

CRUISE REPORT: CRUISE LF3999 DEMERSAL FISH SURVEY

VESSEL: R.V. *Lough Foyle* (DANI)

DATES: 26 September- 8 October 1999

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

1. Prof. Pearse
2. Prof. Murray

TYPE OF SURVEY: Otter trawl

This is the report of the recent otter trawl survey. Catch rates of 0-group cod and whiting were the highest in the series and 0-group haddock whiting were the 2nd highest on record. 1-group herring (18cm) catches were below the series mean.

ADP 14/10/99

OBJECTIVES

1. To obtain information on spatial patterns of abundance of different size- and age-classes of demersal fish in the northern Irish Sea.
2. To obtain abundance indices for the ICES assessments of whiting, haddock, cod and herring.
3. To monitor external parasite loads in whiting and cod, by area.
4. To collect samples from squid stomachs for research at the University of Aberdeen.
5. To collect juvenile herring for otolith work at University College Dublin.

PERSONNEL

| | | |
|------------------|------------------------|----------------|
| M. Dickey-Collas | DANI | (SIC) |
| M. McAliskey | DANI | |
| C. Burns | DANI | |
| J. Peel | DANI | |
| M. Nyegaard | University of Aberdeen | |
| R. Briggs | DANI | (26/9 to 2/10) |
| H Gerritsen | QUB | (2/10 to 8/10) |

METHODS

A commercial Rockhopper trawl fitted with a 20 mm liner in the cod-end was towed over three nautical miles where possible at the stations shown in Figure 1. Gear and towing procedures were those employed on all previous DANI groundfish surveys. A stratified survey design with fixed station positions was employed. The survey area was divided into seven strata defined by depth and substratum.

