RESEARCH VESSEL SURVEY REPORT

RV CEFAS ENDEAVOUR
Survey: C END 17 - 2018.

STAFF:

Name	Role	Name	Role
Part 1		**Part 2**	
Jeroen van der Kooij	SIC/acoustics	**Elisa Capuzzo**	SIC/hydro
Elisa Capuzzo	2IC/hydro	**Jeroen van der Kooij**	2IC/acoustics
Joana Silva	2IC/fish	**Joana Silva**	2IC/fish
Marc Whybrow	Tech	**Marc Whybrow**	Tech
Richard Humphreys	Fish Lead	**Richard Humphreys**	Fish Lead
Matt Eade	Fish	**Louise Cox**	Fish
Piera Carpi	Fish	**Allen Searle**	Fish
Fabio Campanella	Acoustics	**Sílvia Rodríguez-Climent**	Acoustics
Sam Barnett	Fish	**Catarina Maia**	Fish
Hayden Close	Plankton	**Sam Barnett**	Plankton
James Pettigrew	Plankton	**Nevena Almeida**	Plankton
Chris Brodie	PhD (Uni Salford)	**Axayacatl Molina-Ramirez**	Tech
Marine Cusa	PhD (Uni Salford)	**Chris Brodie**	PhD (Uni Salford)
Julian Tilbury	PIA	**Jahcub Trew**	PhD (Uni Exeter)
Pete Howlett	ML observer	**Pete Howlett**	MARINE Life observer
Fiona McNie	ML observer	**Sara Bisset**	ML observer

DURATION: **6th October - 10th November 2018**
6th -22nd Oct (Part 1)
23rd Oct- 10th Nov (Part 2)

LOCATION: **Eastern Celtic Sea and Western Channel (ICES Subareas 27.7 e, f, g)**

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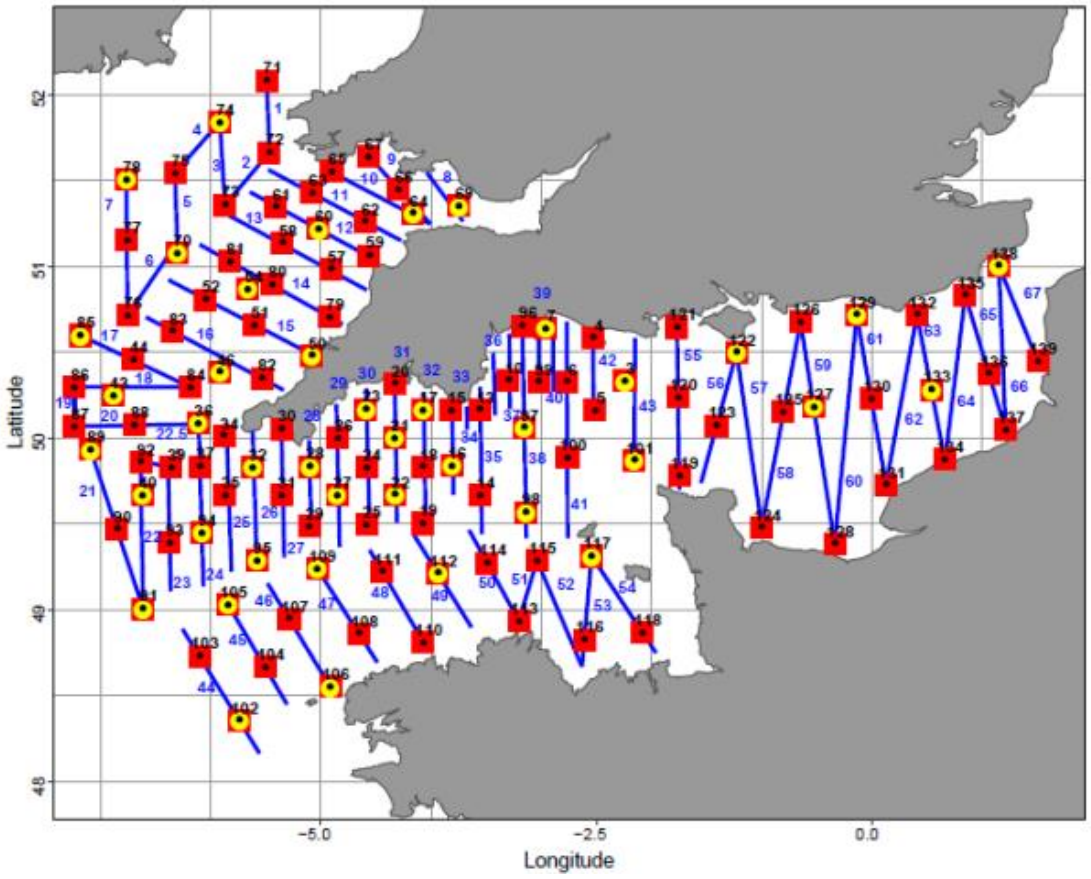

Figure 1. Overview of the planned survey area, with the acoustic transect (blue lines), plankton stations (red squares) and hydrographic stations (yellow circles).

AIMS:

1. Map, quantify and collect biological data on the small pelagic fish (SPF) community in the English Channel and Eastern Celtic Sea, using combination of fisheries acoustics and trawl (daylight). Specifically to assess:
    i. Area 7e sprat biomass for stock assessment (ICES HAWG)
    ii. Area 7 sardine biomass for stock assessment (ICES WGHANSA)
    iii. Importance role of Mackerel Box for juvenile mackerel
2. Investigate the distribution, and abundance of the zooplankton community throughout the survey area using two mesh ringnets (at night). Specifically:
    i. map and quantify sardine eggs and larvae to study the spawning habitat of sardine (1m diameter ringnet with 270 µm mesh)
    ii. map and quantify zooplankton by size and taxonomic group (0.5 m diameter ringnet with 80 µm mesh)
3. Characterise the physical oceanographic properties (pelagic habitat) of the survey area using a combination of CTD profilers (SAIV, ESM2 and SeaBird) and discrete water-samples (Rosette-sampler) at night. Samples for determination of chlorophyll concentration, dissolved oxygen, salinity, temperature, turbidity, and dissolved inorganic nutrients concentration are collected, and will be used for validation of the CTD and FerryBox sensors . Water samples collected will be fixed on board for analysis at sea or post-hoc.

