



**Agri-Food and Biosciences Institute**  
 Agriculture, Food and Environmental Science Division  
 Fisheries and Aquatic Ecosystems Branch

**Cruise Report:** CO 3909  
**Vessel:** RV *Corystes*  
**Date:** 20 – 25 September 2009  
**Area:** Irish Sea (north); ICES div. VIIa & VIIg  
**Survey Type:** Biological Oceanography & Mooring Service

**Personnel:**

B Stewart	SSO	AFBI	19 – 25 Sept 2009
R Gilmore	SO	AFBI	19 – 25 Sept 2009
G Brady	TSO	AFBI	19 – 25 Sept 2009
C Scherer	Student	Napier	19 – 25 Sept 2009
N Greenwood		CEFAS	19 – 25 Sept 2009
T Hull		CEFAS	19 – 25 Sept 2009

**Objectives:**

- i. To maintain an insitu monitoring programme in the Irish Sea and Celtic Sea.
- ii. To investigate the distribution of dissolved nutrients and phytoplankton along a grid of stations in the Irish Sea, Celtic Sea, Celtic Shelf and Beaufort Dyke in the North Channel

<b>Circulation</b>	<input checked="" type="checkbox"/>	<b>Comments</b>
DCSO & CSO	<input checked="" type="checkbox"/>	
Ship Managers	<input checked="" type="checkbox"/>	
Fisheries Division	<input type="checkbox"/>	
ANIFPO	<input type="checkbox"/>	
NIFPO	<input type="checkbox"/>	
		Signed Head of Branch

## **Methods:**

- Stations were profiled using a Seabird SBE 32 water sampler and SBE 911 CTD
- Vertical zooplankton net hauls were taken using a 200 micron mesh bongo net with a 500mm diameter inlet.

## **Cruise Narrative:**

### Friday 18 September 2009

In preparation for the survey the CEFAS SmartBuoy was assembled on ship deck, instrumentation attached and programmed in advance of deployment.

### Saturday 19 September 2009

Following a talk on ship's safety and a demonstration of personal life saving equipment, the RV Corystes departed Belfast at 2200 hrs and sailed overnight in light winds to the AFBI mooring station 38A.

### Sunday 20 September 2009

The vessel arrived on mooring station 38A at 0630 hrs. The weather was dry and bright with a light westerly wind when work commenced at 0800hrs with recovery of the instrument mooring to ship deck. Data from thermistors, CTD and water sampler were down loaded. Samples were removed from the water sampler and following a detailed inspection of mooring parts, instruments were reprogrammed and mooring components reassembled. The instrument mooring was then successfully redeployed at 1300 hrs in depth 92 metres on position  $53^{\circ} 46' .986N$   $005^{\circ} 38' .088W$ . As strong to gale force winds were forecast, the SmartBuoy service was deferred and the survey continued with Irish coastal stations 47D, 36 and 37 followed by sampling stations along the Liverpool Bay and Isle of Man transects.

### Monday 21 September 2009

The Isle of Man transect was completed on station E at 1430 hours. The vessel then sailed in a southerly direction towards the SmartBuoy mooring sampling at stations 50 and 62 until south westerly gales forced the ship to shelter overnight at Wicklow head.

### Tuesday 22 September 2009

With winds decreasing the survey continued with sampling at stations B11, B10 and B9 with work finishing for the day on station B8 at 1730 hrs. Overnight the vessel sailed to the SmartBuoy mooring site in the Celtic Sea.

### Wednesday 23 September 2009

Difficulties were encountered during a first attempt to deploy the onboard replacement SmartBuoy mooring as a wire became caught on a rigid arm supporting light sensors. This resulted in the guard buoy floating an unacceptable angle that was likely to compromise light measurements. The mooring was recovered and successfully deployed at a second attempt on position  $51^{\circ} 15' .570N$   $006^{\circ} 05' .321W$ . Following this the SmartBuoy, previously deployed in July, was successfully recovered to ship deck. Work continued with sampling at Celtic Sea station B7 before sailing overnight to sample at stations in the Irish Sea and North Channel

### Thursday 24 September 2009

In light winds the survey continued with sampling at stations 26, 16, 4 and Beaufort Dyke stations 1 and 4 before docking in Belfast at 1700 hrs.

