

FISHERIES SCIENCE PARTNERSHIP

**Report on catches of cod and other species in the
north eastern Irish Sea by FV Kiroan in spring 2004**

**Fisheries Management Group
CEFAS, Lowestoft
19 May 2004.**

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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

The North Eastern Irish Sea cod project

This report presents the initial results of an FSP project carried out on the otter trawl fishery for cod on the eastern side of the Irish Sea in spring 2004. The project used a commercial otter trawler, the FV Kiroan from 10 Feb to 7 March equipped with an 80 mm mesh codend. The work plan involved otter trawling under dispensation from the quota regulations on grounds chosen by the vessel skippers. No otter trawl survey was undertaken by CEFAS in this region in the same season. [The closest in time is the recently started Irish and Celtic Sea GFS on CEFAS Endeavour in November/December 2003.]

Here we present

- Catch per unit effort of cod, whiting, plaice, and sole;
- The distribution of numbers at length for these commercial species.
- Species compositions of the catches.

Cod and plaice taken during this survey were also used for maturity studies and some stations were fished with short tows to allow capture of cod in good condition for tagging.

Preliminary details of this work will be found in the first cruise report in Appendix 2.

Methods

The FV Kiroan (FD2) is a steel trawler of 21m reg. length, with a 354 Kw engine.

On the first part of the survey (Kir 1/04: 9 - 19 February, stations 1 to 37) the trawl used was a high lift Boris trawl with 80 mm mesh codend. Other details of the trawl were: maximum mesh 200 mm; headline to footrope 7m; footrope 30 m; headline 50 m. This part of the survey was fished within 12 miles of the Blackpool coast.

On the second part of the survey (Kir 2/04: 4 - 6 March, stations 45 to 57), a slightly different trawl designed for hard ground was used. Codend mesh size remained at 80 mm. Other

details were: footrope 27 m equipped with 150 mm discs and rubbers; codend constructed from 4 mm single braided twine with a 200 mm mesh lifting bag/chafer; 90 mm square mesh panel present just before the extension piece. This part of the survey was fished further offshore than the first part.

On most hauls the ship steamed away from the shooting position but returned mid way through the tow to haul close to the start of the tow. The trawl was towed at approximately 3 knots for between 4 and 6 hours, except at stations 39 to 42 which were for less than 50 minutes. These latter stations were those used to catch undamaged fish for tagging purposes. Since the shorter towing times could affect the composition of the catches (particularly for large fish that can swim in front of the trawl for some time before tiring), these tagging tows are excluded from the analyses below.

All commercial fish species caught were measured and classified as 'discarded' or 'retained' according to advice from the fishing crew. Weighing facilities were not available on the FV Kiroan.

Results

Data summary

The position, date, and time of the commercial hauls, along with numbers of fish caught for five commercial species, are shown in Appendix 1. The catch data presented in the report are converted to numbers per hour of towing (catch per hr.) in the analyses below so as to diminish the effects on catch of variable tow times. Cruise reports prepared immediately after the FSP survey can be found as Appendix 2.

Fishing stations

Trip codes, dates, mesh sizes, haul numbers, gear, and average towing hours are summarised below in Table 1. Locations of all stations are shown in Figure 1.

Table 1. NE Irish Sea FSP otter trawl survey, Feb-Mar 2004: details of fishing activities.

Cruise code	Vessel	Mesh mm	Dates in 2004	Hauls	N hauls	Fishing gear	Average tow hrs.
Kir 1/04	FV Kiroan	80	10 Feb - 19 Feb	1- 37	37	Otter trawl	4.94
Kir 2/04	FV Kiroan	80	4 Mar - 7 Mar	45 - 58	14	Otter trawl	4.13

Discards

The only commercial species that were discarded in any quantity during Kir 1/04 were plaice (smaller than 27 cm), 8 cod (smaller than 40 cm), Thorn Back Ray, and whiting. Non commercial species included spotted dog fish and dab. There was little benthos caught by any of the trawling but what there was included swimming crabs and sponges. During Kir 2/04, discards comprised mainly immature small flatfish – plaice, dab and flounder - in varying proportions; large volumes of whiting were also discarded during several hauls.

Geographic plots by species

Catches were composed mostly of cod, plaice, thorn back ray, and flounder but also included brill, haddock, turbot, sole, and whiting. Geographic plots of numbers caught per hour for four of the more numerous and valuable commercial species are described below.

1. Cod - Figures 2a-c.

Good catches of cod were patchily distributed. See fig. 2a. The northern stations of Kir 1/04 yielded better catch rates than the southern which were the first to be fished (stations 1 to 17, fig. 2c). The average catch rate on Kir 1/04 was 10.4 fish per hour. All male cod and most females larger than 40 cm were mature. Later, on Kir 2/04, several catch rates were also relatively high but not all. See fig. 2a and 2c (stations 45 to 58). The average catch rate on Kir 2/04 was 9.7 per hour, hardly different from that on Kir 1/04. More than 95% of the cod caught on Kir 2/04 were running males, and very few maturing males were seen. The few females were ripe fish that were either extruding eggs or were close to doing so. Very few immature cod were caught. The maturity observations on both legs of the survey were consistent with the apparent aggregations of cod being linked to spawning activities.

Length frequency distributions for cod (fig. 2b) were similar between Kir 1/04 and 2/04, suggesting that the two fishing areas were populated by the same stock. Age determination samples show that the cod catch was dominated by 3 year old fish whilst 2 and 4 year or older cod were much less abundant. There was a noticeable peak of 26 cm cod taken by Kir 2/04.

2. Whiting - Fig. 3a.

The catch rates for whiting were even more patchily distributed than for cod (see fig.3a). Whereas the catch rates for whiting were lower than for cod on many hauls, they showed occasional high peaks, particularly on the second leg of the survey. See fig. 3a. Average catch rates jumped from 6.8 per hour on Kir 1/04 to 186.7 on Kir 2/04 in the more offshore locations.

3. Plaice - Fig. 4a.

Most hauls caught larger numbers of plaice than cod or whiting. Like whiting, larger numbers of plaice were taken at the offshore stations (fig. 4a), and average catch rates jumped from 46.5 per hour on Kir 1/04 to 437.9 per hour on Kir 2/04.

4. Sole - Fig. 5a.

Catch rates of sole were much lower than for cod, whiting, or plaice, as would be expected for an otter trawler. The geographic distribution was more uniform than for the other species without a clear offshore difference (fig. 5a). Average catch rates were 1.1 and 1.4 on Kir 1/04 and 2/04 respectively.

Species composition of catches

Species composition is of interest in relation to catch composition rules, and to concerns about the linkage between the catch of cod and other species. Figure 6(a) and (b) therefore makes paired comparisons between the number of cod, whiting, plaice and sole caught by the Kiroan. Each point in a panel of the figure represents the number of fish of a pair of species in one haul. In each row, the vertical location of a point is the number of fish of the species

