

**LOWESTOFT LABORATORY, LOWESTOFT, SUFFOLK, NR33 OHT**

**2018 RESEARCH VESSEL PROGRAMME**

**REPORT: RV CEFAS ENDEAVOUR: SURVEY 5/18**

<b>STAFF:</b>	Part One	Part Two
	I Holmes (SIC)	I Holmes (SIC)
	J Smith (2IC)	J Silva (2IC)
	J Silva	G Eastley
	L Mann (15-24 March)	M Whybrow
	G Eastley	C Jennings
	M Whybrow	S Ware
	C Jennings	A Callaway
	A Downie	A Neish
	L Readdy	C Bird
	P McIlwaine	M Eade
	T Woods	J Bluemel
	G Burt	J Pettigrew
	B Silburn	A Molina-Ramirez
	K Duggan	N Hampton
	H Close	L Aislabie
	R Bullimore	N Almeida
		S Linehan (Irish Observer)

**DURATION:** 15 March – 13 April 2018

**LOCATION:** Western English Channel/Celtic Sea (ICES areas VIle, VIIf, VIIfg, VIIfh, VIIfj)

**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 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 at trawl stations (a minimum of two per day), providing profile information for chlorophyll, oxygen, salinity temperature, nutrient samples and the relevant QAQC samples for calibration of the equipment. Vertical plankton nets/ring nets will also be deployed.

C) Sediment and benthos at a station. Sediment sample(s) will be collected at one end of the tows 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. Where SPI camera deployment is not possible, 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 (4m) salinity, temperature, fluorometry and other environmental data using the 'Ferrybox'. Additionally, a Flow-cytometer (phytoplankton) and plankton image analyser (PIA) for zooplankton may 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 elasmobranchs.
- 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.

## **NARRATIVE: (All times GMT)**

### **Part 1.**

An advance party of scientific staff joined the RV Cefas Endeavour in Swansea at 1530h; 13 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 vessel safety inductions being held that evening.

RV Cefas Endeavour sailed at 0500h; 15 March and headed directly to the first sampling location in stratum C station 3. Survey toolbox talks and emergency muster drill took place, followed by scientific toolbox talks on sorting and sampling fish catches and the safe deployment of benthic sampling equipment preceded all survey activities. Survey activities began with an ESM2 deployment (1052h) followed by the deployment of a single 200µ mesh plankton net, and two 4m beam trawls. Following this, the mini-Hamon grab were successfully deployed along with an invalid deployment of the 2m beam trawl. No SPI camera deployment was possible at this first location.

Scientific staff then moved onto their 2-watch system operating from midnight-mid-day and mid-day to midnight. The remaining four stations in stratum C were completed over the following 24 hours, with the final 4m beam trawl being deployed at 1551h; 16 March with most environmental operations carried out at each location. At Stratum C station 2, the vessel came fast after just 15 minutes. Upon hauling, the starboard gear had snagged an uncharted 5" armoured abandoned cable. This location was <5nm from a cable dumping ground and it is assumed this cable had previously been towed by another vessel to this location. The cable was cleared from the beam. Prior to re-fishing this location, a full gear inspection took place and only a small hole in the square and 2 shackles had been lost. Upon completion of survey work in stratum C, two locations in stratum B were completed close to Lands-End prior to heading into the western Channel. The main species observed in stratum C were lesser-spotted dogfish (*Scyliorhinus canicula*), plaice (*Pleuronectus platessa*), dab (*Limanda limanda*) and sole (*Solea solea*)

with the largest single catches of blonde ray (*Raja brachyura*), dab, grey gurnard (*Eutrigla gurnardus*), small-eyed ray (*Raja microocellata*) and sole caught at a location within this stratum.

On 17 March, work began in stratum 1 around the Isles of Scilly at 0339h with the environmental sample collections taking place before first light at station 4 in this stratum. Four locations in this stratum were completed in daylight before moving offshore into stratum 8 during the night. The following morning, an attempt to fish stratum 1; station 1 was thwarted by the presence of static gear and poor ground so was therefore abandoned. The main species observed in stratum 1 were lesser-spotted dogfish, starry smooth-hound (*Mustelus asterias*) and lemon sole (*Microstomus kitt*) with the largest single observed catch of John dory (*Zeus faber*) being caught at a location within this stratum. The remainder of the daylight hours were spent fishing four locations in stratum 2, before returning to the same locations to complete the environmental sampling at night. Catches in this stratum were dominated by sole, common dragonet (*Callionymus lyra*), lesser-spotted dogfish, and haddock (*Melanogrammus aeglefinus*). The largest single haul of common dragonet, cuckoo ray (*Leucoraja naevus*) and spotted ray (*Raja montagui*) were observed within this stratum.

On 19 March, work began offshore in stratum 13 at station 4, completing all sampling works before arriving at the final location in stratum 2 in daylight. Poor ground meant that at this last location, the beam trawl tow was ceased at 1.7nm. Upon completion of this sampling location, an unscheduled diversion to Newlyn was made to drop off one member of the ship's crew by small boat transfer. This was followed by a long steam into stratum 3 off Fowey. Two locations were completed here with fishing carried out in daylight with the returning to these locations to complete the environmental work before heading back offshore again later in the day. The following day was spent working in stratum 4 south of Plymouth with 7 locations successfully worked in this area before heading offshore into deeper water in stratum 7. The next 48 hours were spent taking advantage of good weather and worked in the offshore stratum 6,7 and 13 where a total of 11 sampling locations were fully completed. The main catches in stratum 4 were plaice (*Pleuronectus platessa*), pout whiting (*Trisopterus luscus*), lesser spotted dogfish and sole, with the largest single catch of pout whiting being observed in this stratum. In stratum 6, the largest catches made were of common cuttlefish (*Sepia officinalis*) lesser-spotted dogfish, whiting (*Merlangius merlangus*) and pout whiting with the largest single catch of cod (*Gadus morhua*) observed within this stratum (1 fish at 94cm). Stratum 7 saw the largest single catch of whiting and was dominated by large catches of common cuttlefish and lesser-spotted dogfish.

On 22 March, the Cefas Endeavour began its work in Lyme Bay beginning work at the southern end around Start Point at stratum 5; station 10 at around 0817h. Five locations in stratum 4 and 5 were successfully worked during daylight hours, heading offshore again once light had faded and completing a further 3 stations in stratum 5 overnight. Three stations close inshore at the northern end of Lyme Bay were completed on the morning of the 23 March with the SPI camera being deployed for the first time at stratum 5; station 4 with the ground worked on being deemed suitable for this gear. Three further locations were worked in this area on this day. The main species observed in stratum 5

were plaice, lesser-spotted dogfish, tub gurnard (*Trigla lucerna*) and greater spider-crab (*Maja squinado*) with the largest single catches of both plaice and tub gurnard caught at a location within this stratum.

With permission to work in waters under the governance of France not granted at this point of the survey and work in UK waters in the western Channel exhausted, the decision was made to head into the Celtic Sea to begin work there. Several sampling locations in UK waters that had been previously by-passed were completed en-route including two locations offshore from Fowey (stratum 3), and one location in stratum 1; south of the Isles of Scilly and two locations offshore in stratum 8. Due to reduced engine capability, the journey from Lyme Bay to Fowey took longer than would normally be expected, taking excess of ten hours. At 1430h 24 March, one Cefas scientist was put ashore at Falmouth, Cornwall following medical advice received from ashore. Major species caught in stratum 3 were once again lesser-spotted dogfish, monkfish (*Lophius piscatorius*), plaice and common dragonet. Additionally, the largest single catch of thornback ray (*Raja clavata*) was observed at a location within this stratum.

Work in the Celtic Sea began in stratum H at station 3 at 1043h on 25 March with a plan to complete all Celtic Sea sampling location that fell north of the 50° line of latitude and leaving those to the south of this latitude for the second part of the survey. This location was followed later that day by working stratum E station 4. The following 3 days (26-28 March) a route was worked allowing locations in stratum B, D, E, G and H with operations completed in stratum B and D. The main species observed in stratum B were lesser-spotted dogfish, sole, dab and monkfish with the largest single catches of streaked gurnard (*Trigloporus lastoviza*), haddock, lemon sole and lesser-spotted dogfish caught at locations within this stratum. Stratum saw large catches of monkfish (*Lophius piscatorius*), lesser-spotted dogfish, haddock and hake (*Merluccius merluccius*), with the largest single catch of hake being observed at a location in this stratum.

A total of 16 locations were successfully completed with a further one location having just the environmental operations to be completed on the second part of the survey. The Cefas Endeavour left this last location (stratum E; station 3) at 1700h on 28 March in order to dock at Fowey, Cornwall at high-water the following day, docking at 1126h.

Unfortunately, the mechanical fault that had developed during the course of the first part of the survey led to the Cefas Endeavour remaining in port until 1754h 4 April whilst the issue was being resolved. The subsequent fix left the survey with continued limited engine capability with the effect of reducing the transit time between sampling locations. This delay in port and the reduced engine capability meant that the ability to complete all planned survey work was severely compromised and decisions on what could realistically be achieved had to be decided upon.

Work on part two of the survey recommenced at 0049h on 5 April in French waters (stratum 9; station 2) as the necessary permission to work there had been received in the interim period. As is 2017, no environmental sampling work was carried out at sampling locations deep into French governed waters. The exception to this being those sampling locations close to the EEZ boundary in stratum that straddled this boundary. A series of sampling locations were successfully completed in stratum 10 and 11 around the Channel

Islands. As in previous years, a prevalence of static gear meant that several sampling locations had to be abandoned. The area south-west of Guernsey and north and north-west of Jersey proved particularly difficult with communications with fishing vessels, Channel Island authorities and our own observations in the field meaning that stations 3 and 6 in stratum 10, and stations 1 and 11 in stratum 11 could not be attempted. On 6 April, damage was sustained to the gear at stratum 10; station 6 rendering the tow invalid for the damaged gear. This location was not attempted a second time as this would have compromised the ability to work the following planned locations in daylight as needed due to the likelihood of encountering static fishing gear.

