Centre for Environment Fisheries & Aquaculture Science

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Western Channel Sole and Plaice Survey, 2021

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Contents

1. Aims

1. To carry out a beam trawl survey of the Western English Channel (ICES Division 7.e), deploying 2x commercially rigged 4-m beam trawls, continuing the survey time-series (2003 onwards), which was previously undertaken as part of the Fisheries Science Partnership (FSP) programme (Cefas Data Portal - View). Although this survey is the nineteenth in the time-series it no longer falls under the FSP programme but continues to build upon previous surveys (Cotter *et al*., 2004; Large *et al*., 2004; Armstrong *et al*., 2006; Roel *et al*., 2007; Engelhard *et al*., 2008a, 2008b, 2009; Bush *et al*., 2010, 2011, 2012; Readdy *et al*., 2013, Burt *et al*., 2014, 2015, 2016, 2017, 2018, 2019, 2021), using the same gear and survey design, thus ensuring consistency over the time-series. An account of the history of the survey-series is detailed within the series of reports.

2. Catches from the trawls are processed to obtain information on:

   • Distribution, size composition and relative abundance of fish and cephalopods.

   • Biological parameters of selected species.

3. The survey provides estimates of abundance of year classes and catch per unit effort (CPUE)-at-age for sole and plaice for submission to the ICES Working Group for the Celtic Seas Ecoregion (WGCSE). These are used for tuning purposes in the stock assessments.

4. Data from this survey are available for use to inform policy, monitoring and quota negotiations.

2. Survey design

A commercial beam trawler, using commercial gear, is chartered for the survey, and for the 2021 survey the charter was awarded to *FV Carhelmar*, operated by Interfish (Figure 2.1). The vessel is rigged with two Interfish 4-m beam trawls fitted with chain mats and rubber discs of approximately 6" and 8" diameter, on 26 mm wire, and towed at about 4 knots. The codend used has an 82 mm diamond mesh (nominal 80 mm) made from 5.5 mm single-braided twine.

The survey samples a total of 90 fixed prime stations with each tow duration lasting around 1 hour. The survey is split into two halves (referred to as the “eastern” and “western” legs, (Annex 1) with 45 stations per leg and a short two- to three-week break between each leg. The survey is usually conducted in Q3 and generally takes place between mid-August to late September. The catch from both beam trawls is combined, and all fish caught are identified to species, or the highest taxonomic level, measured, and categorised as either

commercially retained or discarded. Age samples and biological parameters are taken from sole and plaice, in accordance with targets, to produce age-compositions.

Figure 2.1: *FV Carhelmar* in Sutton Harbour, Plymouth. (Photo: G. Burt, 2010).

3. Narrative (all times in BST)

WESTERN LEG (21–25 August)

After negative COVID-19 PCR test results were received from Cefas staff (Robert Forster) and crew, *FV Carhelmar* sailed at 03:00 from Sutton Harbour on 21 August to commence the western part of the survey, and steamed towards prime station 59 (Figure 3.1), the easternmost station on this leg, deploying the gear at 06:45. The weather was overcast but fair, with a slight sea, and over the course of the day a total nine stations (primes 59, 60, 61, 62, 63, 29, 30, 31, 33) were completed, hauling the last tow at 21:00. Problems with one generator affected the hauling speed (20 mins to haul as opposed to 5 mins), but fortunately the situation rectified itself and later begun to work properly. Information from the CFPO on the distribution of static gear was received, suggesting that the survey could be compromised in Mount's Bay and south of Scilly due to static gear.

The following day the two remaining stations (primes 32, 64), south of Plymouth, were fished first, after which *FV Carhelmar* then continued west and completed all the stations

in Falmouth Bay (primes 65, 34, 38, 37, 36, 40, 39) without incident. The survey headed down to the Wolf Rock overnight.

On 23 August the vessel begun sampling stations situated around the Isles of Scilly, where it was possible to sample seven stations (primes 3, 10, 4, 5, 6, 7, 11), although prime stations 2, 8, 9, 13 could not be fished due to the presence of static gear within the area. The weather remained fair with scores of common dolphins, and one large aggregation of feeding bluefin tuna observed.

The next day stations between the east of Scilly and offshore from Mount's Bay were fished in fair weather, with an easterly breeze. Beginning the day at prime station 1, a further eight stations (8, 15, 16, 17, 18, 19, 20, 24) were successfully sampled. The tow position of prime station 8, which could not be fished the previous day, was moved just to the east to avoid a string of pots.

On 25 August, in sunny weather but with choppy sea, *FV Carhelmar* worked its way through the stations in Mount's Bay. In total seven stations (primes 25, 26, 27, 67, 28, 22, 23) were completed but it was not possible to deploy the gear at prime station 21 due to the presence of pots, and two others (primes 22, 28) were re-positioned to avoid static gear. Once gear was aboard the vessel headed for Plymouth at 18:30.

EASTERN LEG (4–17 September)

The second (eastern leg) of the survey commenced on 3 September, which was undertaken by Rob Forster and Eilís Crimmins, with Rob acting as Lead Observer and trainer to Eilís. After negative PCR tests were received by all, Cefas staff mobilised at Sutton Harbour, Plymouth boarding the vessel at 16:00. Work was still being carried out getting the boat ready which prevented leaving on the afternoon tidal window, and it was agreed to sail early the next day. Leaving port at 05:00, *FV Carhelmar* headed due south to prime station E73. Although the station was completed successfully, and after a change in the tone of the main engine and increased vibration in transmission was noted with a loss of power, it was decided to return to Plymouth to get the condition of the engine investigated. Once the gear was back aboard, the vessel was underway at 11:00, mooring at Victoria Wharf, Plymouth to temporarily unload the beam trawls, then moved to Sutton Harbour. Once the vessel was tied up, crew and Cefas staff were de-mobbed at 15:30, and requested to standby in readiness to recommence the survey once the engineer's report had been received and the vessel was fully operational. Consideration was given to continuing the survey using another beam trawler that had been offered by Interfish, but this offer was not taken as this would have been administratively difficult to achieve.

Once *FV Carhelmar* was fit to sail, Cefas staff and crew mobilised on 12 September proceeded by further PCR testing. At 23:30 the vessel steamed slowly south to resume fishing at prime station E72 at first light. The first station was completed in calm weather

followed by primes E65, E66, E67, E68, E69, E70 clustered to the south of Plymouth, totalling seven for the day.

On 14 September *FV Carhelmar* then headed east to complete nine hauls (primes E74, E79, E77, E76, E81, E57, E56, E53, E63) in calm sunny weather with light catches. At prime station E81, the tow came fast and had to be hauled to check for damage before being reshot, which added 15 mins to the tow duration but did not affect the time on the bottom which remained at 60 mins, the nominal tow duration for the survey.

The next day, on 15 September, with excellent weather continuing, another nine stations (primes E93, E52, E55, E82, E83, E85, E86, E87, E88) were completed.

Exceptional weather continued on 16 September, which made fishing the area known as the ‘Gravel Pits’ problematic as rougher weather is preferable to help gravel wash out of the net whilst towing. After problems were encountered with the trawl digging into soft sand towards the end of the tow at prime station E45 and both beam trawls filling completely with broken shell and coarse gravel at prime station E42 the decision was made to leave the remaining stations on the eastern edge of the ‘Pits’ (primes E39, E40, E41), and switch attention to the western edge. Despite these problems a further six stations were completed (primes E27, E28, E29, E30, E31, E34), totalling eight for the day, although catches were light.

On 17 September, the final day of the survey, *FV Carhelmar* completed the eight remaining stations (primes E37, E36, E61, E62, E49, E31, E33, E92) in excellent weather with a light SW breeze. Problems with the net filling continued, when prime station E36 had to be hauled early as it kept digging in and then came fast, and at prime station E61 the trawl dug in and sand had to be washed out and reshot. Once gear was aboard at 19:30 the vessel headed back for Plymouth, landing into Sutton Harbour at 03:00 the next morning.

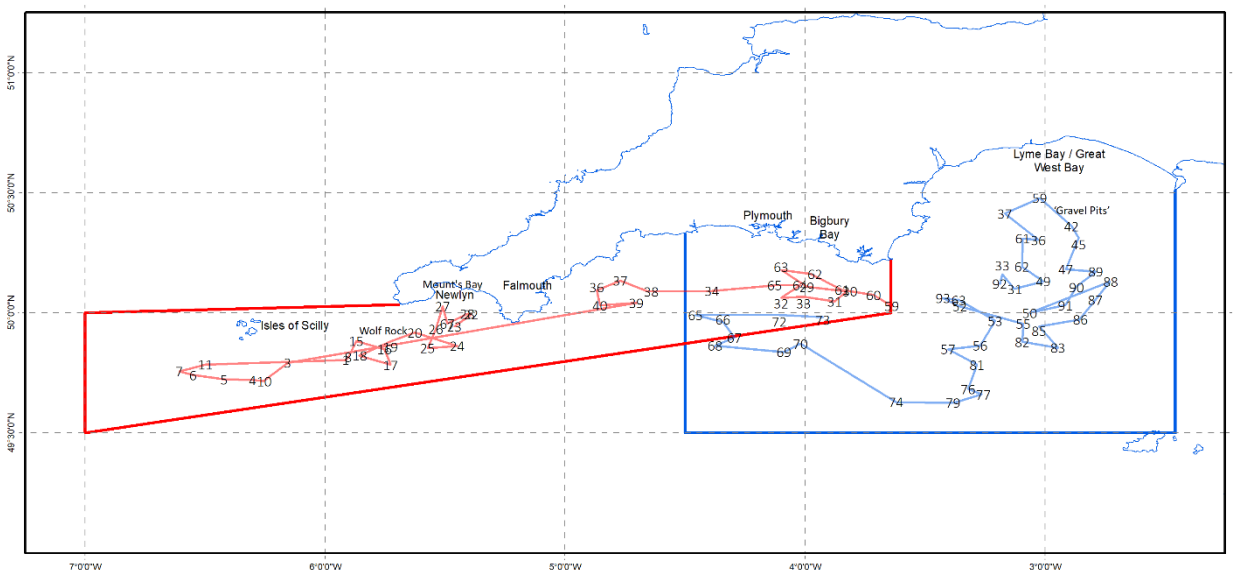

Figure 3.1: Positions of the prime stations sampled by *FV Carhelmar* in 2021, distinguishing the eastern (blue lines, n = 42) and western (red lines, n = 41) legs of the survey, with thin lines connecting consecutive hauls to give approximate indications of the survey leg tracks. Prime stations targeted for the survey are shown in Annex 1.

