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

**2010 RESEARCH VESSEL PROGRAMME**

**REPORT: RV CEFAS ENDEAVOUR: CRUISE 2/10.**

**STAFF:**

S. Milligan (SIC)
S. Pitois (2IC)
F. Goodsir
J. Pettigrew
O. Williams
A. Pliru
S. Pearson
K. May
T. Hull
E. O'Callaghan - AFBINI

**DURATION:** 18 - 31 January 2010

**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 aeglifinus*) and plaice (*Pleuronectes platessa*) eggs.
2. To remove fish eggs from fresh plankton samples at sea. To measure, stage and preserve these eggs individually, in ethanol prior to species identification using a DNA technique on return to the laboratory.
3. To sample adult plaice, cod and haddock for the estimation of fecundity and atresia using a semi-pelagic trawl.
4. To collect surface nutrient and salinity samples at selected plankton stations.
5. To collect surface chlorophyll samples every five sampling stations.
6. To collect supplementary sub-surface environmental data using an ESM-2 self-logging package mounted on the Gulf VII plankton samplers.
7. To collect fine mesh (80 micron) PUP net samples for subsequent zooplankton analysis on every Gulf VII deployment.
8. To continuously log sub-surface (3m) salinity, temperature, fluorometry and other environmental data using the 'Ferrybox'.
9. To continuously log acoustic data from 38 kHz, 120 kHz and 200 kHz echo-sounders.

**NARRATIVE:**

RV CEFAS ENDEAVOUR sailed from Lowestoft at 11:45h 18 January following a life-raft demonstration and man overboard drill prior to departure. Good progress was made overnight and at 02:45h the following day, a CTD profile (with the ESM2 Logger) and 1m ring net

deployment were completed off Selsey Bill. CEFAS ENDEAVOUR then continued steaming west down the English Channel en route to the Irish Sea. A second CTD profile was completed at 09:30h in the central English Channel (off Start Bay) but unfortunately the hydro wire parted during the ring net deployment and the gear was lost. The hydro wire was replaced before a third CTD profile was conducted off Plymouth at 14:00h. A test of the Gulf VII plankton sampler was completed during the afternoon and the opportunity was taken to show all scientific staff the sample handling process for each of the forthcoming plankton survey stations. A further CTD profile was conducted off Bishops Rock, west of the Scillies in the late evening of 19 January with two more CTD stations being completed in the Celtic Deep and off Cardigan Bay the following day.

Plankton sampling with the Gulf VII (aim 1) began at 15:35h 20 January, at 53º 15'N, 04º 50'W (Fig 1, Stn 8). The plankton sampler was equipped with a Valeport CTD, a self-logging environmental package (ESM2 logger) and a fine, 80µm mesh, 'Pup' sampler, which collected supplementary environmental data and biological samples at each station (aims 6 and 7).

Following each plankton station, fish eggs were removed from the fresh sample, then measured and staged. If the eggs were the required size and stage, they were individually preserved in ethanol for subsequent species identification using a DNA technique, back at the laboratory (aim 2). At every second station, surface seawater was taken from the clean seawater supply for subsequent salinity, Chlorophyll 'A' and nutrient analysis (aims 4 and 5).

Plankton sampling began by heading west along the three most southerly stations in stratum B, before turning north then east towards Liverpool Bay. Excellent progress was made but few eggs of the required size and stage were found. With strong SE winds forecast, plankton sampling continued in the lee of the English coast working north, on short east-west transects, into the Solway Estuary when work was suspended for five hours at 03:00h 22 January because of gale force winds.

Plankton sampling resumed at daybreak. CEFAS ENDEAVOUR worked back south into Stratum E, repeating two stations (32 & 33) where the gear had sustained flowmeter damage the previous evening. Good progress was made in fair weather and after completing all the stations in stratum E, a CTD profile was completed with the ESM2 logger south-east of the Isle of Man (Stn 54). ENDEAVOUR continued sampling north, up the east side of the Isle of Man, then west along the Scottish coast until one strand of the armoured towing cable prevented hauling on station 68, at the southern end of the North Channel. The sampler was transferred to a spare cored cable and sampling resumed 2.5 hrs later at 05:15, 24 January.

