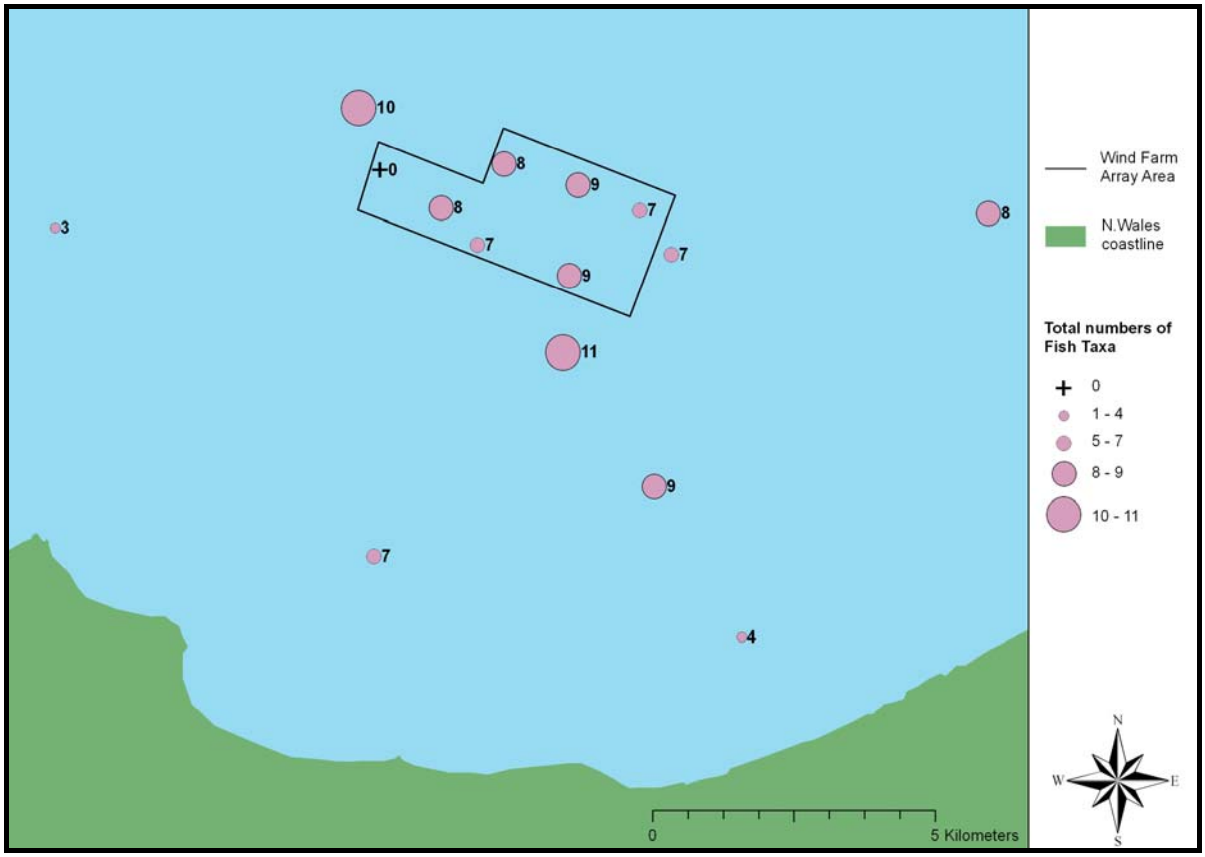


Figure 5 Total numbers of Fish Taxa (see Figure 1 for site locations).

The most common fish species recorded was dab (*Limanda limanda*), with a total of 229 individuals recorded from 9 of the 15 surveyed sites. The largest number of dab was recorded at site 12 on the planned cable route just outside the array area (135 individuals). Large numbers of sand goby (*Pomatoschistus minitus)* were also recorded (206 individuals) and were widespread across the survey area (recorded from 13 of the 15 trawl sites). Sand goby was also most abundant at sites 12 and 13 on the cable route (60 and 68 individuals respectively). Dab was the commonest commercial fish caught. Lower numbers of other commercial taxa were recorded, but only plaice (*Pleuronectes platessa*) was caught with any frequency, being present in low numbers across the majority of the survey area (30 individuals caught from 12 of the 15 survey sites). Distributions of the commonest and commercial fish taxa are displayed in Figures 6 and 7.

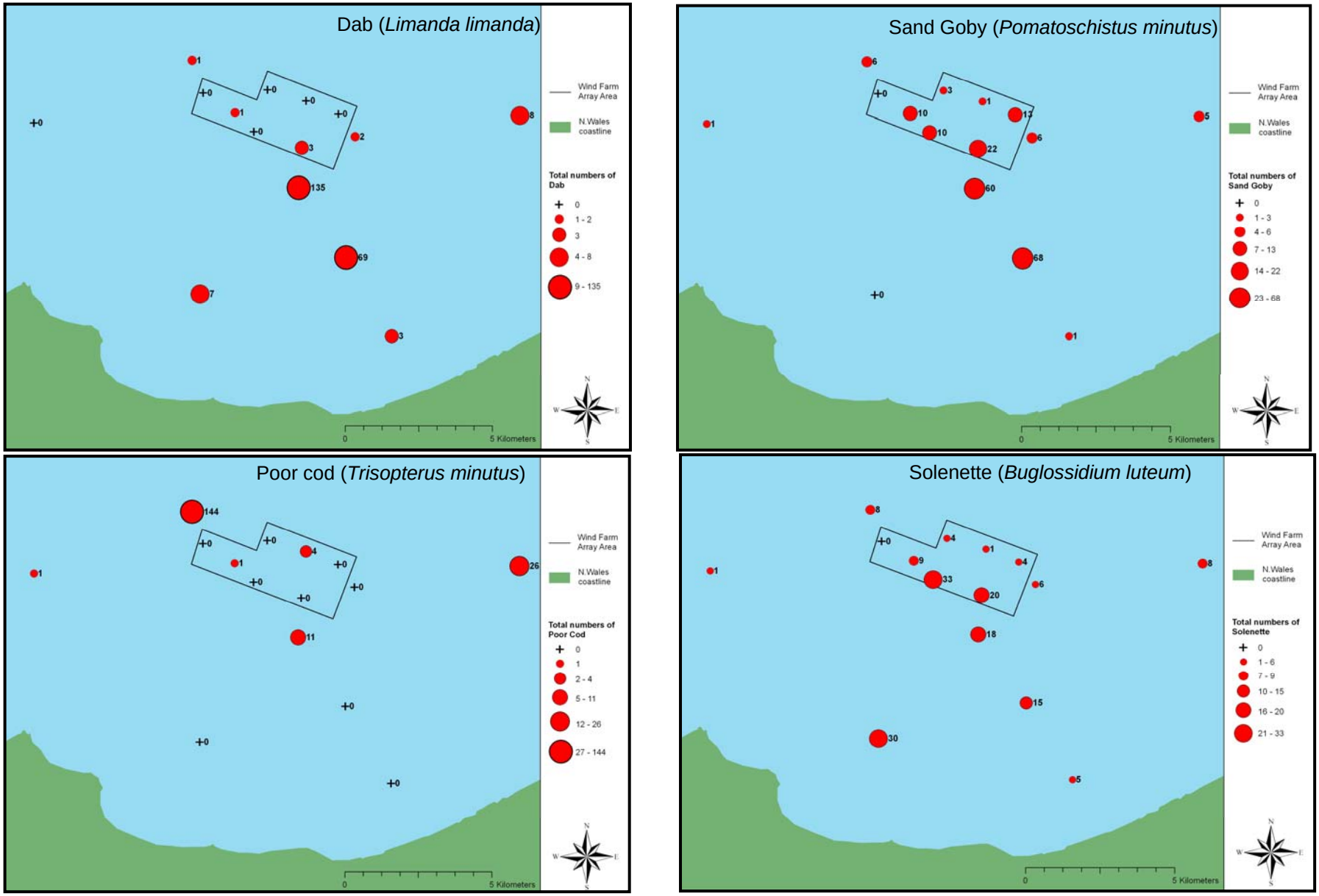


Figure 6 Distribution of the commonest fish taxa (see Figure 1 for site locations).

