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

2014 RESEARCH VESSEL PROGRAMME
REPORT: RV ENDEAVOUR: SURVEY 15/14

STAFF:
Sally Songer (SIC)
Richard Ayers (2IC)
Gary Burt
Mary Brown

Brian Harley 16th – 23rd July
Charlotte Jennings 16th -23rd July

Joanne Smith 23rd -31st July
Neil Pearson 23rd – 31st July
Wendy Dawson 23rd – 31st - July

DURATION:
17th – 31st July 2014

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 4m beam trawl and to quantify 12 species as agreed at the Beam Trawl Working Group.

5. The undertake additional trawling on coastal grounds (15–40 m water depth) between Selsey and Lulworth to provide further information on the distribution of undulate ray.

SECONDARY AIMS:

6. To sample litter caught in the beam trawl on every station
7. To collect berried crabs and lobsters for brood stock
8. To collect live crabs and starfish for Yarmouth Sea Life centre.
9. To collect one water sample per day for nutrient analysis for Naomi Greenwood.

10. To collect FSA fish samples
11. To collect fin clips from bass, red mullet and pollock for DNA analysis.
12. To collect biological information on smooth hounds.
13. To tag and release smooth hounds and rays.
14. To collect length/weight information on selected species.
15. To collect and filter a water sample in the vicinity of the West Gabbard SMART buoy for Elisa Capuzzo.
16. To collect fish ID specimens for Cefas Day.
17. To test applications on the SIC desk computers to ensure they are compatible with Windows 7.

NARRATIVE:

The SIC and 2IC joined the Endeavour on the morning of 16 July and proceeded to set up the EDCs and unpack the gear to check that everything was present. It was discovered that there were no spare EDC wands aboard so a courier was dispatched from Lowestoft to bring some to the ship before she sailed. The rest of the scientific crew joined the vessel at 15:00 on 16 July. Inductions were given for those needing them at 16:00. The vessel sailed from Portland at 0815 on the morning of the 17 July, heading to the first survey station (Prime 44). En route the toolbox talk, scientist safety briefing and lifejacket pre use inspections took place. A muster and abandon ship drill was held at 11:30. Throughout the course of the trip two other drills were carried out, covering evacuation of a casualty by helicopter, chemical spills and man over board.

The survey commenced with the ESM2 logger with Niskin bottle being deployed at prime station 44 in the English sector of VIId, east of Portland this was followed by deployment of the 4m beam.

This first tow was used as a shake down and no problems were encountered. During 17 July 6 prime beam trawl stations, including the shake down tow were completed, all were valid. On the first attempt at prime station 42 the net came up virtually empty, suggesting it had not been in contact with the sea bed. The tide was very strong at this point, so taking this into account we refished the station with a warp ratio of 4:1, this time the catch was as expected and processed as a normal valid station.

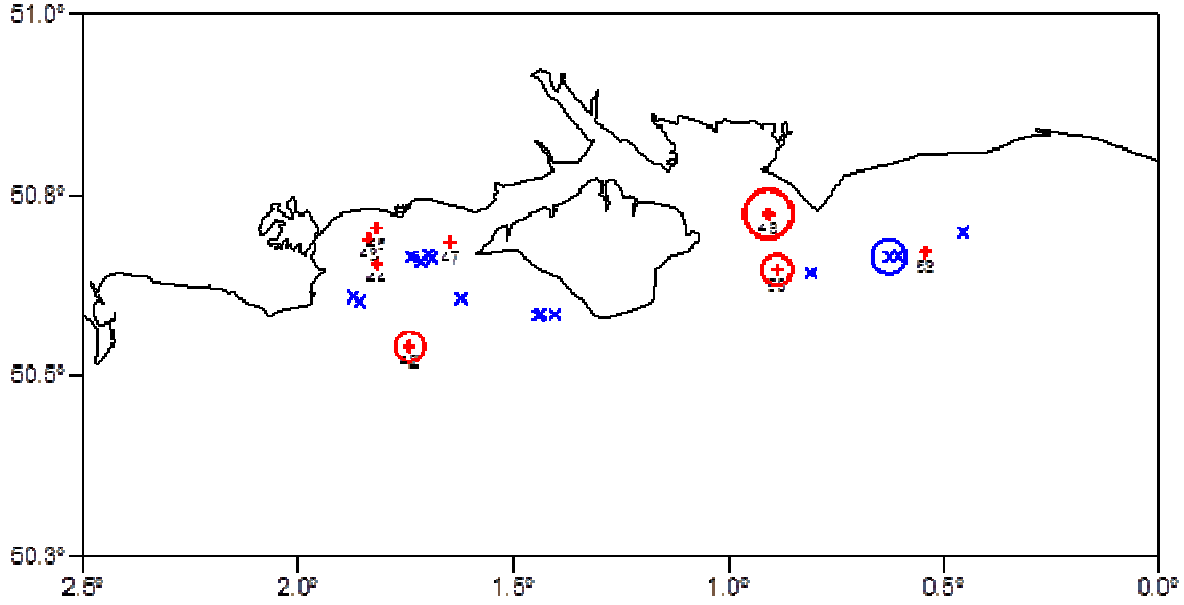
Once the day's fishing was complete the vessel steamed east over night, crossing the Channel to begin operations the following morning at prime station 95 in the French sector of VIId near Bologne. A total of 8 prime stations were fished successfully during the day. On prime station 69 a very large catch of plaice was made which took the fish room team several hours to process, resulting in a late finish. During the evening, while staff were still working in the fish room and we were en route to Prime Station 29 we steamed into an intense thunder storm. The wind speed rose from 5 knots to 50 knots in a matter of minutes and some very impressive dark cloud formations and fork lightening were visible. The storm lasted for over an hour with persistent heavy rain and thunder. This was a pretty memorable experience for all on board. The weather remained somewhat stormy for the next few days but winds were very light and temperatures high.