Two further stations were completed to the east of the Irish coast before the sampler unfortunately hit the bottom on station 72, resulting in the complete loss of the Gulf VII and another damaged towing cable. CEFAS ENDEAVOUR then spent most of the following 24hrs grappling for the sampler on very rough ground, which was not suitable for trawling. Despite receiving a signal from the Hi-Pap beacon on the sampler, which gave its precise location, only the very damaged Pup sampler was recovered after about 20hrs of grappling. The rest of the sampler was eventually abandoned and sampling resumed at 08:30h, 25 January, with the spare Gulf VII towed from the side-scan cable, whilst the other two towing cables were being repaired.

Good progress was then made, working down the central part of the Irish Sea, during the 25 and 26 January, completing all plankton stations in both strata C and B and the final CTD profile (Stn 92) north of Anglesey. Work continued into stratum A, working south and then back north along the Irish coast into Dundrum Bay where work was suspended overnight 27 January because of the presence of static fishing gear in Dundalk Bay. The final two stations in Dundrum and Dundalk Bays were completed by 11:15h 28 January and preparations were made to fish for pre-spawning cod for fecundity estimation (aim 3).

The presence of static fishing gear prevent trawling close to Dundalk Bay but a 30 minute tow was possible further offshore, but still in shallow water (Stn 122). Very few fish were caught and with gales forecast for the following day, it was decided to take the opportunity to fish in deeper water that evening. Three, one-hour tows were completed in a position close to 53º 40'N, 05º 30'W but again few fish were caught with the exception of 2 male cod and a few large haddock.

Northerly gale force winds and the presence of static fishing gear inshore prevented fishing during the morning of the 29 January. Trawling resumed at 14:00h as the wind began to ease but only one plaice was captured. Two further trawl hauls were completed east of Dublin but again catches were light and only one male cod was caught. As the weather slowly improved overnight, ENDEAVOUR steamed to a position off the SW of the Isle of Man to begin fishing the following day. Five, one hour tows were completed around the south and east of the Isle of Man during the 30 January. Very few fish were caught and only one male cod was captured at the penultimate station east of the Isle of Man.

CEFAS ENDEAVOUR then steamed overnight towards Belfast where she docked at 09:15, 31 January 2010.

**RESULTS:**

Aims 1 & 7:

A Gulf VII plankton sampler, fitted with a 40cm aperture nosecone and 270µm mesh net was used during this survey, with an auxiliary 80µm mesh 'Pup' net attached. A Valeport CTD mounted on the sampler, provided 'real time' flow-meter data as well as salinity and temperature profiles for each double oblique plankton haul. 106 plankton stations were completed, covering the whole Irish Sea from 53º 00'N to 55º 00'N (Figure 1), with 270µm samples being collected on each station. The pup sampler or its flowmeter were not available on every station resulting in 93 samples being taken with the 80µm mesh net. The Valeport CTD system was controlled and logged by new Lab-view software developed by A. Emery. This was a vast improvement on the software package provided by Valeport and very few logging problems were encountered, although suggestions have been made to enhance the software for future surveys.

Aim 2:

The 270µm net samples were examined whilst still fresh at sea. Fish eggs in early development stages and between 1.1 and 1.75mm diameter were removed and individually preserved in ethanol. A total of 182 eggs were obtained during this cruise, for subsequent species identification using a DNA technique.

Aim 3:

A Portuguese High Headline Trawl (PHHT) was used on 12 occasions to try to provide samples of mature female cod for fecundity estimations. The trawl was towed for between 30 to 60 minutes but very few fish were caught and only four cod which were all mature males.

Aims 4 and 5:
A total of 60 discrete sub-surface seawater samples were taken from the ships clean seawater. They were taken at every ESM2 logger, profile station and at every other plankton station. These samples were collected for subsequent nutrient, salinity and chlorophyll analysis back at the laboratory.

Aim 6:
Two ESM2 environmental data logging packages were used during the cruise. One was deployed on vertical profiles at eight selected stations in the English Channel and into the Irish Sea (Figure 2). The other was mounted on the plankton sampler until this was lost at station 72. These loggers record a wide range of environmental parameters (temperature, salinity, fluorescence, oxygen, turbidity and light) together with some information on Gulf VII performance (pitch and roll).

Aim 8:
The Ferrybox was run continuously throughout the cruise, logging several environmental parameters (including temperature, salinity and fluorescence) from the ships sub-surface seawater supply. Discrete samples were taken automatically every day for subsequent nutrient analysis back at the laboratory.

Aim 9:
The 38 kHz, 120 kHz and 200 kHz echo-sounders were logged almost continuously (excluding very shallow areas) during the cruise to provide information on the distribution of pelagic fish and plankton patches.

