

**THE CENTRE FOR ENVIRONMENT, FISHERIES & AQUACULTURE SCIENCE,
LOWESTOFT LABORATORY, LOWESTOFT, SUFFOLK, NR33 0HT.**

**2011 RESEARCH VESSEL PROGRAMME
REPORT: RV ENDEAVOUR: SURVEY 13/11**

STAFF:

Sally Songer (SIC)
Richard Ayers (2IC)
Matthew Sherlock (CRP)
Mary Brown
Stephen Shaw
Joanne Smith
Emma Lane
Neil Pearson (20-27 July)
David Limpeny (27– 2 August)

Chukwuemeke Ijeoma Utomi (Exeter Student)

DURATION:

20 July – 2 August 2011

LOCALITY:

English Channel (VIId), North Sea (IVc).

PRIMARY AIMS:

1. To undertake a beam trawl survey in the southern North Sea and eastern Channel as part of an ICES co-ordinated research programme.
2. To obtain fisheries independent data on the distribution and abundance of commercial flatfish species.
3. To collect biological data, including maturity and weight at age, of commercial species, to satisfy the requirements of the EU data regulations.
4. To identify the epibenthos by-catch taken in the 4-metre beam trawl and to quantify 12 species as agreed at the Beam Trawl Working Group.

SECONDARY AIMS:

5. To sample litter on every station
6. To collect isotope samples of queen scallops for Simon Jennings
7. To collect live berried lobsters and mature female lesser spotted dogfish for brood stock for Stuart Hetherington.
8. To collect queen scallops for Bangor University
9. To collect radiological samples of fish and scallops for Paul Rumney
10. To collect water samples for nutrient analysis for Naomi Greenwood.
11. To collect detailed length/weight data for Joana Silva on species of small size.

NARRATIVE:

The SIC and 2IC joined the Endeavour on the morning of 19 July to allow them to time to unload the gear and set up the fishroom before the arrival of the rest of the scientific team in the afternoon of 19 July (17:00h). David Limpeny and Bill Meadows were also on board that day to mob the camera and grab gear that they would be using during the second part of the survey, as were staff from the previous survey that were unloading gear. Safety inductions were carried out at 19:00h for those members of the scientific team who required them.

The vessel sailed from Portland docks at 06:15h on 20 July, and headed to the first survey station. En route the toolbox talk took place.

A typical station consisted of deployment of the 4m beam trawl with mini CTD from the starboard winch. The beam was towed for 30 minutes at a warp ratio of 3.5:1 unless the ground was known to yield an unmanageable catch, in which case the warp and tow time were shortened to 3:1 and 20 minutes respectively. Before the first tow and after the last tow each day the Niskin was deployed with mini CTD and surface water samples were taken from the ferrybox or clean supply when the ferrybox was inoperative.

The survey commenced with the Niskin being deployed to the west of the Isle of Wight in proximity of Poole and Christchurch bay at prime station 44, (VIIId inshore English side) at 09:59h, the beam trawl was shot at 10:17h.

This first tow was used as a shake down and no problems were encountered. During 20 July five prime beam trawl stations were completed. All were valid. Two other prime stations were attempted but both were invalidated as the tows had to be interrupted to avoid static gear. There was no clear space available to repeat these tows so they will be revisited later in the survey. On prime station 24 the codend ripped out but this station was re fished successfully once the net had been repaired. The vessel then proceeded south overnight to start work at prime station 10 on the VIIId French side the following morning.

From 21 July up to and including 2 July the vessel worked eastward along the French coast picking up all prime stations in the standard way, except those noted below.

Prime 4 was moved 300m to the south to avoid static gear.

Prime 12 was moved slightly to the west of its' designated position to avoid towing over a cable on the sea bed.

Prime 14 a massive catch of shell and gravel was encountered. 2 x doubled up 2.5 tonne (SWL) strops parted whilst we were trying to get the catch on board, constituting a significant health and safety risk to the crew. The net was seriously damaged by the weight of the catch and took several hours to mend causing a halt to operations for the remainder of the day. As a result of this the SIC took the decision to abandon prime station 15, which is nearby and has yielded similar catches in previous years.

It is strongly recommended that these stations are dropped from next year's survey as the risk they represent to the crew and the gear, when weighed against the fact that they have not

yielded valid results for a number of years is difficult to justify from a scientific or health and safety stand point.

On the evening of 24 July, once the French side of the VIId grid had been completed the vessel proceeded west to commence work on the morning of 25 July at prime station 26 south of the Isle of Wight.

Prime stations 26, 22 and 23 were fished successfully; the vessel then proceeded north to prime stations 43 and 45 which we had previously been unable to fish due to large amounts of static gear in the area. On arrival the situation was found to be unchanged forcing these two tows to be abandoned. Likewise it was impossible to fish prime stations 49 and 56 because of the volume of static gear in the vicinity. The same problem was encountered at prime 49 on last year's survey (Cend 12/10). Overall this year a marked increase in static gear at several locations has been noted.

