

RESEARCH VESSEL SURVEY REPORT

RV CEFAS ENDEAVOUR

Survey: CEND 15/20.

STAFF: Updated at sailing

Name	Role	Name	Role
Stephen Shaw	SIC	Ruth Hicks	Sampler
Ian Holmes	2IC	Christopher Popham	Sampler
Georgina Eastley	Deckmaster	Paul Nelson	Sampler
John Bignell	Sampler	Gary Thomas	Sampler
Charlotte Reeve	Sampler		

DURATION: 20 – 30 September 2020 (9 days)

LOCATION: Bristol Channel & Celtic Sea (7fg)

AIMS: Updated at sailing for revised survey

1. To carry out a 4m beam-trawl survey of groundfish (Figure 1) to i) obtain fisheries independent data on the distribution and abundance of commercial flatfish species, and ii) derive age compositions of sole, plaice, cod and whiting for use in stock assessments.
2. To collect biological data including maturity and weight at age of sole *Solea solea*, plaice *Pleuronectes platessa*, lemon sole *Microstomus kitt* and other commercially important finfish species as part of CEFAS' requirements under the EU Data Collection Framework.
3. To determine the distribution and relative abundance of juvenile and adult sole and plaice.
4. To collect surface & bottom temperature/salinity data using CTD and Niskin Bottle.
5. To quantify epibenthos and using 4m beam trawl by-catch.
6. Collect length/weight & maturity information using individual fish measurements, in support of the EU Data Collection Framework.
7. To collect surface sea-water samples for processing on return to Lowestoft for the analysis of tritium (AE001) (K Leonard - Cefas, Lowestoft).

8. To collect fish samples in support of Cefas and non-Cefas projects and training courses.
9. Retain any dead specimens of diadromous fish for the DiadES Interreg project (T Basic - Cefas, Lowestoft).
10. Collect chlorophyll samples to test for nutrients from the surface water for the ASMIAC project. (N Greenwood – Cefas, Lowestoft).
11. Collect plankton sample at the Gabbard smart buoy site. (S Pitois – Cefas, Lowestoft).

NARRATIVE: (All times GMT)

Cefas scientists joined the RV Cefas Endeavour by 0730hr, 4 September for COVID-19 testing. Unfortunately, when the test results arrived one member of staff had returned a positive test. This resulted in Cefas Endeavour not being allowed to sail for a period of 14 days so that all staff could self-isolate and be re-tested. On 20 September, a second full set of negative COVID-19 test results were returned and the Cefas Endeavour sailed for a reduced survey at 2130hr. Due to the delay, the trip duration was reduced from 29 days to just 9, therefore the primary aims were reduced to just completing the Bristol Channel Inner (BCI) stations with no CSEMP or scallop work possible.

On 21 September at 0830hr a shakedown tow was completed in the eastern Channel and following a successful tow, the vessel continued to transit to the first prime station. At 0912h, 22 September a pod of common dolphins *Delphinus delphis* was observed to be feeding along with minke whales *Balaenoptera acutorostrata* off the Cornish coast. At 1214hr the first prime station, 133 was fished successfully with a further four fishing stations being completed before deploying the Seabird CTD Rosette to collect surface and bottom water samples.

On 23 September, work started with a Rosette deployment at prime 132 followed by a beam trawl station at first light. At the following station (prime 129) a spiny Lobster *Palinurus elephas* was caught and this was the first time this species had been observed on this survey series (Figure 1). Seven fishing stations were completed followed by a sampling run up the River Severn overnight collecting 33 samples for tritium analysis. On 24 September, the day started with a rosette sample but due to an increasing sea state, the decision was made to swap to an ESM2 profiler and Niskin sampler for the remainder of the survey, six fishing stations were successfully completed in marginal weather.

