

In Confidence: Not to be quoted without prior reference to the Laboratory

FRV 'Explorer'

Cruise 1/83

Report 10-28 January 1983

1ER83

Objectives:

- 1) To carry out an echo integrator survey for sprats in the Western North Sea, between the Moray Firth and Flamborough Head.
- 2) To identify the echo traces using midwater trawl PT 154 (Young Gadoid Trawl) and Isaac Kidd midwater trawl.

General:

'Explorer' sailed from Aberdeen at 13.00 on 10 January and sailed directly to St Andrews Bay where the acoustic equipment was calibrated. Unfortunately poor weather conditions prevented an accurate calibration; however, a constant of 25 tonnes per km² was calculated from the data available.

The acoustic survey started at 08.10 on 11 January. Gale force winds prevented a normal east-west survey pattern and forced a grid pattern running parallel to the coast. 'Explorer' returned to Aberdeen at 09.00 on 13 January to collect a spare net for the Isaac Kidd. The survey resumed at 11.30. Radio contact was made with RV 'Clione' at 09.05 on 14 and 15 January with the intention of organising an intercalibration. However, no concentrations of fish were located and this, combined with poor weather prevented an intercalibration taking place. On 16 Jan very severe gales stopped work in open water and 'Explorer' anchored in Kirkcaldy Bay. An acoustic calibration was attempted but was not successful. 'Explorer' remained at anchor throughout 17 January and at approximately mid-day a maximum wind speed of 63 knots was recorded. 'Explorer' resumed the survey at 09.30 on 18 January but gale force winds prevented the ship from working more than 10 miles from the land. 'Explorer' docked at 03.00 on 19 January for the half landing.

The second half of the survey started at 10.00 on 20 January surveying inshore waters north of Aberdeen and in the Moray Firth, anchoring in the Dornoch Firth for a further calibration on 22 January. The survey continued with attempts to cover off-shore areas. Unfortunately, these attempts were curtailed by gale force south to south westerly winds. 'Explorer' anchored in St Andrews Bay at 15.45 on 26 January for a final calibration. 'Explorer' docked at 17.00 on 27 January with an incomplete survey grid, poor weather conditions and a poor forecast.

Results:

The cruise track (Fig 1) is attached along with a contour diagram (Fig 2) which describes the distribution of integration densities and (Fig 3) which summarises the sprat biomass estimating by half statistical rectangle. The Isaac Kidd trawls did not contain plankton and so the biomasses have been allocated on the basis of the midwater trawls. Tables 1 and 2 detail the acoustic densities and the details of the eight trawl hauls respectively. Mid-water trawl PT 154 fitted with a 10 mm codend was used and the contents of the eight samples are detailed below.

Haul E83/4 shot off Nairn (44E6) contained herring of modal length 11 cm, sprat with a modal length of 7.5 cm and whiting with a modal length of 15 cm. The second haul in the Moray Firth E83/5 off Fraserburgh (44E7b) contained haddock, whiting and an assortment of flat fish. Trawl E83/3 off Aberdeenshire (43E8) contained herring and sprat with modal lengths of 11 cm and 7 cm respectively. Haul E83/8 off Troop Head contained sprat and herring with modal lengths of 5 cm and 11 cm respectively and a few small whiting. Haul E83/6 off Montrose (42E7) contained sprats of modal length 5 cm with an assortment of flat fish and a few whiting. Trawl haul E83/7 taken south west of Bell Rock is probably invalid as a small hole appeared in the codend during the haul. Haul E83/2 shot in the Firth of Forth (41E7) contained sprats with a modal length of 4.5 cm.

Four samples were taken with the Isaac Kidd trawl at the positions of midwater hauls 2, 3, 4 and 5. All samples were preserved in formalin for further analysis.

Of the four calibrations, two yielded results with a standard deviation of less than 5%. The constants calculated from these calibrations were 30.88 and 30.45 tonnes per km² respectively, based on a tungsten carbide target (T.S. -42.36 dB number 21), transducer number 3 with an equivalent beam angle of -16.9 dB, cable number 52/1 and a target strength for sprats of -34 dB/kg.

Conclusion:

Pelagic fish traces were scarce and echo integrator readings low. The clupeoid stock observed is the smallest recorded in the current series of surveys (which started in 1976). The persistent gale force winds prevented the completion of the survey grid, but the areas in which high concentrations have previously been found were adequately covered.