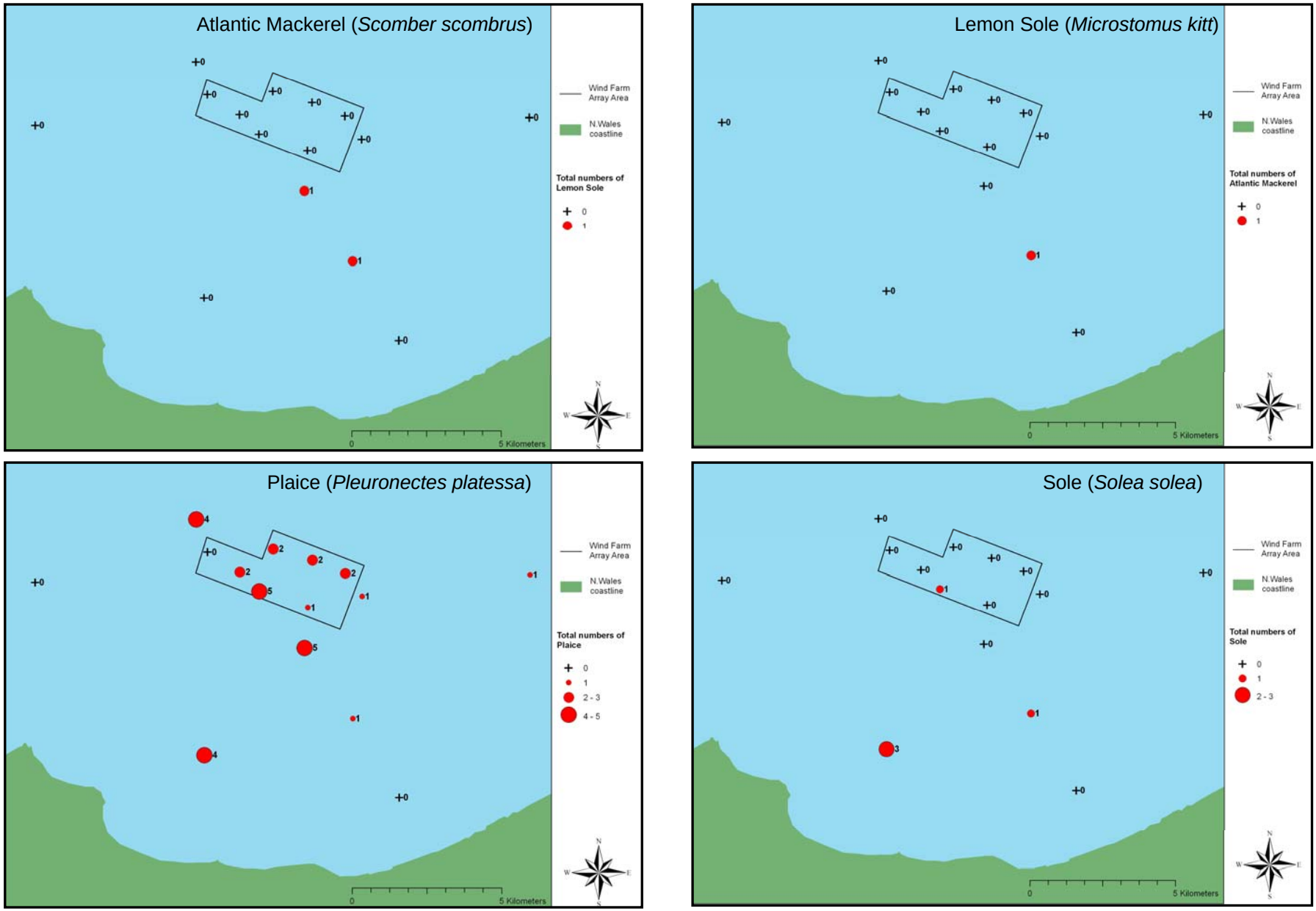
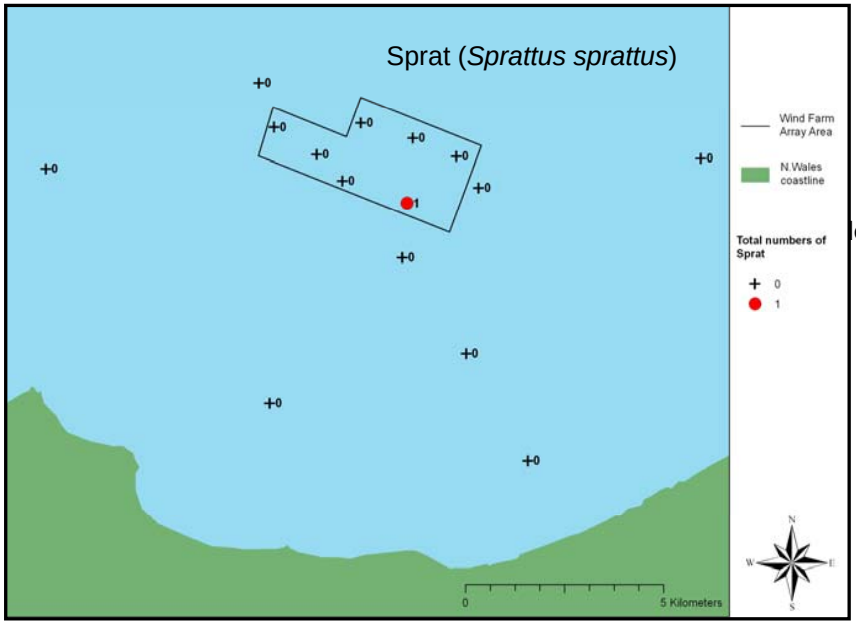
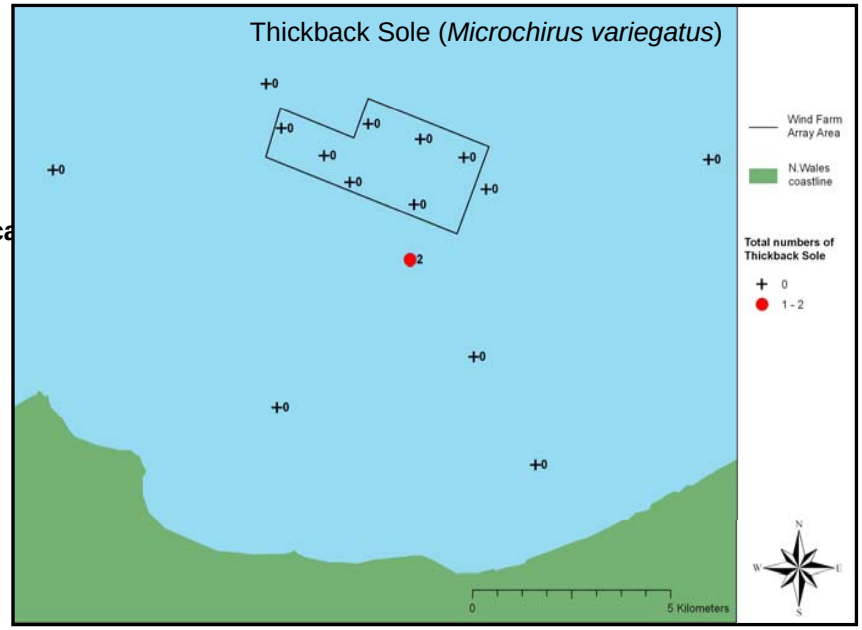


Figure 7 Distribution of commercial fish taxa (see Figure 1 for site locations).





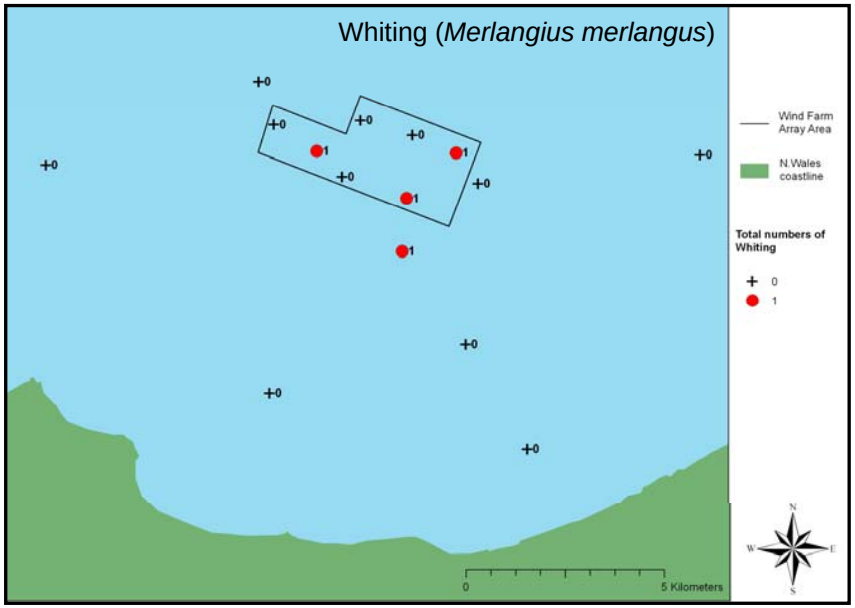


Figure 7 contd Distribution of commercial fish taxa (see Figure 1 for site locations).

Two lesser-spotted dogfish (*Scyliorhinus caniculus*) and a female (740mm L) greater spotted dogfish (*Scyliorhinus stellaris*) were also recorded during the survey. The lesser spotted dogfish were caught during separate trawls at sites 6 (female 610mm L) and 8 (male 594mm L) both inside the array area, whereas the female Greater Spotted Dogfish was recorded during trawling at site 2 in the northwest corner of the project area. These were the only two elasmobranch species recorded during the 2006 survey. No other rare or unusual fish species were recorded however, it should be noted that the sand goby is protected and legislated for under Appendix III (Protected Fauna Species) of the Bern Convention owed to its trophic position and importance. The Sand Goby is regarded as an abundant species in UK waters. It is also important to note that a UK British Diversity Action Plan has been described for commercial marine fish, which although are found over broad geographical areas, are at risk locally from excessive exploitation and stock collapse and are protected under the legislation and regulations underpinning the Common Fisheries Policy.

