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

Cruise Report: LF 2504
Vessel: RV *Lough Foyle*
Date: 27th – 30th June 2004
Area: Irish Sea (north); ICES div. VIIa
Survey Type: Biological Oceanography & Mooring Service

Personnel:

B Stewart(SIC)	SSO	DARDNI
C Smyth	SO	DARDNI
P McShane	ASO	DARDNI
K Kennington	Port Erin	IOM
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J Hill	Student	QMUL

Objectives:

i. To maintain a nutrient and remote monitoring programme at mooring stations38A 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.

iv. To assess sediment, epifauna and *Nephrops* samples for isotopic and pigment content.

v. To assess temperature, salinity and nutrient distributions over depth along an east-west Irish Sea transect at latitude 54 degrees.

Cruise Narrative:

Sunday 27 June 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 westerly breeze towards the mooring site at station 38A.

Monday 28 June 2004

The vessel arrived on the mooring site at 0600 hrs. The weather was dry with a fresh south-westerly wind when work for the day started at 0745 hrs with the complete instrument mooring eventually recovered to ship deck at 0815 hrs. The mooring components were serviced, instruments downloaded and reprogrammed before redeployment at 1130 hrs in depth 94m on position 53^0 46^l.862N 05^0 38^l.109W. The rosette water sampler and zooplankton net were then deployed.

After lunch the rosette water sampler was again deployed, followed by the sediment multi-corer and the beam trawl to acquire water, sediment, epifauna and *Nephrops* samples. The vessel then sailed to arrive at the inshore mooring station 47D at 1945 hrs where the rosette water sampler and zooplankton nets were deployed. Work for the day finished at 2130 hrs and the vessel drifted overnight in proximity to the mooring station.

Tuesday 29 June 2004

Work for the day commenced at 0745 hrs when the instrument mooring was recovered to ship deck at 0810 hrs. Although the entire mooring had been trawled 700 m from the position of deployment there had been no damage to the configuration. Following a thorough service the mooring was redeployed at 0840 hrs in depth 30 m on position 53^0 44^l.504N 06^0 04^l.006W.

The vessel then sailed towards the Strangford coast to commence sampling along the 54 degree latitude line. Work along the transect stations commenced at 1100 hrs when the rosette water sampler was deployed at approximately hourly intervals finishing in Morecambe Bay at 2100 hrs. The vessel then sailed overnight to dock in Belfast at 0900 hrs next day.

Wednesday 2 June 2004

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 1100 hrs.

Parameters Monitored:

The CTD/rosette water sampler was deployed at stations 38A, 47D and at positions along the 54 degree latitude transect from Strangford to Morecambe Bay 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:

The McLane water sampler deployed at depth 20 metres functioned as programmed with the exception of the 10 May and 31 May deployments where programming errors were suspected. Aside this, duplicate samples, for nutrient analysis, were taken every second day during the period 1 April – 9 May 2004. Temperature data recorded

at 3 hourly intervals was recovered during each mooring service from seven thermistors positioned at intervals throughout the water column.

Temperature, salinity and fluorescence data recorded at 15 minute intervals was recovered during each mooring service 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 survey cruises during the period 2nd April – 28th June 2004 demonstrate the annual cycle of change both before and during the spring bloom. Pre-bloom, CTD profiles for 2nd and 16th April show a mixed profile with salinity and temperature typically 34.2 and 12.3 ^{o}C respectively. Nutrient data for the same dates show a well mixed profile with inorganic nitrogen concentrations typically 6.2 micromoles inorg N l^{-1}. However data from the 4th May cruise show change is taking place with surface warming, increased fluorescence and reduced nutrient levels in the top 30 m layer. All indications that the spring bloom has commenced. Data from moored instrumentation give a more precise picture of the onset of the bloom. The moored CTD and fluorometer show fluorescence on the increase during the last week in April. This is supported by nutrient data from the moored sampler showing nutrient uptake commencing in the same period at the end of April. A closer look at both sets of data pinpoints the start of the bloom around the 23rd April. The subsequent cruises on the 10th and 31st May and 28th June show a strengthening of the thermocline with upper layers 13 ^{o}C and deeper layers 9.3 ^{o}C. Change is also occurring in the nutrient profile with the nutrient depleted layer gradually extending deeper as upward nutrient transfer across the thermocline begins to reduce levels in the more concentrated bottom layer .

Data from the moored fluorometer show that the biological activity associated with the bloom starts to subside towards the end of May leaving the profile to begin recovering nutrients during the next part of the annual cycle. Meanwhile the thermocline continues to strengthen as indicated by temperature difference between the surface and near bottom layers.

Station 47D

An often complex situation arises at this inshore station owing to the direct freshwater influence from the River Boyne. However this season the pattern is similar to what occurred offshore. CTD profiles for 2nd and 16th April show a generally mixed profile with salinity and temperature typically 34.0 and 8.0 ^{o}C respectively and with nutrient values for the same dates typically 6-8 micromoles inorg N l^{-1}. Some three weeks on, physical data from the 10 May cruise show surface warming and the early stages of a thermocline developing. Meanwhile nutrients have become depleted throughout the profile. On 31st May the thermocline has strengthened with surface temperature 12.0 ^{o}C and on 28th June continued surface warming at this relatively shallow station has increased temperature at deeper layers to produce a generally

constant 12.4 ^{o}C over the entire profile. Nutrient levels during 31st May and 28th June remain depleted and typically 0-1 micromoles inorg N l^{-1} throughout the profile.

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

19 July 2004