



Rampion Offshore Wind Farm



ES Section 8 – Fish & Shellfish Ecology - Appendix 8.3

Brown & May Marine Ltd

Document 6.3.8iii

December 2012

APFP Regulation 5(2)(a)

Revision A

E.ON Climate & Renewables UK Rampion Offshore Wind Limited

Rampion Offshore Wind Farm

Adult and Juvenile Fish and Epibenthic Characterisation Survey

20th – 26th February 2012

**Undertaken by
Brown & May Marine Ltd**

Ref	Issue Date	Issue type	Checked	Approved
ROWFOB02	02/04/2012	Final	JK/LS/PJM	SJA

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1.0 Summary

In order to establish the abundance and composition of adult and juvenile fish and epibenthic species within the area, an otter and scientific beam trawl survey was undertaken in and adjacent to the Rampion offshore wind farm between the 20th and 26th February 2012. Five of the six commercial target species were identified during the survey: cod (*Gadus morhua*), Dover sole (*Solea solea*), lemon sole (*Microstomus kitt*), plaice (*Pleuronectes platessa*) and whiting (*Merlangius merlangus*). No black sea bream (*Spondylus cantharus*) were caught during the survey.

1.1 Otter Trawl

A total of 31 species were caught; 30 within the wind farm and 22 at the reference stations. Overall, *M. merlangus* was the most abundant species caught, followed by flounder (*Platichthys flesus*) and then herring (*Clupea harengus*). One gilt head sea bream (*Sparus aurata*) was caught at OT24.

M. kitt, *G. morhua* and *S. solea* were found both at the reference stations and within the wind farm. Catch rates for *G. morhua* and *S. solea* were higher at the reference stations, whereas the catch rate for *M. kitt* was greater within the wind farm. One undulate ray (*Raja undulata*) was found within the wind farm at station OT06. Overall, the total catch rate for all species caught was approximately equal at the reference stations (532.3/hr) and within the wind farm (533.6/hr).

The majority of the *M. merlangus* caught at the reference stations were below the MLS, whereas within the wind farm a higher proportion was above the MLS. The proportion of *P. platessa* below the MLS caught at the reference stations and within the wind farm was approximately equal. Most of the *C. harengus* caught in the wind farm, and the one individual caught at the reference stations were above the MLS. All *G. morhua* caught at both the reference stations and within the wind farm were above the MLS.

The highest proportion of the *M. merlangus*, *M. kitt*, *P. platessa* and *G. morhua* caught at both the reference stations and within the wind farm were female. *S. solea* had an equal sex percentage within the wind farm, whereas most individuals at the reference stations were female.

The greatest proportion of the *M. merlangus* caught both within the wind farm and at the reference stations was represented by maturing males. The highest proportion of *P. platessa* caught in both sampling areas was spent females. The greatest percentage of the *M. kitt* caught both within the wind farm and at the reference stations was maturing females. A higher proportion of *G. morhua* caught both within the wind farm and at reference stations were spent females. Maturing *S. solea* represented the majority within the wind farm and at the reference stations.

1.2 Beam Trawl

A total of 24 species of fish were caught in the beam trawl; 22 within the wind farm and 11 at the reference stations. Sand goby (*Pomatoschistus minutus*) was the most prevalent species caught within the wind farm followed by solenette (*Buglossidium luteum*); whereas at the reference stations, *B. luteum* was the most abundant species followed by *P. minutus*. *P. minutus* represented the greatest proportion of the catch at the majority of sampling stations.

Three *P. platessa*, one *M. kitt*, and one *S. solea* were found within the wind farm. Three short-snouted seahorses (*Hippocampus hippocampus*), a species of conservation interest, were found within the wind farm, two individuals at station BT03 and one at station BT05.

A total of 90 motile invertebrate species were found; 74 within the wind farm and 57 at the reference stations. Overall, brittlestar (*Ophiura albida*) was the most abundant motile invertebrate species caught, followed by two species of shrimp (*Philocheras trispinosus* and *Crangon allmani*).

A total of 10 sessile invertebrate taxa were found; 10 within the wind farm and four at the reference stations. The phylum Bryozoa was the most prevalent species, and was found at 22 sampling stations, followed by undetermined species of barnacle and then cloak anemome (*Adamsia carciniopados*).

2.0 Introduction

The following report details the findings of the second adult and juvenile fish and epibenthic characterisation survey, undertaken in and adjacent to the Rampion offshore wind farm between the 20th and 26th February 2012.

The survey methodology, vessel and sampling gear detailed were agreed in consultation with Cefas and the Marine Management Organisation (MMO,) and replicated the previous survey. A dispensation from the MMO for the Provisions of Council Regulations 850/98 to catch and retain undersize fish for scientific research and 43/2009 specifically related to days at sea was obtained prior to commencement of the survey. A summary of the health and safety performance of the survey is provided in Appendix 1.

The aim of the survey was to establish the abundance and composition of fish and epibenthic species within the area. It should be noted that Cefas have defined cod (*Gadus morhua*), Dover sole (*Solea Solea*), lemon sole (*Microstomus kitt*), plaice (*Pleuronectes platessa*), whiting (*Merlangius Merlangus*) and black sea bream (*Spondyliosoma Cantharus*) as the target species within the area. Cefas also highlighted the status of the undulate ray (*Raja undulata*) as a UK Biodiversity Action Plan (BAP) species.

3.0 Planned Scope of Work

The planned scope of works for the February 2012 adult and juvenile fish and epibenthic characterisation survey are detailed below, and illustrated overleaf in Figure 3.1.

- **Otter Trawl**
 - 18 tows of approximately 20 minutes duration within the Rampion site and six reference tows in adjacent areas.
- **Otter Trawl Sample Analysis**
 - Number of individuals and catch rate by species
 - Average length and length distribution by species
 - Finfish & sharks (except herring, *Clupea harengus* & sprat, *Sprattus sprattus*): individual lengths (nearest cm below)
 - *C. harengus* & *S. sprattus*: individual lengths (nearest ½ cm below)
 - Rays: individual length and wing-width (nearest cm below)
 - Sex ratio of target species (see above) and elasmobranchs
 - Spawning condition of target species
 - Finfish species: Cefas Standard Maturity Key - Five Stage
- **Beam Trawls**
 - 18 tows of approximately 500m in length within the Rampion site and six reference tows in adjacent areas (at the same locations as the otter trawls)
- **Beam Trawl Sample Analysis**
 - Abundance, catch rate, average length and length distribution (mm) for fish species, scallops (*Pecten maximus* & *Aequipecten opercularis*) and whelk (*Buccinum undatum*)
 - Abundance and catch rate for invertebrate species
 - Presence/absence for species where counts are unfeasible (i.e. encrusting/colonial species)

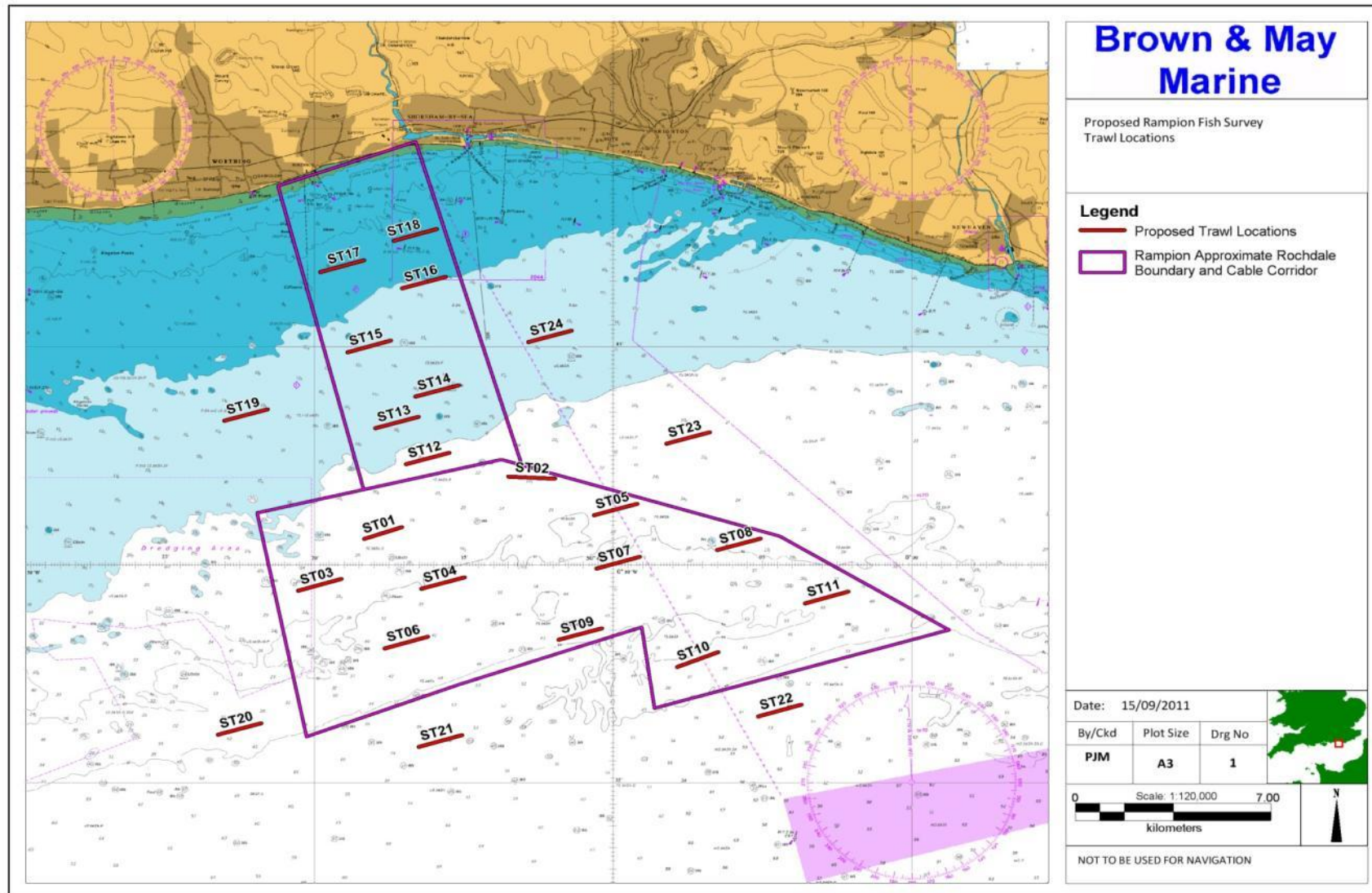


Figure 3.1 Proposed Trawl Locations

4.0 Methodology

4.1 Survey Vessel

The survey vessel, the “Lauren Anne” (Figure 4.1), is a Shoreham-based commercial trawler whose skipper has experience of fishing in the survey area. The specifications of the survey vessel are given in Table 4.1 below.



Figure 4.1 Survey Vessel “Lauren Anne”

Table 4.1 Survey Vessel Specifications

SURVEY VESSEL SPECIFICATIONS	
Length	13.3m
Beam	5.21m
Draft	2.7m
Main engine	Cummins engine NT855-M 221KW(300HP)
Gearbox	4.5:1
Propeller	4 bladed, 1350mm diameter, enclosed in nozzle
GPS	2 x Furuno GPS Navigator
Plotters	Olex Plotter with Electronic Charts
Sounder	Furuno

4.2 Sampling Gears

4.2.1 Commercial Otter Trawl

A commercial otter trawl with an 80mm mesh cod-end was used for sampling (Figure 4.2); the specifications for which are given in Table 4.2 below.



Figure 4.2 Otter Trawl Used

Table 4.2 Otter Trawl Specifications

OTTER TRAWL SPECIFICATIONS	
Towing Warp	18mm, 150 fathoms
Depth: Payout Ratio	4:1
Trawl Doors	Bison
Net	80mm mesh cod-end
Ground line length	14.6m (48 ft)
Footrope	14.5m with 6 inch bobbins
Est. Headline height	2.5m
Distance between doors (est.)	67.1m (220ft)

4.2.2 Scientific Beam Trawl

Epibenthic sampling was undertaken using a 2 metre scientific beam trawl (Figure 4.3); the specifications for which are given in Table 4.3 below.



Figure 4.3 Scientific Beam Trawl Used

Table 4.3 Beam Trawl Specifications

BEAM TRAWL SPECIFICATIONS	
Beam width	2m
Headline height	55cm
Shoe length	77cm
Shoe width	15cm
Cod-end liner	5mm

4.3 Positioning and Navigation

The vessel position was tracked at all times using a Garmin GPSMap 620 with an EGNOS differential connected to an external Garmin GA30 antenna. The trawl start times and positions were recorded when the winch stopped paying out the gear, similarly the trawl end times and positions were taken when hauling of the gear commenced.

The co-ordinates and tow tracks for each otter trawl and beam trawl are given in Section 4.5 and Section 1.1 respectively.

4.4 Sampling Operations

The survey was undertaken between the 20th and 26th February 2012. A summarised log of events is given in Table 4.4 below.

Due to the mechanical configuration onboard the vessel, all scientific beam trawls were completed prior to a full gear change to the otter trawl. Beam trawl sampling was undertaken on 20th, 21st and 23rd February 2012. The otter trawls were undertaken from the 24th to the 26th February 2012.

Station OT08 was relocated slightly due to the presence of a dive vessel near the City of Waterford wreck, and the otter trawls at stations OT04 and OT20 were shortened slightly due to rough ground.

The beam trawl was damaged at stations BT09 and BT23. The net was repaired on board by the skipper.

Table 4.4 Summarised Log of Events

Monday 20th February 2012
Vessel inspection and audit
Mobilise survey
Safety briefing
Beam trawls: BT19, BT13, BT12, BT02, BT05, BT07, BT23, BT24 & BT14.
BT23 - net damaged and repaired
Return to Shoreham
Tuesday 21st February 2012
Beam Trawls: BT01, BT03, BT20, BT21, BT06, BT04, BT09, BT10, BT22, BT11 & BT08.
BT09 - net damaged and repaired
Return to Shoreham
Wednesday 22nd February 2012
Weather Day in Port
Thursday 23rd February 2012
Beam Trawls: BT18, BT16, BT15 & BT17
Return to Shoreham
Friday 24th February 2012
Otter Trawls: OT24, OT05, OT02, OT14, OT12, OT19 & OT16.
Return to Shoreham
Saturday 25th February 2012
Otter Trawls: OT20, OT21, OT09, OT07, OT10, OT22, OT11, OT08, OT23 & OT18
OT20 shortened due to rough ground
OT08 relocated slightly due to dive vessel on nearby wreck
Return to Shoreham

Sunday 26th February 2012
Otter Trawls: OT03, OT01, OT06, OT04, OT13, OT15 & OT17
OT04 shortened due to rough ground
Return to Shoreham
Demobilise survey

4.5 Otter Trawl Sampling

The total catch was boxed, labelled and photographed. All target species (*G. morhua*, *S. solea*, *M. kitt*, *P. platessa*, *M. merlangus* and *S. cantharus*) were retained where possible. Subsampling occurred when large homogenous samples were obtained.

The following sample analysis was undertaken aboard the vessel before returning all non-target individuals to the sea:

- Length: (nearest cm below)
 - Total length for all non-target fish species/species of conservation interest (e.g. *R. undulata*)
 - Mantle length for all cephalopods
 - Shell height for all *B. undatum*
 - Shell diameter for all *P. maximus* and *A. opercularis*
- Sex: All elasmobranchs

The target species were boxed, labelled, photographed, iced and stored at +2°C before transportation to Cefas (Lowestoft) for length, sex and maturity analysis at the end of the survey, in line with the agreed scope of works. The Cefas standard five-stage maturity key used is given in Table 4.5 overleaf.

The start and end times, co-ordinates and the duration of each otter trawl are given in Table 4.6; wind farm and reference tows are highlighted in red and green respectively. The otter trawl tow tracks are shown in Figure 4.4; also illustrated are the locations where the otter trawl was shortened or relocated. For the purposes of data analysis, catch rates have been calculated to allow for quantitative comparisons to be made between the numbers of individuals caught per hour at each station (see Table 5.1).

Table 4.5 Cefas Standard Five Stage Maturity Key

Maturity Stage	Male	Female
I Immature	Roundfish – testes very thin ribbon lying along an unbranched blood vessel. Flatfish – testes tight up against back of gut cavity and very small, not usually larger than 10mm x 2mm. No sign of development.	Roundfish – ovaries small, elongated, whitish, translucent. Flatfish – ovaries small, ovary wall thin and easily broken, internally yellowish-orange (although can be variable). No sign of development.
M Maturing	Colour is progressing towards creamy white and the testes are filling more and more of the body cavity. Roundfish – may be many lobed Flatfish – at latest phase the testes can become bulbous.	Eggs are beginning to develop. Roundfish – the ovaries are filling more and more of the body cavity. Flatfish – ovaries are extending down the side of the body of the fish. There are no signs of hyaline eggs.
H Hyaline	No equivalent stage.	Hyaline eggs present, one or many. Ovaries will not run, even under moderate pressure.
R Running	Will extrude sperm under light pressure to advanced stage of extruding sperm freely with some sperm still in the gonad. Flatfish – sperm evident in ducts.	Will extrude under light pressure to advanced stage of extruding eggs freely with some eggs still in the gonad.
S Spent	Testes shrunken with little sperm in the gonads but often some in the gonoducts which can be extruded under light pressure. The gonad can shrink back to very small size. Flatfish gonad becomes knobbly.	Ovaries shrunken with few residual eggs and slime. Ovaries become tighter, no sign of egg development.

