

MRS P. Edwards PB  
(MIAS)

NATURAL ENVIRONMENT RESEARCH COUNCIL  
INSTITUTE FOR MARINE ENVIRONMENTAL RESEARCH

Cruise Report: Cruise IMER/MAFF/2/87

<u>Vessel:</u>	R.V. Cirolana	MAFF CIROLANA CRUISE 5
<u>Personnel:</u>	K Brander (MAFF)	PART II 26 MAY - 9 JUN.
	S Coombs	
	D Conway	
	D Robins	
	N Halliday	
	M Jordan	
	B Riches (MAFF)	
	B Chapman (MAFF)	
	R Harrop (MAFF)	
	R Shields (Menai Bridge)	- 1st week
	P Connolly (Irish Observer)	- 2nd week
	P Westhaus-Ekau (Kiel)	- 2nd week

Itinerary:

Mon	25 May	1700 hrs	Join ship at Workington.
Tue	26 May	1000 hrs	Depart Workington; commence sampling programme. UNDULATOR tows 1-6.
Wed	27 May		Plankton grid 1 - Central Irish Sea. LHPR 1.
Thurs	28 May		UNDULATOR tows 7-8; return to Holyhead to collect spare light rig parts.
Fri	29 May		Plankton grid 2 - Great Ormes Head. UNDULATOR tows 9-10 LHPR 2.
Sat	30 May		UNDULATOR tows 11-12. Plankton grid 3 - Lambay Island LHPR 3. UNDULATOR tows 13-14.
Sun	31 May		Plankton grid 4 - Dundalk Bay UNDULATOR tows 15-19.
Mon	1 June		Exchange personnel at Holyhead. Plankton grid 5 - Liverpool Bay to Morecambe Bay LHPR 4.
Tues	2 June		UNDULATOR tows 20-21. Plankton grid 6 - Central Irish Sea. UNDULATOR tow 22.
Wed	3 June		Plankton grid 7 - Off Strangford Lough. UNDULATOR tows 23-24. Plankton grid 8 - Irish coast to Luce Bay.
Thurs	4 June		Plankton grid 9 - Wigtown Bay LHPR 5. UNDULATOR tow 25 LHPR 6.
Frid	5 June		Plankton grid 10 - Solway Firth to Anglesey Plankton grid 11 - Caernarvon Bay UNDULATOR tows 26-29.
Sat	6 June		Finish sampling due to severe weather; set course for Plymouth.
Sun	7 June	1000 hrs	Dock Plymouth.

Objectives:

1. To determine the rates and processes of primary and secondary production in different regions of the Irish Sea.
2. To assess the vertical and horizontal availability of food for fish larvae in relation to hydrographic conditions.
3. To determine the nutritional status of fish larvae in relation to feeding conditions.
4. To relate periods of high larval mortality to local feeding conditions.

Operational and EquipmentProblems:

1. MAFF were unable to supply either the multi-layer net or the rosette water bottle sampling systems resulting in severely restricted sampling efficiency and capability.
2. The MAFF 120 kHz echo-sounder was inoperative and the echo-integration system used with the 38 kHz transducer was unreliable in operation so that no useable results were obtained.
3. Problems of insensitivity reduced the usefulness of results from the IMER 200 kHz echo-sounder which is due for replacement.
4. A packing container with batteries and computer discs for the light rig was knocked into the harbour during loading necessitating collection of replacements during the cruise from Holyhead.
5. One day's data from the light rig and results from one UNDULATOR tow (repeated successfully) were lost due to failure of the data logger.
6. Shipboard computer processing programs for MAFF logged data were inadequate.
7. The 7 l water bottles used by IMER suffered continual problems of breakage and inoperation and should be thoroughly overhauled.
8. Some problems with jamming of the LHPR fine mesh system were experienced. Mostly these were due to clogging of the filtering gauze which was remedied by increasing the rate of gauze advance.
9. Further development is required on the UNDULATOR data processing programs on the IBM system to reduce unacceptably long processing times.

