

CEFAS RESEARCH VESSEL SURVEY REPORT

RV CEFAS ENDEAVOUR

Survey: CEND 4 – 2019

STAFF: Part 1 (17 – 31 March)

Part 2 (1 - 14 April)

Name	Role	Name	Role
Ian Holmes	SIC	Ian Holmes	SIC
Joana Silva	2IC	Sarah Walmsley	2IC
Marc Whybrow	DM	Marc Whybrow	DM
Georgina Eastley	Sampler	Georgina Eastley	Sampler
Kevin Duggan	Sampler	Kevin Duggan	Sampler
Suzanne Ware	Environment lead	Ross Bullimore	Environment lead
Tammy Noble-James	Sampler	Lisa Readdy	Sampler
Tom Woods	Sampler	Joanne Smith (1-7 April)	2IC trainer
Linford Mann	DM	Sam Smith (7-14 April)	Sampler
Karen Vanstaen	Sampler	Jon Hawes	Sampler
Briony Silburn	Data manager	Anna Neish	Data Manager
Katherine Maltby	Sampler	Andrew Bodle	MIST
Gary Burt	Benthic	Hayden Close	Sampler
James Pettigrew	Sampler	Charlotte Jennings	DM
Axa Molina-Ramirez	MIST	Nicola Hampton	Sampler
Rogan Harmer	Sampler	Nevena Almeida	Sampler
		Maria Wild	Sampler
		James Scott (PhD student)	PIA
		Leigh Barnwell (Marine Institute)	Observer

DURATION: 17 March – 14 April 2019 (29 days)

LOCATION: Western Channel/Celtic Sea (ICES areas 27.7.e-j)

PRIMARY AIMS:

1) To carry out an integrated monitoring survey of the Celtic Sea, south-western approaches and the western Channel using a random stratified survey design for the purposes of providing fish stock assessment data and the collection of associated ecosystem information.

A) Deployment of two standardised 4m beam trawls. One trawl with cod-end liner (blinder) fitted; one with no blinder fitted. Catches from the trawls will be processed to obtain information on:

- Distribution, size composition and relative abundance of fish, shellfish, cephalopods, and benthic invertebrates.
- Age-length distribution of selected fish species.
- Biological parameters of selected species.
- Distribution of fish in relation to their environment.
- Distribution of macrobenthos and anthropogenic debris.
- Length, weight & maturity information in support of the EU Data Regulation.

The data obtained from processing the trawl catches are collected in support of the EU Data Collection Framework (DCF) and will be submitted to ICES working groups and will also support other Cefas biological studies.

B) Water column sampling. Water column profile and water samples using a Niskin with ESM2 logger will be collected two/three times a day, providing profile information for chlorophyll, oxygen, salinity temperature, nutrient samples and the relevant QA/QC samples for calibration of the equipment.

C) Sediment and benthos at a station. Sediment sample(s) will be collected at one end of the tow along the trawl transect using a mini-Hamon grab. These samples will be used for collecting the following data:

- The benthic macro infauna (5mm sieve)
- Benthic infauna (1mm sieve)
- Sediment particle size analysis

D) Sediment redox. SPI camera dips (with up to 5 replicates at each location) will be collected at one end of the tow. These data will be linked to the sediment and benthic samples so should occur at an equivalent site to those samples.

E) 2m beam trawl deployments. A 2m beam trawl may be deployed to supplement and provide contrast to the fish/benthic catches observed in the 4m beams.

- 2) To continuously log sub-surface (3m) salinity, temperature, fluorometry and other environmental data using the 'Ferrybox'. Additionally, a Flow cytometer (phytoplankton) and plankton image analyser (PIA) for zooplankton will be run in conjunction with the Ferrybox.
- 3) To record details of surface sightings of any marine mammals, sea turtles and large pelagic fish, and record observations on jellyfish aggregations.

SECONDARY AIMS:

4. Collect water samples for caesium & tritium analysis under SLA22 (T Bailey – Cefas Lowestoft).
5. To tag/release specimens of various commercially exploited skates (Rajidae) and other selected elasmobranches.
6. Collect specimens of selected species for ID purposes as well as length-weight measurements where still required.
7. To collect length and weight measurements of jellyfish caught.
8. To collect other samples in support of active Cefas projects.
9. To recover and replace a wave-rider close to the Isles of Scilly (D Pearce – Cefas Lowestoft)
10. To collect otoliths from Ballan Wrasse (*Labrus bergylta*) to aid future Cefas fish ageing studies (J Smith – Cefas Lowestoft).
11. Collect nutrient samples from surface sea-water supply in support of the ASMIAE project (N Greenwood - Cefas Lowestoft).
12. Collect specimens of *Solenocera membranacea* (P McIlwaine - Cefas Lowestoft).
13. Collect a plankton ring-net sample at the Gabbard location. (S Pitois – Cefas Lowestoft).

NARRATIVE: (All times GMT)

Part 1.

An advance party of scientific staff joined the RV Cefas Endeavour in Swansea at 1600h; 14 March to set up labs and equipment and to check all gear had arrived. The remaining scientific staff joined the vessel the following day around 1700h. With strong winds and heavy seas forecast, sailing was delayed from 0900h 16 March to 0800h 17 March. Toolbox talks, vessel safety inductions, emergency muster and safety briefings took place on the morning of 16 March allowing scientific staff on night shift to get into a sleep pattern.

RV Cefas Endeavour sailed at 0800h 17 March and headed directly to the first sampling location in stratum 3; station 2. Further gear specific toolbox talks took place prior to activities, and work began with an ESM2/Niskin deployment at (1005h) followed by the deployment of the two 4-metre beam trawls (1054h), mini-Hamon grab (1245h) and finally the 2-metre beam trawl (1326h). No SPI camera deployment was possible at this first location. Scientific staff then moved onto their 2-watch system operating from midnight to mid-day and mid-day to midnight. In the remainder of the day, a further 3 locations were successfully completed within stratum 3 and 13.

On 18 March, work began at stratum 13; station 4 and continued at inshore stations during the hours of daylight. At stratum 4; station 6, the SPI camera was deployed for the first time on the survey. Plans to complete stratum 4; station 5, close to shore were thwarted due to poor ground, static gear and limited workable area due to the Whitsand and Looe Bay MPA being close to the station. After sunset, stations further offshore were successfully sampled. The final sampling location in stratum 3 was completed on this day. With excellent weather and sea conditions forecast, the decision was made to complete a series of offshore stations in stratum 13, 7 and 9 and these were completed on 19 March. At a position close to stratum 9; station 3, the Hurd Deep caesium and tritium water sample was taken. At stratum 13; station 6, the first deployment of the plankton ring net was successfully completed. For operational reasons, only a single 1m ring net with a 1mm mesh was deployed and this remained the case for all further plankton dips on the survey.

On 20 March, work began in stratum 7 working towards the Devon coast for first light. At stratum 7; station 6, the first electronic tag was used on a female undulate ray (*Raja undulata*). Beam trawls were deployed twice at stratum 4; station 7 due to the small catch observed with the first tow and there being a doubt that the gear had fished correctly. The repeat tow's catch proved similar if not smaller than the first, so the first tow was considered as valid and the second tow treated as an additional tow. Over the course of the day a total of seven valid tows were completed. The following day was spent at the western end of Lyme Bay beginning the day east of Start Point and heading inshore working close to Exmouth during daylight. Stratum 5; station 4 had to be shot to the east in order to avoid the South Devon Inshore Potting Agreement area (IPA). Interactions with static gear were minimal over this day with only limited amounts of gear being observed. A total of eight valid stations were completed on this day.

The 22 March began at the southern end of Lyme Bay heading inshore at the eastern end of the Bay during daylight before heading south of Portland before nightfall. Stratum 7; station 3 had to be abandoned due to large steep sand waves and an inappropriate tide state. At stratum 5; station 7, a large by-catch of sand and gravel meant a deck sort had to be carried out and an estimate of the by-catch being made. Stratum 6; station 4 saw the first large catch of common brittle-stars (*Ophiothrix fragilis*). Seven valid stations were completed during the day. On the following day work began in stratum 6, moving into stratum 9 and 7 later in the day and finishing up in stratum 10 before midnight. Six stations were completed during the day.

On the 24 March, work began in stratum 11 west of Alderney, where two stations were worked in daylight in order to avoid static gear. Locations of gear from a Guernsey vessel (FV Hayley B) had been reported to us but other vessels gear were in the vicinity within the Mid-Channel potting areas. At stratum 11; stratum 13, the tow was located 0.34nm outside of the bullring due to potting areas and cables limiting where the gear could be deployed. The location stratum 11; station 14 was worked in anticipation of losing at least one of the lower numbered locations and initially treated as an additional tow, although poor ground reduced the tow length to 1.2nm. However, it later proved that all other planned locations were successfully completed so this location became an extra valid station. At stratum 11; station 7 a reduced length tow was fished, again due to poor ground and static gear in the way. Stratum 11; station 10 was fished south of the Les Ecrehous RAMSAR area for a 1.55nm tow length – reduced again due to poor ground. The location stratum 11; station 2 had to be fished twice as the first attempt did not fish correctly due to the strong tide. Over the course of the day, seven valid tows were completed.

The following day, work began in stratum 10 in deep water before moving inshore to stratum 10; station 5 south-west of Guernsey to work in daylight. This was followed by stratum 11; station 1 which was fished south of the Pierres de Leco RAMSAR area. The presence of static gear, poor ground and power cables, along with a large portion of the bullring being located within the RAMSAR area meant this location was fished for just 1.5nm and was outside the bullring by 0.5nm. Once daylight was lost, work continued offshore. With offshore locations completed, survey operations paused at 2248h until daylight so that the inshore locations could be worked when any static gear present would be visible.

On 26 March, work began at first light at stratum 10; stratum 6 and moved further inshore to stratum 11; station 9. At both these locations the Cefas Endeavour had many small French trawlers in close proximity. The second of these two stations was fished for just 1.5nm due to deteriorating ground. After a long steam, work in stratum 12 began at station 5 where a large by-catch of common brittle stars was observed. Five stations were successfully completed in the day. The following day was spent offshore in the mid channel area in strata 10, 9 and 12 ending the day at the north end of stratum J and K with seven stations being completed. Good numbers of large sole (*Solea solea*), plaice (*Pleuronectes platessa*) and lemon sole (*Microstomus kitt*) were caught in these areas.

On 28 March, work began in stratum K before heading south to work the notoriously difficult grounds in stratum J. With station 4 being discounted due to the water depth being too shallow,

station 6 in Douarnenez Bay became a targeted station. This location and the following location at station 1, required fishing in daylight due to the potential of static gear being present in the vicinity. This meant by-passing station 3 in this stratum to allow this to happen, with the by-passed location being worked upon completion of those two. This year, the full five locations in stratum J were fished with minimal issues with poor ground or static gear. Four of the five tows were successfully fished for the full 2 nm with only stratum J; station 1 being reduced. This location was fished for 1.44 nm due to poor ground and power cables. With this stratum complete, Cefas Endeavour took advantage of having an excellent weather outlook and headed offshore into stratum N to complete a series of locations some distance away from areas planned to be worked on part two of the survey. One station in stratum N was completed on the 28 March. At this location, the 2m beam trawl suffered damage due to a large catch with the net splitting upon emptying.

On the following day, work began in Stratum N, heading north picking up a close station in stratum H before moving into stratum K to complete the remaining three locations near the Ushant Traffic Separation Scheme (TSS). All locations were successfully completed without incident. Upon completion of this stratum, the survey headed north to ensure arriving in stratum 2 at first light to complete all 5 locations here with good visibility due to a high probability of static gear being in the area. On -route, two stations were successfully completed; one in stratum 13, the other in stratum 8.

On 30 March, all five locations in stratum 2 were completed, but with daylight running out, the decision to fish some of these and leave the environmental operations until darkness was taken. At station 2 in this stratum, a short tow of 1.1 nm was fished due to the tow being close to the Lizard Point SAC, and poor ground with the actual tow being 0.51 nm away from the desired area. The final work in this stratum was completed at 2215h that day. With plans to dock late afternoon the following day, two further locations in stratum 1 and 8 were completed before heading towards port, docking in Falmouth at 1842h on 31 March. Whilst in port, there was a changeover of scientific staff and two crew, along with re-stocking of provisions and water.

Part 2.

Arriving scientists boarded the vessel at 0800h as planned and carried out operational handovers with the departing scientists. Vessel safety inductions were completed at 1400h and after survey toolbox talks, the Cefas Endeavour departed Falmouth at 1636h, 1 April. A planned compass calibration 'swing' was carried out immediately after sailing with this being completed by 1730h. Upon completion of this, the vessel steamed back to the survey grid with work recommencing in stratum 8 at 0717h, 2 April.

After successfully working three locations on this day, weather and sea conditions led to survey operations being suspended at 1920h, 2 April. Cefas Endeavour 'dodged' at the abandoned location whilst awaiting a weather window to resume operations, and this happened 24 hours later at 1920h, 3 April. On 4 April, work began at stratum H; station 1 and one further location was completed before heading west to complete the final three locations within stratum N. These

were completed without incident by 0116h the following morning. During 5 April, two of the southern stations in stratum G were completed along with two further stations in the southern area of stratum E. All were completed fully without incident.

The following day, work began at stratum E; station 5 where a small catch of Norway Lobster (*Nephrops norvegicus*) was caught as expected due to the soft muddy ground fished. The rest of the day was spent working in an easterly direction aiming to work the locations around the Isles of Scilly the following day. Locations within stratum F, H and 8 were completed before work began in stratum 1 west of the Isles of Scilly. Work in stratum 1 began at 2211h at station 3 where several trawlers were observed in the vicinity.

On 7 April, work continued in stratum 1 west of the Isles of Scilly. Whilst working at stratum 1; station 1, the GPS feed into the Tower logging system and the ships DP system (Dynamic Positioning) failed. This was quickly restored to the Tower logging system but remained offline on the ships DP system for almost 24 hours. This did not affect the grab deployments, but meant that deployment of the SPI camera became impossible and the deployment of the 2m beam trawl required careful control. A revised toolbox talk was carried out to ensure these operations continued and acquisition of valid samples were possible. Once the GPS feed to the DP system was restored, all survey operations became possible once again. Upon the successful completion of stratum 1; station 2 to the north of the Isles of Scilly, Cefas Endeavour transited towards Newlyn, Cornwall where a planned exchange of one scientific staff member was due to occur. This was completed by the vessel's own work boat at 1450h and the survey resumed at 1822h the same day at a position south-west of the Isles of Scilly (stratum 1; station 4). Completion of this station signalled the completion of the entire western Channel survey grid.

On 8 April, work began at 0139h at stratum B; station 2 where several beam trawlers were observed working the area. Upon completion of this location, Cefas Endeavour headed into stratum C off the north Cornwall coast. The third location at stratum C; station 4 was very close to shore near Tintagel and a reduced tow length of 1.39nm was fished due to a prevalence of static gear in the area and patches of poor ground. Following this, a long steam was required to the next location in the deeper mid Bristol Channel which was worked in a strong tide. The required sampling location of stratum C; station 3 off Cardiff was abandoned due to the necessity for a timed arrival at the peak of the flood tide and the time this would take out of the remaining survey days. The alternative location at stratum C; station 7 was located close inshore to the Mumbles and on the same location as the Irish Sea/Bristol Channel prime station 111. This meant that a long-term history of working this location was available and showed that there was no history of encountering static gear allowing this station to be worked in darkness.

The following day was spent working around the Celtic Deep in stratum D with other nearby stations worked in addition. The ground here allowed for the SPI camera to be safely deployed at eight consecutive locations, which in addition to the deployment of the Hamon grab and the 2-metre beam slowed down the survey's progress. Additionally, at four locations around the Celtic Deep, plankton net deployments were carried out at four stations. Whilst deploying the 4-metre beam trawls at stratum D; station 3, the main port-side winch failed. Whilst the fault was

being investigated, the port beam was recovered and after a delay over 4 hours, operations continued using the single starboard side 4m beam trawl with the liner fitted. The single beam trawl was deployed at three sampling locations (D3, D1 and F2) and following a successful repair and subsequent load-testing, twin beam trawl operations recommenced at stratum D; station 4 at 0906h, 10 March.

On 10 April, four stations were successfully sampled within stratum B, D and F without incident. The following day was spent in the northern part of the Celtic Sea, south of the Irish coast in stratum B, F and G. The tow at stratum B; station 3 proved difficult with hard ground and static gear in the vicinity but a 2nm tow was successfully achieved. Six locations were completed on this day. The final working day of the survey on 12 March began in stratum E where two stations were completed before heading south to the final survey station at stratum F; station 6 which was fished in lieu of station 2 within that stratum which had been fished with the single 4m beam trawl with liner. Work here was completed at 1702h and once the beam had been checked for final damage and safely stowed aboard, Cefas Endeavour made passage for Lowestoft. During the journey back to Lowestoft, a water sample was taken off Dungeness, Kent and a plankton sample taken at the West Gabbard smart-buoy location. During the journey back, a full clean-down, packing away of gear and data checks were carried out in readiness for docking.

Docking took place in Lowestoft at 1518h on 14 April with the demobbing of equipment and samples taking place the following morning.

RESULTS BY AIM:

A survey sampling location was sampled to two differing sets of deployments. At an environmentally sampled location, the operations consisted of 2 x 4m beam trawls, mini-Hamon grab sampling, SPI camera deployment and 2m beam trawl deployment. Alternatively, a location was sampled using just the 2 x 4m beam trawls. Twice a day, an ESM2 and Niskin water sampler was deployed and this was generally carried out at each change of shift. Environmentally sampled locations were selected as follows:

- Stratum in UK EEZ.
- Stratum that straddled EEZ borders were also sampled in French and Irish EEZ's.

The fishing gear used on this survey were the (survey) standard 4m-beam trawls (number 3) with chain mat, flip-up ropes and the net was fitted with a 40mm cod-end liner and 3m cod-end extension (starboard side), and the same gear (number 1) but without the 40mm cod-end liner on the port side. All fish, cephalopod and selected commercial shellfish were identified to species, weighed and measured with large catches of an individual species being sub-sampled. A SAIV micro CTD unit was attached to the headline on the port 4m-beam trawl to record the temperature and salinity depth profile at each station fished. At two locations each day, a surface salinity sample was taken simultaneously with a Niskin bottom water sample and an ESM2 logger profile. A plankton deployment consisted of a 1m ring net with a 1mm mesh net. A SAIV Micro CTD unit was used to obtain a profile for the sample. Where needed, a SAIV Micro CTD unit was attached to the wire with the ESM2 logger and Niskin sampler in order to collect a sound velocity profile (SVP) for calibration of the multibeam.

All catch details and sample data were entered directly into the Electronic Data Capture (EDC) system and uploaded directly into the Fishing Survey System (FSS). Station details were manually entered into the FSS using information collected from the Transas bridge logging system and bridge logbook. Benthic catches from the starboard beam were sorted by species and weighed and counted as appropriate. Any benthic species seen in the port gear catch not already seen in the starboard gear catch were added to the starboard catch as observations only to enable these to be identified as being port catch. The exception to this, were the rare sentinel benthic species, which when observed in the port gear, were recorded as such. Photographs of both gear catches were taken prior to sorting along with photographs of the bulk benthic catch prior to sub-sampling and sorting.

Plankton sampling consisted of the deployment of a single 1.0m diameter 1mm μ m mesh ring net to collect samples of zooplankton and fish eggs. These samples were fixed in formalin for analysis of bass eggs and larvae at Cefas. Locations were selected as close to locations where bass eggs and larvae were found in plankton samples from the survey in 2017 (CEND 4/17).

Sediment sampling consisted of deployment of the mini-Hamon grab close to the end of beam trawl tow. A maximum of three attempts to get a valid sample were made. The relative success of this sampling coupled with a review of the 4m beam trawl catches determined if SPI camera

and 2m beam sampling would be attempted. Catches with rock or shell meant that the SPI camera was not deployed. Deployment of the 2m beam trawl was assessed based on the bulk observed in the 4m beam and the ground that had been fished.

Where a SPI camera deployment was possible, a deployment consisted of 5 ‘dips’ with the camera at the mini Hamon grab site. Dips were spaced around 5-10m apart with two still photographs taken each time. Where a 2m beam deployment was possible, a deployment consisted of a 5-minute tow ‘on DP’ at around 0.5 knots using a warp to depth ratio of 3:1. Catches were fully sorted, sub-sampling as necessary, into component species with each individual weighed and measured as appropriate. No biological samples from fish species were collected.

PRIMARY AIMS:

Aim 1) To carry out an integrated monitoring survey of the Celtic Sea, south-western approaches and the western Channel using a random stratified survey design for the purposes of providing fish stock assessment data and the collection of associated ecosystem information.

A) Deployment of two standardised 4m beam trawls. A total of 129 successful 4m beam trawl tows were completed out of a total of 131 planned for the survey. These comprised all 81 of the planned tows in the western Channel and 48 of the 50 planned tows in the Celtic Sea. Three locations in the Celtic Sea were fished with just the single beam trawl (in stratum D and F) but one of these stratum was re-visited and a substitute location was sampled. In addition, three locations were worked in completed stratum (Stratum 8, 11, H) where the next ‘spare’ location was opportunistically fished. This meant that a total of 132 locations were successfully fished with two beam trawls and a further three were successfully fished with a single beam trawl and these were recorded as ‘additional’ tows. The total number of beam trawl deployments by survey area and validity are shown in Table 1.

Table 1: 4m Beam trawl gear deployments and validity by area

Area	Gear	Validity	Number of Deployments
Western Channel	4m Beam Trawl with blinder	V	83
Western Channel	4m Beam Trawl with blinder	A	1
Western Channel	4m Beam Trawl with blinder	I	1
Western Channel	4m Beam Trawl without blinder	V	83
Western Channel	4m Beam Trawl without blinder	A	1
Western Channel	4m Beam Trawl without blinder	I	1
Celtic Sea	4m Beam Trawl with blinder	V	49
Celtic Sea	4m Beam Trawl with blinder	A	3
Celtic Sea	4m Beam Trawl without blinder	V	49

The total sampled and non-sampled catches of each species caught on the survey using the 4m beam trawls are shown in Tables 2 and 3. Biological sample collections are shown in Table 4.