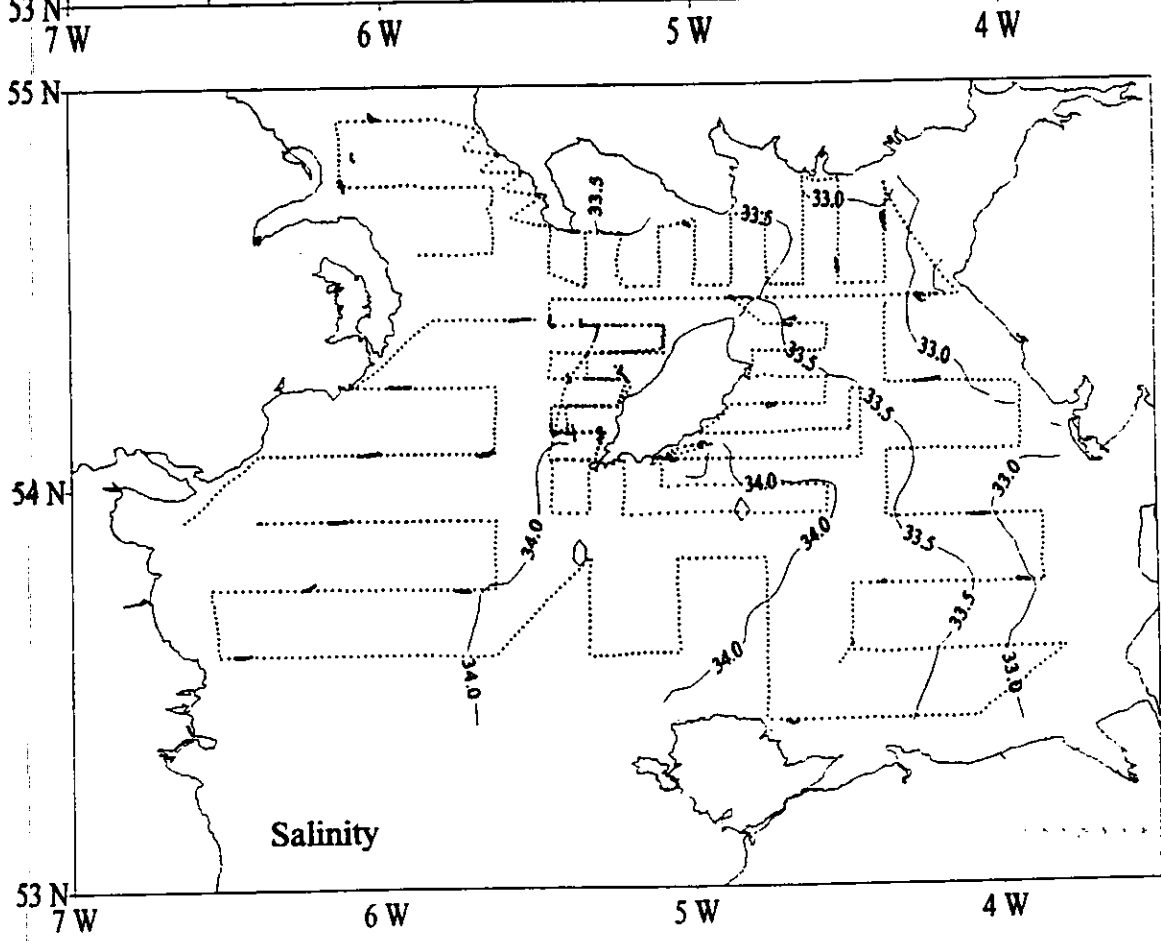
