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Charter cruise FRV *Lough Foyle*

REPORT

Cruise 4/91 19-26 April 1991

43H

Personnel

M Heath	PSO (in charge)
R Mitchell	SSO (19-22 April)
S Hay	HSO
J McKie	HSO
R Payne	HSO (19-22 April)
P Copland	HSO (22-26 April)
L Cargill	SO
J Hunter	PTO
P Brennan	Student (22-26 April)
A Rees	Visitor (Plymouth Marine Laboratory)

Objectives

1. To deploy and service instruments on moorings in Loch Linnhe.
2. To carry out a programme of physical, chemical and biological sampling in Loch Linnhe.

Narrative

Gear was loaded aboard the vessel in Oban on 19 April and the vessel sailed at approximately 1600. During the first two days of the cruise, the three moorings in Loch Linnhe were serviced, and ARIES and fixed station sampling carried out. Scientific staff were exchanged in Oban at 1400 on 22 April, and the vessel then continued with the survey work which was completed at 2000 on the evening of 25 April. Echosounder calibrations were carried out at anchor during the evening, and the vessel then docked in Oban to unload gear at 0830 on 26 April.

Results

Data were successfully recovered from the instruments. The nitrate analysers indicated that there had been little change in nitrate concentration since the previous cruise, and this was borne out from water sampling. There was no evidence from the moored fluorometers of any significant increase in chlorophyll fluorescence over the deployment period. The conclusion was that up to the time of recovery of the instruments, the spring bloom in Loch Linnhe had not commenced.

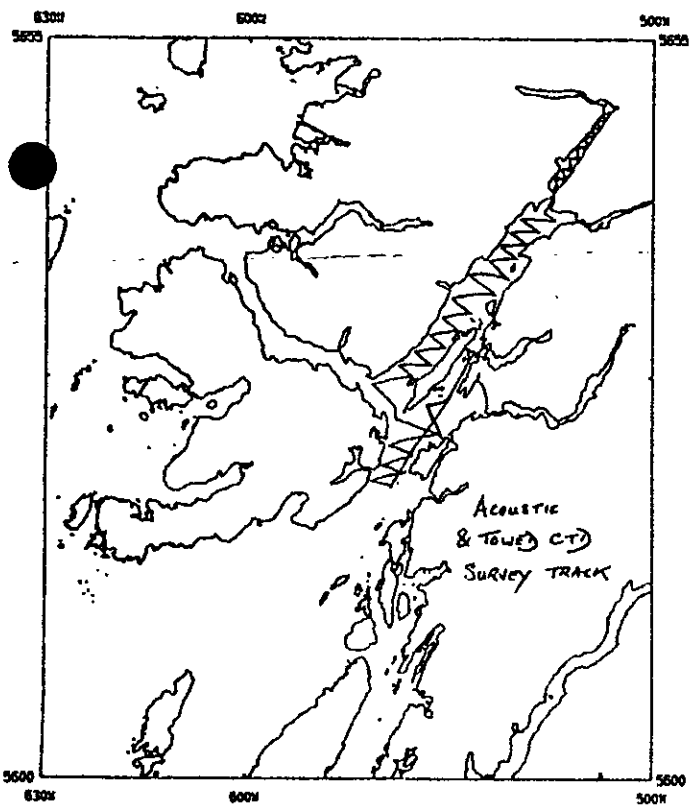
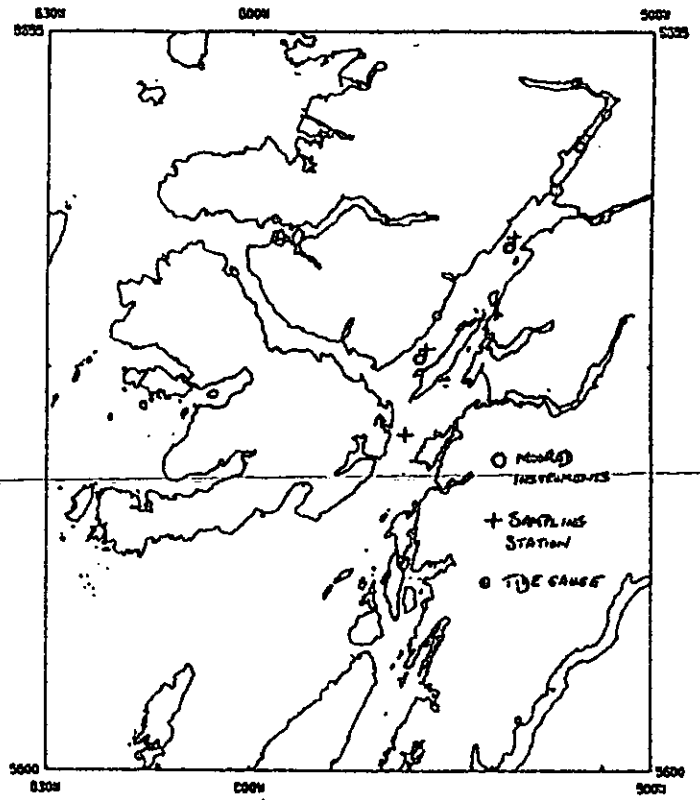
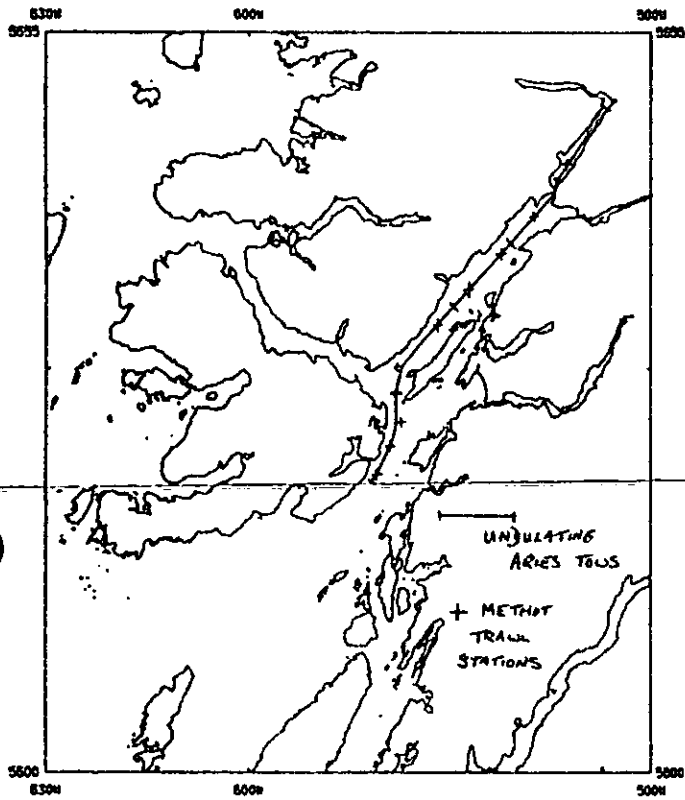
Sampling at the four fixed locations (Inner Loch, Outer Loch, Lismore, and Firth of Lorne) showed that only small quantities of chlorophyll were present in the water ($<1 \text{ mg/m}^3$) within Loch Linnhe, but zooplankton concentrations were substantially higher than in March. In general, chlorophyll concentration increased with distance from the head of the loch. Numbers of copepods and small medusae were also higher at the seaward end of the loch. Incubations of live copepods and medusae (mainly *Sarsia*) showed that ammonia excretion rates were higher than in previous cruises, and water sample analysis indicated an increase of approximately 0.5 mgat/m^3 in the ammonia concentration in the sea. The vertical and horizontal distributions of zooplankton and phytoplankton (from ARIES tows) suggested that the increase in zooplankton was a consequence of advection into the loch from the open sea, rather than growth of the overwintered population in the loch.

