

12 Sprat in the English Channel (divisions 7. de)

The stock structure of sprat populations in this region is not clear, despite evidence from acoustic surveys suggesting the stock is mainly confined to the UK side of 7.e. Further investigations and work are required to resolve this uncertainty.

12.1 The Fishery

12.1.1 ICES advice applicable for 2019 and 2020

The advised catch for the English Channel (7.d and e) was set equal to 2637 and 1506 tonnes for 2019 and 2020, respectively.

12.1.2 Landings

The total sprat landings by country are provided in Table 12.1.1. Total landings from the international sprat fishery are available since 1950 (Figure 12.1.1.). Sprat landings prior to 1985 in 7.de were extracted from official catch statistics dataset (STATLANT27, Historical Nominal Catches 1950–2010, Official Nominal Catches 2006–2013), from 1985 onwards they come from WG estimates. Since 1985 sprat catch has been taken mainly by UK, England and Wales. According to official catch statistics large catches were taken by Danish trawlers in the English Channel between the late 1970s and 1980s. The identity of these catches was not confirmed by the Danish data managers, raising the question of whether those reported catches were the result of species misreporting (i.e. herring misreported as sprat). Therefore, ICES cannot verify the quality of catch data prior to 1988.

The fishery starts in August and runs into February and sometimes March the following year. Most of the catch is taken in 7.e, in particular in the Lyme Bay area. In the last decade catch from UK covered about 99% of landed sprat, however in 2015 and 2016 this percentage diminished, with Netherlands, Denmark, and for the first time in the whole time-series, Germany, contributing to about 11% of the reported landings. In 2019, 98% of the catches were by UK (England, Wales and Northern Ireland), with the remaining 2 % taken by Germany and France. UK has a history of taking the majority of the total landings.

Sprat is found by sonar search and sometimes the shoals are found too far offshore for sensible economic exploitation. This offshore/near shore shift may be related to environmental variability such as spatial and temporal changes in temperature and/or salinity.

12.1.3 Fleets

In the English Channel the primary gear used for the capture of sprat is midwater trawl. Within that gear type three vessels under 15 m have actively targeted sprat and have been responsible for the majority of landings (since 2003 they took on average 96% of the total landings). Sprat is also caught by driftnet, fixed nets, lines and pots and most of the landings are sold for human consumption.

12.1.4 Regulations and their effects

There is a TAC for sprat in ICES divisions 7.de, English Channel. Up until recent years the TAC did not limit the sprat landings in this area (Figure 12.1.2).

12.1.5 Changes in fishing technology and fishing patterns

There is insufficient information available.

12.2 Biological Composition of the Catch

12.2.1 Catches in number and weight-at-age

In 2017/2018 fishing season a pilot self-sampling program started in the Southwest of UK, involving sprat fisher from Lyme bay. This program has continued in 2019 and the fishery is keen to continue contributing data and are receptive to improving their sampling scheme and providing useful scientific data in the future. The data shown are raw numbers-at-length in the samples, and not raised to the total catches.

The skippers have collected length measurements from the catches and recorded information on fishing trips. The main processors for the fishery were engaged in 2019 and have provided length and weight data from landings subsamples. The sprat lengths in the fishers' samples ranged from 7.5 to 15 cm (Figure 12.2.1). The length distributions recorded by the processors was reasonably consistent again in 2019 (Figure 12.2.2).

12.3 Fishery-independent information

PELTIC Acoustic Survey

A pelagic survey was undertaken in autumn in the English Channel and off the coast of Normandy to acoustically assess the biomass of the small pelagic fish community within this area (divisions 7.d–g). This survey, conducted from the RV *Cefas Endeavour*, is divided into three geographically separated regions: the western English Channel, the Isles of Scilly and the Bristol Channel (Figure 12.3.1). In 2017, the survey was expanded to cover the southern area of division 7.e. In 2018 the survey was further extended into division 7.d to investigate the presence of the stock in the channel, this was not repeated during 2019.

Calibrated acoustic data were collected during daylight hours only over three frequencies (38, 120, 200 kHz) from transducers mounted on a lowered drop keel at 8.2 m below the surface. Pulse duration was set to 0.516 m/s for all three frequencies and the ping rate was set to 0.6 s⁻¹ as the depth did not exceed 100 m. Data from 38 kHz was used to determine target species abundance for all swimbladder fish. To distinguish between organisms with different acoustic properties (echotypes) a multifrequency algorithm was developed, principally based on a threshold applied to the summed backscatter of the three frequencies, eventually resulting in separate echograms for each of the echotypes.

The acoustic data were then processed using the echoR software. The survey area has been split into several strata. For each strata, energies were converted into biomass by applying catch ratio and then weighted by abundance of fish in the area surrounding the haul.

A software bug which effected the “SA correction” was made known to the survey during December 2019, this software bug resulted in an underestimate of the sprat biomass in 2018. The software bug has now been removed and the 2018 biomass value revised upward.

Biological data

Biological information from trawl catches carried out during the PELTIC acoustic survey, identified 4 age classes from 0 to 3 contributing on average to 25%, 33%, 36%, and 6% respectively in the samples collected. The age structured observed in 2019 is shown in Figure 12.3.2.

12.4 Mean weight-at-age and maturity-at-age

No data on mean weight-at-age or maturity-at-age in the catch are available.

12.5 Recruitment

The acoustic surveys may provide an index of sprat recruitment in divisions 7.d–e. However further work is required.

