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CHARTER VESSEL MV "MIRFAK"

REPORT

30 March-17 April 1989

Personnel

M Heath	PSO (in charge)
D Seaton	SSO (6-17 April)
S Hay	HSO (6-17 April)
J Dunn	HSO (30 March-6 April)
P Copland	SO
D Baird	SO
A A Matthews	ASO
L Cargill	ASO
J Turriff	ASO
A Macdonald	HPTO (30-31 March)
W Gray	PTO (30-31 March)
J Hunter	PTO
N Collie	PTO (6-17 April)
C Stewart	Craftsman
W Leiper	Craftsman
P Machin	PhD student

Objectives

1. To investigate the spatial relationships between late larval and early "O"-group herring, and potential predators in the northern North Sea.
2. To investigate vulnerability of late larval stages and newly metamorphosed herring to predation by fish species in the North Sea.
3. To investigate the timing of herring metamorphosis in relation to the progress of stratification and the spring plankton bloom in the North Sea.

Narrative

"Mirfak" sailed from Aberdeen at 1330 on 30 March to carry out testing of sampling gear in Aberdeen Bay. Trials were completed on 31 March and the vessel headed for sampling positions 200 km east of Aberdeen. Trawling, hydrographic, acoustic and plankton sampling was carried out at four stations until 4 April when a passage was made to sampling positions off the Firth of Forth.

Surveying was suspended due to bad weather late on 4 April. During the night the vessel steamed to Aberdeen following injury sustained by a member of the scientific staff. The vessel remained in port during 5 April due to continued bad weather, and the mid-cruise break was brought forward to 6 April.

During the second part of the cruise, sampling was completed off the Firth of Forth, off the west coast of Denmark, and in the Skagerrak. Surveying was curtailed for approximately 20 hr on 10 April due to bad weather. A passage from the Danish coast to Aberdeen was made during 16 April and the vessel docked at 0630 on 17 April.

Results

Forty-one sampling locations were visited during the cruise as shown on the attached chart. Effort was concentrated in four areas of contrasting characteristics. In each area plankton was sampled with the OCEAN Sampler carrying a payload of hydrographic and biological sensors. Micronekton, including larval and post-larval herring were sampled at night with a Methot-Isaacs-Kidd Trawl (MIKT) or the Large Opening and Closing Frame trawl (LOCHNESS). Post-larval herring were also sampled with the International Young Gadoid Pelagic Trawl (IYGPT), and demersal fish with a light bottom trawl (BT124). In addition, detailed site studies were carried out at two locations within each area. At each site, hydrographic data and water samples for nutrient analysis were collected, together with samples of phytoplankton for primary production measurements and live zooplankton for copepod physiology studies. A total of 64 OCEAN Sampler, MIKT and LOCHNESS hauls, 18 trawl hauls and eight detailed site studies were completed.

Distribution of larval and post-larval herring

Larval herring of 30-40 mm were caught in each of the sampling areas with the MIKT and LOCHNESS at night, and in small numbers in the IYGPT. In addition, metamorphosing larvae and "0"-group herring, 40-50 mm long, were caught at inshore sites (<30 m) in the Skagerrak. In deeper water in the Skagerrak only pre-metamorphosis larvae were caught.

Distribution of predators on herring

Haddock, whiting, flatfish and cod constituted the majority of the demersal trawl catches. Catches in 1 hr ranged from 20 to 200 kg. Examination of the cod stomachs revealed remains mainly of benthic organisms. Stomachs were removed and preserved from approximately 200 whiting in each study area. Post-larval herring were found in whiting stomachs collected in the Skagerrak area, but no larval herring were identified in stomachs from any of the regions.

Plankton physiology

Vigorous spring plankton bloom activity was in progress in the UK and Danish coastal waters during the cruise. High chlorophyll values were particularly noted in the Firth of Forth area and at the edge of the Jutland Current off the west coast of Denmark. In the latter area a dense Coscinodiscus and Thalassiosira bloom was observed to be settling towards the sea bed. Chlorophyll values were low (<1.5 mg m⁻³) in the central area of the North Sea.

Copepod egg production rates were highest in the coastal waters. However, zooplankton biomass was generally low and some difficulty was encountered in obtaining sufficient copepods for experimental purposes at sites in the central area. Samples of zooplankton for gut fluorescence analysis and material from ammonia excretion experiments were preserved for later analysis.

Instrument performance

The sensor payload on the OCEAN Sampler performed well and data on depth, temperature, conductivity, fluorescence, transparency, light intensity and dissolved oxygen concentration were collected at 10 sec intervals throughout each deployment. The bioluminescence sensor was inoperative throughout the cruise.

The surface towed sensor unit (temperature, conductivity, fluorescence and transparency) functioned reliably, but the tow fish became unstable in the water at speeds in excess of 9 kn.

