Indexed KR

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD
FISHERIES LABORATORY, LOWESTOFT, SUFFOLK, ENGLAND

1986 RESEARCH VESSEL PROGRAMME

REPORT : RV CIROLANA : CRUISE 8
(PROVISIONAL: Not to be quoted without prior reference to the author)

STAFF

J H Nichols
K Brander
A B Thompson
B M Thompson
B R Riches
C L Whiting
J Barry
R T Harrop
L Howard
D Reinschmidt (I.F.M Kiel)
S Turner (UEA)
R Geider (University of Birmingham)

DURATION:

1450h 10 October - left Immingham Dry Dock
0300h 27 October - docked Lowestoft

LOCALITY:

West Central North Sea

AIMS

1. To participate in the ICES coordinated herring larvae survey of region IVB during the two standard sampling periods in October, using the MAFF 53cm high speed sampler.

2. To examine aspects of the planktonic ecosystem of which herring larvae are a part, including:

i) the physical structure of the environment;

ii) the vertical distribution of herring larvae, their food and predators;

iii) herring larvae diet and feeding status;

iv) predation on herring larvae.

NOTE: gear trials in relation to aim 2 will be an integral part of the programme.

3. To take water samples using the ships pump and analyse on board for dissolved sulphur gases using gas chromatograpny (UEA).

4. To examine the spatial and vertical distribution of choanoflagellates in the coastal and open waters of the North Sea (University of Birmingham)

NARRATIVE:

The unscheduled stay in dry dock reduced the time available for this cruise by 8 days and forced the cancellation of DFR participation in the larvae survey of region IVB at the end of September. There was a consequent shift in time of 6 days at the end of the cruise.

RV CIROLANA left Immingham Dry Dock at 1450h 10 October, but spent a further 7 hours taking on fresh water before sailing at 2300hrs. The first plankton survey

was begun at 0300h 11 October at Latitude 53°15'N Longitude 01°10'E and progressed in exceptionally calm ewather until its completion at 2200h 16 october at Latitude 54°45'N Longitude 00°10'E (Figure 1). Very poor visibility was experienced during the 13 and 14 October resulting in a slightly reduced sampling rate on those days.

The towed 38 kHz transducer was rigged and tested over parts of the plankton survey grid north of Latitude 54°N After some problems were experienced with the output from this transducer a second towed body was rigged and shot at 1300h 13 October. Shortly after launching this towed body was lost and it was subsequently discovered that the towing cable had been inadequately secured to the deploying winch. The loss position (54°25.1'N : 00° 05.8'W) was noted but in the absence of suitable gear no attempt was made to recover it.

On completion of the first plankton survey a grid of 12 plankton stations were sampled between 0300h and 1200h 17 October (Figure 2a). These samples were used to identify an area of suitably high herring larvae density in which to conduct comparisons between the performance of the MOCNESS sampling system, the MBA plankton pump and the LHPR. These comparisons were completed at 0130h 20 October after which the 12 sampling positions (Figure 2a) were repeated to confirm the herring larvae densities in this area. Four slow hauls were then made with the 53cm sampler to collect larvae in good condition for histology and biological analyses. During the afternoon 20 October the new Methot/Isaacs Kidd frame trawl was rigged and shot over the starboard quarter in rather poor weather conditions. The method of operation was totally unsuitable and with no potential alternative available, the trials and proposed sampling grid had to be abandoned. As an alternative the vessel made passage northwards to an area of relatively high herring larvae densities in association with thermally stratified water at latitude 55°20'N : Longitude 00°40'W. On completion of a close grid of 11 plankton sampling stations in this area (Figure 2b) in order to relocate the 'patch', sampling began with the MOCNESS, to examine the vertical distribution of herring larvae. A total of 9 standard MOCNESS hauls with 8 nets were made between 1300h 21 October and 2000h 22 October. In addition 2 hauls were made with the LHPR fitted with an additional 53 micron mesh net and two slow speed hauls with the MOCNESS to collect larvae in good condition for histological and biochemical analyses. Four Nansen bottle casts were also made in the stratified water to obtain vertical profile samples for Aims 3 and 4.

