

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

**2003 RESEARCH VESSEL PROGRAMME**

**REPORT: RV CEFAS ENDEAVOUR: CRUISE 6**

**STAFF:**

T W Boon (SIC)	T W Boon (SIC)
G Course (2 SIC)	G Course (2 SIC)
M Etherton (from 8 Aug)	M Etherton
N Bunn	N Bunn
A Tidd	A Tidd
K Sullivan	K Sullivan
R Enever	B Rackham
J van der Kooij	J van der Kooij
T Locke (6 - 8 Aug)	K Warr
R Ayers (8 -9 Aug)	
R Callaway (Swansea University)	6 Aug - 8 Aug & 14 Aug - 5 Sep
A Woolmer (Swansea University)	6 Aug - 5 Sep
F Normandale (NFFO representative)	14 Aug - 19 Aug
J Casey	14 Aug - 19 Aug

**DURATION:** Part A: 6 August – 21 August  
Part B: 22 August – 5 September

**LOCATION:** North Sea

**AIMS:**

1. To carry out a groundfish survey of the North Sea as part of the ICES co-ordinated IBTS, using a standard GOV trawl in order to obtain information on:
  - a) Distribution, size composition and abundance of all fish species caught.
  - b) Age – length distribution of selected species.
  - c) Distribution of fish in relation to their environment.
  - d) Distribution of macrobenthos and anthropogenic debris.
  - e) Surface and bottom temperature and salinity data using CTD.
  - f) Length weight & maturity information using individual fish measurements, in support of the EU Data Regulation.
2. To collect acoustic data at two operating frequencies (38 kHz and 120 kHz) continuously throughout the cruise. Data recorded from the 38 kHz transducer will be combined with GOV trawl data and an estimate of total abundance made for roundfish species. This work will form part of a three year project (CATEFA) aimed at examining the relationships between trawl catches and acoustic data.

3. To collect material for fish identification courses (C Fox, CEFAS Lowestoft)
4. To preserve material from diseased fish (S Feist, CEFAS Weymouth)
5. To collect fish white muscle and queen scallop tissue for stable isotope analysis, as part of an ongoing study on the effects of fishing in the North Sea (S Jennings, CEFAS Lowestoft).
6. To obtain ageing material and biological information from horse mackerel (*Trachurus trachurus*) from the southern North Sea (G Eltink, RIVO for the horse mackerel assessment working group)
7. To collect 2 metre beam trawl and Van Veen grab samples from selected GOV trawl station positions as part of the EU funded project 'Managing fisheries to conserve groundfish and benthic invertebrate species diversity'. The data collected along with other data sets will be used to develop and test an environmental model to incorporate into the EU CFP fisheries regulation calculations. (R Callaway, A Woolmer, University of Wales, Swansea)

#### **NARRATIVE:**

(all times are GMT)

RV CEFAS ENDEAVOUR sailed from Lowestoft at 1637h 6 August and made passage south. During the evening a rendezvous was made with HM Barque Endeavour, an Australian built replica of Captain Cook's 18<sup>th</sup> century expeditionary sailing vessel. Photographs and video footage were taken of the two vessels in close proximity. RV CEFAS ENDEAVOUR continued to a position east of the Thames Estuary, Lat. 51°44.0'N; Long. 01°44.4'E; where the survey began at 1435h on the following day, the morning and early afternoon having been spent preparing the trawl. This work had not been possible any sooner because of the very short turn round between this and the previous cruise and also a number of problems requiring solving before sailing. Sampling at each primary station consisted of one thirty-minute tow with the GOV trawl. Temperature and salinity profiles were obtained using a SAIV micro CTD attached to the headline of the trawl on the forward part of the starboard wing. Also at one primary station each day, when time permitted, a set of five Van Veen grabs and a 5 minute tow with a 2m Jennings beam trawl were completed (Aim 7). As the vessel sailed with only five deck crew, there was only sufficient man hours remaining after trawl preparation to complete one station on 7 August. Two hauls were completed the next day before a course was set to return to Lowestoft. T Locke and a propulsion engineer were put ashore by ship's boat and M Etherton brought aboard. R Ayers also came aboard to deal with a number of faults identified with the EDC system. R Ayers was put ashore at first light on 9 August. R Callaway also went ashore for medical attention.

