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

2004 RESEARCH VESSEL PROGRAMME

REPORT: RV CEFAS ENDEAVOUR: CRUISE 5.

STAFF:

Part 1	Part 2
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M. Godard	M. Godard
C. Fox	I. Holmes
A. Nichols	B. Roel
C. Burt	M. Etherton
M. Brown	M. Shaw
J. Pettigrew	

DURATION: **Part 1:** 24 April – 9 May 2004. Time period 4. (All times are GMT)
Part 2: 10 – 21 May 2004. Time period 5.

LOCATION: Shelf edge of Celtic Sea and Northern Biscay

AIMS:

1. To conduct a plankton survey using a 53cm Gulf VII plankton sampler to determine the distribution and abundance of mackerel (*Scomber scombrus*) and horse mackerel (*Trachurus trachurus*) eggs in the western spawning area during sampling periods 4 and 5.
2. To sample adult mackerel and horse mackerel for the estimation of fecundity and atresia using pelagic and semi-pelagic trawls.
3. To take ovary, otolith and other biological samples from all mature hake (*Merluccius merluccius*) and cod (*Gadus morhua*). (P. Witthames).
4. To collect samples of crab larvae (*Cancer pagurus*) using the plankton sampler at selected positions in the English Channel for subsequent DNA analysis for stock discrimination. (D. Eaton).

Aims 1 and 2 were in support of the ICES co-ordinated international mackerel and horse mackerel egg survey 2004.

NARRATIVE:

RV CEFAS ENDEAVOUR sailed from Lowestoft at 12:00h 24 April and made good progress over the next 24hrs, steaming west down the English Channel, in fine weather. A successful trial deployment of the new FOTO trawl was conducted at 14:15h in mid Channel the following

day. Three plankton hauls were then carried out off the NW coast of Brittany during the evening of 25 April (Stns 2-4, Figure 1). Larvae of the edible crab (*Cancer pagurus*) were removed from these samples and individually preserved in ethanol for subsequent genetic work (aim 4).

Plankton sampling commenced on the mackerel egg survey grid at 48° 15'N, 05° 15'W during the early hours of 26 April (Figure 1). Good progress was made during the day, working west along the 48° 15'N transect. The Foto trawl was deployed at the shelf edge in the early evening but only a few juvenile mackerel were captured and no biological samples were taken.

Once the plankton samples had been fixed for an hour, the fish eggs were removed using a novel 'spray technique' as recommended by ICES WGMEGS and WKMHMES. The eggs were then identified to species and counted. This technique gave a rapid, indication of the mackerel and horse mackerel egg distributions, which helped enormously with cruise planning and sampling strategy.

Plankton sampling continued during 27 April along the 48° 15'N latitude, out to 12° 15'W, where no eggs were found. ENDEAVOUR then headed south-east to 47° 45'N, 11° 45'W where the plankton sampler was deployed, followed by the FOTO trawl. Several baskets of the snake pipefish (*Entelurus aequoreous*) were captured at the surface but no mackerel or horse mackerel.

During 28 April, short north – south transects were worked from west to east along latitudes 47° 45'N and 47° 15'N. At about 17:00h, a MAYDAY was received from the helmsman of a small yacht, 'Silent Annie', who had a crewman aboard suffering from chest pains. The ENDEAVOUR was the only ship responding and immediately altered course to help with this rescue about 20nml away. Falmouth coastguards were contacted and they dispatched a RAF helicopter. A Nimrod aircraft was also sent to help with communications and to pinpoint the position of the yacht. The 'Silent Annie' eventually became visible from the ENDEAVOUR at 1.5nml range but the sea conditions had worsened to a northerly force 7. After some deliberation, the crew of the yacht eventually decided that they would be able to get alongside the ENDEAVOUR and that the sick man would be able to climb the pilot ladder. This was a dangerous manoeuvre given the weather conditions but it was successfully carried out thanks to some skilful seamanship. With the sick man safely aboard, the ENDEAVOUR steamed north to shorten the distance for the helicopter, which arrived some 40 minutes later. The sick man was winched onboard the helicopter and flown to a hospital in Truro, Cornwall over 200nml away.