The following day at stratum 11; station 10, damage was sustained to the port gear due to the hard ground. Once repairs had taken place, this location was re-fished but for 1nm only, producing a valid tow. The rest of this day was spent working sampling locations to the north-west of Guernsey before heading west to begin sampling in stratum 12 and to finish work in stratum 10. The main species observed in stratum 10 were greater spider-crab, lesser-spotted dogfish, scallop (*Pecten maximus*) and sole with the largest single catches of greater spider-crab and black sea-bream (*Spondyliosoma cantharus*) caught at a location within this stratum. In stratum 11, the main species caught were similar to stratum 10 with the addition of starry smooth-hound where the largest single catch was observed. On 8 April, the first large by-catch of common brittlestars (*Ophiothrix fragilis*) were caught with just under 0.5 tonnes observed in the starboard beam at stratum 10; station 11. This was followed by another large catch at stratum 12, station 2. During the following 24 hours, the final locations in stratum 12 and 13 were successfully completing, thus completing the entire sampling grid in the western Channel (VIIe).

Following the completion of the western Channel survey grid, work recommenced in the Celtic Sea stratum at 0326h, 9 April, with work beginning at stratum K station 2. With limited time to complete the survey, just stations 1-4 were completed in this stratum before moving back into stratum H. Catches in stratum H were dominated by monkfish with smaller catches of common cuttlefish, red gurnard (*Aspitrigla cuculus*) and lesser-spotted dogfish. A further 3 sampling locations in this stratum were worked meaning that locations 1-4 were completed. The final two sampling locations worked on the survey were completed at stratum E; station 1 and stratum F; station 2, completing the planned works in these two stratum. The main catches in stratum E megrim (*Lepidorhombus whiffiagonis*), black-bellied anglerfish (*Lophius budegassa*), monkfish and lesser-spotted dogfish with the largest single catch of both megrim and black-bellied anglerfish being observed in this stratum.

Survey work ceased at 0029h, 11 April and Cefas Endeavour began its journey east back to Lowestoft. During the journey, a full clean-down took place along with packing away sampling kit and data checking. Docking took place at 0700h, 13 April in Lowestoft.

## RESULTS BY AIM:

A survey sampling location was sampled to two differing sets of deployments. At an environmentally sampled location, the operations consisted of plankton sampling, 2 x 4m beam trawls, mini-Mini-Hamon grab sampling, SPI camera deployment and 2m beam trawl deployment. Alternatively, a location was sampled using just the plankton net and 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 2) 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 con-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. Additionally, a SAIV Micro CTD unit was used to obtain a sound velocity profile (SVP) for calibration of the multibeam on each plankton net deployment.

All catch details and sample data were entered directly into the Fisheries Electronic Data Capture (FEDC) 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 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. This year the benthic sentinel species list had additional species with the full list now including an additional 5 invasive species. 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 0.5m diameter 200 µm mesh ring net to collect samples of zooplankton. These samples were 'fed' directly into the Plankton Image Analyser (PIA) on board. This was set to 'run' for a minimum of 30 minutes prior to arrival at a sampling location to collect images of zooplankton from surface water. This was followed by the plankton net sample of the entire water column and finally a further surface analysis 'run' completed the data collection.

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, with rocky catches deemed that these two gears were not deployed.

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 ‘drifting’ 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 116 successful 4m beam trawl tows were completed out of a total of 131 planned for the survey. This comprised all 81 of the planned tows in the western Channel and 35 of the 50 planned tows in the Celtic Sea. The locations not sampled in the Celtic Sea were made up of all locations in both stratum I and J, along with three locations in stratum G, one in stratum H and finally one in stratum K. 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

<b>Area</b>	<b>Gear</b>	<b>Validity</b>	<b>Number of Deployments</b>
Western Channel	4m Beam Trawl with blinder	V	81
Western Channel	4m Beam Trawl with blinder	I	3
Western Channel	4m Beam Trawl with blinder	A	1
Western Channel	4m Beam Trawl without blinder	V	81
Western Channel	4m Beam Trawl without blinder	I	4
Celtic Sea	4m Beam Trawl with blinder	V	35
Celtic Sea	4m Beam Trawl with blinder	I	1
Celtic Sea	4m Beam Trawl without blinder	V	35
Celtic Sea	4m Beam Trawl without blinder	I	1

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**

Common Name	Scientific Name	CEFAS code	Sampled weight (kg)	Catch weight (kg)
Lesser spotted dogfish	<i>Scyliorhinus canicula</i>	LSD	685.664	685.664
Greater spider crab	<i>Maja squinado</i>	SCR	456.44	456.615
Anglerfish (monk)	<i>Lophius piscatorius</i>	MON	329.298	329.298
European plaice	<i>Pleuronectes platessa</i>	PLE	312.926	312.926
Poor cod	<i>Trisopterus minutus</i>	POD	218.676	232.955
Sole (dover sole)	<i>Solea solea</i>	SOL	201.052	201.052
Whiting-pout (bib)	<i>Trisopterus luscus</i>	BIB	182.933	182.933
Common cuttlefish	<i>Sepia officinalis</i>	CTC	174.739	174.739
Megrim	<i>Lepidorhombus whiffiagonis</i>	MEG	122.23	122.23
Starry smooth hound	<i>Mustelus asterias</i>	SDS	120.856	120.856
Red gurnard	<i>Aspitrigla (chelidonichthys) cuculus</i>	GUR	119.456	119.456
Haddock	<i>Melanogrammus aeglefinus</i>	HAD	100.676	100.676
Whiting	<i>Merlangius merlangus</i>	WHG	99.106	99.106
Common dragonet	<i>Callionymus lyra</i>	CDT	98.983	98.983
Dab	<i>Limanda limanda</i>	DAB	69.729	96.516
Lemon sole	<i>Microstomus kitt</i>	LEM	79.947	79.947
European conger eel	<i>Conger conger</i>	COE	76.867	76.867
European hake	<i>Merluccius merluccius</i>	HKE	76.176	76.176
Great scallop	<i>Pecten maximus</i>	SCE	74.605	75.213
Black-bellied anglerfish	<i>Lophius budegassa</i>	WAF	65.541	65.541
Thickback sole	<i>Microchirus variegatus</i>	TBS	54.083	56.313
Cuckoo ray	<i>Leucoraja naevus</i>	CUR	50.238	50.238
Tub gurnard	<i>Trigla (chelidonichthys) lucerna</i>	TUB	49.529	49.529
Undulate ray	<i>Raja undulata</i>	UNR	47.297	47.297
Edible crab	<i>Cancer pagurus</i>	CRE	45.156	45.156
Blue skate (Grey skate)	<i>Dipturus batis</i>	SKG	42.293	42.293
Spotted ray	<i>Raja montagui</i>	SDR	42.251	42.251
Boar fish	<i>Capros aper</i>	BOF	39.393	39.393
Atlantic cod	<i>Gadus morhua</i>	COD	37.399	37.399
Grey gurnard	<i>Eutrigla (chelidonichthys) gurnardus</i>	GUG	35.757	35.757
Black seabream	<i>Spondyliosoma cantharus</i>	BKS	35.444	35.444
Common ling	<i>Molva molva</i>	LIN	28.865	28.865
Brill	<i>Scophthalmus rhombus</i>	BLL	27.336	27.336
Blonde ray	<i>Raja brachyura</i>	BLR	25.175	25.175
Barrel jellyfish	<i>Rhizostoma octopus</i>	BAR	0.57	24.382
John dory	<i>Zeus faber</i>	JOD	24.052	24.052
Witch	<i>Glyptocephalus cynoglossus</i>	WIT	22.86	22.86
Thornback ray (roker)	<i>Raja clavata</i>	THR	20.082	20.082
Marbled electric ray	<i>Torpedo marmorata</i>	MER	19.245	19.245
Turbot	<i>Scophthalmus maximus (psetta maxima)</i>	TUR	18.655	18.655
Imperial scaldfish	<i>Arnoglossus imperialis</i>	ISF	16.946	16.946
Streaked gurnard	<i>Trigloporus (chelidonichthys) lastoviza</i>	GUS	16.425	16.425
Nurse hound	<i>Scyliorhinus stellaris</i>	DGN	13.621	13.621
Ballan wrasse	<i>Labrus bergylta</i>	BNW	13.074	13.074

