

RESEARCH VESSEL SURVEY REPORT

RV CEFAS ENDEAVOUR

Survey: CEND 15/21.

STAFF:

Name	Role	Name	Role
Stephen Shaw	SIC	Gary Thomas	Sampler
Georgina Eastley	2IC	Daniel Clarke	Sampler
Nicola Hampton	Deckmaster	Karen Vanstaen	Sampler
Gary Burt	Sampler	Mariusz Huk	Water Sampler

DURATION: 10 September – 30 September 2021 (20 days at sea)

LOCATION: Irish Sea, Bristol Channel & Celtic Sea (7afg)

AIMS:

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).

8. Collection of water samples using the Niskin at night to support PHD student (M Huk – Cefas, Lowestoft)
9. To collect fish samples in support of Cefas and non-Cefas projects and training courses.
10. Retain any dead specimens of diadromous fish for the DiadES Interreg project (T Basic - Cefas, Lowestoft).
11. Collect up to five samples of Queen scallops *Aequipecten opercularis* for biological sampling (A Lawler – Cefas, Lowestoft).
12. Collect individual specimens of broadtail squid *Illex coindetii* and Northern squid *Loligo forbesii*, these are to be frozen separately and will be used by a PHD student (V Laptikhovsky – Cefas, Lowestoft).
13. Collect plankton sample at the Gabbard smart buoy site. (S Pitois – Cefas, Lowestoft).
14. Collect chlorophyll samples to test for nutrients from the surface water for the ASMIAC project. (N Greenwood – Cefas, Lowestoft).
15. Collect 10 to 12 samples of plastic marine litter for a Seedcorn project (F Dal-Molin – Cefas, Lowestoft).
16. Collection of fish samples, 15 individuals of similar size of up to 15 species (NMBAQC).
17. Opportunistic aim - collect sediment core and water samples at a site with ~100 metres of water in the Bristol Channel outer sector at the end of the trip (F Dal-Molin – Cefas, Lowestoft).

NARRATIVE: (All times GMT)

Cefas scientists joined the RV Cefas Endeavour by 0900hr, 9 September for COVID-19 testing. On 10 September, a full set of negative COVID-19 test results were returned and the Cefas Endeavour sailed at 2200hr.

On 11 September at 0925hr, 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 1311hr on 12 September, the first prime station 511 was fished successfully. A further three prime fishing stations were completed before deploying the ESM2 and Niskin to collect surface and bottom water samples. On 13 September, operations started South of Lundy Island and continued into Bideford Bay with eight fishing stations being successfully completed. Overnight, the vessel completed a 'run' of water sampling in the Bristol Channel collecting an additional 29 one litre water samples to determine the tritium levels.

At first light on 14 September, sampling started off Port Talbot and progressed to the west. The first six stations of the day were successful, but on the seventh station (prime 137) a 'bang' was heard after twenty-two minutes and on retrieval, most of the netting was missing. The

crew changed to the spare beam before moving on to the next station, in total ten stations were completed. Overnight the crew were able to repair the damaged gear so that a spare beam was available again. Sampling started in Carmarthen Bay on 15 September and on the second station (prime 138) a large weight was observed on the warp and the tow was hauled early at twenty-two minutes, but no gear damage had occurred. The fifth station of the day was a repeat of prime station 137 and an attempt at an alternative position was made for fifteen minutes with a reduced warp ratio of 3:1. However, after eight minutes a 'bang' was again heard again and upon retrieval, similar damage to the first attempt was taken to the net. The decision was made not to repeat this tow. The crew changed to the spare gear before completing another four stations.

By 1200hr on 16 September, the crew had completed repairing the damaged net so that a spare was again available. The final five stations in the Bristol Channel Inner (BCI) sector were completed followed by another two stations in the Bristol Channel Outer (BCO) sector. On 17 September, RV Cefas Endeavour started work at first light in Cardigan Bay and completed six stations in St Georges Channel (SGC) working to the north. On the following day operations started North of Anglesey in the Irish Sea South (ISS) survey sector. Two attempts were made at the third station of the day (prime 40, Red Wharf Bay) but no clear tow could be found due to the presence of static gear. the tow at Prime 37 was also not possible to sample due to static gear over the tow. A total of eight stations were completed during the day. On 19 September, sampling started in Liverpool Bay and continued to the North and a total of eight stations were successfully completed before transiting to the Solway Firth for the following day.

On 20 September, 8 stations were completed in the Irish Sea North (ISN) survey sector. Prime 14 had to be fished twice due to static gear being over the tow with a 20-minute tow was possible on the original tow position. Overnight, 5 water stations off Sellafield were sampled, with each station consisting of several Niskin deployments at each site to collect data for a PhD project. The vessel was ready to continue fish sampling at first light on 21 September and sampling started at prime 18 and then worked to the South with eight stations being completed. On 22 September, a further attempt was made to fish prime stations 37 and 40 with these being by-passed earlier in the trip due to static gear. The vessel spent time searching for clear tows and Prime 37 was fished at the end of the tow, to the East, while a new tow on the bank had to be found for prime 40. Both stations were successfully completed but with a reduced tow duration of 15-minutes. Due to the large steaming time between stations and an increasing sea state, only six stations were successfully sampled.

Sampling started to the south of the Isle of Man on 23 September in the Irish Sea West (ISW) sector and seven stations were completed working towards and then down the coast of Ireland. Over-night, Endeavour transited to Rosslare and started working South to North in the SGC sector. At the third station of the day (prime 233 Arklow), static gear was observed over the tow but after talking to local vessels, a new tow was found half a mile to the east of the original tow. Five stations were completed during the day. On 25 September, 5 stations in central area of SGC were completed and on the following day the final three stations in the Irish Sea were sampled before the vessel started the transit back to the Bristol Channel. A

decision was made to try to find a new tow at the site of prime 137 where damage had been taken to the gear at the start of the trip.

On 27 September, time was spent using Olex to find a new clear tow and one was located 0.5 nautical miles to the south and a 15-minute tow with 3:1 warp ratio was successfully completed. Due to strong westerly wind, transit was slow to the next station and only a further three stations were completed. On 28 September the final three stations of the survey were completed in the. Due to swell height it was not possible to deploy the Nioz Corer as planned, but it was possible to collect water samples for the litter project. At 1600hr, the transit to Lowestoft commenced and whilst traveling through the Channel, eight chlorophyll samples were collected.

During this period, scientists began the process of cleaning up and packing away all scientific equipment in readiness for docking. At 0728hr on 30 September, a plankton net and water sample was taken at the West Gabbard smart boy site before continuing to Lowestoft to pick up a pilot at 1500hr. Cefas Endeavour docked in Lowestoft at 1600hr, 30 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 3 was used station 1 to 52 and 63 to 181. Beam number 2 was used station 53 to 63) 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 to record the temperature and salinity depth profile at each station fished. In addition, at the first and last fishing station on most days, a surface and bottom water sample was taken with a Niskin and 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 and Table 2 shows the top 10 species by both weight (kg) and number of individuals caught on the survey 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. All 108 stations were successfully fished (Figure 2). Table 4 shows the number of gear deployments undertaken on the survey. Table 5 shows a list of stations that were not fished in the normal position or reduced in time away from the standard 30-minute tow, with reasons for the changes.

