

FISHERIES SCIENCE PARTNERSHIP

Report of investigation into the potential whitefish by-catch in the North Sea sandeel fishery

**Fisheries Management Group
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Introduction

The DEFRA-funded Fisheries Science Partnership was established between DEFRA¹, CEFAS² and NFFO³ for the duration of financial year 2003/4. The objective was to enable the fishing industry to demonstrate the results of commercial fishing in a number of priority fishing areas nominated by the NFFO. Fishing vessels were chartered to fish commercially, usually under dispensation from the quota regulations, to obtain new data on the catch rate and size distribution of target species, and in some cases by-catch species. Ten projects were scheduled and completed. The charter of suitable fishing vessels was arranged by the NFFO, and work plans were developed between NFFO, CEFAS and the vessel skippers. CEFAS deployed sea-going staff to record raw data that were subsequently returned to the laboratory at Lowestoft for input and analysis.

CEFAS acknowledges the help of the NFFO and skippers during the conduct of these studies. The data and results are the intellectual property of the vessel skippers, CEFAS and NFFO.

1. Department of Environment, Food and Rural Affairs
2. Centre for Environment, Fisheries and Aquaculture Science
3. National Federation of Fishermen's Organisations

Whitefish By-catch in the North Sea Sandeel Fishery

This report summarises the preliminary results of FSP Project 1, which fished in July 2003 with a fine-meshed net on sandeel grounds in the north-east Dogger Bank area of the North Sea.

Sandeels are small, eel-shaped fish which require a fine mesh (<16mm) in order to retain them, thus increasing the probability that young fish of non-target species (including cod, haddock and whiting) could also be caught. The EU Technical Conservation Regulation restricts the fish by-catch to 5% by weight of all marine organisms on board, but a low weight of whitefish could still contain a significant number of young whitefish. Compliance with the EU Regulation is monitored by Danish and Norwegian authorities at the ports, where a sub-sample of the landing is taken and analysed for species composition, whilst monitoring at sea is carried out by national inspectors, including those of the UK. It is possible that the effectiveness of port-based monitoring could be compromised by spoilage of small gadoid by-catches in the hold, and that monitoring at sea could be compromised by spatial patchiness, so there has been concern within the UK industry that the official by-catch data may not reflect the true extent of by-catches. This project therefore aimed to observe and record on a haul by haul basis the catch composition obtained when fishing a small meshed sandeel net at a time of the year when young whitefish of the year could conceivably be present in significant numbers on sandeel grounds. Some hauls were also carried out on nearby whitefish grounds using both a whitefish trawl and the sandeel trawl.

The project used an English whitefish trawler, the **Jubilee Quest**, a relatively low-power (465 hp) vessel of 22 m rigged with a commercially-manufactured 16 mm

mesh sandeel net made for the purpose in Denmark, or with the vessel's own whitefish trawl with 100 mm cod-end. Two trips were undertaken, from 3-12 July and from 17-28 July, when 0-group gadoids might be present. Based on satellite records and other sandeel fishing information, the area of operation was chosen to be the western Dogger, and then further south on The Hills (Figures 1a and 1b).

This report presents

- Percentage composition of the catches made by Jubilee Quest using the sandeel net
- Length distributions of catch and by-catch species caught by the Jubilee Quest, and by nearby CEFAS survey and research cruises

Methods

The whitefish trawler Jubilee Quest (length: 21.5 m, 178 GT and 465 hp Jubilee Fishing Limited) was chartered and rigged with purpose built sandeel fishing gear. This comprised a Millionaer net (Model: Canada, Manufacturers: Cosmic, Denmark.). The footrope was 45.6m, headline 45.2m, 70m from wing end to bag and a 30m bag. The liner was a knitted "Fryma" type, 5mm oval mesh. The recommended headline height was 2.5-3m, and the gear was fished with triple bridles 64m (35 fathoms) long. The doors were "Perfect B", size 104", 750 kg, (Manufacturers: Perfect, Denmark). Towing speed (over ground) was generally 2.5-3 knots.

Trips were undertaken from 3rd –12th July and 17th-28th July, because although the main sandeel fishing period is April to June, 0-group gadoids are unlikely to appear in the water column until the end of the sandeel season. Unlike traditional stock surveys, which aim to quantify relative abundance over large areas, this study aimed to mimic a fishery which operates on selected localised grounds. Prospective fishing locations were identified from over-flight and satellite monitoring data available from fisheries inspection and enforcement services. Fishing tracks for the two trips are shown in Figures 1a and 1b. Where GPS data for a haul are missing, linear interpolation was used to complete the track (as shown in blue).

Each haul was completely sorted to species, or sub-sampled by taking 5 samples of 1 bucket (10 litre) from the sorting conveyor at roughly equal intervals to ensure that all parts of the catch had a chance to be sampled, whilst maintaining a random (i.e. unbiased) scheme. For each species found within each sample, the number of individuals and their total weight was recorded. Species with a large number of individuals were sub-sampled, and individual weights and lengths were recorded. Weights (individual and basket) were measured using balances of 5kg (model POLS s-120-3) and 80kg (model POLS s-125-3) capacity. On the second cruise a number of small gadoids (25-55mm long) were observed and these were picked out from the catch, frozen and returned to the laboratory for identification. The act of searching out all small gadoids from the catches, rather than sampling at random, meant these individuals could not be incorporated in any length frequency analysis.

Results

Data summary

For each haul, data on the location, timing and water depth for shooting/hauling were recorded along with sea state, wind force and direction, warp length and total catch. Physical details of each haul are given in Table 1, and the fishing tracks are shown in Figures 1a and 1b.

Table 2 shows the overall species composition by trip for standard hauls made with sandeel gear on sandeel grounds, and Figures 2 and 3 show the species composition on a haul by haul basis, the surface area of each pie-chart being proportional to the total catch.

Table 3 shows the numbers of fish whose weights and lengths were measured. Figure 4 shows the length distributions of species caught by Jubilee Quest using the sandeel net, and by the CEFAS English 3rd Quarter Groundfish Survey in August 2003. Figure 5 shows the size and age distribution of sandeel caught by scallop dredge during a CEFAS research cruise on sandeels in the same area in June 2003 (RV CORYSTES Cruise 6/03).

The operational cruise reports for sandeel Cruises 1 and 2 can be found at Appendix 1 and Appendix 2. Cruise 1 carried out 15 hauls in all, the initial days being spent learning how to deploy the gear. Some gear damage occurred early on, and a day was lost returning to port for repair. Cruise 2 carried out 23 standard hauls with sandeel gear on sandeel ground, (shown black in Figure 1b), plus the following 6 non-standard hauls (red in Figure 1b). Hauls 3 & 4 were modified to examine the vertical distribution of species, particularly juvenile gadoids, by towing at three mid-water depths, (~13, 30 and 40m depth to headline, headline height 16-18m) along the 60m contour. Instrumentation indicated that the gear was flying normally and that such deployment could work, but catches of gadoids and sandeels were so low that the trial was discontinued. Hauls 12-14 were made using the normal whitefish trawl belonging to the vessel plus the Perfect doors, in order to identify the presence of large gadoids just above the sandeel fishing grounds. Haul 15 was made using the sandeel net in the same area, for comparison.

