

CRUISE REPORT: LF/37/98: PELAGIC FISH ACOUSTIC SURVEY

VESSEL: R.V. *Lough Foyle* (DANI) **DATES:** 7 - 18 September 1998

AREA OF OPERATION: Irish Sea ; ICES Division VIIa

TYPE OF SURVEY: Acoustics / midwater trawling

PERSONNEL:	M. Armstrong	(DANI; S.I.C.)
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OBJECTIVES

1. To estimate the biomass and population structure of herring and sprat
2. To quantify food selection and intake of sprat and juvenile herring

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. 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 fish species contributing significantly to the acoustic integrals. Samples of sprat and juvenile herring were frozen for diet analysis. Surface temperature and salinity were measured by the thermosalinograph and logged on computer at 5-minute intervals together with position.

CRUISE NARRATIVE

Due to strong winds, vessel departure was delayed until 08h.00 on Tuesday 8 September. The survey commenced off the southern Ards Peninsula at mid-day and proceeded southwards, stopping overnight off Dundalk Bay because of heavy plankton echoes obscuring fish echoes during darkness. The survey recommenced at dawn on 9 September and continued to transect 15 north of Anglesey. Due to heavy seas and strong NW winds, the survey was terminated part way along this transect and restarted in more sheltered conditions NE of the Isle of Man. The area off the east coast of the Isle of Man was surveyed from 14h.45 on 10 September to 11h.10 on 11 September, finishing at Port St Mary Bay. The vessel lay at anchor north of Port St Mary until early evening, at which point an intensive night-time survey of the Douglas Bank spawning grounds was carried out. This was completed at approximately 10h.00. The vessel then berthed in

Douglas Harbour at 12h.00 for the mid-cruise break, departing again at 13h.00 on 13 September. The survey resumed at Port St Mary Bay at 15h.00 and continued northwards along the west coast of the Isle of Man and then across to the Solway Firth and southwards along the English coast, stopping during the hours of darkness. The grid was broken at 20h.20 on 15 September off Morecambe Bay, at which point the vessel was moved to more sheltered conditions off the SE of the Isle of Man. No work was possible on 16 September because of NW gales, and the vessel remained at anchor in Ramsey Bay. The survey resumed north of the Point of Ayr (IOM) at 7h.07 on 17 September, and proceeded along the Mull of Galloway coast and down the North Channel. The vessel was then anchored overnight in Bangor Bay. A calibration exercise was carried out off Black Head during the morning of 18 September. The vessel then returned to Belfast, berthing during early afternoon.

WORK COMPLETED

Echo sounder calibration

No calibrations were carried out at the start of the survey because of rough sea conditions. The transceiver settings from the previous survey were retained and are shown in Table 1 together with other relevant instrument settings. The calibration on 18 September was carried out in poor conditions. A suspected drop in sensitivity of the 38 kHz system noted whilst surveying down the English coast was confirmed during calibration. The gain settings for the 120 kHz system could not be calibrated with sufficient accuracy but indicated similar values to previous calibrations. As a result of the 38 kHz error, estimates of abundance for the English Coast and North Channel will have to be obtained from the 120 kHz data.

Echo integration

The large-scale survey grid and the transects for the night-time survey of the Douglas Bank are shown in Figures 1 and 2. The 38kHz and 120 kHz echosounders were run continuously during the survey. Surveying was suspended overnight where plankton echoes caused problems with fish detection or where the fish had risen above the level of the transducers. Data were captured using the EP-500 software and were backed up at daily on duplicate digital audio tapes.

Target identification and biological analysis

Twenty seven midwater trawl tows were completed for identification of acoustic targets (Fig. 1 and Table 2). Species compositions and length frequencies were recorded for each catch. Up to 50 herring were sampled from each catch for length, weight, age and maturity. Additional herring were sampled together with individuals of other common species for estimation of length - weight parameters (Table 3).

Results

Adult herring were found on or near the Douglas Bank spawning grounds off the east coast of the Isle of Man (Fig. 2), inshore near Peel on the west coast of the Isle of Man and offshore northwest of the Isle of Man. Sprat were abundant inshore between Dundrum Bay and Dundalk Bay, in water of 50 - 80m off the west coast of the Isle of Man, and in the area off Cumbria, the Solway Firth and the NE coast of the Isle of Man. Sprat were also found off the Mull of Galloway, near the Douglas Bank and in Liverpool Bay.