It is to the credit of the officers and crew of the ENDEAVOUR that this rescue was successfully completed and co-ordinated, enabling the rescue of a sick person from a very small yacht (<30ft long) in marginal weather conditions. Their thoroughly professional conduct enabled this to happen in less than 3hrs from receiving the first MAYDAY to the sick man being winched aboard the helicopter. No further work was possible that evening due to strong to gale force winds and a large swell.

Work recommenced the following morning at 47° 15'N, 9° 45'W in marginal conditions, on a long easterly transect. Having completed just 4 stations, work again had to be abandoned in the early evening of 29 April as conditions worsened once more. Slow progress was made during 30 April, but the wind and swell slowly subsided as ENDEAVOUR approached the French coast on 1 May. A Foto trawl in the evening captured a few juvenile mackerel but none were

suitable for ovary samples. By the following morning ENDEAVOUR was working west on the most southern transect at 46° 15'N. A sample of pilchards was collected from a Foto trawl during the late morning but again no mackerel or horse mackerel samples were taken.

Plankton sampling continued along the 46° 15'N transect out to 8° 45'W where no mackerel or horse mackerel eggs were found. ENDEAVOUR then headed north to 46° 45'N and began sampling back towards the French coast. Two Foto trawls were carried out on this transect during 3 and 4 May but no mackerel or horse mackerel were caught. Slow and uncomfortable progress was made in strong to gale force northerly winds, heading north then west along latitude 47° 45'N during the period 4-6 May. Work had to be abandoned for over 12hrs during 5 May due to a very large north-westerly swell. No fishing was possible during this period.

By 7 May the winds had eased slightly but a large westerly swell was still present when the final plankton sample of the first half of the cruise was completed at 47° 45'N, 10° 15'W. Course was then set for the mid-cruise break in Cobh, Ireland and a Foto trawl was completed as ENDEAVOUR crossed the shelf break that afternoon. A sample of mackerel ovaries was taken from this catch for estimation of atresia. ENDEAVOUR docked in Cobh at 10:15hr, 8 May where an exchange of scientific staff took place.

ENDEAVOUR sailed from Cobh at 19:00hr, 9 May, ready to begin plankton sampling just after midnight at 51° 15'N, 8° 15'W. Good progress was made in calm weather, heading west then north to latitude 51° 45'N. Mackerel ovary samples were taken from a Foto trawl deployment in the early evening of 10 May, off the shelf break. Sampling continued out to 15° 45'W on 11 May, where no eggs were found and ENDEAVOUR headed south to the next transect line at 51° 15'N.

Over the next three days plankton sampling continued in fine weather, working east, on short, north – south transects, at latitudes 51° 15'N and 50° 45'N. A Foto trawl deployment at the shelf edge, in the early afternoon of 14 May, yielded about 160Kg of mackerel, which were sampled for fecundity and atresia. Excellent progress was then made on the plankton survey grid, heading east along 50° 45'N, to 7° 45'W and then southeast to begin the penultimate transect at 50° 15'N. Sampling continued out to 14° 15'W where a Foto trawl was carried out during the evening of 16 May. Again, many snake pipefish were caught, but no mackerel or horse mackerel.

The final transect was begun during the early hours of 17 May, at 49° 45'N, 14° 15'W. The fine weather persisted, which allowed excellent progress to be maintained as ENDEAVOUR headed back east. Two Foto trawl deployments, about 20nml apart, were made at the shelf edge during the evening of 17 May and the early hours of 18 May. Both hauls provided good numbers of mackerel ovaries for fecundity and atresia estimation. Plankton sampling continued until the final station of the mackerel egg survey was completed at 18:00hr, 18 May.

ENDEAVOUR steamed east overnight to a position off Start Point where a small grid of five plankton stations was completed during the following morning. Crab larvae were sorted, identified, staged and individually preserved in ethanol for subsequent DNA analysis (Aim 4, Table 2). An echo survey was then carried out, south of the Eddystone Lighthouse, to look for mackerel and horse mackerel marks on which to shoot the trawl. Unfortunately, no marks were found. The Foto trawl was deployed at 17:00hr south of Start Point where a few scattered

marks had been seen earlier in the day. 64Kg of juvenile mackerel were captured but no ovary samples were taken.