3.2 Epifauna

Full data on epifauna abundance from the 2006 beam trawl survey are provided in Table 1 (Section 5.1). In total 4408 invertebrates were recorded from 22 species from the groups Cnidaria, Mollusca, Crustacea and Echinodermata (see Figure 8). The presence/absence or recorded weight of colonies of hydroids, soft corals and bryozoans was also noted at 12 of the 15 sites surveyed. Consequently, only qualitative data can be recorded for these taxa and their presence is not recorded numerically in the figures below. Substantial numbers of long-clawed porcelain crab (*Pisidia longicornis*) were also recorded during several trawls, especially amongst clumps of hornwrack (*Flustra foliacea*). The small size (<10mm across the carapace) and cryptic habits of this crab render it difficult to observe and quantify accurately, and therefore its presence is often under-recorded. Consequently, the occurrence of large numbers of long-clawed porcelain crab at certain trawl survey sites was recorded as 'present'.

The largest numbers of epifauna was recorded at site 2, off the northwest corner of the wind farm area. Relatively high numbers were also observed at site 5 located within the array area, at the control sites directly east and southwest of the development (sites 11 and 14) and at site 15 inshore along the corridor within which the export cable may potentially be installed.

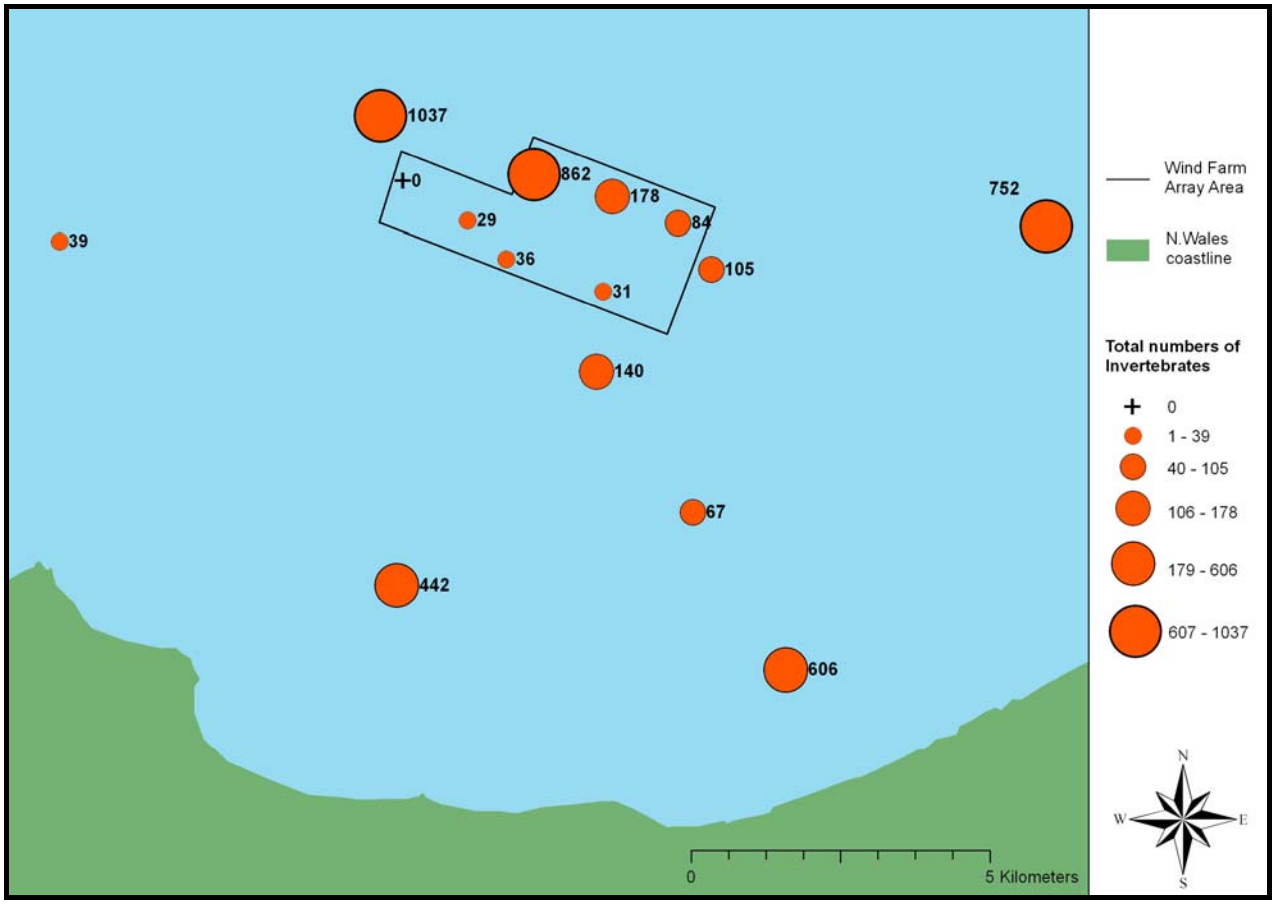


Figure 8 Total numbers of Epifauna (excluding colonials and the presence of the Long-clawed Porcelain Crab (*Pisidia longicornis*)) (see Figure 1 for site locations).

Lower numbers of epifauna were recorded from the remaining trawl sites within the array area and at control site 1 directly west of the development area. No mobile epifauna were recorded at site 3 in the

northwest corner of the array boundary, although long-clawed porcelain crab and dead man's fingers (*Alcyonium digitatum*) were recorded as present.

Of the 15 sites surveyed, site 5 in the northern corner of the array area was the most speciose with 15 different epifauna taxa, including several colonials (see Figure 9). Large numbers of plumose anemone (*Metridium senile*) and common starfish (*Asterias rubens*) accounted for the majority of the epifauna recorded. Significant quantities of dead man's fingers and hornwrack were also present. Relatively high numbers of invertebrate taxa were also recorded at control sites directly east, west and southwest of the array area (sites 11, 1 and 14), in the northwest corner of the project area (site 2) and inshore on the designated cable route (site 15). The majority of trawl sites within the array area and those offshore on the designated cable route were less diverse, especially at site 3 where only a small amount of dead man's fingers and long-clawed porcelain crab were observed. The preliminary recordings of the survey vessel echosounder displayed hard substratum ground at this particular site.

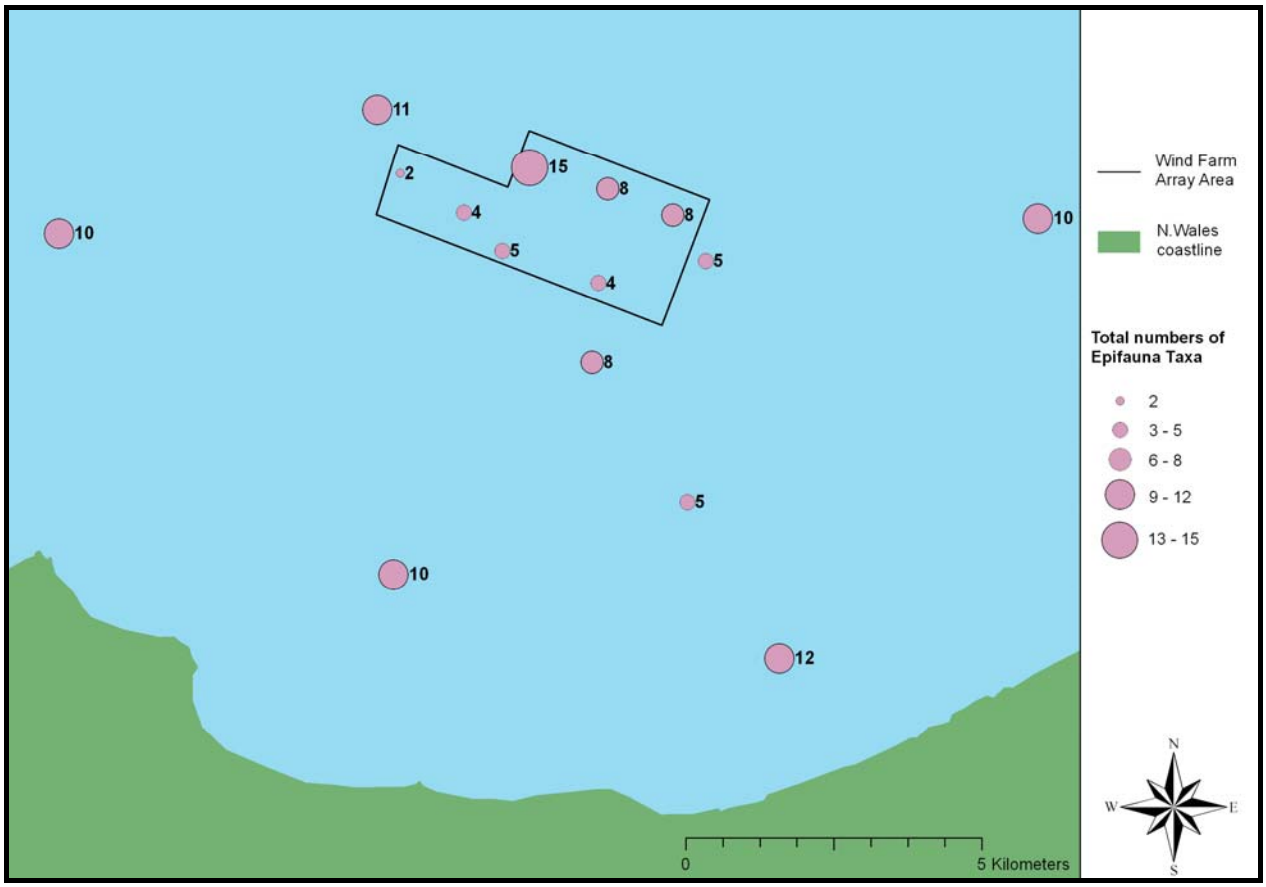


Figure 9 Total numbers of Epifauna Taxa (see Figure 1 for site locations).

