FOREWIND

DOGGER BANK
TEESSIDE A & B

March
2014

Environmental Statement Chapter 13 Appendix B Tranche B Fish and Shellfish Characterisation Survey

Application Reference 6.13.2

Dogger Bank Offshore Wind Farm

Tranche B

Adult and Juvenile Fish Characterisation Survey

21st April to 11th May 2012

F-OFL-RP-003

Undertaken by
Brown and May Marine Ltd

Ref	Issue Date	Issue Type	Author	Checked	Approved
DBTBOB01	05/02/2013	FINAL	LS/AWG	JW/LS/JK	SJA

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1.0 Summary

1.1 Otter Trawl

During the otter trawl survey a total of 37 species were caught; 15 at the control stations, 19 within Tranche B and 32 species along the export cable. Grey gurnard (*Eutrigla gurnardus*) was the most abundant species caught, followed by plaice (*Pleuronectes platessa*) and then dab (*Limanda limanda*). The highest total catch rate was recorded at station OT107 along the export cable with *L. limanda* accounting for 72.9% of the catch. Overall, the total catch rate was highest along the export cable.

P. platessa and cod (*G. morhua*) were caught in all sampling areas, with the highest total catch rate recorded within Tranche B. Whiting (*Merlangius merlangus*) were recorded in all sampling areas, with the greatest total catch rate recorded along the export cable. Raitt's sandeel (*Ammodytes marinus*) were found only along the export cable at station OT104 with a catch rate of 90.0/hr. Two unidentified sandeel (Ammodytidae sp.) were caught within Tranche B, with single individuals found at stations OT68 and OT78. One herring (*Clupea harengus*) was recorded at station OT116 along the export cable.

Seven species of fish were caught which have a minimum landing size (MLS) set by the EC. The percentage of individuals above and below the MLS was approximately even for the *P. platessa* caught along the export cable, whereas at the control stations and within Tranche B a greater proportion of which were above the MLS. Most of the *M. merlangus* caught in all sampling areas were below the MLS. Haddock (*Melanogrammus aeglefinus*) were caught within Tranche B and along the export cable, most of which were above the MLS. All other species were caught in relatively low numbers.

Most of the *P. platessa*, *L. limanda* and *M. merlangus* caught in all sampling areas and the *E. gurnardus* caught at the control stations and within Tranche B were female, whereas along the export cable the sex ratio for *E. gurnardus* was approximately even.

The majority of the *E. gurnardus* caught in all sampling areas were maturing whereas the majority of the *P. platessa* and *L. limanda* caught were spent. The greatest proportion of the *M. merlangus* caught at the control stations was represented by spent individuals, whereas within Tranche B maturing individuals accounted for 45.4% of the catch. Along the export cable both maturing and spent *M. merlangus* represented the highest proportion of the catch. Most of the *G. morhua* caught in all sampling areas were immature. One female 'recovering spent' *C. harengus* was found at station OT116 along the export cable.

1.2 Beam Trawl

A total of 22 species of fish were caught, eight of which were found at the control stations, 16 within Tranche B and 17 along the export cable. Solenette (*Buglossidium luteum*) was the most prevalent species at the control stations and within Tranche B, whereas *L. limanda* were more abundant along the export cable. The station with the greatest total catch rate was BT124 along the export cable, with *L. limanda* and *B. luteum* representing 82.3% of the catch. Overall, the total catch rate was greatest within Tranche B.

A. marinus were found in all sampling areas, with the highest total catch rate within Tranche B. *P. platessa* were found in low numbers in all sampling areas, with the greatest catch rate recorded at the control stations. One *M. merlangus* was found along the export cable at station BT108.

2.0 Introduction

The following report details the findings of the spring 2012 adult and juvenile fish characterisation survey, undertaken within and adjacent to Tranche B of the planned Dogger Bank offshore wind farm and along the proposed export cable between the 21st April and 11th May.

The survey methodology, vessel and sampling gear detailed were agreed in consultation with Cefas and the Marine Management Organisation (MMO). A dispensation from the MMO for the Provisions of Council Regulation 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 this 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 adult and juvenile fish species within the area of the Dogger Bank. It should be noted that *P. platessa*, Ammodytidae sp., *G. morhua*, *M. merlangus* and *C. harengus* have been defined as species of importance in the area.

3.0 Scope of Works

The proposed scope of works for the spring 2012 adult and juvenile fish characterisation survey is detailed below and illustrated in Figure 3.1 overleaf.

- **Otter Trawl**
  - 30 tows of approximately 20 minutes duration within Tranche B, 10 control tows in adjacent areas and 26 tows along the proposed export cable were undertaken

- **Otter Trawl Sample Analysis**
  - Number of individuals and catch rate by species
  - Average length and length distribution by species
    - Finfish & sharks (except *C. 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 by species
  - Spawning condition
    - Finfish species (except *C. harengus* & Mackerel (*Scombrus scombrus*) Cefas Standard Maturity Key - Five Stage
    - *C. harengus*: Cefas Maturity Key – Nine Stage
    - *S. scombrus*: Cefas Maturity Key – Six Stage
    - Ray and shark species: Cefas Standard Elasmobranch Maturity Key- Four Stage

- **Beam Trawl**
  - 30 tows of approximately ten minutes duration within Tranche B, 10 control tows in adjacent areas and 26 tows along the export cable (at the same locations as the otter trawls)

- **Beam Trawl Sample Analysis**
  - Number of individuals and catch rate by fish species
  - Average length and length distribution (nearest mm below) for fish species

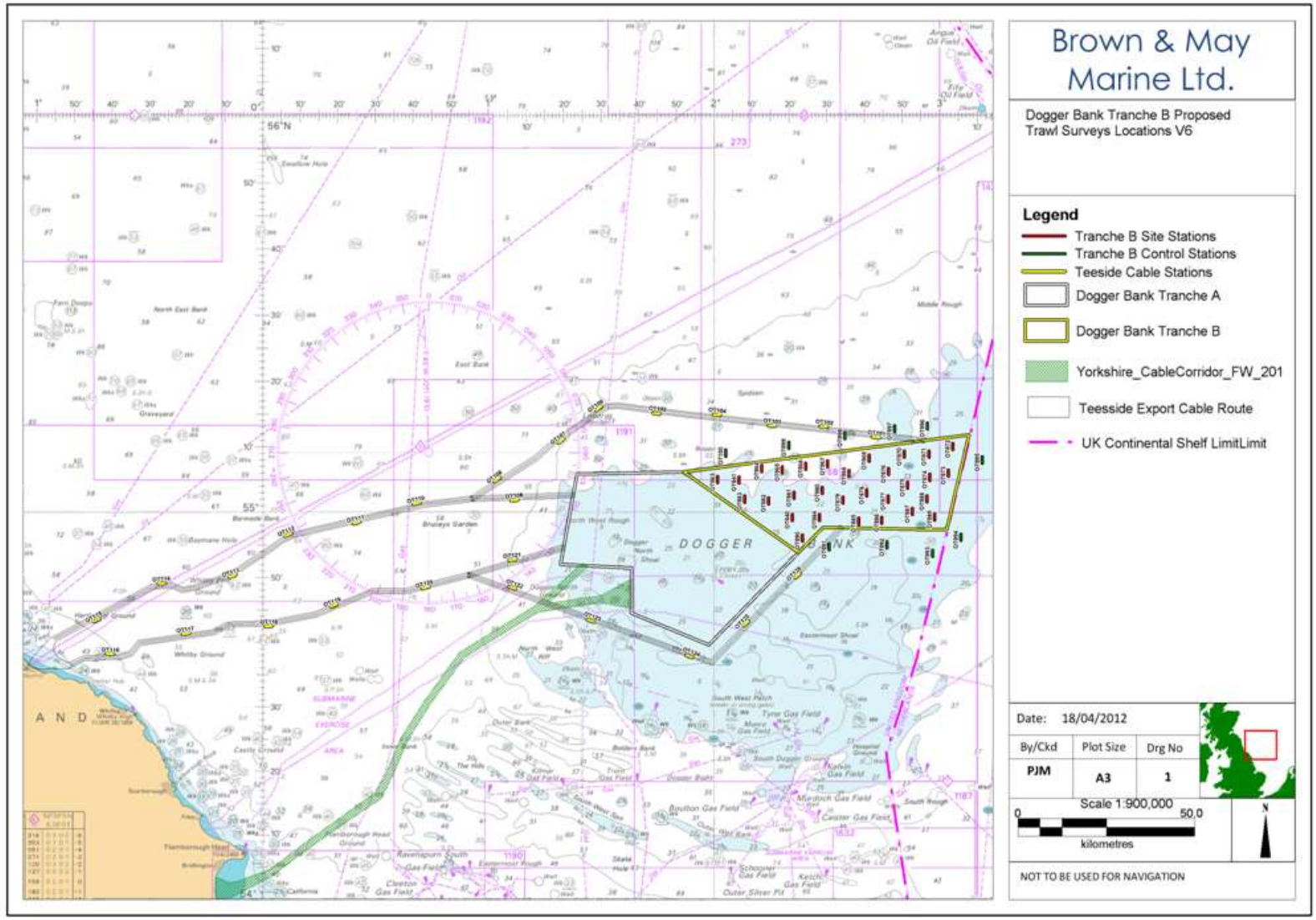


Figure 3.1 Proposed Trawl Locations

4.0 Methodology

4.1 Survey Vessel

The vessel chartered for the survey (Figure 4.1), the “Jubilee Spirit”, is a Grimsby-based commercial trawler whose skipper has experience of fishing on the Dogger Bank and of otter and beam trawl surveys in the area. The specifications of the vessel are given below in Table 4.1.

Figure 4.1 Survey Vessel "Jubilee Spirit"

Table 4.1 Survey Vessel Specifications

Survey Vessel Specifications	
Length	21.2m
Beam	6.9m
Draft	2.3m
Main engine	Caterpillar Type 340TA 475 BHP
Gearbox	Hydraulic 6: reduction
Propeller	4 Blade Manganese Bronze Fixed Pitch 1.7m diameter
GPS	2-Furuno GP80
Plotters	Sodena Plotter with Electronic Charts
Sounder	Furuno Daylight Viewing

4.2 Sampling Gear

4.2.1 Commercial Otter Trawl

Scraper Trawl

A commercial scraper otter trawl with a 130mm mesh cod end (Figure 4.2) was used for sampling at all control and Tranche B sampling stations, and at most of those along the export cable (except stations OT113 to OT119); the specifications of which are given below in Table 4.2.

Figure 4.2 Scraper Otter Trawl Used

Table 4.2 Otter Trawl Specifications

Otter Trawl Specifications	
Towing Warp	18mm, 6x19+1
Depth: Payout Ratio	3:1
Trawl Doors	Perfect B 84
Net	130mm mesh cod-end, square mesh panel 7m from cod-end on top
Ground line length	45.7m
Footrope	Rock-hopper with 6 to 8 inch bobbins
Est. Headline height	2.4m
Distance between doors (est.)	51m

Rock-hopper Trawl

A commercial rock-hopper otter trawl (Figure 4.3) with a 130mm mesh cod-end was used for sampling at stations OT113 to OT119 due to the presence of hard ground and large boulders on the seabed; the specifications of which are given in Table 4.3 below.

Figure 4.3 Rock-hopper Otter Trawl Used

Table 4.3 Otter Trawl Specifications

Otter Trawl Specifications	
Towing Warp	18mm, 6x19+1
Depth: Payout Ratio	3:1
Trawl Doors	Perfect B 84
Net	130mm mesh cod-end
Ground line length	24.4m
Footrope	Rock-hopper with 18 inch bobbins
Est. Headline height	7.3m
Distance between doors (est.)	51m

4.2.2 Scientific Beam Trawl

A 2m scientific beam trawl (Figure 4.4) was used for juvenile fish sampling at all sampling stations; the specifications of which are given in Table 4.4 below.

Figure 4.4 Beam Trawl Used

Table 4.4 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 position of the vessel was tracked at all times using a Garmin GPSMap 278 with an EGNOS differential connected to an external Garmin GA30 antenna. Trawl start times and positions were taken when the winch stopped paying out the gear. Similarly, trawl end times and positions were taken when hauling of the gear commenced.

4.4 Sampling Operations

The survey was undertaken from the 21st April to the 11th May 2012. A summarised log of events is given in Table 4.5 below. It should be noted that one weather day in port was incurred on the 29th April 2012, and poor weather conditions at sea interrupted works on the 26th and 27th April 2012.

Table 4.5 Summarised Log of Events

Saturday 21st April 2012
Mobilise survey – remain at sea after completion of Tranche A survey
Otter Trawls: OT95, OT72, OT73, OT74, OT71, OT96
Beam Trawls: BT95, BT72, BT73, BT74, BT71, BT96
Very large piece of wood/peat obtained in the otter trawl at station OT74. The crew used the hydraulics to roll the object back out of the mouth of the net
Overnight at sea
Sunday 22nd April 2012
Otter Trawls: OT99, OT65, OT64, OT41, OT100
Beam Trawls: BT99, BT65, BT64, BT41, BT100
Overnight at sea
Monday 23rd April 2012
Arrive into Scarborough at 0645
Samples landed and transported to BMM
Depart Scarborough at 1945, steam to survey area
Overnight at sea
Tuesday 24th April 2012
Otter Trawls: OT93, OT94, OT89, OT88
Beam Trawls: BT93, BT94, BT89, BT88
Overnight at sea
Wednesday 25th April 2012
Otter Trawls: OT87, OT75, OT70, OT97, OT98, OT69
Beam Trawls: BT87, BT75, BT70, BT97, BT98, BT69
Overnight at sea
Thursday 26th April 2012
Otter Trawls: OT76, OT77, OT86, OT92
Beam Trawls: BT76, BT77, BT86, BT92
Work stopped at 1400 due to increasing swell
Overnight at sea
Friday 27th April 2012
Otter Trawls: OT85, OT124
Beam Trawls: BT85, BT124
Attempted and repeated the otter trawl at OT91; both samples were considered too small due to the increasing swell and were rejected.
Work stopped at 1030 due to increasing swell
Steam to Scarborough overnight
Overnight at sea
Saturday 28th April 2012
Arrive into Scarborough at 0630
Samples landed and transported to BMM
Sunday 29th April 2012
Weather day in port
Monday 30th April 2012
Depart Scarborough at 1030, steam to survey area

Otter Trawls: OT112, OT111
Beam Trawls: BT112, BT111
Overnight at sea
Tuesday 1st May 2012
Otter Trawls: OT63, OT83, OT82, OT81, OT66, OT67
Beam Trawls: BT63, BT83, BT82, BT81, BT66, BT67
Overnight at sea
Wednesday 2nd May 2012
Otter Trawls: OT68, OT78, OT79, OT80, OT84, OT40, OT90
Beam Trawls: BT68, BT78, BT79, BT80, BT84, BT40, BT90
Overnight at sea
Thursday 3rd May 2012
Otter Trawls: OT101, OT102, OT103, OT104, OT105
Beam Trawls: BT101, BT102, BT103, BT104, BT105
Overnight at sea
Friday 4th May 2012
Otter Trawls: OT123, OT122, OT121, OT120
Beam Trawls: BT123, BT122, BT121, BT120
Steam to Scarborough overnight
Overnight at sea
Saturday 5th May 2012
Arrive into Scarborough at 0330
Samples landed and transported to BMM
Sunday 6th May 2012
Depart Scarborough at 1530, steam to survey area
Overnight at sea
Monday 7th May 2012
Otter Trawls: OT125, OT126, OT91
Beam Trawls: BT125, BT126, BT91
Overnight at sea
Tuesday 8th May 2012
Otter Trawls: OT108, OT109, OT107, OT106, OT110
Beam Trawls: BT108, BT109, BT107, BT106, BT110
Overnight at sea
Wednesday 9th May 2012
Change from scraper to rock-hopper otter trawl for inshore stations
Otter Trawls: OT119, OT118, OT117, OT116
Beam Trawls: BT119, OT118, OT117, OT116
Overnight at sea
Thursday 10th May 2012
Otter Trawls: OT115, OT114, OT113
Beam Trawls: BT115, BT114, BT113
Return to Scarborough, arrive at 1900
Overnight aboard
Friday 11th May 2012
Demobilise survey in Scarborough
Samples landed and returned to BMM

4.5 Otter Trawl Sampling

The whole catch from each otter trawl was retained where possible. Sub-sampling by species occurred when large (>2 boxes) samples were obtained. The samples were then boxed, labelled, photographed, iced and stored at +2°C before transportation to Cefas (Lowestoft) for analysis in the middle and at the end of the survey, in line with the agreed scope of works.

The start and end times, co-ordinates and the duration of each otter trawl are given in Table 4.6 (control, Tranche B and export cable tows highlighted green, red and blue respectively). The vessel tracks whilst towing the otter trawl 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 (see Table 5.1).

Table 4.6 Start and End Times, Co-ordinates and Duration of each Otter Trawl

Station	Date	Start				End				Duration (hh:mm:ss)
		Time (GMT)	UTM31N		Depth (m)	Time (GMT)	UTM31N		Depth (m)	
			Easting	Northing			Easting	Northing		
OT40	02/05/2012	16:04:10	6092723.6	458140.5	14.3	16:24:11	6094274.7	458152.2	14	00:20:01
OT41	22/04/2012	11:51:59	6105096.6	443178.6	16.4	12:11:59	6103282.4	442945.0	15.7	00:20:00
OT63	01/05/2012	07:22:38	6103525.9	437132.6	17.8	07:42:41	6105069.7	437221.7	17.6	00:20:03
OT64	22/04/2012	10:10:16	6108349.2	449730.7	157	10:30:16	6106584.1	449655.1	15.3	00:20:00
OT65		08:28:29	6107369.9	455623.1	17.5	08:48:29	6105622.3	455564.6	16.9	00:20:00
OT66	01/05/2012	15:08:59	6108722.1	462145.7	15.5	15:28:59	6107036.9	462154.0	17.9	00:20:00
OT67		16:53:36	6109229.5	468467.0	17.6	17:13:34	6107507.7	468383.2	15.9	00:19:58
OT68	02/05/2012	06:45:00	6106482.7	474403.1	15.5	07:05:08	6104720.6	474344.8	154	00:20:08
OT69	25/04/2012	17:11:32	6109429.8	480055.5	14.1	17:31:55	6111235.7	480256.6	14.4	00:20:23
OT70		10:44:54	6112099.3	490175.2	15.1	11:04:54	6110344.1	490110.3	15.8	00:20:00
OT71	21/04/2012	14:52:12	6110547.5	497103.3	15.4	15:12:13	6112227.4	497028.3	15.5	00:20:01
OT72		09:06:08	6113658.4	505185.6	14.6	09:26:08	6111973.4	505164.2	14.5	00:20:00
OT73		11:16:31	6107073.1	502441.5	14.1	11:36:37	6105436.4	502421.2	13.5	00:20:06
OT74		13:08:13	6103731.6	497136.6	157	13:28:13	6105507.1	497245.6	15.3	00:20:00
OT75	25/04/2012	08:54:29	6102110.6	491128.7	12.6	09:14:32	6103886.6	491214.2	12.5	00:20:03
OT76	26/04/2012	06:41:06	6105683.9	485719.4	13	07:01:34	6107443.7	486037.6	13.5	00:20:28
OT77		08:55:57	6099306.2	485600.9	12.7	09:16:02	6097941.8	485521.5	12.4	00:20:05
OT78	02/05/2012	08:33:39	6099387.5	479385.9	12.3	08:53:43	6101052.6	479489.4	12.7	00:20:04
OT79		10:12:25	6097511.4	472559.4	14.3	10:32:25	6099057.2	472617.4	14.6	00:20:00
OT80		12:21:35	6100401.5	466739.2	15.8	12:41:36	6101839.4	466983.8	16.8	00:20:01
OT81	01/05/2012	12:57:14	6098894.0	458864.0	165	13:17:39	6100587.0	458806.6	18.2	00:20:25
OT82		11:05:25	6097384.0	451560.5	14.9	11:25:25	6098962.6	451597.4	15.2	00:20:00
OT83		09:22:28	6098013.8	444805.0	15.2	09:42:31	6099578.9	444863.1	15.7	00:20:03
OT84	02/05/2012	14:04:40	6093419.5	465811.1	145	14:24:42	6094943.1	465703.2	15.4	00:20:02
OT85	27/04/2012	06:45:21	6091376.2	477085.1	13	07:05:24	6092975.3	477067.3	13.2	00:20:03
OT86	26/04/2012	10:36:50	6093362.3	483691.4	11.4	10:56:51	6091800.9	484267.8	11.5	00:20:01
OT87	25/04/2012	06:49:27	6093852.3	492736.1	12.5	07:09:27	6095656.1	492774.6	12.7	00:20:00
OT88	24/04/2012	18:08:32	6097867.8	496475.4	14.5	18:28:32	6099530.6	496471.8	14.4	00:20:00
OT89		16:40:34	6092661.1	498600.5	12.3	17:00:34	6094547.7	498519.3	13.3	00:20:00

Station	Date	Start				End				Duration (hh:mm:ss)
		Time (GMT)	UTM31N		Depth (m)	Time (GMT)	UTM31N		Depth (m)	
			Easting	Northing			Easting	Northing		
OT90	02/05/2012	17:49:31	6086724.1	461103.4	13.9	18:09:41	6088253.6	461026.4	14.2	00:20:10
OT91	07/05/2012	12:06:50	6084394.4	468606.4	13.4	12:26:50	6086395.3	468520.3	13.5	00:20:00
OT92	26/04/2012	12:32:14	6086248.4	485072.0	11.1	12:52:34	6084876.8	485024.9	10.5	00:20:20
OT93	24/04/2012	12:44:40	6083911.5	498014.5	10.7	13:04:40	6082247.6	497991.1	10.9	00:20:00
OT94		15:03:12	6088215.3	506076.2	113	15:23:13	6086506.7	506119.2	11.8	00:20:01
OT95	21/04/2012	07:05:13	6108462.7	512209.5	14.4	07:25:41	6110324.5	512221.1	14.7	00:20:28
OT96		16:24:07	6118508.7	496571.7	17.3	16:44:07	6120182.9	496610.9	17.5	00:20:00
OT97	25/04/2012	12:45:36	6119433.7	487389.9	14.5	13:05:36	6117582.4	487345.8	14.3	00:20:00
OT98		14:55:43	6116315.9	473220.1	15.5	15:15:46	6118110.5	473169.8	16.5	00:20:03
OT99	22/04/2012	06:32:29	6113047.0	457459.2	17.3	06:52:25	6114743.4	457448.9	17.3	00:19:56
OT100		13:41:55	6110835.9	439591.0	16.6	14:01:56	6112494.4	439647.0	19.7	00:20:01
OT101	03/05/2012	06:45:43	6116048.4	482818.2	14	07:06:15	6116339.2	480920.6	14.5	00:20:32
OT102		08:57:13	6119157.2	467931.9	17.7	09:17:25	6119348.3	465917.7	167	00:20:12
OT103		11:19:41	6119570.2	451551.3	18.5	11:39:42	6119484.8	452990.3	18.6	00:20:01
OT104		13:50:10	6122882.2	436394.2	18.7	14:10:10	6122699.2	438206.4	18.1	00:20:00
OT105		16:58:35	6123666.2	419915.6	19.4	17:18:37	6123521.4	421691.8	19.8	00:20:02
OT106	08/05/2012	12:54:07	6124730.4	403350.7	28.2	13:14:07	6125658.7	404666.7	28.4	00:20:00
OT107		10:50:57	6115986.7	392756.2	32.6	11:10:58	6117132.9	394214.8	311	00:20:01
OT108		06:41:23	6106372.3	375749.4	34.3	07:01:23	6105512.3	374567.9	34.1	00:20:00
OT109		08:27:26	6099793.9	379099.0	32.6	08:47:28	6100097.5	380928.0	32.9	00:20:02
OT110		17:56:54	6099823.3	352195.8	40.7	18:16:55	6099380.8	350551.3	42.1	00:20:01
OT111	30/04/2012	19:16:15	6094723.9	333782.0	41.9	19:36:31	6094953.2	335416.9	43.7	00:20:16
OT112		16:43:13	6092083.6	315022.3	36.9	17:03:17	6092760.5	316631.5	38.7	00:20:04
OT113	10/05/2012	07:16:15	6081350.2	299322.0	45.6	07:36:19	6080989.8	298218.7	42.7	00:20:04
OT114		10:31:32	6079990.6	278041.8	34.2	10:51:33	6080129.1	276356.7	33.3	00:20:01
OT115		13:07:44	6070734.4	260328.3	29.7	13:27:45	6070098.3	258782.9	29.2	00:20:01
OT116	09/05/2012	17:45:50	6060408.9	261665.9	28.9	18:04:39	6060179.7	263349.7	29.5	00:18:49
OT117		13:31:00	6065358.7	285314.1	33.5	13:51:00	6065211.3	283446.2	32.5	00:20:00
OT118		10:55:07	6066526.4	306001.6	40.7	11:15:07	6066617.5	304381.7	36.6	00:20:00
OT119		07:47:13	6071790.7	328247.8	40.3	08:07:13	6071429.9	326881.4	39.3	00:20:00
OT120	04/05/2012	15:12:39	6075848.6	354242.5	45.6	15:32:40	6075217.8	352755.7	44.6	00:20:01
OT121		11:46:13	6082787.8	378966.6	26.2	12:06:13	6082549.9	377209.3	26.8	00:20:00
OT122		09:36:44	6074673.6	378873.0	23.6	09:56:48	6075720.7	377184.1	27.1	00:20:04
OT123		06:40:54	6064360.6	401344.2	13.4	07:00:55	6065144.1	399720.9	12.6	00:20:01
OT124	27/04/2012	15:01:30	6053935.1	428878.0	11.3	15:21:30	6054519.2	427059.5	11.8	00:20:00
OT125	07/05/2012	07:09:25	6062962.8	444460.3	15.5	07:29:27	6064297.8	445881.1	12.7	00:20:02
OT126		09:47:01	6076408.6	459093.5	11.6	10:07:09	6077861.8	460429.7	11.9	00:20:08

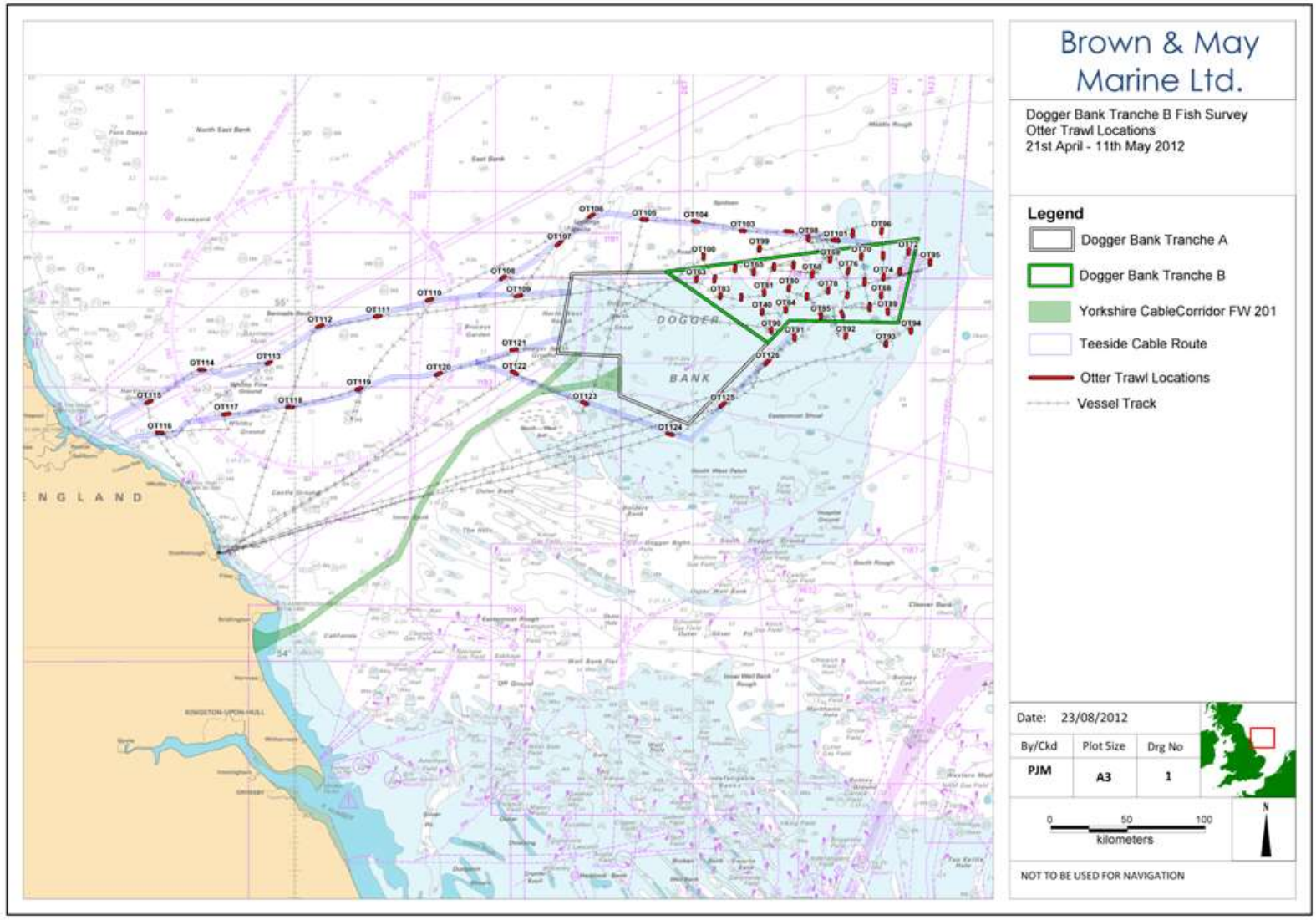


Figure 4.5 Otter Trawl Tow Tracks

4.6 Beam Trawl Sampling

All fish 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 and measured on board and returned to the sea. Sub-sampling was applied when large (> 4 litres) homogenous samples were obtained. Samples were fixed at the end of every day using a 4% seawater buffered formalin solution before being transported to Precision Marine Surveys Ltd. (PMSL) at the end of the survey to be identified, counted and measured.

The start and end times, co-ordinates and the duration of each beam trawl are given in Table 4.7 (control, Tranche B and export cable tows highlighted green, red and blue respectively). The vessel tracks whilst towing the beam trawl are illustrated in Figure 4.6.

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 6.1).

Table 4.7 Start and End Times, Co-ordinates and Duration of each Beam Trawl

Station	Date	Start				End				Duration (hh:mm:ss)
		Time (GMT)	UTM31N		Depth (m)	Time (GMT)	UTM31N		Depth (m)	
			Easting	Northing			Easting	Northing		
BT40	02/05/2012	16:44:30	6094304.2	458222.7	13.9	16:54:31	6093861.5	458522.2	13.9	00:10:01
BT41	22/04/2012	12:29:05	6103268.2	443175.5	16.1	12:39:06	6103781.3	443319.4	15.8	00:10:01
BT63	01/05/2012	08:03:34	6105096.8	436953.2	18.5	08:13:35	6104563.8	437109.4	18.4	00:10:01
BT64	22/04/2012	10:48:34	6106566.7	449580.1	15.2	10:58:38	6107135.6	449622.9	155	00:10:04
BT65		09:07:37	6105869.5	455596.5	16.6	09:17:38	6106317.1	455613.8	162	00:10:01
BT66	01/05/2012	15:47:03	6107111.1	462010.0	181	15:57:04	6107525.3	461972.9	17.4	00:10:01
BT67		17:30:37	6107541.8	468285.9	15.9	17:40:37	6108024.8	468168.9	17.2	00:10:00
BT68	02/05/2012	07:22:03	6104774.7	474267.8	15.3	07:32:07	6105149.2	474149.3	15.5	00:10:04
BT69	25/04/2012	17:51:50	6111261.1	480123.7	13.9	18:01:53	6110897.7	480070.9	14.1	00:10:03
BT70		11:23:22	6110380.6	490147.7	15.6	11:33:23	6110901.2	490166.7	15.6	00:10:01
BT71	21/04/2012	15:29:09	6112463.0	497008.1	156	15:39:10	6111957.7	496916.4	15.5	00:10:01
BT72		10:04:40	6113421.6	505400.7	14.7	10:14:41	6113958.0	505443.1	14.6	00:10:01
BT73		11:55:51	6105170.7	502418.1	13.7	12:05:51	6105895.1	502351.2	13.9	00:10:00
BT74		14:03:54	6105530.1	497123.4	15.8	14:13:56	6105220.7	497370.9	15.3	00:10:02
BT75	25/04/2012	09:30:17	6103855.8	491387.7	12.6	09:40:20	6103392.0	491428.7	12.4	00:10:03
BT76	26/04/2012	07:21:22	6107759.9	485987.1	13.4	07:31:23	6107374.7	486009.7	13.2	00:10:01
BT77		09:33:17	6098042.7	485618.9	12.7	09:43:20	6098629.5	485288.4	12.4	00:10:03
BT78	02/05/2012	09:13:30	6100820.8	479418.0	12.7	09:23:32	6100050.4	479434.5	12.5	00:10:02
BT79		10:51:28	6098831.2	472471.3	15	11:01:29	6098252.5	472690.4	14.5	00:10:01
BT80		12:59:12	6101624.0	466822.5	153	13:09:13	6100941.2	466890.7	15.7	00:10:01
BT81	01/05/2012	13:37:45	6100641.1	458746.5	17.5	13:47:46	6100084.6	458844.7	17.3	00:10:01
BT82		11:42:28	6098912.7	451492.5	15.4	11:52:29	6098462.5	451633.9	15.3	00:10:01
BT83		09:58:39	6099524.0	444680.5	15.5	10:08:41	6098998.3	444872.0	15.4	00:10:02
BT84	02/05/2012	14:42:39	6094492.2	465821.3	164	14:52:39	6093734.0	466058.4	15.5	00:10:00
BT85	27/04/2012	07:24:34	6092683.1	477034.6	13.5	07:34:35	6092051.2	477200.6	13.3	00:10:01
BT86	26/04/2012	11:16:24	6092029.9	484127.3	11.6	11:26:25	6092523.3	483855.8	12	00:10:01

Station	Date	Start				End				Duration (hh:mm:ss)
		Time (GMT)	UTM31N		Depth (m)	Time (GMT)	UTM31N		Depth (m)	
			Easting	Northing			Easting	Northing		
BT87	25/04/2012	07:43:15	6095650.8	492951.1	13	07:53:18	6095212.7	492929.3	12.8	00:10:03
BT88	24/04/2012	18:44:34	6099370.2	496458.8	14.3	18:54:34	6098932.4	496591.2	14.5	00:10:00
BT89		17:18:20	6094491.7	498532.3	13.2	17:28:20	6093917.2	498490.9	12.6	00:10:00
BT90	02/05/2012	18:28:08	6087909.6	460768.3	13.5	18:38:08	6087153.0	460836.5	13.5	00:10:00
BT91	07/05/2012	12:47:05	6086291.4	468422.7	13.6	12:57:06	6086031.8	468179.5	14.1	00:10:01
BT92	26/04/2012	13:10:13	6085160.2	485016.3	10.7	13:20:16	6085952.2	484946.7	10.4	00:10:03
BT93	24/04/2012	13:21:48	6082162.2	497798.3	10.6	13:31:48	6082653.0	497704.6	10.4	00:10:00
BT94		15:39:16	6086501.9	505992.5	11.5	15:49:24	6086942.9	506058.1	11.7	00:10:08
BT95	21/04/2012	07:45:17	6110280.3	512234.0	14.6	07:55:18	6109970.4	512253.1	14.5	00:10:01
BT96		17:01:25	6120227.9	496699.4	17.5	17:11:26	6119744.3	496726.8	17.6	00:10:01
BT97	25/04/2012	13:22:52	6117580.3	487302.7	14.5	13:32:53	6118170.4	487332.1	14.5	00:10:01
BT98		15:33:41	6118141.0	472985.6	16.2	15:43:42	6117747.9	473023.8	16.6	00:10:01
BT99	22/04/2012	07:12:30	6114650.2	457502.6	17.2	07:22:29	6114086.8	457329.0	17.2	00:09:59
BT100		14:20:04	6112321.3	439568.7	20.8	14:30:05	6111650.2	439495.9	16.9	00:10:01
BT101	03/05/2012	07:26:52	6115962.2	480804.6	14.5	07:36:53	6115859.3	481124.3	14.1	00:10:01
BT102		09:38:55	6119041.4	465952.6	18.9	09:48:55	6118983.1	466214.4	19.1	00:10:00
BT103		11:57:18	6119381.0	452771.9	17.9	12:07:19	6119615.4	452223.9	18.4	00:10:01
BT104		14:28:35	6122686.5	438069.7	17.9	14:38:36	6122737.3	437508.5	17.6	00:10:01
BT105		17:37:29	6123439.0	421504.8	19.4	17:47:30	6123466.1	421008.8	187	00:10:01
BT106	08/05/2012	13:34:02	6125524.1	404470.8	28.5	13:44:02	6125417.8	404249.5	27.9	00:10:00
BT107		11:30:55	6117350.4	394426.6	30.7	11:41:02	6117168.9	394212.9	30.9	00:10:07
BT108		07:20:45	6105629.9	374980.6	32.9	07:30:45	6105863.9	375569.3	33.6	00:10:00
BT109		09:07:39	6100161.0	381035.8	31.6	09:17:45	6100195.8	380750.4	31.8	00:10:06
BT110		18:43:52	6099738.4	351137.2	41.4	18:53:52	6099765.0	351488.5	41.2	00:10:00
BT111	30/04/2012	20:02:14	6094928.2	334809.2	43.1	20:12:14	6094882.9	334158.8	42.1	00:10:00
BT112		17:26:21	6092742.4	316605.4	38.6	17:36:23	6092461.7	316306.3	37.6	00:10:02
BT113	10/05/2012	08:03:14	6081256.6	298634.4	44.5	08:13:18	6081377.5	299411.7	45.5	00:10:04
BT114		11:15:46	6080180.5	276179.9	33.6	11:25:47	6080328.4	276368.6	33.8	00:10:01
BT115		13:58:08	6069953.6	258642.4	29.1	14:08:09	6069944.9	258983.7	29	00:10:01
BT116	09/05/2012	18:42:38	6060226.5	262902.4	29.6	18:52:39	6060030.2	263674.2	29.8	00:10:01
BT117		14:17:53	6065323.2	283167.3	32.9	14:27:55	6065163.9	283399.7	32.9	00:10:02
BT118		11:42:13	6066608.3	304223.2	36.3	11:52:12	6066514.4	304554.3	36.5	00:09:59
BT119		08:35:56	6071308.1	327065.9	395	08:45:56	6071642.4	327507.2	39.8	00:10:00
BT120	04/05/2012	16:05:14	6075017.3	353096.1	44.3	16:15:15	6074998.2	353458.1	44.3	00:10:01
BT121		12:26:17	6082249.3	377114.6	26.7	12:36:18	6082260.5	377459.0	26.4	00:10:01
BT122		10:20:45	6075405.5	377191.4	27.3	10:30:45	6075258.4	377721.4	25.8	00:10:00
BT123		07:21:57	6065337.2	399487.4	12.6	07:31:58	6064971.3	399928.1	12.7	00:10:01
BT124	27/04/2012	15:46:53	6054352.1	426916.0	11.6	15:56:54	6054293.0	427316.2	11.7	00:10:01
BT125	07/05/2012	07:48:53	6064173.5	445779.4	13.3	07:58:53	6063923.2	445514.2	15.1	00:10:00
BT126		10:23:11	6077915.3	460402.9	12.1	10:33:11	6077715.9	460296.2	11.7	00:10:00

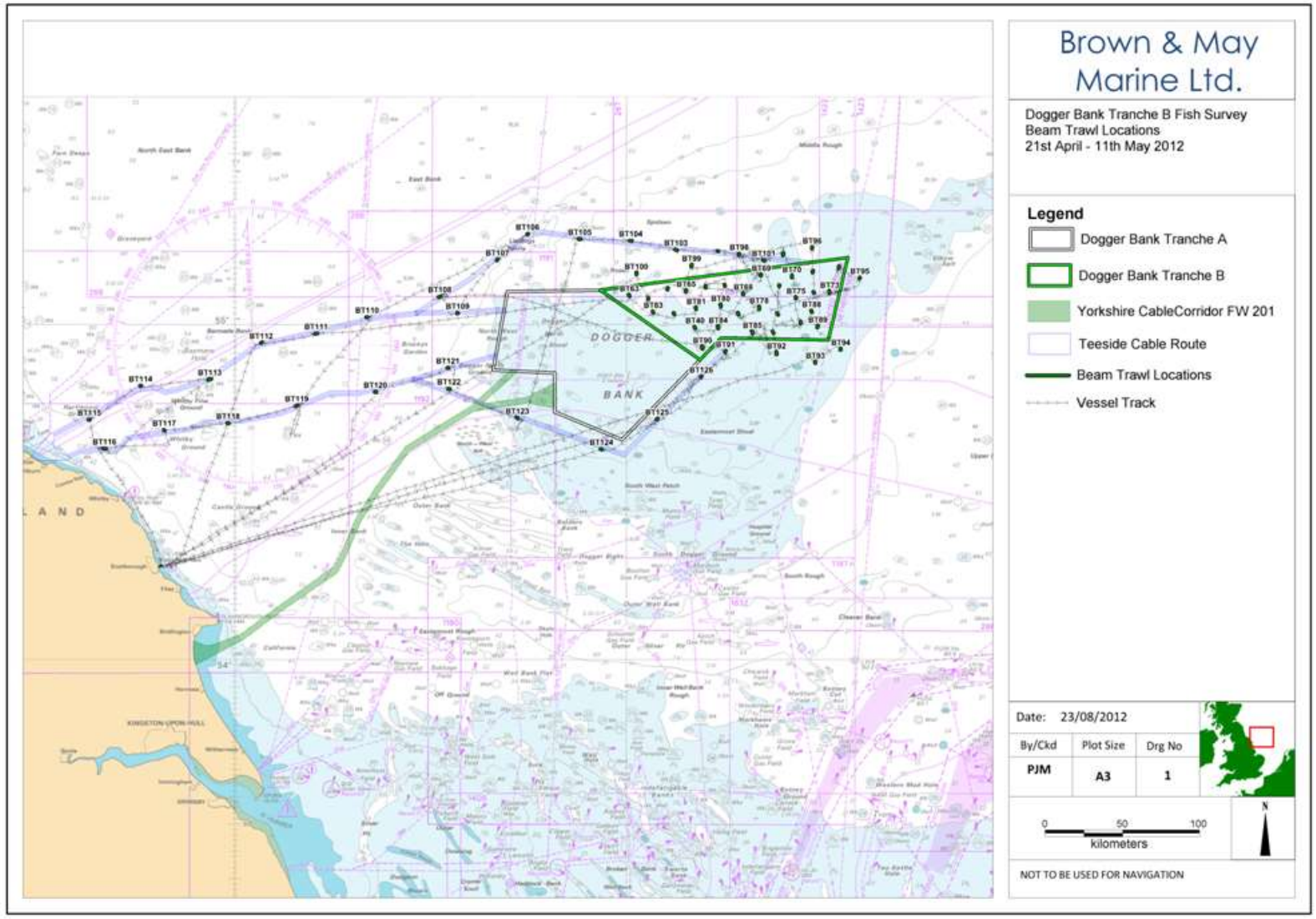


Figure 4.6 Beam Trawl Tow Tracks

5.0 Otter Trawl Results

5.1 Catch Rates and Species Distribution

The total number of individuals caught and the catch rate (number of individuals caught per hour) for fish species at the control stations, in Tranche B, and along the export cable are given in Table 5.1 and are illustrated in Figure 5.1. The catch rates by station and by sampling area are illustrated in Figure 5.2, Figure 5.3 and Figure 5.4 for control, Tranche B and export cable stations respectively.

Spatial distribution plots for the most abundant species are given in Figure 5.5 to Figure 5.8. Spatial plots show the percentage distribution by catch rate of *E. gurnardus*, *P. platessa*, *L. limanda*, and *M. merlangus*. The circle size corresponds to the catch rate i.e. larger circles indicate greater catch rates. Spatial distributions of *G. morhua*, Raitt's sandeel (*Ammodytes marinus*), Ammodytidae sp. and *C. harengus* are not plotted due to their relatively low catch rates.

A total of 37 species were caught; 15 at the control stations, 19 within Tranche B and 32 species along the export cable. Overall, *E. gurnardus* was the most abundant species caught, followed by *P. platessa* and then *L. limanda*. Generally the samples were more diverse at stations within the deeper water along the export cable, rather than on the Dogger Bank itself. The ground along the export cable, particularly in the area of Whitby Fine Ground is known to be hard, with patches of boulders/stony ground.

E. gurnardus had the highest catch rate at the control stations (356.7 individuals per hour) and along the export cable (182.9/hr), whereas *E. gurnardus* and *P. platessa* were found to have similar catch rates within Tranche B (250.7/hr and 250.8/hr respectively).

The highest total catch rate was recorded at station OT107 (2,446.0/hr), followed by OT111 (2,386.2/hr) and then OT122 (1901.7/hr), all along the export cable. *L. limanda* accounted for 72.9% of the catch at station OT107, whereas *M. merlangus* represented the greatest proportion of the catch at stations OT111 (45.9%) and OT122 (59.0%).

P. platessa were caught in all sampling areas, with the greatest total catch rate recorded within Tranche B (250.8/hr), more specifically however, control station OT99 had the highest catch rate for this species (1,008.4/hr).

M. merlangus were recorded in all sampling areas, with the greatest total catch rate recorded along the export cable (273.4/hr) and the highest catch rate by station found at OT108 (1,308.0/hr) along the export cable.

G. morhua were caught in all sampling areas with the highest total catch rate found within Tranche B (2.6/hr); the station with the greatest catch rate of *G. morhua* was OT74 within Tranche B (24.0/hr).

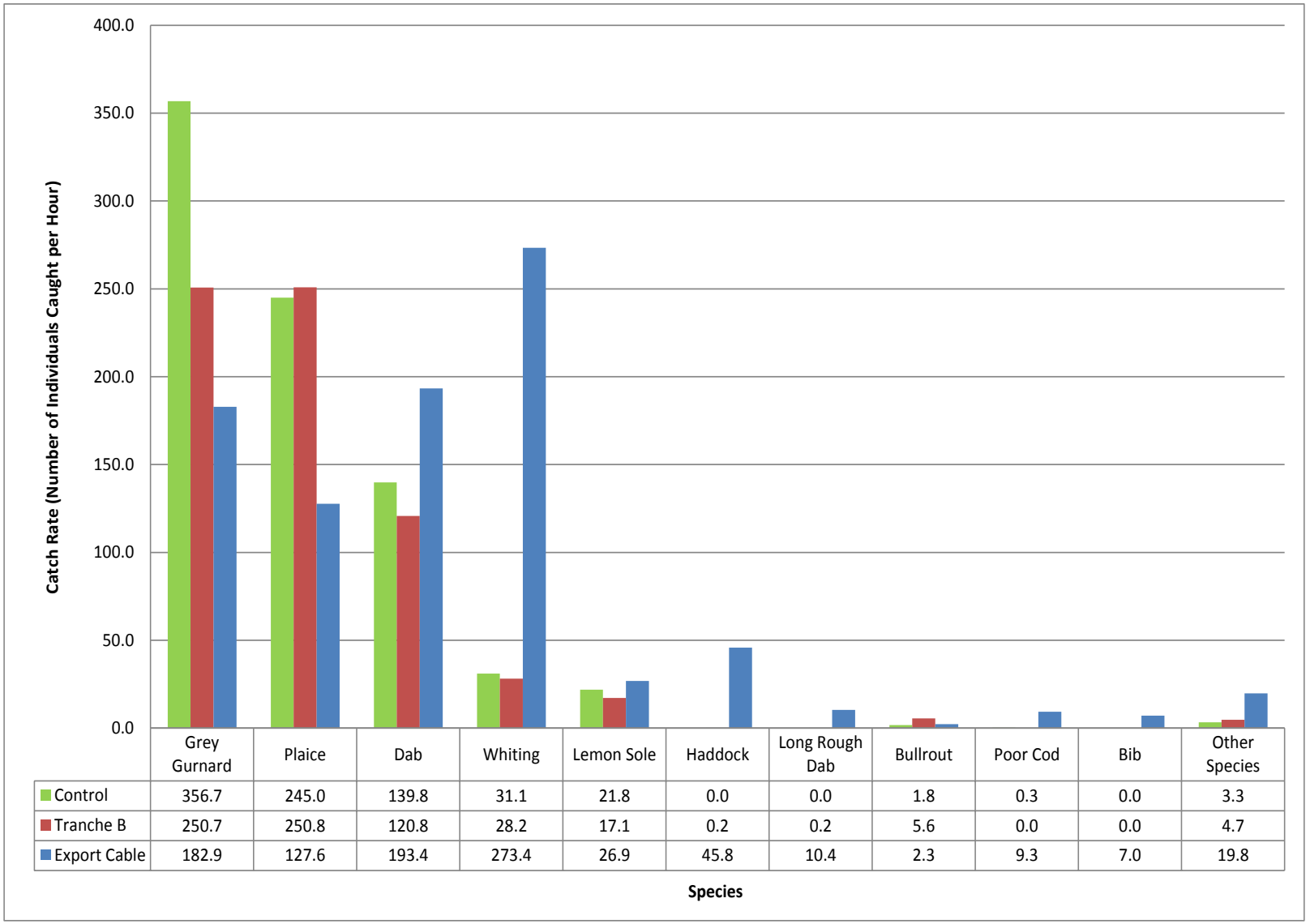
A. marinus were found only along the export cable at station OT104 with a catch rate of 90.0/hr. Two unidentified sandeel (Ammodytidae sp.) were caught within Tranche B, with single individuals found at stations OT68 and OT78. A single *C. harengus* was recorded at station OT116 along the export cable, with a catch rate of 3.2/hr.

Overall, the total catch rate was higher along the export cable (898.8/hr) than at the control stations (799.8/hr) and within Tranche B (678.3/hr).

Table 5.1 Total Numbers of Individuals Caught and Catch Rate for Fish Species by Sampling Area

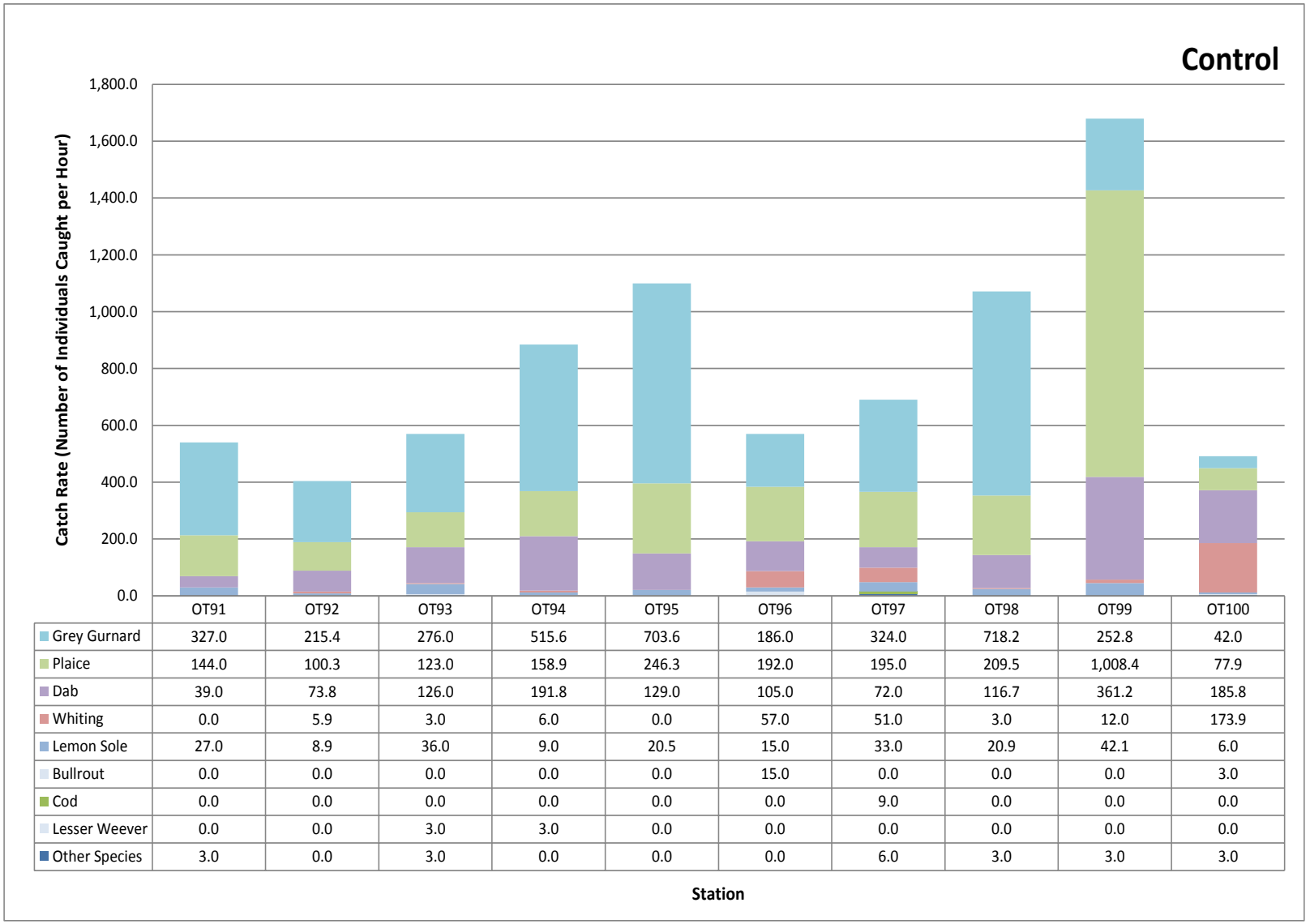
Species		Number of Individuals Caught				Catch Rate (Number of Individuals Caught per Hour)		
Common Name	Scientific Name	Control	Tranche B	Export Cable	Total	Control	Tranche B	Export Cable
Grey Gurnard	*Eutrigla gurnardus*	1,194	2,516	1,586	5,296	356.7	250.7	182.9
Plaice	*Pleuronectes platessa*	820	2,517	1,107	4,444	245.0	250.8	127.6
Dab	*Limanda limanda*	468	1,212	1,677	3,357	139.8	120.8	193.4
Whiting	*Merlangius merlangus*	104	283	2,371	2,758	31.1	28.2	273.4
Lemon Sole	*Microstomus kitt*	73	172	233	478	21.8	17.1	26.9
Haddock	*Melanogrammus aeglefinus*	0	2	397	399	0.0	0.2	45.8
Long Rough Dab	*Hippoglossoides platessoides*	0	2	90	92	0.0	0.2	10.4
Bullrout	*Myoxocephalus scorpius*	6	56	20	82	1.8	5.6	2.3
Poor Cod	*Trisopterus minutus*	1	0	81	82	0.3	0.0	9.3
Bib	*Trisopterus luscus*	0	0	61	61	0.0	0.0	7.0
Cod	*Gadus morhua*	3	26	17	46	0.9	2.6	2.0
Raitt's Sandeel	*Ammodytes marinus*	0	0	30	30	0.0	0.0	3.5
Hake	*Merluccius merluccius*	0	0	23	23	0.0	0.0	2.7
Mackerel	*Scomber scombrus*	0	0	22	22	0.0	0.0	2.5
Starry Ray	*Raja radiata*	1	2	17	20	0.3	0.2	2.0
Flounder	*Platichthys flesus*	1	0	12	13	0.3	0.0	1.4
Red Gurnard	*Aspitrigla cuculus*	0	0	8	8	0.0	0.0	0.9
Witch	*Glyptocephalus cynoglossus*	0	0	8	8	0.0	0.0	0.9
Common Dragonet	*Callionymus lyra*	1	3	3	7	0.3	0.3	0.3
Lumpsucker	*Cyclopterus lumpus*	0	5	1	6	0.0	0.5	0.1
Starry Smoothhound	*Mustelus asterias*	0	0	6	6	0.0	0.0	0.7
Lesser Spotted Dogfish	*Scyliorhinus canicula*	0	3	2	5	0.0	0.3	0.2
Norway Pout	*Trisopterus esmarkii*	0	0	5	5	0.0	0.0	0.6
Spotted Ray	*Raja montagui*	1	0	4	5	0.3	0.0	0.5

Species		Number of Individuals Caught				Catch Rate (Number of Individuals Caught per Hour)		
Common Name	Scientific Name	Control	Tranche B	Export Cable	Total	Control	Tranche B	Export Cable
Anglerfish	*Lophius piscatorius*	0	0	4	4	0.0	0.0	0.5
Lesser Weever	*Echiichthys vipera*	2	1	1	4	0.6	0.1	0.1
Tub Gurnard	*Trigla lucerna*	0	0	3	3	0.0	0.0	0.3
Turbot	*Psetta maxima*	1	1	1	3	0.3	0.1	0.1
Red Mullet	*Mullus surmuletus*	0	0	2	2	0.0	0.0	0.2
Sandeel	Ammodytidae sp.	0	2	0	2	0.0	0.2	0.0
Spurdog	*Squalus acanthias*	0	2	0	2	0.0	0.2	0.0
Brill	*Scophthalmus rhombus*	0	0	1	1	0.0	0.0	0.1
Herring	*Clupea harengus*	0	0	1	1	0.0	0.0	0.1
Scaldfish	*Arnoglossus laterna*	1	0	0	1	0.3	0.0	0.0
Solenette	*Buglossidium luteum*	0	1	0	1	0.0	0.1	0.0
Sprat	*Sprattus sprattus*	0	1	0	1	0.0	0.1	0.0
Thornback Ray	*Raja clavata*	0	0	1	1	0.0	0.0	0.1
Total No. of Individuals		2,677	6,807	7,795				
Total No. of Species		15	19	32				
Total Catch Rate (No. of Individuals Caught per Hour)		799.8	678.3	898.8				



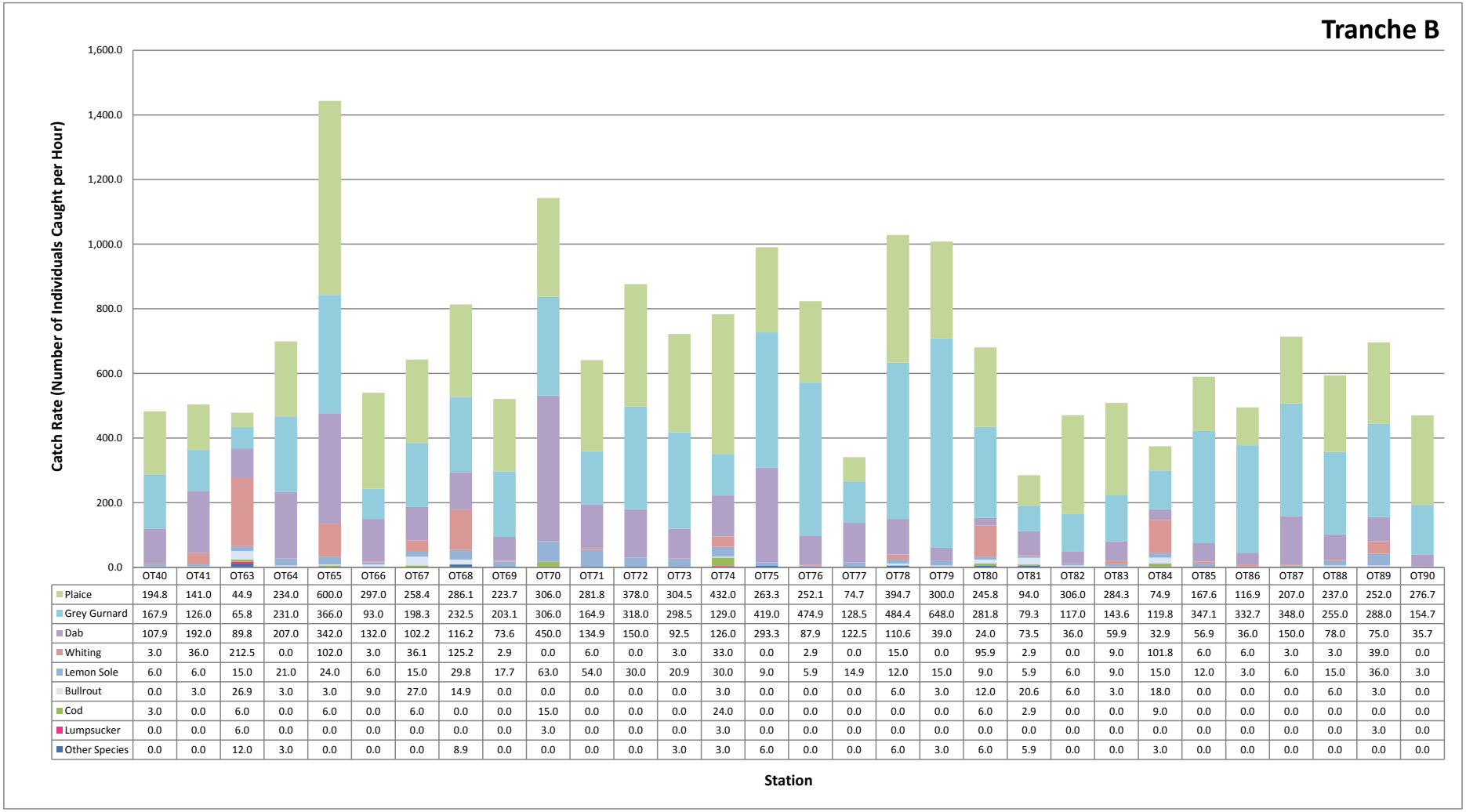
	Grey Gurnard	Plaice	Dab	Whiting	Lemon Sole	Haddock	Long Rough Dab	Bullrout	Poor Cod	Bib	Other Species
Control	356.7	245.0	139.8	31.1	21.8	0.0	0.0	1.8	0.3	0.0	3.3
Tranche B	250.7	250.8	120.8	28.2	17.1	0.2	0.2	5.6	0.0	0.0	4.7
Export Cable	182.9	127.6	193.4	273.4	26.9	45.8	10.4	2.3	9.3	7.0	19.8

Figure 5.1 Catch Rate by Species and Sampling Area



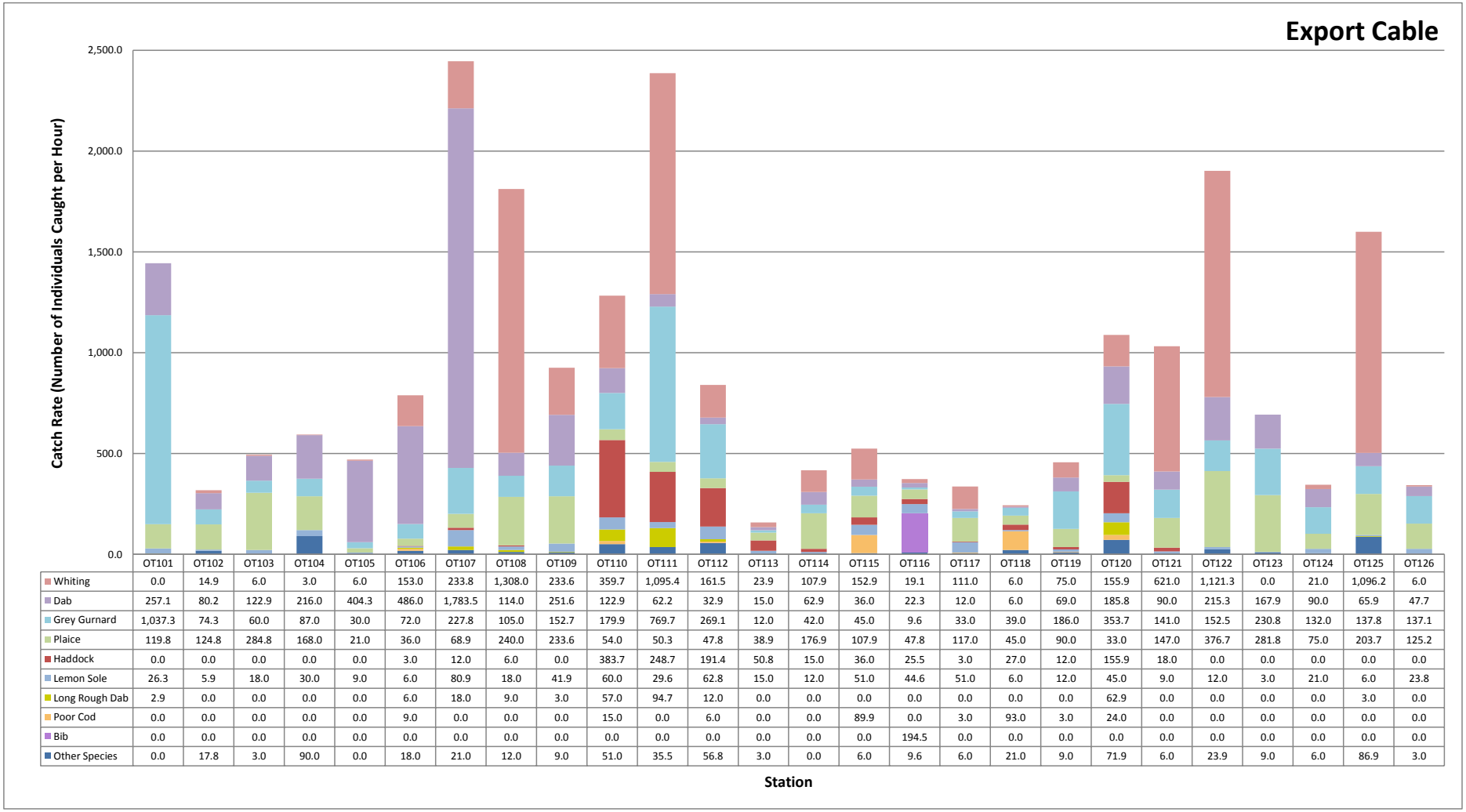
	OT91	OT92	OT93	OT94	OT95	OT96	OT97	OT98	OT99	OT100
Grey Gurnard	327.0	215.4	276.0	515.6	703.6	186.0	324.0	718.2	252.8	42.0
Plaice	144.0	100.3	123.0	158.9	246.3	192.0	195.0	209.5	1,008.4	77.9
Dab	39.0	73.8	126.0	191.8	129.0	105.0	72.0	116.7	361.2	185.8
Whiting	0.0	5.9	3.0	6.0	0.0	57.0	51.0	3.0	12.0	173.9
Lemon Sole	27.0	8.9	36.0	9.0	20.5	15.0	33.0	20.9	42.1	6.0
Bullrout	0.0	0.0	0.0	0.0	0.0	15.0	0.0	0.0	0.0	3.0
Cod	0.0	0.0	0.0	0.0	0.0	0.0	9.0	0.0	0.0	0.0
Lesser Weever	0.0	0.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Species	3.0	0.0	3.0	0.0	0.0	0.0	6.0	3.0	3.0	3.0