Both of the Seamatrix acoustic telemetry units were found to be inoperative at the start of the cruise despite recent servicing, but one was eventually brought into operation. The other could not be made to function at all. Once these problems had been solved, the OCEAN Sampler functioned well as a multi-opening and closing plankton sampler.

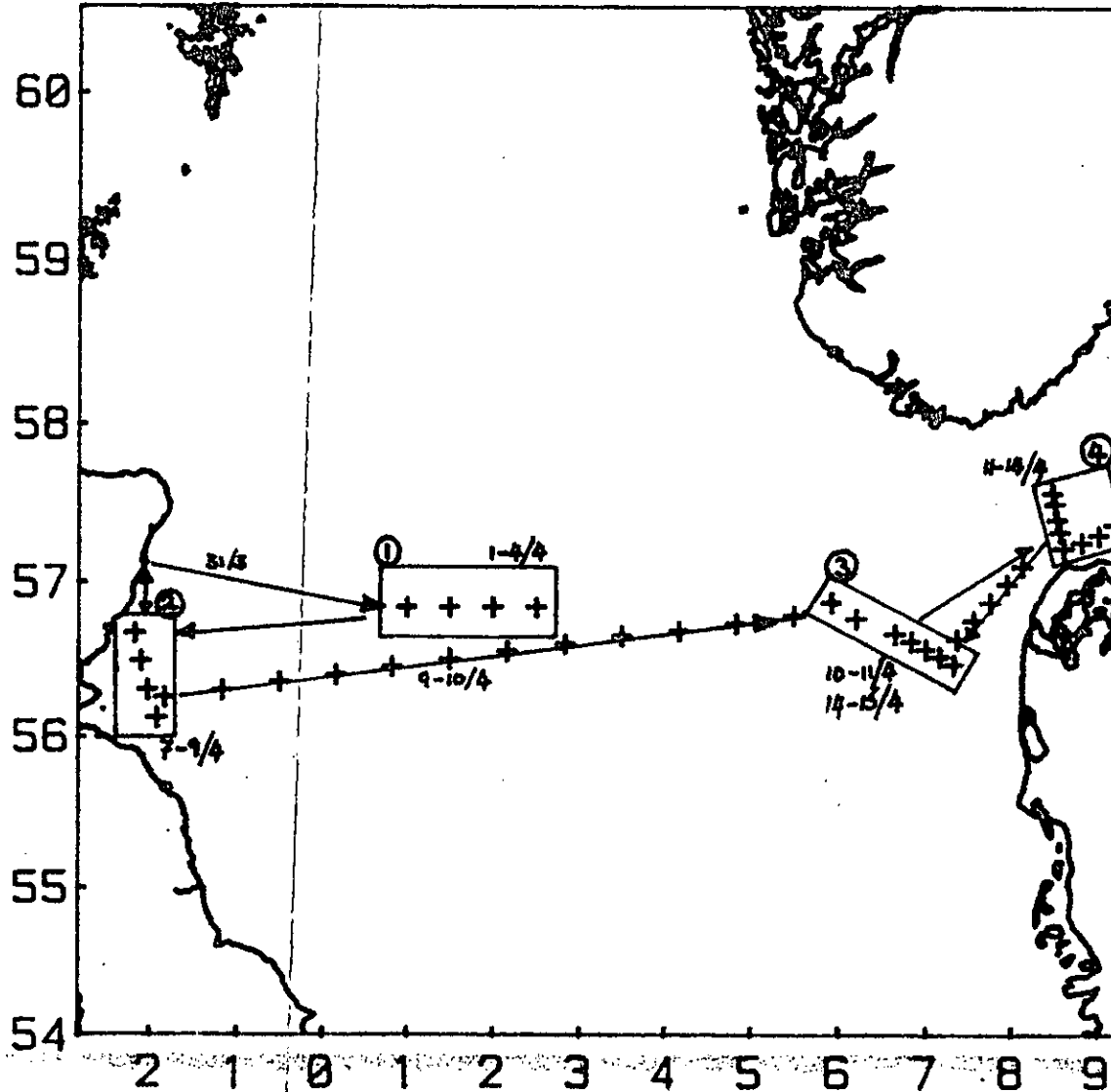
The dual frequency (120/200 kHz) sonar system worked well throughout the cruise, and data were recorded on tape for future analysis. The "Mirfak" proved to be particularly suitable for acoustic surveying work and free from acoustic interference. Unfortunately an electronic fault prevented an adequate calibration of either transducer.

All pelagic and demersal trawls were instrumented with Scanmar headline depth and height, and wing end and door spread sensors. All of these operated well throughout the cruise and sufficient data collected to calculate swept area and volume for each tow.

M Heath

4 May 1989

MV 'MIRFAK' 30/3/89 - 17/4/89



STUDY AREAS



SAMPLING POSITIONS