4. Results

4.1. Completion of the survey summary

The survey was successfully completed within the usual time-window for the survey-series, with the western leg undertaken first (21–25 August) followed by the eastern leg (4–17 September), although the eastern leg is normally sampled first. Weather conditions were generally good throughout, and exceptionally so for the eastern leg.

Of the 45 stations targeted for the western leg four could not be sampled due to the presence of static gear (three around the Isles of Scilly (primes 2, 9, 13) and one in Mount's Bay (prime 21)), which can often be problematic to fish for these reasons, and particularly so in Mount's Bay. Other than this, there were no major incidents, although tows at prime stations 8, 22 and 28 had to be repositioned to avoid static gear.

The duration of the eastern leg was prolonged due to problems with the vessel's engine that meant that it had to return to port for repair on the first day. Once the survey reconvened, of the 45 stations targeted, a total of 42 stations were successfully sampled. Prime stations E39, E40, E41 had to be dropped due to the high likelihood of the nets filling with gravel in the area known as the "Gravel Pits", which was exacerbated by very calm weather preventing the nets from washing out whilst towing. Problems were also

encountered at prime stations E36, E42, E45 and E61 with the nets filling whilst towing but the gear was successfully brought aboard. In addition to this, and at a different location, the tow at prime station E81 came fast and had to be hauled to check for damage before being reshot.

4.2. Catch composition, spatial distributions and length distributions

A total of 64 species/taxa were recorded (Table 4.1) for the 2021 survey, of which boarfish (*Capros aper)* were the most abundant (n=3896), predominately occurring at western locations. Although boarfish are not usually associated with beam trawl catches, it is most likely that they would have been caught whilst the trawl was being deployed and/or retrieved. A notable number (n=1615), although much less, were also encountered during the 2018 survey (recorded in data, not published). Plaice (*Pleuronectes platessa)* and common dragonet (*Callionymus lyra)* were the second and third most abundant species, both of which were well distributed across the survey area.

Of the commercial species of flat-fish, plaice were by far the most abundant (n=2573) species caught and over twice as much as sole (*Solea solea*, n=911), which were also caught at most of the locations sampled and were relatively well distributed throughout, with slightly higher catches taken around The Wolf Rock (Figure 4.1). The biggest catches of plaice occurred at Bigbury Bay and at one station in Lyme Bay (prime E37, Figure 4.1).

Megrim (*Lepidorhombus whiffiagonis)* were captured in relatively high numbers (n=679), albeit almost exclusively at western locations (see also Figure 4.1). Lemon sole (*Microstomus kitt)* were also more abundant and frequently encountered at western locations (see also Figure 4.1), and overall were caught in lower numbers (n=460). Turbot (*Scophthalmus maximus)* and brill (*Scophthalmus rhombus)* were also caught but in much lower numbers (n=29 & 24, respectively), and were mainly associated with the eastern stations.

Commercial species of round-fish are not particularly well sampled by beam trawl surveys and were caught in relatively lower numbers with whiting (*Merlangius merlangus)* being the most abundant (n=69), followed by hake (*Merluccius merluccius*, n=52) that were caught almost entirely at western locations. Cod (*Gadus morhua)*, haddock (*Melanogrammus aeglefinus)* and ling (*Molva molva)* were also caught during the 2021 survey, but the numbers were very low (n≤2).

Eight species of elasmobranch were encountered during the survey of which lesser spotted dogfish (*Scyliorhinus canicular)* was notably the most abundant (n=1553) and were more abundant and frequently encountered at the eastern stations sampled. Of the six species of ray encountered, cuckoo ray (*Raja naevus)* was the by far the most abundant, occurring at 51% of the western, but none of the eastern stations.

Both species of anglerfish (*Lophius piscatorius* and *L. budegassa*) were captured in comparable numbers (n=696 and 438, respectively) although *L. budegassa* were less frequently encountered at eastern locations.

Commercial species of shellfish and cephalopod were also encountered and recorded for the survey with spiny spider crab (*Maja squinado)* being the most abundant (n=208). Cuttlefish (*Sepia officinalis)* were present throughout the survey but were more abundant and frequently encountered at western locations (see also Figure 4.1).

Additional information for the species that are considered to be of primary commercial interest to the survey (sole, plaice, lemon sole, megrim, brill, turbot, cod, haddock, whiting, anglerfish and cuttlefish) is provided as spatial distributions for the 2021 survey (Figure 4.1) and time-series length distributions (Figure 4.2–4.6), where it was considered appropriate to provide when species were reliably measured and caught in significant enough numbers.

Although catches of anglerfish were speciated during the 2021 survey, the separation of the two species (*L. piscatorius* and *L. budegassa*) over the time-series had not been consistent (Burt *et al*., 2021), hence it was considered more appropriate to group these species into anglerfish spp. (*Lophius* spp.) when presenting as a time-series.

Table 4.1. List of fish, shellfish and cephalopod species (ordered taxonomically) measured during the 2021 survey, showing the length range, total numbers caught and the percentage of stations at which they were present by survey leg.

Taxa	Common name	Scientific name	Length range (cm)	Number caught (East survey)	Number caught (West survey)	Occurence at stations % (East survey)	Occurence at stations % (West survey)
Crustacea	EUROPEAN LOBSTER	HOMARUS GAMMARUS	6–11	10	10	16.7%	19.5%
	COMMON SPINY LOBSTER	PALINURUS ELEPHAS	7–9	2	5	4.8%	12.2%
	SPINY SPIDER CRAB	MAJA SQUINADO	6–16	165	43	69.0%	36.6%
	EDIBLE CRAB	CANCER PAGURUS	7–20	23	68	35.7%	73.2%
Mollusca	GREAT SCALLOP	PECTEN MAXIMUS	4–12	24	46	14.3%	43.9%
Cephalopoda	CUTTLE-FISH	SEPIA ELEGANS	5–8		3	0.0%	4.9%
	COMMON CUTTLEFISH	SEPIA OFFICINALIS	4–23	175 *(+1)	20	66.7%	36.6%
	SQUID	ALLOTEUTHIS SUBULATA	10–14	5		7.1%	0.0%
	COMMON SQUIDS	LOLIGO SPP	11–24	9		11.9%	0.0%
	SQUID	OMMASTREPHIDAE	13–20		3	0.0%	7.3%
	OCTOPUSES	OCTOPODIDAE		*(228)	*(105)	73.8%	39.0%
Elasmobranchii	LESSER SPOTTED DOGFISH	SCYLIORHINUS CANICULA	11–70	1374	179	92.9%	70.7%
	STARRY SMOOTH HOUND	MUSTELUS ASTERIAS	48–48	1		2.4%	0.0%
	CUCKOO RAY	RAJA NAEVUS	18–69		220	0.0%	51.2%
	BLONDE RAY	RAJA BRACHYURA	23–102	10	8	16.7%	14.6%
	THORNBACK RAY (ROKER)	RAJA CLAVATA	41–68	5		9.5%	0.0%
	PAINTED RAY	RAJA MICROOCELLATA	23–78		11	0.0%	12.2%
	SPOTTED RAY	RAJA MONTAGUI	21–60	6	53	11.9%	43.9%
	UNDULATE RAY	RAJA UNDULATA	28–95	27	1	33.3%	2.4%
Teleost	EUROPEAN CONGER EEL	CONGER CONGER	64–101	4	5	9.5%	9.8%
	SPRAT	SPRATTUS (CLUPEA) SPRATTUS	12–13	1	1	2.4%	2.4%
	COD	GADUS MORHUA	38–39		2	0.0%	4.9%
	HADDOCK	MELANOGRAMMUS AEGLEFINUS	18–18		1	0.0%	2.4%
	WHITING	MERLANGIUS MERLANGUS	9–40	51	18	23.8%	31.7%
	BLUE WHITING	MICROMESISTIUS POUTASSOU	13–31		3	0.0%	7.3%
	WHITING-POUT (BIB)	TRISOPTERUS LUSCUS	18–39	1220	126	38.1%	48.8%
	POOR COD	TRISOPTERUS MINUTUS	5–22	226	450	57.1%	82.9%
	THREE-BEARDED ROCKLING	GAIDROPSARUS VULGARIS	22–38		5	0.0%	12.2%
	COMMON LING	MOLVA MOLVA	31–31	1		2.4%	0.0%
	GREATER FORKBEARD	PHYCIS BLENNOIDES	31–31		1	0.0%	2.4%
	EUROPEAN HAKE	MERLUCCIUS MERLUCCIUS	25–77	1	51	2.4%	43.9%
	BLACK-BELLIED ANGLERFISH	LOPHIUS BUDEGASSA	16–63	16	422	23.8%	78.0%
	ANGLERFISH (MONK)	LOPHIUS PISCATORIUS	10–91	403	293	100.0%	97.6%
	JOHN DORY	ZEUS FABER	16–47	2	32	2.4%	39.0%
	GREAT PIPEFISH	SYNGNATHUS ACUS	23–23		1	0.0%	2.4%
	TUB GURNARD	TRIGLA LUCERNA	17–44	206	34	90.5%	46.3%
	GREY GURNARD	EUTRIGLA GURNARDUS	7–32	366	633	61.9%	87.8%
	STREAKED GURNARD	TRIGLOPORUS LASTOVIZA	19–31	1	1	2.4%	2.4%
	RED GURNARD	ASPITRIGLA CUCULUS	9–38	1365	409	95.2%	92.7%
	LONG-FINNED GURNARD	ASPITRIGLA OBSCURA	15–22	10		9.5%	0.0%
	RED MULLET	MULLUS SURMULETUS	19–29	21	2	28.6%	4.9%
	GREY MULLETS	MUGILIDAE	19–23	2		4.8%	0.0%
	CUCKOO WRASSE	LABRUS MIXTUS	19–30		5	0.0%	9.8%
	SMOOTH SANDEEL	GYMNAMMODYTES SEMISQUAMATUS	26–38	3		4.8%	0.0%
	GREAT SANDEEL	HYPEROPLUS LANCEEOLATUS	26–26		1	0.0%	2.4%
	BUTTERFLY BLENNY	BLENNIUS OCELLARIS	9–11		2	0.0%	4.9%
	LESSER WEEVER FISH	TRACHINUS (ECHIICHTHYS) VIPERA	11–14	3	2	7.1%	4.9%
	COMMON DRAGONET	CALLIONYMUS LYRA	6–29	823	959	97.6%	97.6%
	SPOTTED DRAGONET	CALLIONYMUS MACULATUS	9–13	1	10	2.4%	14.6%
	BOAR FISH	CAPROS APER	7–16	6	3890	11.9%	56.1%
	MEGRIM	LEPIDORHOMBUS WHIFFIAGONIS	16–50	3	676	7.1%	63.4%
	TURBOT	SCOPHTHALMUS MAXIMUS	27–55	21	8	33.3%	14.6%
	BRILL	SCOPHTHALMUS RHOMBUS	29–56	16	8	31.0%	12.2%
	NORWEGIAN TOPKNOT	PHRYNORHOMBUS NORVEGIUS	8–9	1	9	2.4%	7.3%
	TOPKNOT	ZEUGOPTERUS PUNCTATUS	11–17	1	7	2.4%	12.2%
	IMPERIAL SCALDFISH	ARNOGLOSSUS IMPERIALIS	9–23	148	201	71.4%	68.3%
	SCALD FISH	ARNOGLOSSUS LATERNA	6–17	72	119	47.6%	46.3%
	DAB	LIMANDA LIMANDA	6–32	119	106	61.9%	53.7%
	LEMON SOLE	MICROSTOMUS KITT	17–41	152	308	64.3%	95.1%
	EUROPEAN PLAICE	PLEURONECTES PLATESSA	17–58	1222	1351	92.9%	97.6%
	SOLENETTE	BUGLOSSIDIUM LUTEUM	8–14	13	8	7.1%	14.6%
	THICKBACK SOLE	MICROCHIRUS VARIEGATUS	7–21	79	111	45.2%	36.6%
	SAND SOLE	PEGUSA (SOLEA) LASCARIS	22–34	7	24	7.1%	22.0%
	SOLE (DOVER SOLE)	SOLEA SOLEA (S.VULGARIS)	23–47	276	635	90.5%	100.0%