During the next six days, sampling at nineteen primary stations was completed in the southern Bight of the North Sea. During the afternoon of 14 August the vessel entered Bridlington bay where F Normandale (NFFO representative), J Casey and an additional crew member came aboard. R Callaway also returned aboard. The vessel made an overnight passage to position Lat. 55°50.3'N; Long. 01°09.8'E and recommenced the grid the following morning at 0746h. Moderate head seas had reduced steaming speed overnight resulting in a later than expected start. These conditions persisted during that day and only two primary stations were completed. During the next four days thirteen more stations were completed in the central

area of the North Sea and off the north east English coast. F Normandale and J Casey disembarked at Whitby during the evening of 19 August and an electronics engineer came aboard to deal with some outstanding faults. During the next two days, 5 more primary stations were worked before the mid cruise staff changes were effected at North Shields. R Enever, B Salter (first mate) and the electronics engineer disembarked and B Rackham, K Warr and A Lincoln (first mate) embarked. While making a working passage north towards the Shetland Isles, eleven more primary stations were completed in the western part of the northern North Sea. RV CEFAS ENDEAVOUR docked in Lerwick at 0906h, 25 August to take a cruise break.

The grid was resumed at a position Lat. 61°03.7'N; Long. 01°10.6'E at 0522h on 27 August. The grab sampling was unsuccessful due to the hard nature of the sea bed and the trawl haul was invalidated due to torn belly panels. On arrival at the next fishing position the cooling system on the hydraulic power packs malfunctioned. During the repair work, the chief engineer injured a wrist and the vessel returned to Lerwick to obtain medical treatment. The vessel returned to the grid overnight, still with a full crew. Poor weather on 28 August allowed only two primary stations to be completed. Late that evening, news of a bereavement in the close family of one of the engineering staff entailed another return to Lerwick where the engineer was put ashore on 29 August. The vessel laid at anchor in Bressay Sound until a replacement engineer came aboard at 1415h on 30 August.

The grid was resumed at a position Lat. 60°17.5'N; Long. 00°34.8'E at 1844h on 30 August. The remaining 19 primary stations were completed by 1325h on 4 September. One of these was invalidated due to net damage and a further one was invalidated when a large catch, predominantly of sprat (*Spratus spratus*), could not be brought aboard. Failure of the hydraulic power pack prevented a final set of 5 Van Veen grabs being completed during the evening of 3 September. This mechanical breakdown also prevented the drop keel being raised and the side A frame being brought back inboard.

A course was set for Lowestoft where engineers were brought out to the ship to effect a temporary repair to the hydraulics system. The drop keel and side A frame were reoused and the vessel was docked at 1757h 5 September.

## **RESULTS:**

**Aim 1.** A 30 minute GOV trawl haul was successfully completed at each of the 75 primary station positions. Light gear damage was sustained during one haul and severe damage during a further two hauls. Two of these three hauls were invalidated and third haul was invalidated because the catch could not be brought aboard. Trawling was carried out using the standard specification for International Bottom Trawl Surveys (North Sea). A SAIV micro CTD was used attached to the starboard wing of the trawl to obtain temperature and salinity data. A chart indicating the position of each trawl station is attached (Figure 1). Scanmar equipment was used to monitor headline height and door spread. The performance of this equipment was not up to the required standard. A separate report has been produced detailing the problems. At each station, the catch of each species was weighed and all fish, or representative samples, were measured. Samples of otoliths for age determination were taken as specified in standard instructions. Benthos and crustacea were identified to the species wherever possible and recorded as present. Any anthropogenic waste material was recorded and weighed. The resultant data were input to computer database using the CEFAS Electronic Data Capture System. These data will be analysed at CEFAS Lowestoft and will provide a major input to the ICES assessment of North Sea gadoids and pelagic species.

