

Department of Agriculture and Rural Development (Northern Ireland)
Agriculture and Environmental Science Division

Cruise Report: LF 0204

Vessel: RV *Lough Foyle*

Date: 4th – 6th January 2004

Area: Irish Sea (north); ICES div. VIIa

Survey Type: Biological Oceanography & Mooring Service

Personnel:

B Stewart (SIC)	SSO	DARDNI	4 – 6 Jan
C Smyth	SO	DARDNI	4 – 6 Jan
A M Coyle	ASO	DARDNI	4 – 6 Jan
J Hill	Student	DARDNI	4 – 6 Jan
S McCracken	Temp ASO	DARDNI	4 – 6 Jan
J Hill	Student	QMUL	4 – 6 Jan

Objectives:

- i. To maintain a nutrient and remote monitoring programme at mooring stations 38A and 47D.
- ii. To assess temperature, salinity and nutrient distributions over depth at stations 38A and 47D.
- iii. To assess surface temperature, salinity and nutrient distributions throughout a grid of stations in the north western Irish Sea.

Cruise Narrative:

Sunday 4 January 2004

In preparation for the cruise, all DANI scientific crew were onboard by 2000 hrs when mooring components and the automated sampler were prepared for deployment. Following a talk on ship's safety and a demonstration of personal life saving equipment, the RV Lough Foyle departed Belfast at 2100 hrs and sailed overnight in a light wind to the mooring site at station 38A.

Monday 5 January 2004

The vessel arrived on the mooring site at 0600 hrs. The weather was dry with light winds when work for the day started at 0750 hrs with the complete instrument mooring eventually recovered to ship deck at 0820 hrs. The mooring components were serviced, instruments downloaded and reprogrammed before redeployment at 0940 hrs in depth 96m on position 53⁰ 46¹.909N 05⁰ 38¹.088W. The rosette water

sampler and zooplankton net were then deployed before the vessel sailed to coastal mooring station 47D off the Drogheda foreshore where the instrument mooring was recovered to ship deck at 1300 hrs. Following a thorough service the mooring was redeployed at 1415 hrs in depth 24m on position $53^{\circ} 44' .46\text{N}$ $06^{\circ} 03' .85\text{W}$. Following deployment of the rosette water sampler and zooplankton net the vessel commenced sailing along a grid of stations when samples were taken at regular intervals through the ship's clean sea water supply.

Tuesday 6 January 2003

Sampling continued overnight along the grid and was completed on station 14 off the Portavogie coast at 1230 hrs. The vessel sailed to dock in Belfast where scientific crew disembarked at 1715 hrs.

Wednesday 7 January 2004

Scientific crew returned to the ship at 0900 hrs when samples and equipment were removed from the ship and transported to Newforge Lane.

Parameters Monitored:

The CTD/rosette water sampler was deployed at stations 38A, 47D, and 61 to acquire nutrient, chlorophyll *a*, temperature, light and salinity data from the depth profile. Three zooplankton net hauls were taken at stations 38A & 47D.

Moored instrumentation:

During all cruises the McLane water sampler deployed at depth 20 metres functioned mostly as programmed. Some samples were missed from the October deployment during the period 20 November to 8 December, when the sampler stopped prematurely. Aside this duplicate samples, for nutrient analysis, were taken every second day during the period 3 October 2003 – 3 January 2004. Temperature data recorded at 3 hourly intervals was recovered from seven thermistors positioned at intervals throughout the water column. Temperature, salinity and fluorescence data recorded at 15 minute intervals was recovered from CTD's positioned at near surface and near bottom at station 38A. Currently no instruments are deployed on the station 47D mooring.

Summary of Results:

Station 38A

Data from the three survey cruises during the period 27 October 2003 – 5 January 2004 demonstrate the annual cycle of change that follows the demise of the thermocline observed during the September cruise. The nutrient profile from October shows a general increase in surface concentrations, typically 2 micromoles inorg N l^{-1} since the September survey. Thereafter the surface values continue to increase during

December and January. Although all profiles are thermally mixed, a deep rich nutrient layer evident in October cruise becomes eroded, resulting in thoroughly mixed nutrient profiles during December and early January. Re-mineralisation of seabed organic matter can provide a source of deep-water nutrients and together with Atlantic and riverine inputs would explain the increasing nutrient concentrations throughout the profile observed during December and January. This pattern of increasing nutrients during the survey periods is supported by near surface data obtained from the moored water sampler. CTD data shows salinity as relatively constant and typically 34.3 throughout survey period while temperature shows a steady 1.5 °C decrease between surveys. This gradual decrease in temperature is supported by data obtained from near surface and near bottom thermistors which also chart the breakdown of the thermocline.

Station 47D

Nutrient and physical data obtained from surveys in October, December and January graphically demonstrate the progressive influence of freshwater on a shallow, low tidal coastal region during the winter months. October data shows the profile to be thermally mixed with uniform salinity and typically 34.2 and 12.3 °C; nutrient concentrations are similar throughout the profile and typically 2.7 micromoles inorg N l⁻¹. As winter rainfall increases river loading, the profile stratifies in December with a nutrient rich, cooler, less saline upper layer. The stratification further strengthens in January when surface salinity and temperature fall to 32.15 and 7.6 °C respectively with surface nutrient concentration 25.09 micromoles inorg N l⁻¹. Nutrient data obtained from the surface mapping grid of stations show the potential of this enriched coastal region to influence the offshore mooring station 38A.

Hotel Report & Operational Aspects of the Ship:

During the cruise the A-frame, main trawl winches, both hydrographic winches and the ship's clean seawater supply were used. No problems were encountered with any of the ship's equipment nor indeed with any of the scientific equipment. The hotel and catering service was of the usual high standard and there was a good working relationship between the scientists and the ship's crew. Prior to the ship departing Belfast a comprehensive and detailed safety briefing was delivered to the scientific crew.

Acknowledgements:

I am indebted the deck crew of the RV Lough Foyle for their co-operation and assistance during the mooring recovery and deployment operation. The ship's master, officers, engineers and catering staff are also thanked for their co-operation during this cruise.

B M STEWART

3 February 2004