From the 19 July until the 21July the vessel continued to work east along the French coast picking up all prime stations, ESM2/Niskin stations and full benthic sorts successfully, with the exception of prime station 17 which had to be abandoned as the area was full with static

gear with no clear tows w available to us, and prime station 11, which on the first attempt at warp ratio of 3.5:1 and a tow duration of 30 minutes yielded over 5 tonnes of gravel, with the gear flipping over on hauling. This catch was invalid, so the station was fished again for 20 minutes at a warp ratio of 3:1. This time although, once again a large catch resulted it was manageable and processed as a valid catch.

Once the French side of VIId had been completed we transversed the channel and re started work on the English side of VIId at prime station 25 on the morning of the 22 July. Five prime stations were successfully completed on the 22 July. The 23 July was spent carrying out 15 minute tows in an attempt to catch live undulate rays for tag and release as part of an MCZ project. Tows were carried out within a specified area around the Isle of Wight (See figure 1 below.)

Figure 1. undulate ray survey area and tows.



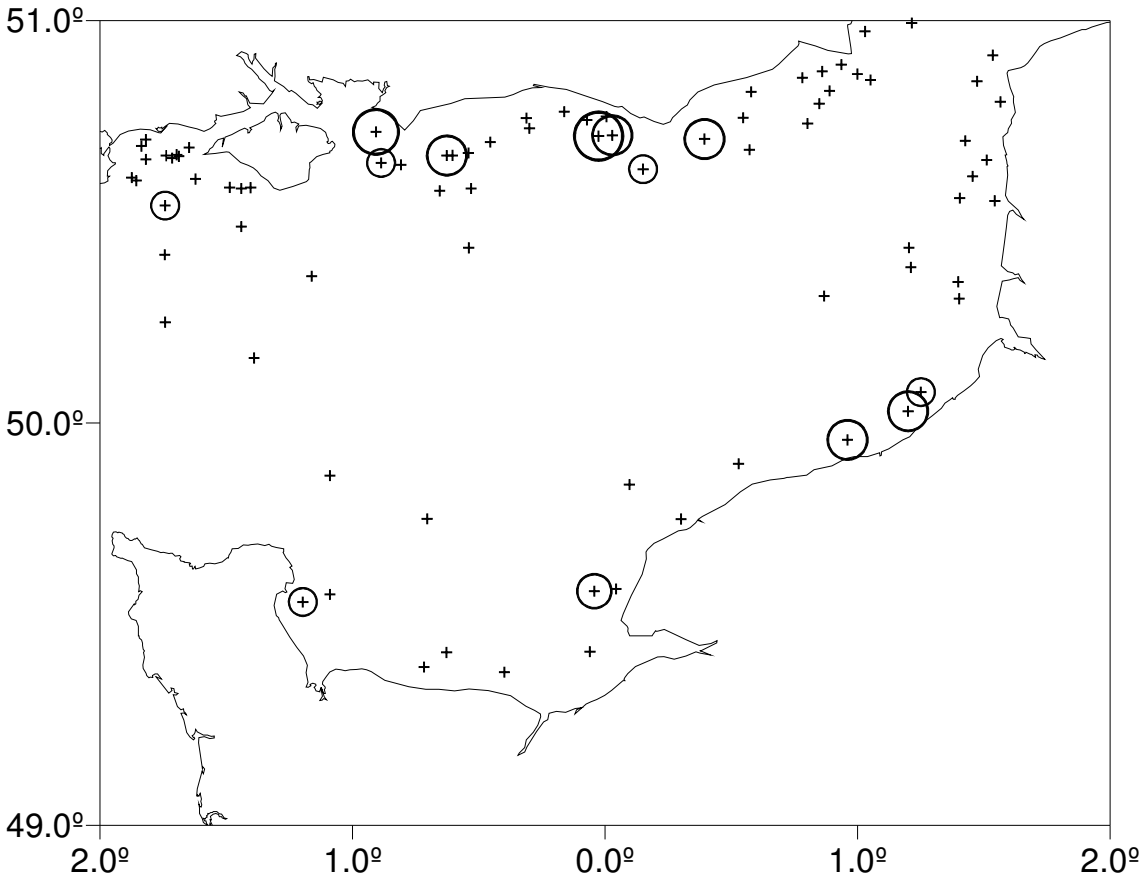


Figure 2. Distribution and relative abundance (ind.h^{-1}) of undulate ray caught during the 2014 English Channel beam trawl survey (maximum bubble size equivalent to 6 ind.h^{-1}), as observed in the overall survey (bottom) and close up of the Isle of Wight area, indicating the number caught per hour at stations (+,x), with main survey prime stations (number indicated below) shown in red and additional stations shown in blue (maximum bubble size equivalent to 5.2 ind.h^{-1}).