Catches on the sandeel grounds.

On the sandeel grounds the main catches were sandeel (64% for trip 1 and 51.8% for trip 2). These overall percentages were well below the 95% limit required by EU legislation, but this is because the by-catch was dominated by several large hauls of sprat (34.4% for trip1 and 45% for trip 2) in the deeper channels in the southern part of the area (the Hills). Other species (including gadoids) only contributed 1.5% and 3.2% per trip. On a haul to haul basis, a total of 12 hauls (4 in trip 1 and 8 in trip 2) contained less than 5% by-catch, indicating that in some areas the fishery could be clean.

Gadoid catches in the sandeel fishing area were low, with zero catches of cod on the first trip. Exceptionally, haul 10 of trip 2 comprised 82% of whiting (1.6 tonnes of 2.0

tonnes catch). Also during trip 2, very small gadoids in the size range 25-55 mm (and therefore likely to be 0-group fish of the year), were picked out of the catch during several hauls, particularly haul 11 on the south west edge of the Dogger Banks, and returned to the Laboratory for identification. Their total number was estimated to be 940 and they all proved to be whiting.

Catches off the sandeel grounds

On haul 12-14 of trip 2, the Jubilee Quest used her own whitefish net with 100 mm cod end on whitefish grounds, and caught cod and haddock with some plaice and dab. Haul 15 then used the sandeel net on the same grounds and produced 5 tonnes of which 96.7% were whiting and 2.58% were haddock.

Size distribution of catches

The number of fish whose lengths and weight were recorded is listed in Table 3. Length frequency data for those species with sufficient sample size are given in Figure 4, where the length units are centimetres. The 0-group whiting were not included in this Figure because they were too small, and were not sampled in the same manner as the other sizes. Figure 4 also shows length-frequency data for sprat, mackerel and whiting caught on the same fishing grounds during the English 3rd Quarter N Sea Groundfish Survey (GFS) in the following month of August.

For whiting the Jubilee Quest and the English GFS both mainly caught whiting in the size range 16–35 cm, whilst the English GFS also caught smaller whiting of 4-14 cm. The principal sizes of sprat and mackerel were similar in the catches by the Jubilee Quest and the English GFS. The sandeels caught by Jubilee Quest were mainly 7-17 cm, plus a small proportion in the size range 20 –27 cm. The size-age data for sandeels caught by scallop dredge during a CEFAS scientific cruise undertaken in broadly the same West Dogger area in June 2003 (Figure 5) indicate that Jubilee Quest was catching mainly 0-group sandeels of the year (7-10 cm), with some 1-group (11-14 cm) and a very few older sandeels (11-19cm).

Conclusions

The main catches using the sandeel net were 0-group sandeel, plus sprat in the Hills area. In contrast, hauls made with Jubilee Quest's own whitefish net (100 mm cod end) on whitefish grounds were predominantly cod and haddock, with some plaice and dab. On these same whitefish grounds the sandeel net was only fished once, but its catch suggested that the sandeel gear allowed the larger gadoids, particularly cod and haddock, to escape, although more hauls are required to generalise from this one observation.

The overall percentage of sandeels was much lower than that required to meet the 95% by-catch requirement for fishing a 16 mm net, but this was because of the high sprat catches in some hauls in the deeper channels, and there were numerous hauls where the catches easily met the by-catch regulations, despite the project taking place late in the sandeel season and in a year when sandeel stocks were low (see below). Skippers can increase or decrease their by-catch percentages by moving to and from the deeper water channels, but there was no incentive to do that here because the

highest catches of sandeels were achieved on traditional sandeel grounds, and there would be no benefit in targeting alternative areas.

A primary aim of this Project was to observe whether the sandeel net caught large by-catches of 0-group gadoids. This was generally not the case during these two cruises, except for the 0-group whiting found during the second cruise, principally in haul 11, which coincided with the presence of a large number of medusae, and a relative absence of any other fish. After some other hauls in cruise 2, one or two 0-groups were found stuck to the baskets at the end of sampling. This suggests that under on-board sampling conditions 0-groups may be more difficult to spot when their numbers are low, and that it would then be helpful to employ a dedicated sorting table with a white background and strong lighting.

It is difficult to evaluate how general these results are, since numerous factors can affect catch composition and catch rates, including the year, timing, location, and the characteristics of the fishing vessel and its gear. This study was timed to coincide with the appearance of 0-group gadoids rather than the peak of the sandeel fishery. The results do not necessarily correspond to what might be found at the traditional peak of sandeel availability in May/June, between their emergence in March/April from overwintering hibernation, and their re-entry to the hibernation phase in late summer. It is also known that 2003 was an atypical year for the North Sea sandeel fishery, since commercial landings were the lowest for the last 20 years. Several years of CEFAS research cruises investigating sandeels on the Dogger Bank provide independent confirmation that the abundance of the sandeel stock in 2003 was low. It is not yet known how other fish in the locality respond to a change in sandeel availability. If other species remain in the locality irrespective of sandeel abundance, then the proportional by-catch rates from this kind of exercise will increase when sandeel abundance is low, and decrease when it is high, whereas the opposite will be the case if the other species move away when sandeel abundance decreases. CEFAS has commenced a new 4 year study to investigate how the abundance of other species varies with sandeel abundance in the west Dogger Bank area.

Studies of this kind are also susceptible to gear effects, so although these trials used a new, fully-specified, commercial sandeel fishing net, there is no guarantee that it is representative of the whole sandeel fleet, since designs differ both with net-maker and through time. The gear was purpose built for the Jubilee Quest and should therefore have been appropriate for this size and power of vessel, although at 175 GRT the Jubilee Quest is smaller than the majority of Danish vessels participating in the sandeel fishery, which are mainly vessels of 200-400 GRT (Figure 6).