Figure 5.2 Catch Rate by Species and Station at the Control Stations



	OT40	OT41	OT63	OT64	OT65	OT66	OT67	OT68	OT69	OT70	OT71	OT72	OT73	OT74	OT75	OT76	OT77	OT78	OT79	OT80	OT81	OT82	OT83	OT84	OT85	OT86	OT87	OT88	OT89	OT90
Plaice	194.8	141.0	44.9	234.0	600.0	297.0	258.4	286.1	223.7	306.0	281.8	378.0	304.5	432.0	263.3	252.1	74.7	394.7	300.0	245.8	94.0	306.0	284.3	74.9	167.6	116.9	207.0	237.0	252.0	276.7
Grey Gurnard	167.9	126.0	65.8	231.0	366.0	93.0	198.3	232.5	203.1	306.0	164.9	318.0	298.5	129.0	419.0	474.9	128.5	484.4	648.0	281.8	79.3	117.0	143.6	119.8	347.1	332.7	348.0	255.0	288.0	154.7
Dab	107.9	192.0	89.8	207.0	342.0	132.0	102.2	116.2	73.6	450.0	134.9	150.0	92.5	126.0	293.3	87.9	122.5	110.6	39.0	24.0	73.5	36.0	59.9	32.9	56.9	36.0	150.0	78.0	75.0	35.7
Whiting	3.0	36.0	212.5	0.0	102.0	3.0	36.1	125.2	2.9	0.0	6.0	0.0	3.0	33.0	0.0	2.9	0.0	15.0	0.0	95.9	2.9	0.0	9.0	101.8	6.0	6.0	3.0	3.0	39.0	0.0
Lemon Sole	6.0	6.0	15.0	21.0	24.0	6.0	15.0	29.8	17.7	63.0	54.0	30.0	20.9	30.0	9.0	5.9	14.9	12.0	15.0	9.0	5.9	6.0	9.0	15.0	12.0	3.0	6.0	15.0	36.0	3.0
Bullrout	0.0	3.0	26.9	3.0	3.0	9.0	27.0	14.9	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	6.0	3.0	12.0	20.6	6.0	3.0	18.0	0.0	0.0	0.0	6.0	3.0	0.0
Cod	3.0	0.0	6.0	0.0	6.0	0.0	6.0	0.0	0.0	15.0	0.0	0.0	0.0	24.0	0.0	0.0	0.0	0.0	0.0	6.0	2.9	0.0	0.0	9.0	0.0	0.0	0.0	0.0	0.0	0.0
Lumpsucker	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0
Other Species	0.0	0.0	12.0	3.0	0.0	0.0	0.0	8.9	0.0	0.0	0.0	0.0	3.0	3.0	6.0	0.0	0.0	6.0	3.0	6.0	5.9	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0

Figure 5.3 Catch Rate by Species and Station within Tranche B



	OT101	OT102	OT103	OT104	OT105	OT106	OT107	OT108	OT109	OT110	OT111	OT112	OT113	OT114	OT115	OT116	OT117	OT118	OT119	OT120	OT121	OT122	OT123	OT124	OT125	OT126
Whiting	0.0	14.9	6.0	3.0	6.0	153.0	233.8	1,308.0	233.6	359.7	1,095.4	161.5	23.9	107.9	152.9	19.1	111.0	6.0	75.0	155.9	621.0	1,121.3	0.0	21.0	1,096.2	6.0
Dab	257.1	80.2	122.9	216.0	404.3	486.0	1,783.5	114.0	251.6	122.9	62.2	32.9	15.0	62.9	36.0	22.3	12.0	6.0	69.0	185.8	90.0	215.3	167.9	90.0	65.9	47.7
Grey Gurnard	1,037.3	74.3	60.0	87.0	30.0	72.0	227.8	105.0	152.7	179.9	769.7	269.1	12.0	42.0	45.0	9.6	33.0	39.0	186.0	353.7	141.0	152.5	230.8	132.0	137.8	137.1
Plaice	119.8	124.8	284.8	168.0	21.0	36.0	68.9	240.0	233.6	54.0	50.3	47.8	38.9	176.9	107.9	47.8	117.0	45.0	90.0	33.0	147.0	376.7	281.8	75.0	203.7	125.2
Haddock	0.0	0.0	0.0	0.0	0.0	3.0	12.0	6.0	0.0	383.7	248.7	191.4	50.8	15.0	36.0	25.5	3.0	27.0	12.0	155.9	18.0	0.0	0.0	0.0	0.0	0.0
Lemon Sole	26.3	5.9	18.0	30.0	9.0	6.0	80.9	18.0	41.9	60.0	29.6	62.8	15.0	12.0	51.0	44.6	51.0	6.0	12.0	45.0	9.0	12.0	3.0	21.0	6.0	23.8
Long Rough Dab	2.9	0.0	0.0	0.0	0.0	6.0	18.0	9.0	3.0	57.0	94.7	12.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	62.9	0.0	0.0	0.0	0.0	3.0	0.0
Poor Cod	0.0	0.0	0.0	0.0	0.0	9.0	0.0	0.0	0.0	15.0	0.0	6.0	0.0	0.0	89.9	0.0	3.0	93.0	3.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0
Bib	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	194.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Species	0.0	17.8	3.0	90.0	0.0	18.0	21.0	12.0	9.0	51.0	35.5	56.8	3.0	0.0	6.0	9.6	6.0	21.0	9.0	71.9	6.0	23.9	9.0	6.0	86.9	3.0

Figure 5.4 Catch Rate by Species and Station along the Export Cable

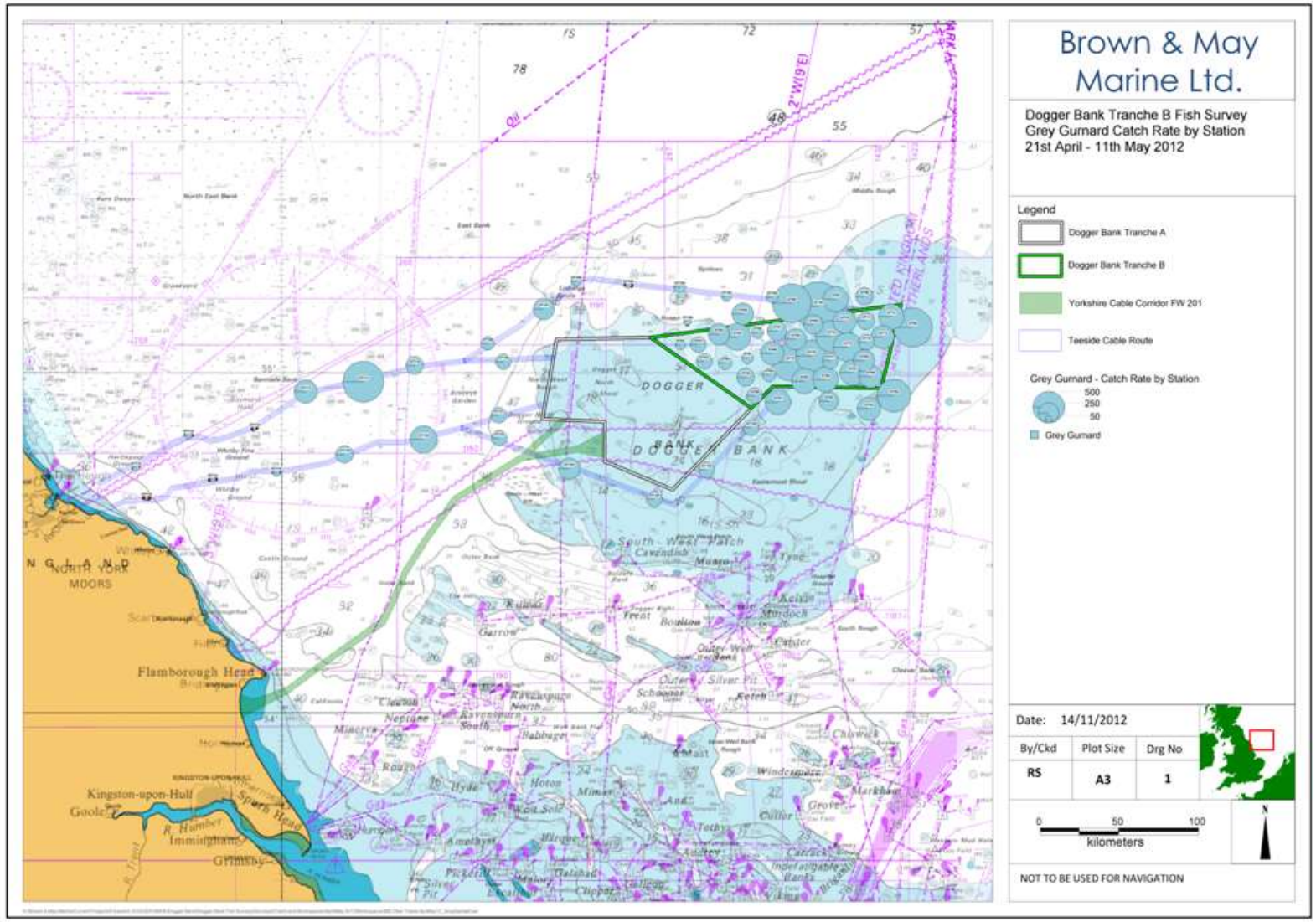


Figure 5.5 Spatial Distribution of Grey Gurnard (*E. gurnardus*) in the Area of Tranche B

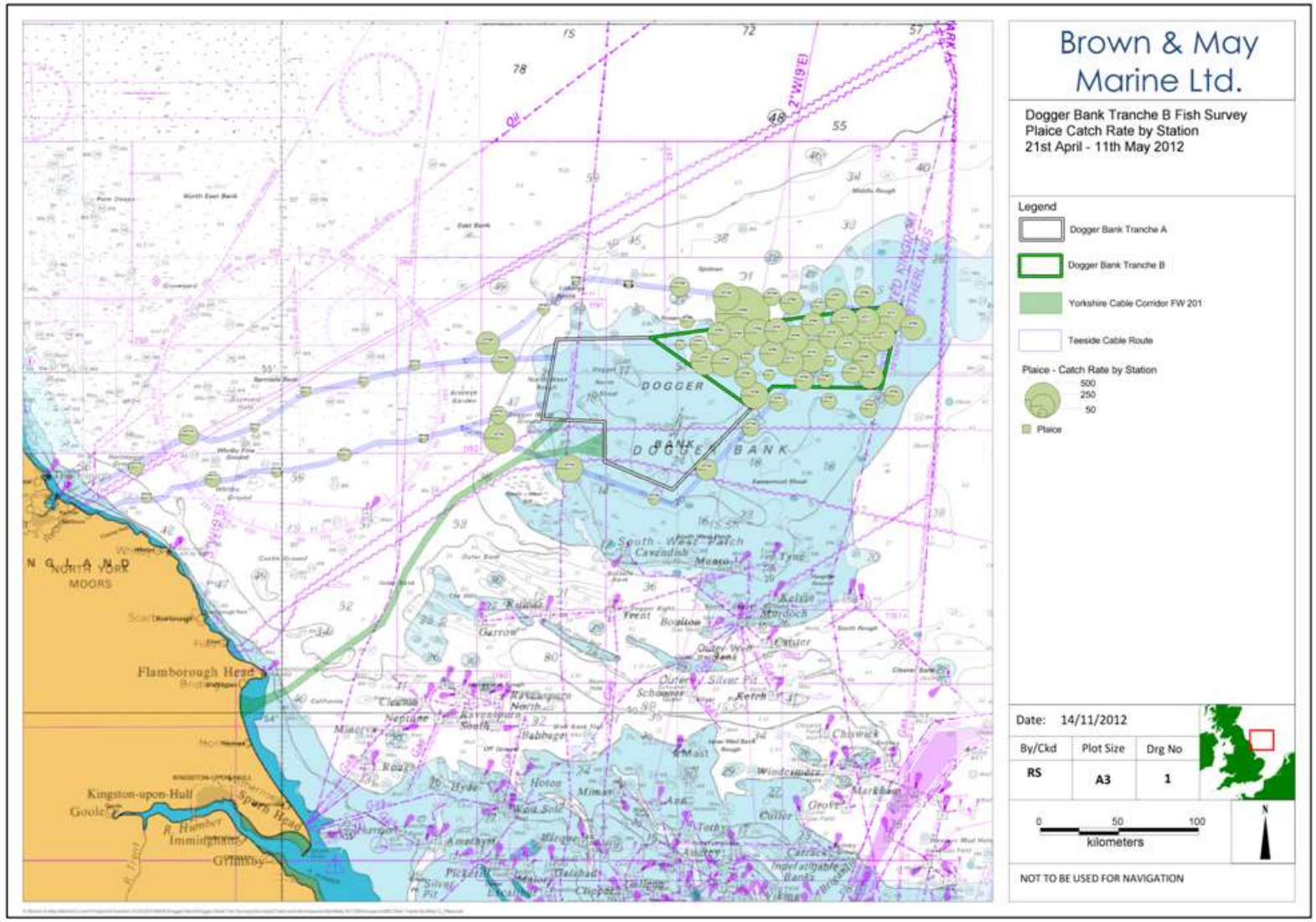


Figure 5.6 Spatial Distribution of Plaice (*P. platessa*) in the Area of Tranche B

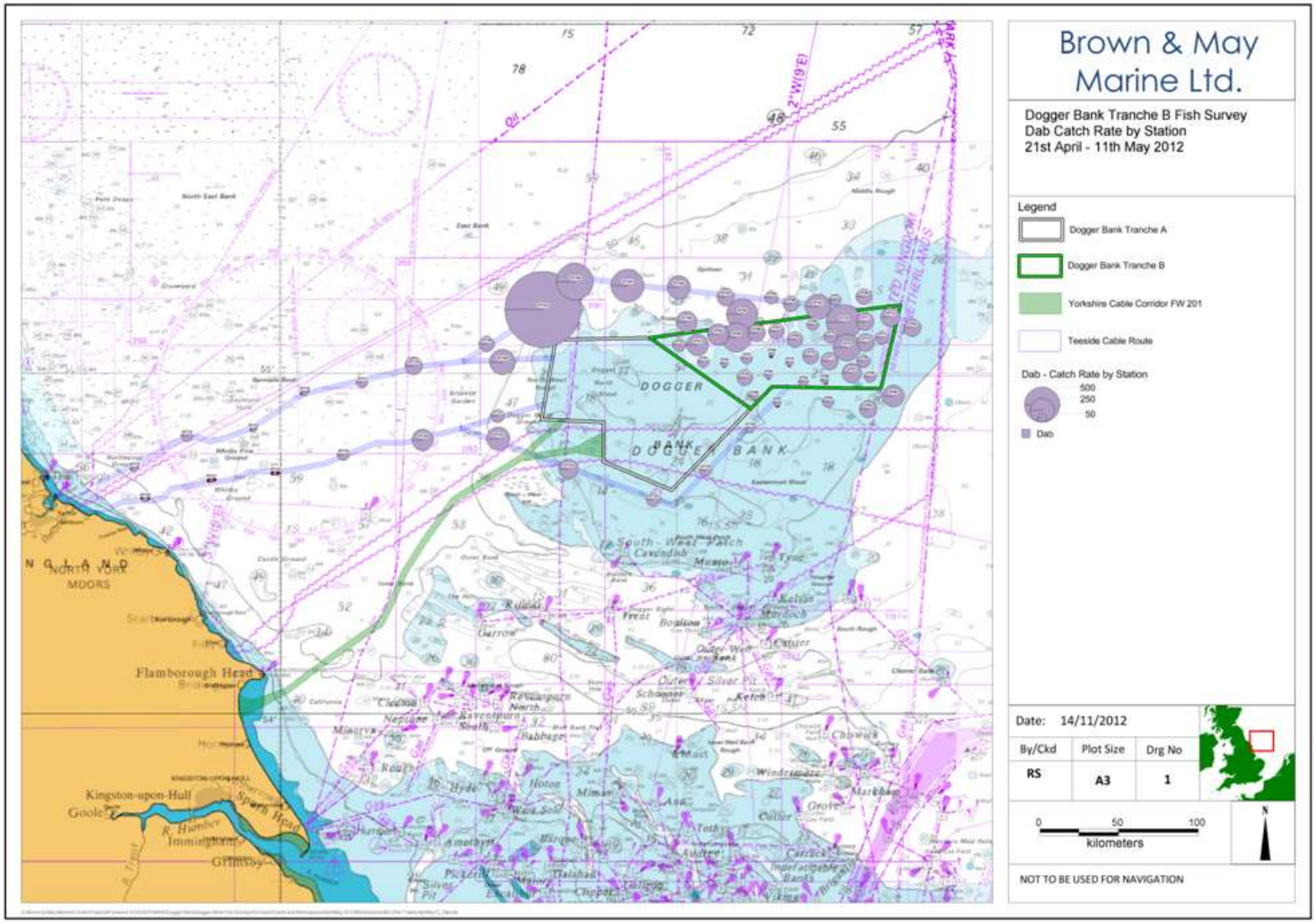


Figure 5.7 Spatial Distribution of Dab (*L. limanda*) in the Area of Tranche B

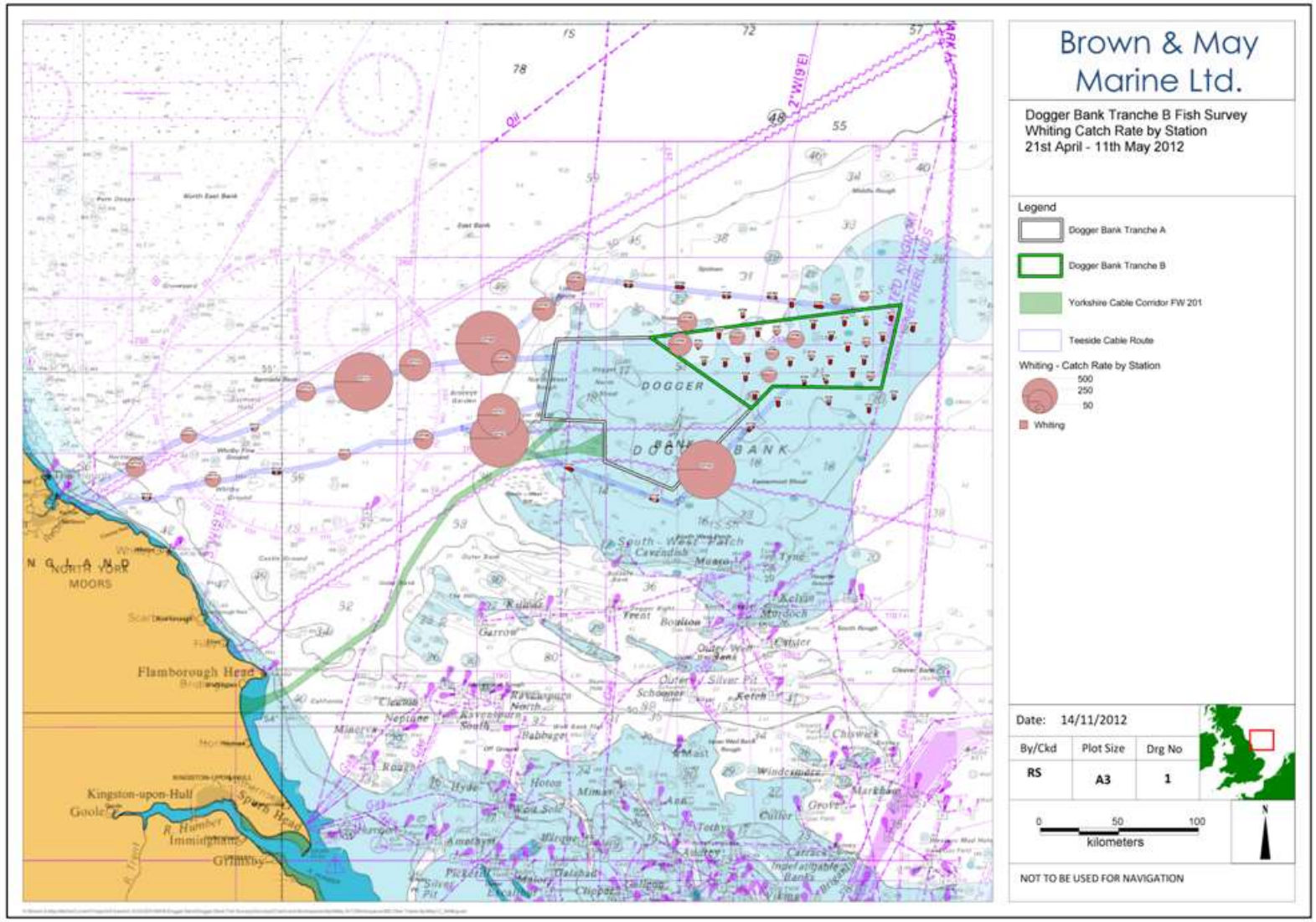


Figure 5.8 Spatial Distribution of Whiting (*M. merlangus*) in the Area of Tranche B

5.2 Length Distributions

The average length (cm) and length range for fish species caught by sampling area (control, Tranche B and export cable stations) are given below in Table 5.2. It should be noted that the poisonous lesser weever (*Echiichthys vipera*) are not measured as a safety precaution, and as such are excluded from this section.

The length distributions of the most abundant species caught during the survey (>2,500 individuals), expressed as the catch rate (number of individuals caught per hour) by length (cm) and by sampling area, are shown in Figure 5.9 to Figure 5.12 overleaf.

Table 5.2 Average Length and Length Ranges of Species Caught by Sampling Area

Species		Average Length (cm)			Length Range (cm)	
Common Name	Scientific Name	Control	Tranche B	Export Cable	Min.	Max.
Anglerfish	*Lophius piscatorius*	-	-	35.8	26.0	42.0
Bib	*Trisopterus luscus*	-	-	19.0	16.0	24.0
Brill	*Scophthalmus rhombus*	-	-	35.0	35.0	35.0
Bullrout	*Myoxocephalus scorpius*	19.5	19.8	19.9	12.0	27.0
Cod	*Gadus morhua*	36.7	27.4	35.2	19.0	55.0
Common Dragonet	*Callionymus lyra*	7.0	23.3	24.7	7.0	28.0
Dab	*Limanda limanda*	21.9	22.1	21.6	12.0	35.0
Flounder	*Platichthys flesus*	33.0	-	27.6	22.0	33.0
Grey Gurnard	*Eutrigla gurnardus*	24.0	23.3	21.5	13.0	38.0
Haddock	*Melanogrammus aeglefinus*	-	35.5	32.8	21.0	49.0
Hake	*Merluccius merluccius*	-	-	42.2	31.0	63.0
Herring	*Clupea harengus*	-	-	28.0	28.0	28.0
Lemon Sole	*Microstomus kitt*	24.9	25.3	25.9	16.0	34.0
Lesser Spotted Dogfish	*Scyliorhinus canicula*	-	63.7	50.5	42.0	67.0
Long Rough Dab	*Hippoglossoides platessoides*	-	22.5	18.5	14.0	26.0
Lumpsucker	*Cyclopterus lumpus*	-	26.8	28.0	25.0	29.0
Mackerel	*Scomber scombrus*	-	-	35.5	26.0	47.0
Norway Pout	*Trisopterus esmarkii*	-	-	16.2	12.0	19.0
Plaice	*Pleuronectes platessa*	28.2	28.5	27.4	13.0	50.0
Poor Cod	*Trisopterus minutus*	13.0	-	17.8	13.0	22.0
Raitt's Sandeel	*Ammodytes marinus*	-	-	14.5	12.5	16.5
Red Gurnard	*Aspitrigla cuculus*	-	-	25.3	18.0	44.0
Red Mullet	*Mullus surmuletus*	-	-	25.0	22.0	28.0
Sandeel	*Ammodytidae sp.*	-	16.0	-	15.0	17.0
Scaldfish	*Arnoglossus laterna*	10.0	-	-	10.0	10.0
Solenette	*Buglossidium luteum*	-	10.0	-	10.0	10.0
Spotted Ray	*Raja montagui*	33.0	-	47.3	33.0	62.0
Sprat	*Sprattus sprattus*	-	11.0	-	11.0	11.0
Spurdog	*Squalus acanthias*	-	99.5	-	80.0	119.0
Starry Ray	*Raja radiata*	44.0	29.0	35.9	24.0	48.0
Starry Smoothhound	*Mustelus asterias*	-	-	78.8	50.0	92.0

Species		Average Length (cm)			Length Range (cm)	
Common Name	Scientific Name	Control	Tranche B	Export Cable	Min.	Max.
Thornback Ray	*Raja clavata*	-	-	42.0	42.0	42.0
Tub Gurnard	*Trigla lucerna*	-	-	28.0	25.0	30.0
Turbot	*Psetta maxima*	32.0	48.0	37.0	32.0	48.0
Whiting	*Merlangius merlangus*	23.3	23.7	25.1	14.0	44.0
Witch	*Glyptocephalus cynoglossus*	-	-	31.6	27.0	36.0

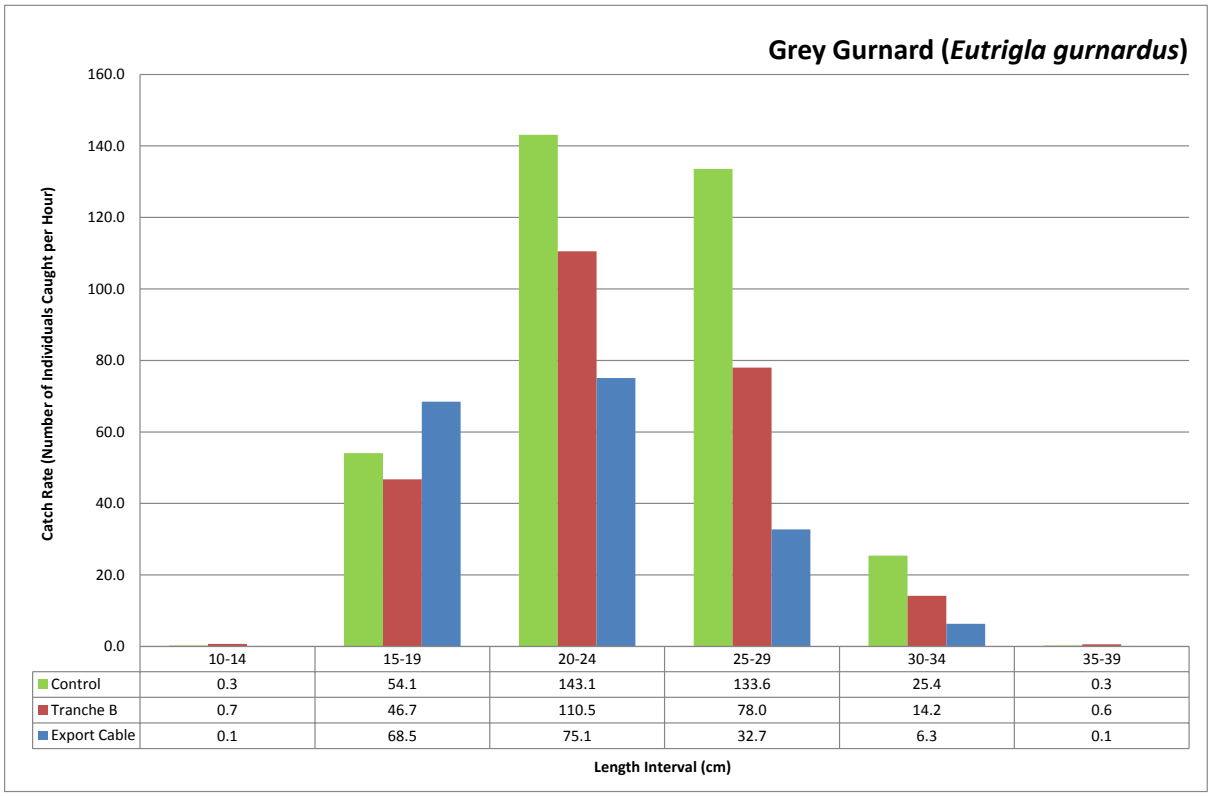
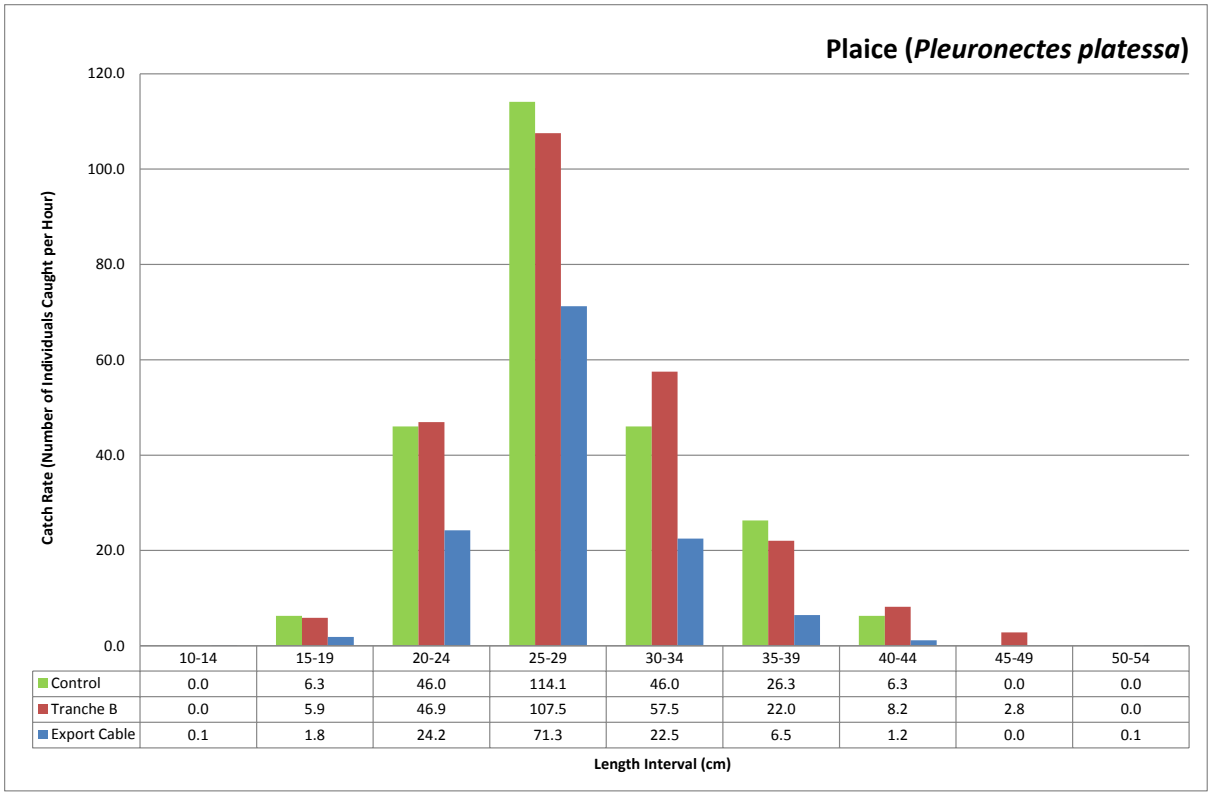
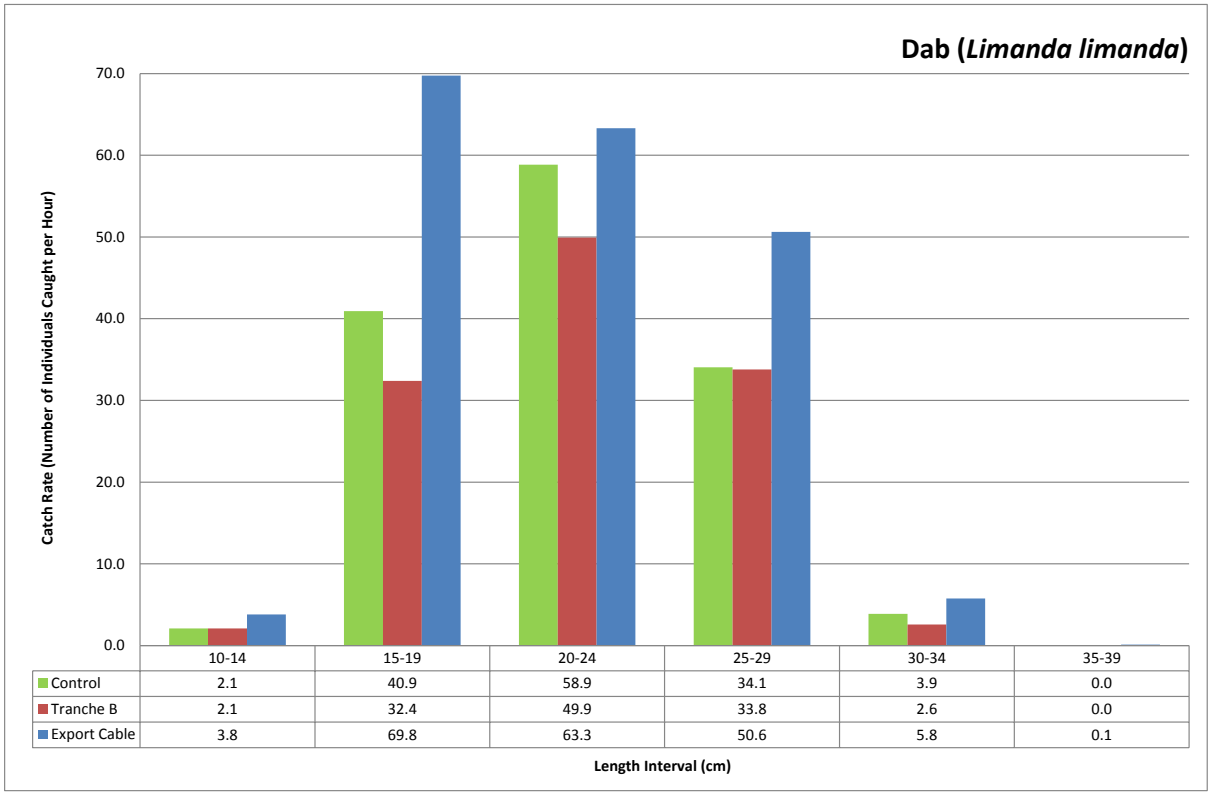


Figure 5.9 Grey Gurnard (*E. gurnardus*) Length Distribution by Sampling Area



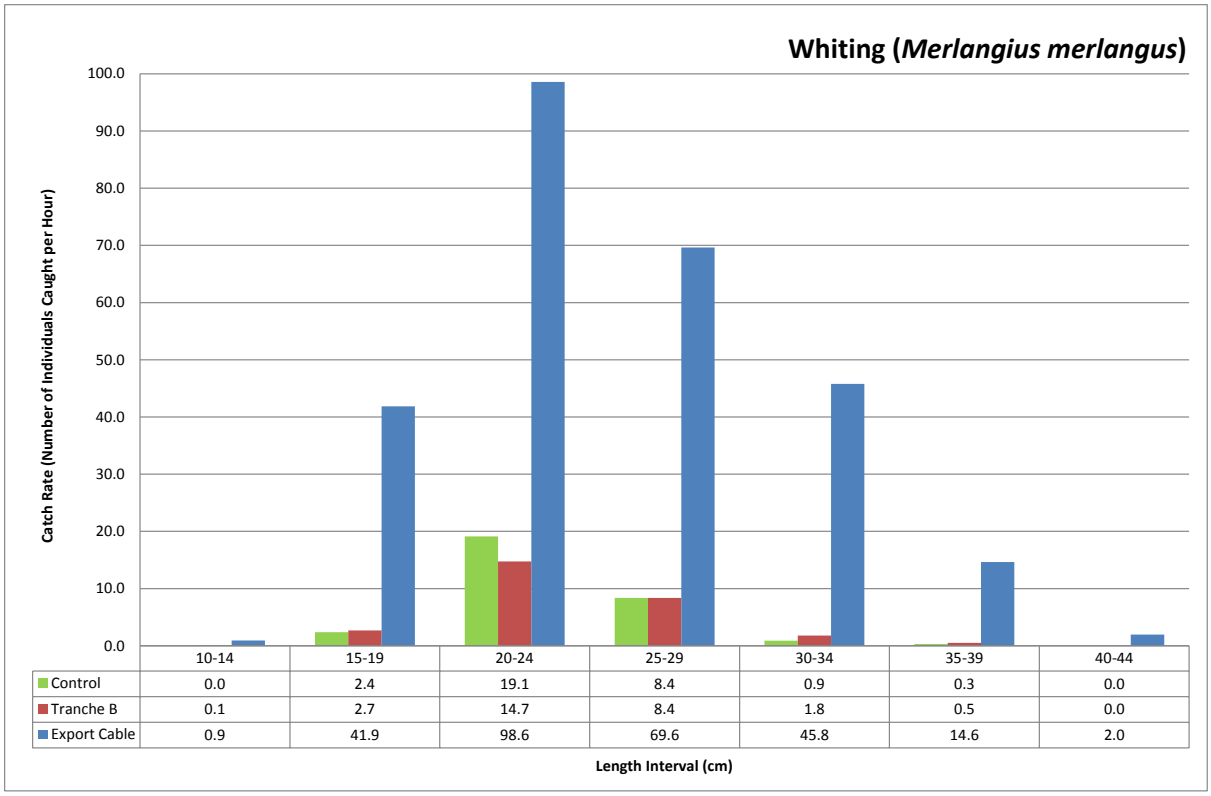
	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54
Control	0.0	6.3	46.0	114.1	46.0	26.3	6.3	0.0	0.0
Tranche B	0.0	5.9	46.9	107.5	57.5	22.0	8.2	2.8	0.0
Export Cable	0.1	1.8	24.2	71.3	22.5	6.5	1.2	0.0	0.1

Figure 5.10 Plaice (*P. platessa*) Length Distribution by Sampling Area



	10-14	15-19	20-24	25-29	30-34	35-39
Control	2.1	40.9	58.9	34.1	3.9	0.0
Tranche B	2.1	32.4	49.9	33.8	2.6	0.0
Export Cable	3.8	69.8	63.3	50.6	5.8	0.1

Figure 5.11 Dab (*L. limanda*) Length Distribution by Sampling Area



	10-14	15-19	20-24	25-29	30-34	35-39	40-44
Control	0.0	2.4	19.1	8.4	0.9	0.3	0.0
Tranche B	0.1	2.7	14.7	8.4	1.8	0.5	0.0
Export Cable	0.9	41.9	98.6	69.6	45.8	14.6	2.0

Figure 5.12 Whiting (*M. merlangus*) Length Distribution by Sampling Area

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).

Table 5.3 shows the seven species of fish caught for which a MLS has been set, and denotes their presence or absence by sampling area (control, Tranche B and export cable).

Table 5.3 MLS Set by EC

Species		EC MLS (cm)	Presence		
Common Name	Scientific Name		Control	Tranche B	Export Cable
Cod	*Gadus morhua*	35	✓	✓	✓
Haddock	*Melanogrammus aeglefinus*	30	-	✓	✓
Hake	*Merluccius merluccius*	27	-	-	✓
Herring	*Clupea harengus*	20	-	-	✓
Mackerel	*Scomber scombrus*	30	-	-	✓
Plaice	*Pleuronectes platessa*	27	✓	✓	✓
Whiting	*Merlangius merlangus*	27	✓	✓	✓

The percentage of individuals caught above and below their set MLS by species is shown in Figure 5.13, Figure 5.14 and Figure 5.15 for control, Tranche B and export cable stations respectively.

The percentage of individuals above and below the MLS was approximately even for the *P. platessa* caught along the export cable, whereas at the control stations and within Tranche B a greater proportion of which were above the MLS (57.4% and 60.5% respectively).

Most of the *M. merlangus* caught at the control stations, within Tranche B and along the export cable were below the MLS (control 83.7%, Tranche B 79.9%, export cable 61.8%).

Haddock (*Melanogrammus aeglefinus*) were caught within Tranche B (in low numbers) and along the export cable, most of which were above the MLS (100.0% and 77.6% respectively).

All other species were caught in relatively low numbers.

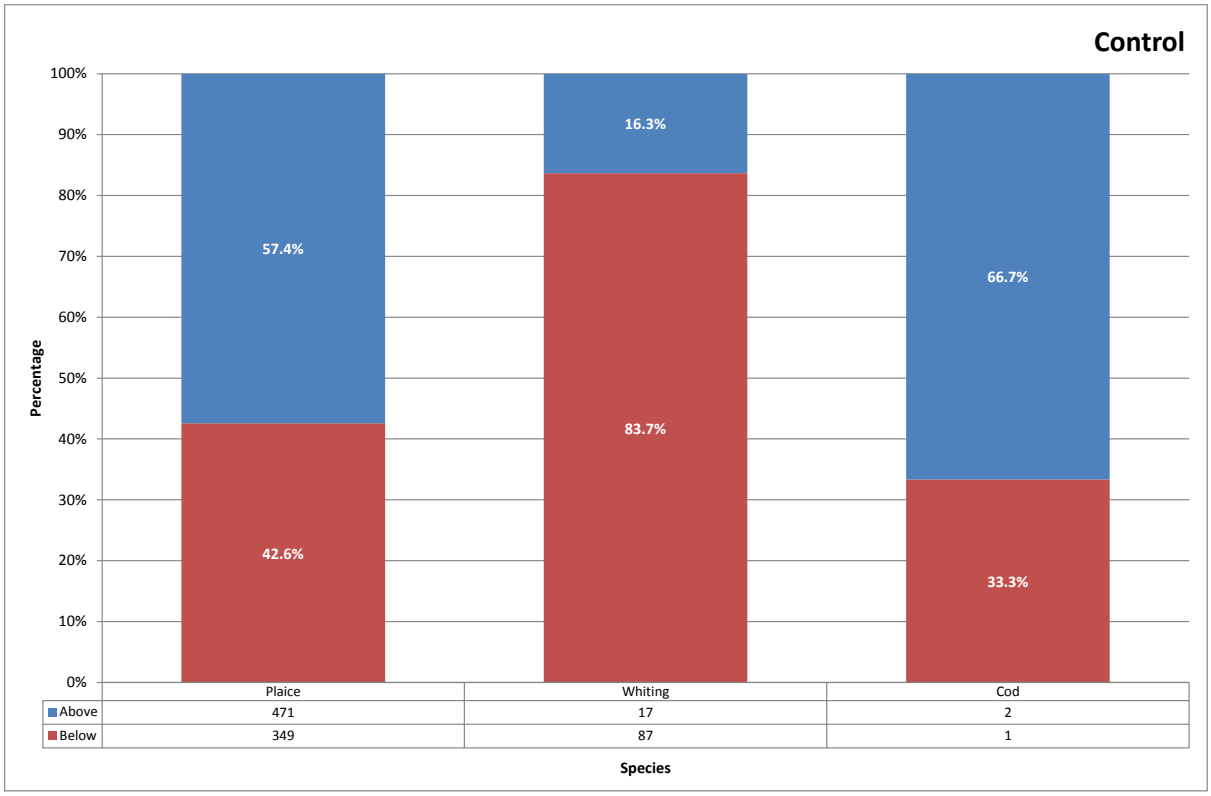


Figure 5.13 Percentage of the Catch Above and Below the MLS by Species at the Control Stations

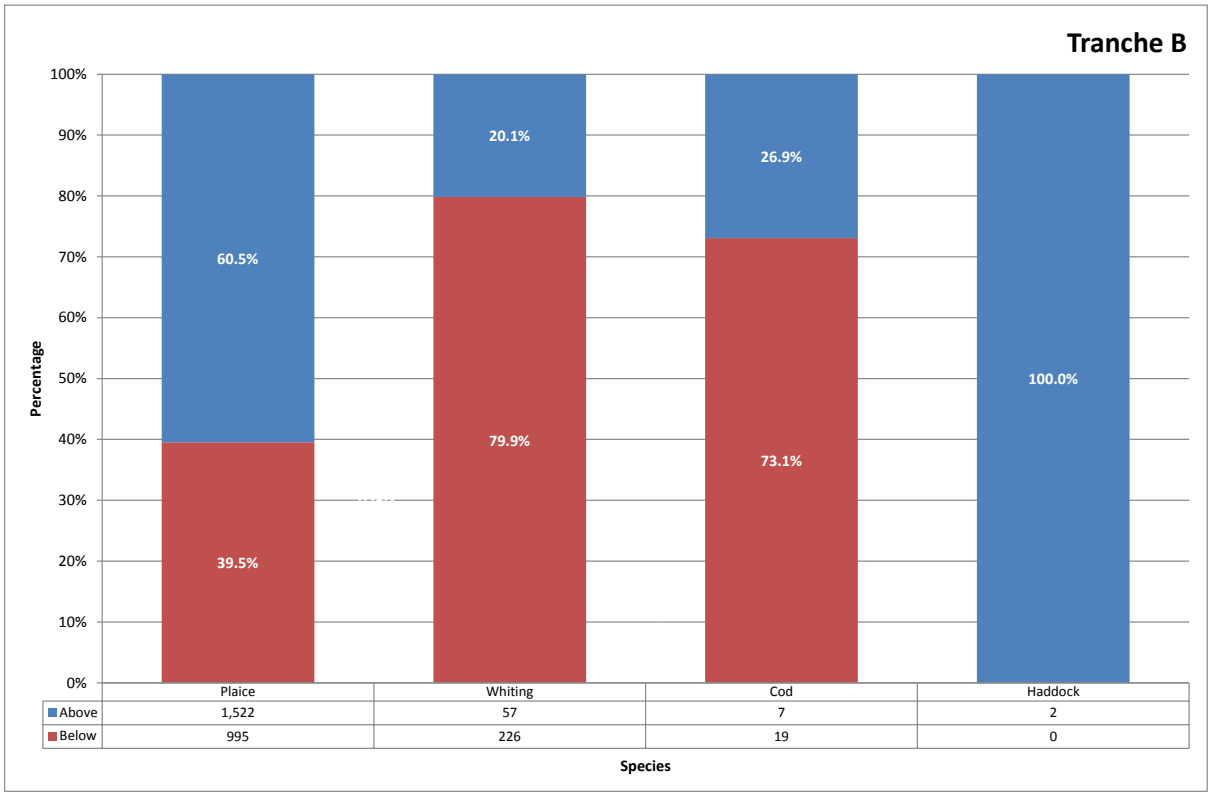


Figure 5.14 Percentage of the Catch Above and Below the MLS by Species within Tranche B

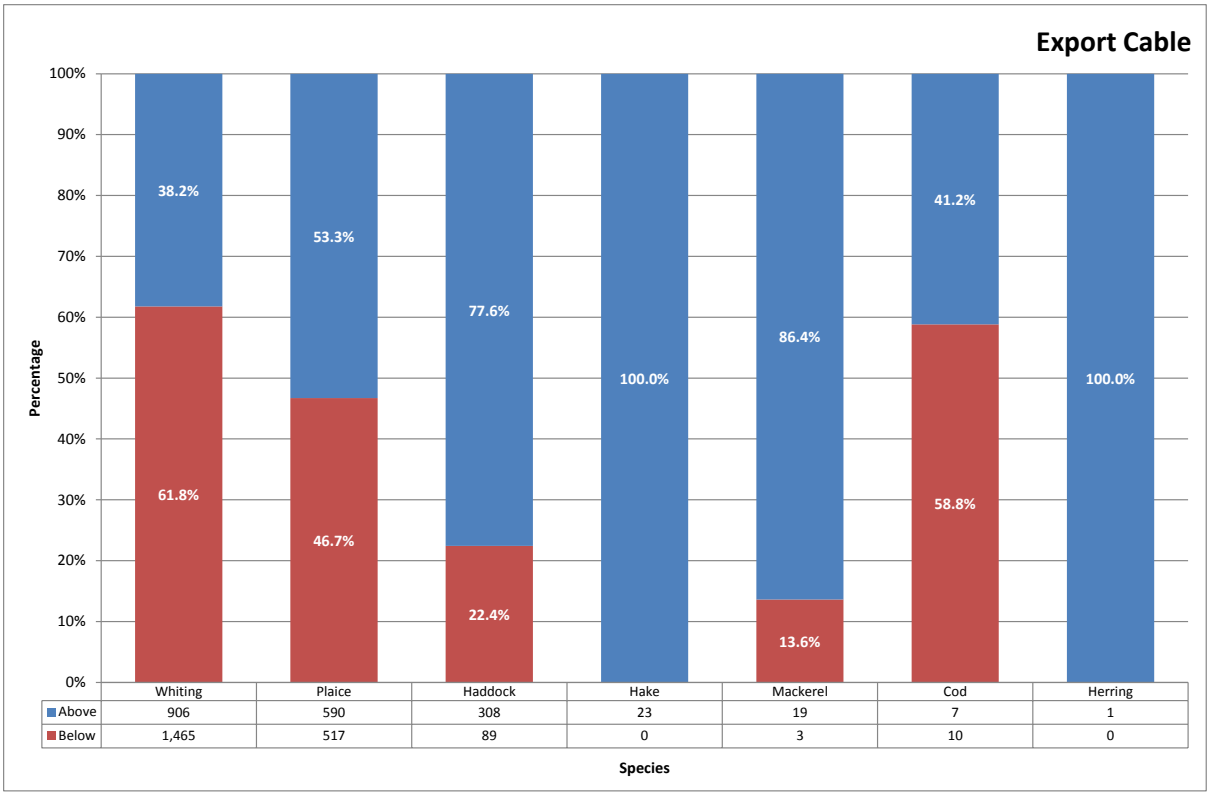


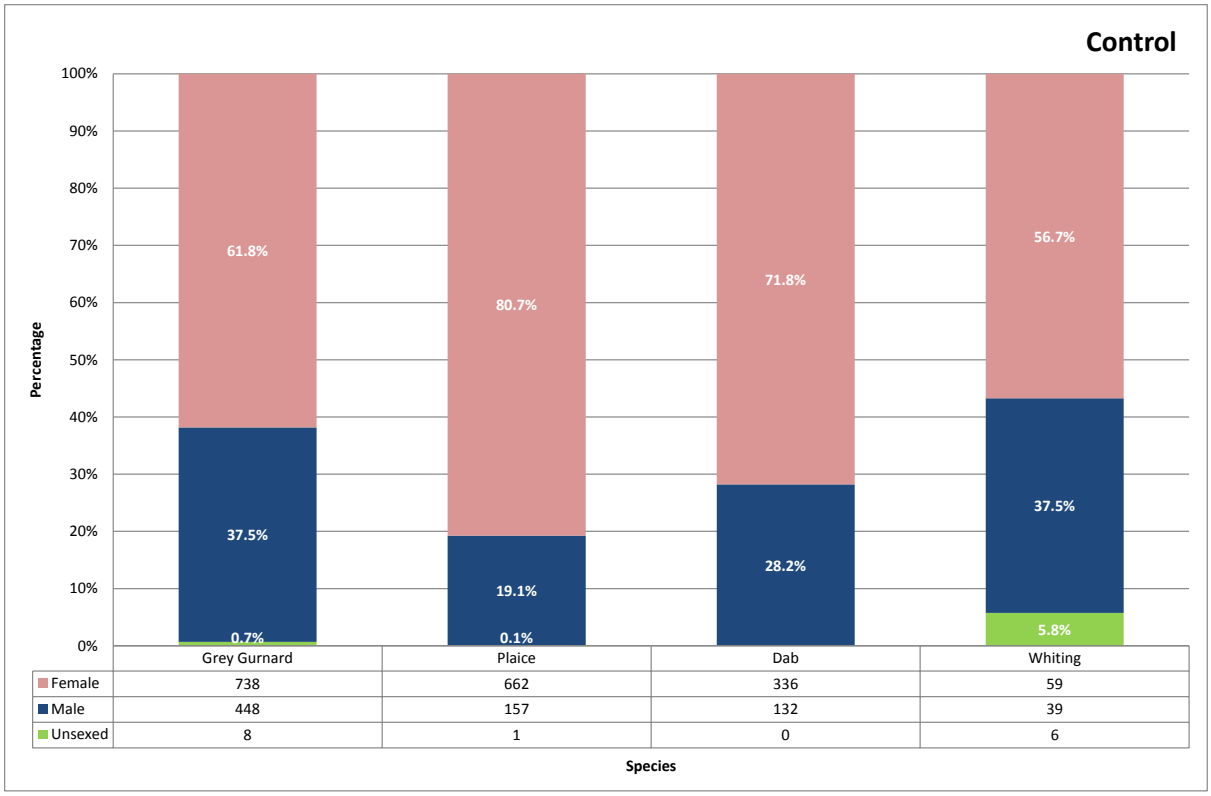
Figure 5.15 Percentage of the Catch Above and Below the MLS by Species at Stations along the Export Cable

5.4 Sex Ratios

The sex ratios of the most abundant species caught during the survey (>2,500 individuals) are shown in Figure 5.16, Figure 5.17 and Figure 5.18 for control, Tranche B and export cable stations, respectively. It should be noted that Cefas were unable to confidently determine the sex of a number of immature individuals, and as such they have been categorised as 'unsexed'.

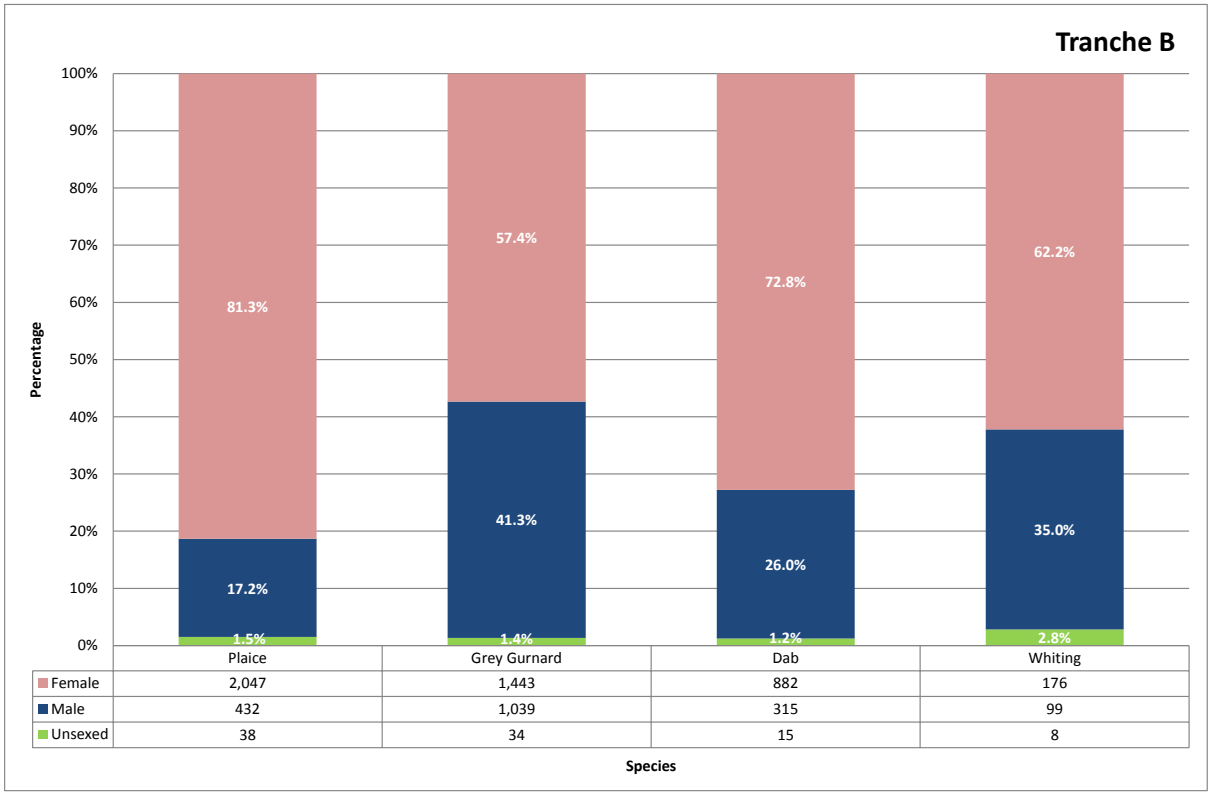
A greater proportion of the *E. gurnardus* caught at the control stations (61.8%) and within Tranche B (57.4%) were female, whereas along the export cable the sex ratio was approximately even.

The majority of the *P. platessa* (control 80.7%, Tranche B 81.3% and export cable 63.8%), *L. limanda* (71.8%, 72.8% and 66.2% respectively) and of the *M. merlangus* identified (56.7%, 62.2% and 55.2%) in all sampling areas were female.



	Grey Gurnard	Plaice	Dab	Whiting
Female	738	662	336	59
Male	448	157	132	39
Unsexed	8	1	0	6

Figure 5.16 Sex Ratio by Species at the Control Stations



	Plaice	Grey Gurnard	Dab	Whiting
Female	2,047	1,443	882	176
Male	432	1,039	315	99
Unsexed	38	34	15	8

Figure 5.17 Sex Ratio by Species within Tranche B

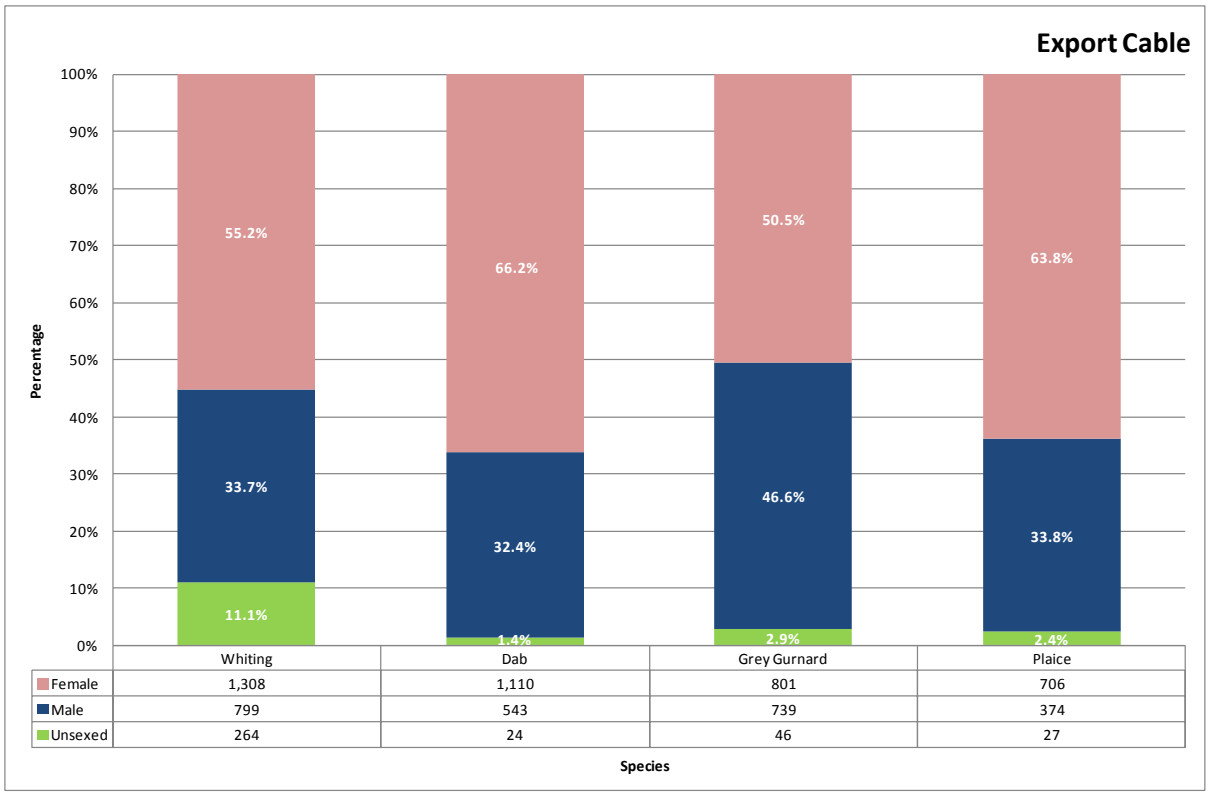


Figure 5.18 Sex Ratio by Species at Stations along the Export Cable

5.5 Spawning Condition

The spawning condition, sex and length range (nearest cm below) for the most abundant species caught during the survey (>2,500 individuals) are given below in Table 5.4 to Table 5.7. The spawning condition, sex and length range for *G. morhua* is also given in Table 5.8.

Where a stage of maturity was not recorded for a species it has not been included in the following tables. It should be noted that Cefas were unable to confidently determine the sex of a number of immature individuals, and as such they have been categorised as 'unsexed'.

A total of 30 *A. marinus* were found at station OT104 along the export cable. It should be noted however that the sex and spawning condition of these individuals could not be confidently determined by PMSL.

Most of the *E. gurnardus* caught at the control stations (97.2%), within Tranche B (94.2%) and along the export cable (95.1%) were maturing individuals.

The majority of the *P. platessa* (control 78.8%, Tranche B 74.4%, export cable 86.5%) and *L. limanda* (82.5%, 81.1% and 88.7% respectively) caught in all sampling areas were spent individuals.

The greatest proportion of the *M. merlangus* caught at the control stations was represented by spent individuals (53.0%), whereas within Tranche B maturing *M. merlangus* accounted for 45.4% of the catch. Along the export cable both maturing (35.4%) and spent (39.4%) individuals represented the highest proportion of the catch.

Most of the *G. morhua* caught in all sampling areas were immature individuals (control 100.0%, Tranche B 100.0%, export cable 88.2%). One spent male and one spent female *G. morhua* were also

found along the export cable. One female 'recovering spent' *C. harengus* was caught at station OT116 along the export cable.

Table 5.4 Grey Gurnard (*E. gurnardus*) Spawning Condition

Grey Gurnard								
Sex	Maturity	Individuals Caught			Total	% of Total Catch	Length Range (cm)	
		Control	Tranche B	Export Cable			Min.	Max.
Female	Immature	6	23	17	46	0.9%	13	27
	Maturing	725	1,363	776	2,864	54.7%	15	38
	Hyaline	0	24	1	25	0.5%	20	34
	Running	0	1	0	1	0.0%	30	30
	Spent	7	32	7	46	0.9%	19	30
Male	Immature	19	37	18	74	1.4%	15	21
	Maturing	428	986	706	2,120	40.5%	14	34
	Spent	1	16	15	32	0.6%	18	29
Unsexed	Immature	0	12	18	30	0.6%	13	18

Table 5.5 Plaice (*P. platessa*) Spawning Condition

Plaice								
Sex	Maturity	Individuals Caught			Total	% of Total Catch	Length Range (cm)	
		Control	Tranche B	Export Cable			Min.	Max.
Female	Immature	79	250	32	361	8.2%	16	31
	Maturing	40	267	81	388	8.9%	18	42
	Spent	543	1530	593	2666	60.9%	20	50
Male	Immature	19	51	6	76	1.7%	13	30
	Maturing	36	66	27	129	2.9%	16	35
	Spent	102	315	341	758	17.3%	16	40
Unsexed	Immature	0	2	0	2	0.0%	17	18

Table 5.6 Dab (*L. limanda*) Spawning Condition

Dab								
Sex	Maturity	Individuals Caught			Total	% of Total Catch	Length Range (cm)	
		Control	Tranche B	Export Cable			Min.	Max.
Female	Immature	15	48	15	78	2.4%	12	22
	Maturing	15	60	135	210	6.3%	12	31
	Hyaline	2	2	0	4	0.1%	24	25
	Spent	304	772	960	2,036	61.3%	13	35
Male	Immature	4	26	8	38	1.1%	12	22
	Maturing	46	90	29	165	5.0%	12	30
	Spent	82	199	506	787	23.7%	12	33
Unsexed	Immature	0	1	0	1	0.0%	13	13

Table 5.7 Whiting (*M. merlangus*) Spawning Condition

Whiting								
Sex	Maturity	Individuals Caught			Total	% of Total Catch	Length Range (cm)	
		Control	Tranche B	Export Cable			Min.	Max.
Female	Immature	4	38	267	309	11.6%	15	28
	Maturing	27	116	767	910	34.3%	17	43
	Hyaline	0	4	6	10	0.4%	22	34
	Spent	28	18	268	314	11.8%	18	42
Male	Immature	9	46	133	188	7.1%	15	27
	Maturing	5	11	38	54	2.0%	16	36
	Spent	25	42	628	695	26.2%	18	44
Unsexed	Immature	2	5	167	174	6.6%	14	22

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

Cod								
Sex	Maturity	Individuals Caught			Total	% of Total Catch	Length Range (cm)	
		Control	Tranche A	Export Cable			Min.	Max.
Female	Immature	2	7	6	15	32.6%	19	53
	Spent	0	0	1	1	2.2%	44	44
Male	Immature	1	12	9	22	47.8%	21	42
	Spent	0	0	1	1	2.2%	55	55
Unsexed	Immature	0	7	0	7	15.2%	19	25

6.0 Beam Trawl Results

6.1 Catch Rates and Species Distribution

The total number of individuals caught and the catch rate (number of individuals caught per hour) for fish species by sampling area are given in Table 6.1 below and are illustrated in Figure 6.1. The catch rate for fish species by sampling station are shown in Figure 6.2 to Figure 6.4 for control, Tranche B and export cable stations respectively.

A total of 22 species of fish were caught, eight of which were found at the control stations, 16 within Tranche B and 17 along the export cable.

