

**AGRI-FOOD and BIOSCIENCES INSTITUTE (NI)**  
**Agriculture Food and Environmental Science Division**  
**(Fisheries and Aquatic Systems Branch)**

**Cruise Report:** CO 1606

**Vessel:** RV *Corystes*

**Date:** 14<sup>th</sup> – 21<sup>st</sup> April 2006

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

**Survey Type:** Irish Sea Egg Production Survey

**Personnel:**

S Beggs (SIC)	SSO	DARDNI
P McCorriston	ASO	DARDNI
N Taylor		CEFAS
M Shaw		CEFAS
E Lane		CEFAS
M Eade		CEFAS
A Brown		CEFAS
B Harley		CEFAS
S Mees		IFM

**Objectives:**

- i. To conduct a plankton survey using a Gulf VII plankton sampler to determine the distribution and abundance of cod (*Gadus morhua*), haddock (*Melanogrammus aeglefinus*) and plaice (*Pleuronectes platessa*) eggs.
- ii. 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.
- iii. To collect a surface nutrient and chlorophyll sample at each of the sampling stations.
- iv. To collect supplementary sub-surface environmental data using a self-logging package carried on the Gulf VII plankton samplers.
- v. To collect surface salinity samples at every third station for calibration of the CTD.
- vi. To collect a surface phytoplankton sample at every third station for phytoplankton species identification.
- vii. To run trial transects using the Kiel Ichthyoplankton Video Camera System.

## **Methods:**

This plankton survey was carried out as part of a collaborative program between CEFAS, AFBI (formally DARDNI) and The Marine Institute. The program was initiated to support the Irish Sea Cod Recovery Program by providing fishery-independent estimates of spawning stock biomass, using egg production surveys in 2006, 2008 and 2010. The annual egg production method requires a series of plankton surveys covering the spawning season. Sampling of adult fish is carried out over the same time period to estimate the average number of eggs produced per unit weight of female fish (fecundity). The ratio of these two estimates provides a measure of the spawning stock biomass of females, which can be converted to total SSB using an estimate of sex ratio (number of males to females in the stock). The current survey was the last in a series of five to be carried out during 2006.

The Gulf VII high speed plankton sampler was deployed in a “V” shaped dive profile for a minimum of 15mins at each station. The fresh plankton sample was then sorted onboard for stage I gadoid like eggs. When present gadoid like eggs were staged and measured, using image analysis equipment, to the nearest 0.01mm. The eggs were then preserved individually in alcohol for further DNA analysis. The remaining plankton sample from each station was fixed in formaldehyde for further sorting at the laboratory. A PUP sample was also collected and fixed in formaldehyde for future analysis. Vertical environmental profiles of the water column were collected at each station using the Valeport system. A nutrient and chlorophyll sample was collected at each station, while a salinity and phytoplankton sample were collected at every third station. The onboard constant surface salinity and temperature logger was run throughout the survey and data downloaded upon return to Belfast Lough.

The Kiel Ichthyoplankton Video Camera System was tested at three locations in the Irish Sea in areas considered to have high abundances of gadoid like eggs. The system was deployed in a similar way to the Gulf VII and towed at 5 knots in a shallow “V” shaped profile. Live images were recorded onboard the vessel and positional data was added to the images via a portable GPS system. The live images were recorded via video tape and returned to Kiel for further image analysis.

## **Cruise Narrative**

### Saturday 15 April

All scientific staff were aboard the R.V. *Corystes* by 08.30am. CEFAS staff and 1 guest arrived onboard the previous evening. The morning was spent unpacking and setting up equipment, while the vessel awaited the arrival of 1 crew member. The vessel set sail and headed directly for the first station at the mouth of Belfast Lough, on route scientific staff were given a safety briefing. All scientific staff were present during the first deployment to run through the methodology. The vessel continued along the Scottish coastline before heading towards the north eastern Irish Sea. A total of 10 stations were completed during the first day. During the initial deployments problems with the external flowmeter readings were noted. The cable connecting the external flowmeter to the main valeport device was replaced.

### Sunday 16 April

The vessel continued to make good progress in the fair weather conditions. Gadoid like stage 1 eggs were found to be sparse and this greatly decreased the plankton

sorting time between stations. A trial deployment of the Ichthyoplankton Video Camera system was carried out in an area of historically higher egg abundance. The system was towed in shallow “V” shaped dive profiles at 5 knots for approximately 1 hour between stations 20 and 21. The system was seen to collect live images of plankton and worked effectively from the R.V. *Corystes*. After the trial the GulfVII system was reconnected and plankton sampling continued.