At around 1400 the vessel ceased work and proceeded west to Weymouth where a small boat transfer of scientific staff was carried out. Brian Harley and Charlotte Jennings left the vessel, and were replaced by Joanne Smith, Wendy Dawson and Neil Pearson. Despite further problems with the workboat this transfer was completed without incident. Once the new scientific staff were safely aboard we steamed east to pick up two more undulate ray stations that evening.

Joanne Smith underwent SIC training during the week she was on board, taking over the bridge work from me for several days to further familiarise herself with this side of operations, this was a success. Wendy Dawson carried out a Group Manager's health and safety inspection of sampling practices in the fish room. The main findings of which were that working hours can be excessively long and that the lighting over the EDC work stations is insufficient when particularly small fish are being otolithed or very detailed work being carried out. This was added to the defects list and raised with P&O and HSEQ.

On 24 July whilst fishing the standard prime stations further undulate ray stations were fished to complete aim 5. From the 25 July up to and including 27 July we continued to work our way around the remaining stations in the English sector of VIId without incident. On 28 July

we fished seven prime stations in IVc with the intention of travelling overnight to the Belgium sector to complete stations there on the 29 July. By the time we had finished fishing the wind had picked up considerably, this dramatic turn in the weather lead to the vessel responding to two separate "May Day" calls. These were two independent incidents of yachts getting into difficulty. Captain Paul Kersey responded in a calm and professional manner providing a reassuring presence until the RNLI and air sea rescue helicopter arrived and duly made the necessary rescues. Thankfully no one was injured and once both yachts were secured and under tow of the lifeboats back into port the Endeavour continued to the Belgium sector as planned.

In the Belgium sector the customary 5 stations were fished successfully, yielding moderate catches of flatfish. Once these stations were complete we steamed back to the IVc stations off East Anglia. On route, within 500m of the West Gabbard SmartBuoy, we collected and filtered a water sample for Chlorophyll analysis as requested by Elisa Capuzzo (see additional aim 15).

On the morning of 30 July the first of the remaining North sea stations (Prime 98) was fished successfully yielding a catch predominantly consisting of soles, smooth hounds, whiting and weed. Next prime station 99 was attempted. Initially the station was fished for 30 minutes with a warp ratio of 3.5:1, this resulted in a catch of over 5 tonnes of mud, which caused the gear to flip over on hauling. This catch was invalid, and it took over an hour to safely bring aboard, dispose of and get the gear ready for fishing again. The second attempt (20mins, warp ratio 3:1) yielded a very small catch, consistent with the gear not being in contact with the sea bed. This catch was also deemed invalid and the station attempted for a third time, with the warp at 3.5:1 and tow duration of 20 minutes. Once again an enormous and unmanageable catch of mud resulted. The station was again invalidated and this site was abandoned, with the vessel eventually moving on to prime station 100. The remaining 5 North Sea stations were fished successfully, thus concluding the 2014 survey.

Once the processing of all stations was complete the scientific staff began to clean down. The vessel docked in Lowestoft at 12:00 on the 31 July.

RESULTS:

Primary aims.

Aim 1:

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, or if a strong tide was running in which case the warp ratio was increased to 4:1 to ensure that the gear was settled on the seabed. Some tows were also reduced to 20 minutes due to obstructions for example static gear, pipelines on the sea bed, wrecks or shallow water. The Niskin and ESM2 logger was deployed and surface water samples were taken from the ferrybox or clean supply when the ferrybox was inoperative twice daily, once on the last tow of the day and once at an appropriate point during the course of the day. At the end of each day's fishing and as required throughout the course of the day's operations the gear was thoroughly inspected for damage. The blade was down one meter at all times to ensure the multi beam remained operational.

Region	Valid 30 mins	Valid 20 mins	Invalid	Abandoned due to static gear	Total valid tows
VIId (English)	33	6	1	0	39
VIId (French)	24	5	1	1	29
IVc	10	8	3	0	18
Total	67	19	5	1	86