At prime station 50 the gear was hauled slightly early to avoid a wreck at the end of the tow, at prime station 66 damage was sustained to the ground rope during hauling, this did not affect the validity of the catch. On prime station 65 a massive catch of mud and starfish was made, this tow was invalidated but a repeat tow of shorter duration was carried out with a smaller warp ratio and this time the catch was valid. Work proceeded without further incident on the English side of VIId until the evening of 29 July, when the VIId section of the survey grid was complete.

At 16:00h on 27 July Neil Pearson left the vessel and was put ashore at Shoreham, Dave Limpeny, Sue Ware and Allan Emery joined the vessel to carry out a feasibility study assessing potential for carrying out multi disciplinary work on fishing surveys, doing grabs, camera studies and multi beam lines during the night. Details of the work carried out during this study are noted in the 'other work' text below. :

On the 30 July work commenced at prime station 79 in IVc. Work proceeded smoothly until prime station 93 was reached at 14:29h. This tow was close to a wind farm and was previously clear. When we hauled the beam at the end of the tow the net was leading straight down, this indicated there was a lot of weight in the net, the net gave way under the weight, ripping the net from the headline and all the way around the fishing line, this was believed to be due to the net digging in to soft sand/mud. Conditions were very calm with light airs and a swell of 0.5m. The trawl was condemned, although the beam, ground gear and CTD were retrieved successfully. Beam 1 was swapped in ready for fishing to recommence the following morning.

On the morning of the 1 August an experimental tow was carried out with the beam trawl, preceded by a multi beam and camera run over the ground. Once the beam trawl was complete the multi beam and camera were again passed over the same track to look for any obvious changes to the seabed. Initial examination of the footage and multibeam data on board showed no significant evidence of the beam trawl's passage across the ground, further detailed work with the data may yield results. As a trial in logistics it proved relatively straight forward to undertake and may offer opportunities for cross divisional working and further investigations in the future.

Work continued in IVc heading North towards Lowestoft on the 31 July and 1 of August. The last survey station was additional tow 105, which was completed at 15:27h.

The Cefas Endeavour docked in Lowestoft on the morning of 2 August at the end of the survey.

RESULTS:

Primary aims.

Aim 1.

Region	Valid 30 mins	Valid 20 mins	Invalid	Number of stations without valid result	Total tows
VIIId (English)	33	2	3	5	43
VIIId (French)	17	14	1	1	33
IVc	8	5	1	1	15
Total	53	21	3	6	91

Table 1. The number of valid and invalid tows fished during the survey.