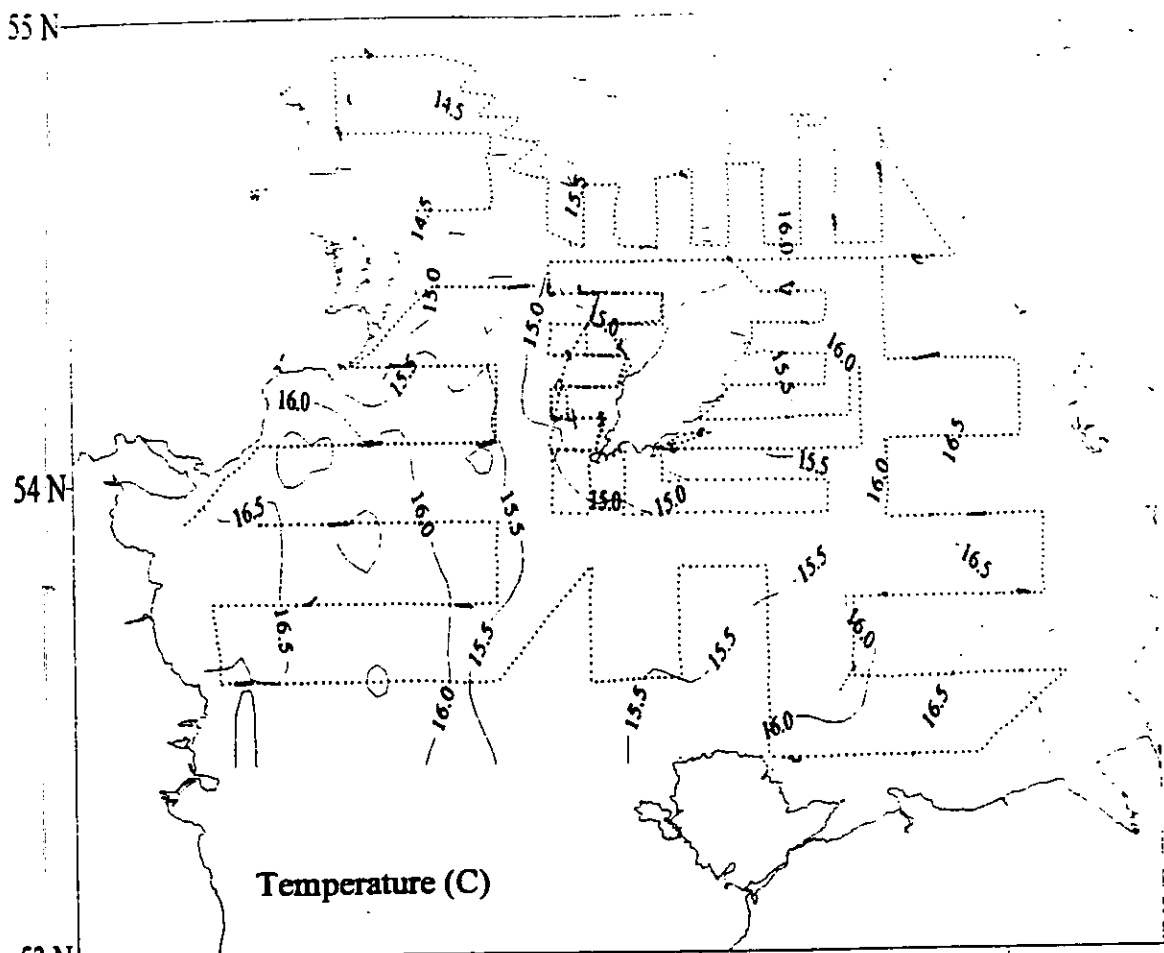