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

	VIIa	VIIb	VIIg	Total
Anglerfish (<i>Lophius piscatorius</i>)	8	21	9	38
Anglerfish (<i>Lophius budegassa</i>)	0	0	0	0
Ballan wrasse	6	0	0	6
Black sea bream	6	0	0	6
Brill	17	2	0	19
Cod	12	6	0	18
Dab	143	146	1	290
Bass	0	21	1	29
Goldsinny wrasse	3	0	1	4
Grey gurnard	66	45	8	119
Red gurnard	46	28	1	75
Tub gurnard	49	25	0	74
Haddock	17	17	14	48
Hake	0	1	3	4
John dory	2	8	1	11
Lemon sole	58	56	4	118
Megrim	0	14	26	40
Plaice	1270	225	23	1518
Red mullet	1	17	0	18
Sole	499	397	56	952
Streaked gurnard	1	0	0	1
Turbot	6	6	2	14
Whiting	129	26	8	163
Total	2339	1068	158	3565

Table 2: Summary of the main species caught over the entire survey

	Weight caught (kg)				Number caught		
	2021	2020*	2019		2021	2020*	2019
Queen scallop	594	14	265	Queen scallop	23951	812	13861
Lesser spotted dogfish	546	450	667	Dab	9754	717	15342
Dab	539	61	677	Plaice	4374	425	7848
Thornback ray	522	92	494	Solenette	3283	546	3459
Plaice	479	83	872	Poor cod	2589	837	1371
Sole	260	138	387	Sole	2351	916	3530
Spiny spider crab	185	88	113	Common dragonet	1745	432	2171
Spotted ray	93	31	109	Whiting	1320	424	1444
Common dragonet	81	24	94	Lesser spotted dogfish	1303	1170	1479
Nursehound	63	14	64	Scaldfish	1274	28	1741
TOTAL (All species)	4041	1334	5084	TOTAL (All species)	59269	7836	60345

* The 2020 survey was limited to working in the BCI sector only.

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

Species	Stations	Species	Stations
<i>Lophius piscatorius</i>	21	<i>Buglossidium luteum</i>	62
<i>Loligo (alloteuthis) subulata</i>	30	<i>Sprattus sprattus</i>	2
<i>Blennius ocellaris</i>	7	<i>Taurulus bubalis</i>	3
<i>Trisopterus luscus</i>	30	<i>Microchirus variegatus</i>	39
<i>Scophthalmus rhombus</i>	13	<i>Raja clavata</i>	76
<i>Raja brachyura</i>	22	<i>Ammodytes tobianus</i>	2
<i>Myoxocephalus scorpius</i>	6	<i>Trigla (chelidonichthys) lucerna</i>	58
<i>Callionymus lyra</i>	94	<i>Scophthalmus maximus (psetta maxima)</i>	13
<i>Gadus morhua</i>	13	<i>Trachinus draco</i>	6
<i>Conger conger</i>	8	<i>Echiichthys (trachinus) vipera</i>	23
<i>Cancer pagurus</i>	23	<i>Merlangius merlangus</i>	81
<i>Sepia officinalis</i>	10	<i>Glyptocephalus cynoglossus</i>	7
<i>Leucoraja naevus</i>	12	<i>Lepidorhombus whiffiagonis</i>	7
<i>Limanda limanda</i>	93	<i>Zeugopterus punctatus</i>	1
<i>Scyliorhinus stellaris</i>	15	<i>Capros aper</i>	3
<i>Dicentrarchus labrax</i>	6	<i>Arnoglossus imperialis</i>	8
<i>Ctenolabrus rupestris</i>	4	<i>Rhizostoma pulmo</i>	6
<i>Syngnathus acus</i>	4	<i>Pholis gunnellus</i>	5
<i>Hyperoplus lanceolatus</i>	2	<i>Chrysaora hysoscella</i>	17
<i>Eutrigla (chelidonichthys) gurnardus</i>	89	<i>Aequorea spp</i>	32
<i>Aspitrigla (chelidonichthys) cuculus</i>	31	<i>Trigloporus (chelidonichthys) lastoviza</i>	1
<i>Melanogrammus aeglefinus</i>	18	<i>Buenia jeffreysii</i>	6
<i>Merluccius merluccius</i>	4	<i>Cyanea capillata</i>	42
<i>Trachurus trachurus</i>	1	<i>Loligo forbesi</i>	9
<i>Zeus faber</i>	9	<i>Sepia elegans</i>	1
<i>Homarus gammarus</i>	5	<i>Liparis liparis</i>	1
<i>Microstomus kitt</i>	34	<i>Gaidropsarus vulgaris</i>	4
<i>Loligo vulgaris</i>	3	<i>Aequipecten opercularis</i>	46
<i>Scyliorhinus canicula</i>	84	<i>Chirolophus ascanii</i>	1
<i>Necora puber</i>	23	<i>Platichthys flesus</i>	3
<i>Mullus surmuletus</i>	14	<i>Galeorhinus galeus</i>	1
<i>Nephrops norvegicus</i>	13	<i>Ciliata septentrionalis</i>	5
<i>Zeugopterus (phrynorhombus) norvegicus</i>	5	<i>Ostrea edulis</i>	1
<i>Trisopterus esmarki</i>	10	<i>Aurelia aurita</i>	5
<i>Hippoglossoides platessoides</i>	5	<i>Spondylisoma cantharus</i>	2
<i>Pleuronectes platessa</i>	86	<i>Symphodus (crenilabrus) balloni</i>	1
<i>Trisopterus minutus</i>	62	<i>Crystallogobius linearis</i>	1
<i>Agonus cataphractus</i>	37	<i>Zeugopterus (phrynorhombus) regius</i>	1
<i>Pomatoschistus spp</i>	36	<i>Lesueurigobius friesii</i>	1
<i>Raja microocellata</i>	15	<i>Hyperoplus immaculatus</i>	2
<i>Callionymus reticulatus</i>	1	<i>Gobius paganellus</i>	2
<i>Pecten maximus</i>	10	<i>Ammodytidae</i>	6

<i>Maja squinado</i>	49	<i>Diplecogaster bimaculata</i>	2
<i>Arnoglossus laterna</i>	57	<i>Micromesistius poutassou</i>	1
<i>Raja montagui</i>	55	<i>Cyanea lamarckii</i>	2
<i>Mustelus asterias</i>	30	<i>Liparis spp</i>	1
<i>Callionymus maculatus</i>	4	<i>Sardina pilchardus</i>	1
<i>Solea solea</i>	96	<i>Loligo spp</i>	1
<i>Pegusa (solea) lascaris</i>	18		

Table 4: Summary of gear deployments and sample collections

Gear	Valid	Shakedown	Invalid	Total
Standard 4m Beam trawl with cod end liner	108	1	6	115
Ring net sample	1	0	0	1
ESM 2 and Niskin (Surface and Bottom)	32	0	0	32
CTD and Niskin (Surface and Bottom)	1	0	0	1
Tritium water samples	74	0	0	74
Caesium water samples	36	0	0	36
Chlorophyll samples	43	0	0	43

Table 5: List of stations that were moved or fished for a non-standard time.

