

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

Cruise Report: LF 4303

Vessel: RV *Lough Foyle*

Date: 26th - 28th October 2003

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

Survey Type: Biological Oceanography & Mooring Service

Personnel:

B Stewart (SIC)	SSO	DARDNI	28 – 30 Oct
C Smyth	SO	DARDNI	28 – 30 Oct
A M Coyle	ASO	DARDNI	28 – 30 Oct
J Hill	Student	DARDNI	28 – 30 Oct
S McCracken	Temp ASO	DARDNI	28 – 30 Oct

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 26 October 2003

In preparation for the cruise, all DARDNI 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 2015 hrs and sailed overnight in a light wind to station 38A mooring site.

Monday 27 October 2003

The vessel arrived on the mooring site at 0600 hrs. The weather was dry with a light north easterly breeze when work for the day started at 0800 hrs with the complete instrument mooring eventually recovered to ship deck at 0830 hrs. The mooring components were inspected for corrosion and parts replaced where necessary. The thermistor chain was removed from the mooring wire, temperature data downloaded and individual units reprogrammed. The CTD's and fluorometer were also removed, data downloaded and reprogrammed. The sub surface water sampler was serviced;

samples removed, rebuilt, reprogrammed and attached to the mooring wire. The mooring components were reassembled and readied for deployment. The CTD's and fluorometers were attached and the mooring redeployed at 1030 hrs in depth 96m on position $53^{\circ} 46' .928\text{N}$ $05^{\circ} 38' .001\text{W}$. Following deployment of the rosette water sampler and zooplankton net the vessel sailed to coastal mooring site 47D off the Drogheda foreshore. The instrument mooring was recovered to ship deck at 1320 hrs, serviced and redeployed at 1340 hrs in depth 24m on position $53^{\circ} 44' .503\text{N}$ $06^{\circ} 03' .007\text{W}$. Following deployment of the rosette water sampler and zooplankton net the vessel sailed to dock in Belfast at 2200 hrs.

Tuesday 28 October 2003

Work for the day commenced at 0800 hrs when samples and equipment were prepared and removed from the vessel for return transportation to Newforge Lane. The scientific crew disembarked at 1030 hrs.

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