The final standard herring larvae survey grid (Figure 3) was started at 2215h 22 October at latitude 55°10'N, Longitude 00°50'W. Sampling continued in mainly strong to gale force winds until a further deterioration in the weather forced a cessation of operations at 0650h 25 October at Latitude 54°00'N, Longitude 01°10'E. RV CIROLANA remained hove to in SW winds force 9 to 10 until 1500h when passage was made to an inshore sampling station (238) off Spurn Point. The survey was restarted there at 1630h and proceeded in poor weather completing a further 10 stations before the weather forced a further stoppage at 0330h 26 October (Station 247). With the forecast of continuing W to NW severe gales passage was made southwards at 0900h in an attempt to complete some priority stations in the Dowsing/Cromer Knoll area. A further six stations were completed between 1245h and 1915h in improving weather before course was set for Lowestoft. RV CIROLANA docked there at 0300h 27 October.

RESULTS:

1. On the first survey (11-16 October) the distribution and abundance of 10-20mm herring larvae was similar to that found in the same survey period last year (Figure 4). However, numbers of recently hatched larvae, <10mm, were considerably lower. The highest abundances of this length group were found south of the Longstone (Station 96) ca: 65.m^{-2}, at the Dowsing, 60.m^{-2} and in the vicinity of Markhams Hole (Station 13) 60.m^{-2}. During the same sampling period last year densities off the Yorkshire coast were up to 500.m^{-2} over a wide area. A few reeently hatched larvae were found in the vicinity of the South West Patch, where spawning was re-established last year. Their abundance however was very low, (20.m^{-2}) compared with 125.m^{-2} last year.

Rough weather precluded any sample sorting on the final survey. A preliminary glance at these samples did confirm the general distribution of large larvae from the first survey but did not identify any new areas of recently hatched larvae.

i) Sub-surface seawater was monitored continuously throughout the cruise for temperature and salinity. The temperature discrepancy reported on the last cruise was traced to a corroded pipe in the system which resulted in a restricted flow through one of the valve outlets. Changing to an alternative valve outlet solved the problem.

Vertical profiles of temperature and salinity were taken at each plankton sampling station using the Guildline CTD system on the 53cm sampler. The surface to bottom temperatures differences (Δ t°C) obtained from these profiles are shown on Figure 4. The southern boundary between the mixed and stratified water masses as indicated by the 0.5°C isotherm is approximately 15nml further north than on the same survey last year. The eastern and north-western boundaries remain the same.

Chlorophyll 'a' flurorescence was also monitored continuously from the pumped sub-surface sea water supply. Vertical profiles of chlorophyll 'a' fluorescence were also obtained from the 'Aquatracker mounted on the 53cm plankton sampler. Discrete samples of sub-surface water were filtered for acetone extraction of chlorophyll to give regular 'field calibrations' of the systems.

All these data were successfully logged continuously and plots of vertical profiles of temperature, salinity and chlorophyll obtained for each station during the cruise.

ii) A comprehensive series of eight deployments each of the MOCNESS the MBA pump and the LHPR was made in a patch of herring larvae (10-20mm) located on the first mini grid (Figure 2a). Each system was operated in darkness, daylight, at dawn and at dusk over a 57 hour period. Considerable problems were encountered with the LHPR system and clogging by Cyanea spp, which could only be overcome by fitting a 13mm mesh over the mouth opening.

The results of these trials are not yet available as the samples were not analysed on board.

After the trials it was decided to use the MOCNESS to examine herring larvae vertical distribtuion in a thermally stratified area located within the mini grid (Figure 2b). The system handled well and appeared to catch a similar size range of larvae to that seen in the 53cm sampler. The net indicator system did not operate positively on every occasion and was a weakness which led to the loss of some samples. The nine large filtering nets, although not difficult to handle, were awkward to wash down in the restricted space available on the vessels starboard side. Ten deployments were made during the 34 hour sampling period with up to 8 discrete 10 metre depth bands in each deployment. Some potential herring larvae predators (small gadoids) were taken in the hauls which will be examined later.