12.6 Stock Assessment

This stock is considered a category 3 stock with the assessment and advice based on survey trends (ICES Advice 2018).

The ICES workshop on short lived species (WKDLSSLS 2019) tested the implementation of 1 over 2 against the current 2 over 3 advice rule using management strategy evaluations. The workshop concluded that 2 over 3 was not suitable for species such as sprat. An Interim proposal was put forward by the workshop of 1 over 2 with an 80% uncertainty cap. However, it was acknowledged that further work on the 1 over 2 guidelines is needed, and the interim proposal is likely to change at the upcoming WKDLSSLS workshop in 2020. The advice for 2021 is based on the 1 over 2 rule with the 20% uncertainty cap and the precautionary buffer applied. This is the most precautionary application of the 1 over 2 rule. HAWG have recommended an inter benchmark in late 2020 to implement the updated recommendations of the WKDLSSLS 2020. The results will be available for HAWG 2021.

12.6.1 Data exploration

Biomass Index

A 8-years time-series of biomass estimates from the PELTIC survey is shown in Table 12.6.1: despite being a short time-series, the acoustic survey covers a much wider area compared to the original survey carried out in partnership with the fishery. The stock identity for sprat in the Channel is still unclear. However, the extension of the survey into ICES division 7.d and the southern part of 7.e suggests that the stock is mainly located in the more northerly part of division 7.e during October. The survey conducted in 2019 showed a concentration of 0 age sprat in Lyme bay. This year the survey covered the area around the Channel Islands (Figure 12.6.1).

Sprat was in general the dominant small pelagic species in the trawl samples, with highest densities in the eastern parts of the western Channel and the Bristol Channel. As in previous years, large schools in the Bristol Channel appeared to consist mainly of juvenile sprat, whereas those in the English Channel also included larger size classes. For more details on the survey design see ICES 2015/SSGIEOM:05.

The age distribution of sprat in the survey area shows a marked distinction between the young fish (0 and 1) found in the Bristol Channel and the older age classes that occupy the Western English Channel. Whether the two clusters belong to the same stock has yet to be proved: the circulation pattern of the area would allow sprat eggs/larvae to travel northward, from division

7.e to 7.g; however, the formation of a front in late spring/early summer seems to suggest these may be two different stocks.

In 2019 the biomass index from the PELTIC acoustic survey was used to provide advice on sprat in Division 7.d–e applying the “2 over 3” rule (ratio between average biomass index of the last 2 years and average biomass index of the previous 3 years). The index was also used to provide an indication of the current harvest rate. The advice guidance has changed in 2020 following testing of the 1 over 2 rule at WKDLSSL 2019. It is intended to convene an inter benchmark can be held to review the stock following any conclusion from WKDLSSL 2020.

The biomass, as estimated by the survey for the English Channel strata only, is stable at high levels in 2013–2014. This trend is followed by a 23% decrease in 2015 and an 85% drop in 2016 to its lowest level of the series. The estimates for 2017 resulted in an upward rescaling (by 3 times) of the biomass compared to 2016, but still remained at about half the values observed at the beginning of the time-series (Table 12.6.1, Figure 12.6.2). A slight decline in biomass was observed in 2018, however the stock index has increased by a third in 2019.

12.7 State of the Stock

The acoustic estimates for 2017 show a three-time increase compared to the all-time low value in 2016, although the biomass is still half of the high levels recorded in the period 2013–2015. The PELTIC biomass index has increased past its last high value in of 32751 tonnes to 36,789 tonnes. The harvest rate index (Figure 12.7.1) has decreased to its pre 2016 value of 5%, having been around 10% between 2017 and 2018. The change in index value (using the 2 over 3 rule) was less than 20%.

12.8 CATCH ADVICE

Given that the index value has a greater than 20% change in the perception of the stock, the biomass index trend continues to be positive and the 2020 guidelines for advice (ICES 2020). A TAC of 1446 tonnes is given after applying the uncertainty cap and the precautionary buffer. In addition, there is an interbenchmark planned for the stock before spring of 2021 where a new, more responsive advice rule for short-lived pelagic species will be examined. The ICES advice for 2021 is therefore 1446 tonnes.

12.9 Short-term projections

No projections are presented for this stock.

12.10 Reference Points

No precautionary reference points are defined for sprat populations in this region due to uncertainty in stock definition.

12.11 Quality of the Assessment

The coverage of the PELTIC acoustic survey was extended in 2017 towards the southern part of Division 7.e: this extension confirmed that the bulk of the sprat distribution in 7.e is located in Lyme Bay and surrounding areas, and very little extend outside. In fact, the transects carried out off the French coast found very little sprat, mostly of ages 0 and 1. This pattern may have

changed somewhat in recent years as sprat have been recorded off the coast of France and around the channel island in 2018 and 2019.

The extent to which the population migrate into Division 7.d was investigated during the 2018 survey. The survey showed that very little sprat was found on the eastern border of division 7.e suggesting no movements of sprat between the two areas and very little was found in 7.d.

Concerns have been raised about the connection between the Western English Channel stock and the Bristol Channel, where large numbers of juveniles are found

12.12 Management Considerations

Sprat is a short-lived species with large interannual fluctuations in stock biomass. The natural interannual variability of stock abundance, mainly driven by recruitment variability, is high and does not appear to be strongly influenced by the observed levels of fishing effort.