Table 2: Total catch of sampled species, ordered by size of total catch weight

Common Name	Scientific Name	CEFAS code	Catch weight (kg)	Sampled weight (kg)
Lesser spotted dogfish	<i>Scyliorhinus canicula</i>	LSD	484.908	484.908
Anglerfish (monk)	<i>Lophius piscatorius</i>	MON	344.542	344.542
Greater spider crab	<i>Maja squinado</i>	SCR	341.926	341.926
Poor cod	<i>Trisopterus minutus</i>	POD	280.197	274.957
European plaice	<i>Pleuronectes platessa</i>	PLE	229.658	229.658
Whiting-pout (bib)	<i>Trisopterus luscus</i>	BIB	188.509	188.509
Sole (dover sole)	<i>Solea solea</i>	SOL	165.674	165.674
Megrim	<i>Lepidorhombus whiffiagonis</i>	MEG	157.228	157.228
Common cuttlefish	<i>Sepia officinalis</i>	CTC	137.993	137.993
Starry smooth hound	<i>Mustelus asterias</i>	SDS	121.476	121.476
Black-bellied anglerfish	<i>Lophius budegassa</i>	WAF	116.818	116.818
Haddock	<i>Melanogrammus aeglefinus</i>	HAD	116.142	116.142
Red gurnard	<i>Aspitrigla (chelidonichthys) cuculus</i>	GUR	102.621	102.621
Boar fish	<i>Capros aper</i>	BOF	94.912	88.342
European conger eel	<i>Conger conger</i>	COE	91.347	91.347
Whiting	<i>Merlangius merlangus</i>	WHG	87.679	87.679
European hake	<i>Merluccius merluccius</i>	HKE	75.086	75.086
Blonde ray	<i>Raja brachyura</i>	BLR	72.249	72.249
Cuckoo ray	<i>Leucoraja naevus</i>	CUR	72.109	72.109
Common dragonet	<i>Callionymus lyra</i>	CDT	68.437	68.437
Black seabream	<i>Spondyliosoma cantharus</i>	BKS	59.996	59.996
Edible crab	<i>Cancer pagurus</i>	CRE	59.521	59.521
Lemon sole	<i>Microstomus kitt</i>	LEM	57.160	57.160
Undulate ray	<i>Raja undulata</i>	UNR	56.077	56.077
Blue whiting	<i>Micromesistius poutassou</i>	WHB	55.900	55.900
Spotted ray	<i>Raja montagui</i>	SDR	53.429	53.429
Great scallop	<i>Pecten maximus</i>	SCE	51.981	51.981
Barrel jellyfish	<i>Rhizostoma octopus</i>	BAR	47.191	6.250
Thornback ray (rocker)	<i>Raja clavata</i>	THR	46.888	46.888
European seabass	<i>Dicentrarchus labrax</i>	ESB	43.536	43.536
Thickback sole	<i>Microchirus variegatus</i>	TBS	40.696	40.696
Tub gurnard	<i>Trigla (chelidonichthys) lucerna</i>	TUB	32.263	32.263
Blue skate (Grey skate)	<i>Dipturus batis</i>	SKG	30.919	30.919
Nurse hound	<i>Scyliorhinus stellaris</i>	DGN	28.765	28.765
Grey gurnard	<i>Eutrigla (chelidonichthys) gurnardus</i>	GUG	26.498	26.498
Brill	<i>Scophthalmus rhombus</i>	BLL	22.891	22.891
Imperial scaldfish	<i>Arnoglossus imperialis</i>	ISF	20.759	20.759
Smalleyed (painted) ray	<i>Raja microocellata</i>	PTR	19.745	19.745
Solenette	<i>Buglossidium luteum</i>	SOT	18.440	12.075
Witch	<i>Glyptocephalus cynoglossus</i>	WIT	18.338	18.338
Atlantic cod	<i>Gadus morhua</i>	COD	16.860	16.860
Turbot	<i>Scophthalmus maximus (psetta maxima)</i>	TUR	15.686	15.686

Common Name	Scientific Name	CEFAS code	Catch weight (kg)	Sampled weight (kg)
Red mullet	<i>Mullus surmuletus</i>	MUR	15.665	15.665
Dab	<i>Limanda limanda</i>	DAB	15.608	15.608
John dory	<i>Zeus faber</i>	JOD	14.041	14.041
Sprat	<i>Sprattus sprattus</i>	SPR	12.533	12.533
Streaked gurnard	<i>Trigloporus (chelidonichthys) lastoviza</i>	GUS	12.197	12.197
Ballan wrasse	<i>Labrus bergylta</i>	BNW	11.415	11.415
Scald fish	<i>Arnoglossus laterna</i>	SDF	10.711	10.711
Sand sole	<i>Pegusa (solea) lascaris</i>	SOS	9.944	9.944
Common ling	<i>Molva molva</i>	LIN	8.485	8.485
Horse-mackerel (scad)	<i>Trachurus trachurus</i>	HOM	8.401	8.401
European lobster	<i>Homarus gammarus</i>	LBE	8.148	7.708
American plaice (Ir dab)	<i>Hippoglossoides platessoides</i>	PLA	7.666	7.666
Common spiny lobster	<i>Palinurus elephas</i>	SLO	6.796	6.796
Greater forkbeard	<i>Phycis blennoides</i>	GFB	6.693	6.693
Marbled electric ray	<i>Torpedo marmorata</i>	MER	6.587	6.587
Velvet swimming crab	<i>Necora puber</i>	MLP	6.454	6.454
Norway lobster	<i>Nephrops norvegicus</i>	NEP	6.338	6.338
Norway pout	<i>Trisopterus esmarkii</i>	NOP	6.087	6.087
Three-bearded rockling	<i>Gaidropsarus vulgaris</i>	TBR	5.639	5.639
Pollack	<i>Pollachius pollachius</i>	POL	5.230	5.230
Cuckoo wrasse	<i>Labrus mixtus (l. Bimaculatus)</i>	CUW	4.714	4.714
(European) mackerel	<i>Scomber scombrus</i>	MAC	3.546	3.546
Topknot	<i>Zeugopterus punctatus</i>	TKT	3.498	3.498
Cry(i)stal jellies	<i>Aequorea spp</i>	CRI	3.124	0.953
Goldsinny	<i>Ctenolabrus rupestris</i>	GDY	2.642	2.642
Squid	<i>Loligo vulgaris</i>	LLV	2.359	2.359
Lesser weever fish	<i>Echiichthys (trachinus) vipera</i>	WEL	2.139	2.139
Baillons wrasse	<i>Symphodus (crenilabrus) balloni</i>	BLW	1.938	1.938
Argentines	<i>Argentinidae</i>	ARG	1.601	1.601
Spurdog	<i>Squalus acanthias</i>	DGS	1.250	1.250
Butterfly blenny	<i>Blennius ocellaris</i>	BBY	1.231	1.231
Spotted dragonet	<i>Callionymus maculatus</i>	SDT	1.229	1.229
Pilchard	<i>Sardina pilchardus</i>	PIL	0.974	0.974
Norwegian topknot	<i>Zeugopterus (phrynorhombus) norvegicus</i>	NKT	0.939	0.939
Pogge (armed bullhead)	<i>Agonus cataphractus</i>	POG	0.890	0.890
Cuttle-fish	<i>Sepia elegans</i>	SEE	0.867	0.867
Sting ray	<i>Dasyatic pastinaca</i>	SGR	0.715	0.715
Pandora	<i>Pagellus erythrinus</i>	PAC	0.685	0.685
Lesser flying squid	<i>Todaropsis eblanae</i>	OME	0.697	0.655
Flounder (European)	<i>Platichthys flesus</i>	FLE	0.650	0.650
Sea scorpion	<i>Taurulus bubalis</i>	SSN	0.541	0.541
European anchovy	<i>Engraulis encrasicolus</i>	ANE	0.503	0.503
Greater weever fish	<i>Trachinus draco</i>	WEG	0.470	0.470
Northern squid	<i>Loligo forbesi</i>	NSQ	0.427	0.427
Common electric ray	<i>Torpedo nobiliana</i>	ECR	0.425	0.425
European common squid	<i>Loligo (alloteuthis) subulata</i>	ATS	0.355	0.355
Steven's goby	<i>Gobius gasteveni</i>	GSV	0.335	0.335

Common Name	Scientific Name	CEFAS code	Catch weight (kg)	Sampled weight (kg)
Herring	<i>Clupea harengus</i>	HER	0.320	0.320
Great sandeel	<i>Hyperoplus lanceolatus</i>	GSE	0.298	0.298
Shagreen ray	<i>Leucoraja fullonica</i>	SHR	0.252	0.252
Pink cuttlefish	<i>Sepia orbignyana</i>	SEO	0.233	0.233
Great pipefish	<i>Syngnathus acus</i>	GPF	0.214	0.214
Tompot blenny	<i>Parablennius gattorugine</i>	TBY	0.210	0.210
Four spot megrim	<i>Lepidorhombus boscii</i>	LBI	0.200	0.200
Four-bearded rockling	<i>Enchelyopus cimbrius</i>	FRR	0.162	0.162
Garfish	<i>Belone belone</i>	GAR	0.162	0.162
Stone crab	<i>Lithodes maja</i>	LDM	0.152	0.152
Long-finned gurnard	<i>Chelidonichthys obscura</i>	GUL	0.127	0.127
Sand goby	<i>Pomatoschistus spp</i>	POM	0.119	0.119
Rock goby	<i>Gobius paganellus</i>	RKG	0.117	0.117
Auxillary seabream	<i>Pagellus acarne</i>	SBA	0.078	0.078
Wrasses	<i>Labridae</i>	WRA	0.075	0.075
Ekstroms topknot	<i>Zeugopterus (phrynorhombus) regius</i>	EKT	0.060	0.060
Northern rockling	<i>Ciliata septentrionalis</i>	NNR	0.047	0.047
Yarrel's blenny	<i>Chirolophis ascanii</i>	YBY	0.043	0.043
Black goby	<i>Gobius niger</i>	BLG	0.043	0.043
Immaculate sandeel	<i>Hyperoplus immaculatus</i>	ISE	0.041	0.041
Gobies	<i>Pomatoschistus spp</i>	SDG	0.040	0.040
Sea horse (short snouted)	<i>Hippocampus hippocampus</i>	SNH	0.030	0.030
Northern shortfin squid	<i>Illex illecebrosus</i>	SQI	0.029	0.029
Silvery pout	<i>Gadiculus argenteus</i>	SYP	0.026	0.026
Rocklings	<i>Gaidropsarus spp</i>	ROL	0.018	0.018
Norway bullhead	<i>Micrenophrys (taurulus) lilljeborgi</i>	NVB	0.011	0.011
Butterfish	<i>Pholis gunnellus</i>	BTF	0.007	0.007
Five-bearded rockling	<i>Ciliata Mustela</i>	FVR	0.007	0.007
Jeffrey's goby	<i>Buenia jeffreysii</i>	JYG	0.007	0.007
Two spotted clingfish	<i>Diplecogaster bimaculata</i>	TSC	0.007	0.007
Frie's goby	<i>Lesueurigobius friesii</i>	FSG	0.004	0.004
Montague's seasnail	<i>Liparis montagui</i>	MSS	0.004	0.004
Sea snail	<i>Liparis liparis</i>	SSL	0.004	0.004
Clingfishes	<i>Gobiesocidae</i>	CFX	0.001	0.001
Sandeels	<i>Ammodytidae spp</i>	SAX	0.001	0.001
Common squids	<i>Liligo spp</i>	SQC	0.001	0.001
Transparent goby	<i>Aphia minuta</i>	TPG	0.001	0.001

Table 3: Total catches of non-sampled species, ordered by size of total catch weight

Common Name	Scientific Name	CEFAS code	Catch weight (kg)
Epibenthic mix unidentified	<i>Epibenthic mixture</i>	BEN	4405.004
Rocks	<i>Assorted rocks</i>	ROK	3166.340
Common brittle star	<i>Ophiothrix fragilis</i>	OPF	2112.759
Sponges	<i>Porifera</i>	PFZ	610.873
Edible sea urchin	<i>Echinus esculentus</i>	URS	607.637
Gravel	<i>Gravel</i>	GRV	514.501
Spiny starfish	<i>Marthasterias glacialis</i>	MAG	506.976
Common starfish	<i>Asterias rubens</i>	STH	470.623
-	<i>Diazona violacea</i>	DIV	335.100
Yellow boring sponge	<i>Cliona celata</i>	CLI	307.907
Breadcrumb sponge	<i>Halichondria panicea</i>	BCS	307.303
Queen scallop	<i>Aequipecten opercularis</i>	QSC	221.998
Curled octopus	<i>Eledone cirrhosa</i>	EDC	123.025
Shell	<i>Broken shell</i>	BSL	116.138
Dead-mens fingers	<i>Alcyonium digitatum</i>	DMF	87.578
Hornwrack	<i>Securiflustra securifrons</i>	FAF	74.242
-	<i>Luidia ciliaris</i>	LDC	72.488
Bryozoan	<i>Cellariidae</i>	CEL	64.509
Bryozoan	<i>Pentapora foliacea</i>	PET	51.812
Purple heart urchin	<i>Spatangus purpureus</i>	SPG	49.324
Kelp	<i>Laminaria spp</i>	LMX	37.886
-	<i>Polymastiidae</i>	PMX	36.005
-	<i>Pachymatisma johnstonia</i>	PMJ	35.790
-	<i>Luidia sarsi</i>	LUS	34.588
Sea mouse	<i>Aphrodite aculeata</i>	AAC	32.630
-	<i>Nemertesia antennina</i>	NEA	32.006
Hydroids	<i>Hydroida (order)</i>	HYD	31.139
Hermit in adamsia	<i>Eupagurus / pagurus in adamsia</i>	HIA	27.848
-	<i>Raspailia spp</i>	RAS	26.313
Sand star	<i>Astropecten irregularis</i>	API	25.775
Common sunstar	<i>Crossaster papposus</i>	CTP	25.415
Hydroid	<i>Tubularia spp</i>	TUI	25.164
-	<i>Ophiocomina nigra</i>	OPN	24.927
-	<i>Molgulidae</i>	MGX	24.594
Wracks	<i>Fucus spp</i>	FUX	23.496
-	<i>Actinauge richardi</i>	ACR	21.799
Cotton spinner	<i>Holothuria Forskali</i>	COT	17.471
Whelk eggs	<i>Whelk eggs</i>	WES	17.144
-	<i>Echinus acutus</i>	URA	16.068
Parchment worm tubes	<i>Chaetopterus tubes</i>	CVT	14.874
Red cushion star	<i>Porania pulvillus</i>	PPV	13.670
Plumose anemone	<i>Metridium senile</i>	PMA	12.198
-	<i>Nemertesia ramosa</i>	NER	10.731
Goose-foot star	<i>Anseropoda placenta</i>	PLM	9.312
-	<i>Psammechinus miliaris</i>	PMM	8.873
Brittlestars	<i>Ophiura ophiura</i>	OHT	8.656
Squid eggs	<i>Squid eggs</i>	SQS	8.075
Circular crab	<i>Atelacyclus rotundatus</i>	ALR	7.543
Dahlia anemone	<i>Urticina (tealia) felina</i>	DHA	7.422
-	<i>Stichastrella rosea</i>	SLR	7.220
Scorpion spider crab	<i>Inachus dorsettensis</i>	IND	7.005

Common Name	Scientific Name	CEFAS code	Catch weight (kg)
Common whelk	<i>Buccinum undatum</i>	WHE	6.222
-	<i>Scaphander lignarius</i>	SDL	6.147
-	<i>Bolocera tuediae</i>	BCT	5.773
Gibbs sea spider	<i>Pisa armata</i>	PAA	5.766
-	<i>Axinella</i>	AXI	5.279
Anemone unidentified	<i>Anemone unidentified</i>	AMU	4.597
Slender-leg spider crab	<i>Inachus leptochirus</i>	INL	4.582
Swimming crab	<i>Liocarcinus depurator</i>	LMD	4.444
Gannet	<i>Morus bassanus</i>	GAN	4.160
Common octopus	<i>Octopus vulgaris</i>	OCV	3.595
Sea lemon	<i>Archidoris pseudoargus</i>	ADP	3.550
Auger shell	<i>Turritella communis</i>	TUC	3.416
Common swimming crab	<i>Polybius (liocarcinus) holsatus</i>	LMH	3.404
-	<i>Henricia oculata</i>	HEO	3.399
Sponge	<i>Suberites spp</i>	SUB	3.250
-	<i>Diphasia nigra</i>	DIN	3.108
Brown seaweeds (nei)	<i>Phaeophyceae</i>	SWB	3.071
Sponge crab	<i>Dromia personata</i>	DRP	3.047
Curly weed	<i>Alcyonidium diaphanum</i>	ALG	3.032
Swimming crab	<i>Macropipus</i>	MPT	2.824
Red sea star	<i>Echinaster sepositus</i>	ECS	2.433
-	<i>Parastichopus tremulus</i>	STT	2.262
Opisthobranchia	<i>Opisthobranchia</i>	OPI	2.213
Hermit in whelk	<i>Eupagurus / pagurus in buccinum</i>	HIW	2.155
-	<i>Limaria hians</i>	LIM	2.052
-	<i>Tritonia hombergi</i>	TNH	2.045
-	<i>Pleurobranchus</i>	PBM	2.014
-	<i>Tethya aurantia</i>	TAA	1.852
Contracted crab	<i>Hyas coarctatus</i>	HYC	1.711
Red seaweeds (nei)	<i>Rhodophyceae</i>	SWR	1.547
-	<i>Dysidea fragilis</i>	DYS	1.541
-	<i>Hyalinoecia tubicola</i>	HYT	1.498
Scaleworm	<i>Laetmonice (hermione) histrix</i>	HMH	1.421
Xanthid crab	<i>Xanthidae</i>	XAN	1.336
Stalk ascidian	<i>Styela clava</i>	SAA	1.323
-	<i>Echinocardium spp.</i>	ECV	1.254
Pheasant tail hydroid	<i>Lytocarpia myriophyllum</i>	HYL	1.239
Slender spider crab	<i>Macropodia tenuirostris</i>	MCT	1.172
-	<i>Crangon allmanni</i>	CGA	1.140
Fan mussel	<i>Atrina fragilis</i>	AFR	1.131
Dog cockle	<i>Glycymeris glycymeris</i>	GLG	1.090
Hermit in suberites	<i>Eupagurus / pagurus in suberites</i>	HIS	1.007
-	<i>Filograna implexa</i>	FII	0.996
Masked crab	<i>Corystes cassivelaunus</i>	CCV	0.993
Feather star	<i>Antedon bifida</i>	ADB	0.971
-	<i>Ophiura albida</i>	OHA	0.907
Squat lobster	<i>Munida rugosa</i>	MNR	0.862
Sea slugs	<i>Nudibranchia spp.</i>	NBX	0.833
Atlantic mud shrimp	<i>Solenocera membranacea</i>	SOA	0.831
Mud snails	<i>Hydrobiidae</i>	HYX	0.810
Variegated scallop	<i>Chlamys varia</i>	CHV	0.785
Sea potato	<i>Echinocardium cordatum</i>	ECC	0.770
Star ascidian	<i>Botryllus schlosseri</i>	BIS	0.751

Common Name	Scientific Name	CEFAS code	Catch weight (kg)
-	<i>Dichelopandalus bonnieri</i>	PDB	0.724
Kelp	<i>Laminaria spp</i>	KEL	0.684
-	<i>Rossia macrosoma</i>	ROM	0.575
Marbled swimming crab	<i>Liocarcinus marmoreus</i>	LMM	0.551
-	<i>Processidae</i>	PCY	0.518
Sea anemone	<i>Calliactis parasitica</i>	CAR	0.489
-	<i>Calliostoma granulatum (=c. Papillosum)</i>	PTQ	0.421
Dogfish egg case	<i>Dogfish egg cases</i>	DEG	0.420
Banded carpet-shell	<i>Paphia rhomboides</i>	TVR	0.387
-	<i>Pandalus propinquus</i>	PDP	0.353
Corrugated swimming crab	<i>Liocarcinus corrugatus</i>	LIC	0.333
Pink shrimp	<i>Pandalus montagui</i>	PRM	0.307
Sargassum crab	<i>Planes minutus</i>	PNM	0.296
Angular crab	<i>Goneplax rhomboides</i>	GOR	0.290
-	<i>Circomphalus casina</i>	CIA	0.286
-	<i>Asciella scabra</i>	ASS	0.270
-	<i>Sepiolidae</i>	SPY	0.247
Rough crab	<i>Eurynome aspersa</i>	EUA	0.238
Hunchback scallop	<i>Chlamys distorta</i>	CHD	0.230
Norway cockle	<i>Laevicardium crassum</i>	LCC	0.222
-	<i>Ascidia virginea</i>	ASV	0.215
Common prawn	<i>Palaemon serratus</i>	CPR	0.204
Squat lobsters	<i>Galathea spp</i>	GLX	0.199
Sea cucumbers	<i>Holothuroidea</i>	HTZ	0.189
Heart cockle	<i>Glossus humanus</i>	GLO	0.188
Dwarf-swimming crab	<i>Liocarcinus pusillus</i>	LPU	0.184
Goose barnacles	<i>Lepadidae</i>	GOZ	0.145
-	<i>Sagartia spp</i>	SAG	0.128
Peacock worm	<i>Sabellidae</i>	PWX	0.125
Hairy crab	<i>Pilumnus hirtellus</i>	PNH	0.117
Long clawed porcelain crab	<i>Pisidia longgicornis</i>	PIS	0.114
-	<i>Acanthocardia spp</i>	ACY	0.114
-	<i>Pontophilus spinosus</i>	PPS	0.113
Oval venus	<i>Timoclea ovata</i>	VEO	0.111
-	<i>Macropodia linaresi</i>	MCL	0.106
Red dead man's fingers	<i>Alcyonium palmatum</i>	AYG	0.105
Barnacles	<i>Cirrepedia</i>	CIZ	0.105
Pink seafan	<i>Eunicella verrucosa</i>	EUV	0.102
Devonshire cup-coral	<i>Caryophyllia smithii</i>	DCC	0.101
Broad clawed burrowing shrimp	<i>Alpheus macrocheles</i>	ALM	0.100
Macropodia spp.	<i>Macropodia spp.</i>	MCX	0.096
Common(brown)shrimp	<i>Crangon crangon</i>	CSH	0.095
Starfish	<i>Luidia spp.</i>	LUI	0.093
-	<i>Philine aperta</i>	PHP	0.086
Sickle hydroid	<i>Hydrallmania falcata</i>	HYH	0.080
Polinices eggs	<i>Euspire (Polinices) eggs</i>	NAE	0.080
Knotted wrack	<i>Ascophyllum nodosum</i>	ANO	0.078
Sea lettuce	<i>Ulva lactuca</i>	ULL	0.078
Bryozoan	<i>Bugula spp</i>	BUG	0.077
-	<i>Acanthodoris pilosa</i>	ACP	0.076
-	<i>Cucumariidae</i>	CMX	0.073
Bryers nut-crab	<i>Ebalia tumefacta</i>	EBM	0.063
White weed	<i>Sertularia</i>	WHW	0.063