Table 4.6 Start and End Times (GMT), Durations and Co-ordinates of each Otter Trawl

Station	Date	Start				End				Duration (mm:ss)
		Time (GMT)	UTM30N		Depth (m)	Time (GMT)	UTM30N		Depth (m)	
			Latitude	Longitude			Latitude	Longitude		
OT01	26/02/2012	07:32:20	5,616,845.5	689,462.6	31.3	07:52:21	5,617,722.9	691,243.3	27.4	20:01
OT02	24/02/2012	11:47:42	5,620,179.9	698,329.6	31.0	12:07:47	5,620,165.0	696,438.5	28.6	20:05
OT03	26/02/2012	06:48:45	5,615,276.2	688,566.6	25.0	07:08:37	5,615,980.9	690,338.9	29.9	19:52
OT04		09:15:20	5,615,805.7	694,084.4	39.2	09:34:13	5,616,308.3	695,913.5	35.6	18:53
OT05	24/02/2012	11:04:02	5,619,328.3	701,144.0	30.9	11:23:49	5,619,062.7	699,626.5	33.1	19:47
OT06	26/02/2012	08:29:06	5,613,335.6	692,627.9	44.3	08:48:54	5,614,220.3	694,137.3	40.8	19:48
OT07	25/02/2012	09:32:34	5,616,456.5	699,850.7	43.1	09:52:15	5,616,980.4	701,832.8	45.3	19:41
OT07	26/02/2012	11:55:19	5,628,594.4	688,172.1	11.5	12:15:15	5,629,852.0	689,794.6	12.4	19:56
OT08	25/02/2012	13:28:58	5,617,855.5	706,797.8	33.6	13:48:11	5,617,482.5	704,793.9	37.7	19:13
OT09		08:35:25	5,613,569.4	698,834.7	47.3	08:55:18	5,614,140.7	700,801.0	48.9	19:53
OT10		10:35:53	5,612,523.8	703,588.9	45.4	10:55:14	5,613,175.5	705,539.5	46.4	19:21
OT11		12:30:14	5,615,591.4	709,012.0	52.7	12:50:07	5,616,229.7	710,806.4	41.7	19:53
OT12	24/02/2012	13:40:58	5,621,217.1	693,836.4	26.9	14:00:15	5,620,608.5	691,868.2	26.0	19:17
OT13	26/02/2012	10:20:08	5,621,916.7	691,973.1	21.6	10:40:17	5,621,794.8	690,436.9	21.5	20:09
OT14	24/02/2012	12:44:08	5,624,446.0	694,527.7	23.1	13:04:17	5,625,686.6	695,981.7	22.5	20:09
OT15	26/02/2012	11:12:59	5,626,785.7	688,385.4	13.9	11:32:12	5,626,601.2	686,656.6	13.3	19:13
OT16	24/02/2012	15:31:56	5,628,514.1	691,563.7	13.7	15:51:38	5,628,975.0	693,263.7	13.1	19:42
OT18	25/02/2012	15:49:40	5,630,151.9	691,212.4	11.1	16:09:18	5,630,377.1	693,120.1	11.6	19:38
OT19	24/02/2012	14:33:28	5,622,914.5	687,614.9	20.9	14:53:07	5,623,546.9	689,192.8	19.7	19:39
OT20	25/02/2012	06:35:01	5,608,855.4	685,169.8	48.1	06:53:29	5,609,333.9	686,460.1	43.0	18:28
OT21		07:38:03	5,608,810.9	693,277.0	57.6	07:57:58	5,609,543.9	694,962.7	53.4	19:55
OT22		11:33:26	5,610,512.6	706,646.9	61.8	11:53:12	5,611,264.6	708,562.1	57.9	19:46
OT23		14:25:25	5,622,277.6	703,782.9	26.8	14:45:08	5,621,812.4	701,663.3	27.7	19:43
OT24	24/02/2012	09:52:28	5,626,924.2	699,391.3	19.1	10:12:38	5,626,338.8	697,995.6	20.2	20:10

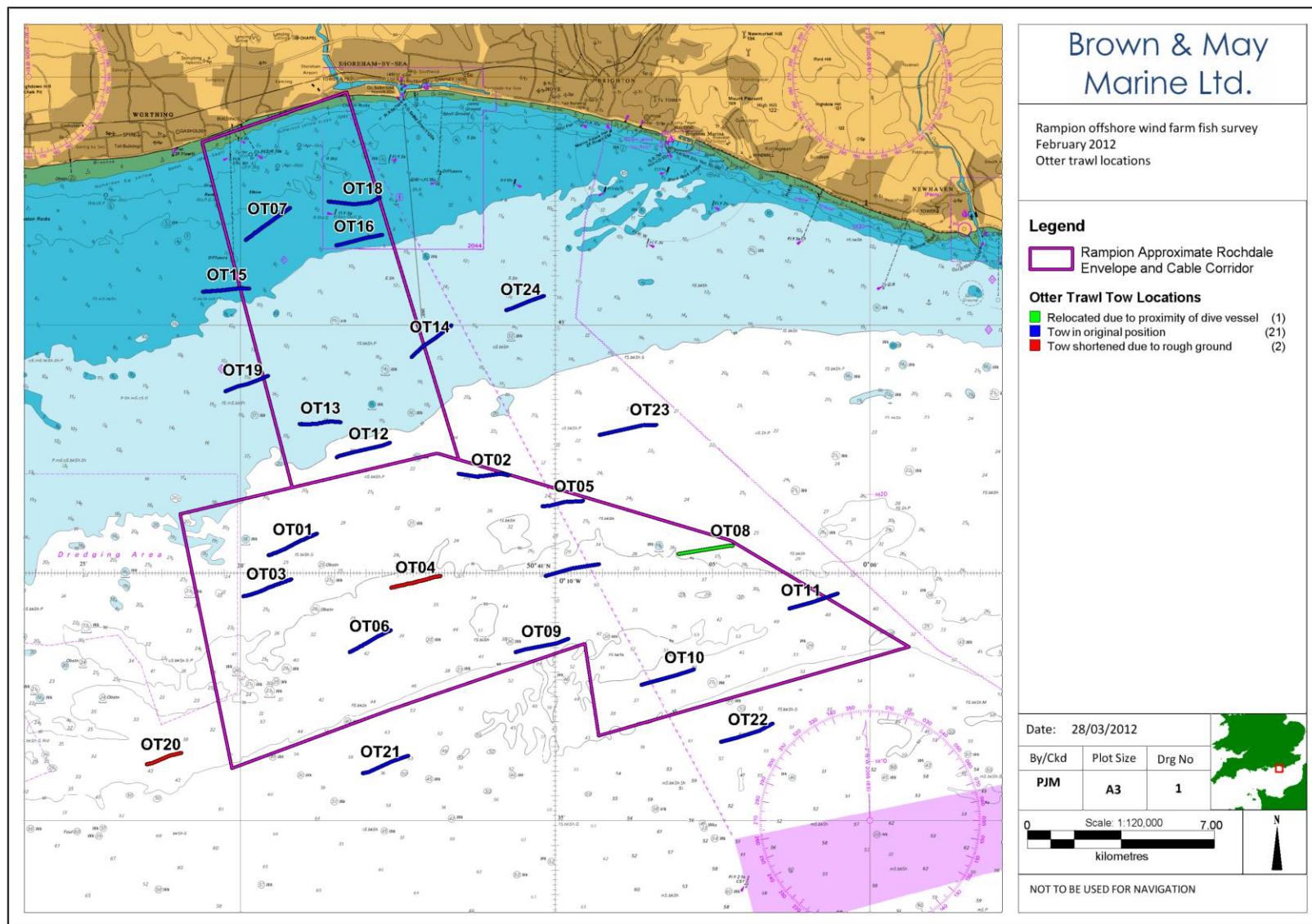


Figure 4.4 Otter Trawl Tow Tracks

4.6 Scientific Beam Trawl Sampling

All individuals caught in the beam trawl were retained, placed in plastic pots, labelled and photographed. Large fish that could not be retained within the sample pots were identified, measured and returned to the sea. Sub-sampling was applied when large (> 4 litres) homogenous samples were obtained. Samples were fixed at the end of each day using a 4% seawater buffered formalin solution.

The start and end times, co-ordinates and the duration of each beam trawl are given in Table 4.7 (reference and wind farm tows highlighted in green and red respectively). The beam trawl tow tracks are illustrated in Figure 4.5 overleaf.

For the purposes of data analysis, catch rates have been calculated to allow for quantitative comparisons to be made between the numbers of individuals caught per hour at each station for fish and motile invertebrates (see Section 6.0).

Table 4.7 Start and End Times (GMT), Durations and Co-ordinates of each Beam Trawl

Station	Date	Start				End				Duration (mm:ss)
		Time (GMT)	UTM30N		Depth (m)	Time (GMT)	UTM30N		Depth (m)	
			Latitude	Longitude			Latitude	Longitude		
BT01	21/02/2012	09:43:44	5,617,537.3	690,861.9	33.6	09:54:18	5,617,318.8	690,405.1	33.4	10:34
BT02	20/02/2012	14:11:09	5,620,159.0	697,017.0	27.3	14:21:01	5,620,162.0	697,527.3	30.3	09:52
BT03	21/02/2012	10:09:40	5,615,621.9	689,489.8	33.4	10:19:03	5,615,470.4	689,013.1	31.2	09:23
BT04		12:57:42	5,615,693.5	693,922.5	42.4	13:09:37	5,615,802.6	694,413.9	42.9	11:55
BT05	20/02/2012	14:37:40	5,619,029.4	699,401.3	28.9	14:47:27	5,619,100.9	699,902.2	26.9	09:47
BT06	21/02/2012	12:27:32	5,613,147.1	692,697.0	50.3	12:37:47	5,613,379.6	693,153.1	46.3	10:15
BT07	20/02/2012	15:11:44	5,616,513.3	699,972.7	42.4	15:22:31	5,616,697.6	700,445.8	41.7	10:47
BT08	21/02/2012	16:31:18	5,617,964.1	706,478.6	28.2	16:40:16	5,617,809.3	706,002.7	28.4	08:58
BT09		13:44:57	5,613,679.3	699,300.0	49.1	13:56:15	5,613,819.6	699,780.1	47.3	11:18
BT10		14:33:11	5,612,567.5	703,707.1	45.1	14:43:37	5,612,814.6	704,142.1	45.4	10:26
BT11		15:54:22	5,615,568.0	708,860.9	48.2	16:04:46	5,615,712.2	709,341.9	45.4	10:24
BT12	20/02/2012	13:31:04	5,620,718.8	692,363.5	23.7	13:44:07	5,620,911.6	692,832.0	33.1	13:03
BT13		13:03:15	5,621,632.1	690,374.5	22.0	13:14:03	5,621,770.0	690,856.2	22.7	10:48
BT14		17:24:31	5,625,136.7	695,326.3	17.4	17:35:45	5,624,813.8	694,935.9	17.8	11:14
BT15	23/02/2012	10:35:43	5,626,827.3	688,614.1	15.3	10:45:00	5,626,804.2	688,111.4	15.2	09:17
BT16		10:01:43	5,628,722.2	692,638.7	14.0	10:12:50	5,628,668.3	692,130.4	14.4	11:07
BT17		10:59:59	5,628,593.4	688,268.9	14.1	11:09:40	5,628,777.1	688,737.6	13.5	09:41
BT18		09:33:56	5,630,216.2	692,184.5	11.5	09:45:51	5,630,080.0	691,666.3	12.7	11:55
BT19	20/02/2012	12:34:49	5,622,825.6	687,543.3	19.7	12:44:22	5,623,050.1	687,998.4	20.0	09:33
BT20	21/02/2012	11:00:17	5,609,203.3	686,501.7	49.4	11:09:51	5,609,427.3	686,952.0	46.3	09:34
BT21		11:47:43	5,608,957.5	693,625.0	59.4	11:57:17	5,609,149.9	694,104.3	59.5	09:34
BT22		15:13:19	5,610,782.1	707,159.2	61.2	15:22:29	5,610,879.4	707,656.4	59.9	09:10
BT23	20/02/2012	15:56:59	5,622,012.7	702,495.6	22.6	16:05:38	5,622,129.7	702,985.3	22.1	08:39
BT24		16:53:32	5,626,478.7	698,333.5	16.7	17:00:40	5,626,691.7	698,801.1	16.2	07:08

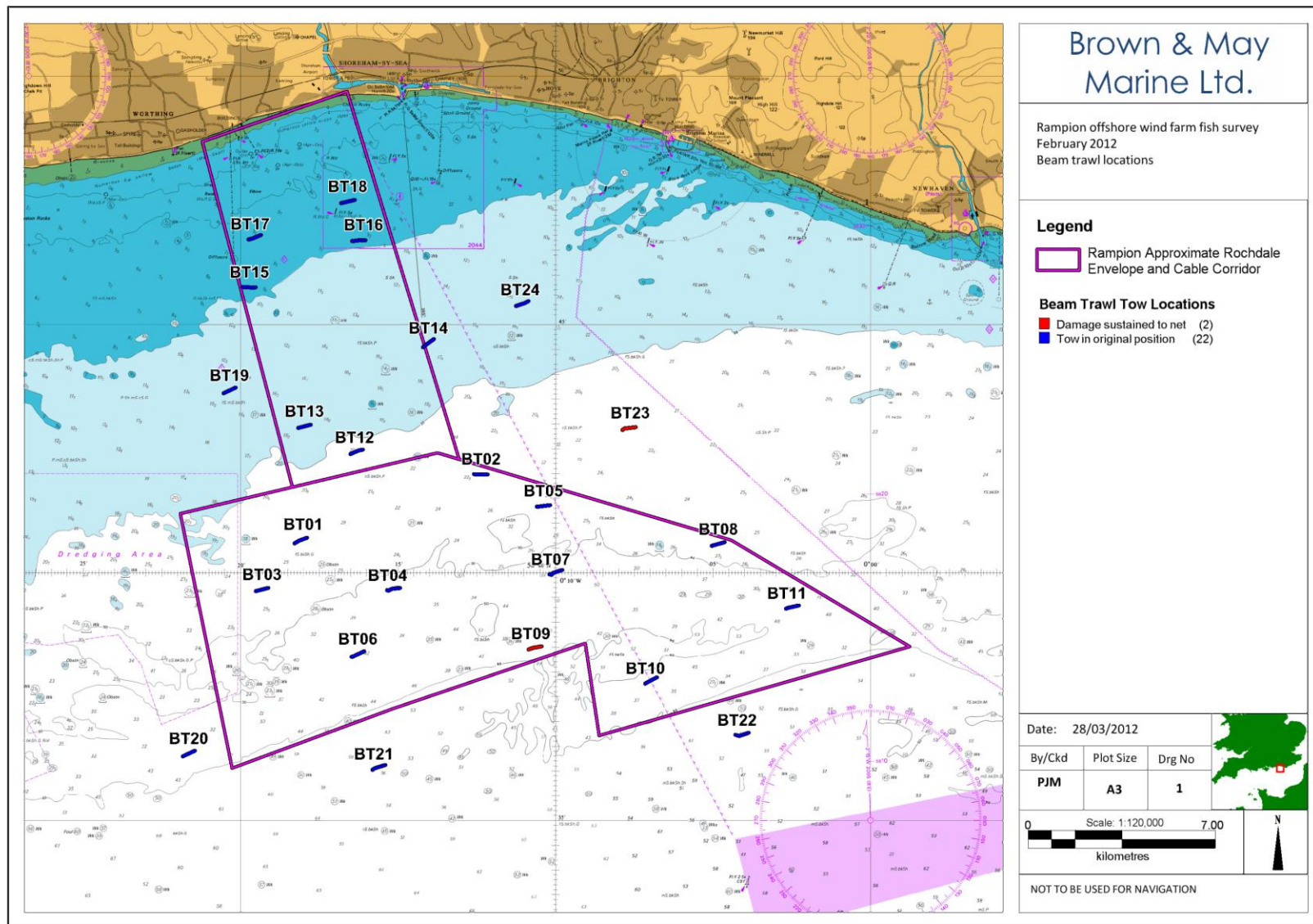


Figure 4.5 Beam Trawl Tow Tracks

5.0 Otter Trawl Results

5.1 Total Abundance and Catch Rates

The total number of individuals caught and the catch rate (number of individuals caught per hour) by species and site are given in Table 5.1 overleaf and illustrated in Figure 5.1. The catch rate by species and station is shown in Figure 5.3 (green and red boxes denote reference and wind farm stations).

A total of 31 species were caught; 30 within the wind farm and 22 at the reference stations. Overall, *M. merlangus* was the most abundant species caught, followed by flounder (*Platichthys flesus*) and then *C. harengus*.

M. merlangus were the most prevalent species caught at both the reference stations and within the wind farm. At the reference stations, 736 *M. merlangus* were caught, with a catch rate of 375.2 individuals per hour (/hr), followed by *S. sprattus* and *P. platessa* (69 individuals each; 35.2/hr). Within the wind farm site, 1,678 *M. merlangus* were caught with a catch rate of 284.0/hr, followed by *C. harengus* (397; 67.2/hr) and then *P. flesus* (392; 66.3/hr).

One gilt head sea bream (*Sparus aurata*) was caught at OT24.

M. kitt were found in greater numbers within the wind farm (14.9/hr), with the highest catch rate recorded at station OT05 (63.7/hr). *G. morhua* were generally found in higher numbers at the reference stations (4.1/hr), but were most abundant at station OT05 within the wind farm (18.2/hr). The catch rate of *S. solea* was higher at the reference stations (1.5/hr) than the wind farm (0.7/hr).

One undulate ray (*Raja undulata*) was found within the wind farm at station OT06.

Overall, the total catch rate for all species caught was approximately equal at the reference stations (532.3/hr) and within the wind farm (533.6/hr).

Table 5.1 Number of Individuals Caught and Catch Rate by Species and Sampling Area

Species		Number of Individuals Caught			Catch Rate (Number of Individuals Caught per Hour)	
Common Name	Scientific Name	Reference	Wind Farm	Total	Reference	Wind Farm
Whiting	<i>Merlangius merlangus</i>	736	1,678	2,414	375.2	284.0
Flounder	<i>Platichthys flesus</i>	47	392	439	24.0	66.3
Herring	<i>Clupea harengus</i>	1	397	398	0.5	67.2
Sprat	<i>Sprattus sprattus</i>	69	169	238	35.2	28.6
Plaice	<i>Pleuronectes platessa</i>	69	159	228	35.2	26.9
Dab	<i>Limanda limanda</i>	30	119	149	15.3	20.1
Lemon Sole	<i>Microstomus kitt</i>	20	88	108	10.2	14.9
Lesser Spotted Dogfish	<i>Scyliorhinus canicula</i>	18	29	47	9.2	4.9
Poor Cod	<i>Trisopterus minutus</i>	13	32	45	6.6	5.4
Cod	<i>Gadus morhua</i>	8	14	22	4.1	2.4
Bib	<i>Trisopterus luscus</i>	9	6	15	4.6	1.0
Mackerel	<i>Scomber scombrus</i>	0	13	13	0.0	2.2
Spotted Ray	<i>Raja montagui</i>	2	11	13	1.0	1.9
Starry Smoothhound	<i>Mustelus asterias</i>	4	8	12	2.0	1.4
Grey Gurnard	<i>Eutrigla gurnardus</i>	3	5	8	1.5	0.8
Whelk	<i>Buccinum undatum</i>	1	7	8	0.5	1.2
Dover Sole	<i>Solea solea</i>	3	4	7	1.5	0.7
Bass	<i>Dicentrarchus labrax</i>	2	4	6	1.0	0.7
Long-Finned Squid	<i>Loligo forbesi</i>	3	2	5	1.5	0.3
Blonde Ray	<i>Raja brachyura</i>	2	1	3	1.0	0.2
Common Dragonet	<i>Callionymus lyra</i>	2	1	3	1.0	0.2
Cuckoo Ray	<i>Raja naevus</i>	0	3	3	0.0	0.5
Thornback Ray	<i>Raja clavata</i>	1	2	3	0.5	0.3
Brill	<i>Scophthalmus rhombus</i>	0	2	2	0.0	0.3
John Dory	<i>Zeus faber</i>	0	2	2	0.0	0.3
Edible Crab	<i>Cancer pagurus</i>	0	1	1	0.0	0.2
Gilt Head Sea Bream	<i>Sparus aurata</i>	1	0	1	0.5	0.0
Greater Weever	<i>Trachinus draco</i>	0	1	1	0.0	0.2
Tub Gurnard	<i>Trigla lucerna</i>	0	1	1	0.0	0.2
Twaite Shad	<i>Alosa fallax</i>	0	1	1	0.0	0.2
Undulate Ray	<i>Raja undulata</i>	0	1	1	0.0	0.2
Total Number of Individuals		1,044	3,153	4,197		
Catch Rate (No. Individuals Caught per Hour)		532.3	533.6	533.3		
Total Number of Species		22	30	31		