The common starfish (*Asterias rubens*) recorded the largest numbers from the survey with 1414 individuals from all 15 sites. This species was the most numerous at sites 11 and 2, directly east of the project area and outside the northwest corner of the array boundary. High numbers of plumose anemone were also observed, especially within the array area at site 5 and just outside the northwest corner of the array boundary at site 2. However, this anemone was only found at 6 of the 15 sites surveyed and was only numerous (>100) at 3 of them. The presence of the brittle star *Ophiura ophiura* and scorpion spider crab (*Inachus dorsettensis*) was also relatively common. The brittle star was widespread across the survey area being found at 13 of the 15 sites trawled and most numerous

southwest of the project area at control site 14. The Scorpion Spider crab was observed less frequently and only in significant numbers at site 15 inshore on the planned cable route, which accounted for 537 of the 582 individuals caught over the entire survey area. Distributions of the commonest epifauna are provided in Figure 10.

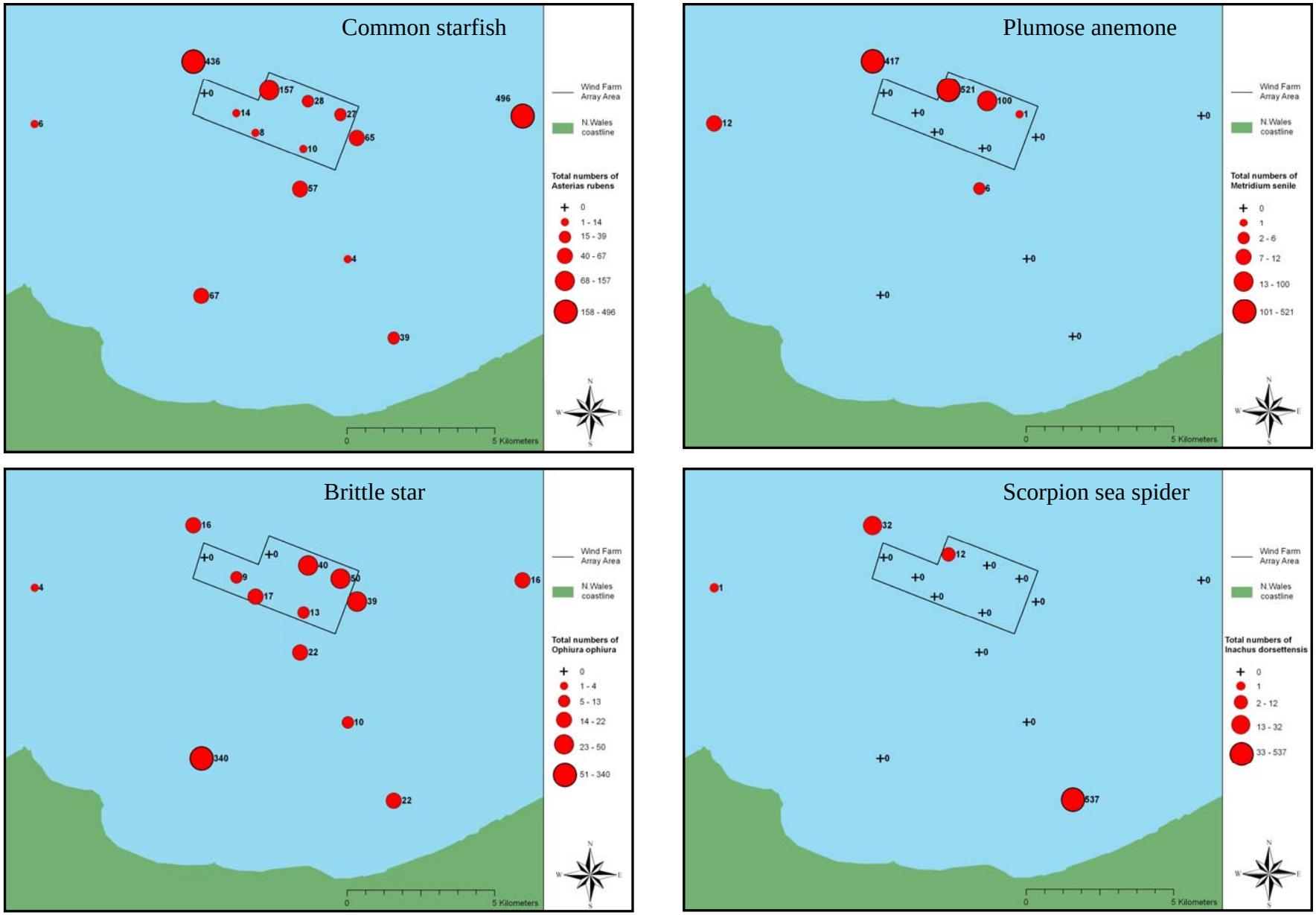


Figure 10 Distribution of the commonest epifauna (see Figure 1 for site locations).

3.3 Comparisons between the 2005 and 2006 Beam Trawl Survey

The numbers of fish recorded during the 2006 beam trawl survey (954) are comparative with the numbers recorded in 2005 (1014). Several sites produced similar catches during both surveys (Figure 11); however differences were notable at sites 2, 12, 13 and 15 in the northwest corner of the project area and along the designated cable route respectively. Numbers of fish were noticeably higher in 2006 at sites 2 and 12. Large catches of poor cod (*Trisopterus minutus*) (144) and dab (135), mainly juveniles (see Appendix 5.2), accounted for the majority of the fish recorded at these sites respectively. Dab was recorded at site 12 during the 2005 survey but in smaller numbers (10), whereas trawling at site 2 produced no catches of poor cod. Fewer fish were recorded at sites 13 and 15 in 2006. Large numbers of sand goby and solenette (*Buglossidium luteum*) accounted for the majority of the catch at site 13 during the 2005 survey, and although present in the catch during 2006 these fish taxa were observed with much lower frequency. Numbers of sand goby also accounted for the differences in catch between 2005 and 2006 at site 15.

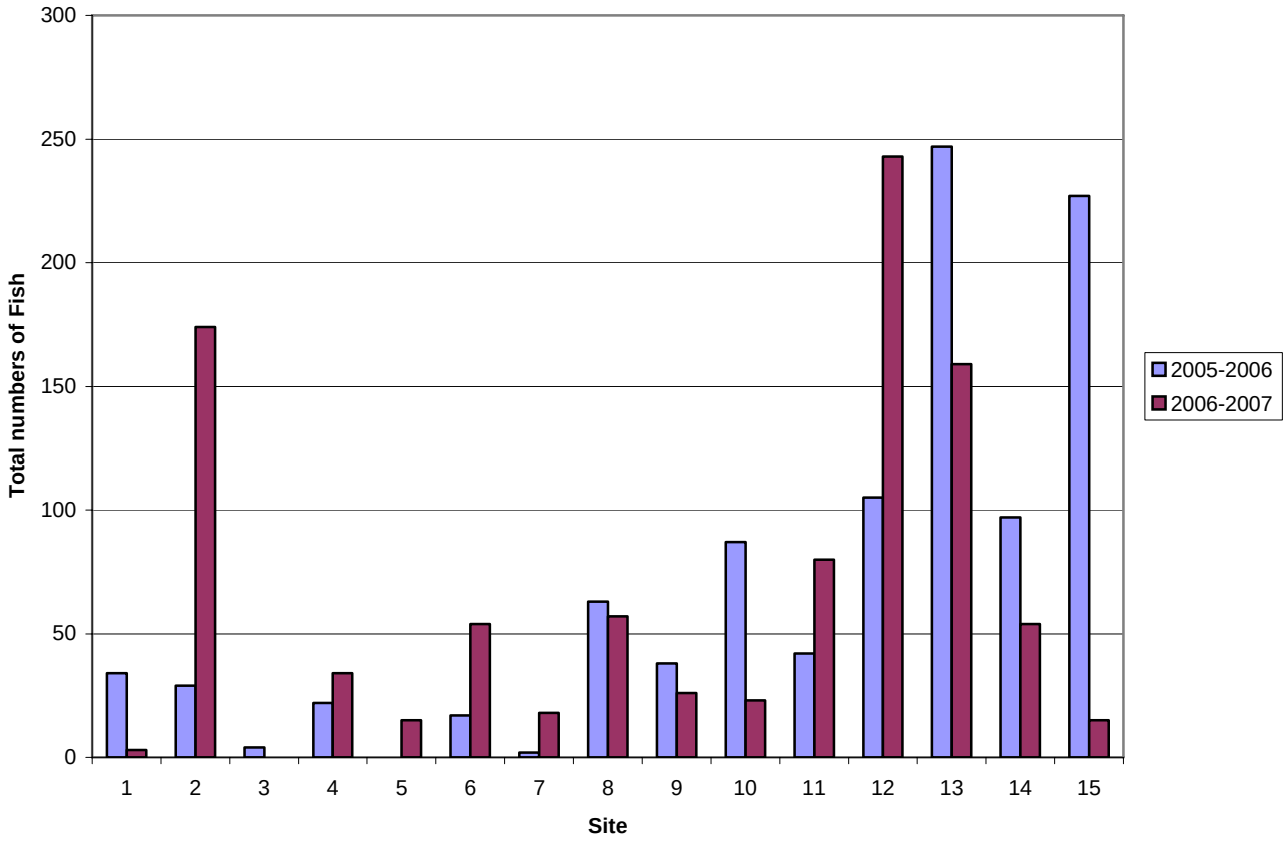


Figure 11 Comparison between the total numbers of fish recorded during the 2005 and 2006 beam trawl surveys.

