

THE CENTRE FOR ENVIRONMENT, FISHERIES & AQUACULTURE SCIENCE,  
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**RESEARCH VESSEL SURVEY REPORT**

**RV CEFAS ENDEAVOUR**  
**Survey: CEND 11/20**

**STAFF:**

<b>Name</b>	<b>Role</b>
Joanne Smith	SIC
Linford Mann	2IC
Matt Eade	Sampler
Mary Brown	Sampler
Charlotte Jennings	Sampler
Chris Popham	Sampler
Joanna Ford	Sampler

**DURATION:** 13 – 25 July (13 days)

**LOCATION:** Eastern Channel (7d), Southern North Sea (4c)

**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 14 species as agreed at the Beam Trawl Working Group.

#### SECONDARY AIMS:

5. To collect full depth, conductivity, temperature and depth profiles at each trawl station alongside surface and near-bottom water samples using a Niskin with ESM2 logger.
6. To continuously log sub-surface (3m) salinity, temperature, fluorometry and other environmental data using the 'Ferrybox'.
7. To sample litter by-catch caught in the beam trawl at every station.
8. Collection of one plankton sample 500m from the West Gabbard Smart buoy (Sophie Pitois, Cefas Lowestoft).
9. The collection & preparation of water samples for chlorophyll determination (Naomi Greenwood, Cefas Lowestoft).

#### OPPORTUNISTIC AIMS:

10. To tag and release specimens of various commercially exploited skates (*Rajidae*) and other selected elasmobranches.
11. Collect specimens of selected species for ID purposes as well as length-weight measurements where still required.
12. To collect samples of benthos from selected sites on the survey grid to investigate toxin concentrations – (Andrew Turner, Cefas Weymouth).
13. To collect biological samples from Greater weaver, *Trachinus draco* (Samantha Barnett, Cefas Lowestoft).
14. To carry out full biological sampling on common cuttlefish, *Sepia officinalis*.
15. To carry out biological sampling, collect scales and photograph gonads of all black seabream *Spondyliosoma cantharus* collected.

**NARRATIVE: (ALL TIMES ARE GMT)**

The SIC (Joanne Smith) joined the RV Cefas Endeavour (CEND) on the afternoon of 10 July for delivery of gear to the vessel and discussions with the master. The following morning the remaining scientific crew joined the vessel, proceeding with COVID-19 testing and cabin isolation. Negative test results for all staff were received by the evening of 12 July, allowing the survey to continue with survey operations whilst following government guidelines. Vessel safety inductions and toolbox talks were carried out on the evening of 12 July. The vessel sailed from Lowestoft at 0430hr on the morning of 13 July, steaming to a wreck off Lowestoft to carry out multi-beam calibrations for the newly fitted multi-beam. A CTD deployment was carried out, followed by several multi-beam tows over the chosen wreck.

On successful completion of the calibration work, CEND began the survey at prime 105 with deployment of the ESM2 logger with Niskin bottle, followed by a shakedown beam trawl tow (beam number 4), to fully test the gear deployment and the on-board fish sampling systems. All equipment worked as required so the survey continued with the days fishing completing prime stations 104, 103, 102 and 100. An abandon ship drill was carried out at 1130hr.

On the morning of 14 July, work continued in the North Sea at prime station 99 followed by a further 6 fishing stations (98, 83, 82, 97, 96 & 119). On 15 July, the remaining North Sea stations were completed (78, 79), followed by further four stations in the English sector of the eastern Channel (75, 80, 74 & 73). Prime station 73 was fished outside TSS to avoid a 3 hour wait for the tide to change, however despite running the tow first the gear had to be hauled after 11 minutes due to the presence of commercial static gear. The station was successfully re-fished at the correct location for the full 30 minutes inside the TSS.

Fishing continued in the English sector working the next four days in a westerly direction completing 27 prime stations (22-25, 27, 42-45, 47, 49-53, 55-64, 67, 94). Prime stations 54 and 45 had to be abandoned due to the presence of static gear. Alternative tows were investigated without success. Prime 27 could only be fished for 1.5 nm due to a newly laid cable and bad ground further along the tow. Prime 50 had to be hauled after 3 minutes due to poor ground. Historically this ground is good, however soon after shooting a 9m recess appeared on the echo sounder, the tow was re-fished successfully. Prime 42 had to be hauled after 20 minutes due to a hard 6m trench on the tow. Primes 47 and 55 had to be hauled early to avoid commercial static gear. Prime 26 was fished for 20 minutes due to history of large catches. Prime 65 had to be abandoned due to no suitable ground to fish, this is normally one of the best tows for high catches of plaice. Historically grounds on this survey are very similar each year however this year they were very different and more difficult to fish. The change in ground quality may be due to the storms at the start of 2020.

On 20 July fishing continued in the French sector of the eastern Channel, starting in the area off Le Havre and working in an easterly direction along the French coast. Over the next five days 31 prime stations were completed (1, 4, 6-12, 16-21, 25, 29, 35-40, 68-72, 76-77, 95). Prime stations 4, 1, 9, 71, 77, 68 & 95 were fished for 20 minutes due to history of large catches of benthic by-catch, particularly brittle stars. Prime stations 11 and 21 were fished for the full 30 minutes instead of the historic 20 minutes to no detriment. Prime station 69 resulted in a

very large catch of muscles, *Mytylidae*, which was difficult to bring onboard. Prime 17 was hauled early (26 minutes) due to commercial static gear at the end of the tow. Grounds in the French sector were similar to previous years.

On completion of the core stations (24 July), CEND steamed to the additional stations off the Belgium coast. Unfortunately, due to issues with our permission received from the Belgium authorities, only four of the five stations planned were fished, (prime stations 113, 114, 115 & 118). On the morning of 25 July CEND completed the West Gabbard plankton station at 0600hr, followed by clean down of the vessel before docking into Lowestoft at 1230hr.

## RESULTS:

### Primary aims.

**Aim 1.** The survey gear was the standard 4m beam trawl number 4, with chain mat, flip-up ropes and a 40mm cod-end liner. Beam trawl number 1 was on-board as a spare but was not needed during the survey.

A SAIV Micro CTD was attached to the headline on the trawl to allow the recording of temperature and salinity at each station. In addition, surface and bottom seawater samples and an ESM2 logger profile were taken twice daily.

A typical station consisted of deployment of the 4m beam trawl with mini CTD attached to the headline and deployed from the starboard winch. The beam was routinely towed for 30 minutes at a warp/depth ratio of 3.5:1 unless the ground was known to yield an unmanageable by-catch, in which case the warp and tow duration were shortened to 3:1 and 20 minutes respectively. If a strong tide was running, the warp/depth ratio was increased to 4:1 to ensure that the gear was settled on the seabed.

All fish and selected commercial shellfish were identified to species, weighed and measured with large catches of an individual species being sub-sampled. 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.