Prime station number	Survey sector	Reason for change	What was changed
54	ISS	History of gear damage	3:1 warp ratio and 15-minute tow
53	ISS	History of gear damage	3:1 warp ratio and 15-minute tow
501	BCO	History of gear damage	15-minute tow
220	ISW	History of large catches	15-minute tow
37	ISS	Static gear over tow	15-minute tow
40	ISS	Static gear over tow	towed across original tow for 15 minutes
313	SGC	History of large catches	15-minute tow
27	ISS	History of large catches	15-minute tow
137	BCI	Reduce the chance of gear damage	New tow position 0.5nm to the south. 3:1 warp ratio and 15-minute tow
214	ISW	History of large catches	15-minute tow
203	ISW	History of large catches	15-minute tow
233	SGC	Static gear over tow	New tow position 0.63nm to the East and 15-minute tow
47	ISS	History of gear damage	3:1 warp ratio and 20-minute tow
120	BCI	History of gear damage	3:1 warp ratio and 20-minute tow
14	ISN	Static gear over tow	20-minute tow
409	ISW	History of gear damage	3:1 warp ratio and 20-minute tow
28	ISS	History of gear damage	Towed slightly to the south, 20-minute tow
425	ISW	History of gear damage	3:1 warp ratio and 20-minute tow
507	BCO	Hauled early due to reducing light levels	20-minute tow
138	BCI	Increased weight observed	22-minute tow
101	BCI	Static gear over the tow	22-minute tow
22	ISN	Static gear over the tow	23-minute tow
401	ISW	Hauled early due to decreasing light level	23-minute tow
3	ISN	Tow in a confined bay	28-minute tow
443	SGC	Static gear over end of tow	29-minute tow
136	BCI	Static gear over end of tow	29-minute tow

Abundances of pre-recruit and recruited plaice and sole are shown in Figures 2 and 3. Abundances of pre-recruit and recruited dab and lemon sole are shown in Figure 4 and 5. In the results any species comparison to 2020 data can only be made in the BCI sector, all other sectors the comparison will be made to 2019 results.

Plaice *Pleuronectes platessa*

Abundance by both catch numbers and catch weight in 2021 decreased for the sixth consecutive year in the BCI sector, with a 29% decrease of both measures and these are now at the survey low (2001-2021).

In all other survey sectors, both catch number and catch weight are down compared to 2019 survey. Catch numbers decreased in ISN by 35%, ISS by 53%, BCO by 44%, ISW by 49% and SGC by 32% compared to the 2019 survey. Catch weights also decreased in ISN by 42%, ISS by 55%, BCO by 53%, ISW by 36% and SGC by 27% compared to 2-19. Both catch weights and numbers are below the survey average and in the ISN, ISS, ISW, SGC sectors are now at the lowest level in the time series (2001 to 2021). Trends in survey catch rates over recent surveys are shown in Figure 6.

Sole *Solea solea*

In BCI, catch numbers increased by 63% and catch weight remained the same compared to the 2020 survey. Catch weight is close to the survey average while catch numbers are above the series average over period 2001-21.

Both catch numbers and weight of sole declined in all other survey sectors compared to the 2019 survey. Catch numbers were down by 31% in ISN, 67% in ISS, 41% in BCO, 12% in ISW and 26% in SGC. In BCO and SGC the catch numbers are now below the survey average 2001-21. Catch weights decreased by 33% in ISN, 49% in ISS, 17% in BCO, 46% in ISW and 23% in SGC and all areas remain above the survey average (2001-21) except SGC that has now fallen below. Trends in survey catch rates over recent surveys are shown in Figure 7.

Dab *Limanda limanda*

Catch rates increased in BCI, with a 45% increase in numbers and a 48% increase in weight but both catch numbers and weight are below survey average (2001-2021). In all other areas the catch numbers and weights decreased compared to the 2019 survey and all remain below the survey average. The catch numbers and weights decreased by 45% and 27% in ISN, 26% and 18% in ISS, 39% and 38% in BCO, 41% and 31% in ISW and, 31% and 18% in SGC. Trends in survey catch rates over recent surveys are shown in Figure 8.

Lemon sole *Microstomus kitt*

Catch rates of lemon sole remain low in the BCI survey sector and are near to the survey low (2001-2021). Catch rates by number increased and weight decreased by 10% and 7% respectively from the 2020 survey. Catch numbers fell in ISN (25%), ISS (14%) and increased in BCO (43%), ISW (5%) and SGC (38%) compared to the 2019 survey. Compared to 2019, catch weights increased in ISS (14%), ISW (36%) and SGC (16%) while they have decreased in ISN (22%) and ISW (16%). In ISN and ISS the catch number and weight are above the survey average (2001-21) while all other areas are near to or just below the average. Trends in survey catch rates over recent surveys are shown in Figure 9.

Other species – Comparison to 2019 survey only

Cod *Gadus morhua* total catch numbers in 2021 (19) were down compared to 2019 (29). Bass *Dicentrarchus labrax* total catch numbers in 2021 (32) were up compared to 2019 (12). Thornback ray *Raja clavata* catch numbers in 2021 (737) were down compared to 2019 (773). Blond ray *Raja brachyura* numbers decreased from 82 in 2019 to 67 in 2021.

Lesser spotted dogfish *Scyliorhinus canicula* catch numbers in 2021 (1303) decreased compared to 2019 (1479). Starry smoothhound *Mustelus asterias* catches decreased from 147 in 2019 to 78 in 2021 but the weight increased from 41.72kg to 47.02kg. Grey gurnard *Eutrigla gurnardus* numbers fell from 1973 in 2019 to 1197 in 2021 while red gurnard *Chelidonichthys cuculus* numbers rose to 214 (2021) from 161 (2019). Haddock *Melanogrammus aeglefinus* numbers decreased from 343 in 2019 to 128 in 2021.

Barrel Jellyfish *Rhizostoma pulmo* total weight decreased from 552kg in 2019 to just 24kg in 2021, other jellyfish species showed similar declines. Queen scallop *Aequipecten opercularis* weight more than doubled from 2019 (265kg) to 2021 (594kg) and the numbers showed similar increase from 13861 in 2019 to 23951 in 2021. Spiny spider crab *Maja squinado* catch number in 2021 (383) increased compared to 2019 (304), total weight caught also showed similar increase from 113kg in 2019 to 185kg in 2021.

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 Niskin deployed from the starboard gantry with the 'CTD' wire used. The sample was routinely taken at around 5m off the surface and seabed. A total of 33 surface and 33 bottom salinity samples were collected.

Aim 5 – Epi-benthos

At 26 selected fishing stations, samples of the epi-benthic by-catches were sorted, identified to species, 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 was collected for all fish that were biologically sampled. Eight common sea snail *Liparis liparis*, six butterfly blenny *Blennius ocellaris* and one butterflyfish *Pholis gunnellus* were sampled to get additional length-weight measurements.

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

A total of 45 one-litre water samples were collected at fishing stations and a further 29 in the Bristol channel collected at non-fishing locations for the analysis of tritium levels. A total of 36 fifty-litre water samples were collected in the Irish Sea for analysis of caesium levels. (K Leonard – Cefas, Lowestoft)

Aim 8 - Collection of water samples using the Niskin to support PHD student

Five sites were chosen around Sellafield on 20 September where multiple Niskin sampling dips were carried out to collect water samples.

Aim 9 - 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 17 Nurse-hound *Scyliorhinus stellaris*, 1 Blonde Ray *Raja brachyura* and 4 Starry smooth-hound were tagged and released. (J Ellis - Cefas, Lowestoft).

C) No sighting of marine mammals were recorded while in transit, Common dolphins were present while carrying out stations for several days in the Bristol Channel.

D) A total of 34 samples of fish and benthic species were frozen for subsequent species identification confirmation in the laboratory. (J Ellis - Cefas, Lowestoft).

Aim 10 - Retain any dead specimens of diadromous fish

No diadromous species were caught during the trip.

