

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

2004 RESEARCH VESSEL PROGRAMME

REPORT: RV CEFAS ENDEAVOUR: CRUISE 10

STAFF:

Part A

T W Boon (SIC)
B Harley (2 SIC)
N Bunn
R Humphreys
J DeOliveira
D Brown
A Tidd

Part B

T W Boon (SIC)
B Harley (2 SIC)
N Bunn
R Humphreys
M Etherton
C Gooding
D Goad (20 Aug - 03 Sep)

J van der Kooij
K Warr

R Callaway (University of Wales)
F Glen (University of Wales)

R Callaway (University of Wales)
F Glen (University of Wales)

A Locker (NFFO representative) 01 Sep - 03 Sep

DURATION: Part A: 05 August – 20 August
Part B: 20 August – 04 September

LOCATION: North Sea

AIMS:

1. To carry out a groundfish survey of the North Sea as part of the ICES coordinated 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 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).
5. 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, F Glen, University of Wales, Swansea)
6. To obtain samples of cod (*Gadus morhua*) ovaries for maturity staging determination. (P Witthames, CEFAS Lowestoft)

NARRATIVE:

(all times are GMT)

RV CEFAS ENDEAVOUR sailed from Lowestoft at 1030h 5 August and made passage northeast to primary station 4 in ICES rectangle 34F2. (NB This was a marked deviation from the recent historical cruise track as the vessel sailed without having received permission to work in any of the five EEZ's applied for. This situation continued until 11 Aug by which time all permissions, either verbal or written had been received and the historical track had been rejoined.) During the first shooting of the GOV trawl the hydraulic brake on the port drum of the main trawl winch failed. By the time the brake had been applied manually, 340m of warp had run out from the port drum with only 60m out from the starboard drum. On retrieval of the gear it was found that the headline had parted in three places, the net was badly torn, the exocet kite buckled and a SCANMAR unit severely damaged. A new trawl was bent on overnight and the survey (re)commenced at a position off Flamborough Head, Lat. 53°56.4'N; Long. 00°16.8'E. 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 after part of the starboard wing. Also, at selected primary stations, when time permitted, a set of five Van Veen grabs and a 5 minute tow with a 2m Jennings beam trawl were completed (Aim 5). Work continued with no notable incidents at the rate of three or four primary stations per day until 19 August. On 20 August two stations were worked but the planned staff transfer off the Tyne was redirected to Bridlington bay because of unfavourable sea conditions. A Tidd, D Brown, J DeOliveira and two crew members disembarked and M Etherton, D Goad, C Gooding, K Warr, J van der Kooij and three crew members embarked. While making a working passage north towards the Shetland Isles, eight more primary stations were completed in the western part of the northern North Sea. RV CEFAS ENDEAVOUR docked in Lerwick at 0935h, 23 August to take a cruise break.

The grid was resumed at a position Lat. 61°03.0'N; Long. 01°12.0'W at 0610h on 25 August. Six more primary stations were successfully completed during that and the following day. On 27 August the early morning 2m beamtrawl and Van Veen grabs were completed in deteriorating weather conditions. Work was suspended and the vessel dodged at primary station 69 in 40+ knots of wind. After 3 hours both wind and sea moderated as quickly as