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4. Record marine mammal, bird and bluefin tuna observations to map and quantify the top predators in the survey area (Marine Life observers).
5. Conduct continuous measurements throughout the survey, of the environmental properties at the subsurface (4 m depth) by the Jena 4HFerrybox (Continuous CTD/Thermo-salinograph).
6. Collect hourly measurements of phytoplankton functional groups, size and abundance, with online flow-cytometer, connected to the FerryBox (collaboration with project JERICHO NEXT).
7. Collect water samples from the Rosette-sampler (at the oceanographic stations) and the FerryBox flow-through (during trawling operations) to extract environmental DNA (eDNA) to detect small pelagic fish and other pelagic organisms. This work is part of a PhD which focusses on the use of eDNA in marine environment to validate acoustic data and as a monitoring tool for rare organisms (PhD candidate Chris Brody, University of Salford).
8. Continuously collect data on mesozooplankton populations with the continuous Plankton Image Analyser (PIA). Collaboration with Plankton Analytics Ltd (Julian Tilbury, Plymouth).
9. Collect and freeze sardine, sprat and anchovy specimens from different areas for a genetic study on the stock structure of the small pelagic fish community.
10. Collect and freeze up to 50 herring specimens at three different locations: Eastern English Channel, Western English Channel and Bristol Channel. (D. Clarke, Swansea University).
11. Collect a zooplankton sample using the 200 µm mesh ringnet at the West Gabbard 2 SmartBuoy, for the Lifeform project (Defra, PI Sophie Pitois) as part of the UK monitoring network for zooplankton.
12. Collect daily water samples with the automatic water sampler on the Ferrybox for analysis of phytoplankton community abundance and composition and dissolved inorganic nutrients concentration, (ASMIAE project PI Sophie Pitois).
13. Collect zooplankton samples at 10 preselected coastal and estuarine stations (primes 10, 13, 15, 17, 20, 21, 23, 50, 79 and 82), to investigate the presence of lineages of microscoporidia on copepods (PhD candidate Jahcub Trew, University of Exeter).
14. Collect stomachs from common small pelagic fish species to determine trophic interactions and microplastic ingestion.
15. Collect subsurface chlorophyll samples at coastal stations in the Western English Channel to investigate the presence of phytoplankton toxins (Cefas, PI Andy Turner).
16. To tag and release elasmobranchs species caught in the trawl with conventional - (Petersen discs) and/or electronic (DSTs) tags (Defra/MMO project(s), PI Jim Ellis/Sophy Phillips).

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NARRATIVE:

All staff joined the RV Cefas Endeavour in Swansea between 12:00 -18:00 (BST) on the 5th of October. Those requiring inductions (11) were all present for 15:30 induction. Pilot joined at 01:45 on the 6th of October and RV left shortly after to steam to St Brides Bay north of Milford Haven. Arrived on location at 08:00 and first had toolbox/introduction with scientists and crew at 08:15. Set up acoustic calibration equipment afterwards which was completed at 11:00. Conditions were far from ideal but speed through water (on the drift) had not exceeded 0.2 knots so still planned to conduct a calibration after Muster drill (11:30) which was completed before lunch. After lunch the RV moved to the northern part of bay to have a sufficiently long period of drift to the south to complete calibration procedures. At 13:30 all was set but as the drift shifted to a westerly direction towards rocks, the calibration spheres had to be brought up. Because the wind had freshened, it was decided to postpone calibrations until better conditions. Instead, the RV steamed into Bristol Channel to conduct a shakedown tow with the pelagic trawl. This year a new rigging of the Marport (headline sensor) vastly improved the trawl deployment due to a reduced risk of the system getting caught in the bigger mesh. Next, the RV steamed to a sheltered spot to trial the new CTD and Rosette-sampler, which was also successfully completed. Overnight the first plankton and water-sampling stations ('rosette stations') were completed.

On Sunday the 7th of October the daylight routine kicked in, running acoustic transects and deploying the trawl when needed. At night, a series of plankton and rosette stations was conducted. The order of transects was adjusted to continue work despite freshening weather conditions. On Thursday the 11th of October, the RV steamed into Bideford Bay, North Devon, having completed transects 8-14 and half of 15, to shelter from the gales forecasted. The very favourable conditions during the remaining 2 hours of daylight and the first hours after nightfall on the 11th were used to conduct the calibration of the 38, 120 and 200 kHz echosounders (at 0.512 and 0.256 ms pulse duration).

Adverse weather conditions prevented any work to be undertaken on Friday the 12th and most of Saturday the 13th of October, until, at 15:00, a small weather window permitted the inshore component of transect 15 to be completed. From Sunday the 14th until Wednesday the 17th of October, the transects and stations of the Bristol Channel and Isles of Scilly were completed (dropping transect 21 following last year's observations of lack of target species on the western-most transects). Overnight, while steaming into French waters, paperwork provided by the FCO was deemed insufficient as a dispensation by the French maritime authorities. Instead, from Thursday the 18th of October until Monday the 22nd of October, the RV continued work on the UK side of the western Channel, completing transects 25-30 and most of transect 31 as well as the associated plankton and rosette stations. At 17:30 on the 22nd of October, the RV docked in Fowey for a scheduled mid-survey break, which included a full crew change and partial staff change. Fortunately, while docking, the official dispensation to work in French waters came through, enabling the survey to proceed and catch up with the western transects in the French sector.

At 18:00 on Tuesday the 23rd of October, the RV left Fowey as scheduled to transit across to French waters. Between Wednesday the 24th of October and Sunday the 28th of October, transects 45-54 were completed (44 was removed for the same reasons stated above for transect 21), as well as the associated plankton and rosette stations. A noticeable reduction in fish schools on the echosounders limited the number of trawls conducted along the transects around the Channel Islands. From Monday the 29th of October until Sunday the 4th of November, fair conditions enabled the RV to resume surveying transects in UK waters, gradually working eastwards. In contrast with the previous days, good numbers of trawls were conducted. From Monday the 5th of November surveying commenced in the eastern Channel, sailing across transects from French to UK coast. Very few schools were observed but, despite that, relatively small but representative catches were obtained when weather and static gear permitted trawling operations (often at first and last daylight).