Results:

1. 29 UNDULATOR tows were completed (Fig. 1). Results showed an area of stratified water extending from near the Irish coast into the central Irish Sea. Several distinct regions of stratification were evident based on characteristic temperature/salinity profiles. Results from the UNDULATOR salinity measurements and the plankton analysis from the UNDULATOR net samples were used to position more detailed station sampling.

Complementary sampling was also carried out along UNDULATOR tows from discrete surface and water samples taken for Coulter counter particle size analysis, chlorophyll, Carbon and Nitrogen measurements and filtration rig samples for various size categories of plankton preserved in formalin. Continuous surface measurements of salinity, temperature, chlorophyll a fluorescence and nitrate concentrations were maintained along the UNDULATOR transects.

2. At selected stations along the UNDULATOR transects and at the detailed sampling stations water bottle sampling was carried out at a series of depths. In addition to the set of analysis outlined above full nutrient analysis was completed on selected samples and water samples preserved in Lugols.
3. Results from the surface Coulter counter analyses showed characteristic size frequency distributions on either side of the frontal region. There was some indication that there was a more suitable size of particle for larval feeding in mixed water to the east of the front. Vertical size frequency profiles showed a more variable situation in the frontal and stratified water than in mixed water where similar distributions were found throughout the water column.
4. 10 grids with a total of 91 stations were worked with standard plankton net sampling to determine areas of ichthyoplankton abundance and to provide material for nutritional analysis (Fig. 2). A further 23 horizontal tows were made at detailed sampling sites. Vertical profiles of temperature, salinity, and chlorophyll a fluorescence were obtained on all hauls using the MAFF sensor system.

Results from the plankton tows indicated very low numbers of fish eggs and larvae throughout the area. Although sprat larvae predominated in the catches there was barely sufficient to provide material for the various analyses planned. Most ichthyoplankton and the more abundant zooplankton were taken in the mixed water in the eastern areas with negligible numbers of sprat larvae - even in areas which from sampling by MAFF two weeks previously had been identified as current spawning areas.

5. 6 LHPR hauls were taken at selected stations (Fig. 2) with the fine and coarse mesh net system. Fish eggs and larvae were sorted from the coarse mesh samples and the remainder preserved for future analysis. Fine mesh samples were washed off and variously treated for chlorophyll and HPLC pigment determinations, Coulter counts for

- size frequency analysis, filtration for total carbon and preservation in formalin for microscope identification.
6. The low numbers of sprat eggs in the area prevented the incubation of any reasonable amount for experimental feeding studies. A small number of larvae surviving from eggs incubated in the first half of the cruise were offered various diets of ciliates and encapsulated food but no feeding was observed. Larvae from these experiments and from a further batch incubated in the latter part of the cruise were preserved for a variety of nutritional and otolith studies.
  7. Sprat larvae from net samples were also preserved for nutritional analysis using DNA/RNA, histological, HPLC for pigments and CHN measurement methods. Additionally specimens were preserved for daily growth determinations from otolith examination and for feeding studies from gut contents analysis. Preliminary findings indicated a surprisingly low incidence of food items in the guts of larvae from all areas of the Irish Sea.
  8. Primary production measurements were obtained from in situ incubations at a free-floating rig on seven days at selected sites. Additional shipboard experiments were carried out to determine specific production rates for individual taxonomic and size groups. Preliminary results indicated that 70-90% of chlorophyll a was found in phytoplankton of  $> 5\mu\text{m}$  in size.
  9. Samples were of plankton and sediment were taken at intervals for radioactivity studies.

Prepared by: S H Coombs

Approved by: R Williams

Date: 23 June 1987

Circulation: Bayne, Williams, Coombs, Conway, Robins, Joint, Pomroy, Halliday, Jordan, Moon, Bruce.