Aim 11 – Collect samples of queen scallops

A total of 11 samples of queen scallops were collected and frozen during the survey for subsequent sampling back at the laboratory to assist with the stock assessment. (A Lawler – Cefas, Lowestoft)

Aim 12 – Collect squid specimens

A total of 4 squid specimens were collected and frozen so that they can be sampled by a PhD student. (V Laptikhovsky – Cefas, Lowestoft)

Aim 13 - Collect plankton sample at the Gabbard smart buoy site

A successful deployment of a ring net was made at the Gabbard on the return journey to Lowestoft, at 0728h 30 September, a chlorophyll sample was also taken. (S Pitois – Cefas, Lowestoft)

Aim 14 – Collect chlorophyll samples

In total 43 chlorophyll samples were collected from surface water, 34 at Niskin deployments, 8 during transit through the English Channel and one at the Gabbard ring net site. (N Greenwood – Cefas, Lowestoft)

Aim 15 – Collect samples of plastic marine litter

This aim was modified after discussion with the project investigator, not enough plastic litter was being caught at individual sites, so it was decided to collect all plastic litter. Different types of plastic litter were kept separate and returned to the lab. (F Dal-Molin – Cefas, Lowestoft)

Aim 17 – Reference collection of fish for NMBAQC

At least fifteen individuals of the same species were collected and frozen for fifteen species. The species collected were grey gurnard, solenette *Buglossidium luteum*, poor cod *Trisopterus minutus*, whiting *Merlangius merlangus*, plaice, witch *Glyptocephalus cynoglossus*, lesser weaver *Echiichthys vipera*, bib *Trisopterus luscus*, bullrout *Myoxocephalus scorpius*, common dragonet *Callionymus lyra*, scaldfish *Arnoglossus laterna*, thickback sole *Microchirus variegatus*, Dover sole, pogge *Agonus cataphractus* and dab.

Aim 17 - Collection of a core sample and water samples at various depths

It was not possible to deploy the Nioz corer due for safety reasons as the weather had caused a considerable swell. It was possible to collect the water samples at four depths using the Niskin. (F Dal-Molin – Cefas, Lowestoft)

Litter by-catch information

Details of the by-catch of marine litter caught at all fishing stations was recorded. Litter by-catch was categorized by 'type', weighed, photographed, and categorized by size at a total of 109 fishing stations with a total of 297 individual items being observed with a combined weight of 9.402 kilograms. 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 109 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 most aims were achieved this year.

S Shaw (Scientist-in-charge)
04/11/2021

INITIALLED: IDH

DISTRIBUTION:

Survey participants +
I Holmes (PI)
P Falconer (PL)
D Pettengell (PM)
Cefas Fisheries Survey's SICs/2ICs
G Burt (for Cefas CDP)
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
G Karlsson (Defra)
B Badger (Defra)

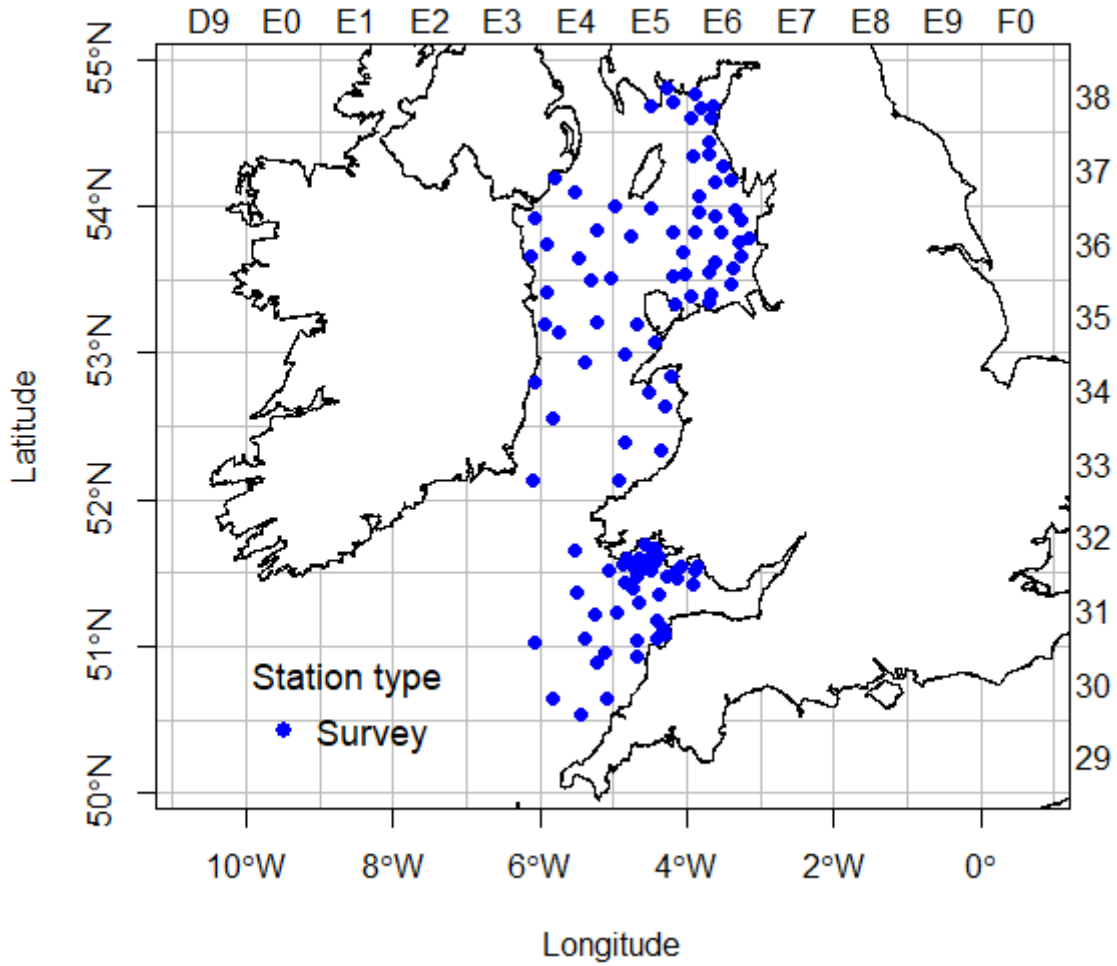
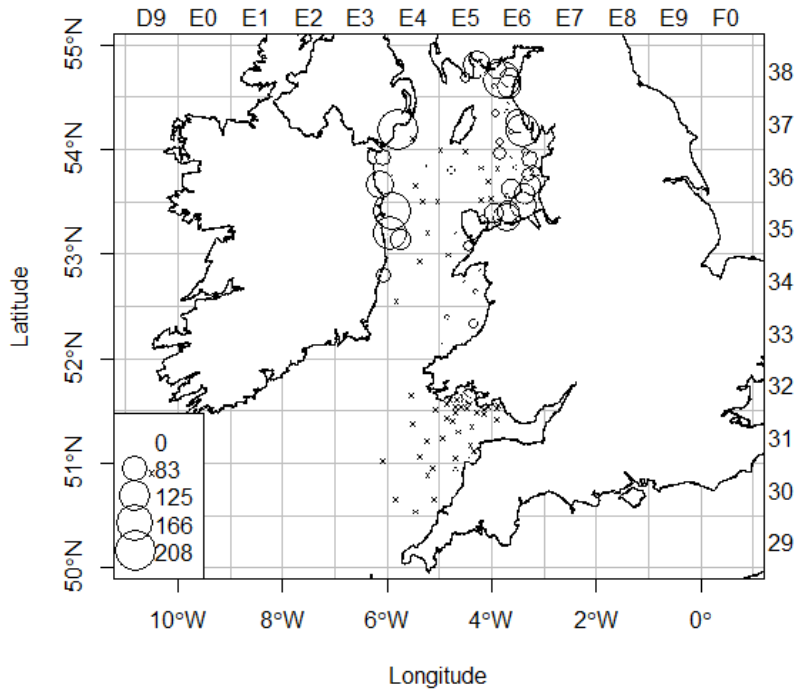