*Numbers of individuals counted but not measured are shown in brackets

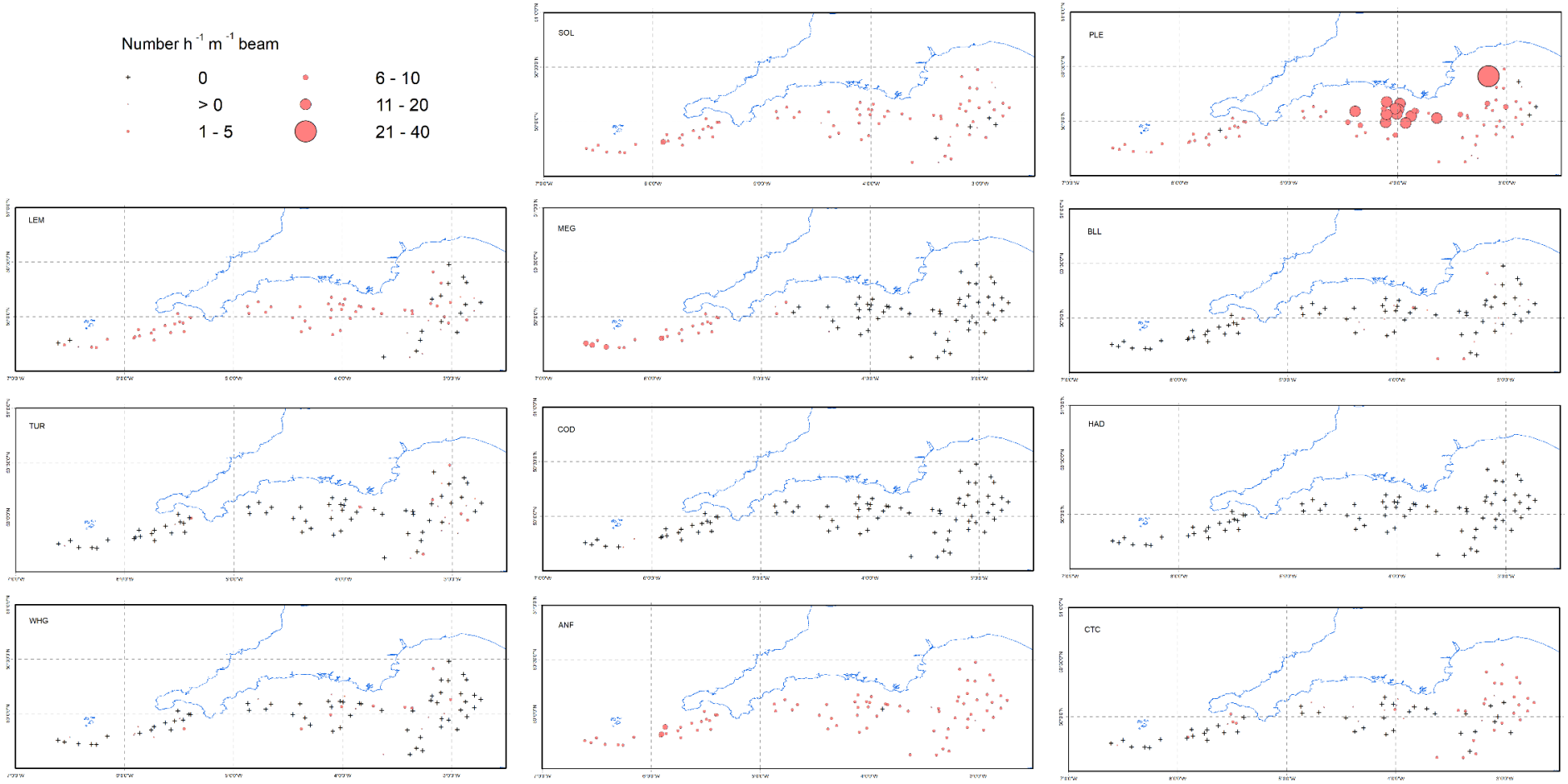

Figure 4.1. Spatial distribution of sole (SOL), plaice (PLE), lemon sole (LEM), megrim (MEG), brill (BLL), turbot (TUR), cod (COD), haddock (HAD), whiting (WHG), anglerfish (ANF) and cuttlefish (CTC) for the 2021 survey (number h^{-1} m $beam^{-1}$).

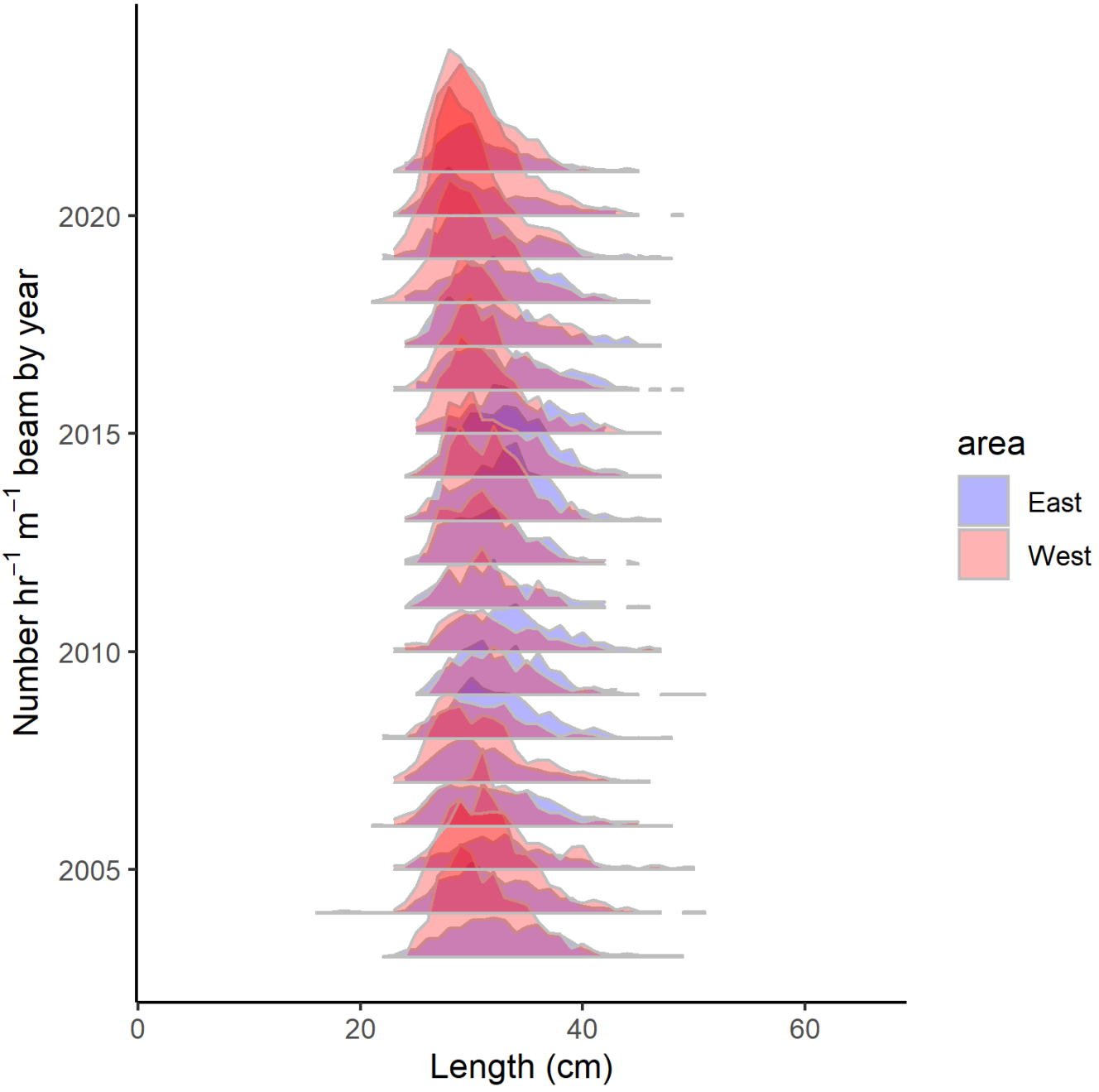

Figure 4.2. Sole length distributions during the Western Channel Sole and Plaice surveys, 2003–2021, expressed as number of fish caught h^{-1} m beam^{-1} per 1-cm length bin. The length distributions are shown separately for the western and eastern legs.