A further five plankton stations for crab larvae were completed in the eastern English Channel during 20 May. Only five edible crab larvae were preserved (Table 2). Sampling was completed by 15:30hr and course was made for Lowestoft. Endeavour docked at 11:30hr 21 May.

RESULTS:

AIM 1: Plankton sampling for mackerel and horse mackerel eggs.

A Gulf III type plankton sampler, fitted with a 20cm aperture nosecone and 270μm mesh net was used during this survey. A Guildline CTD attached to the sampler provided 'real time' flowmeter data as well as salinity and temperature profiles for each double oblique plankton haul. 147 plankton stations were completed (72 stations in period 4 and 75 in period 5), covering a large part of the 'Western' mackerel spawning area from 46º 15'N to 51º 45'N (Figure 1).

The 'spray technique', used to remove fish eggs from the rest of the plankton, worked extremely well and was very useful in providing a quick and reliable estimate of the total numbers of eggs in the samples. Most mackerel and horse mackerel eggs were found, as expected, close to the shelf edge, particularly in the south of the sampling area where the continental shelf edge is steep.

The sub-surface (3m) continuous thermo-salinograph was run throughout this survey. Initial problems with a blocked filter were soon resolved and a procedure was developed during the cruise for back-flushing the system with fresh water. Discrete surface seawater samples were taken at alternate plankton stations to provide a salinity calibration for the Guildline CTD and the continuous thermo-salinograph.

AIM 2: Sampling for fecundity and atresia.

A pelagic FOTO trawl used throughout the survey to provide samples of mature female mackerel and horse mackerel for fecundity and atresia estimations. The trawl was fitted with Scanmar wing-end/distance, headline height and depth sensors.

The trawl was towed for between 60 to 90 minutes depending on the quantity of fish expected. The FOTO trawl was deployed at 13 stations (Figure 2), throughout the spawning area, with effort concentrated towards the shelf edge. The trawl was deployed at every suitable opportunity when crossing the shelf edge or at night at the surface, which has proved to be productive in catching mackerel in the past.

Catches were generally very light except for stations 122 and 155 when 160Kg and 290kg, respectively, of mackerel were caught. The number of mackerel ovaries collected for histological analysis of fecundity and atresia, are given in Table 1. Given the area and timing of the survey, a good coverage of the full size range of fish was achieved. Otoliths were taken from each fish where ovaries were sampled. Only seven mature female horse mackerel were caught for subsequent lipid analysis to estimate the potential annual fecundity of this species.

Table 1. Numbers of mackerel ovaries collected and horse mackerel frozen for fecundity and atresia by Foto trawl station.

Station number	Number of mature female horse mackerel frozen	Total weight of mackerel caught. (kg)	Number of mackerel sampled for fecundity and atresia				
			<250 g	251 - 400g	401-550g	>550g	**Total**
12	0	10					**0**
22	0	0					**0**
43	0	10					**0**
50	0	0					**0**
63	0	0					**0**
69	0	0					**0**
83	2	32	12	7	5	0	**24**
92	0	65	6	8	5	1	**20**
122	0	159	12	3	0	0	**15**
145	0	0					**0**
154	1	91	13	7			**20**
155	4	294	5	5	5	5	**20**
169	0	64					**0**
		Totals	**48**	**30**	**15**	**6**	**99**

AIM 3: To take biological samples from mature hake and cod.
No mature hake or cod were caught.

AIM 4: To collect samples of edible crab larvae (*Cancer pagurus*).
Three known hatching sites, off the coast of north Brittany, off Start Point and in the eastern English Channel, were sampled for edible crab larvae during the cruise (Table 2).

Table 2. The number of crab larvae individually preserved for subsequent DNA analysis at each sampled station.

Area Sampled	Station Number	Number of Crab larvae preserved
Brittany coast	2	21
	3	0
	4	2
Start Point	164	51
	165	50
	166	0
	167	52
	168	1
Eastern Channel	170	3
	171	1
	172	1
	173	0
	174	0

Miscellaneous:

a) Six juvenile monkfish (*Lophius piscatorius*) from station 12 were frozen for S. Warne.
b) A sample of pilchards (*Sardina pilchardus*) from station 50 was frozen for Dr B. Roel.
c) Two diseased grey gurnards (*Eutrigla gurnardus*) from station 169 were frozen for Dr S Feist, CEFAS, Weymouth.
d) Eggs from 7 spawning mackerel were artificially fertilised and incubated in the controlled temperature room at 13ºC. Samples of the developing eggs were removed once per day to provide a reference collection for training purposes.