Figure 1: Beam trawl station positions for CEND 15/21.

a)



b)

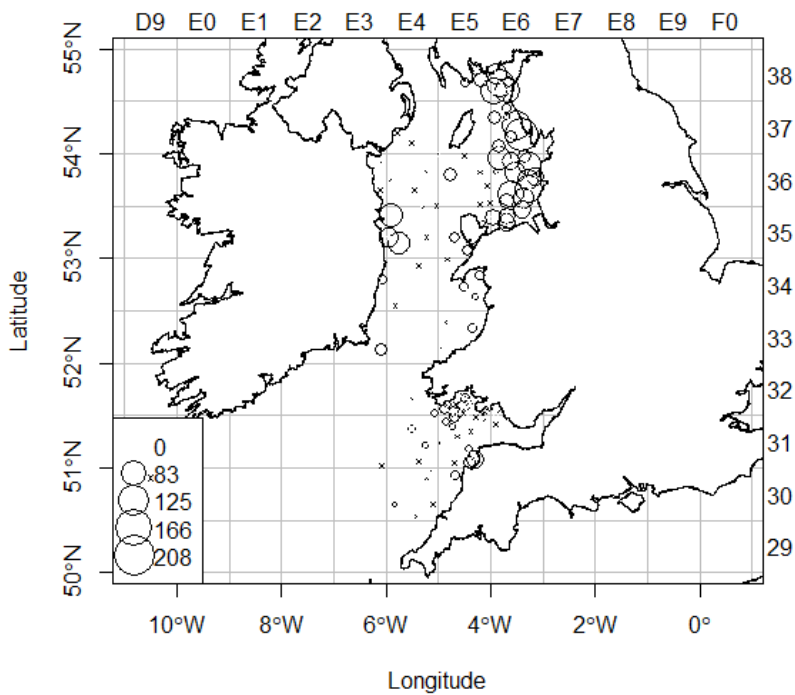
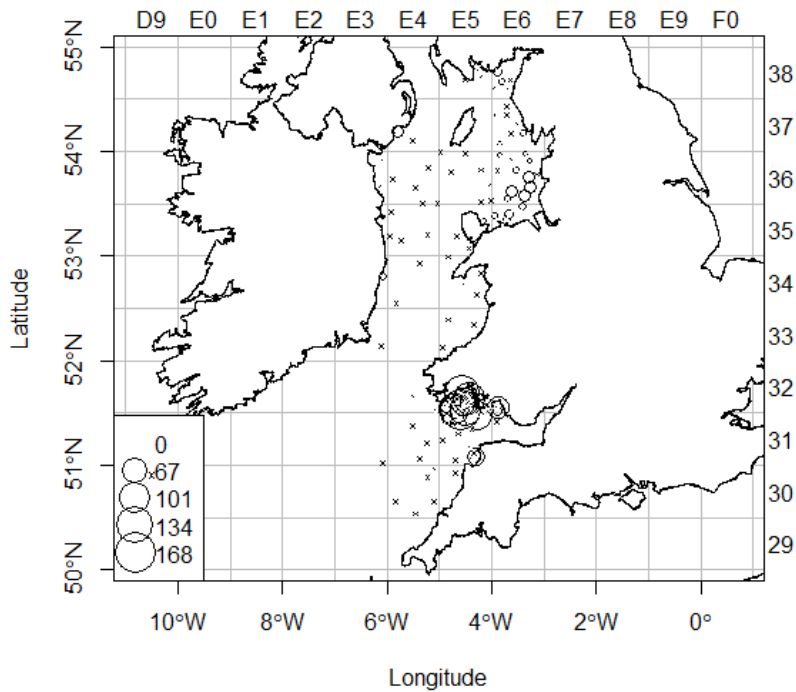


Figure 2: Abundance (number caught per 30-minute tow) of pre-recruit (a) (<21 cm TL) and recruited (b) (≥ 21 cm TL) - plaice.

a)



b)

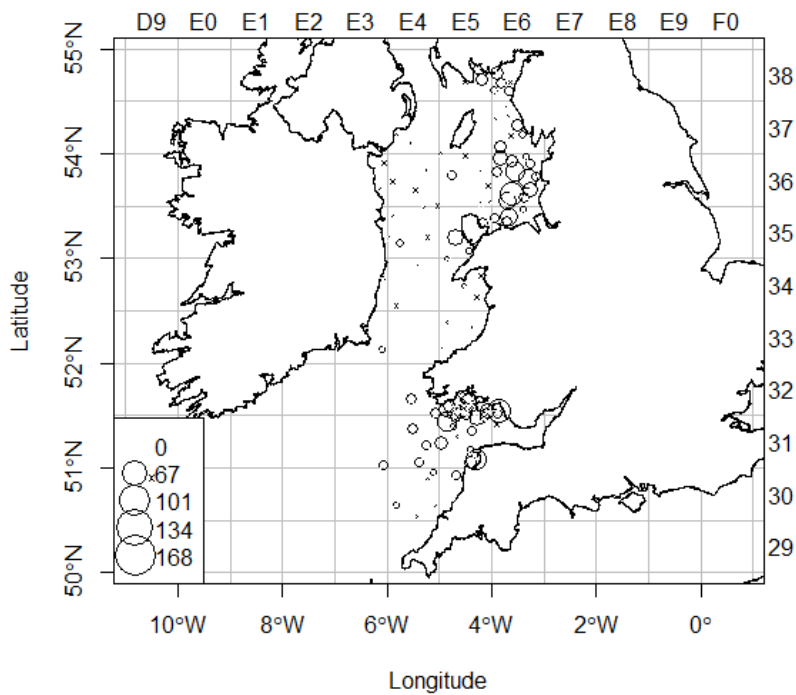
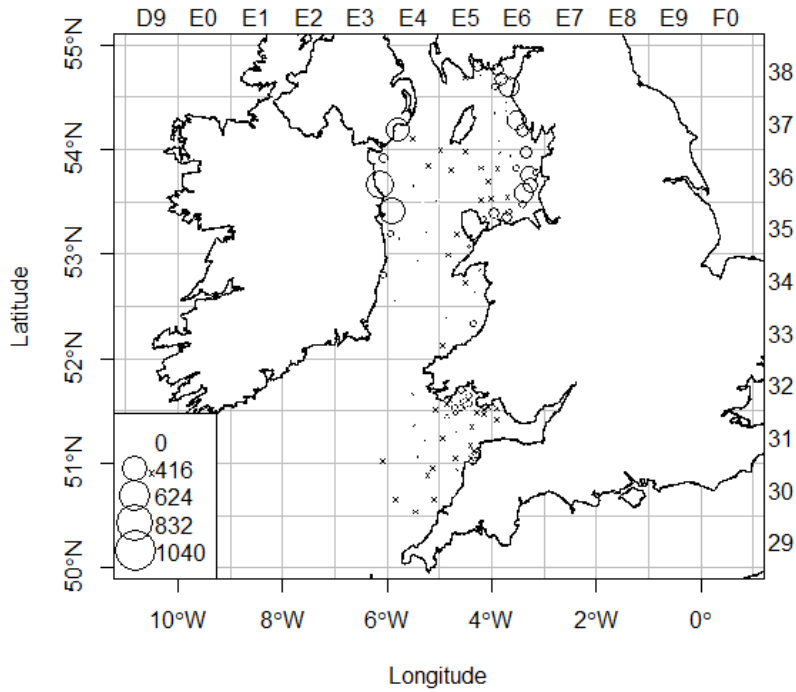