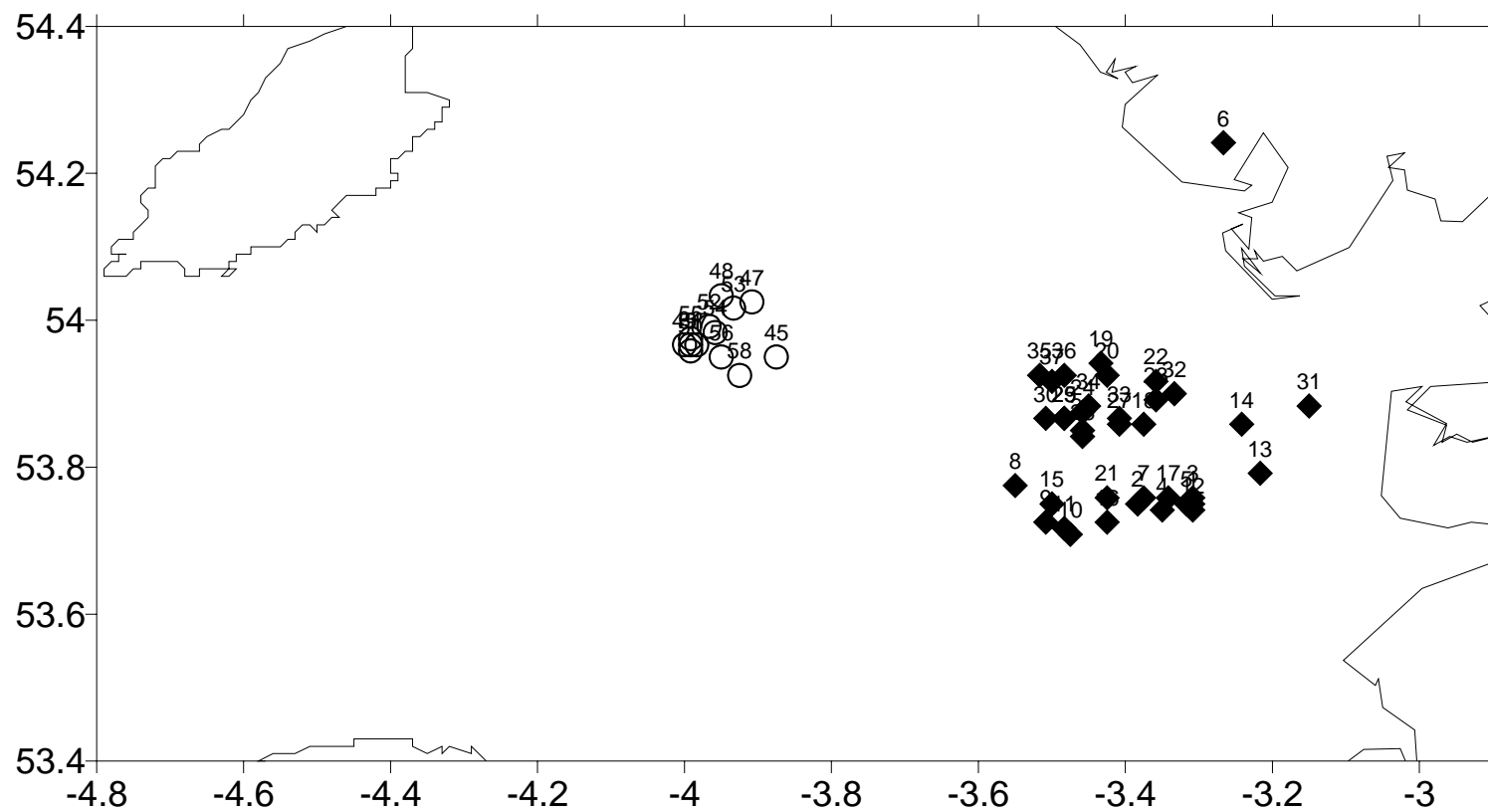
labelled in that row, whilst the horizontal location of a point in each panel is the number of fish of the species labelled in the appropriate column. The panels below the diagonal holding the names of the fish are a mirror image of those above.

If the nets selected strongly for one species to the exclusion of another, the points would tend to lie in vertical or horizontal strings, and if one species was strongly linked to another the points would tend to cluster round a 45° line. For Kir 1/04, the results indicate that cod and whiting tended not to be caught together but this exclusion was not found on Kir 2/04. There was neither strong exclusion nor strong association in the other pairs of species.

Summary and conclusions

1. Catches of cod taken by the FV Kiroan with an otter trawl and 80 mm codend were patchily distributed in the two areas fished, one within 12 miles of the Blackpool coast, the other further offshore. Aggregations of cod may have been associated with spawning activities since many of the fish were mature or ripe running. Catches were dominated by 3-year olds.
2. Catches of whiting were more variable than for cod, with many lower and some much higher per hour of trawling. Most of the larger catches occurred at offshore stations. A similar pattern was observed for plaice.
3. Sole were caught in smaller numbers, as expected for an otter trawler. Catch rates varied gradually over the spatial extent of the two legs of the survey.
4. Catches that included relatively large numbers of cod tended to have relatively small numbers of whiting, and vice versa on Kir 1/04. However, the effect was not repeated on Kir 2/04, further offshore. There was no strong association or exclusion when other pairs of species in the same hauls were compared.

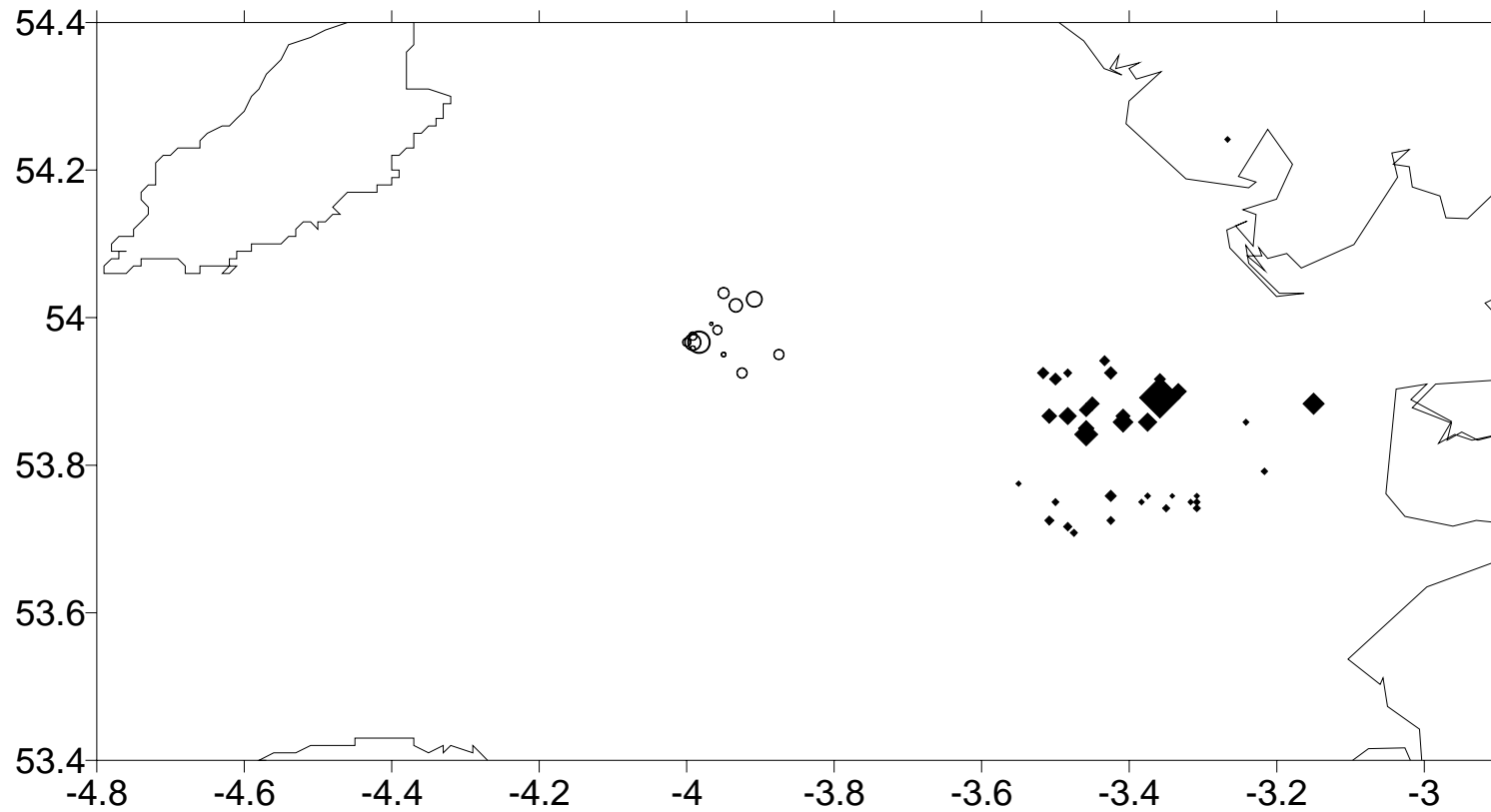
**Fig. 1. NE Irish Sea FSP otter trawl survey, Feb-Mar 2004:
Station positions**