#### Monday 17 April

Sampling continued in the southern eastern Irish Sea with 17 stations successfully completed. A problem with the PUP flowmeter readings was traced back to the cable which showed signs of corrosion. The cable was therefore replaced and sampling continued.

#### Tuesday 18 April

The PUP flowmeter failed again shortly after replacing the cable and this time the damage was found to be more substantial. The system was replaced with a mechanical flowmeter. A second trial of the Ichthyoplankton Video Camera system was carried out. The system continued to operate successfully and approximately 1.5 hours of video was captured for future analysis. During further deployment of the GulfVII a problem with the Valeport system was detected. This was finally traced to current leaking from the main CTD system. The external flowmeter subsequently generated a fault and was also replaced. Soon afterwards the internal flowmeter generated a similar intermittent fault and the cable was replaced. After considerable work and effort by the scientists the system was made operational again.

#### Wednesday 19 April

The system continued to operate although rapid corrosion of the cables, in particular at the connection between the cable and flowmeters, caused concern. In an attempt to prolong the life and reduce the rate of corrosion the cables were dried and covered in water repellent grease between stations. This was thought to reduce the rate of corrosion. Due to the rate of corrosion and lack of spares available Valeport were contacted and requested to send spare flowmeters and cables. This they agreed to do and plans were made to send them either to Belfast or Dublin. The vessel made a small detour to collect a water sample for a PhD project before continuing with the GulfVII sampling. A total of 19 stations were successfully completed.

#### Thursday 20 April

Primarily through the efforts of the scientific staff the Valeport continued to operate and the vessel completed another 18 stations. A final tow of the Ichthyoplankton Video Camera system was carried out in an area of high historical gadoid like egg abundance. The tow lasted approximately 2 hours and it was thought that a number of images of eggs were captured.

#### Friday 21 April

The vessel continued to make good headway in the pleasant weather conditions. The final 16 stations were subsequently completed in good time and the vessel docked in Belfast at approximately 10.30pm.

**Results:**

Despite the problems arising from the faults in the Valeport system all 112 stations were successfully completed (Fig. 1), testament to the dedication and technical skills of the scientific staff onboard. A total of 323 stage I gadoid like eggs were sorted from plankton samples, measured and individually stored in alcohol for further DNA analysis (Fig. 2). Due to the apparently low abundance of gadoid like eggs in the plankton samples, the time taken to process samples between stations did not impinge on the time required to complete the proposed grid. The constant salinity and temperature logger ran throughout the survey, providing comprehensive data of sea surface conditions (Fig. 3, Fig. 4). Phytoplankton, nutrient, salinity and chlorophyll samples were collected and dispatched to CEFAS, Lowestoft for analysis.

From the vertical CTD profiles gathered by the Valeport system stratification of the water column was evident at stations in the eastern and western Irish Sea (Fig. 5, Fig. 6).

**Acknowledgements:**

The SIC would like to thank all scientific staff who assisted with the preparation and running of this cruise from both the AFBI and CEFAS laboratories. The scientific staff remained positive despite the reoccurring problems with the equipment. Through their strong teamwork and trouble shooting skills they enabled the successful completion of the survey. The Officers and Crew of R.V. *Corystes* are thanked also for their enthusiastic cooperation and assistance with all aspects of the survey. Finally, the scientific staff would like to wish the master a long and happy retirement.

Steven Beggs  
*Scientist in Charge*  
April 2006

Andrew Niblock  
*Master* (seen in draft)