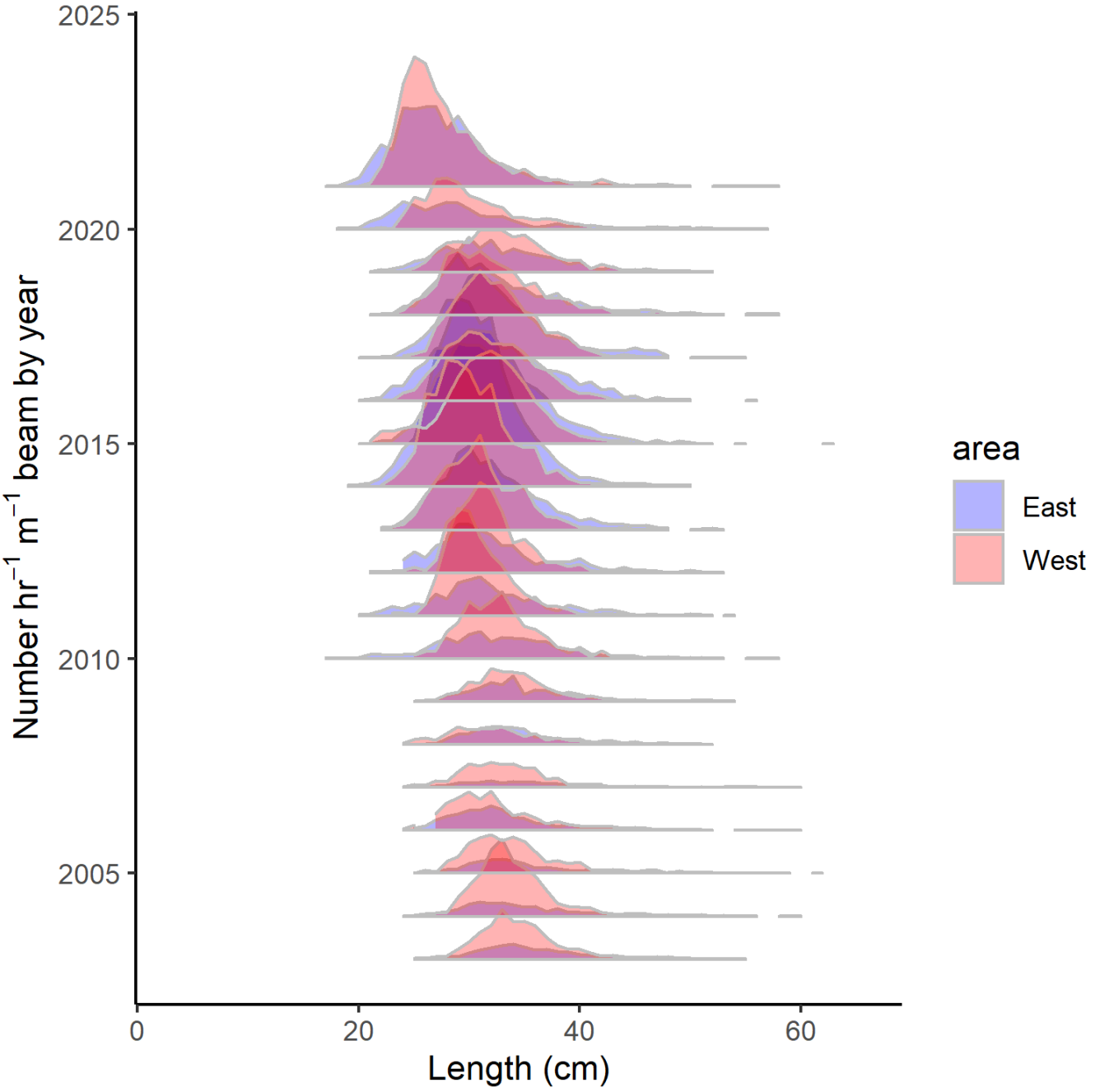

Figure 4.3. Plaice length distributions during the Western Channel Sole and Plaice surveys, 2003–2021, expressed as number of fish caught h^{-1} m beam^{-1} per 1-cm length bin. The length distributions are shown separately for the western and eastern legs.

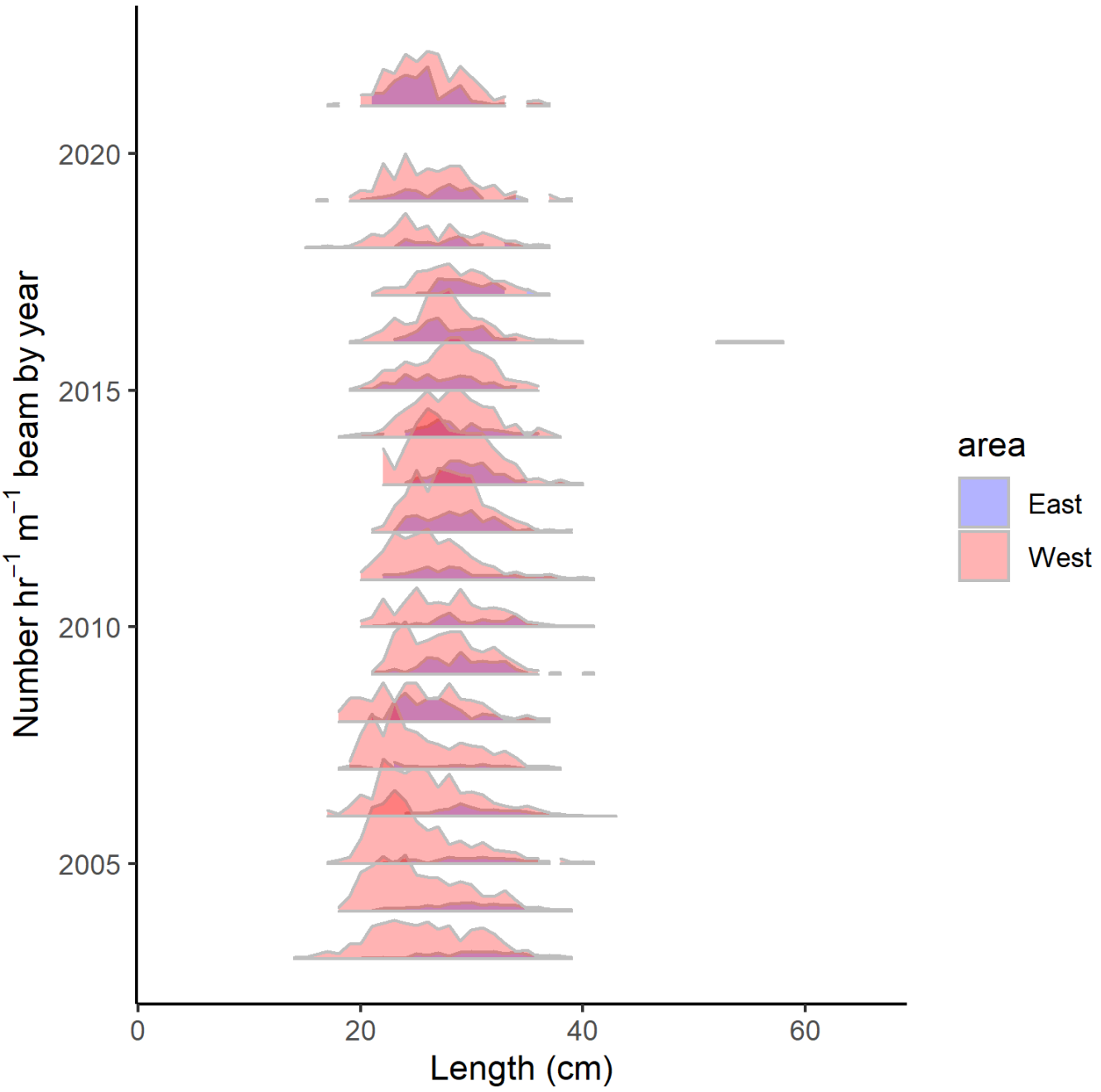

Figure 4.4. Lemon sole length distributions during the Western Channel Sole and Plaice surveys, 2003–2021, expressed as number of fish caught h^{-1} m beam^{-1} per 1-cm length bin. The length distributions are shown separately for the western and eastern legs.

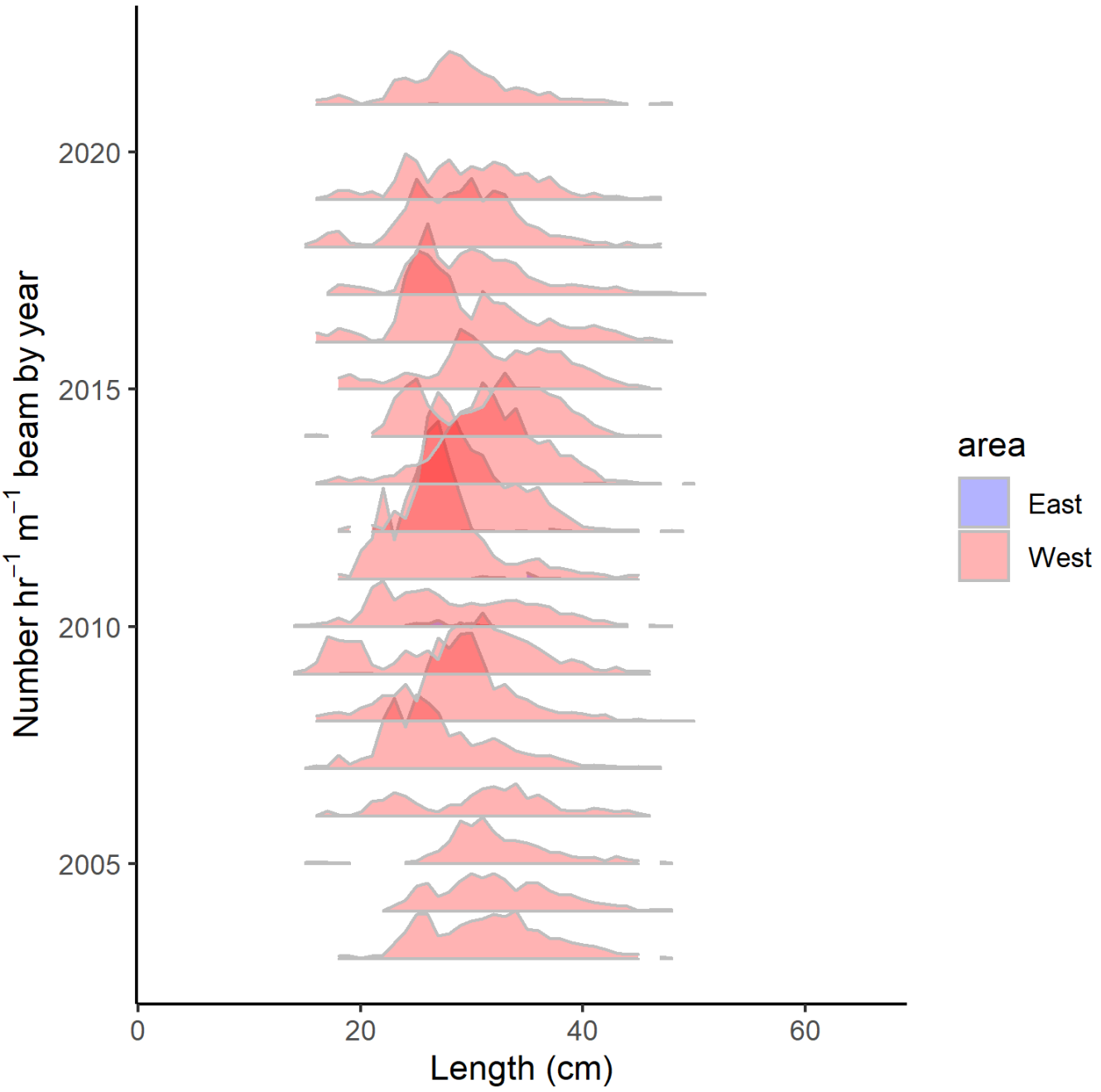

Figure 4.5. Megrim length distributions during the Western Channel Sole and Plaice surveys, 2003–2021, expressed as number of fish caught h^{-1} m beam^{-1} per 1-cm length bin. The length distributions are shown separately for the western and eastern legs.