Diamond = Kir 1/04

Circle = Kir 2/04

**Fig. 2(a). NE Irish Sea FSP otter trawl survey, Feb-Mar 2004:
COD: catch per hr.**



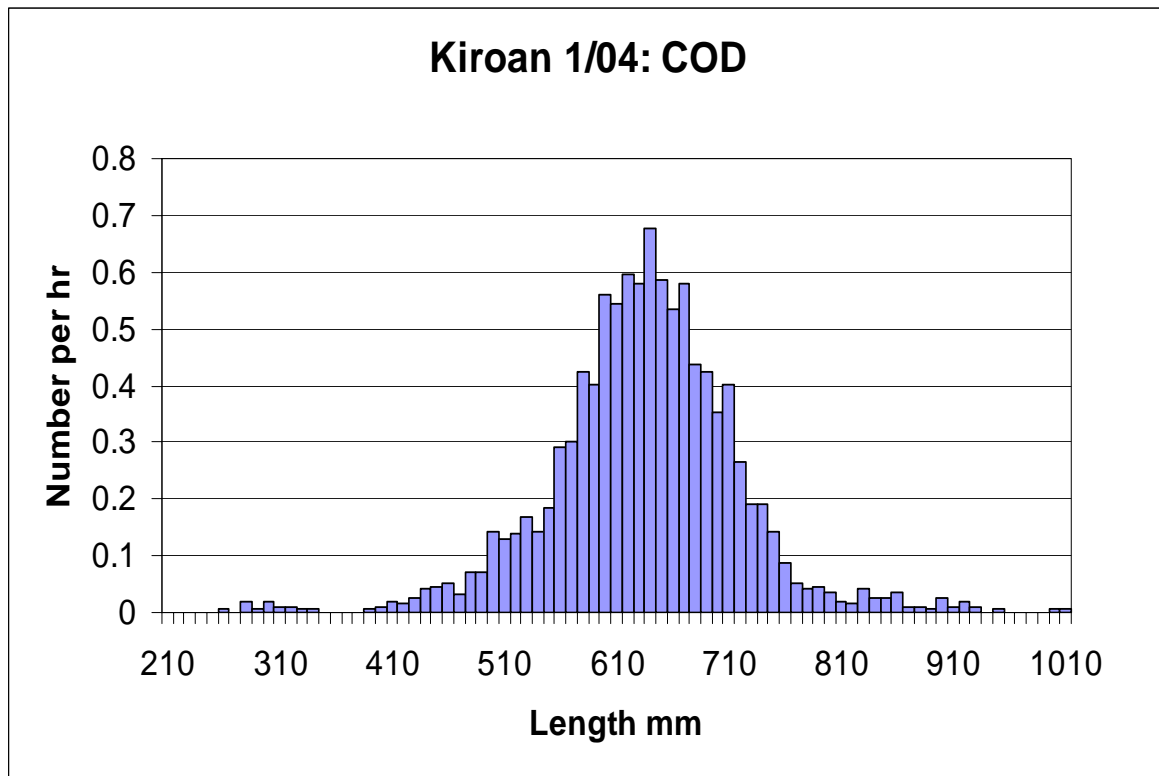
Diamond = Kir 1/04

Circle = Kir 2/04

Scaling: Largest symbol = 46 fish per hr.

**Fig. 2(b). NE Irish Sea FSP otter trawl survey, Feb - Mar 2004:
COD: Length frequency distribution**

(i)



(ii)

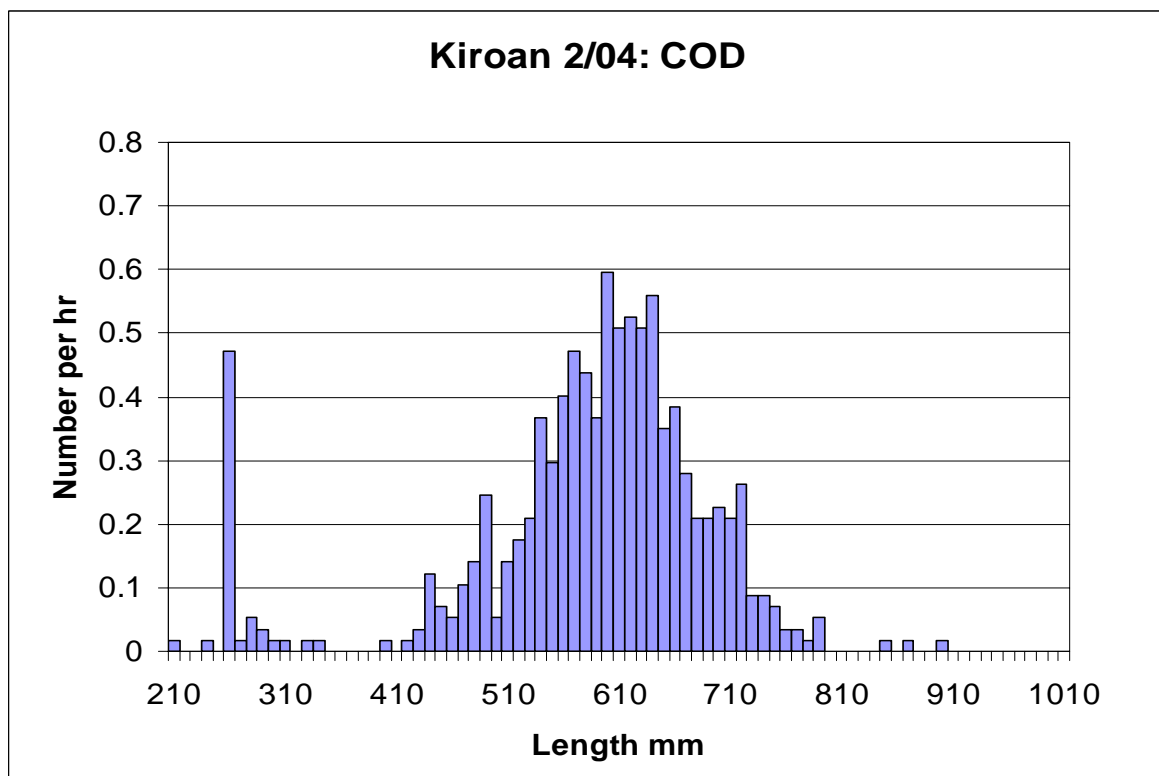
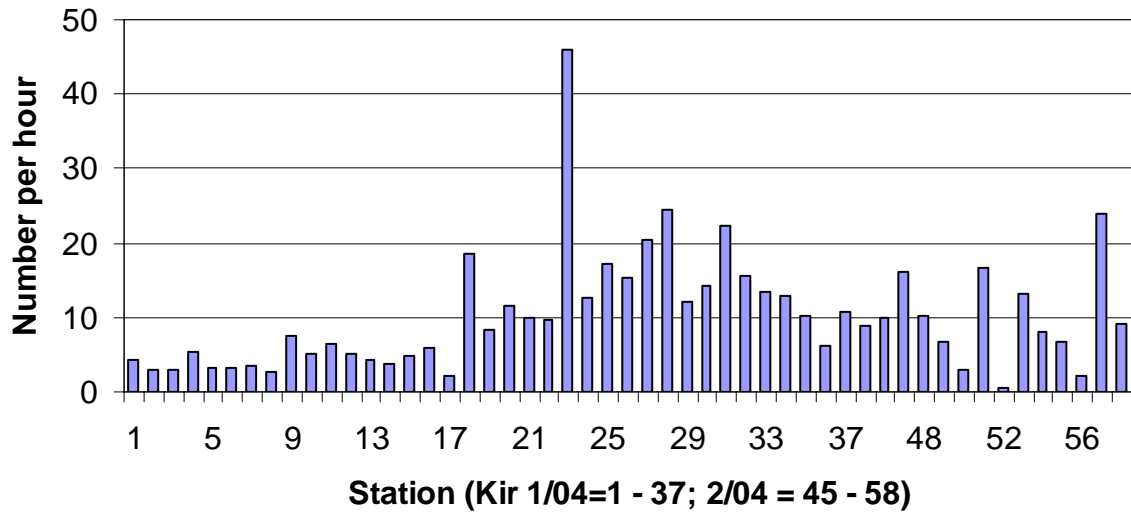
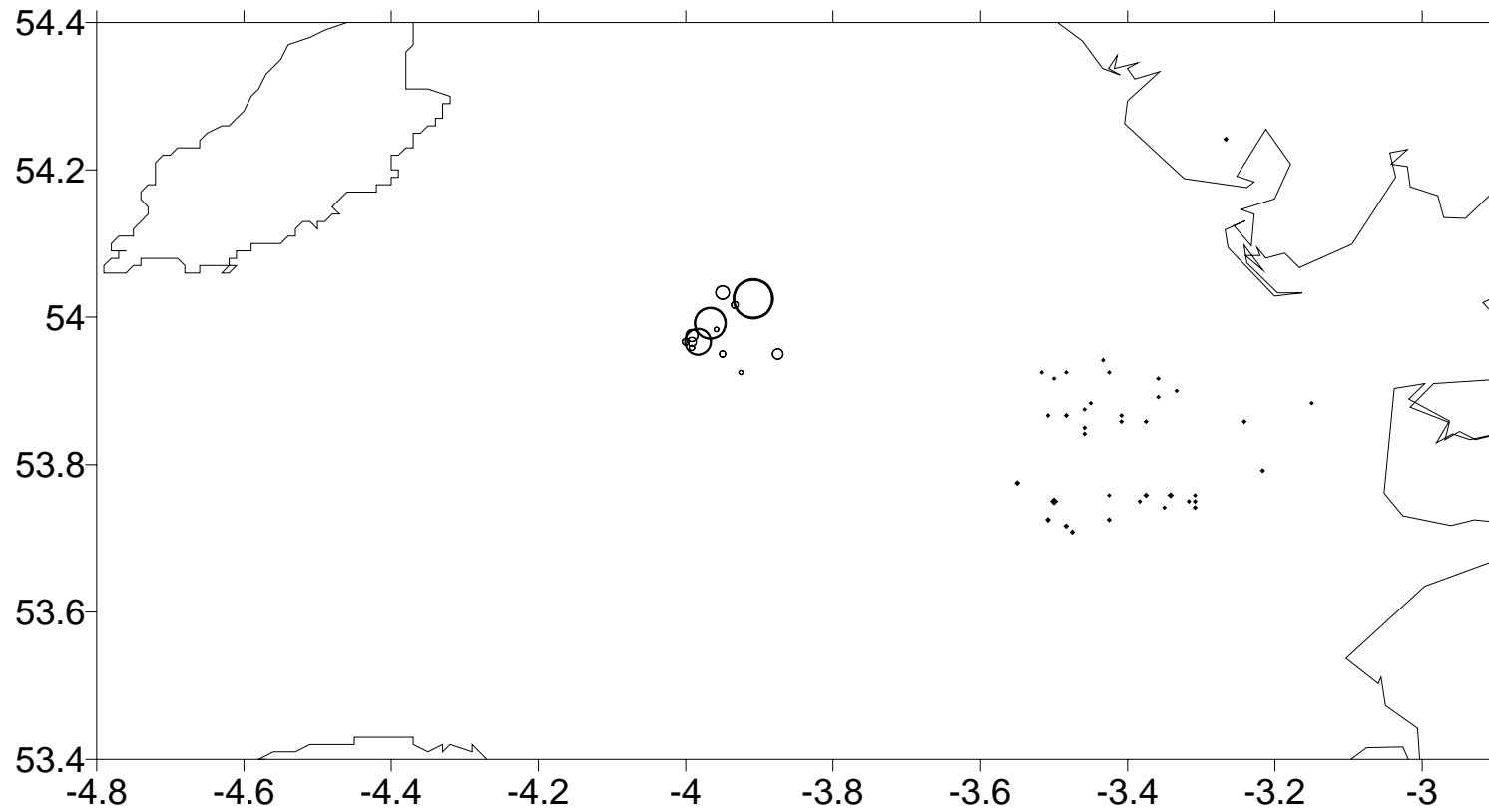