A total number of 8 stations were reduced to 20-minute tows due to history of large by-catches or bad ground. Six tows were reduced to between 21 - 27 minutes and 2 abandoned due to either the presence of commercial static gear or bad ground. One tow was reduced to 20-minutes due to cables over the tow and 1 had to be re-fished due to bad ground 8 minutes into the tow (Table 1). Figure 1 shows the beam trawl station positions on the survey and Table 2 shows the number of gear deployments undertaken on the survey.

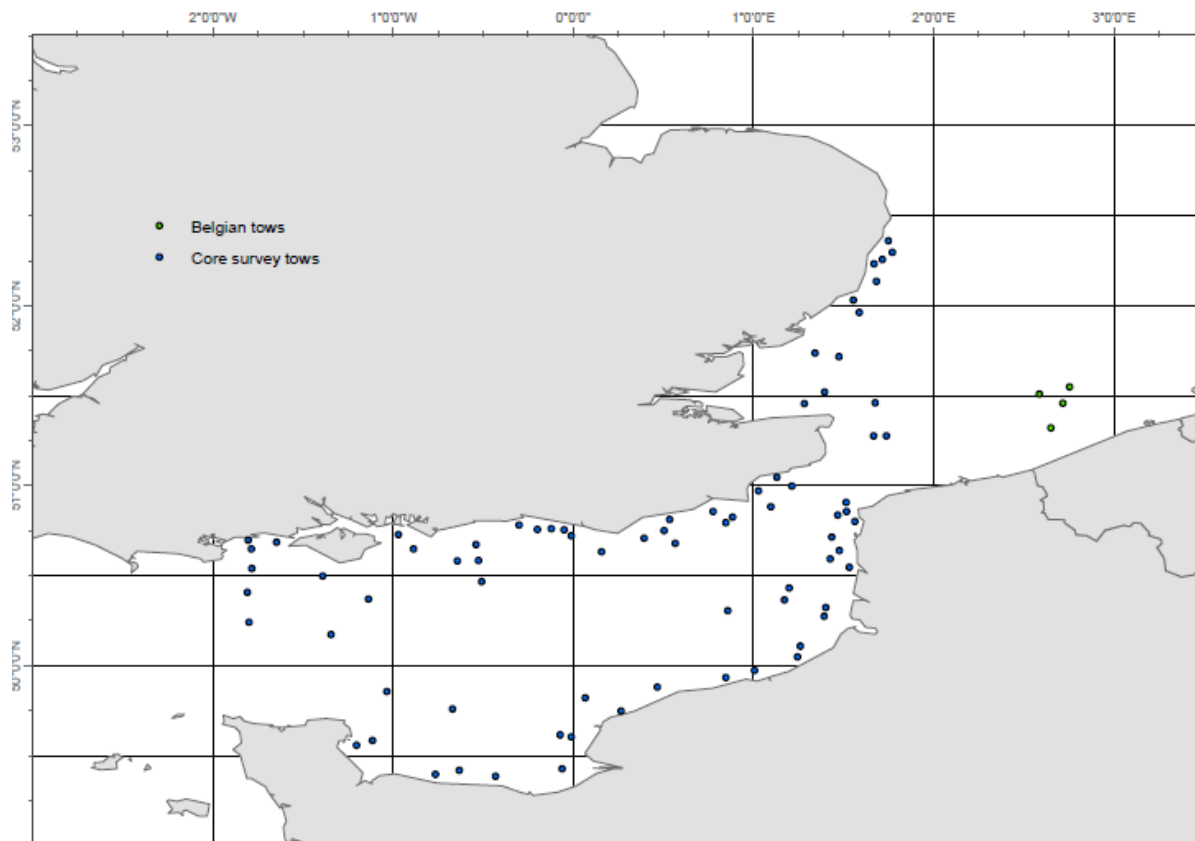
Table 1 Survey Prime stations not worked or reduced in tow duration

Prime Station Number	Sector	Reason for not working or reduction in tow time	Alternative tow or tow time
1	French	History of large catch	20 minutes
4	French	History of large catch	20 minutes
9	French	History of large catch	20 minutes
17	French	Static gear on tow	26 minutes
26	English	History of large catch	20 minutes
27	English	New cable and large catch	20 minutes
42	English	Hauled early, bad ground	20 minutes
45	English	Static gear on tow	No too much gear
47	English	Static gear on tow	23 minutes
54	English	Static gear on tow	No too much gear
55	English	Static gear on tow	27 minutes
65	English	No clear ground	No alternative
68	French	History of large catch	20 minutes
71	French	History of large catch	20 minutes
76	French	Hauled early, bad ground	25 Minutes
77	French	History of large catch	20 minutes
95	French	History of large catch	20 minutes
100	North Sea	Cables on tow	22 minutes

Table 2 The number of valid additional and invalid tows fished during the survey

Region	Valid 30 minutes	Valid Tows under 30 minutes	Additional tows	Invalid	Total tows (exc. Not fished)	Not Fished
7d (English)	27	5	0	3	32	3
7d (French)	21	9	0	0	30	0
4c (North Sea)	13	1	0	0	14	0
Total	61	15	4	3	76	3

Figure 1 Core & additional stations fished during 2020 survey



### Aims 2 & 3

All otolithed fish were measured to the whole cm below, weighed individually, sexed and given a sexual maturity stage. Table 3 shows the numbers of otolith samples collected for the main commercial fish species. All non-commercial finfish by-catch were 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*, European lobster *Homarus gammarus*, King scallop *Pecten maximus*, European flat oyster *Ostrea edulis*, velvet swimming crab *Necora puber*, common spiny lobster *Palinurus elephas*, greater spider crab *Maja squinado* and Queen scallop *Aequipecten opercularis*. Curled octopus *Eledone cirrhosa* were weighed and counted.

The numbers of individual fish measured this year for the main commercial species can be seen in Table 4. The total catch weight and numbers of the main commercial species raised to the standard 30-minute tow (2012-2020) can be seen in Tables 5 and Table 6. In total, 201 different species were recorded. Table 7 shows the number of stations that each species was observed.