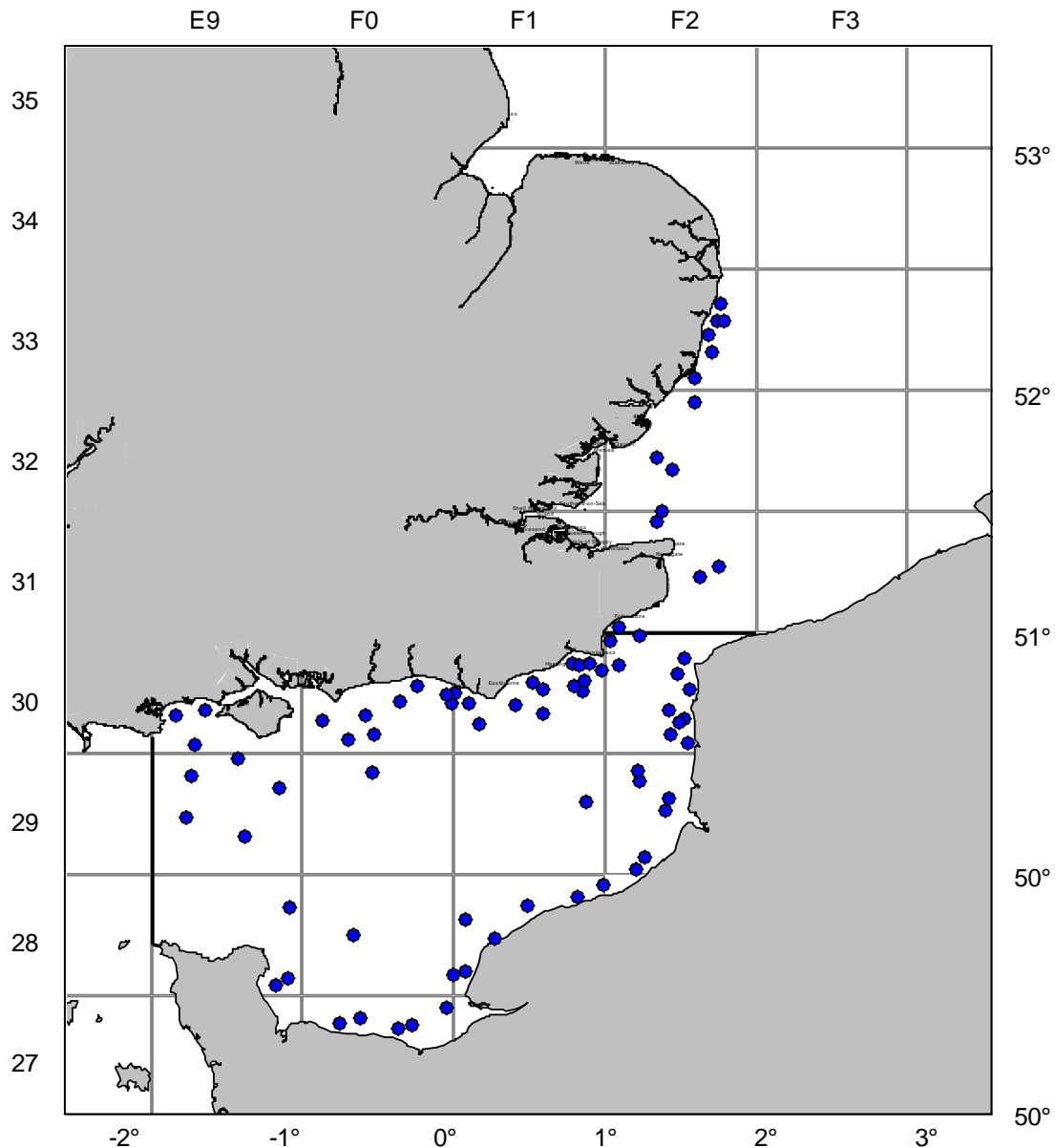


Figure 1 –Stations fished during survey.

Aims 2 & 3

All otolithed fish were measured to the whole cm below, weighed individually, sexed and assigned a sexual maturity code based on a 4-stage key if required. Table 2 shows the otoliths collected for the main commercial fish species. All non-commercial finfish by-catch caught was identified to species level, weighed and measured. In addition the following shellfish and cephalopods were also weighed and measured, cuttlefish (*Sepia officinalis*), *Alloteuthis* spp, *Loligo* spp, edible crab (*Cancer pagurus*), lobster (*Homarus gammarus*), scallops (*Pecten maximus*), velvet swimming crab (*Necora puber*) and spider crab (*Maia squinado*), while queen scallops (*Aequipecten opercularis*) and oysters (*Ostrea edulis*) were weighed and counted only. The numbers of individual fish measured this year for the main commercial species can be seen in Table 3.

In total 203 different species were recorded. Figure 2 (dab), figure 3(lemon sole), figure 4 (plaice) and figure 5 (sole) show bubble plots of the spatial distribution of catches for those specific species.

Region	Brill	Cod	Dab	Flounder	Lemon sole	Plaice	Sole	Bass	Whiting	Turbot
VIIId English	13	0	240	27	156	619	270	1	36	5
VIIId French	22	6	237	32	116	545	301	7	38	34
North Sea (IVc)	3	3	110	60	26	67	360	1	0	1
Total	38	9	587	119	298	1231	931	9	74	40

Table 2. Otoliths collected from the main commercial species in each sampling region.

Species	Species code	VIIId English	VIIId French	IVc North Sea	Total
Brill	BLL	13	22	3	38
Cod	COD	0	6	3	9
Cuttlefish	CTC	70	299	0	369
Dab	DAB	724	722	151	1597
Flounder	FLE	39	33	102	174
Lemon Sole	LEM	190	186	32	408
Plaice	PLE	1659	2854	108	4621
Sole	SOL	509	450	817	1776
Turbot	TUR	6	34	1	41
Whiting	WHG	368	48	174	590
Bass	ESB	1	7	1	9
Velvet swimming crab	MLP	44	850	140	1034

Table 3. Number of fish measured from the main commercial species, in each sampling region.

Table 4 – Comparison of catch weight in kg for the main commercial species over the last 3 surveys (2009-2011).

Species	Weight in Kg		
	2011	2010	2009
Plaice	859.005	721.99	628.117
Sole	167.496	183.622	343.064
Dab	115.12	104.089	149.414
Lemon Sole	65.78	17.96	41.53
Cuttlefish	61.121	121.85	92.685
Flounder	49.447	27.29	107.235
Whiting	45.347	53.162	54.823
Velvet swimming crab	45.195	44.401	75.8
Brill	24.019	14.219	8.9
Turbot	23.124	19.315	7.98
Bass	13.125	4.995	9.52
Cod	3.575	1.055	31.035

As shown in table 4 in general catches in 2011 were slightly higher than in 2010 for all species except cuttlefish, whiting and sole as mentioned above. Catches of plaice have shown an increase year on year over the last three surveys. Catches of sole conversely have decreased over the last 3 years, with this year's catch being down 20.126kg on last year.