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During the final days of surveying, transects 58 and 59 were run in northerly direction due to fresh southerly winds, which on the 7th of November also led to a trawl operation being abandoned due to adverse weather conditions. Fishing operations were resumed on the 8th of November and the last trawl was conducted on the morning of the 9th of November before the last transect was completed (#60) and the RV Cefas Endeavour commenced the transit back to Lowestoft. Very strong southerly winds during the night of the 9 to 10th prevented the collection of the West Gabbard zooplankton sample (objective #11). At 09:20 on the 10th of November the pilot was collected off Lowestoft and the RV docked shortly after.

RESULTS

Pelagic Ichthyofauna

After removing the off-transect data a total of 2200 nautical miles of acoustic sampling units were collected for further analysis (Figure 2). These included several transects in the eastern Channel, which was sampled for the first time this year. A total of 46 valid trawls were made with the mid-water trawl, providing a suitable source of species and length data to partition the acoustic data. Both the number of completed acoustic transects and trawls exceeded those achieved in 2017, despite having more weather induced downtime in 2018. A significant contributing factor to this was the improvement on the rigging of the headline sensor which previously often got entangled in the large mesh upon deployment. The new rig removed these issues which sped up the trawling process and also meant that the trawls were more accurate at catching target schools.

Preliminary results indicated some differences in ichthyofauna observations when compared to 2017. In the Bristol Channel, other than the usual hotspot inside the estuary, the majority of fish biomass was found more inshore, as demonstrated also by the location of the trawl effort. In the French waters of the western Channel more fish activity was found along the western-most transects. Further east in the western Channel, very few schools were encountered, which matched last year's results. The transects east of Lyme Bay, sampled for the first time during Peltic, yielded little fish biomass.

Sprat (*Sprattus sprattus*) was widespread in most of the survey area with to more important areas, one in the Bristol Channel, including in the coastal waters in the west, and the other in English waters of the western Channel (Lyme bay, Figure 3). Medium sized fish (mode of 9 cm) dominated all main areas. As in previous years, the smallest fish were found in the Bristol Channel and the largest (mode of 12 cm) in Lyme Bay. However, only small numbers of sprat found in the trawls conducted in French waters of the southern English Channel, with relatively high numbers of mainly intermediate size specimens caught on transect 47 (Figure 1, 3). A total of 110 sprat specimens from four different stations were collected for genetic processing.

Sardine (*Sardina pilchardus*) distribution was comparable to previous years with the bulk of biomass found in the English Channel (Figure 4). This year, more large sardines (mode of 14 cm and to a lesser extent 18 cm) were found north of the Cornish Peninsula. A wide range of sardine sizes was found in the northern Channel waters, from the Isles of Scilly to the eastern Channel. In French waters, the very smallest sardines dominated (mode of 9.5 cm) although bigger specimens (mode of 15 cm) were also found. A total of 173 sardine specimens from six different stations were collected for further genetic processing.