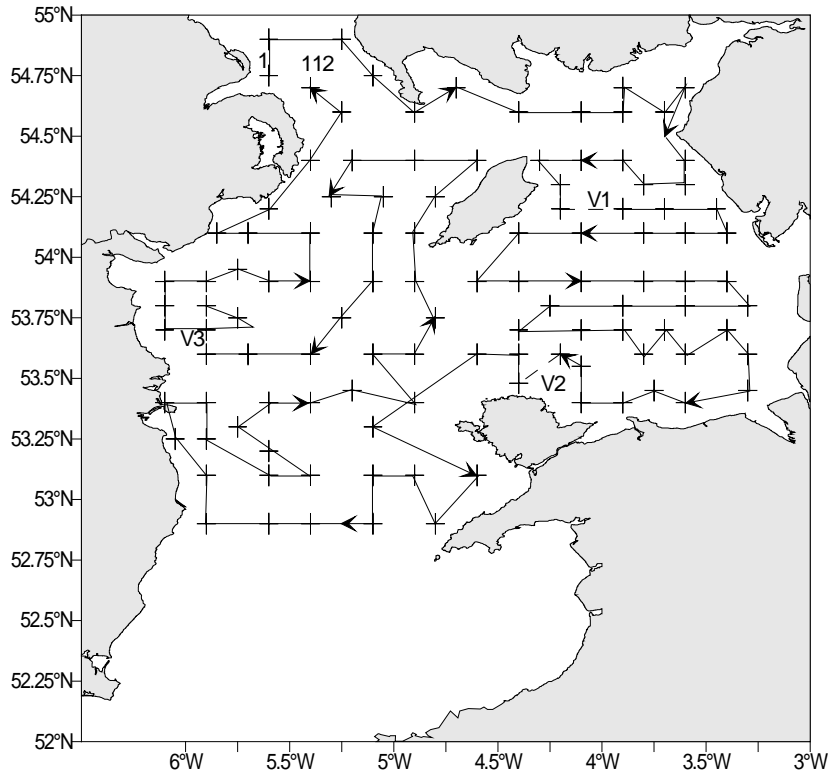


Fig. 1. Stations completed during EP05/06 using the GulfVII high speed plankton sampler. Route shown by arrows. V1, 2, 3 mark positions of trial tows of the Kiel Ichthyoplankton Video Camera System.

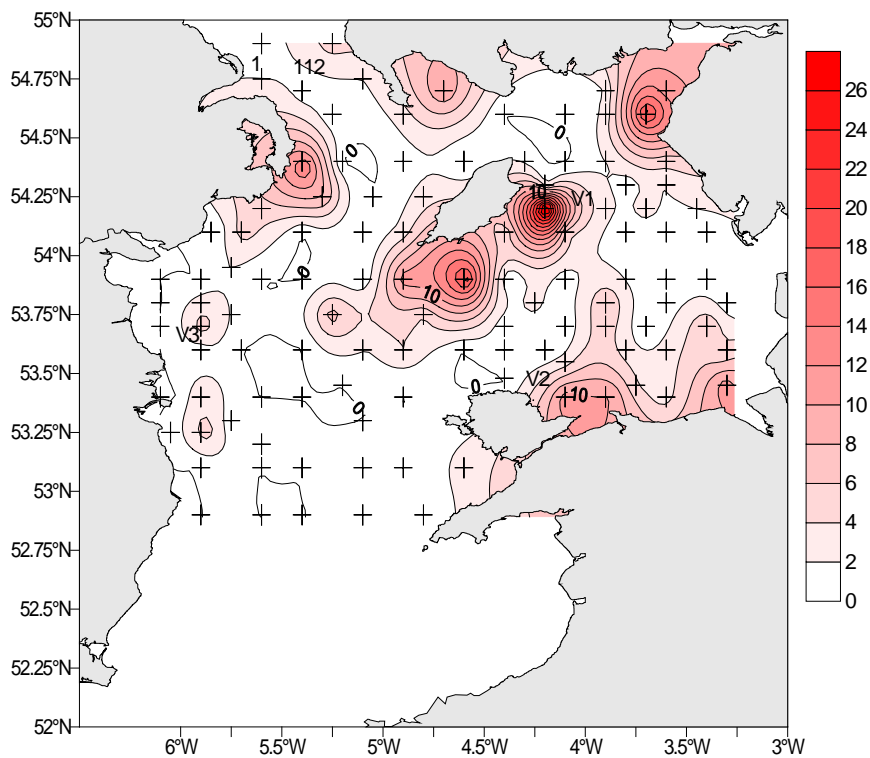


Fig. 2. Number of gadoid like stage I eggs sorted from plankton samples as a measure of relative abundance.

