

DEPARTMENT OF AGRICULTURE FOR N. IRELAND
 AGRICULTURAL AND ENVIRONMENTAL SCIENCES DIVISION

CRUISE REPORT: CRUISE LF/22/94: PELAGIC FISH ACOUSTIC SURVEY

VESSEL: R.V. Lough Foyle (DANI)

DATES: 28 August - 8 September 1994

AREA OF OPERATION: Irish Sea (North); ICES Division VIIa

TYPE OF SURVEY: Acoustics / midwater trawling

PERSONNEL:	M. Armstrong	SSO	(DANI; S.I.C.)
	P. Fernandes		(DOM)
	M. Dickey-Collas	HSO	(DANI)
	M. McAliskey	SO	(DANI)
	C. Burns	ASO	(DANI)
	M. O'Neill		(BIM)
	D. Steele		(RSPB)

OBJECTIVES

1. To estimate the biomass and age-composition of the mixed Manx and Mourne stocks of herring in the northern Irish Sea;
2. To determine the distribution and biomass of sprat;
3. To examine the distribution and abundance of seabirds and marine mammals along the survey track;
4. To further improve acoustic survey methods on Lough Foyle.

METHODS

The survey was carried out in conjunction with the Department of the Marine who supplied the Simrad echosounder, towed body and integration software as well as Dr Fernandes who operated the system and collaborated on survey design and data analysis.

A sphere-calibrated Simrad EK-500 echosounder and 38-kHz split-beam transducer mounted in a towed body were employed to carry out echo integrations along transects in the Northern Irish Sea (Fig. 1). Calibrations were carried out at the commencement of the cruise. The survey grid was stratified to allow increased sampling intensity around the Isle of Man where highest densities of adult herring were expected. Acoustic targets were identified by means of aimed tows of an IC Trawls 12 x 8 fathom midwater trawl fitted with a 10-mm sprat brailer 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.

CRUISE NARRATIVE

Sunday 28 August

New scientists were given a safety demonstration by Mr Woods. Contamination of gearbox oil by water from the cooling system necessitated draining and replacing the oil. Departure was delayed from 21h.00 to 00h.30 as a result.

Monday 29 August 1994

Departed 00h.30. The towed body was deployed at 01h.40, to the SW of Black Head. Transects 1-8 were completed in good conditions. Four trawls were carried out. Conditions were calm by evening allowing calibrations to be carried in Dundrum Bay.

Tuesday 30 August

Transects 9-12 were surveyed in daylight in slight seas. Trawls 5-8 sampled mixed sprat/herring schools. On completion of transect 12 the vessel proceeded to an area about 20 miles off Clogher head to carry out MIK net sampling and echo integration on scattering layers of euphausiids.

Wednesday 31 August

MIK net tows were completed. The acoustic survey proper recommenced at the start of transect 13 at 06h.05, reaching about the midpoint of transect 17 by midnight. Sea conditions were slight to moderate. Trawls 9 and 10 on schools in the lower water column caught mixtures of sprat and juvenile herring.

Thursday 1 September

The survey proceeded from transect 7 to a point inshore between transects 24 and 25 off the Cumbrian coast. Rough sea conditions moderated during the day. Some herring schools were recorded at the end of transect 21; a small number of adult herring were taken in trawl 11. Trawl 12, shot on a diffuse fish aggregation amongst plankton, caught a mixture of sprats and gadoids.

Friday 2 September

The survey proceeded in calm seas from transect 24/25 to transect 37 (off Douglas) by midnight. Trawls 13 and 14 caught sprats etc. Frying marks were seen at the start of transect 30 and midway along 35, and a small number of adult herring were taken in Trawl 15.

Saturday 3 September

The Douglas Bank area was surveyed in slight to moderate sea conditions. Trawls 16 and 17 took adult herring. The survey was broken at 16h.00 for the mid-cruise break in Douglas.

Sunday 4 September

The vessel departed Douglas at 9h.08 and resumed the survey on transect 43 at 11h.00. Transect 53 (off Port Erin) was reached by midnight. Sea conditions were initially rough, moderating by the evening. Trawl 18 caught a mixture of small herring and sprat. A fault in the CTD after the system was restarted in the morning was not detected until the evening resulting in the loss of data over a few transects.