they had risen and fishing recommenced with three hauls completed during the day all be it in conditions again freshening. The weather worsened overnight and the vessel commenced dodging at 0400h 28 August. Two hauls were completed later that day with a little damage to lower panel seven on the first of the two. The remaining eight primary stations were completed by 0542h 31 August mostly in poor weather conditions. A course was set for Bridlington bay. During the passage south the standard GOV trawl was dismantled and a hard ground version of the GOV was rigged. A Locker (NFFO representative) was embarked at 1620h 1 September. The vessel steamed overnight to position Lat. 54°16.7'N; Long. 02°54.8'W. Trawl hauls were successfully completed on hard ground at this and two other off-shore positions during 2 September and at three inshore positions during 3 September. A Locker and D Goad were disembarked off Whitby at 1500h 3 September and the vessel made passage to Lowestoft docking at 1125h 4 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 only. 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. 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 (38kHz and 120kHz), using the SIMRAD Ek60 splitbeam sounder. Post processing was undertaken on the 38kHz frequency only, which is considered to be the standard operating frequency for fisheries acoustic surveys. The 120kHz echogram was scrutinised in parallel with the 38kHz data to aid identification of echo targets and bad data regions. Of the total number of 75 stations, acoustic data of some 20 stations were lost due to poor bottom detection caused by swell conditions and subsequent aeration underneath the hull mounted sounders. Relationships between the acoustic backscatter data of 0-5m above the bottom and the catch data (species composition, length and weight) on the sample stations are extrapolated to the between station acoustic data (partitioned in 2nmi intervals) to quantify demersal fish abundance in the North Sea. This work forms part of a three-year EU project (CATEFA) aimed at examining the relationships between ground fish trawl catches and acoustic data. It also contributes to the acoustic ground fish database. A new software package allowed the use of the recorded fisheries acoustic data for acoustic ground discrimination (AGDS) applications with QTC Impact. Post processing of the AGDS data from the 38kHz sounder will be undertaken at the Lowestoft laboratory and will be used in combination with data from other cruises to map the North Sea seabed. Interference from unknown sources was observed in the acoustic data. One source was identified halfway through the trip and appeared to have been caused by different ping rates of the EA600 hydrographic sounder and the EK60 fisheries acoustic sounder.

Aim 3. Specimens of more than 42 different species were preserved for the Laboratory's fish identification courses.

Aim 4. White muscle tissue samples were collected from 16 different species for stable isotope analysis, 198 samples from 9 stations in Area A (a rectangle described by co-ordinates Lat. 61°30.0'N; Long. 01°00.0'W and Lat. 59°30.0'N; Long. 03°45.0'E) and 202 samples from 10 stations in Area B (a rectangle described by co-ordinates Lat. 59°30.0'N; Long. 01°00.0'W and Lat. 57°40.0'N; Long. 03°45.0'E). In addition tissue was collected from 9 specimens of *Astarte sulcata*. No specimens of *Aequipecten opercularis*, *Modiolus modiolus* and *Arctica islandica* occurred in the trawl catches for sampling.

Aim 5. 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-beam trawl sample were taken at each of 24 primary trawl stations and further beamtrawl samples were taken at another eight stations. Sediment samples were taken from each grab sample. The 2m-beamtrawl samples were sorted and all epibenthic fauna removed. Animals were identified to species level, measured and weighed. The sediment from grabs was washed through a series of five sieves with mesh sizes from 4mm to 0.25mm and the sieve remains were preserved. The preserved grab samples will be taken to the marine department of the University Wales of Swansea and analysed in the laboratory. Results of this project can be obtained from the MAFCONS project reports and the web-page www.mafcons.org.

Aim 6. Samples of cod ovaries for maturity staging determination were obtained from 33 specimens. (P Witthames, CEFAS Lowestoft)

MISCELLANEOUS:

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

1. Using a re-rigged GOV trawl fitted with rockhopper ground gear, six 40 minute trawl hauls were completed on harder ground (specific information on rigging and deployment is contained in the cruise red naturalists log book). Three of these were off shore from Flamborough Head and three inshore on the Yorkshire coast. A Locker, aboard as the NFFO representative, collaborated in conducting this work and it is proposed that this will become a permanent additional part of the main survey.

2. Whiting (*Merlangius merlangus*), sole (*Solea solea*) and plaice (*Pleuronectes platessa*) were sampled from catches in the southern and central North Sea as part of an investigation into the role of estuarine production in supporting commercial fish production (Chris Leakey, University of Plymouth)

3. Haddock (*Melanogrammus aeglefinus*) estimated to be from the 1999 year class were collected at all stations where they were present. The trophic level and energy content of these haddock will be assessed using stable isotope analysis and calorimetry respectively to assess relationships between patterns of distribution and condition (Jan Hiddink, University of Wales, Bangor)

4. Surface water samples were collected from three positions for oxygen isotope analysis (R Millner, CEFAS Lowestoft)
5. Surface water samples were collected from 37 positions for caesium and tritium analysis (D McCubbin, CEFAS Lowestoft)
6. Ten bags each containing 15 specimens of fish were collected and frozen for use in fish identification quality assurance exercises (M Etherton, CEFAS Lowestoft).
7. Otoliths were collected from 50 specimens of herring (*Clupea harengus*) for use in a sectioning experiment (M Easey, CEFAS Lowestoft).