Overall, *B. luteum* was the most abundant species caught (617 individuals), 66.9% of which were found in Tranche B, followed by *L. limanda* (387), and then sand goby (*Pomatoschistus minutus*; 61).

B. luteum were the most prevalent species at the control stations (63.4/hr) and within Tranche B (82.4/hr), whereas *L. limanda* were most abundant along the export cable (37.1/hr).

The station with the greatest total catch rate was BT124 along the export cable (371.4/hr), with *L. limanda* and *B. luteum* representing 82.3% of the catch.

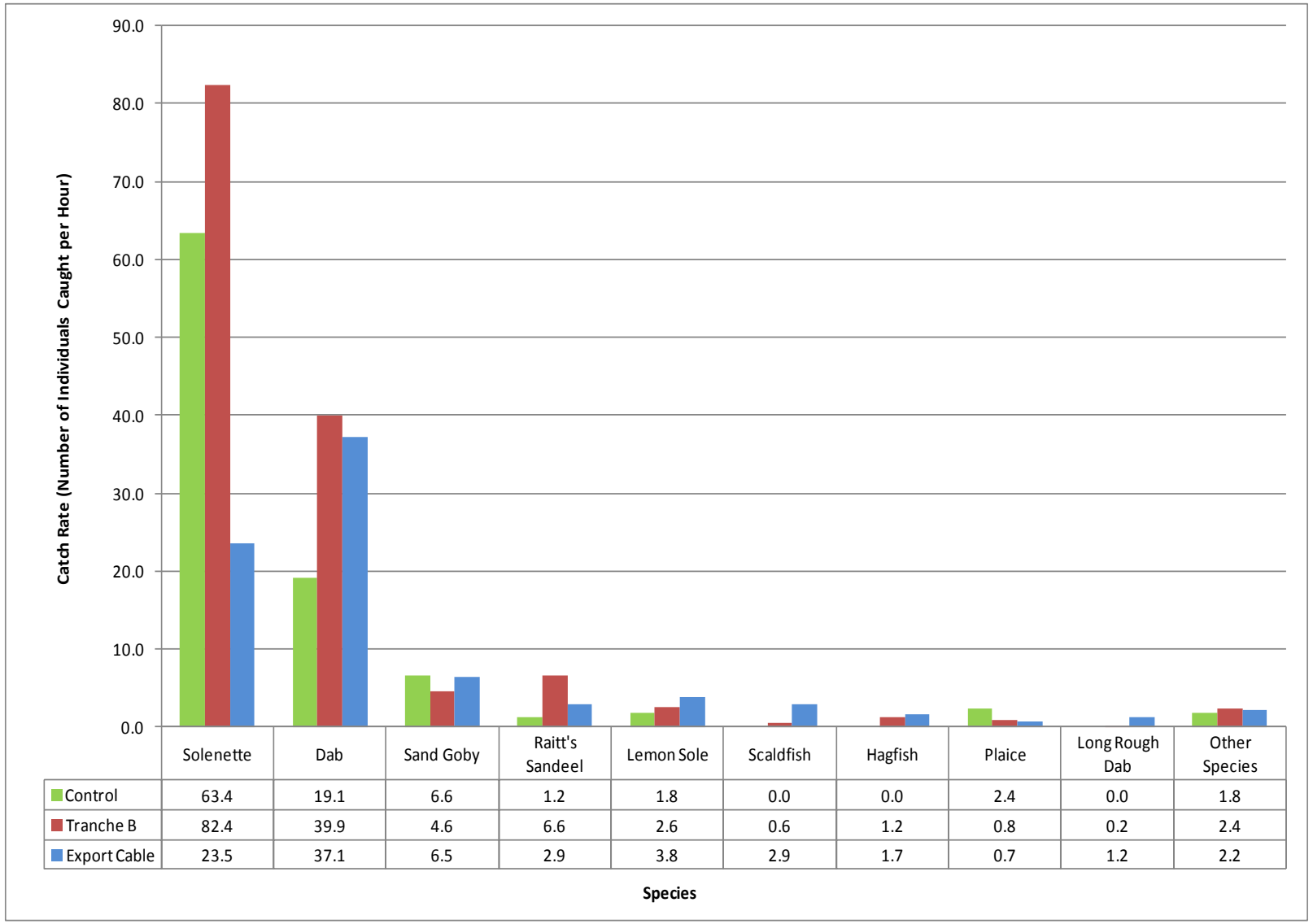
A. marinus were found in all sampling areas, with the highest total catch rate within Tranche B (6.6/hr); the station with the greatest catch rate was BT79 (71.9/hr) within Tranche B.

P. platessa were found in low numbers in all sampling areas, with the greatest catch rate recorded at the control stations (2.4/hr). One *M. merlangus* was found along the export cable at station BT108.

Overall, the total catch rate was greater within Tranche B (141.3/hr) than at the control stations (96.3/hr) and along the export cable (82.4/hr).

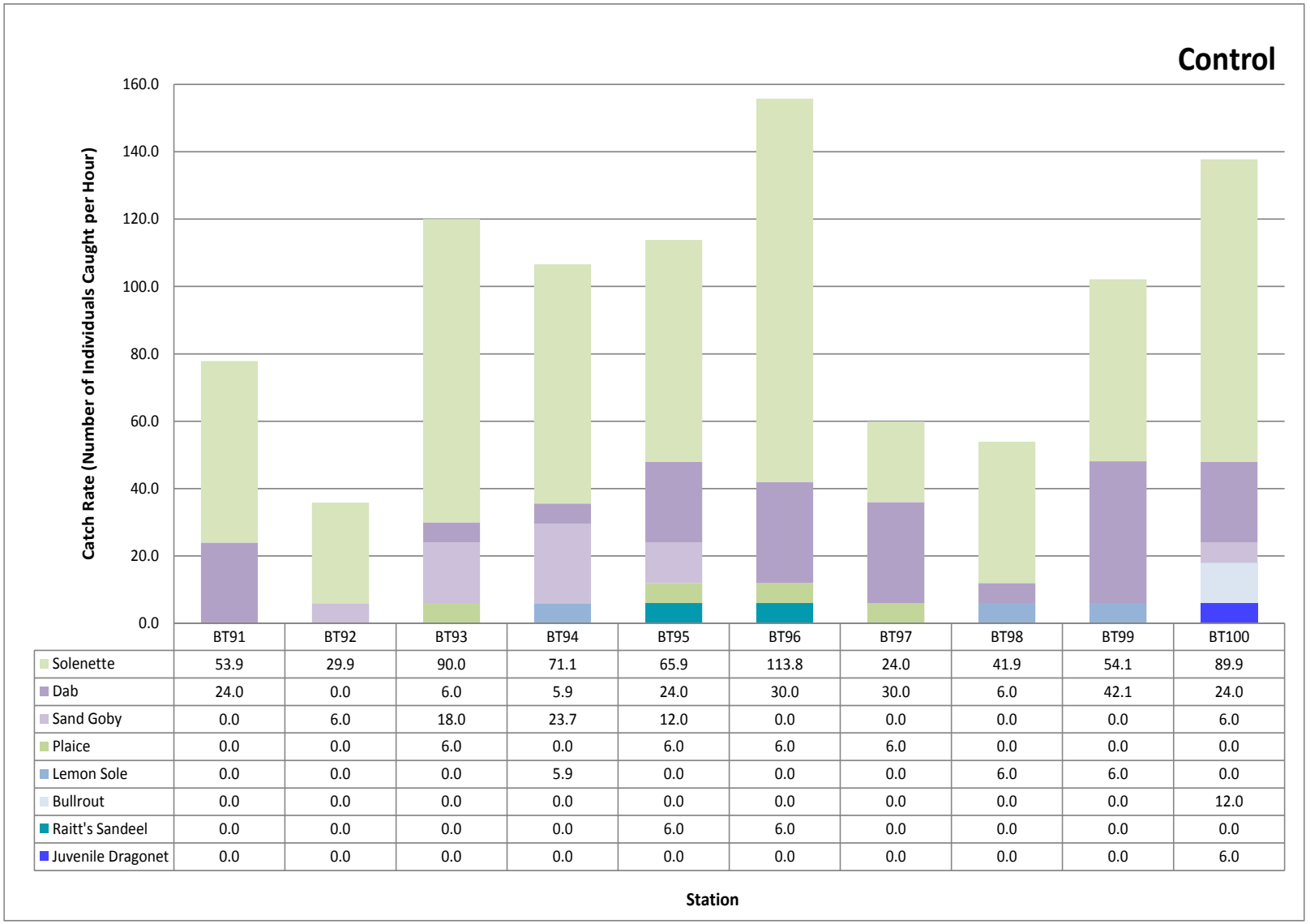
Table 6.1 Number of Individuals Caught and the Catch Rate for Fish Species by Sampling Area

Species		Number of Individuals Caught				Catch Rate (Individuals Caught per Hour)		
Common Name	Scientific Name	Control	Tranche B	Export Cable	Total	Control	Tranche B	Export Cable
Solenette	*Buglossidium luteum*	106	413	98	617	63.4	82.4	23.5
Dab	*Limanda limanda*	32	200	155	387	19.1	39.9	37.1
Sand Goby	*Pomatoschistus minutus*	11	23	27	61	6.6	4.6	6.5
Raitt's Sandeel	*Ammodytes marinus*	2	33	12	47	1.2	6.6	2.9
Lemon Sole	*Microstomus kitt*	3	13	16	32	1.8	2.6	3.8
Scaldfish	*Arnoglossus laterna*	0	3	12	15	0.0	0.6	2.9
Hagfish	*Myxine glutinosa*	0	6	7	13	0.0	1.2	1.7
Plaice	*Pleuronectes platessa*	4	4	3	11	2.4	0.8	0.7
Long Rough Dab	*Hippoglossoides platessoides*	0	1	5	6	0.0	0.2	1.2
Common Dragonet	*Callionymus lyra*	0	2	1	3	0.0	0.4	0.2
Juvenile dragonet	*Callionymus sp.*	1	2	0	3	0.6	0.4	0.0
Nilson's Pipefish	*Syngnathus rostellatus*	0	2	1	3	0.0	0.4	0.2
Painted Goby	*Pomatoschistus pictus*	0	3	0	3	0.0	0.6	0.0
Bullrout	*Myoxocephalus scorpius*	2	1	0	3	1.2	0.2	0.0
Pogge	*Agonus cataphractus*	0	0	2	2	0.0	0.0	0.5
Anglerfish	*Lophius piscatorius*	0	0	1	1	0.0	0.0	0.2
Haddock	*Melanogrammus aeglefinus*	0	0	1	1	0.0	0.0	0.2
Lesser Weever	*Echiichthys vipera*	0	1	0	1	0.0	0.2	0.0
Norwegian Topknot	*Phrynorhombus norvegicus*	0	1	0	1	0.0	0.2	0.0
Starry Ray	*Raja radiata*	0	0	1	1	0.0	0.0	0.2
Whiting	*Merlangius merlangus*	0	0	1	1	0.0	0.0	0.2
Yarrell's Blenny	*Chirolophis ascanii*	0	0	1	1	0.0	0.0	0.2



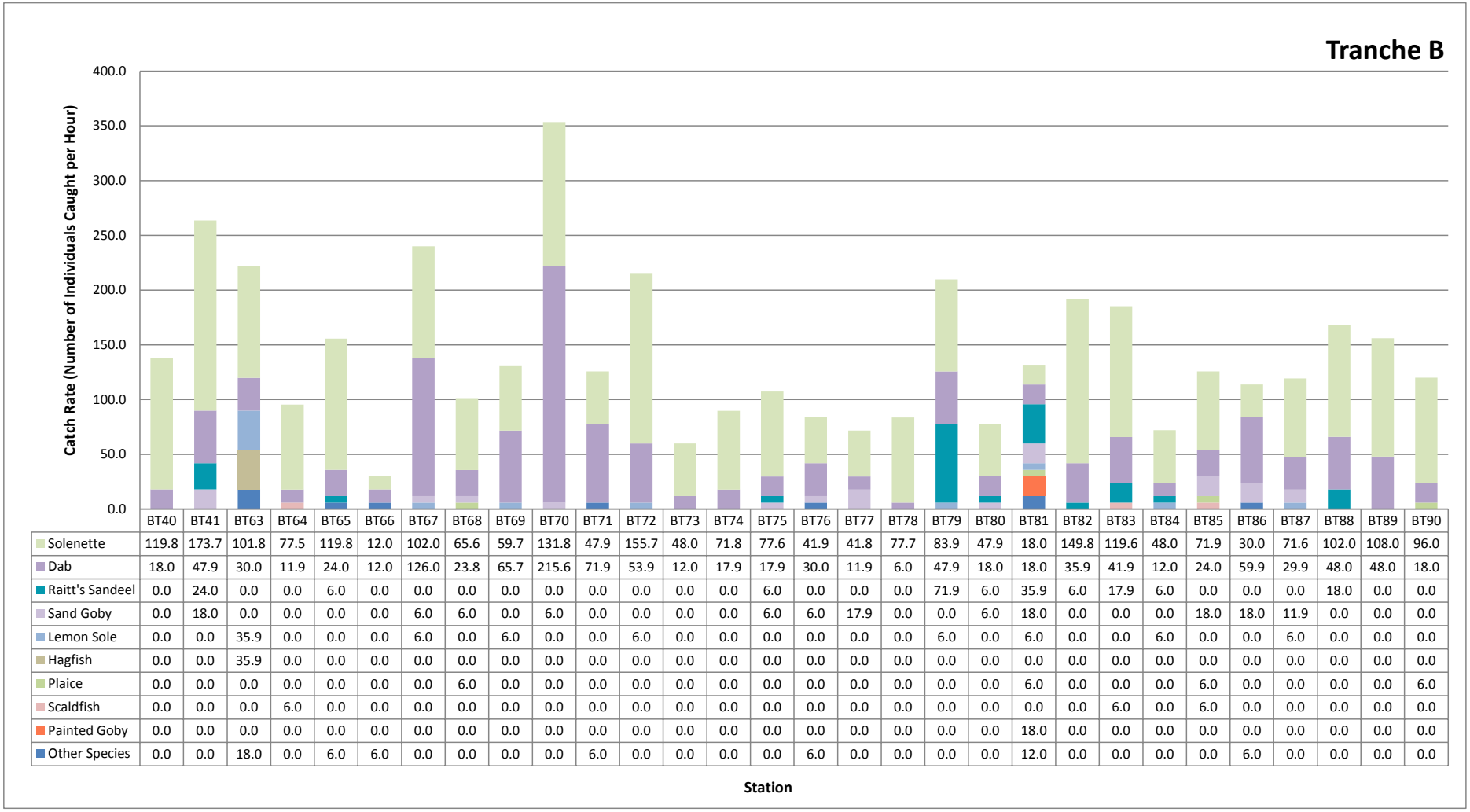
	Solenette	Dab	Sand Goby	Raitt's Sandeel	Lemon Sole	Scaldfish	Hagfish	Plaice	Long Rough Dab	Other Species
Control	63.4	19.1	6.6	1.2	1.8	0.0	0.0	2.4	0.0	1.8
Tranche B	82.4	39.9	4.6	6.6	2.6	0.6	1.2	0.8	0.2	2.4
Export Cable	23.5	37.1	6.5	2.9	3.8	2.9	1.7	0.7	1.2	2.2

Figure 6.1 Catch Rates for Fish Species by Sampling Area



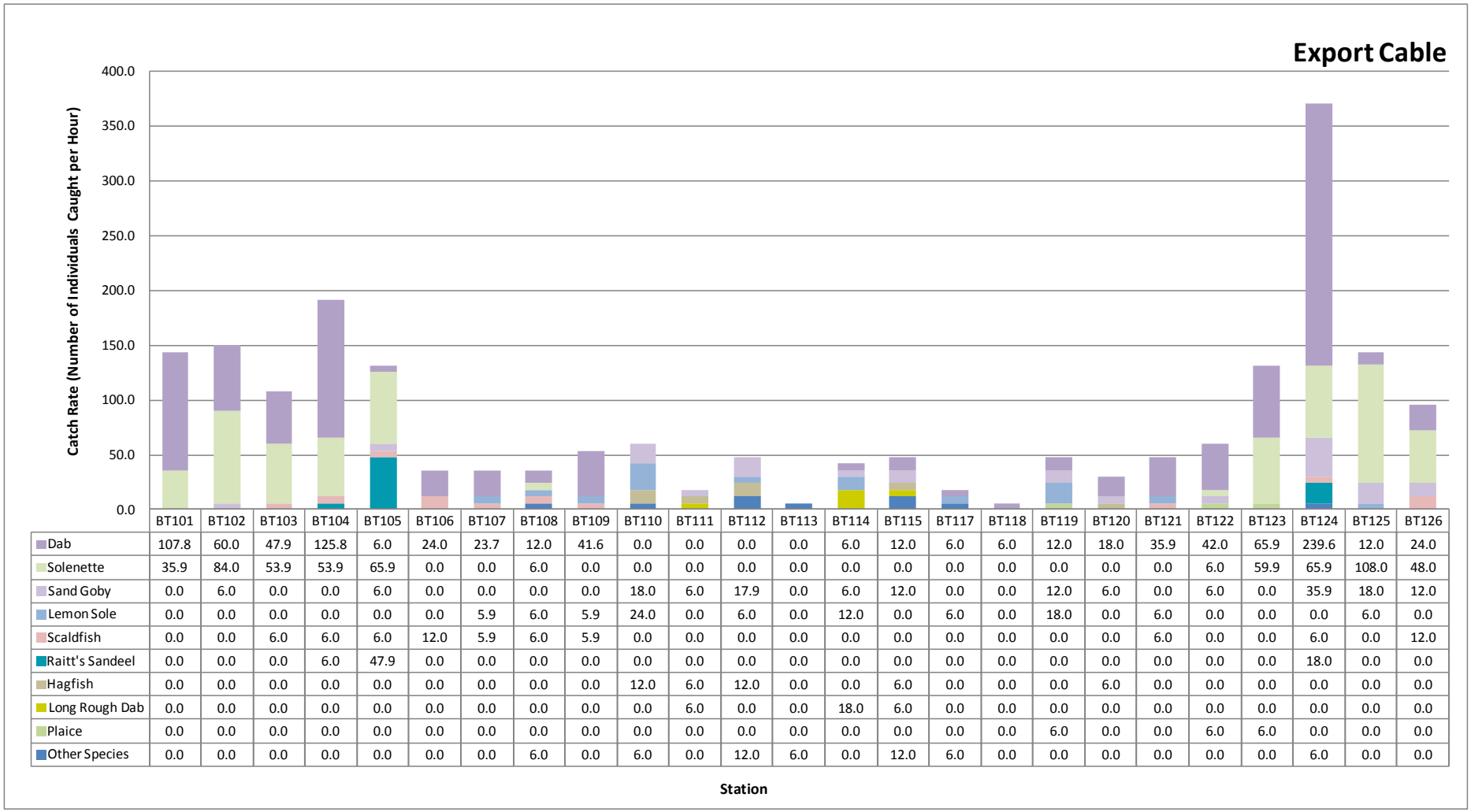
	BT91	BT92	BT93	BT94	BT95	BT96	BT97	BT98	BT99	BT100
Solenette	53.9	29.9	90.0	71.1	65.9	113.8	24.0	41.9	54.1	89.9
Dab	24.0	0.0	6.0	5.9	24.0	30.0	30.0	6.0	42.1	24.0
Sand Goby	0.0	6.0	18.0	23.7	12.0	0.0	0.0	0.0	0.0	6.0
Plaice	0.0	0.0	6.0	0.0	6.0	6.0	6.0	0.0	0.0	0.0
Lemon Sole	0.0	0.0	0.0	5.9	0.0	0.0	0.0	6.0	6.0	0.0
Bullrout	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.0
Raitt's Sandeel	0.0	0.0	0.0	0.0	6.0	6.0	0.0	0.0	0.0	0.0
Juvenile Dragonet	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0

Figure 6.2 Catch Rates for Fish Species by Station at the Control Stations



	BT40	BT41	BT63	BT64	BT65	BT66	BT67	BT68	BT69	BT70	BT71	BT72	BT73	BT74	BT75	BT76	BT77	BT78	BT79	BT80	BT81	BT82	BT83	BT84	BT85	BT86	BT87	BT88	BT89	BT90
Solenette	119.8	173.7	101.8	77.5	119.8	12.0	102.0	65.6	59.7	131.8	47.9	155.7	48.0	71.8	77.6	41.9	41.8	77.7	83.9	47.9	18.0	149.8	119.6	48.0	71.9	30.0	71.6	102.0	108.0	96.0
Dab	18.0	47.9	30.0	11.9	24.0	12.0	126.0	23.8	65.7	215.6	71.9	53.9	12.0	17.9	17.9	30.0	11.9	6.0	47.9	18.0	18.0	35.9	41.9	12.0	24.0	59.9	29.9	48.0	48.0	18.0
Raitt's Sandeel	0.0	24.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	71.9	6.0	35.9	6.0	17.9	6.0	0.0	0.0	0.0	18.0	0.0	0.0
Sand Goby	0.0	18.0	0.0	0.0	0.0	0.0	6.0	6.0	0.0	6.0	0.0	0.0	0.0	0.0	6.0	6.0	17.9	0.0	0.0	6.0	18.0	0.0	0.0	0.0	18.0	18.0	11.9	0.0	0.0	0.0
Lemon Sole	0.0	0.0	35.9	0.0	0.0	0.0	6.0	0.0	6.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	6.0	0.0	0.0	6.0	0.0	0.0	6.0	0.0	0.0	0.0
Hagfish	0.0	0.0	35.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Plaice	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	6.0
Scaldfish	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0
Painted Goby	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Species	0.0	0.0	18.0	0.0	6.0	6.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	12.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0

Figure 6.3 Catch Rates for Fish Species by Station within Tranche B



	BT101	BT102	BT103	BT104	BT105	BT106	BT107	BT108	BT109	BT110	BT111	BT112	BT113	BT114	BT115	BT117	BT118	BT119	BT120	BT121	BT122	BT123	BT124	BT125	BT126
Dab	107.8	60.0	47.9	125.8	6.0	24.0	23.7	12.0	41.6	0.0	0.0	0.0	0.0	6.0	12.0	6.0	6.0	12.0	18.0	35.9	42.0	65.9	239.6	12.0	24.0
Solenette	35.9	84.0	53.9	53.9	65.9	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	59.9	65.9	108.0	48.0
Sand Goby	0.0	6.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	18.0	6.0	17.9	0.0	6.0	12.0	0.0	0.0	12.0	6.0	0.0	6.0	0.0	35.9	18.0	12.0
Lemon Sole	0.0	0.0	0.0	0.0	0.0	0.0	5.9	6.0	5.9	24.0	0.0	6.0	0.0	12.0	0.0	6.0	0.0	18.0	0.0	6.0	0.0	0.0	0.0	6.0	0.0
Scaldfish	0.0	0.0	6.0	6.0	6.0	12.0	5.9	6.0	5.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	6.0	0.0	12.0
Raitt's Sandeel	0.0	0.0	0.0	6.0	47.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.0	0.0	0.0
Hagfish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.0	6.0	12.0	0.0	0.0	6.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0
Long Rough Dab	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	18.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Plaice	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	6.0	6.0	0.0	0.0	0.0
Other Species	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	6.0	0.0	12.0	6.0	0.0	12.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0

Figure 6.4 Catch Rates for Fish Species by Station along the Export Cable

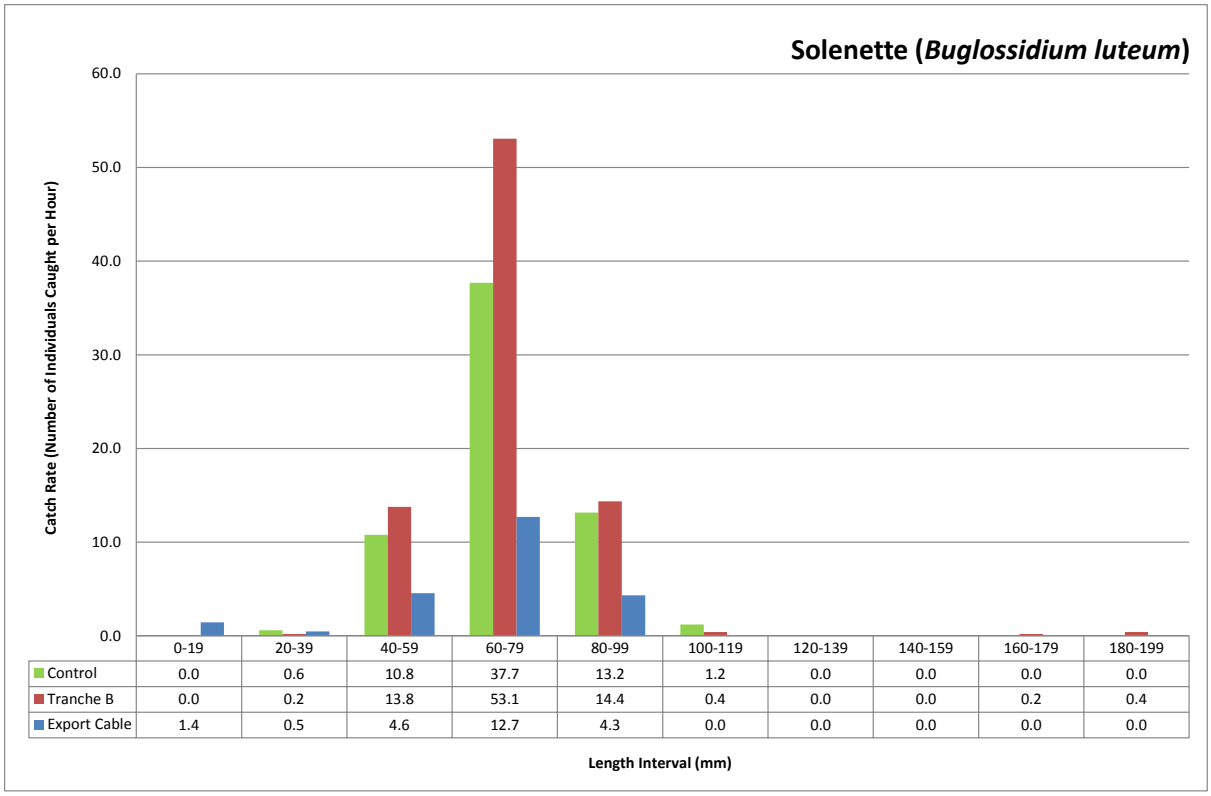
6.2 Length Distributions

The average length (mm) and length range for fish species caught by sampling area (control, Tranche B and export cable) is given in Table 6.2 below. It should be noted that the poisonous *E. vipera* are not measured as a safety precaution, and as such are excluded from this section.

The length distributions of the five most abundant species caught during the survey (>30 individuals), expressed as the catch rate (number of individuals caught per hour) by length (mm) and by sampling area, are shown in Figure 6.5 to Figure 6.9 below.

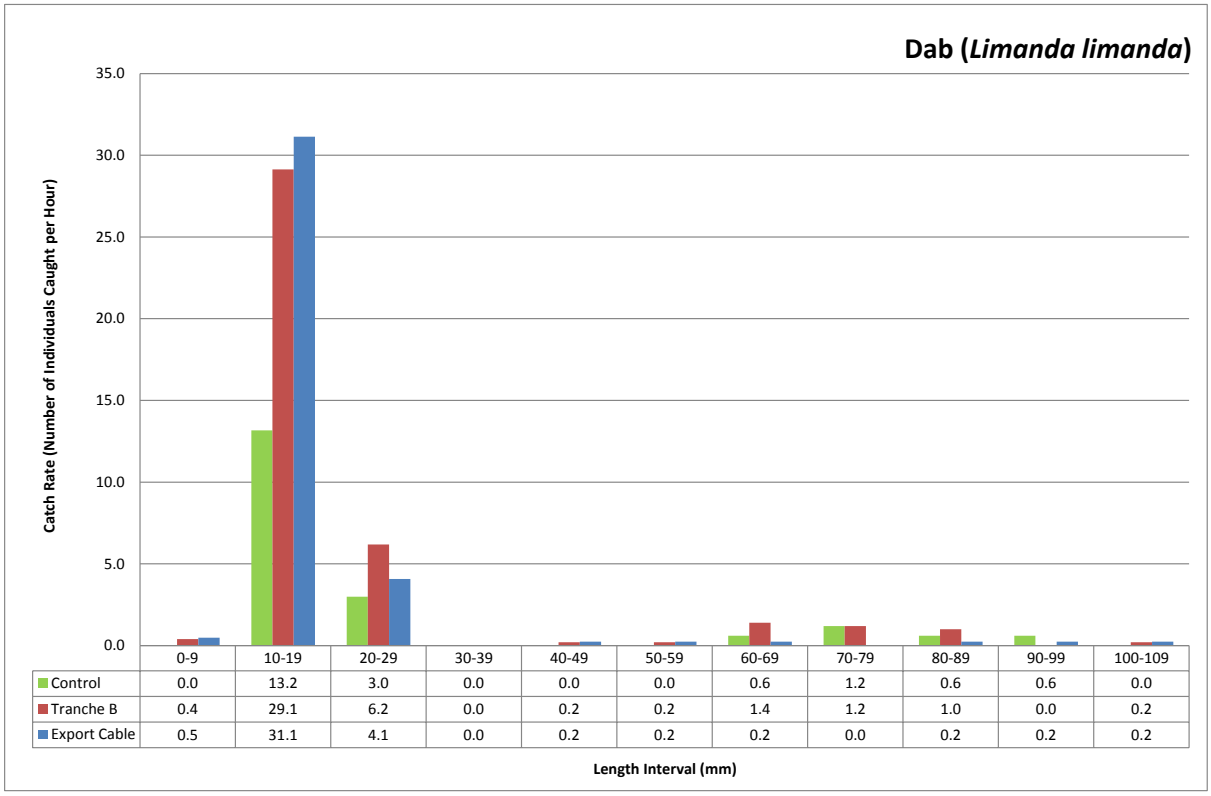
Table 6.2 Average Length and Length Range for Fish Species Caught by Sampling Area

Species		Average Length (mm)			Length Range (mm)	
Common Name	Scientific Name	Control	Tranche B	Export Cable	Min.	Max.
Anglerfish	*Lophius piscatorius*	-	-	21.0	21.0	21.0
Bullrout	*Myoxocephalus scorpius*	16.5	14.0	-	14.0	17.0
Common Dragonet	*Callionymus lyra*	-	34.0	10.0	10.0	50.0
Dab	*Limanda limanda*	22.9	21.3	18.3	8.0	100.0
Juvenile Dragonet	*Callionymus sp.*	35.0	52.5	-	35.0	55.0
Haddock	*Melanogrammus aeglefinus*	-	-	34.0	34.0	34.0
Hagfish	*Myxine glutinosa*	-	23.7	146.4	13.0	315.0
Lemon Sole	*Microstomus kitt*	17.0	19.2	18.4	13.0	25.0
Long Rough Dab	*Hippoglossoides platessoides*	-	19.0	46.6	16.0	95.0
Nilson's Pipefish	*Syngnathus rostellatus*	-	95.0	105.0	95.0	105.0
Norwegian Topknot	*Phrynorhombus norvegicus*	-	6.0	-	6.0	6.0
Painted Goby	*Pomatoschistus pictus*	-	37.5	-	35.0	40.0
Plaice	*Pleuronectes platessa*	27.5	20.5	26.0	17.0	35.0
Pogge	*Agonus cataphractus*	-	-	7.5	5.0	10.0
Raitt's Sandeel	*Ammodytes marinus*	107.5	131.3	133.1	95.0	175.0
Sand Goby	*Pomatoschistus minutus*	45.0	43.2	41.0	30.0	55.0
Scaldfish	*Arnoglossus laterna*	-	90.0	85.4	20.0	105.0
Solenette	*Buglossidium luteum*	69.5	71.1	60.6	6.0	185.0
Starry Ray	*Raja radiata*	-	-	26.0	26.0	26.0
Whiting	*Merlangius merlangus*	-	-	17.0	17.0	17.0
Yarrell's Blenny	*Chirolophis ascanii*	-	-	65.0	65.0	65.0



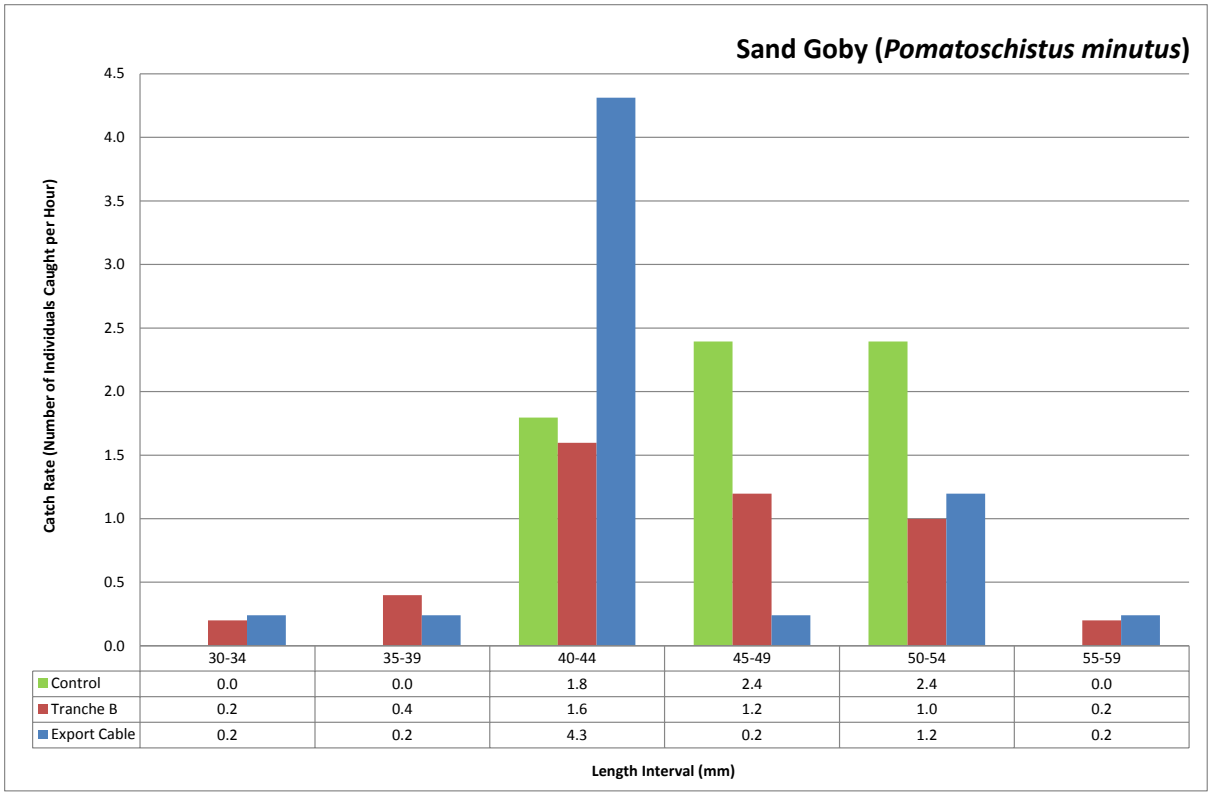
	0-19	20-39	40-59	60-79	80-99	100-119	120-139	140-159	160-179	180-199
Control	0.0	0.6	10.8	37.7	13.2	1.2	0.0	0.0	0.0	0.0
Tranche B	0.0	0.2	13.8	53.1	14.4	0.4	0.0	0.0	0.2	0.4
Export Cable	1.4	0.5	4.6	12.7	4.3	0.0	0.0	0.0	0.0	0.0

Figure 6.5 Solenette (*B. luteum*) Length Distribution by Sampling Area



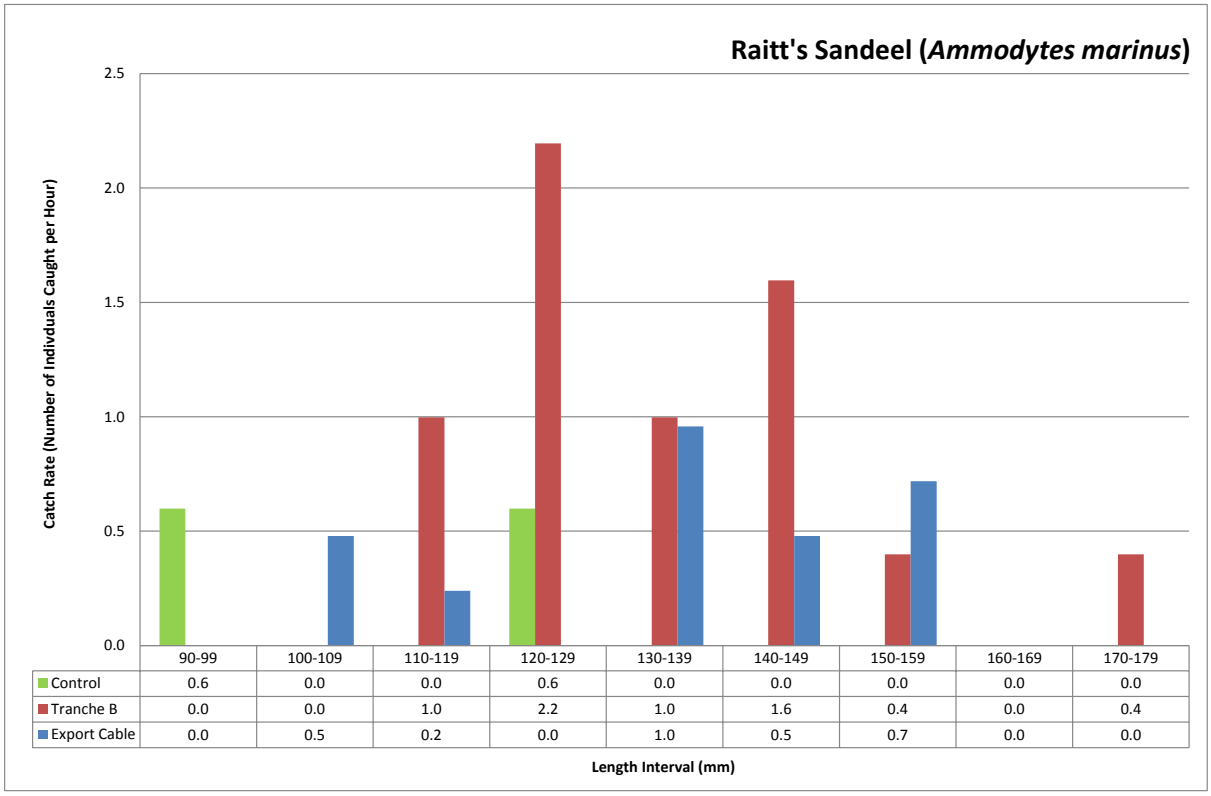
	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100-109
Control	0.0	13.2	3.0	0.0	0.0	0.0	0.6	1.2	0.6	0.6	0.0
Tranche B	0.4	29.1	6.2	0.0	0.2	0.2	1.4	1.2	1.0	0.0	0.2
Export Cable	0.5	31.1	4.1	0.0	0.2	0.2	0.2	0.0	0.2	0.2	0.2

Figure 6.6 Dab (*L. limanda*) Length Distribution by Sampling Area



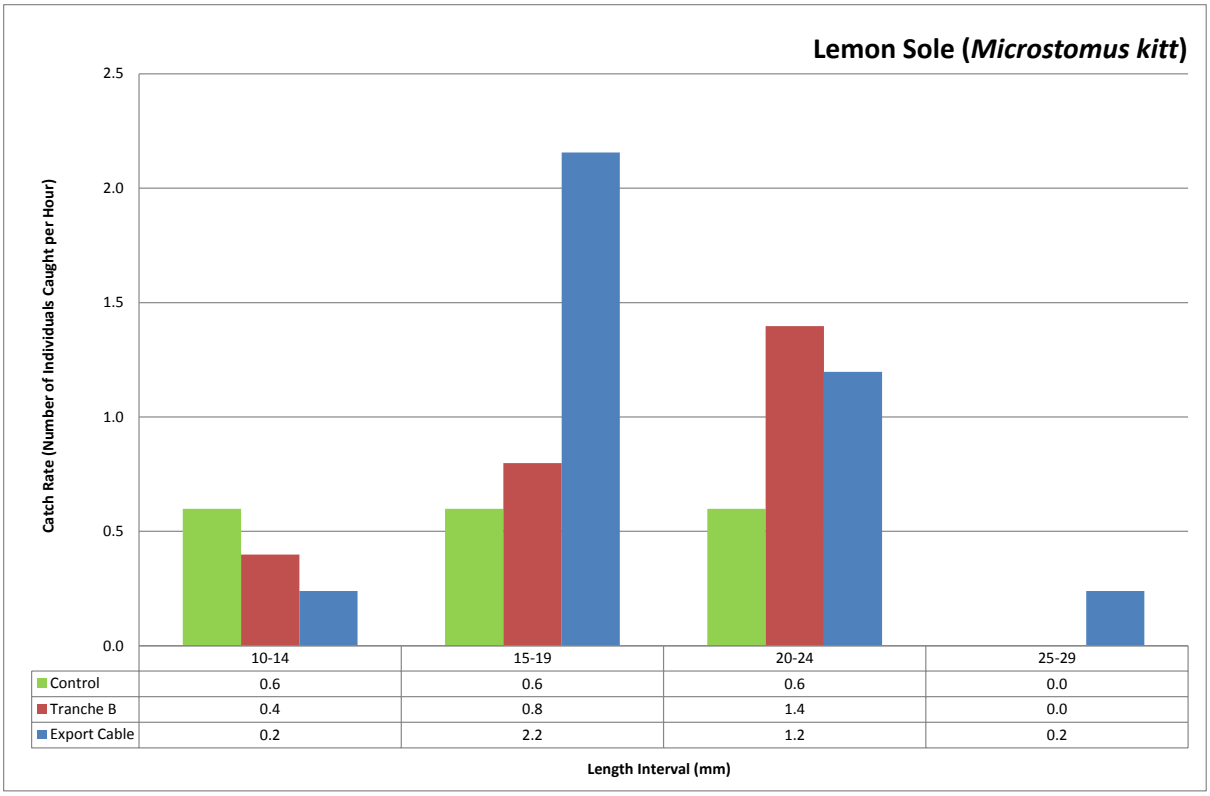
	30-34	35-39	40-44	45-49	50-54	55-59
Control	0.0	0.0	1.8	2.4	2.4	0.0
Tranche B	0.2	0.4	1.6	1.2	1.0	0.2
Export Cable	0.2	0.2	4.3	0.2	1.2	0.2

Figure 6.7 Sand Goby (*P. minutus*) Length Distribution by Sampling Area



	90-99	100-109	110-119	120-129	130-139	140-149	150-159	160-169	170-179
Control	0.6	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0
Tranche B	0.0	0.0	1.0	2.2	1.0	1.6	0.4	0.0	0.4
Export Cable	0.0	0.5	0.2	0.0	1.0	0.5	0.7	0.0	0.0

Figure 6.8 Raitt's Sandeel (*A. marinus*) Length Distribution by Sampling Area



	10-14	15-19	20-24	25-29
Control	0.6	0.6	0.6	0.0
Tranche B	0.4	0.8	1.4	0.0
Export Cable	0.2	2.2	1.2	0.2

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

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 Fire Fighting and Fire Prevention certificates 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 fish room and 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 below.

Table 7.1 Post Trip Survey Review

Project: Dogger Bank Tranche B Spring 2012	**Vessel:** Jubilee Spirit
Surveyors: Lucy Shuff, Alex Winrow-Giffin	**Skipper:** Ross Crookes
Survey Area: Dogger Bank Tranche B	**Total Time at Sea:** 21 Days
Dates at Sea: 21/04/12 - 11/05/12	

	Comments	Actions
Did vessel comply with pre trip safety audits?	Yes	N/A
Skipper and crew attitude to safety?	Good	N/A
Vessel machinery failures?	None	N/A
Safety equipment failures?	None	N/A
Accidents?	None	N/A
Injuries?	None	N/A

Dogger Bank Offshore Wind Farm

Tranche B

Adult and Juvenile Fish Characterisation Survey

23rd July to 8th August 2012

F-OFL-RP-004

Undertaken by
Brown and May Marine Ltd

Ref	Issue Date	Issue Type	Author	Checked	Approved
DBTBOB02	06/02/2013	FINAL	LS/PP	LS/AWG/JK	SJA

Contents

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Tables

1.0 Summary

1.1 Otter Trawl

A total of 31 species were caught; 14 at the control stations, 23 within Tranche B and 21 species along the export cable. Overall, grey gurnard (*Eutrigla gurnardus*) was the most abundant species caught, followed by plaice (*Pleuronectes platessa*) and then dab (*Limanda limanda*). The highest total catch rate was recorded within Tranche B at station OT84, with *E. gurnardus* accounting for 68.5% of the catch. Overall, the total catch rate was highest within Tranche B

P. platessa, whiting (*Merlangius merlangus*) and cod (*Gadus morhua*) were caught in all sampling areas, with the greatest total catch rate recorded along the export cable. Three herring (*Clupea harengus*) were recorded along the export cable at stations OT111 and OT119.

Ten species of fish were caught with a set minimum landing size (MLS). A higher proportion of the *P. platessa* caught in all sampling areas were above the MLS, whereas most of the mackerel (*Scomber scombrus*) and *M. merlangus* caught in all sampling areas were below the set MLS. Haddock (*Melanogrammus aeglefinus*) were caught only along the export cable, 93.7% of which were above the MLS. All other species with a set MLS were caught in relatively low numbers.

The highest proportion of the *E. gurnardus* within Tranche B, and for the *P. platessa* and *L. limanda* found at the control stations and within Tranche B, and for the *M. merlangus* caught within Tranche B and along the export cable were female. The sex ratio for the *E. gurnardus* at the control stations and along the export cable, for the *P. platessa* and *L. limanda* along the export cable, and for the *M. merlangus* caught at the control stations was approximately even.

High proportions of spent *E. gurnardus*, *P. platessa*, and *L. limanda* were found in all sampling areas, whereas most of the *M. merlangus* and the highest proportion of the *G. morhua* caught in all sampling areas were immature. Two 'early spent' female *C. harengus* and one 'early ripening' male were caught along the export cable at stations OT111 and OT119 respectively.

1.2 Beam Trawl

A total of 26 species of fish were caught, 10 of which were found at the control stations, 18 within Tranche B and 16 along the export cable. Overall, solenette (*Buglossidium luteum*) was the most abundant species caught, representing 74.4% of the total fish catch in the beam trawl, followed by *L. limanda* and then sand goby (*Pomatoschistus minutus*). Most of the *B. luteum* caught were found in Tranche B. Overall, the total catch rate was highest within Tranche B.

The station with the greatest total catch rate was BT41 within Tranche B, with *B. luteum* representing 89.0% of the catch. Raitt's sandeel (*Ammodytes marinus*) were found at the control stations and within Tranche B, with the highest total catch rate at the control stations. *P. platessa* were found in low numbers in all sampling areas, with the highest total catch rate recorded within Tranche B. Two *M. merlangus* were found along the export cable at stations BT118 and BT119.

2.0 Introduction

The following report details the findings of the summer 2012 adult and juvenile fish characterisation survey, undertaken within and adjacent to Tranche B of the planned Dogger Bank offshore wind farm and along the proposed export cable between the 23rd July and 8th August.

The survey methodology, vessel and sampling gear detailed were agreed in consultation with Cefas and the Marine Management Organisation (MMO). A dispensation from the MMO for the Provisions of Council Regulation 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 this 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 adult and juvenile fish species within the area of the Dogger Bank. It should be noted that *P. platessa*, Ammodytidae sp., *G. morhua*, *M. merlangus* and *C. harengus* have been defined as species of importance in the area.

3.0 Scope of Works

The proposed scope of works for the summer 2012 adult and juvenile fish characterisation survey, which replicates that of the spring 2012 survey, is detailed below. The proposed otter and beam trawl locations are illustrated in Figure 3.1 overleaf.

- **Otter Trawl**
  - 30 tows of approximately 20 minutes duration within Tranche B, 10 control tows in adjacent areas and 13 tows along the proposed export cable were undertaken

- **Otter Trawl Sample Analysis**
  - Number of individuals and catch rate by species
  - Average length and length distribution by species
    - Finfish & sharks (except *C. 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 by species
  - Spawning condition
    - Finfish species (except *C. harengus* & *S. scombrus*) Cefas Standard Maturity Key - Five Stage
    - *C. harengus*: Cefas Maturity Key – Nine Stage
    - *S. scombrus*: Cefas Maturity Key – Six Stage
    - Ray and shark species: Cefas Standard Elasmobranch Maturity Key- Four Stage

- **Beam Trawl**
  - 30 tows of approximately ten minutes duration within Tranche B, 10 control tows in adjacent areas and 13 tows along the export cable (at the same locations as the otter trawls)

- **Beam Trawl Sample Analysis**
  - Number of individuals and catch rate by fish species
  - Average length and length distribution (nearest mm below) for fish species

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.

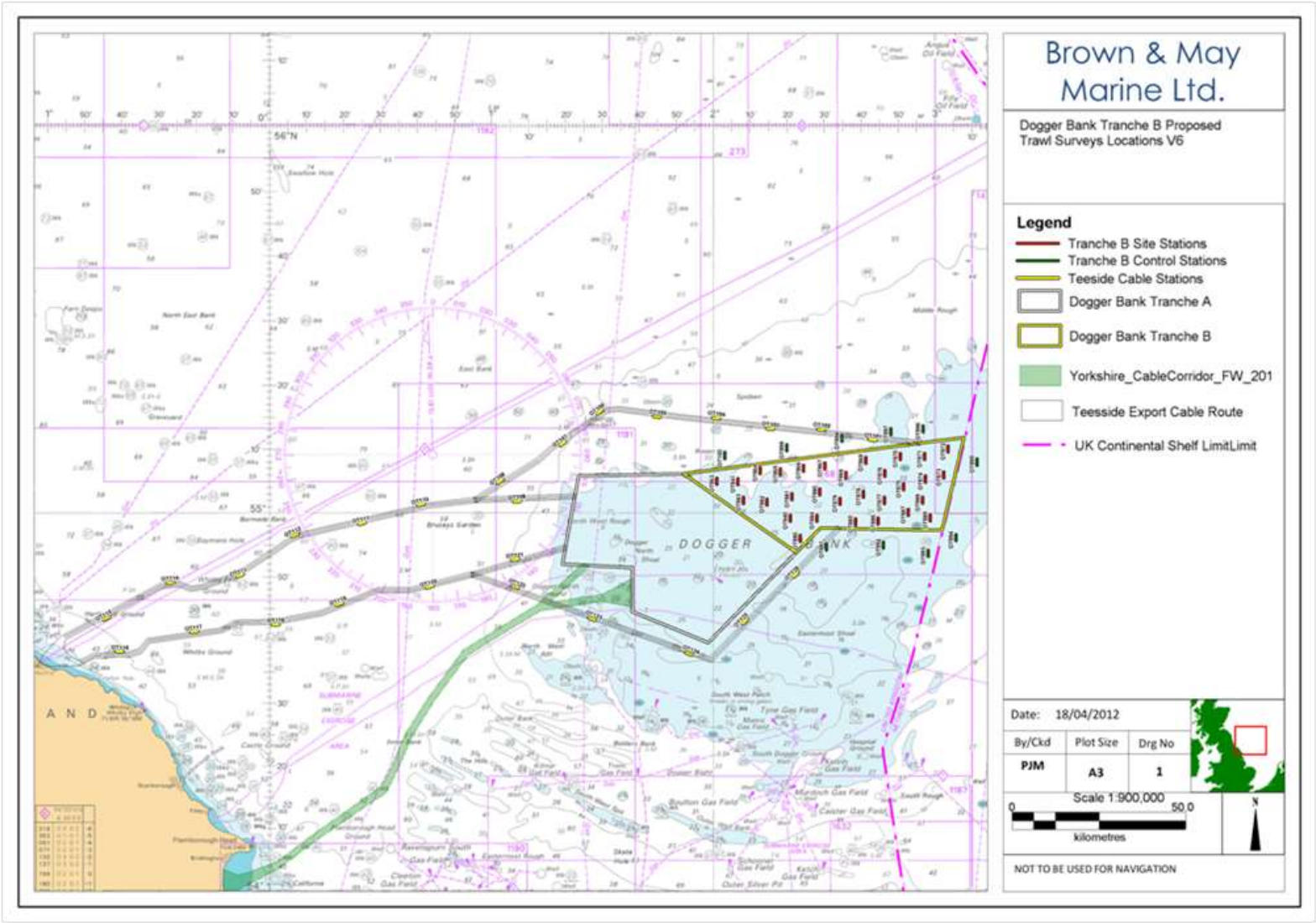


Figure 3.1 Proposed Trawl Locations

4.0 Methodology

4.1 Survey Vessel

The vessel chartered for the survey (Figure 4.1), the “Jubilee Spirit”, is a Grimsby-based commercial trawler whose skipper has experience of fishing on the Dogger Bank and of otter and beam trawl surveys. The specifications of the vessel are given below in Table 4.1.

Figure 4.1 Survey Vessel "Jubilee Spirit"

Table 4.1 Survey Vessel Specifications

Survey Vessel Specifications	
Length	21.2m
Beam	6.9m
Draft	2.3m
Main engine	Caterpillar Type 340TA 475 BHP
Gearbox	Hydraulic 6: reduction
Propeller	4 Blade Manganese Bronze Fixed Pitch 1.7m diameter
GPS	2-Furuno GP80
Plotters	Sodena Plotter with Electronic Charts
Sounder	Furuno Daylight Viewing

4.2 Sampling Gear

4.2.1 Commercial Otter Trawl

Scraper Trawl

A commercial scraper otter trawl with a 130mm mesh cod end (Figure 4.2) was used for sampling at all control and Tranche B sampling stations, and at most of those along the export cable; the specifications of which are given below in Table 4.2.

Figure 4.2 Otter Trawl Used

Table 4.2 Otter Trawl Specifications

Otter Trawl Specifications	
Towing Warp	18mm, 6x19+1
Depth: Payout Ratio	3:1
Trawl Doors	Perfect B 84
Net	130mm mesh cod-end, square mesh panel 7m from cod-end on top
Ground line length	45.7m
Footrope	Rock-hopper with 6 to 8 inch bobbins
Est. Headline height	2.4m
Distance between doors (est.)	51m

Rock-hopper Trawl

A commercial rock-hopper otter trawl (Figure 4.3) with a 130mm mesh cod-end was used for sampling at stations OT13 to OT18 due to the presence of hard ground and large boulders on the seabed; the specifications of which are given in Table 4.3 below.

Figure 4.3 Otter Trawl Used

Table 4.3 Otter Trawl Specifications

Otter Trawl Specifications	
Towing Warp	18mm, 6x19+1
Depth: Payout Ratio	3:1
Trawl Doors	Perfect B 84
Net	130mm mesh cod-end
Ground line length	24.4m
Footrope	Rock-hopper with 18 inch bobbins
Est. Headline height	7.3m
Distance between doors (est.)	51m

4.2.2 Scientific Beam Trawl

A 2m scientific beam trawl (Figure 4.4) was used for juvenile fish sampling; the specifications of which are given in Table 4.4 below.

Figure 4.4 Beam Trawl Used

Table 4.4 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 position of the vessel was tracked at all times using a Garmin GPSMap 278 with an EGNOS differential connected to an external Garmin GA30 antenna. Trawl start times and positions were taken when the winch stopped paying out the gear. Similarly, trawl end times and positions were taken when hauling of the gear commenced.

4.4 Sampling Operations

The survey was undertaken from the 23rd July to the 8th August 2012. A summarised log of events is given in Table 4.5 below.

It should be noted that the otter and beam trawls at stations 115 and 116 were omitted due to the presence of a high density of static gear in the area.

Table 4.5 Summarised Log of Events

Monday 23rd July 2012
Travel to Whitby, arrive at 2000 (BST)
Tuesday 24th July 2012
Mobilise survey
Depart Whitby at 1745, steam to Scarborough
Arrive Scarborough at 1930, take on ice
Depart Scarborough at 2100, steam to Dogger Bank
Overnight at sea
Wednesday 25th July 2012
Arrive at Dogger Bank at 1200
Otter Trawls: OT91, OT90, OT40, OT84
Beam Trawls: BT91, BT90, BT40, BT84
Beam trawl damaged at station BT84, net replaced.
Overnight at sea
Thursday 26th July 2012
Otter Trawls: OT81, OT82, OT83, OT41, OT63, OT100
Beam Trawls: BT81, BT82, BT83, BT41, BT63, BT100
Overnight at sea
Friday 27th July 2012
Otter Trawls: OT64, OT65, OT99, OT66, OT67, OT98
Beam Trawls: BT64, BT65, BT99, BT66, BT67, BT98
Overnight at sea
Saturday 28th July 2012
Otter Trawls: OT96, OT97, OT68, OT80
Beam Trawls: BT96, BT97, BT68, BT80
Danish seine netter fishing at OT69
Steam to Scarborough overnight
Overnight at sea
Sunday 29th July 2012
Arrive into Scarborough at 1030
Samples landed and transported to BMM
Depart Scarborough at 2330, return to Dogger Bank
Overnight at sea
Monday 30th July 2012
Arrive at Dogger Bank at 1530
Otter Trawls: OT79, OT78

Beam Trawls: BT79, BT78
Overnight at sea
Tuesday 31st July 2012
Otter Trawls: OT88, OT74, OT73, OT95, OT72
Beam Trawls: BT88, BT74, BT73, BT95, BT72
Overnight at sea
Wednesday 1st August 2012
Otter Trawls: OT70, OT71, OT75, OT87, OT89
Beam Trawls: BT70, BT71, BT75, BT87, BT89
Overnight at sea
Thursday 2nd August 2012
Otter Trawls: OT121, OT122, OT120, OT119
Beam Trawls: BT121, BT122, BT120, BT119
Steam to Grimsby overnight
Overnight at sea
Friday 3rd August 2012
Arrive into Grimsby at 0800
Samples landed and transported to BMM
Partial crew change – Richard Preston to relieve Alex Winrow-Giffin, Kristopher Chatterton to relieve Craig Fussey
Depart Grimsby at 2100, return to Dogger Bank
Overnight at sea
Saturday 4th August 2012
Arrive at Dogger Bank at 1430
Otter Trawls: OT85, OT86
Beam Trawls: BT85, BT86
Overnight at sea
Sunday 5th August 2012
Otter Trawls: OT94, OT93, OT92, OT77, OT76, OT69
Beam Trawls: BT94, BT93, BT92, BT77, BT76, BT69
Seawater pipe in the engine room burst and was repaired by the crew at sea
Starboard sweep parted, and both were replaced by the crew at sea
Overnight at sea
Monday 6th August 2012
Otter Trawls: OT109, OT108, OT110, OT111, OT112
Beam Trawls: BT109, BT108, BT110, BT111, BT112
Beam trawl damaged at BT112, net replaced
Otter trawl changed from scraper trawl to rock-hopper trawl for the six inshore stations.
Overnight at sea
Tuesday 7th August
Otter Trawls: OT118, OT113, OT114, OT117
Beam Trawls: BT118, BT113, BT114, BT117
Fishing vessel 'Emulator' trawling in the area of BT113
Stations 115 and 116 omitted due to a high density of static gear
Steam to Scarborough to demobilise
Overnight at sea
Wednesday 8th August 2012
Demobilise survey in Scarborough
Samples landed and returned to BMM

4.5 Otter Trawl Sampling

The whole catch from each otter trawl was retained where possible. Sub-sampling by species was carried out at sea if required. The samples were then boxed, labelled, photographed, iced and stored at +2°C before transportation to Cefas (Lowestoft) for analysis after every four days at sea, in line with the agreed scope of works.

The start and end times, co-ordinates and the duration of each otter trawl are given in Table 4.6 (control, Tranche B and export cable tows highlighted green, red and blue respectively). The vessel tracks whilst towing the otter trawl are illustrated in Figure 4.5 overleaf.

Table 4.6 Start and End Times, Co-ordinates and Duration of each Otter Trawl

Station	Date	Start				End				Duration (hh:mm:ss)
		Time (GMT)	UTM31N		Depth (m)	Time (GMT)	UTM31N		Depth (m)	
			Latitude	Longitude			Latitude	Longitude		
OT40	25/07/2012	16:40:25	6094036.09	458162.52	27.5	17:00:27	6092213.73	458192.47	27.9	00:20:02
OT41	26/07/2012	13:00:29	6104790.11	443083.34	31.9	13:20:29	6103217.3	443197.44	31.2	00:20:00
OT63		14:43:09	6105177.9	437249.62	33.6	15:03:09	6103507.54	437266.86	32.8	00:20:00
OT64	27/07/2012	07:07:08	6106394.42	449561.16	30.3	07:27:08	6108050.59	449616.32	31.6	00:20:00
OT65		09:11:23	6106180.25	455522.98	32.3	09:31:23	6107975.64	455728.88	34.3	00:20:00
OT66		13:14:23	6108899.87	462231.34	33.6	13:34:23	6107253.21	462212.73	34.5	00:20:00
OT67		15:05:13	6108970.46	468558.1	33.6	15:25:13	6107220.8	468513.91	31.9	00:20:00
OT68	28/07/2012	12:35:22	6106487.79	474420.86	31.9	12:55:22	6104711.06	474514.58	31.2	00:20:00
OT69	05/08/2012	17:59:49	6109163.12	480195.08	26.8	18:19:49	6110974.3	480234.24	27.4	00:20:00
OT70	01/08/2012	06:59:40	6112032.24	490185.67	28.8	07:19:40	6110327.23	490059.2	30.8	00:20:00
OT71		09:02:23	6112182.74	497055.52	29.4	09:22:25	6110695.49	497191.89	29.2	00:20:02
OT72	31/07/2012	15:36:14	6112231.8	505222.15	28.8	15:56:20	6113912.38	504932.47	30.1	00:20:06
OT73		11:05:24	6105315.51	502464.91	27.4	11:25:24	6107002.73	502618.93	27.9	00:20:00
OT74		09:14:43	6105457.5	497334.34	29.5	09:34:49	6103792.02	497241.48	31.2	00:20:06
OT75	01/08/2012	11:27:51	6103444.78	491017.22	24.6	11:47:51	6101930.16	490955.6	24.2	00:20:00
OT76	05/08/2012	16:30:08	6105857.17	485786.4	25.7	16:50:08	6107646.29	486055.03	25.9	00:20:00
OT77		14:28:00	6099213.62	485358.72	23.5	14:48:00	6097677.27	485262.08	23.7	00:20:00
OT78	30/07/2012	16:35:15	6100481.26	479564.69	25.5	16:55:16	6098562.56	479809.98	24.4	00:20:01
OT79		14:48:32	6097812.33	472757.1	28.8	15:08:34	6099614.44	472939.66	29.2	00:20:02
OT80	28/07/2012	14:44:29	6101604.6	466959.76	30.8	15:04:29	6100074.71	466772.21	31.0	00:20:00
OT81	26/07/2012	06:54:05	6098890.88	458878.98	31.0	07:14:04	6100515.22	458855.08	34.7	00:19:59
OT82		08:55:01	6097460.37	451519.68	29.5	09:15:02	6099149.78	451505.79	29.9	00:20:01
OT83		11:06:34	6099552.98	444865.58	30.8	11:26:35	6097708.41	444840.26	29.7	00:20:01
OT84	25/07/2012	18:25:08	6092415.13	465888.15	28.3	18:45:09	6094370.15	466050.9	29.5	00:20:01
OT85	04/08/2012	14:02:31	6091141.35	476823.29	25.2	14:22:34	6093027.02	477143.62	25.5	00:20:03
OT86		15:55:27	6091968.65	483554.36	23.5	16:15:27	6093863.62	483772.34	23.5	00:20:00
OT87	01/08/2012	13:42:18	6094432.44	492805.01	25.7	14:02:18	6096467.28	492948.95	24.6	00:20:00
OT88	31/07/2012	06:48:40	6097713.22	496485.56	28.3	07:08:40	6099469.72	496547.33	27.5	00:20:00
OT89	01/08/2012	15:31:38	6092722.73	498620.14	24.2	15:51:38	6094677.89	498681.45	25.9	00:20:00
OT90	25/07/2012	14:48:56	6088132.62	460950.41	27.2	15:09:00	6086365.9	460883.43	26.6	00:20:04
OT91		11:38:35	6085885.34	468497.36	27.4	11:58:36	6083859.19	468583.37	27.0	00:20:01
OT92	05/08/2012	11:05:22	6086124	485031.67	21.9	11:24:18	6084533.3	485089.96	21.7	00:18:56
OT93		08:49:10	6083951.6	497999.29	23.0	09:09:10	6082185.13	497887.78	22.4	00:20:00
OT94		06:46:27	6086766.83	506177.31	23.9	07:06:27	6088452	506158.2	22.8	00:20:00
OT95	31/07/2012	13:25:48	6108933.66	512105.53	28.1	13:45:49	6110614.29	512078.85	28.8	00:20:01

Station	Date	Start				End				Duration (hh:mm:ss)
		Time (GMT)	UTM31N		Depth (m)	Time (GMT)	UTM31N		Depth (m)	
			Latitude	Longitude			Latitude	Longitude		
OT96	28/07/2012	06:41:03	6120102.96	496579.01	32.8	07:01:05	6118340.22	496597.43	32.8	00:20:02
OT97		08:54:32	6117890.36	487300.64	29.0	09:14:32	6119607.35	487260.57	30.8	00:20:00
OT98	27/07/2012	17:16:16	6116125.05	473263.74	31.9	17:36:17	6117961.7	473376.43	32.3	00:20:01
OT99		11:06:00	6114017.79	457553.84	33.6	11:26:01	6115697.22	457361.59	32.8	00:20:01
OT100	26/07/2012	16:35:31	6111396.79	439562.99	31.4	16:55:31	6113234.66	439520.8	32.5	00:20:00
OT108	06/08/2012	08:39:34	6106291.88	375606.67	64.3	09:00:02	6105336.51	374191.07	64.1	00:20:28
OT109		06:38:38	6100228.39	380926.22	61.9	06:58:40	6099623.51	379232.9	63.4	00:20:02
OT110		11:48:29	6099804.63	351948.58	74.5	12:08:29	6099283.42	350170.73	78.0	00:20:00
OT111		14:14:42	6095060.25	335150.89	80.2	14:34:42	6094556.87	333283.53	76.7	00:20:00
OT112		16:48:25	6092639.64	316341.37	73.1	17:08:26	6091798.77	314777	72.9	00:20:01
OT113	07/08/2012	10:20:43	6081285.78	299355.42	83.1	10:40:43	6081124.19	297825.26	78.4	00:20:00
OT114		13:35:49	6080312.3	276906.62	61.9	13:55:52	6079842.79	275045.58	67.2	00:20:03
OT115	Omitted due to the presence of a high density of static gear									
OT116										
OT117	07/08/2012	15:46:28	6065267.12	283616.54	62.7	16:06:38	6065063.55	285272.34	64.7	00:20:10
OT118		08:23:39	6066348.54	305692.16	77.5	08:43:46	6066725.35	304299.13	72.5	00:20:07
OT119	02/08/2012	15:07:19	6071775.8	328413.56	76.2	15:27:21	6071395.35	326881.29	64.3	00:20:02
OT120		11:57:36	6075759.44	354265.41	82.6	12:17:36	6075323.01	352493.24	88.4	00:20:00
OT121		06:39:07	6082937.22	379369.45	48.9	06:59:07	6082793.83	377659.91	50.6	00:20:00
OT122		08:46:12	6075136.91	378091.37	46.9	09:06:12	6074384.07	379356.65	45.8	00:20:00

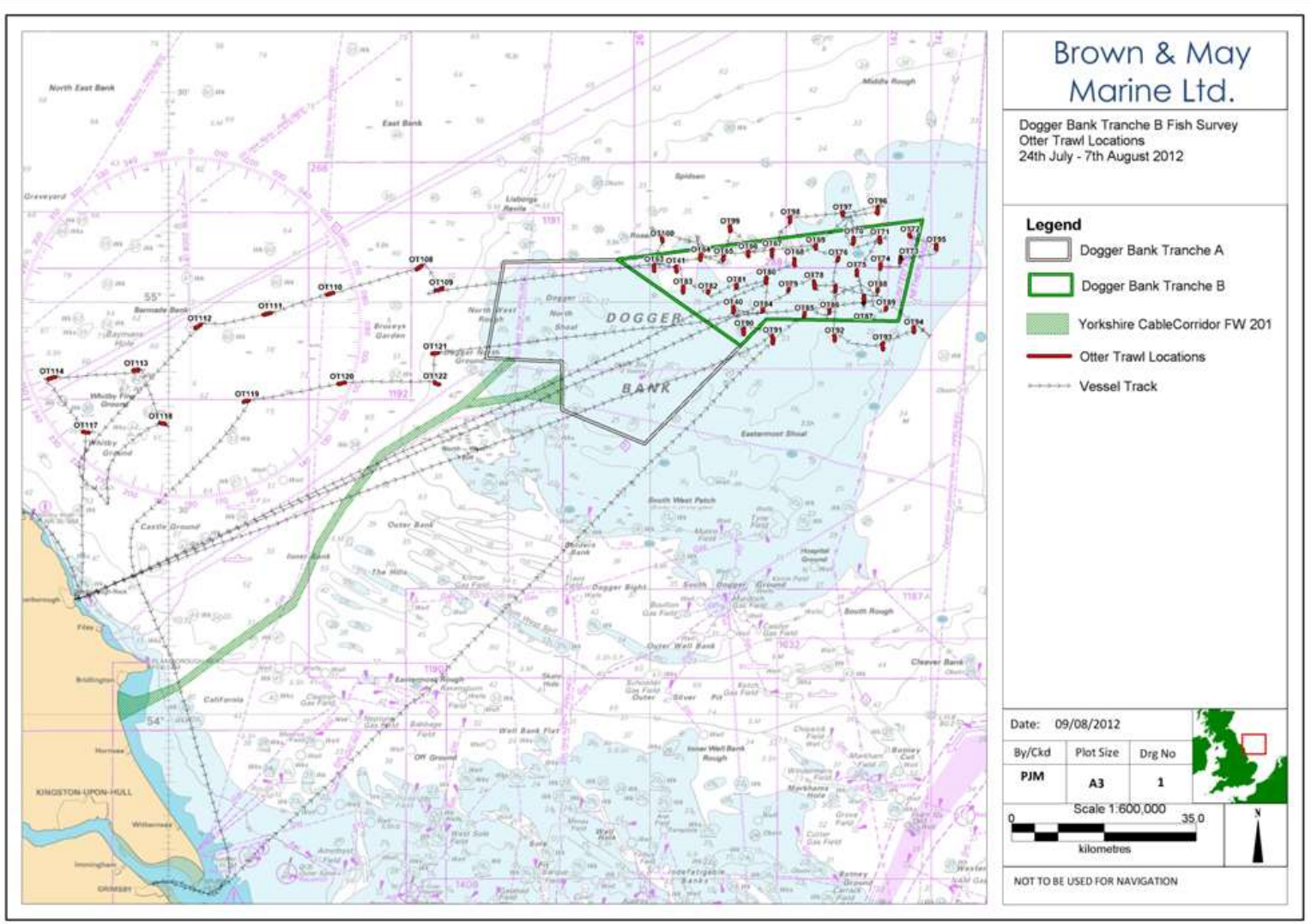


Figure 4.5 Otter Trawl Tow Tracks

4.6 Beam Trawl Sampling

All fish 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 and measured on board and returned to the sea. Sub-sampling was applied at sea when required. Samples were fixed at the end of every day using a 4% seawater buffered formalin solution before being transported to Precision Marine Surveys Ltd. (PMSL) at the end of the survey to be identified, counted and measured.