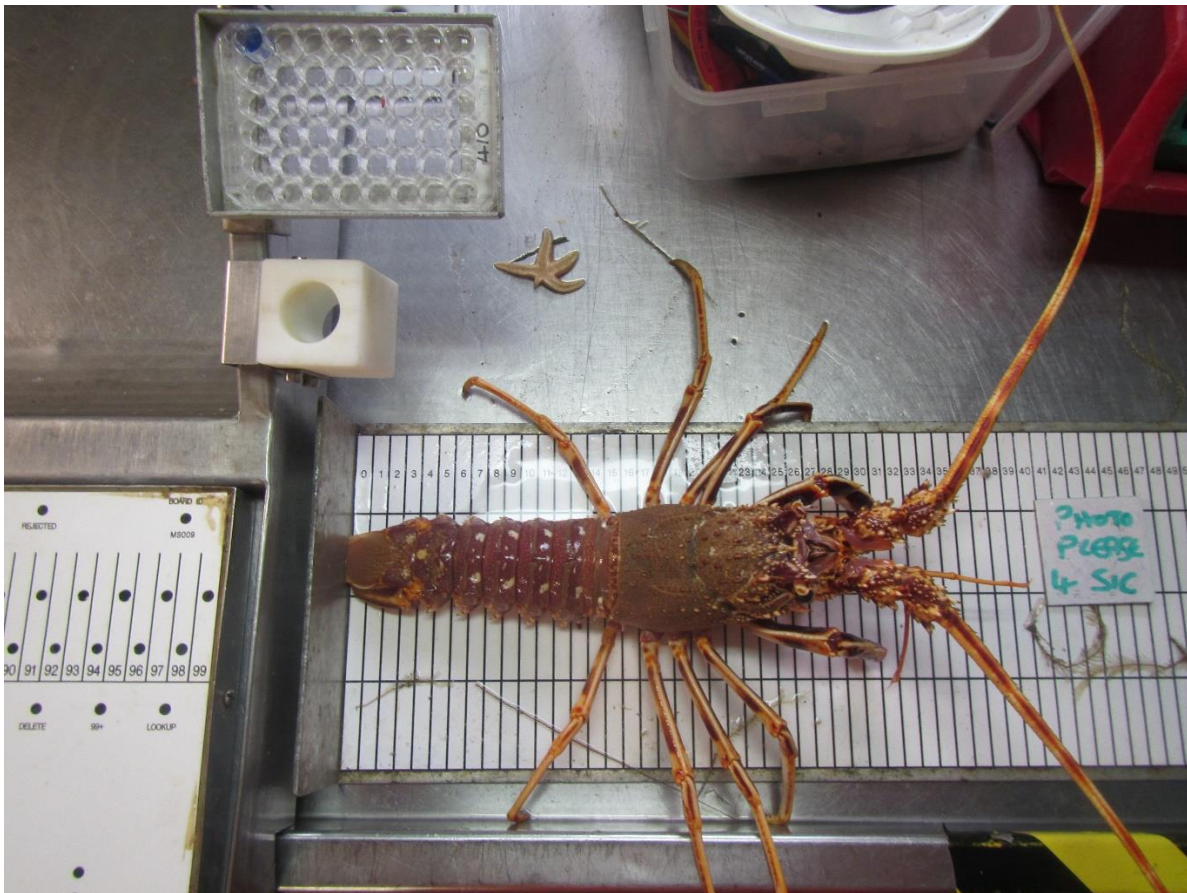


Figure 1 – Spiny lobster *Palinurus elephas* caught at prime station 129.

Nine stations were planned for the 24 September. Prime station 103 had to be moved 0.5 nautical miles further from the coast due to poor weather conditions and a new marker buoy on the original tow. All nine stations were completed leaving enough time to attempt a tenth, but this had to be hauled early due to static gear and was invalid. At the end of the day, an unresolvable problem with the aft gantry meant that the beam had to be left hanging over the stern overnight and no thorough gear inspection was possible. On 25 September, the final day of fishing led to all five remaining BCI stations being completed successfully and this was followed by the gear being brought aboard and inspected. RV Cefas Endeavour started transit back to Lowestoft.

During this period, scientists began the process of cleaning up and packing away all scientific equipment in readiness for docking. At 1229hr on 28 September a plankton net and water sample was taken at the Gabbard smart boy site before continuing to Lowestoft to pick up a pilot at 1830hr. Cefas Endeavour docked in Lowestoft at 1912hr, 28 September and the survey de-mobbed the following day.

RESULTS BY AIM:

Aims 1, 2 & 3

The survey gear was the standard 4m-beam trawl (Beam number 2 was used) with chain mat, flip-up ropes and the net was fitted with a 40mm cod-end liner. All fish and selected commercial shellfish were identified to species, weighed and measured with large catches of an individual species being sub-sampled.

A SAIV Micro CTD unit was attached to the headline on the 4m-beam trawl in order to record the temperature and salinity depth profile at each station fished. In addition, at the first and last fishing station most days, a surface and bottom water sample was taken with a Niskin and rosette or ESM2 logger profile.

All catch details and sample data were entered directly into the Electronic Data Capture (EDC) system and uploaded directly into the Fishing Survey System (FSS). Station details were manually entered into the FSS using information collected from the Transas bridge logging system and bridge logbook. The total number of survey otoliths/scales taken in each ICES Division are shown in Table 1.

Table 2 shows the top 10 species by both weight (kg) and number of individuals caught in the BCI sector in the past three years. Table 3 shows a list of measured species caught during the survey and number of stations at which they were caught. The trawl survey covering the Irish Sea and Bristol Channel is divided up into six sectors consisting of 108 beam trawl tows. Only 32 were successfully fished (Figure 2), as only BCI stations were targeted due to the reduced survey duration. These are used for tuning data for the Working Group of the Celtic Seas Eco-region. Table 4 shows the number of gear deployments undertaken on the survey.

Prime station 120 (Pembroke coast) was reduced from the standard 30-minute tow to a 20-minute tow due to history of gear damage.

Table 1: Numbers of otolith/scale samples taken by ICES division

	VIIa	VIIb	VIIg	Total
Anglerfish (<i>Lophius piscatorius</i>)	0	6	0	6
Anglerfish (<i>Lophius budegassa</i>)	0	0	0	0
Brill	0	5	0	5
Cod	0	1	0	1
Dab	0	142	0	142
Bass	0	49	0	49
Grey Gurnard	0	80	0	80
Red Gurnard	0	11	0	11
Tub Gurnard	0	22	0	22
Haddock	0	0	0	0
Hake	0	1	0	1
John Dory	0	15	0	15
Lemon Sole	0	25	0	25
Megrim	0	0	0	0
Plaice	0	249	4	253
Red Mullet	0	7	0	7
Sole	0	344	8	352
Streaked Gurnard	0	0	0	0
Turbot	0	6	0	6
Whiting	0	26	0	26
Total	0	989	12	1001

Table 2: Summary of the main species caught in the BCI sector (only).

Weight caught (kg)				Number caught			
	2020	2019	2018		2020	2019	2018
Lesser spotted dogfish	450	176	374	Lesser spotted dogfish	1170	438	834
Sole	138	183	251	Sole	916	1521	2116
Thornback ray	92	78	111	Poor cod	837	233	572
Spiny spider crab	88	48	100	Dab	717	1769	1312
Plaice	83	92	105	Solenette	546	1220	273
Starry smooth hound	80	31	56	Common dragonet	432	332	308
Dab	61	98	116	Plaice	425	506	546
Blonde ray	38	47	25	Whiting	424	165	624
Spotted Ray	31	25	22	Spiny spider crab	226	161	203
Common dragonet	24	17	13	Grey gurnard	152	290	202
TOTAL (All species)	1333	1234	1321	TOTAL (All species)	7836	8075	8160

Table 3: List of measured species caught during the survey and number of stations at which they were recorded.