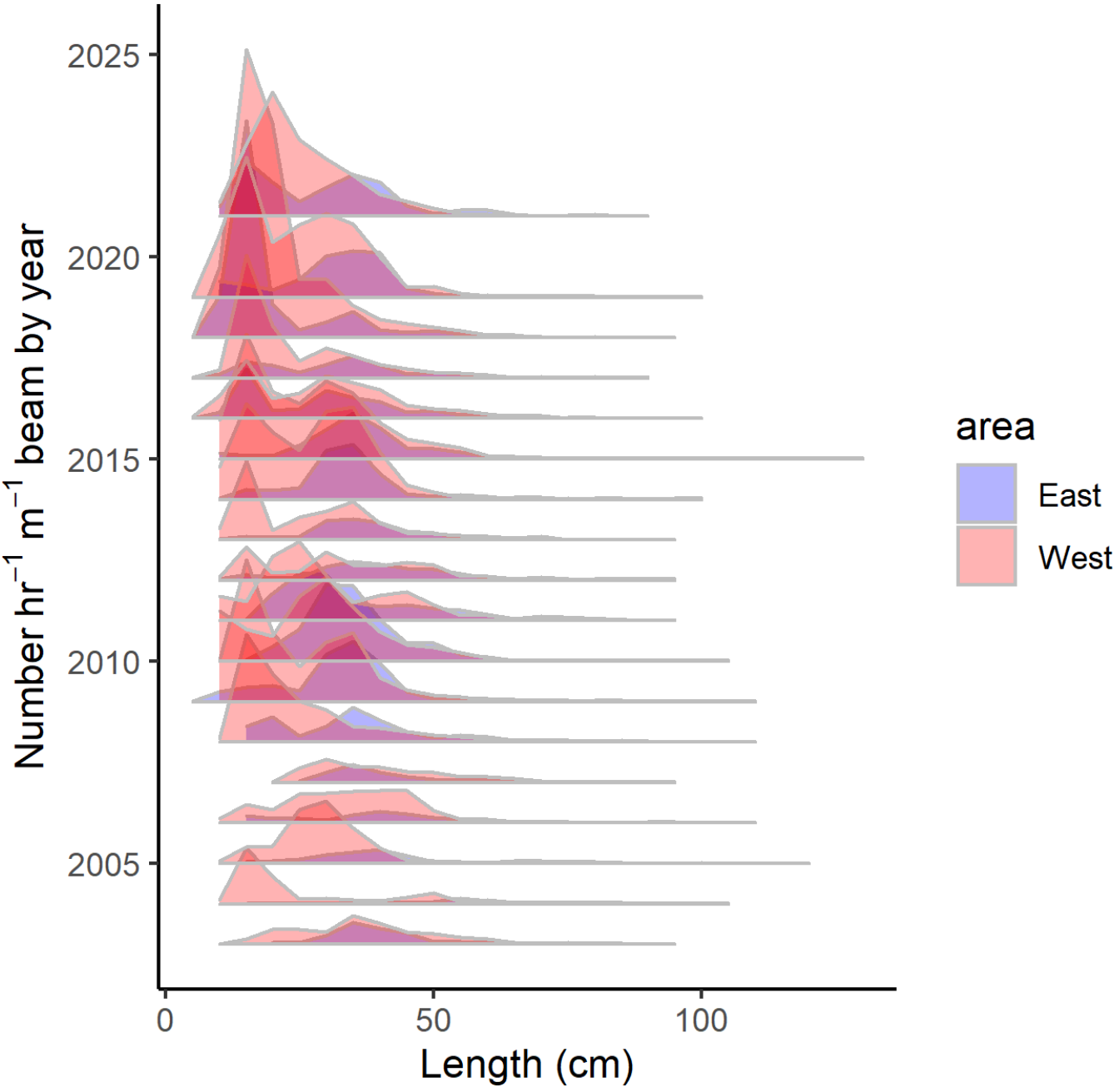

Figure 4.6. Anglerfish length distributions during the Western Channel Sole and Plaice surveys, 2003–2021, expressed as number of fish caught h^{-1} m beam^{-1} per 1-cm length bin. The length distributions are shown separately for the western and eastern legs.

4.3. Time-series temporal changes in abundances

Information relating to absolute numbers caught, mean number and weight (derived from length weight relationships (Silva *et. al*., 2013)) caught per hour per metre beam for the species that are of primary commercial interest to the survey (sole, plaice, lemon sole, megrim, brill, turbot, cod, haddock, whiting, anglerfish and cuttlefish), over the survey time-series (2003–2021), are provided in Table 4.2. (Note that restrictions to sampling protocols for the 2020 survey, due to the COVID-19 pandemic (Burt *et al*., 2021), resulted in catch data being collected for sole and plaice only).

Of these eleven species, plaice have been the most abundant, recording a time-series peak in 2014, after which numbers declined before increasing sharply during the 2021 survey. The trend provided by the calculated catch weights are similar, although the time-series peak is less pronounced.

Overall, sole were caught in much lower numbers than plaice, but there have been periods (2003–2009, 2019–2020) when catch numbers and weights were similar. Over the time-series the numbers caught has been relatively stable, and although there was a slight decline in numbers in 2021 compared to 2020, catches were around the mean of the time-series.

The catch rates of megrim have fluctuated more; increasing from 2006 to a time-series peak in 2011 with a steady decrease thereafter, but catches have remained stable for the last two years. Catch rates for lemon sole have remained constant and have steadily increased since 2018 to a value above the mean in 2021.

Although regularly caught the catch rates for brill, turbot, cod, haddock and whiting are relatively low.

The numbers of anglerfish caught over the period is variable, and the peak recorded in 2018 related to high numbers of juvenile fish being caught (Figure 4.6), hence, it did not correspond to a peak in calculated weight.

Over the time-series the data collected for cuttlefish is not considered reliable due to inconsistent reporting. Although catch numbers and calculated weights are presented for all years, only data recorded from 2014 onwards should be considered robust and shows highly fluctuating trends in both mean numbers and weights.

Table 4.2: Absolute catch numbers, mean number and weight (derived from length weight relationships (Silva *et. al*., 2013)) caught per hour per metre beam for the most commercially important species, 2003–2021.

	Sole	Plaice	Lemon sole	Megrim	Brill	Turbot	Cod	Haddock	Whiting	Anglerfish spp.	Cuttlefish
Total catch number											
2003	1824	1286	535	1014	90	24	17	9	174	646	0
2004	2178	1602	625	735	136	39	7	9	50	373	2248
2005	1328	1207	559	559	78	29	12	7	56	719	63
2006	1625	1543	560	544	105	24	20	19	78	722	473
2007	1537	780	486	1035	85	15	55	68	342	549	716
2008	1212	869	588	1231	72	2	52	121	551	1101	56
2009	733	734	430	1094	45	8	6	75	15	1232	400
2010	711	1354	332	904	41	10	20	21	10	1205	43
2011	653	1677	406	1717	42	22	4	47	14	961	40
2012	887	1741	518	1609	36	13	4	7	9	464	485
2013	1117	2394	587	1410	37	22	10	6	43	589	4
2014	1099	4483	406	1059	44	26	13	41	39	1192	288
2015	984	3215	424	1016	60	22	1	161	38	1230	903
2016	951	2561	395	1272	46	20	2	99	47	795	265
2017	994	2529	273	875	41	25	0	51	56	714	1930
2018	1168	1932	241	1132	48	29	1	49	38	2022	95
2019	1383	1329	352	790	54	15	4	72	49	1337	593
2020[1]	1282	1189									
2021	911	2573	460	679	24	29	2	1	69	1134	195
Mean	*1188*	*1842*	*454*	*1037*	*60*	*21*	*13*	*48*	*93*	*944*	*489*
Approximate mean number caught per hour per meter beam											
2003	1.5	1.1	0.6	1.4	0.1	0.0	0.02	0.0	0.1	0.6	0.0
2004	1.8	1.4	0.7	1.0	0.1	0.0	0.01	0.0	0.0	0.4	1.5
2005	1.1	1.1	0.7	0.8	0.1	0.0	0.01	0.0	0.0	0.7	0.0
2006	1.3	1.3	0.6	0.8	0.1	0.0	0.01	0.0	0.0	0.7	0.6
2007	1.3	0.7	0.6	1.4	0.1	0.0	0.02	0.1	0.2	0.4	0.4
2008	0.9	0.6	0.5	1.3	0.1	0.0	0.03	0.1	0.3	0.9	0.0
2009	1.0	1.0	0.6	1.5	0.1	0.0	0.01	0.1	0.0	1.7	0.6
2010	1.0	1.9	0.5	1.3	0.1	0.0	0.03	0.0	0.0	1.7	0.1
2011	0.9	2.4	0.6	2.4	0.1	0.0	0.01	0.1	0.0	1.4	0.1
2012	1.2	2.4	0.7	2.2	0.1	0.0	0.01	0.0	0.0	0.6	0.7
2013	1.6	3.3	0.8	2.0	0.1	0.0	0.01	0.0	0.1	0.8	0.0
2014	1.6	6.4	0.6	1.5	0.1	0.0	0.02	0.1	0.1	1.7	0.4
2015	1.4	4.5	0.6	1.4	0.1	0.0	0.00	0.2	0.1	1.7	1.3
2016	1.3	3.6	0.5	1.8	0.1	0.0	0.00	0.1	0.1	1.1	0.4
2017	1.4	3.6	0.4	1.2	0.1	0.0	0.00	0.1	0.1	1.0	2.7
2018	1.6	2.7	0.3	1.6	0.1	0.0	0.00	0.1	0.1	2.8	0.1
2019	1.9	1.9	0.5	1.1	0.1	0.0	0.01	0.1	0.1	1.9	0.8
2020[1]	1.8	1.7									
2021	1.4	3.9	0.7	1.0	0.0	0.0	0.00	0.0	0.1	1.7	0.3
Mean	*1.4*	*2.4*	*0.6*	*1.4*	*0.1*	*0.0*	*0.01*	*0.1*	*0.1*	*1.2*	*0.5*

1. In 2020 only plaice and sole were sampled and recorded owing to Covid-19 restrictions

Table 4.2 (continued): **Absolute catch numbers, mean number and weight (derived from length weight relationships (Silva et. al., 2013)) caught per hour per metre beam for the most commercially important species, 2003–2021**.