Figure 3: Abundance (number caught per 30-minute tow) of pre-recruit (a) (<21 cm TL) and recruited (b) (≥ 21 cm TL) - sole.

a)



b)

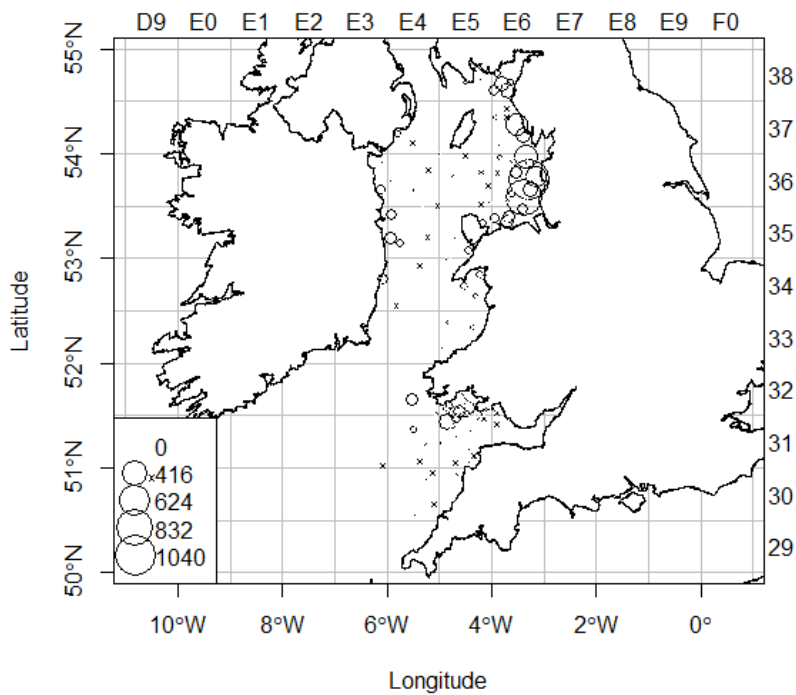
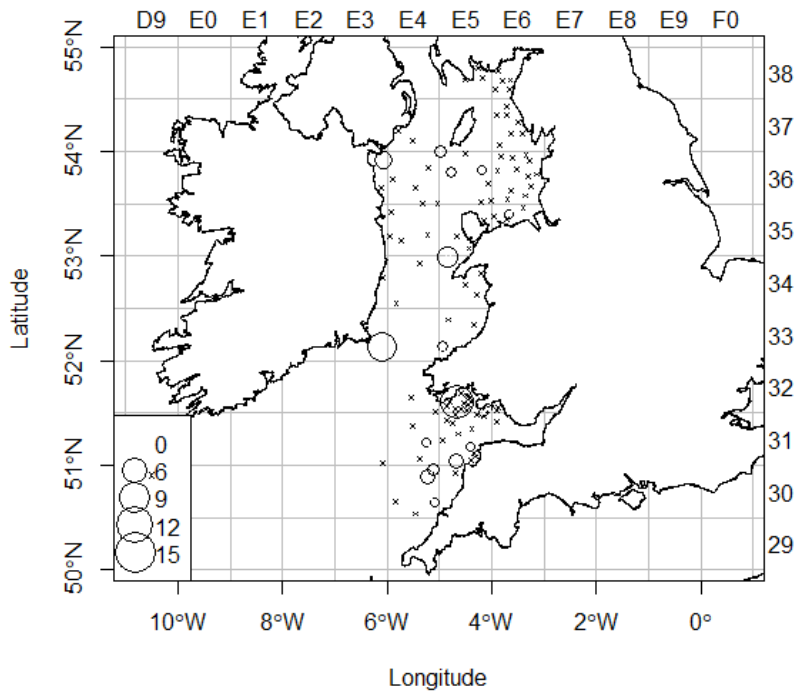


Figure 4: Abundance (number caught per 30-minute tow) of pre-recruit (a) (<16 cm TL) and recruited (b) (≥ 16 cm TL) - dab.

a)



b)

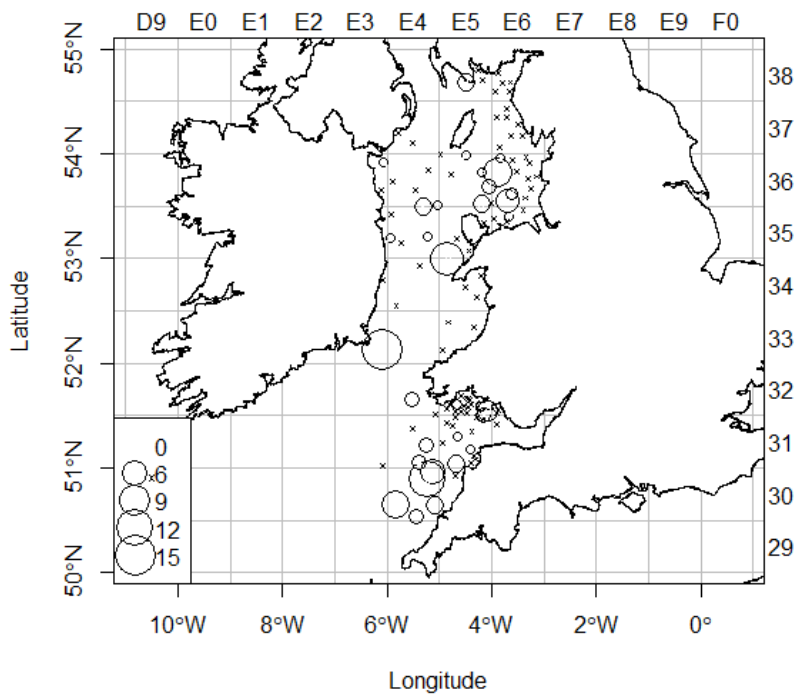


Figure 5: Abundance (number caught per 30-minute tow) of pre-recruit (a) <19 cm TL) and recruited (b) (≥ 19 cm TL) - lemon sole.