Species	Stations	Species	Stations
<i>Aequipecten opercularis</i>	10	<i>Microstomus kitt</i>	8
<i>Aequorea spp</i>	2	<i>Mullus surmuletus</i>	4
<i>Agonus cataphractus</i>	3	<i>Mustelus asterias</i>	20
<i>Ammodytes tobianus</i>	1	<i>Necora puber</i>	14
<i>Arnoglossus laterna</i>	11	<i>Ostrea edulis</i>	1
<i>Aspitrigla (chelidonichthys) cuculus</i>	5	<i>Palinurus elephas</i>	1
<i>Belone belone</i>	1	<i>Pecten maximus</i>	1
<i>Buglossidium luteum</i>	16	<i>Pegusa (solea) lascaris</i>	15
<i>Callionymus lyra</i>	25	<i>Platichthys flesus</i>	3
<i>Cancer pagurus</i>	9	<i>Pleuronectes platessa</i>	26
<i>Capros aper</i>	1	<i>Pomatoschistus spp</i>	6
<i>Chrysaora hysoscella</i>	1	<i>Raja brachyura</i>	12
<i>Ciliata septentrionalis</i>	1	<i>Raja clavata</i>	22
<i>Conger conger</i>	8	<i>Raja microocellata</i>	10
<i>Cyanea capillata</i>	2	<i>Raja montagui</i>	23
<i>Dicentrarchus labrax</i>	10	<i>Rhizostoma octopus</i>	4
<i>Echiichthys (trachinus) vipera</i>	5	<i>Scophthalmus maximus (psetta maxima)</i>	6
<i>Eutrigla (chelidonichthys) gurnardus</i>	22	<i>Scophthalmus rhombus</i>	4
<i>Gadus morhua</i>	1	<i>Scyliorhinus canicula</i>	31
<i>Gaidropsarus vulgaris</i>	1	<i>Scyliorhinus stellaris</i>	5
<i>Galeorhinus galeus</i>	1	<i>Sepia officinalis</i>	4
<i>Homarus gammarus</i>	2	<i>Solea solea</i>	31
<i>Limanda limanda</i>	27	<i>Sprattus sprattus</i>	1
<i>Loligo (alloteuthis) subulata</i>	5	<i>Syngnathus acus</i>	1
<i>Loligo vulgaris</i>	7	<i>Trachurus trachurus</i>	8
<i>Lophius piscatorius</i>	4	<i>Trigla (chelidonichthys) lucerna</i>	10
<i>Maja squinado</i>	28	<i>Trisopterus luscus</i>	13
<i>Merlangius merlangus</i>	26	<i>Trisopterus minutus</i>	24
<i>Merluccius merluccius</i>	1	<i>Zeugopterus (phrynorhombus) norvegicus</i>	1
<i>Microchirus variegatus</i>	10	<i>Zeus faber</i>	8

Table 4: Summary of gear deployments and sample collections

Gear	Valid	Shakedown	Invalid	Total
Standard 4m Beam trawl with cod end liner	32	1	1	34
Rosette sampling with CTD, ESM2 and Niskin (surface and bottom)	4	0	0	4
Ring net sample	1	0	0	1
ESM 2 and Niskin (Surface and Bottom)	6	0	0	6

Abundances of pre-recruit and recruited plaice and sole in the Bristol Channel are shown in Figures 3 and 4. Abundances of pre-recruit and recruited dab and lemon sole are shown in Figure 5 and Figure 6.

Plaice *Pleuronectes platessa*

Abundance by both catch numbers and catch weight in 2020 decreased for the fifth consecutive year in the BCI sector, by 16% and 9% respectively and is now near to the survey low (2001-2020). Trends in survey catch rates over recent surveys are shown in Figure 7.

Sole *Solea solea*

In BCI, catch numbers and weight decreased for the second year, by 40% and 25% respectively from the survey high observed in 2018. Catch weight is close to the survey average while catch numbers is below the series average over period 2001-20. Trends in survey catch rates over recent surveys are shown in Figure 8.

Dab *Limanda limanda*

Catch rates decreased in BCI, with a 59% decrease in numbers and 37% reduction in weight. Catch numbers are at a survey low while weight is at the lowest point in fourteen years (2001-2020). Trends in survey catch rates over recent surveys are shown in Figure 9.

Lemon sole *Microstomus kitt*

Catch rates of lemon sole remain low in the BCI survey sector and are near to the survey low (2001-2020). Catch rates by number and weight decreased by 47% and 32% respectively from the 2019 survey. Trends in survey catch rates over recent surveys are shown in Figure 10.

Other species – Only BCI comparisons

Cod *Gadhus morhua* total catch numbers in 2020 (1) were down compared to 2019 (7). Bass *Dicentrarchus labrax* total catch numbers in 2020 (49) were up compared to 2019 (11). Whiting *Merlangius merlangus* total catch numbers in 2020 (424) were 157% up on those caught in 2019 (165) they remain under the survey average 2001-2020. Thornback ray *Raja clavata* catch numbers in 2020 (138) were up compared to 2019 (118).

Lesser spotted dogfish *Scyliorhinus canicula* catch numbers in 2020 (1170) increased compared to 2019 (438) and is now at the highest numbers in the survey history (2001-2020). Starry smooth-hound *Mustelus asterias* catches decreased from 117 in 2019 to 106 in 2020 but the average weight increased by 157%.

Note – Irish sea survey sectors are ISS/ISN/ISW/SGC and the Bristol Channel survey sectors are BCI/BCO.

Aim 4 - Surface and bottom water sampling

At the start and end of most survey days, a surface and bottom water salinity sample was taken using the rosette or Niskin, the starboard gantry with the 'CTD' wire was used. The sample was routinely taken at around 5m off the surface and seabed. A total of 9 surface and 9 bottom salinity samples were collected.

Aim 5 – Epi-benthos

At 6 selected fishing stations, samples of the epi-benthic by-catches were sorted, identified and quantified. A standard operating procedure (SOP) for the processing of this by-catch was provided. Non-SOP benthic species were identified where on-board expertise allowed.

At all fishing stations on the survey, catches of 14 sentinel taxa of benthic invertebrates were recorded. The total weight of the remaining by-catch of epi-benthic invertebrates was recorded at all stations, benthic observations were recorded from the catches at non-benthic stations.

Aim 6 - Length weight & maturity information

Length weight and maturity information were collected for all fish that were biologically sampled and one additional length-weight measurement was collected for a Garfish *Belone belone*.

Aim 7 – Collection of water samples for analysis of tritium levels

A total of 7 one-litre water samples were collected at fishing stations and a further 33 in the Bristol channel collected at non-fishing locations for the analysis of tritium levels

Aim 8 - Additional sample collections

Additional samples were taken in support of other projects:

A) No rare or unusual species were caught on this survey.