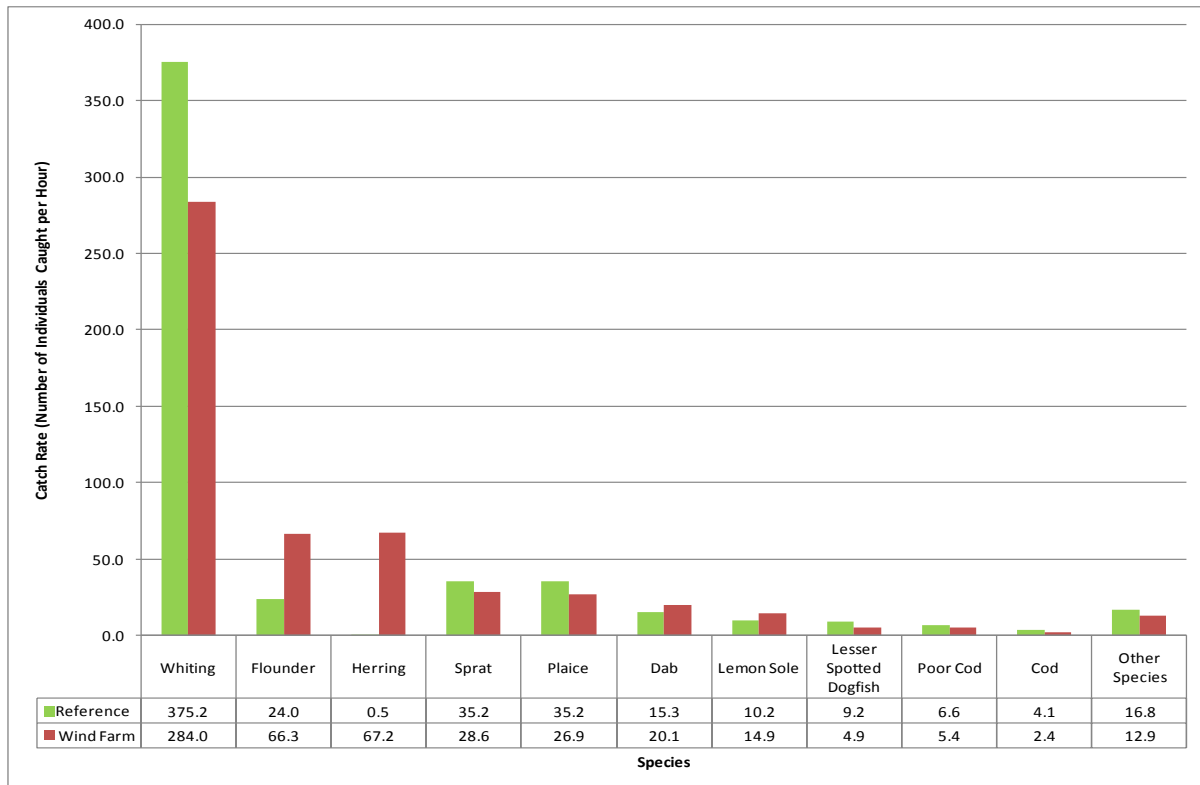


Figure 5.1 Catch Rate by Species and Sampling Area

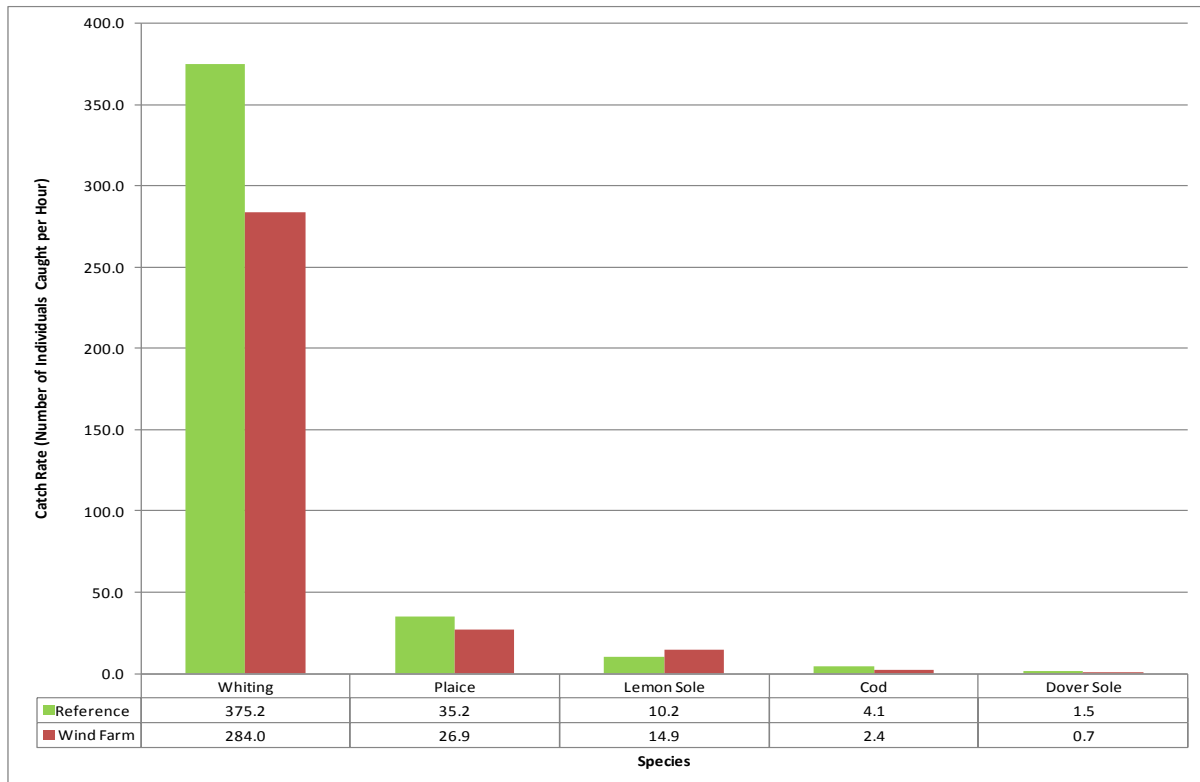


Figure 5.2 Catch Rate of Target Species by Sampling Area

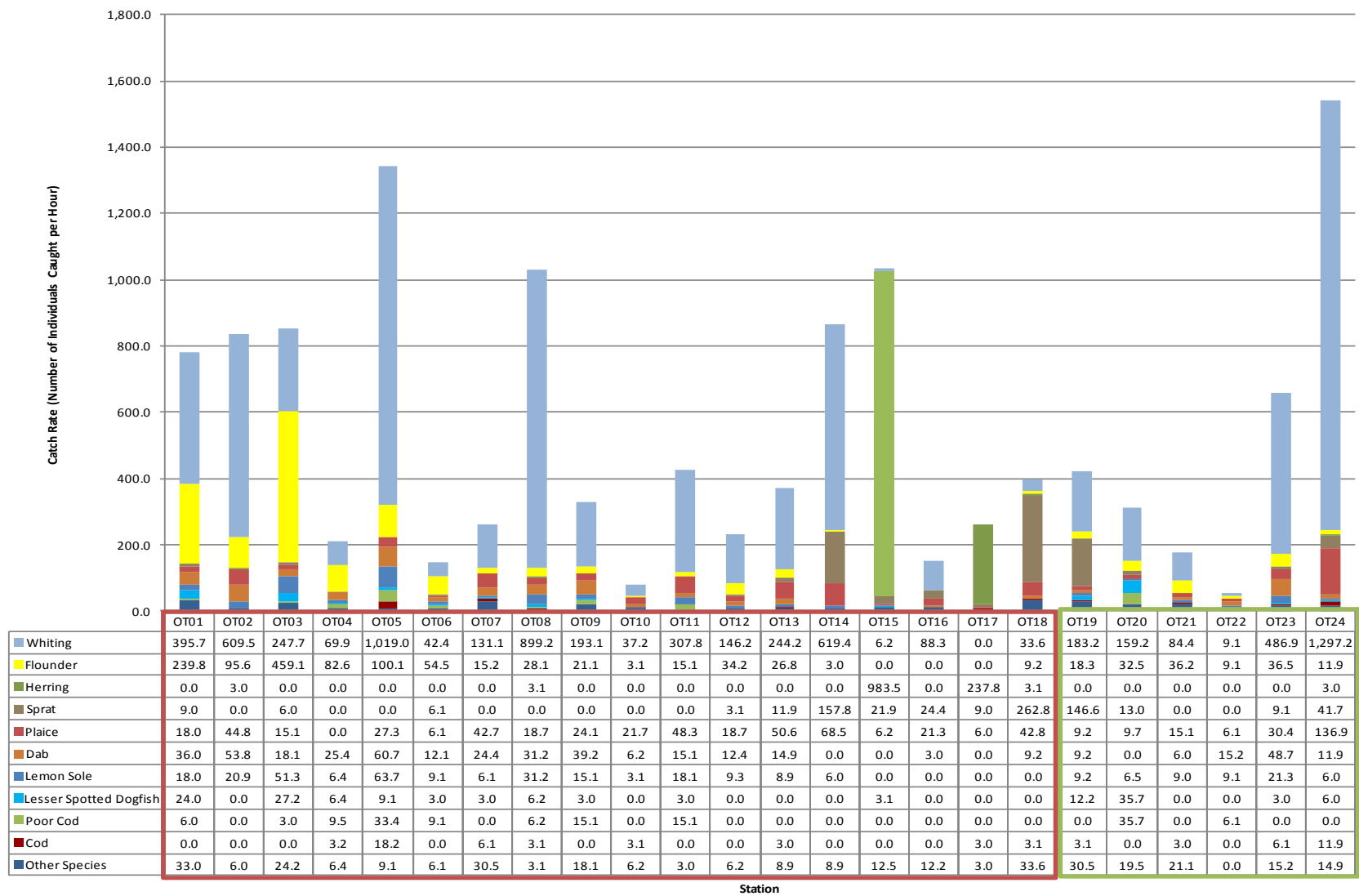


Figure 5.3 Catch Rate by Species and Station (red and green boxes denote wind farm and reference stations respectively)

5.2 Length Distribution

The average length (cm) by sampling area (reference and wind farm), and length range by species, and the length/wing width range for all species of ray caught are given in Table 5.2 and Table 5.3 respectively.

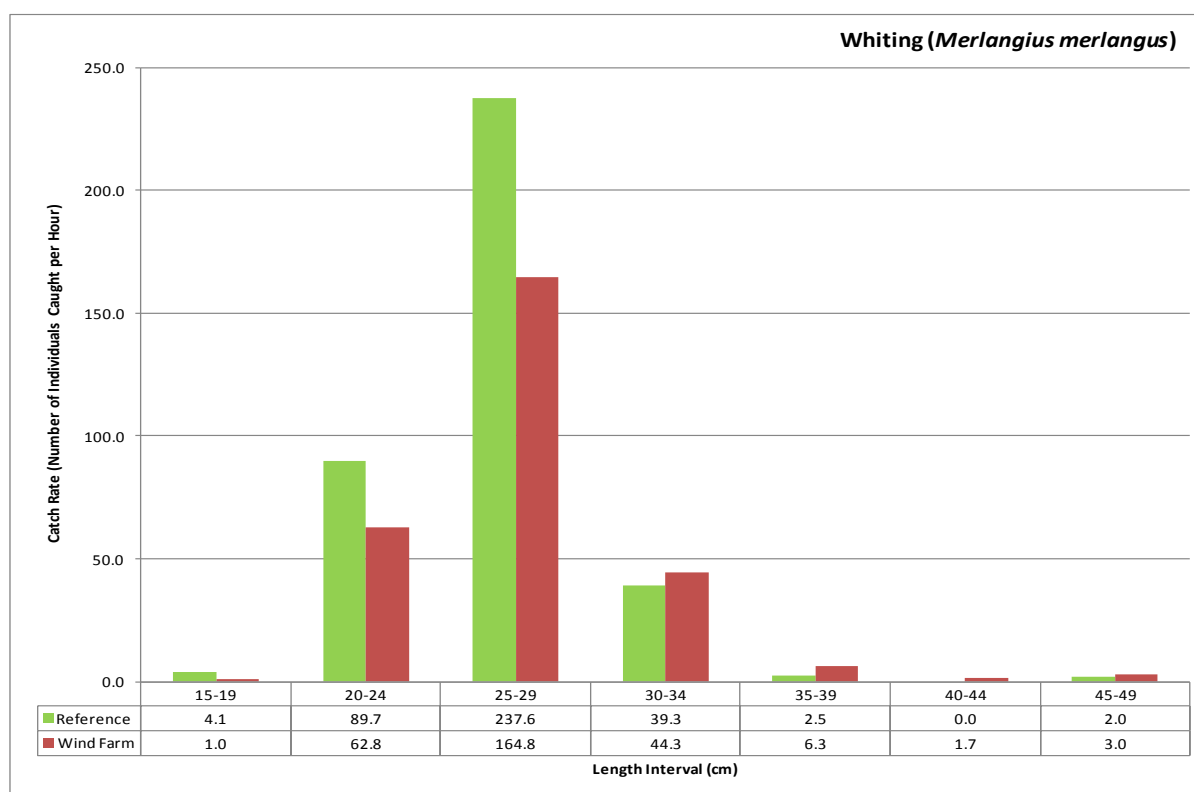
The length distributions for the most abundant species caught (>200 individuals), expressed as the catch rate (number of individuals caught per hour) by length (cm) and sampling area are shown in Figure 5.4 to Figure 5.8. In addition, the length distributions for *M. kitt*, *G. morhua*, *S. solea* and *R. undulata* are given in Figure 5.9 to Figure 5.12. The wing width distribution of *R. undulata* is shown Figure 5.13.

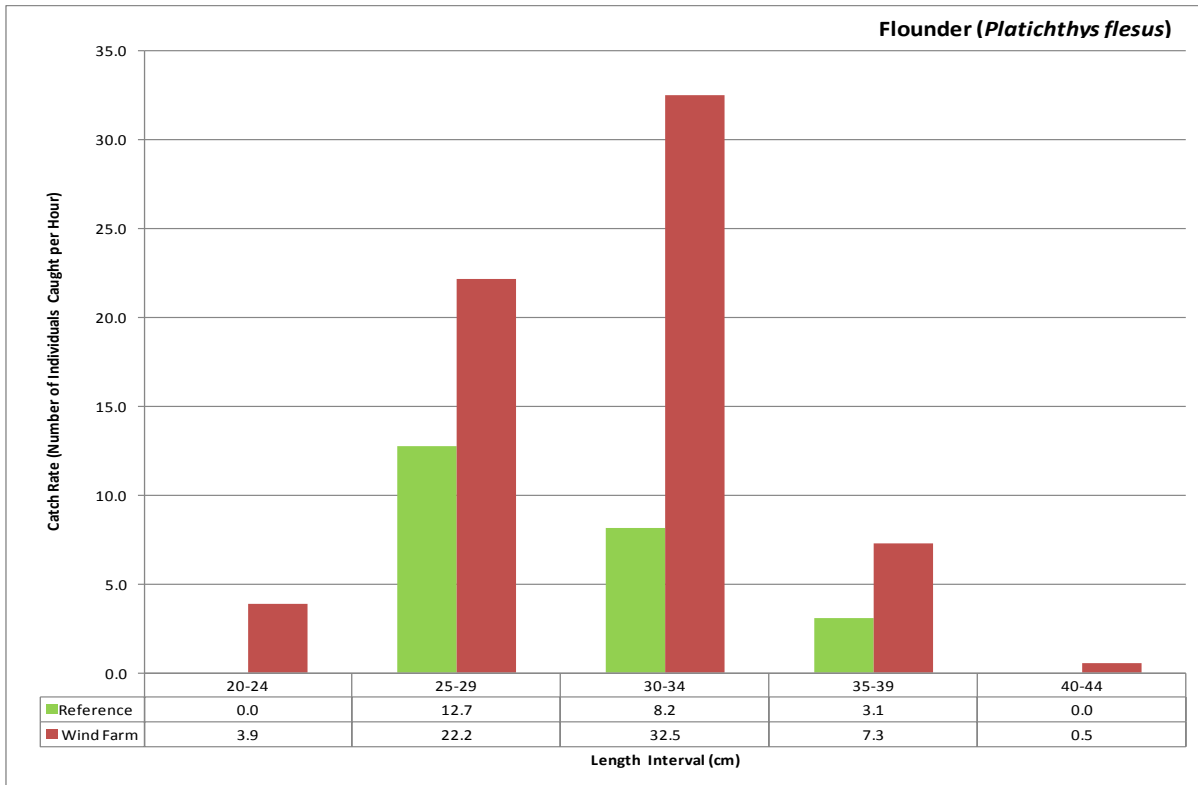
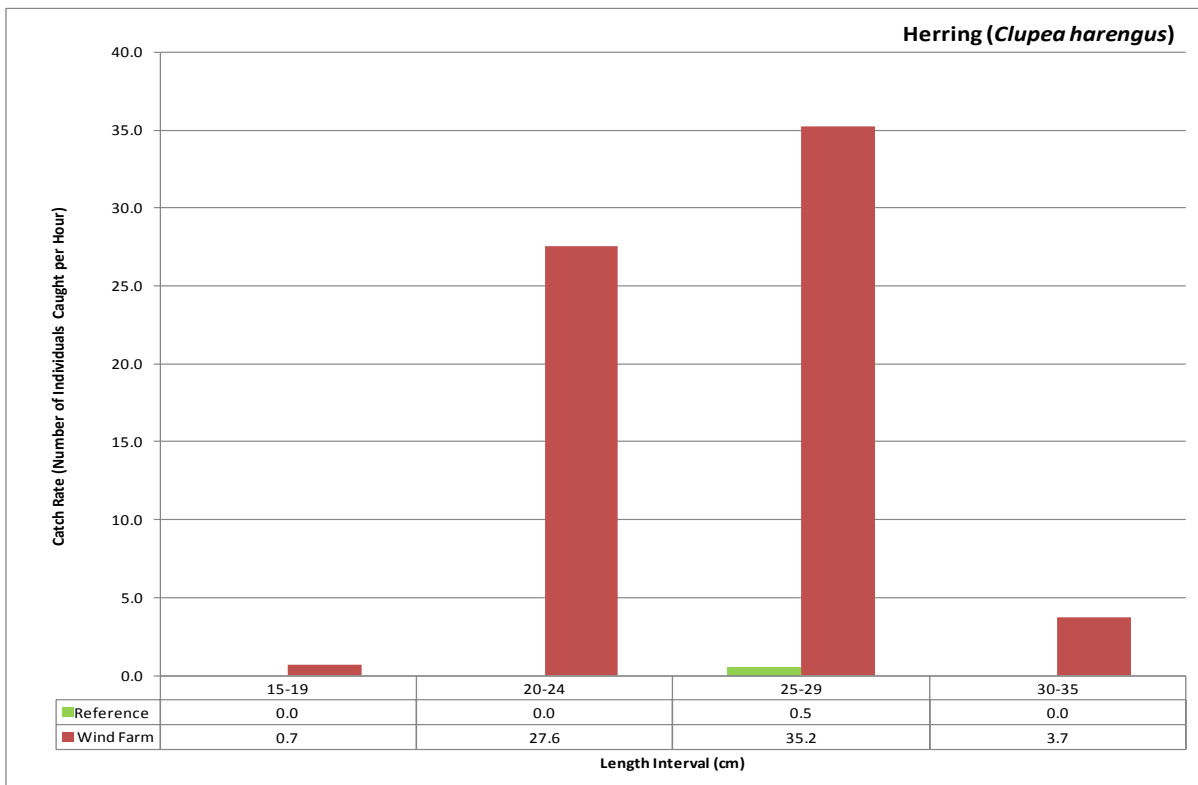
Table 5.2 Average Length and Length Range by Species and Sampling Area