Fig. 2(c). NE Irish Sea FSP: COD catch by station



**Fig. 3(a). NE Irish Sea FSP otter trawl survey, Feb-Mar 2004:
WHITING: catch per hr.**

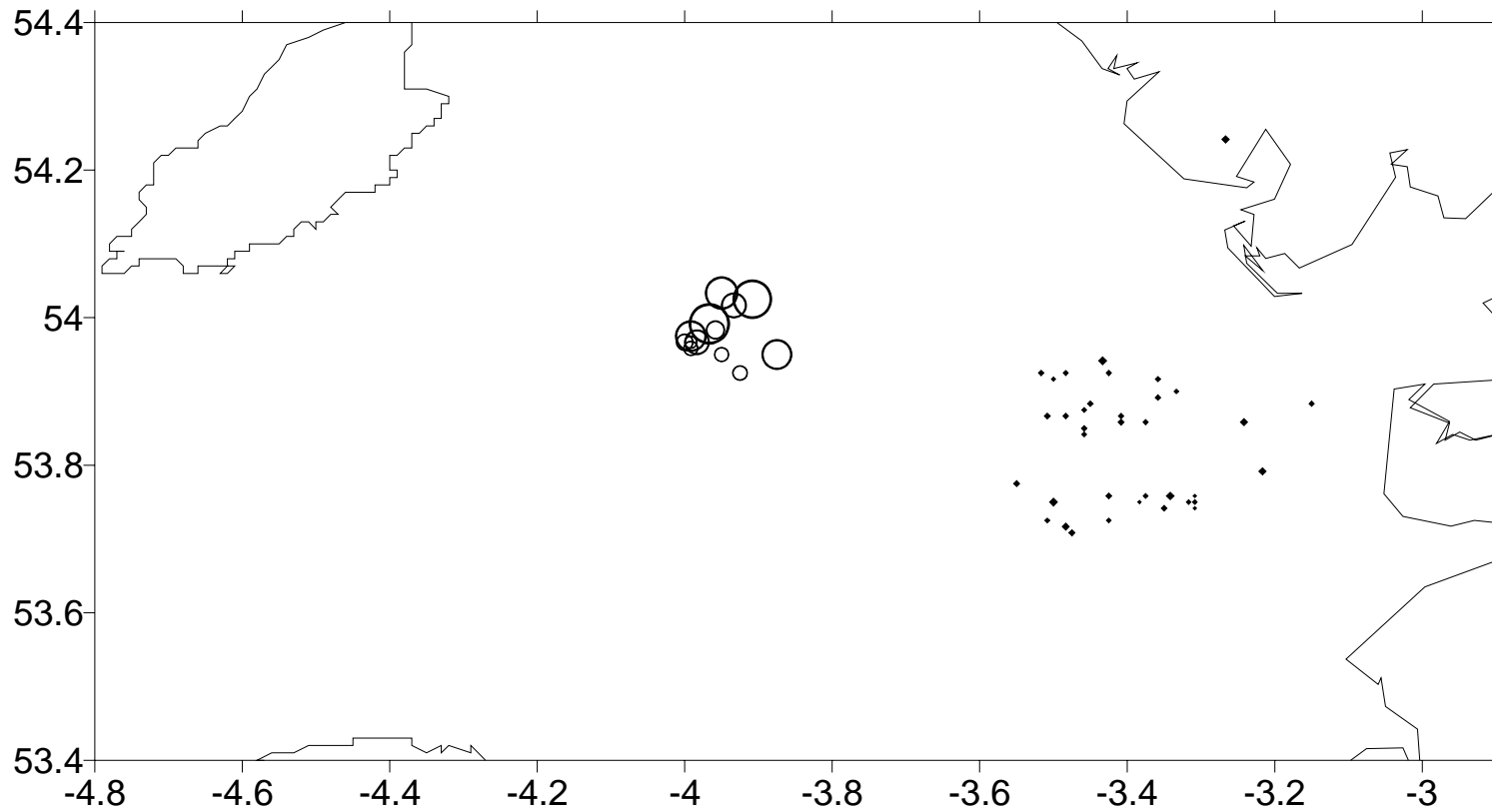


Diamond = Kir 1/04

Circle = Kir 2/04

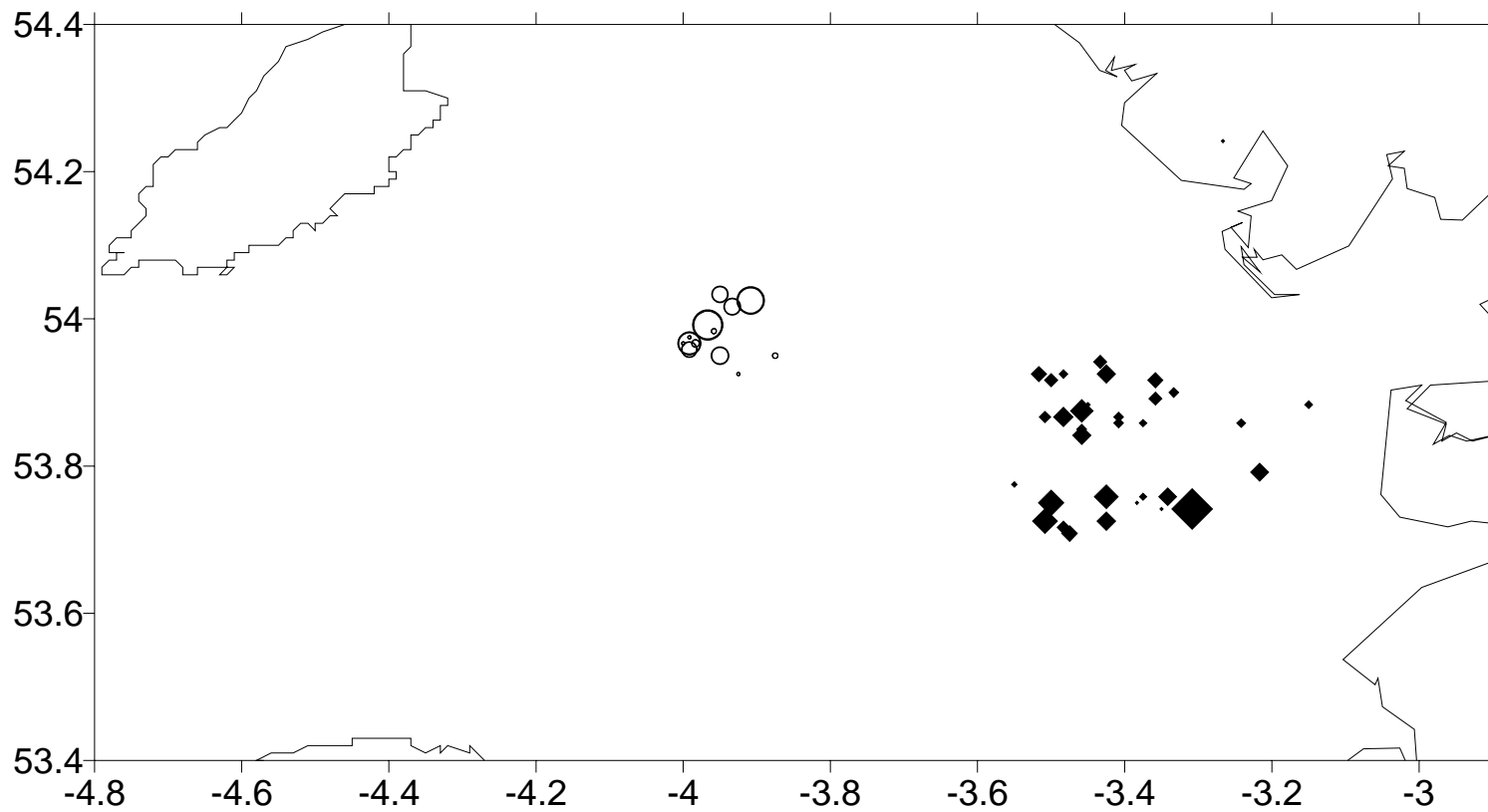
Scaling: Largest symbol = 591 fish per hr.

**Fig. 4(a). NE Irish Sea FSP otter trawl survey, Feb-Mar 2004:
PLAICE: catch per hr.**



Diamond = Kir 1/04
Circle = Kir 2/04