Sprat annual landings from 7.d–e over the past 20 years have been 2570 tonnes on average. The average harvest rate for the 8 year time-series is 10%, however if the 2016 value of 34% is removed this drops to 6% over the entire time-series and 8% over the last 3 years. In general, however, it seems that Lyme Bay, where most of the fishery occurs, consistently hosts quite a substantial part of the sprat stock: this is confirmed by the fact that even in 2016, when the estimated biomass was overall very low, Lyme Bay still contributed 50% of the total sprat population in the Western English Channel.

The strong biomass fluctuations observed in the acoustic index and the relatively strong increase in biomass observed in 2017, suggests that the low level of catch is not impairing the stock and that the reduced sprat biomass is not due to fishing mortality, but it is most likely caused by environmental factors.

The timing of the advice relative to the PELTIC survey should also be considered, currently the survey runs 1 year prior to the generation of the advice which is implemented 1 year later. This is a 2-year time-lag from data collection to advice and has been identified as a weakness in the advice especially for sprat which only live 3-4 years. The advice is therefore being given based on fish that are no longer present in the population at the time of the fishery. In year advice has been proposed to remedy this mismatch of survey data with the fishery.

12.13 Ecosystem Considerations

Multispecies investigations have demonstrated that sprat is one of the important prey species in the North Sea ecosystem, for both fish and seabirds. At present, there are no analysis available on the total amount of sprat, and in general of other pelagic species, taken by seabirds, marine mammals and large predators in the Celtic Seas Ecoregion. However, a wide spectrum of data that covers the whole trophic chain have been collected during the PELTIC acoustic survey: these data will in the future provide a substantial contribution to the knowledge base for the area.

Table 12.1.1 Sprat in 7.d-e. Landings of sprat, 1986–2019.

Country	Denmark	France	Netherlands	UK Eng+Wales+N.Irl.	UK Scotland	Other	Total
1986	15	0	0	1 163	0	0	1 178
1987	250	23	0	2 441	0	0	2 714
1988	2 529	2	1	2 944	0	0	5 476
1989	2 092	10	0	1 520	0	0	3 622
1990	608	79	0	1 562	0	0	2 249
1991	0	0	0	2 567	0	0	2 567
1992	5 389	35	0	1 791	0	0	7 215
1993	0	3	0	1 798	0	0	1 801
1994	3 572	1	0	3 176	40	0	6 789
1995	2 084	0	0	1 516	0	0	3 600
1996	0	2	0	1 789	0	0	1 791
1997	1 245	1	0	1 621	0	0	2 867
1998	3 741	0	0	1 973	0	0	5 714
1999	3 064	0	1	3 558	0	0	6 623
2000	0	1	1	1 693	0	0	1 695
2001	0	0	0	1 349	0	0	1 349
2002	0	0	0	1 196	0	0	1 196
2003	0	2	72	1 368	0	0	1 442
2004	0	6	0	836	0	0	842
2005	0	0	0	1 635	0	0	1 635
2006	0	7	0	1 969	0	0	1 976
2007	0	0	0	2 706	0	0	2 706
2008	0	0	0	3 367	0	0	3 367
2009	0	2	0	2 773	0	0	2 775
2010	0	2	0	4 408	0	0	4 410
2011	0	1	37	3 138	0	0	3 176
2012	6	2	8	4 458	0	0	4 474

Country	Denmark	France	Netherlands	UK Eng+Wales+N.Irl.	UK Scotland	Other	Total
2013	0	0	0	3 793	0	0	3 793
2014	45	0	275	3 338	0	0	3 658
2015	0	1	352	2 659	0	0	3 012
2016	185	7	231	2 867	0	49	3 339
2017	0	0	235	2 498	0	0	2 733
2018	474	1	0	1 776	0	0	2 252
2019	0	0.67	0	1544	0	28	1573

Table 12.6.1. Sprat in 7.d–e. Annual sprat biomass in ICES Subdivision 7.e (Source: Cefas annual pelagic acoustic survey).

Survey	Area	Season	2012	2013	2014	2015	2016	2017	2018	2019
Partial	Lyme Bay	Oct	24 246	62 040	67 538	12 212	6 181	29 996	16 036	30 406
FSP	Lyme Bay*	Oct	27 971							
PELTIC	W Eng Ch	May								
PELTIC	W Eng Ch	Oct		70 680	85 184	65 219	9 826	32 751	21 772	36 789

* ICES rectangles 29E6, 30E6

Table 12.6.2. Sprat in 7.d–e. Landings per unit effort (LPUE) for 3 vessels that target sprat. The years refer to the start of the season 1 August year (y) to 31 March in year (y+1). Please note that LPUE for 2018 and 2019 is estimated as kg/day, as number of hours were not available.

Year	HAWG 2016	HAWG 2017	HAWG 2018	HAWG 2019*	HAWG 2020
1989	682	395	4 432	4 432	4432
1990	429	569	3 684	3 684	3684
1991	528	481	4 147	4 147	4147
1992	422	560	3 887	3 784	3784
1993	630	850	4 779	4 737	4737
1994	747	612	7 809	7 809	7809
1995	599	899	5 831	5 831	5831
1996	803	927	6 768	6 768	6768
1997	868	601	6 845	6 808	6808
1998	736	971	6 794	6 794	6794
1999	970	844	8 919	8 919	8919