AIM 4:

On certain specified stations a full benthic sort was carried out to identify the numbers and weights of species encountered. In addition on all other stations benthos encountered was noted as an observation in the database at species or other taxonomic grouping. There were also 9 sentinel species that if encountered at any time on any tow, should be removed and quantified. We primarily encountered Ross Coral (*Pentapora foliacea*) (at 7 stations) and *Sabellaria spinulosa* of these species (at 7 stations); 4 sponge crabs and 1 mantis shrimp (*Meiosquilla desmaresti*) were also caught. All 12 planned full benthic stations in VIId 3 in IVc were sampled successfully.

Secondary aims.

Aim 5. Litter was recorded in line with protocol provided on every valid beam trawl station.

Aim 6. 70 samples of queen scallops were collect for Simon Jennings for isotope sampling.

Aim 7. 1 live berried lobster was collected for Stuart Hetherington for brood stock.

Aim 8. 40 samples of queen scallops were collected at the designated stations for Bangor University.

Aim 9. Samples of fish were collected for radiological sampling by Paul Rumney at all requested sites.

Aim 10. Water samples for nutrient analysis, to the supplied protocol at all sites requested by Naomi Greenwood.

Aim 11. Detailed length/weight data, to mm and 0.1g was collect on 56 individual fish for Joana Silva.

Other work

The EDC system (Deckmaster and Measure) was upgraded to incorporate communication with the newly acquired DEM marine scales.

The problems previously reported with importing tracks etc into Transas were investigated, we believe we now have a handle on the possible cause but protracted email conversations with Transas have not yet yielded a solution.

End 13/11 MCZ survey work

Aim

In order to fulfil national and international obligations, the UK is committed to creating a network of Marine Protected Areas (MPA's) to protect UK marine biodiversity as well as certain species and habitats. As part of this exercise, a series of Marine Conservation Zones will be created under the auspices of the Marine and Coastal Access Act 2009. It is the responsibility of the JNCC and Natural England (NE) to recommend sites for MCZ designation. This process relies on having good evidence to support these designations. Cefas recognises this need and already have joint projects with JNCC and NE to gather this evidence. This cruise provides an opportunity to assess the potential for using overnight downtime on fisheries cruises to collect data from proposed MCZ sites in particular, but also as a general principle.

Survey approach

A combination of grab sampling, camera and acoustic sites were pre-selected inside proposed MCZ's within the Balanced Seas Regional Project off the south and south-east coast of England. Sampling at these sites was integrated within the main Eastern Channel Beam Trawl Survey grid. Each day, sites were chosen based on their proximity to the last fishing station of that day and the first fishing station of the following day. In this way, the overnight period could be maximised without impinging on the primary aims of the survey.

As a general rule, the multibeam sonar was acquiring data during long transits to and from fishing and dMCZ sites. Multibeam data was not routinely collected during shorter transits or between fishing stations as data quality is generally poor during the manoeuvring on each site. This kind of data is difficult and time consuming to clean, and is of relatively little value.

Survey activity

27 July

Three Cefas staff joined the vessel at Shoreham late in the afternoon of 27 July. An additional AB also joined the vessel to enable overnight working to be conducted. Equipment had been pre-mobilised during the vessels last port visit to Portland earlier in July. Work started

immediately (*circa* 18:00h) on a proposed MCZ off Worthing (Kingmere dMCZ no 16). Three multibeam lines were run over the site initially (following an SVP drop). Following this, two drop camera stations were worked and digital stills and video data were collected. Examples of *Pentapora foliacea* were observed on the video/stills record. Work had to be completed by 24:00h as the vessel had to steam approximately 45NM to the first fishing site for the following day.



Fig 1. *Pentapora foliacea* observed at the Kingmere dMCZ.

28 July

Fishing was completed by 18:00h and Endeavour steamed to dMCZ no 9 (Offshore Foreland), beginning survey work at around 21:00h on a drop camera site within the traffic separation zone. Dense beds of *Ophiothrix fragilis* were present at the seabed. At the second camera drop site the tide was too strong to enable the vessels DP system to survey at a sufficiently slow speed to gather video/stills data, and the site was abandoned. After an SVP drop, a single multibeam line was run that supplemented existing MCA multibeam data that covers much of this dMCZ. This line was completed by around 23:30h. The vessel then transited to the next drop camera site, collecting multibeam data *en route*.

29 July

Two drop camera sites were visited in the southbound traffic zone and good data was collected from both, although a strong tide caused significant camera/cable vibration during the tow at the first site. Survey work was completed at 03:00h in order to get the vessel back to the first fishing site for the following morning. Three engines were required to ensure that the vessel arrived on site by 05:30h. The following afternoon a crew member was put ashore at Dover, and on passage from Dover back to the Dungeness fishing sites, a single multibeam

line was run over the Folkstone Holes dMCZ (dMCZ no 11.4). After fishing work was completed in the Dungeness area, Endeavour steamed to the Offshore Foreland dMCZ, crossing the Folkstone Holes dMCZ *en route*. Multibeam data was gathered throughout this transit. In the evening and throughout the night, drop camera sites were worked within the traffic zones inside the Offshore Foreland dMCZ.