The first towed CTD survey (23 April 1991) showed the usual distribution of temperature and salinity in Loch Linnhe and the Firth of Lorne. Nitrate (recorded from the on-line autoanalyser) was close to winter levels ($7-9 \text{ mgat/m}^3$) throughout, but lower in the Firth of Lorne than on previous occasions. Values of chlorophyll fluorescence equivalent to approximately $1-2 \text{ mg chlorophyll/m}^3$ were measured over a wide area in the Firth of Lorne. However, in a small area off the southern tip of Lismore, in the mouth of the Sound of Mull fluorescence equivalent to approximately $4-6 \text{ mg chlorophyll/m}^3$ was measured in association with reduced nitrate values, suggesting the beginnings of a spring bloom at the mouth of Loch Linnhe. To evaluate the progression of this bloom, the survey was repeated on 25 April. In the repeat survey, there was a substantially higher chlorophyll concentration (8 mg/m^3) and lower nitrate levels ($3-4 \text{ mgat/m}^3$) along the eastern shore of Outer Loch Linnhe, suggesting a developing bloom originating from the northern end of Lismore Island. To investigate this further, the survey was extended into the Lynn of Lorne, a shallow embayment on the eastern side of Lismore with a narrow outlet into Loch Linnhe. An intense bloom was underway in the Lynn, with chlorophyll concentrations in excess of 15 mg/m^3 , and nitrate at levels close to the lower detection limit of the autoanalyser (0.1 mgat/m^3).

The interference detected on the acoustic equipment during earlier cruises seemed to be very substantially reduced on this occasion; and it seems likely that it may be related to the ballasting of the vessel. The water tanks on the ship were filled prior to commencing echosounding work on this cruise, whereas on previous occasions they have been low. Initial inspection of the data from both acoustic surveys seems to indicate an increase in scatterers in the water compared to previous cruises, and this was born out by the MIKT sampling, which caught large numbers of decapods and fish larvae (mainly sandeel and cod). Specimens of sandeel, cod and sprat larvae were retained for otolith microstructure and RNA/DNA analysis.

M Heath

28 May 1991



Lough Foyle 4/91

19-26 APRIL 1991