The largest numbers of fish were observed at sites 13 and 12 during the 2005 and 2006 survey respectively. Trawling at both of these sites produced large catches in both survey years. The importance of each survey site, in terms of the number of fish recorded, was relatively similar between both the surveys, the only major exceptions being sites 2 and 15, where the differences are attributable to the presence or absence of one species.

A greater diversity of fish was recorded during the 2006 beam trawl survey (23 taxa) compared to 2005 (15 taxa), including two species of elasmobranchs; the lesser and greater spotted dogfish. No elasmobranchs were caught during the 2005 survey. A total of 26 taxa are recorded from both the beam trawl surveys with 13 of these 26 being recorded as present during both the 2005 and the 2006 surveys. Several more commercial fish species were observed in 2006 including Atlantic mackerel (*Scomber scombrus*), sole (*Solea solea*), lemon sole (*Microstomus kitt*), thickback sole (*Microchirus variegatus*) and sprat (*Sprattus sprattus*), although dab, plaice and whiting were recorded during both years. Otherwise similar species were recorded from both surveys.

Similar numbers of fish taxa were recorded at several of the sites surveyed (see Figure 12), although catches were generally more diverse in 2006 (11 out of the 15 sites surveyed). Notable differences were apparent at sites 2, 3, 5, and 7 just outside the northwest corner of the array and within the array boundary respectively. Larger numbers of taxa caught in 2006 account for the majority of these differences, with the exception of site 3. No fish were recorded from this site during 2006. However, although 4 different fish taxa were caught during trawling at the same site in 2005 there was only a single incidence of each, and all are common species to Liverpool Bay and the wider Irish Sea.

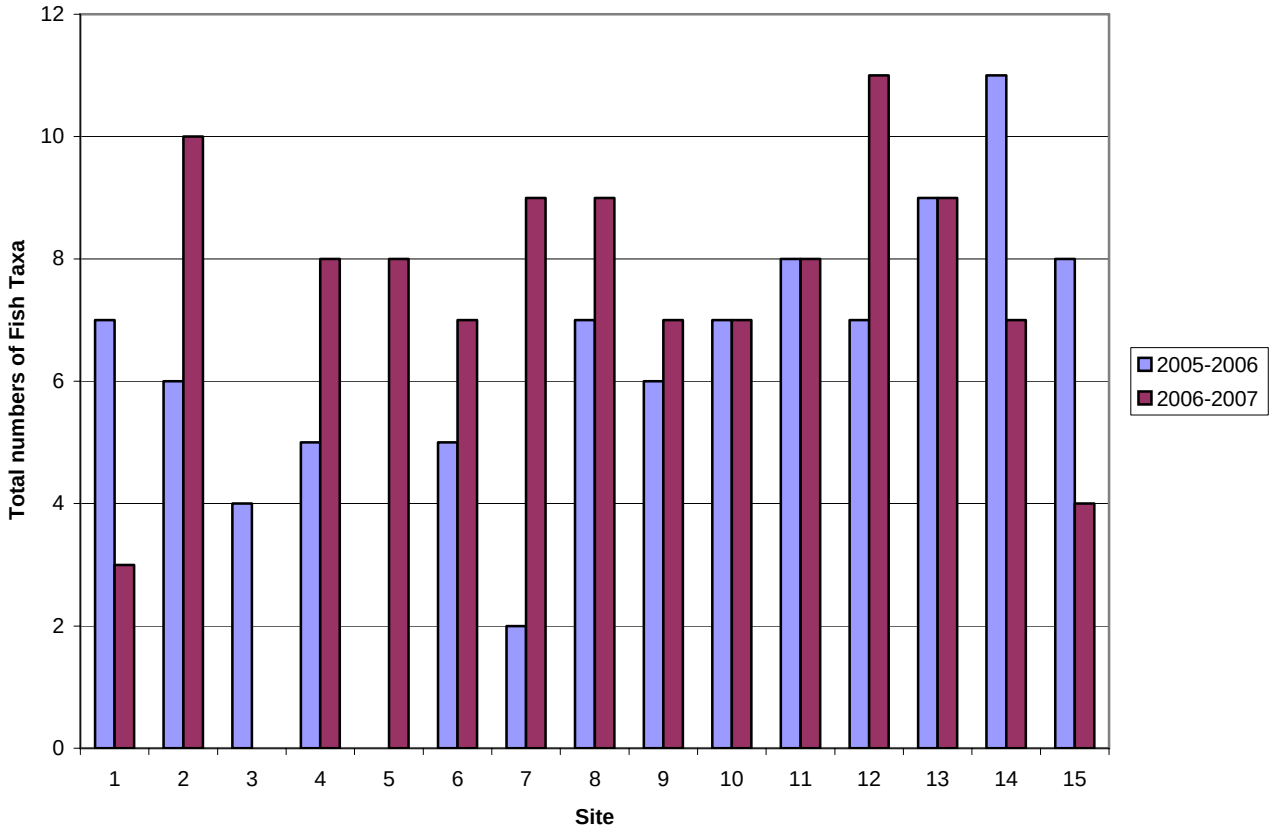


Figure 12 Comparison between the total numbers of fish taxa recorded during the 2005 and 2006 beam trawl surveys.

Sites 14 and 12 were the most speciose in terms of fish taxa during the 2005 and 2006 surveys respectively. Very little consistency in the order of sites, in terms of the most and least diverse, is apparent between the two surveys, which is mainly attributable to the more varied catches observed in 2006. Sand goby and solenette were the most numerous fish caught during 2005. Similarly high numbers of these taxa were recorded in 2006, although dab was the most numerous and mainly

present as juveniles at site 12. Generally larger and fewer dab were recorded in the trawl survey a year earlier. Lesser weever fish (*Echiichthys vipera*) and scaldfish (*Arnoglossus laterna*) were numerically common and generally widespread over the survey area in 2005 and, although present in many trawls in 2006, were caught in lower numbers. Numbers of poor cod were much greater in 2006, although mainly accounted for by a large catch at site 2.

Very similar numbers of epifauna were recorded during the 2005 (4373) and 2006 (4408) beam trawl surveys. Similar numbers of invertebrates were recorded at several sites over the two survey years, although notable differences were apparent at sites 5, 13, 11 and 14 inside the array, at control sites directly east and southwest of the development area and inshore on the designated cable route respectively (see Figure 13). Large numbers of plumose anemone and common starfish accounted for the majority of the epifauna recorded at site 5 in 2006. Several crustaceans and two molluscs were also observed but with lower frequency.