Monday 5 September

The survey proceeded from transect 53 to 60b. A catch of herring was taken off Elby Point (trawl 19). Trawl 20 off Peel failed to catch a strong herring school; trawls 21-23 on offshore marks caught mixtures of sprat and juvenile herring. A number of strong herring targets were observed in 30-40m off Jurby, and it was decided to break the survey at the end of transect 63 and re-survey the area at night on 5 additional transects (63b-59b) to facilitate trawling. However, no significant herring targets were observed.

Tuesday 6 September

Work commenced on transect 60b in rough sea conditions. The survey proper recommenced on transect 64 at 4h.35. Herring aggregations were observed and successfully sampled (Trawl 24) in about 90 m of water at the ends of transects 64 and 65. A strong herring mark was recorded farther north between transects 71 and 72, near the "Peaks". The area at the extremities of transects 64 and 65, where strong herring marks were observed during the morning, was resurveyed after dark on an intensive grid comprising 2-mile transects at 1-mile spacing. However, there was no evidence of herring.

Wednesday 7 September

The coast of the Mull of Galloway was surveyed to 54° 58'N on a zig-zag grid. However, no marks were observed. The vessel then proceeded westwards to the Co. Antrim coast. Trawls 25 and 26 caught juvenile herring and sprat inshore of the Maidens and SE of the Copeland Islands. Five transects were surveyed, finishing off the Ards Peninsula at 21h.08. The vessel then returned to Belfast.

WORK COMPLETEDCalibration

The EK-500 system was calibrated in Dundrum Bay on 29 August. Details are given in Table 1. A 7% correction to transducer gain settings was made compared to the previous calibration of the system made during the West of Ireland herring survey earlier in the summer.

Echo integration

The echosounder and EP-500 software were run continuously during the survey at the settings given in Table 1. Data were backed up on digital audio tapes at intervals.

Target identification

Twenty five successful midwater trawl tows were completed for identification of acoustic targets. The trawl positions are shown on Figure 1. Details of the tows are given in Table 2.

Seabird observations

Distribution and abundance of seabird species was recorded at intervals during daylight hours along each transect. Observations were carried out for approximately 9 hours each day.

Oceanographic data

The CTD was operated continuously to monitor sea surface temperature from the ship's seawater intake.

RESULTS

The EK-500 and towed transducer provided stable, high-resolution images of back-scatter throughout the water column and continuous recording of integration data in user-specified depth channels. Data were also logged using the EP-500 software allowing post-processing where necessary. Analysis of the data will provide estimates of biomass for both herring and sprat. The estimate for herring will be used in the annual stock assessments carried out by ICES.

Herring schools were recorded in a general line from the "Peaks" (south of the Mull of Galloway) to Peel on the Manx West Coast, off the NE coast of the IOM, on the Douglas Bank, and between the Douglas Bank and Liverpool Bay. Relocation of day-time herring schools proved difficult during trawling operations, the schools clearly avoiding both the ship and the net. Sprats and juvenile herring were widely distributed off the Irish coast, the Manx West Coast, the Cumbrian coast and the Solway Firth. Abundances of seabirds were higher in the western Irish Sea than in the eastern Irish Sea.

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 dedicated hard work. Particular thanks are extended to the Department of the Marine for supplying the echosounding equipment, and to Dr Fernandes for operating and calibrating the system.

Signed:

Scientist in charge..... *M. J. Anthony* date..... *8 September 1994*
Ships master..... *A. W. Blot* date..... *8 September 1994*
Section Division Head..... *S. J. Honey* date..... *12.9.94*

TRANSCIEVER 1 MENU:

Absorption coefficient: 10 dB km-1
Pulse length: Medium (1ms)
Bandwidth: Auto
Maximum Power: 2000W
Angle sensitivity: 21.9
2-way beam angle: -21.1 dB
Sv Transducer gain: 27.6 dB [Precalibration : 27.3 dB]
TS Transducer gain: 26.9 dB [Precalibration : 26.8 dB]
[Calibration correction factor = 1.072]
3 dB beamwidth: 6.7 degrees

LOG MENU:

Interval: 2.5 n.miles
Simulator speed: 10 knots

OPERATION MENU:

Ping interval: 25m range..... 0.3 s
50m range..... 0.5 s
100m range..... 0.8 s
250m range..... 1.5 s

DISPLAY AND PRINTER MENUS:

TVG: 20 log R
Integration line: 100
TS Colour min. -50 dB
Sv Colour min. -70 dB

Catches of selected species in midwater trawls during cruise LF2294.