Surface temperatures were coolest in the North Channel and warmest in the eastern Irish Sea, particularly off the NE coast of the Isle of Man (Fig.3). Highest surface salinities were recorded in the central Irish Sea and North Channel.

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. Arron

date: 11/9/98

Ships master

J. A. Hughes

date: 18/8/98.

Head of

Aquatic Sciences

S. J. Henry

date:

6. 11. 98

Table 1 EK-500 instrument settings used during cruise LF3798

Transducer	ES38B	ES120-7
Frequency	38 kHz	120 kHz
(1) TRANSCIVER MENU	Serial N° 26535	Serial N° 26252
Absorption coefficient	10 dB/km	38 dB/km
Pulse length	Medium (1.0 ms)	Medium (0.3 ms)
Bandwidth	Wide	Wide
Max. power	2000 W	1000 W
Angle sensitivity	21.9	21.0
2-way beam angle	-20.9 dB	-20.6 dB
Sv transducer gain	26.11 dB	25.60 dB
TS transducer gain	26.43 dB	25.80 dB
3 dB beamwidth Alongship	6.83 deg	7.1 deg
3 dB beamwidth Athwartship	6.88 deg	7.1 deg
Alongship offset	-0.03 deg	0.0 deg
Athwartship offset	0.10 deg	0.0 deg

(2) OTHER SETTINGS	
Operation menu:	Ping rate = 0.6 s (50m,100m range); 0.8 s (150m, 250m range) [25m range not used]
Log menu:	Mode = ping based Ping interval = 1480 (50, 100); 1115 (150, 250m range)
Layer menu:	Super-layer = 11 - 250 metres Layers: 8-11, 11-25, 25-50, 50-75, 75-100, 100-150, 150-200, 200-250
Printer / EP-500 settings:	Sv colour min. = -70 dB TS colour min. = -60 dB
TS detection menu: (both frequencies)	TS min. = -60 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 = -45 dB