**Aim 2.** Fisheries acoustic data were continuously collected throughout the cruise at two operating frequencies (38 kHz and 120 kHz). Post processing was undertaken on the 38 kHz only, which is considered to be the standard operating frequency for fisheries acoustic surveys. The 120 kHz echogram was scrutinised in parallel with the 38 kHz data to aid identification of echo targets and bad data regions. Of the total number of 75 primary stations sampled, acoustic data of 3 stations were lost (bad data) due to power cuts in main supply, at least another 3 due to bad weather, 3 due to faulty GPS data, and the first station as the result of incorrect calibration settings. Relationships between the acoustic backscatter data of 0-5m layer above the bottom and catch data (species composition, length and weight) on the sample stations are extrapolated to the between-station acoustic data (partitioned in 5m intervals) to quantify demersal fish abundance in the North Sea. This work forms part of a three-year project (CATEFA) aimed at examining the relationships between groundfish trawl catches and acoustic data. The QTC Seaview seabed classification system received acoustic data input from a hydrographic singlebeam 50 kHz sounder. Post processing of these data will be undertaken at the Lowestoft Laboratory and will be used in combination with data from previous cruises to map the seabed. Interference from an unknown source was observed in the acoustic data and might be the cause of poor performance of the scanmar. Although its intensity varied, it was present throughout most of the cruise. It seemed to be in the proximity of the 50 kHz range and had most impact on the lower frequency sounders.

**Aim 3.** Specimens of more than 62 different species were preserved for the Laboratory's fish identification courses. Additional material was collected to facilitate fish identification quality assurance exercises.

**Aim 4.** No unusual occurrences of diseased fish were encountered on the survey.

**Aim 5.** White muscle tissue samples were collected from 16 different species for stable isotope analysis, 222 samples from 9 stations in area A and 203 samples from 9 stations in area B. In addition tissue was collected from 8 specimens of *Astarte sulcata* and 1 specimen of *Arctica islandica*. *Aequipecten opercularis* and *Modiolus modiolus* did not occur in the trawl catches. The original aim was modified to include large bivalves as well as the specified *Aequipecten opercularis*.

**Aim 6.** Ageing material and biological information were obtained from 109 horse mackerel (*Trachurus trachurus*) from trawl hauls made in southern and east central North Sea.

**Aim 7.** Benthos samples were collected for the EU-project MAFCONS ('Managing fisheries to conserve groundfish and benthic invertebrate species diversity'). The samples along with other data sets will be used to develop and test an environmental model which could be incorporated into EU fisheries regulation calculations. Five Van Veen grab samples and one 2m-beamtrawl sample were taken at each of 22 primary trawl stations throughout the North Sea. Meiofauna and sediment samples were taken from the grab samples. The sediment from grabs was washed through a series of five sieves with mesh sizes from 4mm to 0.25mm and subsequently preserved for later analyses in the laboratory. The 2m-beamtrawl samples were sorted and all epibenthic fauna removed. Animals were identified to species level, measured and weighed.

**MISCELLANEOUS:**

The following aims, which did not appear in the cruise programme, were also accomplished.

1. Tissue samples were collected from 16 *Helicolenus dactylopterus* for DNA analysis (M A Aboim, Southampton Oceanography Centre).
2. Empty *Actica islandica* shells were collected from a number of trawl hauls and frozen (C A Richardson, University of Wales, Bangor).
3. Length/weight data were collected from 8 non-commercial species (R Ayers *et al*, CEFAS Lowestoft)
4. The jaws of three specimens of starry smooth hound (*Mustelus asterias*) were wind dried for DNA and dentition investigations (M Harris, Tampa Bay, Florida, USA)