Common Name	Scientific Name	CEFAS code	Sampled weight (kg)	Catch weight (kg)
Red mullet	<i>Mullus surmuletus</i>	MUR	12.735	12.735
Pollack	<i>Pollachius pollachius</i>	POL	10.32	10.32
Sand sole	<i>Pegusa (solea) lascaris</i>	SOS	9.889	9.889
Norway lobster	<i>Nephrops norvegicus</i>	NEP	8.941	8.941
Scald fish	<i>Arnoglossus laterna</i>	SDF	8.877	8.877
American plaice (lr dab)	<i>Hippoglossoides platessoides</i>	PLA	8.644	8.644
Shagreen ray	<i>Leucoraja fullonica</i>	SHR	7.55	7.55
Cuckoo wrasse	<i>Labrus mixtus (l. Bimaculatus)</i>	CUW	7.203	7.203
Norway pout	<i>Trisopterus esmarki</i>	NOP	7.028	7.028
Smalleyed (painted) ray	<i>Raja microocellata</i>	PTR	6.484	6.484
Horse-mackerel (scad)	<i>Trachurus trachurus</i>	HOM	6.136	6.136
European lobster	<i>Homarus gammarus</i>	LBE	5.873	5.873
Velvet swimming crab	<i>Necora puber</i>	MLP	5.761	5.79
Three-bearded rockling	<i>Gaidropsarus vulgaris</i>	TBR	5.695	5.695
Blue whiting	<i>Micromesistius poutassou</i>	WHB	4.986	4.986
Solenette	<i>Buglossidium luteum</i>	SOT	4.81	4.81
Flounder (european)	<i>Platichthys flesus</i>	FLE	4.74	4.74
(european) mackerel	<i>Scomber scombrus</i>	MAC	3.825	3.825
Spurdog	<i>Squalus acanthias</i>	DGS	3.6	3.6
Common spiny lobster	<i>Palinurus elephas</i>	SLO	2.898	3.178
Topknot	<i>Zeugopterus punctatus</i>	TKT	2.523	2.523
Baillons wrasse	<i>Symphodus (crenilabrus) balloni</i>	BLW	1.893	1.893
Sprat	<i>Sprattus sprattus</i>	SPR	1.229	1.229
Cuttle-fish	<i>Sepia elegans</i>	SEE	1.21	1.221
European seabass	<i>Dicentrarchus labrax</i>	ESB	1.21	1.21
Squid	<i>Loligo vulgaris</i>	LLV	1.027	1.027
Lesser flying squid	<i>Todaropsis eblanae</i>	OME	0.822	0.822
Goldsinny	<i>Ctenolabrus rupestris</i>	GDY	0.77	0.77
Herring	<i>Clupea harengus</i>	HER	0.66	0.66
Pilchard	<i>Sardina pilchardus</i>	PIL	0.626	0.626
Spotted dragonet	<i>Callionymus maculatus</i>	SDT	0.616	0.616
Lesser weever fish	<i>Echiichthys (trachinus) vipera</i>	WEL	0.566	0.566
Great sandeel	<i>Hyperoplus lanceolatus</i>	GSE	0.529	0.529
Pogge (armed bullhead)	<i>Agonus cataphractus</i>	POG	0.502	0.502
Norwegian topknot	<i>Zeugopterus (phrynorhombus) norvegicus</i>	NKT	0.497	0.497
Argentines	<i>Argentinidae</i>	ARG	0.497	0.497
Butterfly blenny	<i>Blennius ocellaris</i>	BBY	0.454	0.454
Greater weever fish	<i>Trachinus draco</i>	WEG	0.453	0.453
Couchs seabream	<i>Pagrus pagrus</i>	SBC	0.315	0.315
Immaculate sandeel	<i>Hyperoplus immaculatus</i>	ISE	0.208	0.208
European common squid	<i>Loligo (alloteuthis) subulata</i>	ATS	0.199	0.199
Ekstroms topknot	<i>Zeugopterus (phrynorhombus) regius</i>	EKT	0.181	0.181
Great pipefish	<i>Syngnathus acus</i>	GPF	0.181	0.181
Greater forkbeard	<i>Phycis blennoides</i>	GFB	0.145	0.145
Tompot blenny	<i>Parablennius gattorugine</i>	TBY	0.131	0.131
Cry(i)stal jellies	<i>Aequorea spp</i>	CRI	0.048	0.13
Steven's goby	<i>Gobius gasteveni</i>	GSV	0.119	0.119

Common Name	Scientific Name	CEFAS code	Sampled weight (kg)	Catch weight (kg)
Sandeels	<i>Ammodytidae</i>	SAX	0.106	0.106
Northern squid	<i>Loligo forbesi</i>	NSQ	0.098	0.098
Garfish	<i>Belone belone</i>	GAR	0.091	0.091
Gobies	<i>Pomatoschistus spp</i>	POM	0.082	0.082
European anchovy	<i>Engraulis encrasicolus</i>	ANE	0.08	0.08
Pink cuttlefish	<i>Sepia orbignyana</i>	SEO	0.079	0.079
Mauve stinger	<i>Pelagia noctiluca</i>	PEL	0.061	0.061
Northern rockling	<i>Ciliata septentrionalis</i>	NNR	0.054	0.054
Red bandfish	<i>Cepola rubescens (c. Macrophthalma)</i>	RPF	0.051	0.051
Northern shortfin squid	<i>Illex illecebrosus</i>	SQI	0.051	0.051
Sandeel	<i>Ammodytes tobianus</i>	TSE	0.048	0.048
Blue-mouth redfish	<i>Helicolenus dactylopterus</i>	RBM	0.034	0.034
Rock goby	<i>Gobius paganellus</i>	RKG	0.026	0.026
Black goby	<i>Gobius niger</i>	BLG	0.025	0.025
Frie's goby	<i>Lesueurigobius friesii</i>	FSG	0.021	0.021
Reticulate dragonet	<i>Callionymus reticulatus</i>	RDT	0.017	0.017
Butterfish	<i>Pholis gunnellus</i>	BTF	0.011	0.011
Montague's seasnail	<i>Liparis montagui</i>	MSS	0.011	0.011
Yarrel's blenny	<i>Chirolophis ascanii</i>	YBY	0.01	0.01
Two spotted clingfish	<i>Diplecogaster bimaculata</i>	TSC	0.008	0.008
Norway bullhead	<i>Micrenophrys (taurulus) lilljeborgi</i>	NVB	0.007	0.007
Sea horse (short snouted)	<i>Hippocampus hippocampus</i>	SNH	0.006	0.006
Bullrout	<i>Myoxocephalus scorpius</i>	BRT	0.004	0.004
Jeffrey's goby	<i>Buenia jeffreysii</i>	JYG	0.002	0.002
Dragonets	<i>Callionymidae</i>	DTX	0.001	0.001
Gobies	<i>Gobiidae</i>	GPA	0.001	0.001
Sea scorpion	<i>Taurulus bubalis</i>	SSN	0.001	0.001
Transparent goby	<i>Aphia minuta</i>	TPG	0.001	0.001
Worm pipefish	<i>Nerophis lumbriciformis</i>	WPF	0.001	0.001

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

Common Name	Scientific Name	CEFAS code	Catch weight (kg)
Epibenthic mix unidentified	<i>Epibenthic mixture</i>	BEN	3745.881
Rocks	<i>Assorted rocks</i>	ROK	2596.356
Common brittle star	<i>Ophiothrix fragilis</i>	OPF	731.464
Spiny starfish	<i>Marthasterias glacialis</i>	MAG	490.669
Sponges	<i>Porifera</i>	PFZ	337.524
Yellow boring sponge	<i>Clyona celata</i>	CLI	328.802
Edible sea urchin	<i>Echinus esculentus</i>	URS	300.309
Hornwrack	<i>Flustra foliacea</i>	FAF	258.819
Queen scallop	<i>Aequipecten opercularis</i>	QSC	254.046
Common starfish	<i>Asterias rubens</i>	STH	253.975
Sea mouse	<i>Aphrodite aculeata</i>	AAC	161.781
Dead-mens fingers	<i>Alcyonium digitatum</i>	DMF	153.081
Shell	<i>Broken shell</i>	BSL	116.845
-	<i>Diazona violacea</i>	DIV	107.018
Curled octopus	<i>Eledone cirrhosa</i>	EDC	100.603
Purple heart urchin	<i>Spatangus purpureus</i>	SPG	86.439
-	<i>Luidia ciliaris</i>	LDC	56.064
-	<i>Pachymatisma johnstonia</i>	PMJ	54.632
Bryozoan	<i>Pentapora foliacea</i>	PET	44.542
Hermit in adamsia	<i>Eupagurus / pagurus in adamsia</i>	HIA	36.209
Bryozoan	<i>Cellariidae</i>	CEL	35.854
-	<i>Polymastiidae</i>	PMX	32.257
-	<i>Luidia sarsi</i>	LUS	28.577
-	<i>Nemertesia antennina</i>	NEA	25.79
Sand star	<i>Astropecten irregularis</i>	API	21.662
Hydroids	<i>Hydroida (order)</i>	HYD	21.378
-	<i>Raspailia spp</i>	RAS	20.78
Plumose anemone	<i>Metridium senile</i>	PMA	20.745
Parchment worm tubes	<i>Chaetopterus tubes</i>	CVT	17.498
Sea lemon	<i>Archidoris pseudoargus</i>	ADP	16.72
Whelk eggs	<i>Whelk eggs</i>	WES	15.47
-	<i>Echinocardium spp</i>	ECV	14.349
Swimming crab	<i>Liocarcinus depurator</i>	LMD	13.237
-	<i>Nemertesia ramosa</i>	NER	13.165
Wracks	<i>Fucus spp</i>	FUX	13.137
Anemone unidentified	<i>Anemone unidentified</i>	AMU	11.543
-	<i>Scaphander lignarius</i>	SDL	11.073
Hydroid	<i>Tubularia spp</i>	TUI	11.004
Squid eggs	<i>Squid eggs</i>	SQS	11
Sea squirts	<i>Asciadiacea</i>	SSX	10.065
Brittle-stars	<i>Ophiuroidea</i>	BSY	8.885
-	<i>Asciidiidae</i>	ASY	8.739
Goose-foot star	<i>Anseropoda placenta</i>	PLM	8.384
Common sunstar	<i>Crossaster papposus</i>	CTP	8.356
-	<i>Molgulidae</i>	MGX	8.251
Sea cucumbers	<i>Holothuroidea</i>	HTZ	8.139
-	<i>Stichastrella rosea</i>	SLR	7.634
-	<i>Axinella infundibuliformis</i>	AXI	7.227
-	<i>Ophiocomina nigra</i>	OPN	5.754
Kelp	<i>Laminaria spp</i>	LMX	5.537