Common Name	Scientific Name	CEFAS code	Catch weight (kg)
Hermit crabs	<i>Paguridae</i>	PAY	0.058
Nut shells	<i>Nuculidae</i>	NNX	0.057
-	<i>Euspira fusca</i>	EFU	0.056
-	<i>Colus gracilis</i>	CSG	0.055
-	<i>Processa canaliculata</i>	PCC	0.055
Leachs spider crab	<i>Inachus phalangium</i>	INP	0.051
Little cuttlefish	<i>Sepiola atlantica</i>	SPA	0.047
-	<i>Scalpellum scalpellum</i>	SCA	0.044
Sponge	<i>Haliclona oculata</i>	HAO	0.043
Pandalid shrimps	<i>Pandalidae</i>	PSH	0.042
Nut crab	<i>Ebalia spp.</i>	EBA	0.041
-	<i>Ophiurida</i>	OPH	0.039
Long-leg spider crab	<i>Macropodia rostrata</i>	MCR	0.036
-	<i>Porella compressa</i>	PCO	0.034
Ray egg cases	<i>Raja egg cases</i>	RES	0.033
Bladder wrack	<i>Fucus vesiculosus</i>	WRB	0.033
-	<i>Bathynectes longipes</i>	BAL	0.032
Tubeworms	<i>Tubeworms</i>	TBX	0.032
Bristle worms	<i>Polychaeta</i>	BWX	0.031
Hermit crab	<i>Pagurus bernhardus</i>	PEB	0.030
Lace corals	<i>Phidoloporidae</i>	RXX	0.030
Hermit crab in epizoanthus	<i>Anapagurus in epizoanthus</i>	HIE	0.027
Pennants nut-crab	<i>Ebalia tuberosa</i>	EBT	0.025
-	<i>Upogebia spp</i>	UPX	0.025
Mantis shrimp	<i>Rissoides (meiosquilla) desmaresti</i>	MED	0.023
Echurian worms	<i>Echiura spp</i>	EAZ	0.023
Common pelicans foot	<i>Aporrhais pespelicani</i>	APP	0.022
Bivalves	<i>Mollusca-bivalvia</i>	BIV	0.021
Chitons	<i>Polyplacophora</i>	PLX	0.021
Sea spider	<i>Pycnogonum littorale</i>	PGL	0.020
Cuttlefish eggs	<i>Cuttlefish eggs</i>	CEG	0.020
Northern pink shrimp	<i>Pandalus borealis</i>	PRA	0.020
Red snapping shrimp	<i>Alpheus glaber</i>	ALP	0.019
Hornwrack	<i>Securiflustra securifrons</i>	FAS	0.019
Greenweed seaweed	<i>Chlorophyceae</i>	CHZ	0.019
-	<i>Simnia patula</i>	SIM	0.018
Common basket shell	<i>Corbula gibba</i>	CGB	0.017
-	<i>Cirolana cranchii</i>	CIB	0.017
Cranchs nut crab	<i>Ebalia cranchii</i>	EBC	0.017
Wentle-trap	<i>Epitonium (clathrus) clathrus</i>	EPC	0.017
-	<i>Priapulis caudatus</i>	PPC	0.016
Sea squirts	<i>Molgula spp.</i>	MOA	0.015
Anemone	<i>Epizoanthus incrustatus</i>	EPS	0.013
-	<i>Pontobdella muricata</i>	PDM	0.013
Furrowed crab	<i>Xantho incisus</i>	XAI	0.013
-	<i>Ascidia conchilega</i>	ASD	0.012
Sea mats	<i>Bryozoa</i>	EPZ	0.012
American slipper limpet	<i>Crepidula fornicata</i>	ASL	0.010
Squids	<i>Loliginidae</i>	SQZ	0.010
-	<i>Astarte sulcata</i>	AES	0.009
-	<i>Armina loveni</i>	AAL	0.008
Common saddle oyster	<i>Anomia ephippium</i>	AEP	0.008
-	<i>Lamellaria perspicua</i>	LMP	0.007

Common Name	Scientific Name	CEFAS code	Catch weight (kg)
-	<i>Pasiphaea spp</i>	PAS	0.006
-	<i>Spirontocaris lilljeborgii</i>	SPL	0.006
Sea grass	<i>Zostera spp</i>	ZOX	0.006
Doris sticata	<i>Doris sticata</i>	DOR	0.005
Sea urchins	<i>Echinoida</i>	EEZ	0.005
Squat lobsters	<i>Galatheidae</i>	GAL	0.005
Keyhole limpet	<i>Diodora graeca</i>	KYL	0.005
Sand mason	<i>Lanice conchilega</i>	LCE	0.005
Banded venus shell	<i>Clausinella fasciata</i>	VFR	0.005
Hermit crab	<i>Anapagurus laevis</i>	APL	0.004
Star ascidian	<i>Botrylloides leachi</i>	BOT	0.004
Tiger scallop	<i>Palliolium tigrinum</i>	CYT	0.004
Great spider crab	<i>Hyas araneus</i>	HYA	0.004
Netted dogwhelk	<i>Hinia (nassarius)</i>	NSR	0.004
-	<i>Pontophilus spp</i>	PNZ	0.004
Poraniidae	<i>Poraniidae</i>	PPY	0.004
Painted top shell	<i>Calliostoma zizyphinum</i>	PTS	0.004
-	<i>Styelidae</i>	SYX	0.004
Striped venus	<i>Chamelea gallina</i>	VST	0.004
Rissos crab	<i>Xantho pilipes</i>	XAP	0.004
Anemone	<i>Paraphellia expansia</i>	PAE	0.003
-	<i>Reteporella beaniana</i>	SBN	0.003
Arctic cowrie	<i>Trivia arctica</i>	TRA	0.003
-	<i>Inachus spp.</i>	INX	0.002
-	<i>Macropodia deflexa</i>	MCD	0.002
Hermit crab	<i>Pagurus pubescens</i>	PEP	0.002
-	<i>Philocheras trispinosus</i>	PPT	0.002
Japweed	<i>Sargassum muticum</i>	SAM	0.002
Seapen (pinnate)	<i>Virgularia mirabilis</i>	VAM	0.002
-	<i>Calocaris</i>	CCM	0.001
-	<i>Glycera tridactyla</i>	GLC	0.001
-	<i>Ophiura affinis</i>	OHF	0.001
Pink shrimps	<i>Pandalus spp.</i>	PAN	0.001
Pink shrimp	<i>Pandalina brevisrostris</i>	PDW	0.001
-	<i>Portinidae</i>	PUZ	0.001
Sea spider	<i>Pycnogonida</i>	PYG	0.001
Tusk shell	<i>Scaphopoda</i>	SPZ	0.001
-	<i>Spirontocaris spp.</i>	SSZ	0.001

Table 4: Biological information and samples collected by sex and area - alphabetical order

Common Name	Scientific Name	Sex	Celtic Sea	Western Channel
Red gurnard	<i>Aspitrigla (Chelidonichthys) cuculus</i>	F	90	176
Red gurnard	<i>Aspitrigla (Chelidonichthys) cuculus</i>	M	92	113
Red gurnard	<i>Aspitrigla (Chelidonichthys) cuculus</i>	U	3	12
Long-finned gurnard	<i>Aspitrigla (Chelidonichthys) obscura</i>	F	0	2
Conger eel	<i>Conger conger</i>	F	0	4
Conger eel	<i>Conger conger</i>	M	0	3
Conger eel	<i>Conger conger</i>	U	18	42
Sting ray	<i>Dasyatis pastinaca</i>	M	0	1
European Seabass	<i>Dicentrarchus labrax</i>	F	1	3
European Seabass	<i>Dicentrarchus labrax</i>	M	13	38
Common Skate (Blue skate [Grey skate])	<i>Dipturus batis</i>	F	4	4
Common Skate (Blue skate [Grey skate])	<i>Dipturus batis</i>	M	14	9
Grey Gurnard	<i>Eutrigla gurnardus</i>	F	151	70
Grey Gurnard	<i>Eutrigla gurnardus</i>	M	94	52
Grey Gurnard	<i>Eutrigla gurnardus</i>	U	19	40
Cod	<i>Gadus morhua</i>	F	12	1
Cod	<i>Gadus morhua</i>	M	6	1
Witch	<i>Glyptocephalus cynoglossus</i>	F	88	0
Witch	<i>Glyptocephalus cynoglossus</i>	M	22	1
Witch	<i>Glyptocephalus cynoglossus</i>	U	5	1
Ballan wrasse	<i>Labrus bergylta</i>	F	0	2
Ballan wrasse	<i>Labrus bergylta</i>	M	0	10
4-spot megrim	<i>Lepidorhombus boscii</i>	F	1	0
4-spot megrim	<i>Lepidorhombus boscii</i>	M	1	0
Megrim	<i>Lepidorhombus whiffiagonis</i>	F	500	152
Megrim	<i>Lepidorhombus whiffiagonis</i>	M	265	55
Shagreen Ray	<i>Leucoraja fullonica</i>	F	3	0
Cuckoo Ray	<i>Leucoraja naevus</i>	F	32	25
Cuckoo Ray	<i>Leucoraja naevus</i>	M	36	21
Black bellied Anglerfish	<i>Lophius budegassa</i>	F	53	16
Black bellied Anglerfish	<i>Lophius budegassa</i>	M	46	35
Black bellied Anglerfish	<i>Lophius budegassa</i>	U	21	4
Anglerfish	<i>Lophius piscatorius</i>	F	84	107
Anglerfish	<i>Lophius piscatorius</i>	M	64	109
Anglerfish	<i>Lophius piscatorius</i>	U	9	3
Haddock	<i>Melanogrammus aeglefinus</i>	F	159	46
Haddock	<i>Melanogrammus aeglefinus</i>	M	148	21
Haddock	<i>Melanogrammus aeglefinus</i>	U	4	1
Whiting	<i>Merlangius merlangus</i>	F	64	111
Whiting	<i>Merlangius merlangus</i>	M	48	96
Whiting	<i>Merlangius merlangus</i>	U	0	10
Hake	<i>Merluccius merluccius</i>	F	57	14
Hake	<i>Merluccius merluccius</i>	M	56	27
Hake	<i>Merluccius merluccius</i>	U	23	8
Lemon Sole	<i>Microstomus kitt</i>	F	67	61

Common Name	Scientific Name	Sex	Celtic Sea	Western Channel
Lemon Sole	<i>Microstomus kitt</i>	M	53	61
Lemon Sole	<i>Microstomus kitt</i>	U	3	0
Ling	<i>Molva molva</i>	F	1	1
Ling	<i>Molva molva</i>	M	2	0
Red Mullet	<i>Mullus surmuletus</i>	F	14	26
Red Mullet	<i>Mullus surmuletus</i>	M	7	26
Red Mullet	<i>Mullus surmuletus</i>	U	4	15
Starry Smooth-hound	<i>Mustelus asterias</i>	F	5	39
Starry Smooth-hound	<i>Mustelus asterias</i>	M	3	43
Plaice	<i>Pleuronectes platessa</i>	F	149	271
Plaice	<i>Pleuronectes platessa</i>	M	111	140
Blonde Ray	<i>Raja brachyura</i>	F	13	4
Blonde Ray	<i>Raja brachyura</i>	M	10	4
Thornback Ray	<i>Raja clavata</i>	F	9	23
Thornback Ray	<i>Raja clavata</i>	M	5	18
Small-eyed Ray	<i>Raja microocellata</i>	F	12	3
Small-eyed Ray	<i>Raja microocellata</i>	M	15	4
Spotted Ray	<i>Raja montagui</i>	F	30	20
Spotted Ray	<i>Raja montagui</i>	M	21	19
Undulate Ray	<i>Raja undulata</i>	F	0	5
Undulate Ray	<i>Raja undulata</i>	M	0	11
Turbot	<i>Scophthalmus maximus</i>	F	2	2
Turbot	<i>Scophthalmus maximus</i>	M	0	5
Brill	<i>Scophthalmus rhombus</i>	F	5	7
Brill	<i>Scophthalmus rhombus</i>	M	3	3
Nursehound	<i>Scyliorhinus stellaris</i>	F	0	3
Nursehound	<i>Scyliorhinus stellaris</i>	M	1	5
Sole	<i>Solea solea</i>	F	125	207
Sole	<i>Solea solea</i>	M	141	165
Sole	<i>Solea solea</i>	U	1	0
Black Sea bream	<i>Spondyliosoma cantharus</i>	F	2	109
Black Sea bream	<i>Spondyliosoma cantharus</i>	M	2	58
Black Sea bream	<i>Spondyliosoma cantharus</i>	U	0	32
Spurdog	<i>Squalus acanthias</i>	M	2	0
Marbled Electric Ray	<i>Torpedo marmorata</i>	F	2	4
Marbled Electric Ray	<i>Torpedo marmorata</i>	M	2	4
Tub Gurnard	<i>Trigla (Chelidonichthys) lucerna</i>	F	8	35
Common electric ray	<i>Torpedo nobiliana</i>	M	1	0
Tub Gurnard	<i>Trigla (Chelidonichthys) lucerna</i>	M	4	17
Tub Gurnard	<i>Trigla (Chelidonichthys) lucerna</i>	U	0	1
Streaked Gurnard	<i>Trigloporus (Chelidonichthys) lastoviza</i>	F	8	36
Streaked Gurnard	<i>Trigloporus (Chelidonichthys) lastoviza</i>	M	1	32
Streaked Gurnard	<i>Trigloporus (Chelidonichthys) lastoviza</i>	U	0	7
John dory	<i>Zeus faber</i>	F	10	46
John dory	<i>Zeus faber</i>	M	5	15
John dory	<i>Zeus faber</i>	U	1	4

Figure 1 shows the positions of all 4m beam trawl fishing stations, with Figure 2 showing the survey track each day with the relevant tow validities of these 4m beam deployments. Species composition pie charts for the entire survey are shown on Figure 3. The distribution of six major commercial species for the survey are shown in Figure 4 along with the length distributions of the same species, along with total catch numbers for the two different gears (Figure 5). Appendix 1 gives the station details of each survey station including date/time, shooting and hauling coordinates and various weather/sea-state observational data. Appendix 2 shows the planned priority sampling locations not fished with the reasons why this was not possible, along with the alternative sampling locations fished where appropriate.

Target species observations

The largest catches of sole were observed in the Celtic Sea off the north Cornwall coast and in the western English Channel close to Start Point and in Lyme Bay, with larger catches observed west of the Channel Islands and around the Celtic deep. Smaller numbers of sole were caught around the Channel Islands and off the northern French coast. Few soles were caught in the outer Celtic Sea as observed in previous years. In total, sole catch numbers were 10% less than observed in 2018 despite more sampling locations being fished. The catch weight of sole was 18% less than observed in 2018. Plaice was caught predominantly in Lyme Bay and around the Lizard, with larger catches also observed south east of Wexford (Republic of Ireland). As observed in previous years, few plaice were caught in French waters and in the Celtic Sea. In total, 30% less plaice was caught compared to the 2018 survey following a similar fall on the previous year. The catch weight of plaice fell by 27% compared to the 2018 survey.

Anglerfish was observed in greatest abundance in the western English Channel between Lands-End and Lizard Point and in the Celtic Sea southeast of Ireland. Catch numbers were 53% greater than those observed in 2018 but the mean total length of those caught was just over 30cm, whereas in 2018 the mean length was almost 34cm. The weight caught in 2019 was ~5% greater than observed in 2018. Black-bellied anglerfish was caught in greater numbers in the Celtic Sea and at the western end of the western Channel. In 2019, an increase in catch numbers and catch weight of 53% and 78% respectively with a corresponding increase in mean total length caught of ~29cm compared to ~25.5cm in 2018. Lemon sole was caught predominantly off the Cornish and south Devon coast, in the Celtic Sea south of Ireland and north-west of Brest on the French Atlantic coast. Overall, catches of lemon sole in 2019 increased from those observed in 2018 with catch numbers and catch weights increasing by 46% and 40% respectively with the mean total length caught remaining the same as in 2018 at ~26cm. As in 2018, common cuttlefish (*Sepia officinalis*) catches were almost all caught in the western Channel with few cuttlefish caught in the Celtic Sea. Overall catch numbers were ~15% up compared to 2018 but still well short of the numbers observed in 2017. The catch weight was ~20% less than that observed in 2018.

Other species observations

Most ray species catch weights increased in 2019 compared to 2018 with increases seen in Small-eyed ray, *Raja microocellata* (205%), blonde ray, *Raja brachyura* (187%), thornback ray, *Raja clavata* (133%), cuckoo ray, *Leucoraja naevus* (44%), spotted ray, *Raja montagui* (26%) and undulate ray (19%). However, there were decreases in observed catch weight of common skate (27%), marbled electric ray, *Torpedo marmorata* (66%) and shagreen ray, *Leucoraja fullonica* (97%) with the latter having only small specimens (<30cm total length) caught. The only shark species that saw an increase in catch weight was greater spotted dogfish or nursehound (*Scyliorhinus stellaris*) which increased by 111% compared to 2018. Lesser spotted dogfish (*Scyliorhinus canicula*) catches declined by 29% with a corresponding decrease in catch numbers of 23%, with spurdog (*Squalus acanthias*) catches also down by 63%. The latter is as expected with this type of gear, beam trawlers known to be less selective for spurdog and when caught, specimens are generally smaller juvenile fish.

European seabass (*Dicentrarchus labrax*) catches in 2019 were much greater than observed previously with a total of 56 specimens caught compared to just 1 in 2018 and 5 in 2017. Black sea-bream (*Spondyliosoma cantharus*) catch weight in 2019 was almost 70% greater than observed in 2018, with 492 specimens caught compared to just 192 in 2018. Other species where catch weights in 2019 increased on the 2018 survey included megrim, *Lepidorhombus whiffiagonis* (up 29%), boar fish, *Capros aper* (up 125%), edible crab, *Cancer pagurus* (up 32%), red mullet, *Mullus surmuletus* (up 23%) conger eel, *Conger conger* (up 18%) and poor cod, *Trisopterus minutus* (up 18%). All gurnard species catch weights decreased in 2019 with tub gurnard, *Trigla (Chelidonichthys) lucerna* showing the largest decrease of 35%. Turbot (*Scophthalmus maximus*) and brill (*Scophthalmus rhombus*) catches also decreased in 2019 with both species declining by around 15% on the 2018 survey. Other species where catch weight decreased in 2019 include John dory, *Zeus faber* (down 42%), spider crab, *Maja squinado* (down 25%) and witch, *Glyptocephalus cynoglossus* (down 20%).

A total of 126 species were caught on the survey in 2019, six more than observed in 2018. Of note, was a stone crab (*Lithodes maja*), only the 4th specimen caught on this survey time series since 2006 and only the 14th recorded on any Cefas survey working outside of the North Sea.

Litter by-catch information.

Details of litter by-catch caught at all fishing stations were recorded separately by gear. Litter by-catch was categorized by 'type', weighed, photographed and categorized by size at every fishing station with, details of any attached organisms being recorded. Most of the litter items caught were classified as plastic in line with previous surveys.

B) Water column sampling.

At 47 sampling locations (28 in the western Channel and 19 in the Celtic Sea), a CTD profile using an ESM2 logger along with a Niskin water sampler were deployed using the starboard gantry with the 'hydrographic' wire. Salinity samples from the 'bottom' were collected at each location from the Niskin along with a surface seawater samples collected using the 'feed' from the Ferrybox.

C) Sediment and benthos at a station.

Sea-bed sediment samples were collected using a 0.1 m² mini Mini-Hamon grab and were collected close to the end of the 4m beam trawl track. A sample was considered valid if the bulk volume was ~5 litres and there was no evidence of sediment wash-out during sample recovery. Figure 6 shows the mini Hamon grab sampler along with a valid un-sieved sample, and the sieved samples on both the 5mm and the 1mm mesh sieves.



Figure 6: The mini-Hamon grab sampler plus a typical retrieved sample along with 5mm and 1mm sieved samples

A total of 37 deployments were carried out in the Celtic Sea with 32 of these yielding a valid sample. In the western Channel, a total of 60 deployments were carried out with 52 of these yielding a valid sample. Valid samples were initially sampled for sediment particle size analysis (PSA) where a mixed sub-sample of material (~0.5 l) was extracted and frozen for subsequent analysis back in Lowestoft. The remaining sample was then sieved through 5mm and 1mm sieves to retain the macro infauna. These retained sediment and faunal fractions were transferred to a sample container and preserved in formalin for transport back to the laboratory for subsequent faunal extraction and identification. Photographs at all stages of this collection were taken.

D) Sediment redox.

At each environmentally sampled location, the decision on whether to deploy the Sediment Profile Imaging camera (SPI) was taken based on the sample observed from the mini-Hamon grab and the catch observed from the 4 m beam trawl deployment. The SPI was not deployed where there was any chance of causing damage to it. Figure 7 shows the SPI camera ready for deployment with a close-up of the SPI camera prism and camera housing.

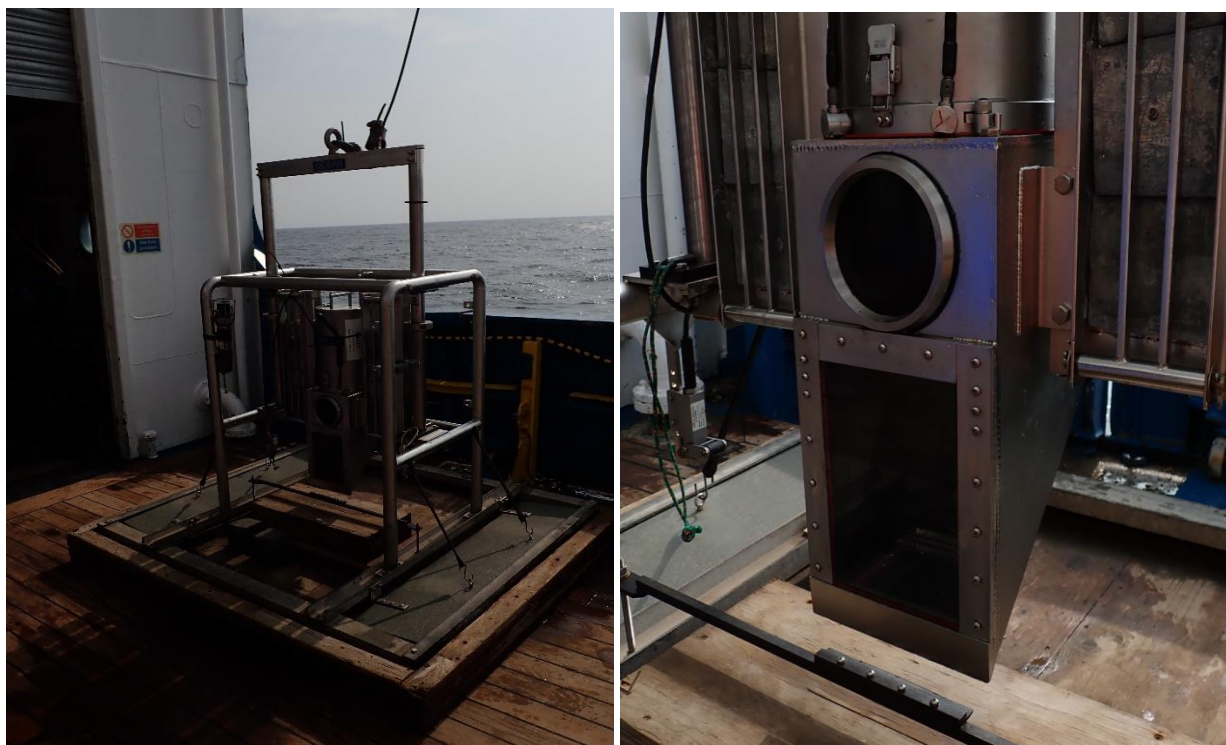


Figure 7: The SPI camera awaiting deployment, with image of the prism and camera housing.