Fig 2. *Ophiothrix fragilis* beds with associated fauna at the Offshore Foreland dMCZ.

30 July

Camera stations in the Offshore Foreland dMCZ were completed by approximately 08:00h and fishing stations were then recommenced. During the day, fishing stations were completed in the Channel and initiated in the Thames Estuary. During the evening and overnight, multibeam lines were run along the main exit/entry channel from the Inner Thames and in an area to the south of the Galloper. This data will support a proposed Cefas funded strategic mapping project in the Southern North Sea. Work was completed by 08:00h on 31 July.



Fig 3. Lesser spotted dogfish on a sandy substrate at the Offshore Foreland dMCZ.

31 July

Fishing stations were worked in the Thames Estuary during the day. During the evening, 3 drop camera stations were worked in dMCZ ?? (Fishermans Friend) off Southwold, and multibeam data was also collected at this site. A site of potential interest and probable data paucity was identified to the east of the Outer Gabbard sandbanks. A number of multibeam lines were worked in the southern half of this area overnight, but we were not able to survey in the northern portion of the site due to a vessel (the *Ginga Tiger*) being anchored in the area.

1 Aug

A pilot study which aimed at assessing the physical/biological impact of the 4m beam trawl at the sea bed was conducted at the 'East of Outer Gabbard' site during the morning. The beam trawl was towed across a sandy/gravelly area of seabed, and the drop camera was manoeuvred across the tow immediately afterwards. The impact of the beam trawl was not categorically identified using the camera techniques and this was probably due to the hard nature of the seabed and the relatively low numbers of benthos. Beam trawl marks caused by commercial fishing gear were observed on the MB backscatter record later in the day soon after two beam trawlers fished through the area. It is likely that the weight of the Cefas equipment was not sufficient to cause easily observable marks on the seabed. After conducting fishing work close in off the Suffolk coast during the day, the vessel returned to the 'East of Outer Gabbard' site in the evening. Camera stations were worked across the site during the evening and halted at around 23:30h when the tide became too strong to hold position on DP.

2 Aug

The remaining multibeam lines were run at the 'East of Outer Gabbard' site and work was completed at approximately 02:00hrs and the vessel headed for Lowestoft.

A serious problem with noise levels produced by using DP was noted almost immediately, representing a health and safety risk to the crew who were deprived of sleep. The SIC took the decision that no DP work could be carried out between 23:00h and 05:00h to reduce this risk, during this quiet period multi beam lines were worked. It was apparent that this kind of multi use of the vessel would only be practical in the long term if a considerable period of planning took place before the survey commenced to ensure stations worked by both teams coincided reducing the amount of steaming required, disruption to the crew and scientists onboard and to ensure both teams could get optimal use from the vessel.

Acknowledgements

The SIC would like to offer her sincere thanks to the officers and crew of the Cefas Endeavour for their support and expertise throughout the course of the survey, without which it would not have been possible.

S Songer

01/08/11

INITIALLED: Brian Harley

DISTRIBUTION:

