

**CRUISE REPORT: LF/36/97: PELAGIC FISH ACOUSTIC SURVEY**

**VESSEL:** R.V. *Lough Foyle* (DANI) **DATES:** 31 August - 15 September 1997

**AREA OF OPERATION:** Irish Sea ; ICES Division VIIa

**TYPE OF SURVEY:** Acoustics / midwater trawling

<b>PERSONNEL:</b>	M. Armstrong	(DANI; S.I.C.)	31/8 - 12/9
	W. Clarke	(DANI)	31/8 - 12/9
	M. Dickey-Collas	(DANI)	31/8 - 15/9
	M. McAliskey	(DANI)	31/8 - 15/9
	J. Peel	(DANI)	31/8 - 15/9
	C. Burns	(DANI)	31/8 - 15/9
	D. Steele	(RSPB)	31/8 - 15/9
	W. McCurdy	(DANI)	14/9 - 15/9

**OBJECTIVES**

1. To estimate the distribution, biomass and age composition of herring in the northern Irish Sea.
2. To estimate the distribution and biomass of sprat in the Irish Sea.
3. To carry out a seabird census.

**METHODS**

A sphere-calibrated Simrad EK-500 acoustic system with 38 and 120 kHz split-beam transducers mounted in a towed body was employed to carry out echo integrations along transects in the Irish Sea. Instrument settings used during the survey are given in Table 1. The initial planned survey grid is shown in Fig. 1. Acoustic targets were identified by means of aimed tows of a Maritin 54m x 47m midwater trawl fitted with a 20-mm stretched-mesh liner and a Furuno netsonde. Species compositions and length frequencies were recorded from all trawl catches. Subsamples of up to 50 herring were taken from each catch for recording of age and other biological parameters. Length-weight parameters were estimated for all fish species contributing significantly to the acoustic integrals. Seabirds were counted along the transects using standard census techniques.

**CRUISE NARRATIVE**

The vessel departed Belfast at 23h.00 on Sunday 31 August, and proceeded overnight to the start of transect 1 off the north coast of the Isle of Man (Fig. 2). Poor weather

precluded the planned calibration of the acoustic system off Douglas. During the afternoon of 2 September (transect 16), a heavy swell caused the support cable from the hydrographic winch to snap at the tail of the towed body. Due to imminent gales, shelter was sought in Ramsey Bay until the morning of 4 September. On completion of transect 65b (Fig. 2), a mid-cruise break took place in Belfast from approximately 21h.00 on 5 September to 23h.00 on 6 September. The survey resumed at 6h.00 on 7 September. During calibrations in Dundrum Bay on Sunday 7 September, it was discovered that connections to the rear quadrants of the split-beam transducer were faulty. Examination of survey data indicated that the fault probably occurred at the start of the survey, as the EK-500 and 38 kHz transducer had been tested by Simrad (Aberdeen) immediately prior to the cruise and found to be fully functional. Unquantifiable errors in the echo integration data and target strength estimates from the first week of the cruise meant that the echo integration data could be used only for mapping of fish distribution and not for estimation of biomass. The vessel returned to Belfast during Sunday evening, berthing around 22h.40, to allow repairs to the transducer cable.

The vessel departed again at 06h.00 on Monday 8 September, and anchored north-east of Black Head for calibration of the echosounder. The transects around the Isle of Man were then re-surveyed as the great majority of adult herring have in the past been observed in this region. The cruise track was amended (Fig. 3) to ensure coverage of areas where adult herring have been recorded in previous surveys. Additional transects were also placed over the Douglas Bank spawning grounds for herring to increase the sampling intensity in this area. Surveying commenced at transect 1 on 8 September and was suspended after transect 60b on Friday 12 September, the original completion date. The vessel berthed in Belfast during Friday afternoon

An additional two days of ship time were allocated to allow the western Irish Sea to be surveyed. The vessel departed Belfast on Sunday evening, 14 September, however due to severe gales it did not leave Belfast Lough and remained at anchor off Bangor. The weather failed to moderate and the forecasts were poor so the vessel returned to Belfast on Monday evening.