Table 3 Otoliths collected from the main commercial species by strata

Region	Brill	Cod	Dab	Flounder	Lemon sole	Plaice	Sole	Whiting	Turbot
7d English	7	0	17	4	14	602	82	6	5
7d French	14	0	52	15	19	662	144	16	26
North Sea	1	0	23	48	39	321	197	38	2
Total	22	0	92	67	72	1585	423	60	33

Table 4 Number of fish measured from the main commercial species by strata

Region	Brill	Cod	Dab	Flounder	Lemon sole	Plaice	Sole	Whiting	Turbot
7d English	7	0	84	4	44	1800	317	40	6
7d French	16	0	181	17	30	2175	647	18	28
North Sea	1	0	376	50	39	611	1673	485	1
Total	24	0	641	71	113	4586	2637	543	35

Table 5 Comparison of catch weight (kg) for the main commercial species over the last 8 surveys (2013-2020) (raised to 30-minute tows)

	2013	2014	2015	2016	2017	2018	2019	2020
Plaice	790	1238	1042	975	836	846	721	541
Sole	169	235	171	183	214	231	234	200
Dab	107	87	73	70	47	41	42	29
Lemon sole	38	38	24	18	14	11	14	13
Cuttlefish	57	48	35	101	103	60	111	95
Flounder	35	72	17	29	19	27	28	18
Whiting	20	30	89	24	52	27	44	51
Brill	16	10	14	10	11	13	10	8
Turbot	10	9	15	17	15	13	10	18
Bass	3	9	2	7	15	8	5	11
Cod	2	16	13	0	1	1	0	0

Table 6 Comparison of catch numbers for the main commercial species over the last 8 surveys (2013-2020) (raised to 30-minute tows)

	2013	2014	2015	2016	2017	2018	2019	2020
Plaice	3778	7197	5635	5137	5364	5904	5546	4586
Sole	1522	2084	2229	1770	2805	2398	3342	2636
Dab	1484	1684	1183	954	917	720	989	641
Lemon sole	222	258	171	119	162	124	170	113
Cuttlefish	404	214	91	526	500	279	495	475
Flounder	118	262	72	127	95	119	131	71
Whiting	600	388	1201	239	927	400	431	542
Brill	25	31	32	20	24	24	21	24
Turbot	20	18	23	27	31	25	23	35
Bass	4	9	2	3	23	6	14	9
Cod	7	43	8	0	2	2	3	0

Table 7: List of species caught during the survey and number of stations at which they were recorded

<i>Abra Alba</i>	1	<i>Abra Spp</i>	5
<i>Acanthocardia Aculeata</i>	2	<i>Acanthochitona Crinita</i>	1
<i>Adamsia Carciniopados</i>	1	<i>Aequipecten Opercularis</i>	25
<i>Aequorea Spp</i>	18	<i>Agonus Cataphractus</i>	34
<i>Alcyonidium Diaphanum</i>	55	<i>Alcyonium Digitatum</i>	41
<i>Alloteuthis Subulata</i>	43	<i>Ammodytes Tobianus</i>	1
Ammodytidae	1	<i>Anemone Indet</i>	2
<i>Anseropoda Placenta</i>	11	<i>Aphia Minuta</i>	1
<i>Aphrodite Aculeata</i>	28	<i>Archidoris Pseudoargus</i>	16
<i>Arenicola Marina</i>	4	<i>Arnoglossus Laterna</i>	33
<i>Ascidia Conchilega</i>	6	Ascidacea	27
<i>Asterias Rubens</i>	49	<i>Astropecten Irregularis</i>	2
<i>Atelecyclus Rotundatus</i>	3	<i>Aurelia Aurita</i>	5
Balanomorpha	1	<i>Blennius Ocellaris</i>	4
<i>Bolocera Tuediae</i>	1	<i>Botrylloides Leachi</i>	2
<i>Botryllus Schlosseri</i>	4	Broken Shell	40
<i>Buccinum Undatum</i>	30	<i>Buglossidium Luteum</i>	38
<i>Calliactis Parasitica</i>	1	<i>Callionymus Lyra</i>	64
<i>Callionymus Maculatus</i>	6	<i>Calliostoma Zizyphinum</i>	1
<i>Cancer Pagurus</i>	23	Catshark (Dogfish) Eggcase	15
<i>Chelidonichthys (Aspitrigla) Cuculus</i>	26	<i>Chelidonichthys (Trigla) Lucerna</i>	31
<i>Chlamys Varia</i>	10	Chlorophyceae	3
<i>Chrysaora Hysoscella</i>	33	<i>Ciliata Septentrionalis</i>	1





<i>Cirolana Cranchii</i>	1	<i>Cliona Celata</i>	3
<i>Conger Conger</i>	7	<i>Crangon Allmanni</i>	1
<i>Crangon Crangon</i>	12	<i>Crepidula Fornicata</i>	10
<i>Crossaster Papposus</i>	14	<i>Ctenolabrus Rupestris</i>	1
<i>Cucumariidae Indet</i>	1	Cuttlefish Eggs	36
<i>Cyanea Capillata</i>	6	<i>Cyanea Lamarckii</i>	20
<i>Cyclopterus Lumpus</i>	1	<i>Dicentrarchus Labrax</i>	6
<i>Diphasia Nigra</i>	10	<i>Dromia Personata</i>	10
<i>Echiichthys (Trachinus) Vipera</i>	27	<i>Echinocardium Spp</i>	12
<i>Echinocyamus Pusillus</i>	2	<i>Eledone Cirrhosa</i>	2
Epibenthic Mix Unidentified	65	Eupagurus	13
Eupagurus / Pagurus In Suberites	1	<i>Eutrigla Gurnardus</i>	11
<i>Filograna Implexa</i>	6	<i>Flustra Foliacea</i>	32
Fucus Spp Other Furoid Algae	14	<i>Fucus Vesiculosus</i>	23
<i>Galathea Spp</i>	1	Gastropod Egg Mass	4
<i>Glycymeris Glycymeris</i>	8	<i>Gobius Gasteveni</i>	11
<i>Gobius Niger</i>	3	<i>Gobius Paganellus</i>	2
Golfingiidae	2	<i>Halichondria Panicea</i>	4
<i>Haliclona Oculata</i>	2	<i>Henricia Oculata</i>	6
<i>Hinia (Nassarius) Reticulata</i>	8	<i>Hippocampus Hippocampus</i>	3
Holothuroidea	1	<i>Homarus Gammarus</i>	5
<i>Hyas Araneus</i>	1	<i>Hyas Coarctatus</i>	3
<i>Hydrallmania Falcata</i>	9	Hydroida (Order)	46
<i>Hyperoplus Immaculatus</i>	1	<i>Hyperoplus Lanceolatus</i>	7
<i>Idotea Spp (Idoteidae)</i>	1	<i>Inachus Dorsettensis</i>	24
<i>Inachus Leptochirus</i>	16	<i>Labrus Bergylta</i>	4
Laminarian Algae (Phaeophyceae)	18	Lepadidae	2
<i>Limanda Limanda</i>	39	<i>Liocarcinus Depurator</i>	14
<i>Liocarcinus Marmoreus</i>	19	<i>Liparis Liparis</i>	1
<i>Lophius Piscatorius</i>	3	<i>Lycocarpia Myriophyllum</i>	4
<i>Macropodia Tenuirostris</i>	24	<i>Maja Squinado</i>	71
<i>Merlangius Merlangus</i>	34	<i>Metridium Senile</i>	30
<i>Microchirus Variegatus</i>	9	<i>Microstomus Kitt</i>	18
Molgulidae (Molgula Spp)	16	Mollusca-Bivalvia	1
Morlog	5	<i>Mullus Surmuletus</i>	2
<i>Mustelus Asterias</i>	11	<i>Myoxocephalus Scorpius</i>	4
Mysidacea	1	<i>Mytilus Edulis</i>	10
<i>Necora Puber</i>	29	<i>Nemertesia Antennina</i>	22
<i>Nemertesia Ramosa</i>	5	<i>Nucella Lapillus</i>	1
<i>Ocenebra Erinaceus</i>	2	<i>Ophiocomina Nigra</i>	2
<i>Ophiothrix Fragilis</i>	16	<i>Ophiura Affinis</i>	1
<i>Ophiura Ophiura</i>	35	<i>Ostrea Edulis</i>	4
<i>Pagrus Pagrus</i>	1	Paguridae	13