B) A total of 3 nurse-hound *Scyliorhinus stellaris*, 12 blonde Ray *Raja brachyura*, 12 starry smooth-hound and 1 Spotted ray *Raja montagui* were tagged and released. J Ellis (Cefas, Lowestoft).

C) In total 1 sighting of marine mammals were recorded while in transit, common dolphins were present while carrying out stations for several days; the one observations was a pod of common Dolphins and several minke whales feeding at the surface.

D) Samples of common fish species were frozen for ID course to be held in Weymouth. S Davis (Cefas, Lowestoft)

E) A total of 3 samples of fish and benthic species were frozen for subsequent species identification confirmation in the laboratory. J Ellis (Cefas, Lowestoft).

F) No collection of Shad (Allis or Twaite) or Lamprey was possible on the survey. A Walker (Cefas, Lowestoft)

Aim 9 - Retain any dead specimens of diadromous fish

No diadromous species were caught during the trip.

Aim 10 - Collect chlorophyll samples

72 chlorophyll samples were collected during the trip.

Aim 11 - Collect plankton sample at the Gabbard smart buoy site

This aim was successfully completed on 28 September 1229h, an additional 100 litre sample of water was collected.

Litter by-catch information

Details of the by-catch of marine litter caught at all fishing stations were recorded. Litter by-catch was categorized by 'type', weighed, photographed, and categorized by size at a total of 33 fishing stations with a total of 141 individual items being observed. In addition, details of any attached organisms were recorded.

Micro CTD

The SAIV Micro CTD unit was attached to the 4m-beam trawl to record the temperature, salinity and depth profile at each station fished and this was successful in recording data for all fishing stations. A total of 34 successful CTD data collections were made.

Once again, our thanks go to the officers and crew of RV Cefas Endeavour for their help, support and advice given during this survey and it is largely due to their skill and co-operation that reduced survey duration aims were achieved this year.

S Shaw (Scientist-in-charge)
04/12/2020

INITIALLED: IDH

DISTRIBUTION:

Survey participants +
I Holmes (PI)
P Falconer (PL)
D Pettengell (PM)
Cefas Fisheries Survey's SICs/2ICs
Gary Burt (for Cefas Trim)
T Bailey
D Evans (AW)
B Salter (AW)
Master (Cefas Endeavour)
FCO (Republic of Ireland)
Marine Management Organisation (MMO)
Welsh Government (WG)
Devon & Severn IFCA
Cornwall IFCA
North Western IFCA
Scottish Government

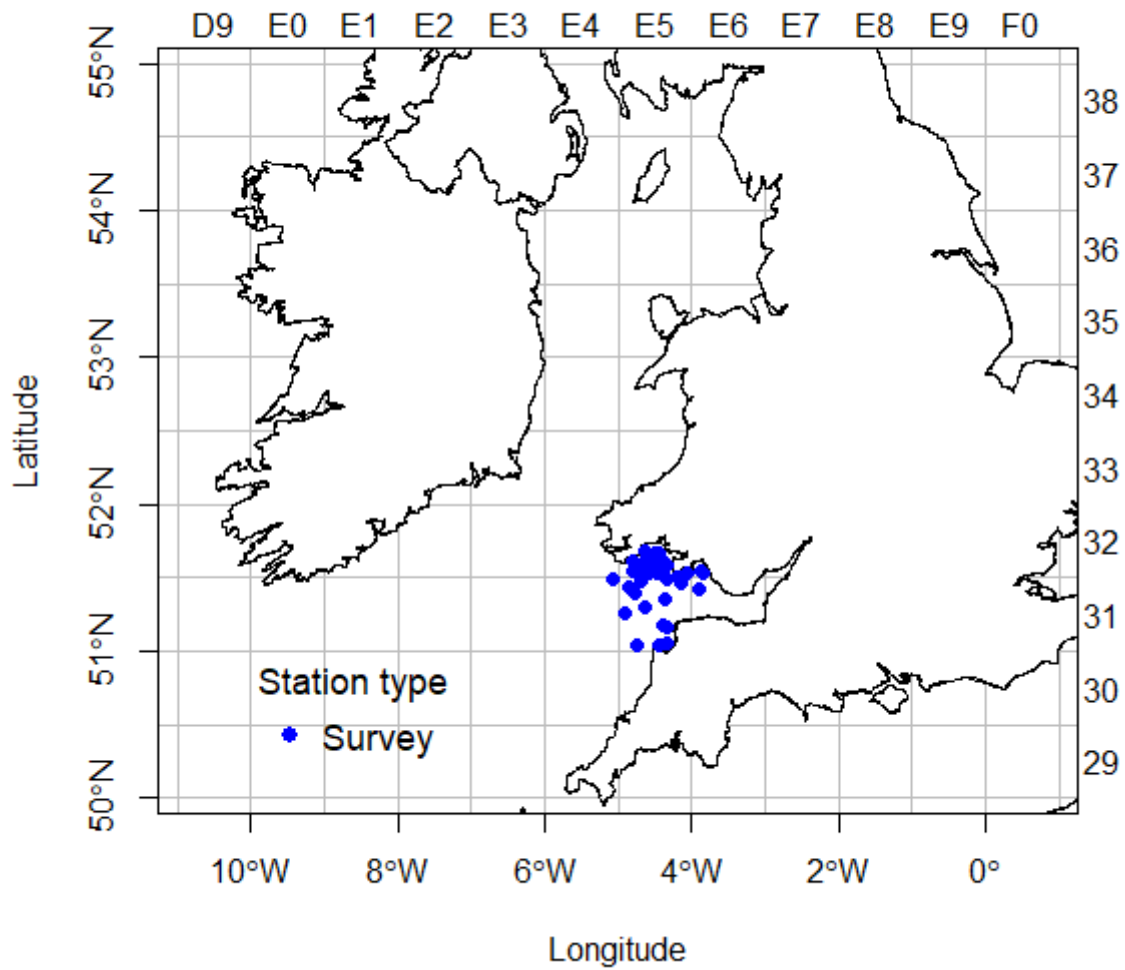
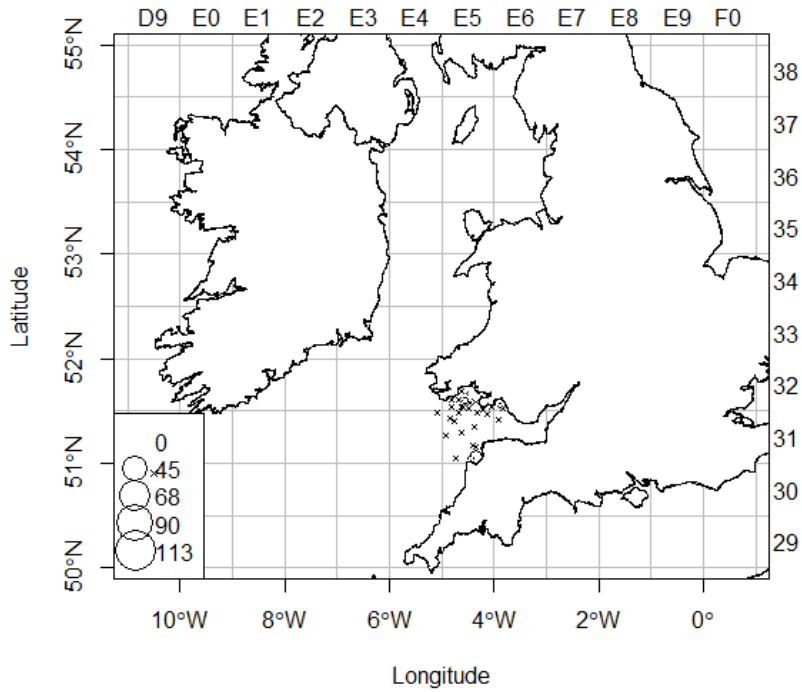