S. Milligan
Scientist In Charge
21 May 2004

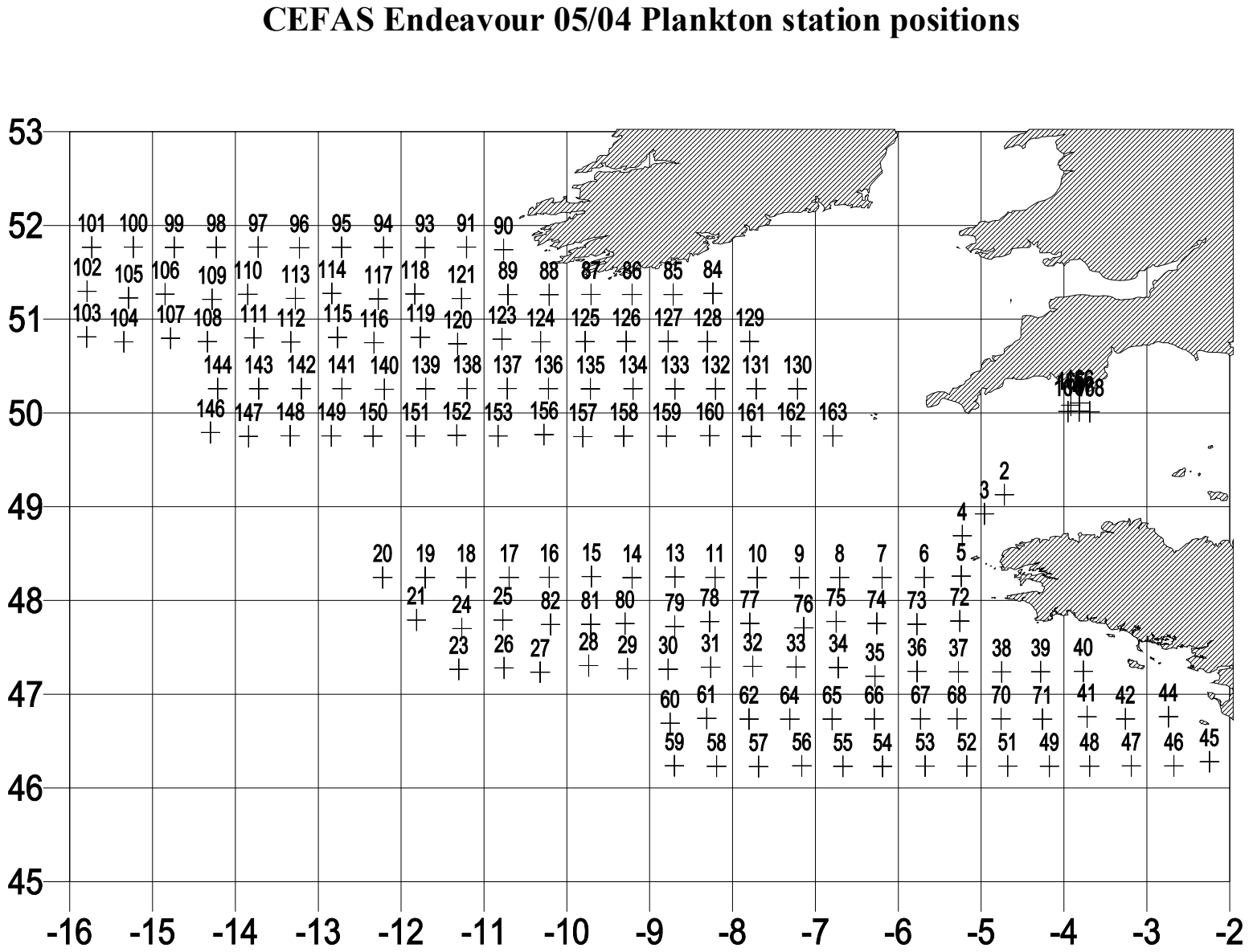
SEEN IN DRAFT

Master: Capt. A. Reading
Senior Fishing Mate: Mr. A. Lincoln

INITIALLED: Dr. R. Millner

DISTRIBUTION:
Basic List
Staff on cruise
Dr R Millner
Dr D Reid (Chair, WGMEGS, FRS, Aberdeen)
FCO (for Ireland and France)

Figure 1.