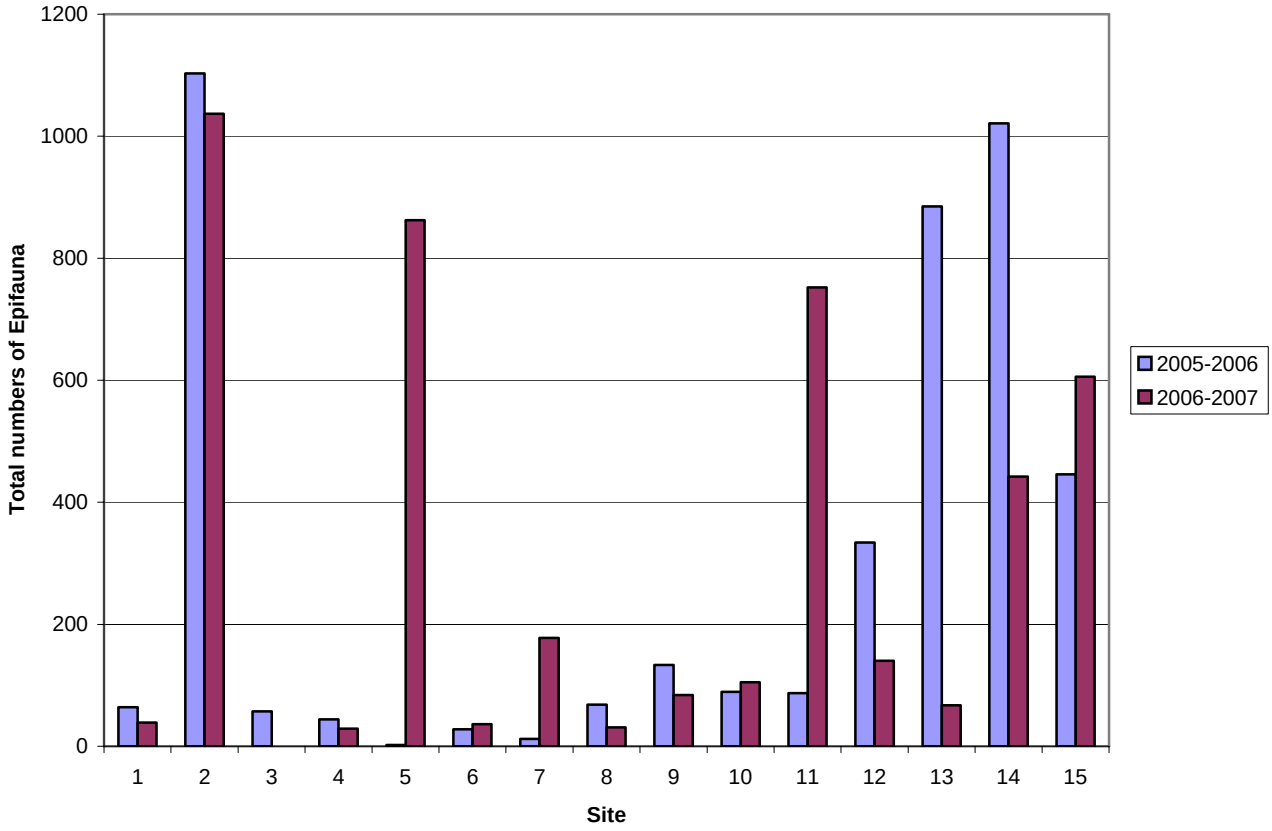


Figure 13 Comparison between the total numbers of epifauna recorded during the 2005 and 2006 beam trawl surveys, excluding colonials and the presence of the Long-clawed Porcelain Crab (Pisidia longicornis).

A similar range of epifauna was recorded at site 11 during both surveys, with the exception of considerable numbers of the sea urchin *Psammechinus miliaris* occurring only in 2006. Common starfish and the brittle star *Ophiura ophiura* accounted for the majority of invertebrates at the site in both survey years, although with greater frequency in 2006. Numbers of epifauna were noticeably reduced at sites 13 and 14 in 2006 compared to the previous year's survey, although a similar range of invertebrates was identified. Common starfish and the brittle star *Ophiura ophiura* were most numerous, although with a lower frequency in 2006. The largest numbers of epifauna were observed

at site 2 during both survey years. However, there was little consistency between surveys in the importance of the remaining sites, in terms of the most and least abundant.

A slightly elevated diversity of epifauna was recorded during the 2005 beam trawl survey (36 taxa) compared to 2006 (30 taxa). Twenty-four of the 39 taxa were recorded from both survey years and included colonial hydroids, bryozoans and soft coral. Similar numbers of epifauna taxa were recorded at several of the sites surveyed (Figure 14), although there were some notable differences between years at sites 2 and 5 just outside the northwest corner of the array area and within the array boundary respectively. A greater diversity of crustaceans and molluscs were recorded at site 2 during 2005 compared to 2006, although clumps of hornwrack and numerous plumose anemone were common to both surveys.

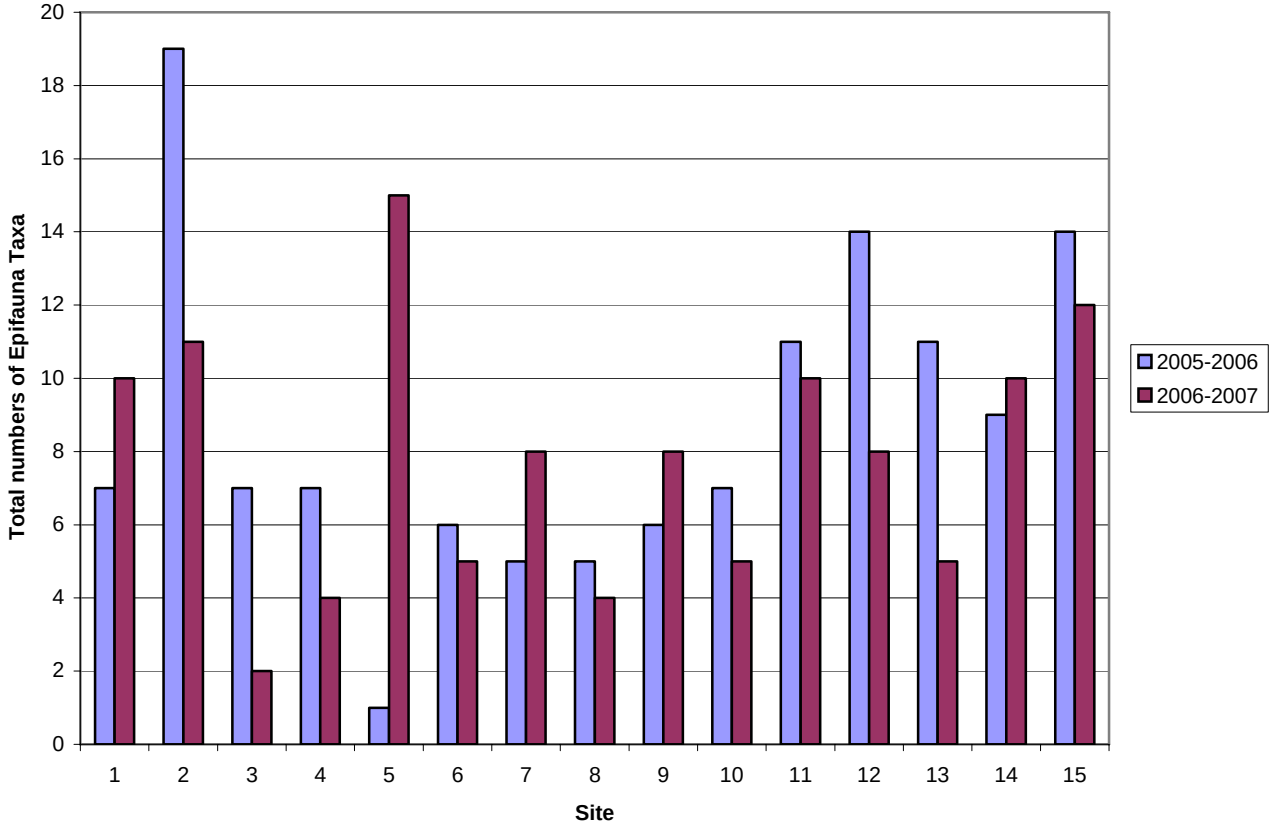


Figure 14 Comparison between the total numbers of epifauna taxa recorded during the 2005 and 2006 beam trawl surveys.

Many more species of epifauna were recorded at site 5 during the 2006 beam trawl survey compared to 2005. Large amounts of hornwrack and dead man's fingers were recorded during the 2006 survey, including several crustaceans and molluscs commonly associated with these assemblages. Large numbers of common starfish and plumose anemone were also observed and were common across the majority of the survey area.

Sites 2 and 5 were the most speciose during the 2005 and 2006 beam trawl surveys respectively. The number of different taxa was also relatively high at site 2 during 2006, and at site 15 during both survey years. Despite being most diverse in 2006, the trawl at site 5 was very epifauna 'poor' in 2005, only producing two Common starfish. The varied assemblage of Plumose anemone, crustaceans,

molluscs and echinoderms recorded in 2006 was accompanied by considerable quantities of dead man's fingers and hornwrack commonly associated with several species of epifauna.

The brittle star *Ophiura ophiura*, common starfish and plumose anemone were consistently the most numerous epifauna recorded in both the 2005 and 2006 beam trawl surveys. High numbers of Scorpion Spider crab were also observed in 2006, and although present in 2005, observations were much less frequent.

3.3.1 Multivariate statistical analysis

The number and species of fish and epifauna at each site were statistically compared using Bray Curtis similarity square root transformation with the results being displayed as a Multi-dimensional scaling plot (MDS) (see Figure 15) and an associated dendrogram (see Figure 16) displaying percentage similarity. This statistical analysis did not include colonial species which cannot readily be quantified and also omitted the Long-clawed Porcelain Crab (*Pisidia longicornis*) which was only identified on a presence or absence basis. Site three is not displayed upon the MDS plot as this only had colonial species recorded at this location and therefore did not display well upon the MDS plot.

The results show that sites appear to cluster together depending upon location, for instance those sites located along the proposed cable route cluster well with other inshore locations. Sites within the wind farm area also cluster well together indicating similarities of fish and benthic epifaunal species.

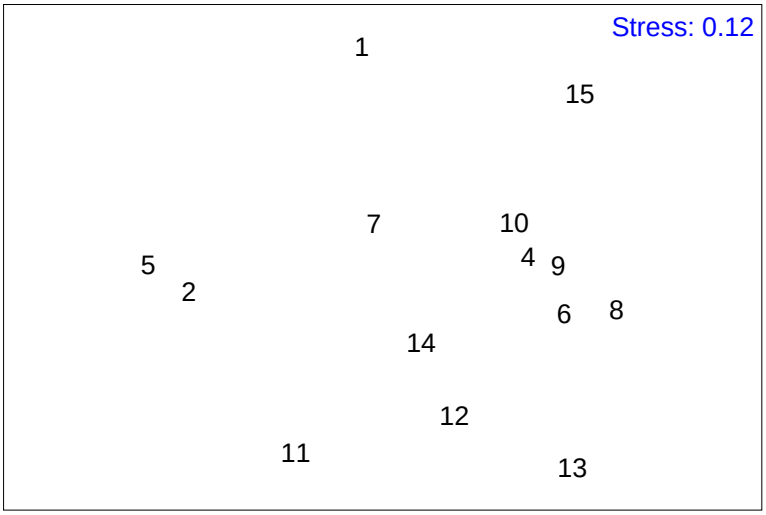


Figure 15 MDS plot displaying the similarities between results from sites sampled during 2006 benthic beam trawl survey.