Figure 3. Sea surface (4m) temperature (C) and salinity on LF3699.

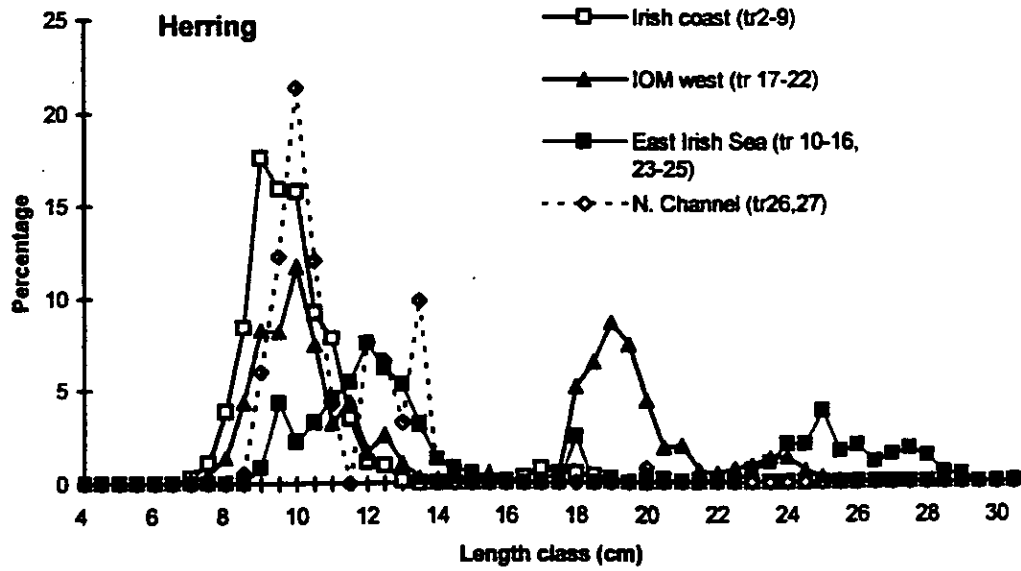
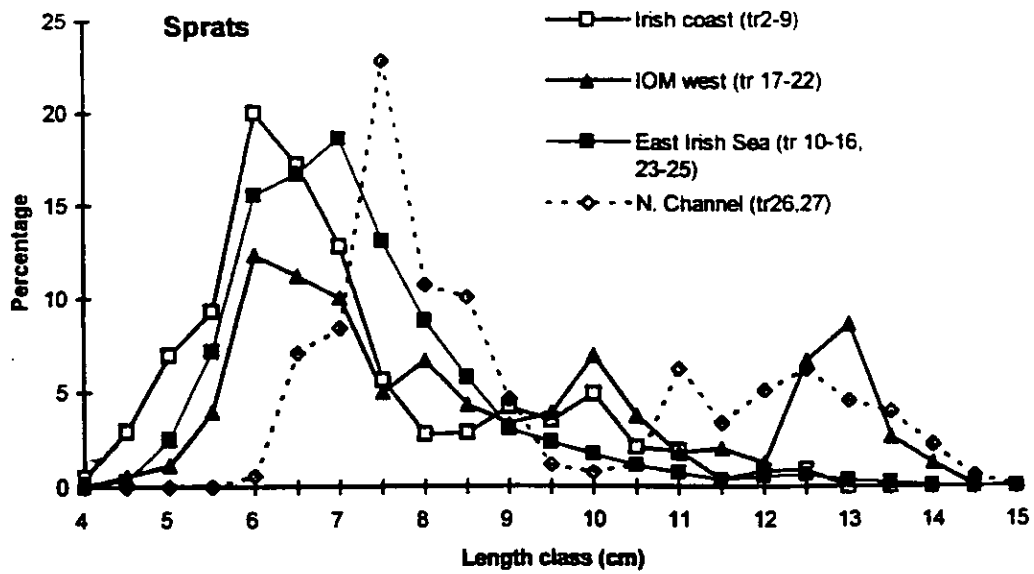