CEFAS Endeavour 05/04 Plankton station positions
53
52
51
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49
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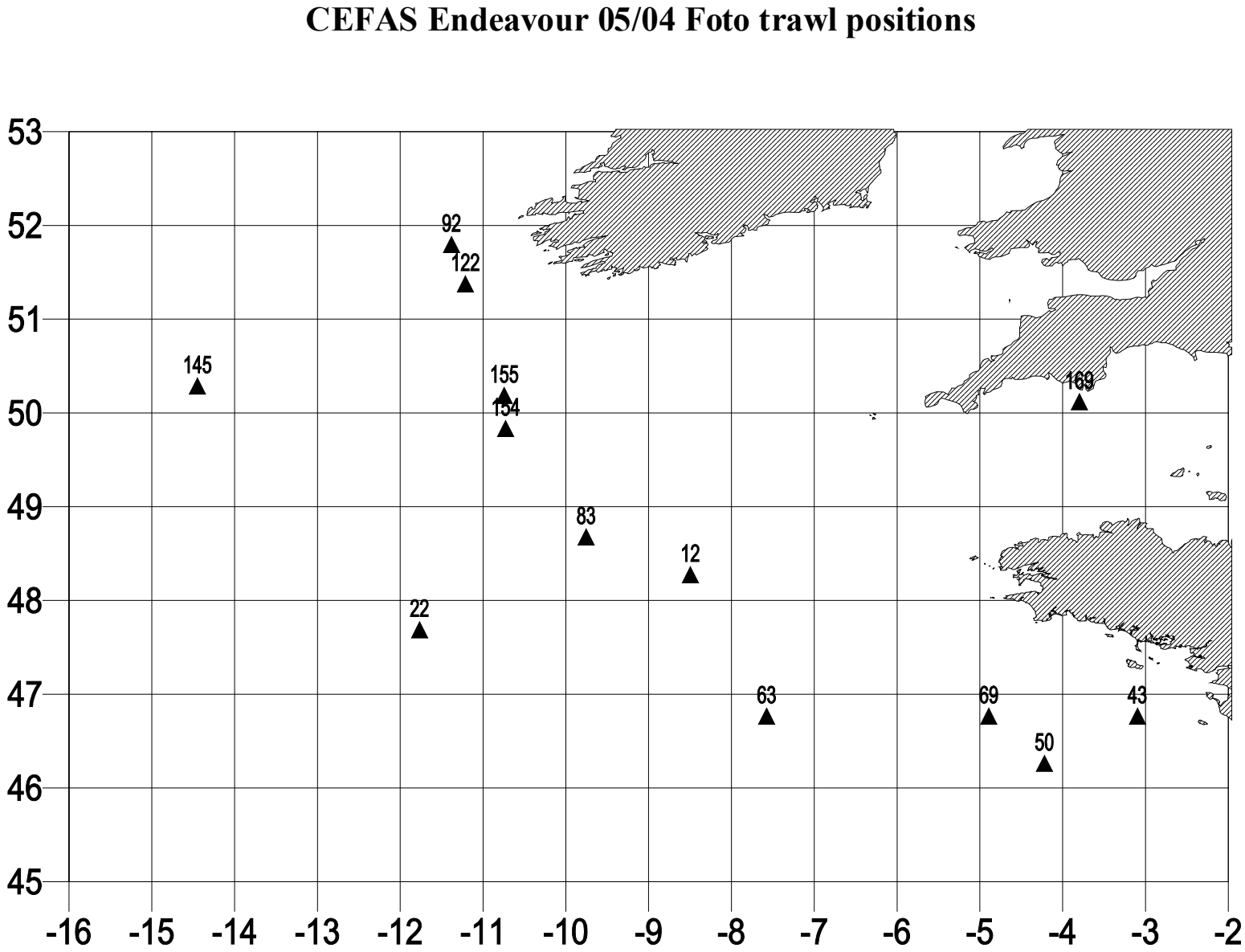
Figure 2.


CEFAS Endeavour 05/04 Foto trawl positions
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