The LHPR fitted with a 53 micron sampling system as well as the standard 280 micron net was deployed three times during the vertical distribution series. One deployment was a complete failure whilst the other two both resulted in incomplete sampling with the coarse net. Two valid profiles of the microzooplankton were however obtained with the 53 micron net.

Acoustic profiling

The aim of this work was to produce depth profiles of acoustic backscatter using the Simrad QD integrator during the main plankton survey grids and when the depth layered samplers were being deployed.

A number of problems before and during the cruise meant that the amount of useable information collected was limited, but good records were obtained during two twenty four hour periods when depth layered plankton samples were taken.

iii) Four low speed hauls with the 53cm sampler were taken in the southernmost herring larvae patch to obtain specimens in good condition for feeding status studies. Specimens from above, below and in the thermocline were also taken from additional MOCNESS tows in stratified water within the mini grid (Figure 2b). A total of 82 herring larvae were measured and fixed in Bouins fluid for histological preparation and subsequent assessment of nutritional status. Twenty samples of between 5 and 15 herring larvae from various length groups were fixed in liquid nitrogen for RNA/DNA analysis. Ten samples of 20 to 100 herring larvae and 8 samples of other zooplankters were deep frozen in 'solvent' for subsequent lipid analysis by the IMB.

iv) The Methot/Isaacs Kidd trawl could not be used to sample potential herring larvae predators. The gear was launched once, but placed such a severe strain on the cored cable and running blocks that the haul had to be abandoned. Once in the water the net did appear to dive and fish well and will eventually fill an important gap in our sampling ability. Before the system can become operational, however, a cabless depth monitoring system must be used allowing this net to be towed on standard wire over the stern of the vessel. To that end useful suggestions were recorded by the Captain and Fishing Skipper which will be passed on to the RVST.

3. Over 130 water samples (surface and 4 depths profiles) taken over the majority of the area covered were anlysed for DMS (Dimethyl sulphide) using purge and trap/gas chromotography. Concentrations were relatively low as was expected for this time of year. Simultaneous measurements were made for the DMS precursor (DMSP) present inter-and intracellularly.

Incubation experiments to determine the rate of intercellular DMSP decomposition, and the effect of nitrate on DMS production were also carried out.

4. Distribution and abundance of choanoflagellates

Samples were taken at 37 stations for the identification and enumeration of microorganisms in the size range of 0.2 to 100 µm including bacteria, cyanobacteria, microalgae, ciliates and flagellates with particular emphasis on the choanoflagellates. A new technique for preparing samples for transmitted light and epifluorescence microscopy was used for the first time at sea. Samples were prepared for transmission and scanning electron microscopy. Dry preparations for light microscopy were also made. Growth rates of bacteria and grazing losses of bacteria to other microbes were determined in five additional experiments.

ACKNOWLEDGEMENTS
I would like to acknowledge the cooperation of staff at IMER Plymouth for the loan of the double LHPR system; staff at the MBA Plymouth for theloan of the plankton pump and Professor Nellen IFMK, Kiel, W.Germany for the loan of the MOCNESS and for making the services of Daniel Reinschmidt available to operate it.

J H Nichols
27 October 1986

SEEN IN DRAFT: D J G

M J Willcock (Captain)
E W Pearson (Fishing Skipper)