## WORK COMPLETED

### Echo sounder calibration

Following repair of the transducer cable, a sphere calibration of the 38 kHz system was carried out on 8 September near Black Head at the mouth of Belfast Lough to quantify the on-axis sensitivity and the beam pattern. The following revisions were made to the EK500 instrument settings:

	TS gain	Sv gain	Difference between TS and Sv gain settings
Previous value	27.0	26.6	0.40
New value	26.43 <sup>1</sup>	26.11	0.32
% change	-2.1%	-1.8%	

<sup>1</sup> Calculated using LOBE program

A small change in gain settings was anticipated due to modification of the TVG algorithm in the newly installed EK500 version 5.30 software.

The previous settings from calibration in September 1996 were used for the survey up to 7 September. The old and new transceiver settings are shown in Table 1 together with other relevant instrument settings. The 120 kHz sounder was not calibrated due to increasing tidal flow off Black Head, and previous settings were retained.

### Echo integration

The 38kHz echosounder was run continuously during the survey. Surveying was suspended overnight where plankton echoes caused problems with fish detection. The 120 kHz sounder was run from 10 September onwards. Data were captured using the EP-500 software and were backed up at intervals on digital audio tapes.

### Target identification and biological analysis

24 midwater trawl tows were completed for identification of acoustic targets. The trawl positions are shown on Figs. 2 and 3. Details of the tows are given in Table 2. Species compositions and length frequencies were recorded for each catch. A total of 497 herring were sampled for length, weight, age and maturity stage. Length - weight parameters were estimated for the main species caught (Table 3).

### Sea bird census

Seabird observations were made at 1-minute intervals on the transects to be used for fish abundance estimation. Counts were made of birds in flight and those on the water.

### Results

During the repeat survey, adult herring were found mainly in three areas: on or near the Douglas Bank spawning grounds off the east coast of the Isle of Man, inshore between Port Erin and Peel on the west coast of the Isle of Man, and in a layer on the seabed in 100m of water at the outer end of transect 32. Herring schools encountered inshore to the north of the Mull of Galloway during the first week of the survey were not observed in the second week. Sprat were abundant in water deeper than 40m off the west and south west of the Isle of Man, and inshore between the Solway Firth and the Mull of Galloway. As in previous surveys, the seabird census showed highest concentrations of auks and other piscivorous species in areas where sprat and small herring were abundant. Full details of the survey design and results will be available in technical reports from DANI and RSPB.

### ACKNOWLEDGEMENTS

The Ship's Master, Officers, Fishing Master, Engineers, Catering Staff and Crew are thanked for their cooperation and service during this cruise. The scientific staff are also acknowledged for their thorough work throughout the cruise.

Signed

SIC

*M. J. Armitage*

date: 25/9/97 Ships master

*[Signature]*

date:

15 1X 97

Head of  
Aquatic Sciences

*R. J. Heaney*

date:

29.9.97

Table 1 EK-500 instrument settings used during cruise LF3697

	1 - 7 Sept.	8 - 12 Sept.	10 - 12 Sept
Transducer	ES38B	ES38B	ES120-7
Frequency	38 kHz	38 kHz	120 kHz
<b>(1) TRANSCIVER MENU</b>			
Absorption coefficient	10 dB/km	10 dB/km	38 dB/km
Pulse length	Medium (1.0 ms)	Medium (1.0 ms)	Medium (0.3 ms)
Bandwidth	Wide	Wide	Wide
Max. power	2000 W	2000 W	1000 W
Angle sensitivity	21.9	21.9	21.0
2-way beam angle	-20.9 dB	-20.9 dB	-20.6 dB
Sv transducer gain	26.6 dB	26.11 dB	25.60 dB
TS transducer gain	27.0 dB	26.43 dB	25.80 dB
3 dB beamwidth Alongship	6.9 deg	6.83 deg	7.1 deg
3 dB beamwidth Athwartship	6.8 deg	6.88 deg	7.1 deg
Alongship offset	0.0 deg	-0.03 deg	0.0 deg
Athwartship offset	0.0 deg	0.10 deg	0.0 deg

New settings from calibration on 8 Sept.