Figure 2: Beam trawl station positions for CEND 15/20.

a)



b)

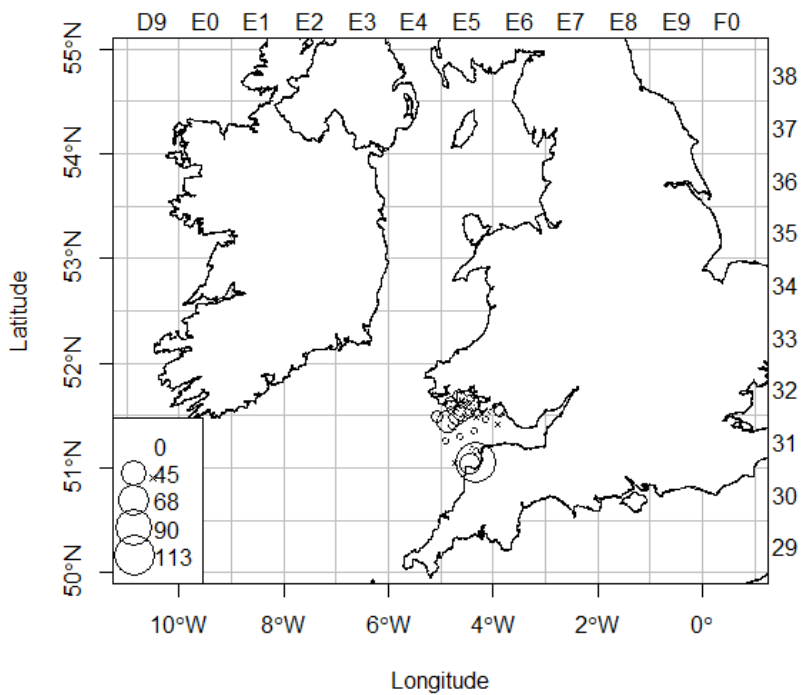
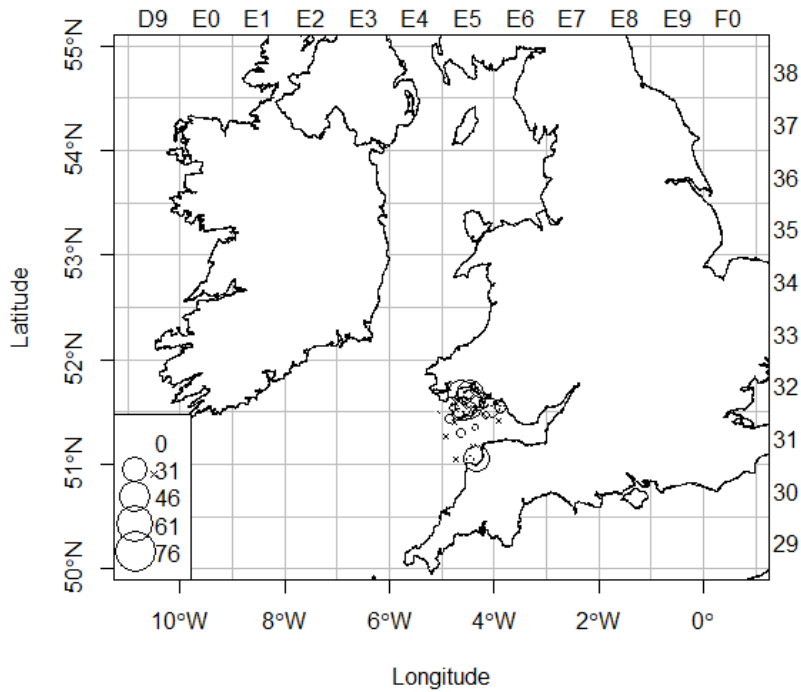


Figure 3: Abundance (number caught per 30-minute tow) of pre-recruit (a) (<21 cm TL) and recruited (b) (≥21 cm TL) - plaice.

a)



b)