A total of 13 deployments were carried out in the Celtic Sea area with a further four in the western Channel. All were considered as valid except one in the Celtic Sea where the photos taken were out of focus. At each site, a total of five ‘hops’ were made with the camera penetrating the sediment and taking two still photographs at each hop. These still photographs were stored for subsequent analysis back at Lowestoft. Figure 8 below shows the sediment profile images taken at two survey sites (five ‘hops’ at each) in the Celtic Deep.

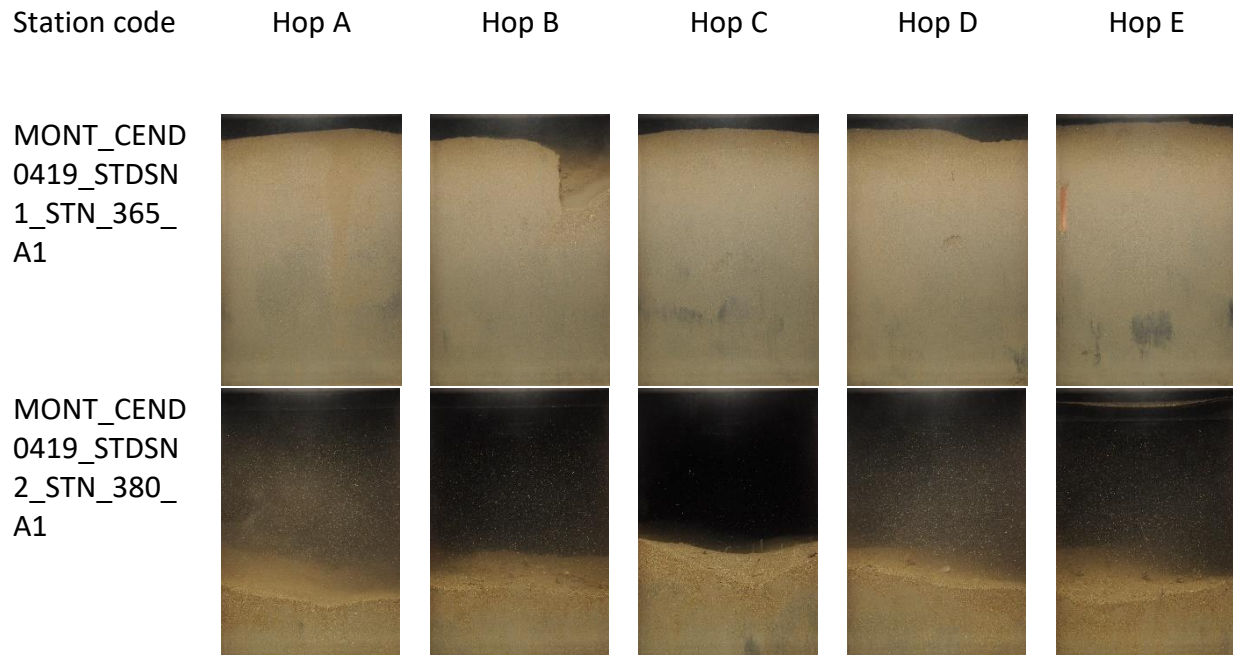


Figure 8 Typical SPI camera images taken at two survey locations in the Celtic Deep

E) 2 m beam trawl deployments.

A 2m Jennings beam trawl deployment was attempted at environmentally sampled locations where the ground allowed, at a speed of around 0.5 knots and using a warp to depth ration of 3:1. A total of 24 valid deployments were carried out in the Celtic Sea and in the western Channel, a total 59 deployments were carried with only two being deemed as invalid.

The catch was photographed and then washed over a 5 mm sieve. The resulting sample was then sorted and identified by species and then individual weights recorded along with length measurements for fish species caught. Additionally, these catches were also entered into the EDC system for subsequent uploading into the FSS, but benthic catches were treated as observations only except when relating to a sentinel species. Figure 9 shows the 2m Jennings beam trawl used on the survey, along with a typical un-sieved catch and along with the sieved sample on the 5 mm sieve ready for sorting.



Figure 9 - A 2m Jennings's beam trawl with a typical catch ready for sieving and the resulting 5mm sample for sorting.

2) To continuously log sub-surface (4m) salinity, temperature, fluorometry and other environmental data using the 'Ferrybox'. Additionally, a Flow-cytometer (phytoplankton) and plankton image analyser (PIA) for zooplankton will be run in conjunction with the Ferrybox.

The Ferrybox system was set up and run for the duration of the survey sending data back 'real time' to Cefas Lowestoft. The flow-cytometer was not installed aboard the Cefas Endeavour on this survey for operational reasons. The Plankton Image Analyser (PIA) is a real-time high-speed instrument that takes a surface water supply from the same inlet as the Ferrybox system and takes images of the passing particles within the water. These images are sent to a piece of recognition software which classifies each particle into categories corresponding to zooplankton taxonomic groups. Surface seawater was fed through the PIA throughout the second half of the survey. The instrument was set-up in the ship's 'garage' on part two of the survey only and PhD student James Scott was aboard specifically to manage this equipment.

Overall the PIA performed well; known issues were less frequent than initially anticipated and image quality was consistently high. The PIA was operational for in excess of 85% of the time the

instrument was on the vessel and was only offline for maintenance and one computer error. The issue of bubbles in the water was seemingly random and constituted a much smaller proportion of the images taken when compared to previous years. A new method of analysis has been developed to ensure that stations saturated with bubbles are analysed. Although numbers of bubbles were reduced, the presence of non-organic particulate was particularly high (sand, grit etc.). Whilst the PIA is not pushed beyond its computational capacity, it results in exceptionally convoluted folders and means the successful analysis of the plankton becomes a timely process and therefore unlikely and this issue affected four stations in total. This survey further presented the opportunity to modify camera parameters to ensure that the PIA ignored smaller images, which in turn, highlighted the need for small improvements in the user interface of the PIA. For example, these parameters must be programmed at the start of every run rather than being cached from previous entries. A collection of images recorded by the PIA are shown below in Figure 10.

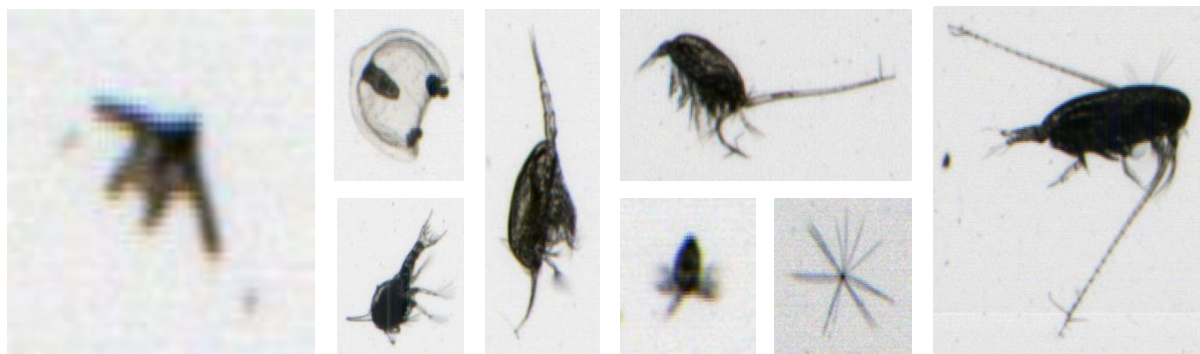


Figure 10. Example PIA images collected on survey. (from left to right and top to bottom: Echinodermata larvae, Medusae larvae, brachyuran zoea, Calanoid copepod (x2), Copepod nauplii, Radiolaria, Calanus spp.)

The data collected by the PIA during the survey are of a high enough standard that it can successfully contribute to the beginnings of a time series specific to this annual survey. Furthermore, the data collected this year will form the basis of a N.E. Atlantic zooplankton biodiversity study as well as contribute to a N.E. Atlantic ecosystems interactions study. The PIA is an instrument in its infancy and these surveys are crucial for demonstrating and testing the application of the data and integral in the on-going improvement of the instrument

Aim 3) To record details of surface sightings of any marine mammals, sea turtles and large pelagic fish, and record observations on jellyfish aggregations.

No dedicated observer was present on this survey and therefore no sightings of marine mammals, sea turtles, large pelagic fish and jellyfish aggregations were made.

SECONDARY SURVEY AIMS:

Aim 4) Collect water samples for caesium and tritium analysis under SLA22 (T Bailey – Cefas Lowestoft).

All eleven samples targeted were successfully collected at the nearest survey sampling location to the water collection site. At each location, 3 x 25 litre carboys and a 1 litre bottle were filled with surface seawater.

Aim 5) To tag/release specimens of various commercially exploited skates (Rajidae) and other selected elasmobranches.

Over the course of the survey a total of 19 elasmobranch specimens were tagged and released with Petersen discs, following SOP's and animal welfare practices. One further specimen of undulate ray was tagged with CTL electronic Data Storage Tags (DST's). Figure 11 shows a blonde ray being tagged with a Peterson disc tag prior to release. Table 5 shows the numbers of each elasmobranch species tagged and released during the survey.

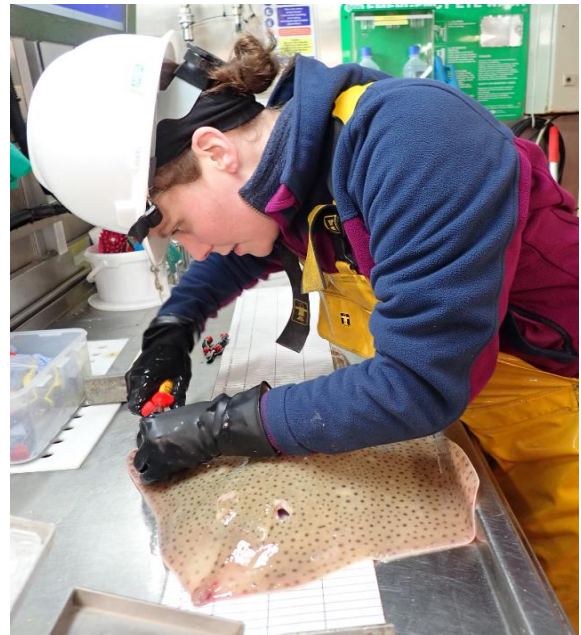


Figure 11: A blonde ray being tagged with a Peterson tag.

Table 5: Tagging of elasmobranch species

Common Name	Scientific name	Number tagged/released
Nursehound	<i>Scyliorhinus stellaris</i>	6
Starry smooth-hound	<i>Mustelus asterias</i>	5
Undulate Ray	<i>Raja undulata</i>	3*
Blonde Ray	<i>Raja brachyura</i>	3
Cuckoo Ray	<i>Leucoraja naevus</i>	2
Small-eyed ray	<i>Raja microocellata</i>	1
	Total	20

* One specimen tagged with electronic Data Storage Tags (DST's)

Aim 6) Collect specimens of selected species for ID purposes as well as length-weight measurements where still required.

A total of 208 individual length/weight measurements were taken from a range of fish and shellfish species and these are detailed in Table 6. This collection may be added to, once samples returned to Lowestoft for species identification are processed.

Table 6: Individual length/weight measurements taken

Common name	Scientific name	Cefas species code	Number recorded
Butterfly blenny	<i>Blennius ocellaris</i>	BBY	53
Solenette	<i>Buglossidium luteum</i>	SOT	35
Northern rockling	<i>Ciliata septentrionalis</i>	NNR	21
Steven's goby	<i>Gobius gasteveni</i>	GSV	14
Two spotted clingfish	<i>Diplecogaster bimaculata</i>	TSC	12
Norway bullhead	<i>Micrenophrys (taurulus) lilljeborgi</i>	NVB	11
Common spiny lobster	<i>Palinurus elephas</i>	SLO	11
Blonde ray	<i>Raja brachyura</i>	BLR	10
Tompot blenny	<i>Parablennius gattorugine</i>	TBY	8
Yarrel's blenny	<i>Chirolophis ascanii</i>	YBY	4
Butterfish	<i>Pholis gunnellus</i>	BTF	3
Norwegian topknot	<i>Zeugopterus (phrynorhombus) norvegicus</i>	NKT	3
Pandora	<i>Pagellus erythrinus</i>	PAC	3
Wrasses	<i>Labridae</i>	WRA	3
Ekstroms topknot	<i>Zeugopterus (phrynorhombus) regius</i>	EKT	2
Undulate ray	<i>Raja undulata</i>	UNR	2
European conger eel	<i>Conger conger</i>	COE	2
Greater forkbeard	<i>Phycis blennoides</i>	GBF	2
Four spot megrim	<i>Lepidorhombus boscii</i>	LBI	2
Imperial scaldfish	<i>Arnoglossus imperialis</i>	ISF	1
Long-finned gurnard	<i>Chelidonichthys obscura</i>	GUL	1
Goldsinny	<i>Ctenolabrus rupestris</i>	GDY	1
Rocklings	<i>Gaidropsarus spp</i>	ROL	1
Scald fish	<i>Arnoglossus laterna</i>	SDF	1
Jeffrey's goby	<i>Buenia jeffreysii</i>	JYG	1
Four-bearded rockling	<i>Enchelyopus cimbrius</i>	FRR	1
		Total	208

Aim 7) To collect length and weight measurements of jellyfish caught.

All jellyfish caught were measured where possible when the disc was intact. These were entered as part of the total catch into the EDC system, measured to the nearest ½ cm (below) apart from barrel Jellyfish (*Rhizostoma octopus*) which were measured to the nearest whole cm (below).

Aim 8) To collect other samples in support of active Cefas projects.

- a) Acoustics information. Fisheries acoustic data at four operating frequencies (38, 120, 200 and 333kHz) were recorded throughout the survey at an operational depth of 150m. (J Van Der Kooij – Cefas, Lowestoft)
- b) Multi-beam data. Multibeam echo sounder (MBES) data was continuously recorded throughout the survey. (S Kupschus - Cefas, Lowestoft).
- c) Whelk sample collection. A total of 2 samples of whelks (*Buccinum undatum*) were retained as part on on-going shellfish projects (V Laptivhovsky – Cefas Lowestoft).
- d) Squid sample collection. A total of 11 whole squid samples were retained for confirmation of ID along with determination of the sex and maturity stage of each individual specimen. In addition, a further 8 samples of squid-eggs were retained to allow for species identification, embryonic stage ID and analysis of deposition time. (V Laptivhovsky – Cefas, Lowestoft).
- e) Cuttlefish sample collection. Three samples of cuttlefish were collected for on-going studies. (V Laptivhovsky – Cefas, Lowestoft).
- f) Sample identification. A total of 18 samples of benthic and fish species requiring confirmation of species identification were retained (J Ellis, Cefas, Lowestoft).
- g) Scallop ageing samples A total of 9 samples of scallop shell were retained to aid the determination of first year growth and to supplement age samples collected from other sources. (C Reeve – Cefas, Lowestoft)
- h) Cefas connects and Outreach programmes. Several specimens of fish species were retained for use on these programmes. (L Mann/K Vanstaen – Cefas, Lowestoft)

Aim 9) To recover & replace a wave-rider close to the Isles of Scilly (D Pearce – Cefas, Lowestoft)

Aim not completed as work carried out on another vessel.

*Aim 10) To collect otoliths from Ballan Wrasse (*Labrus bergylta*) to aid future Cefas fish ageing studies (J Smith – Cefas Lowestoft).*

A total of 12 Ballan wrasse otoliths were collected to aid future age determination contract work. (J Smith – Cefas, Lowestoft)

Aim 11) Collect nutrient samples from surface sea-water supply in support of the ASMIAE project. (N Greenwood - Cefas Lowestoft).

Samples of surface seawater were collected and frozen at 33 locations over the course of the survey, with samples generally being taken at 12-hour intervals from the outflow pipe of the Ferrybox.

*Aim 12) Collect specimens of *Solenocera membranacea* and *Dichelopandalus bonnieri* (P McIlwaine - Cefas Lowestoft).*

Several specimens were collected and fixed in formaldehyde to aid future species identification.

Aim 13) Collect a plankton ring-net sample at the Gabbard location. (S Pitois – Cefas Lowestoft).

This sample was collected on the last day of the survey.

Aim 14) Collect plankton samples at locations previously known from samples collected on CEND 4/17 for having clusters of seabass eggs and larvae. (V Bendall – Cefas, Lowestoft)

A total of 18 plankton samples were collected using a 1m diameter ring net with a 1mm mesh. Fourteen of these locations were in the western channel with the remaining four locations around the Celtic Deep.

Micro CTD

The SAIV Micro CTD unit was attached to the 4m-beam trawl to record the temperature, salinity and depth profile at each station fished and this was successful in recording data on most fishing days. A total of 128 successful CTD data collections were made at valid 4m beam trawl stations, along with a further five data collections where the station was classified as not being valid. At a further four locations, no valid CTD readings were recorded.

Acknowledgements

My thanks once again go to all the officers and crew of RV Cefas Endeavour for their invaluable help, support and advice given during this survey, without which the survey would not have been as successful as it was. Additionally, my thanks also go to the shore-based P & O staff who ensured that the equipment needed for the survey all arrived fully to specification.

Finally, my thanks go to the Cefas scientists (including students and observers) who delivered the survey aims. Your commitment, dedication and hard work is really appreciated, and without such a committed group, the survey aims would not have been achieved.

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16 May 2019

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Welsh Government (WG)

Devon & Severn IFCA

Cornwall IFCA

Isles of Scilly IFCA

Southern IFCA

States of Jersey

Bailiwick of Guernsey

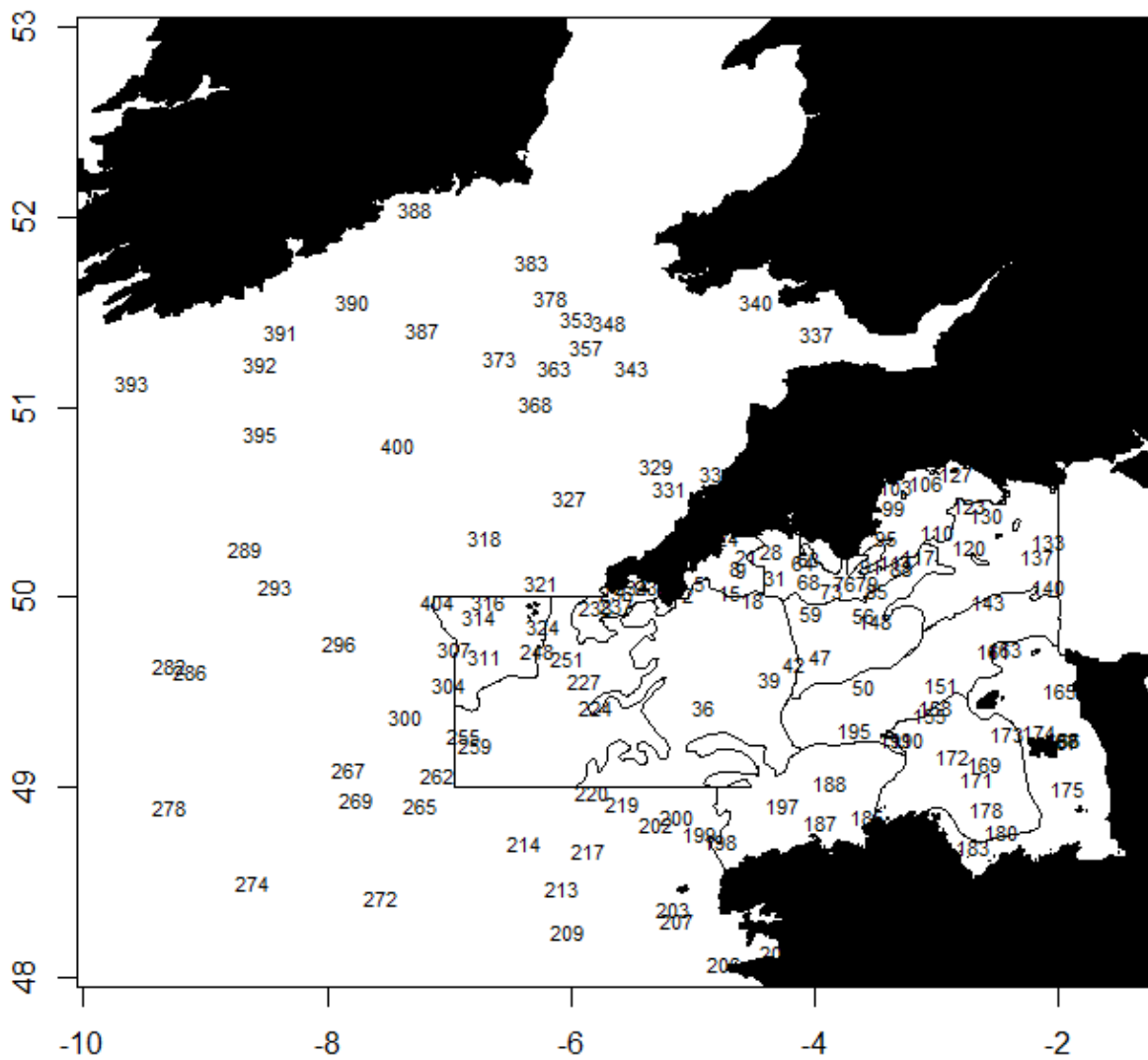


Figure 1: Chart of survey station numbers for CEND 4/19 (4m beam trawl stations only).