Common Name	Scientific Name	CEFAS code	Catch weight (kg)
Red cushion star	<i>Porania pulvillus</i>	PPV	5.223
Sickle hydroid	<i>Hydrallmania falcata</i>	HYH	5.143
-	<i>Echinus acutus</i>	URA	5.085
Circular crab	<i>Atelyocyclus rotundatus</i>	ALR	4.936
Scorpion spider crab	<i>Inachus dorsettensis</i>	IND	4.819
Common whelk	<i>Buccinum undatum</i>	WHE	4.31
-	<i>Ophiura ophiura</i>	OHT	4.167
-	<i>Psammechinus miliaris</i>	PMM	4.047
Gibbs sea spider	<i>Pisa armata</i>	PAA	3.715
-	<i>Henricia oculata</i>	HEO	3.652
Sponge crab	<i>Dromia personata</i>	DRP	3.599
-	<i>Actinauge richardi</i>	ACR	3.322
Masked crab	<i>Corystes cassivelaunus</i>	CCV	3.223
-	<i>Ascidia virginea</i>	ASV	3.162
Sponge	<i>Suberites spp</i>	SUB	3.15
-	<i>Diphasia nigra</i>	DIN	2.596
Peacock worm	<i>Sabellidae</i>	PWX	2.261
Sea slugs	<i>Nudibranchia</i>	NBX	2.256
-	<i>Bolocera tuediae</i>	BCT	2.219
Dahlia anemone	<i>Urticina (tealia) felina</i>	DHA	2.169
-	<i>Dysidea fragilis</i>	DYS	2.075
Stalk ascidian	<i>Styela clava</i>	SAA	1.909
Common swimming crab	<i>Polybius (liocarcinus) holsatus</i>	LMH	1.847
American slipper limpet	<i>Crepidula fornicata</i>	ASL	1.845
Slender-leg spider crab	<i>Inachus leptochirus</i>	INL	1.757
Brown seaweeds (nei)	<i>Phaeophyceae</i>	SWB	1.733
-	<i>Hyalinoecia tubicola</i>	HYT	1.645
Hermit in whelk	<i>Eupagurus / pagurus in buccinum</i>	HIW	1.643
Calcareous sponges	<i>Calcarea</i>	CCZ	1.639
Hydroid	<i>Nemertesia spp</i>	NEM	1.591
Curly weed	<i>Alcyonidium diaphanum</i>	ALG	1.566
Slender spider crab	<i>Macropodia tenuirostris</i>	MCT	1.474
-	<i>Filograna implexa</i>	FII	1.435
Variiegated scallop	<i>Chlamys varia</i>	CHV	1.421
-	<i>Pleurobranchus membranaceus</i>	PBM	1.394
Great spider crab	<i>Hyas araneus</i>	HYA	1.28
Knotted wrack	<i>Ascophyllum nodosum</i>	ANO	1.217
Long clawed porcelain crab	<i>Pisidia longgicornis</i>	PIS	1.188
Swimming crab	<i>Macropipus tuberculatus</i>	MPT	1.179
Bladder wrack	<i>Fucus vesiculosus</i>	WRB	1.162
-	<i>Tritonia hombergi</i>	TNH	1.081
Contracted crab	<i>Hyas coarctatus</i>	HYC	1.053
-	<i>Dichelopandalus bonnieri</i>	PDB	1.019
Hermit in suberites	<i>Eupagurus / pagurus in suberites</i>	HIS	0.965
Fan mussel	<i>Atrina fragilis</i>	AFR	0.929
-	<i>Tethya aurantia</i>	TAA	0.887
-	<i>Rossia macrosoma</i>	ROM	0.849
Red seaweeds (nei)	<i>Rhodophyceae</i>	SWR	0.808
Squat lobster	<i>Munida rugosa</i>	MNR	0.807
Norway cockle	<i>Laevicardium crassum</i>	LCC	0.807
-	<i>Tethya spp</i>	TTA	0.605
-	<i>Parastichopus tremulus</i>	STT	0.572
-	<i>Philine aperta</i>	PHP	0.559

Common Name	Scientific Name	CEFAS code	Catch weight (kg)
Dog cockle	<i>Glycymeris glycymeris</i>	GLG	0.516
Xanthidae	<i>Xanthid crab</i>	XAN	0.465
Sponge	<i>Haliclona oculata</i>	HAO	0.451
Feather star	<i>Antedon bifida</i>	ADB	0.418
-	<i>Crangon allmanni</i>	CGA	0.398
Goose barnacles	<i>Lepadidae</i>	GOZ	0.382
-	<i>Macropodia linaresi</i>	MCL	0.38
-	<i>Calliactis parasitica</i>	CAR	0.376
-	<i>Acanthodoris pilosa</i>	ACP	0.369
-	<i>Ascidia conchilega</i>	ASD	0.357
Atlantic mud shrimp	<i>Solenocera membranacea</i>	SOA	0.351
Breadcrumb sponge	<i>Halichondria panicea</i>	BCS	0.332
Dogfish egg case	<i>Dogfish egg cases</i>	DEG	0.318
Heart cockle	<i>Glossus humanus</i>	GLO	0.315
Scaleworm	<i>Laetmonice (hermione) histrix</i>	HMH	0.314
Little cuttlefish	<i>Sepiolo atlantica</i>	SPA	0.291
Star ascidian	<i>Botryllus schlosseri</i>	BIS	0.288
-	<i>Sagartia spp</i>	SAG	0.253
Lyre-urchin	<i>Brissopsis lyrifera</i>	BRL	0.233
Sargassum crab	<i>Planes minutus</i>	PNM	0.221
Sea potato	<i>Echinocardium cordatum</i>	ECC	0.214
-	<i>Limaria hians</i>	LIM	0.205
Marbled swimming crab	<i>Liocarcinus marmoreus</i>	LMM	0.184
Polinices eggs	<i>Euspira (polinices) eggs</i>	NAE	0.179
Cotton spinner	<i>Holothuria forskali</i>	COT	0.15
-	<i>Phakellia ventilabrum</i>	PHA	0.136
-	<i>Ascidella scabra</i>	ASS	0.132
-	<i>Nucula sulcata</i>	NUS	0.117
Rissos crab	<i>Xantho pilipes</i>	XAP	0.106
Rough crab	<i>Eurynome aspersa</i>	EUA	0.102
-	<i>Porella compressa</i>	PCO	0.099
Japweed	<i>Sargassum muticum</i>	SAM	0.098
Pink shrimp	<i>Pandalus montagui</i>	PRM	0.097
-	<i>Processidae</i>	PCY	0.084
Squat lobsters	<i>Galathea spp</i>	GLX	0.075
-	<i>Colus gracilis</i>	CSG	0.069
Pheasant tail hydroid	<i>Lytocarpia myriophyllum</i>	HYL	0.064
Pink seafan	<i>Eunicella verrucosa</i>	EUV	0.063
Common prawn	<i>Palaemon serratus</i>	CPR	0.062
-	<i>Pandalus propinquus</i>	PDP	0.052
Barnacles	<i>Cirrepedia</i>	CIZ	0.049
Hornwrack	<i>Securiflustra securifrons</i>	FAS	0.048
Common razor shell	<i>Ensis ensis</i>	ESE	0.047
Dwarf-swimming crab	<i>Liocarcinus pusillus</i>	LPU	0.047
Broad clawed burrowing shrimp	<i>Alpheus macrocheles</i>	ALM	0.046
Bryozoan	<i>Bugula spp</i>	BUG	0.046
Hermit crab	<i>Pagurus bernhardus</i>	PEB	0.046
-	<i>Circomphalus casina</i>	CIA	0.045
Bryers nut-crab	<i>Ebalia tumefacta</i>	EBM	0.038
Ray egg cases	<i>Raja egg cases</i>	RES	0.038
Bristle worms	<i>Polychaeta</i>	BWX	0.037
Squat lobster	<i>Galathea strigosa</i>	GLT	0.037
-	<i>Scalpellum scalpellum</i>	SCA	0.036

Common Name	Scientific Name	CEFAS code	Catch weight (kg)
-	<i>Pontophilus spinosus</i>	PPS	0.034
Anemone	<i>Paraphellia expansia</i>	PAE	0.033
Banded carpet-shell	<i>Paphia rhomboides</i>	TVR	0.031
-	<i>Phascolion strombus</i>	PCS	0.027
Pink shrimp	<i>Pandalina brevirostris</i>	PDW	0.027
Long-leg spider crab	<i>Macropodia rostrata</i>	MCR	0.026
Hermit crab in epizoanthus	<i>Anapagurus in epizoanthus</i>	HIE	0.026
-	<i>Sepiolidae</i>	SPY	0.025
Leachs spider crab	<i>Inachus phalangium</i>	INP	0.025
Dosinia spp	<i>Dosinia spp</i>	DOS	0.024
-	<i>Philocheras trispinosus</i>	PPT	0.024
Devonshire cup-coral	<i>Caryophyllia smithii</i>	DCC	0.022
-	<i>Acanthocardia spp</i>	ACY	0.021
Red snapping shrimp	<i>Alpheus glaber</i>	ALP	0.02
Brittle-stars	<i>Ophiuridae</i>	BTZ	0.02
-	<i>Cucumariidae</i>	CMX	0.02
-	<i>Pontobdella muricata</i>	PDM	0.02
Opisthobranchia	<i>Opisthobranchia</i>	OPI	0.019
-	<i>Simnia patula</i>	SIM	0.018
Corrugated swimming crab	<i>Liocarcinus corrugatus</i>	LIC	0.018
Sand mason	<i>Lanice conchilega</i>	LCE	0.016
Angular crab	<i>Goneplax rhomboides</i>	GOR	0.015
Common(brown)shrimp	<i>Crangon crangon</i>	CSH	0.015
-	<i>Pagurus variabilis</i>	PEV	0.015
Bivalves	<i>Mollusca-bivalvia</i>	BIV	0.014
Mantis shrimp	<i>Rissoides (meiosquilla) desmaresti</i>	MED	0.013
-	<i>Ophiura albida</i>	OHA	0.013
Necklace shell	<i>Euspira (polinices) catena</i>	PNC	0.013
Star ascidian	<i>Botrylloides leachi</i>	BOT	0.012
Gas mantle ascidian	<i>Corella parallelogramma</i>	CLP	0.012
Gastropod eggs	<i>Gastropod eggs</i>	GAE	0.012
-	<i>Pagurus prideaux</i>	PEX	0.012
Common basket shell	<i>Corbula gibba</i>	CGB	0.011
Cloak anemone	<i>Adamsia carciniopados</i>	AMP	0.01
-	<i>Bathynectes longipes</i>	BAL	0.01
Striped venus	<i>Chamelea gallina</i>	VST	0.009
Painted top shell	<i>Calliostoma zizyphinum</i>	PTS	0.009
Sea hare	<i>Aplysia punctata</i>	AYP	0.008
Sea mats	<i>Bryozoa</i>	EPZ	0.008
Hermit crabs	<i>Paguridae</i>	PAY	0.008
Sea grass	<i>Zostera spp</i>	ZOX	0.008
Sea anemone	<i>Actinia spp</i>	ALI	0.007
Anemone	<i>Epizoanthus incrustatus</i>	EPS	0.007
Sea lettuce	<i>Ulva lactuca</i>	ULL	0.007
-	<i>Upogebia spp</i>	UPX	0.007
-	<i>Buccinum humphreysianum</i>	WHH	0.007
-	<i>Epizoanthus encrustans</i>	EZI	0.006
Nemertean worm	<i>Nemertea</i>	NEY	0.006
-	<i>Calliostoma granulatum (=c. Papillosum)</i>	PTQ	0.006
-	<i>Upogebia deltaura</i>	UPD	0.006
Banded venus shell	<i>Clausinella fasciata</i>	VFR	0.006
-	<i>Alcyonidium parasiticum</i>	ALA	0.005
-	<i>Phaxus pellucidus</i>	CUP	0.005