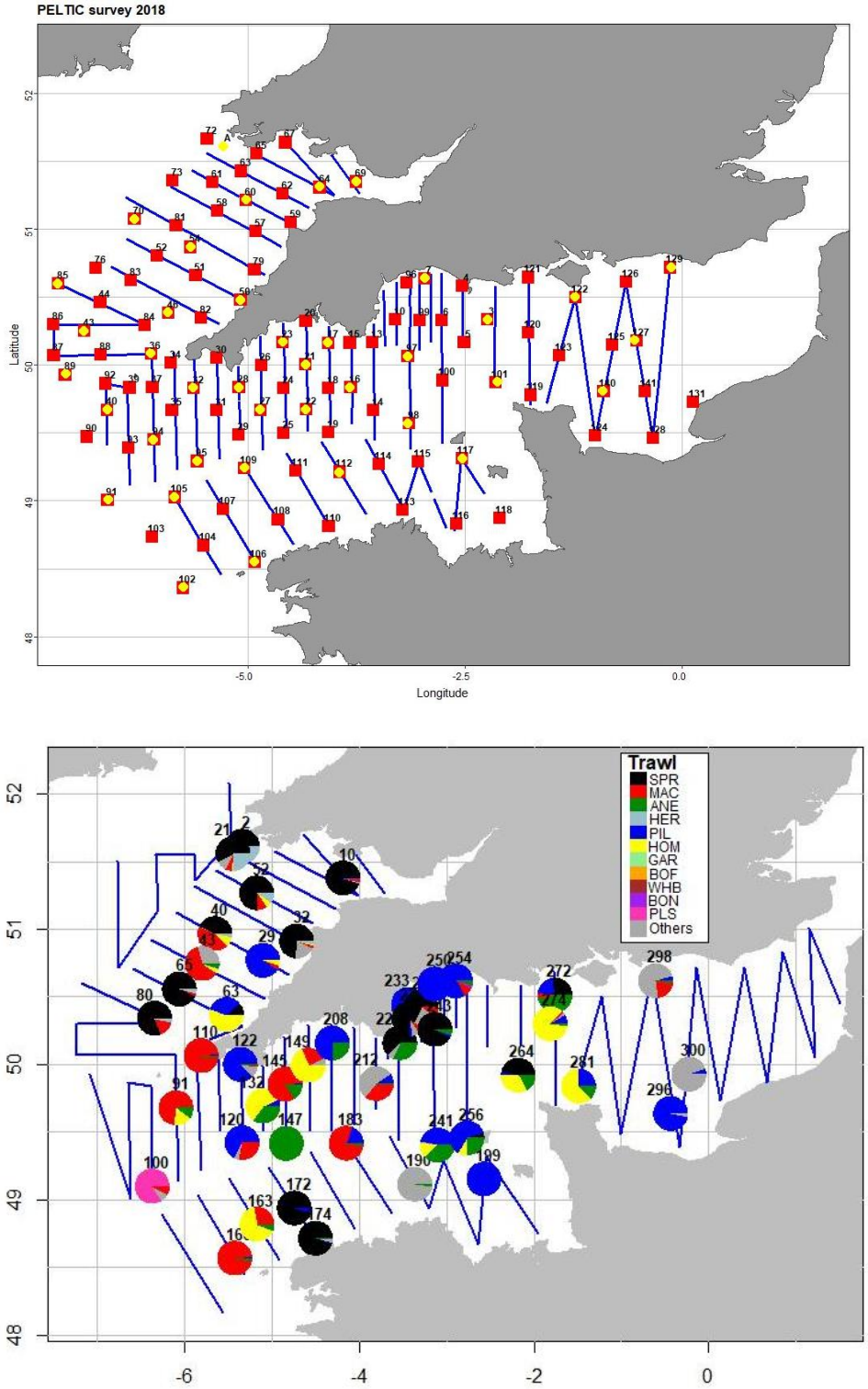

Figure 2. Overview map and detail of the survey area. Top: Acoustic transects (blue lines) and prime stations completed during PELTIC18. Bottom: Trawl stations (pies) with relative catch composition by key species. Three letter codes: SPR=sprat, MAC=mackerel, ANE=anchovy, HER=herring, PIL=sardine, HOM= horse mackerel, GAR=garfish, BOF=Boarfish, WHB=Blue whiting, BON=Atlantic bonito, PLS=pearlside.

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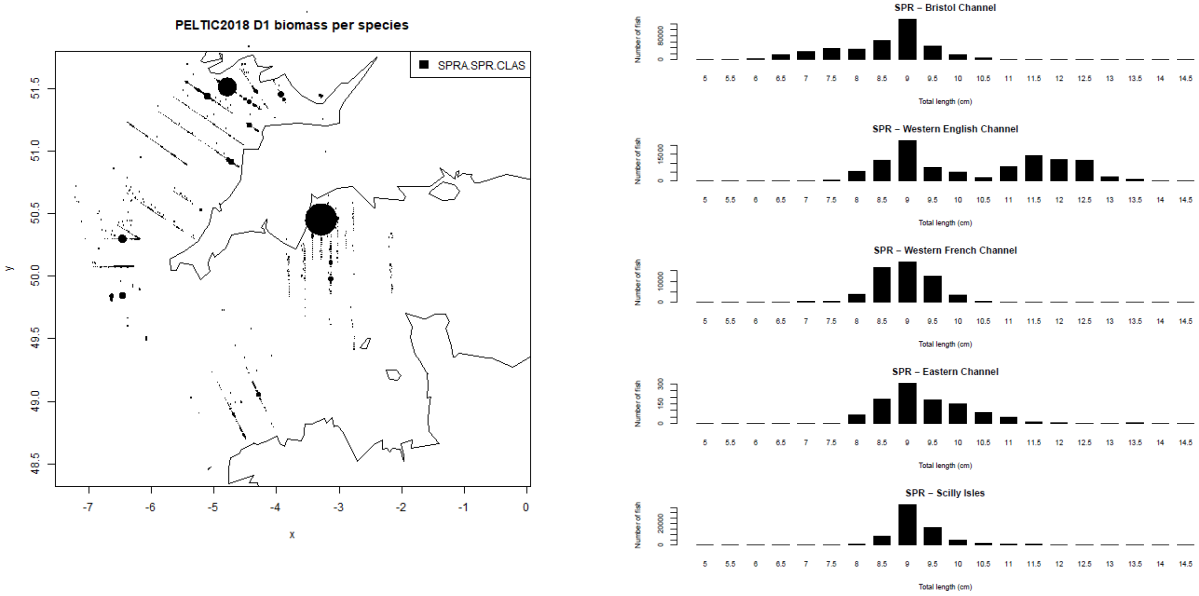

Figure 3. Acoustically derived sprat biomass distribution (left) and trawl-based length frequency histogram for sprat in each of the subareas of the Peltic survey (right). Please note that bubble size has not been standardised between species.

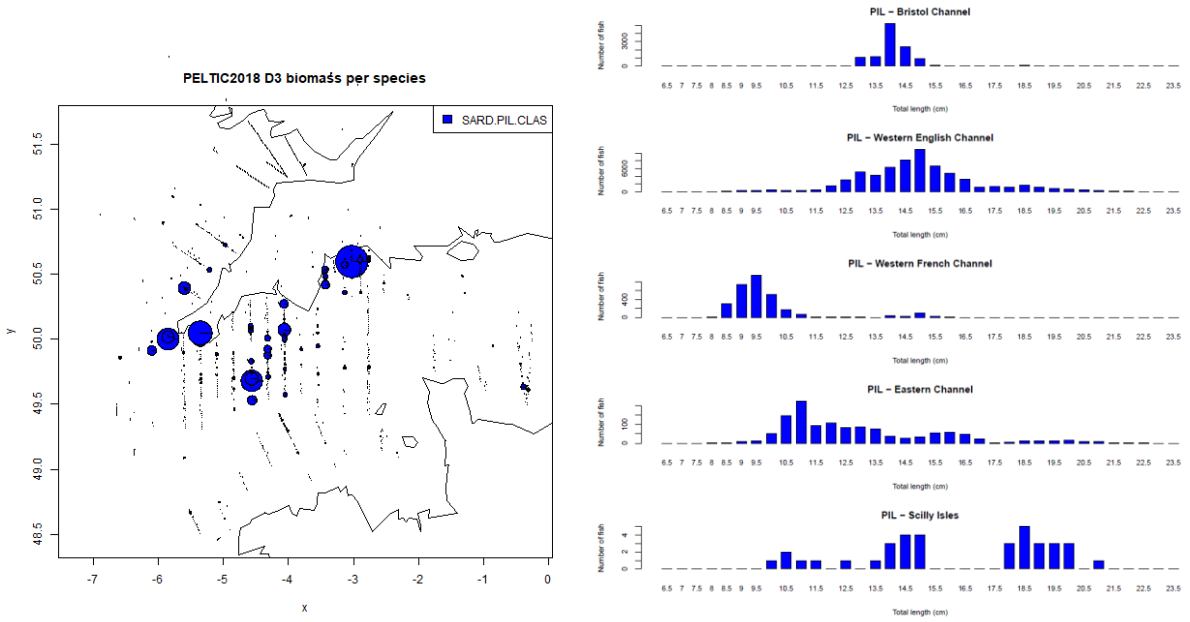

Figure 4. Acoustically derived sardine biomass distribution (left) and trawl-based length frequency histogram for sardine in each of the subareas of the Peltic survey. Please note that bubble size has not been standardised between species.