T W Boon  
5 September 2003

**SEEN IN DRAFT:**

Master	R J McCurry
Senior Fishing Mate	A G Lincoln

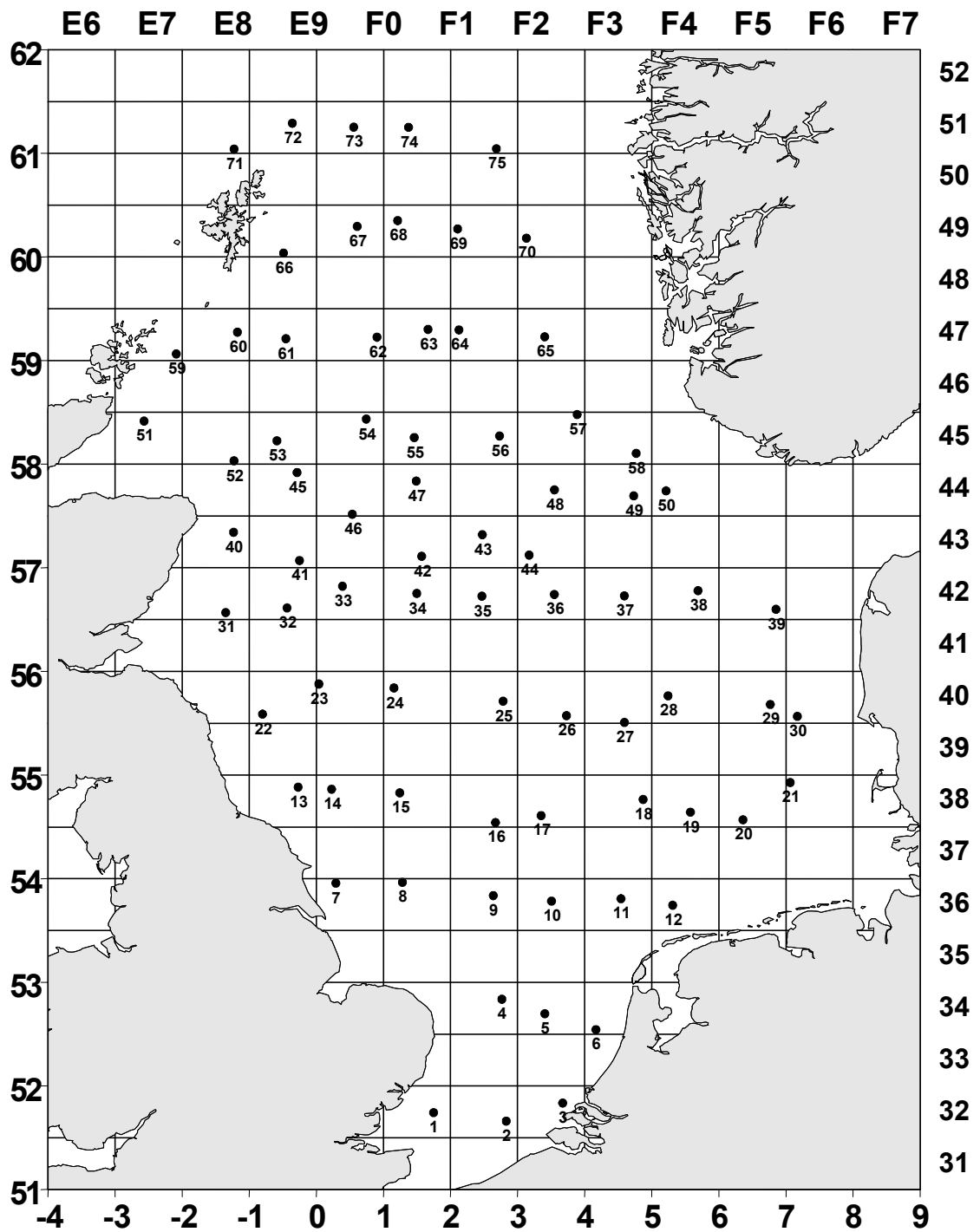
**INITIALLED:**

Surveys Contract Manager	R Millner
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**DISTRIBUTION:**

Basic list +

T W Boon	K Sullivan	T Locke
G Course	R Enever	R A Ayers
N Bunn	B Rackham	J Casey
A Tidd	J van der Kooij	R Callaway
M Etherton	K Warr	A Woolmer



Primary fishing positions  
 CEFAS Endeavour 6/03