<b>(2) OTHER SETTINGS</b>	
Operation menu:	Ping rate = 0.6 s ( 50m,100m, 150m range); 0.8 s (250m range) [25m range not used]
Log menu:	Mode = ping based Ping interval = 1495 (50, 100, 150m range); 1125 (250m range)
Layer menu:	Super-layer = 9 - 250 metres Layers: 6-9, 9-20, 20-50, 50-75, 75-100, 100-150, 150-250 metres
Printer / EP-500 settings:	Sv colour min. = -70 dB TS colour min. = -55 dB
TS detection menu: (both frequencies)	TS min. = -55 dB Min. echo length = 0.8 Max. echo length = 1.3 Max. gain compensation = 3.0 dB Max. phase deviation = 4.0 dB
Bottom detection menu:	Minimum level = -50 dB

Table 2 Details of trawl catches taken during cruise LF3697

tow	Date	Shooting details				Total catch kg	percentage composition by weight					Mean length (cm)	
		Time	Lat	Long	depth (m)		sprat	herring	mackerel	gadoids	other	sprat	herring
1	01-Sep	11h.12	54 21.6	4 4.7	31	82	38.9	60.9	0.1	0.1	0.0	11.5	13.3
2	02-Sep	7h.09	54 00.1	4 33.9	38	63	0.0	99.6	0.4	0.0	0.0		25.4
3		9h.25	54 00.6	4 21.1	45	1906	0.0	100.0	0.0	0.0	0.0		25.9
4	04-Sep	11h.54	54 09.3	4 57.0	79	37	90.1	7.5	1.6	0.7	0.0	6.3	12.4
5		13h.58	54 12.0	4 48.0	33	665	0.0	91.3	8.7	0.0	0.0		19.2
6		17h.17	54 16.1	4 55.4	85	106	80.7	16.5	1.4	1.4	0.0	8.5	16.8
7		22h.07	54 24.4	4 53.4	56	32	10.3	11.1	0.0	78.6	0.0	6.6	21.1
8	05-Sep	07h.25	54 44.8	5 02.7	46	10	79.2	6.2	14.5	0.1	0.0	7.9	13.0
9		10h.05	54 46.6	5 05.8	45	292	0.0	99.5	0.5	0.0	0.0		19.4
10		14h.15	54 45.0	5 31.3	77	162	40.3	0.7	0.3	58.6	0.0	9.9	12.3
11	07-Sep	07h.04	54 25.0	5 04.4	112	159	97.5	2.2	0.0	0.3	0.0	8.1	11.1
12		09h.37	54 23.3	5 22.3	43	260	98.3	1.6	0.1	0.0	0.0	8.2	15.9
13	09-Sep	20h.48	54 01.4	4 31.4	35	178	0.0	100.0	0.0	0.0	0.0		26.1
14	10-Sep	06h.23	53 49.5	4 56.9	90	33	86.8	5.9	6.8	0.4	0.0	6.2	11.3
15		09h.06	54 00.0	5 02.2	64	117	98.2	0.2	0.0	1.6	0.0	8.1	16.5
16		11h.43	53 48.1	5 07.3	70	53	7.5	3.3	0.3	89.0	0.0	6.2	15.4
17		15h.00	54 03.8	4 53.0	42	202	5.4	94.6	0.0	0.0	0.0	14.6	19.4
18		16h.58	54 08.0	4 50.6	38	1636	0.0	100.0	0.0	0.0	0.0		21.4
19		19h.19	54 11.9	4 51.0	56	359	96.1	3.1	0.8	0.0	0.0	10.9	14.2
20	11-Sep	07h.04	54 15.9	4 53.4	64	353	99.7	0.2	0.0	0.1	0.0	9.7	15.2
21		11h.50	54 23.8	4 56.5	93	890	0.0	99.4	0.0	0.6	0.0		21.5
22		13h.23	54 28.0	4 54.8	69	109	83.0	16.5	0.0	0.5	0.0	10.1	15.7
23		18h.44	54 43.0	4 01.7	28	24	95.7	4.1	0.0	0.0	0.2	8.3	11.7
24	12-Sep	04h.59	54 31.9	4 49.3	64	50	97.7	0.2	0.8	1.3	0.0	7.8	12.9