Basic list +

Cruise staff

Fishing Skipper Cefas Endeavour

W Demare, Belgium

Frans v Beek, Netherlands

Joel Vigneau, France

Kent and Essex, Sussex, Southern and Eastern SFCs

DARD Northern Ireland

Cend 13/11 - Dab

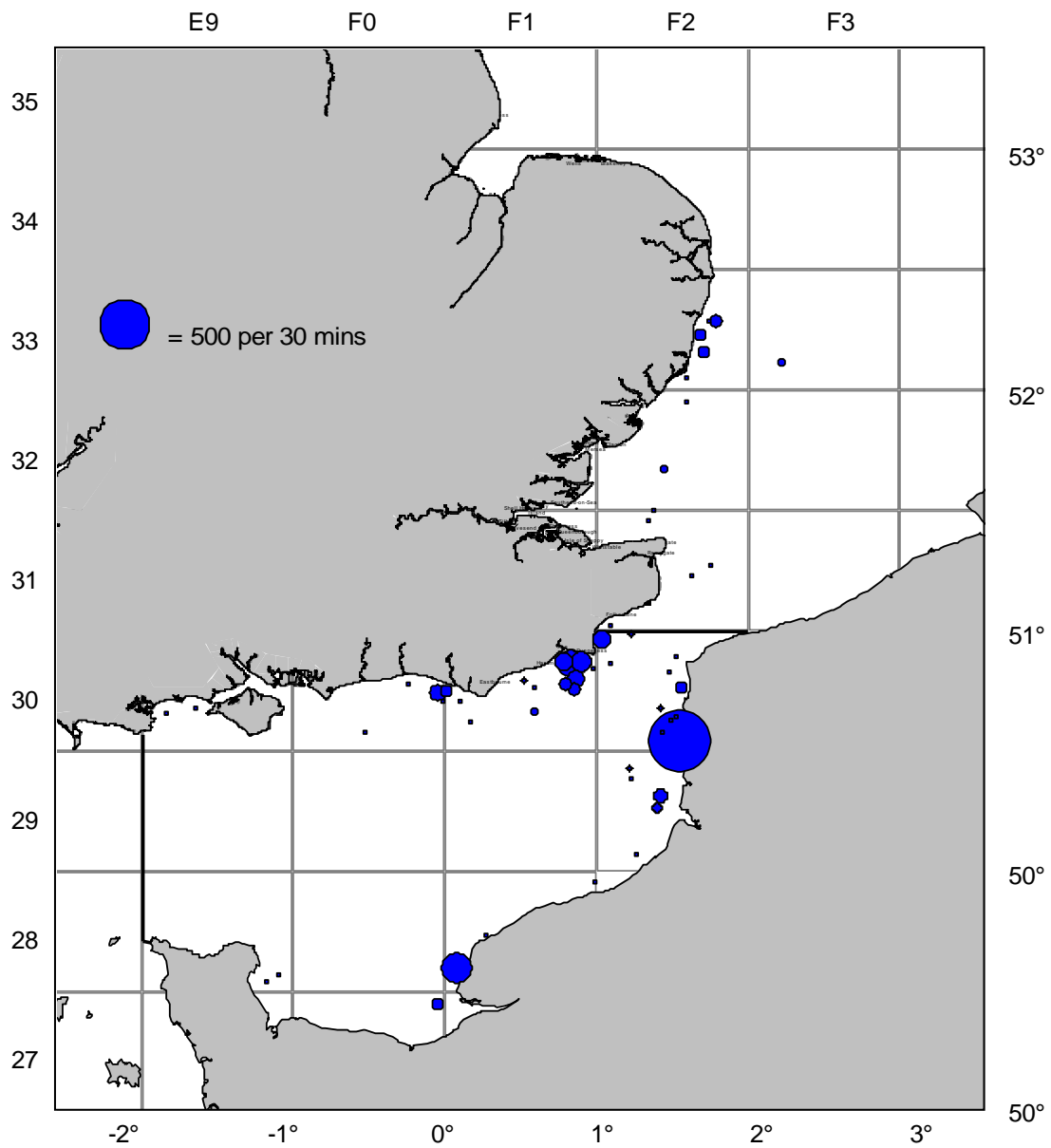


Figure 2 – Distribution of dab caught on 2011 survey.