2000	683	732	8 369	8 369	8369
2001	521	944	5 976	5 976	5976
2002	644	622	5 992	5 992	5992
2003	375	841	4 215	4 190	4190
2004	588	1 108	5 938	5 841	5841
2005	1 050	1 388	8 820	8 820	8820
2006	992	1 059	8 035	8 035	8035
2007	1 050	945	8 241	8 241	8241
2008	1 029	890	8 085	8 085	8085
2009	773	1 388	7 474	7 474	7474
2010	1 527	1 288	13 260	13 260	13260
2011	1 042	1 709	9 801	9 801	9801
2012	1 904	1 870	13 475	13 475	13475
2013	1 933	2 225	11 398	11 398	11398
2014	2 405	1 683	11 977	11 977	11977
2015	2 221	1 765	8 763	8 763	8763
2016		624	9 459	9 459	9459
2017			9 515	9 457	9457
2018				8 373	8373
2019					8235

*provisional

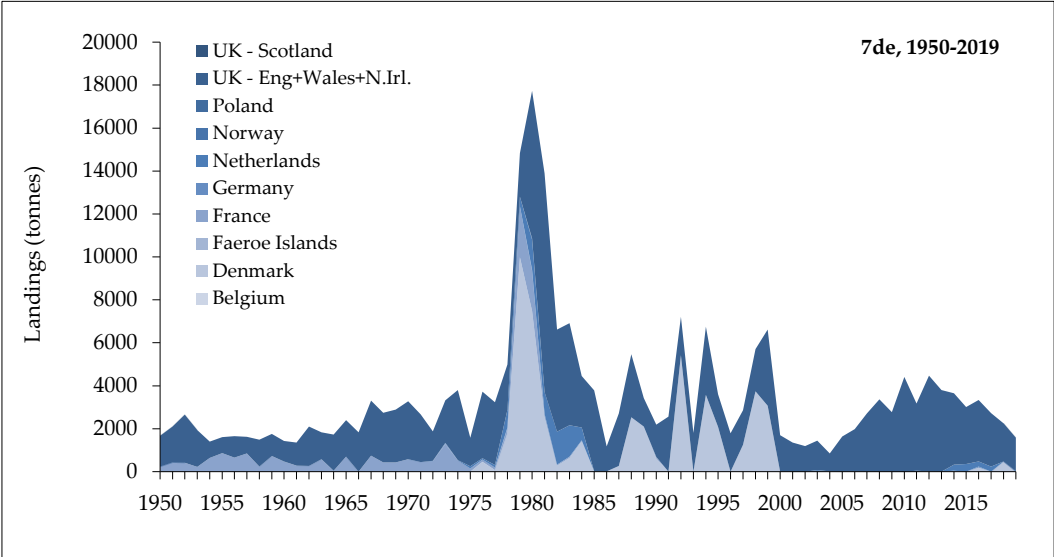


Figure 12.1.1. Sprat in 7.d-e. Landings of sprat 1950–2018.

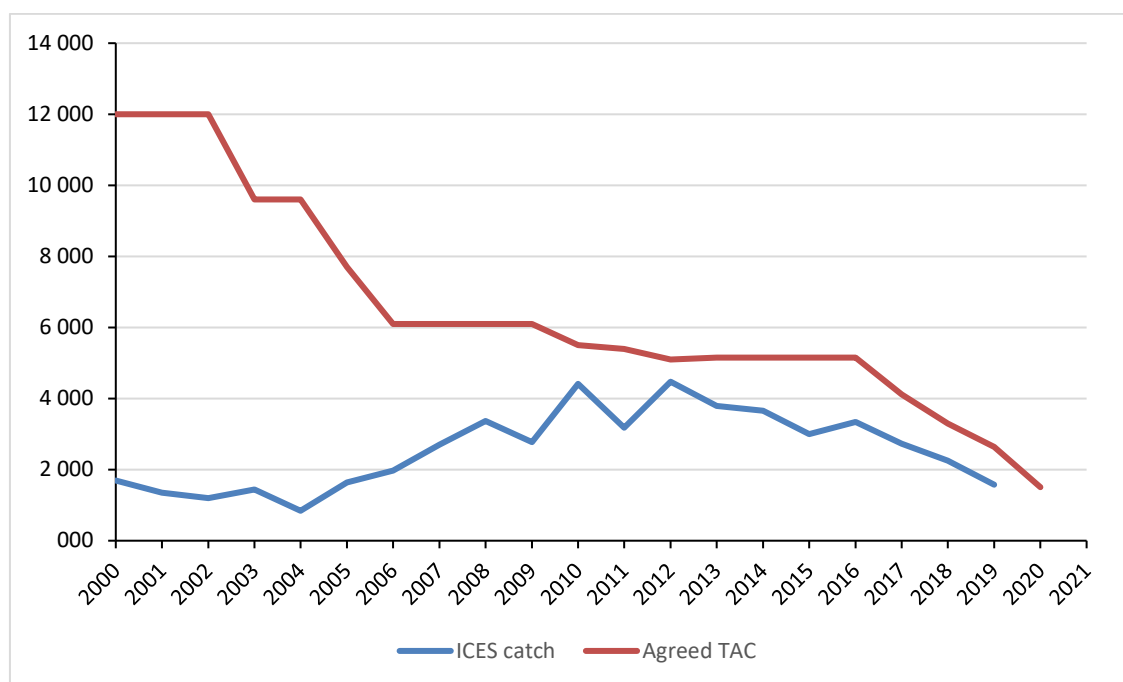


Figure 12.1.2. Sprat in 7.d-e. ICES catch (blue line) and agreed TAC (red line) from 2000 to 2020.