DISTRIBUTION:
Basic List+
Staff on cruise

Figure 1

CIROLANA 8 86

SHOWING :
CRUISE TRACK
STATION NUMBER

COASTLINE

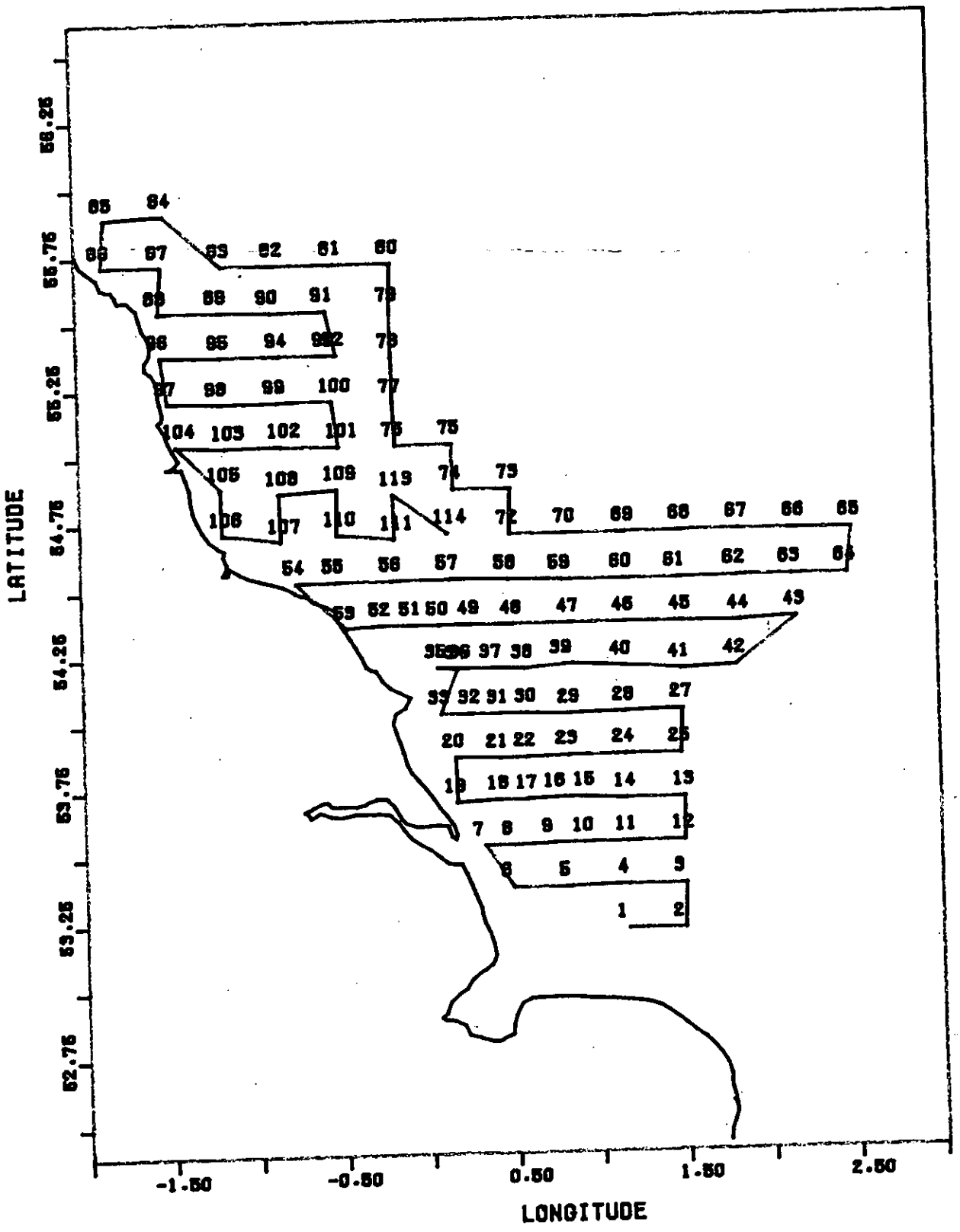
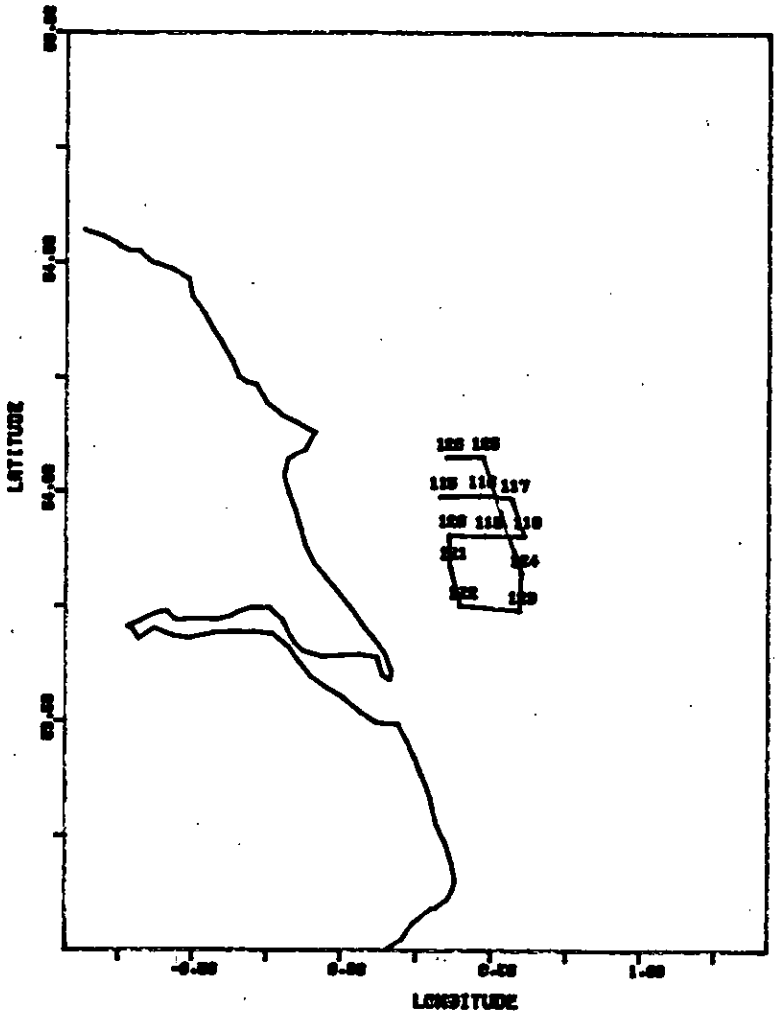