## **Work Completed:**

Despite periods of gales and heavy seas careful manipulation of the work programme enabled all cruise objectives to be achieved.

## Results:

Detailed results of the hydrographic and nutrient data collected during the period of the cruises will be made available as the data is worked up and interpreted by the laboratory. However some preliminary CTD and inorganic nitrogen data clearly illustrate the demise of the thermocline at the AFBI mooring site. Figure 1 shows the temperature and salinity profile from the August cruise and details a weakening thermocline at 25 metres. The temperature difference between surface and seabed has reduced from 4.5 °C, as recorded during the July survey, to 2.2 °C in August. Further mixing induced by surface cooling and stronger winds have resulted in an almost isothermal profile recorded during the September survey (Fig. 2).

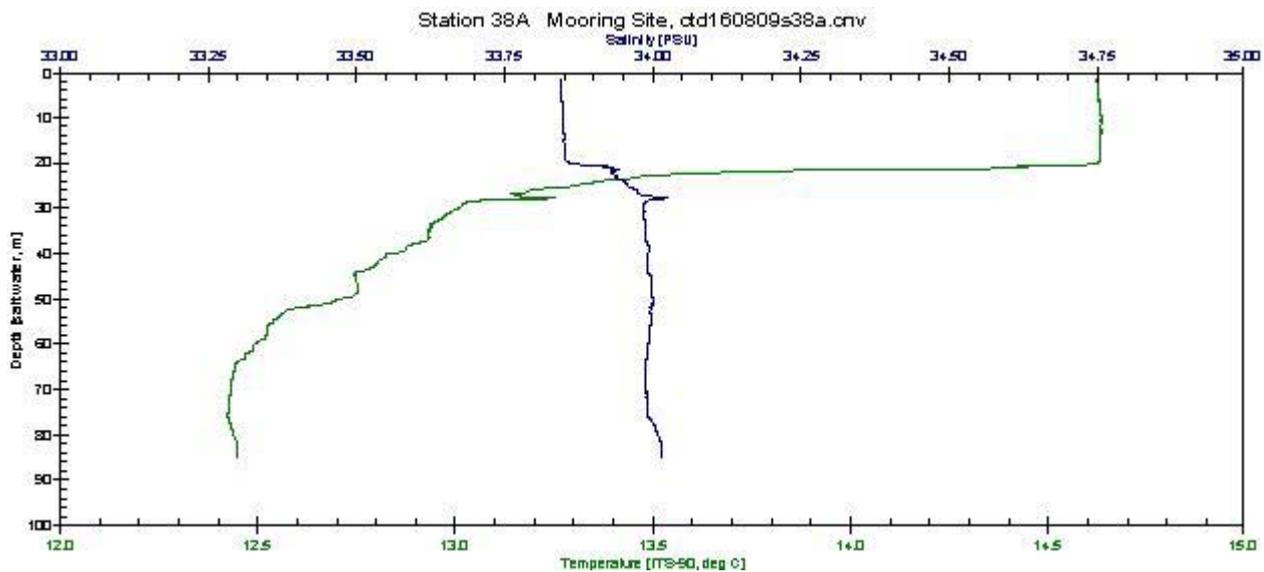


Figure 1. Station 38A Temperature and salinity profile recorded on 16 August 2009