station	date	gear	time shot	time hauled	depth shot	depth hauled	soak time	latitude shot	longitude shot	latitude hauled	longitude hauled	wind	for	di	sea state	door metres	spread metres	warp metres	catch (tonnes)	n	sample	
Trip#1	1	04/07/03	SAN	04:10	08:15	37	26	04:05	54:18.315	01:07.110	54:13.409	01:25.997	5-6	NW	mod		33	79	0.750		5	
	2	04/07/03	SAN	14:20	19:00	18	15	04:40	53:39.726	01:13.368	53:30.161	01:25.820	3-4	NW	mod		33	79	3.000		5	
	3	05/07/03	SAN	04:30	08:35	18	18	04:05	53:30.665	01:24.488	53:19.888	01:31.262	3-4	NW	mod		33	79	4.000		5	
	4	05/07/03	SAN	11:05	14:45	22	7	03:40	53:21.560	01:40.228	53:14.107	01:54.726	2-3	NW	mod		33	79	4.000		5	
	5	07/07/03	SAN	03:10	06:35	37	57	03:25	55:15.424	01:32.503	55:23.236	01:42.253	2	SW	calm		34	63	0.089		1	
	6	07/07/03	SAN	08:15	11:15	40	40	03:00	55:21.905	01:59.037	55:25.889	02:20.423	1-2	SW	calm		34	79	0.316		1	
	7	08/07/03	SAN	03:15	07:15	18	20	04:00	53:42.325	01:40.124	53:36.193	01:54.188	1-2	SW	calm		34	63	0.500		5	
	8	08/07/03	SAN	08:45	12:55	20	15	04:10	53:30.880	02:00.634	53:21.296	02:15.541	2-3	SW	calm		34	63	0.122		1	
	9	08/07/03	SAN	14:30	19:10	15	7	04:40	53:13.040	02:19.559	53:21.73	02:03.594	1-2	SW	calm		34	63	10.000		5	
	10	09/07/03	SAN	04:10	06:30	16	11	02:20	53:15.247	01:53.247	53:11.529	02:2.989	0		calm		34	63	2.598	976.47kg		
	11	10/07/03	SAN	03:50	07:55	15	9	04:05	53:01.678	02:20.825	53:10.157	02:11.765	2-3	S	calm		34	63	5.500		5	
	12	10/07/03	SAN	09:15	13:45	7	9	04:30	53:11.702	02:09.501	53:20.100	01:54.800	2-3	S	calm		34	63	5.500		5	
	13	10/07/03	SAN	14:55	19:00	15	9	04:05	53:19.647	01:44.020	53:10.720	01:58.949	2-3	SW	calm		34	63	14.000		5	
	14	11/07/03	SAN	04:10	08:10	16	22	04:00	53:08.380	01:52.709	53:14.818	01:41.476	2	SW	calm		34	63	7.500		5	
	15	11/07/03	SAN	10:00	15:10	9	18	05:10	53:16.745	01:34.435	53:30.899	01:25.074	2	SW	calm		31	63	3.000		5	
Trip#2	1	18/07/03	SAN	12:05	15:45	27	27	03:40	54:50.920	01:19.55	55:01.830	01:20.980	4-5	SW	moderate		35	77	0.281		1	
	2	18/07/03	SAN	16:20	19:40	24	43	03:20	55:02.440	01:22.12	55:11.040	01:23.270	2-3	S	moderate		37	77	0.227		1	
	3	19/07/03	SAN	04:00	08:15	65	60	04:15	55:25.410	01:39.02	55:25.370	01:44.880	2	S	slight swell				0.036		1	
	4	19/07/03	SAN	08:55	12:00	50	79	03:05	55:26.890	01:46.88	55:34.270	02:1.570	2	SW	slight swell				46	0.013		1
	5	19/07/03	SAN	16:10	19:30	28	23	03:20	55:05.900	02:03.160	54:56.240	02:04.340	3	SE	slight swell				67	0.014		1
	6	20/07/03	SAN	03:33	08:00	27	22	04:27	54:57.270	01:21.200	54:44.970	01:28.290	3-4	S	swell		33	77	0.434		5	
	7	20/07/03	SAN	09:30	13:45	26	36	04:15	54:37.620	01:29.730	54:27.010	01:41.220	3	S	swell		38	77	0.675		5	
	8	20/07/03	SAN	14:50	19:35	15	14	04:45	54:26.890	01:44.120	54:27.590	02:05.420	2	S	gentle swell		33	67	0.995		5	
	9	21/07/03	SAN	03:50	08:15	35	30	04:25	54:08.700	02:15.870	54:09.580	01:54.610	S2 INCR	SW5	gentle swell		38	77	0.029		1	
	10	21/07/03	SAN	09:30	13:50	27	28	04:20	54:10.460	01:55.700	54:10.790	01:36.660	4-5	S	choppy		35	77	2.020		5	
	11	21/07/03	SAN	14:45	19:05	30	49	04:20	54:11.470	01:35.680	54:13.510	01:21.570	4-5	sse	choppy		35	77	0.001		1	
	12	21/07/03	OWN	20:50	01:05	71	74	04:15	54:09.370	01:25.160	54:02.940	01:44.050	2-3	S			74	167	2.000			
	13	22/07/03	OWN	03:10	07:10	73	81	04:00	54:07.260	01:32.080	54:03.540	01:47.890	2-3	sw	swell		80	167	1.750			
	14	22/07/03	OWN	08:20	12:35	71	71	04:15	54:22.050	01:46.640	54:01.980	02:08.300	2-3				79	167	0.800			
	15	22/07/03	SAN	14:05	18:10	71	72	04:05	54:21.890	02:09.160	54:01.880	02:49.310	3	sw	swell		38		5.000		5	
	16	23/07/03	SAN	04:00	08:25	19	21	04:25	53:42.110	01:40.480	53:35.090	01:55.340	1		calm		36	77	1.200		5	
	17	23/07/03	SAN	9:35	13:45	21	14	04:10	53:30.690	02:01.100	53:21.500	02:15.600	1		calm		38	77	0.123		2	
	18	23/07/03	SAN	15:15	19:30	15	8	04:15	53:13.170	02:19.480	53:21.670	02:03.660	2-3				0	67	7.000			
	19	24/07/03	SAN	03:55	08:05	18	8	04:10	53:22.640	01:50.480	53:14.090	02:04.480	3	S			33	67	1.230		5	
	20	24/07/03	SAN	08:50	13:15	10	11	04:25	53:13.690	02:05.110	53:04.990	02:18.080	3				33	67	1.090		5	
	21	24/07/03	SAN	14:45	19:25	14	8	04:40	53:06.890	02:07.760	53:14.350	01:52.360	1				33	67	22.000		5	
	22	25/07/03	SAN	04:00	08:00	22	26	04:00	53:21.100	01:40.960	53:12.960	01:54.810	3-4	S-sw	swell				67	8.000		5
	23	25/07/03	SAN	10:10	14:15	18	31	04:05	53:15.960	01:41.050	53:09.310	01:53.290	4	S			31	67	0.220		2	
	24	26/07/03	SAN	04:00	08:00	18	16	04:00	53:39.240	01:14.020	53:29.250	01:26.560	2-3	ssw					77	5.000		5
	25	26/07/03	SAN	08:45	13:00	17	17	04:15	53:29.140	01:26.600	53:20.000	01:31.150	3-2	ssw			31	77	2.500		5	
	26	26/07/03	SAN	15:20	19:20	14	21	04:00	53:10.410	01:49.780	53:02.770	02:06.570	3	se			33	67	4.000		5	
	27	27/07/03	SAN	04:00	07:55	16	7	03:55	52:46.070	02:15.660	52:54.200	02:11.520	2-3	NE			33	67	30.000		5	
	28	27/07/03	SAN	10:55	14:55	15	7	04:00	53:01.980	02:20.610	53:11.890	02:09.200	3	nnw			32	67	2.250		5	
	29	27/07/03	SAN	15:55	18:50	18	17	02:55	53:11.520	02:03.680	53:15.430	01:53.930	2-3	SW			33	67	0.120		2	

Table 1. Physical details on each haul. Hauls in bold used non-standard techniques and are not included in by-catch estimation.