**Table 3** Length - weight parameters estimated during cruise LF3697  
(Lengths in cm; weights in g)

SPECIES	INTERCEPT	SLOPE	SAMPLE SIZE
Herring	0.00238	3.403	805
Sprat	0.00307	3.364	325
Anchovy	0.00280	3.295	19
Mackerel	0.00506	3.147	123
Haddock	0.01427	2.898	48
Whiting	0.00702	3.050	190
Norway Pout	0.00419	3.244	29
Poor cod	0.00260	3.549	12

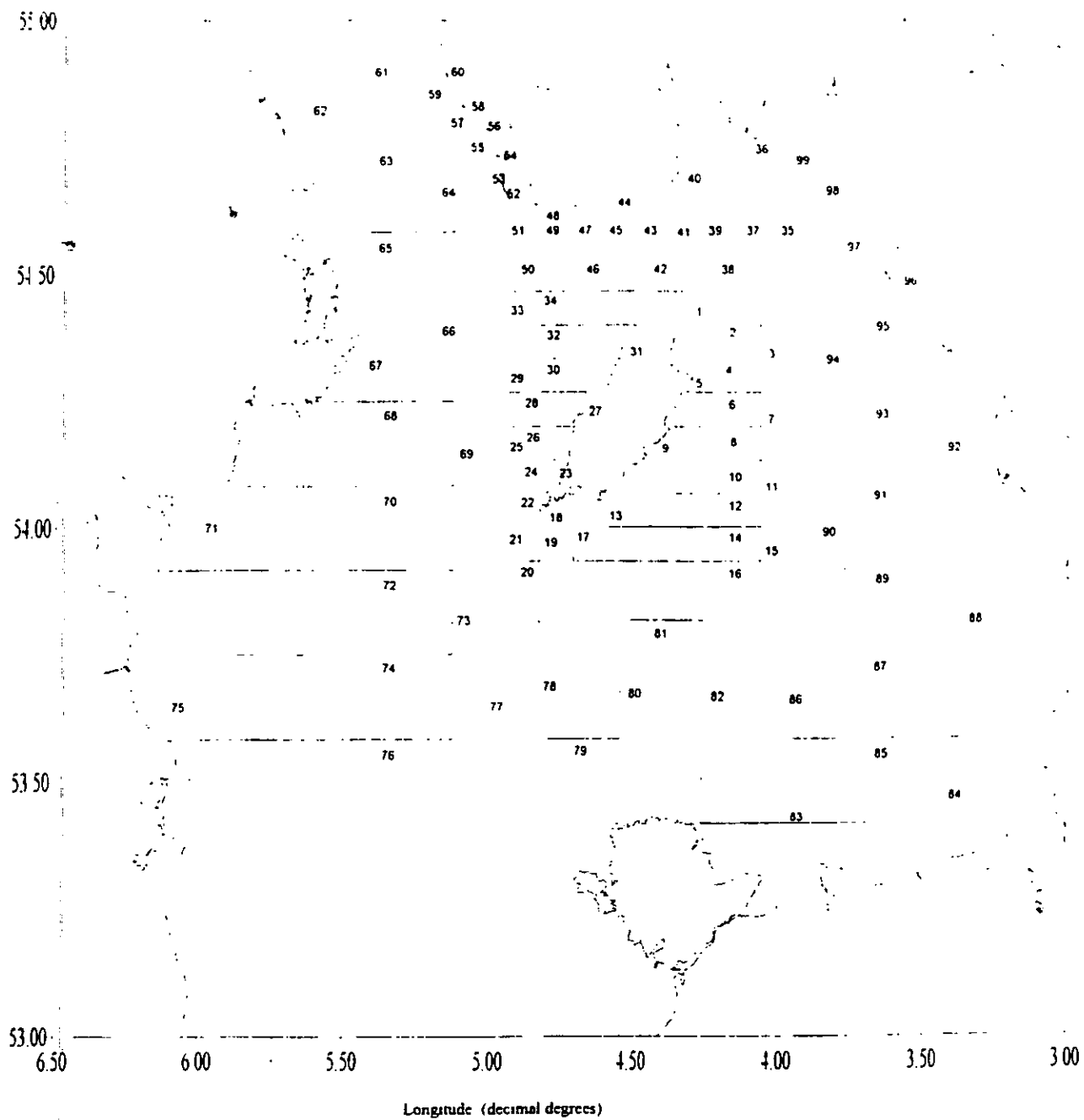


Fig. 1 Original transects plan for acoustic survey LF3697 (September 1997).