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

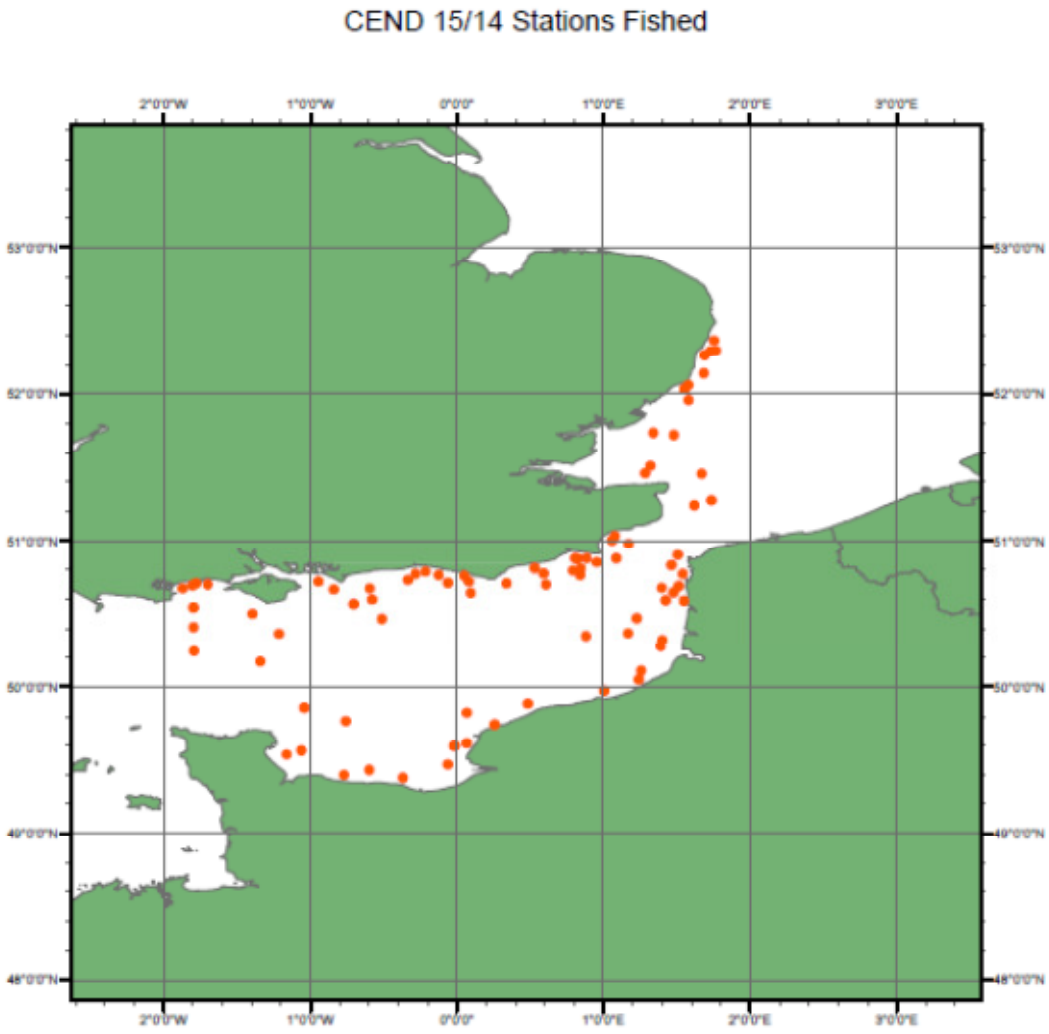


Figure 2 – Core stations fished during 2014 survey.

Aims 2 & 3:

All otolithed fish were measured to the whole cm below, weighed individually, sexed and where required assigned a sexual maturity code based on a 4-stage key. Sexual maturity of plaice, sole and dab was not assessed as it is extremely difficult to determine accurately during the 2nd quarter. 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 whenever they were present in the catch, cuttlefish (*Sepia officinalis*), *Alloteuthis spp, Loligo spp*, edible crab (*Cancer pagurus*), lobster (*Homarus gammarus*), scallops (*Pecten maximus*), velvet swimming crab (*Necora puber*), crawfish (*Palinurus elephas)* and spider crab (*Maia squinado*), while queen scallops (*Aequipecten opercularis*), Octopus (*Octopodidae)* and oysters (*Ostrea edulis*) were weighed and counted. Otolith targets for dab, lemon sole, gurnards, whiting and sole were reduced from previous years due to requirements of the DCF and a lower number of staff on the survey. The numbers of individual fish measured this year for the main commercial species can be seen in Table 3.

In total 183 different species were recorded.

Figures 2 – 5 show the spatial distribution of dab, lemon sole, plaice and sole caught during the survey

Region	Brill	Cod	Dab	Flounder	Lemon sole	Plaice	Sole	Bass	Whiting	Turbot
VIId English	14	16	60	97	52	1004	296	5	16	3
VIId French	15	18	33	40	28	943	147	2	42	14
North Sea (IVc)	2	9	17	11	42	74	209	1	33	0
Total	31	43	110	148	122	2021	652	8	91	17

Table 2. Otoliths /biological data collected from the main commercial species by strata.

Species	VIId English	VIId French	IVc North Sea	Total
Brill	14	15	2	31
Cod	16	18	9	43
Cuttlefish	102	111	0	213
Dab	757	536	54	1347
Flounder	112	40	76	228
Lemon Sole	92	84	61	237
Plaice	2396	2991	94	5481
Sole	846	562	664	2072
Turbot	3	14	0	17
Whiting	162	161	131	454
Bass	5	2	1	8
Velvet swimming crab	53	789	500	1342

Table 3. Number of fish measured from the main commercial species by strata

		Weight in Kg				
Species	2014	2013	2012	2011	2010	2009
Plaice	1389.081	865.792	727.978	859.005	721.99	628.117
Sole	241.463	174.702	154.018	167.496	183.622	343.064
Dab	109.585	131.997	91.208	115.12	104.089	149.414
Lemon Sole	39.253	38.37	47.272	65.78	17.96	41.53
Cuttlefish	50.994	55.165	100.120	61.121	121.85	92.685
Flounder	61.85	35.875	36.99	49.447	27.29	107.235
Whiting	40.791	20.076	26.039	45.347	53.162	54.823
Velvet swimming crab	86.264	66.874	41.326	45.195	44.401	75.8
Brill	12.473	14.785	2.795	24.019	14.219	8.9
Turbot	11.14	10.835	17.65	23.124	19.315	7.98
Bass	9.575	2.79	1.345	13.125	4.995	9.52
Cod	19.75	2.887	13.391	3.575	1.055	31.035

Table 4 – Comparison of catch weight (kg) for the main commercial species over the last 6 surveys (2009-2014).