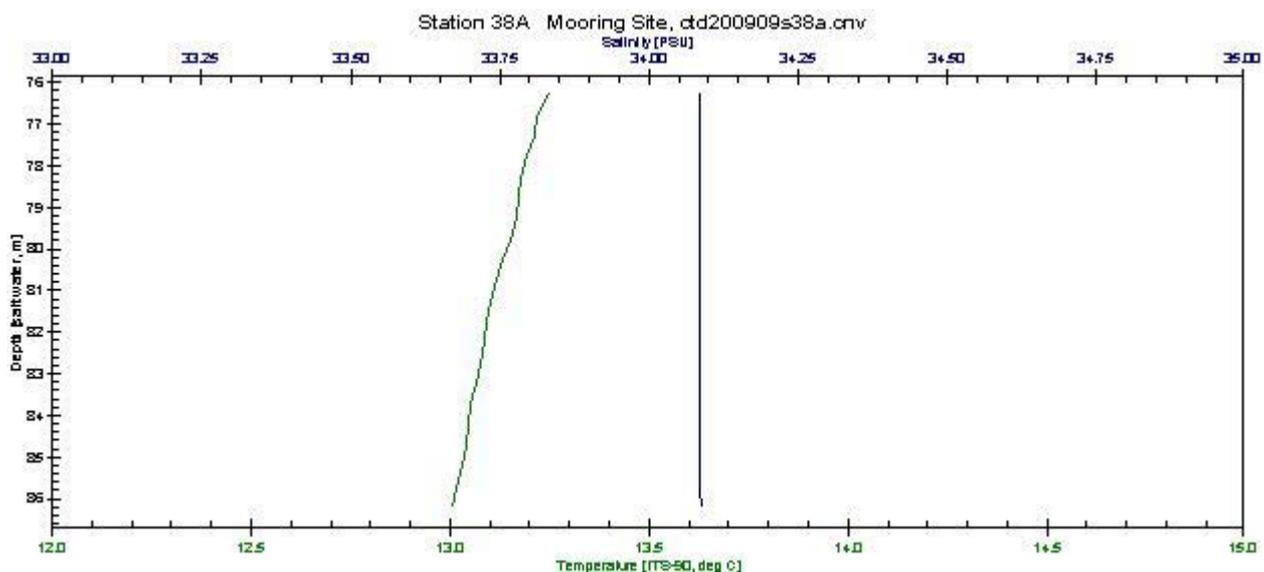


Figure 2. Station 38A Temperature and salinity profile recorded on 20 September 2009

The erosion of the thermocline also has an effect on the distribution of nutrients throughout the profile. During the spring bloom surface layers become depleted in inorganic nitrogen and with the onset of stratification density difference at the thermocline limits the transfer of nutrients to the upper layers. The nutrient profile from August show nutrient depletion down to 25 metres: the depth of the thermocline. Below the thermocline there is a gradual diffusion of nutrients from depth to the mid profile region (Fig. 3). In September as the thermocline breaks down inorganic nitrogen begins to diffuse across the profile and into the surface layers as shown in figure 4. With mixing this process will continue until nutrient concentrations are constant across the depth profile.

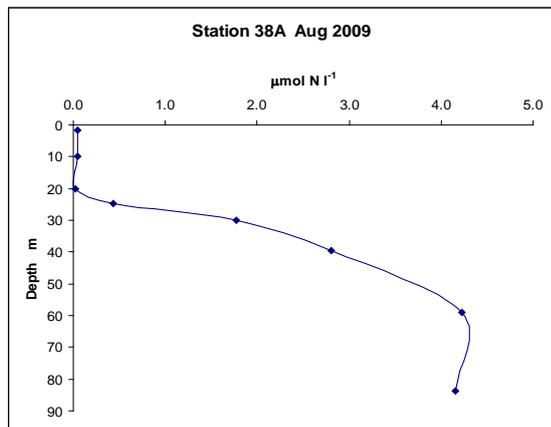


Fig. 3. Inorganic Nitrogen profile from August survey

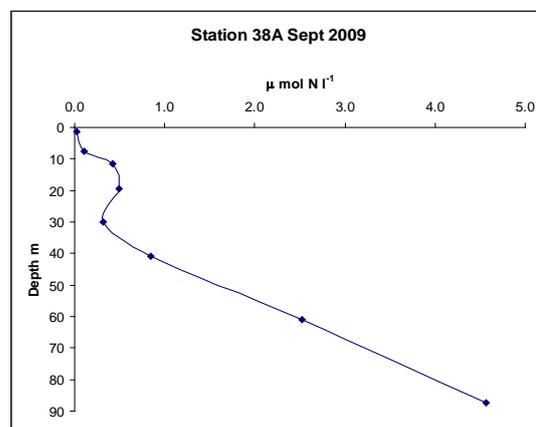


Fig 4. Inorganic nitrogen profile from September survey

### 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 ship's equipment. The hotel and catering service was of an acceptable 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.