The start and end times, co-ordinates and the duration of each beam trawl are given in Table 4.7 (control, Tranche B and export cable tows highlighted green, red and blue respectively). The vessel tracks whilst towing the beam trawl are illustrated in Figure 4.6.

Table 4.7 Start and End Times, Co-ordinates and Duration of each Beam Trawl

Station	Date	Start				End				Duration (hh:mm:ss)
		Time (GMT)	UTM31N		Depth (m)	Time (GMT)	UTM31N		Depth (m)	
			Easting	Northing			Easting	Northing		
BT40	25/07/2012	17:20:44	6092202.18	458022.48	28.3	17:30:46	6092492.75	457738.51	28.5	00:10:02
BT41	26/07/2012	13:38:44	6103511.44	443259.8	31.6	13:48:45	6103863.57	443190.28	31.6	00:10:01
BT63		15:24:18	6103967.57	437129.47	34.3	15:34:21	6104468	437087.04	34.5	00:10:03
BT64	27/07/2012	07:49:02	6108034.83	449603.2	32.8	07:59:02	6107931.72	449450.91	31.4	00:10:00
BT65		09:50:46	6107812.83	455760.94	34.3	10:00:46	6107478.8	455811.91	33.6	00:10:00
BT66		13:54:11	6107501.87	462404.48	33.6	14:04:11	6107920.38	462541.65	33.4	00:10:00
BT67		15:55:01	6107756.09	468466.41	31.6	16:05:01	6108117.91	468556.54	34.3	00:10:00
BT68	28/07/2012	13:15:35	6104692.78	474499.98	31.2	13:25:36	6105039.94	474371.96	30.8	00:10:01
BT69	05/08/2012	18:39:18	6111004.65	480393.02	27.5	18:49:18	6110594.2	480401.73	27.4	00:10:00
BT70	01/08/2012	07:39:55	6110823.23	490257.39	30.3	07:49:55	6111455.54	490304.98	29.2	00:10:00
BT71		09:56:51	6110815.8	496995.78	29.2	10:06:56	6111262.97	496775.88	29.2	00:10:05
BT72	31/07/2012	16:42:03	6112682.68	505097.7	29.2	16:52:04	6112358.05	505174.85	29.2	00:10:01
BT73		11:49:09	6107023.57	502492.54	27.7	11:59:09	6106726.41	502622.92	27.7	00:10:00
BT74		09:57:34	6103771.56	497054.61	30.8	10:07:35	6104024.73	497029.76	29.9	00:10:01
BT75	01/08/2012	12:07:49	6102411.37	490881.55	24.2	12:17:50	6103007.67	490964.87	25.0	00:10:01
BT76	05/08/2012	17:10:27	6107610.61	486039.22	26.3	17:20:28	6107475.33	485991.28	25.9	00:10:01
BT77		15:32:59	6098435.55	485121.02	24.1	15:43:00	6098970.76	485001.25	24.2	00:10:01
BT78	30/07/2012	17:21:50	6099188.07	479515.63	25.0	17:31:50	6099534.33	479309.15	25.3	00:10:00
BT79		15:26:54	6099671.94	473073.81	28.8	15:36:55	6099296.09	472917.66	29.2	00:10:01
BT80	28/07/2012	15:23:35	6100048.66	467224.73	30.8	15:33:36	6100496.36	467164.44	30.6	00:10:01
BT81	26/07/2012	07:35:46	6100380.51	458824.77	33.2	07:45:46	6100124.09	458705.54	33.6	00:10:00
BT82		09:57:06	6097926.37	451629.2	29.5	10:07:06	6097476.42	451692.62	29.9	00:10:00
BT83		11:46:46	6097932.88	444984.46	29.7	11:56:46	6098307.86	445027.31	29.5	00:10:00
BT84	25/07/2012	19:06:16	6094197.38	465881.83	31.9	19:16:18	6093852.16	465854.95	30.6	00:10:02
BT85	04/08/2012	14:42:46	6093435.13	476960.71	25.7	14:52:46	6093476.54	476615.88	26.3	00:10:00
BT86		16:35:38	6093983.01	483807.64	23.5	16:45:39	6093659.25	483757.01	23.7	00:10:01
BT87	01/08/2012	14:24:30	6096313.48	492881.44	24.2	14:34:30	6095935.34	492827.43	25.0	00:10:00
BT88	31/07/2012	07:31:56	6099305.42	496598.46	27.5	07:41:57	6099014.42	496609.55	27.4	00:10:01
BT89	01/08/2012	16:15:28	6094564.69	498800.4	25.2	16:25:28	6094318.65	498800.46	25.5	00:10:00
BT90	25/07/2012	15:30:59	6086459.17	460627.48	26.6	15:40:59	6086739.67	460430.37	26.6	00:10:00
BT91		13:42:22	6085180.74	468476.06	27.0	13:52:25	6085425.52	468339.45	27.0	00:10:03
BT92	05/08/2012	13:06:09	6085980.06	484947.29	21.5	13:16:09	6086487.97	484869.45	21.3	00:10:00

Station	Date	Start				End				Duration (hh:mm:ss)
		Time (GMT)	UTM31N		Depth (m)	Time (GMT)	UTM31N		Depth (m)	
			Easting	Northing			Easting	Northing		
BT93		09:29:54	6082445.84	498175.08	22.2	09:39:55	6082842.83	498265.87	22.1	00:10:01
BT94		07:28:43	6088070.18	506298.7	23.3	07:38:43	6087623.67	506261.02	23.7	00:10:00
BT95	31/07/2012	14:11:44	6110819.32	512299.98	28.8	14:21:44	6110367.58	512285.81	28.6	00:10:00
BT96	28/07/2012	07:25:17	6118310.36	496508.33	33.6	07:35:17	6118562.14	496562.87	32.5	00:10:00
BT97		10:07:37	6118238.93	487524.48	29.9	10:17:37	6117943.33	487775.59	30.1	00:10:00
BT98	27/07/2012	17:56:23	6118058.08	473338.38	31.4	18:06:24	6117776.28	473248.86	31.7	00:10:01
BT99		11:48:41	6115426.4	457622.44	32.7	11:58:41	6115064.63	457596.31	32.8	00:10:00
BT100	26/07/2012	17:15:09	6113404.02	439392.23	33.2	17:25:11	6112939.09	439338.8	35.2	00:10:02
BT108	06/08/2012	09:25:58	6105687.05	374855.17	63.6	09:35:58	6106000.54	375226.31	63.2	00:10:00
BT109		07:22:49	6099843.25	379609.58	62.5	07:32:55	6099635.86	380238.25	61.7	00:10:06
BT110		12:33:24	6099430.74	350777.39	75.1	12:43:25	6099749.84	351190.71	75.1	00:10:01
BT111		15:02:03	6094702.8	333855.32	78.0	15:12:03	6094909.58	334154.92	79.5	00:10:00
BT112		17:37:58	6092242.88	314982.2	70.1	17:48:06	6092277.77	315403.12	69.8	00:10:08
BT113	07/08/2012	11:10:39	6080851.54	298382.77	80.0	11:20:38	6080729.69	298901.46	78.7	00:09:59
BT114		13:02:20	6080148.85	278316.22	63.6	13:12:29	6080360.64	277686.5	63.2	00:10:09
BT115	Omitted due to the presence of a high density of static gear									
BT116										
BT117	07/08/2012	16:39:35	6065416.18	285207.42	65.2	16:49:35	6065543.05	284885.89	64.8	00:10:00
BT118		07:48:37	6066093.45	307180.58	81.1	07:58:36	6065312.163	306668.7675	80.2	00:09:59
BT119	02/08/2012	15:55:33	6071401.53	327239.9	75.8	16:05:34	6071252.15	327524.92	75.8	00:10:01
BT120		12:48:42	6075521.61	352887.26	91.0	12:58:43	6075533.87	353245.01	89.4	00:10:01
BT121		07:24:32	6082869.52	377726.11	48.0	07:34:32	6082928.67	378130.82	49.1	00:10:00
BT122		09:34:58	6074744.98	378636.62	45.5	09:44:58	6075059.82	378212.37	46.2	00:10:00

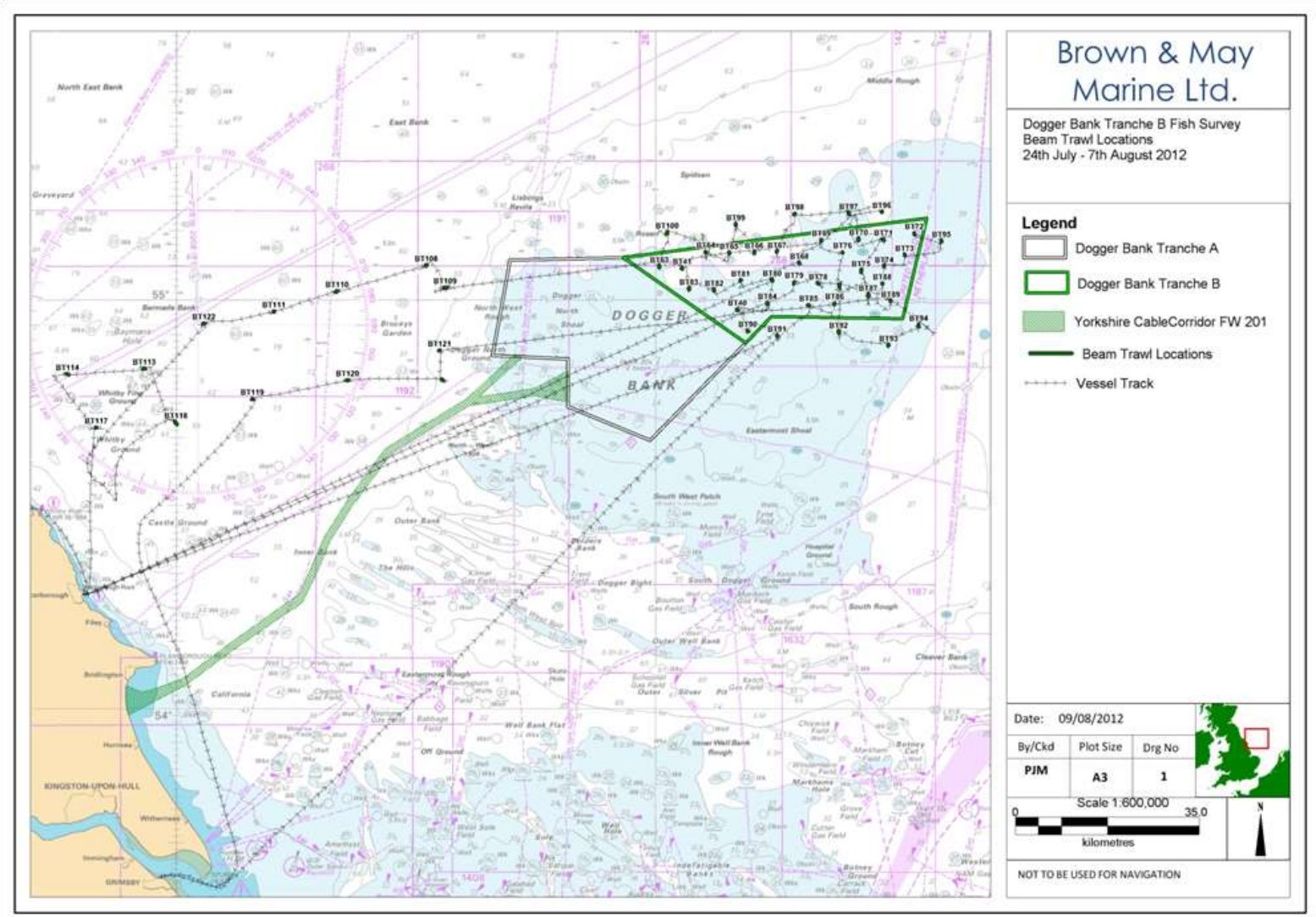


Figure 4.6 Beam Trawl Tow Tracks

5.0 Otter Trawl Results

5.1 Catch Rates and Species Distribution

The total number of individuals caught and the catch rate (number of individuals caught per hour) for fish species at the control stations, in Tranche B, and along the export cable are given in Table 5.1 and are illustrated in Figure 5.1. The catch rates by station and by sampling area are illustrated in Figure 5.2, Figure 5.3 and Figure 5.4 for control, Tranche B and export cable stations respectively.

Spatial distribution plots for the most abundant species are given in Figure 5.5 to Figure 5.8; the spatial distribution for *G. morhua* is also given in Figure 5.9.

Spatial plots show the percentage distribution by catch rate of *E. gurnardus*, *P. platessa*, *L. limanda*, *M. merlangus* and *G. morhua*. The circle size corresponds to the catch rate i.e. larger circles indicate greater catch rates.

A total of 31 species were caught; 14 at the control stations, 23 within Tranche B and 21 species along the export cable. Overall, *E. gurnardus* was the most abundant species caught, followed by *P. platessa* and then *L. limanda*.

E. gurnardus had the highest catch rate at the control stations (703.0 individuals per hour) and within Tranche B (702.4/hr), whereas *E. gurnardus*, *P. platessa* and *M. merlangus* were found to have similar catch rates along the export cable (185.8/hr, 199.2/hr and 197.1/hr respectively).

The highest total catch rate was recorded within Tranche B at station OT84 (2,493.9/hr), with *E. gurnardus* accounting for 68.5% of the catch.

P. platessa were caught in all sampling areas, with the greatest total catch rate recorded along the export cable (199.2/hr). Stations OT67 within Tranche B and OT121 along the export cable had the highest catch rate for this species (432.0/hr).

M. merlangus were recorded in all sampling areas, with the greatest total catch rate recorded along the export cable (197.1/hr) and the highest catch rate by station found at OT108 (932.2/hr) along the export cable, as in the previous survey.

G. morhua were caught in all sampling areas in relatively low numbers, with the highest total catch rate found along the export cable (7.8/hr); the station with the greatest catch rate of *G. morhua* was OT63 within Tranche B (54.0/hr).

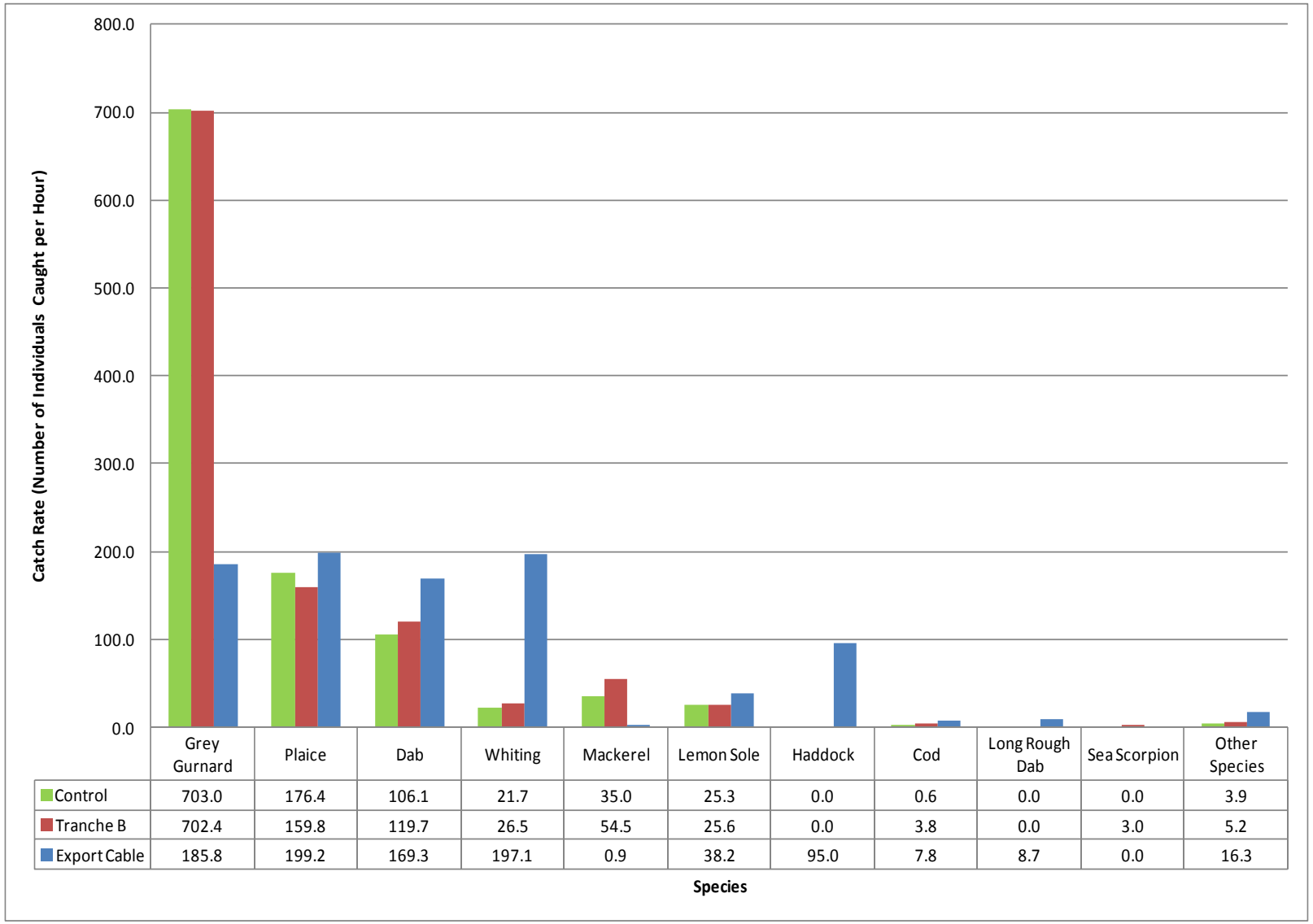
Three *C. harengus* were recorded along the export cable at stations OT111 (two; 6.0/hr) and OT119 (one; 3.0/hr).

Overall, the total catch rate was higher within Tranche B (1,100.3/hr) than at the control stations (1,072.0/hr) and along the export cable (918.3/hr).

Table 5.1 Total Numbers of Individuals Caught and Catch Rate for Fish Species by Sampling Area

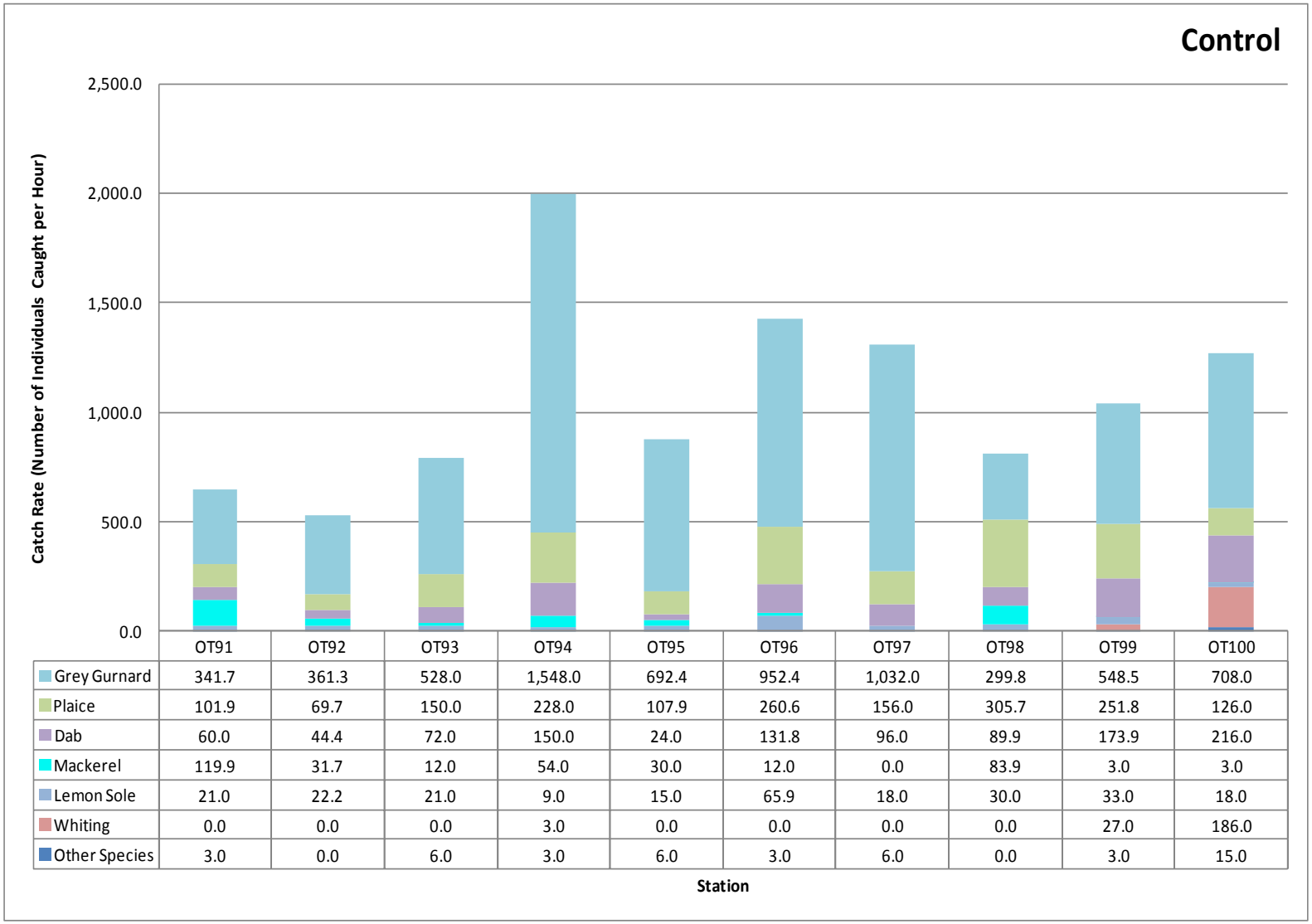
Species		Number of individuals Caught				Catch Rate (Number of Individuals Caught per Hour)		
Common Name	Scientific Name	Control	Tranche B	Export Cable	Total	Control	Tranche B	Export Cable
Grey Gurnard	*Eutrigla gurnardus*	2,332	7,029	808	10,169	703.0	702.4	185.8
Plaice	*Pleuronectes platessa*	585	1,599	866	3,050	176.4	159.8	199.2
Dab	*Limanda limanda*	352	1,198	736	2,286	106.1	119.7	169.3
Whiting	*Merlangius merlangus*	72	265	857	1,194	21.7	26.5	197.1
Mackerel	*Scomber scombrus*	116	545	4	665	35.0	54.5	0.9
Lemon Sole	*Microstomus kitt*	84	256	166	506	25.3	25.6	38.2
Haddock	*Melanogrammus aeglefinus*	0	0	413	413	0.0	0.0	95.0
Cod	*Gadus morhua*	2	38	34	74	0.6	3.8	7.8
Long Rough Dab	*Hippoglossoides platessoides*	0	0	38	38	0.0	0.0	8.7
Sea Scorpion	*Taurulus bubalis*	0	30	0	30	0.0	3.0	0.0
Starry Ray	*Amblyraja radiata*	0	0	18	18	0.0	0.0	4.1
Common Dragonet	*Callionymus lyra*	2	7	6	15	0.6	0.7	1.4
Hake	*Merluccius merluccius*	0	2	11	13	0.0	0.2	2.5
Red Mullet	*Mullus surmuletus*	2	10	0	12	0.6	1.0	0.0
Poor Cod	*Trisopterus minutus*	0	1	8	9	0.0	0.1	1.8
Anglerfish	*Lophius piscatorius*	1	1	6	8	0.3	0.1	1.4
Bullrout	*Myoxocephalus scorpius*	1	7	0	8	0.3	0.7	0.0
Witch	*Glyptocephalus cynoglossus*	0	0	8	8	0.0	0.0	1.8
Lesser Spotted Dogfish	*Scyliorhinus canicula*	0	7	0	7	0.0	0.7	0.0
Turbot	*Psetta maxima*	4	1	2	7	1.2	0.1	0.5
Horse Mackerel	*Trachurus trachurus*	0	4	2	6	0.0	0.4	0.5
Spurdog	*Squalus acanthias*	0	6	0	6	0.0	0.6	0.0
Sprat	*Sprattus sprattus*	0	0	5	5	0.0	0.0	1.1
Herring	*Clupea harengus*	0	0	3	3	0.0	0.0	0.7

Species		Number of individuals Caught				Catch Rate (Number of Individuals Caught per Hour)		
Common Name	Scientific Name	Control	Tranche B	Export Cable	Total	Control	Tranche B	Export Cable
Tub Gurnard	*Trigla lucerna*	2	1	0	3	0.6	0.1	0.0
Brill	*Scophthalmus rhombus*	0	1	1	2	0.0	0.1	0.2
John Dory	*Zeus faber*	0	2	0	2	0.0	0.2	0.0
Dover Sole	*Solea solea*	1	0	0	1	0.3	0.0	0.0
Lesser Weever	*Echiichthys vipera*	0	1	0	1	0.0	0.1	0.0
Saithe	*Pollachius virens*	0	0	1	1	0.0	0.0	0.2
Spotted Ray	*Raja montagui*	0	1	0	1	0.0	0.1	0.0
Total No. Individuals		3,556	11,012	3,993				
Total No. Species		14	23	21				
Total Catch Rate (No. Individuals Caught per Hour)		1,072.0	1,100.3	918.3				



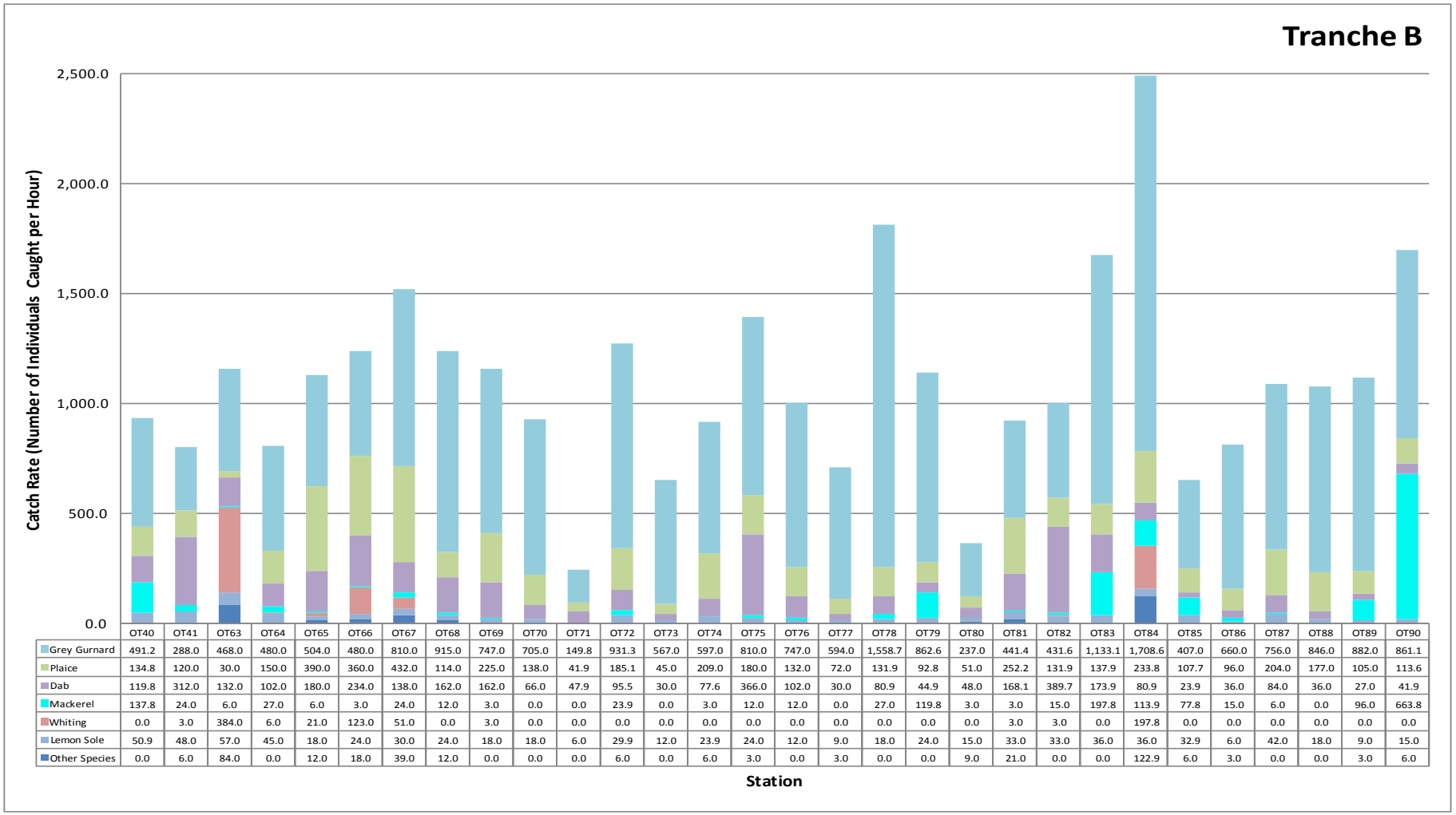
	Grey Gurnard	Plaice	Dab	Whiting	Mackerel	Lemon Sole	Haddock	Cod	Long Rough Dab	Sea Scorpion	Other Species
Control	703.0	176.4	106.1	21.7	35.0	25.3	0.0	0.6	0.0	0.0	3.9
Tranche B	702.4	159.8	119.7	26.5	54.5	25.6	0.0	3.8	0.0	3.0	5.2
Export Cable	185.8	199.2	169.3	197.1	0.9	38.2	95.0	7.8	8.7	0.0	16.3

Figure 5.1 Catch Rate by Species and Sampling Area



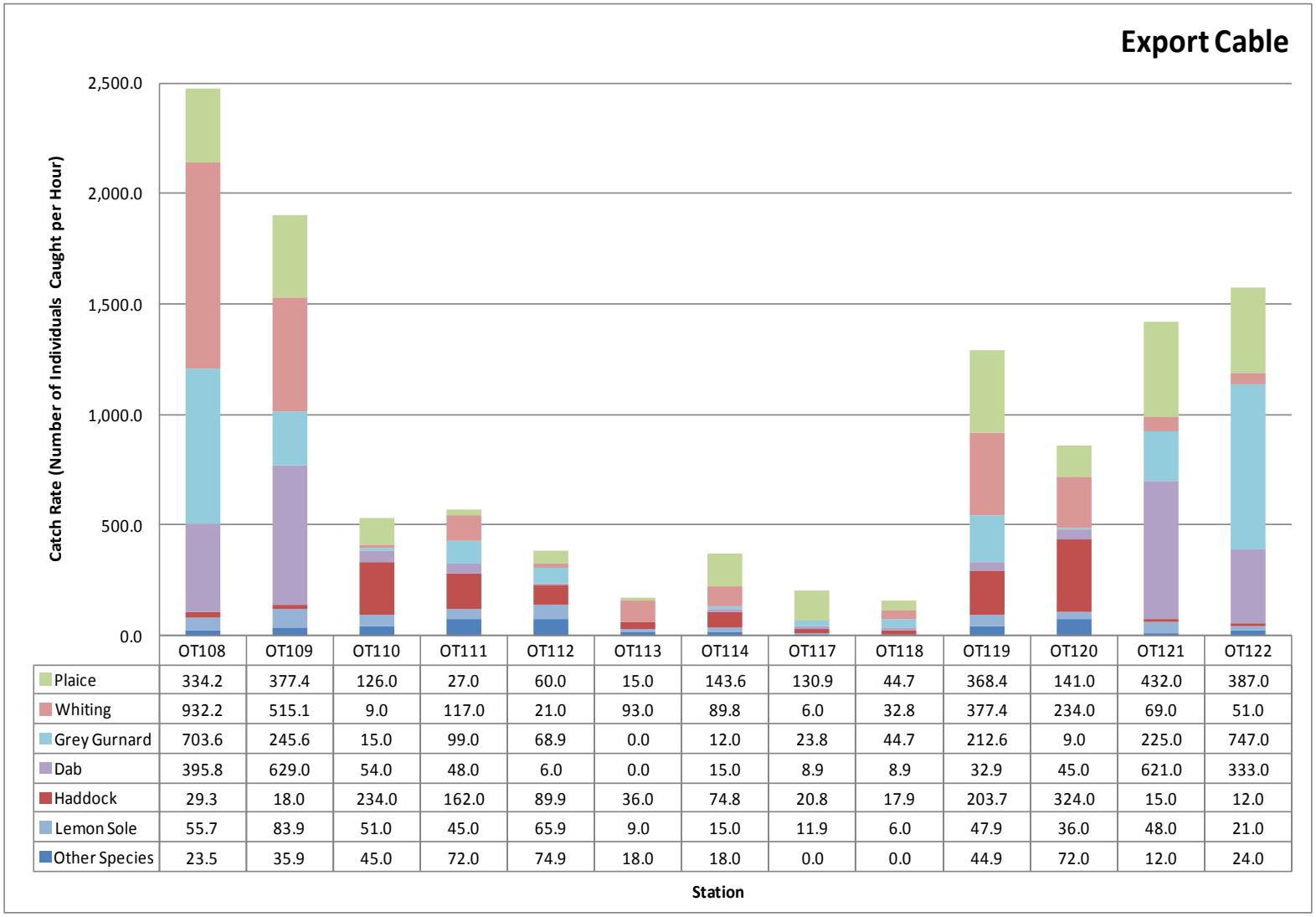
	OT91	OT92	OT93	OT94	OT95	OT96	OT97	OT98	OT99	OT100
Grey Gurnard	341.7	361.3	528.0	1,548.0	692.4	952.4	1,032.0	299.8	548.5	708.0
Plaice	101.9	69.7	150.0	228.0	107.9	260.6	156.0	305.7	251.8	126.0
Dab	60.0	44.4	72.0	150.0	24.0	131.8	96.0	89.9	173.9	216.0
Mackerel	119.9	31.7	12.0	54.0	30.0	12.0	0.0	83.9	3.0	3.0
Lemon Sole	21.0	22.2	21.0	9.0	15.0	65.9	18.0	30.0	33.0	18.0
Whiting	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	27.0	186.0
Other Species	3.0	0.0	6.0	3.0	6.0	3.0	6.0	0.0	3.0	15.0

Figure 5.2 Catch Rate by Species and Station at the Control Stations



	OT40	OT41	OT63	OT64	OT65	OT66	OT67	OT68	OT69	OT70	OT71	OT72	OT73	OT74	OT75	OT76	OT77	OT78	OT79	OT80	OT81	OT82	OT83	OT84	OT85	OT86	OT87	OT88	OT89	OT90
Grey Gurnard	491.2	288.0	468.0	480.0	504.0	480.0	810.0	915.0	747.0	705.0	149.8	931.3	567.0	597.0	810.0	747.0	594.0	1,558.7	862.6	237.0	441.4	431.6	1,133.1	1,708.6	407.0	660.0	756.0	846.0	882.0	861.1
Plaice	134.8	120.0	30.0	150.0	390.0	360.0	432.0	114.0	225.0	138.0	41.9	185.1	45.0	209.0	180.0	132.0	72.0	131.9	92.8	51.0	252.2	131.9	137.9	233.8	107.7	96.0	204.0	177.0	105.0	113.6
Dab	119.8	312.0	132.0	102.0	180.0	234.0	138.0	162.0	162.0	66.0	47.9	95.5	30.0	77.6	366.0	102.0	30.0	80.9	44.9	48.0	168.1	389.7	173.9	80.9	23.9	36.0	84.0	36.0	27.0	41.9
Mackerel	137.8	24.0	6.0	27.0	6.0	3.0	24.0	12.0	3.0	0.0	0.0	23.9	0.0	3.0	12.0	12.0	0.0	27.0	119.8	3.0	3.0	15.0	197.8	113.9	77.8	15.0	6.0	0.0	96.0	663.8
Whiting	0.0	3.0	384.0	6.0	21.0	123.0	51.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	3.0	0.0	197.8	0.0	0.0	0.0	0.0	0.0	0.0
Lemon Sole	50.9	48.0	57.0	45.0	18.0	24.0	30.0	24.0	18.0	18.0	6.0	29.9	12.0	23.9	24.0	12.0	9.0	18.0	24.0	15.0	33.0	33.0	36.0	36.0	32.9	6.0	42.0	18.0	9.0	15.0
Other Species	0.0	6.0	84.0	0.0	12.0	18.0	39.0	12.0	0.0	0.0	0.0	6.0	0.0	6.0	3.0	0.0	3.0	0.0	0.0	9.0	21.0	0.0	0.0	122.9	6.0	3.0	0.0	0.0	3.0	6.0

Figure 5.3 Catch Rate by Species and Station within Tranche B



	OT108	OT109	OT110	OT111	OT112	OT113	OT114	OT117	OT118	OT119	OT120	OT121	OT122
Plaice	334.2	377.4	126.0	27.0	60.0	15.0	143.6	130.9	44.7	368.4	141.0	432.0	387.0
Whiting	932.2	515.1	9.0	117.0	21.0	93.0	89.8	6.0	32.8	377.4	234.0	69.0	51.0
Grey Gurnard	703.6	245.6	15.0	99.0	68.9	0.0	12.0	23.8	44.7	212.6	9.0	225.0	747.0
Dab	395.8	629.0	54.0	48.0	6.0	0.0	15.0	8.9	8.9	32.9	45.0	621.0	333.0
Haddock	29.3	18.0	234.0	162.0	89.9	36.0	74.8	20.8	17.9	203.7	324.0	15.0	12.0
Lemon Sole	55.7	83.9	51.0	45.0	65.9	9.0	15.0	11.9	6.0	47.9	36.0	48.0	21.0
Other Species	23.5	35.9	45.0	72.0	74.9	18.0	18.0	0.0	0.0	44.9	72.0	12.0	24.0

Figure 5.4 Catch Rate by Species and Station along the Export Cable

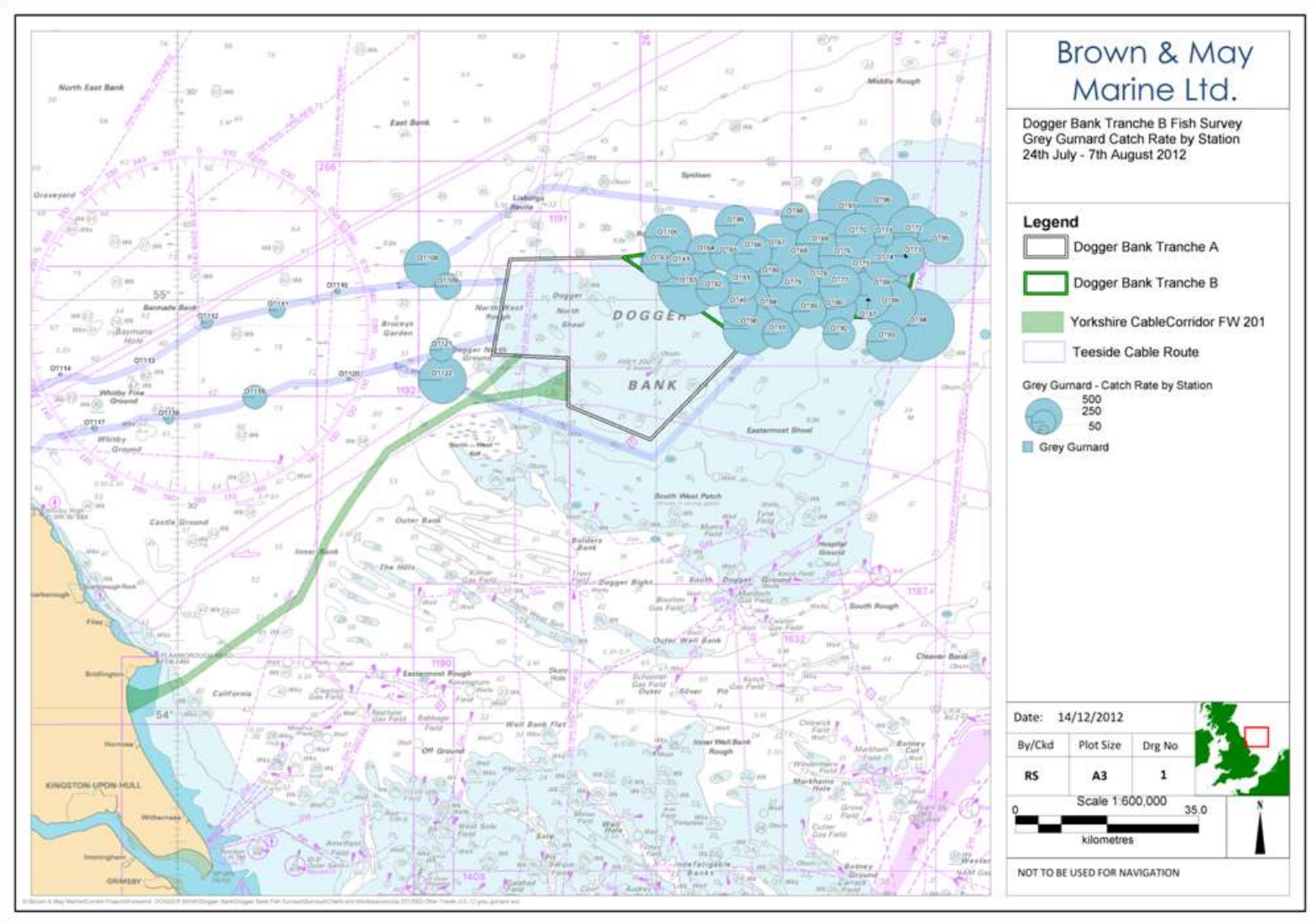


Figure 5.5 Spatial Distribution of Grey Gurnard (*E. gurnardus*) in the Area of Tranche B

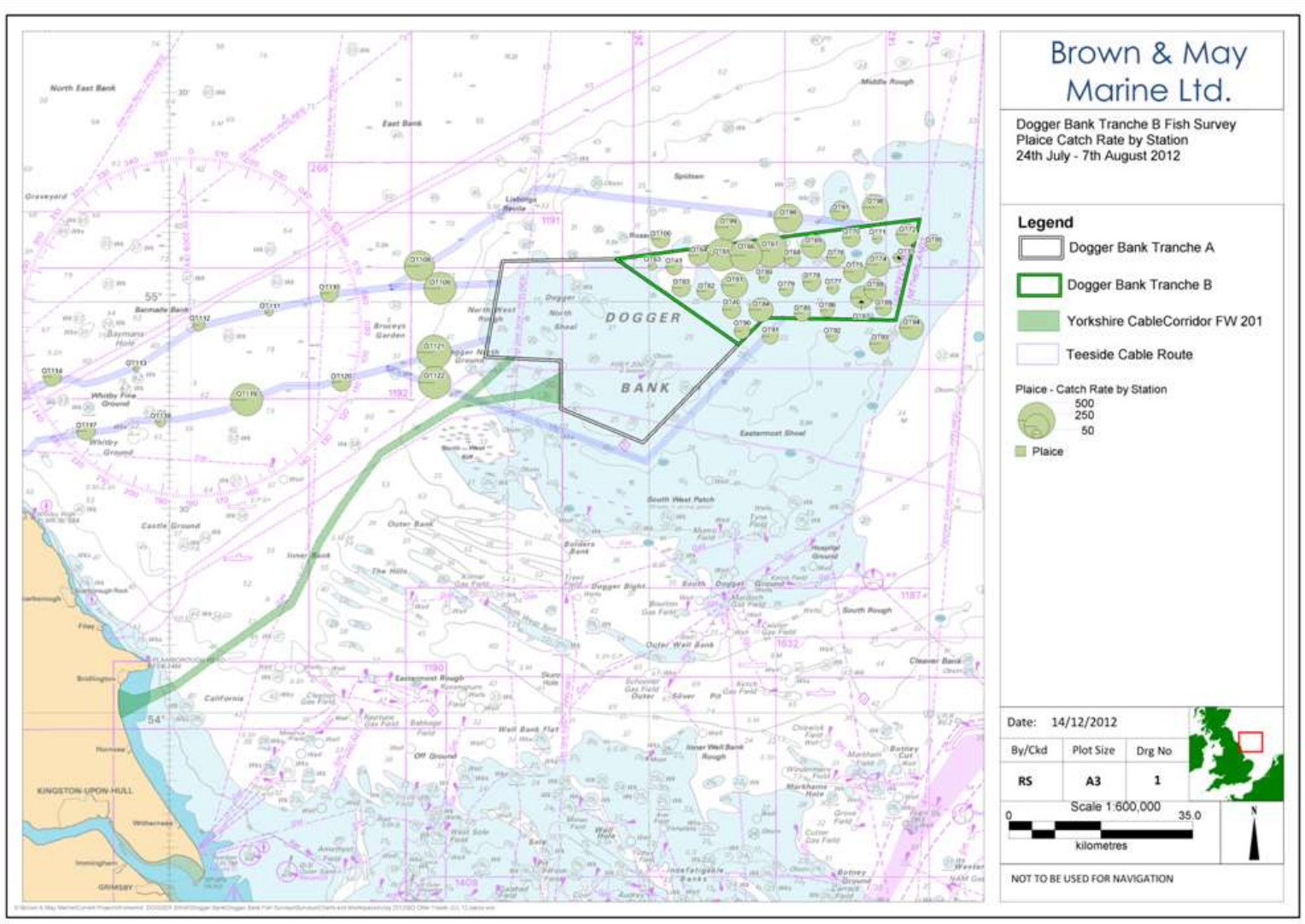


Figure 5.6 Spatial Distribution of Plaice (*P. platessa*) in the Area of Tranche B

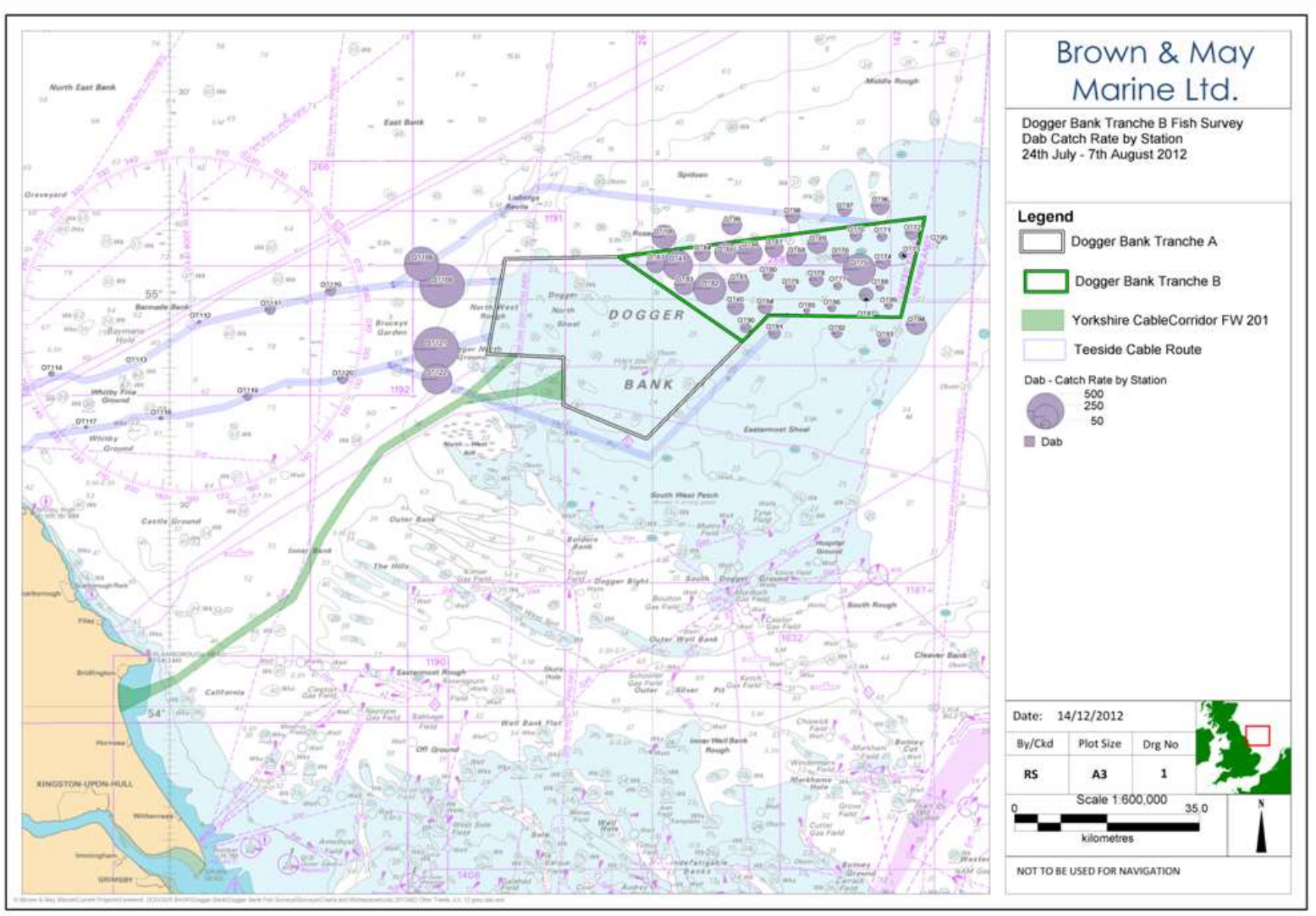


Figure 5.7 Spatial Distribution of Dab (*L. limanda*) in the Area of Tranche B

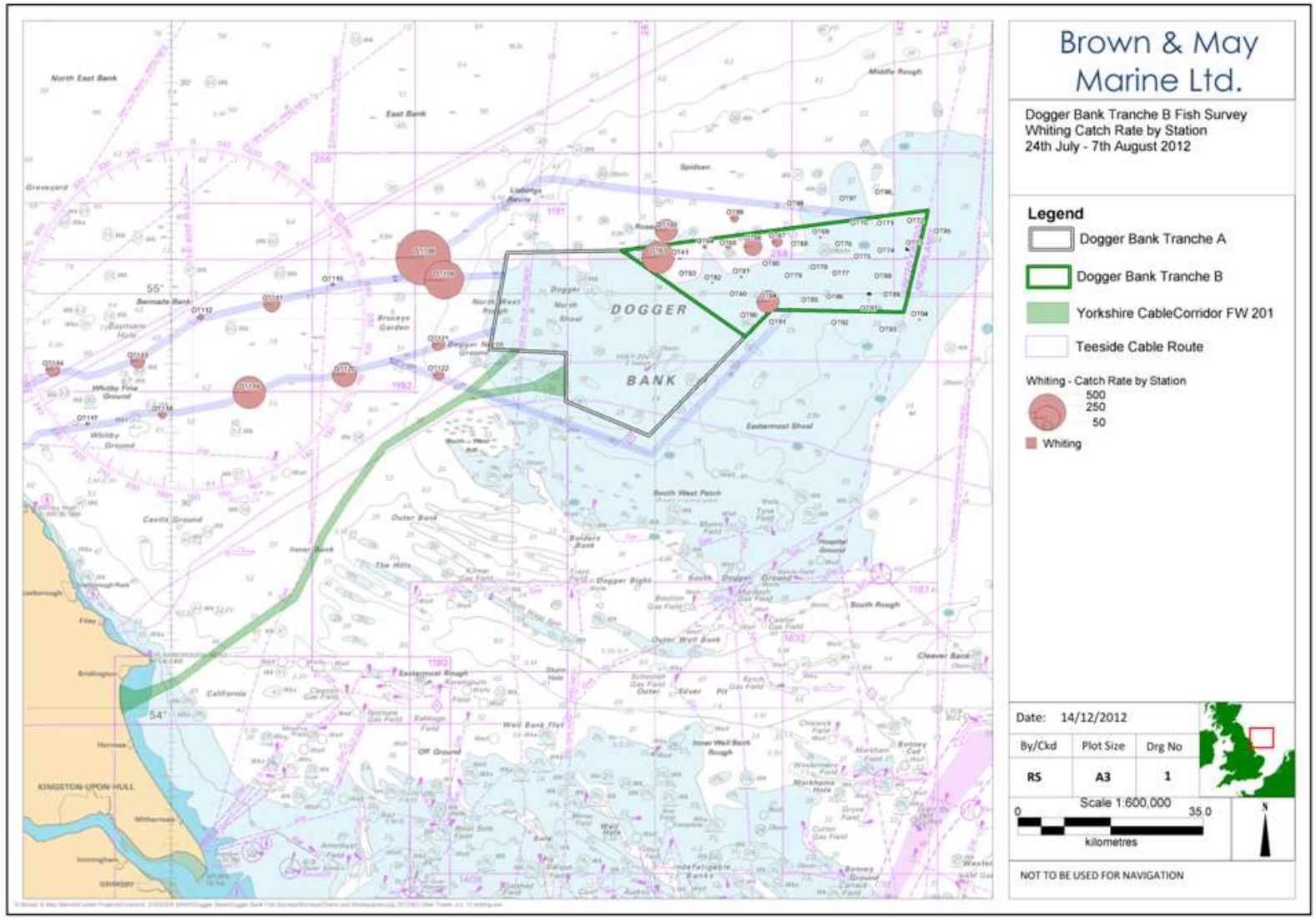


Figure 5.8 Spatial Distribution of Whiting (*M. merlangus*) in the Area of Tranche B

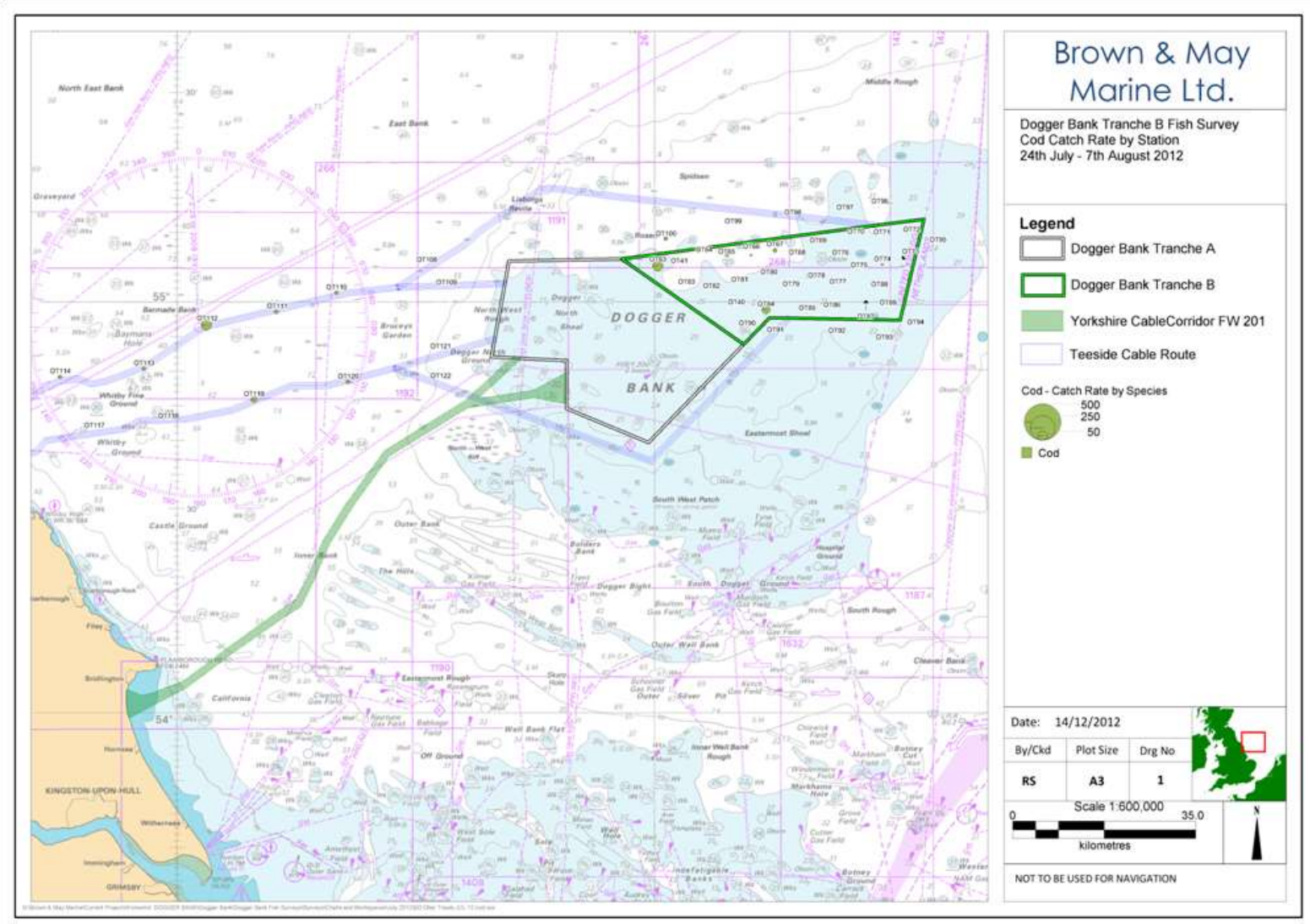


Figure 5.9 Spatial Distribution of Cod (*G. morhua*) in the Area of Tranche B

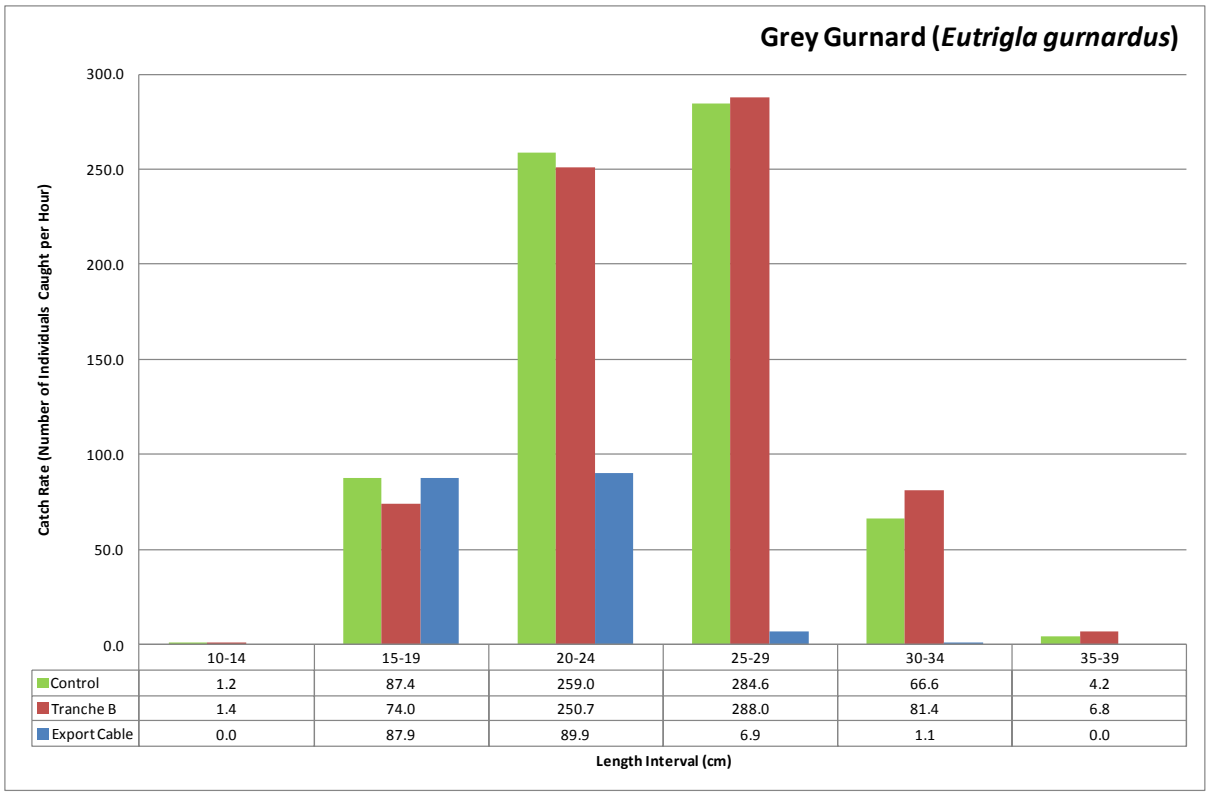
5.2 Length Distributions

The average length (cm) and length range for fish species caught by sampling area (control, Tranche B and export cable stations) are given below in Table 5.2. It should be noted that, as a safety precaution, length data is not recorded for the poisonous lesser weever (*Echiichthys vipera*), and as such is excluded from this section.

The length distributions of the most abundant species caught during the survey (>1,000 individuals), expressed as the catch rate (number of individuals caught per hour) by length (cm) and by sampling area, are shown in Figure 5.10 to Figure 5.13 overleaf.