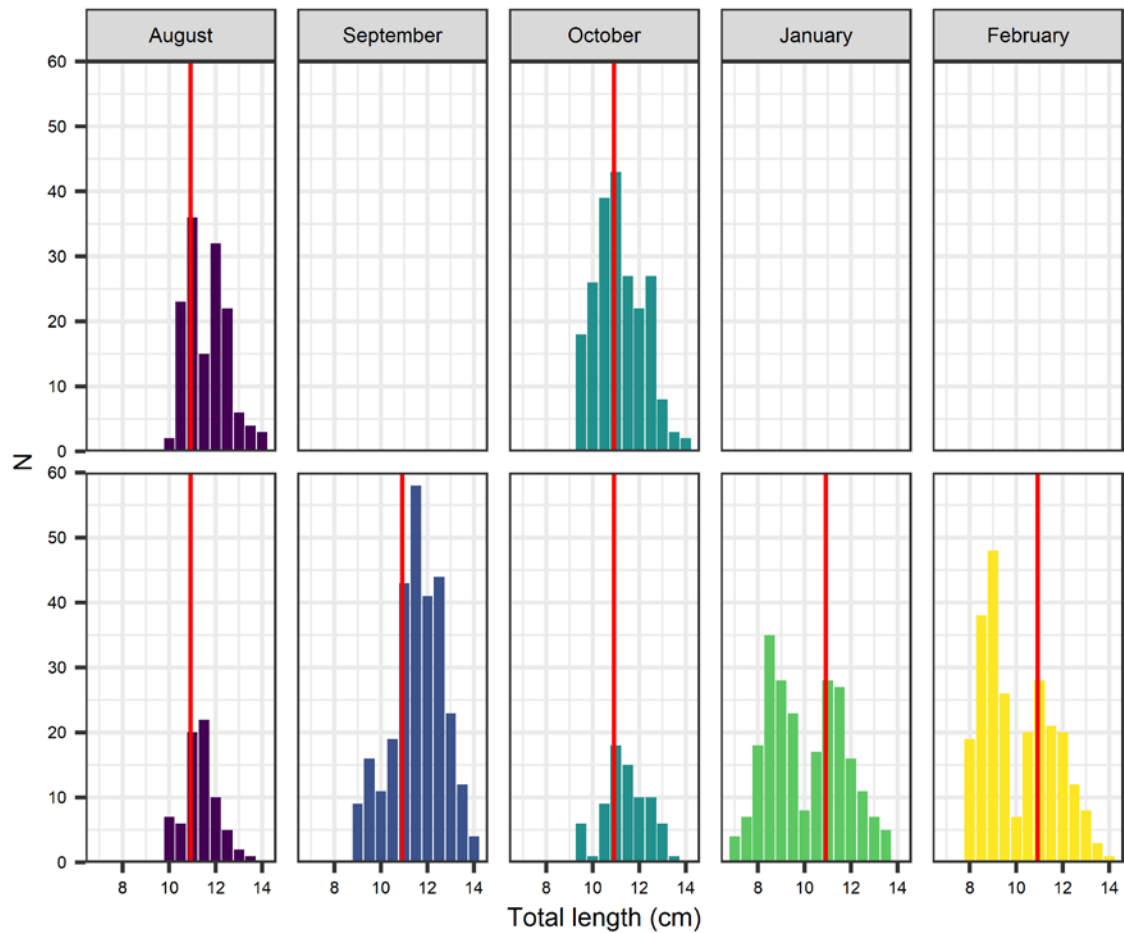


Figure 12.2.1. Length distribution collected by the fishers by month. Red line indicates weighted mean length at each month.