Figure 2 Length frequencies of sprat and herring, by area

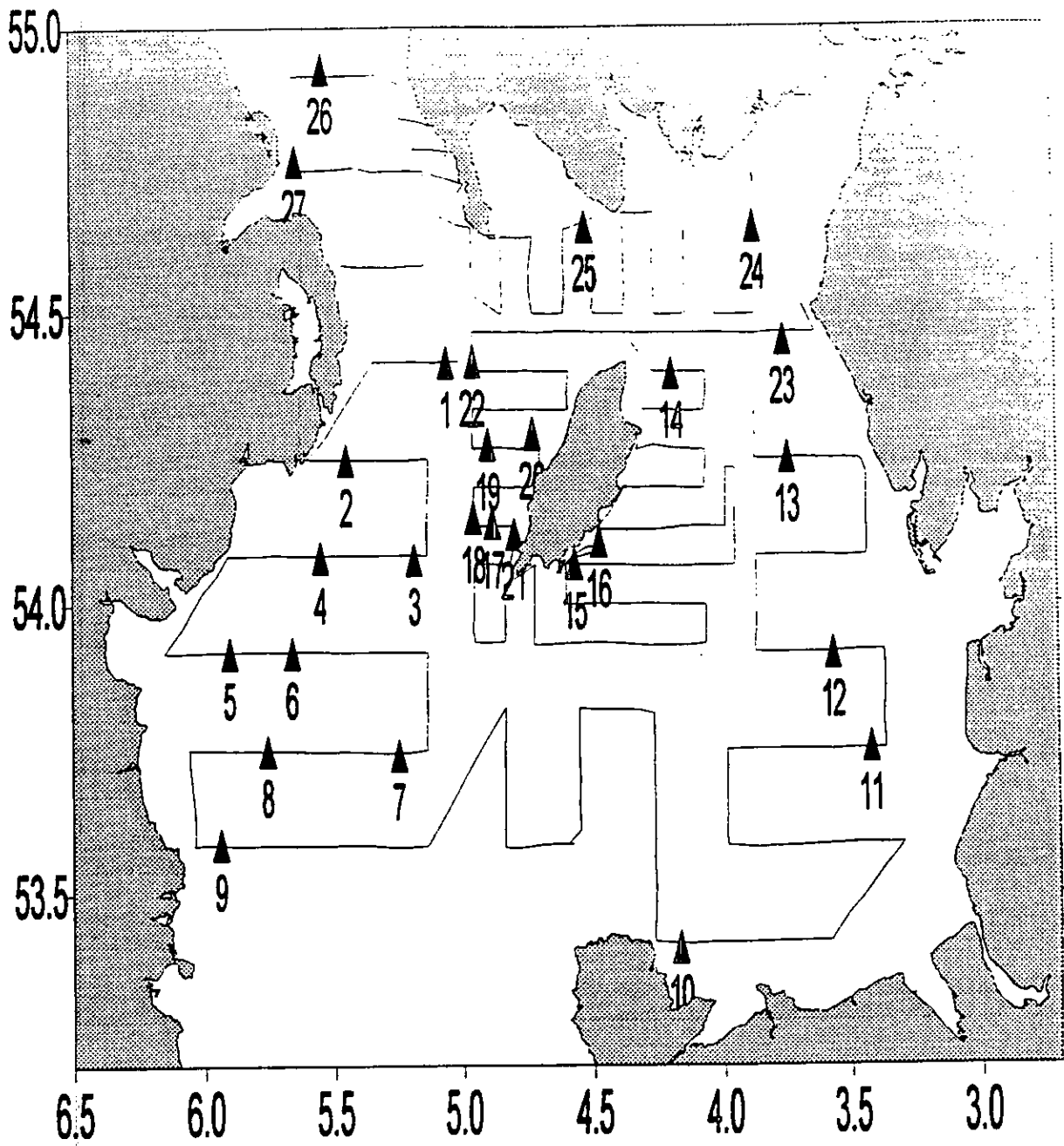


Fig. 1. Cruise track for acoustic survey LF3699. Positions of trawls are indicated by triangles.

Table 3 Length - weight parameters estimated during cruise LF3699
(Lengths in cm; weights in g)
Formula: $\text{weight} = a * L^b$

| SPECIES | <i>a</i> | <i>b</i> | SAMPLE SIZE |
|----------|----------|----------|-------------|
| Herring | 0.00227 | 3.411 | 320 |
| Sprat | 0.00284 | 3.375 | 199 |
| Mackerel | 0.00669 | 3.057 | 103 |
| Whiting | 0.00713 | 3.027 | 176 |

Table 2 Details of trawl catches taken during cruise LF3699

(fish species only, excluding elasmobranchs)