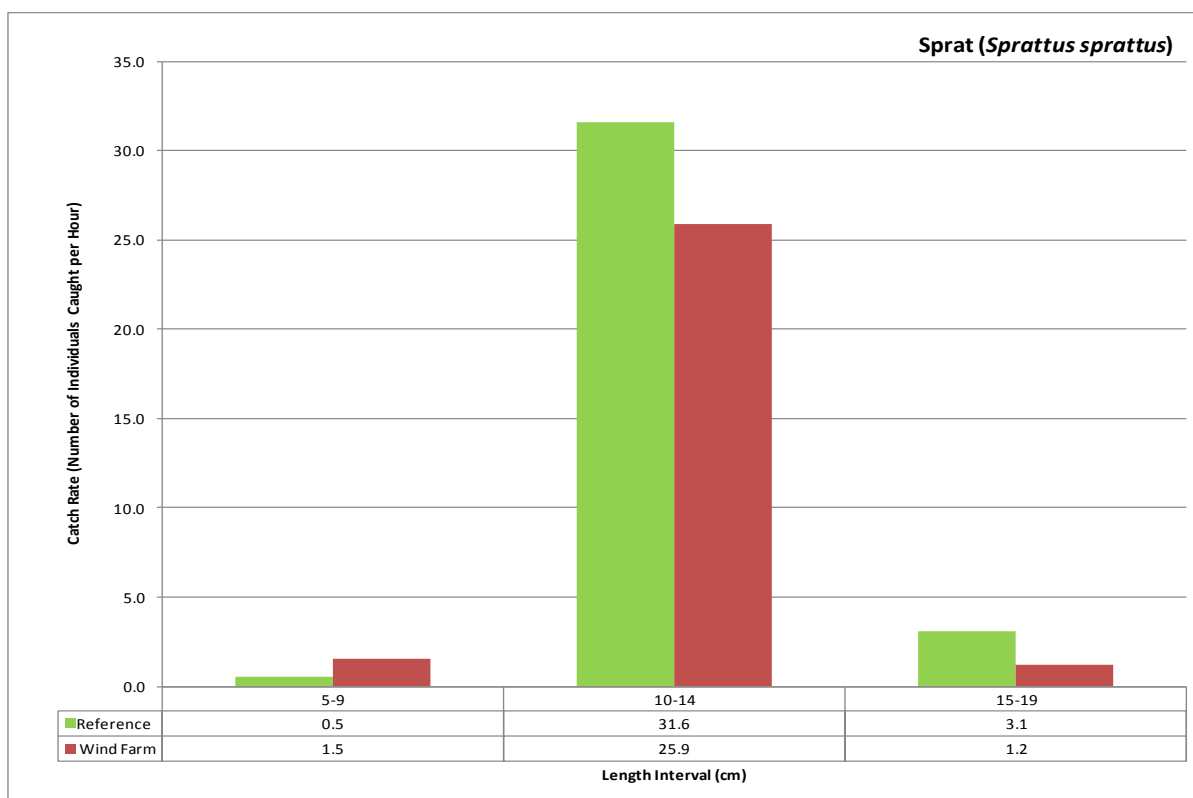
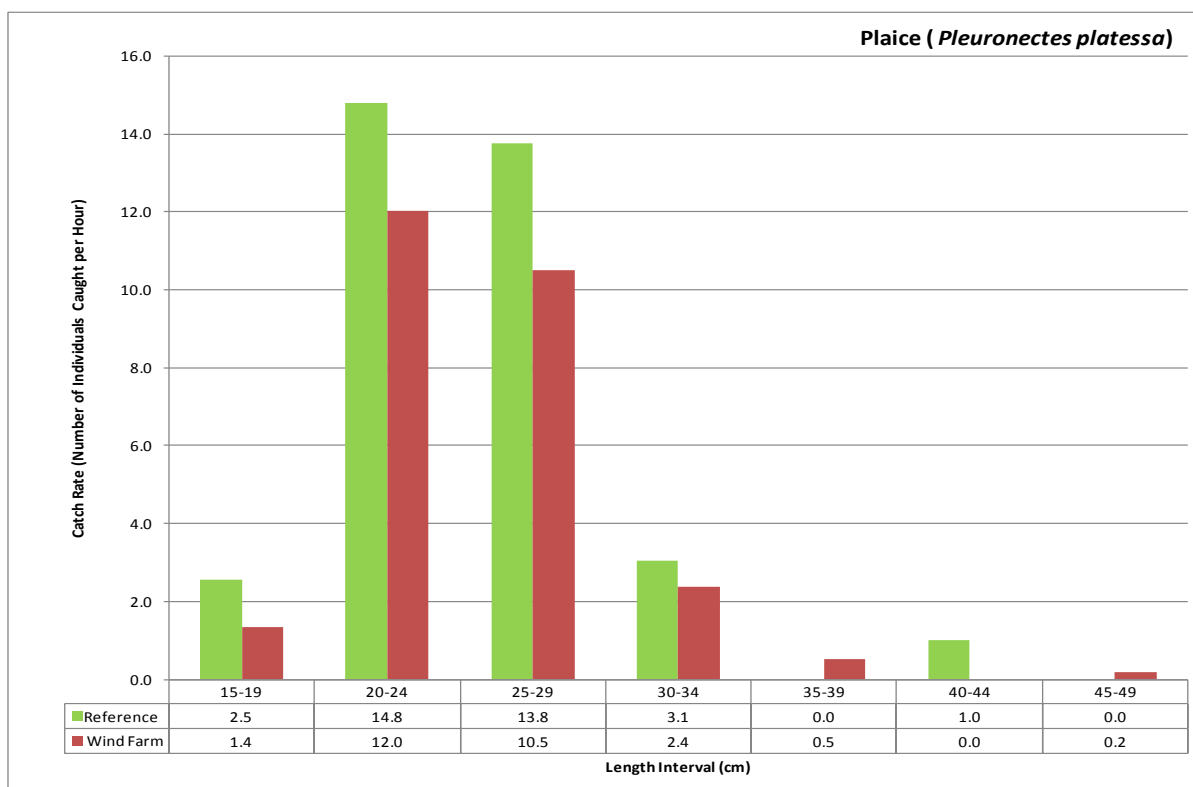
Species		Average Length (cm)		Length Range (cm)	
Common Name	Scientific Name	Reference	Wind Farm	Min.	Max.
Bass	<i>Dicentrarchus labrax</i>	33.5	34.5	26.0	41.0
Bib	<i>Trisopterus luscus</i>	22.0	21.7	16.0	31.0
Blonde Ray	<i>Raja brachyura</i>	61.0	81.0	59.0	81.0
Brill	<i>Scophthalmus rhombus</i>	0.0	31.0	29.0	33.0
Cod	<i>Gadus morhua</i>	54.8	60.8	46.0	78.0
Common Dragonet	<i>Callionymus lyra</i>	21.0	13.0	13.0	24.0
Cuckoo Ray	<i>Raja naevus</i>	0.0	38.0	30.0	53.0
Dab	<i>Limanda limanda</i>	22.3	21.5	14.0	30.0
Edible Crab	<i>Cancer pagurus</i>	0.0	18.8	18.8	18.8
Flounder	<i>Platichthys flesus</i>	30.1	30.3	21.0	43.0
Gilt Head Sea Bream	<i>Sparus aurata</i>	27.0	0.0	27.0	27.0
Greater Weever	<i>Trachinus draco</i>	0.0	34.0	34.0	34.0
Grey Gurnard	<i>Eutrigla gurnardus</i>	22.0	24.2	21.0	27.0
Herring	<i>Clupea harengus</i>	27.0	25.2	15.0	31.0
John Dory	<i>Zeus faber</i>	0.0	19.0	13.0	25.0
Lemon Sole	<i>Microstomus kitt</i>	25.8	26.8	19.0	36.0
Lesser Spotted Dogfish	<i>Scyliorhinus canicula</i>	53.8	54.6	40.0	63.0
Long-Finned Squid	<i>Loligo forbesi</i>	21.7	23.5	13.0	34.0
Mackerel	<i>Scomber scombrus</i>	0.0	30.9	25.0	37.0
Plaice	<i>Pleuronectes platessa</i>	25.2	25.0	17.0	46.0
Poor Cod	<i>Trisopterus minutus</i>	27.5	28.4	15.0	37.0
Dover Sole	<i>Solea solea</i>	31.3	26.5	25.0	36.0
Spotted Ray	<i>Raja montagui</i>	40.0	40.5	30.0	63.0
Sprat	<i>Sprattus sprattus</i>	12.9	11.7	8.0	15.0
Starry Smoothhound	<i>Mustelus asterias</i>	46.5	50.1	38.0	84.0
Thornback Ray	<i>Raja clavata</i>	53.0	25.0	13.0	53.0
Tub Gurnard	<i>Trigla lucerna</i>	0.0	22.0	22.0	22.0
Twaite Shad	<i>Alosa fallax</i>	0.0	43.0	43.0	43.0
Undulate Ray	<i>Raja undulata</i>	0.0	96.0	96.0	96.0
Whelk	<i>Buccinum undatum</i>	7.1	7.9	6.7	8.7
Whiting	<i>Merlangius merlangus</i>	26.4	27.2	17.0	47.0

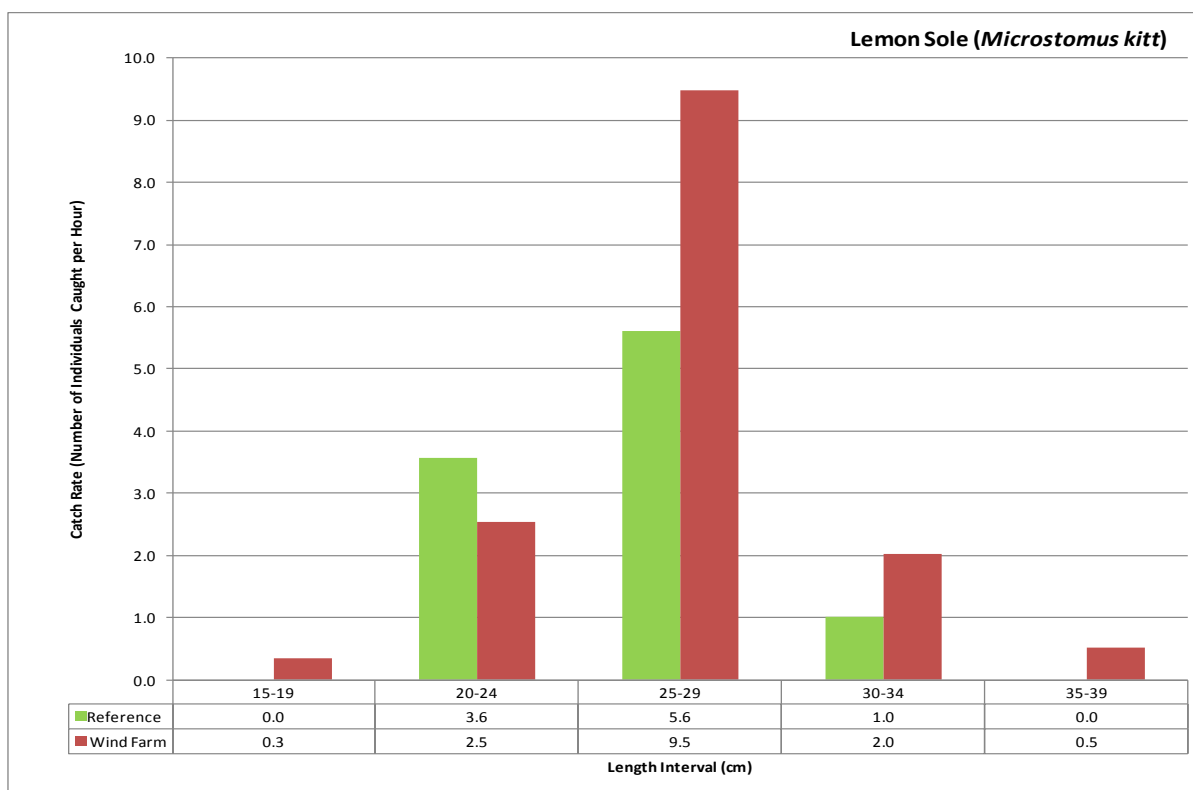
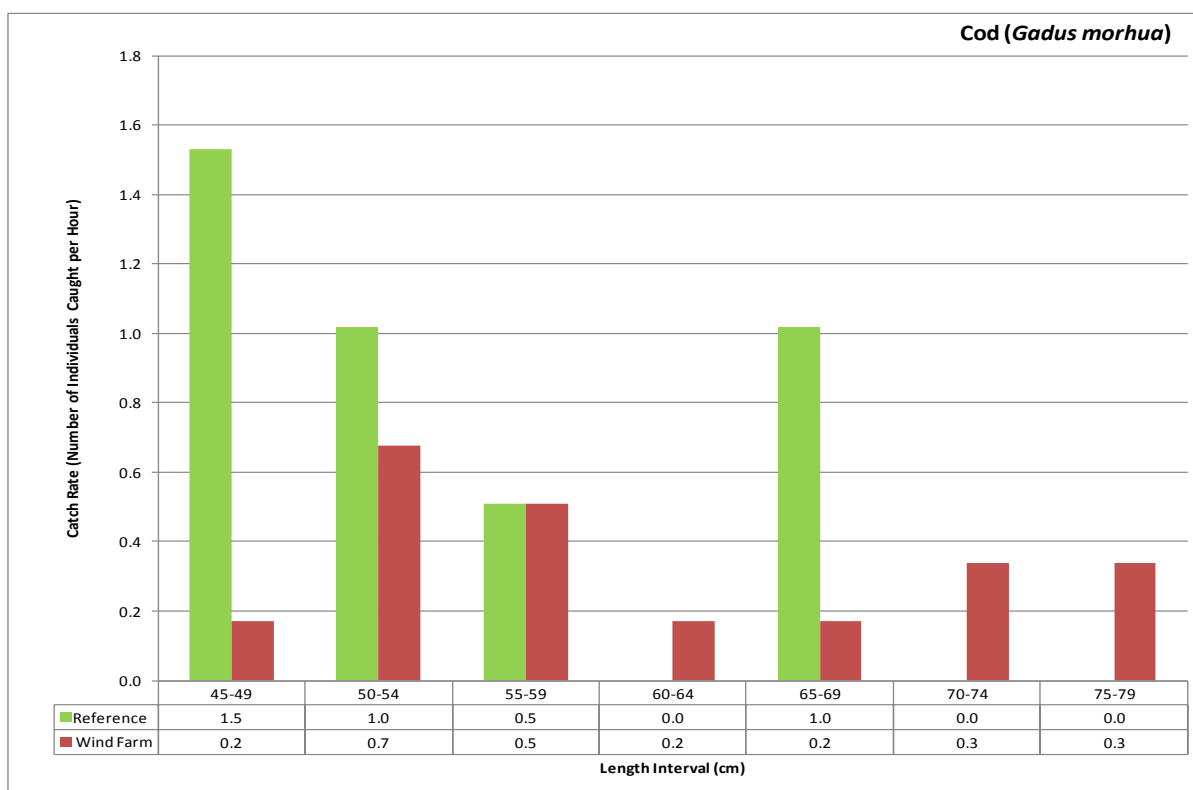
Table 5.3 Average Length, Length Range and Wing-Width Range for Ray Species and Sampling Area

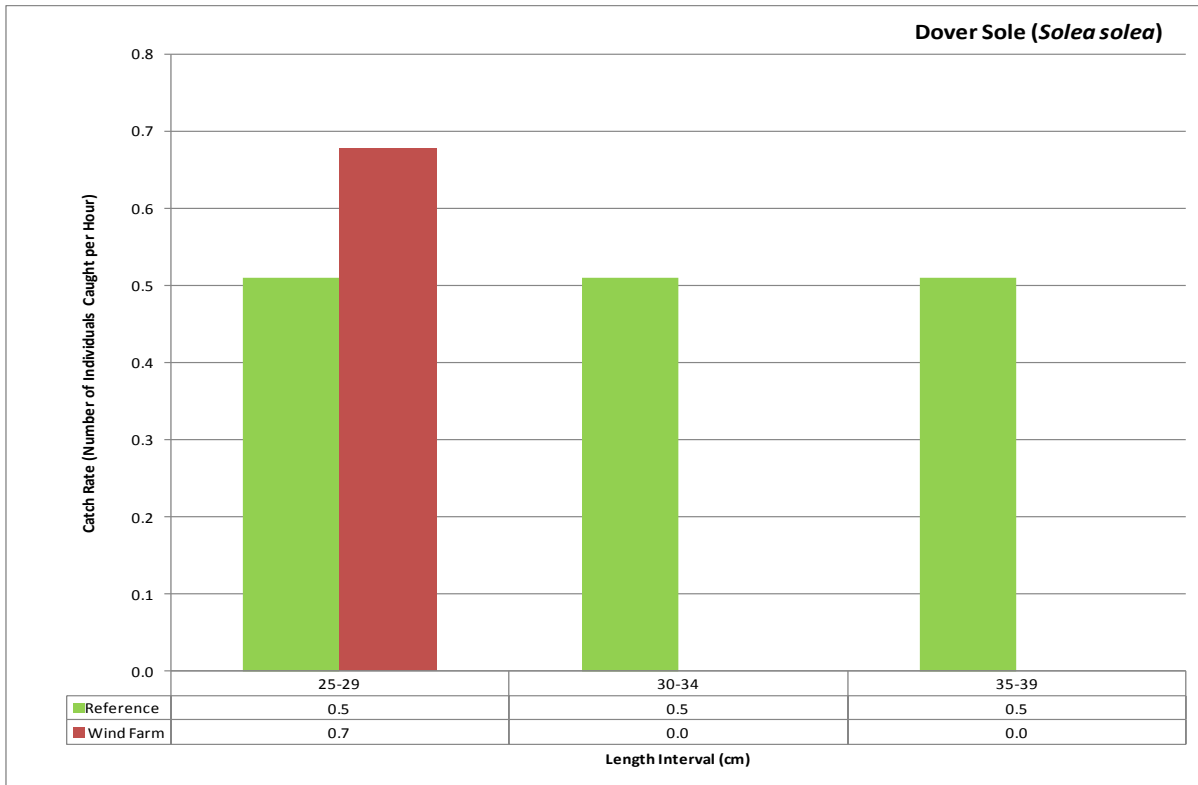
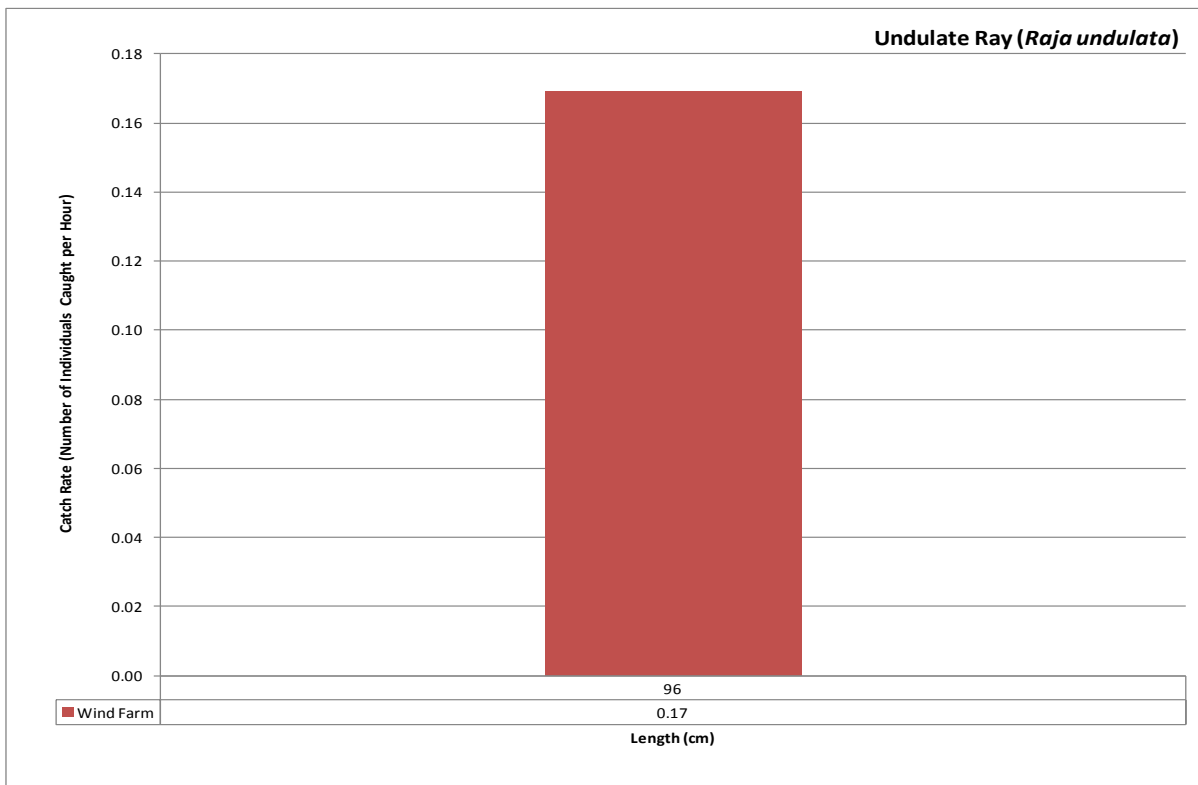
Species		Average Length (cm)		Length Range (cm)		Wing Width Range (cm)	
Common Name	Scientific Name	Reference	Wind Farm	Min.	Max.	Min	Max
Blonde Ray	<i>Raja brachyura</i>	61.0	81.0	59.0	81.0	40.0	59.0
Cuckoo Ray	<i>Raja naevus</i>	0.0	38.0	30.0	53.0	20.0	35.0
Spotted Ray	<i>Raja montagui</i>	40.0	40.5	30.0	63.0	19.0	42.0
Thornback Ray	<i>Raja clavata</i>	53.0	25.0	16.0	53.0	11.0	38.0
Undulate Ray	<i>Raja undulata</i>	0.0	96.0	96.0	96.0	52.0	52.0