<b>Common Name</b>	<b>Scientific Name</b>	<b>CEFAS code</b>	<b>Catch weight (kg)</b>
Echurian worms	<i>Echiura spp</i>	EAZ	0.005
Pennants nut-crab	<i>Ebalia tuberosa</i>	EBT	0.005
-	<i>Cirolana cranchii</i>	CIB	0.004
-	<i>Eurynome spinosa</i>	EUS	0.004
Ragworms	<i>Nereis spp</i>	NEX	0.004
Sea spider	<i>Pycnogonida</i>	PYG	0.004
-	<i>Spinulosida (order)</i>	SPI	0.004
Arctic cowrie	<i>Trivia arctica</i>	TRA	0.004
Wentle-trap	<i>Epitonium (clathrus) clathrus</i>	EPC	0.003
Squat lobster	<i>Galathea intermedia</i>	GLI	0.003
-	<i>Processa canaliculata</i>	PCC	0.003
-	<i>Reteporella beaniana</i>	SBN	0.003
Oysters	<i>Ostreidae</i>	OYY	0.002
-	<i>Pasiphaea spp</i>	PAS	0.002
Ross worm (colonies)	<i>Sabellaria spinulosa</i>	RCL	0.002
Hermit crab	<i>Anapagurus laevis</i>	APL	0.001
-	<i>Ditrupa arientina</i>	DTA	0.001
-	<i>Ebalia granulosa</i>	EBG	0.001
Common goose barnacle	<i>Lepas anatifera</i>	GEB	0.001
Squat lobster	<i>Galathea squamifera</i>	GLS	0.001
Lancet	<i>Branchiostoma (amphioxus) lanceolatum</i>	LCT	0.001
-	<i>Ophiura affinis</i>	OHF	0.001
Sea spider	<i>Pycnogonum littorale</i>	PGL	0.001
-	<i>Pontophilus spp</i>	PNZ	0.001
-	<i>Spirontocaris lilljeborgii</i>	SPL	0.001
-	<i>Thyone fusus</i>	THH	0.001
Seapen (pinnate)	<i>Virgularia mirabilis</i>	VAM	0.001
Anemone	<i>Parazoanthus spp</i>	ZOA	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	56	206
Red gurnard	<i>Aspitrigla (Chelidonichthys) cuculus</i>	M	50	125
Red gurnard	<i>Aspitrigla (Chelidonichthys) cuculus</i>	U	5	47
Conger eel	<i>Conger conger</i>	U	5	39
European Seabass	<i>Dicentrarchus labrax</i>	M	0	1
Common Skate (Blue skate [Grey skate])	<i>Dipturus batis</i>	F	1	1
Common Skate (Blue skate [Grey skate])	<i>Dipturus batis</i>	M	3	3
Grey Gurnard	<i>Eutrigla gurnardus</i>	F	150	63
Grey Gurnard	<i>Eutrigla gurnardus</i>	M	121	59
Grey Gurnard	<i>Eutrigla gurnardus</i>	U	18	52
Cod	<i>Gadus morhua</i>	F	14	1
Cod	<i>Gadus morhua</i>	M	6	0
Witch	<i>Glyptocephalus cynoglossus</i>	F	84	3
Witch	<i>Glyptocephalus cynoglossus</i>	M	52	3
Megrim	<i>Lepidorhombus whiffiagonis</i>	F	320	180
Megrim	<i>Lepidorhombus whiffiagonis</i>	M	146	31
Shagreen Ray	<i>Leucoraja fullonica</i>	F	1	1
Shagreen Ray	<i>Leucoraja fullonica</i>	M	3	3
Cuckoo Ray	<i>Leucoraja naevus</i>	F	14	25
Cuckoo Ray	<i>Leucoraja naevus</i>	M	20	30
Black bellied Anglerfish	<i>Lophius budegassa</i>	F	34	22
Black bellied Anglerfish	<i>Lophius budegassa</i>	M	30	22
Black bellied Anglerfish	<i>Lophius budegassa</i>	U	5	3
Anglerfish	<i>Lophius piscatorius</i>	F	84	77
Anglerfish	<i>Lophius piscatorius</i>	M	69	70
Anglerfish	<i>Lophius piscatorius</i>	U	1	2
Haddock	<i>Melanogrammus aeglefinus</i>	F	117	30
Haddock	<i>Melanogrammus aeglefinus</i>	M	95	24
Haddock	<i>Melanogrammus aeglefinus</i>	U	5	1
Whiting	<i>Merlangius merlangus</i>	F	114	112
Whiting	<i>Merlangius merlangus</i>	M	108	72
Whiting	<i>Merlangius merlangus</i>	U	1	0
Hake	<i>Merluccius merluccius</i>	F	56	13
Hake	<i>Merluccius merluccius</i>	M	60	10
Hake	<i>Merluccius merluccius</i>	U	57	21
Lemon Sole	<i>Microstomus kitt</i>	F	108	71
Lemon Sole	<i>Microstomus kitt</i>	M	78	65
Ling	<i>Molva molva</i>	F	0	2
Ling	<i>Molva molva</i>	M	3	2
Ling	<i>Molva molva</i>	U	3	1
Red Mullet	<i>Mullus surmuletus</i>	F	9	32
Red Mullet	<i>Mullus surmuletus</i>	M	2	25
Red Mullet	<i>Mullus surmuletus</i>	U	0	2
Starry Smooth-hound	<i>Mustelus asterias</i>	F	2	35
Starry Smooth-hound	<i>Mustelus asterias</i>	M	6	51
Plaice	<i>Pleuronectes platessa</i>	F	134	290
Plaice	<i>Pleuronectes platessa</i>	M	213	203
Blonde Ray	<i>Raja brachyura</i>	F	14	1
Blonde Ray	<i>Raja brachyura</i>	M	9	2
Thornback Ray	<i>Raja clavata</i>	F	1	10

Common Name	Scientific Name	Sex	Celtic Sea	Western Channel
Thornback Ray	<i>Raja clavata</i>	M	3	11
Small-eyed Ray	<i>Raja microocellata</i>	F	4	2
Small-eyed Ray	<i>Raja microocellata</i>	M	1	0
Spotted Ray	<i>Raja montagui</i>	F	18	26
Spotted Ray	<i>Raja montagui</i>	M	20	25
Undulate Ray	<i>Raja undulata</i>	F	0	8
Undulate Ray	<i>Raja undulata</i>	M	0	7
Turbot	<i>Scophthalmus maximus</i>	F	0	4
Turbot	<i>Scophthalmus maximus</i>	M	1	3
Brill	<i>Scophthalmus rhombus</i>	F	2	8
Brill	<i>Scophthalmus rhombus</i>	M	4	16
Nursehound	<i>Scyliorhinus stellaris</i>	F	0	4
Nursehound	<i>Scyliorhinus stellaris</i>	M	1	4
Sole	<i>Solea solea</i>	F	126	179
Sole	<i>Solea solea</i>	M	229	178
Spurdog	<i>Squalus acanthias</i>	F	0	1
Marbled Electric Ray	<i>Torpedo marmorata</i>	F	1	5
Marbled Electric Ray	<i>Torpedo marmorata</i>	M	1	2
Tub Gurnard	<i>Trigla (Chelidonichthys) lucerna</i>	F	4	84
Tub Gurnard	<i>Trigla (Chelidonichthys) lucerna</i>	M	2	68
Tub Gurnard	<i>Trigla (Chelidonichthys) lucerna</i>	U	0	3
Streaked Gurnard	<i>Trigloporus (Chelidonichthys) lastoviza</i>	F	12	35
Streaked Gurnard	<i>Trigloporus (Chelidonichthys) lastoviza</i>	M	10	36
Streaked Gurnard	<i>Trigloporus (Chelidonichthys) lastoviza</i>	U	0	6
John dory	<i>Zeus faber</i>	F	14	54
John dory	<i>Zeus faber</i>	M	5	12
John dory	<i>Zeus faber</i>	U	0	5

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.

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, off the north Cornwall coast, with smaller numbers 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 75% greater than observed in 2017 despite less sampling locations being fished. Plaice was caught predominantly at the western part of Lyme Bay and off the north Cornish coast, with a large catch also observed at a single station located south of Wexford (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 2017 survey but were of a similar magnitude to those

caught in 2016. Anglerfish was observed in greatest abundance in the western English Channel around Lizard Point and in the Celtic Sea southeast of Ireland. Catch numbers were greater than those observed in 2017 but most caught were of a smaller size (<32cm) whereas in 2017, larger numbers were caught between 40-60cm. Black-bellied anglerfish was caught in greater numbers in the Celtic Sea and at the western end of the western Channel, with similar numbers caught to those seen in 2017. Lemon sole was caught predominantly off the north Cornish coast and in the Celtic Sea south-west of Ireland. Catches around Start Point in the western Channel and in French waters west of Brest were noticeably less than those observed in 2017. Overall, catches of lemon sole in 2018 were similar to those observed in 2017. Common cuttlefish catches were almost entirely seen in the western Channel, but this year appeared to be less prevalent in both the eastern and western areas. Few cuttlefish were caught in the Celtic Sea and overall catch numbers were ~50% down on the high levels observed in 2017.

*B) Water column sampling.*

At 40 sampling locations (26 in the western Channel and 14 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.

Additionally, at 120 sampling locations (85 in the western Channel and 35 in the Celtic Sea), plankton samples were taken using single 'standard' ring net with 0.5 m diameter; 200 micron mesh to collect samples of zooplankton. These samples were 'diluted' with filtered sea-water and fed directly into the Plankton Image Analyser (PIA) with images of zooplankton within the sample being taken and stored for later analysis. Additionally, live samples of surface seawater were also fed through the PIA for a period of 30 minutes both prior to the ring net deployment and again afterwards. Analysis of the recorded images to be carried out by Plymouth University. Table 5 shows the number of deployments by sea area. Figure 6 shows the PIA gear in situ on the Cefas Endeavour.