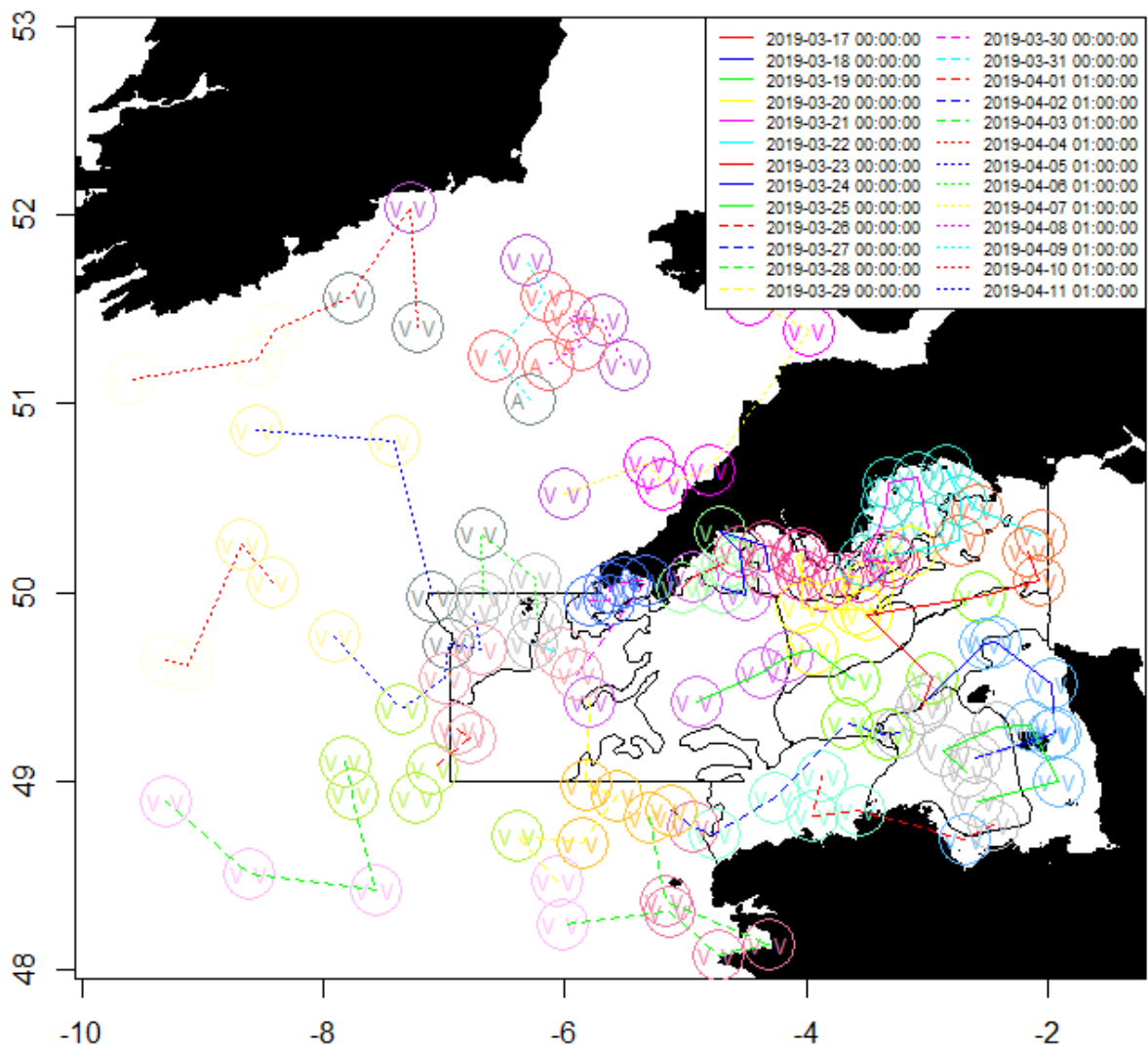


Figure 2: Survey track showing 4m beam trawl stations and deployment validity codes (V = valid; I = invalid; A = Additional) by day.

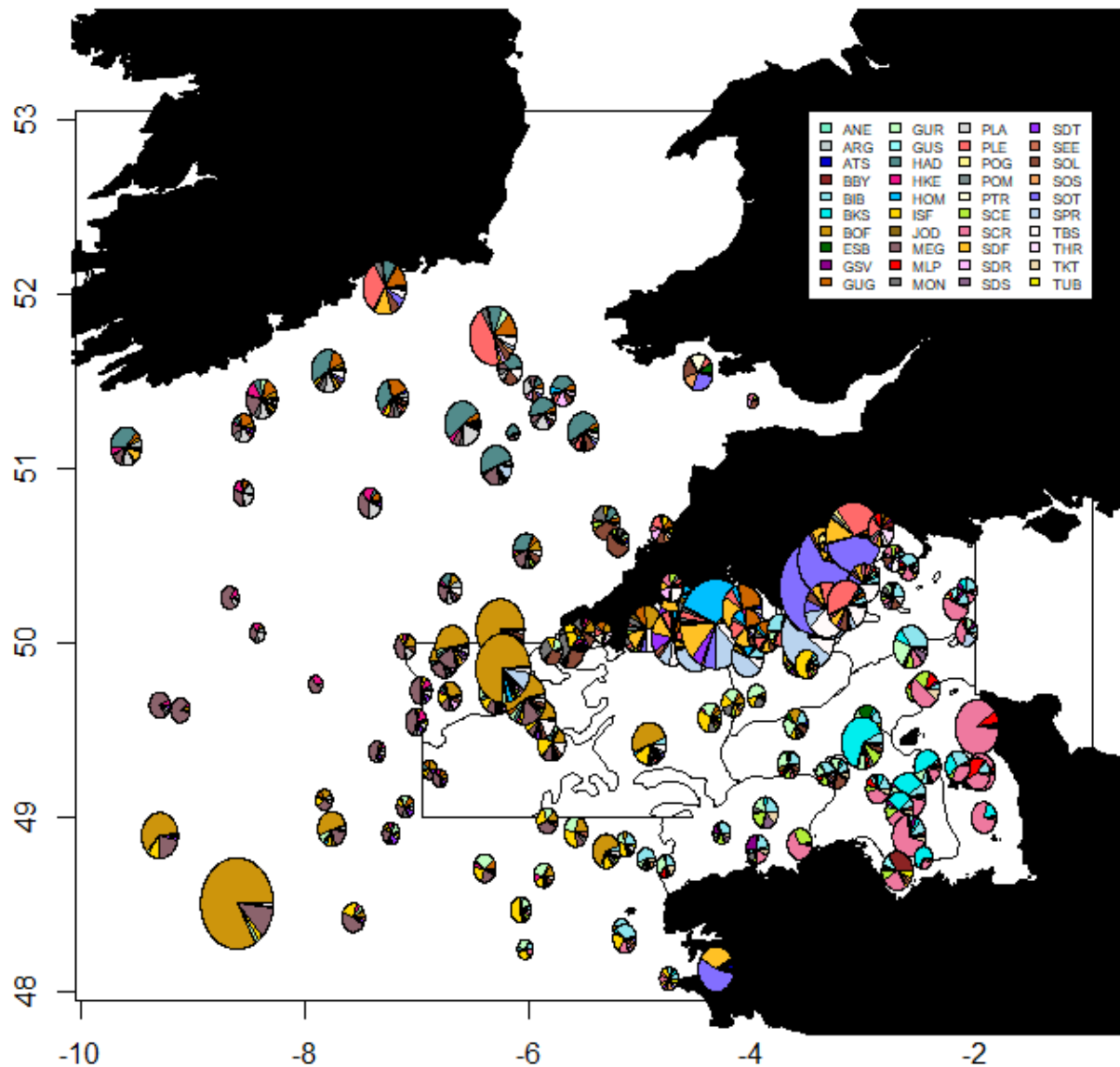


Figure 3: Species composition pie plots for Cend 4/19. Size of circles represents the size of the overall catch in numbers of the 40 most abundant species at a station with the size of the slice representing the relative proportion of each species encountered. For Cefas species codes see Table 2.

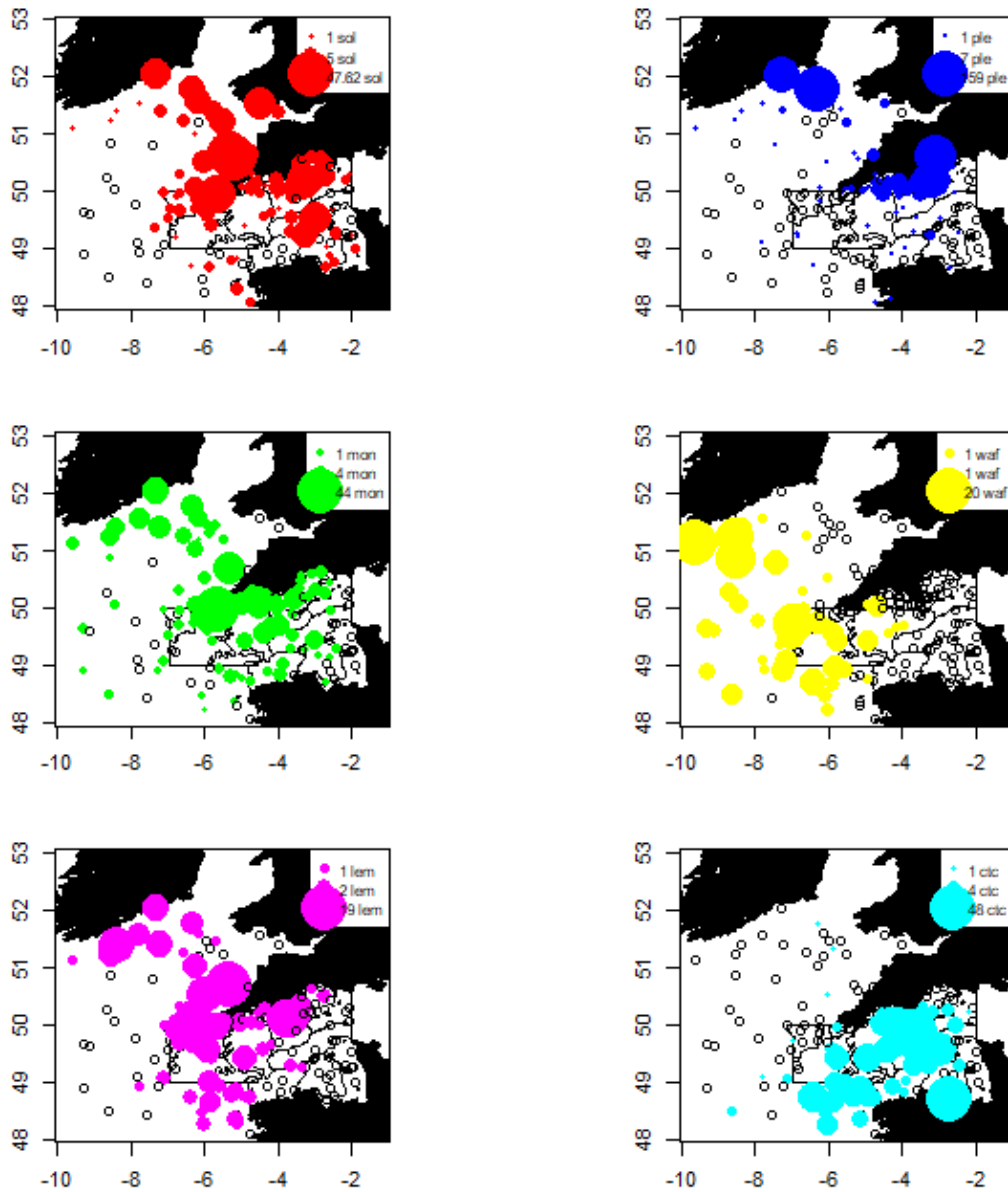


Figure 4: Distribution and numbers of major commercial species by station (see Table 2, for species codes).

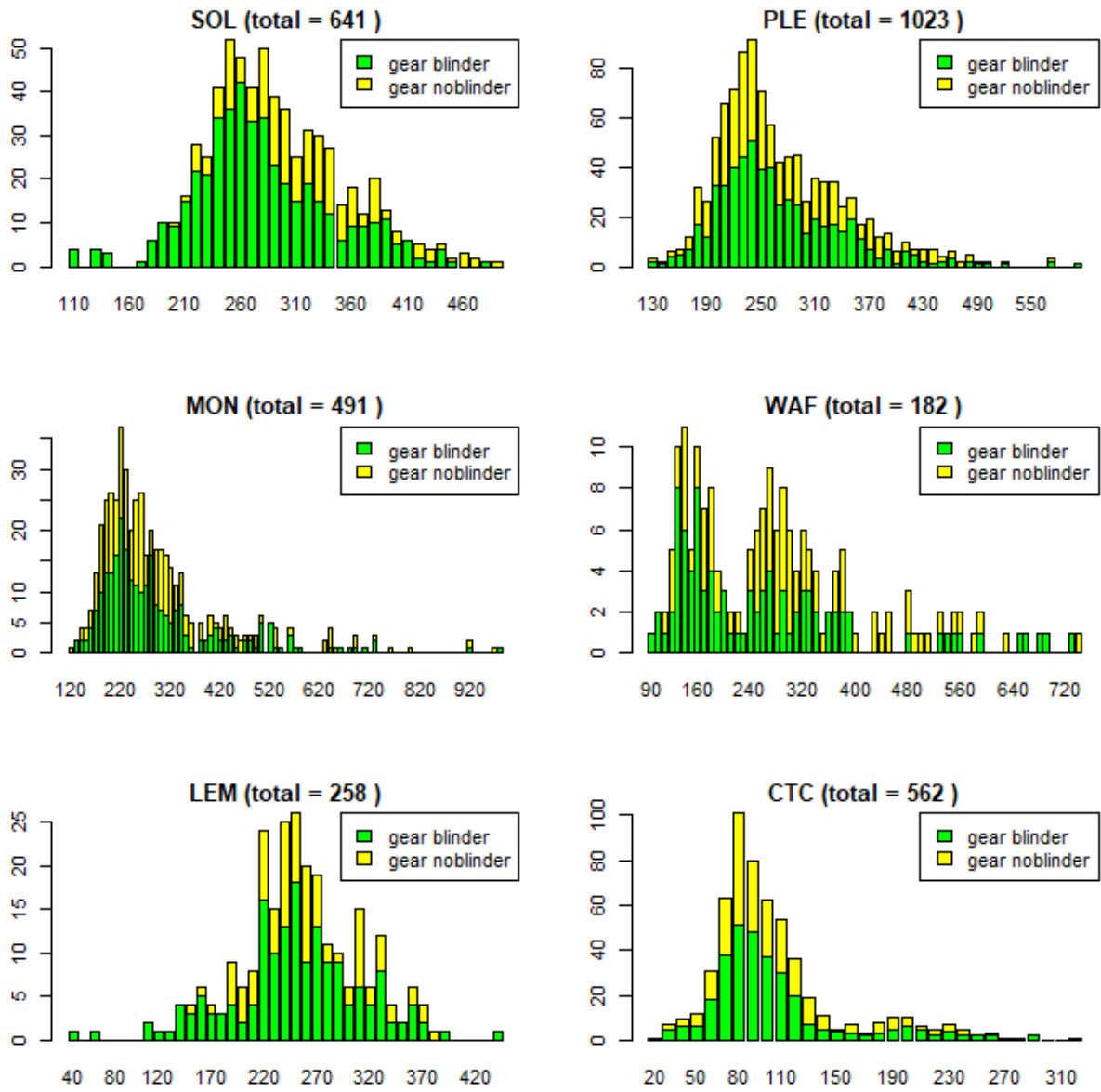


Figure 5: Length distributions (mm) for the major commercial species with total catch numbers by the two different gear types.

Appendix 1: Station Log information (all times GMT)

Station	Date/Time	Lat Shot	Long Shot	Lat Haul	Long Haul	Distance	Depth Shot	Depth Haul	Tide dir.	Tide speed	Wind dir.	Wind speed	Sea Height	Swell Dir	Swell Hgt	Barom	Gear
1	17/03/2019 10:05	49.979	-5.05	49.974	-5.05	-	76	76	7	0.5	340	12	0.8	250	1.5	1019	ESM2 and Niskin
2	17/03/2019 10:54	50.02	-5.038	49.986	-5.041	1.9	69	76	7	0.5	340	12	0.7	250	1.5	1019	2 x 4m Beam trawls
3	17/03/2019 12:45	49.992	-5.04	49.988	-5.037	-	77	77	7	0.5	340	25	1.7	250	2	1020	Hamon grab
4	17/03/2019 13:26	49.992	-5.04	49.992	-5.041	-	77	77	7	0.5	340	25	1.7	250	2	1020	2m beam trawl
5	17/03/2019 14:51	50.079	-4.945	50.047	-4.963	1.9	67	70	48	0.5	330	28	1.2	250	1.7	1020	2 x 4m Beam trawls
6	17/03/2019 16:04	50.05	-4.961	50.05	-4.956	-	70	70	-	-	310	30	1.2	250	1.5	1022	Hamon grab
7	17/03/2019 16:19	50.05	-4.962	50.05	-4.963	-	70	70	-	-	310	30	1.2	250	1.5	1022	2m beam trawl
8	17/03/2019 18:05	50.156	-4.656	50.169	-4.609	2	66	64	88	0	310	26	1.2	250	1.5	1024	2 x 4m Beam trawls
9	17/03/2019 19:12	50.142	-4.603	50.153	-4.554	2	66	66	256	0.2	310	30	1.2	250	1.5	1024	2 x 4m Beam trawls
10	17/03/2019 20:15	50.149	-4.576	50.149	-4.576	-	66	66	-	-	310	26	1.2	250	1.5	1025	Hamon grab
11	17/03/2019 20:36	50.149	-4.576	50.15	-4.578	-	67	66	-	-	310	26	1.2	250	1.5	1025	2m beam trawl
12	17/03/2019 21:39	50.164	-4.629	50.164	-4.629	-	65	65	-	-	310	23	1.2	250	1.5	1027	Hamon grab
13	17/03/2019 21:56	50.164	-4.629	50.165	-4.631	-	65	64	-	-	310	23	1.2	250	1.5	1027	2m beam trawl
14	18/03/2019 23:35	50.034	-4.67	50.034	-4.67	-	77	77	-	-	325	18	1.2	250	1.5	1028	ESM2 and Niskin
15	18/03/2019 00:14	50.028	-4.701	50.029	-4.649	2	78	77	13	0.2	325	18	1.7	250	1.5	1028	2 x 4m Beam trawls
16	18/03/2019 01:55	50.029	-4.657	50.029	-4.657	-	78	78	-	-	310	20	1.2	250	1.5	1028	Hamon grab
17	18/03/2019 02:39	50.029	-4.657	50.03	-4.659	-	78	79	-	-	310	20	1.2	250	1.5	1028	2m beam trawl
18	18/03/2019 04:48	49.984	-4.503	49.976	-4.554	2	78	79	64	0.1	310	20	1.7	250	1.5	1029	2 x 4m Beam trawls
19	18/03/2019 05:52	49.979	-4.537	49.979	-4.537	-	78	78	-	-	310	18	1.2	250	1.5	1030	Hamon grab
20	18/03/2019 06:06	49.978	-4.537	49.979	-4.539	-	79	78	-	-	310	18	1.2	250	1.5	1030	2m beam trawl
21	18/03/2019 08:11	50.214	-4.554	50.213	-4.502	2	59	58	256	0.2	310	14	1	250	1.7	1031	2 x 4m Beam trawls
21	18/03/2019 08:11	50.214	-4.554	50.213	-4.502	2	59	58	256	0.2	310	14	1	250	1.7	1031	Caesium and Tritium
22	18/03/2019 09:17	50.213	-4.508	50.213	-4.508	-	58	58	-	-	283	18	1	250	1.2	1031	Hamon grab
23	18/03/2019 09:33	50.213	-4.508	50.213	-4.509	-	58	58	-	-	283	18	1	250	1.2	1031	2m beam trawl
24	18/03/2019 11:10	50.318	-4.718	50.304	-4.699	1.2	19	22	269	0.2	260	16	0.7	-	-	1032	2 x 4m Beam trawls
25	18/03/2019 12:05	50.306	-4.7	50.306	-4.7	-	23	23	-	-	280	13	0.7	-	-	1032	Nutrients or SVP
25	18/03/2019 12:05	50.306	-4.7	50.306	-4.7	-	23	23	-	-	280	13	0.7	-	-	1032	Hamon grab
26	18/03/2019 12:19	50.306	-4.7	50.306	-4.703	-	24	24	-	-	280	13	0.7	-	-	1032	2m beam trawl
27	18/03/2019 15:39	50.241	-4.363	50.241	-4.363	-	58	58	-	-	280	16	1	-	-	1031	ESM2 and Niskin
28	18/03/2019 16:06	50.245	-4.35	50.218	-4.394	2	57	57	74	0.5	280	16	1	-	-	1031	2 x 4m Beam trawls
29	18/03/2019 17:37	50.233	-4.384	50.233	-4.384	-	56	56	-	-	280	12	0.7	-	-	1032	Hamon grab
30	18/03/2019 17:51	50.233	-4.384	50.233	-4.386	-	56	56	-	-	280	12	0.7	-	-	1032	2m beam trawl
31	18/03/2019 18:53	50.109	-4.318	50.115	-4.267	2	72	71	227	0	320	12	0.7	-	-	1033	2 x 4m Beam trawls
32	18/03/2019 19:55	50.114	-4.271	50.114	-4.271	-	72	72	-	-	320	12	0.7	-	-	1033	Hamon grab
33	18/03/2019 20:32	50.114	-4.272	50.114	-4.272	-	71	71	-	-	320	10	0.7	-	-	1033	SPI camera

