

**CENTRE FOR ENVIRONMENT, FISHERIES AND AQUACULTURE SCIENCE  
LOWESTOFT LABORATORY, SUFFOLK, NR33 0HT**

**2006 RESEARCH VESSEL PROGRAMME**

**REPORT: RV CELTIC VOYAGER 0606: ISEPS CRUISE 3/06.**

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**DURATION:** 7 - 16 March 2006 (All times are GMT)

**LOCATION:** Irish Sea

**AIMS:**

1. To conduct a plankton survey using a 76cm Gulf VII plankton sampler to determine the distribution and abundance of cod (*Gadus morhua*), haddock (*Melanogrammus aeglefinus*) and plaice (*Pleuronectes platessa*) eggs.
2. To remove fish eggs from fresh plankton samples at sea. To measure, stage and preserve these eggs in ethanol prior to species identification using a DNA technique on return to the laboratory.
3. To collect surface nutrient and chlorophyll samples at each sampling station.
4. To collect a surface phytoplankton and salinity sample every three sampling stations.
5. To collect fine mesh (80 micron) PUP net samples for subsequent zooplankton analysis on every Gulf VII deployment.
6. To continuously monitor sub-surface (3m) salinity, temperature and fluorometer data using the ships pumped seawater supply and onboard CTD.

**NARRATIVE:**

This was the third, of five planned plankton surveys to estimate the spawning stock biomass (SSB) of cod, haddock and plaice in the Irish Sea using the annual egg production method (AEPM).

RV Celtic Voyager sailed from Belfast at 15:30h, 7 March and proceeded to the first plankton station at the mouth of Belfast Lough. This was the first plankton station to use the new Valeport CTD and software on the Gulf VII sampler, and it was successfully completed by 17:40h. A few teething problems with lack of data from various flowmeters, and the altimeter, were gradually resolved during the first few deployments of the sampler in deep water in the North Channel. Good progress was made overnight and during the next day, as

sampling continued along the coast of Dumfries and Galloway into the Solway Firth. Unfortunately a complete power failure (including the UPS) on the ship during station 16 at 18:00h, 8 March, caused much concern, as one of the engines appeared to be overheating. The sampler was eventually recovered, the ship's systems were restored, and the station repeated successfully, following a delay of approximately one hour.

Sampling resumed into the Solway, down the Cumbrian coast, then west towards the Isle of Man. With NW gales forecast on 9 March, Celtic Voyager continued working west of the Isle of Man and into Dundrum Bay to seek some respite from the weather. The wind increased to SW 8 to 9 overnight, but sampling continued, working south, close to the Irish coast, reaching Dublin Bay by midday, 10 March. The Celtic Voyager then worked slowly north, in strong, to gale force WNW winds, to stations east of Dundalk Bay. The winds gradually eased overnight and good progress was made as the Celtic Voyager again worked south towards the most southern row of stations at 53° 05'N. With SE gales forecast the following day, sampling continued east towards the Welsh coast and Anglesey. By midnight 11 March, the wind and swell were too great for sampling to continue, and shelter was sought in Red Wharf Bay, Anglesey where the Celtic Voyager remained at anchor until 08:30h, 13 March.

Strong to gale force SE winds hampered progress during 13 March, and only five stations were completed before the Celtic Voyager anchored for the night in Liverpool Bay. The wind eased overnight and sampling resumed the next morning, just north of the Mersey Estuary. Good progress was made, with 16 stations being completed by 09:00h, 15 March. Unfortunately, whilst steaming to complete stations between the Isle of Man and the Cumbrian coast, the wind again increased to gale force. With no prospect of working in the area for the foreseeable future the Celtic Voyager abandoned work and headed towards Dublin where she docked at 20:30h, 15 March.

All scientific equipment and preserved samples were retained on-board, for subsequent offloading in Belfast, following the forth plankton survey of the series (Celtic Voyager 0608, 24 Mar - 4 Apr).

## **RESULTS:**

### AIM 1. Gulf VII plankton survey. Figure 1.

Despite the inclement weather experienced during this survey, 81 plankton stations of the original 107 planned were successfully completed (Figure 1). The samples were sorted whilst fresh (see aim 2), and once the required eggs had been removed, the rest of the sample was preserved in 4% buffered formaldehyde for subsequent analysis at Cefas, Lowestoft.

The Valeport CTD and software, generally worked well, but further enhancements to the software will be required to make the system more robust and to enable data summaries to be produced for each sampled station.

### AIM 2. Sorting and preservation of fish eggs for subsequent DNA analysis. Figure 2.

Every Gulf VII plankton sample was taken into the shipboard laboratory, where fish eggs were measured and staged. Those eggs in the size range 1.1 to 1.75mm, and in stage 1, were preserved individually in ethanol. A total of 1653, early stage, 'cod-sized' eggs were removed from the samples for subsequent species identification by DNA sequencing. The distribution of the number of selected eggs removed is shown in figure 2.

AIM 3. Collection of surface nutrient and chlorophyll samples.

A sub-surface (approx 3m depth) seawater sample was collected (using a shipboard pump) on every Gulf VII station. A 100ml aliquot of this water was preserved with mercuric chloride and returned to Cefas, for subsequent nutrient analysis. A further 250ml aliquot was filtered through a GFC filter, which was frozen and returned to Cefas for subsequent chlorophyll analysis.