J I Edwards
10 Feb 1983

Seen in draft W Findlay

TABLE 1 ESTIMATES OF BIOMASS (referred to -34dB/kg) of sprats and herring

SW Corner of rectangle		No of 15 min Integrator Readings	Sea Area of Rectangle (km ²)	Trawl Haul Used for Species Allocation	Total Biomass + x 10 ³ tonnes (all species)	SPRAT		Total	HERRING
Lat	Long					1-group	2-group		
58°00	4°00W	3	162	4	0.19	0.19	0	0.10	0.08
"	3°30'W	7	1055	4	1.54	0.54	0	0.77	0.62
"	3°00'W	6	1624	4	1.45	1.45	0	0.73	0.58
57°30'N	4°00'W	44	823	4	2.01	2.01	0	1.01	0.80
"	3°30'W	44	988	4	4.30	4.30	0	2.51	1.71
"	3°00'W	47	988	4	1.49	1.49	0	0.75	0.59
"	2°30'W	49	988	5	1.50	0	0	0	0
"	2°00'W	31	1317	5	1.41	0	0	0	0
"	1°30'W	5	1647	5	7.63	0	0	0	0
57°00'N	2°30'W	6	167	3	0.16	0.16	0	0.06	0.06
"	2°00'W	49	1419	3	2.06	2.06	0	0.72	0.79
"	1°30'W	15	1670	3	3.68	3.68	0	1.29	1.42
56°30'N	2°30'W	45	1269	6, 8	1.20	1.20	0	0.22	0.35
"	2°00'W	14	1693	6, 8 mean of	1.68	1.68	0	0.37	0.49
"	1°30'W	6	1693	6, 8	1.46	1.46	0	0.32	0.43
"	1°00'W	20	1693	6, 8	2.81	2.81	0	0.61	0.82
56°00'N	3°30'W	5	171	2	0.09	0.09	0	0.09	0.03
"	3°00'W	47	771	7	1.21	1.21	0	1.21	0
"	2°30'W	60	1715	7	1.28	1.28	0	1.28	0
"	2°00'W	13	1715	7	1.66	1.66	0	1.66	0
"	1°30'W	9	1715	7	2.33	2.33	0	2.33	0
"	1°00'W	4	1715	7	2.21	2.21	0	2.21	0
"	0°30'W	10	1715	7	1.11	1.11	0	1.11	0
55°30'N	2°30'W	4	260	1	0.38	0.38	0	0.18	0.20
"	2°00'W	47	1303	1	4.25	4.25	0	2.04	2.21
"	1°30'W	28	1737	1	2.25	2.25	0	1.08	1.17
"	1°00'W	6	1737	1	1.78	1.78	0	0.85	0.93
"	0°00'W	2	1737	1	1.60	1.60	0	0.77	0.83
55°00'N	2°00'W	3	176	1	0.46	0.46	0	0.22	0.24
"	1°30'W	35	1672	1	1.99	1.99	0	0.95	1.04
"	1°00'W	21	1760	1	1.37	1.37	0	0.66	0.71
"	0°30'W	21	1760	1	2.82	2.82	0	1.35	1.47
"	0°00'W	4	1760	1	2.75	2.75	0	1.32	1.43
54°30'N	1°30'W	29	713	1	0.86	0.86	0	0.41	0.45
"	1°00'W	56	1603	1	1.68	1.68	0	0.80	0.88
"	0°30'W	16	1782	1	1.04	1.04	0	0.50	0.54
54°00'N	0°30'W	55	1082	1	0.81	0.81	0	0.39	0.42
"	0°00'W	17	1804	1	1.84	1.84	0	0.88	0.92
Total								31.75	22.21

TABLE 2 DETAILS OF TRAWL HAULS EXPLORER JANUARY 1983

Haul No	Date	Shooting Position	Sprats Number	Weight	As of Total	Herring Number	Weight	As % of total	Other Species Weight (%)
1	11.1.83	55°33'N 1°33'W	233389	188254	47.9	17180	204752	52.09	0.01
2	16.1.83	56°06'N 2°47'W	6045	3155	99.59	1	12.72	0.4	0.01
3	20.1.83	57°15'N 1°52'W	8244	17917	35.17	2244	19625	38.53	26.29
4	22.1.83	57°38.8'N 3°49.9'W	20800	61845	50.01	5720	49012	39.7	10.1
5	23.1.83	57°58'N 2°02'W	0	0	0	0	0	0	100
6	26.1.83	56°40'N 2°20'W	835	598	15.7	2	15.84	0.4	83.9
7	26.1.83	56°24.2'N 2°29.7'W	5	* Small Hole in Codend					
8	27.1.83	56°48.9'N 2°12.4'W	4775	3859	28	930	8029	58.3	13.7