Table 5: Plankton ring net and CTD/Niskin deployments

<b>Area</b>	<b>Gear</b>	<b>Validity</b>	<b>Number of Deployments</b>
Western Channel	200 micron plankton nets	V	84
Western Channel	200 micron plankton nets	I	1
Celtic Sea	200 micron plankton nets	V	35
Western Channel	ESM2 logger and Niskin	V	26
Celtic Sea	ESM2 logger and Niskin	V	14

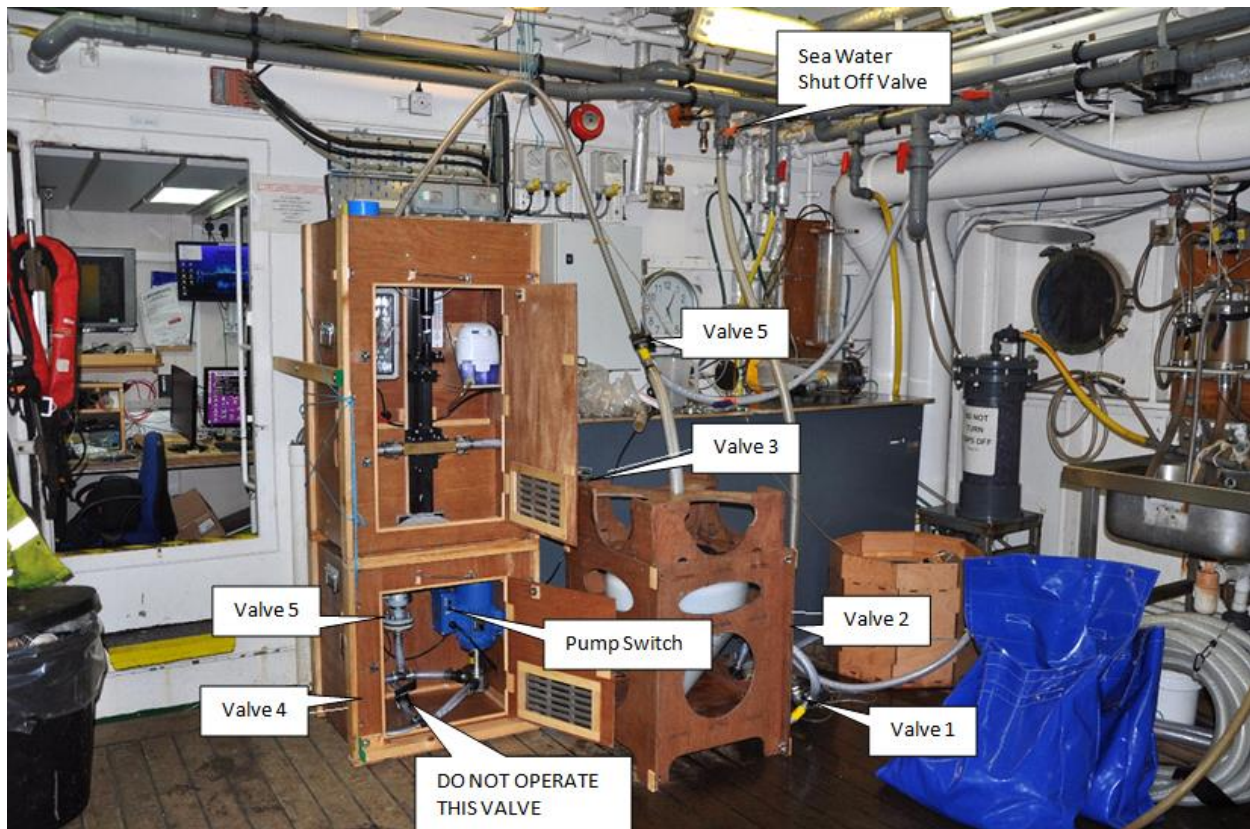


Figure 6 – The Plankton Image Analyser (PIA) set up on the Cefas Endeavour

### C) Sediment and benthos at a station.

Sea-bed sediment samples were collected using a 0.1 m<sup>2</sup> mini Mini-Hamon grab and were collected close to the end of the 4m beam trawl track. A sample was considered as valid if the bulk volume was ~5 litres and there was no evidence of sediment wash-out during sample recovery. A total of 21 deployments were carried out in the Celtic Sea with 19 of these yielding a valid sample. In the western Channel, a total of 45 deployments were carried out with 37 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 sample collection were taken. Figure 7 shows the mini-Mini-Hamon grab sampler and a typical collected sample (un-sieved) with that same sample sieved on both the 5mm mesh screens.

No bulk chlorophyll, bulk nutrients or meiofaunal samples were collected on this survey.

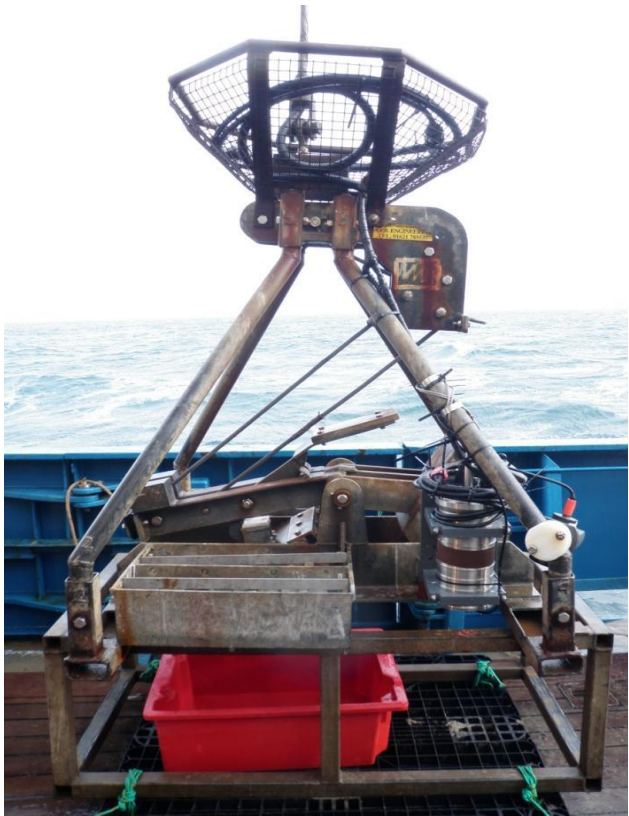


Figure 7 The mini-Mini-Hamon grab sampler plus a typical retrieved sample along with 5mm sieved sample



#### D) Sediment redox.

At each environmentally sampled location, the decision on whether to deploy the SPI camera 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. A total of 6 deployments were carried out in the Celtic Sea area with just 1 in the western Channel. 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).

Station code	Hop A	Hop B	Hop C	Hop D	Hop E
MONT_CENDO 518_ST5SN4_S TN_200_A1					
MONT_CENDO 518_STFSN4_S TN_246_A1					

Figure 8 Typical SPI camera images taken at two survey locations

*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 ratio of 3:1. A total of nine deployments were carried out in the Celtic Sea with six of those considered invalid due to a large catch of mud. In the western Channel, a total 20 deployments were carried with all being deemed as valid.

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. Figure 9 (below) 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.

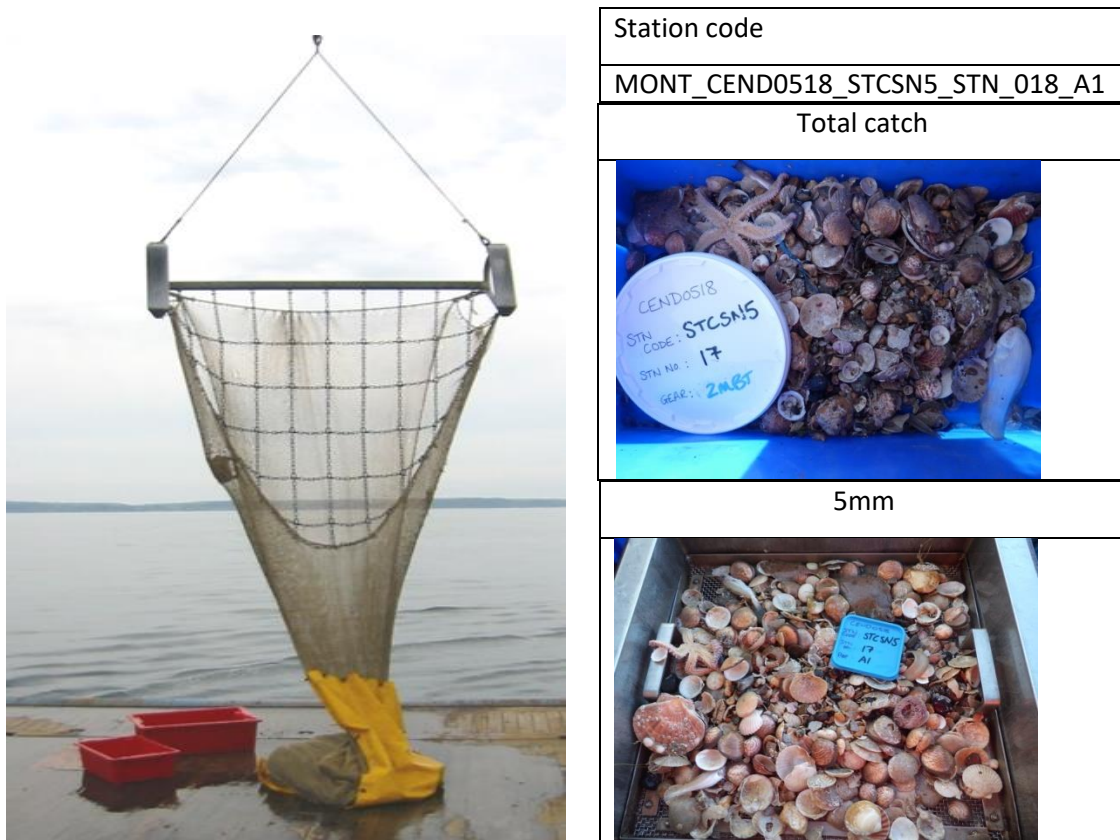


Figure 9 - A 2m Jennings's beam trawl with a typical catch ready for sieving and the resulting 5mm sample for sorting.