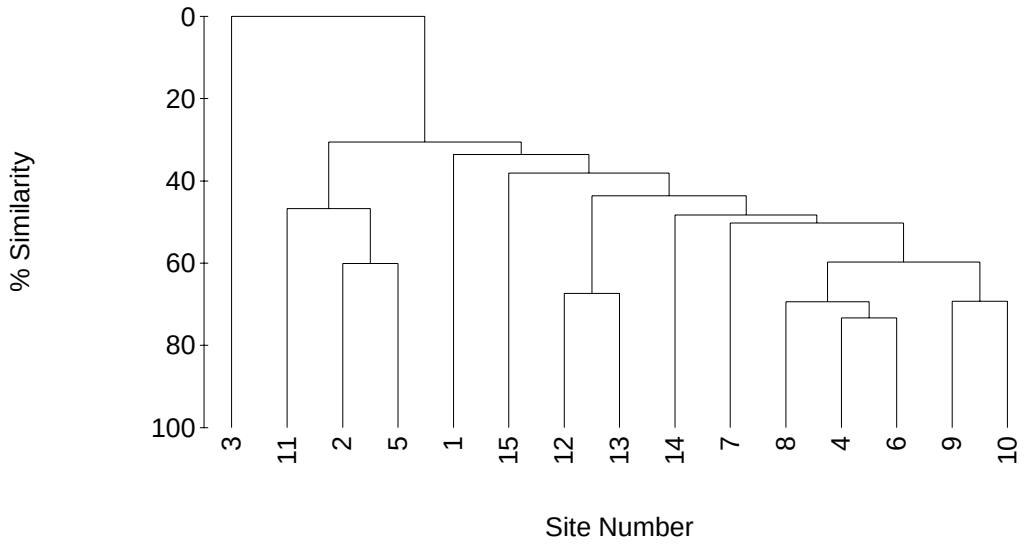


Figure 16 Dendrogram displaying the percentage similarities between 2006 beam trawl survey sites

A statistical comparisons between the results obtained as part of the 2005 monitoring survey and those obtained as part of this year's 2006 survey has also been undertaken using Bray-Curtis similarity square root transformation, the results of which are displayed with Figures 17 and 18 below. The results show that sites display broadly similar results from both survey data sets with obvious clustering of sites from the same survey year. This indicates that the sites are statistically similar to those of the previous years with most of the sites showing a similarity of 40 % or above between each other regardless of year.

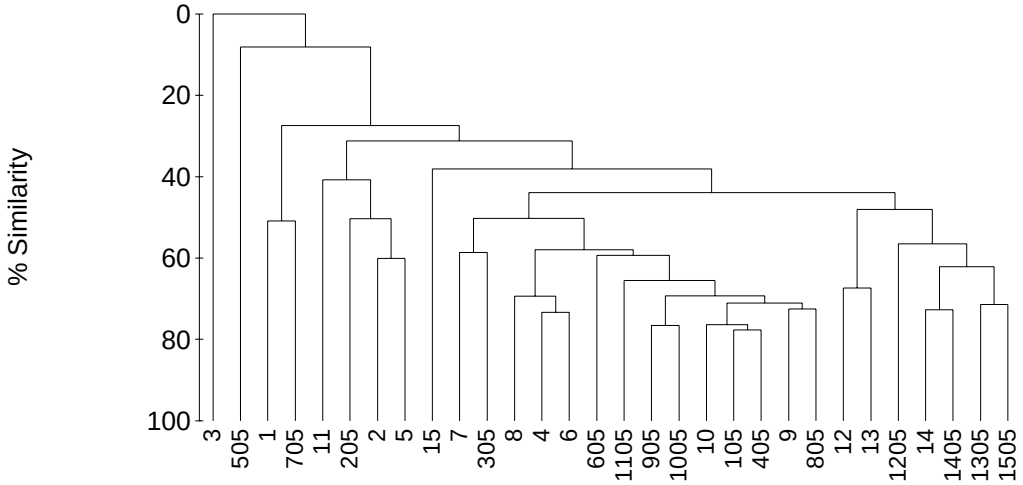


Figure 17 Dendrogram displaying the percentage similarity between the 2005 and 2006 monitoring surveys (2005= 05 suffix)

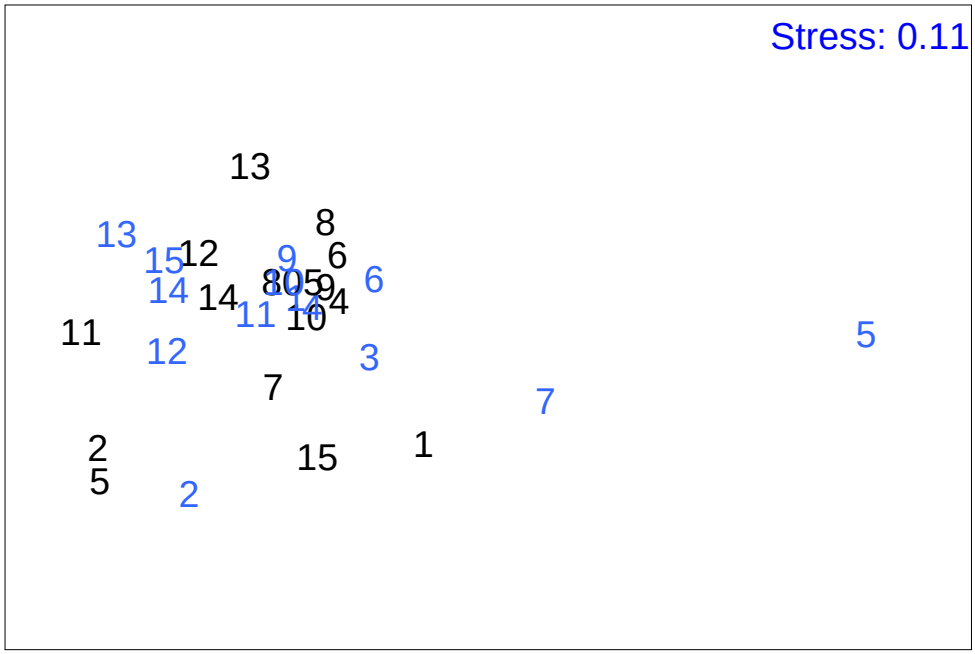


Figure 18 MDS plot displaying the species similarities between the results from the 2005 (blue) and the 2006 (black) surveys.

4 Conclusion

The results from the 2006 beam trawl monitoring program have yielded epifaunal and fish species and numbers which are similar to those recorded at the same sites from the previous monitoring survey undertaken in 2005. All species are known from Liverpool Bay and are associated with the sandy substratum of the area. Sites within the 2006 survey showed species similarities to other sites from the immediate area with a noticeable difference between inshore sites and those located at the wind farm site and further offshore. There was no great statistical difference between the numbers or species at each monitoring site between the two survey years and it is considered that these two data sets from successive years (2005 and 2006) will provide significant information from which to monitor any possible impacts of the Rhyl Flats Wind Farm construction and operation upon the benthic fish and epifaunal species populations of the area.

5 Appendices

5.1 Appendix 1 Total numbers of Fish and Epifauna recorded from the 2006 Rhyl Flats Offshore Wind Farm Beam Trawl Survey.

		Rhyl Flats Trawls															
Common Name Fish	**Species Name**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**Totals**
Pogge	*Agonus cataphractus*	0	2	0	0	1	0	0	0	0	0	14	8	0	0	0	**25**
Lesser sand eel	*Ammodytes tobianus*	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	**1**
Scald Fish	*Arnoglossus laterna*	0	1	0	0	0	0	2	0	1	2	0	1	1	4	0	**12**
Red gurnard	*Aspitriglia cuculus*	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	**1**
Solenette	*Buglossidium luteum*	1	8	0	9	4	33	1	20	4	6	8	18	15	30	5	**162**
Dragonet	*Callionymus lyra*	0	5	0	0	2	0	2	0	0	0	8	1	2	2	0	**22**
Weever	*Echiichthys vipera*	0	0	0	8	0	3	4	5	4	5	0	0	0	4	6	**39**
Mermaids Purse	Empty elasmobranch egg case	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	**1**
Grey gurnard	*Eutrigla gurnardus*	0	0	0	2	1	1	1	0	0	1	9	0	0	0	0	**15**
Dab	*Limanda limanda*	0	1	0	1	0	0	0	3	0	2	8	135	69	7	3	**229**
Whiting	*Merlangius merlangus*	0	0	0	1	0	0	0	1	1	0	0	1	0	0	0	**4**
Thickback sole	*Microchirus variegatus*	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	**2**
Lemon sole	*Microstomus kitt*	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	**2**
Bull rout, Father Lasher	*Myoxocephalus scorpius*	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	**3**
Butterfish	*Pholis gunnellus*	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	**1**
Plaice	*Pleuronectes platessa*	0	4	0	2	2	5	2	1	2	1	1	5	1	4	0	**30**
Sand Goby	*Pomatoschistus minutus*	1	6	0	10	3	10	1	22	13	6	5	60	68	0	1	**206**
Atlantic mackerel	*Scomber scombrus*	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	**1**
Lesser Spotted Dogfish	*Scyliorhinus caniculus*	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	**2**
Greater Spotted Dogfish	*Scyliorhinus stellaris*	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
Sole	*Solea solea*	0	0	0	0	0	1	0	0	0	0	0	0	1	3	0	**5**
Sprat	*Sprattus sprattus*	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	**1**
Lesser pipefish	*Syngnathus rostellatus*	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	**3**