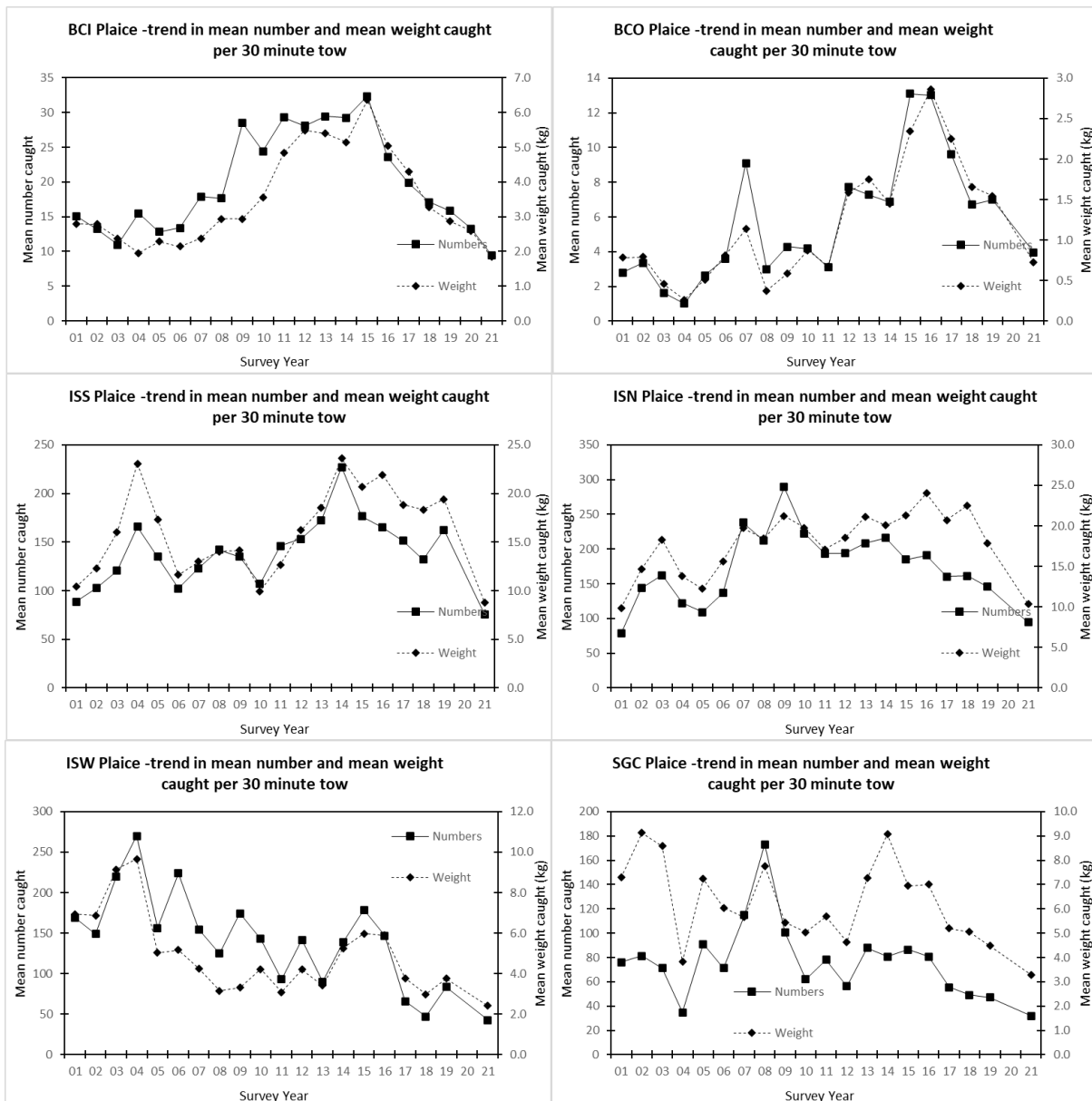


Figure 6: Mean number and weight of plaice caught per 30-minute tow

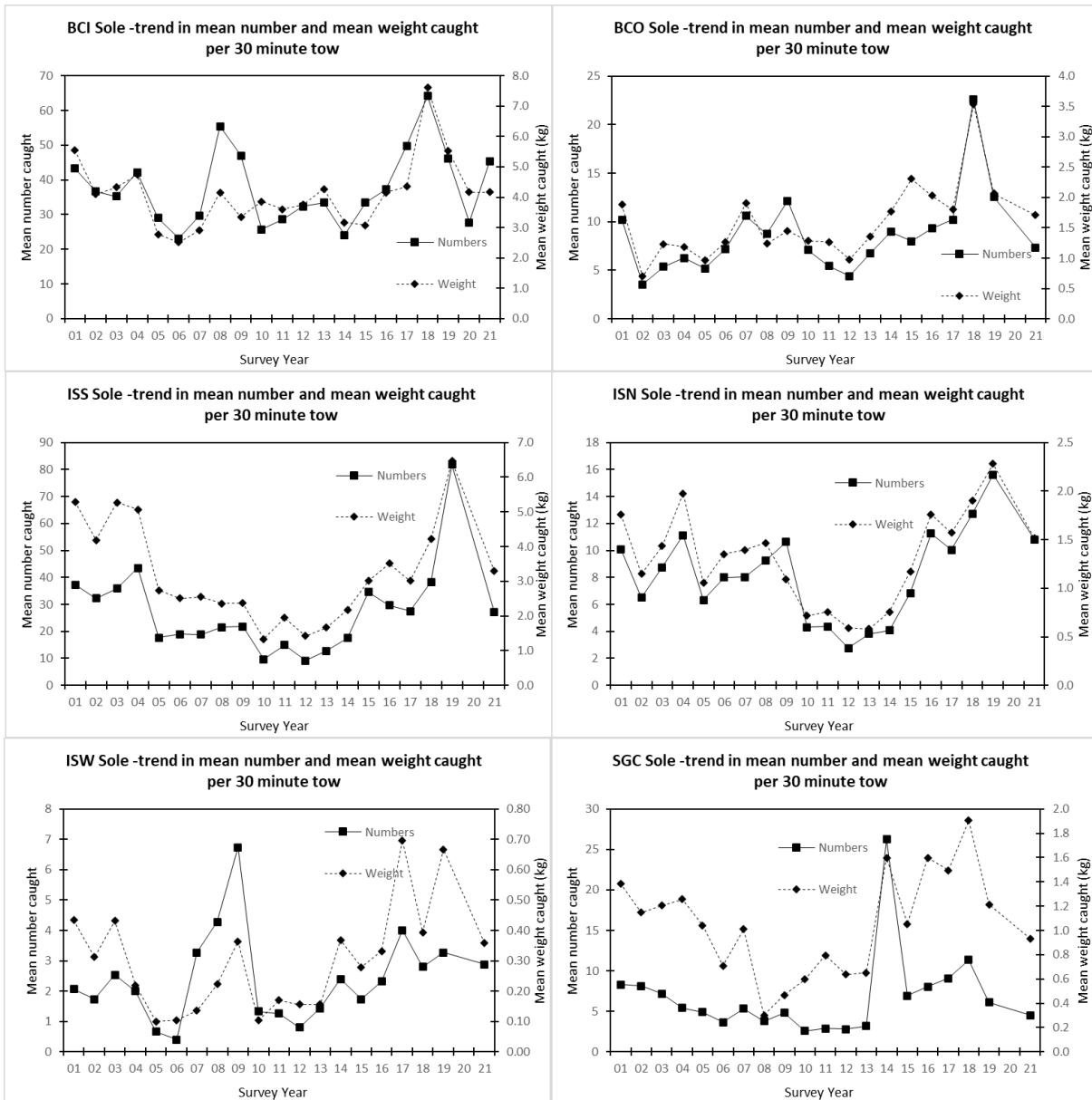


Figure 7: Mean number and weight of sole caught per 30-minute tow.