*Aim 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) (zooplankton) may 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. In addition, the flow cytometer was set up in the CTD annex on the vessel to take hourly water samples to record phytoplankton at and just below the surface with data again being remotely available at Cefas Lowestoft. To further validate/calibrate this equipment samples were taken in the form of a filtration of surface seawater for chlorophyll daily between the hours of 1100h and 1300h following an SOP provided. These samples will require subsequent processing back at Cefas.

The Plankton Image Analyser (PIA) is a real-time high-speed instrument developed by Phil Culverhouse (University of Plymouth) that takes samples from the same inlet as the CALPS and Ferrybox systems and was set-up in the ship's 'garage'. This was set up with the help of Julian Tilbury (University of Plymouth) who also remained in touch daily with staff operating the kit to continue the process of improvement. The PIA takes images of the passing particles within the water, recording them to a file that is sent to a piece of recognition software which classifies them into categories corresponding zooplankton

taxonomic groups. Surface samples were fed through the PIA for ~30-minute time periods both before and after the plankton deployment to record and categorise zooplankton at the sampling location. In addition, the plankton sample collected using the single 'standard' ring net with 0.5 m diameter; 200 micron mesh were diluted with filtered seawater and was also fed directly into the PIA providing zooplankton images for the entire water column at the sampling location.

*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 each of the selected locations, 3 x 25 litre carboys and a 1 litre bottle of seawater were collected.

*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 36 elasmobranch specimens were tagged and released with Petersen discs, following SOP's and animal welfare practices. Three further specimens of starry smooth-hound were tagged with Cefas electronic Data Storage Tags (DST's). Figure 10 shows a starry smooth-hound tagged with a DST prior to release.

Table 5: Tagging of elasmobranch species

<b>Common Name</b>	<b>Scientific name</b>	<b>Number tagged/released</b>
Starry smooth-hound	<i>Mustelus asterias</i>	19*
Undulate Ray	<i>Raja undulata</i>	8
Common (Blue) skate	<i>Dipturus batis</i>	5
Nursehound	<i>Scyliorhinus stellaris</i>	4
Shagreen ray	<i>Leucoraja fullonica</i>	2
Spurdog	<i>Squalus acanthias</i>	1
	Total	39

\* Three specimens tagged with electronic Data Storage Tags (DST's)





Figure 10: Starry smooth-hound tagged with a DST prior to release

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

A total of 13 individual length/weight measurements were taken from a range of fish and shellfish species and these are detailed in Table 6 below.

Table 6: Individual length/weight measurements taken

<b>Common Name</b>	<b>Scientific name</b>	<b>Number measured</b>
Rock goby	<i>Gobius paganellus</i>	4*
Montague's seasnail	<i>Liparis montagui</i>	2*
Norway bullhead	<i>Micrenophrys</i>	2
Northern rockling	<i>Ciliata septentrionalis</i>	1
Butterfish	<i>Pholis gunnellus</i>	1
Red bandfish	<i>Cepola rubescens</i> (c. <i>Macrophthalma</i> )	1
Worm pipefish	<i>Nerophis lumbriciformis</i>	1
Common spiny lobster	<i>Palinurus elephas</i>	1
	<b>Total</b>	<b>13</b>
*Species awaiting ID confirmation		

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

All jellyfish caught were measured where possible as many were not 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 16 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 20 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 6 samples of squid-eggs were retained to allow for species identification, embryonic stage ID and analysis of deposition time. (V Laptivhovsky – Cefas, Lowestoft).

- e) Elasmobranch egg-case collection. A number of 'empty' ray and dogfish egg cases were retained for delivery to The Shark Trust.
- f) Sample identification. A total of 22 samples of benthic and fish species requiring confirmation of species identification were retained (J Ellis, Cefas, Lowestoft).

### **Litter by-catch information.**

Details of litter by-catch caught at all fishing stations were recorded separately by gear. Litter bycatch was categorized by 'type', weighed, photographed and categorized by size at every fishing station with, details of any attached organisms being recorded. In addition, an Electronic 'App' loaded onto a small laptop was further tested alongside the manual method of recording this information to test for accuracy and ease of use. The majority of the litter items caught were classified as plastic in line with previous surveys.

### **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 116 successful CTD data collections were made at valid 4m beam trawl stations, along with a further 4 data collections where the station was classified as not being valid.

Our thanks once again go to all the officers and crew of RV Cefas Endeavour for their help, support and advice given during this survey. It is largely due to their skill and co-operation that as many survey locations were successfully sampled given the unfortunate loss of survey days. Additionally, our thanks also go to the shore-based P & O staff who ensured that the equipment needed for the survey arrived to specification.

Ian Holmes  
7 June 2018

INITIALLED: S Kupschus  
SEEN IN DRAFT: N/A

## **DISTRIBUTION:**

Survey participants +

S Kupschus

W Dawson (Portfolio lead)

D Pettengell (For DCF)

Cefas Fisheries Survey's SICs/2ICs

Gary Burt (for Cefas Trim)

T Bailey

J Maitland (P&O)

B Salter (P&O)

Master (Cefas Endeavour)

FCO (for France & Republic of Ireland)

Marine Management Organisation (MMO)

Welsh Government (WG)