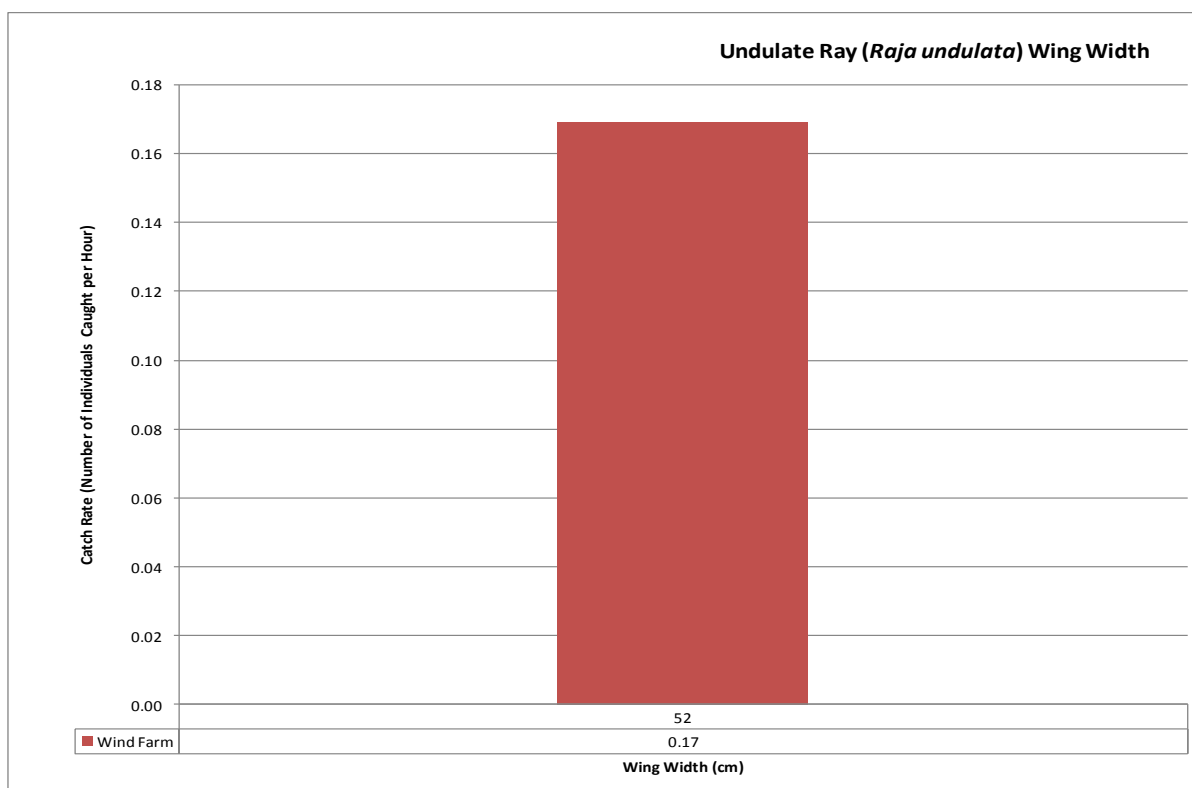
Figure 5.4 Whiting (*M. merlangus*) Length Distribution

Figure 5.5 Flounder (*P. flesus*) Length DistributionFigure 5.6 Herring (*C. harengus*) Length Distribution

Figure 5.7 Sprat (*S. sprattus*) Length DistributionFigure 5.8 Plaice (*P. platessa*) Length Distribution

Figure 5.9 Lemon Sole (*M. kitt*) Length DistributionFigure 5.10 Cod (*G. morhua*) Length Distribution

Figure 5.11 Dover Sole (*S. solea*) Length DistributionFigure 5.12 Undulate Ray (*R. undulata*) Length Distribution

Figure 5.13 Undulate Ray (*R. undulata*) Wing-Width Distribution

5.3 Minimum Landing Sizes

Minimum landing sizes (MLS) for fish and shellfish species are set by the EC under Regulation No. 850/98 (Annex XII) and by the local Inshore Fisheries and Conservation Authorities in waters within their jurisdictions. The Rampion offshore wind farm site is located within the boundaries of the Sussex Inshore Fisheries and Conservation Authority (S-IFCA) and therefore the MLS's for fish and shellfish species set by this authority apply.

The nine species caught for which a MLS has been set are given in Table 5.4, along with their presence or absence within the wind farm and reference locations.

Table 5.4 Minimum Landing Sizes (MLS) by Species

Species		MLS (cm)	Presence	
Common Name	Scientific Name	S-IFCA	Reference	Wind Farm
Whiting	<i>Merlangius merlangus</i>	27	✓	✓
Cod	<i>Gadus morhua</i>	35	✓	✓
Herring	<i>Clupea harengus</i>	20	✓	✓
Mackerel	<i>Scomber scombrus</i>	20		✓
Plaice	<i>Pleuronectes platessa</i>	27	✓	✓
Bass	<i>Dicentrarchus labrax</i>	36	✓	✓
Dover Sole	<i>Solea solea</i>	24		✓
Edible Crab	<i>Cancer pagurus</i>	14 (carapace width)		✓
Whelk	<i>Buccinum undatum</i>	4.5 (shell height)	✓	✓

Figure 5.14 and Figure 5.15 illustrate the percentage of individuals caught, by species, above and below their set MLS at the reference stations and within the wind farm, respectively.

The majority of the *M. merlangus* caught at the reference stations (60.5%) were below the MLS, whereas within the wind farm a higher proportion was above the MLS (54.0%).

The proportion of *P. platessa* below the MLS caught at the reference stations and within the wind farm was approximately equal (72.5% and 73.0%).

The majority of the *C. harengus* were caught in the wind farm, with most (99.0%) found to be above the MLS.

All *G. morhua* caught at both the reference stations and within the wind farm were above the MLS.

All other species were caught in relatively low numbers.

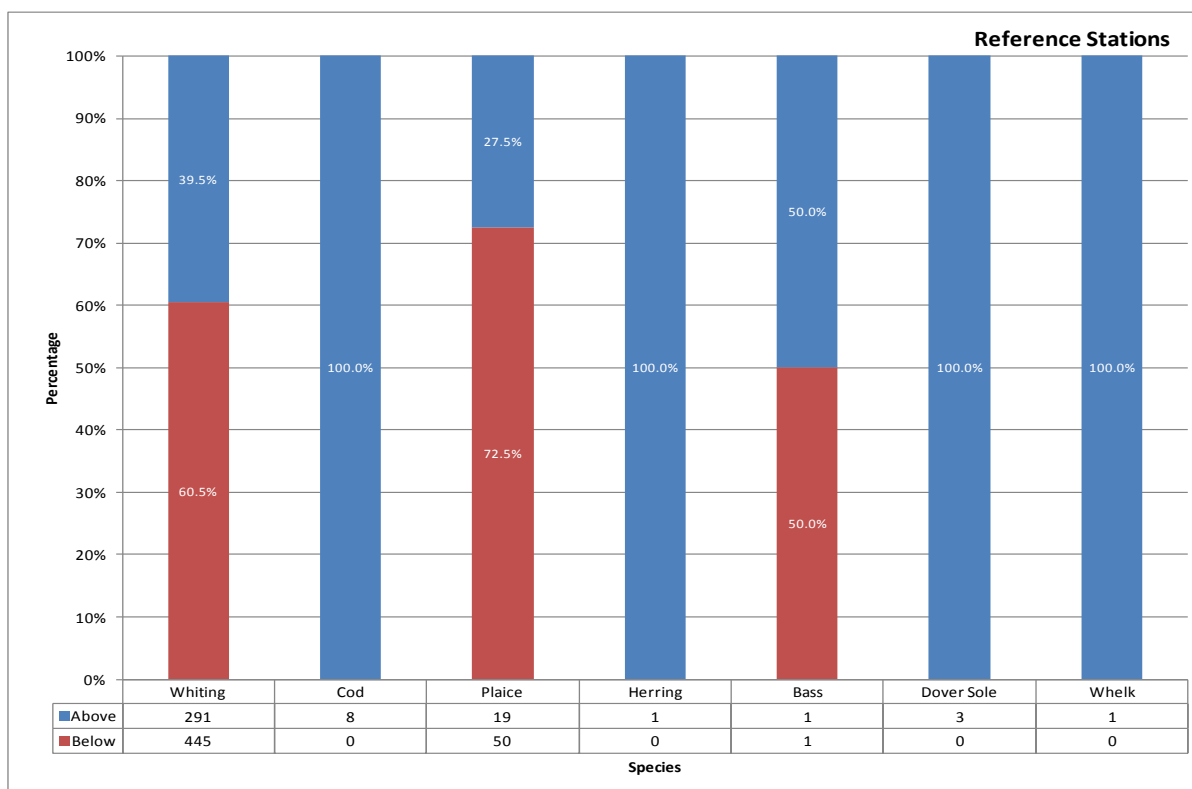


Figure 5.14 Percentage of Individuals Caught Below and Above their Set MLS by Species at the Reference Stations

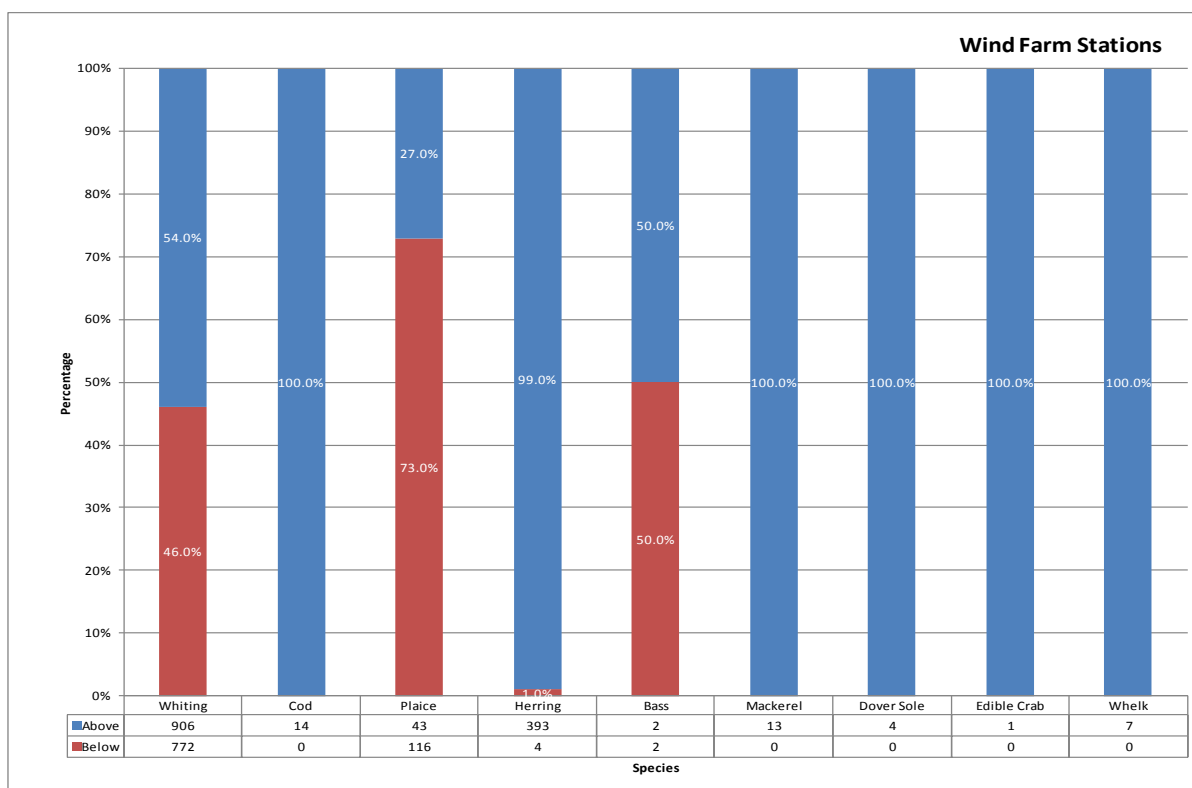


Figure 5.15 Percentage of Individuals Caught Below and Above their Set MLS by Species within the Wind Farm

5.4 Sex Percentage

The sex percentage for the five target species caught is illustrated in Figure 5.16 (reference) and Figure 5.17 (wind farm).

The highest proportion of the *M. merlangus* (reference 68.8%, wind farm 59.7%), *M. kitt* (70.0%, 64.8%), *P. platessa* (63.8%, 65.4%) and *G. morhua* (62.5%, 71.4%) caught at both the reference stations and within the wind farm were female.

S. solea had an equal sex percentage within the wind farm, whilst the greatest proportion of individuals in the reference area was female.

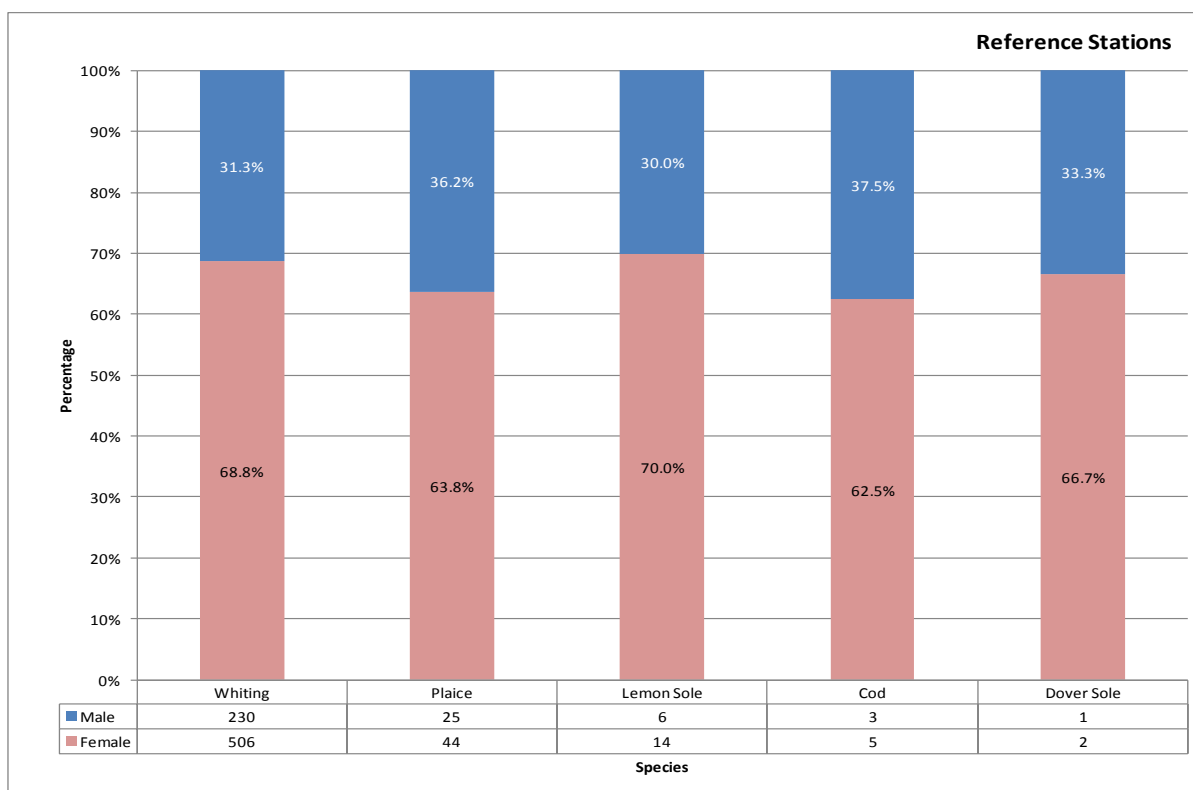


Figure 5.16 Sex Percentage by Species caught at the Reference Stations

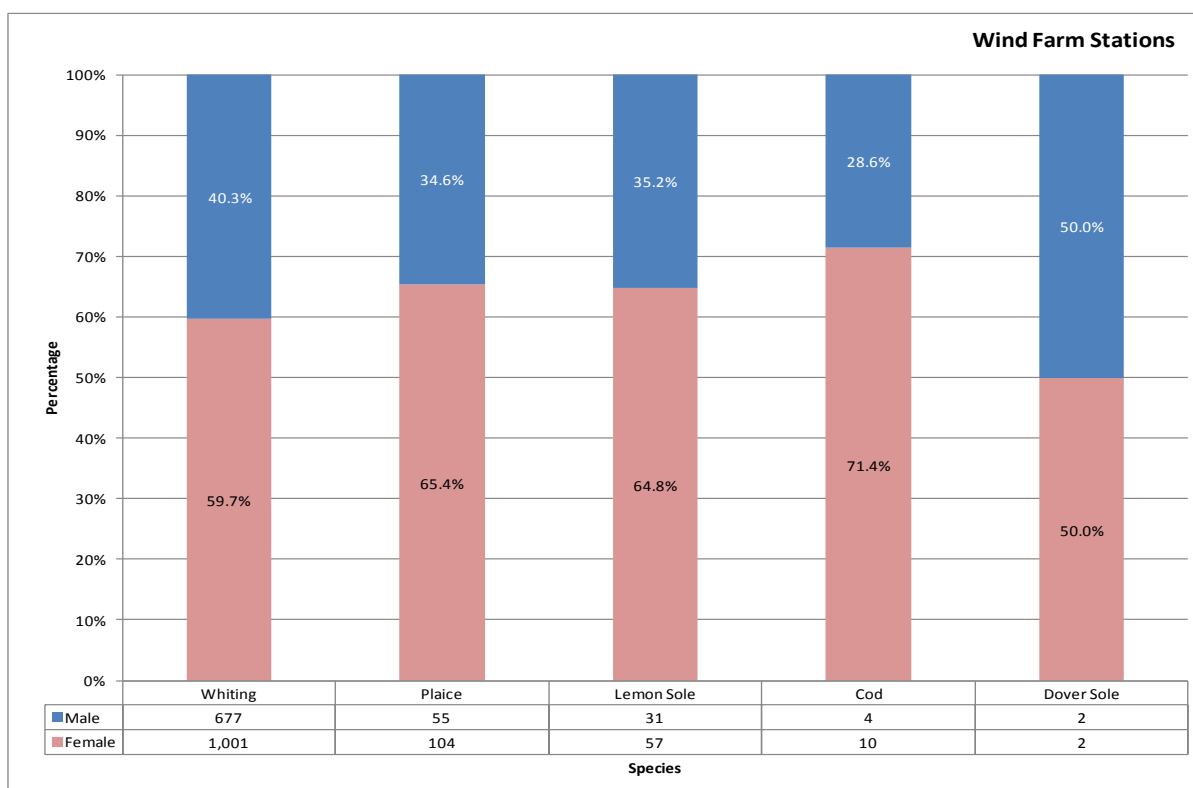


Figure 5.17 Sex Percentage by Species caught within the Wind Farm

5.5 Spawning Condition

The sex, spawning condition and length range of the five target species caught are given in Table 5.5 to Table 5.9. Where a stage of maturity was not identified it has not been included in the following tables.