T W Boon
4 September 2004

SEEN IN DRAFT:

Master	R J McCurry
Senior Fishing Mate	A G Lincoln

INITIALLED:

Surveys Contract Manager R Millner

DISTRIBUTION:

Basic list +

T W Boon	D Brown	J van der Kooij
B Harley	J DeOliveira	K Warr
N Bunn	M Etherton	R Callaway
R Humphreys	D Goad	F Glen
A Tidd	C Gooding	

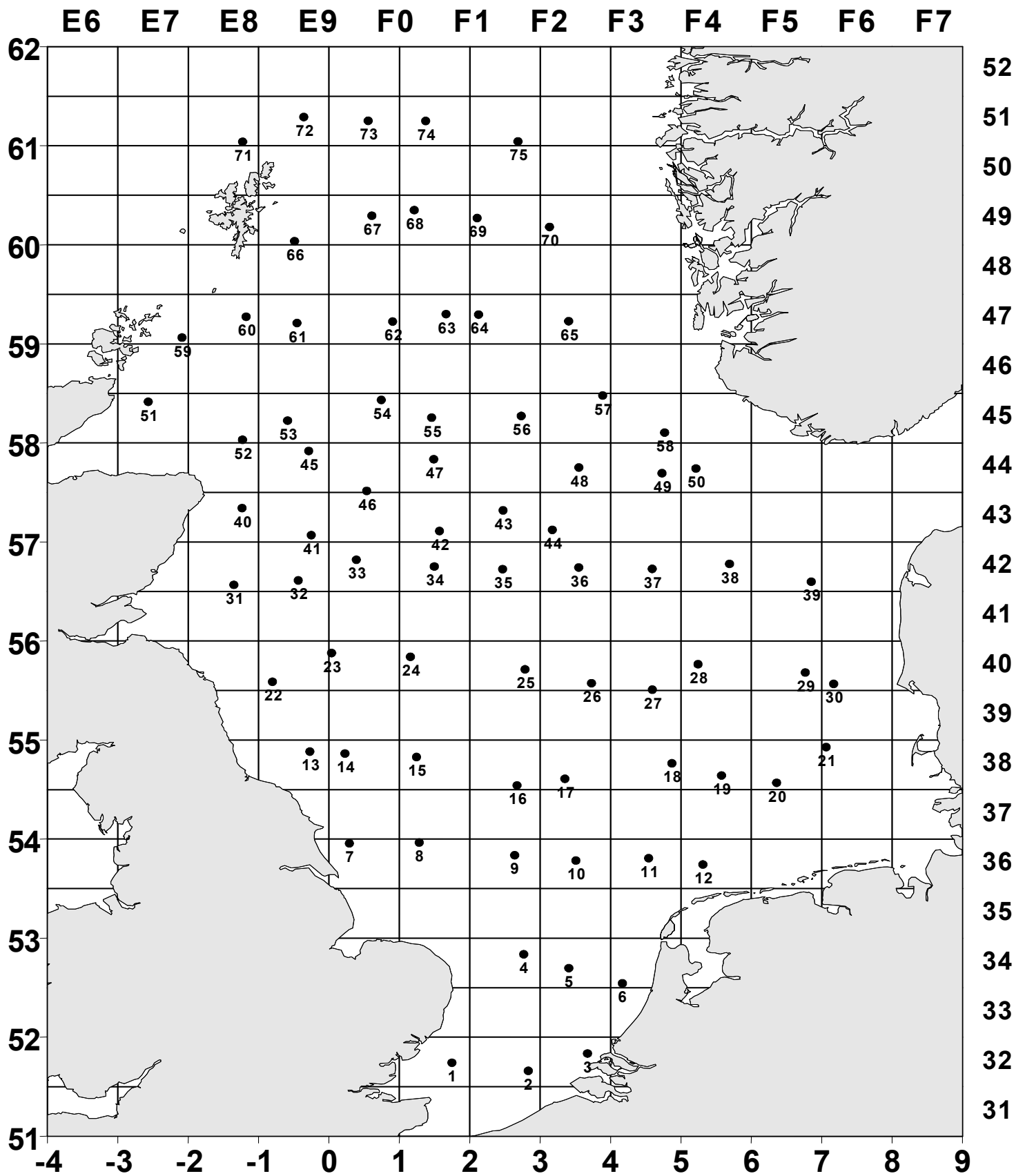


Fig. 1 **Primary station positions CEFAS Endeavour 10/04**