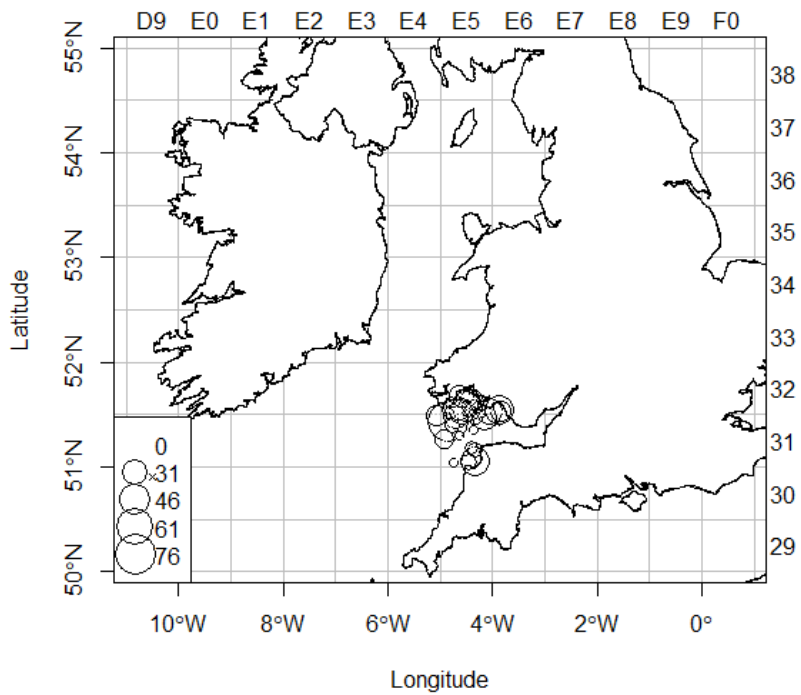
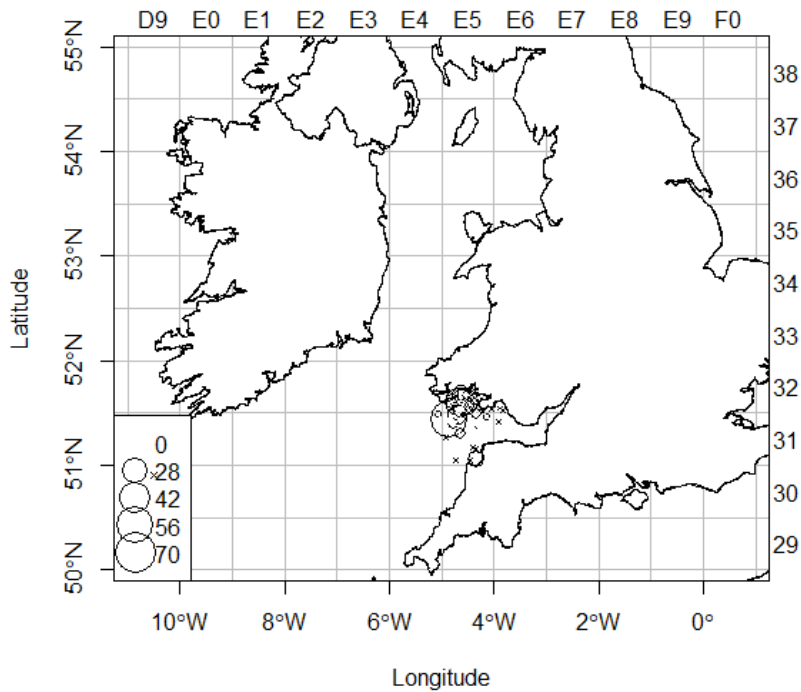


Figure 4: Abundance (number caught per 30-minute tow) of pre-recruit (a) (<21 cm TL) and recruited (b) (>=21 cm TL) - sole.

a)



b)

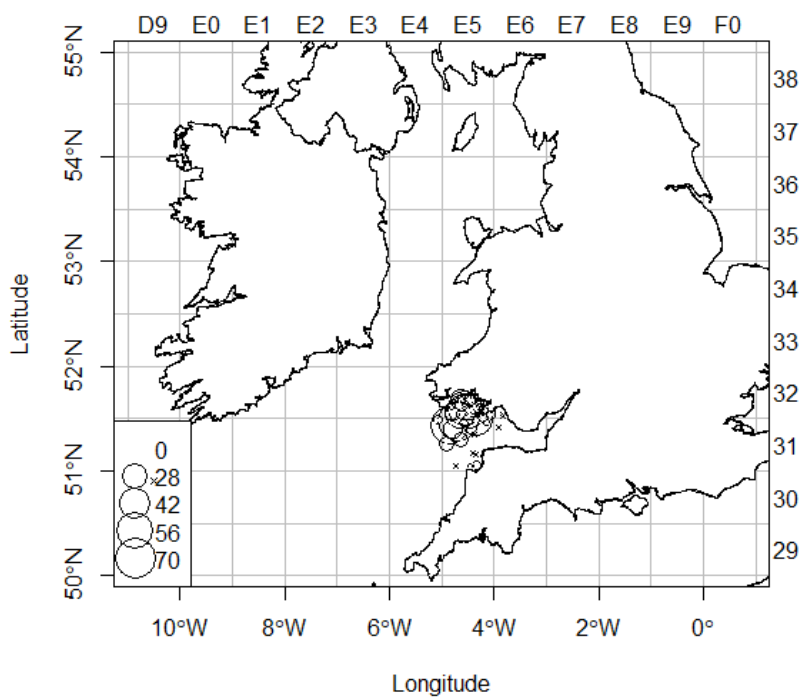
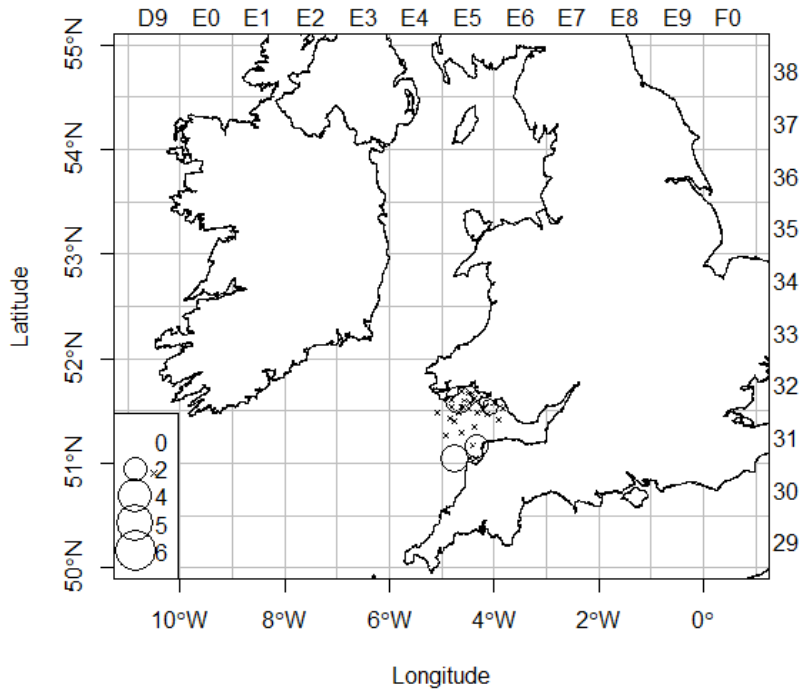