The greatest proportion of the *M. merlangus* caught both within the wind farm and at the reference stations was represented by maturing males (34.2%), followed by hyaline females (29.3%).

The highest proportion of *P. platessa* caught in both sampling areas was spent females (32.5%), followed by immature females (30.7%).

The greatest percentage of the *M. kitt* caught both within the wind farm and at the reference stations was maturing females (41.7%).

A higher proportion of *G. morhua* caught both within the wind farm and at reference stations were spent females (36.4%). Maturing *S. solea* (71.5%) represented the majority within the wind farm and at the reference stations.

Table 5.5 Whiting (*M. merlangus*) Spawning Condition

Whiting							
Sex	Maturity	Site		Grand Total	% of Total Catch	Length Range (cm)	
		Reference	Wind Farm			Min.	Max.
Female	Immature	36	62	98	4.1%	17	26
	Maturing	241	417	658	27.3%	21	46
	Hyaline	205	503	708	29.3%	22	47
	Spent	24	19	43	1.8%	24	41
Male	Immature	39	23	62	2.6%	18	28
	Maturing	189	637	826	34.2%	19	33
	Spent	2	17	19	0.8%	25	29

Table 5.6 Plaice (*P. platessa*) Spawning Condition

Plaice							
Sex	Maturity	Site		Grand Total	% of Total Catch	Length Range (cm)	
		Reference	Wind Farm			Min.	Max.
Female	Immature	22	48	70	30.7%	18	28
	Maturing	3	0	3	1.3%	27	34
	Hyaline	1	0	1	0.4%	25	25
	Spent	18	56	74	32.5%	22	46
Male	Immature	14	23	37	16.2%	17	26
	Maturing	6	19	25	11.0%	20	29
	Spent	5	13	18	7.9%	24	31

Table 5.7 Lemon Sole (*M. kitt*) Spawning Condition

Lemon Sole							
Sex	Maturity	Site		Grand Total	% of Total Catch	Length Range (cm)	
		Reference	Wind Farm			Min.	Max.
Female	Immature	1	5	6	5.6%	19	26
	Maturing	6	39	45	41.7%	24	36
	Hyaline	0	3	3	2.8%	29	32
	Spent	7	10	17	15.7%	24	25
Male	Immature	1	5	6	5.6%	20	23
	Maturing	5	23	28	25.9%	19	30
	Spent	0	3	3	2.8%	25	29

Table 5.8 Cod (*G. morhua*) Spawning Condition

Cod							
Sex	Maturity	Site		Grand Total	% of Total Catch	Length Range (cm)	
		Reference	Wind Farm			Min.	Max.
Female	Immature	2	3	5	22.7%	48	56
	Maturing	0	1	1	4.5%	60	60
	Hyaline	0	1	1	4.5%	54	54
	Spent	3	5	8	36.4%	55	78
Male	Immature	1	1	2	9.1%	49	52
	Maturing	1	3	4	18.2%	48	71
	Spent	1	0	1	4.5%	46	46

Table 5.9 Dover Sole (*S. solea*) Spawning Condition

Dover Sole							
Sex	Maturity	Site		Total	% of Total Catch	Length Range (cm)	
		Reference	Wind Farm			Min.	Max.
Female	Maturing	2	0	2	28.6%	32	36
	Spent	0	2	2	28.6%	25	28
Male	Maturing	1	2	3	42.9%	25	28

6.0 Scientific 2-metre Beam Trawl Results

6.1 Abundance and Catch Rates

A total of 24 fish and 100 invertebrate (90 motile and 10 sessile) species were caught. The numbers of individuals and catch rates by sampling area for fish and motile invertebrate species are given in Table 6.1 and Table 6.3 respectively. The presence/absence or count by sampling area for sessile invertebrate species is given in Table 6.4.

6.1.1 Fish Species

A total of 24 species of fish were caught in the beam trawl; 22 within the wind farm and 11 at the reference stations. Sand goby (*Pomatoschistus minutus*) was the most prevalent species caught within the wind farm (68.9/hr) followed by solenette (*Buglossidium luteum*, 15.4/hr); whereas at the reference stations, *B. luteum* was the most abundant species (40.3/hr) followed by *P. minutus* (25.7/hr).

Three *P. platessa* (0.9/hr), one *M. kitt* (0.3/hr), and one *S. solea* (0.3/hr) were found within the wind farm.

Three short-snouted seahorses (*Hippocampus hippocampus*), a species of conservation interest, were found within the wind farm, two individuals at station BT03 and one at station BT05.

The highest total catch rate was recorded at station BT05 (607.2/hr), followed by BT24 (353.3/hr), and then BT04 (292.0/hr). *P. minutus* represented the greatest proportion of the catch at the majority of sampling stations.

Overall, the total catch rate for fish species caught in the beam trawl was greater within the wind farm (128.0/hr) than at the reference stations (101.8/hr).

Table 6.1 Abundance and Catch Rates of Fish Species by Station

Species		Number of Individuals Caught			Catch Rate (Number of Individuals Caught per Hour)	
Common Name	Scientific Name	Reference	Wind Farm	Total	Reference	Wind Farm
Sand Goby	<i>Pomatoschistus minutus</i>	23	219	242	25.7	68.9
Solenette	<i>Buglossidium luteum</i>	36	49	85	40.3	15.4
Common Goby	<i>Pomatoschistus microps</i>	5	32	37	5.6	10.1
Painted Goby	<i>Pomatoschistus pictus</i>	0	27	27	0.0	8.5
Common Dragonet	<i>Callionymus lyra</i>	5	20	25	5.6	6.3
Lesser Weever	<i>Echiichthys vipera</i>	10	15	25	11.2	4.7
Poor Cod	<i>Trisopterus minutus</i>	5	10	15	5.6	3.1
Dab	<i>Limanda limanda</i>	1	5	6	1.1	1.6
Scaldfish	<i>Arnoglossus laterna</i>	1	5	6	1.1	1.6
Pogge	<i>Agonus cataphractus</i>	0	5	5	0.0	1.6
Plaice	<i>Pleuronectes platessa</i>	0	3	3	0.0	0.9
Reticulated Dragonet	<i>Callionymus reticulatus</i>	3	0	3	3.4	0.0
Short-snouted Seahorse	<i>Hippocampus hippocampus</i>	0	3	3	0.0	0.9
Bib	<i>Trisopterus luscus</i>	1	1	2	1.1	0.3
Goby	<i>Gobiidae</i>	0	2	2	0.0	0.6

Species		Number of Individuals Caught			Catch Rate (Number of Individuals Caught per Hour)	
Common Name	Scientific Name	Reference	Wind Farm	Total	Reference	Wind Farm
Rock Goby	<i>Gobius paganellus</i>	0	2	2	0.0	0.6
Spotted Dragonet	<i>Callionymus maculatus</i>	0	2	2	0.0	0.6
Transparent Goby	<i>Aphia minuta</i>	0	2	2	0.0	0.6
Dover Sole	<i>Solea solea</i>	0	1	1	0.0	0.3
Five-bearded Rockling	<i>Ciliata mustela</i>	0	1	1	0.0	0.3
Grey Gurnard	<i>Eutrigla gurnardus</i>	0	1	1	0.0	0.3
Lemon Sole	<i>Microstomus kitt</i>	0	1	1	0.0	0.3
Lesser Spotted Dogfish	<i>Scyliorhinus canicula</i>	1	0	1	1.1	0.0
Thickback Sole	<i>Microchirus variegatus</i>	0	1	1	0.0	0.3
Total Number of Individuals		91	407	498		
Catch Rate (No. of Individuals Caught per Hour)		101.8	128.0	122.3		
Total Number of Species		11	22	24		

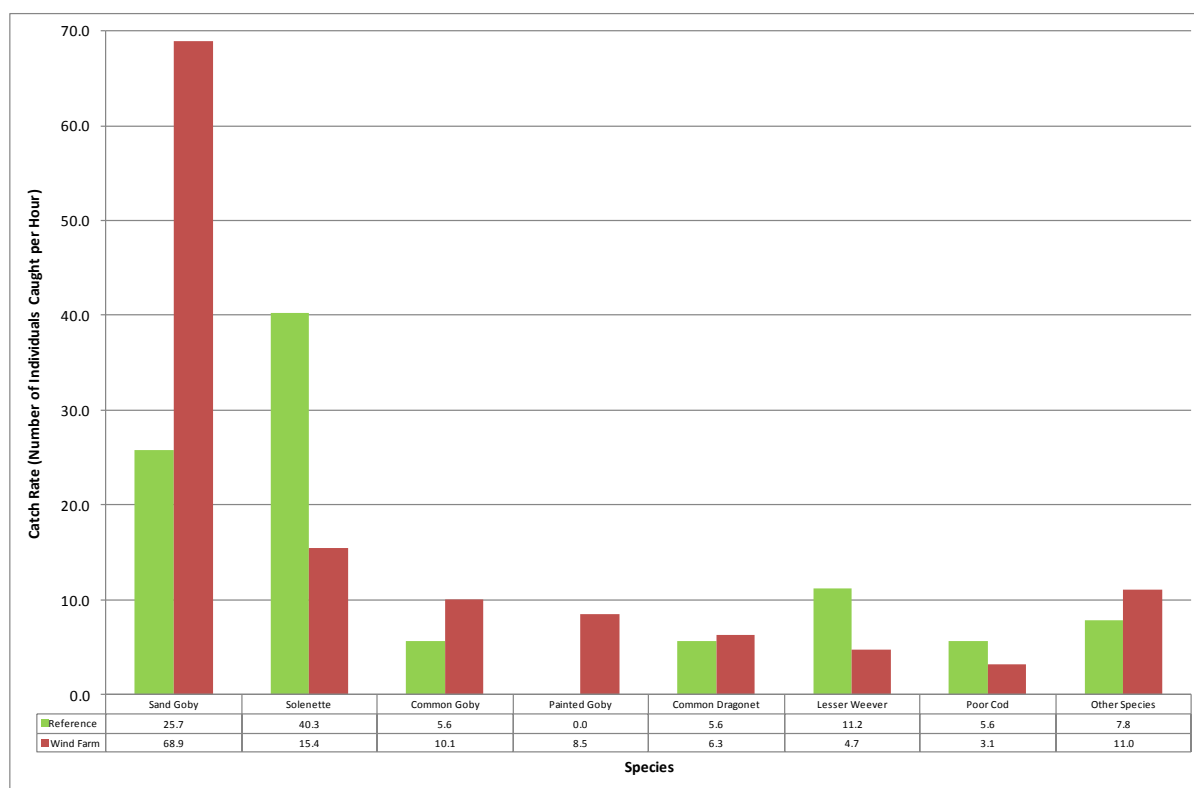


Figure 6.1 Catch Rate by Fish Species and Sampling Area

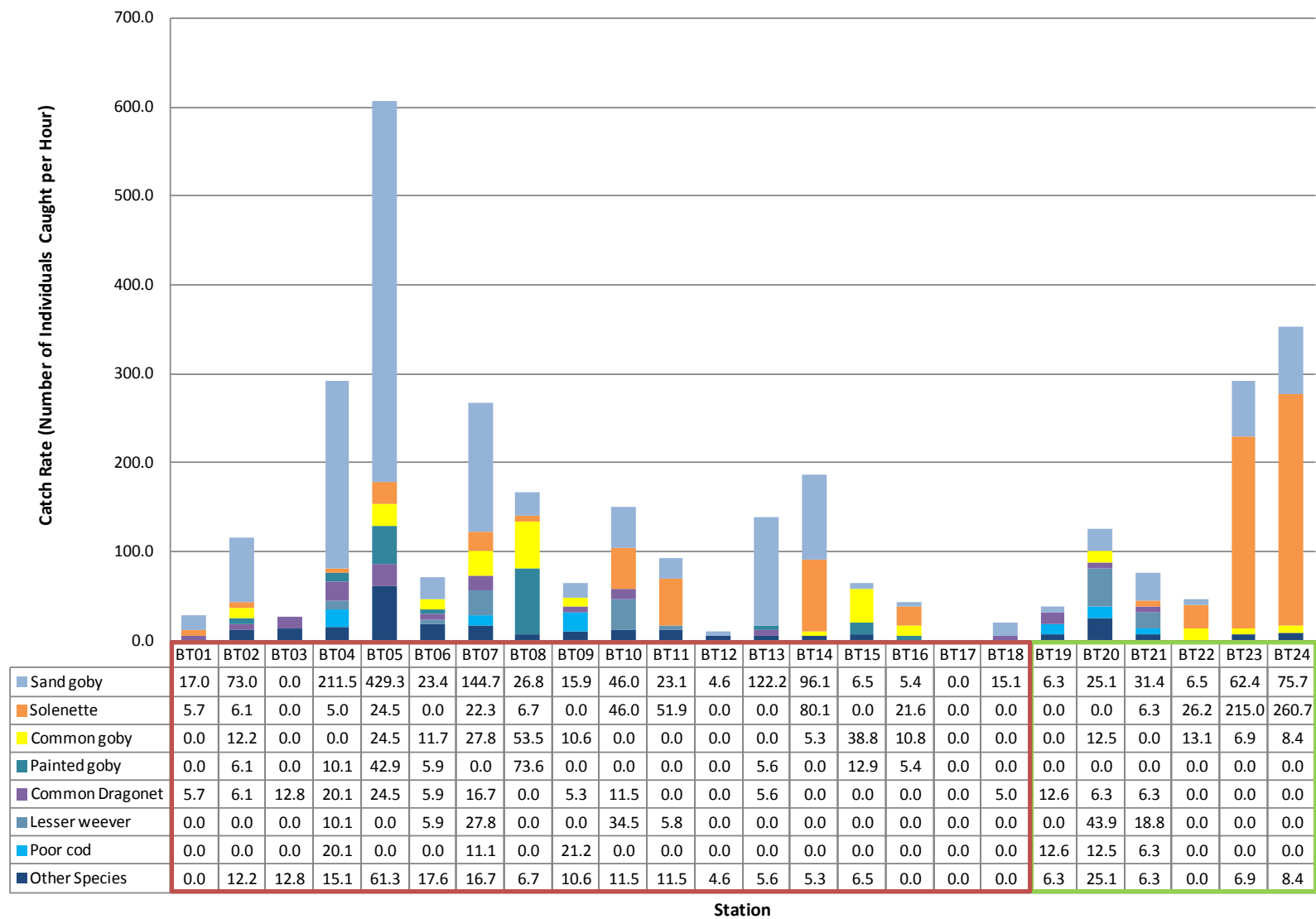


Figure 6.2 Catch Rate by Fish Species and Station (red and green boxes denote wind farm and reference stations respectively)