Figure 2a

CIRCLANA 8 1986 MINIGRID 1



2b.

CIRCLANA 8 1986 MINIGRID 3

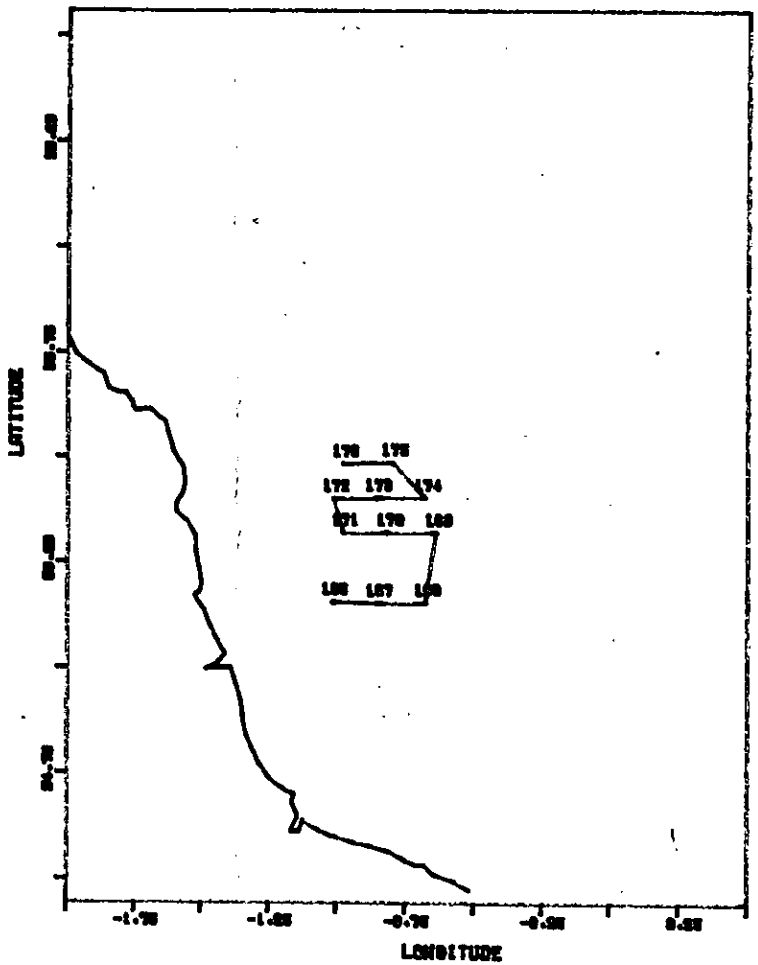


Figure 3

CIROLANA 8 1986 CRUISE TRACK 2