Fig. 1 'Explorer' 10-28 Jan 83
Cruise Track and Position of Trawl Hauls

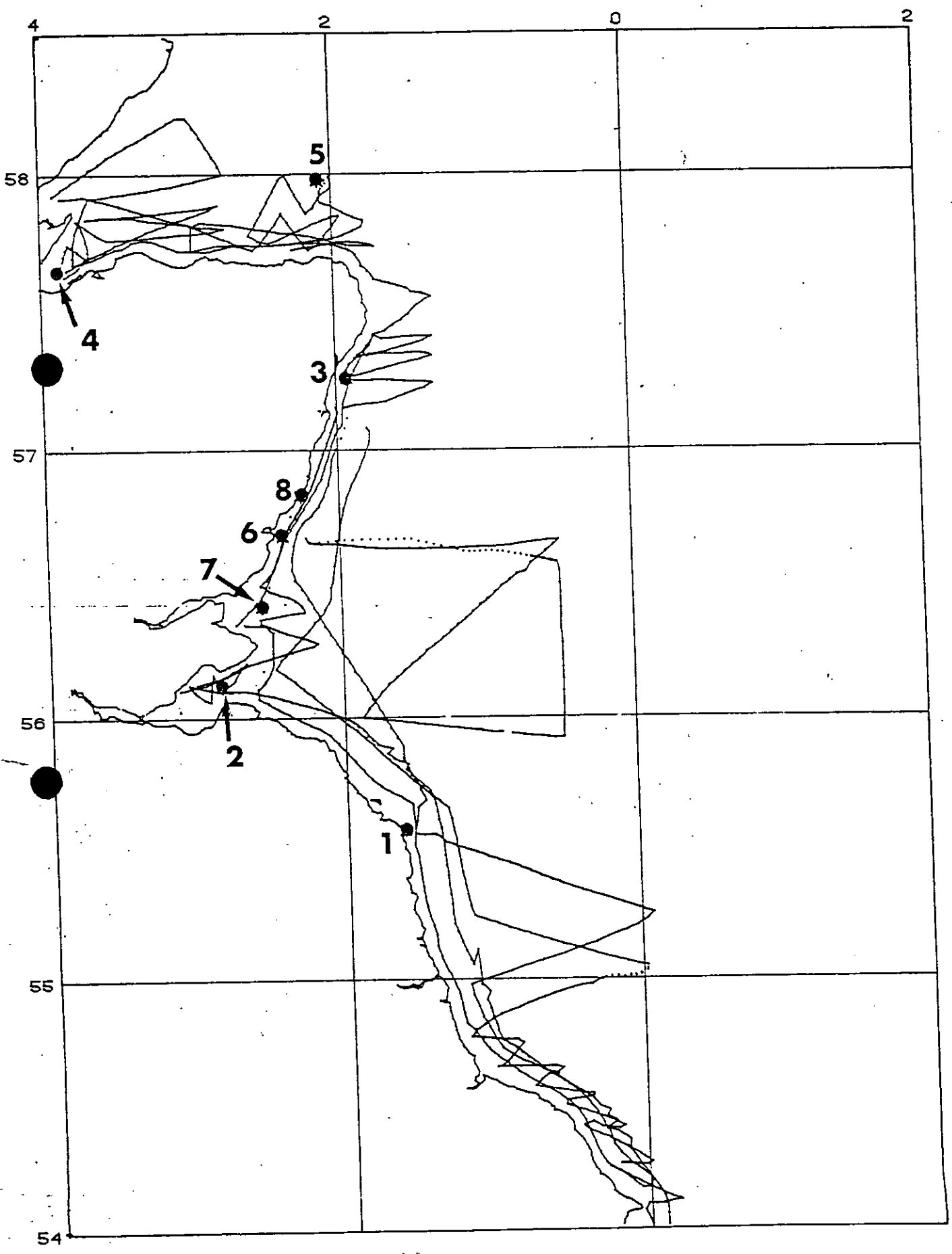


Fig. 2 Distribution of Biomass Based on -34 dB/kg