Catch positions are also shown in Figure 1. Total catches (in kg) and mean lengths are given.

No.	Date	Shooting posn.		Time (BST)	Sound- ing(m)	Sprat		Herring		Mackerel		Scad		Gadoids	
		Lat.	Long.			Kg.	L (cm)	Kg.	L (cm)	Kg.	L (cm)	Kg.	L (cm)	Kg.	L (cm)
1	29 Aug.	54 45.2	5 37.0	03h.00	40	104.5	6.2	+	14.3	.2	29.3			66.2	21.6
2		54 18.8	5 16.5	09h.42	70	16.9	6.8	47.4	8.7	.5	27.8			1.9	8.7
3		54 11.5	5 39.1	13h.29	30	788.0	9.7	1.1	8.1	1.2	28.1			.9	25.3
4		54 04.7	5 38.0	19h.02	50	35.5	6.0	.4	8.8	2.7	26.9				
5	30 Aug.	53 57.9	5 39.8	06h.46	70	103.0	9.3	31.8	8.7	32.9	26.9			5.0	8.9
6		53 44.3	6 01.1	14h.00	30	164.0	7.4			5.2	26.8				
7		53 36.7	5 46.9	19h.07	70	15.3	6.5	4.9	9.0	10.8	26.8			1.1	9.4
8		53 36.9	5 59.7	21h.29	35	177.0	5.9							8.6	10.8
9	31 Aug.	53 42.8	5 19.6	10h.27	85	8.8	6.0	7.3	8.0	.6	26.5			3.4	10.9
10		53 56.6	5 05.6	15h.07	70	105.0	9.2	.5	18.6	.6	26.8			.8	15.5
11	1 Sept.	54 01.4	3 59.6	14h.05	45			.9	22.8	125.0	26.2				
12		54 17.9	3 56.5	21h.20	30	22.4	11.9	3.5	13.6	3.1	26.5			6.7	13.2
13	2 Sept.	54 20.5	3 31.3	00h.30	20	9.0	7.6	1.1	12.5	3.6	31.3			11.6	14.2
14		54 39.0	3 51.3	06h.25	25	117.0	11.2	7.9	11.4	1.1	32.4	.2	29.3	.3	22.6
15		54 13.5	4 06.0	20h.10	30			1.2	23.3	55.4	27.1	6.5	25.4		
16	3 Sept.	54 05.3	4 32.0	03h.37	30			1085.0	26.0	4.8	26.8				
17		54 03.6	4 17.0	07h.46	40			27.9	23.7	.2	26.8				
18	4 Sept.	54 05.1	4 58.7	23h.00	65	1.7	9.7	17.5	15.4	3.3	30.9			2.2	10.5
19	5 Sept.	54 09.0	4 47.9	02h.40	30			128.0	20.2					.4	9.3
20		54 15.0	4 45.0	06h.55	20	(No catch)									
21		54 14.9	4 56.6	08h.04	85	32.3	6.8	25.5	10.0			6.0	36.7		
22		54 19.0	4 51.3	12h.22	50	458.0	11.1	5.7	11.6						
23		54 23.0	4 59.3	17h.23	140	28.1	6.7	41.3	9.7						
24	6 Sept.	54 26.2	4 57.5	07h.17	100	5.3	7.8	1960.0	24.3			9.0	29.2	50.0	12.7
25	7 Sept.	54 56.0	5 51.6	09h.25	40	1.5	11.8	32.6	11.5						
26		54 38.6	5 23.3	17h.09	75	3.8	7.3	11.8	9.7	.3	26.0			.3	12.1

Soundings to nearest 5 m.