Scaling: Largest symbol = 784 fish per hr.

**Fig. 5(a). NE Irish Sea FSP otter trawl survey, Feb-Mar 2004:
SOLE: catch per hr.**



Diamond = Kir 1/04
Circle = Kir 2/04
Scaling: Largest symbol = 4 fish per hr.

Fig. 6. NE Irish Sea FSP otter trawl survey, Feb-Mar 2004: Numbers of individuals of 4 commercial species in catches of the FV Kiroan.

a) Kir 1/04 (stations 1 - 37)

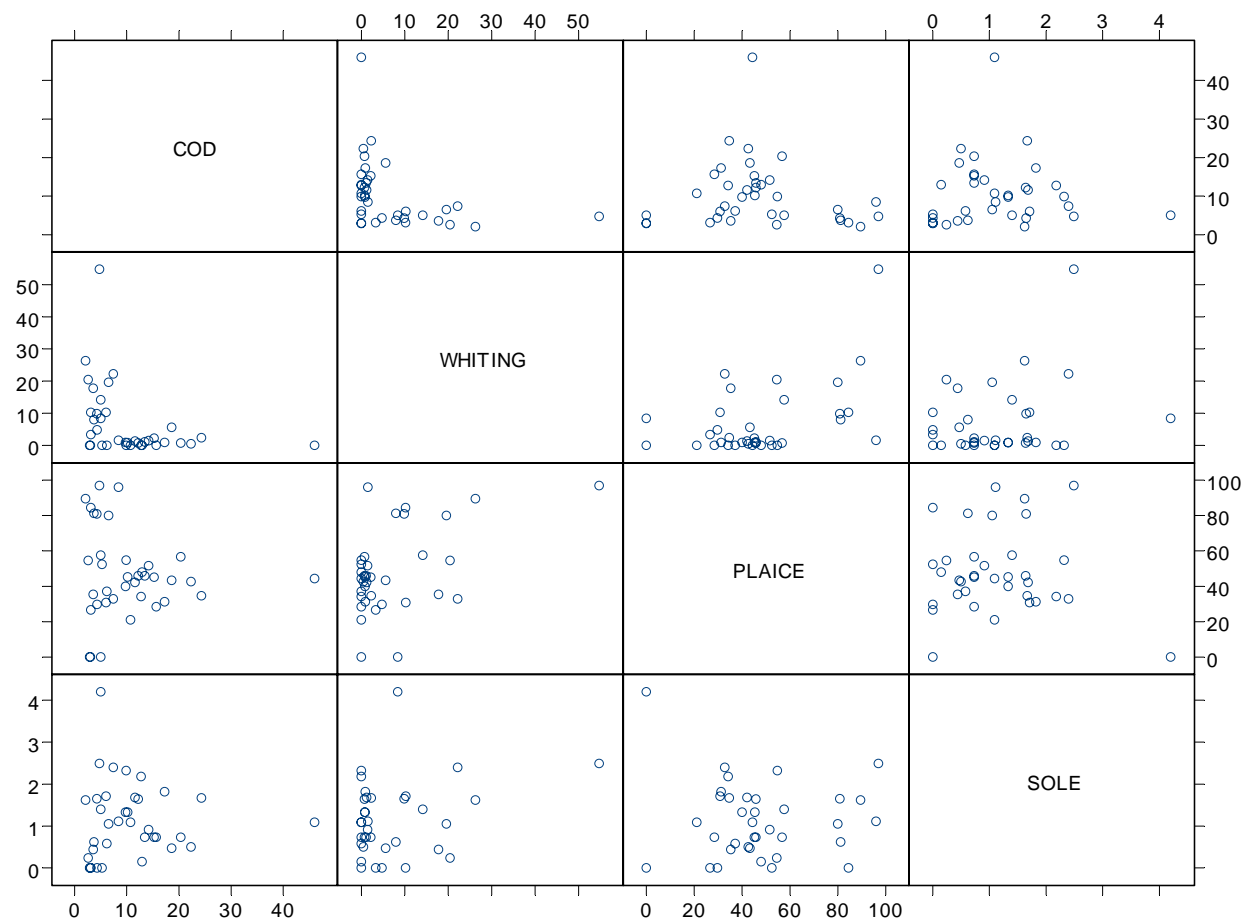
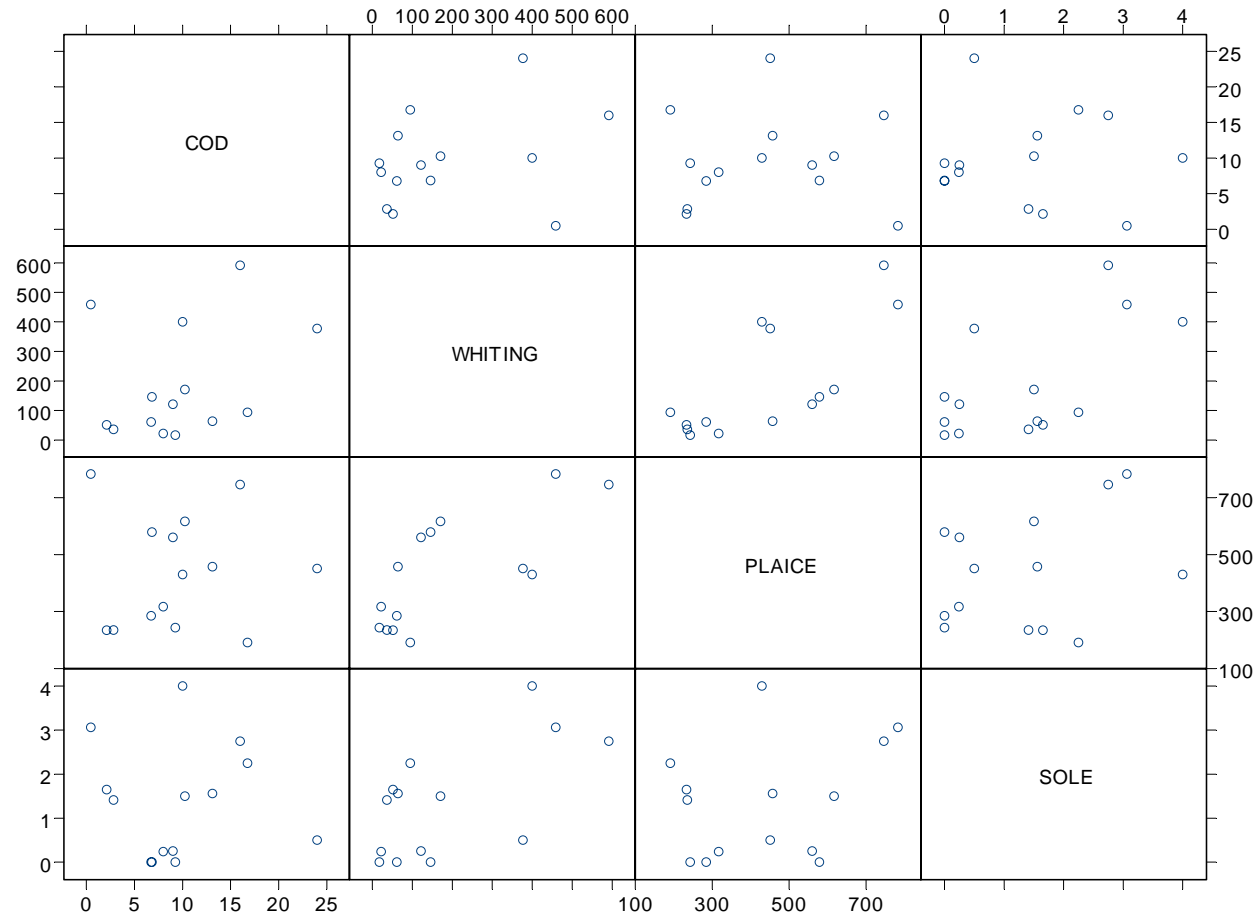