	Sole	Plaice	Lemon sole	Megrim	Brill	Turbot	Cod	Haddock	Whiting	Anglerfish spp.	Cuttlefish
Approximate mean weight (kg) caught per hour per meter beam											
2003	0.50	0.51	0.16	0.38	0.09	0.03	0.01	0.00	0.03	0.78	0.00
2004	0.59	0.62	0.17	0.30	0.14	0.06	0.01	0.01	0.01	0.46	0.79
2005	0.41	0.50	0.16	0.22	0.08	0.05	0.01	0.00	0.01	0.71	0.02
2006	0.44	0.50	0.16	0.20	0.11	0.03	0.02	0.01	0.01	0.89	0.25
2007	0.40	0.31	0.13	0.27	0.09	0.02	0.02	0.03	0.04	0.70	0.19
2008	0.30	0.26	0.11	0.26	0.08	0.01	0.04	0.03	0.06	0.76	0.01
2009	0.37	0.46	0.18	0.33	0.09	0.02	0.02	0.01	0.01	1.14	0.48
2010	0.37	0.75	0.14	0.27	0.08	0.02	0.02	0.01	0.01	1.41	0.03
2011	0.31	0.82	0.16	0.42	0.09	0.05	0.01	0.03	0.01	1.24	0.01
2012	0.40	0.89	0.21	0.50	0.08	0.03	0.01	0.01	0.00	0.85	0.23
2013	0.55	1.19	0.25	0.53	0.09	0.06	0.02	0.00	0.01	0.78	0.00
2014	0.57	2.04	0.18	0.41	0.09	0.08	0.01	0.02	0.01	1.34	0.18
2015	0.48	1.67	0.17	0.41	0.11	0.05	0.00	0.04	0.01	1.37	0.56
2016	0.46	1.34	0.16	0.40	0.08	0.06	0.00	0.04	0.02	0.94	0.19
2017	0.48	1.39	0.12	0.29	0.07	0.06	0.00	0.01	0.02	0.68	1.17
2018	0.53	1.05	0.09	0.35	0.08	0.06	0.00	0.02	0.01	1.07	0.04
2019	0.59	0.76	0.13	0.26	0.09	0.03	0.00	0.02	0.01	1.15	0.42
2020[1]	0.57	0.54									
2021	0.41	0.98	0.17	0.22	0.04	0.06	0.00	0.00	0.02	1.12	0.14
Mean	*0.46*	*0.87*	*0.16*	*0.33*	*0.09*	*0.04*	*0.01*	*0.02*	*0.02*	*0.97*	*0.26*

1. In 2020 only plaice and sole were sampled and recorded owing to Covid-19 restrictions

4.4. Age compositions

A total of 160 and 179 sole otoliths were collected during the 2021 survey for the eastern and western legs, respectively, and of these two fish could not be aged. As in previous years, there was a broad age distribution (Figure 4.7), with fish >10 years old encountered, the oldest being 22 years, a 37 cm male. The oldest sole recorded for the time-series was a 47 cm female aged 31 years old, caught in 2016. Over the time-series 3-, 4- and 5-year-olds were generally the dominant age-groups, as was the case for the 2021 survey. Elevated peaks in age-groups recorded in some years also give rise to elevated abundances of the ensuing age-group the following year, for example recent peaks in the abundance of 3-year-olds recorded for 2016, 2017 and 2019 gave rise to higher numbers of 4-year-olds the following year, and in the case of 2019 elevated numbers of 5-year-olds in 2021. Sole catch rates by age for 2003–2021 are given by area in Table 4.3 and averaged over the eastern and western surveys in Table 4.5.

The total number of plaice otoliths collected in 2021 from the eastern and western surveys were 267 and 230, respectively, and of these two fish could not be aged. Over the survey period (2003–2021), 2-, 3- and 4-year-olds have mainly dominated the catches (Figure 4.7) as was the case for the 2021 survey. A relatively strong 2010 year-class is indicated by elevated catch rates of 3-year-olds in 2013, 4-year-olds in 2014 and 5-year-olds in 2015. Similarly, a relatively strong year-class in 2013 would have contributed towards elevated catches of 4-year-olds in 2017, which was the dominant age group caught, followed by relatively high catch rates of 5-year-olds during the 2018 survey. The age distribution of plaice is relatively narrower than for sole, with the eldest fish being 13 years old, and the oldest recorded plaice for the time-series was a 20-year-old female, measuring 59 cm that was caught in 2005. Plaice catch rates by age for the period 2003–2021 are given in Tables 4.4 and 4.5.

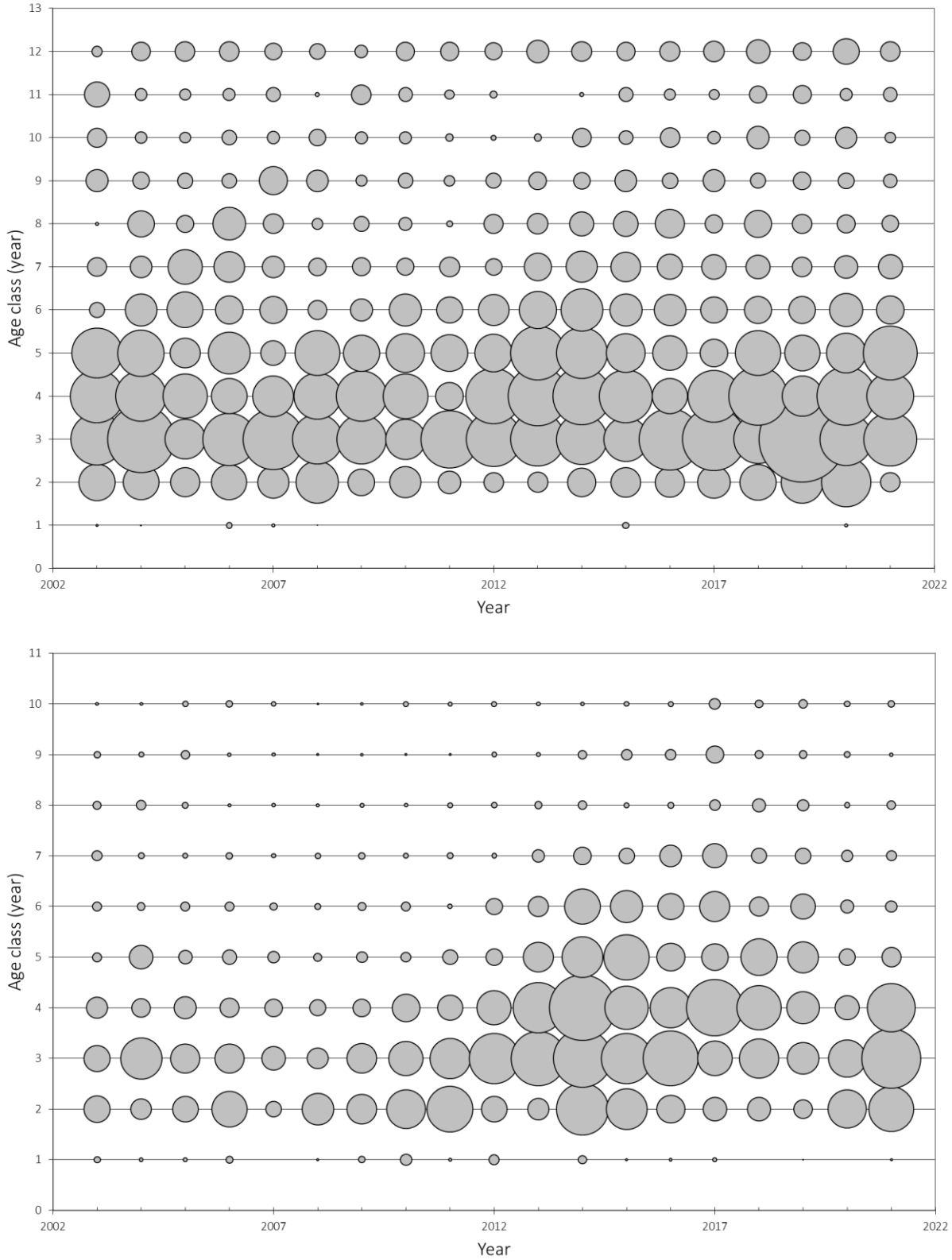

Figure 4.7 Mean number of sole (top) and plaice (bottom) by age caught per hour per metre beam for the eastern and western survey legs combined (2003–2021). Size of bubbles are relative to values presented in Table 4.5.

Table 4.3: Mean numbers of sole caught per hour per metre beam length, by age class and survey area during the 2003–2021 Western Channel Sole and Plaice surveys. An index of spawning-stock biomass (SSB) is also shown (derived from catch rates expressed as kg h^{-1} m $beam^{-1}$).