	Trip 1		Trip 2	
	Kg	%	Kg	%
Anchovy	0.09	<0.0%		
Cod			2.53	<0.0%
Common dragonet	0.03	<0.0%	0.09	<0.0%
Dab	0.06	<0.0%	0.18	<0.0%
Garfish			0.54	<0.0%
Grey gurnard	97.44	0.2%	24.47	<0.0%
Haddock	4.26	<0.0%	2.61	<0.0%
Herring	0.18	<0.0%	0.04	<0.0%
Horse mackerel	218.90	0.4%	2.08	<0.0%
Lamprey			0.09	<0.0%
Lesser weaver	93.63	0.2%	88.05	0.1%
Mackerel	392.71	0.7%	1,050.21	1.2%
Monkfish			0.19	<0.0%
Plaice			1.41	<0.0%
Poor cod	0.03	<0.0%		
Sandeel	36,460.18	64.0%	46,278.85	51.8%
Sea trout	0.26	<0.0%	0.60	<0.0%
Sprat	19,603.44	34.4%	40,269.07	45.0%
Spurdog			2.68	<0.0%
Squid	40.75	0.1%	20.38	<0.0%
Starry smooth hound			2.74	<0.0%
Tub gurnard			0.38	<0.0%
Twaite shad			2.86	<0.0%
Whiting	23.75	<0.0%	1,639.03	1.8%
TOTAL	56935.71		89389.08	

Table 2 Species composition by trip for those hauls made on sandeel ground with sandeel gear.

Species	Lengths	Weights
Sandeel	1594	722
Mackerel	1106	394
Greater sandeel	837	264
Sprat	485	60
Whiting	297	201
Lesser weaver	147	25
Grey gurnard	130	50
Haddock	47	47
Squid	19	19
Horse mackerel	6	6
Plaice	5	5
Norway pout	4	4
Sea trout	3	3
Poor cod	2	2
Tub gurnard	2	2
Cod	1	1
Dab	1	1
Dragonet	1	1
Garfish	1	1
Monkfish	1	1
Starry smooth hound	1	1
<i>Total</i>	<i>4690</i>	<i>1810</i>

Table 3 Number of individual lengths and weights recorded over both trips. Each weight measurement was accompanied by a length measurement.

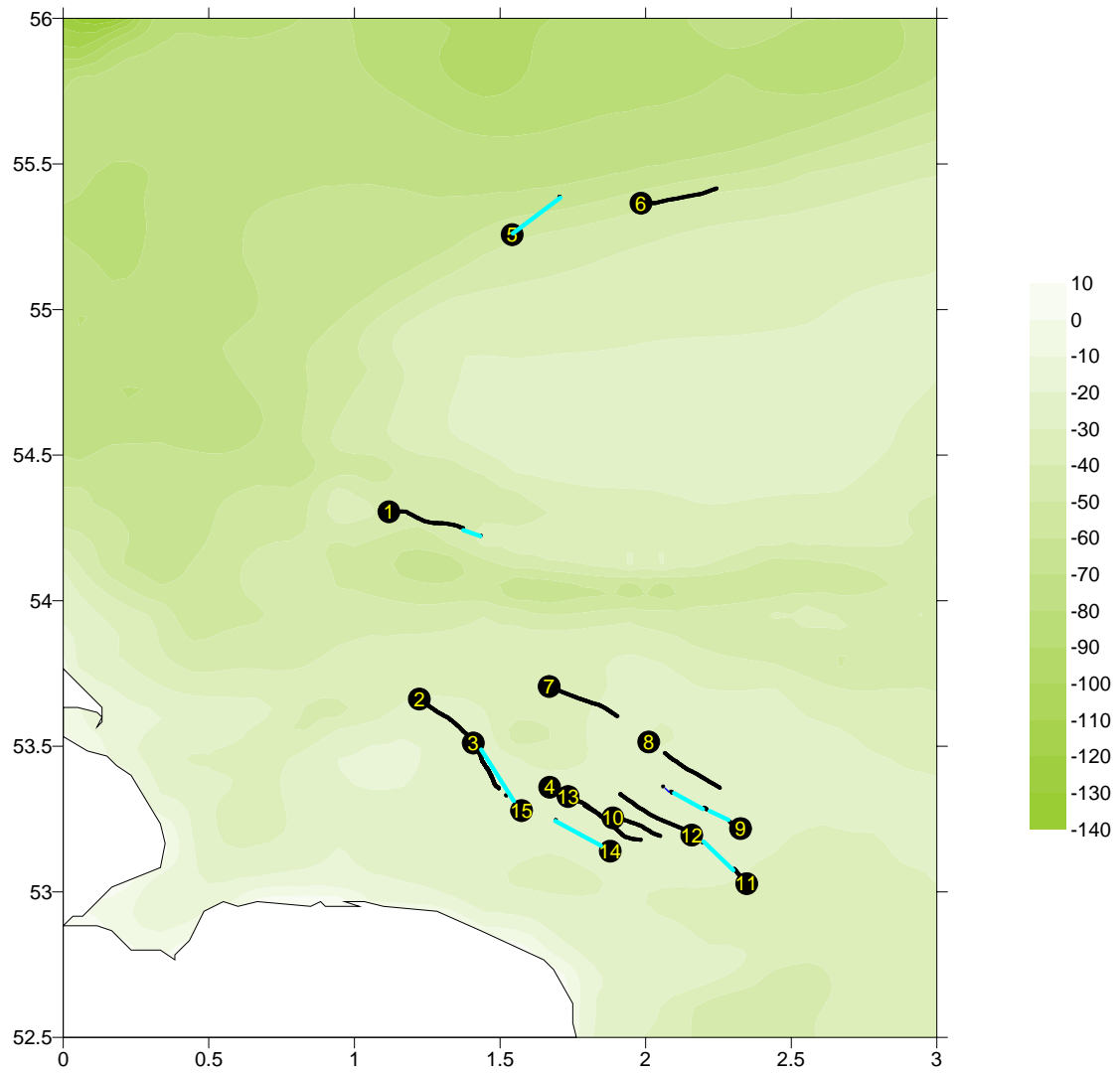


Figure 1a. Location and direction of hauls for trip 1. Circles indicate the shooting position, the number contained within gives the station number. Black tracks are those using standard protocol, red indicates non-standard protocol. Where GPS data were not available, linear interpolation is used, indicated by blue lines.