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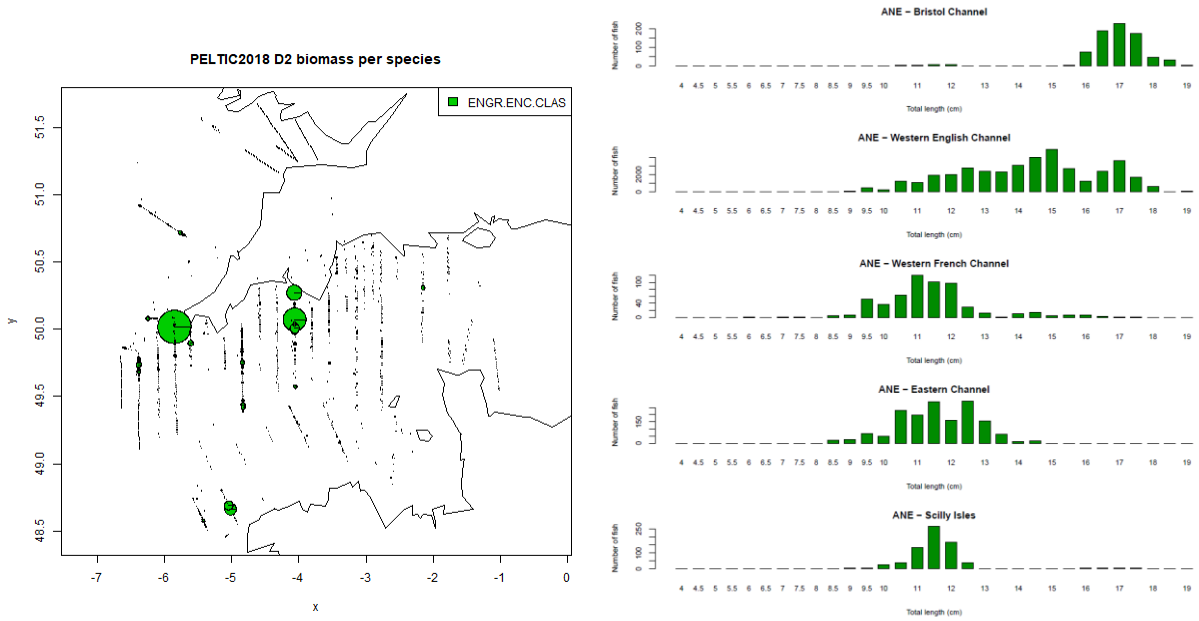

Figure 5. Acoustically derived anchovy biomass distribution (left) and trawl-based length frequency histogram for anchovy in each of the subareas of the Peltic survey. Please note that bubble size has not been standardised between species.

Anchovy (*Engraulis encrasicolus*) distribution was much more widespread than observed in recent years and preliminary results suggested a higher biomass than in 2017. Coverage in the French waters as well as in the eastern Channel resulted in a consistent presence in species mix. Another notable observation included the presence of juvenile anchovy in small surface schools on the French side. In contrast to last year, the whole size spectrum was found in each of the main survey strata. In 2018 anchovy in the Bristol Channel were dominated by the largest fish (mode at 17 cm) whereas smaller fish dominated in French waters (6 cm smallest fish caught). Figure 5).

Herring (*Clupea harengus*), normally only found in mixed schools with sprat in a handful of Bristol Channel stations, this year contributed to all but one of the Bristol Channel trawl stations and in some occasions in large numbers. The majority of fish were aged 0 years old.

For the first time in the survey series (since 2012), several **Atlantic bonito *(Sarda sarda*,** Figure 6***)*** were caught: in the Bristol Channel at stations 10 (82 specimens) and 40 (1), and in Lyme Bay at stations 243 (2) and 254 (6). The bonitos from the Bristol Channel ranged between 15 -23 cm and those in Lyme Bay were slightly bigger at 21-30 cm, though all were aged as 0-year old. Although a typical species of warmer waters, the survey area is part of the species' natural distribution range. The limited records found in UK waters suggest it's most likely found during summer.

Figure 6. Specimen of Atlantic bonito (*Sarda sarda*) collected during the survey.

Zooplankton

Samples of mesozooplankton and ichthyoplankton communities were collected at 107 stations using 80 and 270 micron ringnets, respectively. Preliminary results on the distribution of sardine eggs suggested a similar distribution as found in previous years with key spawning areas on both side of the Cornish Peninsula (Figure 7). Sardine eggs appeared to be distributed perpendicular to the coast, with highest concentrations associated with the boundary between mixed and stratified waters. Plankton samples were again collected in the southern half of the English Channel and, for the first time in the eastern Channel; both eggs and larvae were found here although in relatively low densities. Size information and taxonomic group of zooplankton samples collected at the same stations, will be obtained by Zooscan processing back in the lab.

Additional zooplankton samples (with ring nets, mesh sizes 80 µm and 200 µm) were collected at 10 sampling stations for investigation of Microsporidia infection in copepods (Table 1).

For the duration of the survey, the Plankton Image Analyser (PIA) was run to collect images of zooplankton organisms, which will be processed and analysed at PML.