Cend 13/11 - Lemon sole

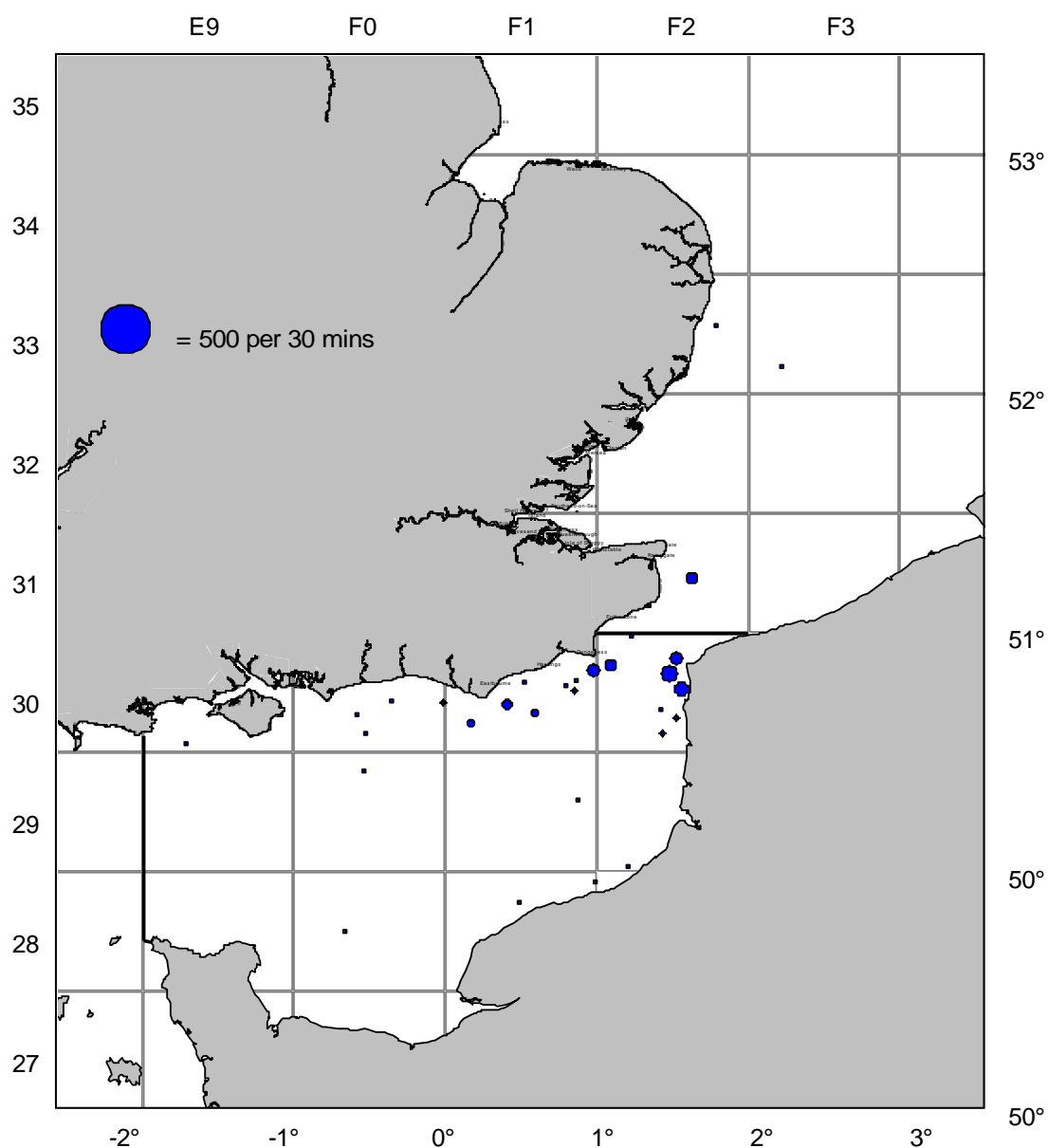


Figure 3 – Distribution of lemon sole caught on 2011 survey.