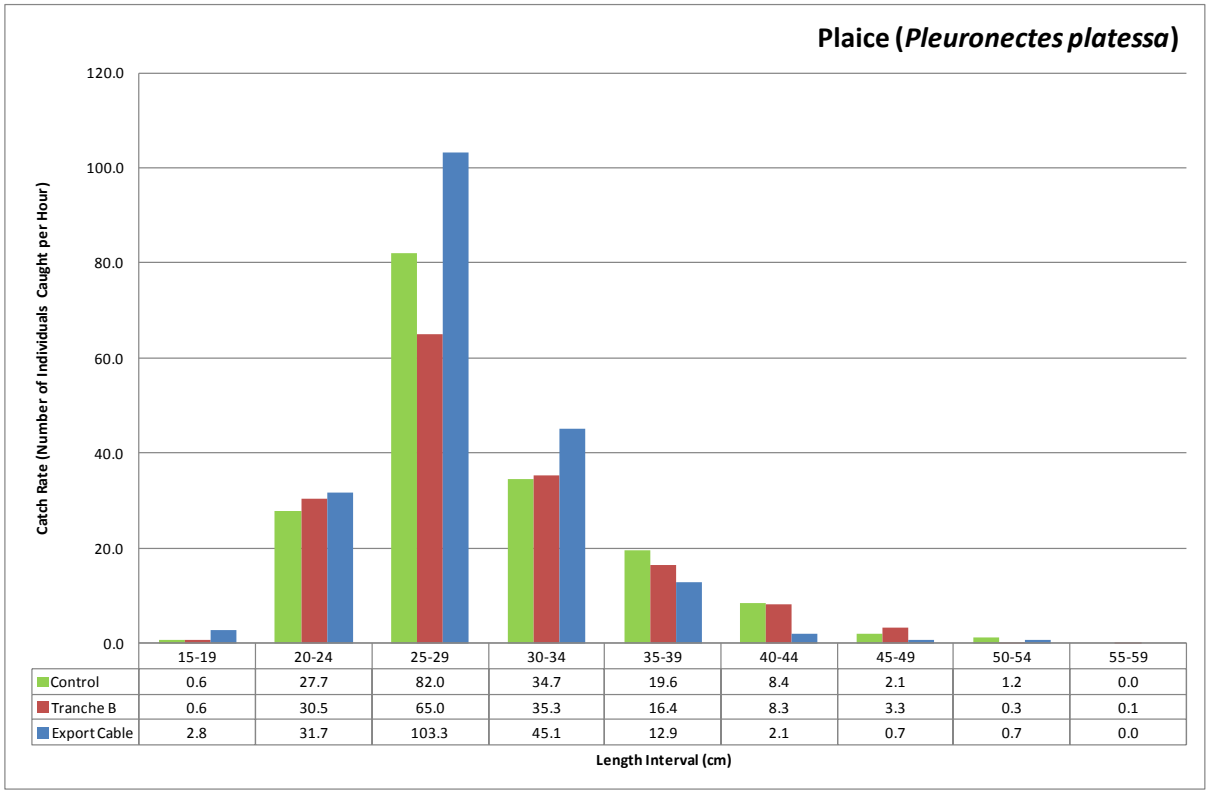
Table 5.2 Average Length and Length Ranges of Species Caught by Sampling Area

Species		Average Length (cm)			Length Range (cm)	
Common Name	Scientific Name	Control	Tranche B	Export Cable	Min.	Max.
Anglerfish	*Lophius piscatorius*	41.0	46.0	41.8	30	54
Brill	*Scophthalmus rhombus*	-	48.0	31.0	31	48
Bullrout	*Myoxocephalus scorpius*	18.0	20.7	-	17	25
Cod	*Gadus morhua*	29.0	31.2	40.9	23	74
Common Dragonet	*Callionymus lyra*	21.5	20.1	21.3	16	24
Dab	*Limanda limanda*	21.8	21.4	19.0	11	35
Dover Sole	*Solea solea*	33.0	-	-	33	33
Grey Gurnard	*Eutrigla gurnardus*	24.4	24.8	19.8	12	39
Haddock	*Melanogrammus aeglefinus*	-	-	34.6	25	50
Hake	*Merluccius merluccius*	-	77.5	48.5	25	98
Herring	*Clupea harengus*	-	-	26.0	26	26
Horse Mackerel	*Trachurus trachurus*	-	28.5	28.5	27	33
John Dory	*Zeus faber*	-	23.5	-	22	25
Lemon Sole	*Microstomus kitt*	24.7	24.0	26.3	14	38
Lesser Spotted Dogfish	*Scyliorhinus canicula*	-	66.1	-	56	73
Long Rough Dab	*Hippoglossoides platessoides*	-	-	18.6	14	23
Mackerel	*Scomber scombrus*	24.1	23.6	26.5	21	33
Plaice	*Pleuronectes platessa*	29.2	29.5	28.3	15	57
Poor Cod	*Trisopterus minutus*	-	19.0	17.1	14	21
Red Mullet	*Mullus surmuletus*	24.5	22.7	-	20	26
Saithe	*Pollachius virens*	-	-	45.0	45	45
Sea Scorpion	*Taurulus bubalis*	-	20.1	-	14	25
Spotted Ray	*Raja montagui*	-	44.0	-	44	44
Sprat	*Sprattus sprattus*	-	-	12.7	12	14
Spurdog	*Squalus acanthias*	-	72.2	-	44	107
Starry Ray	*Amblyraja radiata*	-	-	33.2	16	44
Tub Gurnard	*Trigla lucerna*	30.5	39.0	-	30	39
Turbot	*Psetta maxima*	48.0	35.0	39.0	35	53
Whiting	*Merlangius merlangus*	22.4	23.0	25.9	17	41
Witch	*Glyptocephalus cynoglossus*	-	-	29.8	27	34



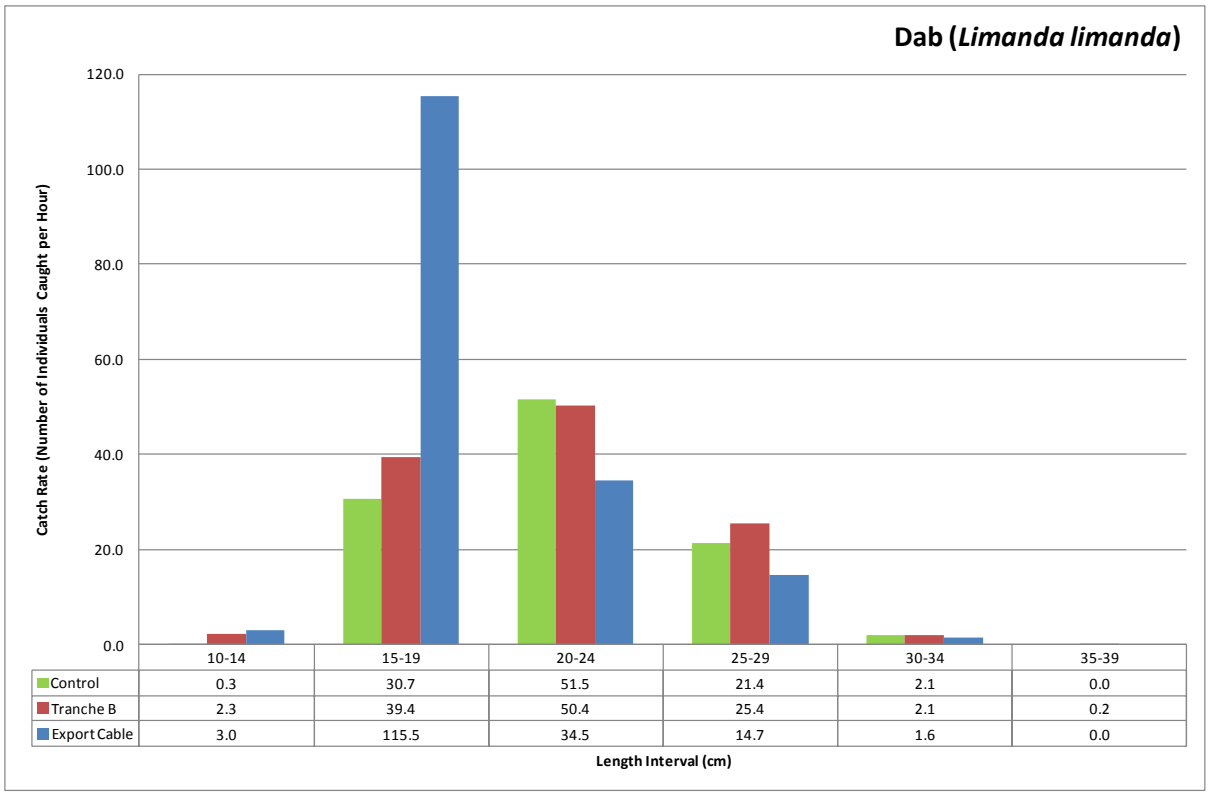
	10-14	15-19	20-24	25-29	30-34	35-39
Control	1.2	87.4	259.0	284.6	66.6	4.2
Tranche B	1.4	74.0	250.7	288.0	81.4	6.8
Export Cable	0.0	87.9	89.9	6.9	1.1	0.0

Figure 5.10 Grey Gurnard (*E. gurnardus*) Length Distribution by Sampling Area



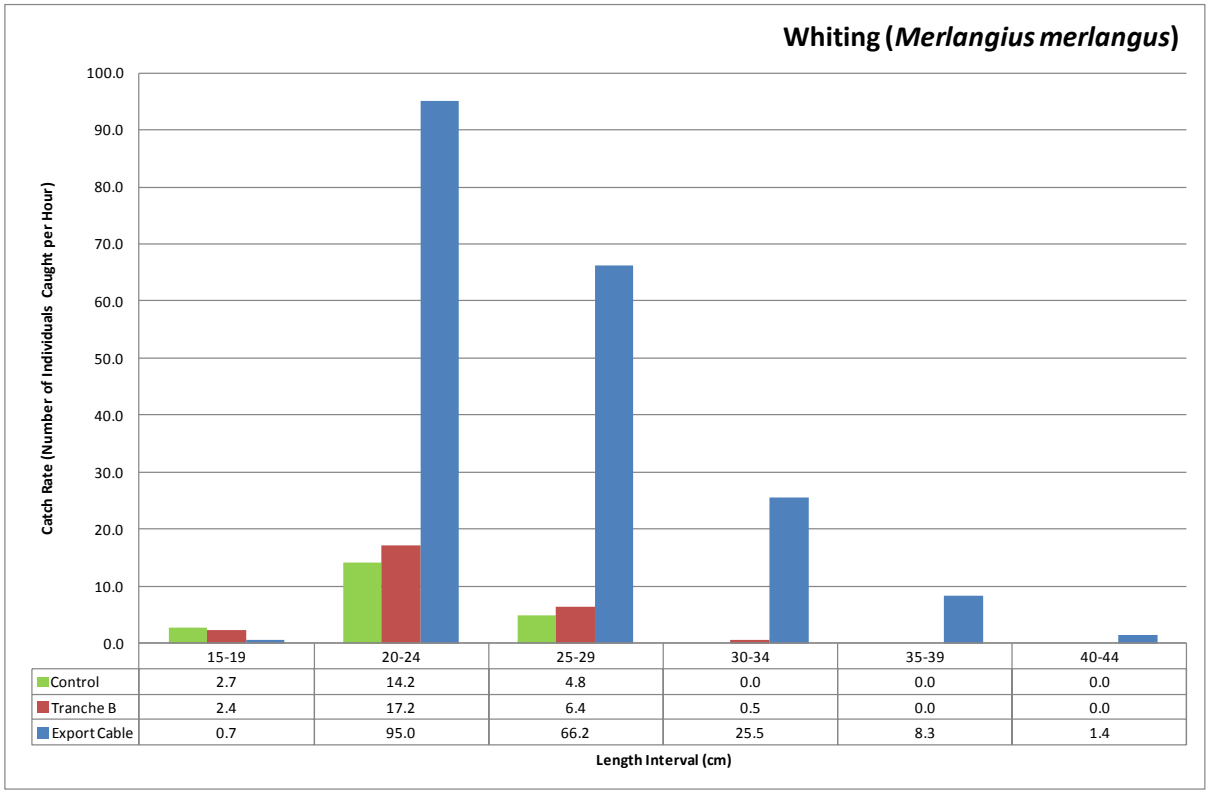
	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59
Control	0.6	27.7	82.0	34.7	19.6	8.4	2.1	1.2	0.0
Tranche B	0.6	30.5	65.0	35.3	16.4	8.3	3.3	0.3	0.1
Export Cable	2.8	31.7	103.3	45.1	12.9	2.1	0.7	0.7	0.0

Figure 5.11 Plaice (*P. platessa*) Length Distribution by Sampling Area



	10-14	15-19	20-24	25-29	30-34	35-39
Control	0.3	30.7	51.5	21.4	2.1	0.0
Tranche B	2.3	39.4	50.4	25.4	2.1	0.2
Export Cable	3.0	115.5	34.5	14.7	1.6	0.0

Figure 5.12 Dab (*L. limanda*) Length Distribution by Sampling Area



	15-19	20-24	25-29	30-34	35-39	40-44
Control	2.7	14.2	4.8	0.0	0.0	0.0
Tranche B	2.4	17.2	6.4	0.5	0.0	0.0
Export Cable	0.7	95.0	66.2	25.5	8.3	1.4

Figure 5.13 Whiting (*M. merlangus*) Length Distribution by Sampling Area

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).

Table 5.3 shows the ten species of fish caught for which a MLS has been set, and denotes their presence or absence by sampling area (control, Tranche B and export cable).

Table 5.3 MLS Set by EC

Species		EC MLS (cm)	Presence		
Common Name	Scientific Name		Control	Tranche B	Cable
Cod	*Gadus morhua*	35	✓	✓	✓
Haddock	*Melanogrammus aeglefinus*	30	-	-	✓
Hake	*Merluccius merluccius*	27	-	✓	✓
Herring	*Clupea harengus*	20	-	-	✓
Horse Mackerel	*Trachurus spp.*	15	-	✓	✓
Mackerel	*Scomber scombrus*	30	✓	✓	✓
Plaice	*Pleuronectes platessa*	27	✓	✓	✓
Saithe	*Pollachius virens*	35	-	-	✓
Dover Sole	*Solea solea*	24	✓	-	-
Whiting	*Merlangius merlangus*	27	✓	✓	✓

The percentage of individuals caught above and below their set MLS by species is shown in Figure 5.14, Figure 5.15 and Figure 5.16 for control, Tranche B and export cable stations respectively.

A higher proportion of the *P. platessa* caught at the control stations (62.6%), within Tranche B (63.5%) and along the export cable (61.5%) were above the MLS. *M. aeglefinus* were caught only along the export cable, 93.7% of which were above the MLS.

Most of the *S. scombrus* and *M. merlangus* caught at the control stations (99.1% and 97.2% respectively), within Tranche B (99.4% and 92.1%) and along the export cable (75.0% and 65.8%) were below the MLS.

All other species with a set MLS were caught in relatively low numbers.

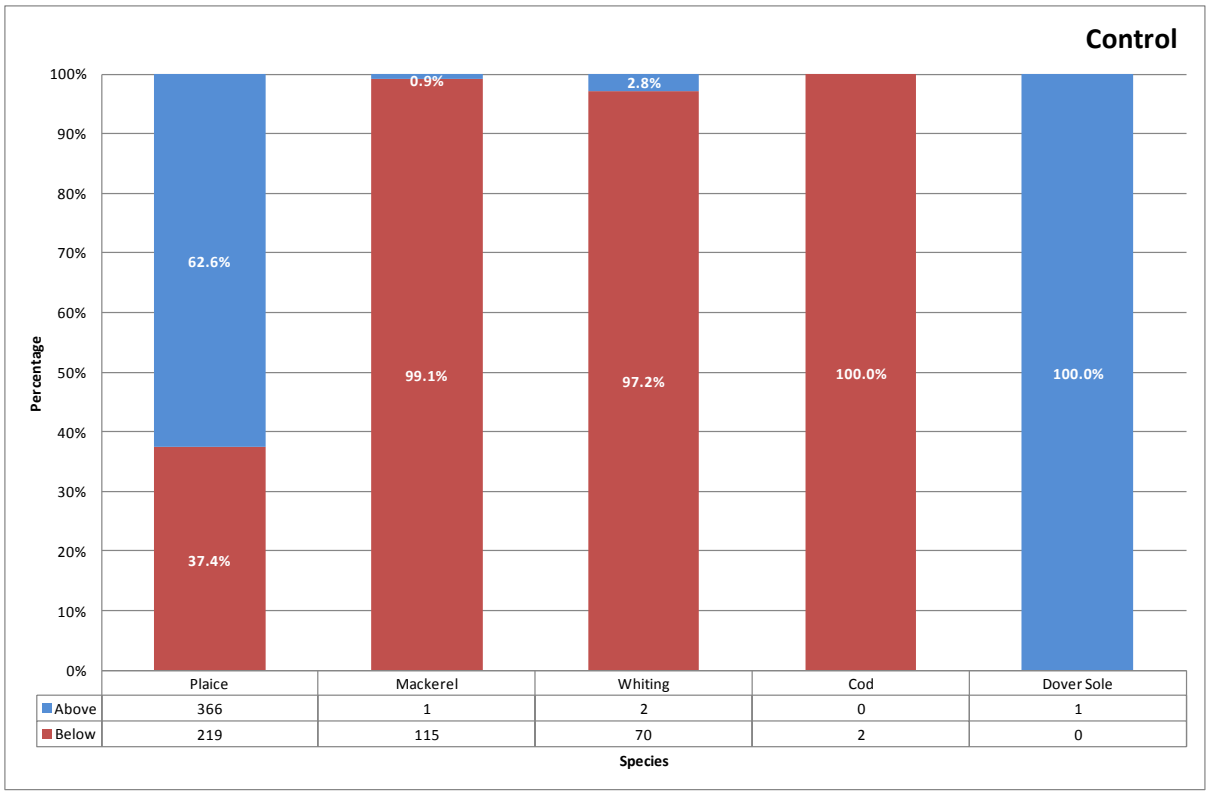


Figure 5.14 Percentage of the Catch Above and Below the MLS by Species at the Control Stations

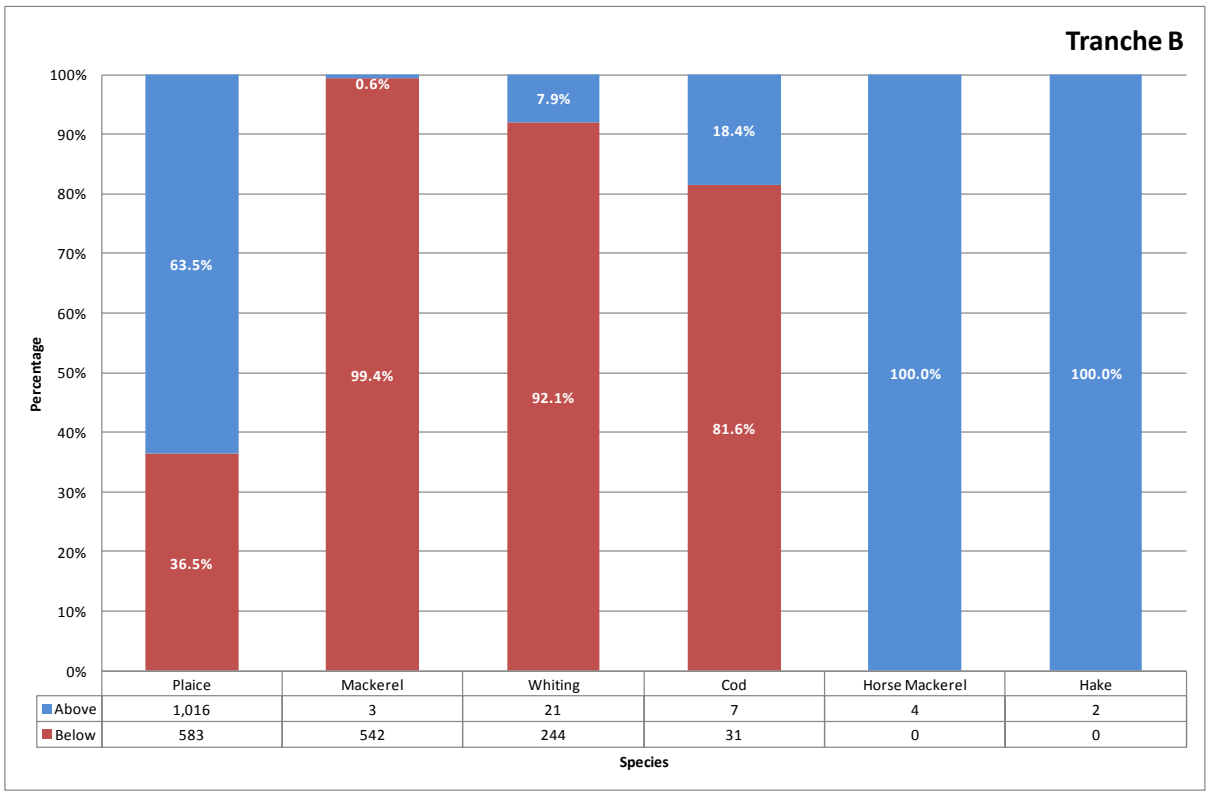


Figure 5.15 Percentage of the Catch Above and Below the MLS by Species within Tranche B

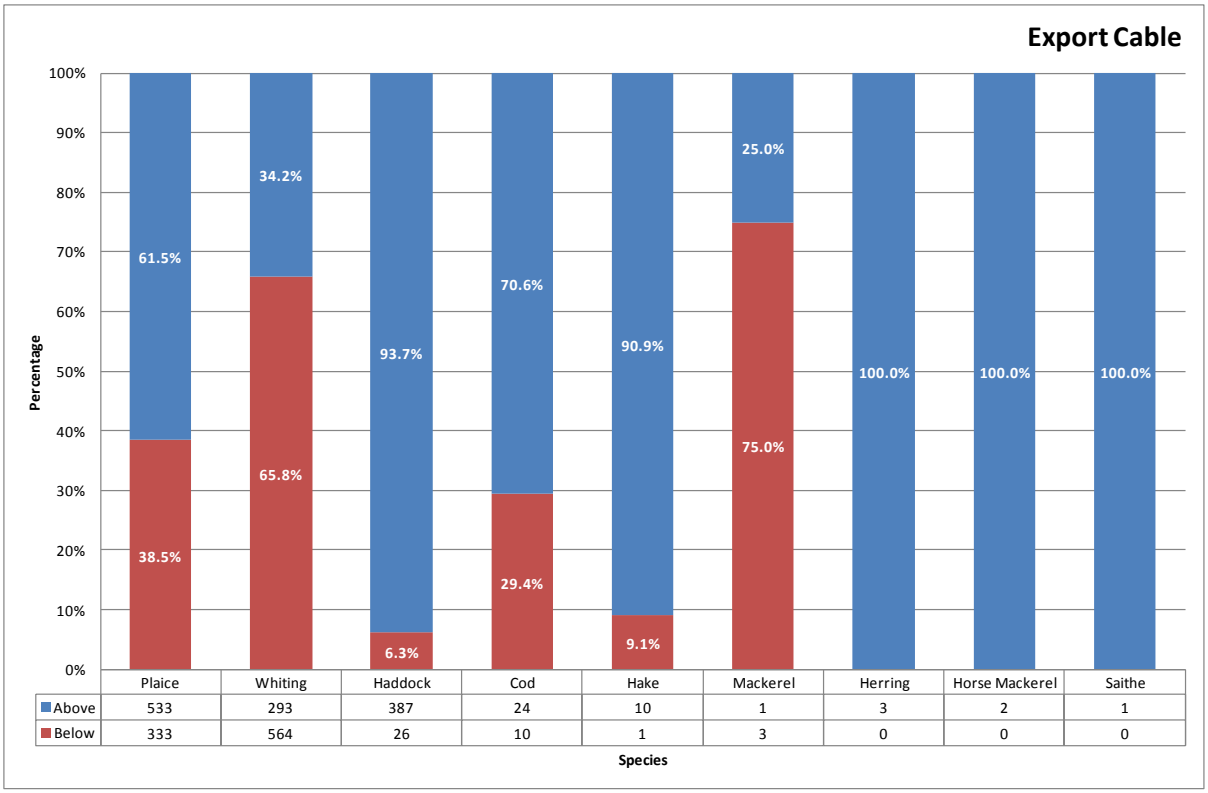


Figure 5.16 Percentage of the Catch Above and Below the MLS by Species at Stations along the Export Cable

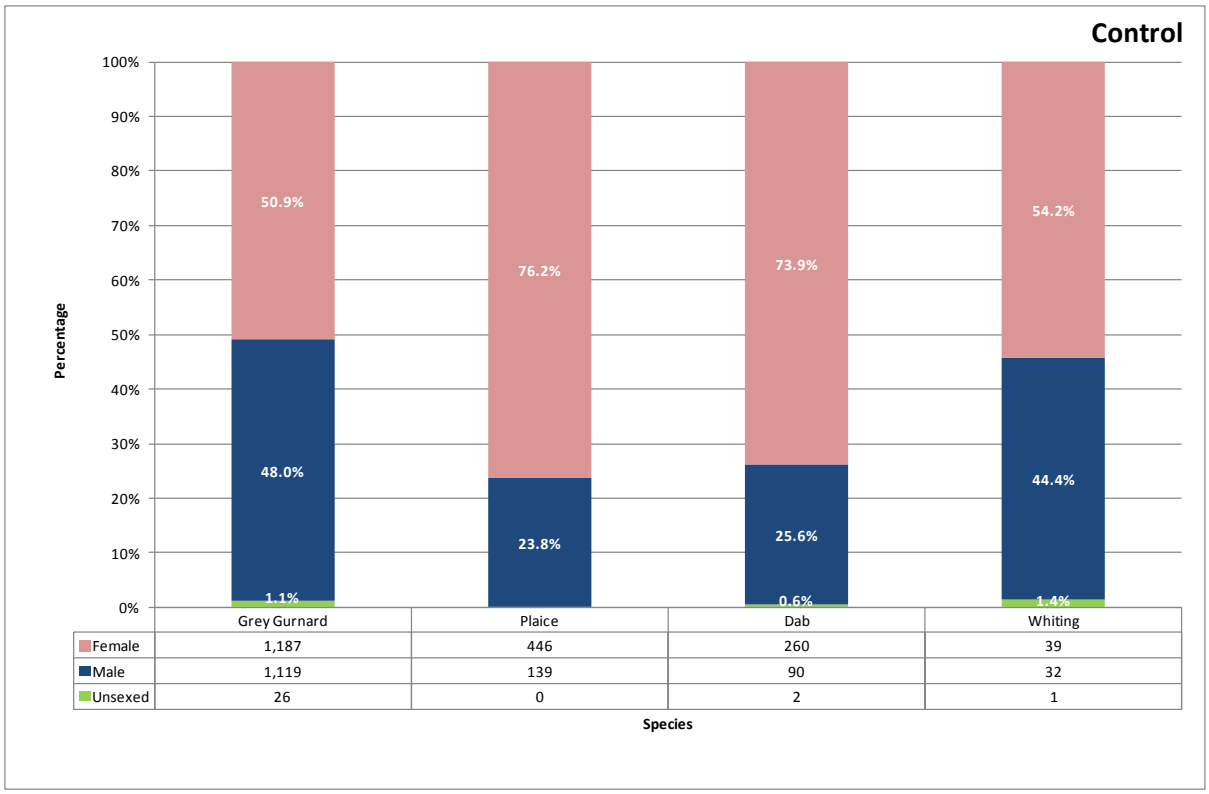
5.4 Sex Ratios

The sex ratios of the most abundant species caught during the survey (>1,000 individuals) are shown in Figure 5.17, Figure 5.18 and Figure 5.19 for control, Tranche B and export cable stations, respectively. It should be noted that Cefas were unable to confidently determine the sex of a number of immature individuals, and as such they have been categorised as 'unsexed'.

The sex ratio for the *E. gurnardus* caught at the control stations and along the export cable was approximately even, whereas the greatest proportion of those found within Tranche B was female (56.5%).

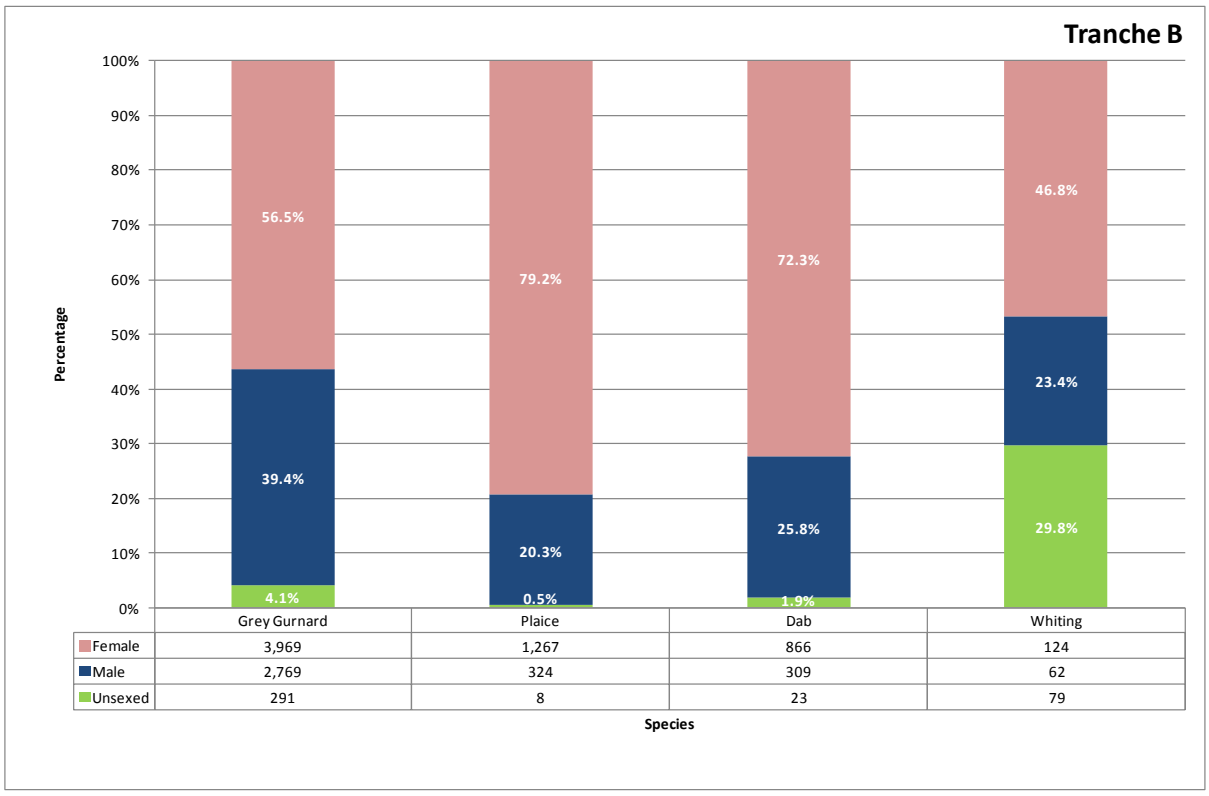
Most of the *P. platessa* and *L. limanda* caught at the control stations (76.2% and 73.9% respectively) and within Tranche B (79.2% and 72.3%) were female, whereas the sex ratio for both species along the export cable was approximately even.

The highest proportion of the *M. merlangus* caught within Tranche B (46.8%) and along the export cable (55.3%) were female (where the sex could be determined), whereas at the control stations the sex ratio was approximately even.



	Grey Gurnard	Plaice	Dab	Whiting
Female	1,187	446	260	39
Male	1,119	139	90	32
Unsexed	26	0	2	1

Figure 5.17 Sex Ratio by Species at the Control Stations



	Grey Gurnard	Plaice	Dab	Whiting
Female	3,969	1,267	866	124
Male	2,769	324	309	62
Unsexed	291	8	23	79

Figure 5.18 Sex Ratio by Species within Tranche B

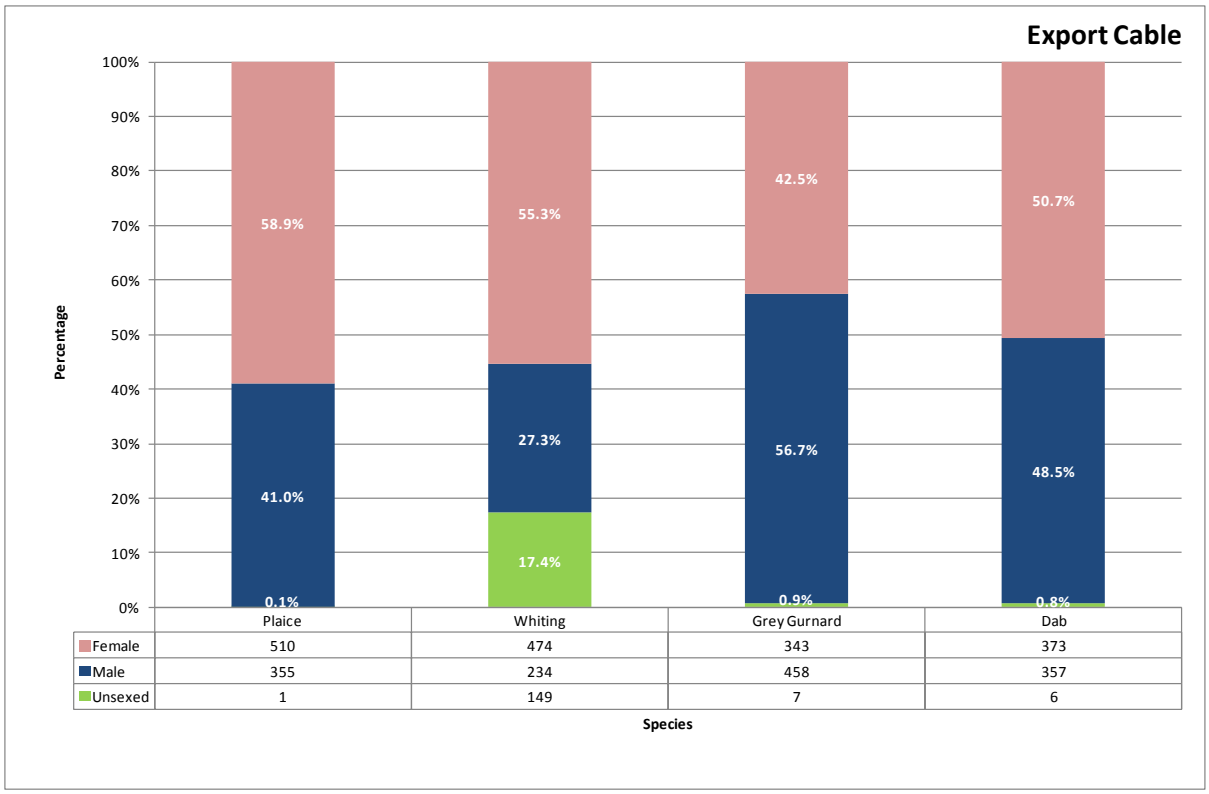


Figure 5.19 Sex Ratio by Species at Stations along the Export Cable

5.5 Spawning Condition

The spawning condition, sex and length range (nearest cm below) for the most abundant species caught during the survey (>1,000 individuals) are given below in Table 5.4 to Table 5.7. The spawning condition, sex and length range for *G. morhua* is also given in Table 5.8.

Where a stage of maturity was not recorded for a species it has not been included in the following tables. It should be noted that Cefas were unable to confidently determine the sex of a number of immature individuals, and as such they have been categorised as 'unsexed'.

The highest proportion of the *E. gurnardus* caught at the control stations (59.0%) and within Tranche B (50.0%) were spent individuals, whereas along the export cable maturing (40.0%) and spent (39.1%) individuals represented a large proportion of the catch.

The greatest proportion of the *P. platessa* (control 77.8%, Tranche B 68.4%, export cable 63.9%) and *L. limanda* (93.7%, 80.9% and 48.0% respectively) caught in all sampling areas were spent individuals.

Most of the *M. merlangus* (72.2%, 78.9% and 62.7%) and the highest proportion of the *G. morhua* (100.0%, 94.7% and 41.2%) caught in all sampling areas were immature.

Two 'early spent' female *C. harengus* and one 'early ripening' male were caught along the export cable at stations OT111 and OT119 respectively.

Table 5.4 Grey Gurnard (*E. gurnardus*) Spawning Condition

Grey Gurnard								
Sex	Maturity	Individuals Caught			Total	% of Total Catch	Length Range (cm)	
		Control	Tranche B	Export Cable			Min.	Max.
Female	Immature	76	226	51	353	3.6%	14	25
	Maturing	261	1,198	99	1,558	15.7%	16	39
	Hyaline	134	404	26	564	5.7%	17	37
	Running	0	20	0	20	0.2%	30	33
	Spent	716	2,121	167	3,004	30.3%	17	39
Male	Immature	135	217	87	439	4.4%	15	27
	Maturing	339	1,278	223	1,840	18.6%	15	35
	Spent	645	1,274	148	2,067	20.9%	17	36
Unsexed	Immature	0	57	4	61	0.6%	12	19

Table 5.5 Plaice (*P. platessa*) Spawning Condition

Plaice								
Sex	Maturity	Individuals Caught			Total	% of Total Catch	Length Range (cm)	
		Control	Tranche B	Export Cable			Min.	Max.
Female	Immature	83	278	128	489	16.0%	15	40
	Maturing	6	108	61	175	5.7%	21	47
	Hyaline	0	0	3	3	0.1%	24	24
	Spent	357	881	318	1,556	51.1%	20	57
Male	Immature	41	80	45	166	5.4%	17	28
	Maturing	0	33	75	108	3.5%	21	34
	Spent	98	211	235	544	17.9%	19	39
Unsexed	Immature	0	6	0	6	0.2%	19	22

Table 5.6 Dab (*L. limanda*) Spawning Condition

Dab								
Sex	Maturity	Individuals Caught			Total	% of Total Catch	Length Range (cm)	
		Control	Tranche B	Export Cable			Min.	Max.
Female	Immature	17	113	150	280	12.4%	13	28
	Maturing	0	41	25	66	2.9%	15	29
	Spent	243	712	198	1,153	51.0%	13	35
Male	Immature	1	39	80	120	5.3%	11	26
	Maturing	4	27	123	154	6.8%	15	29
	Spent	85	243	154	482	21.3%	13	28
Unsexed	Immature	0	5	3	8	0.4%	13	19

Table 5.7 Whiting (*M. merlangus*) Spawning Condition

Whiting								
Sex	Maturity	Individuals Caught			Total	% of Total Catch	Length Range (cm)	
		Control	Tranche B	Export Cable			Min.	Max.
Female	Immature	25	79	254	358	30.0%	17	29
	Maturing	0	6	67	73	6.1%	19	38
	Spent	14	39	153	206	17.3%	21	41
Male	Immature	26	51	134	211	17.7%	18	31
	Maturing	0	3	31	34	2.8%	21	28
	Spent	6	8	69	83	7.0%	23	37
Unsexed	Immature	1	79	149	229	19.2%	17	27

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

Cod								
Sex	Maturity	Individuals Caught			Total	% of Total Catch	Length Range (cm)	
		Control	Tranche B	Export Cable			Min.	Max.
Female	Immature	1	18	6	25	33.8%	26	49
	Maturing	0	0	5	5	6.8%	36	74
	Spent	0	2	7	9	12.2%	38	56
Male	Immature	1	17	6	24	32.4%	26	44
	Maturing	0	0	1	1	1.4%	48	48
	Spent	0	0	7	7	9.5%	36	63
Unsexed	Immature	0	1	2	3	4.1%	23	29

6.0 Beam Trawl Results

6.1 Catch Rates and Species Distribution

The total number of individuals caught and the catch rate (number of individuals caught per hour) for fish species by sampling area are given in Table 6.1 below and are illustrated in Figure 6.1. The catch rate of fish species by sampling station are shown in Figure 6.2 to Figure 6.4 for control, Tranche B and export cable stations respectively.

A total of 26 species of fish were caught, 10 of which were found at the control stations, 18 within Tranche B and 16 along the export cable.

Overall, *B. luteum* was the most abundant species caught (1,906 individuals), representing 74.4% of the total fish catch in the beam trawl, followed by *L. limanda* (333) and then *P. minutus* (79). Most of the *B. luteum* caught (79.8%) were found in Tranche B.

B. luteum were the most prevalent species at the control stations (222.3/hr) and within Tranche B (303.8/hr), whereas *L. limanda* were most abundant along the export cable (17.0/hr).

The station with the greatest total catch rate was BT41 within Tranche B (976.4/hr), with *B. luteum* representing 89.0% of the catch.

A. marinus were found at the control stations and within Tranche B, with the highest total catch rate at the control stations (5.4/hr). Stations BT94 (control; 42.0/hr) and BT84 (Tranche B; 41.9/hr) had the greatest catch rates for this species.

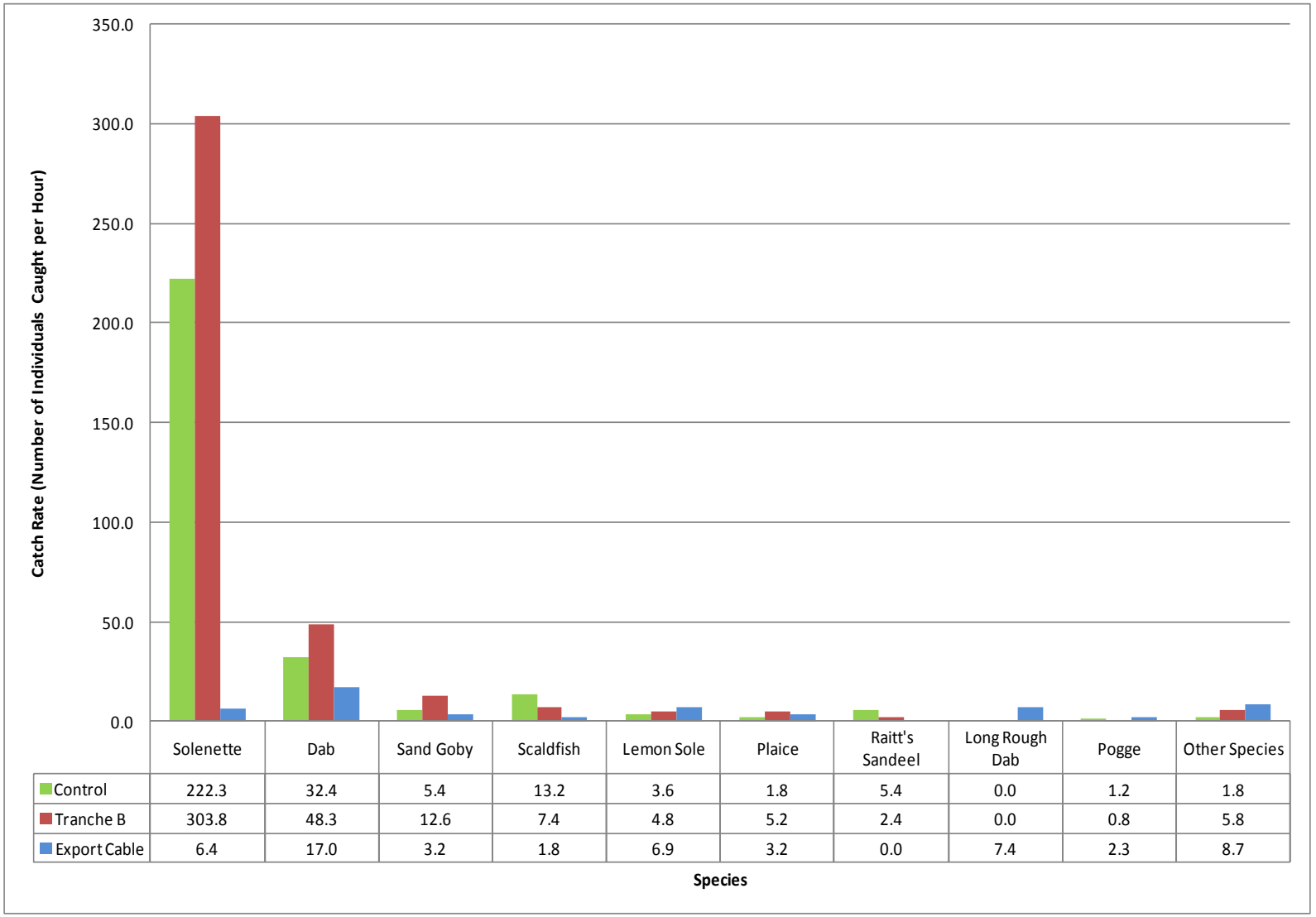
P. platessa were found in low numbers in all sampling areas, with the highest total catch rate recorded within Tranche B (5.2/hr). A total of two *M. merlangus* were found along the export cable at stations BT118 and BT119.

Overall, the total catch rate was greater within Tranche B (391.1/hr) than at the control stations (287.1/hr) and along the export cable (57.1/hr).

Table 6.1 Number of Individuals Caught and the Catch Rate for Fish Species by Sampling Area

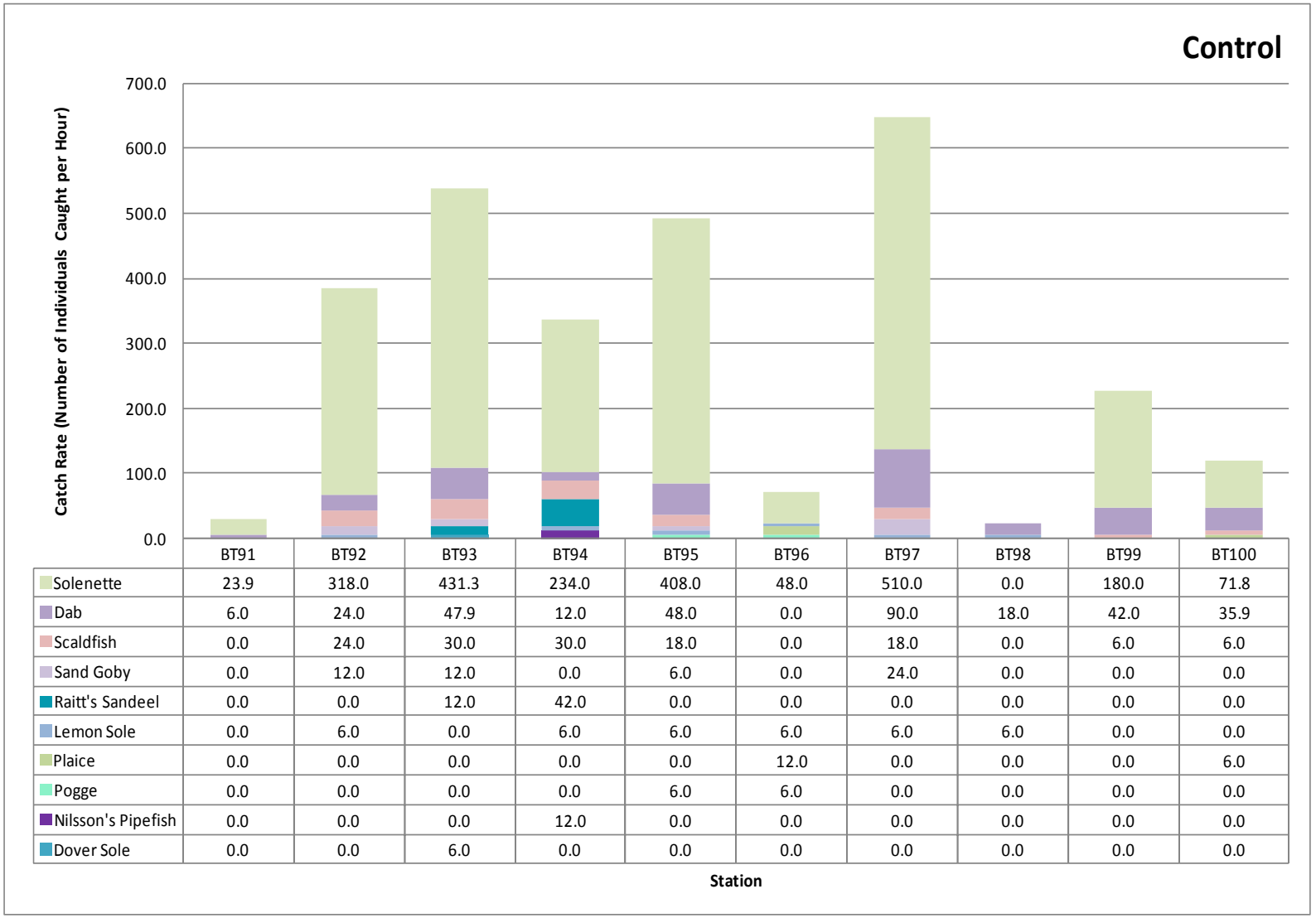
Species		Number of Individuals Caught				Catch Rate (Individuals Caught per Hour)		
Common Name	Scientific Name	Control	Tranche B	Export Cable	Total	Control	Tranche B	Export Cable
Solenette	*Buglossidium luteum*	371	1,521	14	1,906	222.3	303.8	6.4
Dab	*Limanda limanda*	54	242	37	333	32.4	48.3	17.0
Sand Goby	*Pomatoschistus minutus*	9	63	7	79	5.4	12.6	3.2
Scaldfish	*Arnoglossus laterna*	22	37	4	63	13.2	7.4	1.8
Lemon Sole	*Microstomus kitt*	6	24	15	45	3.6	4.8	6.9
Plaice	*Pleuronectes platessa*	3	26	7	36	1.8	5.2	3.2
Raitt's Sandeel	*Ammodytes marinus*	9	12	0	21	5.4	2.4	0.0
Long Rough Dab	*Hippoglossoides platessoides*	0	0	16	16	0.0	0.0	7.4
Pogge	*Agonus cataphractus*	2	4	5	11	1.2	0.8	2.3
Common Dragonet	*Callionymus lyra*	0	6	2	8	0.0	1.2	0.9
Hagfish	*Myxine glutinosa*	0	0	8	8	0.0	0.0	3.7
Megrim	*Lepidorhombus whiffiagonis*	0	5	0	5	0.0	1.0	0.0
Sea Scorpion	*Taurulus bubalis*	0	4	1	5	0.0	0.8	0.5
Gurnard (indet.)	*Triglidae sp.*	0	3	1	4	0.0	0.6	0.5
Gadoid (indet.)	*Gadidae sp.*	0	3	0	3	0.0	0.6	0.0
Poor Cod	*Trisopterus minutus*	0	0	3	3	0.0	0.0	1.4
Grey Gurnard	*Eutrigla gurnardus*	0	2	0	2	0.0	0.4	0.0
Lesser Weever	*Echiichthys vipera*	0	2	0	2	0.0	0.4	0.0
Nilsson's Pipefish	*Syngnathus rostellatus*	2	0	0	2	1.2	0.0	0.0
Painted Goby	*Pomatoschistus pictus*	0	2	0	2	0.0	0.4	0.0
Whiting	*Merlangius merlangus*	0	0	2	2	0.0	0.0	0.9
Crystal Goby	*Crystallogobius lineois*	0	1	0	1	0.0	0.2	0.0
Dover Sole	*Solea solea*	1	0	0	1	0.6	0.0	0.0
Goby (indet.)	*Gobiidae sp.*	0	0	1	1	0.0	0.0	0.5

Species		Number of Individuals Caught				Catch Rate (Individuals Caught per Hour)		
Common Name	Scientific Name	Control	Tranche B	Export Cable	Total	Control	Tranche B	Export Cable
Reticulated Dragonet	*Callionymus reticulatus*	0	1	0	1	0.0	0.2	0.0
Thornback Ray	*Raja clavata*	0	0	1	1	0.0	0.0	0.5
Total No. Individuals		479	1,958	124				
Total No. Species		10	18	16				
Total Catch Rate (No. Individuals Caught per Hour)		287.1	391.1	57.1				



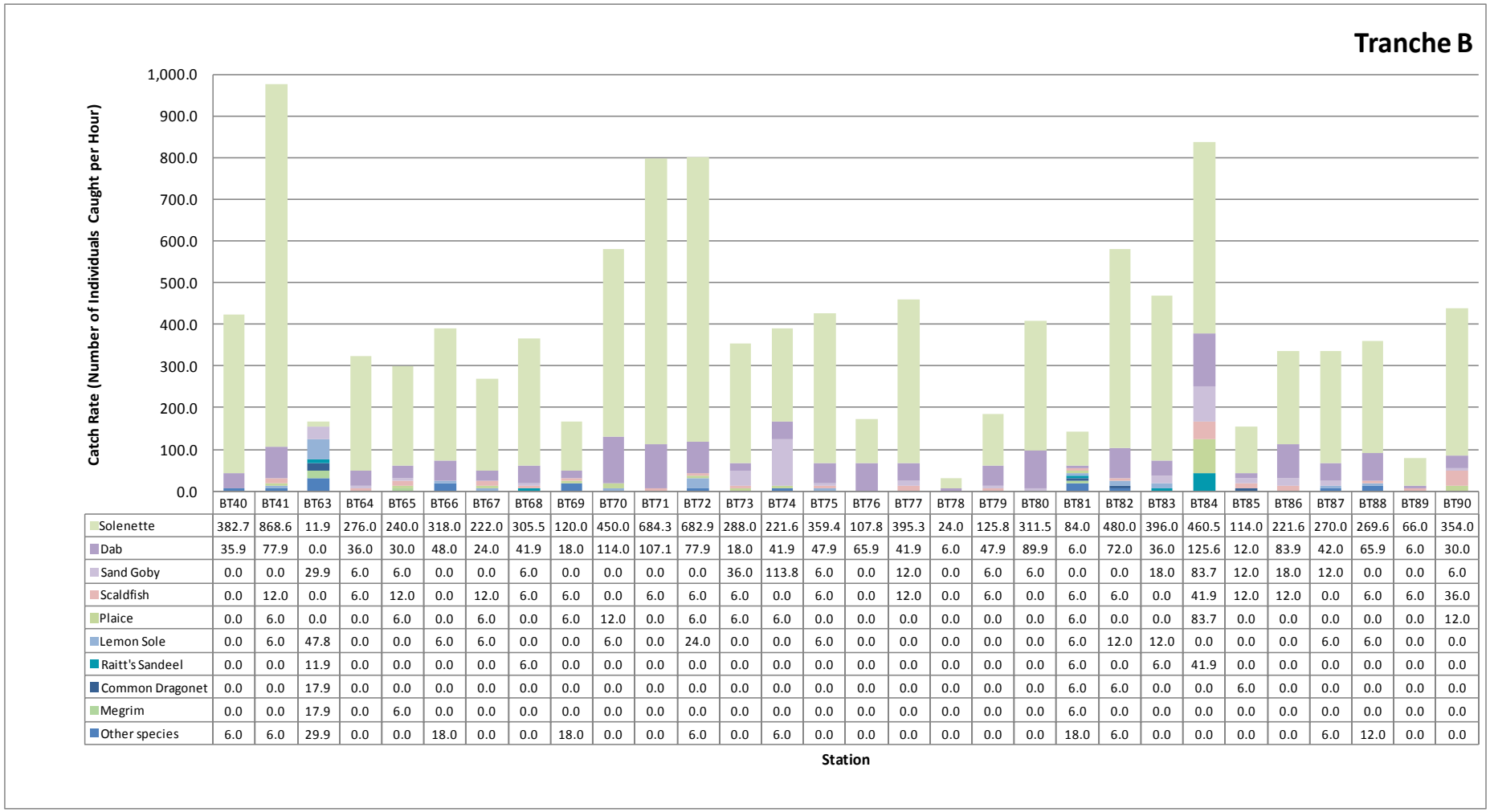
	Solenette	Dab	Sand Goby	Scaldfish	Lemon Sole	Plaice	Raitt's Sandeel	Long Rough Dab	Pogge	Other Species
Control	222.3	32.4	5.4	13.2	3.6	1.8	5.4	0.0	1.2	1.8
Tranche B	303.8	48.3	12.6	7.4	4.8	5.2	2.4	0.0	0.8	5.8
Export Cable	6.4	17.0	3.2	1.8	6.9	3.2	0.0	7.4	2.3	8.7

Figure 6.1 Catch Rates for Fish Species by Sampling Area



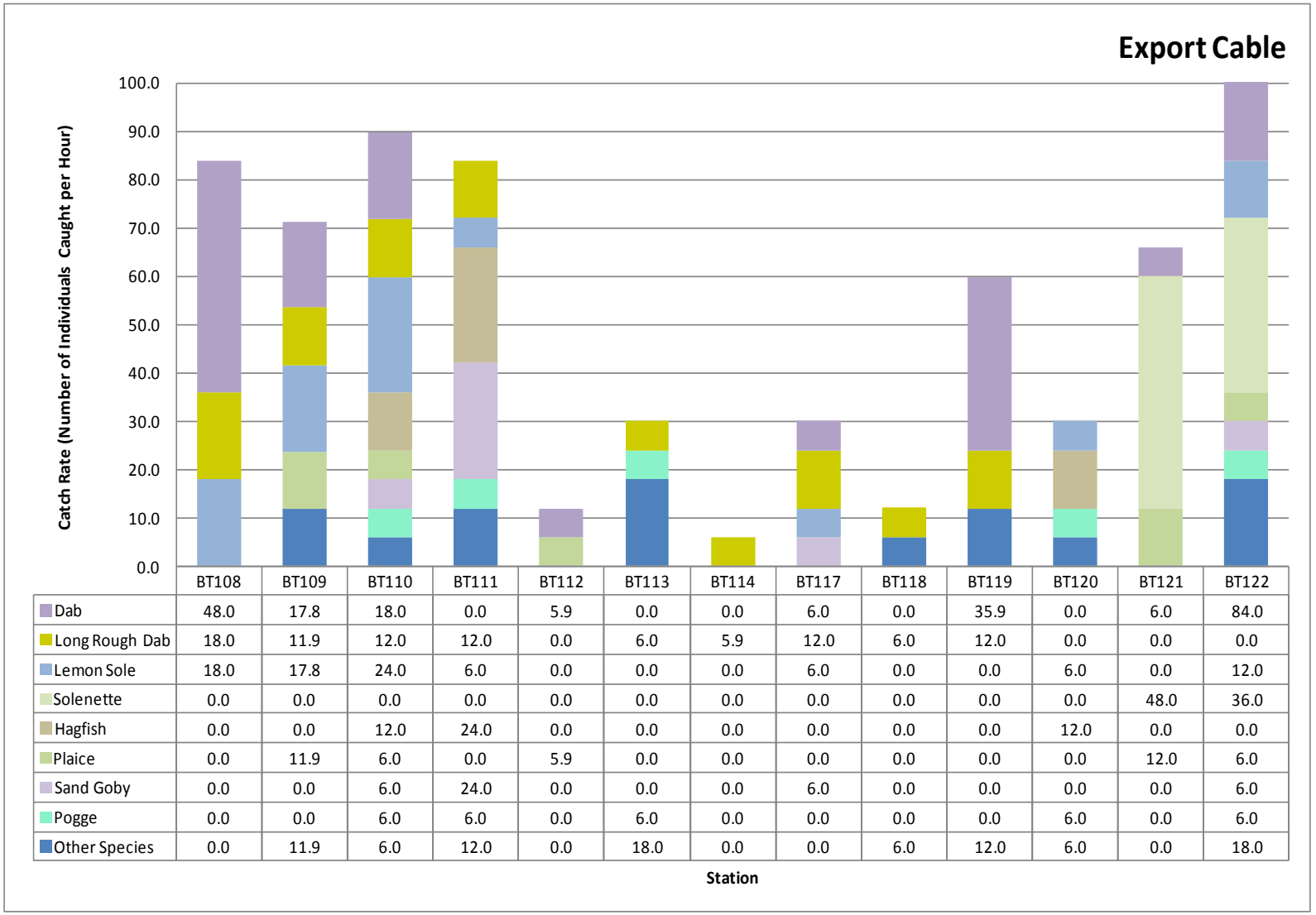
	BT91	BT92	BT93	BT94	BT95	BT96	BT97	BT98	BT99	BT100
Solenette	23.9	318.0	431.3	234.0	408.0	48.0	510.0	0.0	180.0	71.8
Dab	6.0	24.0	47.9	12.0	48.0	0.0	90.0	18.0	42.0	35.9
Scaldfish	0.0	24.0	30.0	30.0	18.0	0.0	18.0	0.0	6.0	6.0
Sand Goby	0.0	12.0	12.0	0.0	6.0	0.0	24.0	0.0	0.0	0.0
Raitt's Sandeel	0.0	0.0	12.0	42.0	0.0	0.0	0.0	0.0	0.0	0.0
Lemon Sole	0.0	6.0	0.0	6.0	6.0	6.0	6.0	6.0	0.0	0.0
Plaice	0.0	0.0	0.0	0.0	0.0	12.0	0.0	0.0	0.0	6.0
Pogge	0.0	0.0	0.0	0.0	6.0	6.0	0.0	0.0	0.0	0.0
Nilsson's Pipefish	0.0	0.0	0.0	12.0	0.0	0.0	0.0	0.0	0.0	0.0
Dover Sole	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Figure 6.2 Catch Rates for Fish Species by Station at the Control Stations



	BT40	BT41	BT63	BT64	BT65	BT66	BT67	BT68	BT69	BT70	BT71	BT72	BT73	BT74	BT75	BT76	BT77	BT78	BT79	BT80	BT81	BT82	BT83	BT84	BT85	BT86	BT87	BT88	BT89	BT90
Solenette	382.7	868.6	11.9	276.0	240.0	318.0	222.0	305.5	120.0	450.0	684.3	682.9	288.0	221.6	359.4	107.8	395.3	24.0	125.8	311.5	84.0	480.0	396.0	460.5	114.0	221.6	270.0	269.6	66.0	354.0
Dab	35.9	77.9	0.0	36.0	30.0	48.0	24.0	41.9	18.0	114.0	107.1	77.9	18.0	41.9	47.9	65.9	41.9	6.0	47.9	89.9	6.0	72.0	36.0	125.6	12.0	83.9	42.0	65.9	6.0	30.0
Sand Goby	0.0	0.0	29.9	6.0	6.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	36.0	113.8	6.0	0.0	12.0	0.0	6.0	6.0	0.0	0.0	18.0	83.7	12.0	18.0	12.0	0.0	0.0	6.0
Scaldfish	0.0	12.0	0.0	6.0	12.0	0.0	12.0	6.0	6.0	0.0	6.0	6.0	6.0	0.0	6.0	0.0	12.0	0.0	6.0	0.0	6.0	6.0	0.0	41.9	12.0	12.0	0.0	6.0	6.0	36.0
Plaice	0.0	6.0	0.0	0.0	6.0	0.0	6.0	0.0	6.0	12.0	0.0	6.0	6.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	83.7	0.0	0.0	0.0	0.0	0.0	12.0
Lemon Sole	0.0	6.0	47.8	0.0	0.0	6.0	6.0	0.0	0.0	6.0	0.0	24.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	6.0	12.0	12.0	0.0	0.0	0.0	6.0	6.0	0.0	0.0
Raitt's Sandeel	0.0	0.0	11.9	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	6.0	41.9	0.0	0.0	0.0	0.0	0.0	0.0
Common Dragonet	0.0	0.0	17.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	6.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0
Megrim	0.0	0.0	17.9	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other species	6.0	6.0	29.9	0.0	0.0	18.0	0.0	0.0	18.0	0.0	0.0	6.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	18.0	6.0	0.0	0.0	0.0	0.0	6.0	12.0	0.0	0.0

Figure 6.3 Catch Rates for Fish Species by Station within Tranche B



	BT108	BT109	BT110	BT111	BT112	BT113	BT114	BT117	BT118	BT119	BT120	BT121	BT122
Dab	48.0	17.8	18.0	0.0	5.9	0.0	0.0	6.0	0.0	35.9	0.0	6.0	84.0
Long Rough Dab	18.0	11.9	12.0	12.0	0.0	6.0	5.9	12.0	6.0	12.0	0.0	0.0	0.0
Lemon Sole	18.0	17.8	24.0	6.0	0.0	0.0	0.0	6.0	0.0	0.0	6.0	0.0	12.0
Solenette	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	48.0	36.0
Hagfish	0.0	0.0	12.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	12.0	0.0	0.0
Plaice	0.0	11.9	6.0	0.0	5.9	0.0	0.0	0.0	0.0	0.0	0.0	12.0	6.0
Sand Goby	0.0	0.0	6.0	24.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	6.0
Pogge	0.0	0.0	6.0	6.0	0.0	6.0	0.0	0.0	0.0	0.0	6.0	0.0	6.0
Other Species	0.0	11.9	6.0	12.0	0.0	18.0	0.0	0.0	6.0	12.0	6.0	0.0	18.0

Figure 6.4 Catch Rates for Fish Species by Station along the Export Cable

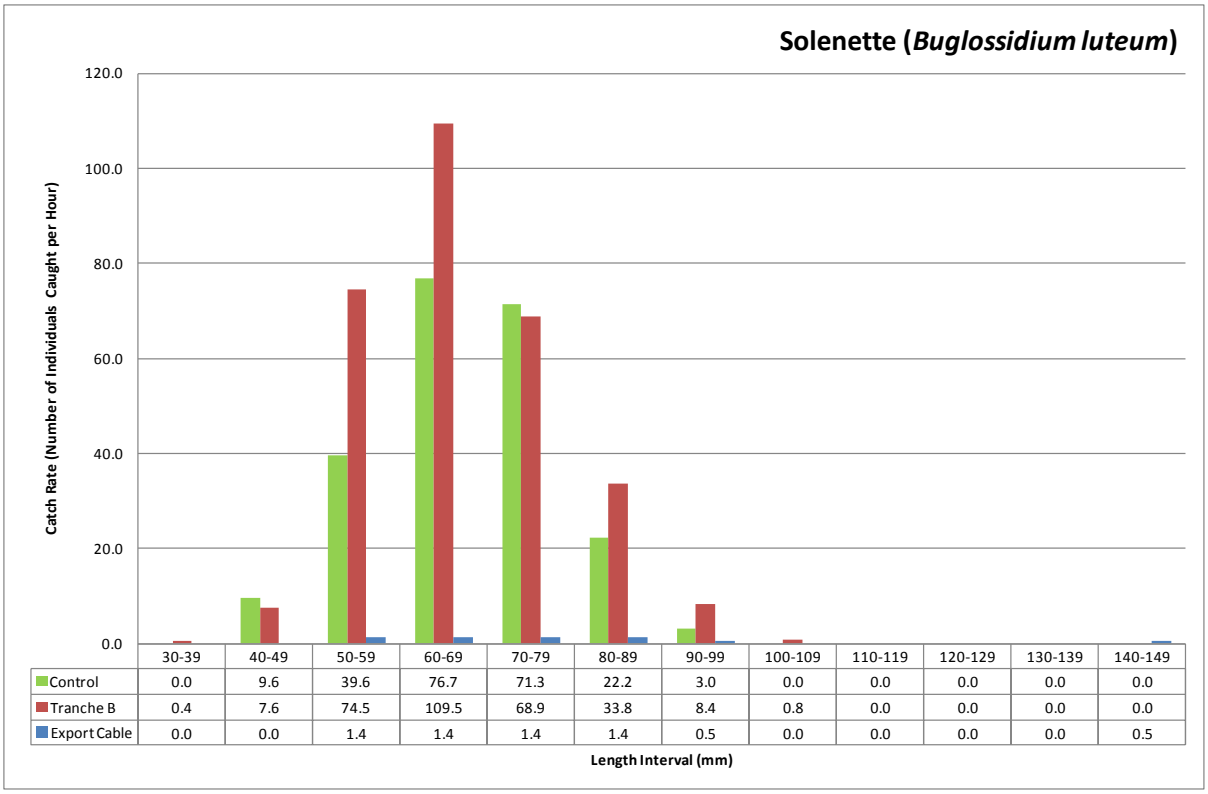
6.2 Length Distributions

The average length (mm) and length range for fish species caught by sampling area (control, Tranche B and export cable) is given in Table 6.2 below.