As shown in table 4 catches of plaice and sole were considerably higher than last year, with plaice catches being at the highest level seen during the five year period document here. Catches of lemon sole, flounder, whiting, velvet swimming crabs, turbot, bass and cod were also higher than in 2013. Only cuttlefish and brill had decreased and were within the expected range seen over the last 5 years.

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 observed was recorded by species or other taxonomic grouping. There were 9 sentinel species that if encountered at any time on any tow, were removed and quantified. Of these we primarily encountered Ross Coral (*Pentapora foliacea*) (15 stations); *Sabelleria spinulosa* (6 stations); sponge crabs (12 individuals) and mantis shrimps (*Meiosquilla desmaresti*) (1 individual). All 12 full benthic stations in VIId and 3 in IVc were sampled successfully.

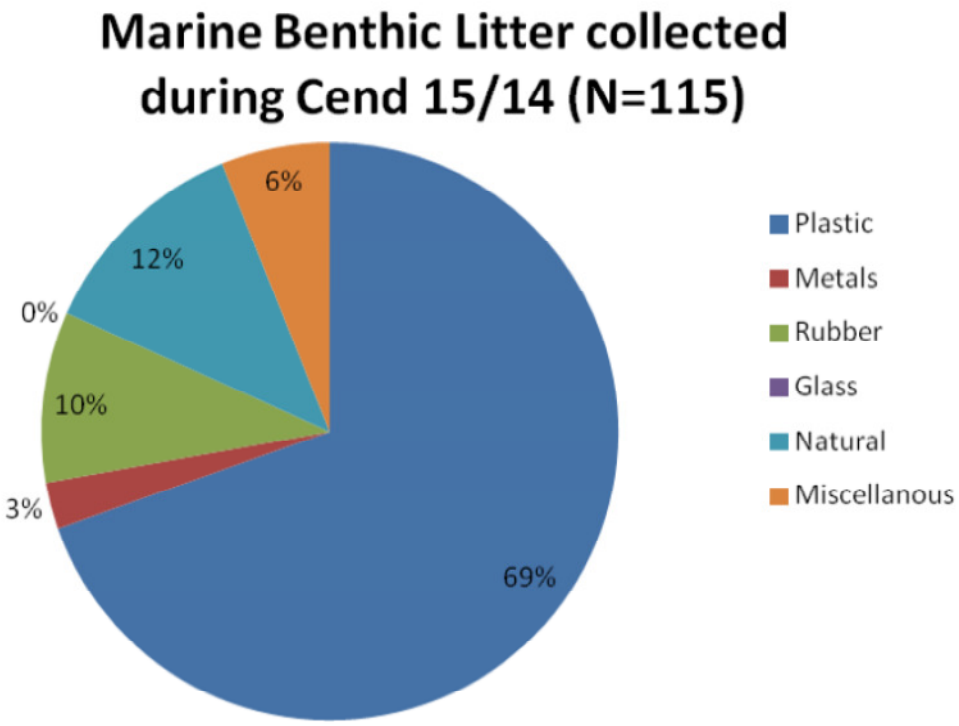
Aim 5:

A variety of substrates were sampled with depths of <20m and 20-30m targeted where possible. Fourteen of these additional tows were completed in total. During the overall survey, 19 undulate rays (21–93 cm total length) were caught at 13 individual trawl stations at depths of 15–57 m. Most of the undulate rays were captured in the standard survey hauls, with only one individual caught in the additional tows. The sites along the south coast of England where undulate ray were observed included the grounds (a) west of the Isle of Wight, (b) off Selsey Bill and (c) off Beachy Head. They were also encountered at certain sites along the French coast, including the Baie de Seine and off Dieppe. Males (n = 11) were caught over the range 27–70 cm length, and females (n = 8) were between 21–93 cm length. Of the 19 fish caught, three (15.8%) were caught in waters <20 m deep, 14 (73.7%) were

caught at sites of 21–30 m depth, and only two fish (10.5%) were captured in waters >30 m deep. All larger undulate ray (>50 cm LT; n = 5) were tagged and released, with smaller individuals released but not tagged.

Secondary aims.

Aim 6. Litter was collected and recorded in line with the protocol provided on every valid beam trawl station. The pie chart below shows the relative commonality of the main types of litter encountered.



Aim 7 1 live berried spider crab was collected for return to the lab for brood stock.

Aim 8 Live specimens were collected for Yarmouth Sea Life centre.

Aim 9 Water samples for nutrient analysis were collected in line with the supplied protocol at all sites requested by Naomi Greenwood.

Aim 10 No FSA fish samples were collected for Robin Law due to time constraints.

Aim 11 Fin clips from12 red mullet and 2 bass were collected for DNA analysis for Steve Shaw

Aim 12 Biological information was collected for all smooth hounds caught. 17 smooth hounds were frozen for further analysis.