Fig. 6(b) Kir 2/04 (stations 45 - 58)



APPENDIX 1: NE Irish Sea FSP Survey, spring 2004: Station and catch details for 5 species of fish.
Selected abbreviations: WHG_N=whiting, PLE=plaice, SOL=sole.

CruiseName	Stn.	Rect	Gear	Mesh mm	Shot Lon	Shot Lat	Haul Lon	Haul Lat	Date shot	Time shot	Tow hrs	COD_N	HAD_N	WHG_N	PLE_N	SOL_N
KIRO 1/04	1	36E6	Otter trawl	80	-3.22	53.78	-3.40	53.72	10-Feb-04	3:50	4.17	18	0	20	124	0
KIRO 1/04	2	36E6	Otter trawl	80	-3.38	53.78	-3.38	53.72	10-Feb-04	8:00	5.00	15	0	0	0	0
KIRO 1/04	3	36E6	Otter trawl	80	-3.22	53.78	-3.40	53.73	10-Feb-04	13:30	3.08	9	0	0	0	0
KIRO 1/04	4	36E6	Otter trawl	80	-3.40	53.73	-3.30	53.75	10-Feb-04	17:15	4.75	25	0	0	249	0
KIRO 1/04	5	36E6	Otter trawl	80	-3.30	53.75	-3.33	53.75	10-Feb-04	22:30	4.50	14	0	15	120	0
KIRO 1/04	6	36E6	Otter trawl	80	-3.32	53.75	-3.22	54.73	11-Feb-04	3:30	4.50	14	0	46	380	0
KIRO 1/04	7	36E6	Otter trawl	80	-3.22	53.73	-3.53	53.78	11-Feb-04	8:30	4.50	16	0	80	159	2
KIRO 1/04	8	36E6	Otter trawl	80	-3.53	53.78	-3.57	53.77	11-Feb-04	13:30	4.25	11	0	87	232	1
KIRO 1/04	9	36E6	Otter trawl	80	-3.57	53.77	-3.45	53.68	11-Feb-04	18:00	5.00	37	0	111	164	12
KIRO 1/04	10	36E6	Otter trawl	80	-3.45	53.68	-3.50	53.73	11-Feb-04	23:30	5.00	25	0	71	288	7
KIRO 1/04	11	36E6	Otter trawl	80	-3.50	53.73	-3.47	53.70	12-Feb-04	5:00	4.75	31	0	93	380	5
KIRO 1/04	12	36E6	Otter trawl	80	-3.42	53.72	-3.20	53.77	12-Feb-04	10:15	5.00	25	0	42	0	21
KIRO 1/04	13	36E6	Otter trawl	80	-3.20	53.77	-3.23	53.82	12-Feb-04	15:45	4.25	18	0	42	344	7
KIRO 1/04	14	36E6	Otter trawl	80	-3.23	53.82	-3.25	53.90	12-Feb-04	20:30	3.25	12	0	26	264	2
KIRO 1/04	15	36E6	Otter trawl	80	-3.55	53.78	-3.45	53.72	13-Feb-04	18:50	4.42	21	0	242	428	11
KIRO 1/04	16	36E6	Otter trawl	80	-3.47	53.72	-3.38	53.73	13-Feb-04	23:50	4.67	28	0	48	144	8
KIRO 1/04	17	36E6	Otter trawl	80	-3.38	53.75	-3.30	53.77	14-Feb-04	5:20	4.33	9	0	114	388	7
KIRO 1/04	18	36E6	Otter trawl	80	-3.30	53.77	-3.45	53.95	14-Feb-04	10:15	4.25	79	0	24	184	2
KIRO 1/04	19	36E6	Otter trawl	80	-3.45	53.95	-3.42	53.93	14-Feb-04	15:00	4.50	38	0	7	432	5
KIRO 1/04	20	36E6	Otter trawl	80	-3.42	53.93	-3.43	53.92	14-Feb-04	20:00	4.75	55	0	6	200	8
KIRO 1/04	21	36E6	Otter trawl	80	-3.43	53.58	-3.42	53.93	15-Feb-04	1:15	4.75	47	0	0	260	11
KIRO 1/04	22	36E6	Otter trawl	80	-3.42	53.93	-3.30	53.90	15-Feb-04	6:30	4.50	44	0	4	180	6
KIRO 1/04	23	36E6	Otter trawl	80	-3.30	53.90	-3.42	53.88	15-Feb-04	11:30	5.50	253	0	0	244	6
KIRO 1/04	24	36E6	Otter trawl	80	-3.42	53.88	-3.50	53.87	15-Feb-04	17:30	5.50	70	0	0	188	12
KIRO 1/04	25	36E6	Otter trawl	80	-3.50	53.87	-3.47	53.87	15-Feb-04	23:30	5.50	95	0	5	172	10

APPENDIX 1 continued : NE Irish Sea FSP Survey, spring 2004: Station and catch details for 5 species of fish.

Selected abbreviations: WHG_N=whiting, PLE=plaice, SOL=sole.