Station	Date/Time	Lat Shot	Long Shot	Lat Haul	Long Haul	Distance	Depth Shot	Depth Haul	Tide dir.	Tide speed	Wind dir.	Wind speed	Sea Height	Swell Dir	Swell Hgt	Barom	Gear
34	18/03/2019 21:11	50.114	-4.272	50.115	-4.271	-	71	70	-	-	300	5	0.7	-	-	1034	2m beam trawl
35	19/03/2019 02:00	49.435	-4.902	49.435	-4.902	-	99	99	-	-	330	12	1	280	1	1034	ESM2 and Niskin
36	19/03/2019 03:18	49.422	-4.915	49.405	-4.96	2	101	102	67	1.5	330	12	1	280	1	1034	2 x 4m Beam trawls
37	19/03/2019 04:40	49.415	-4.951	49.415	-4.951	-	99	99	-	-	330	12	1	280	1	1034	Hamon grab
38	19/03/2019 05:00	49.407	-4.952	49.407	-4.953	-	101	101	-	-	330	10	0.7	280	1	1035	2m beam trawl
39	19/03/2019 08:11	49.571	-4.374	49.584	-4.327	2	87	85	238	0.6	-	-	0.5	-	-	1036	2 x 4m Beam trawls
39	19/03/2019 08:11	49.571	-4.374	49.584	-4.327	2	87	85	238	0.6	-	-	0.5	-	-	1036	Caesium and Tritium
40	19/03/2019 09:42	49.582	-4.333	49.582	-4.333	-	60	60	-	-	-	-	0.7	-	-	1036	Hamon grab
41	19/03/2019 09:58	49.58	-4.334	49.58	-4.332	-	85	85	-	-	-	-	0.7	320	1.2	1037	2m beam trawl
42	19/03/2019 11:14	49.656	-4.169	49.659	-4.118	2	80	80	258	0.8	-	-	0.7	320	1.2	1037	2 x 4m Beam trawls
43	19/03/2019 12:23	49.659	-4.141	49.659	-4.141	-	82	82	-	-	260	7	0.7	260	1.2	1037	Nutrients or SVP
43	19/03/2019 12:23	49.659	-4.141	49.659	-4.141	-	82	82	-	-	260	7	0.7	260	1.2	1037	Hamon grab
44	19/03/2019 12:40	49.658	-4.141	49.659	-4.139	-	82	81	-	-	260	10	0.7	260	1	1037	2m beam trawl
45	19/03/2019 13:05	49.659	-4.135	49.659	-4.135	-	83	83	-	-	260	10	0.7	260	1	1037	Ring Net(s)
46	19/03/2019 14:24	49.688	-3.985	49.688	-3.985	-	82	82	-	-	280	10	0.7	260	1	1037	ESM2 and Niskin
47	19/03/2019 14:54	49.695	-3.954	49.684	-4.003	2	82	82	77	0.6	280	10	0.8	260	1	1037	2 x 4m Beam trawls
48	19/03/2019 16:08	49.686	-3.998	49.686	-3.998	-	84	84	-	-	270	10	0.7	260	0.7	1037	Hamon grab
49	19/03/2019 16:24	49.685	-3.998	49.685	-4	-	84	83	-	-	270	10	0.7	260	0.7	1037	2m beam trawl
50	19/03/2019 18:24	49.535	-3.602	49.52	-3.649	2	81	81	47	1.4	-	-	0.5	260	0.7	1038	2 x 4m Beam trawls
51	19/03/2019 19:33	49.526	-3.633	49.526	-3.633	-	81	81	-	-	-	-	0.5	260	0.7	1039	Hamon grab
52	19/03/2019 19:51	49.526	-3.633	49.525	-3.635	-	80	79	-	-	-	-	0.5	260	0.7	1039	2m beam trawl
53	19/03/2019 20:19	49.522	-3.639	49.522	-3.639	-	79	79	-	-	-	-	0.5	260	0.7	1039	Ring Net(s)
54	19/03/2019 20:49	49.477	-3.596	49.477	-3.596	-	100	100	-	-	-	-	0.5	260	0.7	1039	Caesium and Tritium
55	19/03/2019 23:45	49.912	-3.599	49.912	-3.599	-	70	70	-	-	-	-	1	-	-	1039	ESM2 and Niskin
56	20/03/2019 00:03	49.911	-3.59	49.914	-3.533	2.2	70	70	238	1.6	250	11	0.7	-	-	1039.5	2 x 4m Beam trawls
56	20/03/2019 00:03	49.911	-3.59	49.914	-3.533	2.2	70	70	238	1.6	250	11	0.7	-	-	1039.5	Caesium and Tritium
57	20/03/2019 01:11	49.914	-3.537	49.914	-3.537	-	71	71	-	-	260	10	0.7	-	-	1039	Hamon grab
58	20/03/2019 01:26	49.915	-3.537	49.915	-3.535	-	72	72	-	-	260	10	0.7	-	-	1039	2m beam trawl
59	20/03/2019 03:37	49.917	-4.036	49.909	-4.086	2	78	78	77	0.9	260	10	0.7	-	-	1039	2 x 4m Beam trawls
60	20/03/2019 04:42	49.911	-4.068	49.911	-4.068	-	78	78	-	-	260	10	0.7	-	-	1039	Hamon grab
61	20/03/2019 04:53	49.911	-4.068	49.911	-4.07	-	78	79	-	-	260	10	0.7	-	-	1039	2m beam trawl
62	20/03/2019 05:17	49.911	-4.071	49.911	-4.071	-	79	79	-	-	260	12	0.7	-	-	1039	Ring Net(s)
63	20/03/2019 07:41	50.207	-4.047	50.197	-4.096	2	58	61	138	0.3	260	10	0.7	-	-	1040	2 x 4m Beam trawls
64	20/03/2019 08:48	50.189	-4.085	50.206	-4.04	2.1	61	57	239	0.1	260	14	0.7	-	-	1040	2 x 4m Beam trawls
65	20/03/2019 10:02	50.197	-4.094	50.197	-4.094	-	59	59	-	-	-	-	0.7	-	-	1042	Hamon grab
66	20/03/2019 10:24	50.198	-4.096	50.198	-4.094	-	59	59	-	-	-	-	0.7	-	-	1042	2m beam trawl
67	20/03/2019 10:46	50.198	-4.097	50.198	-4.097	-	59	59	-	-	-	-	0.7	-	-	1042	Ring Net(s)
68	20/03/2019 11:46	50.087	-4.05	50.083	-3.999	2	68	69	281	1.4	-	-	0.7	-	-	1041	2 x 4m Beam trawls

Station	Date/Time	Lat Shot	Long Shot	Lat Haul	Long Haul	Distance	Depth Shot	Depth Haul	Tide dir.	Tide speed	Wind dir.	Wind speed	Sea Height	Swell Dir	Swell Hgt	Barom	Gear
69	20/03/2019 12:46	50.085	-4.018	50.085	-4.018	-	71	71	-	-	-	-	0.7	-	-	1041	Nutrients or SVP
69	20/03/2019 12:46	50.085	-4.018	50.085	-4.018	-	71	71	-	-	-	-	0.7	-	-	1041	Hamon grab
70	20/03/2019 13:02	50.085	-4.018	50.085	-4.016	-	72	71	-	-	-	-	0.7	-	-	1041	2m beam trawl
71	20/03/2019 14:27	50.035	-3.895	50.035	-3.895	-	71	71	-	-	-	-	0.7	-	-	1041	ESM2 and Niskin
72	20/03/2019 14:43	50.036	-3.894	50.036	-3.894	-	75	75	-	-	-	-	0.7	-	-	1041	Ring Net(s)
73	20/03/2019 15:13	50.035	-3.864	50.028	-3.915	2	72	73	-	-	-	-	0.7	-	-	1041	2 x 4m Beam trawls
74	20/03/2019 16:11	50.031	-3.891	50.031	-3.891	-	75	75	-	-	260	10	0.7	-	-	1041	Hamon grab
75	20/03/2019 16:35	50.031	-3.89	50.03	-3.892	-	75	75	-	-	260	10	0.7	-	-	1041	2m beam trawl
76	20/03/2019 17:46	50.073	-3.746	50.076	-3.798	2	74	74	77	1.3	260	14	0.7	-	-	1041	2 x 4m Beam trawls
76	20/03/2019 17:46	50.073	-3.746	50.076	-3.798	2	74	74	77	1.3	260	14	0.7	-	-	1041	Caesium and Tritium
77	20/03/2019 18:54	50.075	-3.792	50.075	-3.792	-	73	73	-	-	260	12	0.7	-	-	1041	Hamon grab
78	20/03/2019 19:09	50.075	-3.792	50.075	-3.794	-	73	73	-	-	260	12	0.7	-	-	1041	2m beam trawl
79	20/03/2019 20:36	50.08	-3.558	50.062	-3.601	2	67	67	70	0.6	270	10	0.7	-	-	1041	2 x 4m Beam trawls
80	20/03/2019 22:08	50.063	-3.595	50.063	-3.595	-	68	68	-	-	-	-	0.7	-	-	1042	Hamon grab
81	20/03/2019 22:24	50.064	-3.595	50.065	-3.594	-	68	68	-	-	-	-	0.7	-	-	1042	2m beam trawl
82	20/03/2019 22:52	50.064	-3.599	50.064	-3.599	-	67	67	-	-	270	10	0.7	-	-	1042	Ring Net(s)
83	20/03/2019 23:53	50.026	-3.511	50.026	-3.511	-	68	68	-	-	270	10	0.7	-	-	1042	ESM2 and Niskin
84	21/03/2019 00:08	50.024	-3.521	50.024	-3.521	-	69	69	-	-	270	10	0.7	-	-	1042	Ring Net(s)
85	21/03/2019 00:39	50.034	-3.493	50.049	-3.447	2	68	68	224	1.9	270	10	0.7	-	-	1042	2 x 4m Beam trawls
86	21/03/2019 01:43	50.05	-3.446	50.05	-3.446	-	70	70	-	-	270	10	0.7	-	-	1042	Hamon grab
87	21/03/2019 01:58	50.05	-3.446	50.05	-3.444	-	65	69	-	-	270	8	0.5	-	-	1041	2m beam trawl
88	21/03/2019 03:12	50.159	-3.285	50.182	-3.248	2	64	64	232	1	270	8	0.5	-	-	1041	2 x 4m Beam trawls
89	21/03/2019 04:10	50.054	-3.254	50.054	-3.254	-	65	65	-	-	270	8	0.5	-	-	1041	Hamon grab
90	21/03/2019 04:28	50.179	-3.253	50.178	-3.255	-	65	65	-	-	270	8	0.5	-	-	1041	2m beam trawl
91	21/03/2019 06:01	50.17	-3.539	50.148	-3.577	2	70	71	52	2.2	290	14	0.5	-	-	1041	2 x 4m Beam trawls
92	21/03/2019 07:02	50.148	-3.577	50.148	-3.577	-	72	72	-	-	-	-	0.5	-	-	1040	Hamon grab
93	21/03/2019 07:17	50.148	-3.577	50.148	-3.578	-	71	71	-	-	-	-	0.5	-	-	1040	2m beam trawl
94	21/03/2019 07:36	50.148	-3.574	50.148	-3.574	-	72	72	-	-	-	-	0.5	-	-	1040	Ring Net(s)
95	21/03/2019 08:57	50.318	-3.411	50.302	-3.457	2	56	56	63	0.8	-	-	0.5	-	-	1042	2 x 4m Beam trawls
96	21/03/2019 10:01	50.303	-3.457	50.303	-3.457	-	56	56	-	-	-	-	0.5	-	-	1040	Hamon grab
97	21/03/2019 10:17	50.302	-3.457	50.303	-3.459	-	55	55	-	-	-	-	0.5	-	-	1042	2m beam trawl
98	21/03/2019 11:48	50.466	-3.342	50.466	-3.342	-	34	34	-	-	-	-	0.5	-	-	1042	Nutrients or SVP
98	21/03/2019 11:48	50.466	-3.342	50.466	-3.342	-	34	34	-	-	-	-	0.5	-	-	1042	ESM2 and Niskin
99	21/03/2019 12:03	50.473	-3.345	50.499	-3.313	2	32	31	209	0.6	-	-	0.5	-	-	1041.5	2 x 4m Beam trawls
99	21/03/2019 12:03	50.473	-3.345	50.499	-3.313	2	32	31	209	0.6	-	-	0.5	-	-	1041.5	Caesium and Tritium
100	21/03/2019 13:00	50.497	-3.316	50.497	-3.316	-	31	31	-	-	-	-	0.5	-	-	1042	Hamon grab
101	21/03/2019 13:19	50.497	-3.316	50.497	-3.316	-	31	32	-	-	-	-	0.5	-	-	1042	SPI camera
102	21/03/2019 13:48	50.497	-3.317	50.498	-3.315	-	35	35	-	-	-	-	0.5	-	-	1042	2m beam trawl

Station	Date/Time	Lat Shot	Long Shot	Lat Haul	Long Haul	Distance	Depth Shot	Depth Haul	Tide dir.	Tide speed	Wind dir.	Wind speed	Sea Height	Swell Dir	Swell Hgt	Barom	Gear
103	21/03/2019 15:07	50.58	-3.327	50.606	-3.294	2	19	17	67	0.1	-	-	0.5	-	-	1042	2 x 4m Beam trawls
104	21/03/2019 16:06	50.599	-3.306	50.599	-3.306	-	19	19	-	-	-	-	0.5	-	-	1040	Hamon grab
105	21/03/2019 16:18	50.599	-3.306	50.599	-3.304	-	19	20	-	-	-	-	0.5	-	-	1040	2m beam trawl
106	21/03/2019 17:39	50.608	-3.084	50.597	-3.137	2.1	32	32	60	0.4	-	-	0.5	-	-	1040	2 x 4m Beam trawls
107	21/03/2019 18:32	50.598	-3.119	50.598	-3.119	-	32	32	-	-	-	-	0.5	-	-	1039	Hamon grab
108	21/03/2019 18:42	50.598	-3.13	50.598	-3.13	-	32	32	-	-	-	-	0.5	-	-	1039	SPI camera
109	21/03/2019 19:15	50.598	-3.129	50.597	-3.131	-	32	32	-	-	-	-	0.5	-	-	1039	2m beam trawl
110	21/03/2019 21:11	50.341	-2.991	50.335	-3.042	2	58	58	79	1.1	-	-	0.5	-	-	1039	2 x 4m Beam trawls
110	21/03/2019 21:11	50.341	-2.991	50.335	-3.042	2	58	58	79	1.1	-	-	0.5	-	-	1039	Caesium and Tritium
111	21/03/2019 22:16	50.336	-3.03	50.336	-3.03	-	57	57	-	-	-	-	0.5	-	-	1039	Hamon grab
112	21/03/2019 22:30	50.336	-3.03	50.336	-3.032	-	57	57	-	-	-	-	0.5	-	-	1039	2m beam trawl
113	22/03/2019 00:13	50.185	-3.336	50.185	-3.336	-	61	61	-	-	180	0.9	0.7	-	-	1038	ESM2 and Niskin
114	22/03/2019 00:32	50.19	-3.325	50.206	-3.279	2.1	61	61	222	1.4	180	0.5	0.7	-	-	1038	2 x 4m Beam trawls
115	22/03/2019 01:34	50.207	-3.28	50.207	-3.28	-	61	61	-	-	170	8	0.7	-	-	1038	Hamon grab
116	22/03/2019 01:49	50.207	-3.28	50.207	-3.278	-	61	62	-	-	170	8	0.7	-	-	1038	2m beam trawl
117	22/03/2019 04:59	50.216	-3.147	50.186	-3.124	2.1	63	64	354	0.2	170	12	0.7	-	-	1036	2 x 4m Beam trawls
118	22/03/2019 05:49	50.186	-3.123	50.186	-3.123	-	64	64	-	-	170	12	0.7	-	-	1036	Hamon grab
119	22/03/2019 06:04	50.186	-3.124	50.185	-3.125	-	64	66	-	-	170	14	0.7	-	-	1036	2m beam trawl
120	22/03/2019 07:49	50.269	-2.736	50.259	-2.785	2.1	61	62	78	2.3	-	-	0.5	-	-	1037	2 x 4m Beam trawls
121	22/03/2019 08:57	50.259	-2.785	50.259	-2.785	-	62	62	-	-	-	-	0.5	-	-	1036	Hamon grab
122	22/03/2019 09:13	50.259	-2.785	50.259	-2.788	-	62	62	-	-	-	-	0.5	-	-	1036	2m beam trawl
123	22/03/2019 10:52	50.487	-2.725	50.509	-2.765	2	46	43	128	1.6	-	-	0.5	-	-	1037	2 x 4m Beam trawls
123	22/03/2019 10:52	50.487	-2.725	50.509	-2.765	2	46	43	128	1.6	-	-	0.5	-	-	1037	Caesium and Tritium
124	22/03/2019 13:35	50.509	-2.765	50.509	-2.765	-	42	42	-	-	-	-	0.5	-	-	1036	Nutrients or SVP
124	22/03/2019 13:35	50.509	-2.765	50.509	-2.765	-	42	42	-	-	-	-	0.5	-	-	1036	Hamon grab
125	22/03/2019 13:47	50.509	-2.765	50.509	-2.763	-	43	43	-	-	-	-	0.5	-	-	1036	2m beam trawl
126	22/03/2019 14:56	50.647	-2.832	50.647	-2.832	-	29	29	-	-	210	10	0.5	-	-	1036	ESM2 and Niskin
127	22/03/2019 15:13	50.649	-2.84	50.638	-2.791	2	28	28	297	1.1	210	10	0.5	-	-	1034	2 x 4m Beam trawls
128	22/03/2019 16:14	50.639	-2.798	50.639	-2.798	-	29	29	-	-	210	10	0.5	-	-	1035	Hamon grab
129	22/03/2019 16:26	50.639	-2.798	50.638	-2.797	-	29	29	-	-	210	10	0.5	-	-	1035	2m beam trawl
130	22/03/2019 19:10	50.435	-2.593	50.449	-2.64	2	52	52	96	2	220	14	0.7	-	-	1036	2 x 4m Beam trawls
131	22/03/2019 20:20	50.447	-2.633	50.447	-2.633	-	52	52	-	-	260	12	0.7	-	-	1036	Hamon grab
132	22/03/2019 20:34	50.447	-2.634	50.447	-2.636	-	52	53	-	-	260	12	0.7	-	-	1036	2m beam trawl
133	22/03/2019 22:49	50.299	-2.072	50.296	-2.123	2	56	56	92	1.9	180	10	0.7	-	-	1037	2 x 4m Beam trawls
134	23/03/2019 00:17	50.299	-2.115	50.299	-2.115	-	55	55	-	-	240	11	0.7	-	-	1036	Hamon grab
135	23/03/2019 00:31	50.299	-2.116	50.299	-2.118	-	55	56	-	-	240	11	0.7	-	-	1036	2m beam trawl
136	23/03/2019 01:30	50.224	-2.139	50.224	-2.139	-	60	60	-	-	250	14	0.7	-	-	1036	ESM2 and Niskin
137	23/03/2019 01:58	50.22	-2.167	50.225	-2.115	2.1	60	57	262	3.4	250	18	0.8	-	-	1036	2 x 4m Beam trawls

Station	Date/Time	Lat Shot	Long Shot	Lat Haul	Long Haul	Distance	Depth Shot	Depth Haul	Tide dir.	Tide speed	Wind dir.	Wind speed	Sea Height	Swell Dir	Swell Hgt	Barom	Gear
138	23/03/2019 03:08	50.225	-2.115	50.225	-2.115	-	56	56	-	-	250	10	0.7	-	-	1036	Hamon grab
139	23/03/2019 03:30	50.225	-2.065	50.225	-2.113	-	57	58	-	-	250	10	0.7	-	-	1036	2m beam trawl
140	23/03/2019 05:12	50.061	-2.074	50.06	-2.022	2	61	61	273	1.5	-	-	0.7	-	-	1037	2 x 4m Beam trawls
141	23/03/2019 06:16	50.06	-2.023	50.06	-2.023	-	62	62	-	-	-	-	0.7	-	-	1037	Hamon grab
142	23/03/2019 06:31	50.06	-2.022	50.06	-2.024	-	63	63	-	-	-	-	0.7	-	-	1037	2m beam trawl
143	23/03/2019 09:20	49.976	-2.573	49.969	-2.623	1.9	73	72	71	2.5	-	-	0.5	-	-	1039	2 x 4m Beam trawls
144	23/03/2019 10:48	49.97	-2.622	49.97	-2.622	-	70	70	-	-	-	-	0.5	-	-	1038	Nutrients or SVP
144	23/03/2019 10:48	49.97	-2.622	49.97	-2.622	-	70	70	-	-	-	-	0.5	-	-	1038	Hamon grab
145	23/03/2019 11:00	49.969	-2.622	49.969	-2.624	-	70	70	-	-	-	-	0.5	-	-	1038	2m beam trawl
146	23/03/2019 11:20	49.969	-2.624	49.969	-2.624	-	70	70	-	-	-	-	0.5	-	-	1038	Ring Net(s)
147	23/03/2019 15:08	49.876	-3.506	49.876	-3.506	-	69	69	-	-	60	12	0.7	-	-	1038	ESM2 and Niskin
148	23/03/2019 15:25	49.876	-3.505	49.885	-3.453	2.1	71	69	224	1.9	60	12	0.7	-	-	1038	2 x 4m Beam trawls
149	23/03/2019 16:22	49.883	-3.461	49.883	-3.461	-	71	71	-	-	60	12	0.7	-	-	1039	Hamon grab
150	23/03/2019 16:36	49.884	-3.46	49.884	-3.459	-	71	71	-	-	60	12	0.7	-	-	1039	2m beam trawl
151	23/03/2019 19:36	49.542	-2.964	49.523	-3.006	2	77	77	59	2	80	14	0.7	-	-	1038	2 x 4m Beam trawls
152	23/03/2019 20:45	49.526	-2.999	49.526	-2.999	-	80	80	-	-	80	15	0.5	-	-	1038	Hamon grab
153	23/03/2019 21:06	49.525	-2.999	49.524	-3.001	-	80	80	32	2.5	80	15	1	-	-	1038	2m beam trawl
154	23/03/2019 21:32	49.524	-2.998	49.524	-2.998	-	79	79	-	-	80	15	1	-	-	1038	Ring Net(s)
155	23/03/2019 23:30	49.381	-3.052	49.348	-3.047	2	70	69	333	1.7	50	13	1.3	-	-	1038	2 x 4m Beam trawls
155	23/03/2019 23:30	49.381	-3.052	49.348	-3.047	2	70	69	333	1.7	50	13	1.3	-	-	1038	Caesium and Tritium
156	24/03/2019 00:25	49.349	-3.053	49.349	-3.053	-	69	69	-	-	50	11	1.2	-	-	1038	Ring Net(s)
157	24/03/2019 00:40	49.349	-3.069	49.349	-3.069	-	69	69	-	-	50	11	1.2	-	-	1038	ESM2 and Niskin
158	24/03/2019 02:00	49.426	-3.006	49.437	-2.958	2	67	67	233	1.7	70	12	1.3	-	-	1038	2 x 4m Beam trawls
159	24/03/2019 02:54	49.443	-2.966	49.443	-2.966	-	68	68	-	-	30	12	1.2	-	-	1038	Ring Net(s)
160	24/03/2019 03:28	49.438	-2.958	49.439	-2.957	-	68	69	-	-	30	12	1.2	-	-	1038	2m beam trawl
161	24/03/2019 07:28	49.725	-2.534	49.716	-2.584	2	74	90	70	1.6	60	14	1	-	-	1038	2 x 4m Beam trawls
162	24/03/2019 08:28	49.718	-2.568	49.718	-2.568	-	84	84	-	-	60	12	1	-	-	1039	Ring Net(s)
163	24/03/2019 09:45	49.733	-2.442	49.719	-2.463	1.2	72	72	44	4.4	25	12	1	-	-	1039	2 x 4m Beam trawls
164	24/03/2019 13:34	49.554	-1.953	49.554	-1.953	-	23	23	-	-	50	12	0.7	-	-	1039	Nutrients or SVP
164	24/03/2019 13:34	49.554	-1.953	49.554	-1.953	-	23	23	-	-	50	12	0.7	-	-	1039	ESM2 and Niskin
165	24/03/2019 14:00	49.516	-1.979	49.538	-1.963	1.5	27	23	200	1.6	50	10	0.7	-	-	1039	2 x 4m Beam trawls
166	24/03/2019 16:37	49.257	-1.949	49.272	-1.982	1.6	24	26	119	2.8	50	12	0.7	-	-	1040	2 x 4m Beam trawls
167	24/03/2019 18:39	49.249	-1.976	49.264	-2.021	2	26	33	105	3.4	315	14	0.5	-	-	1039	2 x 4m Beam trawls
168	24/03/2019 19:46	49.249	-1.977	49.265	-2.022	2	26	36	99	1.2	315	8	0.5	-	-	1038	2 x 4m Beam trawls
169	24/03/2019 23:30	49.123	-2.598	49.099	-2.563	2	58	54	317	1.7	310	18	0.7	-	-	1038	2 x 4m Beam trawls
170	25/03/2019 00:41	49.089	-2.549	49.089	-2.549	-	52	52	-	-	330	18	1.7	-	-	1039	ESM2 and Niskin
171	25/03/2019 01:49	49.043	-2.673	49.025	-2.63	2.1	50	48	288	2	350	20	1.2	-	-	1039	2 x 4m Beam trawls
172	25/03/2019 05:22	49.163	-2.869	49.18	-2.913	2	66	70	109	3.1	350	20	1.5	-	-	1039	2 x 4m Beam trawls