The length distributions of the five most abundant species caught during the survey (>40 individuals), expressed as the catch rate (number of individuals caught per hour) by length (mm) and by sampling area, are shown in Figure 6.5 to Figure 6.9 below.

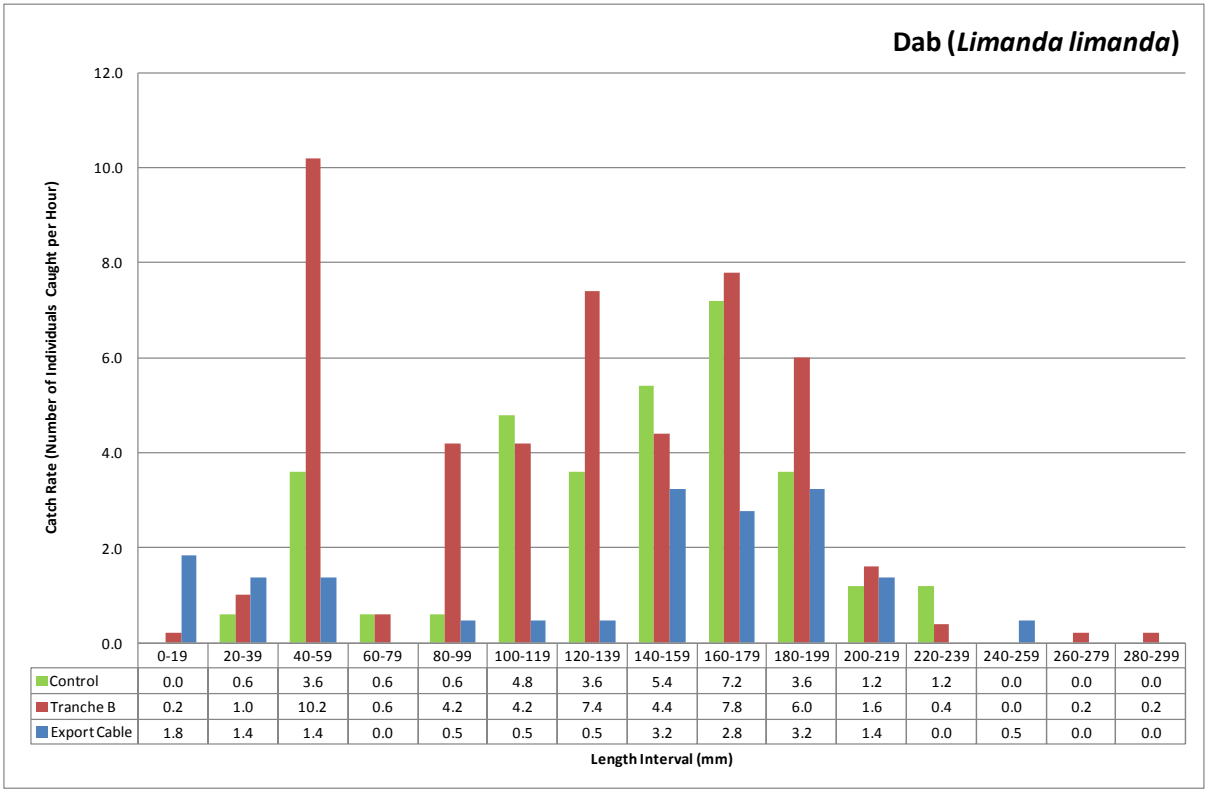
Table 6.2 Average Length and Length Range for Fish Species Caught by Sampling Area

Species		Average Length (mm)			Length Range (mm)	
Common Name	Scientific Name	Control	Tranche B	Export Cable	Min.	Max.
Common Dragonet	*Callionymus lyra*	-	145.0	170.0	90.0	190.0
Crystal Goby	*Crystallogobius lineois*	-	35.0	-	35.0	35.0
Dab	*Limanda limanda*	136.8	126.3	131.0	10.0	280.0
Dover Sole	*Solea solea*	280.0	-	-	280.0	280.0
Gadoid (indet.)	*Gadidae sp.*	-	25.0	-	20.0	30.0
Goby (indet.)	*Gobiidae sp.*	-	-	10.0	10.0	10.0
Grey Gurnard	*Eutrigla gurnardus*	-	200.0	-	180.0	220.0
Gurnard (indet.)	*Triglidae sp.*	-	21.7	25.0	20.0	25.0
Hagfish	*Myxine glutinosa*	-	-	201.3	140.0	290.0
Lemon Sole	*Microstomus kitt*	200.0	198.8	191.3	140.0	290.0
Long Rough Dab	*Hippoglossoides platessoides*	-	-	170.6	130.0	200.0
Megrim	*Lepidorhombus whiffiagonis*	-	65.0	-	50.0	80.0
Nilsson's Pipefish	*Syngnathus rostellatus*	130.0	-	-	130.0	130.0
Painted Goby	*Pomatoschistus pictus*	-	40.0	-	40.0	40.0
Plaice	*Pleuronectes platessa*	280.0	325.8	267.1	180.0	460.0
Pogge	*Agonus cataphractus*	65.0	47.5	69.0	25.0	150.0
Poor Cod	*Trisopterus minutus*	-	-	113.3	70.0	140.0
Raitt's Sandeel	*Ammodytes marinus*	77.5	120.8	-	40.0	155.0
Reticulated Dragonet	*Callionymus reticulatus*	-	100.0	-	100.0	100.0
Sand Goby	*Pomatoschistus minutus*	49.3	41.1	38.6	15.0	60.0
Scaldfish	*Arnoglossus laterna*	78.6	81.9	88.8	20.0	130.0
Sea Scorpion	*Taurulus bubalis*	-	190.0	15.0	15.0	220.0
Solenette	*Buglossidium luteum*	66.4	68.2	77.3	30.0	140.0
Thornback Ray	*Raja clavata*	-	-	170.0	170.0	170.0
Whiting	*Merlangius merlangus*	-	-	280.0	230.0	330.0



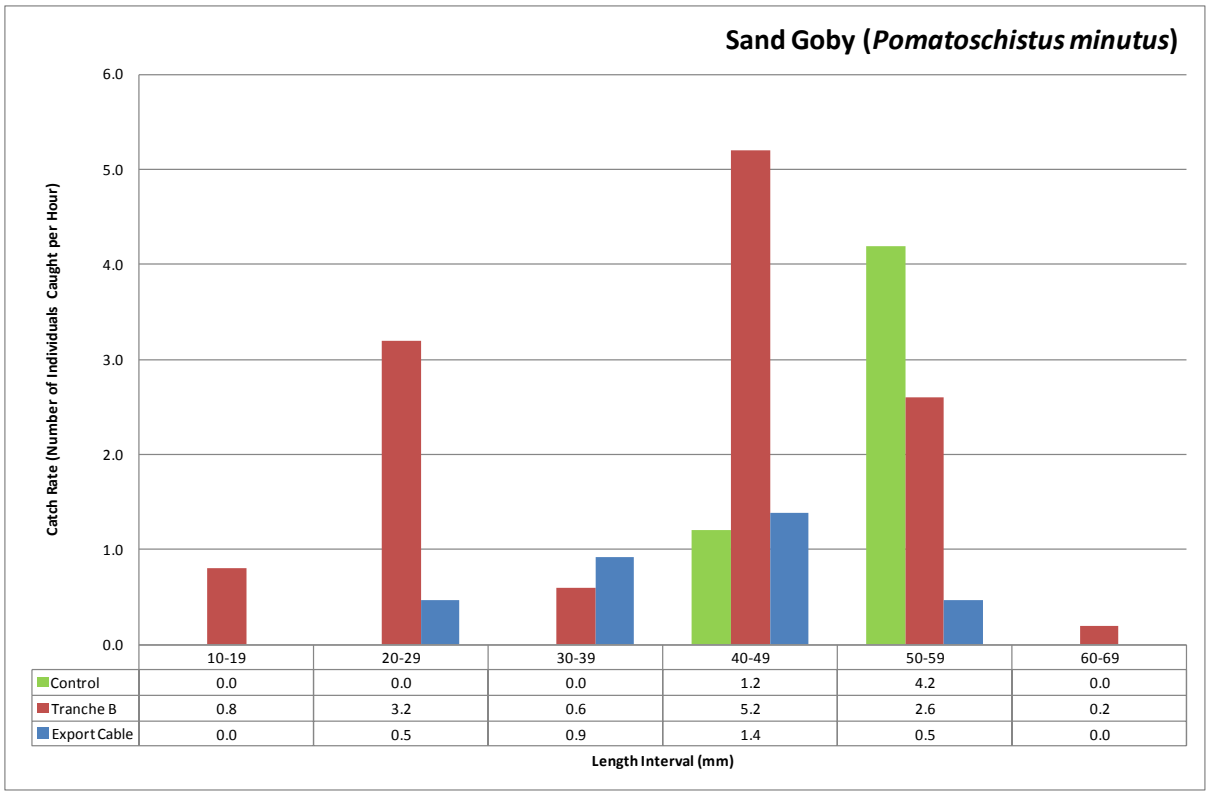
	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100-109	110-119	120-129	130-139	140-149
Control	0.0	9.6	39.6	76.7	71.3	22.2	3.0	0.0	0.0	0.0	0.0	0.0
Tranche B	0.4	7.6	74.5	109.5	68.9	33.8	8.4	0.8	0.0	0.0	0.0	0.0
Export Cable	0.0	0.0	1.4	1.4	1.4	1.4	0.5	0.0	0.0	0.0	0.0	0.5

Figure 6.5 Solenette (*B. luteum*) Length Distribution by Sampling Area



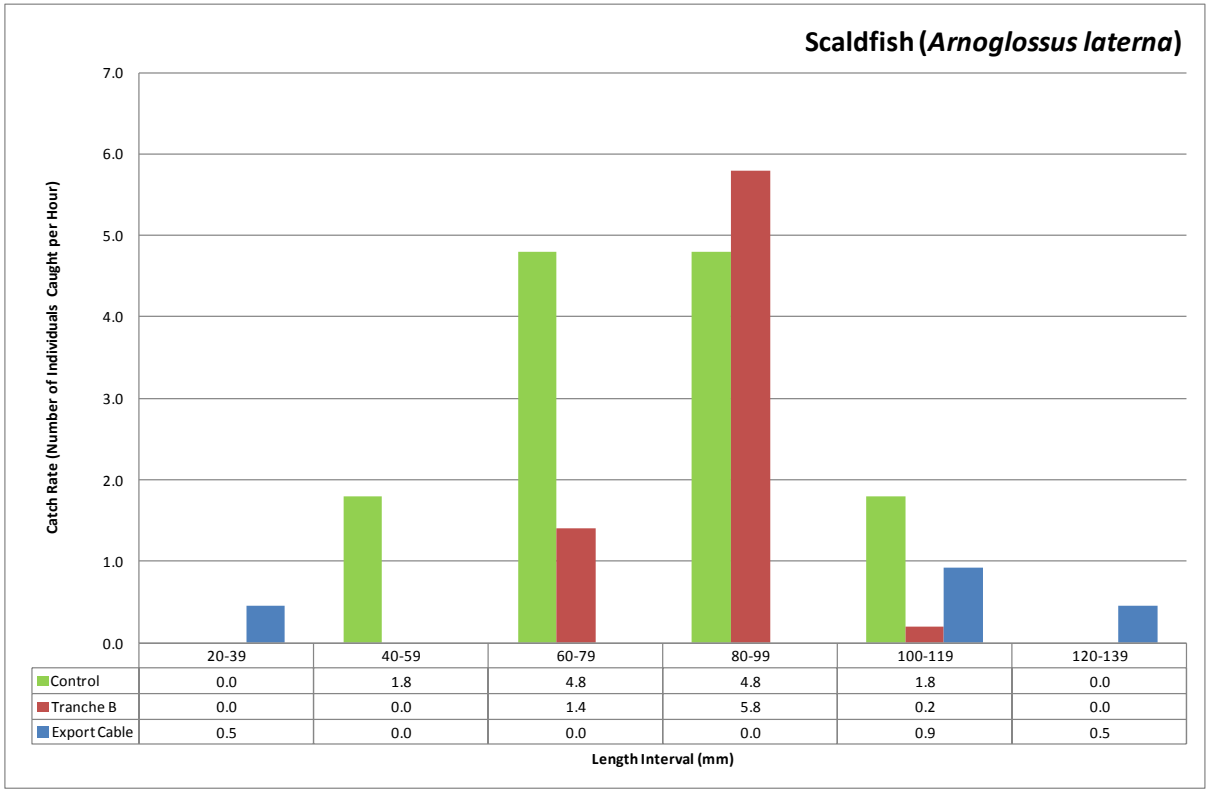
	0-19	20-39	40-59	60-79	80-99	100-119	120-139	140-159	160-179	180-199	200-219	220-239	240-259	260-279	280-299
Control	0.0	0.6	3.6	0.6	0.6	4.8	3.6	5.4	7.2	3.6	1.2	1.2	0.0	0.0	0.0
Tranche B	0.2	1.0	10.2	0.6	4.2	4.2	7.4	4.4	7.8	6.0	1.6	0.4	0.0	0.2	0.2
Export Cable	1.8	1.4	1.4	0.0	0.5	0.5	0.5	3.2	2.8	3.2	1.4	0.0	0.5	0.0	0.0

Figure 6.6 Dab (*L. limanda*) Length Distribution by Sampling Area



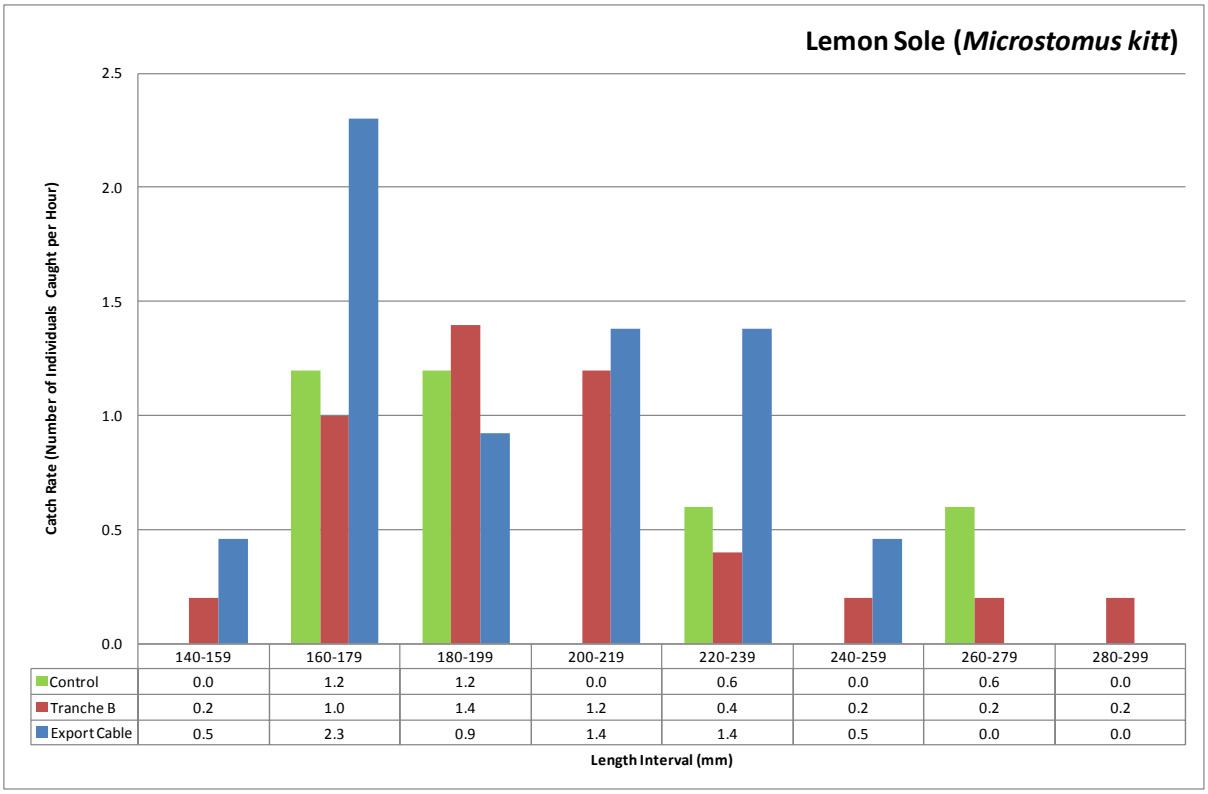
	10-19	20-29	30-39	40-49	50-59	60-69
Control	0.0	0.0	0.0	1.2	4.2	0.0
Tranche B	0.8	3.2	0.6	5.2	2.6	0.2
Export Cable	0.0	0.5	0.9	1.4	0.5	0.0

Figure 6.7 Sand Goby (*P. minutus*) Length Distribution by Sampling Area



	20-39	40-59	60-79	80-99	100-119	120-139
Control	0.0	1.8	4.8	4.8	1.8	0.0
Tranche B	0.0	0.0	1.4	5.8	0.2	0.0
Export Cable	0.5	0.0	0.0	0.0	0.9	0.5

Figure 6.8 Scaldfish (*A. laterna*) Length Distribution by Sampling Area



	140-159	160-179	180-199	200-219	220-239	240-259	260-279	280-299
Control	0.0	1.2	1.2	0.0	0.6	0.0	0.6	0.0
Tranche B	0.2	1.0	1.4	1.2	0.4	0.2	0.2	0.2
Export Cable	0.5	2.3	0.9	1.4	1.4	0.5	0.0	0.0

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

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 Fire Fighting and Fire Prevention certificates 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 fish room and 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 below.

Table 7.1 Post Trip Survey Review

Project: Dogger Bank Tranche B Summer 2012	**Vessel:** Jubilee Spirit
Surveyors: Lucy Shuff, Alex Winrow-Giffin, Richard Preston	**Skipper:** Ross Crookes
Survey Area: Dogger Bank Tranche B	**Total Time at Sea:** 17 Days
Dates at Sea: 23/07/12 - 08/08/12	

	Comments	Actions
Did vessel comply with pre trip safety audits?	Yes	N/A
Skipper and crew attitude to safety?	Good	N/A
Vessel machinery failures?	Water pipe in engine room burst. Starboard sweep parted.	Water pipe repaired by crew at sea. Sweeps replaced by crew at sea.
Safety equipment failures?	None	N/A
Accidents?	None	N/A
Injuries?	None	N/A

Dogger Bank Offshore Wind Farm

Tranche B

Adult and Juvenile Fish Characterisation Survey

1st to 25th October 2012

F-OFL-RP-005

Undertaken by
Brown and May Marine Ltd

Ref	Issue Date	Issue Type	Author	Checked	Approved
DBTBOB03	06/02/2013	FINAL	LS/PP	LS/AWG	SJA

Contents

Figures

Tables

1.0 Summary

1.1 Otter Trawl

A total of 38 species were caught in the otter trawl survey; 15 at the control stations, 26 within Tranche B and 30 species along the export cable. Overall, grey gurnard (*Eutrigla gurnardus*) was the most abundant species caught, followed by plaice (*Pleuronectes platessa*) and then dab (*Limanda limanda*). The highest total catch rate was recorded at control station OT95, with *E. gurnardus* accounting for 90.3% of the catch. Overall, the total catch rate was slightly higher along the export cable than at the control stations and within Tranche B.

P. platessa were caught in all sampling areas, with the greatest total catch rate recorded at the control stations. Whiting (*Merlangius merlangus*) were recorded in all sampling areas, with a considerably higher total catch rate recorded along the export cable. Cod (*Gadus morhua*) and herring (*Clupea harengus*) were caught in relatively low numbers within Tranche B and along the export cable.

Nine fish and four shellfish species were caught with an EC minimum landing size (MLS). Most of the *P. platessa* caught at the control stations and most of the *M. merlangus* and haddock (*Melanogrammus aeglefinus*) found along the export cable were above the set MLS. Within Tranche B and along the export cable the percentage of *P. platessa* above and below the MLS was approximately even, and most of the *M. merlangus* caught at the control stations and within Tranche B were below the MLS. All other species with a set MLS were caught in relatively low numbers.

A higher proportion of the *E. gurnardus*, *P. platessa* and *L. limanda* caught at the control stations and within Tranche B, and of the *M. merlangus* found in all sampling areas were female. The sex ratio for the *E. gurnardus* and *P. platessa* caught along the export cable was approximately even, and a higher proportion of the *L. limanda* found in this sampling area was male.

The highest proportion of the *E. gurnardus* and *P. platessa* found in all sampling areas, and the *L. limanda* and *M. merlangus* caught along the export cable were maturing. The greatest proportions of the *L. limanda* caught at the control stations and within Tranche B were spent. The majority of the *M. merlangus* caught at the control stations and within Tranche B, and the *G. morhua* found within Tranche B and along the export cable were immature. One male 'virgin' *C. harengus* was caught within Tranche B, whereas along the export cable the greatest proportion was 'ripening'.

1.2 Beam Trawl

A total of 19 species of fish were caught, nine of which were found at the control stations, 11 within Tranche B and 15 along the export cable. Overall, solenette (*Buglossidium luteum*) was the most abundant species caught, followed by *L. limanda*, and then sand goby (*Pomatoschistus minutus*). The station with the greatest total catch rate was BT63 within the wind farm, with *B. luteum* representing 77.0% of the catch. Overall, the total catch rate was highest within Tranche B.

P. platessa were found in low numbers in all sampling areas, and Raitt's sandeel (*Ammodytes marinus*) were found in low numbers at the control stations and within Tranche B. One *M. merlangus* was caught along the export cable at station BT122.

2.0 Introduction

The following report details the findings of the autumn 2012 adult and juvenile fish characterisation survey, undertaken within and adjacent to Tranche B of the planned Dogger Bank offshore wind farm and along the proposed export cable between the 1st and 25th October.

The survey methodology, vessel and sampling gear detailed were agreed in consultation with Cefas and the Marine Management Organisation (MMO). A dispensation from the MMO for the Provisions of Council Regulation 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 this 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 adult and juvenile fish species within the area of the Dogger Bank. It should be noted that *P. platessa*, Ammodytidae sp., *G. morhua*, *M. merlangus* and *C. harengus* have been defined as species of importance in the area.

3.0 Scope of Works

The proposed scope of works for the autumn 2012 adult and juvenile fish characterisation survey replicates that of the spring and summer 2012 surveys and is detailed below. The proposed otter and beam trawl locations are illustrated in Figure 3.1 overleaf.

- **Otter Trawl**
  - 30 tows of approximately 20 minutes duration within Tranche B, ten control tows in adjacent areas and 26 tows along the proposed export cable were undertaken

- **Otter Trawl Sample Analysis**
  - Number of individuals and catch rate by species
  - Average length and length distribution by species
    - Finfish & sharks (except *C. 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 by species
  - Spawning condition
    - Finfish species (except *C. harengus* & mackerel (*Scombrus scombrus*) Cefas Standard Maturity Key - Five Stage
    - *C. harengus*: Cefas Maturity Key – Nine Stage
    - *S. scombrus*: Cefas Maturity Key – Six Stage
    - Ray and shark species: Cefas Standard Elasmobranch Maturity Key- Four Stage

- **Beam Trawl**
  - 30 tows of approximately ten minutes duration within Tranche B, ten control tows in adjacent areas and 26 tows along the cable route (at the same locations as the otter trawls)

- **Beam Trawl Sample Analysis**
  - Number of individuals and catch rate by fish species
  - Average length and length distribution (nearest mm below) for fish species

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.

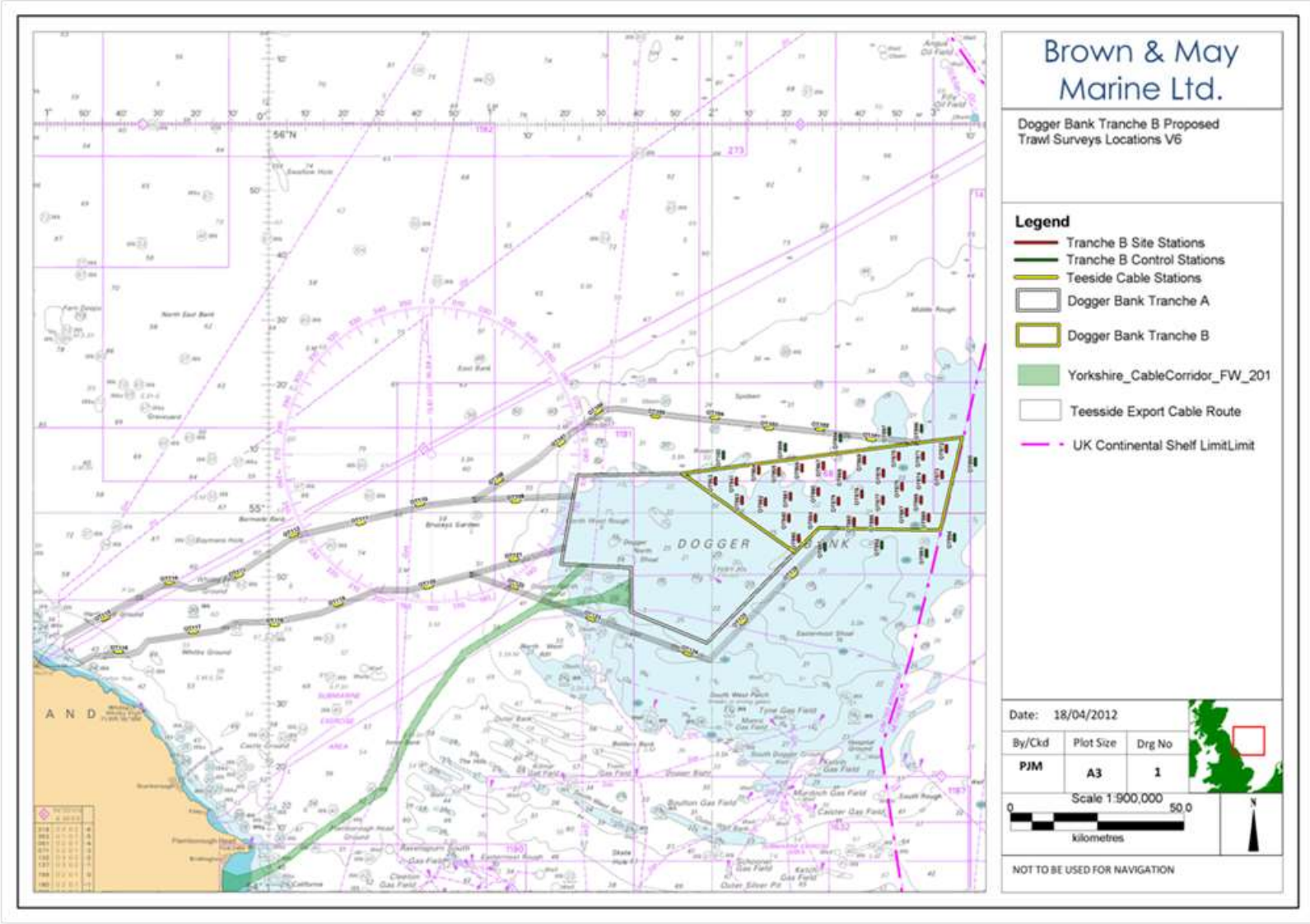


Figure 3.1 Proposed Trawl Locations

4.0 Methodology

4.1 Survey Vessel

The vessel chartered for the survey (Figure 4.1), the “Jubilee Spirit”, is a Grimsby-based commercial trawler whose skipper has experience of fishing on the Dogger Bank and of otter and beam trawl surveys. The specifications of the vessel are given below in Table 4.1.

Figure 4.1 Survey Vessel "Jubilee Spirit"

Table 4.1 Survey Vessel Specifications

Survey Vessel Specifications	
Length	21.2m
Beam	6.9m
Draft	2.3m
Main engine	Caterpillar Type 340TA 475 BHP
Gearbox	Hydraulic 6: reduction
Propeller	4 Blade Manganese Bronze Fixed Pitch 1.7m diameter
GPS	2-Furuno GP80
Plotters	Sodena Plotter with Electronic Charts
Sounder	Furuno Daylight Viewing

4.2 Sampling Gear

4.2.1 Commercial Otter Trawl

Scraper Trawl

A commercial scraper otter trawl with a 130mm mesh cod end (Figure 4.2) was used for sampling at all control and Tranche B sampling stations, and at most of those along the export cable; the specifications of which are given below in Table 4.2.

Figure 4.2 Otter Trawl Used

Table 4.2 Otter Trawl Specifications

Otter Trawl Specifications	
Towing Warp	18mm, 6x19+1
Depth: Payout Ratio	3:1
Trawl Doors	Perfect B 84
Net	130mm mesh cod-end, square mesh panel 7m from cod-end on top
Ground line length	45.7m
Footrope	Rock-hopper with 6 to 8 inch bobbins
Est. Headline height	2.4m
Distance between doors (est.)	51m

Rock-hopper Trawl

A commercial rock-hopper otter trawl (Figure 4.3) with a 130mm mesh cod-end was used for sampling at stations OT13 to OT18 due to the presence of hard ground and large boulders on the seabed; the specifications of which are given in Table 4.3 below.

Figure 4.3 Otter Trawl Used

Table 4.3 Otter Trawl Specifications

Otter Trawl Specifications	
Towing Warp	18mm, 6x19+1
Depth: Payout Ratio	3:1
Trawl Doors	Perfect B 84
Net	130mm mesh cod-end
Ground line length	24.4m
Footrope	Rock-hopper with 18 inch bobbins
Est. Headline height	7.3m
Distance between doors (est.)	51m

4.2.2 Scientific Beam Trawl

A 2m scientific beam trawl (Figure 4.4) was used for juvenile fish sampling; the specifications of which are given in Table 4.4 below.

Figure 4.4 Beam Trawl Used

Table 4.4 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 position of the vessel was tracked at all times using a Garmin GPSMap 278 with an EGNOS differential connected to an external Garmin GA30 antenna. Trawl start times and positions were taken when the winch stopped paying out the gear. Similarly, trawl end times and positions were taken when hauling of the gear commenced.

4.4 Sampling Operations

The survey was undertaken from the 1st to the 25th October 2012. A summarised log of events is given in Table 4.5 below.

It should be noted that the otter and beam trawls at stations 115 and 116 were omitted due to the presence of a high density of static gear in the area.

Table 4.5 Summarised Log of Events

Monday 1st October 2012
Surveyors depart BMM at 1500 hrs (BST), travel to Scarborough
Arrive Scarborough at 2200 hrs (BST)
Tuesday 2nd October 2012
Load vessel, stow gear, mobilise survey
CMID Audit by PMSS at 1740
Overnight aboard vessel
Wednesday 3rd October 2012
Depart Scarborough at 1600 hrs (BST), steam to Dogger Bank overnight
Overnight at sea
Thursday 4th October 2012
Otter Trawls: OT95, OT72, OT96
Beam Trawls: BT95, BT72, BT96
Steam into deeper water overnight due to BF8-10/3-4m swell forecast
Overnight at sea
Friday 5th October
Return to sampling area as weather conditions better than forecast (BF6-7)
Otter Trawls: OT97, OT70, OT71
Beam Trawls: BT97, BT70, BT71
Sampling operations stopped at 1630 (BST) due to 3.5m swell
Overnight at sea
Saturday 6th October 2012
Otter Trawls: OT73, OT74, OT88, OT87, OT75
Beam Trawls: BT73, BT74, BT88, BT87, BT75
Overnight at sea
Sunday 7th October 2012
Otter Trawls: OT86, OT85
Beam Trawls: BT86, BT85
Begin steaming to port at 1130 hrs (BST) due to strong westerly winds, and an estimated 20 hours steaming time.
Steam to Scarborough overnight
Overnight at sea
Monday 8th October 2012
Arrive into Scarborough at 0700 hrs (BST)
Samples landed at 0830 hrs (BST) and transported to BMM
Depart Scarborough at 2130 hrs (BST), return to sampling area

Overnight at sea
Tuesday 9th October 2012
Otter trawls: OT91, OT90
Beam trawls: BT91, OT90
Overnight at sea
Wednesday 10th October 2012
Otter Trawls: OT78, OT77, OT76, OT69, OT68
Beam Trawls: BT78, BT77, BT76, BT69, BT68
Overnight at sea
Thursday 11th October 2012
Otter Trawls: OT92, OT93, OT94, OT89
Beam Trawls: BT92, BT93, BT94, BT89
Overnight at sea
Friday 12th October 2012
Weather day at sea
Steam to Scarborough overnight
Overnight at sea
Saturday 13th October 2012
Arrive Scarborough at 0130 hrs (BST)
Samples landed and transported to BMM
Overnight aboard vessel
Sunday 14th October 2012
Weather day in port
Overnight at sea
Monday 15th October 2012
Depart Scarborough at 0300, steam to survey area
Otter Trawls: OT119, OT120, OT121, OT122
Beam Trawls: BT119, BT120, BT121, BT122
Steam inshore overnight to shelter from forecast strong winds
Overnight at sea
Tuesday 16th October 2012
Weather day at sea
Overnight at sea
Wednesday 17th October 2012
Otter Trawls: OT112, OT111, OT110
Beam Trawls: BT112, BT111, BT110
Overnight at sea
Thursday 18th October 2012
Otter Trawls: OT108, OT109
Beam Trawls: BT108, BT109
Overnight at sea
Friday 19th October 2012
Arrive into Scarborough at 0730 hrs (BST)
Samples landed and returned to BMM
Depart Scarborough at 2015 hrs (BST)
Overnight at sea
Saturday 20th October 2012
Change from scraper to rock-hopper otter trawl for inshore stations
Otter Trawls: OT114, OT113
Beam Trawls: BT114, BT113
Overnight at sea

Sunday 21st October 2012
Change from rock-hopper to scraper otter trawl to continue offshore sampling
Otter Trawls: OT63, OT100, OT41, OT64, OT83
Beam Trawls: BT63, BT100, BT41, BT64, BT83
Overnight at sea
Monday 22nd October 2012
Otter Trawls: OT98, OT67, OT80, OT79, OT84, OT40
Beam Trawls: BT98, BT67, BT80, BT79, BT84, BT40
Overnight at sea
Tuesday 23rd October 2012
Otter Trawls: OT99, OT65, OT66, OT81, OT82
Beam Trawls: BT99, BT65, BT66, BT81, BT82
Overnight at sea
Wednesday 24th October 2012
Otter Trawls: OT118, OT117
Beam Trawls: BT118, BT117
Steam to Scarborough, arrive at 1430 hrs (BST)
Overnight aboard vessel
Thursday 25th October 2012
Demobilise survey in Scarborough
Samples landed and returned to BMM

4.5 Otter Trawl Sampling

The whole catch from each otter trawl was retained where possible. Sub-sampling by species was carried out at sea if required. The samples were then boxed, labelled, photographed, iced and stored at +2°C before transportation to Cefas (Lowestoft) for analysis after every four days at sea, in line with the agreed scope of works.

The start and end times, co-ordinates and the duration of each otter trawl are given in Table 4.6 (control, Tranche B and export cable tows highlighted green, red and blue respectively). The vessel tracks whilst towing the otter trawl are illustrated in Figure 4.5 overleaf.

Table 4.6 Start and End Times, Co-ordinates and Duration of each Otter Trawl

Station	Date	Start				End				Duration (hh:mm:ss)
		Time (GMT)	UTM31N		Depth (m)	Time (GMT)	UTM31N		Depth (m)	
			Latitude	Longitude			Latitude	Longitude		
OT40	22/10/2012	15:34:56	458403.6	6092236	27.7	15:54:56	457966.1	6093973	27.4	00:20:00
OT41	21/10/2012	10:55:54	443278.5	6105310	34.5	11:15:54	443543.1	6103524	33.2	00:20:00
OT63		07:32:42	437049.5	6103332	34.5	07:52:49	437400	6105105	35.0	00:20:07
OT64		12:43:16	449644.6	6108012	30.8	13:03:16	449408.8	6106173	30.3	00:20:00
OT65	23/10/2012	08:57:23	455446.1	6108043	34.3	09:17:22	455370.1	6106235	32.5	00:19:59
OT66		10:31:49	462218	6107053	34.7	10:51:49	462603.4	6108708	34.5	00:20:00
OT67	22/10/2012	09:03:33	468258.6	6107367	32.5	09:23:32	468491.4	6109155	33.9	00:19:59
OT68	10/10/2012	14:46:16	474428.8	6104872	31.9	15:06:16	474211.5	6106631	31.6	00:20:00
OT69		12:38:04	480246.8	6110638	27.2	12:58:04	480218.9	6108847	27.7	00:20:00
OT70	05/10/2012	12:16:15	490140.8	6111829	28.8	12:36:15	490085.1	6110065	31.2	00:20:00
OT71		14:29:22	497195.2	6111819	30.1	14:49:22	497036.7	6110022	30.6	00:20:00
OT72	04/10/2012	14:13:24	505095.3	6113526	29.4	14:33:25	505028.5	6111700	28.8	00:20:01
OT73	06/10/2012	06:45:13	502436.7	6105497	28.5	07:05:18	502361.7	6107231	28.5	00:20:05
OT74		08:42:31	497296	6104070	30.5	09:02:38	497219.3	6105777	30.6	00:20:07
OT75		15:06:53	491212	6101748	24.4	15:27:10	490934.4	6103611	25.2	00:20:17
OT76	10/10/2012	10:38:37	485989.4	6106390	26.8	10:58:38	485902.4	6108209	27.2	00:20:01

Station	Date	Start				End				Duration (hh:mm:ss)
		Time (GMT)	UTM31N		Depth (m)	Time (GMT)	UTM31N		Depth (m)	
			Latitude	Longitude			Latitude	Longitude		
OT77		08:48:20	485597.4	6099116	24.2	09:08:20	485492.4	6097284	23.9	00:20:00
OT78		07:02:49	479510.9	6101520	25.7	07:22:49	479351.1	6099670	25.0	00:20:00
OT79	22/10/2012	12:21:29	472562.3	6097762	29.0	12:41:29	472875.2	6099503	28.8	00:20:00
OT80		10:35:25	466897.8	6101111	32.5	10:55:27	466632.3	6099335	32.3	00:20:02
OT81	23/10/2012	12:09:36	458891.6	6100471	33.4	12:29:36	458617.9	6098680	32.1	00:20:00
OT82		13:47:32	451424	6099058	29.2	14:07:32	450956	6097227	28.8	00:20:00
OT83	21/10/2012	14:38:46	444989.1	6100011	30.5	14:58:46	444566.2	6098102	29.2	00:20:00
OT84	22/10/2012	14:06:09	466063.4	6092426	30.6	14:26:08	465592.3	6094081	29.5	00:19:59
OT85	07/10/2012	09:19:28	477127.4	6093041	26.4	09:39:29	477164	6091432	25.9	00:20:01
OT86		06:34:21	483696	6093233	23.9	06:54:22	484070.1	6091608	23.7	00:20:01
OT87	06/10/2012	12:58:08	492779.5	6095670	23.9	13:18:09	492379.4	6093897	23.9	00:20:01
OT88		10:48:32	496500.5	6099350	27.7	11:08:33	496380.1	6097510	29.2	00:20:01
OT89	11/10/2012	13:43:16	498754.3	6094357	25.9	14:03:42	498823.2	6092765	24.1	00:20:26
OT90	09/10/2012	16:07:06	461017.7	6086730	27.9	16:27:10	460960.1	6088620	28.3	00:20:04
OT91		14:14:38	468655.5	6085615	26.8	14:34:38	468628.5	6083836	27.5	00:20:00
OT92	11/10/2012	06:41:34	484862.5	6086425	21.9	07:01:31	485038.3	6084996	21.9	00:19:57
OT93		09:17:46	497690.7	6084067	21.7	09:37:47	498073.4	6082693	21.5	00:20:01
OT94		11:16:25	506079	6086597	23.5	11:36:25	506682.8	6088602	22.6	00:20:00
OT95	04/10/2012	11:56:00	512201	6109971	28.6	12:16:12	512166.3	6107918	27.5	00:20:12
OT96		16:23:46	496487.9	6118875	33.8	16:43:46	496471.3	6120608	33.2	00:20:00
OT97	05/10/2012	10:17:57	487571.2	6119583	30.1	10:37:59	487159.6	6117970	29.5	00:20:02
OT98	22/10/2012	07:09:13	473104.3	6115661	32.5	07:29:13	473606.3	6117275	33.2	00:20:00
OT99	23/10/2012	07:10:11	457380.5	6113189	32.5	07:30:11	457501.9	6114950	32.7	00:20:00
OT100	21/10/2012	09:16:33	439620.6	6111406	32.8	09:36:34	439649.8	6113271	33.9	00:20:01
OT108	18/10/2012	06:54:51	374404.3	6105349	65.8	07:14:51	376107.6	6106292	64.5	00:20:00
OT109		09:25:52	380223.5	6099981	62.3	09:45:55	378946.4	6099506	61.0	00:20:03
OT110	17/10/2012	14:26:11	351536.6	6099602	76.4	14:46:11	353226.9	6099924	76.5	00:20:00
OT111		11:41:12	333568.7	6094808	76.7	12:01:18	335134.3	6094946	80.0	00:20:06
OT112		07:04:06	314861.6	6091790	72.7	07:24:06	316291.4	6092693	73.1	00:20:00
OT113	20/10/2012	11:14:10	298869.2	6081281	81.5	11:34:14	297372.7	6080935	74.7	00:20:04
OT114		13:18:56	277788.6	6080104	63.6	13:38:56	275997.1	6080407	62.1	00:20:00
OT117	24/10/2012	09:09:50	285551.9	6065313	67.2	09:29:50	283891.1	6065142	64.1	00:20:00
OT118		07:13:53	305809.8	6066547	76.7	07:34:00	304123.2	6066737	69.8	00:20:07
OT119	15/10/2012	08:42:44	327119.9	6071565	72.7	09:02:45	328775.9	6071847	74.5	00:20:01
OT120		11:58:15	352341.7	6075208	80.8	12:18:16	354021.9	6075425	83.0	00:20:01
OT121		15:04:22	377413.3	6082386	50.8	15:24:22	379196	6082792	50.8	00:20:00
OT122		16:40:16	377771.4	6074923	50.8	17:00:16	379618.7	6073771	48.2	00:20:00

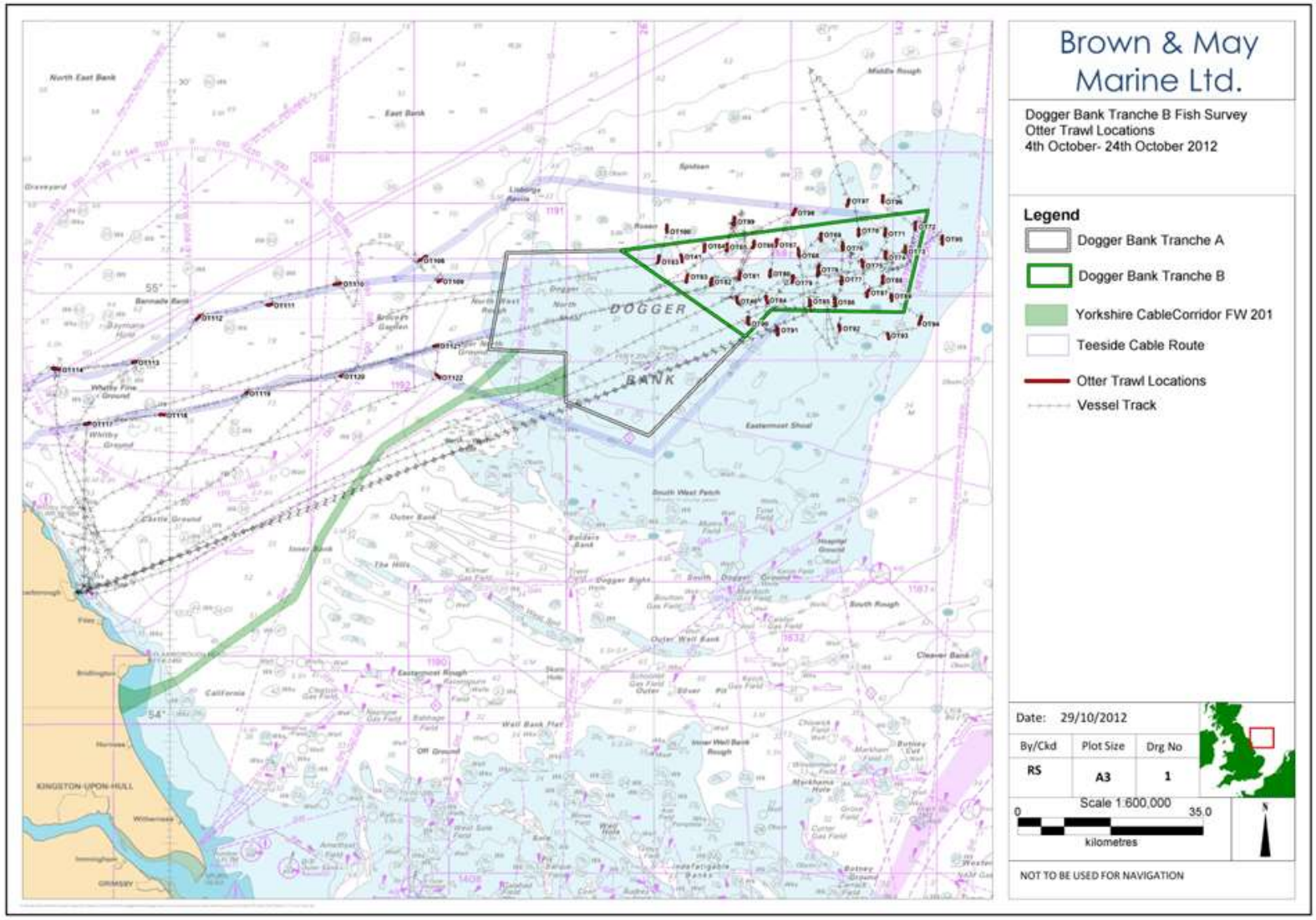


Figure 4.5 Otter Trawl Tow Tracks

4.6 Beam Trawl Sampling

All fish 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 and measured on board and returned to the sea. Sub-sampling was applied at sea when required. Samples were fixed at the end of every day using a 4% seawater buffered formalin solution before being transported to Precision Marine Surveys Ltd. (PMSL) at the end of the survey to be identified, counted and measured.

The start and end times, co-ordinates and the duration of each beam trawl are given in Table 4.7 (control, Tranche B and export cable tows highlighted green, red and blue respectively). The vessel tracks whilst towing the beam trawl are illustrated in Figure 4.6.

Table 4.7 Start and End Times, Co-ordinates and Duration of each Beam Trawl

Station	Date	Start				End				Duration (hh:mm:ss)
		Time (GMT)	UTM31N		Depth (m)	Time (GMT)	UTM31N		Depth (m)	
			Easting	Northing			Easting	Northing		
BT40	22/10/2012	16:13:16	457805.37	6094255.34	27.9	16:23:16	458033.83	6094095.94	27.9	00:10:00
BT41	21/10/2012	11:31:19	443686.52	6103432.46	33.0	11:41:19	443845.66	6103890.1	31.7	00:10:00
BT63		08:09:22	437271.88	6105239.58	31.9	08:19:39	437322.22	6104751.84	32.8	00:10:17
BT64		13:19:16	449410.08	6106149.62	29.7	13:29:16	449457.41	6106547.29	30.1	00:10:00
BT65	23/10/2012	09:36:18	455468.05	6106059.95	32.3	09:46:18	455506.69	6106440.39	31.9	00:10:00
BT66		11:08:51	462453.39	6108694.67	34.3	11:18:52	462388.06	6108321.41	33.6	00:10:01
BT67	22/10/2012	09:39:46	468290.87	6109359.4	34.9	09:49:46	467963.39	6108794.41	36.3	00:10:00
BT68	10/10/2012	15:24:31	474340.19	6106485.92	31.2	15:34:31	474426.35	6105923.44	31.0	00:10:00
BT69		13:18:10	480325.79	6108932.07	27.0	13:28:25	480327.89	6109579.06	26.3	00:10:15
BT70	05/10/2012	13:05:21	490103.43	6110464.68	30.6	13:15:22	490805.31	6110460.95	29.2	00:10:01
BT71		15:18:49	496872.85	6110499.29	29.2	15:28:50	497468.94	6110409.1	30.1	00:10:01
BT72	04/10/2012	14:54:50	504988.7	6111820.24	29.2	15:04:51	504997.35	6112229.31	29.0	00:10:01
BT73	06/10/2012	07:26:39	502537.02	6107117.07	28.6	07:36:39	502604.14	6106760.79	28.8	00:10:00
BT74		09:34:28	497117.61	6105722.16	30.6	09:44:30	497645.48	6105521.32	30.3	00:10:02
BT75		15:49:13	491364.71	6103600.23	25.5	15:59:14	491668.1	6103094.43	25.0	00:10:01
BT76	10/10/2012	11:18:55	485826.3	6107726.46	26.3	11:28:58	485947.12	6107286.74	26.4	00:10:03
BT77		09:25:01	485405.42	6097309.34	24.1	09:35:02	485525.57	6097869.25	24.8	00:10:01
BT78		07:42:39	479204.36	6099329.72	25.2	07:52:39	479276.53	6099871.22	25.5	00:10:00
BT79	22/10/2012	12:59:08	472803.03	6099582.11	29.5	13:09:08	472437.93	6099277.76	28.3	00:10:00
BT80		11:17:17	467100.19	6099831.24	31.6	11:27:17	466749.93	6099913.96	31.9	00:10:00
BT81	23/10/2012	12:48:01	458664.19	6098514.27	33.2	12:58:02	458797.18	6098850.9	31.9	00:10:01
BT82		14:26:13	451366.97	6097016.98	29.0	14:36:13	451720.01	6097371.95	29.4	00:10:00
BT83	21/10/2012	15:15:21	444653.47	6098068.3	28.8	15:25:21	444738.06	6098430.28	29.2	00:10:00
BT84	22/10/2012	14:44:12	465218.31	6094235.1	26.8	14:54:12	464857.15	6093789.11	25.5	00:10:00
BT85	07/10/2012	10:06:55	477306.78	6091972.59	26.3	10:16:55	477920.16	6091551.1	25.9	00:10:00
BT86		07:26:37	483989.97	6092098.94	24.6	07:36:37	484227.41	6091510.43	23.9	00:10:00
BT87	06/10/2012	13:39:11	492429.77	6093548.5	23.9	13:49:12	492123.98	6093697.03	23.7	00:10:01
BT88		11:36:34	496428.66	6097948.06	28.3	11:46:34	497046.33	6097909.22	29.4	00:10:00
BT89	11/10/2012	14:20:07	498445.53	6093023.8	24.8	14:30:07	498372.62	6093836.95	25.3	00:10:00
BT90	09/10/2012	16:45:50	460995.72	6088333.76	27.5	16:55:51	461010.46	6087979.75	28.3	00:10:01
BT91		15:01:15	468279.8	6084822.13	27.4	15:11:19	468616.74	6084559.48	27.7	00:10:04
BT92	11/10/2012	07:17:17	485077.39	6085109.98	21.7	07:27:17	485055.91	6085782.18	22.2	00:10:00
BT93		09:54:04	497991.35	6082967.91	22.2	10:04:05	497829.64	6083748.93	21.9	00:10:01
BT94		11:57:56	506549.48	6088716.06	23.3	12:07:56	506523.37	6088385.53	23.1	00:10:00
BT95	04/10/2012	12:45:54	511924.62	6108079.09	27.7	12:55:55	511962.96	6108291.74	27.7	00:10:01
BT96		17:02:51	496643.51	6120450	33.8	17:12:52	496722.61	6120155.37	34.3	00:10:01
BT97	05/10/2012	11:03:00	487299.16	6118329.26	28.8	11:13:02	488048.96	6118526.38	29.0	00:10:02
BT98	22/10/2012	07:44:42	473276.24	6117598.62	33.2	07:54:42	472958.08	6117127.36	32.1	00:10:00
BT99	23/10/2012	07:50:37	457394.53	6114835.85	32.3	08:00:37	457285.59	6114620.22	33.0	00:10:00

Station	Date	Start				End				Duration (hh:mm:ss)
		Time (GMT)	UTM31N		Depth (m)	Time (GMT)	UTM31N		Depth (m)	
			Easting	Northing			Easting	Northing		
BT100	21/10/2012	09:55:23	439685.55	6112838.1	36.1	10:05:24	439763.66	6112281.78	39.6	00:10:01
BT108	18/10/2012	07:48:21	375797.92	6106201.37	63.7	07:58:21	375548.12	6106520.89	64.1	00:10:00
BT109		10:20:15	379327.65	6099700.33	60.5	10:30:15	379302.34	6100467.71	61.6	00:10:00
BT110	17/10/2012	15:20:52	352266.3	6099289.16	76.4	15:30:52	352197.56	6099596.47	76.4	00:10:00
BT111		12:36:46	335114.25	6095270.91	80.6	12:46:46	334993.68	6095972.99	82.8	00:10:00
BT112		07:52:33	316237.58	6092812.59	72.5	08:02:34	315620.55	6092872.93	71.2	00:10:01
BT113	20/10/2012	10:19:17	297179.23	6080683.32	73.6	10:29:19	297906.03	6080909.05	78.7	00:10:02
BT114		08:28:51	276291.66	6080080.53	65.2	08:39:01	276859.03	6079808.2	64.8	00:10:10
BT117	24/10/2012	10:01:05	283667.15	6064956.29	63.7	10:11:05	284163.54	6065123.49	64.7	00:10:00
BT118		06:28:49	306186.76	6066654.67	80.2	06:38:49	305733.32	6066600.38	76.7	00:10:00
BT119	15/10/2012	09:29:07	328204.4	6072341.85	73.1	09:39:07	327433.97	6072397.45	72.7	00:10:00
BT120		12:46:44	354151.66	6075790.4	83.0	12:56:41	353656.83	6075919.48	84.0	00:09:57
BT121		15:50:21	379253.84	6082495.42	50.4	16:00:21	378902.43	6082527.7	51.1	00:10:00
BT122		17:20:50	379860.95	6073744.33	49.3	17:30:50	379534.71	6073993.08	48.2	00:10:00

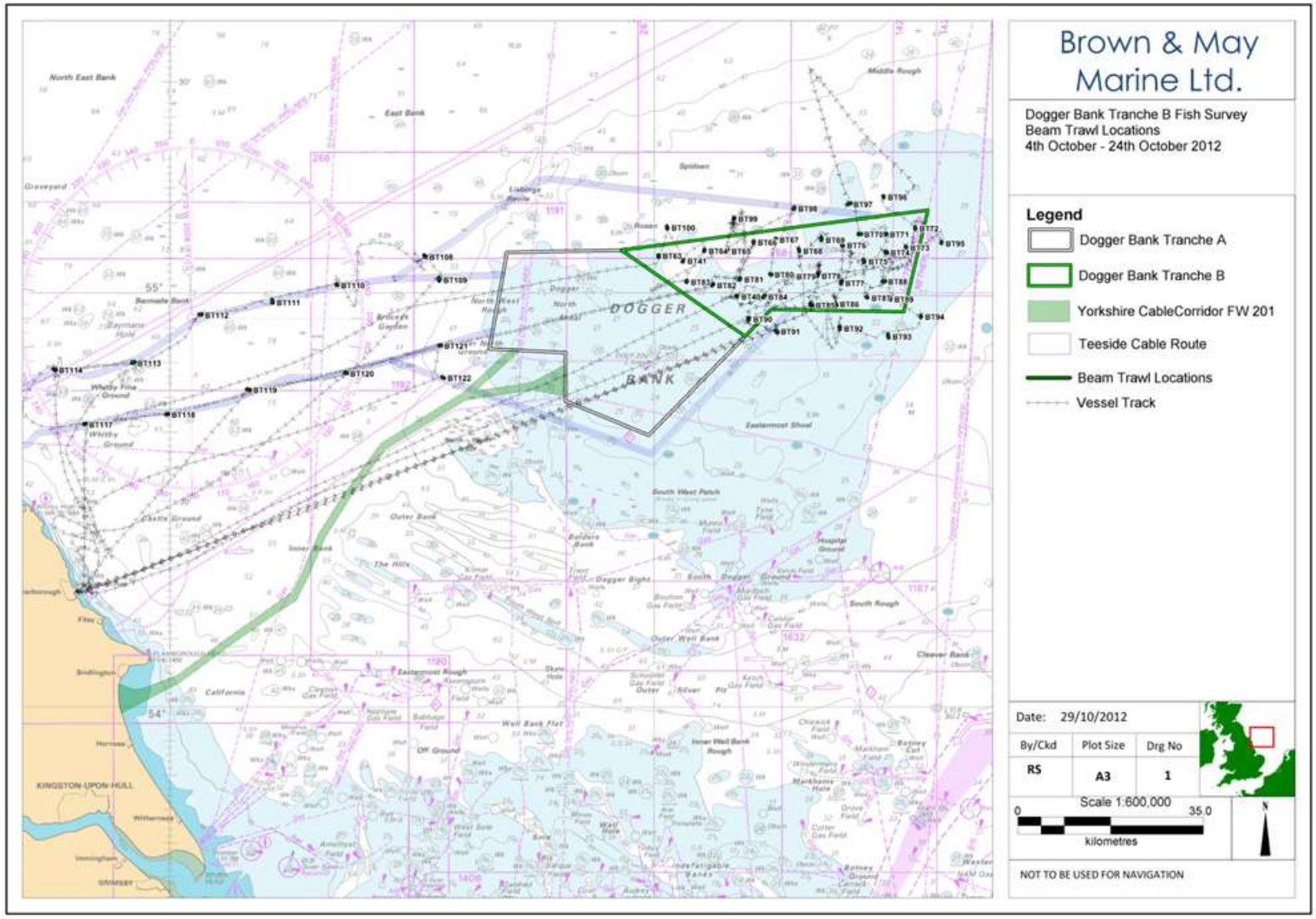


Figure 4.6 Beam Trawl Tow Tracks

5.0 Otter Trawl Results

5.1 Catch Rates and Species Distribution

The total number of individuals caught and the catch rate (number of individuals caught per hour) by species at the control stations, in Tranche B, and along the export cable are given in Table 5.1 and are illustrated in Figure 5.1. The catch rates by station and by sampling area are illustrated in Figure 5.2, Figure 5.3 and Figure 5.4 for control, Tranche B and export cable stations respectively.

Spatial distribution plots for the most abundant species are given in Figure 5.5 to Figure 5.8; spatial distributions for *G. morhua* and *C. harengus* are also given in Figure 5.9 and Figure 5.10.

Spatial plots show the percentage distribution by catch rate of *E. gurnardus*, *P. platessa*, *L. limanda*, *M. merlangus, G. morhua* and *C. harengus*. The circle size corresponds to the catch rate i.e. larger circles indicate greater catch rates.

A total of 38 species were caught; 15 at the control stations, 26 within Tranche B and 30 species along the export cable. Overall, *E. gurnardus* was the most abundant species caught, followed by *P. platessa* and then *L. limanda*.

The highest total catch rate was recorded at control station OT95 (4,440.6/hr), with *E. gurnardus* accounting for 90.3% of the catch.

P. platessa were caught in all sampling areas, with the greatest total catch rate recorded at the control stations (372.5/hr); the station with the highest catch rate of *P. platessa* was control station OT99 (1,440.0/hr).

M. merlangus were recorded in all sampling areas, with a considerably higher total catch rate recorded along the export cable (371.0/hr) than at the control stations and within the wind farm. The highest catch rate by station was found at OT111 (668.7/hr) along the export cable.

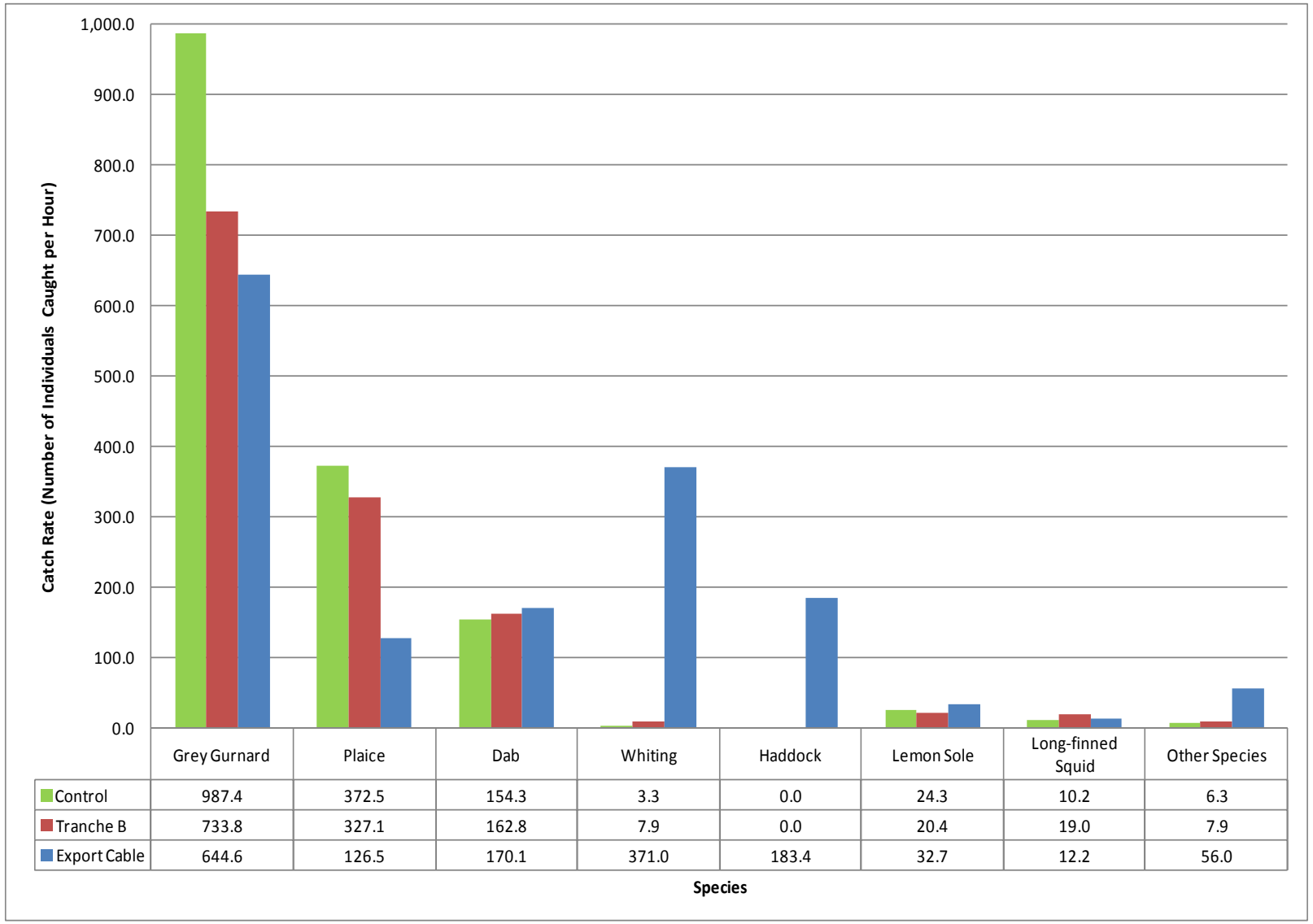
G. morhua and *C. harengus* were caught in relatively low numbers within Tranche B (*G. morhua* 0.5/hr and *C. harengus* 0.1/hr) and along the export cable (5.1/hr and 5.8/hr respectively).

Overall, the total catch rate was slightly higher along the export cable (1,596.5/hr) than at the control stations (1,558.3/hr) and within Tranche B (1,278.7/hr).