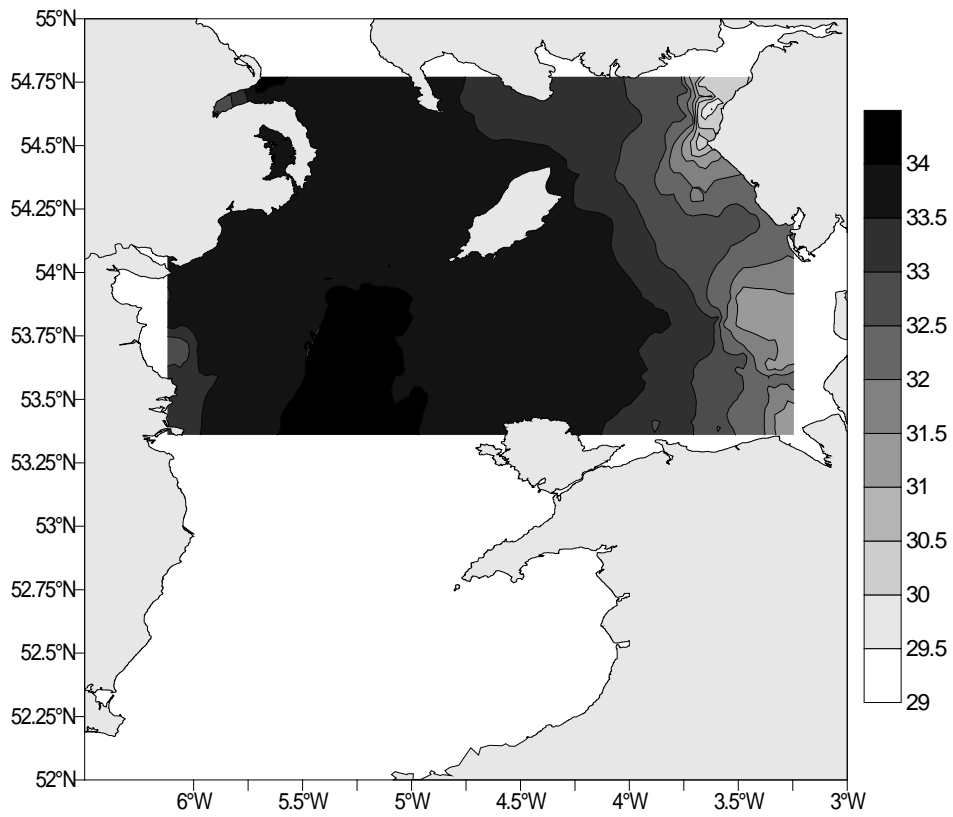


Fig. 3. Surface seawater salinity contour map of the Irish Sea (PSU).

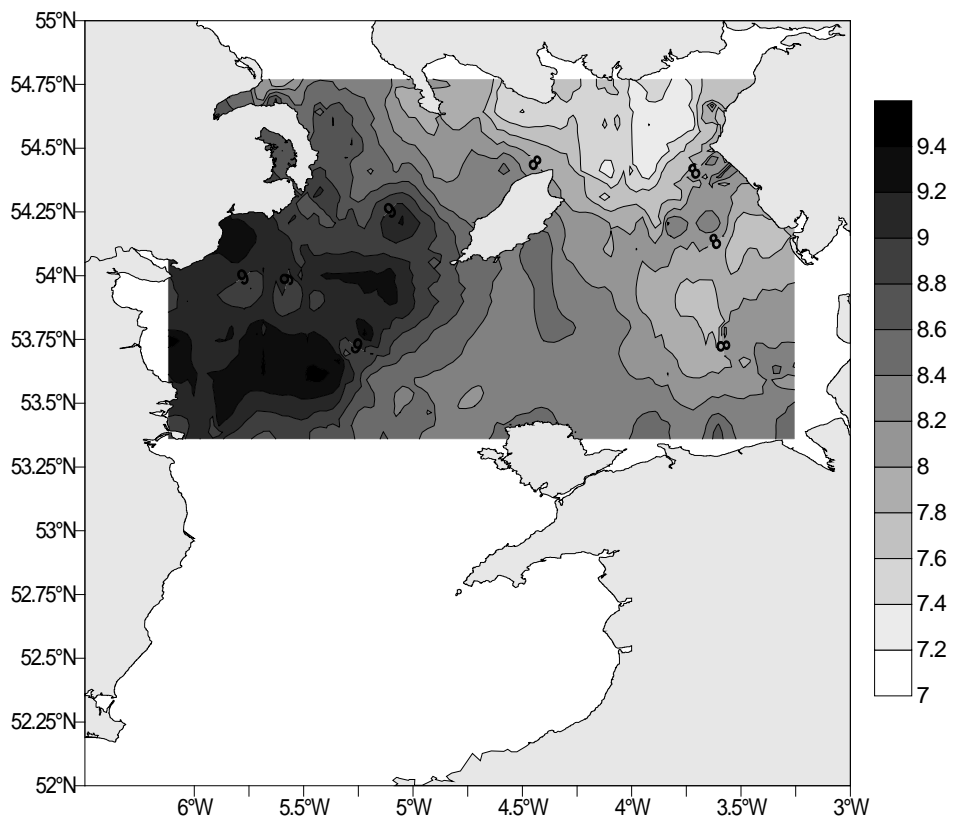


Fig. 4. Surface seawater temperature (°C) contour map of Irish Sea.