+ Catch < 0.1 kg

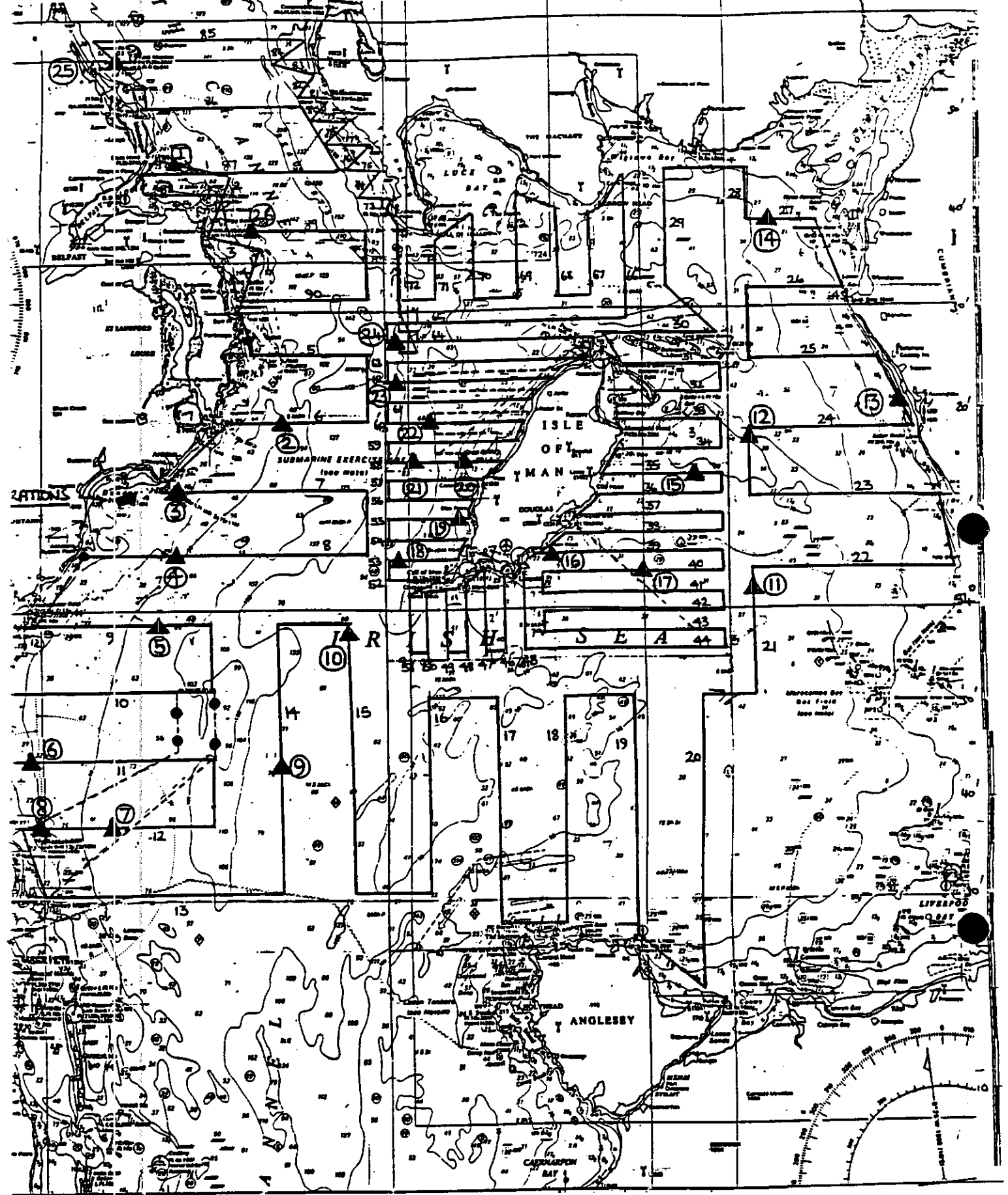


Fig. 1 Cruise track of acoustic survey LF2294. Triangles indicate position of midwater trawl tows. Circles show position of Methot-Isaacs Kidd frame trawl tows.