<i>Pagurus Prideaux</i> In <i>Adamsia</i>	8	<i>Palaemon Serratus</i>	4
<i>Pandalus Montagu</i>	6	<i>Paphia Rhomboides</i>	1
<i>Parablennius Gattorugine</i>	4	<i>Pasiphaea</i> Spp	1
<i>Pecten Maximus</i>	15	<i>Pegusa (Solea) Lascaris</i>	15
<i>Pentapora Foliacea</i>	9	Phaeophyceae	17
<i>Philine Aperta</i>	4	<i>Pholis Gunnellus</i>	1
<i>Phrynorhombus (Zeugopterus)</i>	1	<i>Pisa Armata</i>	13
<i>Pisa Tetraodon</i>	1	<i>Pisidia Longicornis</i>	10
<i>Platichthys Flesus</i>	15	<i>Pleurobrachia Pileus</i>	3
<i>Pleuronectes Platessa</i>	56	<i>Polybius (Liocarcinus) Holsatus</i>	45
Polychaeta	8	Polymastiidae	4
Polyplacophora	1	<i>Pomatoschistus</i> Spp	15
Porifera	11	<i>Psammechinus Miliaris</i>	39
<i>Raja Brachyura</i>	5	<i>Raja Clavata</i>	85
<i>Raja Microocellata</i>	3	<i>Raja Montagu</i>	17
<i>Raja Undulata</i>	6	<i>Raspailia</i> Spp	13
Rhodophyceae	20	<i>Rissoides (Meiosquilla)</i>	4
Rocks	44	<i>Sabellaria Spinulosa</i>	8
<i>Scophthalmus Maximus</i>	21	<i>Scophthalmus Rhombus</i>	10
<i>Scyliorhinus Canicula</i>	31	Scyphozoa	12
<i>Sepia Officinalis</i>	56	<i>Sepiola Atlantica</i>	8
Sepiolidae	1	<i>Solea Solea</i>	62
<i>Spatangus Purpureus</i>	1	<i>Spisula</i> Spp	1
<i>Spondylisoma Cantharus</i>	7	<i>Sprattus Sprattus</i>	2
Squid Eggs	5	<i>Styela Clava</i>	20
<i>Suberites</i> Spp	9	<i>Symphodus (Crenilabrus) Balloni</i>	5
<i>Syngnathus Acus</i>	2	<i>Tethya Aurantium</i>	13
<i>Trachinus Draco</i>	5	<i>Trachurus Trachurus</i>	3
<i>Trigloporus Lastoviza</i>	9	<i>Trisopterus Luscus</i>	42
<i>Trisopterus Minutus</i>	22	Tubes of Parchment Worm	27
<i>Ulva Lactuca</i>	20	Unidentified Species I	1
<i>Urticina (Tealia) Felina</i>	20	Whelk ( <i>Buccinum</i> ) Eggs	11
Xanthidae	11	<i>Zeugopterus (Phrynorhombus)</i>	6
<i>Zeugopterus Punctatus</i>	1	<i>Zeus Faber</i>	3
<i>Zostera</i> Spp	1		

## Plaice

Overall catch weight (531kg) and catch number (4586 fish) of plaice was lower than in 2019 (721 kg; 5546 fish) (Tables 5 & 6). In the English and French 7d sector, catch weights (-13%, -44%) and catch numbers (-22%, -27%) were lower than in 2019. However, catch weight (141%) and numbers (158%) were higher in the North Sea (Figure 11). Catch numbers and weights were lower than the average (4898 fish, 861kg) for the past 10 years (2011-2019). Recruited plaice ( $\geq 21$ cm) distribution was similar to previous years, with high numbers seen off Hastings and Brighton (7d English sector), Dieppe and Boulogne (7d French sector). There was also an increase in numbers in Poole area, compared to last year (Figure 5). Pre-recruit plaice ( $< 21$ cm) distribution and numbers were higher this year and were most abundant off Hastings (7d English sector) and Dieppe and Boulogne (7d French sector), with an increase also seen off Ramsgate.

## Sole

Catch numbers and weights of sole were lower this year with (2636 fish, 200kg) compared to 3342 fish, 234kg) in 2019, however the previous year was above average (Tables 5 & 6). Both catch weight and numbers in 2020 were higher than the average historic catch rate 2009 - 19 (2093 fish, 192 kg). There was a decrease in sole catch numbers and weights in the English (-65%, -53%) and in the French sector (-37%, -11%). However, there was an increase in numbers and weights in the North Sea (17% , 23%) compared to 2019. Recruited sole ( $\geq 21$ cm) were most abundant between Folkestone and Dungeness (7d English sector) and at the North Sea stations, with a noticeable increase in distribution along the French coast (Figure 6). Pre-recruit sole ( $< 21$ cm) were most abundant in the North Sea, with a decrease compared to previous year around Dungeness (7d English sector). Catches were largest off the French coast off Le Havre and between Dieppe to Calais (Figure 8).

## Other species

Catches of dab, lemon sole, cuttlefish, flounder, and cod were lower this year, however there was an increase in the number of turbot, brill, bass and whiting caught compared to 2019 (Table 5 & 6). There was an increase in the number of lemon sole in the English sector of 7d but a decrease in French 7d and the North Sea sectors. Lemon sole catches were largest off Ramsgate, with a decrease off both Harwich and Boulogne (Figure 10). There was an increase in the number of dab in the North Sea but a decrease in English and French sectors. Dab catches were largest off Hastings and Margate, with an increase in the number off Felixstowe (Figure 9). Unusual catches of a Couch's seabream, *Pagrus pagrus* (prime 71) and lump sucker, *Cyclopterus lumpus* (prime 53) (Figure 4) were caught during the survey.

#### Aim 4:

At certain specified stations, a full benthic sort was carried out to identify the numbers and weights of species encountered. In addition, at all other stations, benthic observations were recorded by species or other taxonomic grouping. There were 14 sentinel species that if encountered at any time on any tow, were removed and quantified with ross coral *Pentapora foliacea*; ross worm colonies *Sabellaria spinulosa*; sponge crab *Dromia personate* and mantis shrimp *Meiosquilla desmaresti* all being encountered. All 12 full benthic stations in 7d and three in 4c were sampled successfully. However, benthic station 54 had to be replaced by prime 53 as it was abandoned due to too much commercial static gear on the tow.