Table 2 Details of trawl catches taken during cruise LF3798

Tow	Date	Shooting details						Total catch kg.	percentage composition by weight					Mean length	
		Time	Lat.	Long.	depth (m)		sprat		herring	mackerel	goodeids	other	sprat	herring	
1	08-Sep	13h.07	54	27.0	5	8.2	110	26	93.9	3.2	0.5	0.1	2.2	6.9	11.7
2	08-Sep	16h.52	54	18.3	5	16.2	84	259	99.3	0.7	0.0	0.0	0.0	7.1	10.7
3	09-Sep	7h.05	54	2.7	5	50.1	32	77	84.2	14.4	0.8	0.7	0.0	6.8	16.1
4	09-Sep	9h.08	53	57.7	5	39.1	73	340	98.2	1.3	0.5	0.0	0.0	7.3	10.3
5	09-Sep	13h.38	53	48.0	5	11.7	69	0	0.0	0.0	0.0	0.0	0.0		
6	09-Sep	15h.19	53	48.0	5	17.5	72	16	95.7	2.3	1.3	0.0	0.8	6.2	11.6
7	09-Sep	21h.20	53	37.8	5	57.8	32	62	57.3	0.5	0.0	38.9	3.4	4.9	8.7
8	10-Sep	6h.15	53	51.0	4	19.4	59	22	62.3	4.9	31.9	0.7	0.2	6.3	20.8
9	10-Sep	15h.35	54	28.9	4	10.0	53	34	92.0	1.2	4.4	0.3	2.1	7.1	14.1
10	10-Sep	23h.16	54	10.2	4	23.6	28	102	0.0	93.0	7.0	0.0	0.0		24.6
11	11-Sep	21h.20	54	5.3	4	31.7	28	234	0.0	99.2	0.7	0.0	0.1		26.4
12	11-Sep	23h.35	54	8.0	4	25.6	30	277	0.0	100.0	0.0	0.0	0.0		26.2
13	12-Sep	2h.28	54	8.1	4	22.9	32	1119	0.0	99.3	0.6	0.0	0.1		26.4
14	12-Sep	4h.59	54	8.3	4	20.3	37	72	82.2	4.1	13.7	0.0	0.0	6.2	26.8
15	13-Sep	17h.05	54	0.8	4	57.0	52	76	90.8	3.8	0.7	4.7	0.0	7.5	11.9
16	13-Sep	20h.06	54	10.5	4	57.1	78	35	88.1	8.2	0.0	3.6	0.0	7.5	11.1
17	13-Sep	23h.22	54	12.0	4	48.2	30	928	0.0	100.0	0.0	0.0	0.0		21.7
18	14-Sep	8h.08	54	21.5	4	53.8	75	153	71.0	2.3	0.4	26.2	0.0	8.3	12.6
19	14-Sep	13h.42	54	27.5	4	57.4	92	664	5.4	40.5	3.0	51.2	0.0	7.6	22.3
20	14-Sep	20h.25	54	39.9	3	57.2	35	79	65.6	22.4	9.9	2.1	0.0	10.3	13.4
21	15-Sep	09h.00	54	29.5	3	40.3	24	127	97.0	0.8	0.1	1.0	1.1	6.2	11.1
22	15-Sep	11h.05	54	21.6	3	51.8	41	232	99.8	0.0	0.1	0.0	0.0	7.9	21.8
23	15-Sep	19h.34	53	53.5	3	23.4	22	100	46.7	2.2	1.1	50.0	0.0	6.6	13.7
24	17-Sep	09h.40	54	35.1	4	51.9	63	264	99.5	0.2	0.3	0.0	0.0	7.5	12.4
25	17-Sep	11h.25	54	43.3	4	58.8	21	25	91.8	8.2	0.0	0.0	0.0	6.2	21.9
26	17-Sep	13h.55	54	55.7	5	13.6	46	158	97.7	0.1	2.0	0.0	0.1	7.4	14.8
27	17-Sep	16h.05	54	58.1	5	34.6	144	11	76.5	4.6	14.8	0.0	4.1	6.4	12.4

Table 3 Length - weight parameters estimated during cruise LF3798
 (Lengths in cm; weights in g)
 Formula: $\text{weight} = a * L^b$

SPECIES	<i>a</i>	<i>b</i>	SAMPLE SIZE
Herring	0.00274	3.355	623
Sprat	0.00381	3.302	348
Anchovy	0.00350	3.282	23
Mackerel	0.00422	3.202	135
Whiting	0.00769	3.006	160