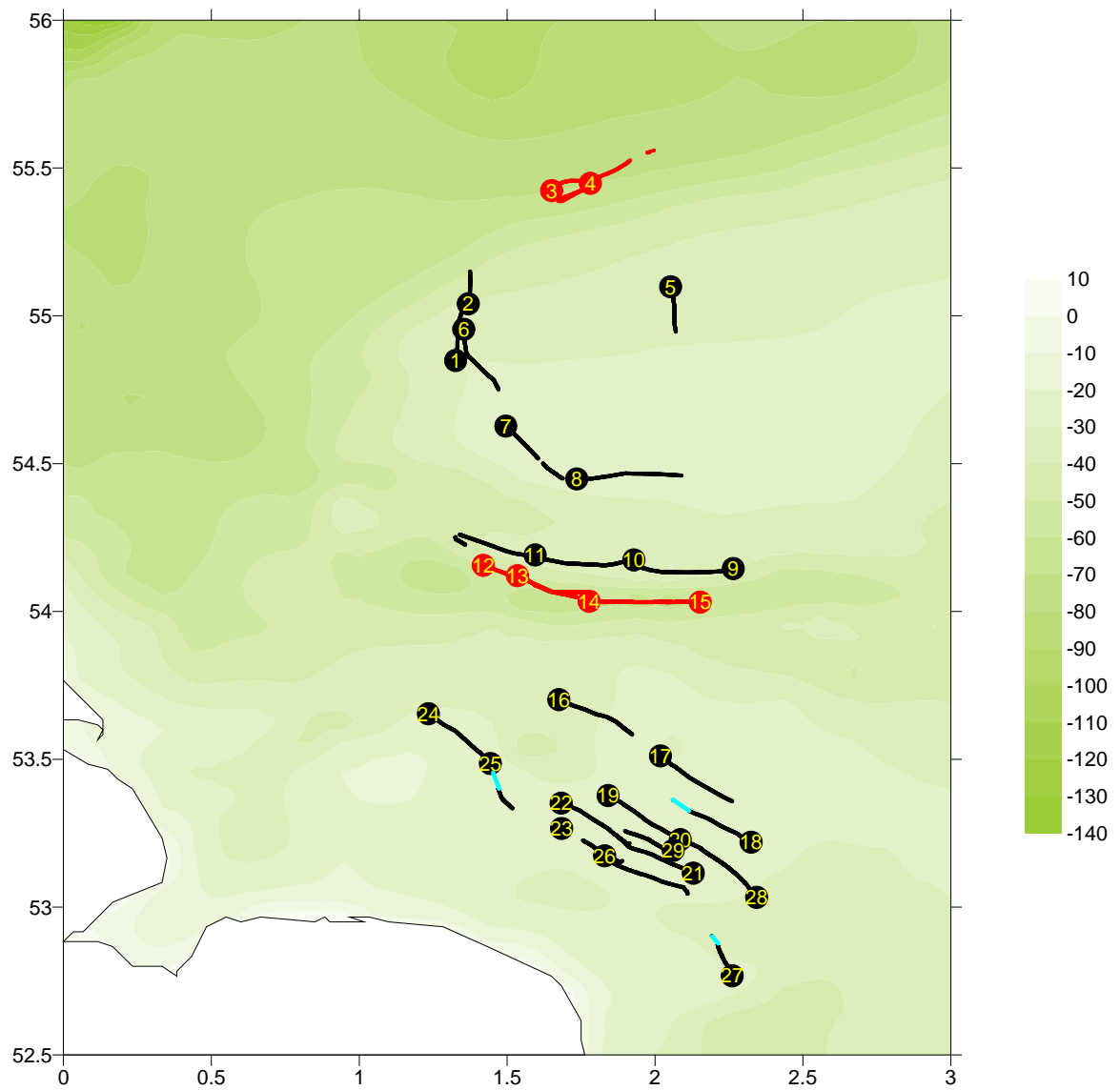


Figure 1b. Location and direction of hauls for trip 2. Circles indicate the shooting position, the number contained within gives the station number. Black tracks are those using standard protocol, red indicates non-standard protocol. Where GPS data were not available, linear interpolation is used, indicated by blue lines.

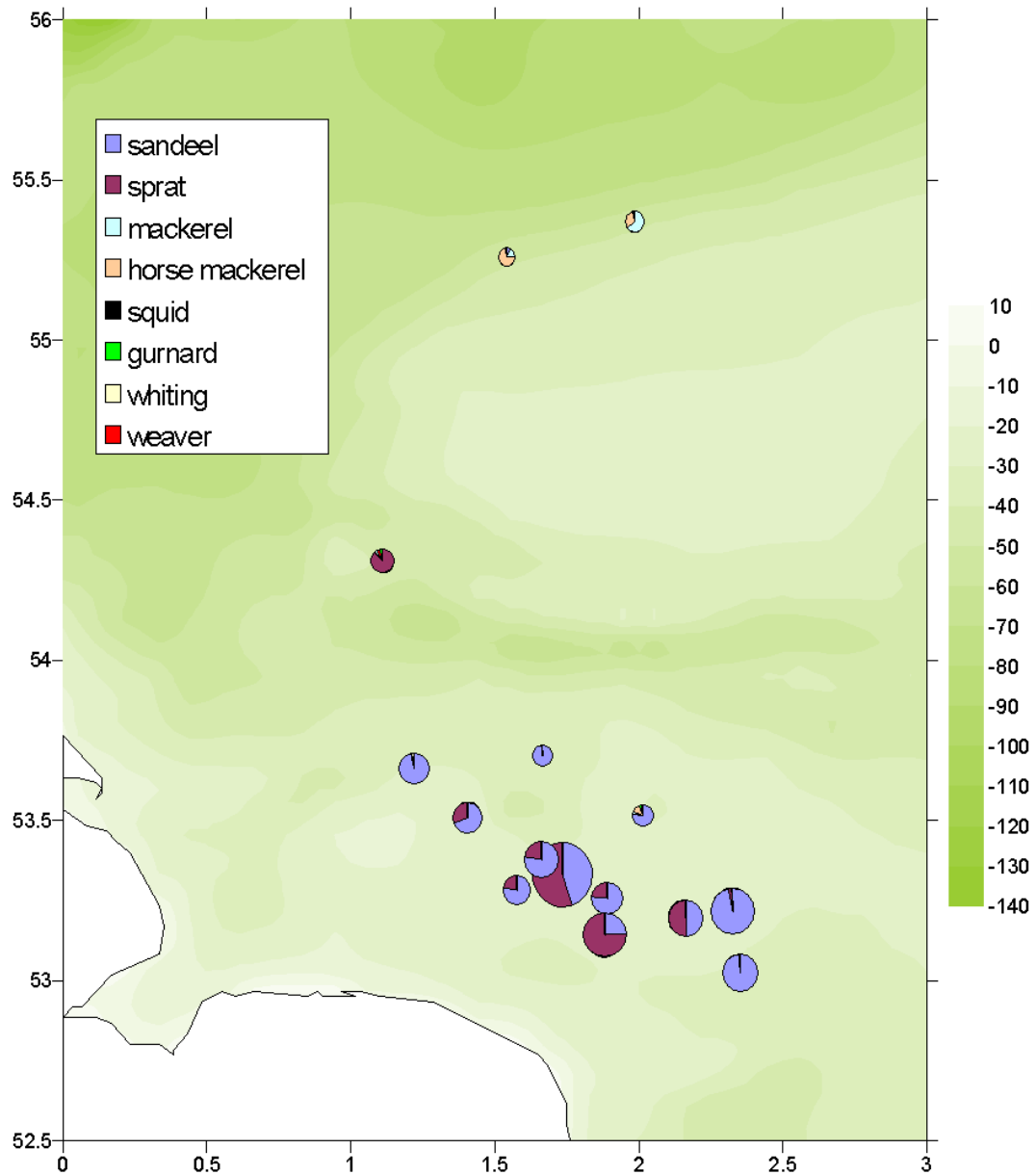


Figure 2. Haul locations (shooting positions) and catches for trip 1. The size (area) of pie is proportional to the catch rate (tonnes per hour). Figures 2 and 3 use the same scale for pie sizing. Proportions by species are given by wedge size.