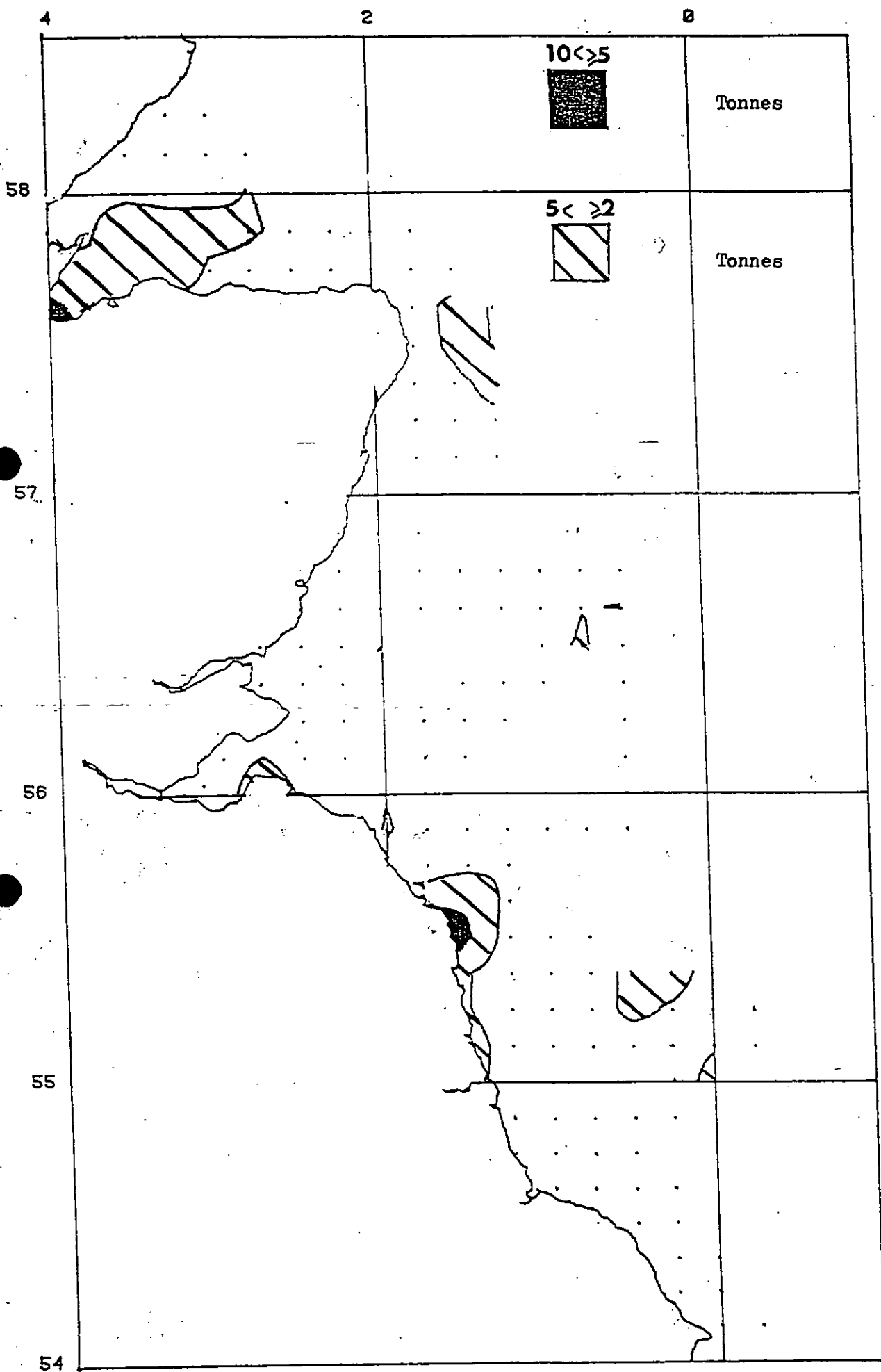


Fig. 3 Sprat and Herring Biomass Estimates (,000 tonnes) of all age groups (based on -34dB/kg)