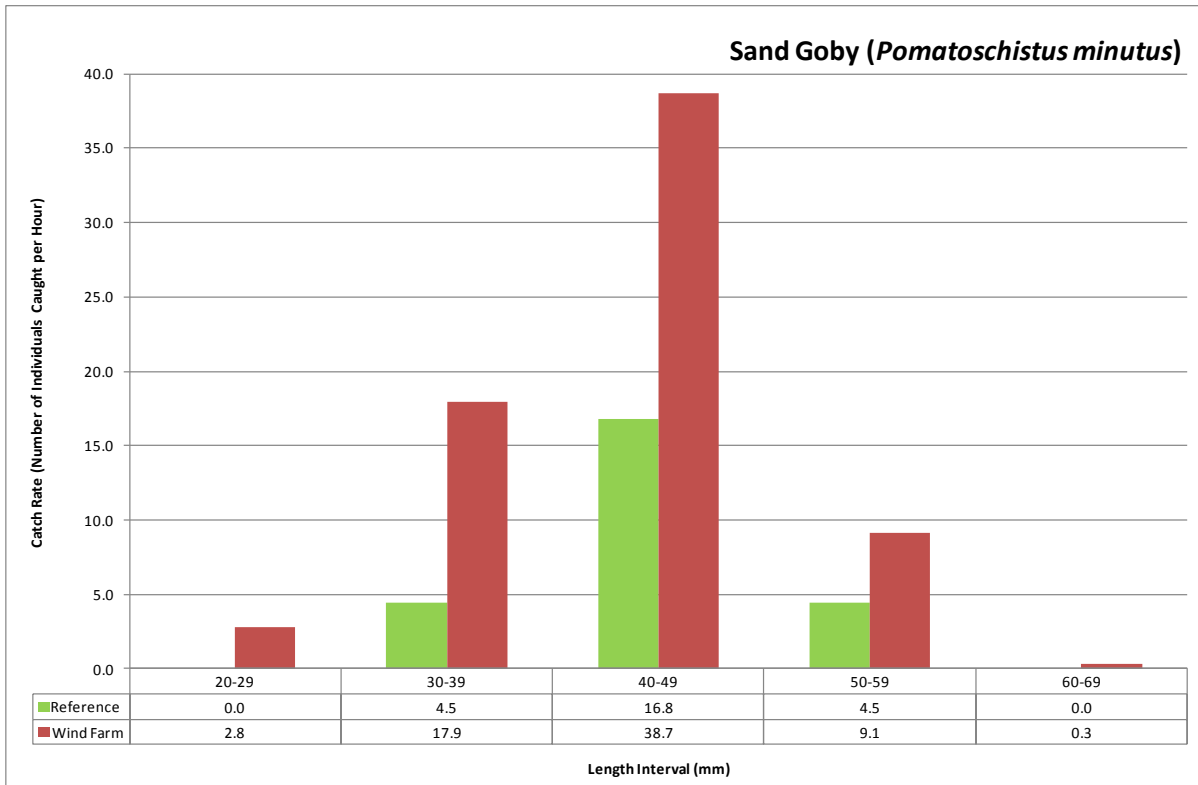
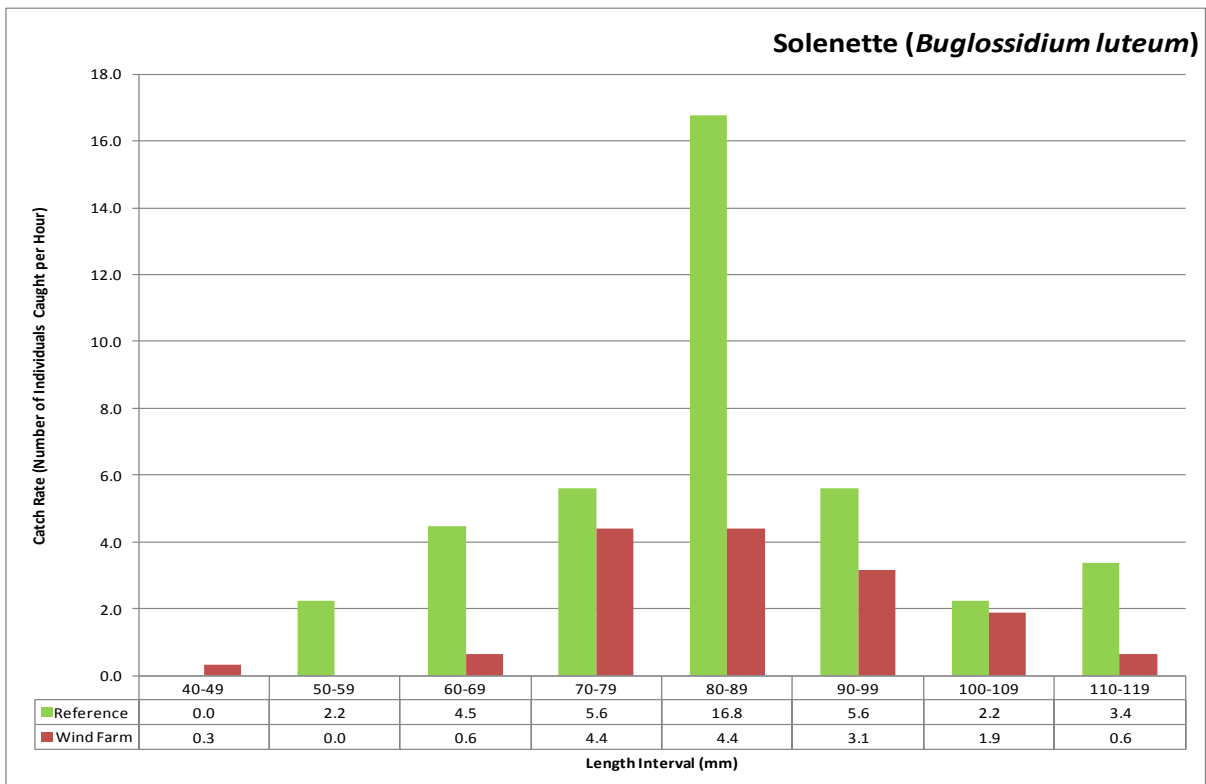
6.2 Length Distribution

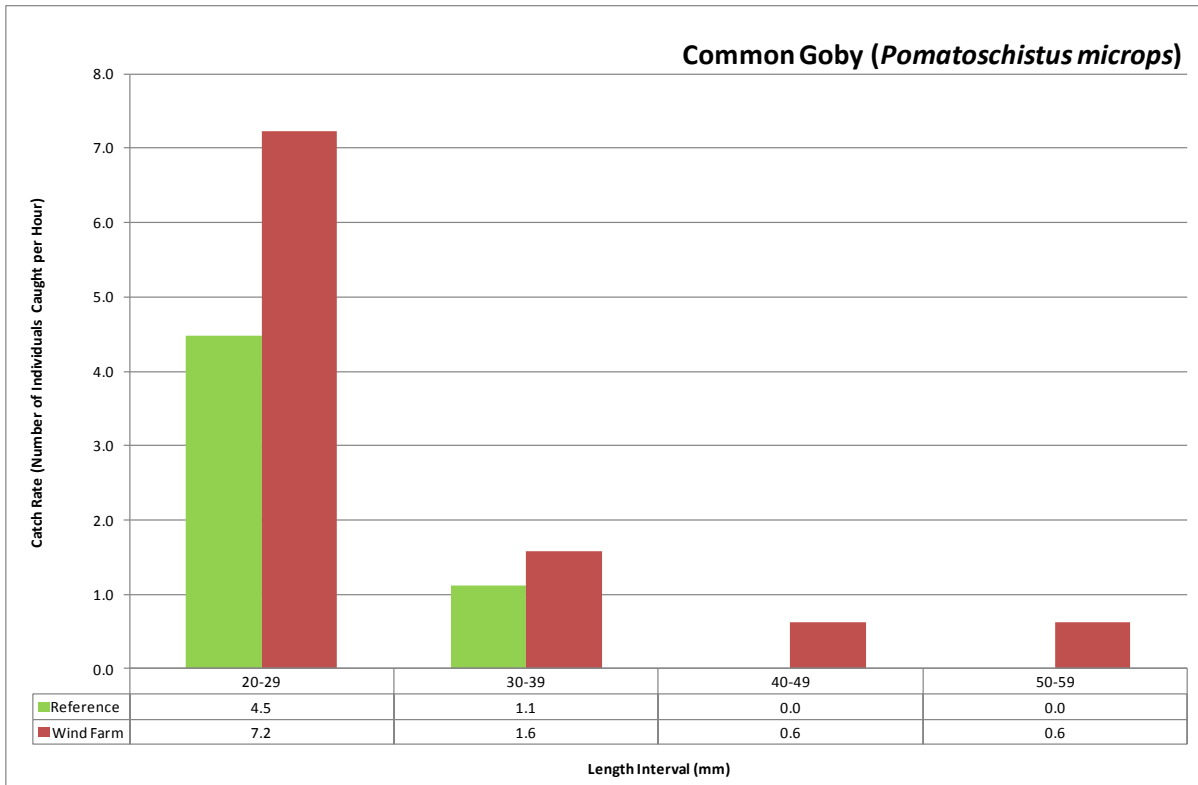
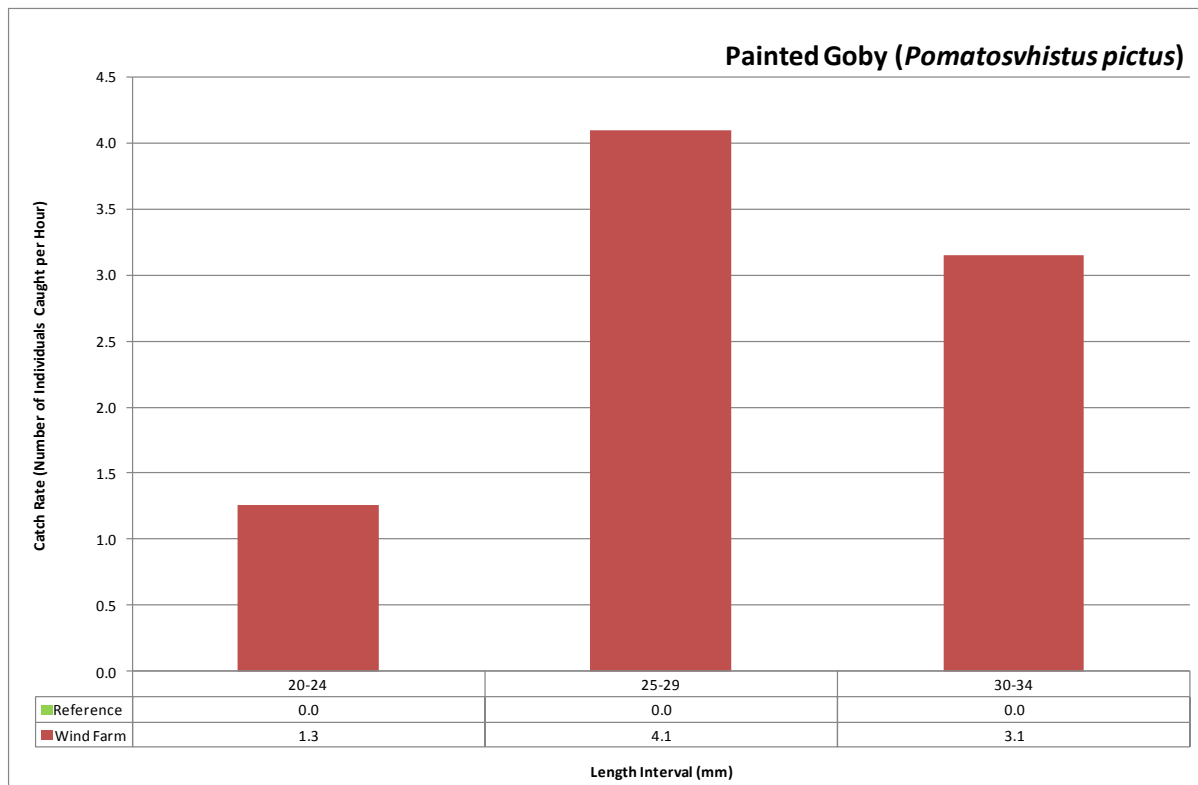
The average length (mm) and length range of species caught by sampling area (reference and wind farm), are given below in Table 6.2 respectively.

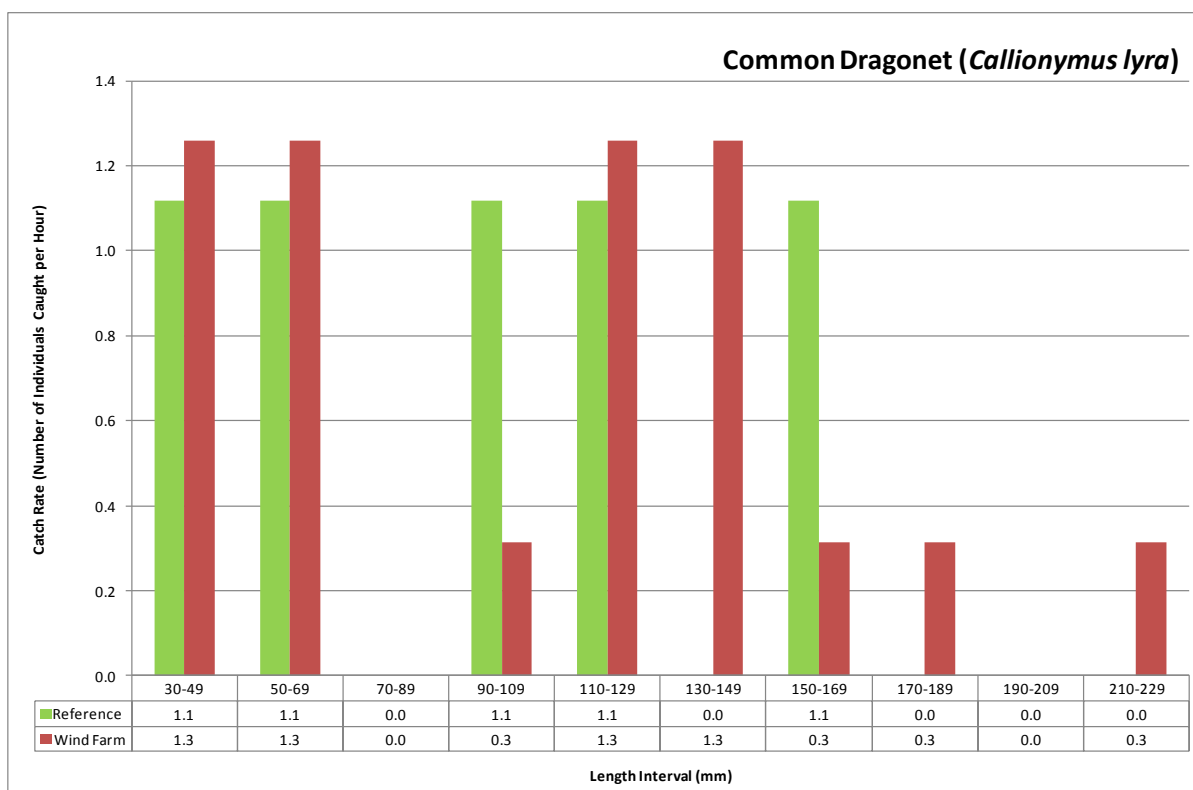
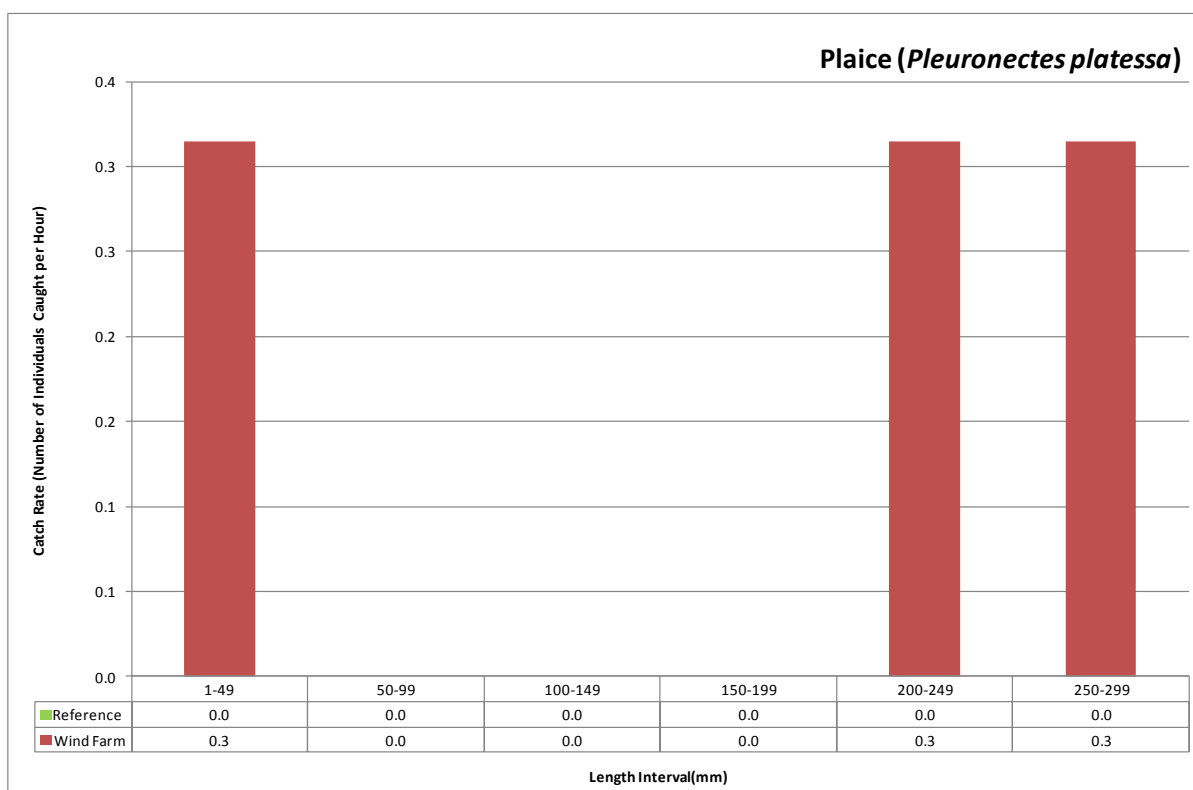
The length distributions for the five most abundant species caught (>20 individuals), expressed as the catch rate (number of individuals caught per hour) by length (mm) are shown in Figure 6.3 to Figure 6.7. Lesser weever is not included as individuals are not measured due to health and safety issues regarding their poisonous nature. In addition, the length distributions for *P. platessa*, *M. kitt* and *S. solea* are given in Figure 6.8 to Figure 6.10.