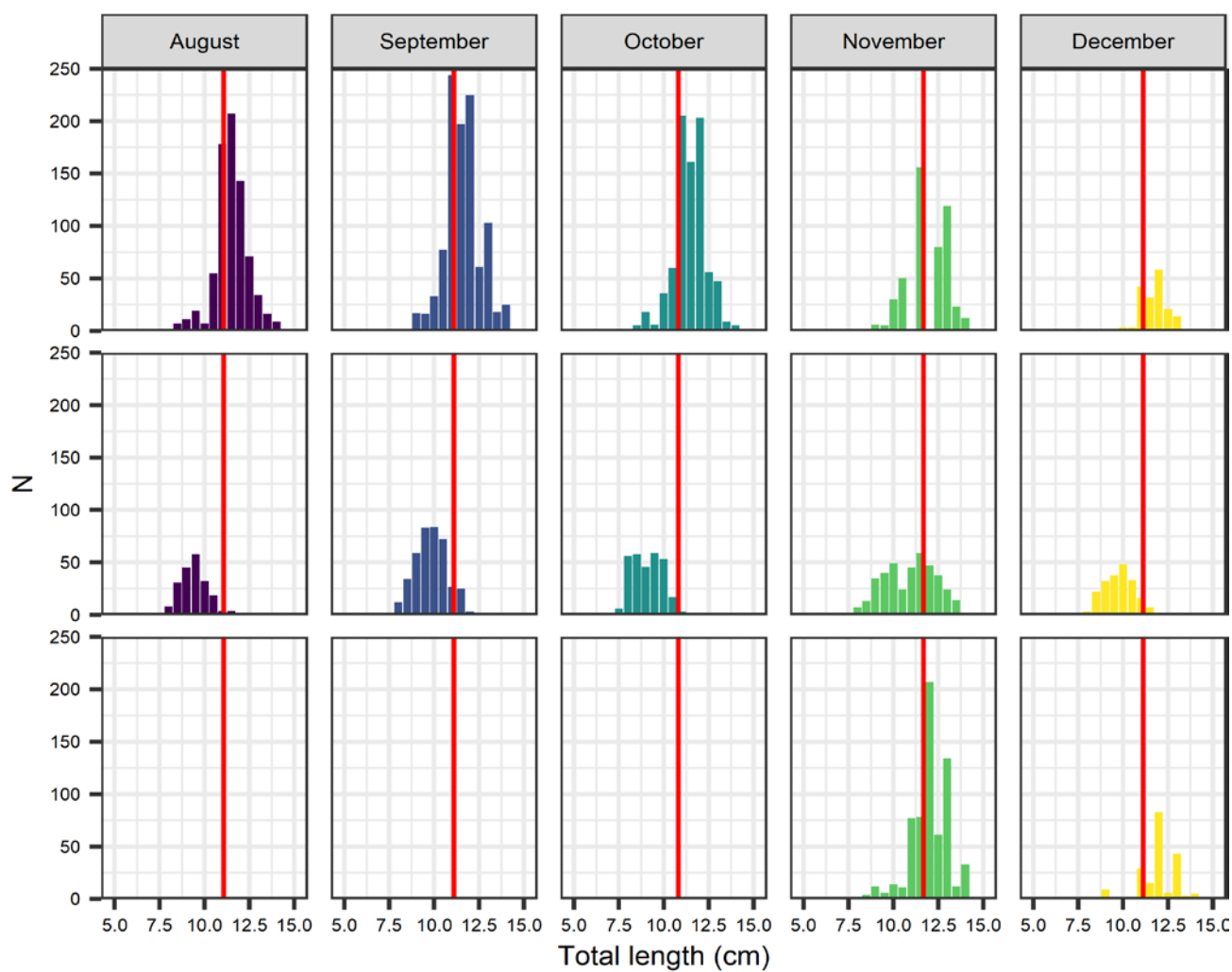


Figure 12.2.2. Monthly collected sprat total length distribution by all processors (3) in season 2019-2020. Red line indicates weighted mean length at each month.

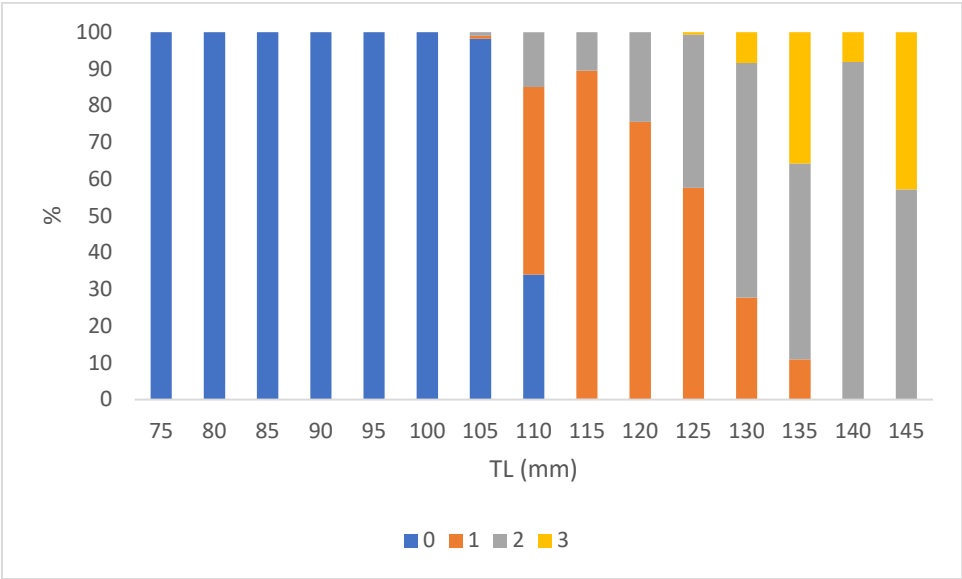


Figure 12.3.2. Sprat in 7.d-e. Proportion of numbers-at-age in the biological sample collected during the 2019 PELTIC acoustic survey