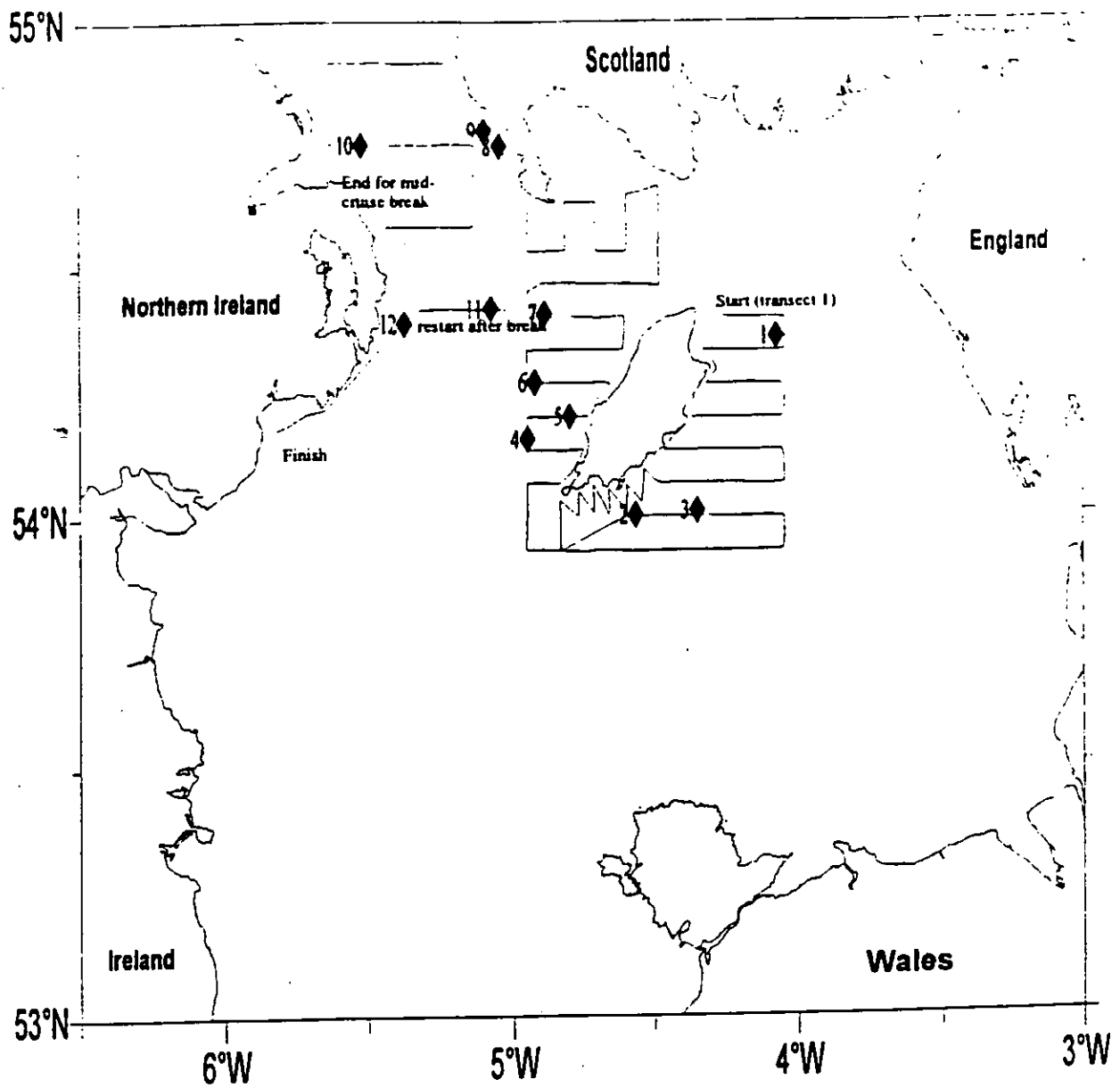


Fig 2 Cruise track for 1 - 7 September survey. Trawl positions are indicated by diamonds.