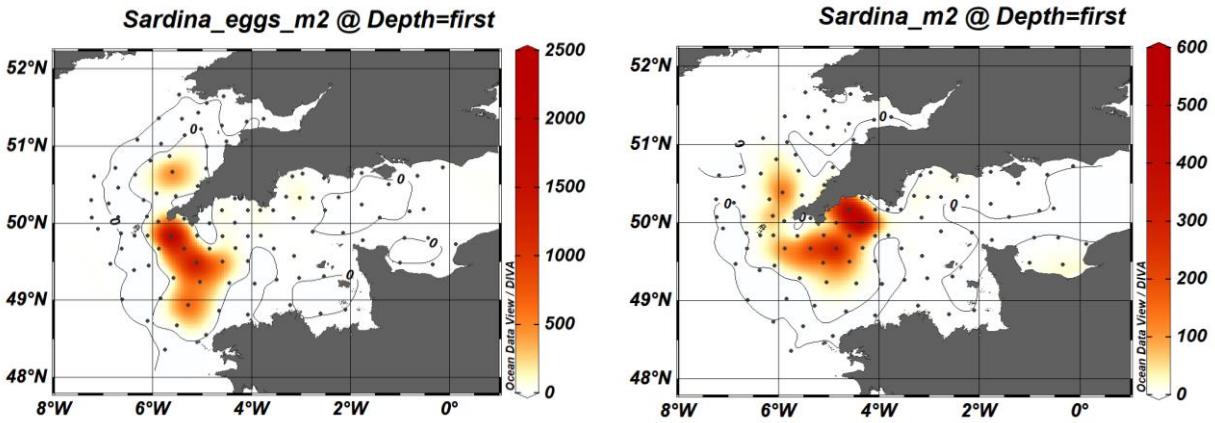

Figure 7. Sardine eggs (left) and larvae (right) densities in m^2 as sampled during the 2018 Peltic survey. Note that the larvae section only includes those larvae that could be identified as sardine (*Sardina pilchardus).* More larvae were observed and although they could not be identified to species, the vast majority was considered to also be sardine.

Physical Oceanography

A SAIV mini CTD was deployed at the 107 zooplankton stations, providing information on temperature (°C) and salinity). A Rosette sampler, equipped with 12 Niskin bottles was used at 38 of those stations ('rosette stations') to collect discrete water samples to determine phytoplankton and microzooplankton communities and the physical and chemical properties. The later included: dissolved oxygen, salinity, phytoplankton pigments (including chlorophyll-a) and dissolved inorganic nutrients (nitrate, nitrite, ammonium, phosphate and silicate). This year, additional water samples were collected both at rosette stations and during trawls (Table 1). These were filtered to extract environmental DNA (eDNA). A SeaBird CTD (equipped with temperature, salinity, PAR, oxygen, turbidity and fluorescence sensors) mounted on the Rosette provided live measurements of the vertical properties of the water column.

Surface water conditions (at 4 m depth) were continuously monitored by the FerryBox, which recorded temperature, salinity, fluorescence, turbidity, and oxygen. A flow cytometer, connected to the FerryBox, carried out measurements of abundance and size of the phytoplankton community every hour.

Table 1. Number of samples collected (top) and CTD profiles carried out (bottom) during CEnd19_18.

Measured variables	Total (N)
Salinity	39
Dissolved oxygen (triplicates)	15
Chlorophyll/Pigments analysis (HPLC - duplicates)	38
Chlorophyll (HABs detection)	22
Inorganic nutrients	38
Phytoplankton	38
Microzooplankton	38
Mesozooplankton (80 µm)	107
Mesozooplankton (270 µm)	107
Mesozooplankton parasitic copepods (80 µm - duplicates)	10
Mesozooplankton parasitic copepods (200 µm - duplicates)	10
CTD profiles with Rosette	35
CTD profiles with ESM2	2
CTD profiles with SAIV MiniCTD	113

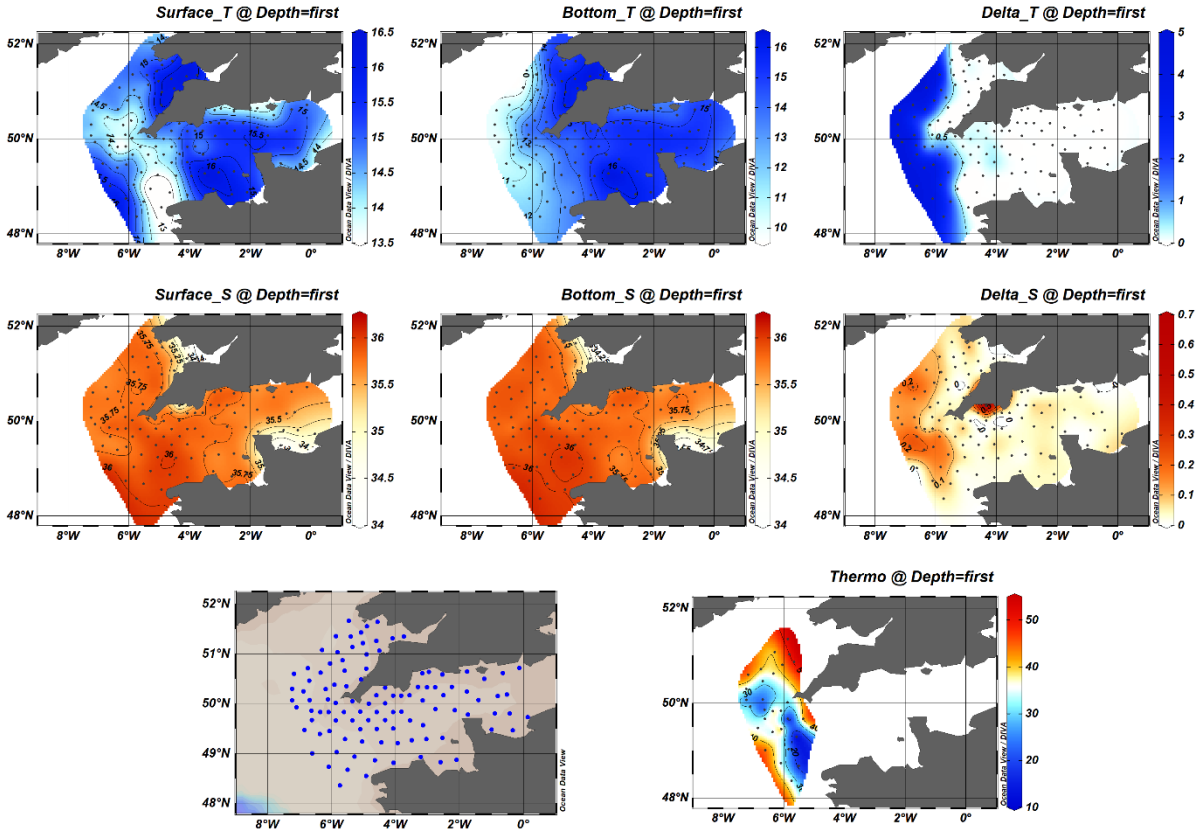

Figure 8. Temperature (T, °C, top) and salinity (S, middle) distribution at the surface (left column) and bottom (central column) as recorded by the SAIV MiniCTD at the 99 sampling stations. The difference in temperature (Delta_T, right) and salinity (Delta_S) between surface and bottom is also given, together with depth (m) of the thermocline (Thermo), at the stratified stations (Delta_T > 0.5 °C).