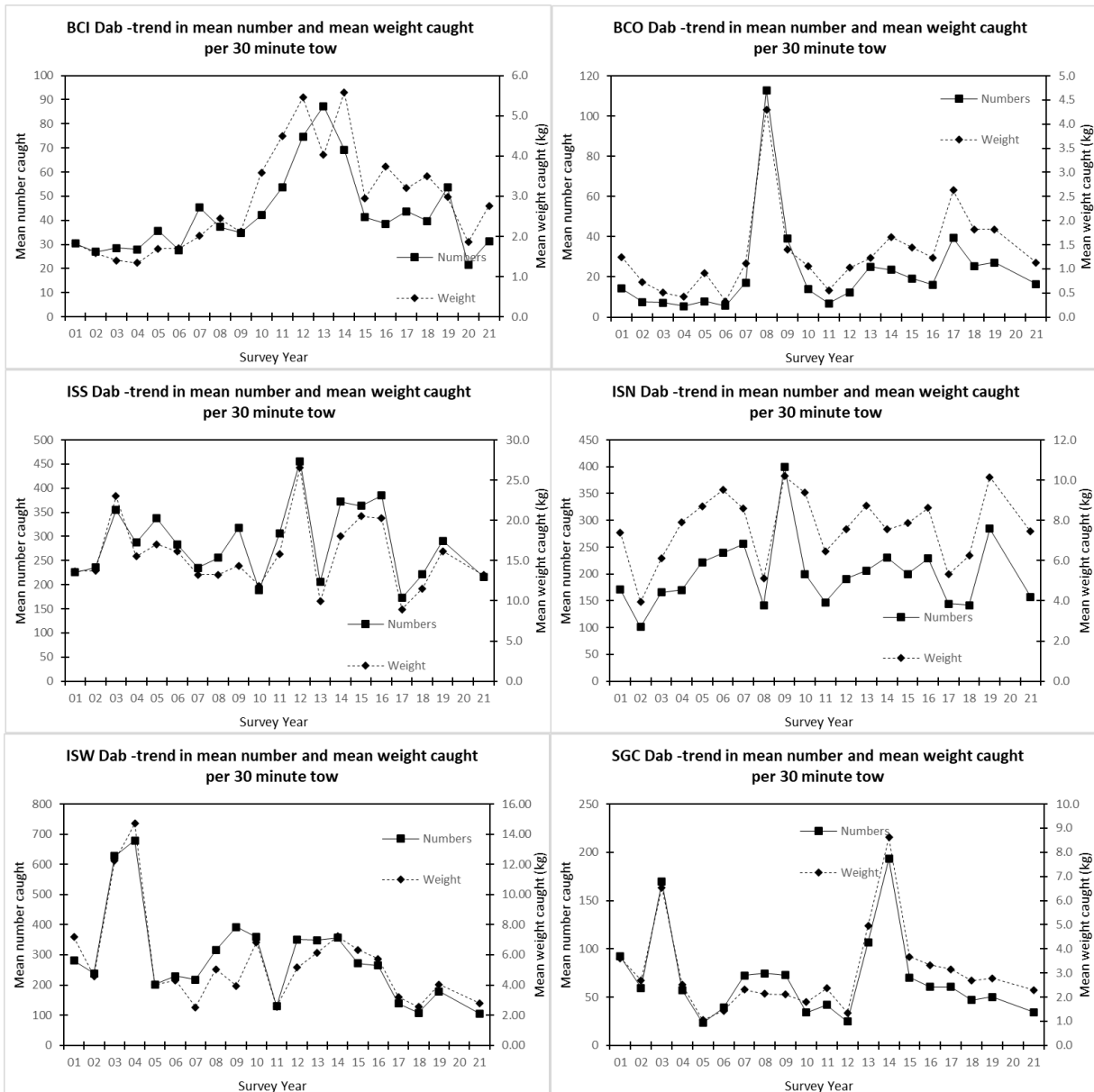


Figure 8: Mean number and weight of dab caught per 30-minute tow.

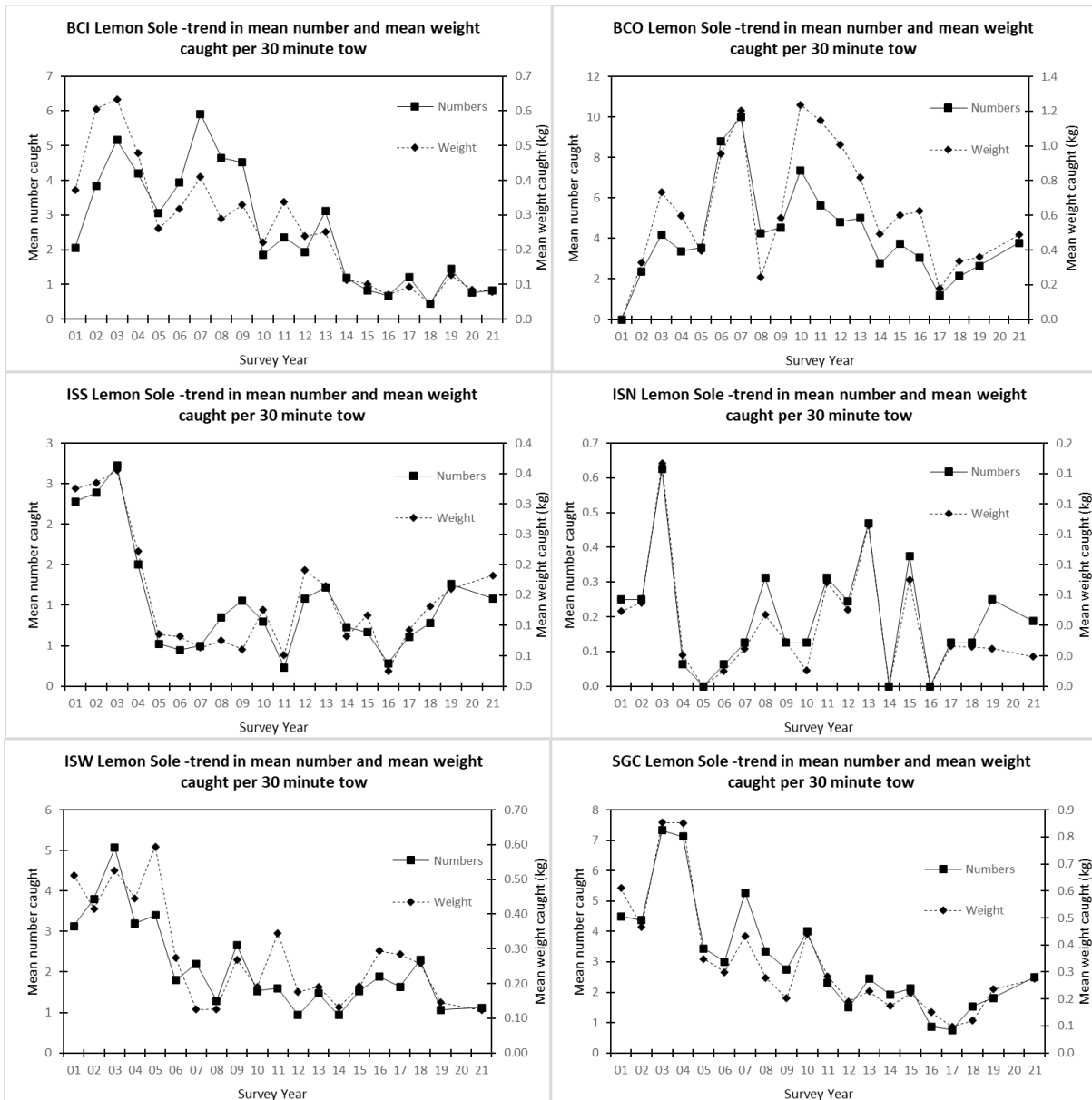


Figure 9: Mean number and weight of lemon sole caught per 30-minute tow.