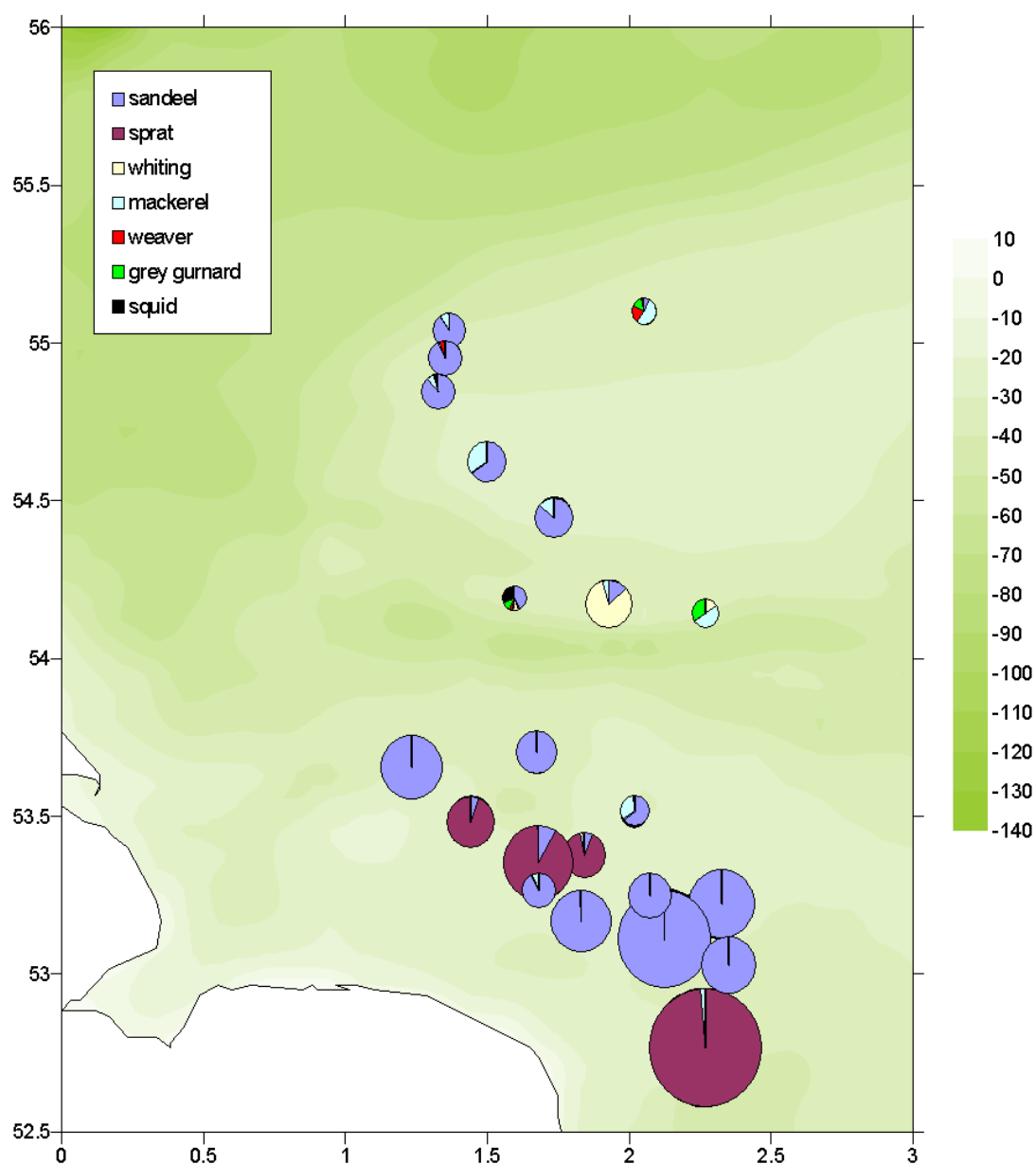


Figure 3. Haul locations (shooting positions) and catches for trip 2. The size (area) of pie is proportional to catch rate (tonnes per hour). Figures 2 and 3 use the same scale for pie sizing. Proportions by species are given by wedge size.

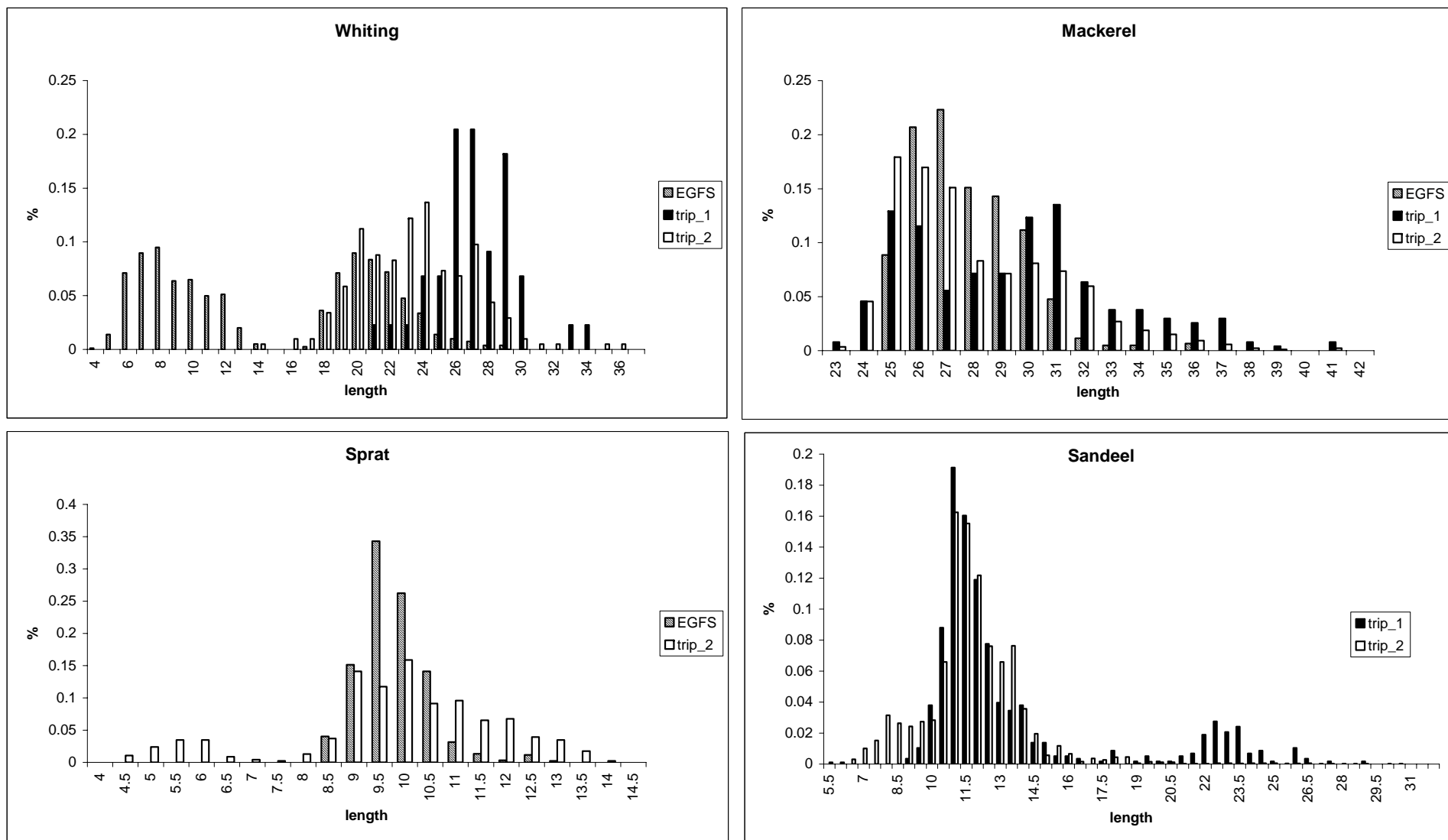


Figure 4. Length frequency distributions by species and trip for Whiting, Mackerel, Sprat and Sandeel. Note that 0-group whiting, although caught on trip_2, are not included.