| Tow | Date | Shooting drifts | | | Total fish catch kg. | percentage composition of fish by weight | | | Mean length | | | Invertebrate catch (kg) | | | | | |
|-----|--------|-----------------|------|-------|----------------------|--|-------|---------|-------------|---------|------------|-------------------------|-------|---------|------|------|-------|
| | | Time | Lat. | Long. | | depth (m) | sprat | herring | mackerel | gadoids | other fish | | sprat | herring | | | |
| 1 | 06-Sep | 08h.53 | 54 | 24.9 | 5 | 3.2 | 95 | 67 | 95.4 | 4.6 | 0.0 | 0.0 | 0.0 | 0.0 | 7.2 | 9.5 | 0.0 |
| 2 | 06-Sep | 13h.03 | 54 | 14.9 | 5 | 26.7 | 42 | 281 | 99.7 | 0.2 | 0.1 | 0.0 | 0.0 | 0.0 | 7 | 14.8 | 0.0 |
| 3 | 06-Sep | 16h.29 | 54 | 4.6 | 5 | 10.9 | 106 | 57 | 77.3 | 19.8 | 0.6 | 0.2 | 2.2 | 0.0 | 6.1 | 10.1 | 638.0 |
| 4 | 06-Sep | 19h.11 | 54 | 4.8 | 5 | 32.8 | 68 | 413 | 99.3 | 0.4 | 0.0 | 0.4 | 0.0 | 0.0 | 10.3 | 9.8 | 0.0 |
| 5 | 07-Sep | 06h.51 | 53 | 55.0 | 5 | 53.8 | 48 | 141 | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 7.1 | 10.2 | 0.0 |
| 6 | 07-Sep | 08h.57 | 53 | 55.0 | 5 | 39.4 | 89 | 111 | 63.0 | 8.7 | 0.1 | 28.2 | 0.0 | 0.0 | 7.0 | 10.2 | 47.4 |
| 7 | 07-Sep | 13h.03 | 53 | 44.4 | 5 | 14.7 | 74 | 99 | 91.7 | 6.5 | 1.7 | 0.0 | 0.1 | 0.0 | 6.7 | 9.8 | 0.0 |
| 8 | 07-Sep | 15h.47 | 53 | 44.9 | 5 | 45.2 | 72 | 198 | 96.3 | 3.6 | 0.0 | 0.0 | 0.0 | 0.0 | 8.3 | 10.0 | 1.0 |
| 9 | 07-Sep | 19h.06 | 53 | 35.2 | 5 | 56.1 | 40 | 499 | 99.5 | 0.3 | 0.2 | 0.0 | 0.0 | 0.0 | 5.7 | 10.4 | 0.0 |
| 10 | 08-Sep | 08h.33 | 53 | 24.4 | 4 | 10.2 | 37 | 105 | 85.6 | 6.2 | 6.6 | 0.0 | 1.7 | 0.0 | 7.0 | 12.1 | 0.0 |
| 11 | 09-Sep | 10h.52 | 53 | 45.2 | 3 | 25.4 | 33 | 118 | 95.6 | 0.6 | 0.8 | 3.1 | 0.0 | 0.0 | 7.1 | 12.6 | 0.0 |
| 12 | 09-Sep | 14h.06 | 53 | 54.9 | 3 | 34.1 | 30 | 364 | 99.1 | 0.2 | 0.7 | 0.1 | 0.0 | 0.0 | 6.9 | 12.1 | 0.0 |
| 13 | 09-Sep | 21h.03 | 54 | 15.1 | 3 | 44.5 | 37 | 67 | 71.9 | 0.9 | 2.2 | 24.7 | 0.4 | 0.0 | 7.5 | 11.8 | 0.2 |
| 14 | 13-Sep | 9h.03 | 54 | 23.8 | 4 | 11.4 | 26 | 633 | 97.5 | 1.7 | 0.7 | 0.0 | 0.1 | 0.0 | 8.2 | 13.5 | 0.0 |
| 15 | 13-Sep | 21h.23 | 54 | 4.2 | 4 | 34.0 | 31 | 1414 | 0.0 | 99.8 | 0.2 | 0.0 | 0.0 | 0.0 | 25.9 | 25.9 | 0.0 |
| 16 | 13-Sep | 23h.07 | 54 | 6.4 | 4 | 28.3 | 34 | 2500 | 0.0 | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 25.9 | 25.9 | 0.0 |
| 17 | 14-Sep | 9h.36 | 54 | 8.4 | 4 | 52.7 | 39 | 63 | 0.0 | 98.2 | 1.2 | 0.6 | 0.0 | 0.0 | 21.3 | 21.3 | 0.0 |
| 18 | 14-Sep | 11h.01 | 54 | 8.9 | 4 | 57.1 | 80 | 92 | 89.6 | 8.9 | 0.9 | 0.6 | 0.0 | 0.0 | 8.7 | 10.5 | 1.6 |
| 19 | 14-Sep | 14h.24 | 54 | 16.4 | 4 | 53.6 | 67 | 964 | 98.8 | 0.8 | 0.1 | 0.4 | 0.0 | 0.0 | 9.0 | 11.2 | 0.0 |
| 20 | 14-Sep | 23h.24 | 54 | 17.5 | 4 | 43.4 | 22 | 127 | 0.0 | 93.1 | 4.3 | 2.6 | 0.0 | 0.0 | 19.1 | 19.1 | 0.0 |
| 21 | 15-Sep | 02h.21 | 54 | 7.2 | 4 | 47.7 | 38 | 406 | 0.4 | 98.5 | 0.4 | 0.7 | 0.0 | 0.0 | 13.2 | 19.8 | 0.0 |
| 22 | 15-Sep | 07h.07 | 54 | 25.0 | 4 | 57.0 | 102 | 355 | 97.8 | 1.9 | 0.0 | 0.0 | 0.3 | 0.0 | 7.6 | 10.9 | 0.0 |
| 23 | 15-Sep | 13h.12 | 54 | 27.3 | 3 | 45.3 | 21 | 811 | 99.8 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 8.3 | 18.3 | 0.0 |
| 24 | 15-Sep | 17h.01 | 54 | 39.2 | 3 | 52.0 | 32 | 529 | 99.3 | 0.3 | 0.3 | 0.1 | 0.0 | 0.0 | 7.0 | 10.4 | 0.0 |
| 25 | 16-Sep | 06h.20 | 54 | 39.1 | 4 | 30.9 | 31 | 38 | 91.2 | 1.2 | 7.1 | 0.2 | 0.3 | 0.0 | 7.4 | 14.4 | 0.0 |
| 26 | 16-Sep | 17h.04 | 54 | 55.8 | 5 | 31.8 | 152 | 49 | 92.0 | 5.9 | 2.1 | 0.0 | 0.0 | 0.0 | 7.8 | 10.1 | 0.0 |
| 27 | 16-Sep | 19h.30 | 54 | 46.1 | 5 | 37.9 | 49 | 177 | 99.0 | 0.8 | 0.0 | 0.2 | 0.0 | 0.0 | 11.2 | 12.0 | 0.0 |