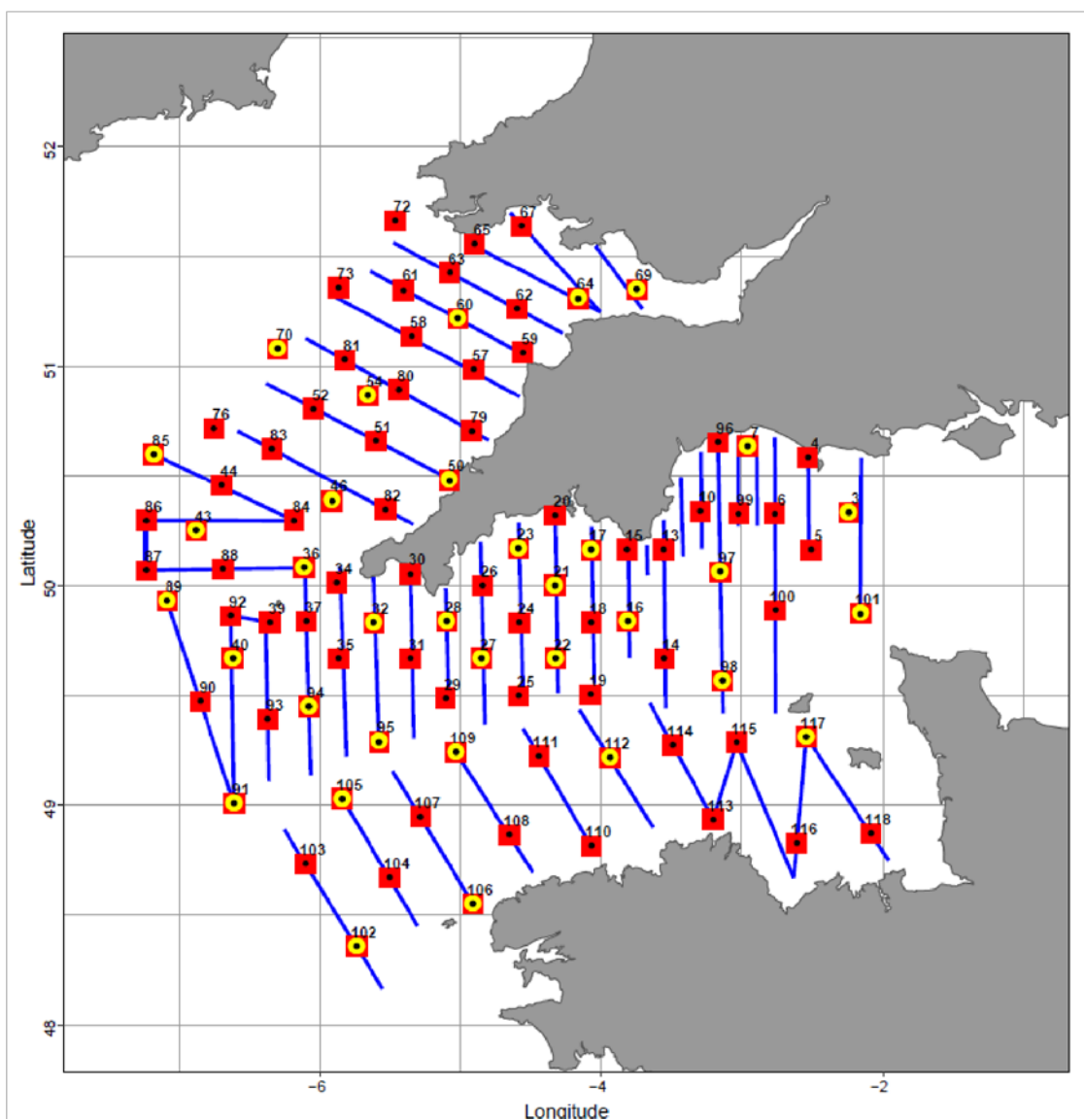


Figure 12.3.1. Sprat in 7.d-e. Survey design with acoustic transects (blue lines), zooplankton stations (red squares) and oceanographic stations (yellow circles).

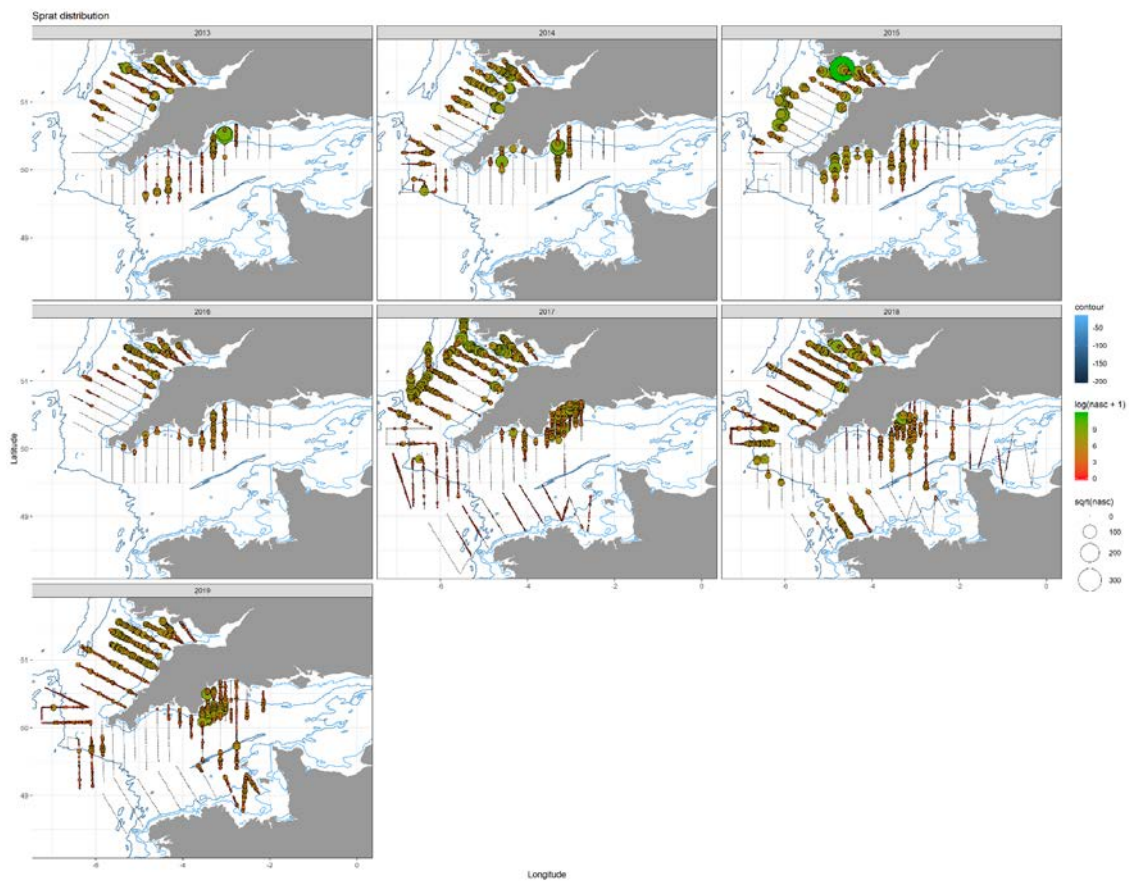


Figure 12.6.1. Sprat in 7.d–e. Acoustic backscatter attributed to sprat per 1 nmi equidistant sampling unit (EDSU) during October.