Table 6.2 Average Length and Length Range by Species and Sampling Area

Species		Average Length (mm)		Length Range (mm)	
Common Name	Scientific Name	Reference	Wind Farm	Min.	Max.
Bib	<i>Trisopterus luscus</i>	370.0	125.0	125.0	370.0
Common Dragonet	<i>Callionymus lyra</i>	93.0	101.3	35.0	220.0
Common Goby	<i>Pomatoschistus microps</i>	25.0	29.4	20.0	55.0
Dab	<i>Limanda limanda</i>	115.0	173.0	110.0	270.0
Dover Sole	<i>Solea solea</i>	0.0	210.0	210.0	210.0
Five-Bearded Rockling	<i>Ciliata mustela</i>	0.0	75.0	75.0	75.0
Goby	<i>Gobiidae</i>	0.0	27.5	25.0	30.0
Grey Gurnard	<i>Eutrigla gurnardus</i>	0.0	185.0	185.0	185.0
Lemon Sole	<i>Microstomus kitt</i>	0.0	240.0	240.0	240.0
Lesser Spotted Dogfish	<i>Scyliorhinus canicula</i>	470.0	0.0	470.0	470.0
Painted Goby	<i>Pomatoschistus pictus</i>	0.0	26.4	20.0	30.0
Plaice	<i>Pleuronectes platessa</i>	0.0	153.3	10.0	250.0
Pogge	<i>Agonus cataphractus</i>	0.0	81.0	65.0	115.0
Poor Cod	<i>Trisopterus minutus</i>	152.0	113.1	85.0	170.0
Reticulated Dragonet	<i>Callionymus reticulatus</i>	37.5	0.0	35.0	40.0
Rock Goby	<i>Gobius paganellus</i>	0.0	70.0	65.0	75.0
Sand Goby	<i>Pomatoschistus minutus</i>	42.3	39.5	20.0	60.0
Scaldfish	<i>Arnoglossus laterna</i>	100.0	94.0	55.0	130.0
Short-Snouted Seahorse	<i>Hippocampus hippocampus</i>	0.0	48.3	45.0	55.0
Solenette	<i>Buglossidium luteum</i>	82.7	84.6	40.0	115.0
Spotted Dragonet	<i>Callionymus maculatus</i>	0.0	110.0	35.0	185.0
Thickback Sole	<i>Microchirus variegatus</i>	0.0	110.0	110.0	110.0
Transparent Goby	<i>Aphia minuta</i>	0.0	30.0	25.0	35.0

Figure 6.3 Sand Goby (*P. minutus*) Length DistributionFigure 6.4 Solenette (*B. luteum*) Length Distribution

Figure 6.5 Common Goby (*P. microps*) Length DistributionFigure 6.6 Painted Goby (*P. pictus*) Length Distribution

Figure 6.7 Common Dragonet (*C. lyra*) Length DistributionFigure 6.8 Plaice (*P. platessa*) Length Distribution

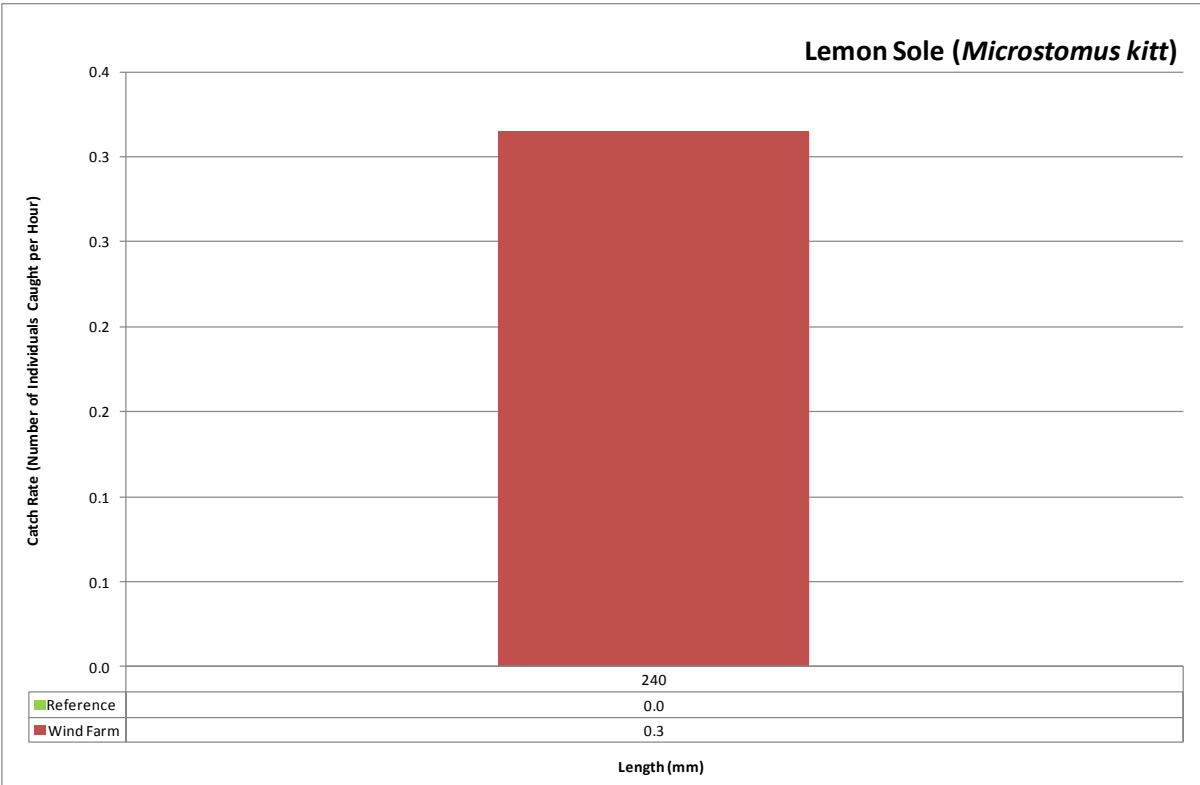


Figure 6.9 Lemon Sole (*M. kitt*) Length Distribution

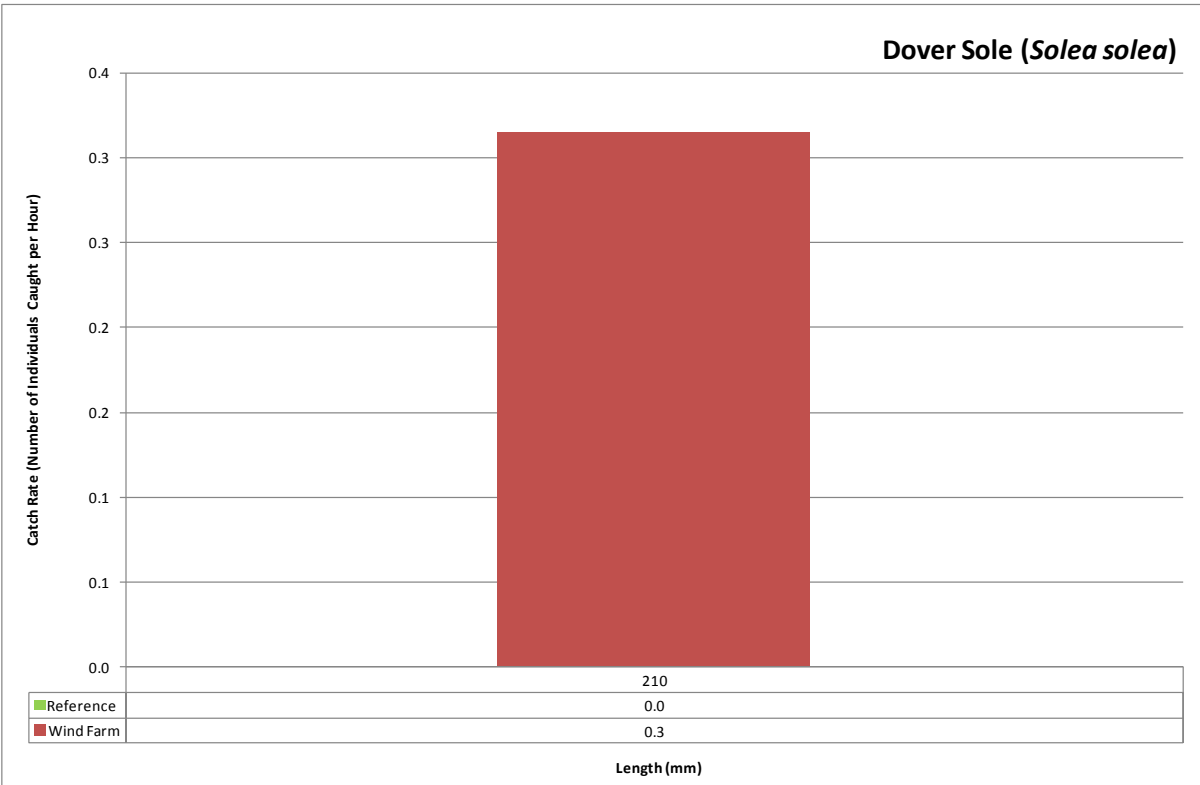


Figure 6.10 Dover Sole (*S. solea*) Length Distribution

6.2.1 Motile Invertebrate Species

A total of 90 motile invertebrate species were found; 74 within the wind farm and 57 at the reference stations. It should be noted that species presence (P) is given where counts were not feasible, and therefore catch rates could not be calculated.

Overall, brittlestar (*Ophiura albida*) was the most abundant motile invertebrate species caught (659 individuals), followed by two species of shrimp (*Philocheras trispinosus*, 252; *Crangon allmani*, 175).

O. albida was the most prevalent species within the wind farm and reference stations with catch rates of 148.2/hr and 210.3/hr respectively.

The greatest numbers of individuals (all species) were found at station BT03 (545); this is attributable to the high numbers of *O. albida* caught (164).

Overall, the total catch rate for the motile invertebrate species caught was greater at the reference stations (856.9/hr) than within the wind farm (588.3/hr).

Table 6.3 Abundance and Catch Rates of Motile Invertebrate Species by Station

Species				Number of Individuals			Catch Rate	
Phylum	Class	Common Name	Scientific Name	Reference	Wind Farm	Total	Reference	Wind Farm
Annelida	Polychaeta	Cat Worm	Nephtyidae sp	0	5	5	0.0	1.6
		Phyllodocidae	Eumida sp.	2	0	2	2.2	0.0
		Polychaete	Serpulidae sp.	P	P	-	-	-
			Sabellariidae sp	P	P	-	-	-
			Opheliidae sp.	2	1	3	2.2	0.3
			Pectinariidae sp.	2	0	2	2.2	0.0
			<i>Flabelligera affinis</i>	1	0	1	1.1	0.0
			<i>Nematonereis hebes</i>	0	1	1	0.0	0.3
			Polychaeta	0	1	1	0.0	0.3
			Syllidae sp.	0	1	1	0.0	0.3
			Terebellinae sp.	0	1	1	0.0	0.3
		Rag Worm	Nereididae sp.	0	5	5	0.0	1.6
			<i>Platynereis dumerilii</i>	0	1	1	0.0	0.3
		Scale Worm	Polynoidae sp.	1	2	3	1.1	0.6
			<i>Leptodontus clava</i>	1	0	1	1.1	0.0
			Sigalonidae sp.	0	1	1	0.0	0.3
		Sea Mouse	<i>Aphrodita aculeata</i>	2	0	2	2.2	0.0
		Syllidae	Syllis sp.	2	0	2	2.2	0.0
Arthropoda	Malacostraca	Shrimp	<i>Philocheras trispinosus</i>	61	191	252	68.2	60.1
			<i>Crangon allmani</i>	40	135	175	44.7	42.5
		Hermit Crab	<i>Pagurus bernhardus</i>	61	95	156	68.2	29.9
		Amphipod	Melitidae sp.	50	51	101	55.9	16.0
		Mysid Shrimp	Mysida	15	68	83	16.8	21.4

Species				Number of Individuals			Catch Rate	
Phylum	Class	Common Name	Scientific Name	Reference	Wind Farm	Total	Reference	Wind Farm
		Shrimp	<i>Pontophilus bispinosus</i>	13	63	76	14.5	19.8
		Hermit Crab	Paguridae	20	37	57	22.4	11.6
		Amphipod	Isaeidae sp.	22	19	41	24.6	6.0
		Shrimp	<i>Pandalina brevirostris</i>	1	37	38	1.1	11.6
			Crangonidae	15	21	36	16.8	6.6
		Hermit Crab	<i>Pagurus prideaux</i>	10	19	29	11.2	6.0
		Long-clawed Porcelain Crab	<i>Pisidia longicornis</i>	1	28	29	1.1	8.8
		Amphipod	Aoridae sp.	21	1	22	23.5	0.3
			Caprellidae sp.	18	3	21	20.1	0.9
		Crab	<i>Inachus dorsettensis</i>	1	18	19	1.1	5.7
		Amphipod	Corophiidae sp.	0	12	12	0.0	3.8
			Ampeliscaidae sp.	0	8	8	0.0	2.5
		Marbled Swimming Crab	<i>Liocarcinus marmoreus</i>	1	5	6	1.1	1.6
		Pink Shrimp	<i>Pandalus montagui</i>	1	3	4	1.1	0.9
		Prawn	Processa sp.	0	4	4	0.0	1.3
		Amphipod	Calliopiidae sp.	2	1	3	2.2	0.3
			Dexaminidae sp.	0	3	3	0.0	0.9
		Dwarf Swimming Crab	<i>Liocarcinus pusillus</i>	3	0	3	3.4	0.0
		Prawn	<i>Palaemon serratus</i>	0	3	3	0.0	0.9
		Swimming Crab	<i>Liocarcinus depurator</i>	1	2	3	1.1	0.6
		Cumacean	Cumacea sp.	1	1	2	1.1	0.3
		Flying Crab	<i>Liocarcinus holsatus</i>	0	2	2	0.0	0.6
		Mantis Shrimp	<i>Rissoides desmaresti</i>	0	2	2	0.0	0.6
		Masked Crab	<i>Corystes cassivelaunus</i>	0	2	2	0.0	0.6
		Spider Crab	Macropodia sp.	2	0	2	2.2	0.0
		Amphipod	Lysianassidae sp.	0	1	1	0.0	0.3
		Amphipod (Lyassinidae)	<i>Hippomedon denticulatus</i>	0	1	1	0.0	0.3
		Bryer's Nut Crab	<i>Ebalia tumefacta</i>	0	1	1	0.0	0.3
		Crab	<i>Eurynome spinosa</i>	1	0	1	1.1	0.0
		Hairy Crab	<i>Pilumnus hirtellus</i>	0	1	1	0.0	0.3
		Isopod	<i>Janira maculosa</i>	0	1	1	0.0	0.3
		Pennant's Nut Crab	<i>Ebalia tuberosa</i>	0	1	1	0.0	0.3
		Prawn	<i>Processa canaliculata</i>	1	0	1	1.1	0.0
			<i>Processa parva</i>	0	1	1	0.0	0.3
			Processidae	1	0	1	1.1	0.0
		Snapping Prawn	<i>Alpheus macrocheles</i>	0	1	1	0.0	0.3
		Spider Crab	<i>Hyas araneus</i>	1	0	1	1.1	0.0
		Squat Lobster	<i>Galathea intermedia</i>	0	1	1	0.0	0.3
		Thumbnail Crab	<i>Thia scutellata</i>	0	1	1	0.0	0.3
Ctenophora	Nuda	Sea Gooseberry	Ctenophora sp	1	52	53	1.1	16.4

Species				Number of Individuals			Catch Rate	
Phylum	Class	Common Name	Scientific Name	Reference	Wind Farm	Total	Reference	Wind Farm
Echinodermata	Asteroidea	Common Starfish	<i>Asterias rubens</i>	42	123	165	47.0	38.7
	Echinoidea	Green Sea Urchin	<i>Psammechinus miliaris</i>	38	124	162	42.5	39.0
		Pea Urchin	<i>Echinocyamus pusillus</i>	5	12	17	5.6	3.8
		Urchin	<i>Spatangus purpureus</i>	1	0	1	1.1	0.0
	Ophiuroidea	Brittlestar	<i>Ophiura albida</i>	188	471	659	210.3	148.2
			<i>Ophiura ophiura</i>	64	63	127	71.6	19.8
		Common Brittlestar	<i>Ophiothrix fragilis</i>	3	27	30	3.4	8.5
Mollusca	Bivalvia	Queen Scallop	<i>Aequipecten opercularis</i>	11	27	38	12.3	8.5
		Saddle Oyster	Anomiidae	3	20	23	3.4	6.3
		Bivalve	<i>Abra prismatica</i>	4	3	7	4.5	0.9
		Bivlave	<i>Spisula elliptica</i>	5	1	6	5.6	0.3
		Nutshell	<i>Nucula hanleyi</i>	6	0	6	6.7	0.0
		King Scallop	<i>Pecten maximus</i>	0	2	2	0.0	0.6
		Dog Cockle	<i>Glycymeris glycymeris</i>	1	0	1	1.1	0.0
		Razor Clam	<i>Phaxas pellucidus</i>	1	1	1	1.1	0.3
	Cephalopoda	Little Cuttlefish	<i>Sepiolo atlantica</i>	1	4	5	1.1	1.3
	Gastropoda	Slipper Limpet	<i>Crepidula fornicata</i>	0	37	37	0.0	11.6
		Common Whelk	<i>Buccinum undatum</i>	6	17	23	6.7	5.3
		Netted Dogwhelk	<i>Nassarius reticulatus</i>	0	9	9	0.0	2.8
		Common Necklace Shell	<i>Euspira pulchella</i>	2	4	6	2.2	1.3
		Large Necklace shell	<i>Lunatia catena</i>	1	5	6	1.1	1.6
		Top Shell	<i>Gibbula tumida</i>	0	1	1	0.0	0.3
	Opisthobranchia	"Hedgehog" Seaslug	<i>Eubranchus tricolor</i>	0	1	1	0.0	0.3
		Sea Slug	<i>Berthella plumula</i>	0	1	1	0.0	0.3
	Scaphopoda	Common tusk shell	<i>Antalis vulgaris</i>	3	0	3	3.4	0.0
Nemertea	N/a	Ribbon Worms	Nemertea sp.	3	1	4	3.4	0.3
Sipuncula	Sipunculidea	Sipunculid	<i>Golfingia vulgaris</i>	0	1	1	0.0	0.3

6.2.2 Sessile/Encrusting Invertebrate Species

It should be noted that species presence (P) is given where counts were not feasible, and therefore catch rates could not be calculated.

A total of 10 sessile invertebrate taxa were found; 10 within the wind farm and four at the reference stations.

The phylum Bryozoa was the most prevalent species, and was found at 22 sampling stations, followed by undetermined species of barnacle (12 stations) and then cloak anemome (*Adamsia carciniopados*; 7 stations).

Table 6.4 Presence/Number of Sessile/Encrusting Invertebrate Species by Station

Species				Site		Number of Stations where Present
Phylum	Class	Common name	Scientific name	Reference	Wind Farm	
Arthropoda	Maxillopoda	Barnacle	Barnacle Sp.	P	P	12
Bryozoa	Gymnolaemata	Hornwrack	Flustra foliacea	-	P	2
	N/a	Bryozoan	Bryozoa sp.	P	P	5
Chordata	Ascidacea	Sea Squirt	Ascidacea sp.	-	P	2
Cnidaria	Anthozoa	Cloak Anemone	Adamsia carciniopados	P	P	7
		Sea Anemone	Actiniaria sp.	-	P	4
		Snakelocks Anemone	Anemonia viridis	-	P	1
	Hydrozoa	Hydrozoa	Hydrozoa sp.	P	P	22
	Octocorallia	Dead Man's Fingers	Alcyonium digitatum	-	P	1
Porifera	N/a	Sponge	Porifera Sp.	-	P	2

7.0 Appendix

7.1 Appendix 1 - Health and Safety

7.1.1 Personnel

Brown and May Marine (BMM) staff protocol followed the standard health and safety protocol outlined in the BMM “Offshore Operational Procedures for Surveys using Commercial Fishing Vessels”.

All BMM staff have completed a Sea Survival course approved by the Maritime and Coastguard Agency, meeting the requirements laid down in: **STCW 95 Regulation VI/1 para 2.1.1 and STCW Code section A-VI/1** before boarding any vessel conducting works for the company. Employees are also required to have valid medical certificates (ENG1 or ML5) Seafish Safety Awareness, Seafish Basic First Aid and Seafish Basic Firefighting certificates before participating in offshore works. before participating in offshore works.

7.1.2 Vessel Induction

Before boarding the survey team were shown how to safely board and disembark the vessel. Prior to departure the skipper briefed the BMM staff on the whereabouts of the safety equipment, including the life raft, emergency flares and fire extinguishers, and also the location of the emergency muster point. The safe deck areas, man-overboard procedures and emergency alarms were also discussed. The survey team were warned about the possible hazards, such as slippery decks and obstructions whilst aboard. The BMM staff were briefed about trawling operations and the need to keep clear of all winch’s when operational. All hazards were assessed prior to the survey in the BMM health and safety risk assessment.

7.1.3 Daily Safety Checks

The condition of the life jackets, EPIRB’s, and life raft were inspected daily. Also checked were the survey team working areas, including the wheelhouse to ensure these areas were clear of hazards such as clutter and obstructions.

7.1.4 Post Trip Survey review

Upon completion of the survey a “Post Trip Survey Review” was filed, see Table 7.1 overleaf.

Table 7.1 Post Trip Survey Review

Project: Rampion Offshore Wind Farm	Vessel: Lauren Ann	
Surveyors: Jonathan Keer, Richard Preston	Skipper: Andrew Hill	
Survey Area: English Channel – Off the coast of Shoreham	Total Time at Sea: 6 Days	
Dates at Sea: 20/2/2012-21/02/2012, 23/2/2012–26/02/2012		
	Comments	Actions
Did vessel comply with pre trip safety audits?	Yes – Audited on 20/02/2012	N/A
Skipper and crew attitude to safety?	Very Good	Crew wore lifejackets for entire survey
Vessel machinery failures?	None	N/A
Safety equipment failures?	None	N/A
Accidents?	None	N/A
Injuries?	None	N/A