MAFF: Garrod, Brander, Chapman, Riches, Harrop, Nichols  
Menai Bridge: Shields, Rees  
NERC Swindon: D Pugh, S White  
IOS (Wormley): M Angel - Library  
(Bidston): Acting Director - Library  
(MIAS): Mrs P Edwards - Library  
RVS: L Skinner (x 2)  
MBA: Prof. Denton  
DAFS: Acting Director  
SMBA: J L Matthews

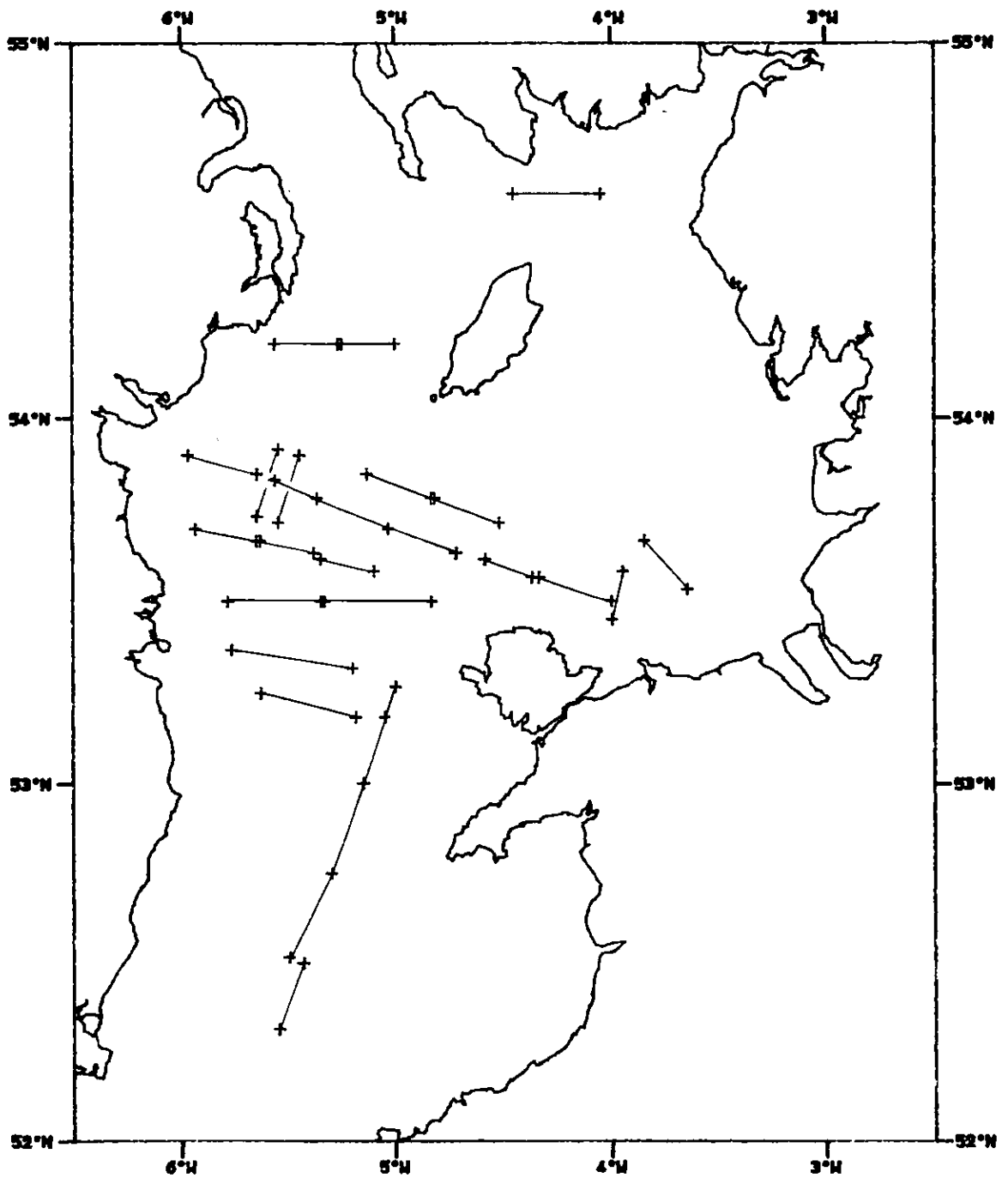


Fig. 1 UNDULATOR tows.