Aim 13 10 starry smooth hounds, 1 spotted ray, 2 blonde rays and 4 painted rays were tagged and released. 5 Undulate rays were also tagged and released within the MCZ undulate ray box.

Aim 14 No additional length weight information was collected for Joana Silva as no appropriate species were caught.

Aim 15 A water sample was collected for chlorophyll analysis 500m from the West Gabbard Smart buoy.

Aim 16 Fish ID specimens were collected for Cefas day.

Aim 17 windows 7 testing was not completed due to time constraints.

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Other work

The cause of interference on the new EK333 echo sounder was investigated for Jeroen Van Der Kooij, this involved recording times that the interference was apparent and then trying to eliminate causes of this by turning off other instruments aboard the vessel to see if this had any effect. Equipment aboard the vessel that cuts in and out automatically was also investigated to see if it correlated with when the interference was occurring. No satisfactory cause of the interference could be determined.

Acknowledgements

As SIC of this survey I would like to offer my 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 to achieve the survey aims. I would also like to thank everyone on board for creating a welcoming and happy atmosphere aboard the vessel and always being prepared to go the extra mile.

S Songer
13/08/14

INITIALLED:

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

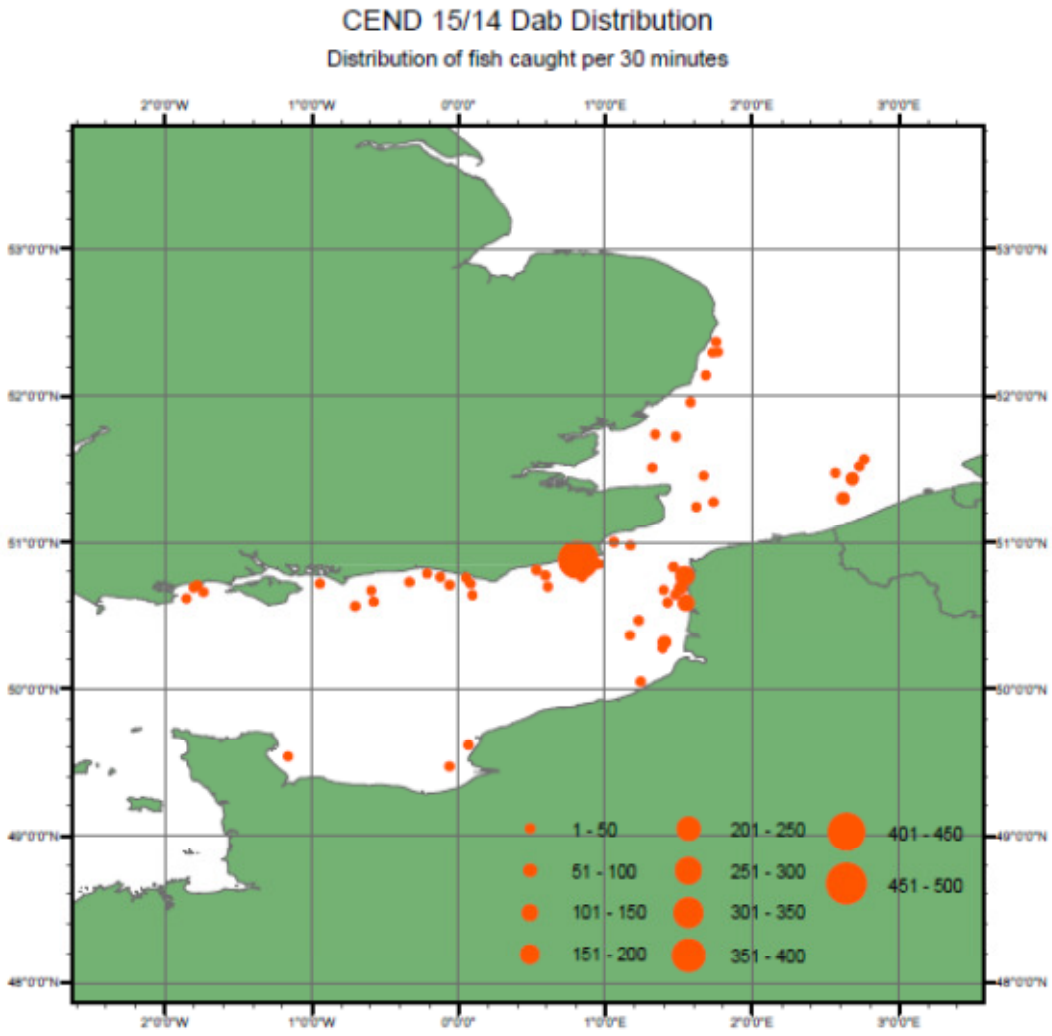

Figure 2 – Distribution of dab caught on 2014 survey.