Station	Date/Time	Lat Shot	Long Shot	Lat Haul	Long Haul	Distance	Depth Shot	Depth Haul	Tide dir.	Tide speed	Wind dir.	Wind speed	Sea Height	Swell Dir	Swell Hgt	Barom	Gear
173	25/03/2019 08:39	49.287	-2.424	49.269	-2.467	2	61	62	59	2.1	350	22	1.5	-	-	1039	2 x 4m Beam trawls
174	25/03/2019 11:27	49.292	-2.152	49.273	-2.174	1.5	34	35	336	2	20	15	1.2	-	-	1040	2 x 4m Beam trawls
175	25/03/2019 15:35	48.998	-1.918	49.03	-1.899	2	15	17	214	0.8	30	14	1	-	-	1040	2 x 4m Beam trawls
176	25/03/2019 16:29	49.027	-1.899	49.029	-1.898	-	17	17	179	1	30	14	1	-	-	1040	2m beam trawl
177	25/03/2019 16:51	49.028	-1.899	49.028	-1.899	-	18	18	-	-	30	14	1	-	-	1040	Nutrients or SVP
177	25/03/2019 16:51	49.028	-1.899	49.028	-1.899	-	18	18	-	-	30	14	1	-	-	1040	ESM2 and Niskin
178	25/03/2019 21:07	48.891	-2.587	48.915	-2.622	1.9	48	50	130	0.8	30	12	0.7	-	-	1041	2 x 4m Beam trawls
179	25/03/2019 22:43	48.914	-2.622	48.916	-2.622	-	49	49	-	-	80	10	0.7	-	-	1042	2m beam trawl
180	26/03/2019 06:30	48.766	-2.459	48.785	-2.501	1.9	37	38	128	2.2	-	-	0.5	-	-	1042	2 x 4m Beam trawls
181	26/03/2019 07:22	48.784	-2.504	48.784	-2.504	-	39	39	-	-	-	-	0.5	-	-	1042	ESM2 and Niskin
182	26/03/2019 08:04	48.785	-2.5	48.785	-2.502	-	41	41	-	-	-	-	0.5	-	-	1043	2m beam trawl
183	26/03/2019 10:14	48.692	-2.695	48.716	-2.728	2	34	36	72	0	-	-	0.5	-	-	1043	2 x 4m Beam trawls
184	26/03/2019 14:57	48.842	-3.584	48.842	-3.584	-	53	53	-	-	330	8	1	-	-	1042	Nutrients or SVP
184	26/03/2019 14:57	48.842	-3.584	48.842	-3.584	-	53	53	-	-	330	8	1	-	-	1042	ESM2 and Niskin
185	26/03/2019 15:19	48.846	-3.567	48.846	-3.53	1.5	48	46	273	1	330	8	1	-	-	1042	2 x 4m Beam trawls
186	26/03/2019 17:41	48.817	-3.963	48.817	-3.963	-	79	79	-	-	330	14	1	-	-	1042	Nutrients or SVP
187	26/03/2019 18:05	48.819	-3.947	48.805	-3.994	2	78	80	77	1	330	14	1	-	-	1042	2 x 4m Beam trawls
188	26/03/2019 21:09	49.026	-3.876	49.022	-3.926	2.1	87	89	80	1	350	10	1	-	-	1042	2 x 4m Beam trawls
189	27/03/2019 01:05	49.227	-3.195	49.227	-3.195	-	72	72	-	-	340	8	0.7	-	-	1042	ESM2 and Niskin
190	27/03/2019 01:38	49.252	-3.239	49.229	-3.203	1.9	71	70	287	1.5	340	6	0.7	-	-	1042	2 x 4m Beam trawls
191	27/03/2019 03:18	49.25	-3.337	49.247	-3.287	2	67	70	266	1.5	340	8	0.7	-	-	1042	2 x 4m Beam trawls
192	27/03/2019 04:33	49.248	-3.301	49.248	-3.301	-	71	71	-	-	340	10	0.7	-	-	1042	Hamon grab
193	27/03/2019 04:47	49.248	-3.3	49.249	-3.298	-	72	72	-	-	340	10	0.7	-	-	1042	2m beam trawl
194	27/03/2019 05:20	49.247	-3.301	49.247	-3.301	-	70	70	-	-	50	10	0.7	-	-	1042	Ring Net(s)
195	27/03/2019 08:20	49.302	-3.666	49.29	-3.689	1.1	86	86	73	1.2	50	14	0.8	-	-	1043	2 x 4m Beam trawls
196	27/03/2019 13:16	48.91	-4.198	48.91	-4.198	-	94	94	-	-	-	-	0.7	-	-	1043	Nutrients or SVP
196	27/03/2019 13:16	48.91	-4.198	48.91	-4.198	-	94	94	-	-	-	-	0.7	-	-	1043	ESM2 and Niskin
197	27/03/2019 14:03	48.91	-4.266	48.92	-4.217	2	94	92	266	1	30	12	0.7	-	-	1043	2 x 4m Beam trawls
198	27/03/2019 17:47	48.719	-4.769	48.698	-4.809	2	103	104	47	1.3	60	16	1	-	-	1043	2 x 4m Beam trawls
199	27/03/2019 19:47	48.76	-4.946	48.743	-4.989	2	109	110	45	1.2	60	18	1	-	-	1044	2 x 4m Beam trawls
200	27/03/2019 22:10	48.843	-5.13	48.829	-5.175	2	111	108	70	0.7	50	15	1.2	-	-	1044	2 x 4m Beam trawls
201	27/03/2019 23:41	48.8	-5.282	48.8	-5.282	-	111	111	-	-	50	10	1.2	-	-	1044	Nutrients or SVP
201	27/03/2019 23:41	48.8	-5.282	48.8	-5.282	-	111	111	-	-	50	10	1.2	-	-	1044	ESM2 and Niskin
202	28/03/2019 00:59	48.805	-5.301	48.836	-5.284	2	110	109	213	0.6	30	10	0.7	-	-	1043	2 x 4m Beam trawls
203	28/03/2019 07:16	48.362	-5.167	48.392	-5.188	2	102	102	8	0.3	60	14	1	-	-	1044	2 x 4m Beam trawls
204	28/03/2019 12:04	48.128	-4.308	48.128	-4.308	-	18	18	242	0.2	80	11	0.7	-	-	1042	Nutrients or SVP
204	28/03/2019 12:04	48.128	-4.308	48.128	-4.308	-	18	18	242	0.2	80	11	0.7	-	-	1042	ESM2 and Niskin
205	28/03/2019 12:12	48.129	-4.315	48.128	-4.367	2.1	18	25	242	0.2	80	11	0.7	-	-	1042	2 x 4m Beam trawls

Station	Date/Time	Lat Shot	Long Shot	Lat Haul	Long Haul	Distance	Depth Shot	Depth Haul	Tide dir.	Tide speed	Wind dir.	Wind speed	Sea Height	Swell Dir	Swell Hgt	Barom	Gear
206	28/03/2019 14:39	48.075	-4.74	48.105	-4.719	2	40	50	183	0.2	80	12	0.5	-	-	1041	2 x 4m Beam trawls
207	28/03/2019 17:39	48.303	-5.135	48.28	-5.123	1.4	97	92	330	0.2	330	14	0.7	-	-	1041	2 x 4m Beam trawls
208	28/03/2019 21:56	48.215	-6.078	48.215	-6.078	-	118	118	-	-	60	16	0.7	-	-	1040	Nutrients or SVP
209	28/03/2019 22:58	48.242	-6.028	48.23	-6.075	2.1	133	136	83	0.4	60	16	1.2	-	-	1040	2 x 4m Beam trawls
210	29/03/2019 00:19	48.23	-6.072	48.23	-6.072	-	135	135	-	-	90	17	1.7	-	-	1040	Nutrients or SVP
210	29/03/2019 00:19	48.23	-6.072	48.23	-6.072	-	135	135	-	-	90	17	1.7	-	-	1040	Hamon grab
211	29/03/2019 00:43	48.23	-6.073	48.231	-6.071	-	135	135	-	-	90	17	1.8	-	-	1040	2m beam trawl
212	29/03/2019 02:57	48.503	-6.065	48.503	-6.065	-	123	123	-	-	100	12	1.7	-	-	1039	ESM2 and Niskin
213	29/03/2019 03:35	48.468	-6.066	48.5	-6.053	1.9	124	123	221	0.5	100	12	1.2	-	-	1039	2 x 4m Beam trawls
214	29/03/2019 06:35	48.707	-6.39	48.675	-6.406	2.1	141	138	326	0.2	80	14	1.2	-	-	1037	2 x 4m Beam trawls
215	29/03/2019 08:03	48.675	-6.406	48.675	-6.406	-	140	140	-	-	80	12	1	-	-	1037	Hamon grab
216	29/03/2019 08:25	48.676	-6.406	48.674	-6.405	-	114	114	-	-	80	12	1	-	-	1037	2m beam trawl
217	29/03/2019 11:45	48.666	-5.862	48.647	-5.903	2	117	120	65	0.3	80	15	1.2	300	1	1035	2 x 4m Beam trawls
218	29/03/2019 14:47	48.91	-5.571	48.91	-5.571	-	115	115	-	-	90	16	1.2	300	1	1033	Nutrients or SVP
218	29/03/2019 14:47	48.91	-5.571	48.91	-5.571	-	115	115	-	-	90	16	1.2	300	1	1033	ESM2 and Niskin
219	29/03/2019 15:21	48.917	-5.574	48.943	-5.544	2	114	114	221	0.4	90	16	1.2	300	1	1033	2 x 4m Beam trawls
220	29/03/2019 17:50	48.979	-5.83	49.011	-5.813	2	116	116	247	0.6	39	16	1.2	300	1.2	1032	2 x 4m Beam trawls
221	29/03/2019 19:07	49.009	-5.812	49.009	-5.812	-	117	117	-	-	80	14	1.2	300	1.2	1032	Hamon grab
222	29/03/2019 19:27	49.009	-5.813	49.009	-5.811	-	117	116	281	0.2	80	14	1.2	300	1.2	1032	2m beam trawl
223	29/03/2019 22:21	49.433	-5.791	49.433	-5.791	-	110	110	-	-	90	11	0.7	-	-	1031	ESM2 and Niskin
224	29/03/2019 22:55	49.423	-5.791	49.403	-5.833	2	108	110	47	0.2	90	11	0.7	-	-	1031	2 x 4m Beam trawls
224	29/03/2019 22:55	49.423	-5.791	49.403	-5.833	2	108	110	47	0.2	90	11	0.7	-	-	1031	Caesium and Tritium
225	30/03/2019 00:02	49.405	-5.826	49.405	-5.826	-	111	111	-	-	65	6	0.7	-	-	1031	Nutrients or SVP
225	30/03/2019 00:02	49.405	-5.826	49.405	-5.826	-	111	111	-	-	65	6	0.7	-	-	1031	Hamon grab
226	30/03/2019 00:25	49.405	-5.826	49.406	-5.824	-	111	110	-	-	65	6	0.7	-	-	1031	2m beam trawl
227	30/03/2019 01:42	49.564	-5.895	49.587	-5.932	2	104	103	148	0.1	-	-	0.7	-	-	1030	2 x 4m Beam trawls
228	30/03/2019 02:46	49.588	-5.932	49.588	-5.932	-	103	103	-	-	-	-	0.7	-	-	1030	Hamon grab
229	30/03/2019 03:06	49.587	-5.932	49.589	-5.932	-	104	103	-	-	50	10	0.7	-	-	1030	2m beam trawl
230	30/03/2019 07:55	50.058	-5.331	50.049	-5.306	1.1	31	26	283	0.3	40	12	0.7	-	-	1029	2 x 4m Beam trawls
231	30/03/2019 08:49	50.054	-5.322	50.054	-5.322	-	30	30	-	-	40	12	0.7	-	-	1029	Hamon grab
232	30/03/2019 09:01	50.054	-5.322	50.054	-5.32	-	30	29	-	-	-	-	0.5	-	-	1029	2m beam trawl
233	30/03/2019 10:02	50.04	-5.509	50.04	-5.509	-	55	55	-	-	20	11	0.7	-	-	1029	Nutrients or SVP
234	30/03/2019 10:54	50.057	-5.508	50.024	-5.514	2	48	55	53	0.1	20	10	0.7	-	-	1029	2 x 4m Beam trawls
235	30/03/2019 12:18	50.017	-5.618	50.017	-5.618	-	63	63	-	-	20	12	0.7	-	-	1030	Nutrients or SVP
235	30/03/2019 12:18	50.017	-5.618	50.017	-5.618	-	63	63	-	-	20	12	0.7	-	-	1030	ESM2 and Niskin
236	30/03/2019 13:11	50.026	-5.628	49.994	-5.612	2	57	66	94	0.1	20	12	0.7	-	-	1030	2 x 4m Beam trawls
237	30/03/2019 15:05	49.96	-5.629	49.992	-5.642	2	71	67	109	0.1	30	16	1	-	-	1029	2 x 4m Beam trawls
238	30/03/2019 17:05	49.954	-5.792	49.987	-5.799	2	70	66	184	0.5	30	16	1	290	1.2	1028	2 x 4m Beam trawls

Station	Date/Time	Lat Shot	Long Shot	Lat Haul	Long Haul	Distance	Depth Shot	Depth Haul	Tide dir.	Tide speed	Wind dir.	Wind speed	Sea Height	Swell Dir	Swell Hgt	Barom	Gear
239	30/03/2019 18:22	49.983	-5.797	49.983	-5.797	-	68	68	-	-	30	14	1	290	1.2	1029	Hamon grab
240	30/03/2019 18:39	49.983	-5.798	49.984	-5.797	-	67	67	-	-	30	14	1	290	1.2	1029	2m beam trawl
241	30/03/2019 19:40	49.988	-5.642	49.988	-5.642	-	67	67	-	-	30	16	1	290	1.7	1029	Hamon grab
242	30/03/2019 19:58	49.989	-5.642	49.99	-5.64	-	69	67	-	-	30	14	1	290	1.7	1029	2m beam trawl
243	30/03/2019 20:35	49.997	-5.613	49.997	-5.613	-	66	66	-	-	30	14	1	290	1.7	1029	Hamon grab
244	30/03/2019 20:55	49.997	-5.613	49.997	-5.611	-	66	65	-	-	30	14	1	290	1.7	1029	2m beam trawl
245	30/03/2019 21:52	50.027	-5.515	50.027	-5.515	-	55	55	-	-	20	17	1	290	1.7	1030	Hamon grab
246	30/03/2019 22:08	50.027	-5.515	50.028	-5.515	-	55	55	-	-	20	17	1	-	-	1030	2m beam trawl
247	31/03/2019 01:46	49.725	-6.264	49.725	-6.264	-	102	102	-	-	20	14	1.2	-	-	1029	ESM2 and Niskin
248	31/03/2019 02:03	49.723	-6.278	49.723	-6.33	2	101	101	100	0.4	20	14	1.7	-	-	1029	2 x 4m Beam trawls
249	31/03/2019 03:11	49.723	-6.33	49.723	-6.33	-	102	102	-	-	40	14	1.2	-	-	1029	Hamon grab
250	31/03/2019 03:33	49.723	-6.33	49.73	-6.33	-	102	102	-	-	40	14	1.2	-	-	1029	2m beam trawl
251	31/03/2019 05:20	49.68	-6.03	49.701	-5.989	2	100	97	223	0.2	50	12	1.3	-	-	1028	2 x 4m Beam trawls
252	31/03/2019 06:36	49.701	-5.99	49.701	-5.99	-	97	97	-	-	50	12	1.2	-	-	1028	Hamon grab
253	31/03/2019 07:17	49.701	-5.99	49.701	-5.989	-	98	100	-	-	60	12	1.2	-	-	1028	2m beam trawl
254	02/04/2019 07:17	49.248	-6.889	49.248	-6.889	-	122	122	-	-	310	25	1.2	310	1.7	1021	ESM2 and Niskin
255	02/04/2019 07:53	49.273	-6.884	49.306	-6.875	2	122	122	248	0.5	315	25	1.5	310	2	1021	2 x 4m Beam trawls
256	02/04/2019 09:05	49.305	-6.874	49.305	-6.874	-	124	124	-	-	310	24	1.2	310	1.7	1021	Hamon grab
257	02/04/2019 09:36	49.305	-6.875	49.306	-6.875	-	123	122	-	-	310	24	1.2	310	1.7	1021	2m beam trawl
258	02/04/2019 10:24	49.305	-6.874	49.305	-6.874	-	122	123	-	-	310	26	1.2	310	2.2	1020	SPI camera
259	02/04/2019 11:44	49.223	-6.792	49.253	-6.814	2	121	122	9	0.3	320	26	1.5	310	2.5	1021	2 x 4m Beam trawls
260	02/04/2019 13:27	49.253	-6.812	49.253	-6.812	-	124	124	-	-	320	26	1.5	310	2.5	1020	Nutrients or SVP
260	02/04/2019 13:27	49.253	-6.812	49.253	-6.812	-	124	124	-	-	320	26	1.5	310	2.5	1020	Hamon grab
261	02/04/2019 13:53	49.253	-6.813	49.253	-6.816	-	124	123	78	0.6	320	26	1.5	310	2.5	1020	2m beam trawl
262	02/04/2019 16:11	49.062	-7.102	49.067	-7.152	2.1	135	127	123	0.3	320	32	2	310	2.7	1012	2 x 4m Beam trawls
263	02/04/2019 17:40	49.067	-7.148	49.067	-7.148	-	123	123	-	-	320	33	2	310	3	1018	Hamon grab
264	03/04/2019 19:33	48.922	-7.293	48.922	-7.293	-	142	142	-	-	350	26	1.5	320	4	1012	Nutrients or SVP
264	03/04/2019 19:33	48.922	-7.293	48.922	-7.293	-	142	142	-	-	350	26	1.5	320	4	1012	ESM2 and Niskin
265	03/04/2019 20:17	48.907	-7.23	48.879	-7.203	2	127	142	262	0.8	340	22	1.5	340	3.2	1012	2 x 4m Beam trawls
266	03/04/2019 21:50	48.879	-7.204	48.879	-7.204	-	144	144	-	-	340	22	1.5	340	3.5	1012	Hamon grab
267	04/04/2019 02:16	49.098	-7.828	49.079	-7.785	2	140	135	59	0.5	320	25	2	310	3	1005	2 x 4m Beam trawls
268	04/04/2019 03:33	49.079	-7.783	49.079	-7.783	-	138	138	-	-	300	26	2	310	3	1004	Hamon grab
269	04/04/2019 05:10	48.933	-7.761	48.91	-7.722	2.1	150	148	161	0.2	320	26	2	310	3	1003	2 x 4m Beam trawls
270	04/04/2019 06:27	48.91	-7.721	48.91	-7.721	-	149	149	-	-	320	20	1.5	310	3	1002	Hamon grab
271	04/04/2019 09:46	48.412	-7.577	48.412	-7.577	-	170	170	-	-	270	17	1.5	310	3	1001	Nutrients or SVP
271	04/04/2019 09:46	48.412	-7.577	48.412	-7.577	-	170	170	-	-	270	17	1.5	310	3	1001	ESM2 and Niskin
272	04/04/2019 10:26	48.423	-7.567	48.449	-7.617	1.9	169	167	112	0	270	16	1.5	310	2.5	1001	2 x 4m Beam trawls
273	04/04/2019 11:53	48.449	-7.616	48.449	-7.616	-	165	165	-	-	265	17	1.5	310	2.2	999	Hamon grab

Station	Date/Time	Lat Shot	Long Shot	Lat Haul	Long Haul	Distance	Depth Shot	Depth Haul	Tide dir.	Tide speed	Wind dir.	Wind speed	Sea Height	Swell Dir	Swell Hgt	Barom	Gear
274	04/04/2019 16:59	48.505	-8.61	48.516	-8.657	2	184	174	76	0.6	290	12	1	310	2.2	998	2 x 4m Beam trawls
275	04/04/2019 18:18	48.515	-8.657	48.515	-8.657	-	175	175	-	-	290	18	0.7	310	2.2	998	Hamon grab
276	04/04/2019 18:46	48.515	-8.657	48.516	-8.659	-	175	175	-	-	290	18	0.7	310	2.2	998	2m beam trawl
277	04/04/2019 23:00	48.889	-9.318	48.889	-9.318	-	160	160	-	-	30	8	0.5	330	1.5	999	Nutrients or SVP
277	04/04/2019 23:00	48.889	-9.318	48.889	-9.318	-	160	160	-	-	30	8	0.5	330	1.5	999	ESM2 and Niskin
278	04/04/2019 23:28	48.894	-9.301	48.901	-9.251	2	162	162	294	0.3	-	-	0.5	330	1	999	2 x 4m Beam trawls
279	05/04/2019 00:37	48.9	-9.25	48.9	-9.25	-	162	162	-	-	30	8	0.5	330	1.5	999	Hamon grab
280	05/04/2019 01:11	48.901	-9.251	48.9	-9.25	-	164	164	-	-	-	-	1	330	1	999	2m beam trawl
281	05/04/2019 05:54	49.636	-9.273	49.636	-9.273	-	148	148	-	-	30	10	0.5	320	1.5	1001	Nutrients or SVP
282	05/04/2019 06:18	49.643	-9.301	49.655	-9.351	2.1	149	145	164	1.2	30	10	0.5	320	1.5	1001	2 x 4m Beam trawls
283	05/04/2019 07:30	49.654	-9.35	49.654	-9.35	-	148	148	-	-	40	12	0.5	320	1.5	1001	Hamon grab
284	05/04/2019 07:47	49.654	-9.35	49.654	-9.35	-	148	148	-	-	30	10	0.5	320	1.5	1001	SPI camera
285	05/04/2019 08:31	49.655	-9.351	49.657	-9.353	-	146	147	-	-	-	-	0.5	310	1.5	1001	2m beam trawl
286	05/04/2019 10:01	49.613	-9.118	49.621	-9.066	2	150	150	251	0.8	190	10	1	310	3.5	1001	2 x 4m Beam trawls
287	05/04/2019 11:10	49.621	-9.067	49.621	-9.067	-	149	149	-	-	75	15	0.7	310	3.7	1002	Nutrients or SVP
287	05/04/2019 11:10	49.621	-9.067	49.621	-9.067	-	149	149	-	-	75	15	0.7	310	3.7	1002	Hamon grab
288	05/04/2019 11:38	49.621	-9.068	49.621	-9.065	-	149	149	280	0.5	75	15	0.7	310	3.7	1002	2m beam trawl
289	05/04/2019 16:23	50.259	-8.674	50.258	-8.726	2.1	132	133	69	0.8	70	24	1.5	290	2.7	1002	2 x 4m Beam trawls
290	05/04/2019 17:34	50.263	-8.754	50.263	-8.754	-	134	134	-	-	70	26	1.5	290	2.7	1003	ESM2 and Niskin
291	05/04/2019 18:10	50.258	-8.718	50.258	-8.718	-	129	129	-	-	70	22	1.5	290	2.7	1002	Hamon grab
292	05/04/2019 18:39	50.258	-8.718	50.258	-8.721	-	131	131	-	-	70	22	1.5	290	2.7	1002	2m beam trawl
293	05/04/2019 21:11	50.057	-8.426	50.092	-8.43	2.1	136	136	208	0.7	110	24	1.7	290	2.7	1004	2 x 4m Beam trawls
294	05/04/2019 22:27	50.092	-8.43	50.092	-8.43	-	134	134	-	-	135	24	1.5	-	-	1004	Hamon grab
295	06/04/2019 02:02	49.77	-7.932	49.77	-7.932	-	130	130	-	-	110	18	1.5	-	-	1005	ESM2 and Niskin
296	06/04/2019 02:31	49.763	-7.905	49.729	-7.9	2	132	133	7	0.7	110	18	1.5	-	-	1005	2 x 4m Beam trawls
297	06/04/2019 03:38	49.729	-7.899	49.729	-7.899	-	136	136	-	-	110	22	1.5	-	-	1005	Hamon grab
298	06/04/2019 03:59	49.729	-7.899	49.73	-7.9	-	134	134	-	-	120	14	1.5	-	-	1005	SPI camera
299	06/04/2019 04:38	49.73	-7.9	49.729	-7.916	-	135	135	-	-	120	18	1.5	-	-	1006	2m beam trawl
300	06/04/2019 07:56	49.377	-7.353	49.405	-7.326	2.1	128	130	211	0.5	120	22	1.5	-	-	1007	2 x 4m Beam trawls
301	06/04/2019 09:04	49.405	-7.326	49.405	-7.326	-	128	128	-	-	120	17	1.5	290	2	1008	Hamon grab
302	06/04/2019 09:33	49.405	-7.327	49.405	-7.325	-	128	129	-	-	120	17	1.5	290	2	1008	2m beam trawl
303	06/04/2019 11:47	49.546	-7.022	49.546	-7.022	-	123	123	-	-	100	10	1.5	290	2	1009	ESM2 and Niskin
304	06/04/2019 12:16	49.547	-7.003	49.536	-6.955	2	120	119	315	0.4	100	10	1.5	290	2	1009	2 x 4m Beam trawls
305	06/04/2019 13:19	49.536	-6.955	49.536	-6.955	-	118	118	-	-	100	8	1.5	2	2	1010	Hamon grab
306	06/04/2019 13:42	49.536	-6.954	49.535	-6.952	-	119	120	21	0.8	100	8	1.5	2	2	1010	2m beam trawl
307	06/04/2019 15:34	49.726	-6.959	49.706	-7	2	117	120	25	0.8	100	10	1.2	290	1.5	1010	2 x 4m Beam trawls
308	06/04/2019 16:54	49.706	-6.999	49.706	-6.999	-	121	121	-	-	100	12	1.5	290	1.5	1010	Hamon grab
309	06/04/2019 17:12	49.706	-6.999	49.706	-6.999	-	122	122	-	-	100	14	1.5	290	1.5	1010	SPI camera