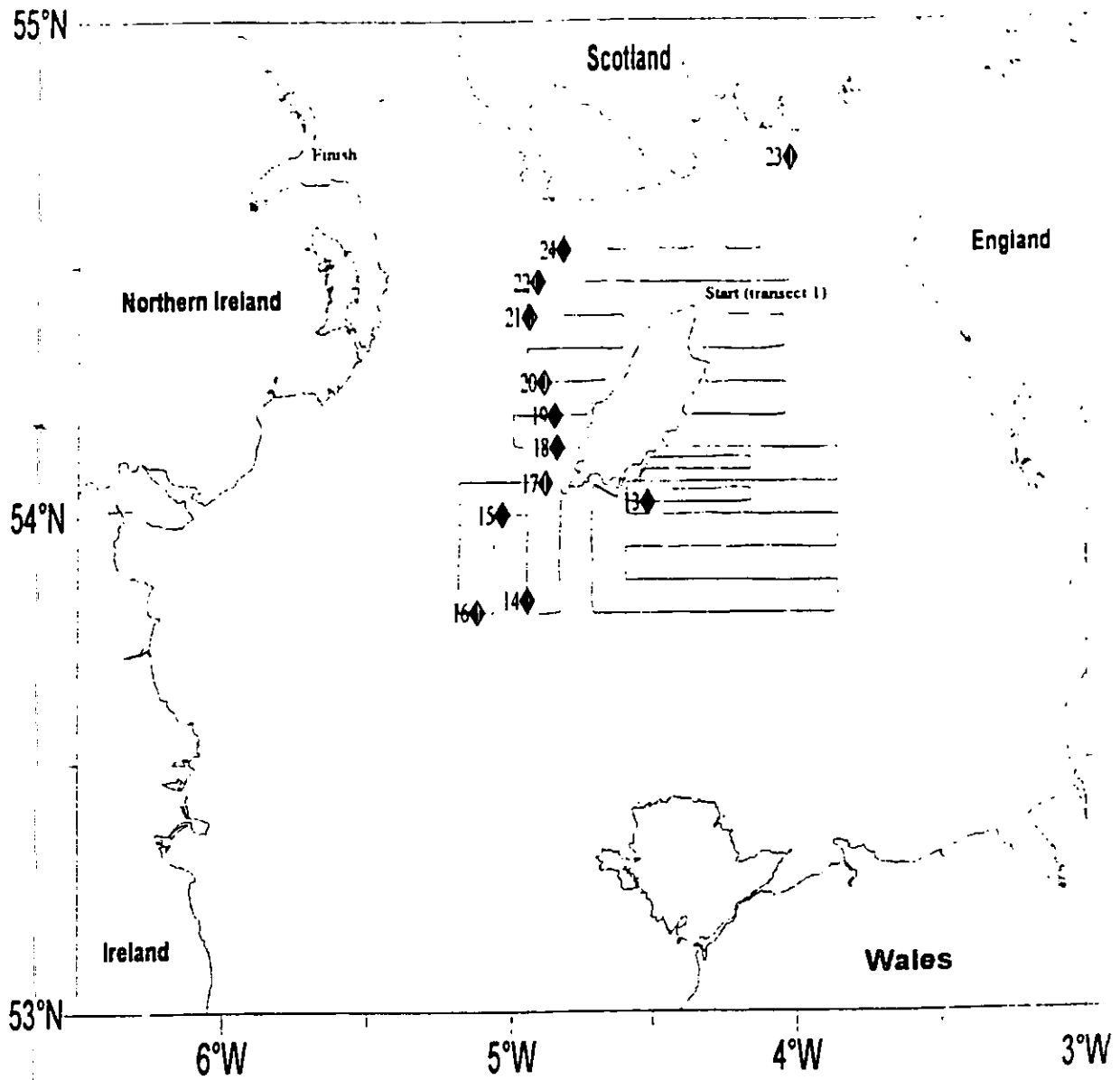


Fig. 3 Cruise track for re-survey from 8 - 12 September. Trawl positions are indicated by diamonds.