Sea surface temperature during the survey was highest in the Bristol Channel, and in the French waters of the Western Channel (off St Malo). The maximum temperature of 16.4 °C (Table 2) was slightly lower than the maximum temperature recorded during the previous surveys (16.7 °C in 2017 and 17 °C in 2016). This is unexpected as sea surface temperatures prior the survey, in September, were generally higher than

September 2017. As observed in previous years, lowest surface temperatures were recorded in the cool water patch in the southern areas of the Channel, off France (clearly visible in Figure 8). Furthermore, the lowest temperature recorded this year at the surface (12.8 °C) was almost 0.5 °C cooler than lowest temperatures in 2017. Lowest bottom temperatures were recorded at the most westerly stations in the Celtic Sea and the minimum bottom temperature was almost 1 °C lower than last year. The boundary layer where the patch of cooler water meets the warmer waters of the English Channel and the Celtic Sea was marked by a series of frontal systems.

Table 2. Summary statistics (minimum, maximum, mean, standard deviation, and number of observations) of temperature and salinity measurements, recorded by the SAIV MiniCTD at the sampling stations. Column titles are the same as in Figure 8.

	Surface_T	Bottom_T	Surface_S	Bottom_S	Delta_T	Delta_S	Thermo
Min	12.84	9.78	34.21	34.22	0	0	11
Max	16.41	16.43	36.03	36.06	4.92	0.70	53
Mean	14.80	13.94	35.69	35.75	0.88	0.06	34.7
StDev	0.76	1.76	0.30	0.30	1.46	0.08	10.4
Number	106	106	106	106	106	106	30

Offshore stations in the Bristol Channel and in the Western approaches, west of Lizard Point, were thermally stratified (Delta_T > 0.5 °C; Figure 8), while coastal stations, on both sides of the English Channel were vertically mixed (Figure 8). The difference between surface and bottom temperatures was highest at offshore stations in the Celtic Sea and up to 4.92 °C (Table 2). The offshore stratified stations (in the Bristol Channel) were characterized by the deepest thermocline depth (> 30 m) while stratified stations associated with the cooler patch of surface water had a shallower thermocline (minimum of 11 m depth; Table 2 and Figure 8). Stratification in 2018 survey was stronger than last year with maximum "Delta_T of 4.92 °C versus the 4.31 °C in 2017). Salinity was lowest in the inner stations of the Bristol Channel and in the Bay of Sein, France (34.21, while highest values were recorded in offshore (south west) waters of the Celtic Sea (34.21; Table 2 and Figure 8). Minimum, maximum and average values of salinity in 2018 were all higher than the same statistics in 2017; this could have been the results of lower precipitation and higher temperature in summer 2018 or could be a results of different sensor settings in the SAIV MiniCTD profiler (with the second point to be addressed during the validation of the sensors versus discrete samples).

Surface distribution of chlorophyll concentration was estimated by fluorometers on the FerryBox and on the SeaBird profiler mounted on the Rosette sampler. Remote sensed images of ocean colour from MODIS (algorithm OC3) from Neodaas.co.uk (PML) were also used to obtain a synoptic view of the study area. Unfortunately, due to poor weather conditions and often overcast sky, a very limited number of satellite pictures was available. From (uncalibrated) measurements of fluorescence (proxy for chlorophyll) from the FerryBox some areas with slightly higher chlorophyll concentrations were identified: one in Eddystone/Mount Bay, another one offshore in the Celtic Sea, and last one towards the eastern English Channel. Presence of phytoplankton in the water (particularly large diatoms such as *Coscinodiscus* spp. and *Rhizosolenia* spp.) was observed during microscopy analysis of ring net samples.

Observer data: Marine Mammal, Birds and large pelagic fish

During both halves of the 2018 survey, two experienced volunteer MARINElife surveyors, stationed on the bridge in a central position, employed an effort-based 300m box methodology for recording birds (an adapted version of ESAS methodology) with an additional 180° scan area surveyed along each transect line, as used on the majority of MARINElife's year-round surveys. During transits between transects, the

team recorded incidental observations when possible, logging significant species only. Furthermore, casual observations were regularly conducted during the net-retrieval stage of many trawls to identify species of birds associated with the fishing activity of the survey vessel but only significant species were logged as incidental records. During survey transects, all species of birds (both seabirds and terrestrial migrants) were recorded, along with all sightings of marine mammals. During the deployment of the fishing net, both teams paused effort. However, during the net-retrieval phase, incidental records of significant species were logged (e.g. Balearic Shearwater, Sooty Shearwater, cetaceans) whenever time permitted. During these times, observations were conducted from the rear of the Bridge to cover a 180° arc, aft of the vessel. Whilst this data was not part of the standard transect data it provided an opportunity to observe behaviour and associations with a fishing vessel and could provide useful comparisons with future surveys in these waters.

The weather was difficult for surveying in 2018, though on average slightly better than 2017 with approx. 63% of effort made in sea state 4 or less. However, there were a few days within the survey, particularly part 1, where the team were faced with storms. Resulting in a day off effort and in shelter early on in the survey on 12th October. Unlike the previous year, north-easterly airflow was predominant

A summary of all species recorded during the survey are provided in the following tables. A total of 4,534 sightings of 14,151 birds, from 41 species were recorded throughout the duration of the survey. As in all previous surveys, the gannet (*Morus bassanus*) was the highest recorded species. Though 2018 also saw higher numbers than previously of kittiwake (*Rissa tridactyla*) and most notably, significant higher numbers of Great shearwater (*Puffinus gravis*). However, recorded figures of a number of other species were notably down on previous years, particularly considering the extended survey effort. For example the total for European Storm Petrel (*Hydrobates pelagicus*) was significantly less in 2018.