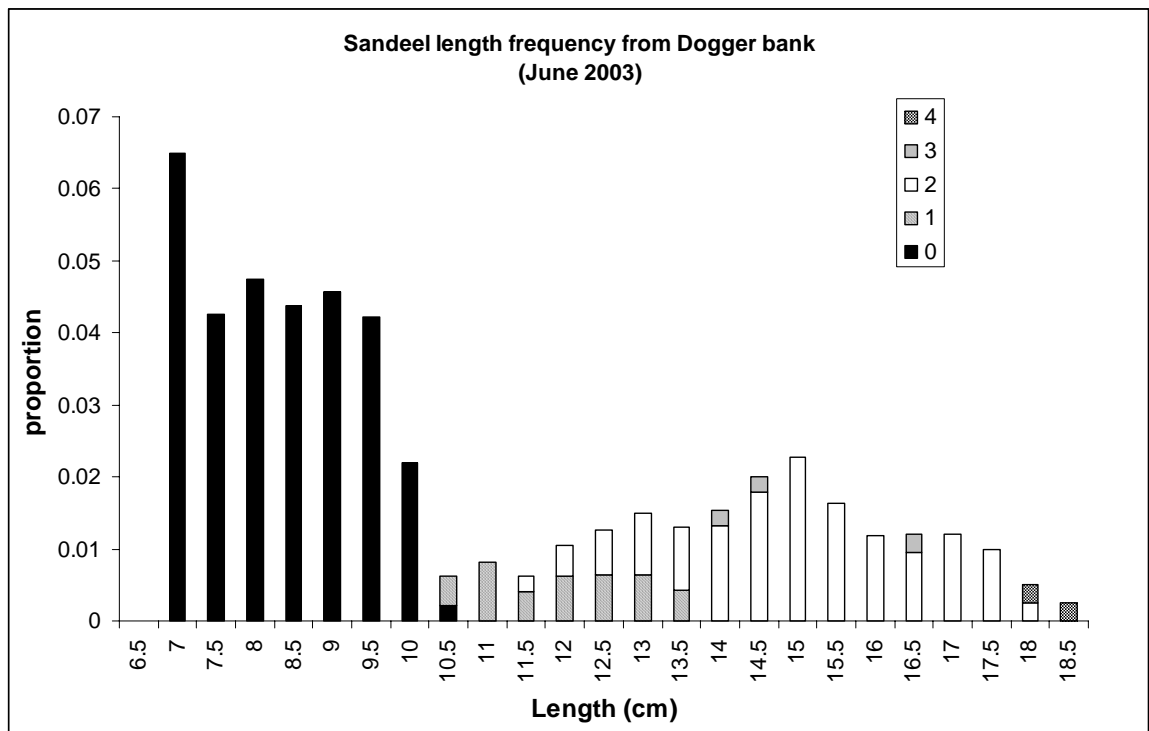


Figure 5. Length frequency by age for sandeels from CEFAS scientific cruise on Dogger Bank in June 2003.

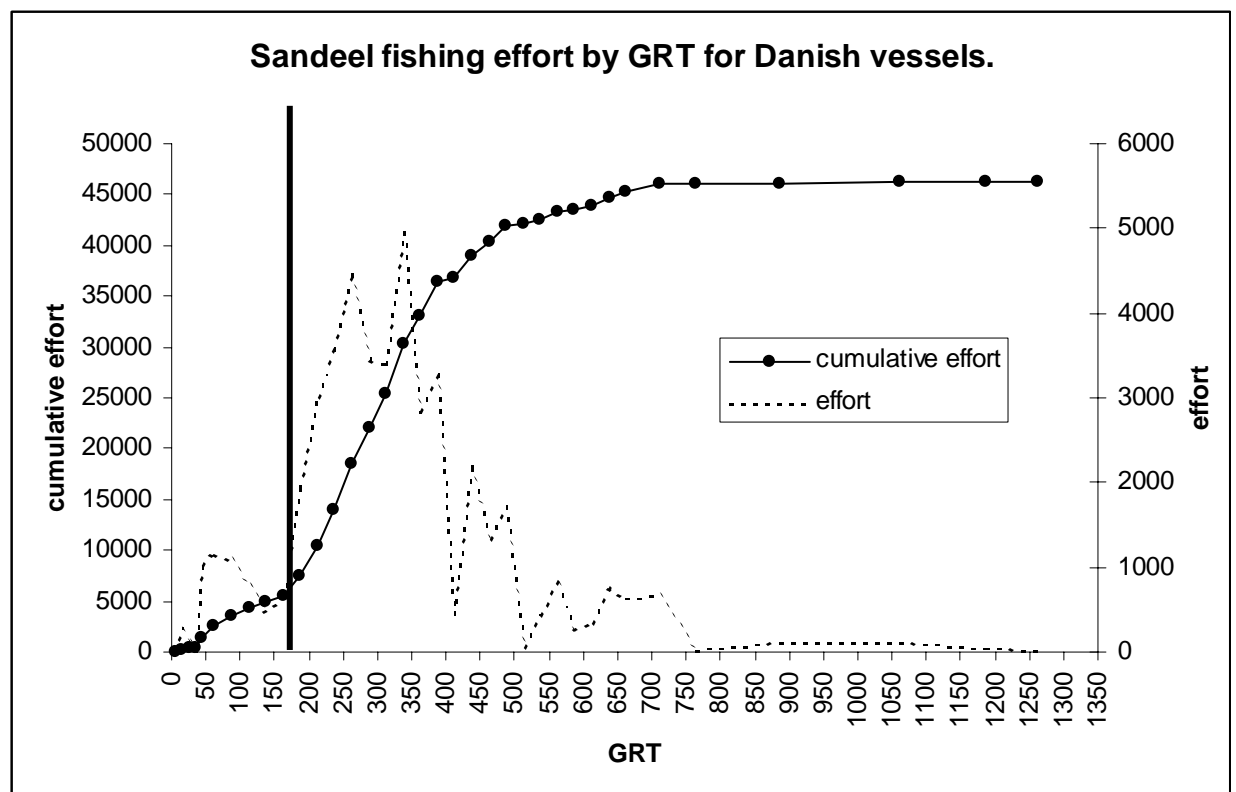


Figure 6. Effort (in days) input to the sandeel fishery by Danish vessels at various size (GRT) categories. The thick vertical line at 175 GRT represents the Jubilee Quest.