CruiseName	Stn.	Rect	Gear	Mesh mm	Shot Lon	Shot Lat	Haul Lon	Haul Lat	Date shot	Time shot	Tow hrs	COD_N	HAD_N	WHG_N	PLE_N	SOL_N
KIRO 1/04	26	36E6	Otter trawl	80	-3.47	53.87	-3.45	53.83	16-Feb-04	5:30	5.50	84	0	12	248	4
KIRO 1/04	27	36E6	Otter trawl	80	-3.42	53.85	-3.40	53.87	16-Feb-04	11:30	5.50	112	0	4	312	4
KIRO 1/04	28	36E6	Otter trawl	80	-3.45	53.83	-3.47	53.85	16-Feb-04	17:00	6.00	146	0	14	208	10
KIRO 1/04	29	36E6	Otter trawl	80	-3.47	53.85	-3.50	53.88	16-Feb-04	23:30	5.50	67	0	4	252	9
KIRO 1/04	30	36E6	Otter trawl	80	-3.50	53.88	-3.52	53.85	17-Feb-04	5:30	5.50	78	0	8	284	5
KIRO 1/04	31	36E6	Otter trawl	80	-3.05	53.85	-3.25	53.92	17-Feb-04	11:30	6.00	134	0	3	256	3
KIRO 1/04	32	36E6	Otter trawl	80	-3.25	53.92	-3.42	53.88	17-Feb-04	23:00	5.50	86	0	0	156	4
KIRO 1/04	33	36E6	Otter trawl	80	-3.42	53.88	-3.40	53.85	18-Feb-04	5:00	5.50	74	0	6	252	4
KIRO 1/04	34	36E6	Otter trawl	80	-3.40	53.85	-3.50	53.92	18-Feb-04	11:00	6.50	84	0	0	312	1
KIRO 1/04	35	36E6	Otter trawl	80	-3.50	53.92	-3.53	53.93	18-Feb-04	18:00	6.00	61	0	5	272	8
KIRO 1/04	36	36E6	Otter trawl	80	-3.50	53.92	-3.47	53.93	19-Feb-04	0:50	5.17	32	0	0	192	3
KIRO 1/04	37	36E6	Otter trawl	80	-3.47	53.93	-3.53	53.90	19-Feb-04	6:30	5.50	59	0	0	116	6
KIRO 1/04	45	36E6	Otter trawl	80	-3.83	53.93	-3.92	53.97	04-Mar-04	14:00	4.00	36	0	486	2241	1
KIRO 1/04	46	36E6	Otter trawl	80	-3.92	53.97	3.92	54.05	04-Mar-04	18:30	4.00	40	0	1600	1719	16
KIRO 1/04	47	37E6	Otter trawl	80	-3.92	54.05	-3.90	54.00	04-Mar-04	23:00	4.00	64	0	2366	2985	11
KIRO 1/04	48	37E6	Otter trawl	80	-3.90	54.00	-4.00	54.07	05-Mar-04	3:30	4.00	41	0	683	2468	6
KIRO 1/04	49	37E5	Otter trawl	80	-4.03	54.02	-3.97	53.92	05-Mar-04	8:00	4.00	27	0	246	1140	0
KIRO 1/04	50	36E6	Otter trawl	80	-3.97	53.92	-4.02	54.00	05-Mar-04	12:30	4.25	12	0	154	1001	6
KIRO 1/04	51	37E5	Otter trawl	80	-4.02	54.00	-3.97	53.93	05-Mar-04	17:15	4.00	67	0	378	765	9
KIRO 1/04	52	36E6	Otter trawl	80	-3.97	53.93	-3.97	54.05	05-Mar-04	21:45	4.25	2	0	1950	3330	13
KIRO 1/04	53	37E6	Otter trawl	80	-3.95	54.05	-3.92	53.98	06-Mar-04	2:30	4.50	59	0	287	2058	7
KIRO 1/04	54	36E6	Otter trawl	80	-3.92	53.98	-4.00	53.98	06-Mar-04	7:30	4.25	34	0	95	1348	1
KIRO 1/04	55	36E6	Otter trawl	80	-4.00	53.98	-3.98	53.97	06-Mar-04	12:15	4.25	29	0	621	2462	0
KIRO 1/04	56	36E6	Otter trawl	80	-3.98	53.97	-3.92	53.93	06-Mar-04	16:45	4.25	9	0	220	994	7
KIRO 1/04	57	36E6	Otter trawl	80	-3.97	53.92	-4.00	54.02	06-Mar-04	22:45	4.00	96	0	1509	1806	2
KIRO 1/04	58	37E6	Otter trawl	80	-4.00	54.02	-3.85	53.83	07-Mar-04	3:15	4.00	37	0	69	973	0

APPENDIX 2: NE Irish Sea FSP Survey, spring 2004: Cruise report 1 (excluding data shown in main report).

**CENTRE FOR ENVIRONMENT, FISHERIES AND AQUACULTURE SCIENCE
LOWESTOFT LABORATORY, LOWESTOFT, SUFFOLK NR33 0HT
2003-4 CHARTER VESSEL PROGRAMME
PROGRAMME: MFV Kiroan**

STAFF:

Peter R. Witthames
M. Godard

DURATION: 10 February – 21 February

LOCATION: Eastern Irish Sea

AIMS:

1. Obtain information on the abundance and size composition of cod and other commercial species in the eastern Irish sea.
2. Collect fecundity and otolith samples from cod and plaice.
3. Collect samples of fins to study population variability in cod DNA.
4. Tag and release selected cod from the catch to study population movements.

NARRATIVE:

(all times are GMT)

Staff and gear left Lowestoft in the late afternoon of February 9 and traveled to Fleetwood to join the Kiroan for sailing on the early morning tide at 02:00. Fishing with a high lift Boris trawl (cod end 80 mm mesh, trawl maximum mesh 200 mm, headline to footrope 7 m, door spread 52 m, footrope 30 m, headline 50 m) started at 03:50 on the same day and continued uninterrupted until 01:00 on the 13 February. The preferred gear for normal commercial fishing on this vessel has been a Twin rig (2 nets with one pair of doors) but this was not used on this Fisheries Science Partnership exercise in order to catch more cod rather than mixed ground fish. 'Riddlers' or large meshes in the cod end are also used with the twin rig to reduce the need to handle and discard small (<27 cm) plaice which have become very abundant in this area of the Irish Sea. On most hauls the ship steamed away from the shooting position but returned mid way through the tow to haul close to the start of the tow. Mr Dell the skipper preferred this method of working to obtain better information on the spatial distribution of fish on the ground. The weather improved from the start of the cruise moderating from SW 4-5 to SW 2 during the first day and calm conditions lasted until the wind started to freshen on the 20 February. On the 13 February Kiroan returned to Fleetwood to unload the catch but sailed on the next full tide at 15:30 to commence fishing at 18:50 on the same day. Fishing continued again for a further 7 days until the Kiroan docked again in Fleetwood at 22:00 on the 19 February to unload fish. On the following tide (11:30) Kiroan sailed again to catch cod in good condition for tagging, working hauls (numbers 39-42) of short duration (<50 minutes) until the winds started to freshen when this part of the work was abandoned for longer tows to trawl away from the gas platforms. During the final tow on the morning of Saturday 21 the wind continued to freshen and the trawl was severely damaged and the charter was terminated. Staff returned to Lowestoft on the same day which marked the end of the first part of the charter.

RESULTS:

Aim 1.

A total of valid 43 hauls were completed within the 12 mile limit off Blackpool (Table 1) until the net was badly torn on haul 44. Data from the shorter tagging tows 39-42 will be excluded from the data set as only cod were measured. The only commercial species that were discarded in any quantity were plaice (smaller than 27 cm), 8 cod (smaller than 40 cm), Thorn Back Ray, and whiting. Non commercial species included spotted dog fish and dab. There was little benthos caught by any of the trawling and included swimming crabs and sponges. The commercial catch was composed mostly of cod, plaice Thorn back Ray and flounder but also included Brill, haddock, turbot sole, and whiting. The length composition, and catch per hour of cod is shown in Figure 1 panels a-c. Based on published growth rate information for Irish Sea cod the catch was mostly dominated by 3 year old fish whilst 2 and 4 year or older cod were much less abundant. Catches of cod were highest during neap tides perhaps because of increased net efficiency in shallower water.

Aim 2 Collect fecundity and otolith samples from cod, plaice and haddock.

Fecundity (145) and otolith (192) samples were collected mostly from cod and also from 12 plaice. All male cod larger than 40 cm were mature as were most females though in each case there was a large effect of length on their reproductive potential (a measure of the capacity of fish to produce new off spring) shown by the relationship between testes or ovary weight to fish length (Fig 2).

Aim 3 Collect samples of fins to study population variability in cod DNA.

Samples were taken from 100 fish of which 45 were released after tagging

Aim 4 Tag and release selected cod from the catch to study population movements

Details of the number of fish released after hauls 15-44 are shown in table 2. In the case of the hauls lasting over 4 hours only the strongest most lively fish less were tagged and then less usually less than 4 were processed after each haul. Prior to release each fish was observed closely, whilst it was held in a polyethylene bag filled with water, to assess whether it was recovered and orientated. On all but 2 occasions the released fish swam away rapidly down from the surface.

SEEN IN DRAFT:

Trevor Boon
Colin Banister

INITIALLED:

Colin Bannister

DISTRIBUTION:

Basic list + RCA Bannister, T W Boon, John Cotter, Philip Dell ¹ Mike Parker ² Chris Neeve³, Tom Watson⁴.