Sole	East																		
Age	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.19	0.12	0.07	0.18	0.13	0.27	0.10	0.15	0.06	0.04	0.03	0.11	0.09	0.09	0.10	0.12	0.14	0.22	0.06
3	0.28	0.40	0.15	0.36	0.42	0.36	0.35	0.17	0.40	0.42	0.27	0.32	0.21	0.42	0.48	0.20	0.47	0.24	0.27
4	0.29	0.19	0.22	0.15	0.17	0.31	0.39	0.27	0.05	0.31	0.41	0.41	0.20	0.15	0.29	0.34	0.16	0.23	0.29
5	0.19	0.23	0.10	0.22	0.05	0.35	0.16	0.22	0.19	0.13	0.35	0.38	0.18	0.12	0.08	0.19	0.13	0.06	0.17
6	0.04	0.09	0.12	0.09	0.08	0.03	0.05	0.18	0.09	0.11	0.16	0.25	0.13	0.07	0.06	0.05	0.09	0.08	0.03
7	0.02	0.02	0.06	0.13	0.03	0.04	0.05	0.04	0.06	0.04	0.12	0.07	0.07	0.10	0.05	0.05	0.02	0.03	0.04
8	0.00	0.06	0.03	0.06	0.03	0.01	0.01	0.01	0.00	0.06	0.05	0.04	0.04	0.08	0.04	0.06	0.03	0.03	0.01
9	0.01	0.02	0.03	0.02	0.02	0.08	0.00	0.02	0.01	0.04	0.05	0.04	0.03	0.01	0.04	0.03	0.01	0.01	0.00
10	0.00	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.05	0.02	0.03	0.02	0.02	0.02	0.00	0.00
11	0.00	0.01	0.02	0.02	0.01	0.00	0.04	0.02	0.00	0.00	0.00	0.00	0.02	0.01	0.01	0.00	0.03	0.00	0.00
12+	0.01	0.02	0.04	0.05	0.03	0.03	0.01	0.03	0.03	0.01	0.07	0.04	0.01	0.03	0.03	0.03	0.03	0.01	0.02
Total	1.02	1.17	0.84	1.31	0.97	1.49	1.17	1.10	0.91	1.16	1.53	1.73	1.00	1.11	1.20	1.08	1.12	0.92	0.91
SSB Index	0.279	0.312	0.266	0.381	0.215	0.418	0.333	0.368	0.242	0.322	0.513	0.569	0.338	0.341	0.343	0.343	0.290	0.218	0.229

Sole	West																		
Age	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
1	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2	0.12	0.20	0.15	0.11	0.11	0.14	0.06	0.07	0.07	0.05	0.07	0.08	0.14	0.14	0.18	0.22	0.32	0.43	0.03
3	0.42	0.77	0.27	0.31	0.50	0.23	0.22	0.24	0.41	0.28	0.49	0.30	0.29	0.53	0.50	0.44	1.58	0.48	0.46
4	0.43	0.50	0.28	0.17	0.25	0.19	0.20	0.21	0.15	0.48	0.46	0.40	0.55	0.16	0.39	0.54	0.27	0.71	0.23
5	0.49	0.32	0.12	0.20	0.12	0.09	0.16	0.13	0.13	0.23	0.38	0.22	0.19	0.18	0.12	0.34	0.19	0.39	0.62
6	0.02	0.17	0.22	0.10	0.11	0.06	0.08	0.05	0.08	0.12	0.19	0.16	0.13	0.20	0.12	0.15	0.09	0.23	0.20
7	0.08	0.11	0.28	0.10	0.10	0.03	0.03	0.03	0.03	0.03	0.04	0.20	0.16	0.04	0.10	0.10	0.08	0.11	0.12
8	0.00	0.13	0.05	0.24	0.07	0.02	0.05	0.04	0.01	0.02	0.05	0.11	0.13	0.13	0.04	0.14	0.07	0.05	0.06
9	0.14	0.05	0.03	0.03	0.22	0.02	0.04	0.04	0.01	0.01	0.01	0.02	0.10	0.06	0.09	0.02	0.08	0.06	0.05
10	0.11	0.03	0.02	0.02	0.04	0.07	0.02	0.03	0.00	0.01	0.00	0.03	0.04	0.08	0.03	0.13	0.04	0.13	0.03
11	0.19	0.02	0.01	0.02	0.05	0.00	0.06	0.03	0.03	0.01	0.00	0.00	0.03	0.03	0.02	0.09	0.06	0.04	0.05
12+	0.01	0.07	0.06	0.04	0.05	0.03	0.04	0.06	0.05	0.07	0.05	0.06	0.08	0.07	0.08	0.13	0.06	0.19	0.09
Total	2.01	2.38	1.48	1.35	1.62	0.90	0.96	0.94	0.97	1.32	1.75	1.58	1.86	1.61	1.66	2.29	2.83	2.84	1.94
SSB Index	0.554	0.617	0.457	0.379	0.413	0.214	0.298	0.271	0.233	0.344	0.477	0.477	0.529	0.414	0.433	0.572	0.535	0.689	0.493

Table 4.4: Mean numbers of plaice caught per hour per metre beam length, by age class and survey area during the 2003–2021 Western Channel Sole and Plaice surveys. An index of spawning-stock biomass (SSB) is also shown (derived from catch rates expressed as kg h^{-1} m $beam^{-1}$).

Plaice	East																		
Age	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
1	0.00	0.01	0.01	0.02	0.00	0.00	0.03	0.11	0.01	0.07	0.00	0.04	0.00	0.01	0.01	0.00	0.00	0.00	0.00
2	0.20	0.24	0.18	0.51	0.08	0.46	0.41	0.65	0.82	0.29	0.16	1.68	0.88	0.51	0.32	0.27	0.19	0.67	0.95
3	0.19	0.33	0.24	0.35	0.16	0.21	0.33	0.39	0.61	1.10	1.39	1.91	1.44	1.71	0.67	0.72	0.43	0.68	1.53
4	0.13	0.10	0.15	0.16	0.04	0.12	0.15	0.31	0.20	0.51	1.23	2.70	1.02	0.86	1.65	0.96	0.51	0.24	1.38
5	0.04	0.07	0.04	0.05	0.05	0.03	0.05	0.04	0.11	0.16	0.57	0.94	1.13	0.40	0.33	0.62	0.44	0.12	0.18
6	0.06	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.01	0.08	0.21	0.46	0.45	0.22	0.41	0.14	0.26	0.06	0.05
7	0.05	0.02	0.00	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.12	0.11	0.10	0.21	0.20	0.07	0.10	0.04	0.04
8	0.01	0.04	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.03	0.02	0.01	0.03	0.07	0.07	0.04	0.02	0.03
9	0.02	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.04	0.04	0.10	0.02	0.02	0.02	0.00
10+	0.00	0.01	0.02	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.05	0.03	0.02	0.01	0.02
Total	0.69	0.83	0.68	1.15	0.37	0.88	1.03	1.55	1.80	2.25	3.73	7.89	5.09	4.00	3.81	2.88	2.00	1.85	4.18
SSB Index	0.239	0.259	0.220	0.249	0.128	0.207	0.263	0.345	0.351	0.556	1.086	1.835	1.436	1.100	1.258	0.934	0.672	0.356	0.670

Plaice	West																		
Age	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
1	0.05	0.00	0.00	0.03	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.57	0.17	0.55	0.79	0.18	0.56	0.48	0.87	1.36	0.37	0.32	0.76	0.75	0.21	0.20	0.28	0.15	0.80	1.06
3	0.58	1.63	0.71	0.53	0.45	0.22	0.61	0.88	1.09	1.46	1.57	1.29	0.98	1.17	0.48	0.83	0.60	0.71	2.06
4	0.35	0.28	0.38	0.22	0.33	0.13	0.15	0.49	0.49	0.69	1.33	1.26	0.77	0.75	1.47	1.02	0.55	0.36	0.78
5	0.05	0.61	0.16	0.18	0.09	0.03	0.07	0.06	0.12	0.11	0.24	0.67	0.85	0.37	0.37	0.72	0.55	0.16	0.19
6	0.02	0.05	0.07	0.08	0.03	0.01	0.04	0.07	0.01	0.22	0.19	0.87	0.61	0.53	0.52	0.26	0.37	0.12	0.08
7	0.05	0.02	0.03	0.04	0.01	0.01	0.03	0.02	0.01	0.00	0.01	0.23	0.15	0.27	0.42	0.18	0.14	0.10	0.07
8	0.07	0.05	0.03	0.01	0.01	0.00	0.01	0.01	0.01	0.02	0.03	0.05	0.02	0.00	0.04	0.12	0.10	0.00	0.04
9	0.03	0.02	0.06	0.01	0.01	0.00	0.00	0.01	0.00	0.02	0.00	0.05	0.09	0.08	0.23	0.05	0.05	0.01	0.01
10+	0.01	0.00	0.01	0.03	0.02	0.00	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.02	0.07	0.03	0.06	0.03	0.03
Total	1.77	2.82	2.02	1.91	1.13	0.97	1.41	2.43	3.12	2.93	3.71	5.24	4.23	3.40	3.81	3.48	2.57	2.30	4.32
SSB Index	0.469	0.798	0.563	0.426	0.317	0.168	0.329	0.508	0.492	0.670	0.879	1.280	1.187	0.993	1.260	1.017	0.875	0.475	0.643

Table 4.5: Sole and plaice: mean catch per hour per metre beam length, averaged over eastern and western surveys during the 2003–2021 Western Channel Sole and Plaice surveys. An index of spawning-stock biomass (SSB) is also shown (derived from catch rates expressed as kg h^{-1} m $beam^{-1}$).

	Sole																		
Age	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.16	0.15	0.10	0.15	0.12	0.22	0.09	0.12	0.06	0.05	0.05	0.10	0.11	0.11	0.13	0.16	0.21	0.30	0.05
3	0.33	0.55	0.20	0.34	0.45	0.31	0.30	0.20	0.40	0.37	0.36	0.31	0.24	0.46	0.49	0.29	0.91	0.34	0.35
4	0.34	0.31	0.24	0.16	0.20	0.27	0.31	0.25	0.09	0.38	0.43	0.40	0.34	0.15	0.33	0.42	0.20	0.42	0.26
5	0.31	0.26	0.11	0.22	0.08	0.25	0.16	0.18	0.17	0.17	0.36	0.32	0.18	0.14	0.10	0.25	0.15	0.19	0.35
6	0.03	0.12	0.16	0.10	0.09	0.04	0.06	0.13	0.08	0.12	0.17	0.21	0.13	0.12	0.09	0.09	0.09	0.14	0.09
7	0.04	0.06	0.15	0.12	0.06	0.04	0.04	0.04	0.05	0.03	0.09	0.12	0.11	0.08	0.07	0.07	0.05	0.06	0.07
8	0.00	0.09	0.04	0.13	0.05	0.01	0.03	0.02	0.00	0.04	0.05	0.07	0.08	0.10	0.04	0.09	0.05	0.04	0.03
9	0.06	0.03	0.03	0.03	0.10	0.06	0.02	0.03	0.01	0.03	0.04	0.03	0.06	0.03	0.06	0.03	0.04	0.03	0.02
10/10+	0.05	0.02	0.01	0.03	0.02	0.03	0.02	0.02	0.01	0.00	0.01	0.04	0.02	0.05	0.02	0.06	0.03	0.05	0.01
11	0.08	0.02	0.02	0.02	0.02	0.00	0.05	0.02	0.01	0.01	0.00	0.00	0.03	0.01	0.01	0.04	0.04	0.02	0.02
12+	0.01	0.04	0.05	0.05	0.04	0.03	0.02	0.04	0.04	0.04	0.06	0.05	0.04	0.05	0.05	0.07	0.04	0.08	0.05
Total	1.41	1.65	1.10	1.33	1.23	1.26	1.09	1.04	0.93	1.23	1.62	1.67	1.34	1.31	1.38	1.56	1.80	1.68	1.32
SSB Index	0.387	0.433	0.342	0.381	0.293	0.338	0.319	0.330	0.239	0.331	0.499	0.533	0.414	0.370	0.379	0.434	0.387	0.405	0.333