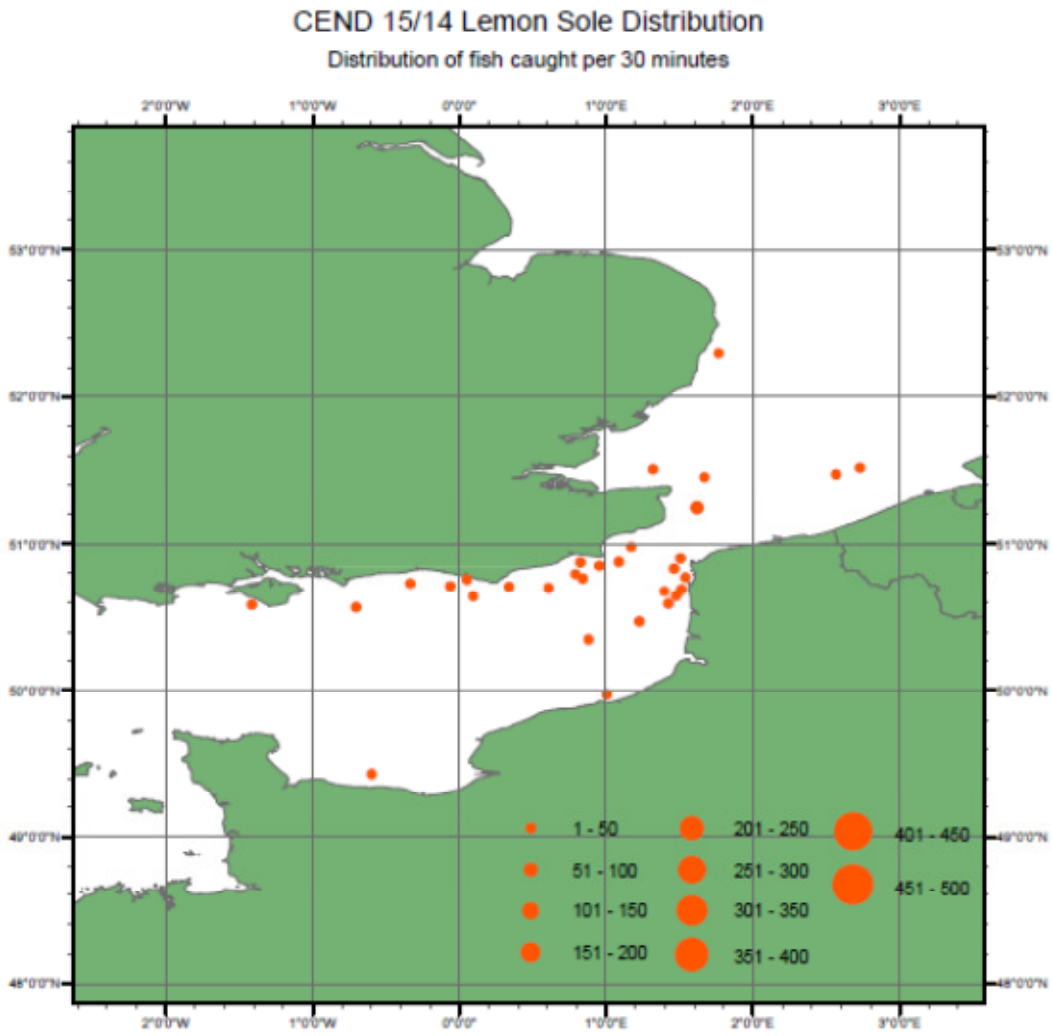

Figure 3 – Distribution of lemon sole caught on 2014 survey.