#### Secondary aims

#### Aim 5

Depth, salinity, and temperature profiles were successfully taken at 72 trawl stations. Unfortunately, this was not recorded at 8 trawl stations due to the equipment not being turned on correctly. In addition, surface and near-bottom water samples were taken using a Niskin with ESM2 logger at 24 locations.

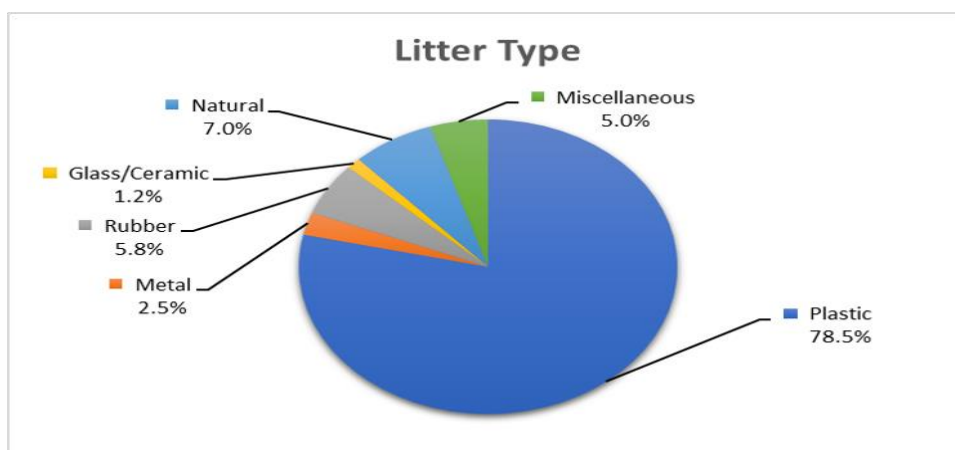
#### Aim 6

Salinity, temperature, fluorometry and other environmental data was continuously logged using the 'Ferrybox'.

#### Aim 7

Litter by-catch was recorded in line with the protocol provided at every valid beam trawl station. The pie chart below (Figure 3) shows the relative commonality of the main types of litter encountered. Overall, there were 242 litter items logged (29.6394kg in weight) of which 190 were plastic. There were only 29 trawling stations where no litter was caught.

Figure 3 Percentage of marine litter collected in the beam trawl



### **Aim 8**

Collection of one sample, 500m from the West Gabbard Smart buoy for (Sophie Pitois, Cefas Lowestoft) was collected.

### **Aim 9**

13 water samples were collected for chlorophyll determination (Naomi Greenwood, Cefas Lowestoft)

### **Opportunistic aims**

#### **Aim 10**

Three undulate ray *Raja undulata* (Tag numbers E6766162, E676163, E6766164), two spotted ray *Raja montagui* (Tag numbers E676161, E676159) and one small eyed ray *Raja microocellata* (Tag number E676160) were tagged with Peterson tags and released.

#### **Aim 11**

Three specimens of selected species were collected for ID purposes to be identified at the lab.

#### **Aim 12**

13 benthic specimens were collected around the entire survey grid for toxic analysis (Andrew Turner, Cefas Weymouth).

#### **Aim 13**

19 biological samples were carried out on greater weaver *Trachinus draco* (Samantha Barnett, Cefas Lowestoft)

#### **Aim 14**

Biological sampling was carried out on common cuttlefish *Sepia officinalis*

#### **Aim 15**

Biological sampling, scale collection and photography of gonads was carried out on all black seabream (*Spondyliosoma*) caught.

**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, especially in these challenging times.

J. Smith  
Scientist in Charge  
28/7/20

**INITIALLED:** I D Holmes

**DISTRIBUTION:**

Survey staff  
D Pettengell (PM)  
P Falconer (PL)  
S Kupschus  
Cefas Fisheries surveys SICs/2ICs  
Cefas CDP (Gary Burt)  
AWSM - Pinbush  
Fishing Skipper/Master Cefas Endeavour  
Els Torreele, Belgium  
Joel Vigneau, France  
FCO (For France and Belgium)  
Kent and Essex, Sussex, Southern and Eastern IFCA's