Figure 5: Abundance (number caught per 30-minute tow) of pre-recruit (a) (<16 cm TL) and recruited (b) (≥ 16 cm TL) - dab.

a)



b)

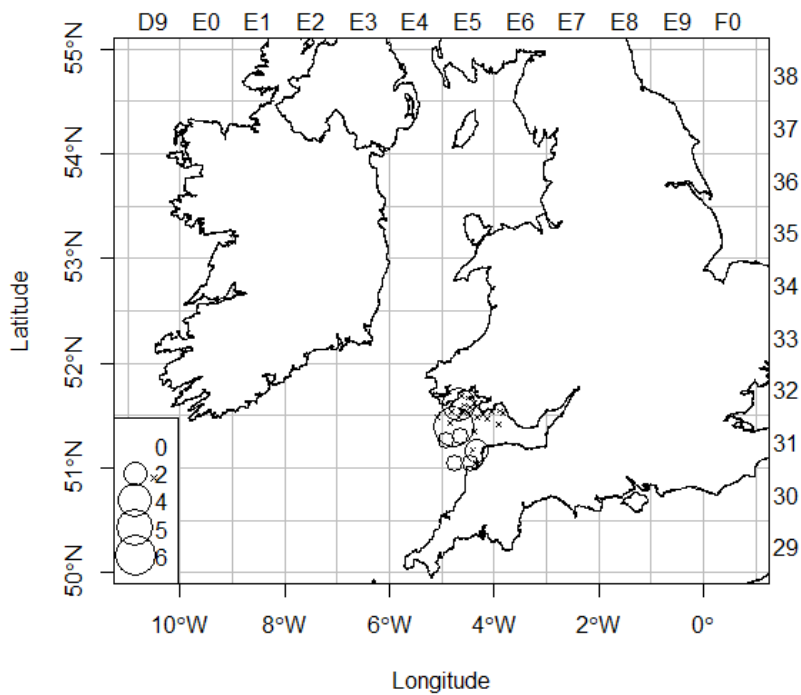


Figure 6: Abundance (number caught per 30-minute tow) of pre-recruit (a) <19 cm TL) and recruited (b) (≥19 cm TL) - lemon sole.