Table 1 EK-500 instrument settings used during cruise LF3699

| | | |
|----------------------------|-----------------|-------------------|
| Transducer | ES38B ser 26535 | ES120-7 ser 26352 |
| Frequency | 38 kHz | 120 kHz |
| (1) TRANSCIVER MENU | | not used |
| Absorption coefficient | 10 dB/km | |
| Pulse length | Medium (1.0 ms) | |
| Bandwidth | Wide | |
| Max. power | 2000 W | |
| Angle sensitivity | 21.9 | |
| 2-way beam angle | -20.9 dB | |
| Sv transducer gain | 26.77 dB | |
| TS transducer gain | 26.81 dB | |
| 3 dB beamwidth Alongship | 6.9 deg | |
| 3 dB beamwidth Athwartship | 6.9 deg | |
| Alongship offset | 0.0 deg | |
| Athwartship offset | -0.08 deg | |

| | |
|--|--|
| (2) OTHER SETTINGS | |
| Operation menu: | Ping rate = 0.8 s |
| Log menu: | Mode = ping based Ping interval = 1125 |
| Layer menu: | Super-layer = 11 - 250 metres Layers: 8-11, 11-25, 25-50, 50-75, 75-100, 100-150, 150-250 metres |
| 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 = 1.2 Max. gain compensation = 3.0 dB Max. phase deviation = 4.0 dB |
| Bottom detection menu: | Minimum level = -50 dB |

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. Archie and Andrew Orr of the NI fishing industry are thanked for sharing their knowledge of herring distribution in the Irish Sea and for passing on information on catch locations from the *Havilah-A*.

Signed

SIC. M. J. Armstrong

date 17-Sept-99

Ships master A. W. B. O'Connell

date: 17 Sept. 1999.

Head of Aquatic Sciences S. P. Henry

date: 11.10.99

The *Lough Foyle* departed Belfast again at 21h.45 on Sunday 12 September and proceeded to transect 1 off the north of the Isle of Man where the survey re-commenced at 7h.30. A deviation from the survey track was made at the end of transect 10 to investigate a patch of herring located by commercial vessels. The survey continued, breaking only to trawl, until part way along transect 32. Work was then suspended between 18h.00 and 19h.45 on 14 September after which transects 32 - 22 (in depths shallower than about 50m) were re-surveyed during darkness to obtain further acoustic data and trawl samples of herring. Transect 32 was rejoined at 06h.30 on 15 September and the survey continued to the Solway Firth and then westwards. The acoustic survey was completed at the end of transect 65 at 0h.30 on 17 September, after which the vessel was anchored overnight off Bangor. A system calibration was carried out during the morning. The vessel was then returned to Belfast.

WORK COMPLETED

Echo sounder calibration

Conditions proved too rough to calibrate the acoustic system at the beginning of the cruise. Although post-cruise calibration on 17 September was marred by increasing wind strength, peak sphere TS appeared correct using transceiver settings from the previous calibration. It was not possible to carry out a reliable S_v calibration due to erratic off-axis movements of the sphere. The previous calibration values were retained.

Echo integration

The survey grid is shown in Figure 1. The 38kHz echosounder was run continuously during the survey. Data were captured using Echolog (SonarData, Tasmania) software and were backed up at intervals on duplicate CDs.

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 mainly inshore on the SE coast of the Isle of Man, and near Peel on the west coast of the Isle of Man. Sprat were widespread along the Irish Coast, in water deeper than 50m off the west coast of the Isle of Man, between Morecambe Bay and the Solway Firth, off the NE coast of the Isle of Man and between Solway Firth and Burrow Head on the Scottish coast. Length frequencies of herring and sprat are given in Fig. 2.

Surface temperatures were coolest in the North Channel and warmest in Liverpool Bay and off Dundalk Bay (Fig. 3). Highest surface salinities were recorded in the central Irish Sea south of the Isle of Man.