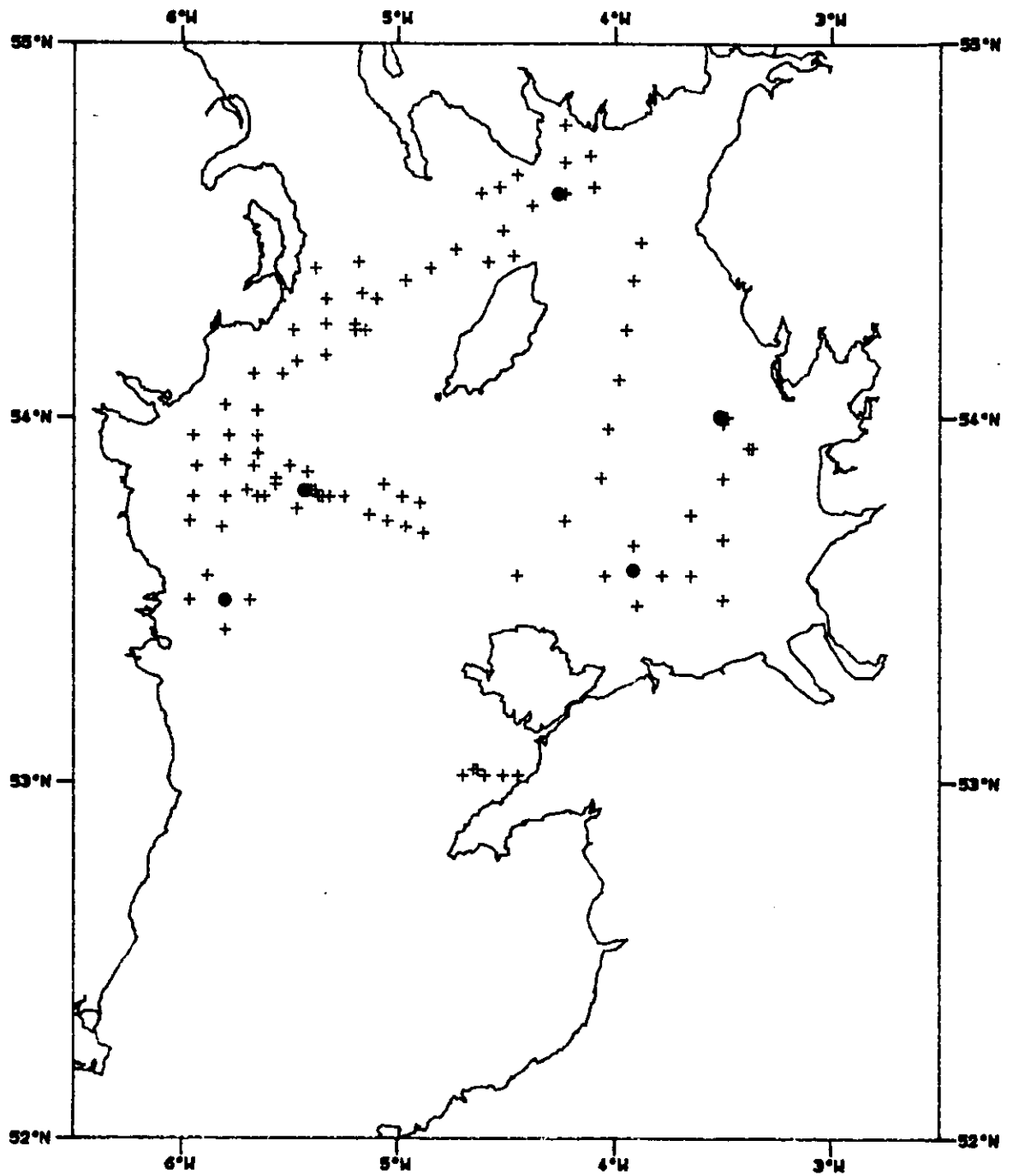


Fig. 2 Plankton stations (crosses) and LHPR hauls (dots).