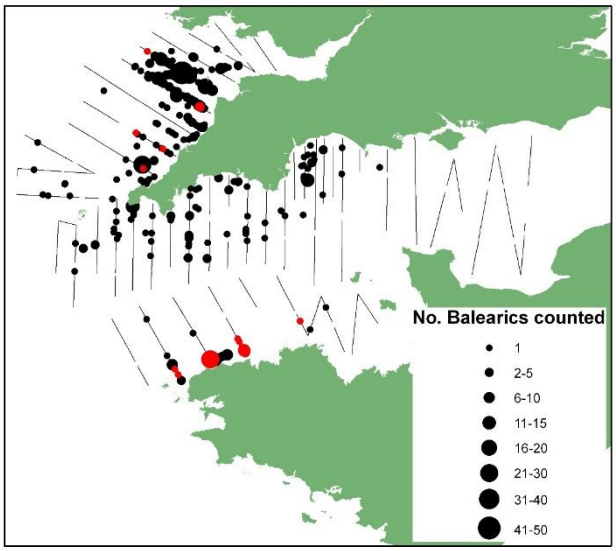

Figure 9: Distribution of Balearic Shearwater sightings recorded on effort in 2018 (red circles) in comparison to 2013, 2014, 2015, 2016 and 2017 (black circles). Sightings are scaled to abundance as shown in the figure legend. Grey lines show survey effort.

Of significant note, the total number of Balearic Shearwater (*Puffinus mauretanicus*) was again lower in 2018 than in in previous years (16 sightings of 51 individuals), and similar to 2017, the majority were recorded during the more southern section of the survey off the North coast of France (Figure 9). Not only did the 2018 survey yield a much lower count of Balearic Shearwater *Puffinus mauretanicus* than in previous years, the distribution was again seemingly different from historical surveys and more in line with the distribution recorded in 2017. Historically this survey observed the main concentration of this species to the west of Lundy and in transects off the north Devon coast. However, this year the only concentrations were off the northwest corner of Brittany, with a few additional smaller sightings of the north coasts of Devon and Cornwall. Most notably, 2018 was the first year that not a single sighting was made of this species off the south coast of Cornwall, Devon or Dorset, and therefore the first year no single sighting was made during the survey of a Balearic shearwater in Lyme Bay.

The MARINElife observers recorded a total of 204 cetacean encounters, totalling approximately 3,049 animals from 8 species. The cetacean sightings recorded on effort are given in Table 3.

Table 3. Observations of marine mammals during Peltic 18

Species	Scientific Name	No. sightings	No. animals
Fin Whale	*Balaenoptera physalus*	9	14
Minke Whale	*Balaenoptera acutorostrata*	4	4
Unidentified whale sp.		3	3
Common Bottlenose Dolphin	*Tursiops truncates*	6	31
Short-beaked Common Dolphin	*Delphinus delphis*	145	3049
Risso's Dolphin	*Grampus griseus*	1	3
White-beaked Dolphin	*Lagenorhynchus albirostris*	1	3
Long-finned Pilot Whale	*Globicephala melas*	1	2
Harbour Porpoise	*Phocoena phocoena*	28	131
Unidentified dolphin sp.	*Odontocete sp.*	6	13
	Total:	**204**	**3,253**

A greater diversity of species were recorded in 2018, with the addition of Risso's dolphin and Minke whale, not recorded during the 2017 survey. Comparable sightings of Fin whale *Balaenoptera physalus* were again made this year, with 9 sightings of 14 animals, predominantly in deeper waters west of north Cornwall and Devon, towards the Celtic Deep. Short-beaked common dolphin *Delphinus delphis* was again by far the most frequently recorded species, with nearing 150 sightings of over 3000 animals (Table 3). Similar to previous years, the highest concentration of Common Dolphin encounters were in the Celtic Sea and the waters around the Isles of Scilly (Figure 10). Notably, no Common dolphins were recorded on transect in the eastern English Channel, beyond Lyme Bay (Figure 10). One group of 3 White-beaked Dolphin *Lagenorhynchus albirostris* were seen this year in Lyme Bay.

Figure 10: Distribution of Common dolphin sightings recorded on effort in 2018 (green circles). Sightings are scaled to abundance as shown in the figure legend. Grey lines show survey effort.

Numbers of Atlantic Bluefin tuna (*Thunnus thynnus*) observations increased again compared to 2017 with in total 67 different feeding observations observed.

Summary

Peltic18 constituted the 7th autumn survey on small pelagic fish and their ecosystem in the waters of the western English Channel and eastern Celtic Sea. For the second year, the survey was extended beyond the area covered between 2012 and 2016, which had focussed solely on the Mackerel Box. The 2018 survey coverage included the French waters of western English Channel and a large part of the eastern Channel. The survey commenced on the 6th of October and ran for 36 effective survey days, starting in the Bristol Channel working into the English Channel. The 2200 nautical miles of effective acoustic coverage were supplemented with 46 valid trawls which provided details on species composition and biological information. Preliminary results indicated that, despite the hot summer preceding the survey, surface temperatures were similar to the ones recorded in 2017, although the stratification was stronger.

In addition, salinity was higher than previous years, most likely due to reduced rainfall. Sardine dominated the pelagic ichthyofauna, Anchovy was found in higher numbers than in 2017 but sprat biomass decreased in the whole survey area, although it was more widespread north of the Cornish Peninsula. Sardine egg- and larval maps showed similar geographical areas of sardine spawning compared to previous years with the waters at the mouth of the English Channel being most important. For the first time since 2012, Atlantic bonito (*Sarda sarda*) were caught (at four different stations). Feeding Atlantic Bluefin Tuna (*Thunnus thynnus*) observations increased again.

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Scientists In Charge
1st Mar 2019

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