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² Mike Parker 26 London Street Fleetwood Lancashire FY7 6 JG

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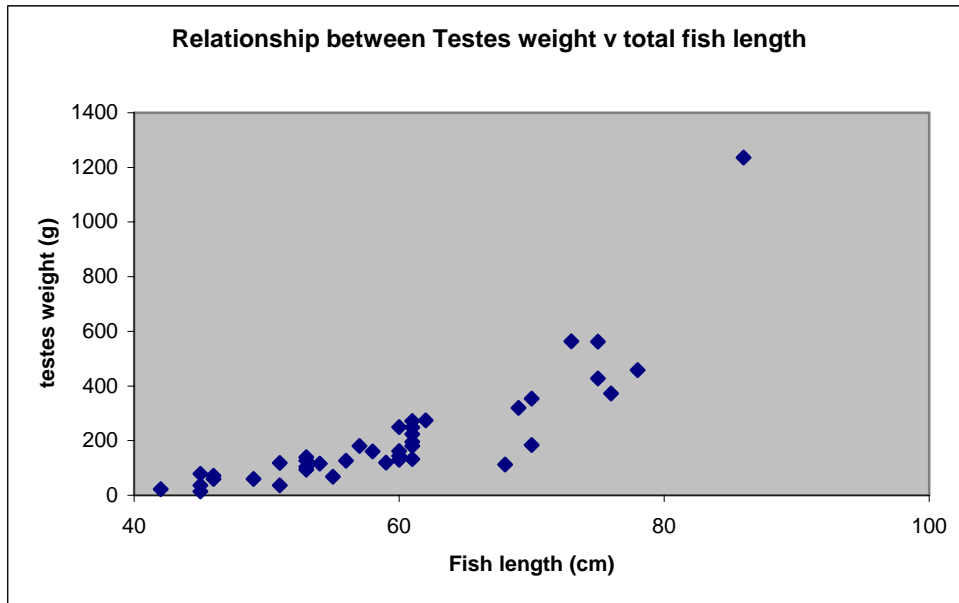
Table 2 Details of the number of fish released on hauls where fish were tagged.

HAUL	DATE	TIME	LATITUDE	LONGITUDE	DEPTH (m)	Number of fish tagged
15	13/02/2004	18:50	53.78	3.55	28	2
16	13/02/2004	23:50	53.72	3.47	22	4
17	14/02/2004	5:20	53.75	3.38	28	3
18	14/02/2004	10:15	53.77	3.67	14	4
19	14/02/2004	15:00	53.95	3.45	20	4
20	14/02/2004	20:00	53.93	3.42	21	4
21	15/02/2004	1:15	53.58	3.43	20	4
22	15/02/2004	6:30	53.93	3.42	19	4
23	15/02/2004	11:30	53.90	3.30	20	4
24	15/02/2004	17:30	53.88	3.42	21	4
25	15/02/2004	23:30	53.87	3.50	21	5
26	16/02/2004	5:30	53.87	3.47	19	6
27	16/02/2004	17:00	53.83	3.45	19	6
28	16/02/2004	23:30	53.85	3.47	21	4
29	16/02/2004	5:30	53.88	3.50	19	4
30	17/02/2004	5:30	53.88	3.50	19	4
31	17/02/2004	11:30	53.85	3.05	23	6
32	17/02/2004	23:00	53.92	3.25	17	4
33	18/02/2004	5:00	53.88	3.42	21	5
34	18/02/2004	11:00	53.85	3.40	18	6
35	18/02/2004	18:00	53.92	3.50	19	5
36	19/02/2004	0:50	53.92	3.50	22	8
37	19/02/2004	6:30	53.93	3.47	22	4
38	19/02/2004	12:30	53.90	3.53	25	4
39	20/02/2004	14:00	53.92	3.35	18	1
40	20/02/2004	14:00	53.92	3.35	18	1
41	20/02/2004	14:45	53.90	3.47	20	14
42	20/02/2004	16:00	53.88	3.58	25	7
43	20/02/2004	17:30	53.87	3.70	28	4
44	21/02/2004	1:00	54.08	3.45	19	4
Total number of fish released						139

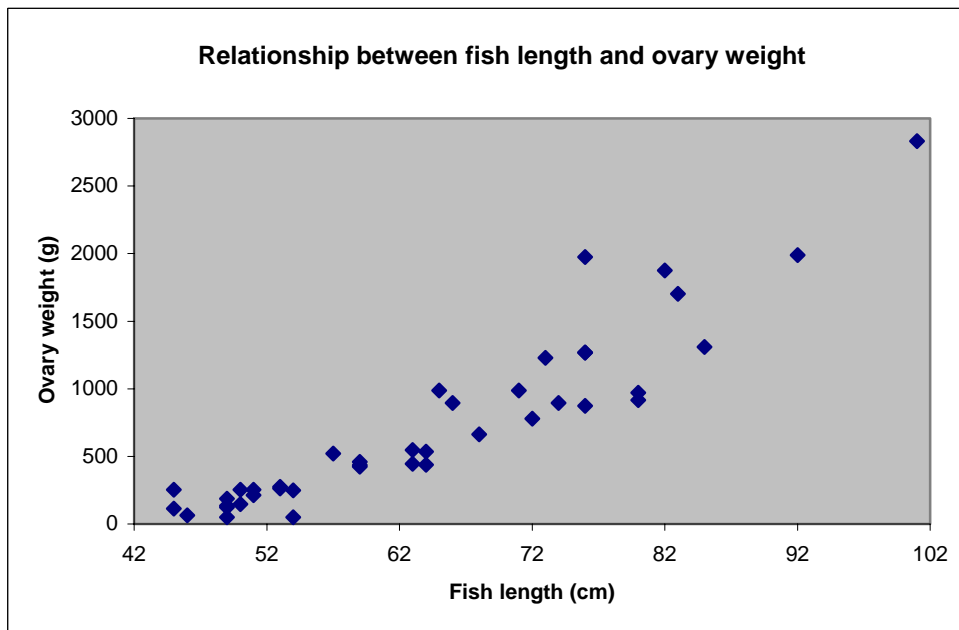
Figure 2

Plots showing the weight of testes (panel a) and ovary (panel b) in relation to fish length

Panel a



Panel b



APPENDIX 2: NE Irish Sea FSP Survey, spring 2004: Cruise report 2

2003-4 CHARTER VESSEL PROGRAMME

PROGRAMME: MFV Kiroan Part II

STAFF:

David Goad

DURATION: 4th – 7th March 2004

LOCATION: Eastern Irish Sea

AIMS:

5. Obtain information on the abundance and size composition of cod and other commercial species in the eastern Irish Sea.
6. Collect otolith samples and maturity stages from the length classes of cod present.

Narrative:

Staff member joined the vessel on 4th of March to sail at 10:00, and the vessel fished on grounds known as '10 miles west of rigs' and '16 miles south east of the Isle of Mann'. These were well known to the skipper and typically fished when targeting cod.

A dual-purpose trawl was towed, at approximately 3 knots, rigged with 6" discs and rubbers for use on hard ground. The footrope measured 90 feet (27m). The cod-end mesh was 80mm constructed of 4mm single braided twine, and an 8"(200mm) mesh 4mm double braided lifting bag / chafer was used. A 90mm square mesh panel was present just before the extension piece. Door spread was 150 feet (46m), with 100 fm (184m) warps and 50 fm (92m) bridles and splits.

This gear is identical to that used commercially by the skipper, as he is allowed more days at sea with the 80mm mesh. He would prefer to work larger mesh cod ends as these dramatically reduce discarding. This gear was used for second part of the survey as it was already aboard the vessel and the skipper was reluctant to change over for 3 days fishing. It also allowed collection of data on discarding with the smaller mesh, a point the skipper feels very strongly about.

Weather was good with conditions freshening towards the end of the trip from calm seas and variable breezes to a north westerly force 4 with moderate seas.

The vessel returned to land at Fleetwood at 11:30 on the 7th March.

Aim 1:

A total of 14 tows (numbers 45 – 58) were conducted in a similar manner to the first part of the cruise, each of approximately 4 hours duration. All tows were sampled for retained and discarded species. During tow 56 a large boulder was picked up, damaging the cod-end such that very little fish was taken aboard. Otherwise only slight gear damage was sustained.

Retained species comprised of predominantly cod, thornback ray, plaice, and flounder. Haddock, whiting, and other rays were caught less frequently, while very small quantities on lemon sole, dover sole, brill, pollack and scallops were retained. Approximately 75% of the female plaice were spent, while others were running or hyaline (if not immature). The males were about half running and half spent. Flounders of both sexes were about half running and half spent. Catches of cod and whiting were better in the dark, although the skipper would expect to take more cod on smaller tides.

Discards by number caught comprised mainly of immature small flats – plaice, dab and flounder - in varying proportions, however large volumes of whiting were also discarded during several hauls.

Aim 2.

A total of 109 cod otoliths were taken across the size range of individuals. More than 95% of the cod were running males, and very few maturing males were seen. The few females were running or hyaline. Very few immature cod were caught.