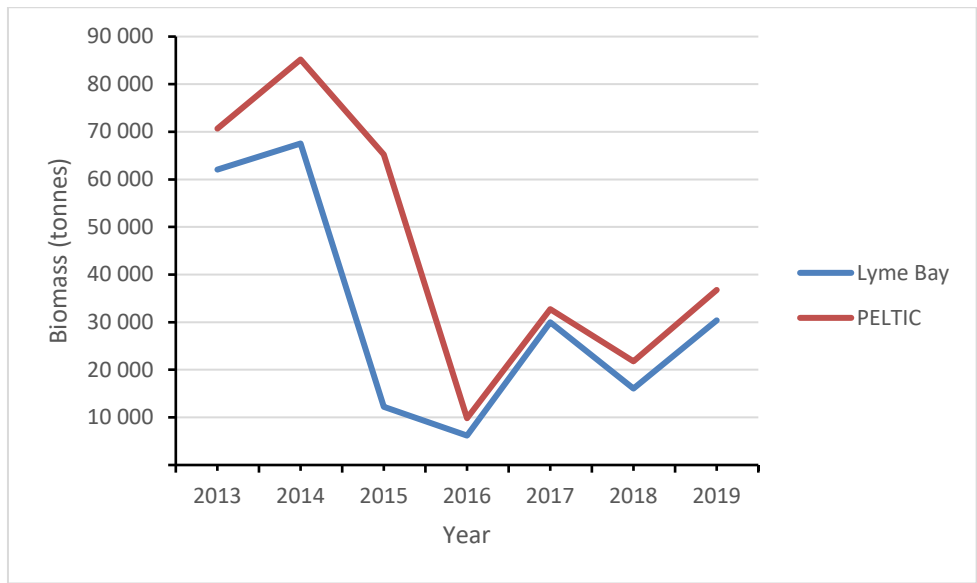


Figure 12.6.2. Sprat in 7.d–e. Biomass of sprat estimated from the PELTIC acoustic survey from 2013 to 2018 for Division 7.e (red line) and the Lyme Bay area (blue line).

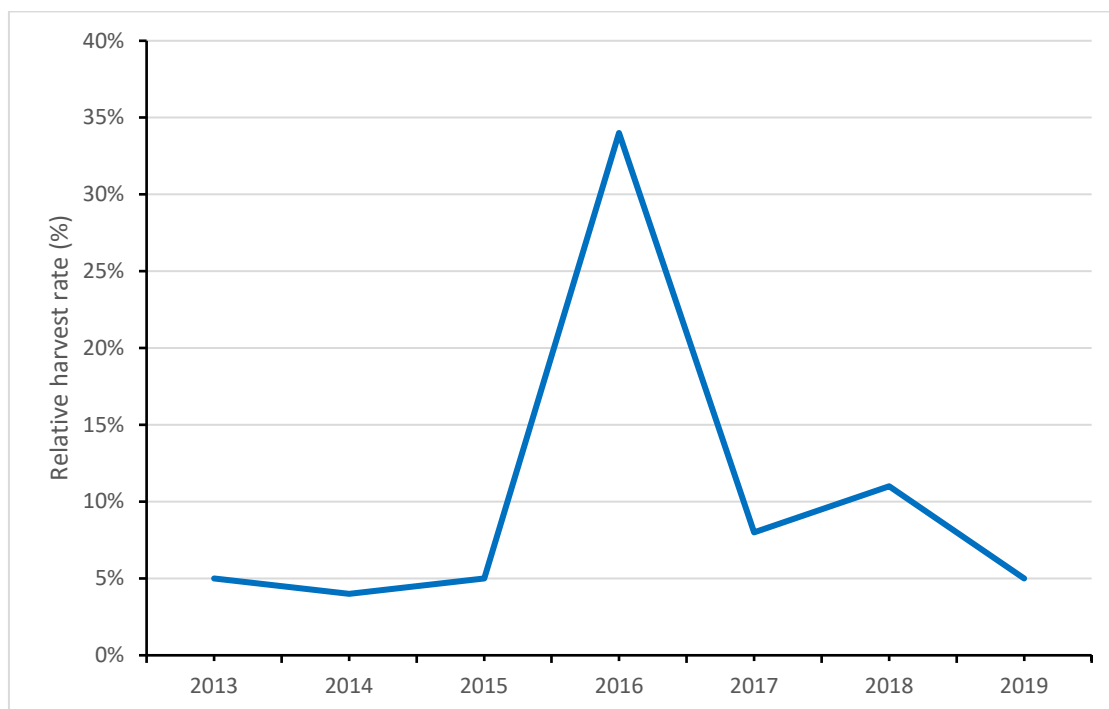


Figure 12.7.1. Sprat in 7.d-e. Harvest rate index (ratio between landings and PELTIC acoustic survey biomass estimate).