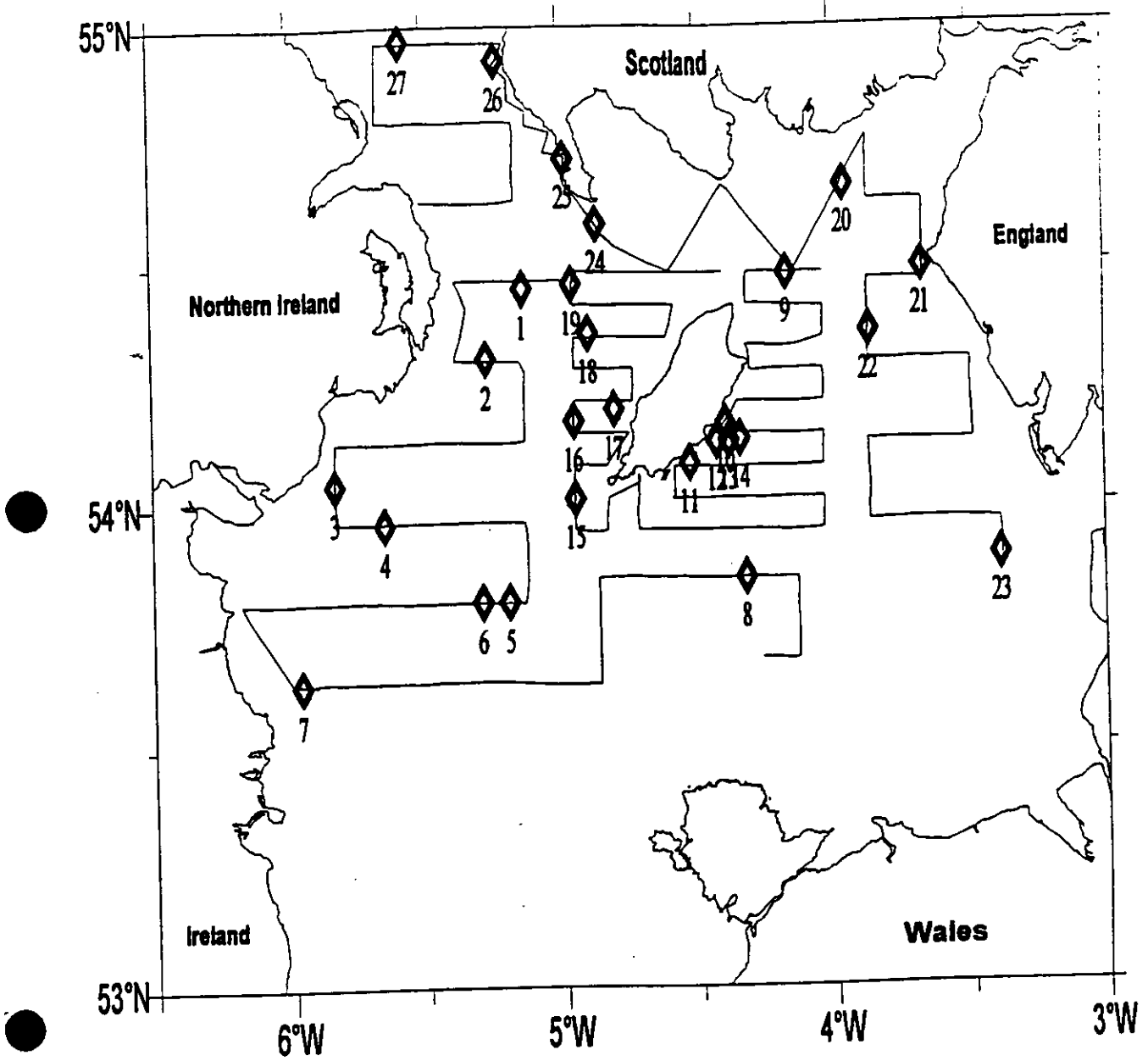


Fig. 1 Positions of transects and trawls for cruise LF3798

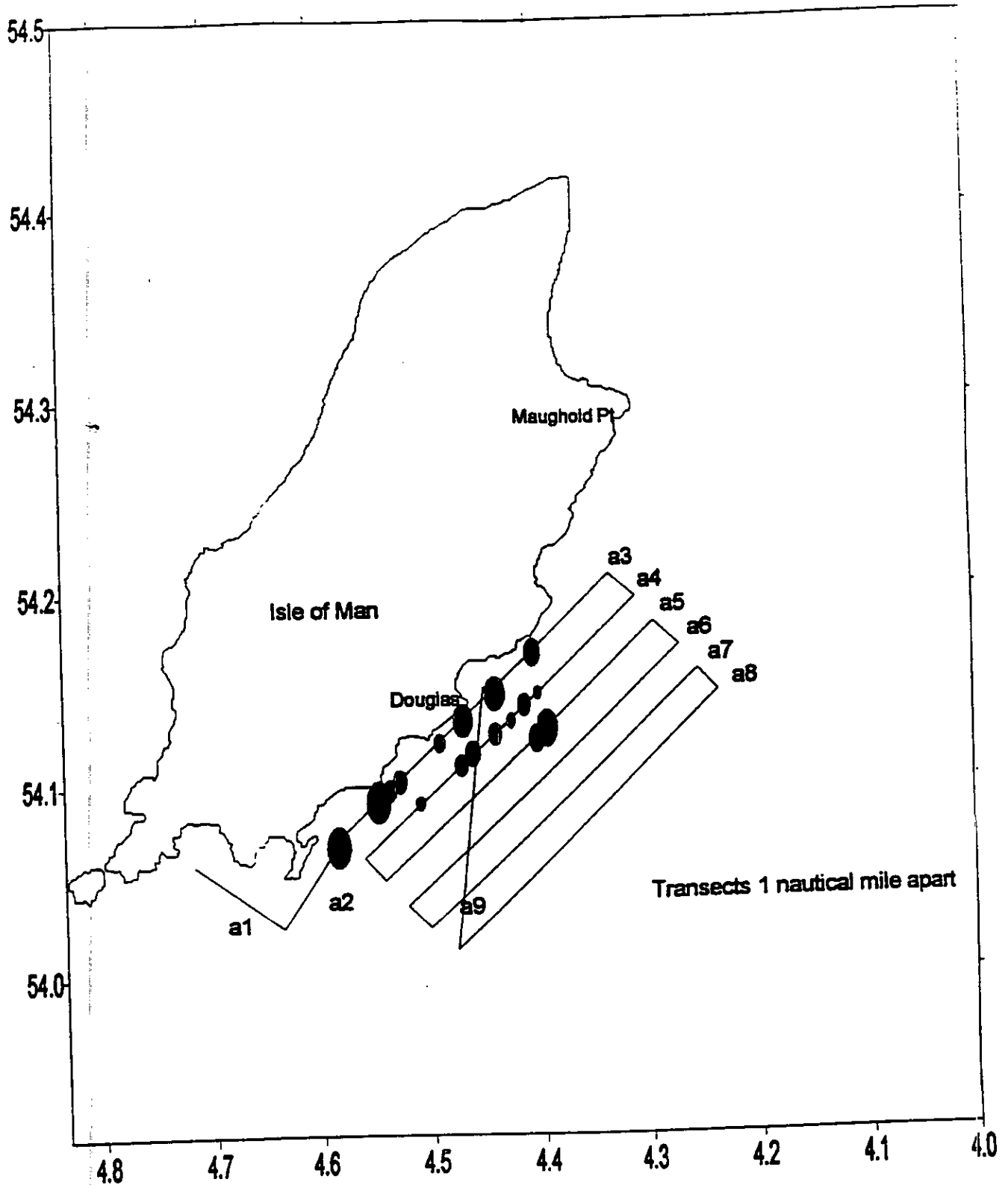


Fig. 2 Transects for night-time survey of Douglas Bank spawning grounds: Friday 11 September - Saturday 12 September. Positions of herring schools are indicated by ellipses (areas of ellipses are proportional to size of schools).