SHOWING :
CRUISE TRACK
STATION NUMBER

COASTLINE

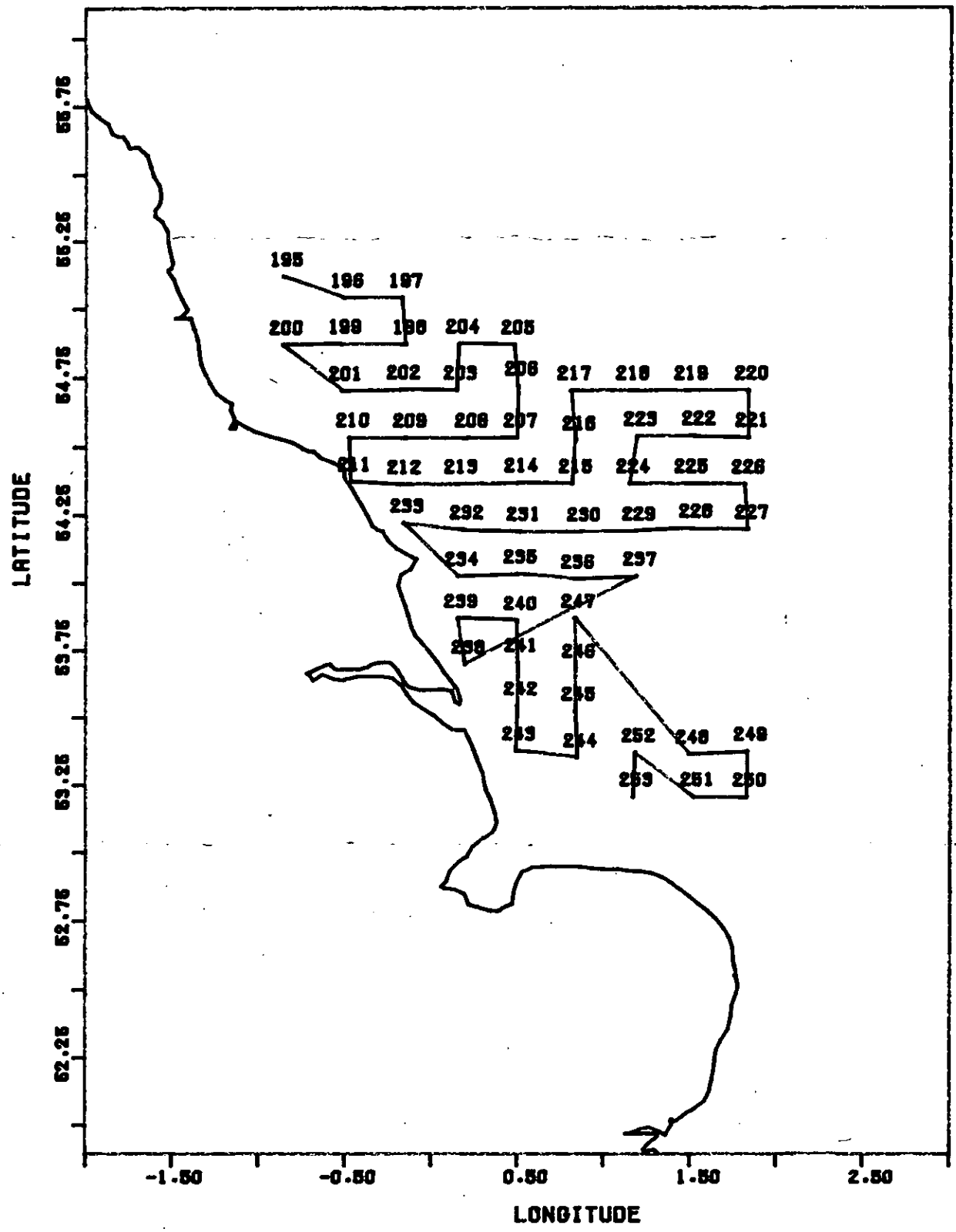
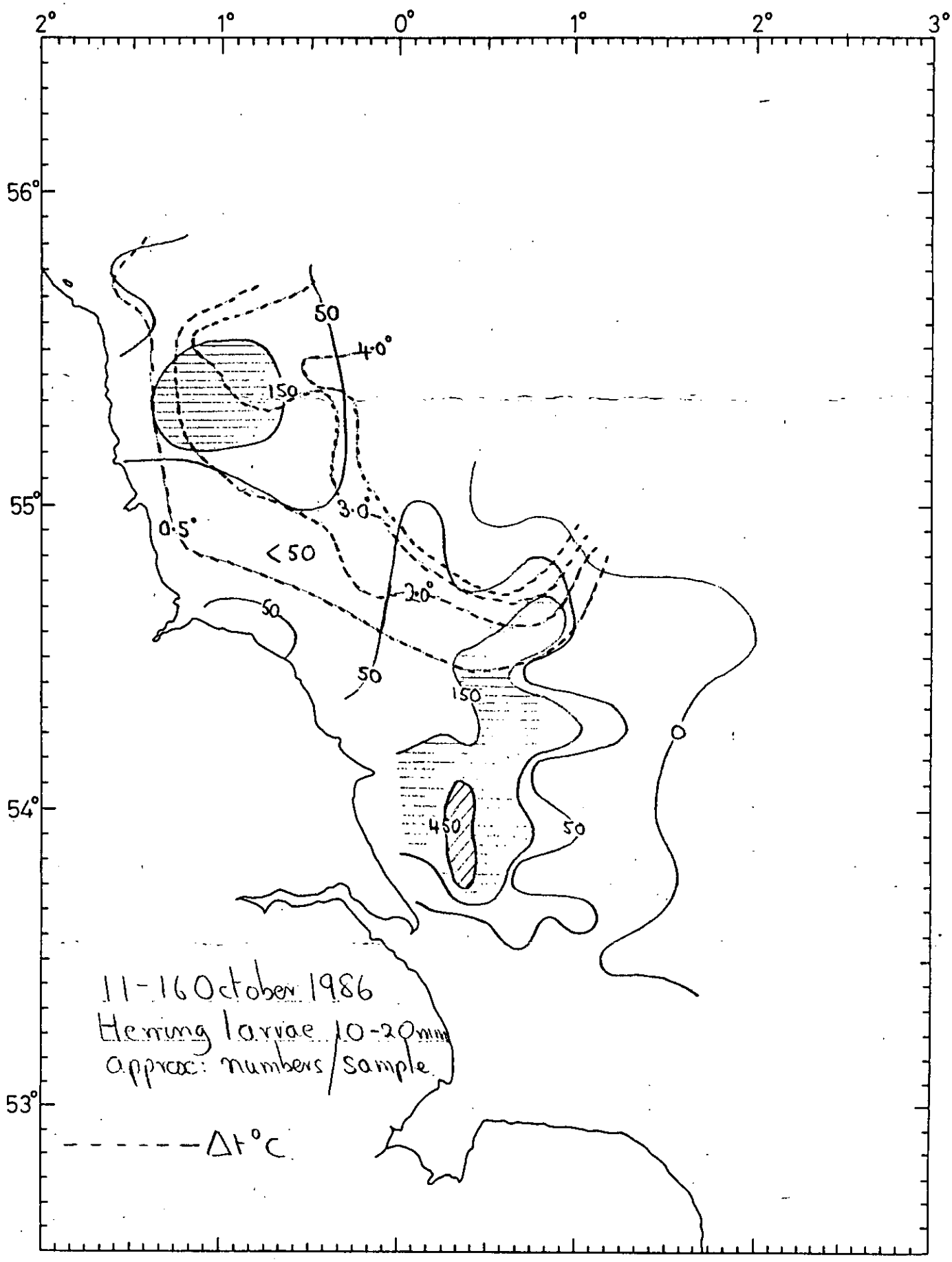


Figure 4


2°
1°
0°
1°
2°
3°
56°
55°
54°
53°
50
4·0°
150
3·0
0·5°
<50
2·0°
50
50
150
0
450
50
11-16 October 1986
Herring larvae 10-20mm
approx: numbers/sample
Δt°C