Station	Date/Time	Lat Shot	Long Shot	Lat Haul	Long Haul	Distance	Depth Shot	Depth Haul	Tide dir.	Tide speed	Wind dir.	Wind speed	Sea Height	Swell Dir	Swell Hgt	Barom	Gear
310	06/04/2019 17:52	49.706	-6.999	49.705	-7	-	120	121	80	0.9	100	14	1.5	290	1.5	1010	2m beam trawl
311	06/04/2019 19:30	49.693	-6.703	49.726	-6.713	2	108	104	176	0.5	100	18	1.2	290	1.5	1012	2 x 4m Beam trawls
312	06/04/2019 20:39	49.726	-6.712	49.726	-6.712	-	104	104	-	-	100	12	1.5	290	1.5	1012	Hamon grab
313	06/04/2019 22:11	49.889	-6.756	49.889	-6.756	-	106	106	-	-	-	-	0.5	290	1.2	1012	Nutrients or SVP
313	06/04/2019 22:11	49.889	-6.756	49.889	-6.756	-	106	106	-	-	-	-	0.5	290	1.2	1012	ESM2 and Niskin
314	06/04/2019 22:36	49.901	-6.751	49.933	-6.734	1.9	105	103	198	1.3	-	-	1.5	290	1.2	1012	2 x 4m Beam trawls
314	06/04/2019 22:36	49.901	-6.751	49.933	-6.734	1.9	105	103	198	1.3	-	-	1.5	290	1.2	1012	Caesium and Tritium
315	06/04/2019 23:43	49.933	-6.735	49.933	-6.735	-	104	104	-	-	310	10	1	290	1.2	1012	Hamon grab
316	07/04/2019 00:19	49.978	-6.681	50.007	-6.652	2	100	100	234	0.8	310	10	1	290	1.5	1012	2 x 4m Beam trawls
317	07/04/2019 02:03	50.007	-6.653	50.007	-6.653	-	100	100	-	-	30	16	1	290	1.2	1011	Hamon grab
318	07/04/2019 03:58	50.313	-6.703	50.282	-6.724	2	102	102	17	0.5	50	20	1.5	290	1.5	1011	2 x 4m Beam trawls
319	07/04/2019 04:12	50.287	-6.721	50.287	-6.721	-	102	102	-	-	50	20	1.2	290	1.2	1012	Hamon grab
320	07/04/2019 07:37	50.063	-6.238	50.063	-6.238	-	84	84	-	-	50	16	1.2	290	1.2	1011	Nutrients or SVP
321	07/04/2019 07:57	50.077	-6.251	50.104	-6.281	2.1	84	85	113	0.8	80	19	1.5	-	-	1012	2 x 4m Beam trawls
322	07/04/2019 09:07	50.104	-6.28	50.104	-6.28	-	84	84	-	-	50	19	1.2	90	1.7	1012	Hamon grab
323	07/04/2019 18:22	49.831	-6.258	49.831	-6.258	-	89	89	-	-	160	12	1	-	-	1014	Nutrients or SVP
323	07/04/2019 18:22	49.831	-6.258	49.831	-6.258	-	89	89	-	-	160	12	1	-	-	1014	ESM2 and Niskin
324	07/04/2019 19:16	49.854	-6.227	49.829	-6.261	2	86	91	110	0.9	160	14	1	-	-	1014	2 x 4m Beam trawls
325	07/04/2019 20:24	49.83	-6.258	49.83	-6.258	-	91	91	-	-	160	15	0.7	-	-	1014	Hamon grab
326	08/04/2019 01:39	50.522	-6.017	50.522	-6.017	-	85	85	-	-	130	10	1	-	-	1015	Nutrients or SVP
326	08/04/2019 01:39	50.522	-6.017	50.522	-6.017	-	85	85	-	-	130	10	1	-	-	1015	ESM2 and Niskin
327	08/04/2019 02:00	50.526	-6.013	50.54	-5.964	2.1	85	85	260	1.3	-	-	1.5	-	-	1015	2 x 4m Beam trawls
328	08/04/2019 03:18	50.539	-5.953	50.539	-5.953	-	86	86	-	-	130	12	1	-	-	1015	Hamon grab
329	08/04/2019 05:47	50.69	-5.305	50.678	-5.355	2	70	71	59	1.1	120	16	0.5	-	-	1015	2 x 4m Beam trawls
330	08/04/2019 07:05	50.678	-5.355	50.678	-5.355	-	72	72	-	-	120	16	1	-	-	1016	Hamon grab
331	08/04/2019 08:26	50.575	-5.197	50.61	-5.196	2.1	61	61	235	0.8	140	12	1	-	-	1015	2 x 4m Beam trawls
332	08/04/2019 09:28	50.609	-5.195	50.609	-5.195	-	61	61	-	-	140	14	1	-	-	1015	Hamon grab
333	08/04/2019 11:01	50.613	-4.859	50.613	-4.859	-	32	32	-	-	140	14	0.5	-	-	1016	Nutrients or SVP
333	08/04/2019 11:01	50.613	-4.859	50.613	-4.859	-	32	32	-	-	140	14	0.5	-	-	1016	ESM2 and Niskin
334	08/04/2019 11:47	50.65	-4.803	50.627	-4.81	1.4	36	27	279	0.2	140	14	0.5	-	-	1016	2 x 4m Beam trawls
335	08/04/2019 12:37	50.63	-4.809	50.63	-4.809	-	27	27	-	-	140	16	0.5	-	-	1016	Hamon grab
336	08/04/2019 12:52	50.63	-4.809	50.629	-4.807	-	27	26	13	0.2	140	16	0.5	-	-	1016	2m beam trawl
337	08/04/2019 18:26	51.387	-3.988	51.386	-4.042	2	39	44	105	2.1	110	12	0.7	-	-	1018	2 x 4m Beam trawls
338	08/04/2019 19:40	51.387	-4.042	51.387	-4.042	-	46	46	-	-	110	12	0.7	-	-	1018	Hamon grab
339	08/04/2019 21:28	51.513	-4.423	51.513	-4.423	-	41	41	-	-	120	14	0.7	-	-	1018	Nutrients or SVP
339	08/04/2019 21:28	51.513	-4.423	51.513	-4.423	-	41	41	-	-	120	14	0.7	-	-	1018	ESM2 and Niskin
340	08/04/2019 22:11	51.552	-4.477	51.542	-4.427	2	30	28	300	1.4	110	10	0.7	-	-	1020	2 x 4m Beam trawls
341	08/04/2019 23:14	51.541	-4.428	51.541	-4.428	-	27	27	-	-	110	8	0.5	-	-	1018	Hamon grab

Station	Date/Time	Lat Shot	Long Shot	Lat Haul	Long Haul	Distance	Depth Shot	Depth Haul	Tide dir.	Tide speed	Wind dir.	Wind speed	Sea Height	Swell Dir	Swell Hgt	Barom	Gear
342	08/04/2019 23:28	51.541	-4.428	51.541	-4.426	-	27	27	-	-	110	8	0.5	-	-	1018	2m beam trawl
343	09/04/2019 03:25	51.21	-5.505	51.232	-5.544	2	74	77	139	0.9	-	-	0.5	-	-	1020	2 x 4m Beam trawls
344	09/04/2019 04:23	51.233	-5.546	51.233	-5.546	-	78	78	-	-	-	-	0.5	-	-	1020	Hamon grab
345	09/04/2019 04:46	51.231	-5.54	51.231	-5.54	-	80	80	-	-	-	-	0.5	-	-	1020	Hamon grab
346	09/04/2019 04:57	51.231	-5.54	51.231	-5.539	-	80	80	-	-	-	-	0.5	-	-	1020	SPI camera
347	09/04/2019 05:27	51.23	-5.539	51.231	-5.541	-	80	80	-	-	-	-	0.5	-	-	1020	2m beam trawl
348	09/04/2019 07:06	51.445	-5.689	51.442	-5.742	2	83	85	48	1.1	-	-	0.5	240	1	1020	2 x 4m Beam trawls
349	09/04/2019 08:10	51.442	-5.743	51.442	-5.743	-	87	87	-	-	-	-	0.5	220	1.5	1021	Hamon grab
350	09/04/2019 08:25	51.442	-5.744	51.442	-5.743	-	85	86	-	-	-	-	0.5	220	1.5	1021	SPI camera
351	09/04/2019 09:03	51.443	-5.743	51.441	-5.743	-	86	87	-	-	-	-	0.5	220	1.5	1021	2m beam trawl
352	09/04/2019 10:16	51.472	-5.969	51.472	-5.969	-	109	109	-	-	100	14	0.7	220	1.7	1022	Nutrients or SVP
352	09/04/2019 10:16	51.472	-5.969	51.472	-5.969	-	109	109	-	-	100	14	0.7	220	1.7	1022	ESM2 and Niskin
353	09/04/2019 10:42	51.462	-5.955	51.443	-5.912	2.1	107	96	302	0.5	100	14	1	220	1.5	1022	2 x 4m Beam trawls
354	09/04/2019 11:47	51.443	-5.913	51.443	-5.913	-	96	96	-	-	100	14	1	220	1.7	1022	Hamon grab
355	09/04/2019 11:59	51.443	-5.913	51.443	-5.913	-	96	95	-	-	100	14	1	220	1.7	1022	SPI camera
356	09/04/2019 12:32	51.443	-5.914	51.443	-5.912	-	95	95	259	0.5	100	14	1	220	1.7	1022	2m beam trawl
357	09/04/2019 18:50	51.314	-5.869	51.313	-5.922	2.1	92	96	72	0.4	100	14	1	220	1.7	1024	2 x 4m Beam trawls
358	09/04/2019 20:01	51.314	-5.922	51.314	-5.922	-	97	97	-	-	80	11	0.7	220	1.7	1024	Hamon grab
359	09/04/2019 20:20	51.314	-5.922	51.314	-5.922	-	97	96	-	-	80	11	0.7	220	1.7	1024	SPI camera
360	09/04/2019 21:01	51.314	-5.922	51.313	-5.921	-	96	96	1	0.4	-	-	0.7	220	1.2	1025	2m beam trawl
361	09/04/2019 21:37	51.315	-5.926	51.315	-5.926	-	97	97	-	-	-	-	0.7	220	1.2	1025	Ring Net(s)
362	09/04/2019 23:20	51.215	-6.15	51.215	-6.15	-	106	106	-	-	-	-	1	220	1.5	1025	Nutrients or SVP
362	09/04/2019 23:20	51.215	-6.15	51.215	-6.15	-	106	106	-	-	-	-	1	220	1.5	1025	ESM2 and Niskin
363	09/04/2019 23:51	51.204	-6.138	51.191	-6.088	2.1	105	102	281	0.5	-	-	1	220	1.5	1025	2 x 4m Beam trawls
364	10/04/2019 00:55	51.192	-6.109	51.192	-6.109	-	105	105	-	-	60	5	0.5	220	1.5	1025	Hamon grab
365	10/04/2019 01:09	51.192	-6.109	51.192	-6.109	-	104	104	-	-	60	6	0.5	220	1.5	1025	SPI camera
366	10/04/2019 01:42	51.192	-6.11	51.193	-6.107	-	104	104	-	-	60	6	0.5	220	1.5	1025	2m beam trawl
367	10/04/2019 03:17	51	-6.281	51	-6.281	-	99	99	-	-	-	-	0.5	220	1.5	1025	Ring Net(s)
368	10/04/2019 03:44	51.018	-6.286	51.051	-6.294	2	97	102	151	0.1	-	-	0.5	220	1.5	1025	2 x 4m Beam trawls
369	10/04/2019 04:42	51.051	-6.293	51.051	-6.293	-	103	103	-	-	60	16	1	220	1.5	1026	Hamon grab
370	10/04/2019 04:56	51.051	-6.293	51.051	-6.293	-	103	103	-	-	60	16	1	220	1.5	1026	SPI camera
371	10/04/2019 05:29	51.051	-6.292	51.051	-6.294	-	104	103	-	-	90	14	1.5	220	1.5	1026	2m beam trawl
372	10/04/2019 07:19	51.271	-6.552	51.271	-6.552	-	107	107	-	-	90	14	0.7	220	1.2	1027	Ring Net(s)
373	10/04/2019 09:06	51.257	-6.588	51.228	-6.614	2.1	100	101	34	0.8	90	10	1	220	1.5	1027	2 x 4m Beam trawls
374	10/04/2019 10:14	51.228	-6.613	51.228	-6.613	-	103	103	-	-	70	10	0.7	130	0.7	1028	Hamon grab
375	10/04/2019 11:35	51.227	-6.614	51.227	-6.614	-	103	102	-	-	50	9	0.7	130	0.7	1029	Nutrients or SVP
375	10/04/2019 11:35	51.227	-6.614	51.227	-6.614	-	103	102	-	-	50	9	0.7	130	0.7	1029	SPI camera
376	10/04/2019 12:11	51.227	-6.614	51.228	-6.612	-	102	103	269	0.1	50	10	0.7	130	0.7	1029	2m beam trawl

Station	Date/Time	Lat Shot	Long Shot	Lat Haul	Long Haul	Distance	Depth Shot	Depth Haul	Tide dir.	Tide speed	Wind dir.	Wind speed	Sea Height	Swell Dir	Swell Hgt	Barom	Gear
377	10/04/2019 15:59	51.557	-6.175	51.557	-6.175	-	117	117	-	-	50	12	1	130	0.7	1030	ESM2 and Niskin
378	10/04/2019 16:22	51.572	-6.162	51.599	-6.141	2.1	117	116	206	0.7	50	12	1	130	0.7	1030	2 x 4m Beam trawls
379	10/04/2019 17:22	51.599	-6.14	51.599	-6.14	-	117	117	-	-	50	10	1	130	0.7	1030	Hamon grab
380	10/04/2019 17:36	51.599	-6.14	51.598	-6.14	-	118	117	-	-	50	10	1	130	0.7	1030	SPI camera
381	10/04/2019 18:06	51.598	-6.141	51.6	-6.14	-	118	117	187	0.4	50	8	0.7	-	-	1030	2m beam trawl
382	10/04/2019 18:38	51.602	-6.141	51.602	-6.141	-	119	119	-	-	50	8	0.7	-	-	1030	Ring Net(s)
383	10/04/2019 20:14	51.763	-6.315	51.775	-6.365	2	76	71	48	0.4	30	8	0.7	-	-	1031	2 x 4m Beam trawls
384	10/04/2019 21:22	51.777	-6.373	51.777	-6.373	-	70	70	-	-	50	9	1.5	-	-	1031	Hamon grab
385	10/04/2019 21:41	51.777	-6.373	51.776	-6.374	-	70	70	-	-	50	9	1.5	-	-	1031	2m beam trawl
386	11/04/2019 01:37	51.404	-7.157	51.404	-7.157	-	85	85	-	-	60	8	0.7	-	-	1031	Nutrients or SVP
386	11/04/2019 01:37	51.404	-7.157	51.404	-7.157	-	85	85	-	-	60	8	0.7	-	-	1031	ESM2 and Niskin
387	11/04/2019 02:07	51.403	-7.217	51.416	-7.167	2	84	83	248	0.9	60	8	1	-	-	1031	2 x 4m Beam trawls
388	11/04/2019 06:54	52.038	-7.288	52.007	-7.309	2	50	54	12	0.4	-	-	0.5	-	-	1032	2 x 4m Beam trawls
389	11/04/2019 10:34	51.567	-7.783	51.567	-7.783	-	88	88	-	-	180	5	0.5	-	-	1033	Nutrients or SVP
389	11/04/2019 10:34	51.567	-7.783	51.567	-7.783	-	88	88	-	-	180	5	0.5	-	-	1033	ESM2 and Niskin
390	11/04/2019 10:54	51.559	-7.793	51.531	-7.822	2	87	85	185	0.1	-	-	0.5	-	-	1033	2 x 4m Beam trawls
391	11/04/2019 13:59	51.399	-8.387	51.386	-8.436	2	89	91	243	0.4	-	-	0.5	240	1	1033	2 x 4m Beam trawls
392	11/04/2019 15:49	51.232	-8.554	51.225	-8.606	2.1	102	102	266	0.2	140	12	0.5	240	1	1033	2 x 4m Beam trawls
393	11/04/2019 20:12	51.126	-9.603	51.118	-9.654	2	121	122	68	0.4	160	15	0.7	270	1.7	1031	2 x 4m Beam trawls
394	12/04/2019 01:25	50.85	-8.558	50.85	-8.558	-	116	116	-	-	150	16	1.5	270	1.5	1031	Nutrients or SVP
394	12/04/2019 01:25	50.85	-8.558	50.85	-8.558	-	116	116	-	-	150	16	1.5	270	1.5	1031	ESM2 and Niskin
395	12/04/2019 01:51	50.859	-8.553	50.882	-8.514	2	114	114	240	0.6	150	16	1.5	270	1.5	1031	2 x 4m Beam trawls
396	12/04/2019 02:58	50.881	-8.517	50.881	-8.517	-	115	115	-	-	170	18	1.5	270	1.5	1031	Hamon grab
397	12/04/2019 03:21	50.881	-8.517	50.881	-8.517	-	114	114	-	-	170	18	1.5	270	1.5	1031	SPI camera
398	12/04/2019 04:00	50.881	-8.517	50.881	-8.515	-	116	115	-	-	170	20	1.5	270	1.5	1032	2m beam trawl
399	12/04/2019 08:18	50.81	-7.404	50.81	-7.404	-	107	107	-	-	140	19	1.2	270	1.5	1031	Nutrients or SVP
399	12/04/2019 08:18	50.81	-7.404	50.81	-7.404	-	107	107	-	-	140	19	1.2	270	1.5	1031	ESM2 and Niskin
400	12/04/2019 08:46	50.802	-7.42	50.793	-7.471	2	106	107	63	0.3	140	19	1.5	270	1.5	1031	2 x 4m Beam trawls
401	12/04/2019 09:51	50.794	-7.471	50.794	-7.471	-	108	108	-	-	170	18	1.2	270	1.7	1031	Hamon grab
402	12/04/2019 10:04	50.794	-7.47	50.794	-7.471	-	108	108	-	-	170	18	1.2	270	1.7	1031	SPI camera
403	12/04/2019 10:39	50.795	-7.471	50.793	-7.469	-	109	108	-	-	170	18	1.2	270	1.7	1031	2m beam trawl
404	12/04/2019 15:52	49.979	-7.102	49.967	-7.054	2	112	111	260	0.5	150	20	2	270	1.5	1029	2 x 4m Beam trawls
405	12/04/2019 17:02	49.967	-7.055	49.967	-7.055	-	113	113	-	-	150	20	1.7	270	1.2	1029	Hamon grab
406	14/04/2019 07:20	51.952	2.117	51.952	2.117	-	44	44	-	-	80	12	1	20	1	1033	Ring Net(s)

Appendix 2: Survey priority stations not worked on CEND 4/19

Stratum	Priority number	P Reference number	Reason for not working	Alternative priority station worked
4	5	P	Static gear/poor ground and the Whitsand & Looe MPA	Str 4 Stn 11
5	5	P	In Lyme Bay and Torbay SAC – Refused entry by Southern IFCA	Str 5 Stn 9
7	3	P	Poor ground- no tow possible	Str 7 Stn 7
11	4	P	Too Shallow	Str 11 Stn 8
11	5	P	Too Shallow	Str 11 Stn 10
11	6	P	Too Shallow	Str 11 Stn 11
11	8	P	In static gear area, no permission from Guernsey provided.	Str 11 Stn 9
11	11	P	In static gear area, no permission from Guernsey provided.	Str 11 Stn 12
11	12	P	Too Shallow	Str 11 Stn 13
C	3	P	Tactical decision – Had to visit on peak of flood tide and in doing so would jeopardise other stations. Station was location ~70nm from any other station.	Str C Stn 6
C	6	P	Station located in Milford Haven estuary. Too many obstructions, jetties and probable pilotage needed to work this.	Str C Stn 7
E	4	P	Station located in Greater Haig Fras MCZ	Str E Stn 6
J	4	P	Too Shallow	Str J Stn 6