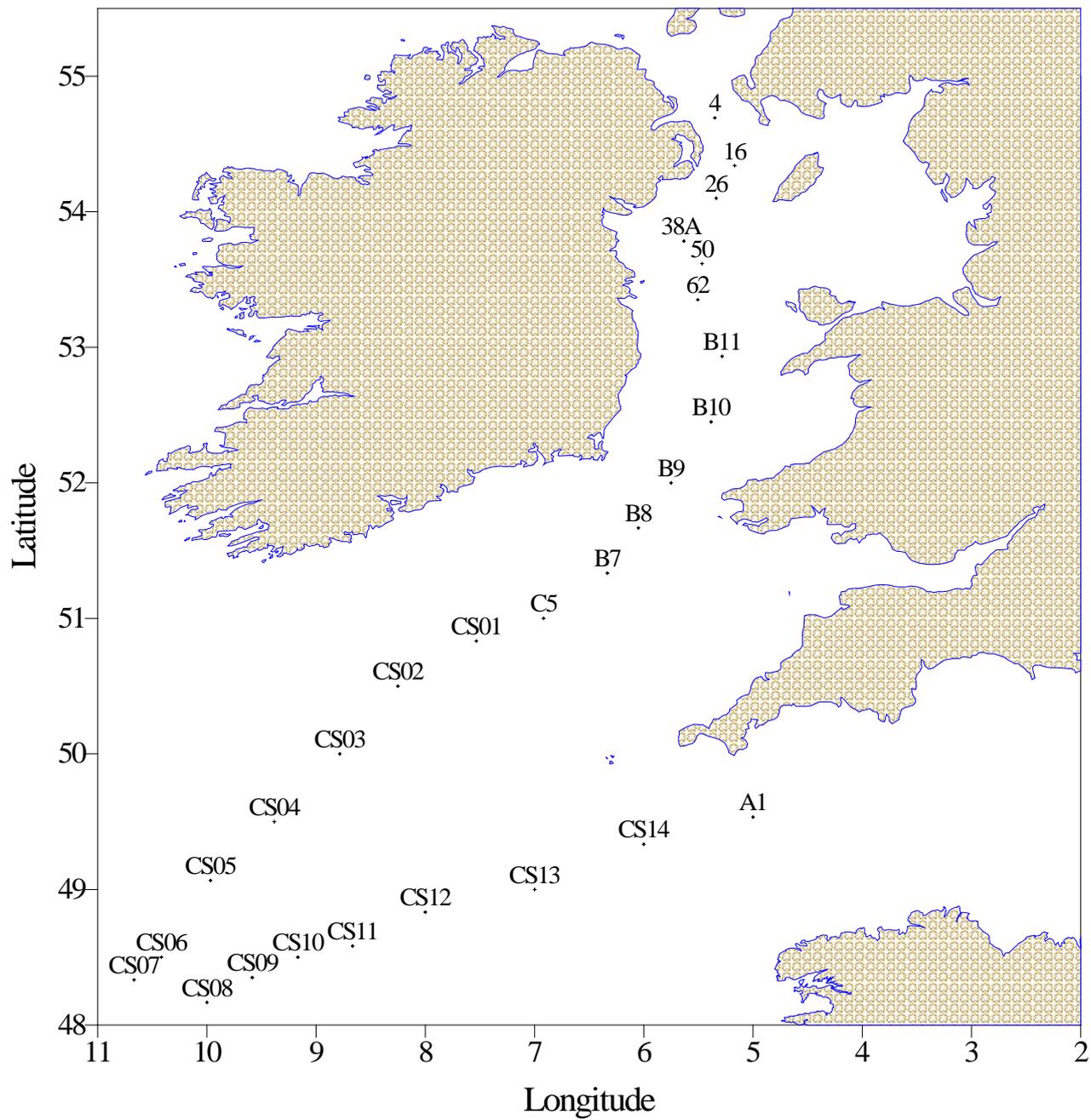
### Acknowledgements:

I am indebted the deck crew of the RV Corystes 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.

*Scientist in Charge*

Date: 14 October 2009

Not to be cited without prior reference to AFBI (Fisheries & Aquatic Ecosystems Branch)



**Survey Transect CO 3909**