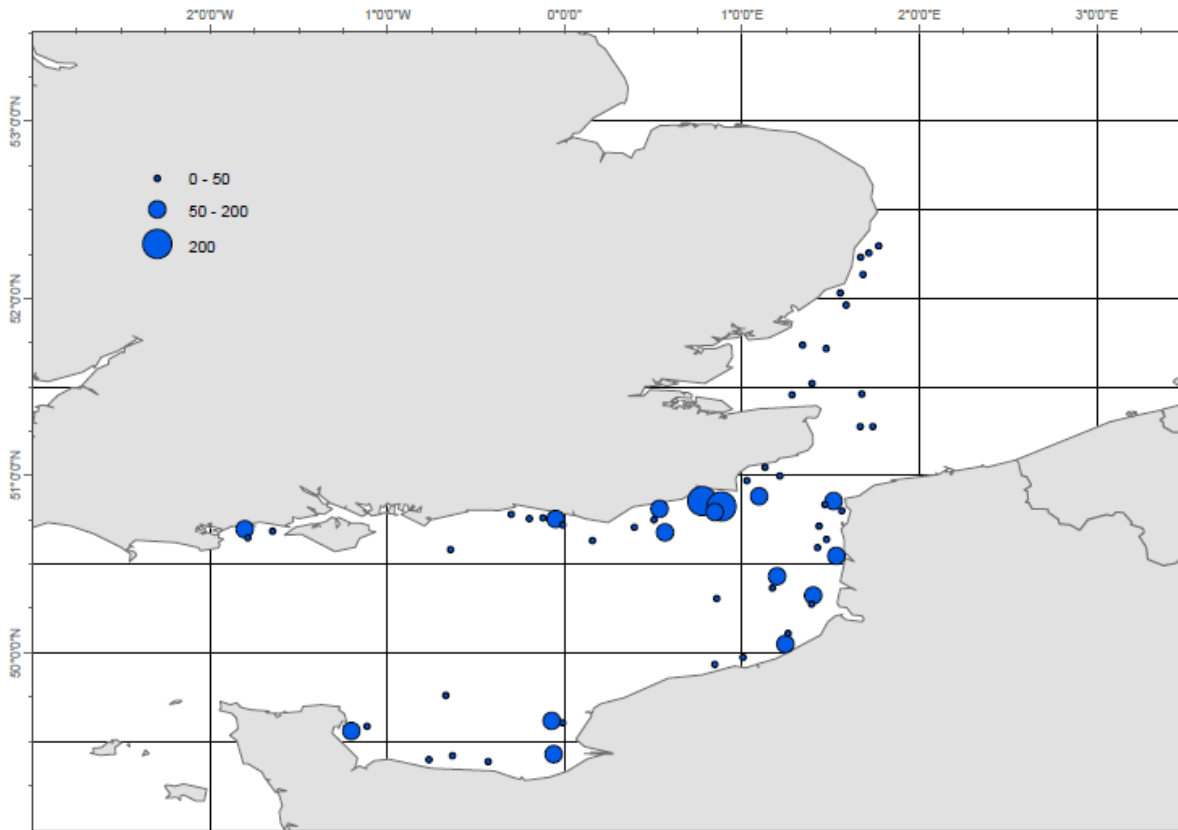


**Figure 4** Unusual catch of lump sucker *Cyclopterus lumpus*

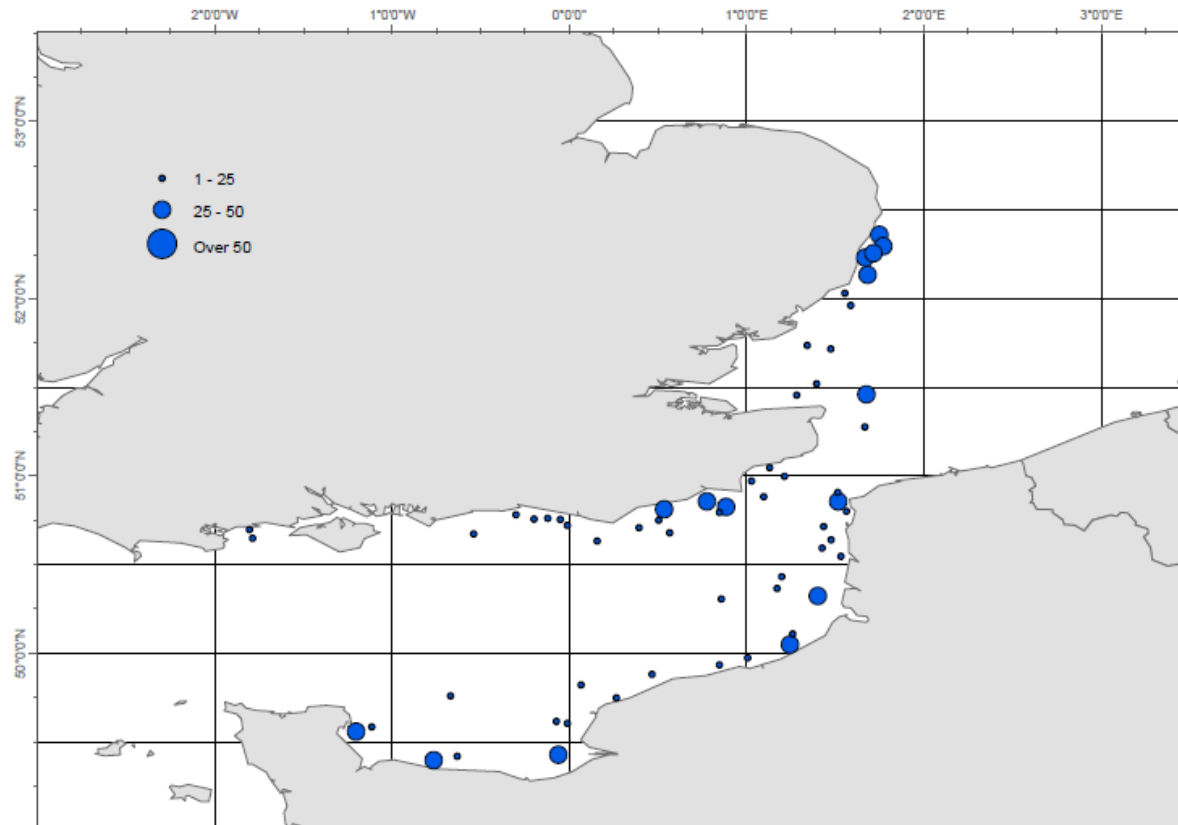




**Figure 5** Abundance (number caught per 30-minute tow) of recruited ( $\geq 21$  cm TL) plaice



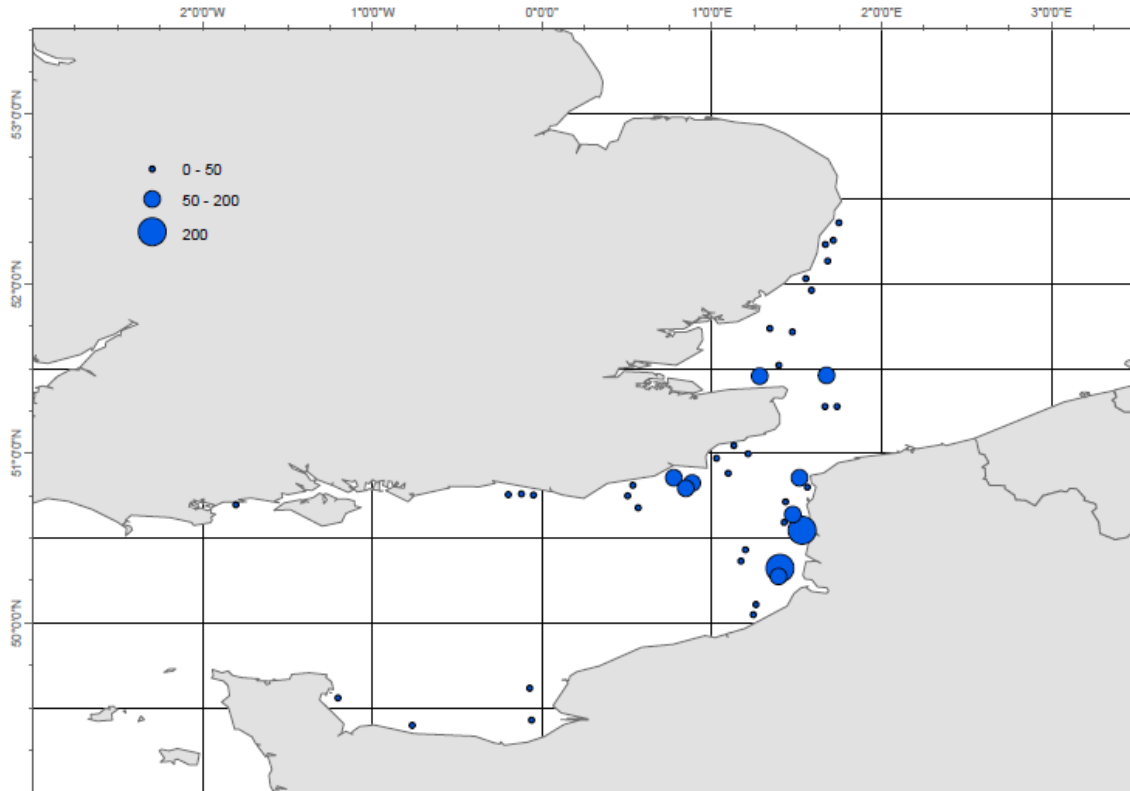
**Figure 6** Abundance (number caught per 30-minute tow) of recruited ( $\geq 21$  cm TL) sole