	Plaice																		
Age	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
1	0.02	0.01	0.01	0.03	0.00	0.00	0.02	0.06	0.00	0.05	0.00	0.04	0.00	0.00	0.01	0.00	0.00	0.00	0.00
2	0.34	0.21	0.33	0.62	0.12	0.50	0.44	0.74	1.04	0.32	0.23	1.32	0.83	0.39	0.27	0.27	0.17	0.72	0.99
3	0.34	0.84	0.43	0.42	0.27	0.22	0.44	0.58	0.80	1.24	1.46	1.66	1.26	1.50	0.60	0.77	0.50	0.69	1.74
4	0.22	0.17	0.24	0.19	0.16	0.13	0.15	0.38	0.31	0.58	1.27	2.13	0.92	0.82	1.58	0.98	0.52	0.29	1.14
5	0.04	0.28	0.09	0.10	0.07	0.03	0.06	0.05	0.11	0.14	0.44	0.83	1.02	0.39	0.34	0.66	0.48	0.13	0.18
6	0.04	0.03	0.04	0.04	0.03	0.02	0.03	0.04	0.01	0.13	0.20	0.62	0.51	0.34	0.45	0.19	0.30	0.08	0.06
7	0.05	0.02	0.01	0.02	0.01	0.02	0.02	0.01	0.02	0.01	0.08	0.16	0.12	0.24	0.29	0.11	0.12	0.06	0.05
8	0.03	0.05	0.02	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.03	0.04	0.01	0.02	0.06	0.09	0.06	0.01	0.03
9	0.02	0.01	0.04	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.04	0.06	0.06	0.15	0.03	0.03	0.02	0.01
10/10+	0.00	0.00	0.02	0.02	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.06	0.03	0.03	0.02	0.02
11																			
12+																			
Total	1.12	1.62	1.21	1.45	0.67	0.91	1.18	1.89	2.32	2.52	3.72	6.84	4.75	3.76	3.81	3.12	2.23	2.03	4.24
SSB Index	0.330	0.472	0.356	0.319	0.203	0.192	0.289	0.409	0.407	0.602	1.004	1.615	1.337	1.057	1.259	0.967	0.752	0.403	0.660

4.5. Comparisons with the ICES stock assessment results

Trends in SSB were calculated from the Western Channel Sole and Plaice survey (WCSP) indices-at-age using data on maturity (ICES, 2007 (for sole); ICES, 2009 (for plaice)) and weights calculated from length-weight relationships (Silva *et. al*., 2013). Values are in Tables 4.3–4.5 (bottom rows).

The historical trends for sole from the combined eastern and western surveys have been broadly in accord with the results of the ICES 2021 assessment for sole 7.e (Figure 4.8), although the WCSP survey indicates a relatively larger increase in SSB between 2011 and 2013, and a general decline since 2018, compared to an increase for the ICES assessment. The trends for the east and west WCSP values generally follow one another apart from 2008 and more recently in 2020.

For plaice, all three (eastern, western and combined) WCSP SSB estimates show a similar trend to the ICES 2021 assessment for plaice 7.e (Figure 4.8), apart from a survey peak recorded from 2013 to 2015, which was not mirrored by the ICES estimates. Since then, SSB estimates have steadily decreased, which has been more noticeable for the WCSP survey, with numbers stabilising for this year's survey and increasing slightly for the survey index.

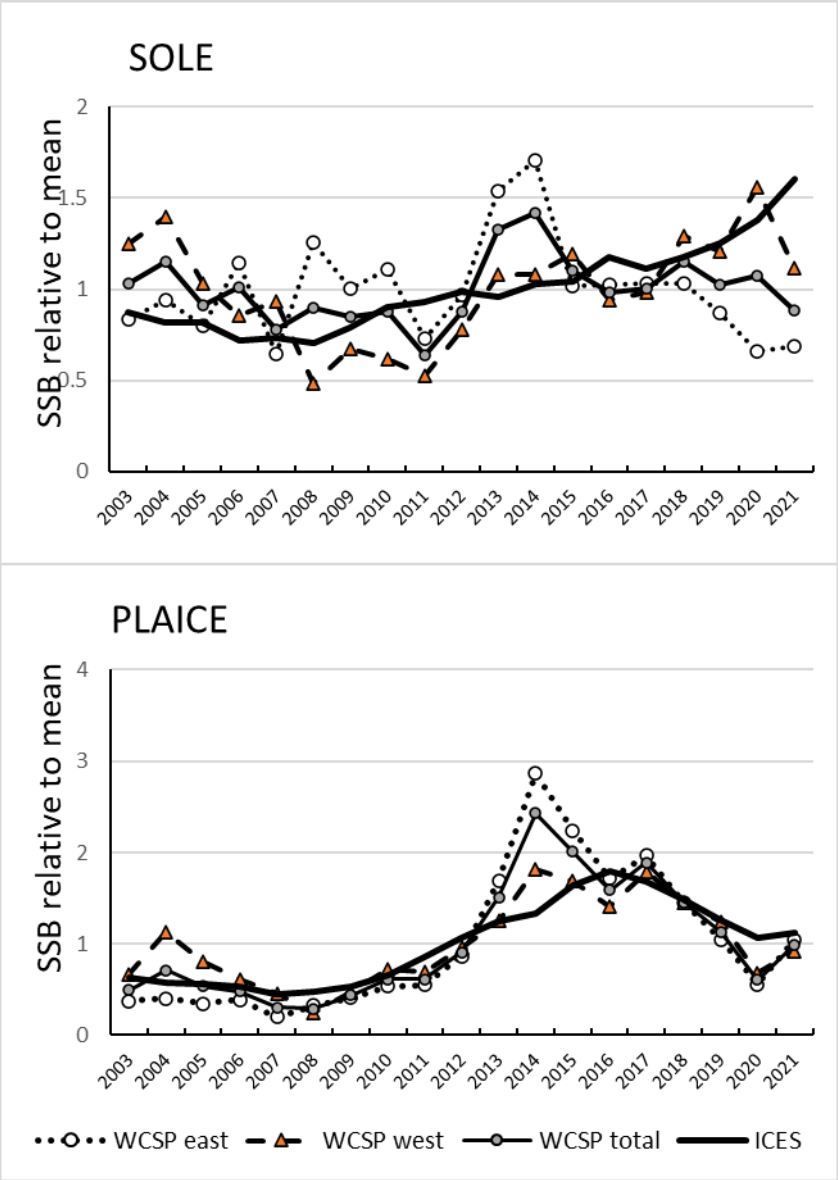

Figure 4.8 Comparison between trends in the index of spawning-stock biomass (SSB) found by the WCSP surveys (2003–2021) and the ICES assessments carried out in 2021 for the 7.e stocks of sole and plaice (ICES, 2021a, b & c). WCSP trends are given separately for the eastern and western surveys, and for the surveys combined.

5. Acknowledgements

Similar to the 2020 survey, it was again another challenging year to organise and implement the 2021 survey during the COVID-19 pandemic. We continue to be indebted to Interfish, the skipper Lee and the crew, not to mention the Cefas Observers for their

cooperation, flexibility, and dedication demonstrated throughout, to ensure that the survey was successfully delivered.

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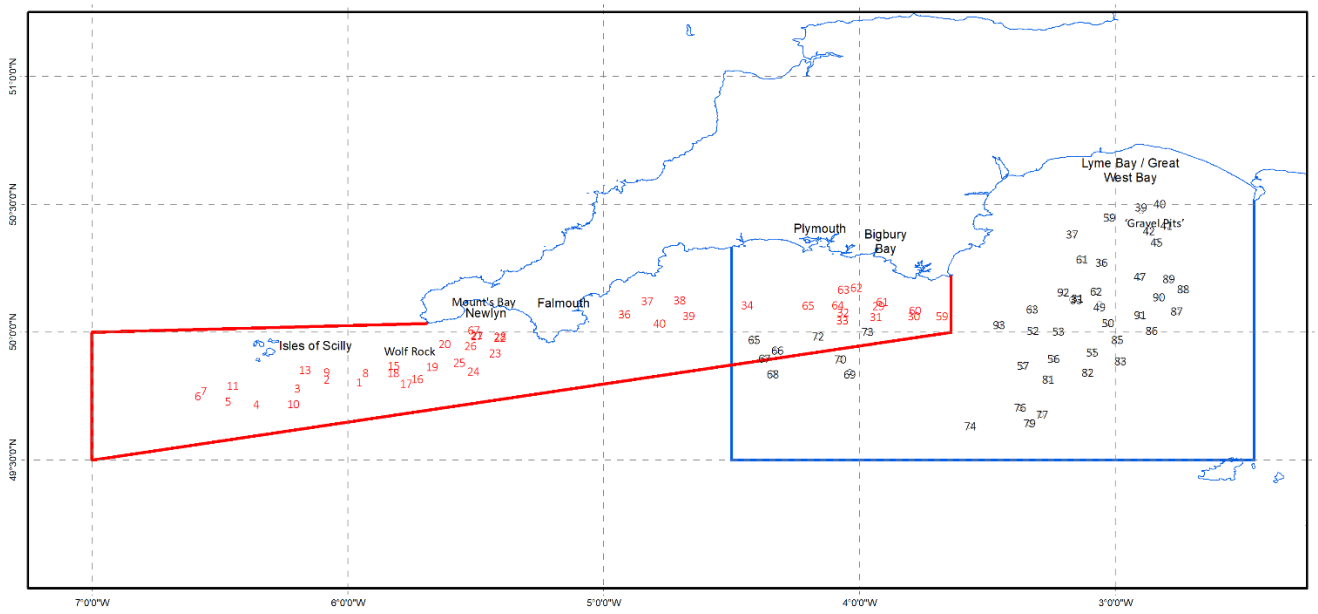
7. Appendices

Annex 1: Prime stations targeted for the survey with the eastern leg stations shown in black (n=45) and western in red (n=45).



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