Table 5.1 Total Numbers of Individuals Caught and Catch Rate for Fish Species by Sampling Area

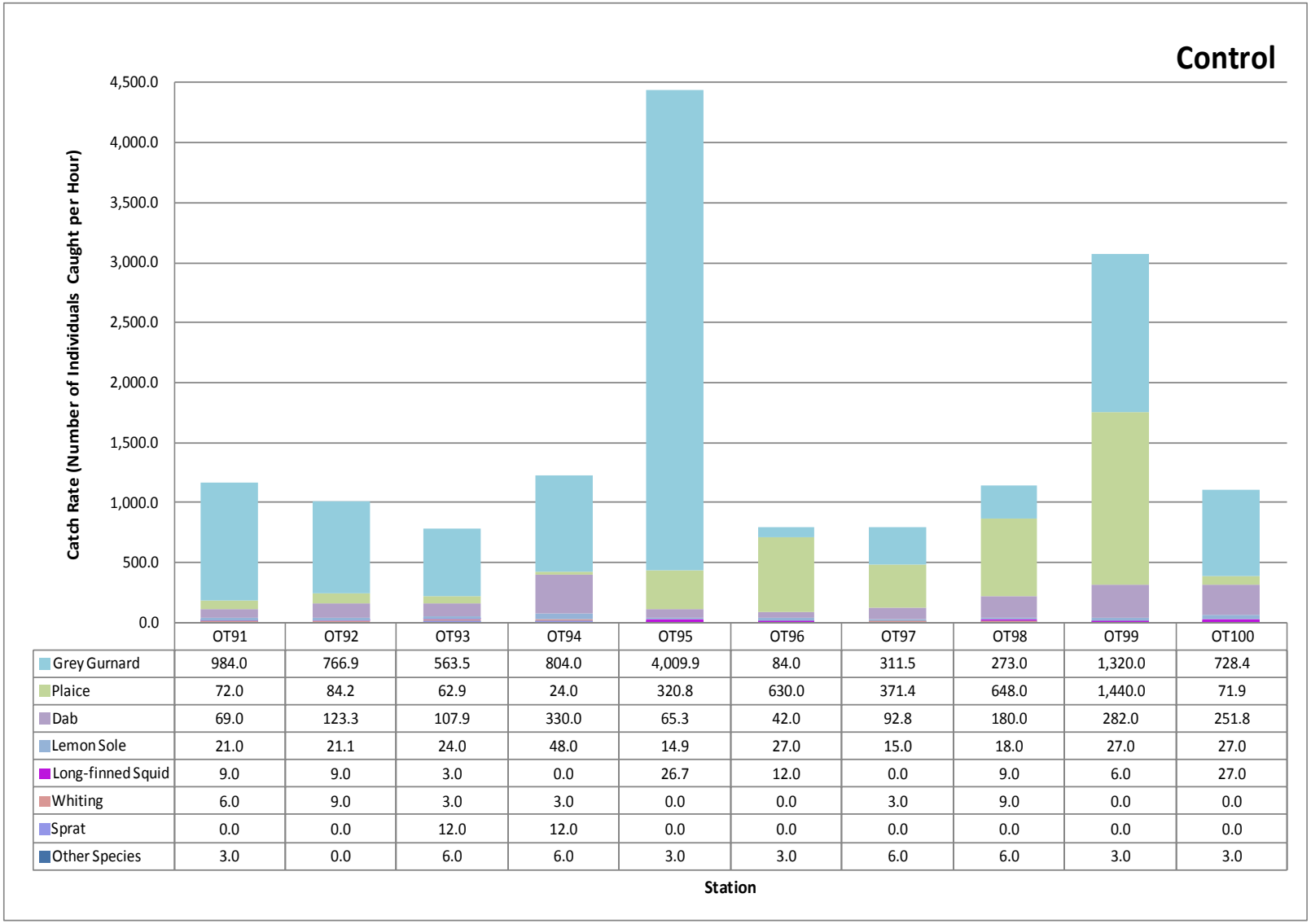
Species		Number of Individuals Caught				Catch Rate (Number of Individuals Caught per Hour)		
Common Name	Scientific Name	Control	Tranche B	Export Cable	Total	Control	Tranche B	Export Cable
Grey Gurnard	*Eutrigla gurnardus*	3,295	7,352	2,797	13,444	987.4	733.8	644.6
Plaice	*Pleuronectes platessa*	1,243	3,277	549	5,069	372.5	327.1	126.5
Dab	*Limanda limanda*	515	1,631	738	2,884	154.3	162.8	170.1
Whiting	*Merlangius merlangus*	11	79	1,610	1,700	3.3	7.9	371.0
Haddock	*Melanogrammus aeglefinus*	0	0	796	796	0.0	0.0	183.4
Lemon Sole	*Microstomus kitt*	81	204	142	427	24.3	20.4	32.7
Long-finned Squid	*Loligo forbesi*	34	190	53	277	10.2	19.0	12.2
Long Rough Dab	*Hippoglossoides platessoides*	0	0	62	62	0.0	0.0	14.3
Hake	*Merluccius merluccius*	0	0	47	47	0.0	0.0	10.8
Edible Crab	*Cancer pagurus*	3	17	11	31	0.9	1.7	2.5
Cod	*Gadus morhua*	0	5	22	27	0.0	0.5	5.1
Herring	*Clupea harengus*	0	1	25	26	0.0	0.1	5.8
Mackerel	*Scomber scombrus*	2	7	8	17	0.6	0.7	1.8
Poor Cod	*Trisopterus minutus*	0	0	17	17	0.0	0.0	3.9
Bullrout	*Myoxocephalus scorpius*	0	13	1	14	0.0	1.3	0.2
Queen Scallop	*Aequipecten opercularis*	0	2	11	13	0.0	0.2	2.5
Sprat	*Sprattus sprattus*	8	1	0	9	2.4	0.1	0.0
Spurdog	*Squalus acanthias*	1	8	0	9	0.3	0.8	0.0
Squid	*Loligo sp.*	0	8	1	9	0.0	0.8	0.2
Starry Smoothhound	*Mustelus asterias*	0	1	8	9	0.0	0.1	1.8
Witch	*Glyptocephalus cynoglossus*	0	0	8	8	0.0	0.0	1.8
Velvet Crab	*Necora puber*	1	5	0	6	0.3	0.5	0.0
Anglerfish	*Lophius piscatorius*	0	1	4	5	0.0	0.1	0.9
Common Dragonet	*Callionymus lyra*	2	1	2	5	0.6	0.1	0.5
Starry Ray	*Amblyraja radiata*	0	1	4	5	0.0	0.1	0.9

Species		Number of Individuals Caught				Catch Rate (Number of Individuals Caught per Hour)		
Common Name	Scientific Name	Control	Tranche B	Export Cable	Total	Control	Tranche B	Export Cable
Turbot	*Psetta maxima*	1	2	1	4	0.3	0.2	0.2
Spotted Ray	*Raja montagui*	0	0	3	3	0.0	0.0	0.7
Brill	*Scophthalmus rhombus*	0	0	2	2	0.0	0.0	0.5
John Dory	*Zeus faber*	0	2	0	2	0.0	0.2	0.0
Lesser Spotted Dogfish	*Scyliorhinus canicula*	0	1	1	2	0.0	0.1	0.2
Lesser Weever	*Echiichthys vipera*	2	0	0	2	0.6	0.0	0.0
Spiny Spider Crab	*Maja squinado*	0	0	2	2	0.0	0.0	0.5
Whelk	*Buccinum undatum*	0	1	1	2	0.0	0.1	0.2
Common Squid	*Loligo vulgaris*	1	0	0	1	0.3	0.0	0.0
Horse Mackerel	*Trachurus trachurus*	0	1	0	1	0.0	0.1	0.0
Ling	*Molva molva*	0	0	1	1	0.0	0.0	0.2
Red Gurnard	*Aspitrigla cuculus*	0	0	1	1	0.0	0.0	0.2
Sea Scorpion	*Taurulus bubalis*	0	1	0	1	0.0	0.1	0.0
Total No. of Individuals		5,200	12,812	6,928				
Total No. of Species		15	26	30				
Total Catch Rate (No. of Individuals Caught per Hour)		1,558.3	1,278.7	1,596.5				



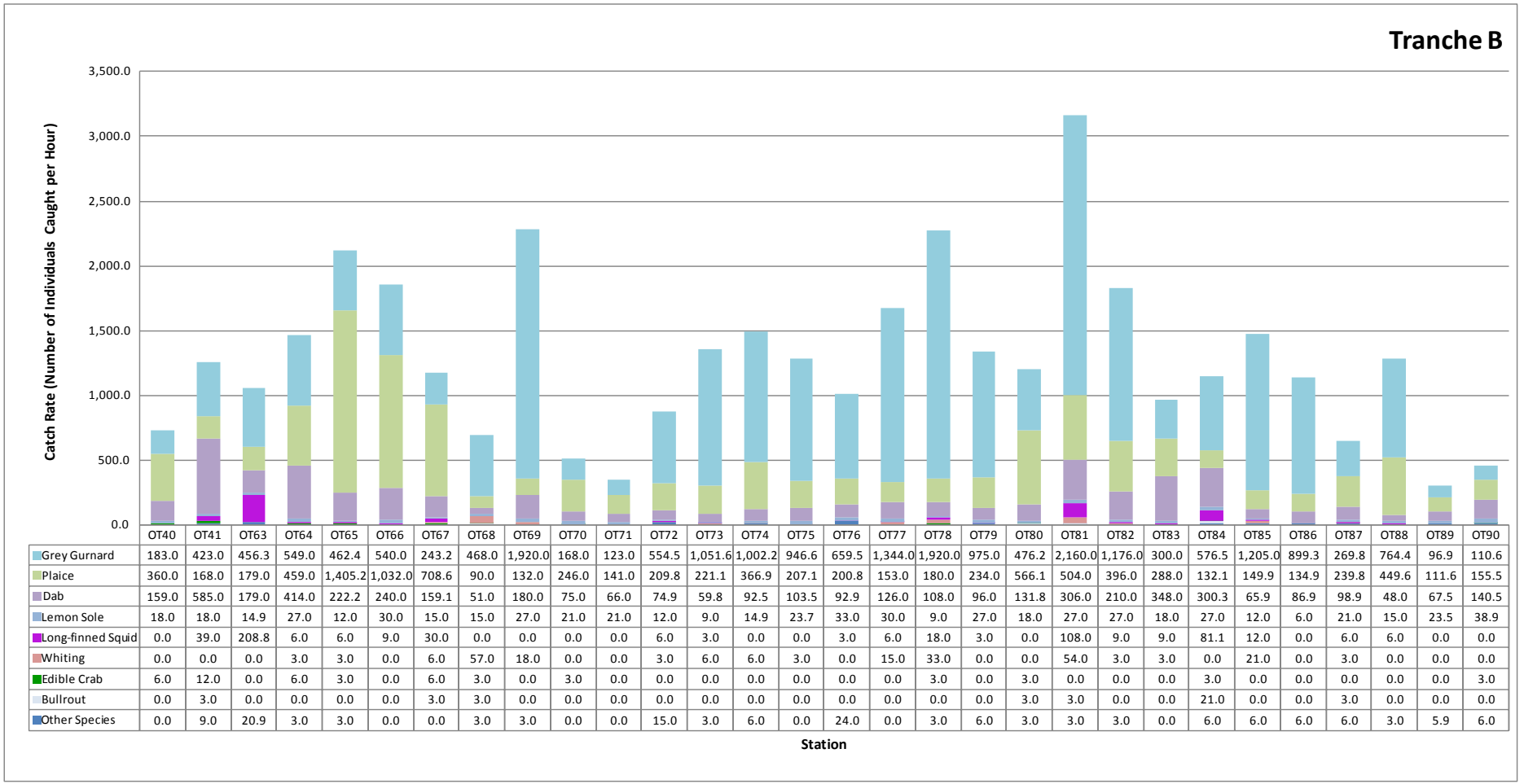
	Grey Gurnard	Plaice	Dab	Whiting	Haddock	Lemon Sole	Long-finned Squid	Other Species
Control	987.4	372.5	154.3	3.3	0.0	24.3	10.2	6.3
Tranche B	733.8	327.1	162.8	7.9	0.0	20.4	19.0	7.9
Export Cable	644.6	126.5	170.1	371.0	183.4	32.7	12.2	56.0

Figure 5.1 Catch Rate by Species and Sampling Area



	OT91	OT92	OT93	OT94	OT95	OT96	OT97	OT98	OT99	OT100
Grey Gurnard	984.0	766.9	563.5	804.0	4,009.9	84.0	311.5	273.0	1,320.0	728.4
Plaice	72.0	84.2	62.9	24.0	320.8	630.0	371.4	648.0	1,440.0	71.9
Dab	69.0	123.3	107.9	330.0	65.3	42.0	92.8	180.0	282.0	251.8
Lemon Sole	21.0	21.1	24.0	48.0	14.9	27.0	15.0	18.0	27.0	27.0
Long-finned Squid	9.0	9.0	3.0	0.0	26.7	12.0	0.0	9.0	6.0	27.0
Whiting	6.0	9.0	3.0	3.0	0.0	0.0	3.0	9.0	0.0	0.0
Sprat	0.0	0.0	12.0	12.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Species	3.0	0.0	6.0	6.0	3.0	3.0	6.0	6.0	3.0	3.0

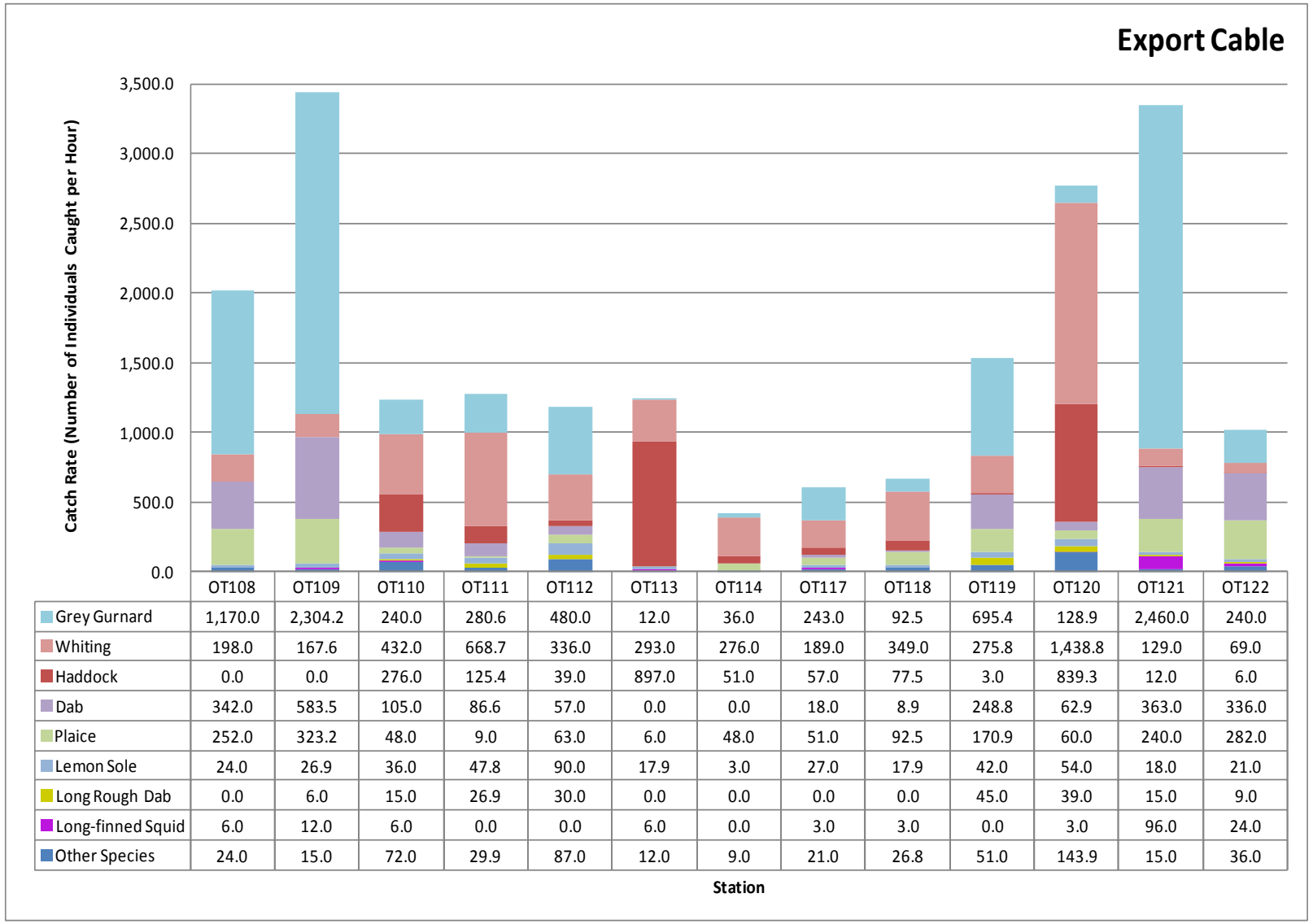
Figure 5.2 Catch Rate by Species and Station at the Control Stations



	OT40	OT41	OT63	OT64	OT65	OT66	OT67	OT68	OT69	OT70	OT71	OT72	OT73	OT74	OT75	OT76	OT77	OT78	OT79	OT80	OT81	OT82	OT83	OT84	OT85	OT86	OT87	OT88	OT89	OT90
Grey Gurnard	183.0	423.0	456.3	549.0	462.4	540.0	243.2	468.0	1,920.0	168.0	123.0	554.5	1,051.6	1,002.2	946.6	659.5	1,344.0	1,920.0	975.0	476.2	2,160.0	1,176.0	300.0	576.5	1,205.0	899.3	269.8	764.4	96.9	110.6
Plaice	360.0	168.0	179.0	459.0	1,405.2	1,032.0	708.6	90.0	132.0	246.0	141.0	209.8	221.1	366.9	207.1	200.8	153.0	180.0	234.0	566.1	504.0	396.0	288.0	132.1	149.9	134.9	239.8	449.6	111.6	155.5
Dab	159.0	585.0	179.0	414.0	222.2	240.0	159.1	51.0	180.0	75.0	66.0	74.9	59.8	92.5	103.5	92.9	126.0	108.0	96.0	131.8	306.0	210.0	348.0	300.3	65.9	86.9	98.9	48.0	67.5	140.5
Lemon Sole	18.0	18.0	14.9	27.0	12.0	30.0	15.0	15.0	27.0	21.0	21.0	12.0	9.0	14.9	23.7	33.0	30.0	9.0	27.0	18.0	27.0	27.0	18.0	27.0	12.0	6.0	21.0	15.0	23.5	38.9
Long-finned Squid	0.0	39.0	208.8	6.0	6.0	9.0	30.0	0.0	0.0	0.0	0.0	6.0	3.0	0.0	0.0	3.0	6.0	18.0	3.0	0.0	108.0	9.0	9.0	81.1	12.0	0.0	6.0	6.0	0.0	0.0
Whiting	0.0	0.0	0.0	3.0	3.0	0.0	6.0	57.0	18.0	0.0	0.0	3.0	6.0	6.0	3.0	0.0	15.0	33.0	0.0	0.0	54.0	3.0	3.0	0.0	21.0	0.0	3.0	0.0	0.0	0.0
Edible Crab	6.0	12.0	0.0	6.0	3.0	0.0	6.0	3.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	3.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	3.0
Bullrout	0.0	3.0	0.0	0.0	0.0	0.0	3.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	3.0	0.0	0.0	21.0	0.0	0.0	3.0	0.0	0.0	0.0
Other Species	0.0	9.0	20.9	3.0	3.0	0.0	0.0	3.0	3.0	0.0	0.0	15.0	3.0	6.0	0.0	24.0	0.0	3.0	6.0	3.0	3.0	3.0	0.0	6.0	6.0	6.0	6.0	3.0	5.9	6.0

Station

Figure 5.3 Catch Rate by Species and Station within Tranche B



	OT108	OT109	OT110	OT111	OT112	OT113	OT114	OT117	OT118	OT119	OT120	OT121	OT122
Grey Gurnard	1,170.0	2,304.2	240.0	280.6	480.0	12.0	36.0	243.0	92.5	695.4	128.9	2,460.0	240.0
Whiting	198.0	167.6	432.0	668.7	336.0	293.0	276.0	189.0	349.0	275.8	1,438.8	129.0	69.0
Haddock	0.0	0.0	276.0	125.4	39.0	897.0	51.0	57.0	77.5	3.0	839.3	12.0	6.0
Dab	342.0	583.5	105.0	86.6	57.0	0.0	0.0	18.0	8.9	248.8	62.9	363.0	336.0
Plaice	252.0	323.2	48.0	9.0	63.0	6.0	48.0	51.0	92.5	170.9	60.0	240.0	282.0
Lemon Sole	24.0	26.9	36.0	47.8	90.0	17.9	3.0	27.0	17.9	42.0	54.0	18.0	21.0
Long Rough Dab	0.0	6.0	15.0	26.9	30.0	0.0	0.0	0.0	0.0	45.0	39.0	15.0	9.0
Long-finned Squid	6.0	12.0	6.0	0.0	0.0	6.0	0.0	3.0	3.0	0.0	3.0	96.0	24.0
Other Species	24.0	15.0	72.0	29.9	87.0	12.0	9.0	21.0	26.8	51.0	143.9	15.0	36.0

Figure 5.4 Catch Rate by Species and Station along the Export Cable

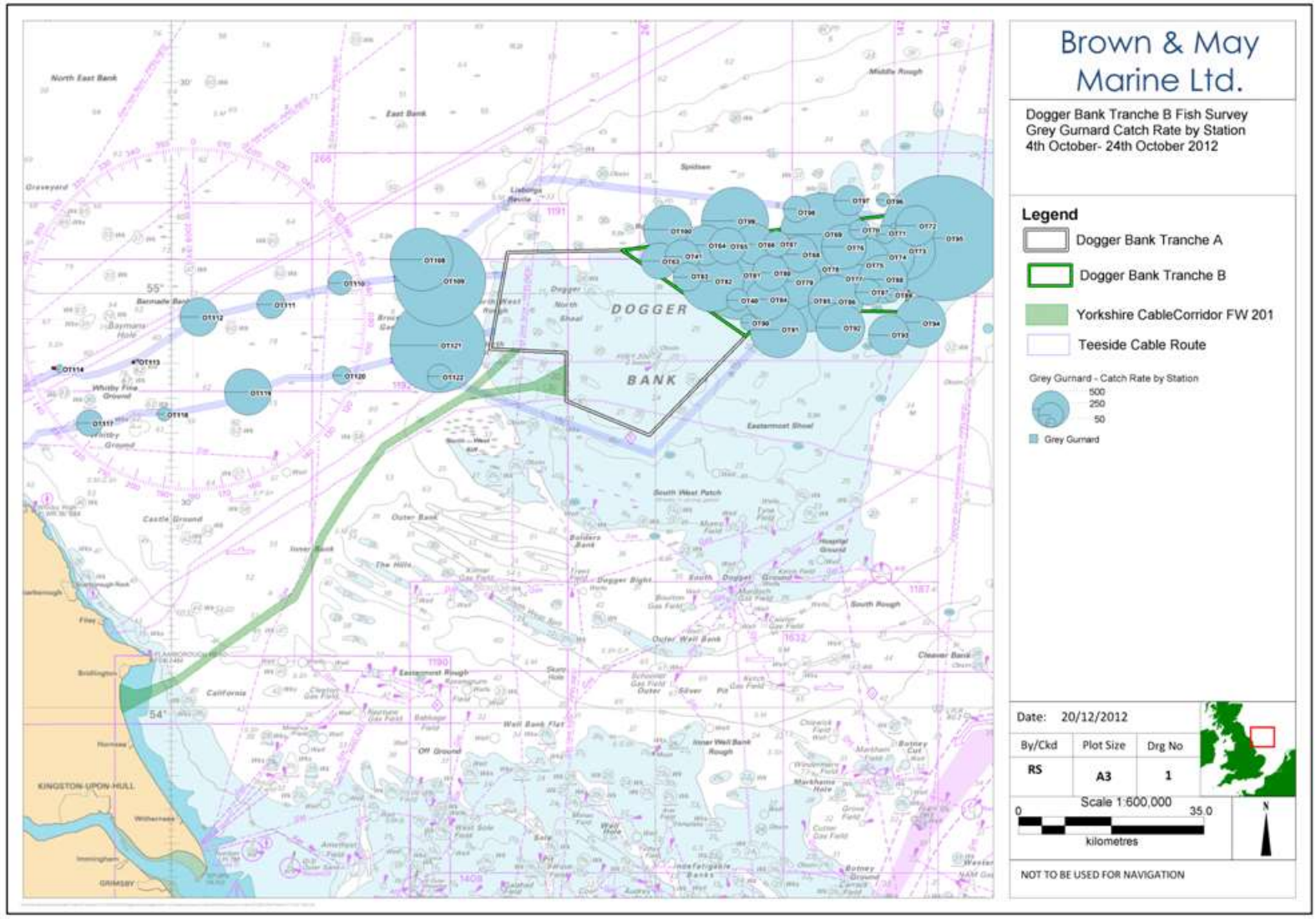


Figure 5.5 Spatial Distribution of Grey Gurnard (*E. gurnardus*) in the Area of Tranche B

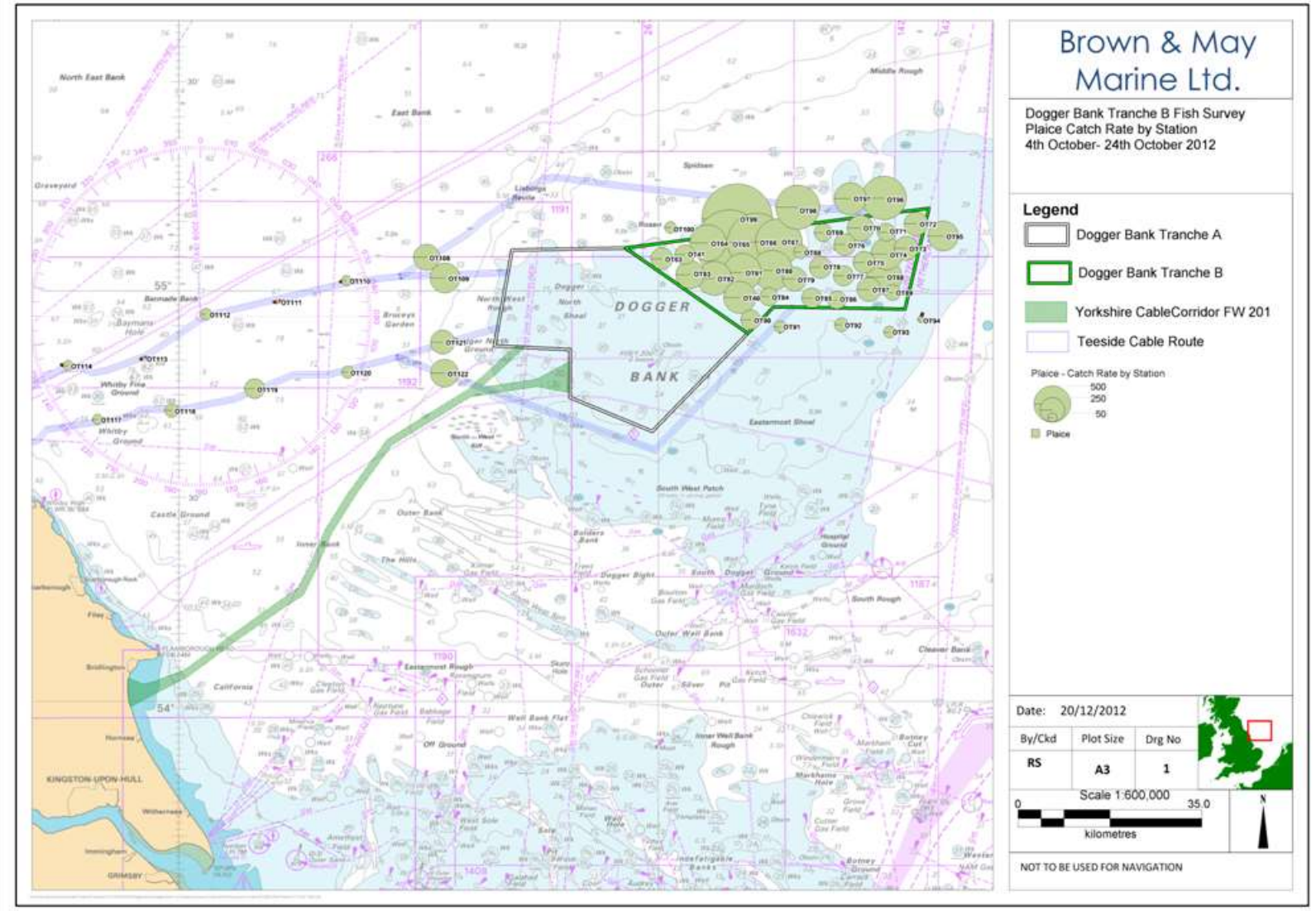


Figure 5.6 Spatial Distribution of Plaice (*P. platessa*) in the Area of Tranche B

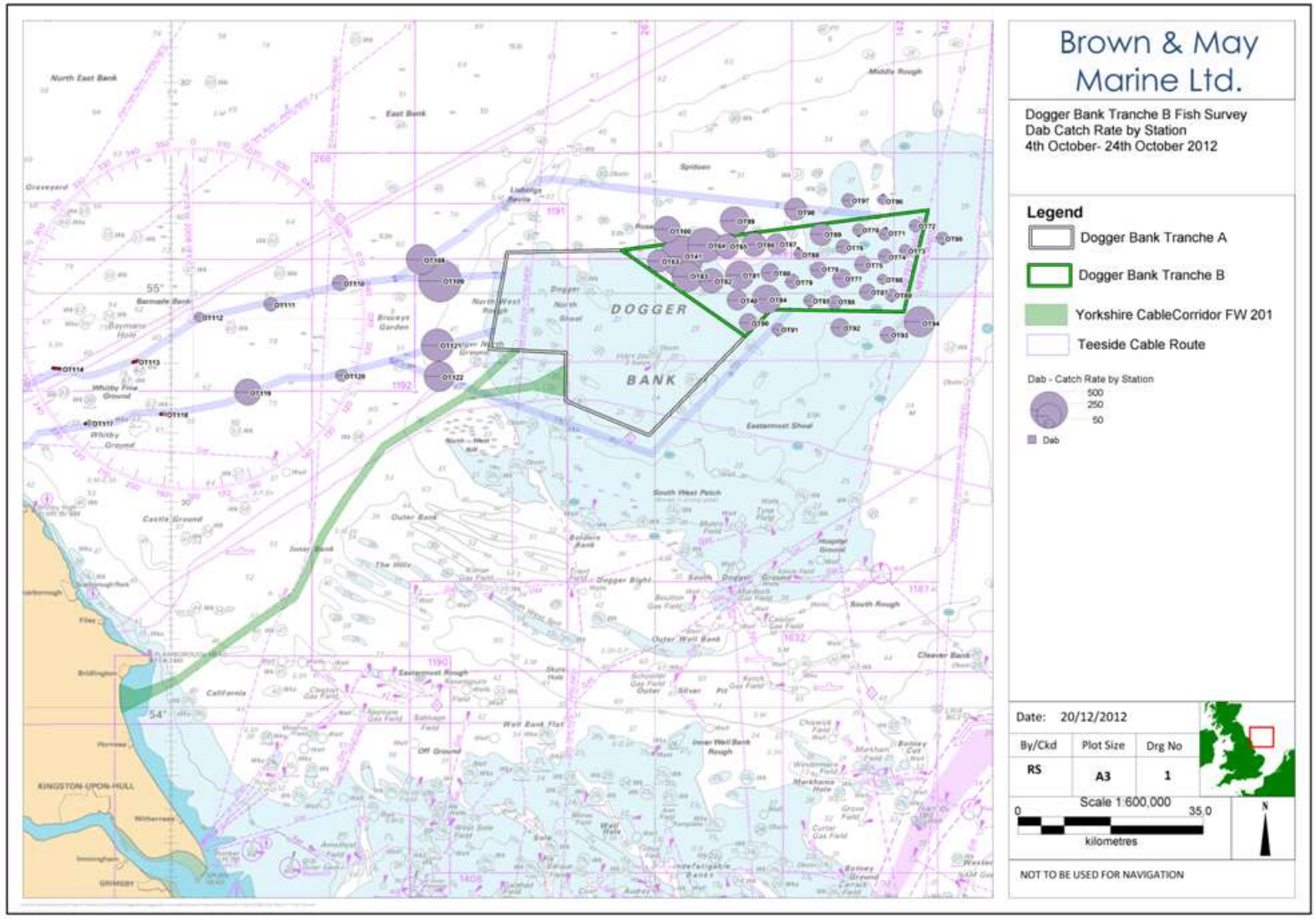


Figure 5.7 Spatial Distribution of Dab (*L. limanda*) in the Area of Tranche B

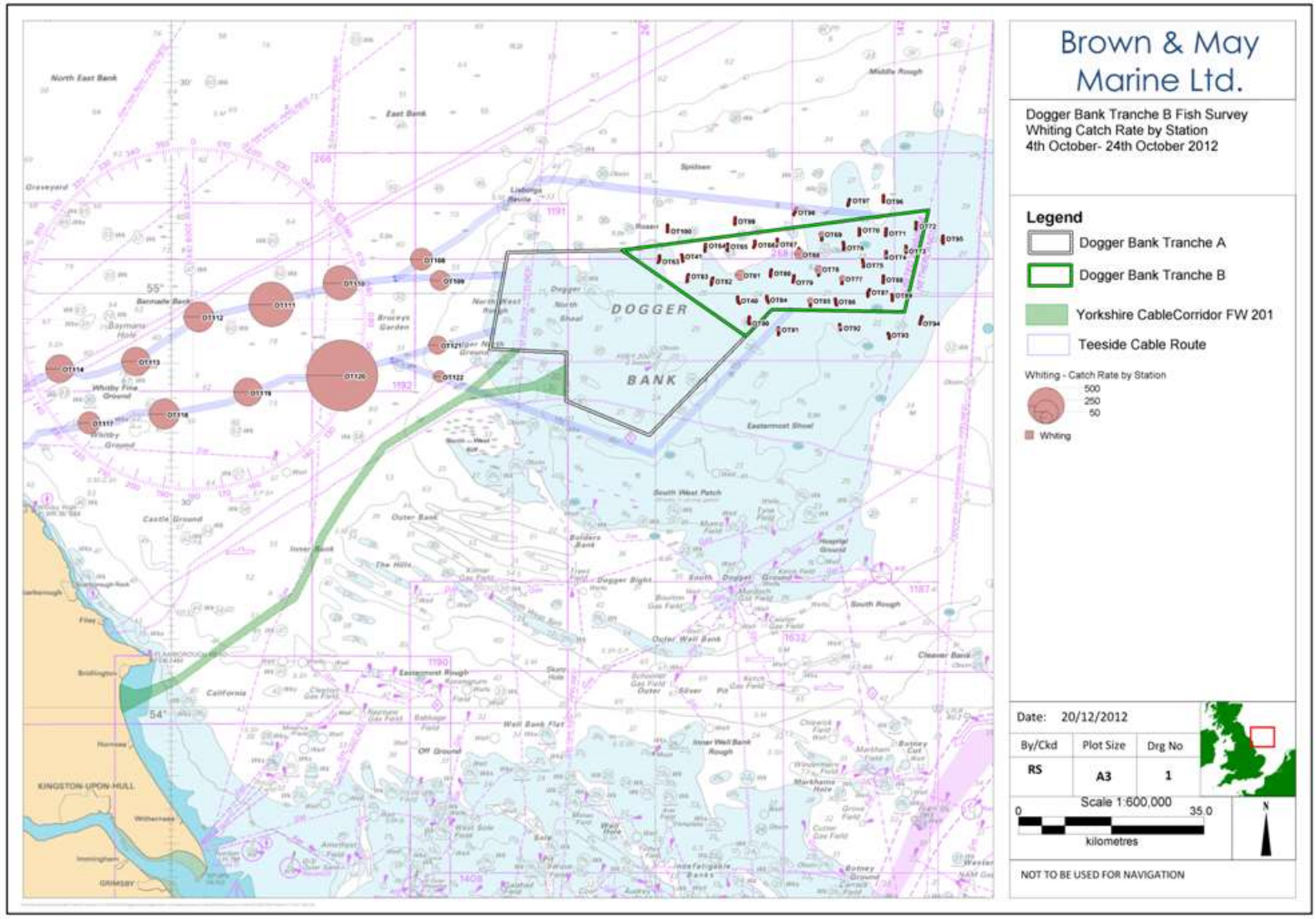


Figure 5.8 Spatial Distribution of Whiting (*M. merlangus*) in the Area of Tranche B

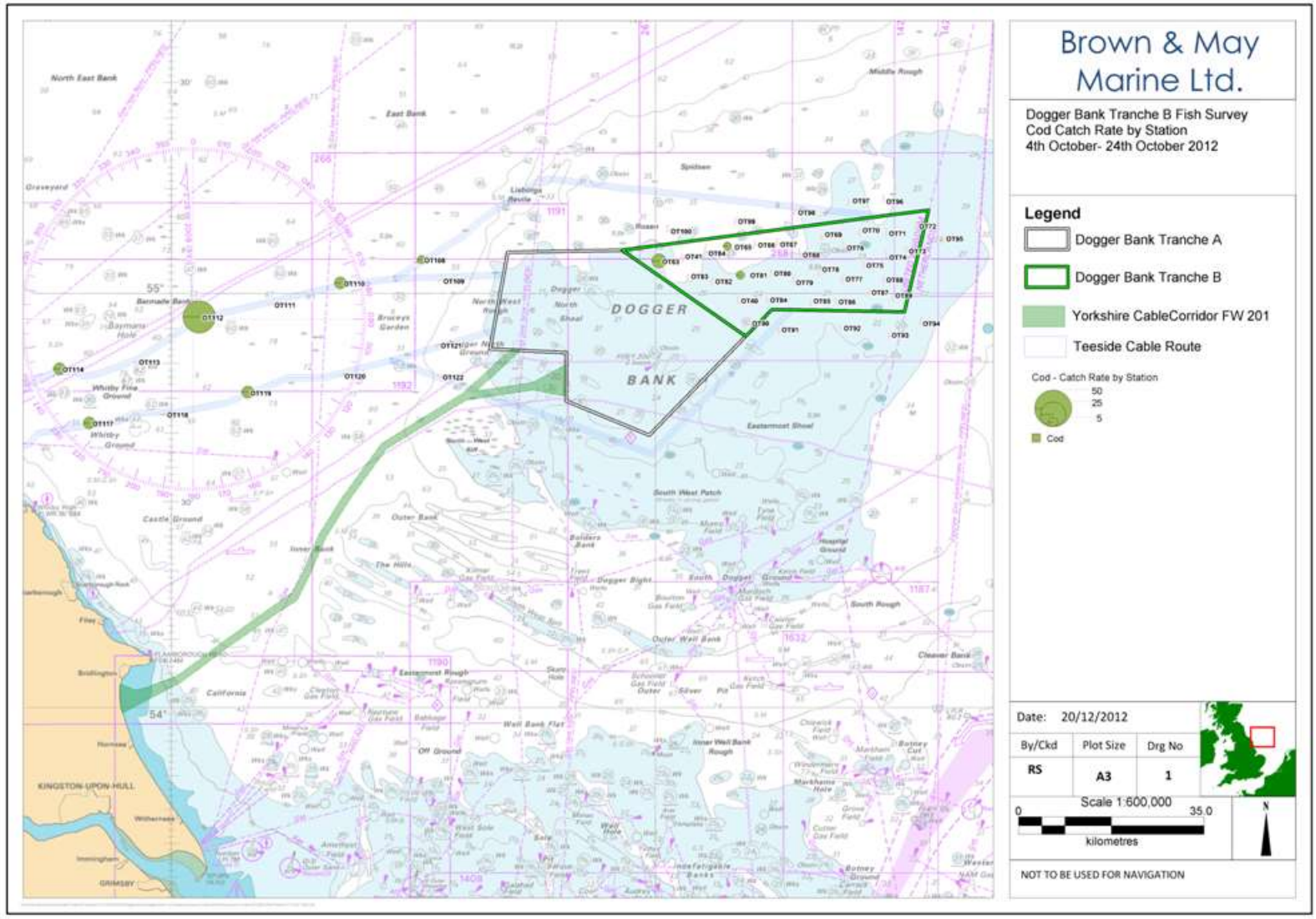


Figure 5.9 Spatial Distribution of Cod (*G. morhua*) in the Area of Tranche B

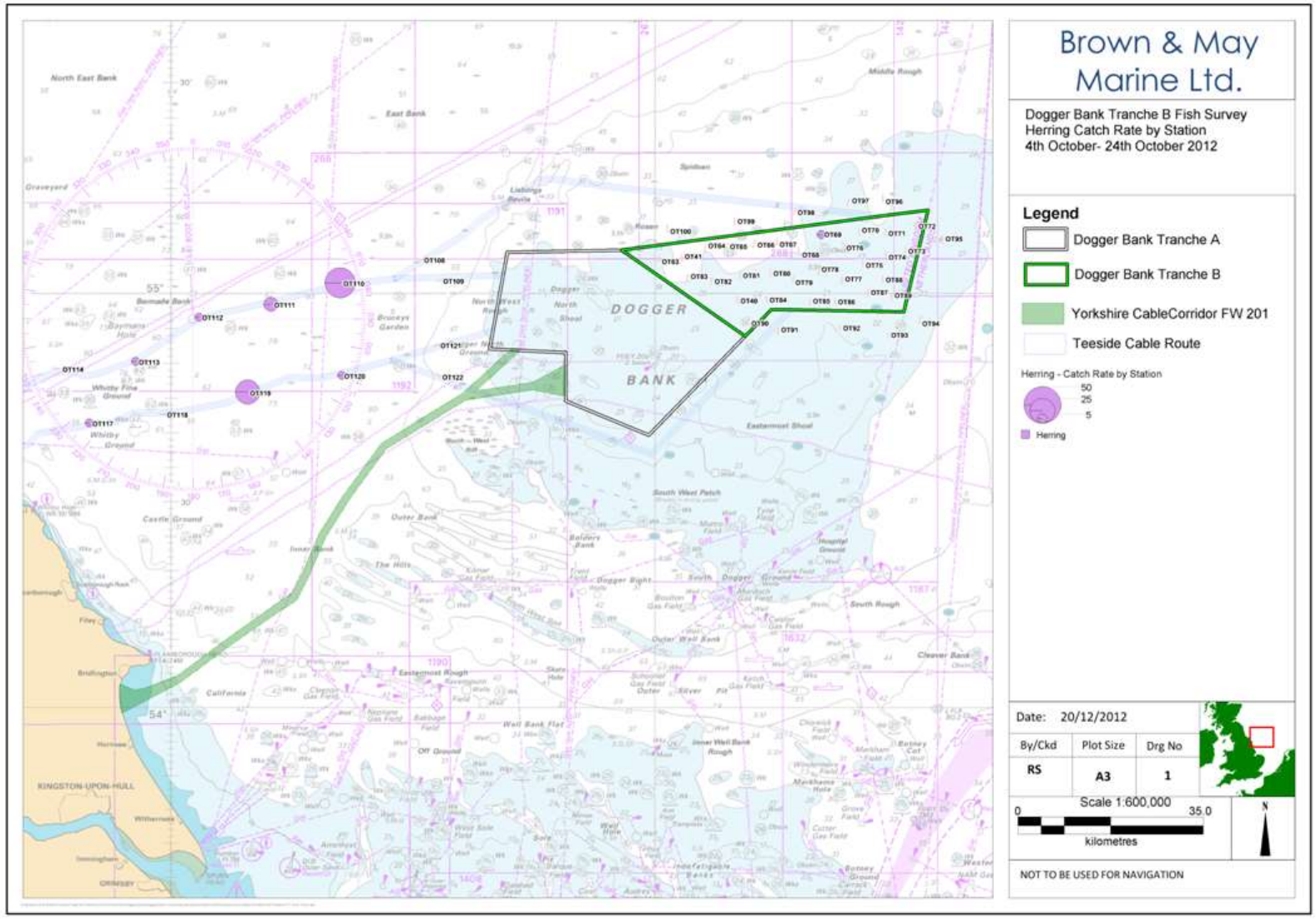


Figure 5.10 Spatial Distribution of Herring (*C. harengus*) in the Area of Tranche B

5.2 Length Distributions

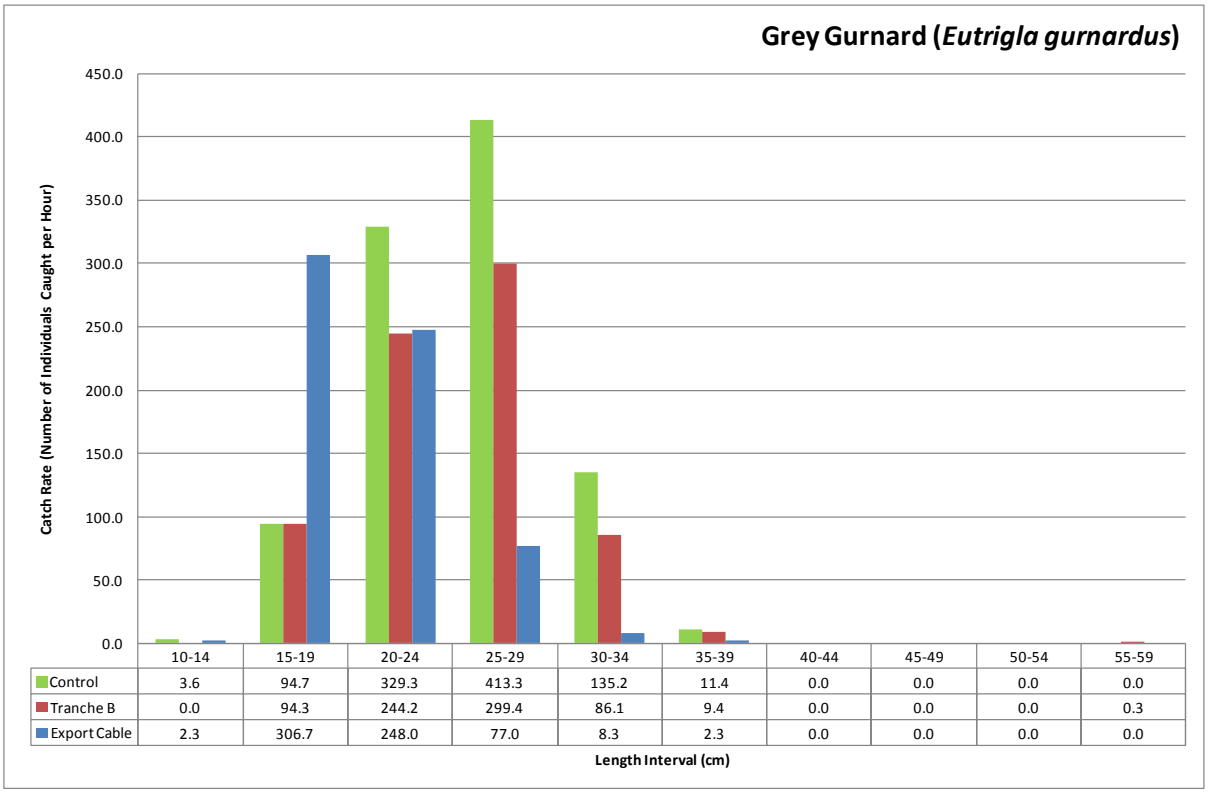
The average length (cm) and length range for fish species caught by sampling area (control, Tranche B and export cable stations) are given below in Table 5.2. It should be noted that, as a safety precaution, length data is not recorded for the poisonous lesser weever (*Echiichthys vipera*), and as such is excluded from this section.

The length distributions of the most abundant species caught during the survey (>1,700 individuals), expressed as the catch rate (number of individuals caught per hour) by length (cm) and by sampling area, are shown in Figure 5.11 to Figure 5.14 overleaf.

Table 5.2 Average Length and Length Ranges of Species Caught by Sampling Area

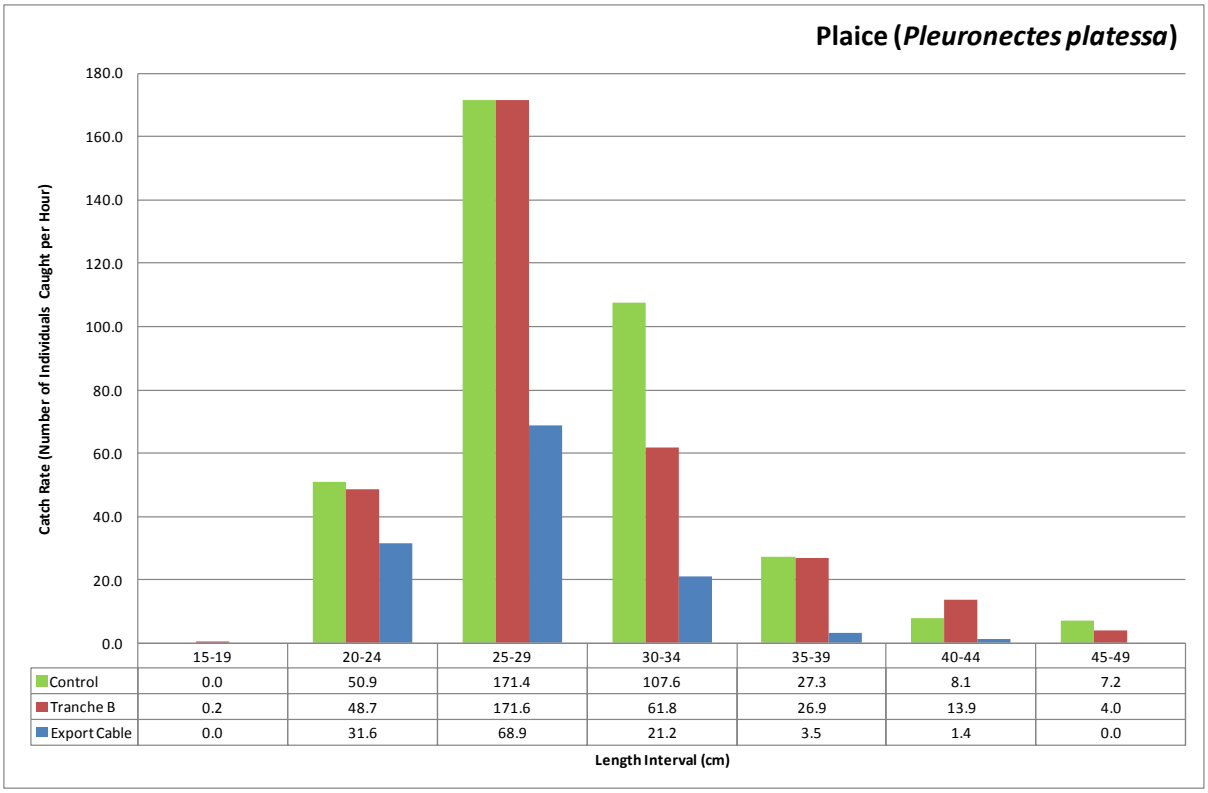
Species		Average Length (cm)			Length Range (cm)	
Common Name	Scientific Name	Control	Tranche B	Export Cable	Min.	Max.
Anglerfish	*Lophius piscatorius*	-	64.0	47.0	35.0	64.0
Brill	*Scophthalmus rhombus*	-	-	41.5	34.0	49.0
Bullrout	*Myoxocephalus scorpius*	-	20.8	26.0	17.0	26.0
Cod	*Gadus morhua*	-	36.2	40.2	15.0	70.0
Common Dragonet	*Callionymus lyra*	20.0	15.0	20.5	15.0	22.0
Common Squid	*Loligo vulgaris*	21.0	-	-	21.0	21.0
Dab	*Limanda limanda*	21.0	22.2	18.8	12.0	34.0
Edible Crab	*Cancer pagurus*	16.5	14.2	17.9	7.9	19.9
Grey Gurnard	*Eutrigla gurnardus*	25.1	24.8	20.4	14.0	57.0
Haddock	*Melanogrammus aeglefinus*	-	-	34.6	23.0	50.0
Hake	*Merluccius merluccius*	-	-	37.7	26.0	64.0
Herring	*Clupea harengus*	-	15.0	25.5	15.0	30.5
Horse Mackerel	*Trachurus trachurus*	-	40.0	-	40.0	40.0
John Dory	*Zeus faber*	-	26.5	-	25.0	28.0
Lemon Sole	*Microstomus kitt*	23.7	23.4	25.3	16.0	34.0
Lesser Spotted Dogfish	*Scyliorhinus canicula*	-	61.0	52.0	52.0	61.0
Ling	*Molva molva*	-	-	64.0	64.0	64.0
Long Rough Dab	*Hippoglossoides platessoides*	-	-	19.1	16.0	23.0
Long-finned Squid	*Loligo forbesi*	14.6	15.5	10.1	7.0	45.0
Mackerel	*Scomber scombrus*	23.5	25.3	25.4	21.0	27.0
Plaice	*Pleuronectes platessa*	29.2	28.8	26.9	17.0	49.0
Poor Cod	*Trisopterus minutus*	-	-	18.8	16.0	22.0
Queen Scallop	*Aequipecten opercularis*	-	4.8	6.8	1.7	8.0
Red Gurnard	*Aspitrigla cuculus*	-	-	22.0	22.0	22.0
Sea Scorpion	*Taurulus bubalis*	-	21.0	-	21.0	21.0
Spiny Spider Crab	*Maja squinado*	-	-	96.5	95.0	98.0
Spotted Ray	*Raja montagui*	-	-	46.3	42.0	50.0
Sprat	*Sprattus sprattus*	12.1	11.0	-	11.0	12.5
Spurdog	*Squalus acanthias*	102.0	79.5	-	69.0	107.0
Squid	*Loligo sp.*	-	5.1	9.0	2.0	13.0
Starry Ray	*Amblyraja radiata*	-	26.0	37.5	26.0	43.0

Species		Average Length (cm)			Length Range (cm)	
Common Name	Scientific Name	Control	Tranche B	Export Cable	Min.	Max.
Starry Smoothhound	*Mustelus asterias*	-	79.0	83.6	73.0	93.0
Turbot	*Psetta maxima*	46.0	35.5	32.0	32.0	46.0
Velvet Crab	*Necora puber*	9.0	7.6	-	7.2	9.0
Whelk	*Buccinum undatum*	-	8.5	16.9	8.5	16.9
Whiting	*Merlangius merlangus*	23.0	23.4	29.9	18.0	44.0
Witch	*Glyptocephalus cynoglossus*	-	-	30.4	25.0	36.0



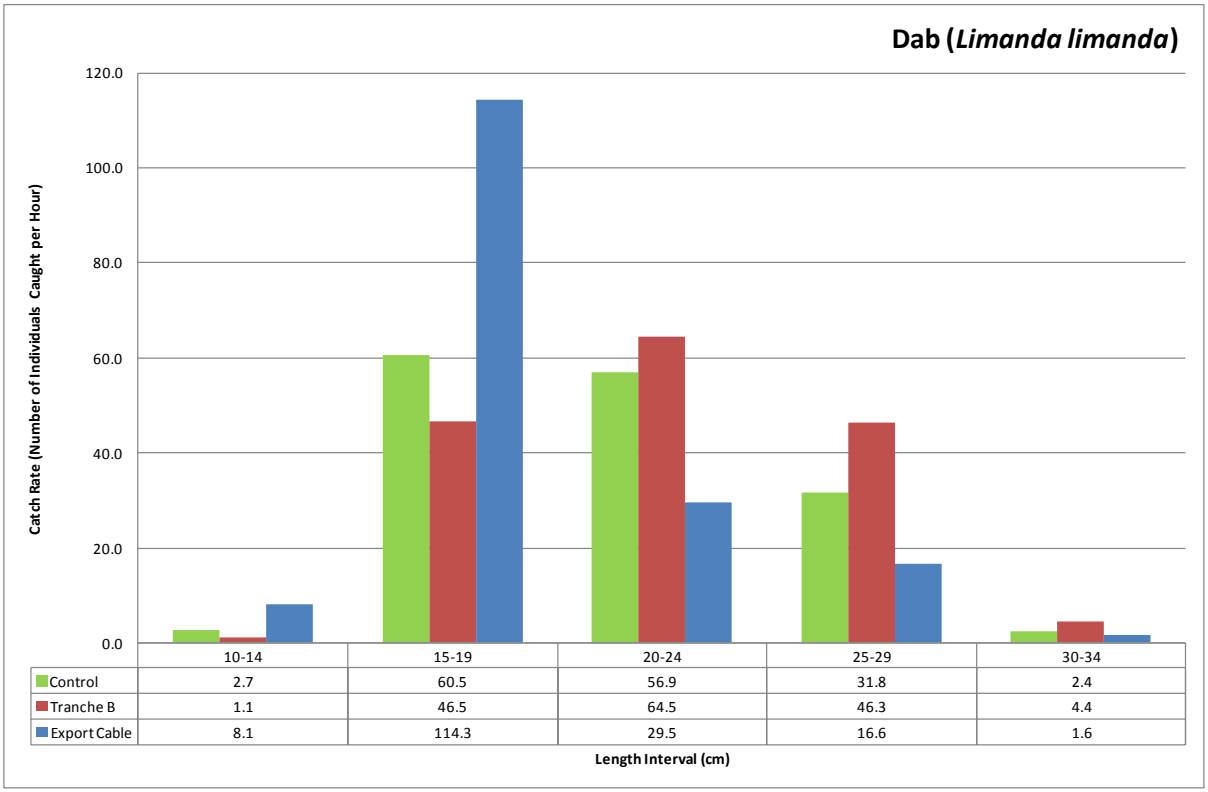
	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59
Control	3.6	94.7	329.3	413.3	135.2	11.4	0.0	0.0	0.0	0.0
Tranche B	0.0	94.3	244.2	299.4	86.1	9.4	0.0	0.0	0.0	0.3
Export Cable	2.3	306.7	248.0	77.0	8.3	2.3	0.0	0.0	0.0	0.0

Figure 5.11 Grey Gurnard (*E. gurnardus*) Length Distribution by Sampling Area



	15-19	20-24	25-29	30-34	35-39	40-44	45-49
Control	0.0	50.9	171.4	107.6	27.3	8.1	7.2
Tranche B	0.2	48.7	171.6	61.8	26.9	13.9	4.0
Export Cable	0.0	31.6	68.9	21.2	3.5	1.4	0.0

Figure 5.12 Plaice (*P. platessa*) Length Distribution by Sampling Area



	10-14	15-19	20-24	25-29	30-34
Control	2.7	60.5	56.9	31.8	2.4
Tranche B	1.1	46.5	64.5	46.3	4.4
Export Cable	8.1	114.3	29.5	16.6	1.6

Figure 5.13 Dab (*L. limanda*) Length Distribution by Sampling Area

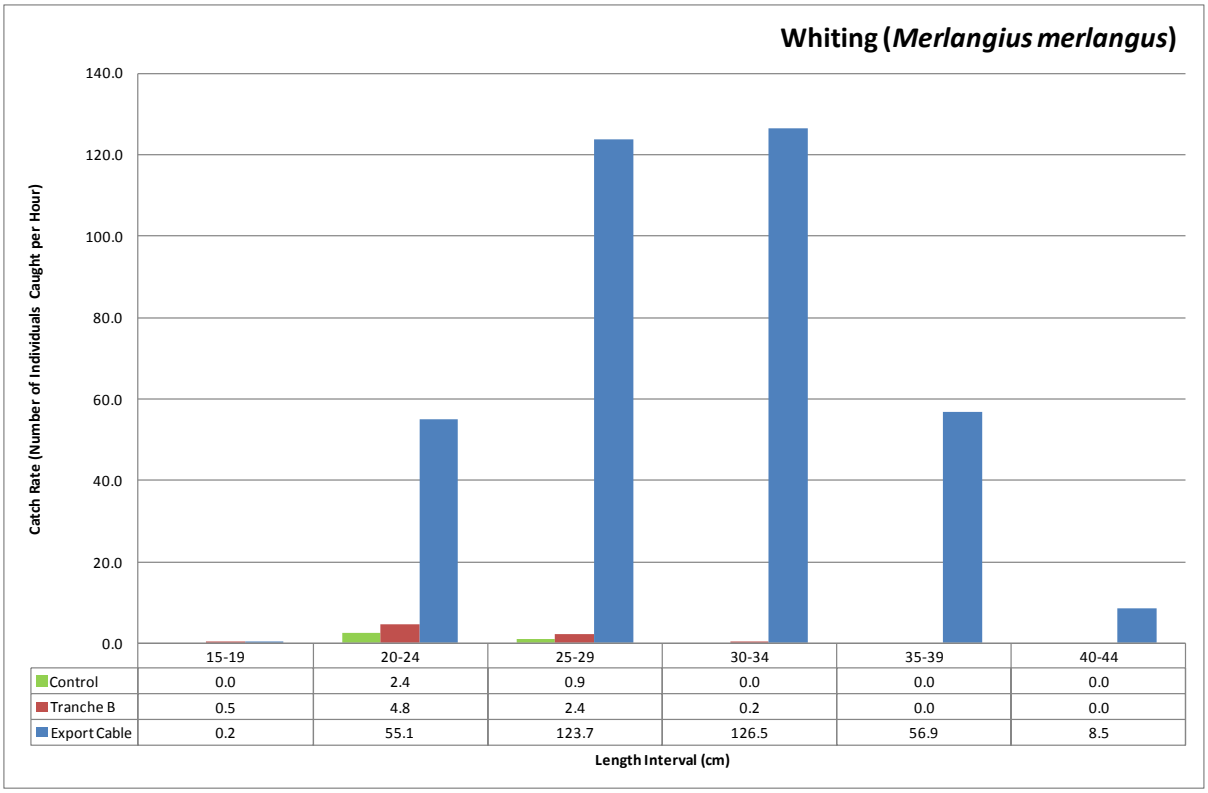


Figure 5.14 Whiting (*M. merlangus*) Length Distribution by Sampling Area

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).

Table 5.3 shows the nine fish and four shellfish species caught for which a MLS has been set, and denotes their presence or absence by sampling area (control, Tranche B and export cable).

Table 5.3 MLS Set by EC

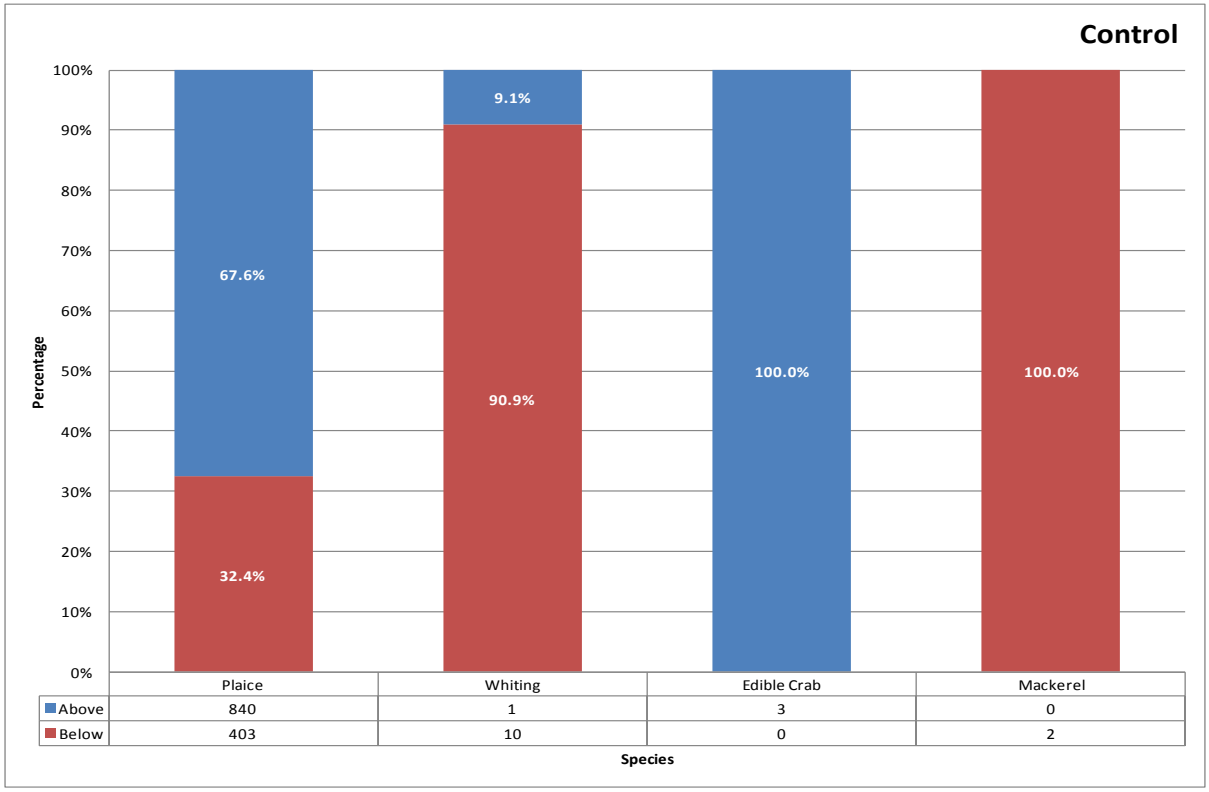
Species		EC MLS (cm)	Presence		
Common Name	Scientific Name		Control	Tranche B	Export Cable
Cod	*Gadus morhua*	35	-	✓	✓
Haddock	*Melanogrammus aeglefinus*	30	-	-	✓
Hake	*Merluccius merluccius*	27	-	-	✓
Herring	*Clupea harengus*	20	-	✓	✓
Horse Mackerel	*Trachurus trachurus*	15	-	✓	-
Ling	*Molva molva*	63	-	-	✓
Mackerel	*Scomber scombrus*	30	✓	✓	✓
Plaice	*Pleuronectes platessa*	27	✓	✓	✓
Whiting	*Merlangius merlangus*	27	✓	✓	✓
Edible Crab	*Cancer pagurus*	13	✓	✓	✓
Queen scallop	*Aequipecten opercularis*	4	-	✓	✓
Spiny Spider Crab	*Maja squinado*	12	-	-	✓
Whelk	*Buccinum undatum*	4.5	-	✓	✓

The percentage of individuals caught above and below their set MLS by species is shown in Figure 5.15, Figure 5.16 and Figure 5.17 for control, Tranche B and export cable stations respectively.

At the control stations, most of the *P. platessa* caught were above the set MLS (67.6%), whereas within Tranche B and along the export cable the percentage of individuals above and below the MLS was approximately even.