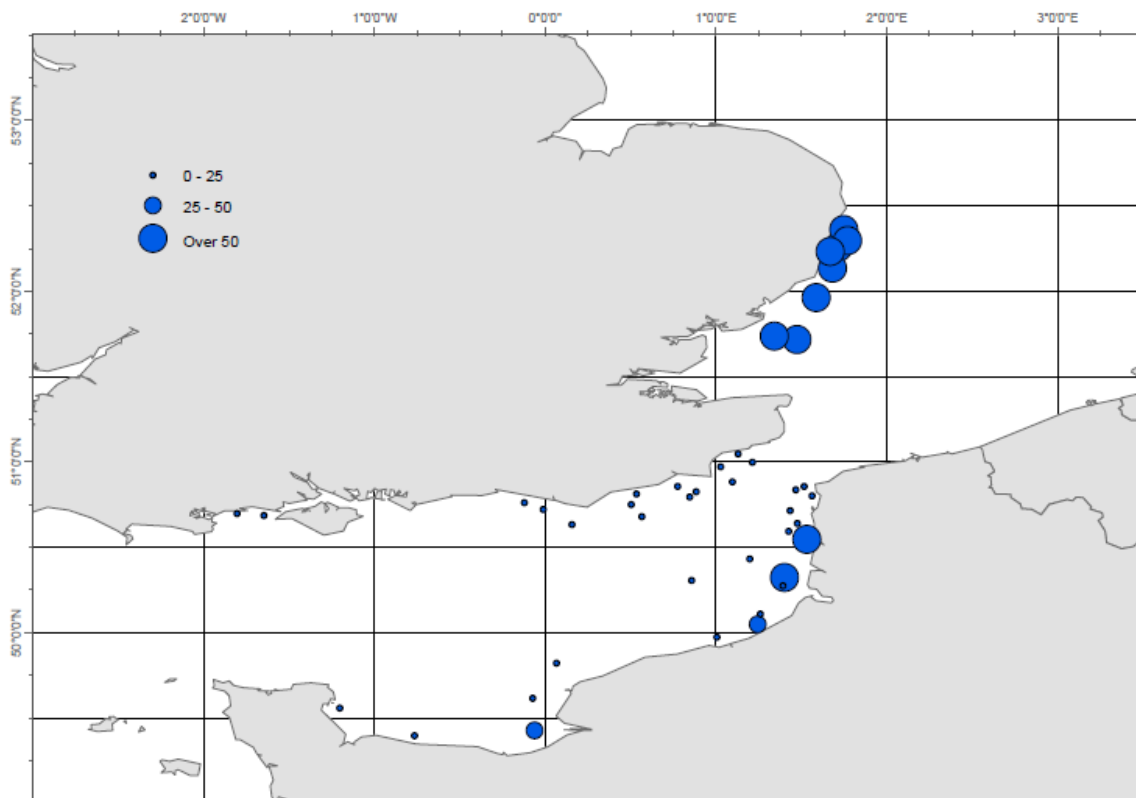




**Figure 7** Abundance (number caught per 30-minute tow) of pre-recruit (<21 cm TL) plaice

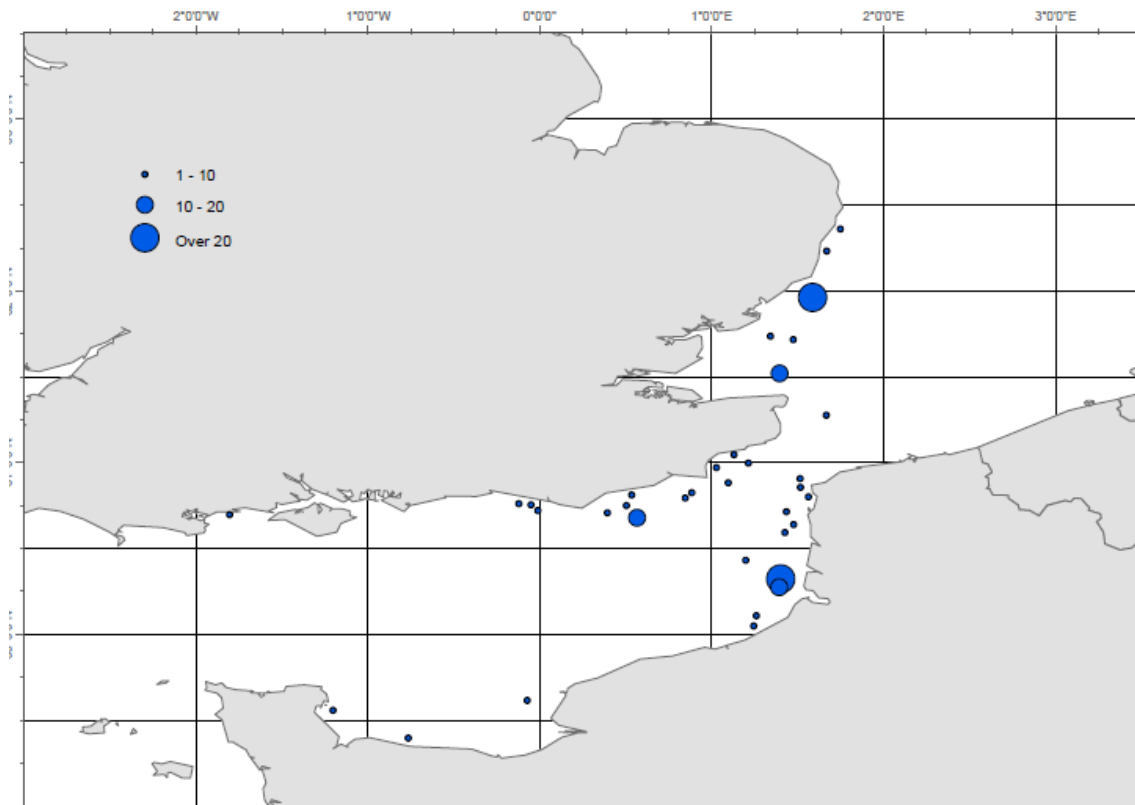


**Figure 8** Abundance (number caught per 30-minute tow) of pre-recruit (<21 cm TL) sole

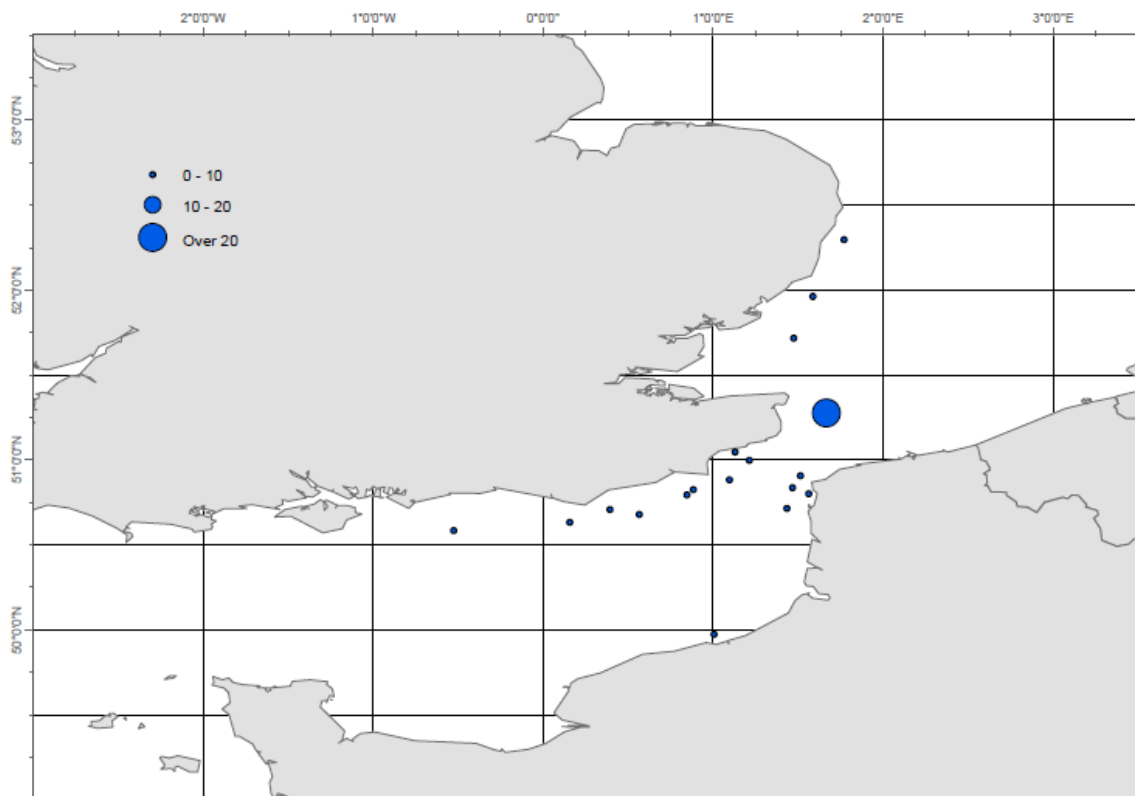




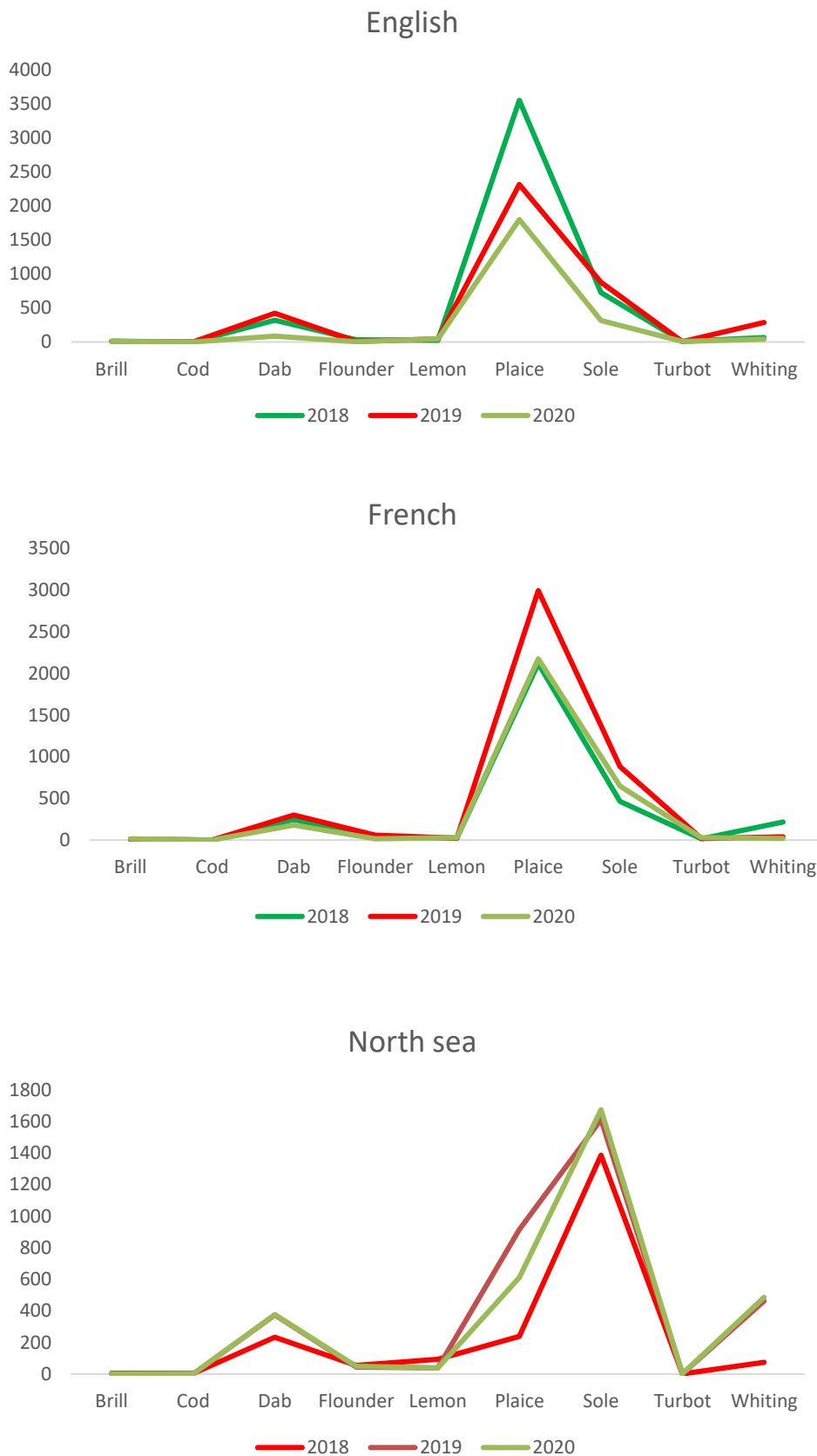
**Figure 9** Abundance (number caught per 30-minute tow) of Dab



**Figure 10** Abundance (number caught per 30-minute tow) of Lemon sole



**Figure 11** Catch number of selected commercial fish caught in English and French sectors of the eastern Channel (7d) and southern North Sea (4c) during 2018-20 surveys



**Figure 12** Comparison of total weight of commercial species caught on survey between 2015–20