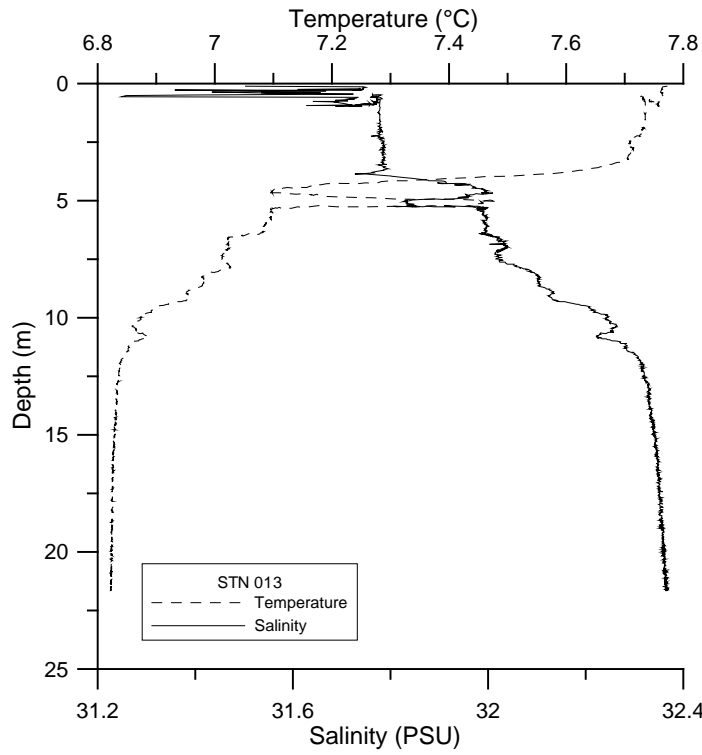


Fig. 5. Vertical profile of water column showing salinity (PSU) and temperature (°C) at inshore station STN013 in the eastern Irish Sea.

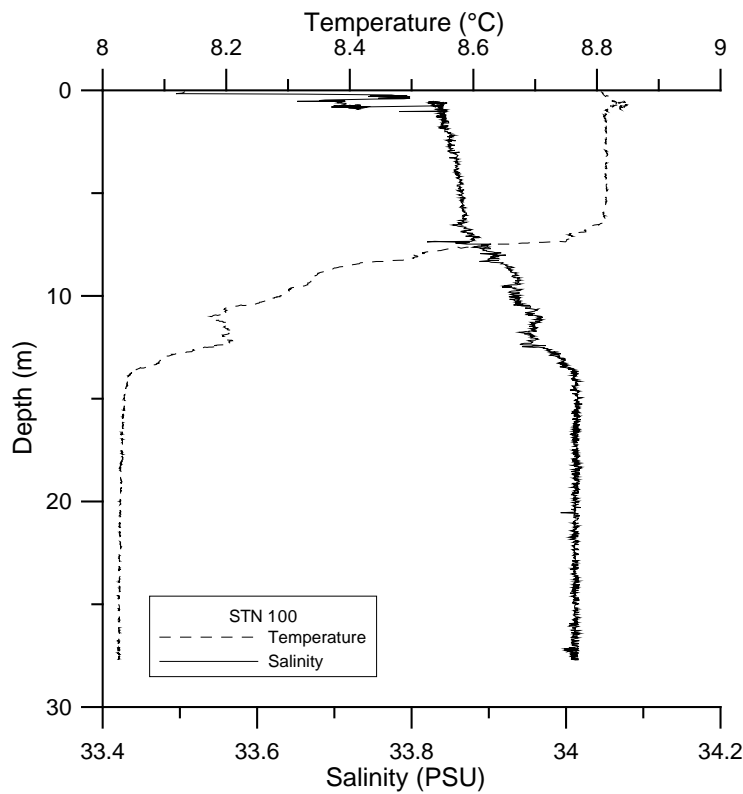


Fig. 6. Vertical profile of water column showing salinity (PSU) and temperature (°C) at station STN100 in the western Irish Sea.