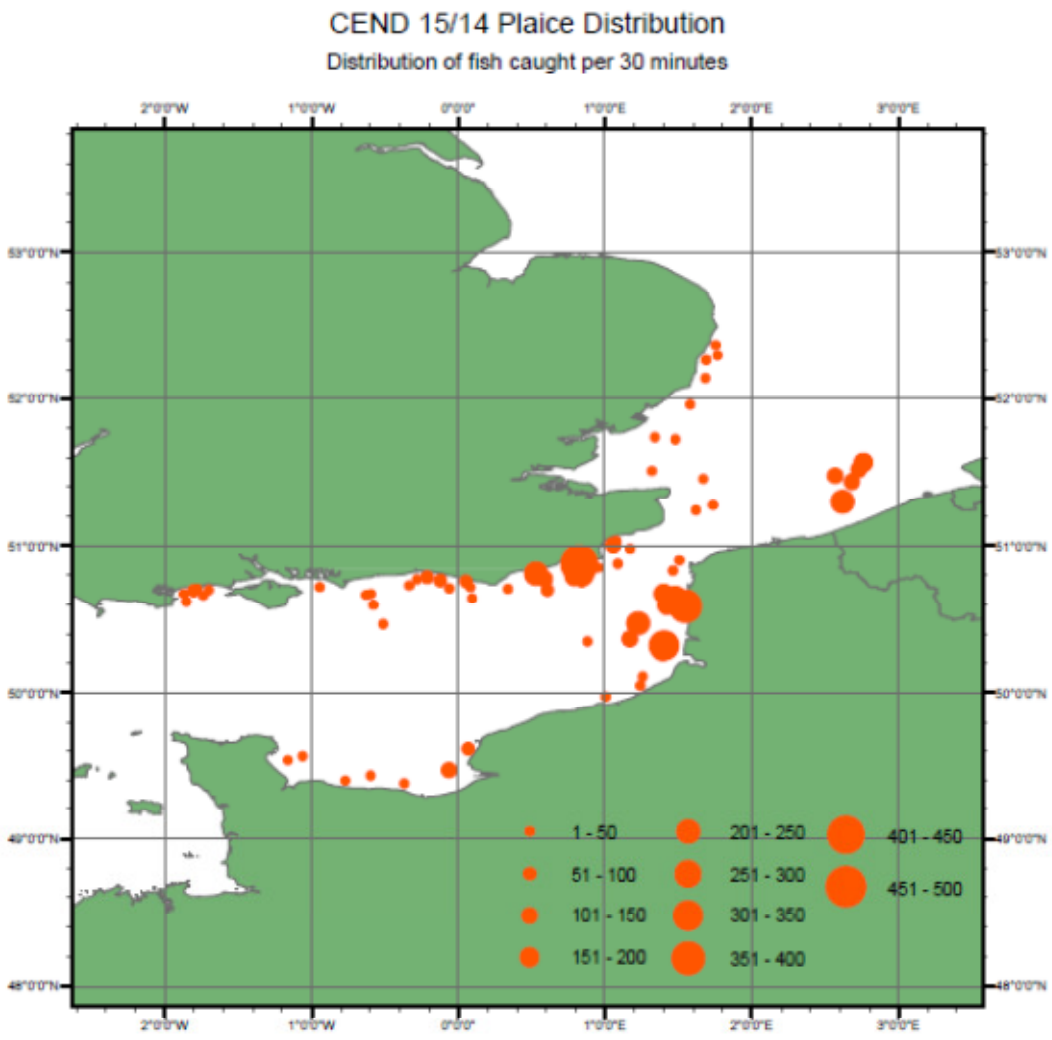

Figure 4 – Distribution of plaice caught on 2014 survey.

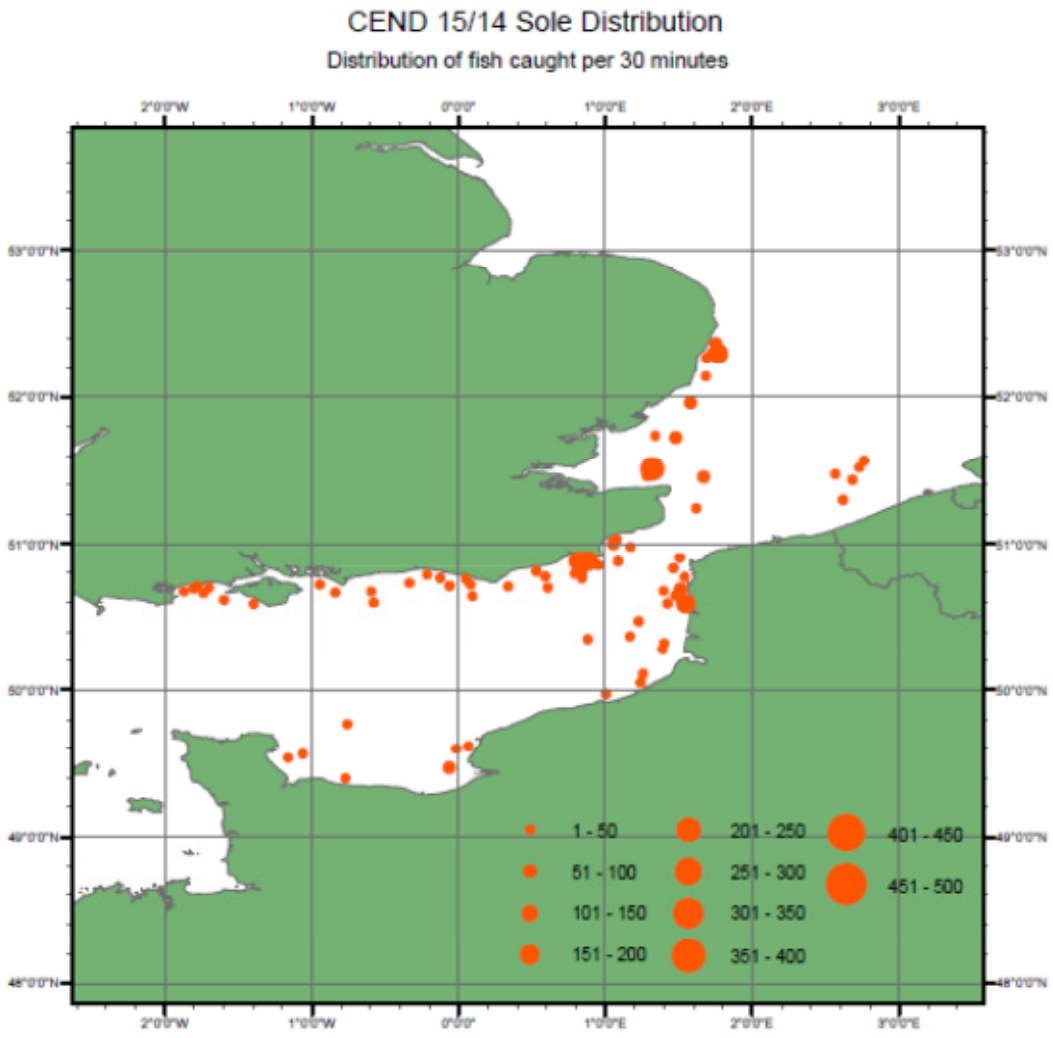

Figure 5 – Distribution of sole caught on 2014 survey.