S. Milligan
Scientist In Charge
31 January 2010

SEEN IN DRAFT

Master: Capt. B. McCurry
Senior Fishing Mate: Mr. B. Salter

INITIALLED: Dr. M. Armstrong

DISTRIBUTION:
Basic List
M. Armstrong
Steven Beggs (AFBINI, Belfast)
Pieter-Jan Schon (AFBINI, Belfast)
FCO (for Republic of Ireland)
MFA (Wales)

Figure 1. Cefas Endeavour 2/10.

Plankton Stations (numbered) and
PHHT trawl positions (black triangles).

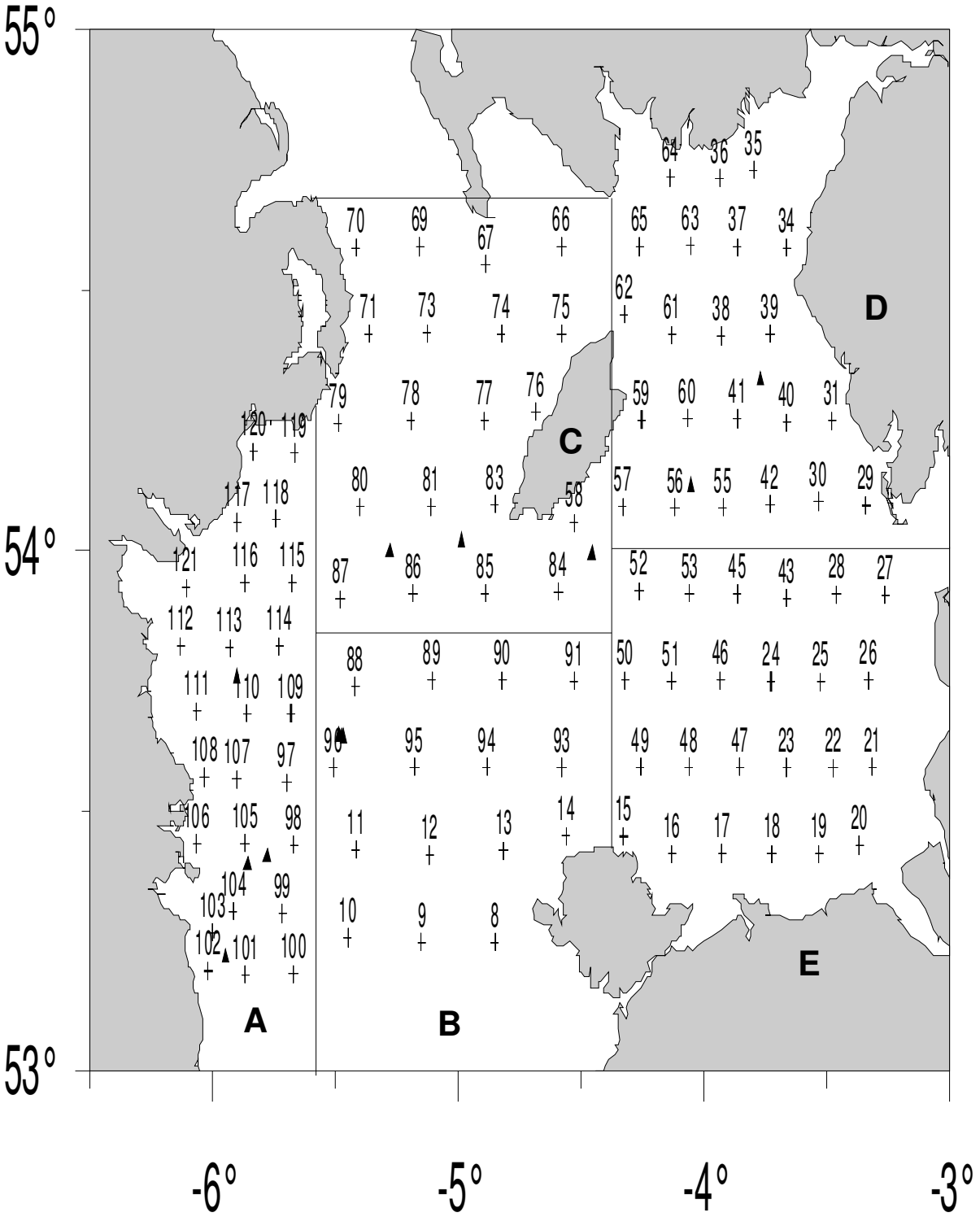

Fig 2. Cefas Endeavour 2/10

ESM2 CTD Profile stations