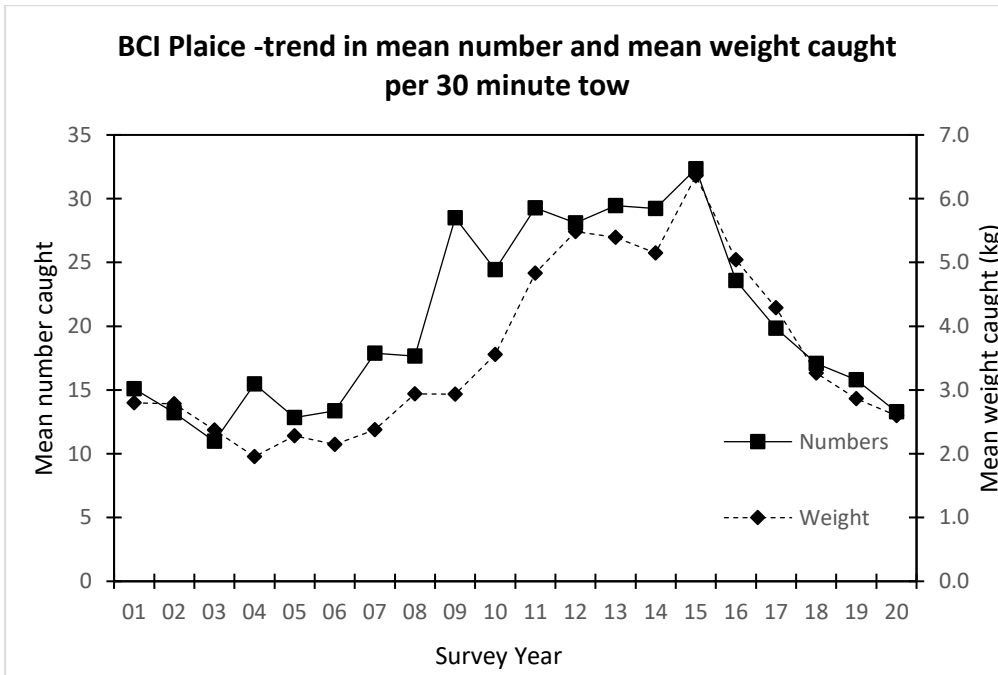


Figure 7: Mean number and weight of plaice caught per 30-minute tow - BCI

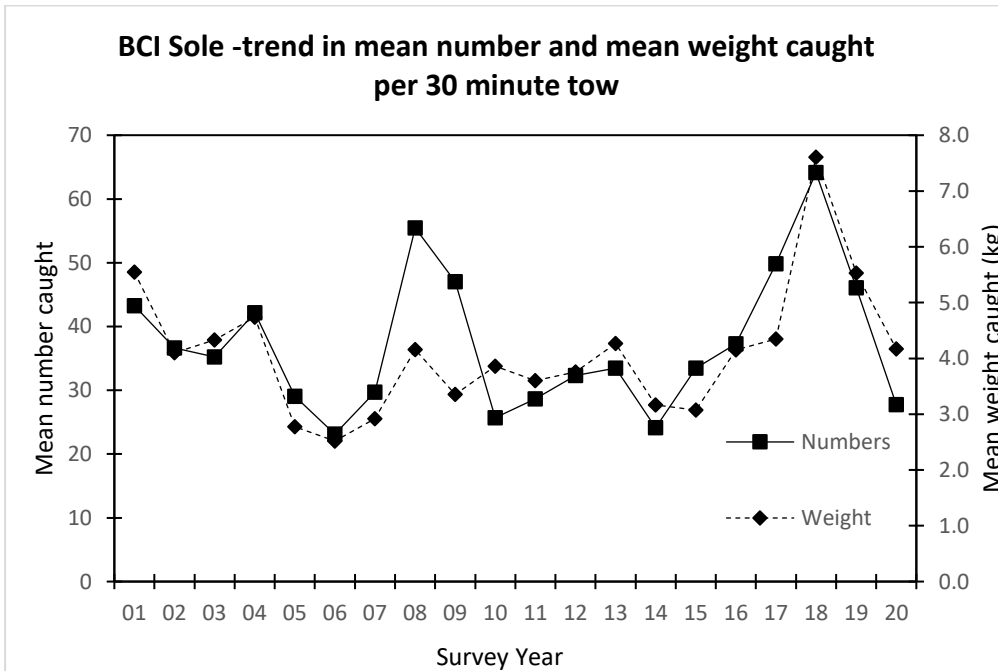


Figure 8: Mean number and weight of sole caught per 30-minute tow - BCI.

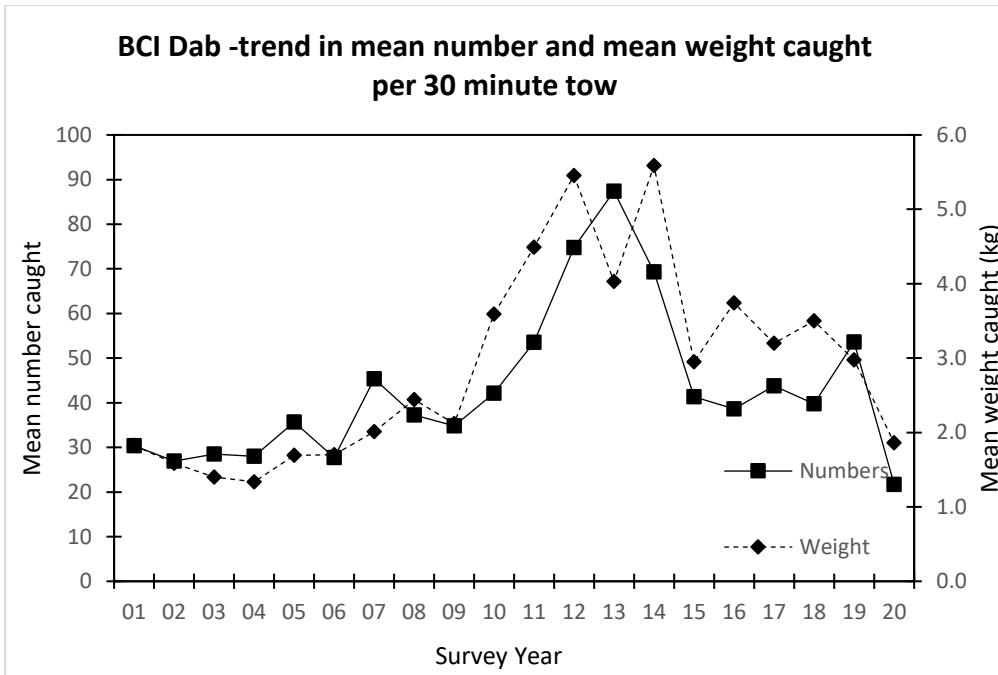


Figure 9: Mean number and weight of dab caught per 30-minute tow - BCI.

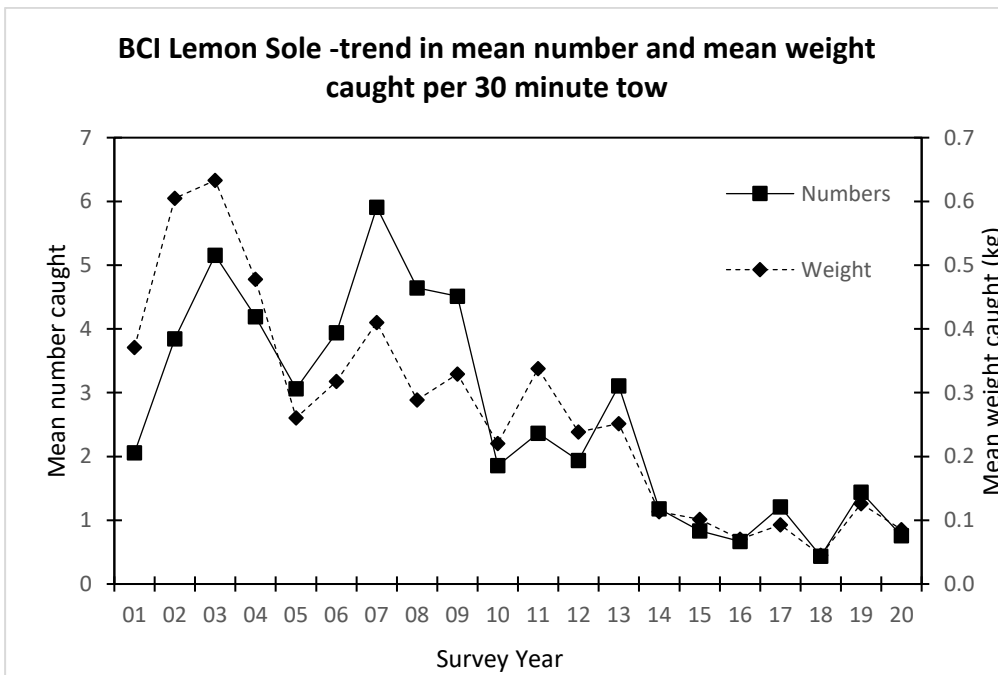


Figure 10: Mean number and weight of lemon sole caught per 30-minute tow - BCI.