		Rhyl Flats Trawls															
Common Name	**Species Name**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**Totals**
Poor cod	*Trisopterus minutus*	1	144	0	1	0	0	4	0	0	0	26	11	0	0	0	**187**
Cnidarians																	
Dead Mans Fingers	*Alcyonium digitatum*	0	6820	<10	0	18240	0	0	0	0	0	0	0	0	P	P	**N/A**
Plumose Anemone	*Metridium senile*	12	417	0	0	521	0	100	0	1	0	0	6	0	0	0	**1057**
Bryozoans																	
Erect bryozoan*	*Alcyonidium diaphranum*	0	0	0	0	P	0	0	0	0	0	0	0	0	0	0	**N/A**
Erect bryozoan*	*Alcyonidium parasiticum*	0	0	0	0	0	0	0	0	0	0	0	0	0	P	0	**N/A**
Hornwrack*	*Flustra foliacea*	260	9460	0	0	7800	0	<10	0	P	P	<450	0	P	0	P	**N/A**
Hydroids																	
Whiteweed*	*Hydrallmania falcata*	0	0	0	0	0	0	0	0	0	P	P	0	0	P	P	**N/A**
Sea Beard*	*Nemertesia antennina*	0	0	0	0	P	0	0	0	0	0	0	0	0	0	0	**N/A**
Sponge*	Unidentified	P	P	0	0	0	0	0	0	0	0	0	0	0	0	0	**N/A**
Crustaceans																	
Masked Crab	*Corystes cassivelaunus*	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	**2**
Brown Shrimp	*Crangon crangon*	1	0	0	0	12	0	0	0	2	0	0	13	39	1	0	**68**
Scorpion Spider Crab	*Inachus dorsettensis*	1	32	0	0	12	0	0	0	0	0	0	0	0	0	537	**582**
Harbour crab	*Liocarcinus depurator*	0	0	0	0	0	0	0	0	0	0	16	2	0	0	0	**18**
Crab	*Liocarcinus holsatus*	0	0	0	3	12	3	1	7	1	0	8	35	14	8	1	**93**
Longed-legged spider crab	*Macropodia sp*	14	87	0	3	48	6	6	0	0	0	72	3	0	20	2	**261**
Hermit crab	*Pagurus bernhardus*	0	0	0	0	12	0	2	0	0	0	0	2	0	0	0	**16**
Pink Shrimp	*Pandalus montagui*	0	0	0	0	4	0	1	0	0	0	0	0	0	4	0	**9**
Long-clawed Porcelain crab*	*Pisidia longicornis*	P	P	P	0	P	0	0	0	0	0	8	0	0	0	0	**N/A**
Broad-clawed Porcelain crab	*Porcellana platycheles*	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	**2**
Molluscs																	
Queen scallop	*Aequipecten opercularis*	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	**12**
Sea lemon	*Archidoris pseudoargus*	0	48	0	0	0	0	0	0	0	0	0	0	0	0	0	**48**
Common whelk	*Buccinum undatum*	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	**8**
Common Razor shell	*Ensis ensis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	**1**
Squid	*Loligo forbesii*	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	**2**

		Rhyl Flats Trawls															
Common Name	**Species Name**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**Totals**
Little Cuttlefish	*Sepiola atlantica*	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	**3**
Thick Trough Shell	*Spisula solida*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	**2**
Nudibranch	*Tritonia hombergi*	0	1	0	0	72	0	0	0	0	0	0	0	0	0	0	**73**
Echinoderms																	
Common starfish	*Asterias rubens*	6	436	0	14	157	8	28	10	27	65	496	57	4	67	39	**1414**
Sand star	*Astropecten irregularis*	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	**3**
Brittle star	*Ophiura ophiura*	4	16	0	9	0	17	40	13	50	39	16	22	10	340	22	**598**
Sea urchin	*Psammechinus milliaris*	0	0	0	0	0	0	0	0	0	0	136	0	0	0	0	**136**

* ‘P’ = Present, and numbers represent weight in grammes

5.2 Appendix 2 Total Fish length data from the 2006 Rhyl Flats Offshore Wind Farm Beam Trawl Survey

		Length (mm)										
Site	Individual	Atlantic Mackerel	Dab		Greater Spotted Dogfish	Lemon Sole	Lesser Spotted Dogfish	Plaice	Sole	Sprat	Thickback Sole	Whiting
1	no commercial fish											
2	1		196		Female 740L			190				
	2							241				
	3							239				
	4							242				
3	no commercial fish											
4	1							209				98
	2							194				
5	1							243				
	2							325				
6	1						Female 610L	227	237			
	2							272				
	3							224				
	4							230				
	5							182				
7	1							234				
	2							318				
8	1		317				Male 594L	207		68		92
	2		218									
	3		200									
9	1							279				82
	2							198				
10	1		152					190				
	2		70									
11	1		249					247				
	2		192									
	3		190									
	4		142									
	5		155									
	6		179									
	7		140									
	8		62									
12	1/69		173	145		95		209			260	115
	2/70		170	132				250			265	
	3/71		195	80				225				
	4/72		160	145				135				
	5/73		130	110				110				
	6/74		143	134								
	7/75		169	150								
	8/76		150	126								
	9/77		161	126								
	10/78		160	74								

		Length (mm)											
Site	Individual	Atlantic Mackerel	Dab		Greater Spotted Dogfish	Lemon Sole	Lesser Spotted Dogfish	Plaice	Sole	Sprat	Thickback Sole	Whiting
	11/79		152	250								
	12/80		142	123								
	13/81		146	90								
	14/82		120	71								
	15/83		157	72								
	16/84		141	135								
	17/85		145	80								
	18/86		149	75								
	19/87		170	80								
	20/88		137	78								
	21/89		175	75								
	22/90		132	75								
	23/91		135	62								
	24/92		138	78								
	25/93		135	80								
	26/94		164	80								
	27/95		145	71								
	28/96		135	78								
	29/97		158	150								
	30/98		185	72								
	31/99		132	85								
	32/100		160	81								
	33/101		140	78								
	34/102		159	87								
	35/103		160	85								
	36/104		140	69								
	37/105		152	65								
	38/106		148	135								
	39/107		138	126								
	40/108		95	75								
	41/109		123	134								
	42/110		180	80								
	43/111		115	75								
	44/112		129	82								
	45/113		130	74								
	46/114		120	80								
	47/115		140	123								
	48/116		115	82								
	49/117		125	83								
	50/118		79	70								
	51/119		80	70								
	52/120		159	140								
	53/121		65	80								
	54/122		75	80								
	55/123		86	125								
	56/124		83	74								
	57/125		76	135								
	58/126		105	70								

		Length (mm)											
Site	Individual	Atlantic Mackerel	Dab		Greater Spotted Dogfish	Lemon Sole	Lesser Spotted Dogfish	Plaice	Sole	Sprat	Thickback Sole	Whiting
	59/127		74	80								
	60/128		75	72								
	61/129		62	82								
	62/130		90	85								
	63/131		84	81								
	64/132		86	75								
	65/133		68	86								
	66/134		70	90								
	67/135		85	75								
	68		75									
13	1	239	217			117		167				
	2		152									
	3		183									
	4		150									
	5		196									
	6		147									
	7		142									
	8		128									
	9		183									
	10		122									
	11		38									
	12		69									
	13		163									
	14		131									
	15		151									
	16		175									
	17		81									
	18		76									
	19		72									
	20		133									
	21		51									
	22		159									
	23		126									
	24		137									
	25		72									
	26		51									
	27		70									
	28		88									
	29		70									
	30		81									
	31		73									
	32		89									
	33		80									
	34		127									
	35		122									
	36		133									
	37		127									
	38		78									

		Length (mm)											
Site	Individual	Atlantic Mackerel	Dab		Greater Spotted Dogfish	Lemon Sole	Lesser Spotted Dogfish	Plaice	Sole	Sprat	Thickback Sole	Whiting
	39		64									
	40		61									
	41		53									
	42		59									
	43		138									
	44		57									
	45		68									
	46		65									
	47		60									
	48		74									
	49		59									
	50		71									
	51		82									
	52		64									
	53		68									
	54		136									
	55		87									
	56		72									
	57		71									
	58		64									
	59		70									
	60		80									
	61		72									
	62		60									
	63		64									
	64		78									
	65		70									
	66		71									
	67		58									
	68		57									
	69		55									
14	1		75					180	165	80		
	2		133					233	171			
	3		152					179	100			
	4		150					110				
	5		113									
	6		134									
	7		70									
15	1		41									
	2		48									
	3		43									

5.3 Appendix 3 Photos of each trawl from the 2006 Beam Trawl Survey.


7


8


9


10


11


12


13


RF
14
HATCHES TO BE
CLOSED AT SEA


HATCHES TO BE
CLOSED AT SEA
RF
15