Appendix 1: Cruise Report for First Trip

**CENTRE FOR ENVIRONMENT, FISHERIES AND AQUACULTURE
SCIENCE,
LOWESTOFT LABORATORY, LOWESTOFT, SUFFOLK NR33 0HT**

REPORT: Charter **FV JUBILEE QUEST 1/03**

STAFF: C. Satchell

DURATION: 3rd - 12th July 2003

LOCATION: Western Dogger Bank

OBJECTIVE: To identify potential by-catch in the sandeel fishery by following current industrial fishing practice.

NARRATIVE: The Catch sampling officer left Lowestoft on 2nd July to travel to Grimsby and sampling equipment was loaded aboard 'Jubilee Quest' that day. Sailing was also planned for the 2nd of July, however weather conditions prevented this and therefore the 'Jubilee Quest' sailed at 08:00 on the 3rd. On the afternoon of the 3rd fishing trials were conducted, with the survey beginning at first light on the 4th. On the 4th a heavy swell prevented trawling in the very shallow water of a number of banks and as a result stations were determined by weather conditions and water depth. At some time on the 5th the net was damaged to an extent that a port visit was required in order to spread the net out on the quay to allow effective repairs. 'Jubilee Quest' docked in Grimsby at 09:00 on the 6th to fix the net and sailed at 13:00 on the same day. Fishing resumed on the 7th at 04:00 and continued in good weather conditions, with the last tow complete in the afternoon of the 11th. 'Jubilee Quest' docked at Grimsby at approximately 05:00 on the 12th and the CSO returned to Lowestoft.

SAMPLING METHOD: 15 tows were conducted in daylight hours only, on banks in depths of between 7.3 metres and 56.7 metres. The duration of tows was between 2 and 5 hours, with warp length, door spread, weather conditions and positions recorded for each tow. Catches varied between around 100kg up to an estimated 14.5 tonnes and predominately consisted of Sandeel and Sprat, with relatively small quantities of Whiting, Weever, Haddock, Grey gurnard, Horse mackerel, Mackerel, Squid, Poor cod, Dab and Herring also caught. Recording of the entire catch by numbers of individuals and specie weight was possible on tows where the total bulk caught was relatively small. When a large amount of bulk was caught it was necessary to sub sample the catch. Sub sampling was achieved by randomly collecting 5 buckets of bulk as the fish were transported from the hopper along the conveyor belt and deposited in the sea. For full survey results contact Dr. Ewen Bell.

C. Satchell
1st August 2003

Appendix 2: Crusie Report for Second Trip

CEFAS, LOWESTOFT LABORATORY, SUFFOLK, NR33 0HT, ENGLAND

**FISHERIES SCIENCE PARTNERSHIP
SANDEEL FISHERY BY-CATCH INVESTIGATIONS**

REPORT: FV JUBILEE QUEST SANDEEL TRIP 2/03.

SKIPPER: G Hall

CEFAS STAFF: C Garrod

DURATION: 17 – 28 July 2003

LOCALITY: North Sea; north of Lisborgs Ridge and from western Dogger Bank south to Smith's Knoll.

AIMS:

1. To identify potential by-catch in the industrial sandeel fishery by following current fishing practise.
2. To test the selectivity of the sandeel net by targeting demersal fish (1 day).
3. To test for the presence of pelagic '0' group gadoids in water depths of 60 to 70 m in the area north of the Dogger Bank and, if found, to investigate their vertical distribution (1 day).
4. To freeze any salmonids caught for return to CEFAS.

NARRATIVE: (All times are UTC)

Mr Garrod travelled to Grimsby with Dr Ewen Bell on the morning of 17 July for a meeting with skipper Hall and representatives of NFFO to discuss matters arising from the first sandeel-fishing trip and to modify the programme for the second trip.

JUBILEE QUEST sailed from Grimsby at 21:15 on the 17 July and steamed north to Flamborough overnight sheltered from strong southwest winds by the lee of the English coast. The weather moderated as forecast early in the morning of 18 July and the ship steamed off to the sandeel fishing grounds on the western Dogger Bank and commenced fishing with the sandeel trawl at 12:00 hours. Two tows were completed in daylight and the ship steamed to deeper water to the north of Lisborgs Ridges overnight ready to fish in midwater for pelagic '0' group gadoids the next day.

On the morning of 19 July the side-scan transducer, normally used to monitor the door to door spread of the trawl, was mounted on it's side on the headline of the net to act

as a downward firing headline transducer and pelagic fishing trials commenced. The improvised headline transducer worked well and the net appeared to operate successfully in mid-water, fishing depth being controlled via adjustments to warp out and engine revs. Two tows were made with the net fished at three depth strata on each tow so as to sample most of the water column. Only one '0' group gadoid was caught during the two tows so the aim to investigate their vertical distribution was abandoned and no tows covering specific depth strata were made. JUBILEE QUEST steamed back to the relatively shallow sandeel grounds on the west of the Dogger Bank and completed another bottom tow before dark.

Bottom fishing with the sandeel net continued during daylight hours, generally moving south over the survey area, until the evening of 21 July. Trials were conducted overnight in the area of Skate Hole to ensure that the ships own Granton trawl (100mm cod-end mesh) fished effectively when rigged with the doors from the sandeel net. The trials were successful and in the morning of 22 July a tow was made with the Granton trawl on fine ground in the Silver Pits to confirm the presence of groundfish. This was followed by a tow with the sandeel net in the same area to see if it would catch groundfish. During this tow JUBILEE QUEST was boarded by a party from HMS TYNE making a routine fishery regulation enforcement inspection.

The ship steamed to the southerly shallow banks overnight and re-commenced bottom fishing for sandeels at daybreak on 23 July. Fishing for sandeels continued throughout daylight hours until the evening of 27 July when the ship set sail for Grimsby, docking on the morning tide of 24 July at 0400 hours.

A small amount of fish was landed to market and the fishing gear and sampling equipment were unloaded from the ship. Mr Garrod returned to Lowestoft later that day.

RESULTS

1. To identify potential by-catch in the industrial sandeel fishery by following current fishing practise.

Twenty-three bottom tows with the sandeel trawl were completed in daylight on banks identified as sandeel fishing grounds. Tow tracks were recorded by downloading position data from a portable GPS unit to a lap-top computer. Hauls were of approximately four hours duration. The weight and number of each fish species in the catch was evaluated, either by sorting the entire catch or by taking sub-samples (by weight) as appropriate. The bulk weight of catches over one tonne was estimated by eye. Length-frequency and length-weight samples were taken for each species.

To test the selectivity of the sandeel net by targeting demersal fish (1 day).

2.

Three tows were made with the ships own Granton trawl in deeper water off the sandeel banks to confirm the presence of demersal fish. One tow targeting demersal fish with the sandeel trawl was made in this area.

3. *To test for the presence of pelagic '0' group gadoids in water depths of 60 to 70 m in the area north of the Dogger Bank and, if found, to investigate their vertical distribution (1 day).*

Two pelagic tows sampling throughout the water column were made with the sandeel net. Only one '0' group gadoid was caught and the aim to investigate their vertical distribution was abandoned. However, '0' group gadoids were caught on ten of the twenty three hauls made under aim 1, above. Samples were frozen at sea and were all identified as whiting back in the laboratory.

4. *To freeze any salmonids caught for return to CEFAS.*

Four frozen sea-trout (including one caught on the first sandeel trip) were returned to Lowestoft for the attention of Alan Walker.

C Garrod
7 August 2003