Most of the *M. merlangus* caught at the control stations (90.9%) and within Tranche B (87.3%) were below the MLS, whereas most of the *M. merlangus* (72.9%) and *M. aeglefinus* (93.1%) caught along the export cable were above the MLS.

All other species with a set MLS were caught in relatively low numbers.



	Plaice	Whiting	Edible Crab	Mackerel
Above	840	1	3	0
Below	403	10	0	2

Figure 5.15 Percentage of the Catch Above and Below the MLS by Species at the Control Stations

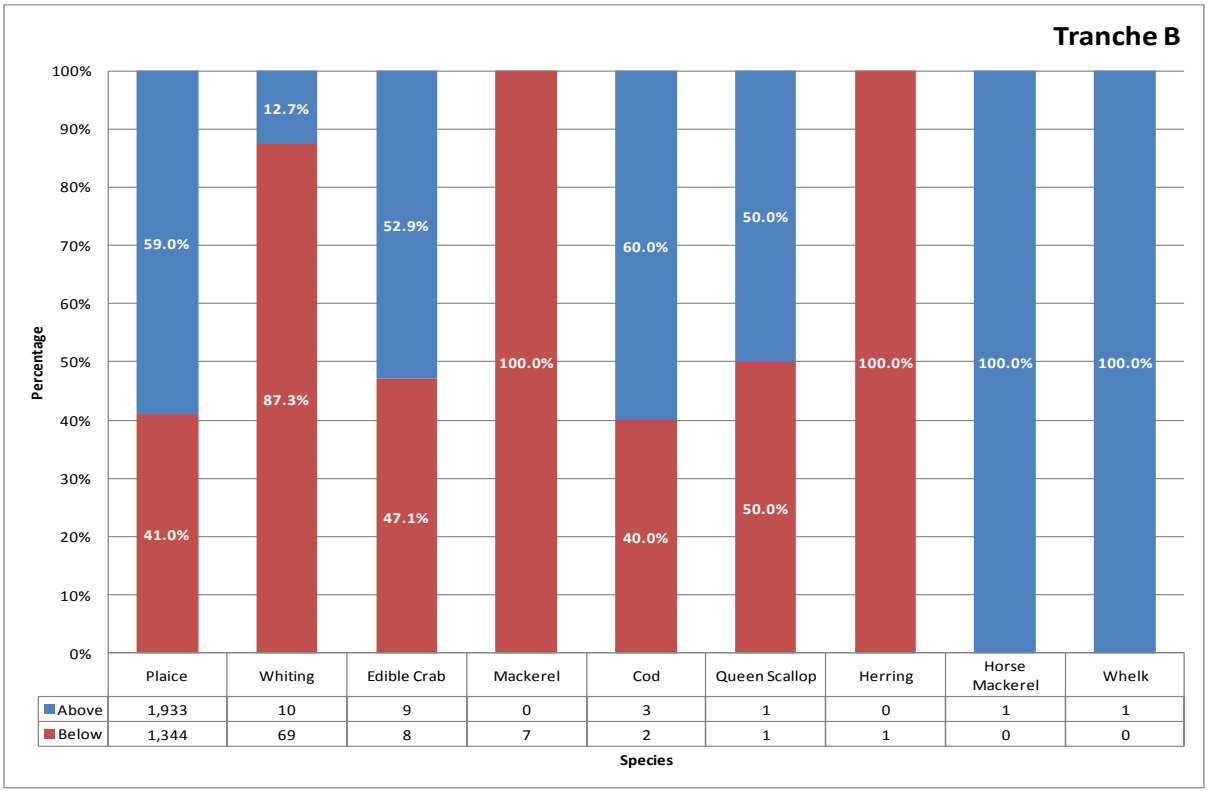


Figure 5.16 Percentage of the Catch Above and Below the MLS by Species within Tranche B

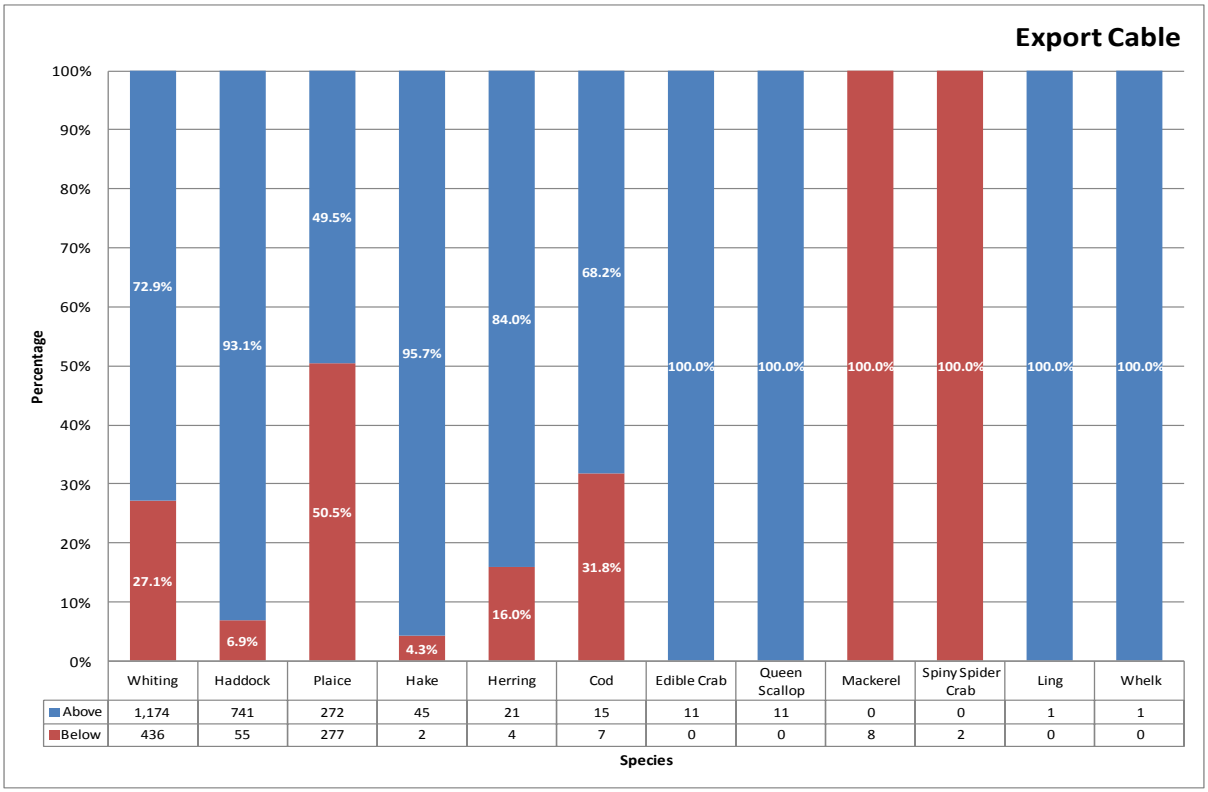


Figure 5.17 Percentage of the Catch Above and Below the MLS by Species at Stations along the Export Cable

5.4 Sex Ratios

The sex ratios of the most abundant species caught during the survey (>1,700 individuals) are shown in Figure 5.18, Figure 5.19 and Figure 5.20 for control, Tranche B and export cable stations, respectively. It should be noted that Cefas were unable to confidently determine the sex of a number of immature individuals, and as such they have been categorised as 'unsexed'.

A higher proportion of the *E. gurnardus* and *P. platessa* caught at the control stations (53.2% and 69.6% respectively) and within Tranche B (51.2% and 73.8% respectively) were female, whereas the sex ratio for these species along the export cable was approximately even.

The greatest proportions of the *M. merlangus* found in all sampling areas (control 36.4%, Tranche B 34.2%, export cable 64.2%), and of the *L. limanda* caught at the control stations (68.2%) and within Tranche B (72.5%) were female. A higher proportion of the *L. limanda* found along the export cable were male (52.8%).

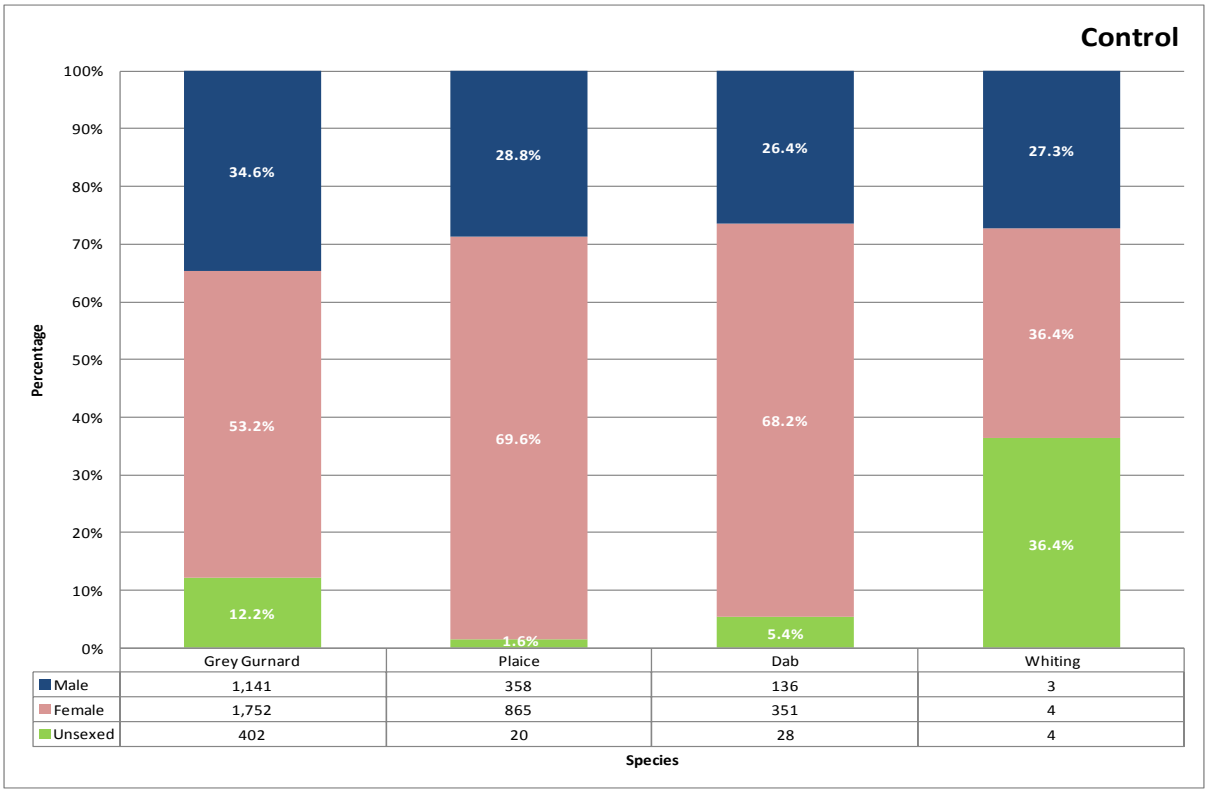


Figure 5.18 Sex Ratio by Species at the Control Stations

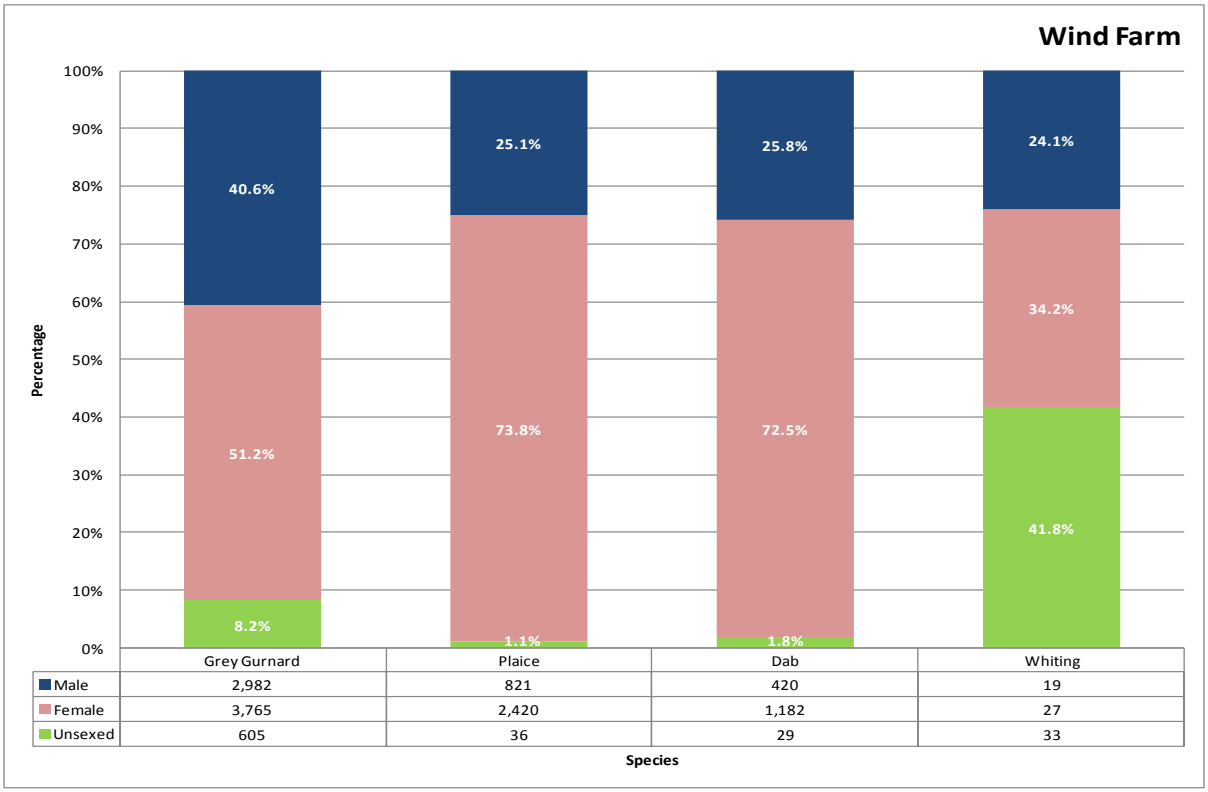


Figure 5.19 Sex Ratio by Species within Tranche B

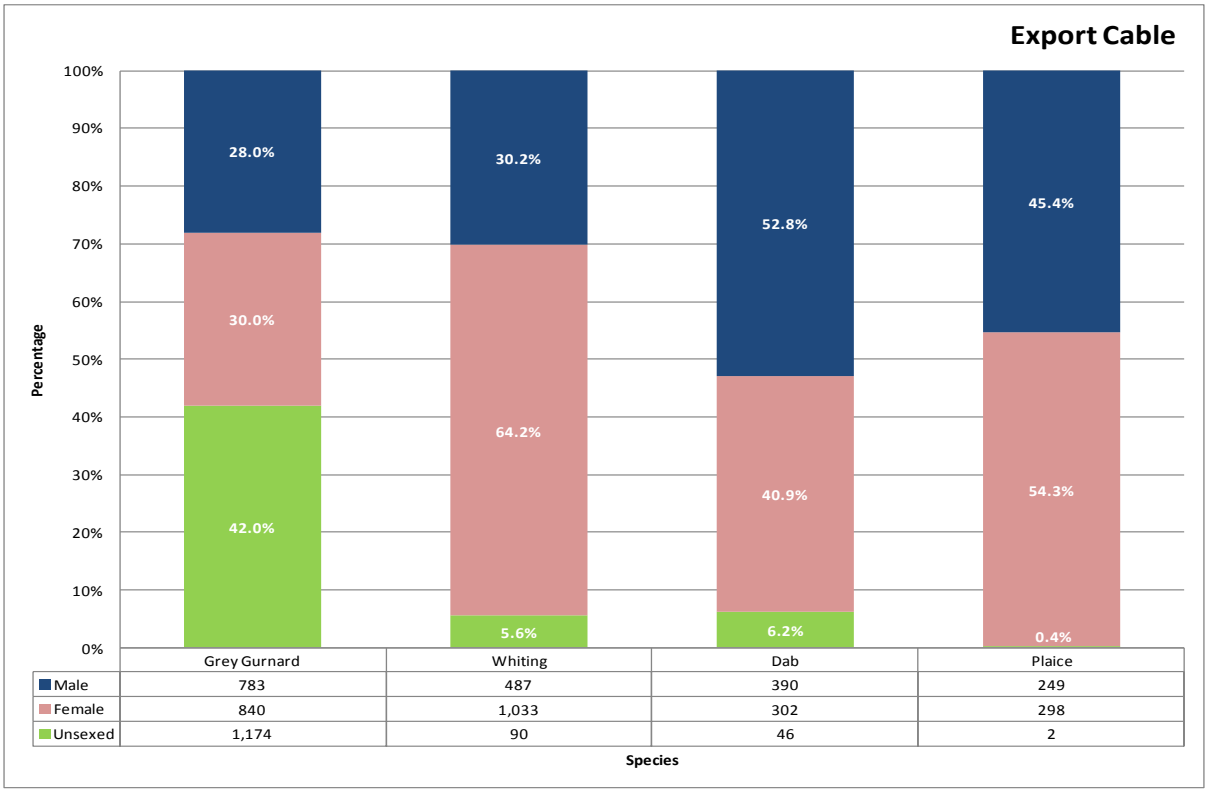


Figure 5.20 Sex Ratio by Species at Stations along the Export Cable

5.5 Spawning Condition

The spawning condition, sex and length range (nearest cm below) for the most abundant species caught during the survey (>1,700 individuals) are given below in Table 5.4 to Table 5.7. The spawning condition, sex and length range is also detailed for *G. morhua* and *C. harengus* in Table 5.8 and Table 5.9 respectively.

Where a stage of maturity was not recorded for a species it has not been included in the following tables. It should be noted that Cefas were unable to confidently determine the sex of a number of immature individuals, and as such they have been categorised as 'unsexed'.

The highest proportion of the *E. gurnardus* (control 62.0%, Tranche B 50.1% and export cable 55.4%) and *P. platessa* (71.7%, 62.8% and 93.6% respectively) found in all sampling areas were maturing.

The greatest proportion of the *L. limanda* caught at the control stations (47.9%) and within Tranche B (49.8%) was spent, whereas along the export cable most of the individuals were maturing (88.9%).

The majority of the *M. merlangus* caught at the control stations (72.7%) and within Tranche B (74.7%) were immature, whereas along the export cable most of the individuals were maturing (72.5%).

The highest proportion of the *G. morhua* caught within Tranche B (80.0%) and along the export cable (59.1%) was immature. One male 'virgin' *C. harengus* was caught within Tranche B, whereas along the export cable the greatest proportion was represented by 'ripening' individuals (40.0%).

Table 5.4 Grey Gurnard (*E. gurnardus*) Spawning Condition

Grey Gurnard								
Sex	Maturity	Individuals Caught			Total	% of Total Catch	Length Range (cm)	
		Control	Tranche B	Export Cable			Min.	Max.
Female	Immature	112	428	48	588	4.7%	15	30
	Maturing	1,137	1,844	769	3,750	30.0%	15	57
	Hyaline	0	0	1	1	0.0%	29	29
	Running	15	0	0	15	0.1%	28	28
	Spent	488	1,493	22	2,003	16.0%	19	37
Male	Immature	118	439	42	599	4.8%	15	29
	Maturing	712	1,578	721	3,011	24.1%	15	37
	Spent	311	965	20	1,296	10.4%	17	34
Unsexed	Immature	88	82	1,066	1,236	9.9%	14	21

Table 5.5 Plaice (*P. platessa*) Spawning Condition

Plaice								
Sex	Maturity	Individuals Caught			Total	% of Total Catch	Length Range (cm)	
		Control	Tranche B	Export Cable			Min.	Max.
Female	Immature	30	361	15	406	8.1%	20	33
	Maturing	619	1,410	273	2,302	45.9%	20	49
	Running	0	1	0	1	0.0%	41	41
	Spent	216	648	10	874	17.4%	21	47
Male	Immature	12	34	2	48	1.0%	17	28
	Maturing	258	630	241	1,129	22.5%	20	36
	Spent	88	157	6	251	5.0%	21	31
Unsexed	Immature	0	5	2	7	0.1%	20	23

Table 5.6 Dab (*L. limanda*) Spawning Condition

Dab								
Sex	Maturity	Individuals Caught			Total	% of Total Catch	Length Range (cm)	
		Control	Tranche B	Export Cable			Min.	Max.
Female	Immature	79	128	48	255	9.1%	12	27
	Maturing	44	311	236	591	21.2%	13	32
	Hyaline	0	3	0	3	0.1%	28	28
	Spent	228	740	18	986	35.4%	15	34
Male	Immature	4	22	2	28	1.0%	13	20
	Maturing	125	339	381	845	30.3%	13	29
	Spent	7	59	7	73	2.6%	15	28
Unsexed	Immature	4	1	2	7	0.3%	14	15

Table 5.7 Whiting (*M. merlangus*) Spawning Condition

Whiting								
Sex	Maturity	Individuals Caught			Total	% of Total Catch	Length Range (cm)	
		Control	Tranche B	Export Cable			Min.	Max.
Female	Immature	3	11	26	40	2.4%	19	26
	Maturing	1	3	905	909	54.4%	21	44
	Spent	0	13	102	115	6.9%	23	44
Male	Immature	1	15	55	71	4.2%	19	28
	Maturing	1	2	241	244	14.6%	19	36
	Spent	1	2	191	194	11.6%	21	37
Unsexed	Immature	4	33	61	98	5.9%	18	28

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

Cod								
Sex	Maturity	Individuals Caught			Total	% of Total Catch	Length Range (cm)	
		Control	Tranche B	Export Cable			Min.	Max.
Female	Immature	0	3	2	5	18.5%	33	40
	Maturing	0	1	4	5	18.5%	35	47
	Spent	0	0	2	2	7.4%	63	70
Male	Immature	0	1	9	10	37.0%	29	43
	Spent	0	0	3	3	11.1%	46	67
Unsexed	Immature	0	0	2	2	7.4%	15	16

Table 5.9 Herring (*C. harengus*) Spawning Condition

Herring								
Sex	Maturity	Individuals Caught			Total	% of Total Catch	Length Range (cm)	
		Control	Tranche B	Export Cable			Min.	Max.
Female	1 - Virgin	0	0	2	2	7.7%	18.5	19
	3 - Early Ripening	0	0	3	3	11.5%	26.5	28
	4 - Ripening	0	0	3	3	11.5%	27.5	30.5
Male	1 - Virgin	0	1	2	3	11.5%	15	23
	2 - Late Virgin	0	0	2	2	7.7%	22.5	23
	3 - Early Ripening	0	0	1	1	3.8%	25.5	25.5
	4 - Ripening	0	0	7	7	26.9%	25.5	28.5
	5 - Late Ripening	0	0	1	1	3.8%	25.5	25.5
	7.1 - Early Spent	0	0	1	1	3.8%	28	28
	7.2 - Late Spent	0	0	2	2	7.7%	29	30
Unsexed	1- Virgin	0	0	1	1	3.8%	18.5	18.5

6.0 Beam Trawl Results

6.1 Catch Rates and Species Distribution

The total number of individuals caught and the catch rate (number of individuals caught per hour) for fish species by sampling area are given in Table 6.1 below and are illustrated in Figure 6.1. The catch rate of fish species by sampling station are shown in Figure 6.2 to Figure 6.4 for control, Tranche B and export cable stations respectively.

A total of 19 species of fish were caught, nine of which were found at the control stations, 11 within Tranche B and 15 along the export cable.

Overall, *B. luteum* was the most abundant species caught (688 individuals), 80.1% of which were found in Tranche B, followed by *L. limanda* (174), and then *P. minutus* (144).

B. luteum were the most prevalent species at the control stations (74.9/hr) and within Tranche B (109.9/hr), whereas *P. minutus* were most abundant along the export cable (23.0/hr).

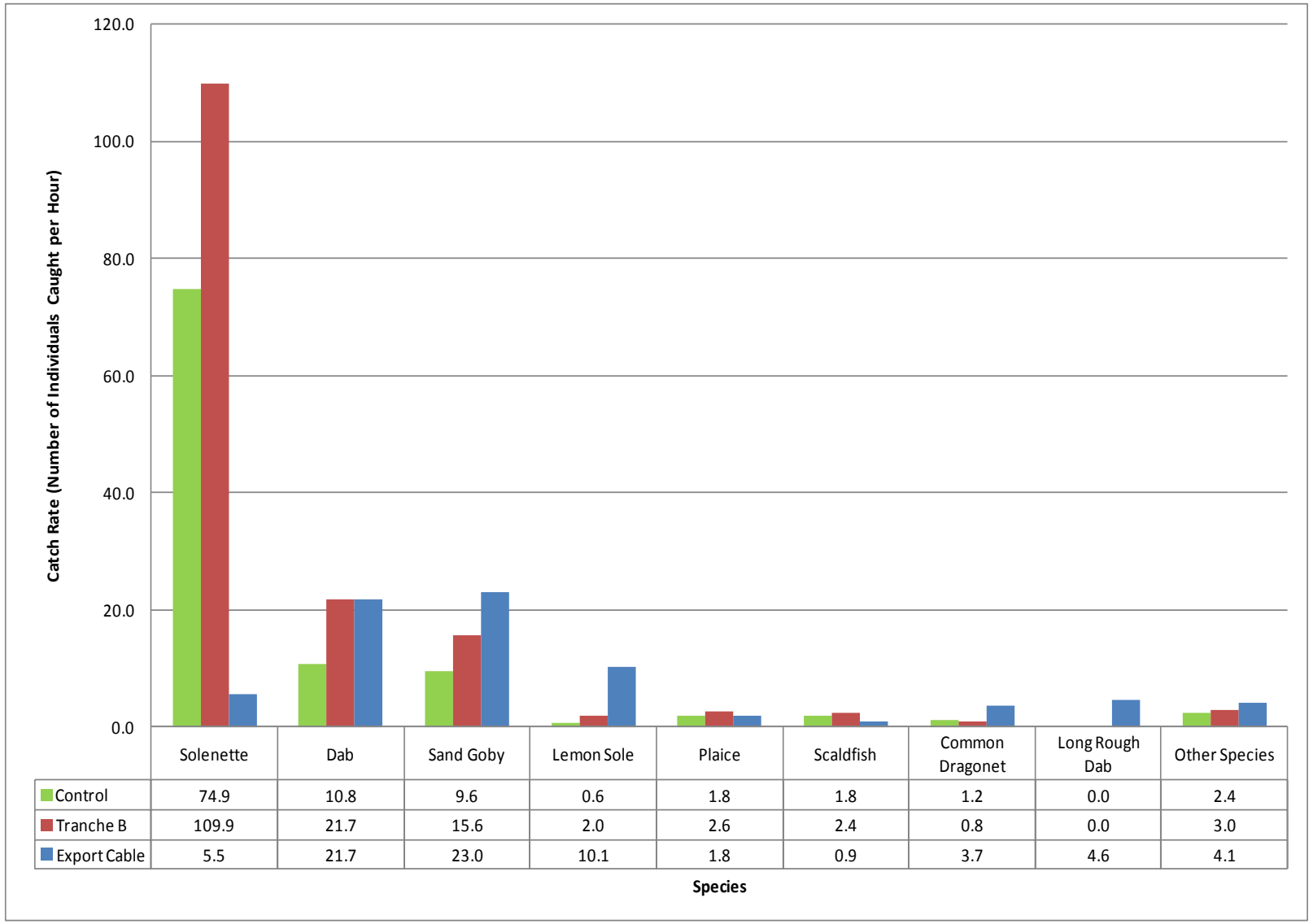
The station with the greatest total catch rate was BT63 within the wind farm (355.9/hr), with *B. luteum* representing 77.0% of the catch.

P. platessa were found in low numbers in all sampling areas, and *A. marinus* were found in low numbers at the control stations and within Tranche B. One *M. merlangus* was caught along the export cable at station BT122.

Overall, the total catch rate was higher within Tranche B (158.0/hr) than at the control stations (103.0/hr) and along the export cable (75.6/hr).

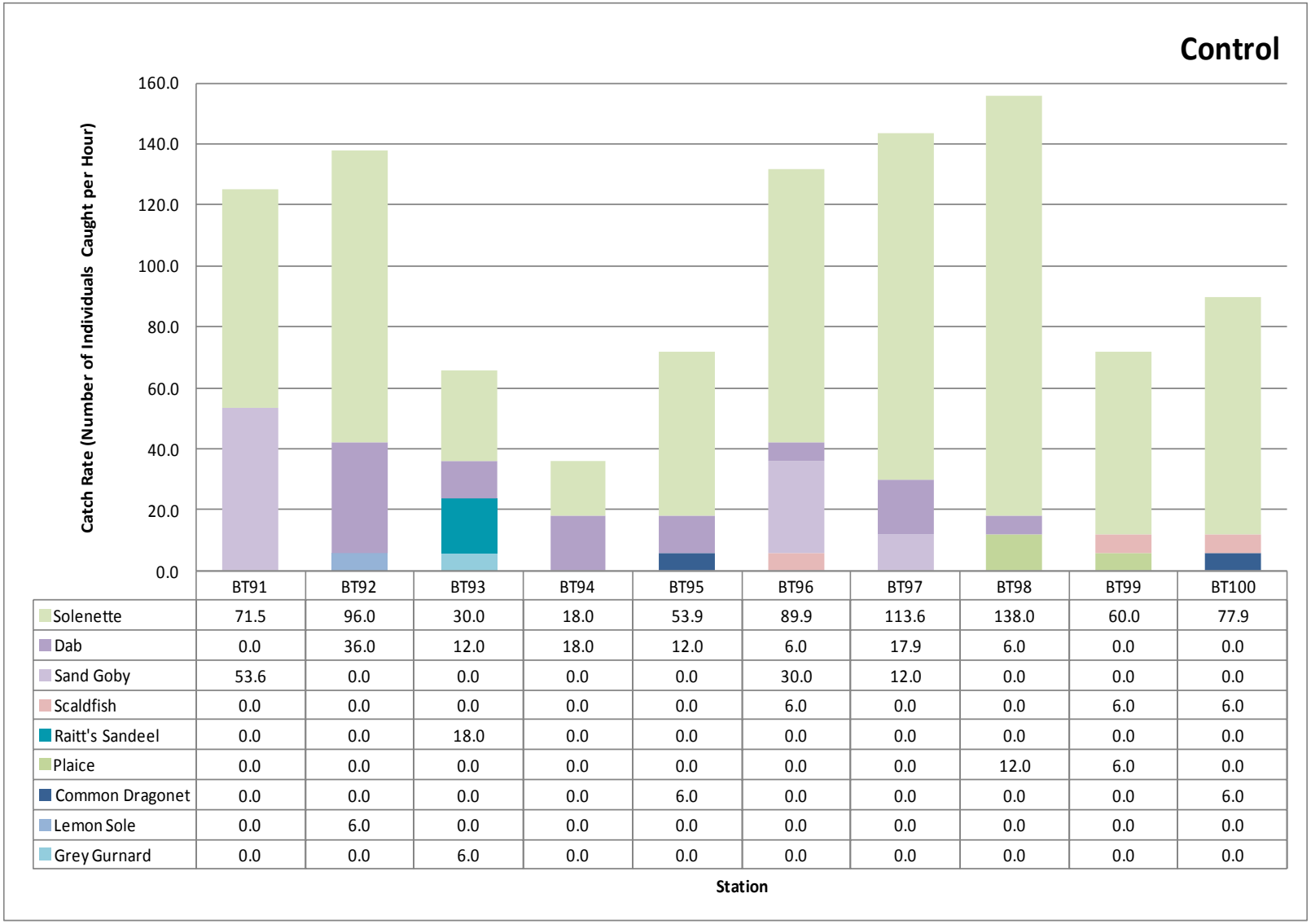
Table 6.1 Number of Individuals Caught and the Catch Rate for Fish Species by Sampling Area

Species		Number of Individuals Caught				Catch Rate (Number of Individuals Caught per Hour)		
Common Name	Scientific Name	Control	Tranche B	Export Cable	Total	Control	Tranche B	Export Cable
Solenette	*Buglossidium luteum*	125	551	12	688	74.9	109.9	5.5
Dab	*Limanda limanda*	18	109	47	174	10.8	21.7	21.7
Sand Goby	*Pomatoschistus minutus*	16	78	50	144	9.6	15.6	23.0
Lemon Sole	*Microstomus kitt*	1	10	22	33	0.6	2.0	10.1
Plaice	*Pleuronectes platessa*	3	13	4	20	1.8	2.6	1.8
Scaldfish	*Arnoglossus laterna*	3	12	2	17	1.8	2.4	0.9
Common Dragonet	*Callionymus lyra*	2	4	8	14	1.2	0.8	3.7
Long Rough Dab	*Hippoglossoides platessoides*	0	0	10	10	0.0	0.0	4.6
Painted Goby	*Pomatoschistus pictus*	0	9	0	9	0.0	1.8	0.0
Raitt's Sandeel	*Ammodytes marinus*	3	4	0	7	1.8	0.8	0.0
Hagfish	*Myxine glutinosa*	0	0	2	2	0.0	0.0	0.9
Megrim	*Lepidorhombus whiffiagonis*	0	1	1	2	0.0	0.2	0.5
Pogge	*Agonus cataphractus*	0	0	2	2	0.0	0.0	0.9
Goby (indet.)	*Gobiidae sp.*	0	0	1	1	0.0	0.0	0.5
Grey Gurnard	*Eutrigla gurnardus*	1	0	0	1	0.6	0.0	0.0
Norway Pout	*Trispoterus esmarkii*	0	0	1	1	0.0	0.0	0.5
Sea Scorpion	*Taurulus bubalis*	0	1	0	1	0.0	0.2	0.0
Sea Snail	*Liparis liparis*	0	0	1	1	0.0	0.0	0.5
Whiting	*Merlangius merlangus*	0	0	1	1	0.0	0.0	0.5
Total No. of Individuals		172	792	164				
Total No. of Species		9	11	15				
Total Catch Rate (No. of Individuals Caught per Hour)		103.0	158.0	75.6				



	Solenette	Dab	Sand Goby	Lemon Sole	Plaice	Scaldfish	Common Dragonet	Long Rough Dab	Other Species
Control	74.9	10.8	9.6	0.6	1.8	1.8	1.2	0.0	2.4
Tranche B	109.9	21.7	15.6	2.0	2.6	2.4	0.8	0.0	3.0
Export Cable	5.5	21.7	23.0	10.1	1.8	0.9	3.7	4.6	4.1

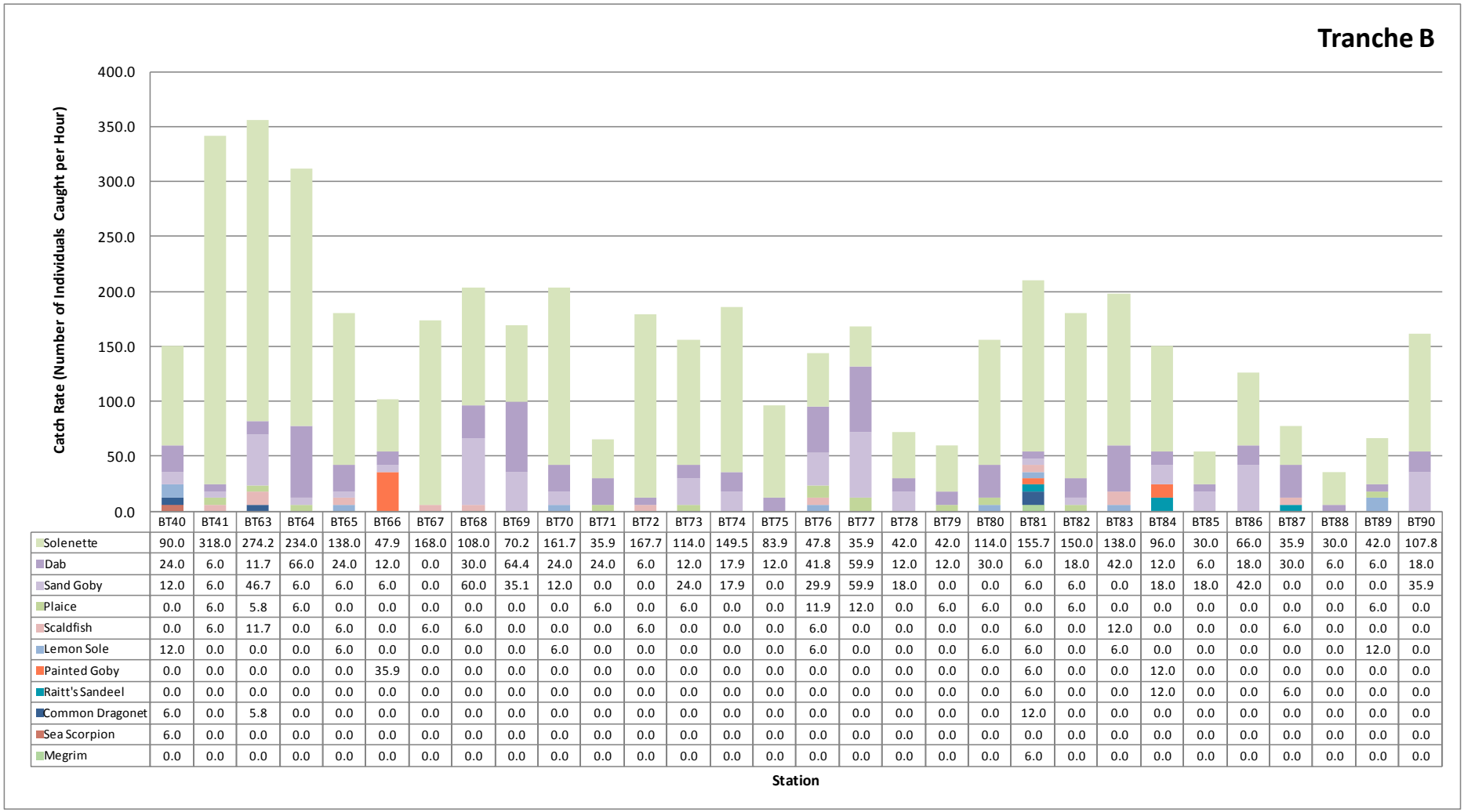
Figure 6.1 Catch Rates for Fish Species by Sampling Area



	BT91	BT92	BT93	BT94	BT95	BT96	BT97	BT98	BT99	BT100
Solenette	71.5	96.0	30.0	18.0	53.9	89.9	113.6	138.0	60.0	77.9
Dab	0.0	36.0	12.0	18.0	12.0	6.0	17.9	6.0	0.0	0.0
Sand Goby	53.6	0.0	0.0	0.0	0.0	30.0	12.0	0.0	0.0	0.0
Scaldfish	0.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	6.0	6.0
Raitt's Sandeel	0.0	0.0	18.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Plaice	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.0	6.0	0.0
Common Dragonet	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	6.0
Lemon Sole	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Grey Gurnard	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

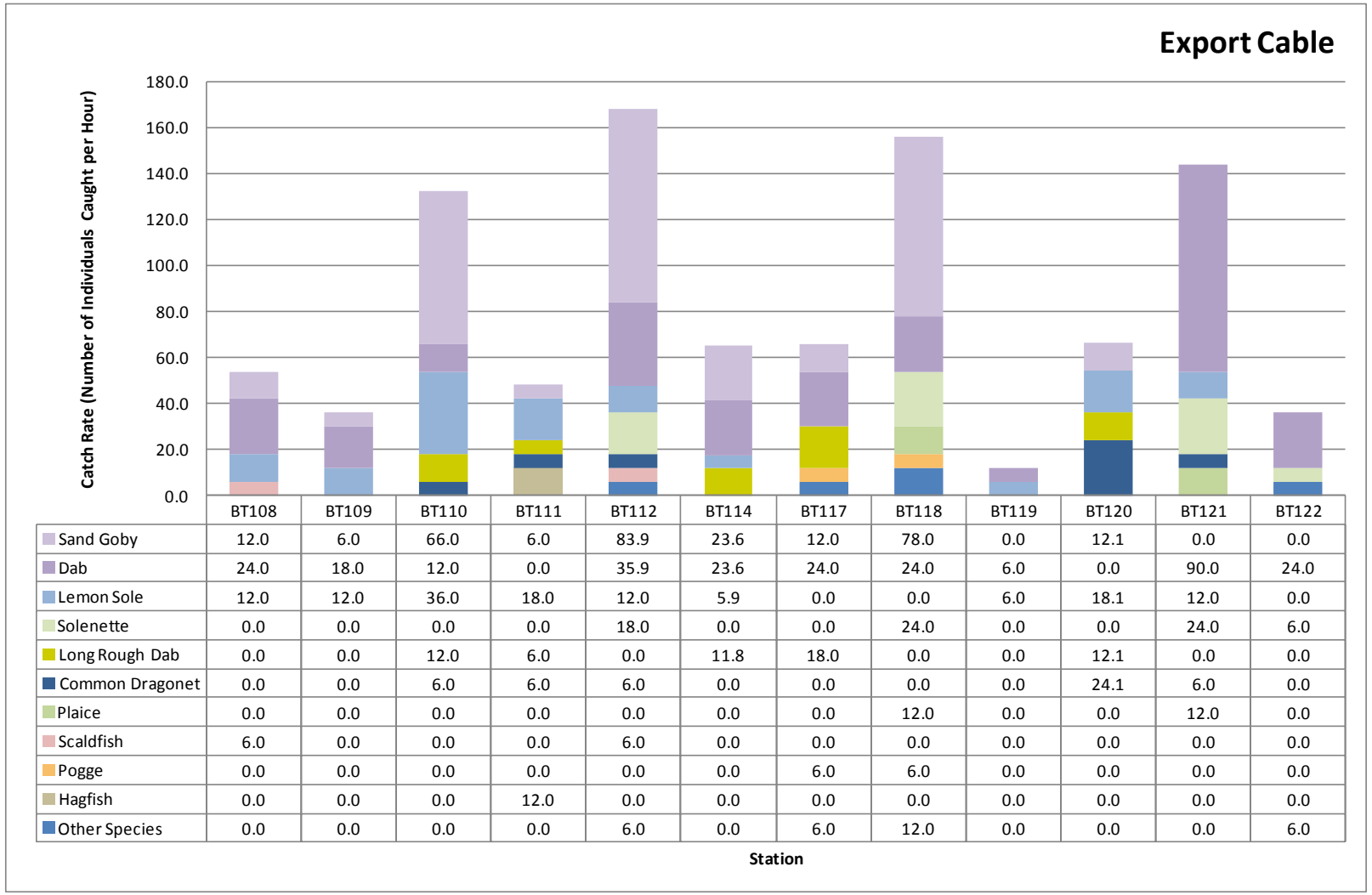
Station

Figure 6.2 Catch Rates for Fish Species by Station at the Control Stations



	BT40	BT41	BT63	BT64	BT65	BT66	BT67	BT68	BT69	BT70	BT71	BT72	BT73	BT74	BT75	BT76	BT77	BT78	BT79	BT80	BT81	BT82	BT83	BT84	BT85	BT86	BT87	BT88	BT89	BT90
Solenette	90.0	318.0	274.2	234.0	138.0	47.9	168.0	108.0	70.2	161.7	35.9	167.7	114.0	149.5	83.9	47.8	35.9	42.0	42.0	114.0	155.7	150.0	138.0	96.0	30.0	66.0	35.9	30.0	42.0	107.8
Dab	24.0	6.0	11.7	66.0	24.0	12.0	0.0	30.0	64.4	24.0	24.0	6.0	12.0	17.9	12.0	41.8	59.9	12.0	12.0	30.0	6.0	18.0	42.0	12.0	6.0	18.0	30.0	6.0	6.0	18.0
Sand Goby	12.0	6.0	46.7	6.0	6.0	6.0	0.0	60.0	35.1	12.0	0.0	0.0	24.0	17.9	0.0	29.9	59.9	18.0	0.0	0.0	6.0	6.0	0.0	18.0	18.0	42.0	0.0	0.0	0.0	35.9
Plaice	0.0	6.0	5.8	6.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	6.0	0.0	0.0	11.9	12.0	0.0	6.0	6.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0
Scaldfish	0.0	6.0	11.7	0.0	6.0	0.0	6.0	6.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	6.0	0.0	12.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0
Lemon Sole	12.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	6.0	6.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	12.0	0.0
Painted Goby	0.0	0.0	0.0	0.0	0.0	35.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	12.0	0.0	0.0	0.0	0.0	0.0	0.0
Raitt's Sandeel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	12.0	0.0	0.0	6.0	0.0	0.0	0.0
Common Dragonet	6.0	0.0	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sea Scorpion	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Megrim	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Figure 6.3 Catch Rates for Fish Species by Station within Tranche B



	BT108	BT109	BT110	BT111	BT112	BT114	BT117	BT118	BT119	BT120	BT121	BT122
Sand Goby	12.0	6.0	66.0	6.0	83.9	23.6	12.0	78.0	0.0	12.1	0.0	0.0
Dab	24.0	18.0	12.0	0.0	35.9	23.6	24.0	24.0	6.0	0.0	90.0	24.0
Lemon Sole	12.0	12.0	36.0	18.0	12.0	5.9	0.0	0.0	6.0	18.1	12.0	0.0
Solenette	0.0	0.0	0.0	0.0	18.0	0.0	0.0	24.0	0.0	0.0	24.0	6.0
Long Rough Dab	0.0	0.0	12.0	6.0	0.0	11.8	18.0	0.0	0.0	12.1	0.0	0.0
Common Dragonet	0.0	0.0	6.0	6.0	6.0	0.0	0.0	0.0	0.0	24.1	6.0	0.0
Plaice	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.0	0.0	0.0	12.0	0.0
Scaldfish	6.0	0.0	0.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pogge	0.0	0.0	0.0	0.0	0.0	0.0	6.0	6.0	0.0	0.0	0.0	0.0
Hagfish	0.0	0.0	0.0	12.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Species	0.0	0.0	0.0	0.0	6.0	0.0	6.0	12.0	0.0	0.0	0.0	6.0

Figure 6.4 Catch Rates for Fish Species by Station along the Export Cable

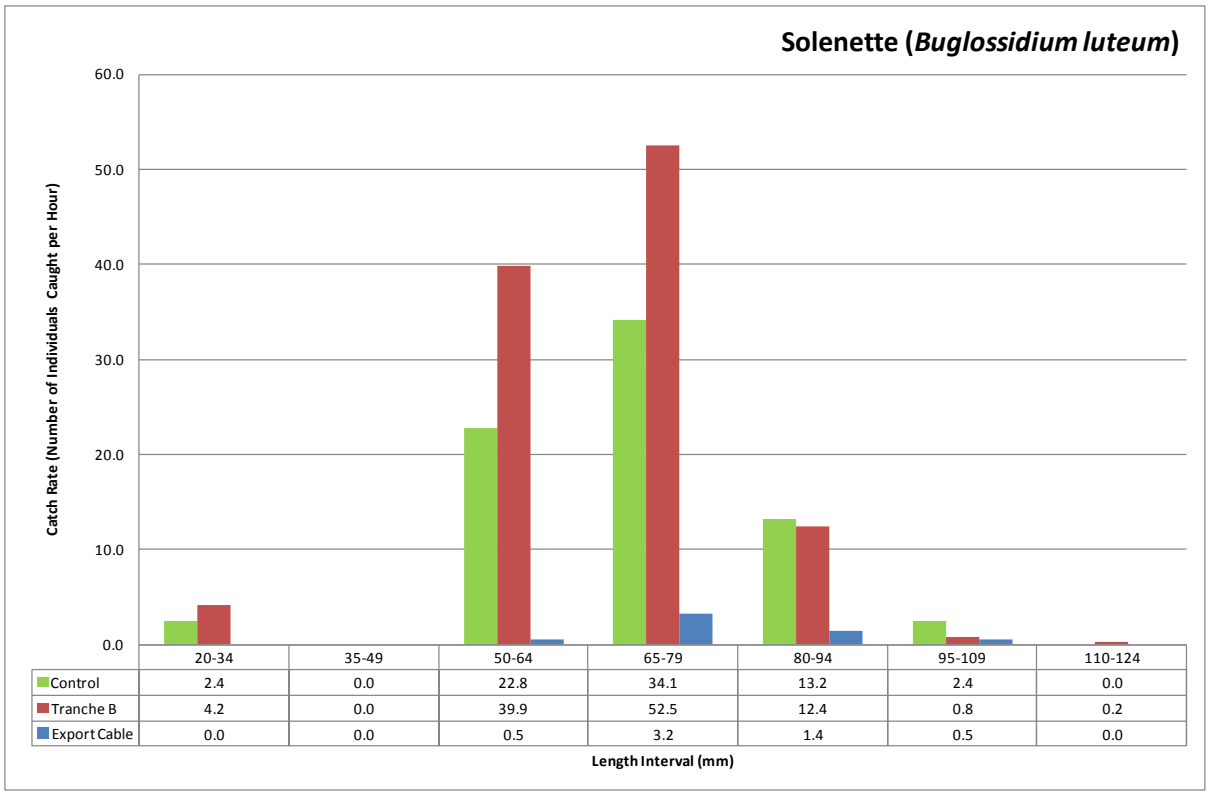
6.2 Length Distributions

The average length (mm) and length range for fish species caught by sampling area (control, Tranche B and export cable) is given in Table 6.2 below.

The length distributions of the five most abundant species caught during the survey (>20 individuals), expressed as the catch rate (number of individuals caught per hour) by length (mm) and by sampling area, are shown in Figure 6.5 to Figure 6.9 below.

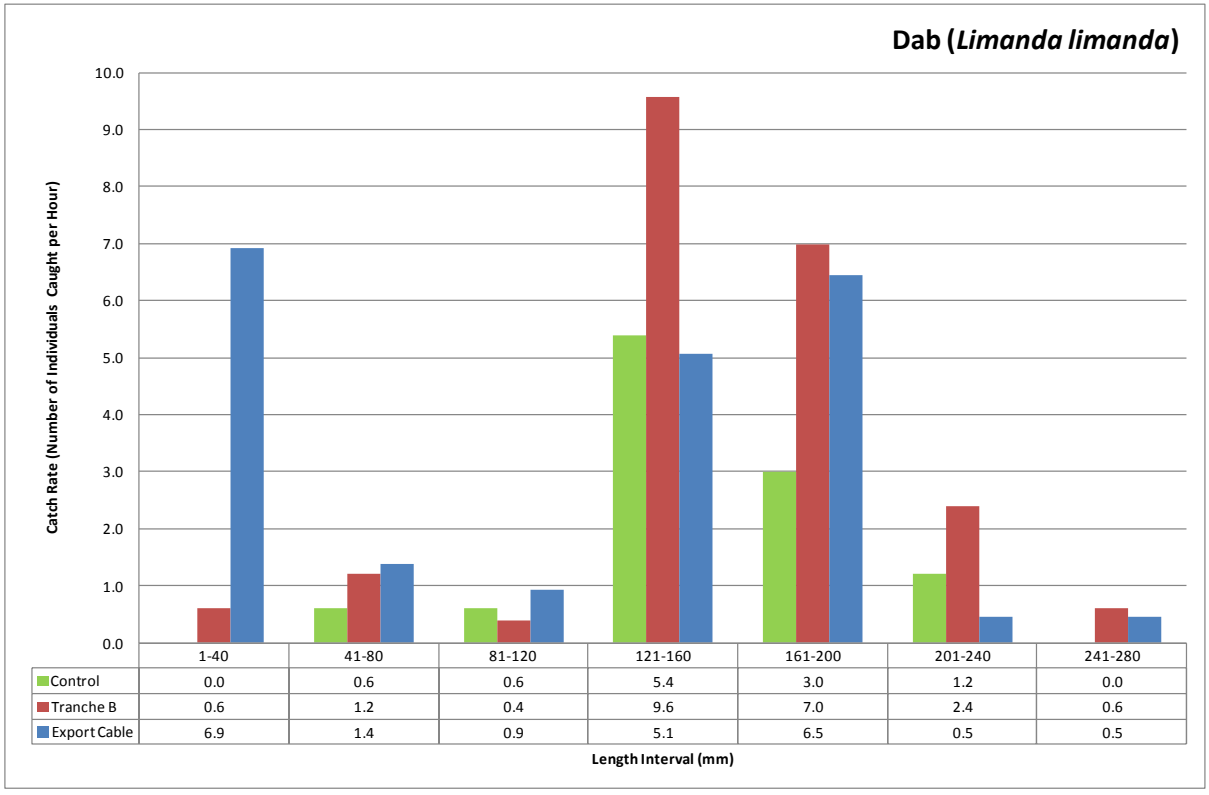
Table 6.2 Average Length and Length Range for Fish Species Caught by Sampling Area

Species		Average Length (mm)			Length Range (mm)	
Common Name	Scientific Name	Control	Tranche B	Export Cable	Min.	Max.
Common Dragonet	*Callionymus lyra*	155.0	137.5	176.3	40.0	230.0
Dab	*Limanda limanda*	161.8	161.3	128.7	20.0	280.0
Goby (indet.)	*Gobiidae sp.*	-	-	20.0	20.0	20.0
Grey Gurnard	*Eutrigla gurnardus*	80.0	-	-	80.0	80.0
Hagfish	*Myxine glutinosa*	-	-	255.0	230.0	280.0
Lemon Sole	*Microstomus kitt*	270.0	183.0	192.3	140.0	280.0
Long Rough Dab	*Hippoglossoides platessoides*	-	-	145.0	55.0	200.0
Megrim	*Lepidorhombus whiffiagonis*	-	80.0	65.0	65.0	80.0
Norway Pout	*Trispoterus esmarkii*	-	-	95.0	95.0	95.0
Painted Goby	*Pomatoschistus pictus*	-	30.0	-	20.0	40.0
Plaice	*Pleuronectes platessa*	303.3	249.2	260.0	210.0	370.0
Pogge	*Agonus cataphractus*	-	-	47.5	45.0	50.0
Raitt's Sandeel	*Ammodytes marinus*	77.5	142.5	-	70.0	155.0
Sand Goby	*Pomatoschistus minutus*	35.0	35.1	26.8	20.0	60.0
Scaldfish	*Arnoglossus laterna*	90.0	92.1	95.0	75.0	110.0
Sea Scorpion	*Taurulus bubalis*	-	170.0	-	170.0	170.0
Sea Snail	*Liparis liparis*	-	-	45.0	45.0	45.0
Solenette	*Buglossidium luteum*	68.8	66.2	75.0	20.0	110.0
Whiting	*Merlangius merlangus*	-	-	320.0	320.0	320.0



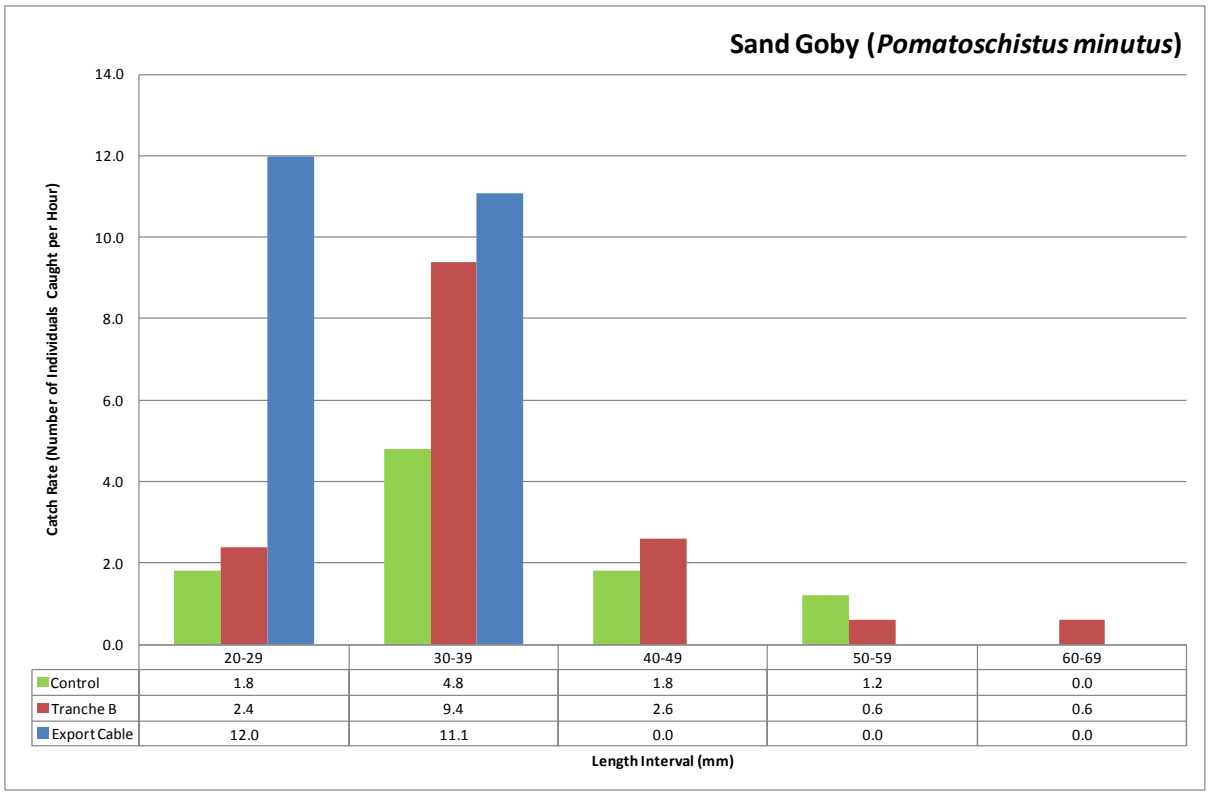
	20-34	35-49	50-64	65-79	80-94	95-109	110-124
Control	2.4	0.0	22.8	34.1	13.2	2.4	0.0
Tranche B	4.2	0.0	39.9	52.5	12.4	0.8	0.2
Export Cable	0.0	0.0	0.5	3.2	1.4	0.5	0.0

Figure 6.5 Solenette (*B. luteum*) Length Distribution by Sampling Area



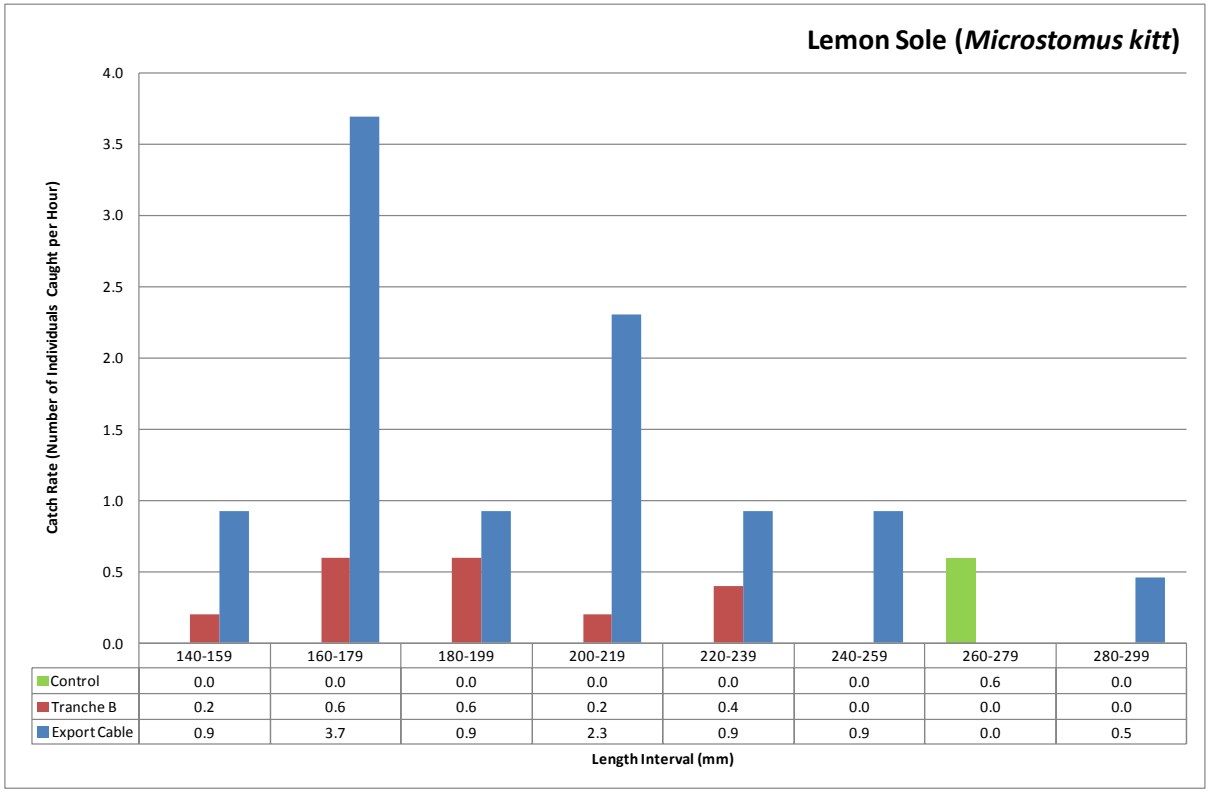
	1-40	41-80	81-120	121-160	161-200	201-240	241-280
Control	0.0	0.6	0.6	5.4	3.0	1.2	0.0
Tranche B	0.6	1.2	0.4	9.6	7.0	2.4	0.6
Export Cable	6.9	1.4	0.9	5.1	6.5	0.5	0.5

Figure 6.6 Dab (*L. limanda*) Length Distribution by Sampling Area



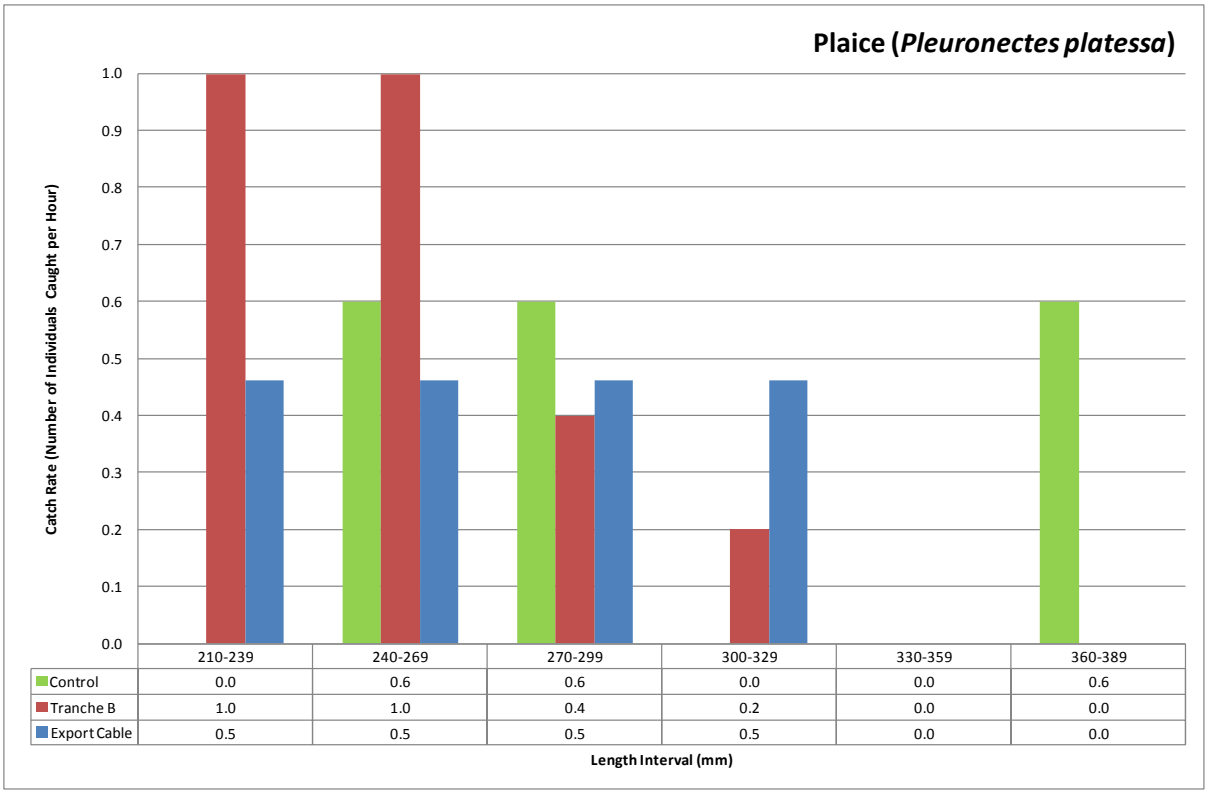
	20-29	30-39	40-49	50-59	60-69
Control	1.8	4.8	1.8	1.2	0.0
Tranche B	2.4	9.4	2.6	0.6	0.6
Export Cable	12.0	11.1	0.0	0.0	0.0

Figure 6.7 Sand Goby (*P. minutus*) Length Distribution by Sampling Area



	140-159	160-179	180-199	200-219	220-239	240-259	260-279	280-299
Control	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0
Tranche B	0.2	0.6	0.6	0.2	0.4	0.0	0.0	0.0
Export Cable	0.9	3.7	0.9	2.3	0.9	0.9	0.0	0.5

Figure 6.8 Lemon Sole (*B. luteum*) Length Distribution by Sampling Area



	210-239	240-269	270-299	300-329	330-359	360-389
Control	0.0	0.6	0.6	0.0	0.0	0.6
Tranche B	1.0	1.0	0.4	0.2	0.0	0.0
Export Cable	0.5	0.5	0.5	0.5	0.0	0.0

Figure 6.9 Plaice (*P. platessa*) Length Distribution by Sampling Area

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 Fire Fighting and Fire Prevention certificates 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 fish room and 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 below.

Table 7.1 Post Trip Survey Review

Project: Dogger Bank Tranche B Autumn 2012	**Vessel:** Jubilee Spirit
Surveyors: Lucy Shuff, Alex Winrow-Giffin	**Skipper:** Ross Crookes
Survey Area: Dogger Bank Tranche B	**Total Time at Sea: 23 Days**
Dates at Sea: 01/10/12 - 25/10/12	

	Comments	Actions
Did vessel comply with pre trip safety audits?	Yes	N/A
Skipper and crew attitude to safety?	Good	N/A
Vessel machinery failures?	None	N/A
Safety equipment failures?	None	N/A
Accidents?	None	N/A
Injuries?	None	None