AIM 4. Collection of surface salinity and phytoplankton samples. Figure 1

27 sub-surface (approx 3m depth) seawater samples were collected (using a shipboard pump) on every third station, and returned to Cefas for subsequent salinity analysis. This will enable comparisons to be carried out between the Valeport CTD, the shipboard continuously logged water supply and these reference samples. 27 water samples were also taken from the same shipboard supply and preserved in Lugols Iodine for subsequent phytoplankton species analysis.

AIM 5. Collection of 80 micron, 'Pup' net samples.

Fine mesh 'pup' samples were taken from an auxiliary plankton sampler using an 80 micron mesh net, mounted on the side of the Gulf VII frame. These 81 samples were preserved in 4% buffered formaldehyde for subsequent analysis at Cefas, Lowestoft.

AIM 6. Continuous monitoring of sea-surface environmental parameters.

A Seabird CTD continuous logged (every 10 seconds) sub-surface (3m) salinity, temperature and fluorescence throughout the duration of the cruise. These data, containing over 75,000 records, provides a comprehensive record of the environmental conditions at the surface of the Irish Sea throughout the period of this survey.

Stephen Milligan  
Scientist In Charge  
5 April 2006

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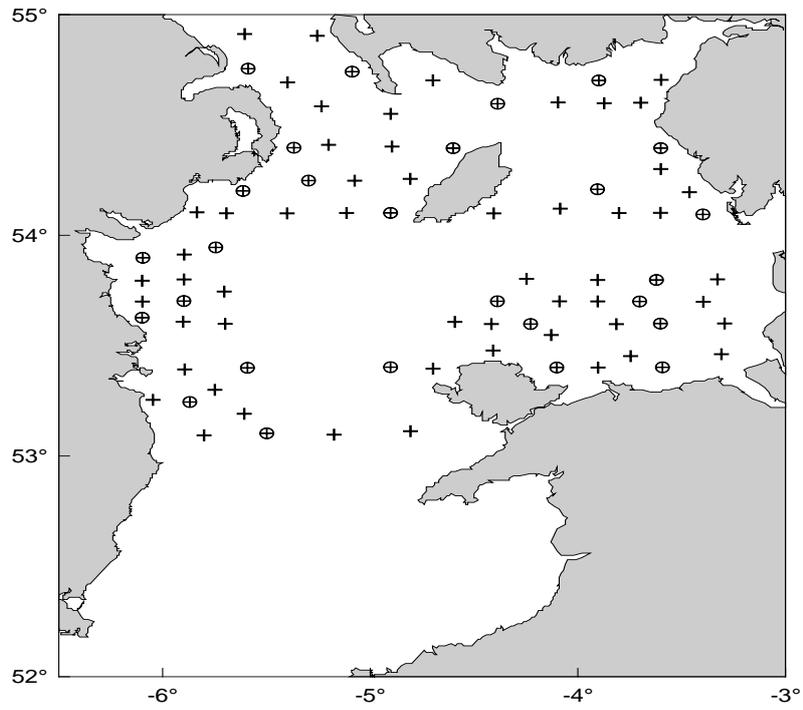
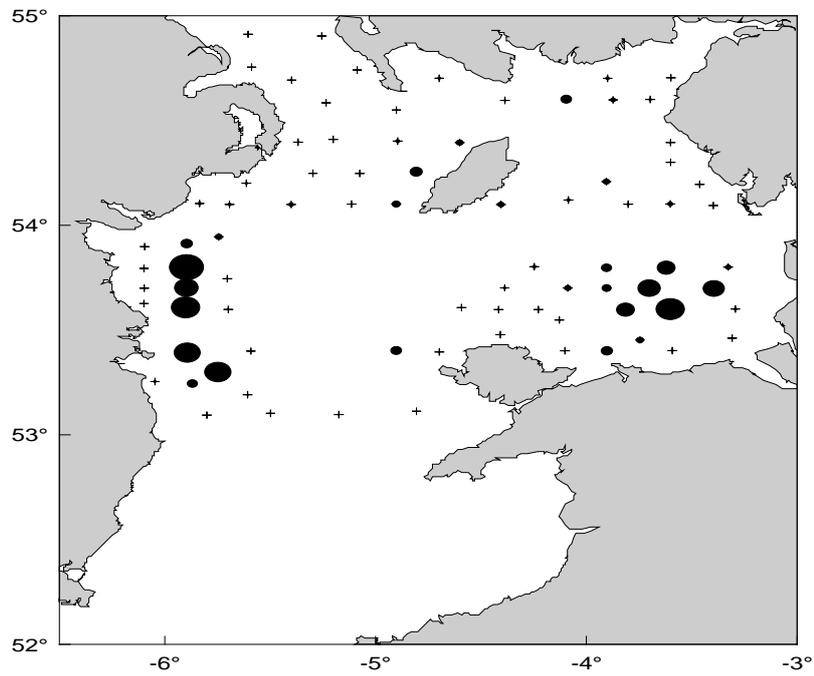


Figure 1. Celtic Voyager 3/06, 7-15 Mar 2006. Plankton stations sampled. **+** denotes stations where salinity and phytoplankton samples were taken.



Symbol	Nos.m <sup>-2</sup>	
+	0	Symbols on linear scale
●	40	
●	80	
●	120	

Figure 2. Numbers of stage 1 cod-size eggs pre-sorted from each plankton station.