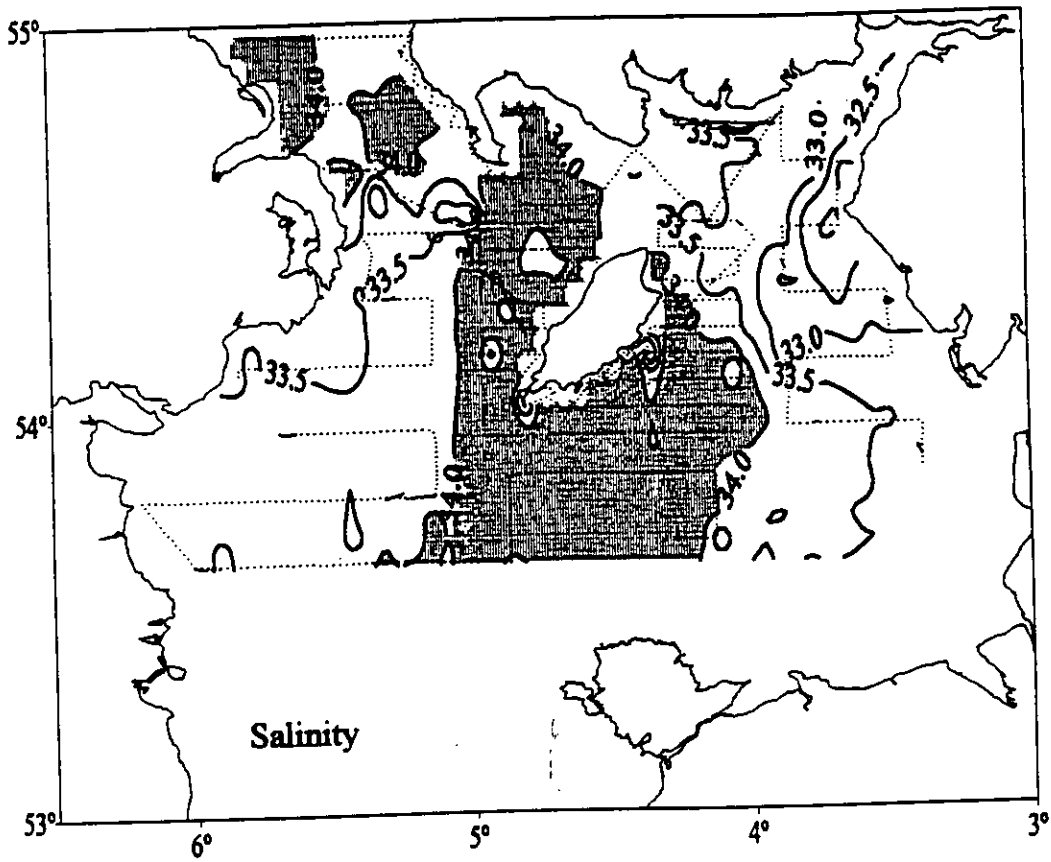
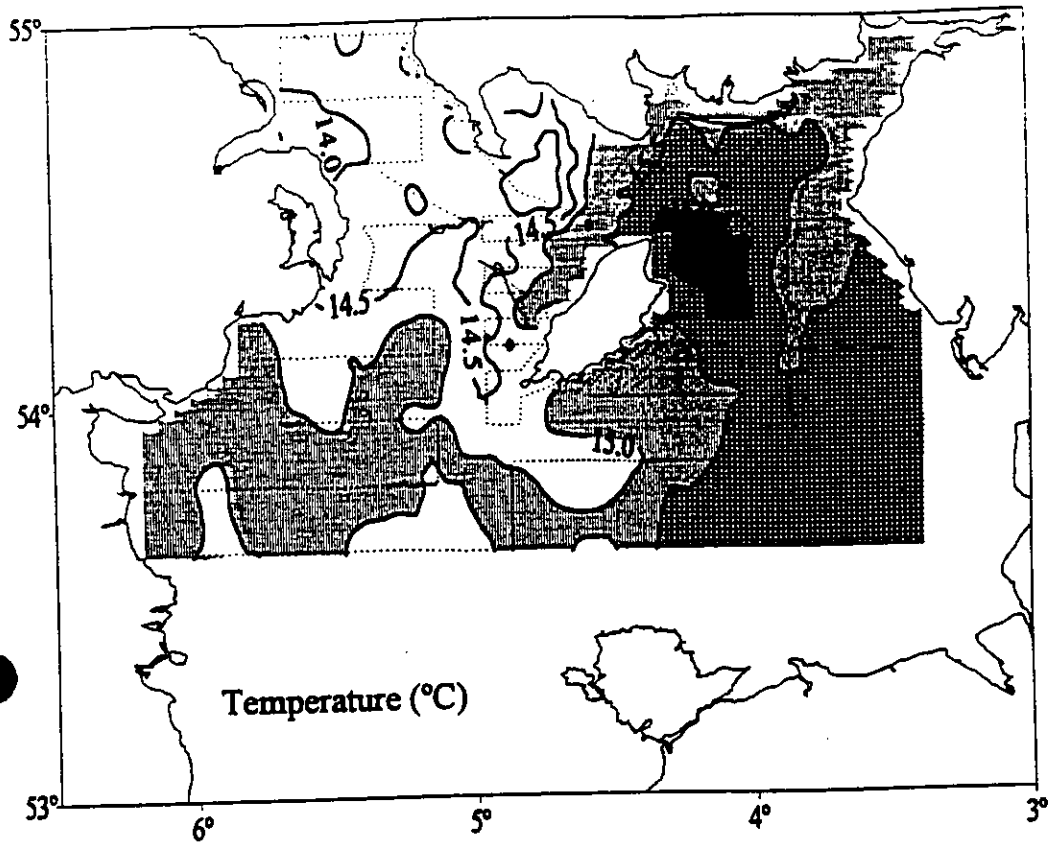


Fig 3. Surface water temperature and salinity on LF3798, 7-18 September 1998