Cend 13/11 - Plaice

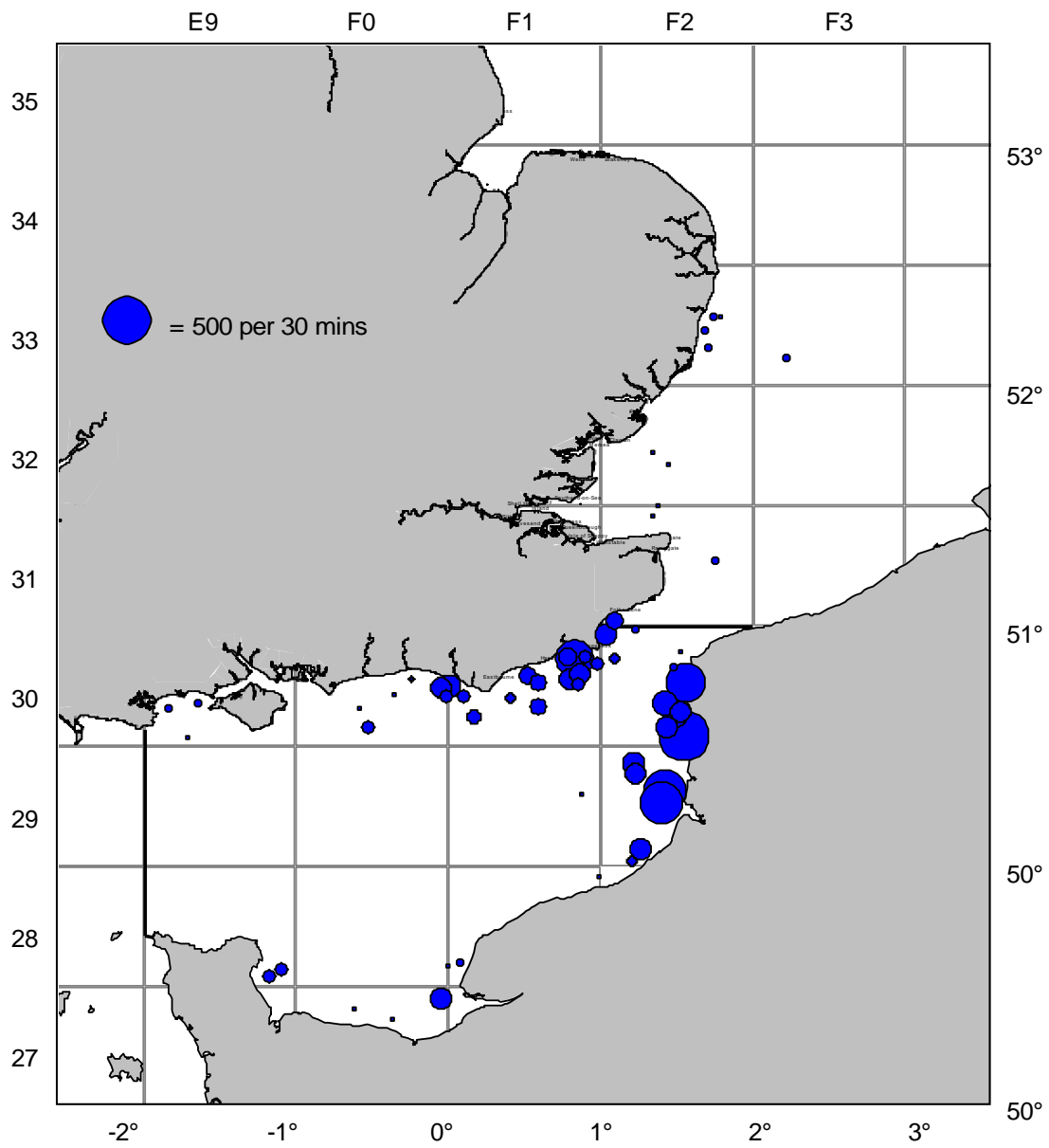


Figure 4 – Distribution of plaice caught on 2011 survey.

Cend 13/11 - Sole

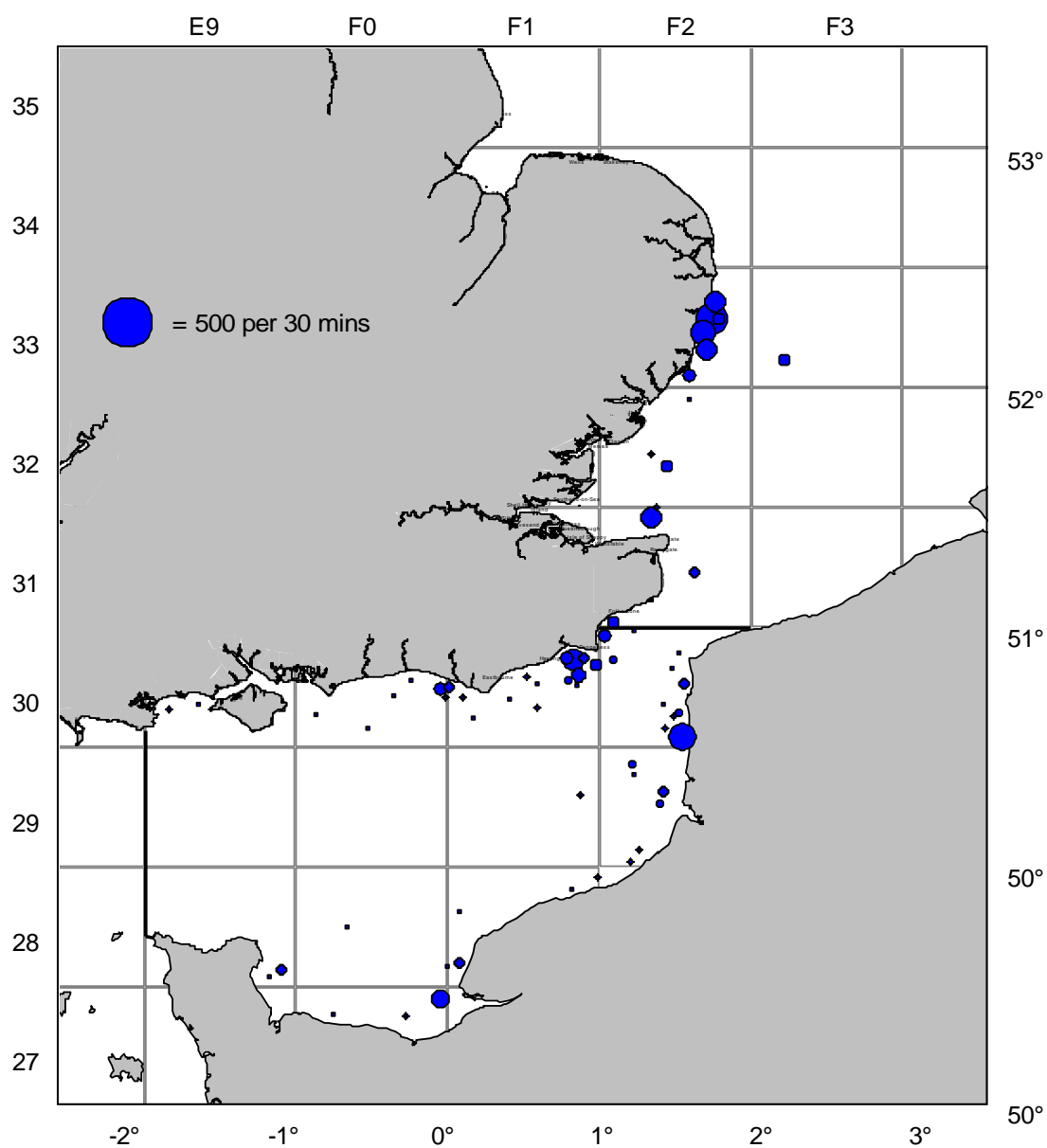


Figure 5 – Distribution of sole caught on 2011 survey.