Devon & Severn IFCA

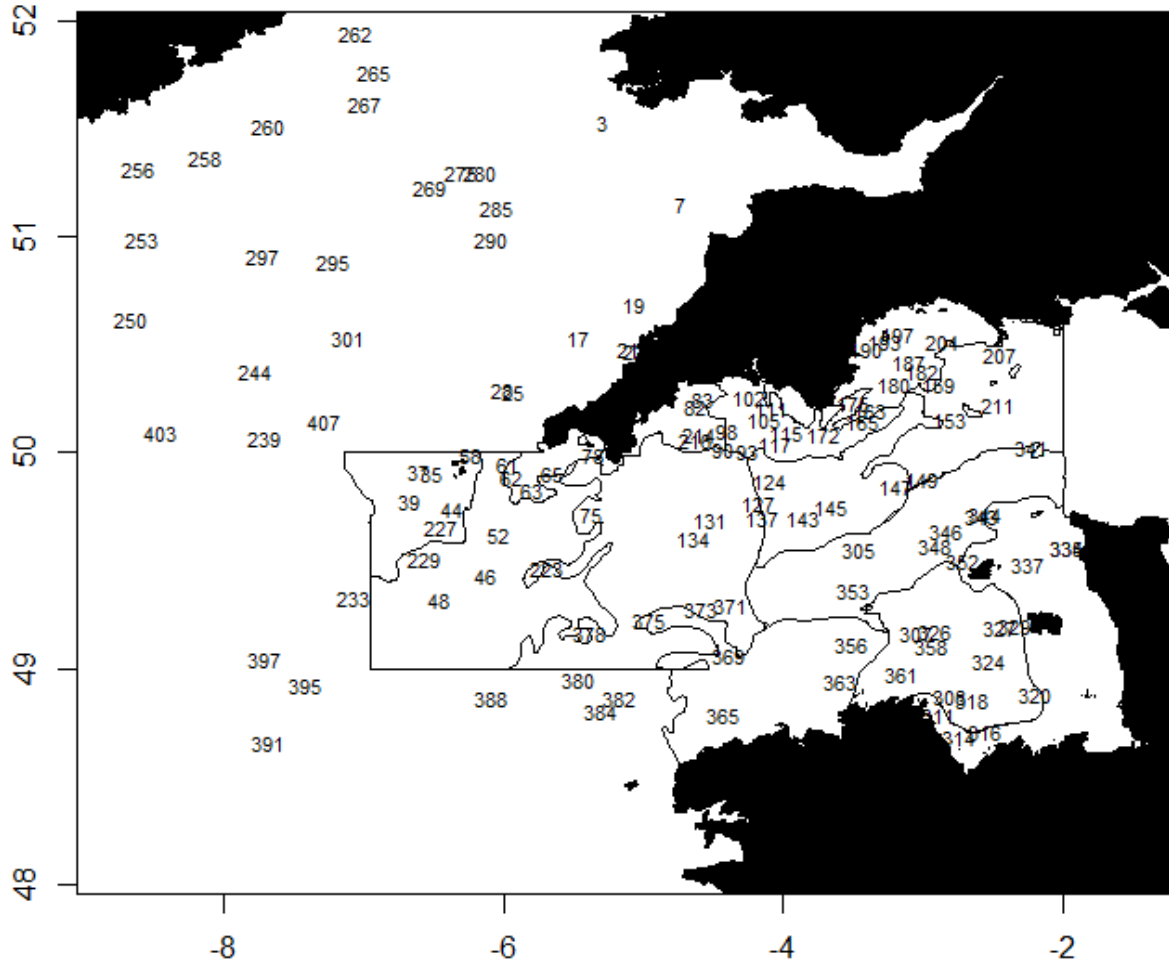
Cornwall IFCA

Isles of Scilly IFCA

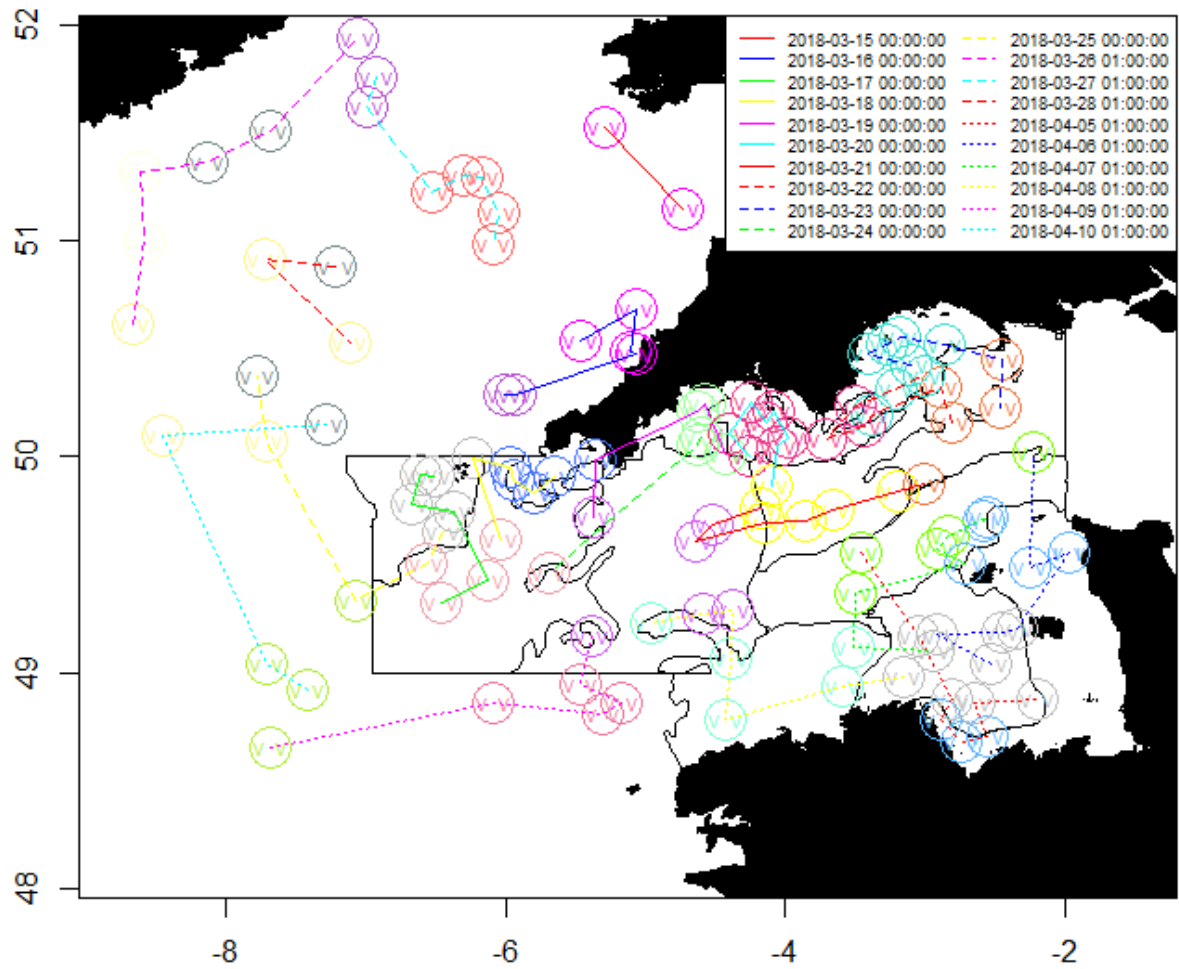
Southern IFCA

States of Jersey

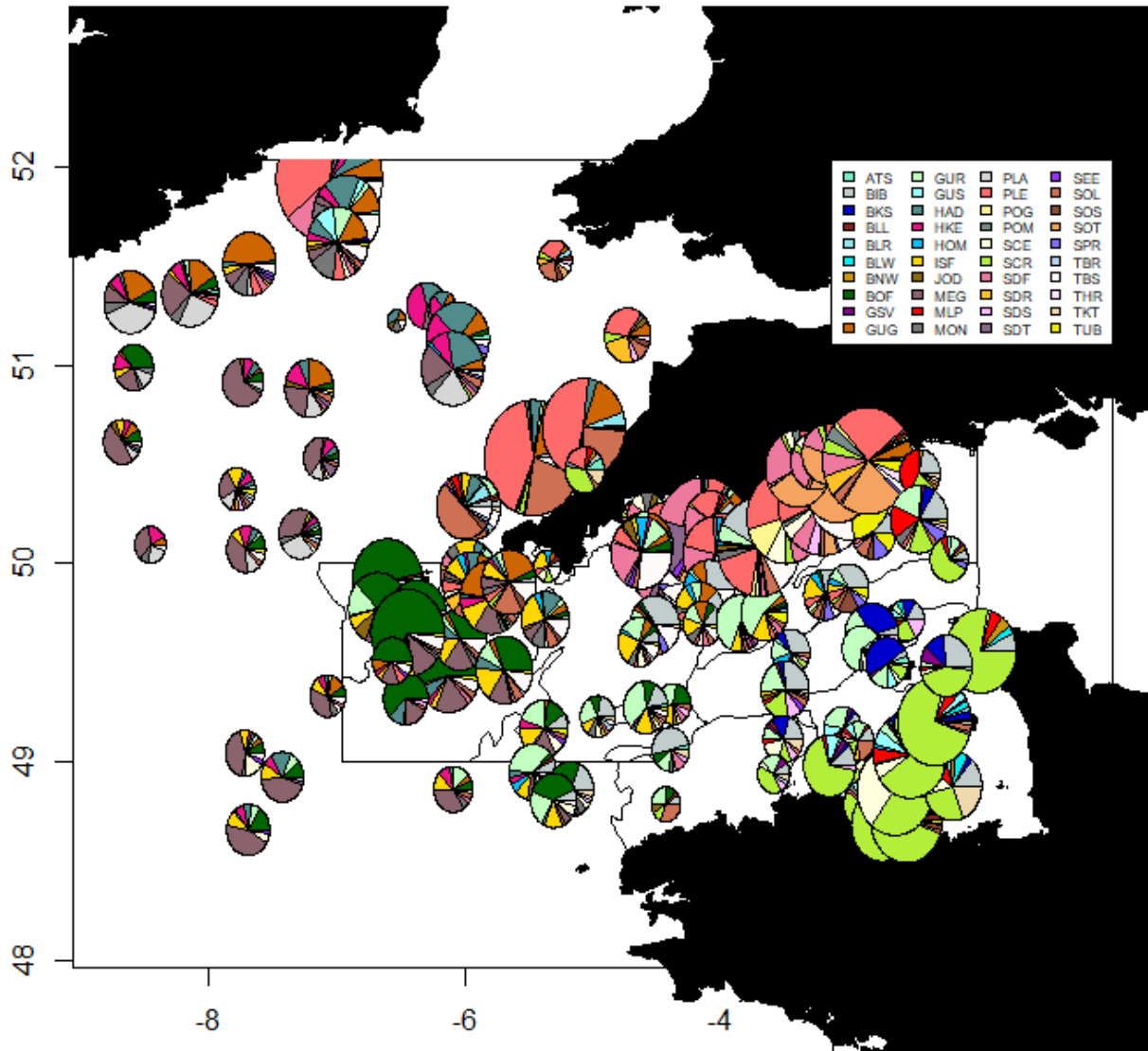
Bailiwick of Guernsey



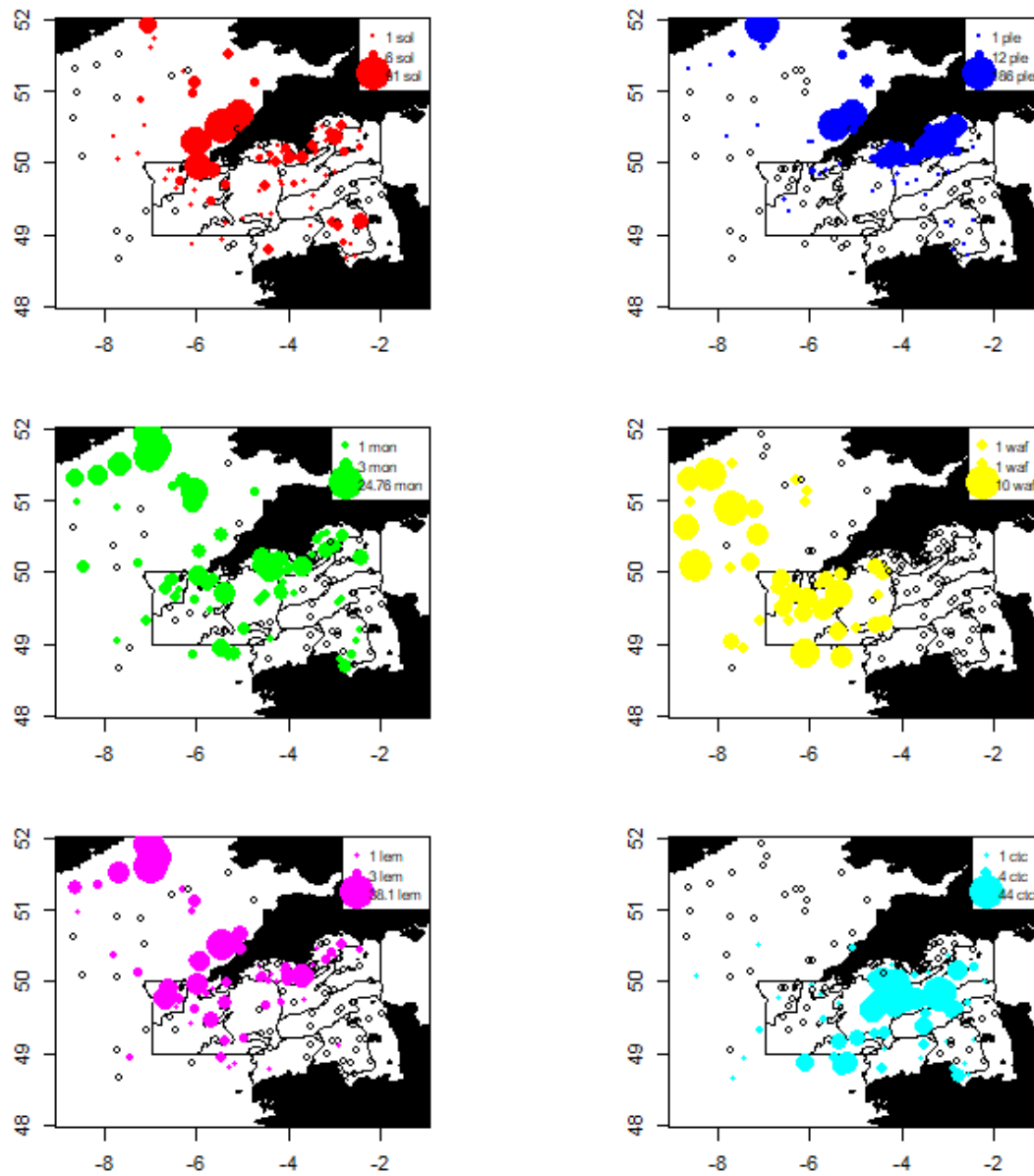
**Figure 1:** Chart of survey station numbers for CEND 5/18 (4m beam trawl stations only).



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

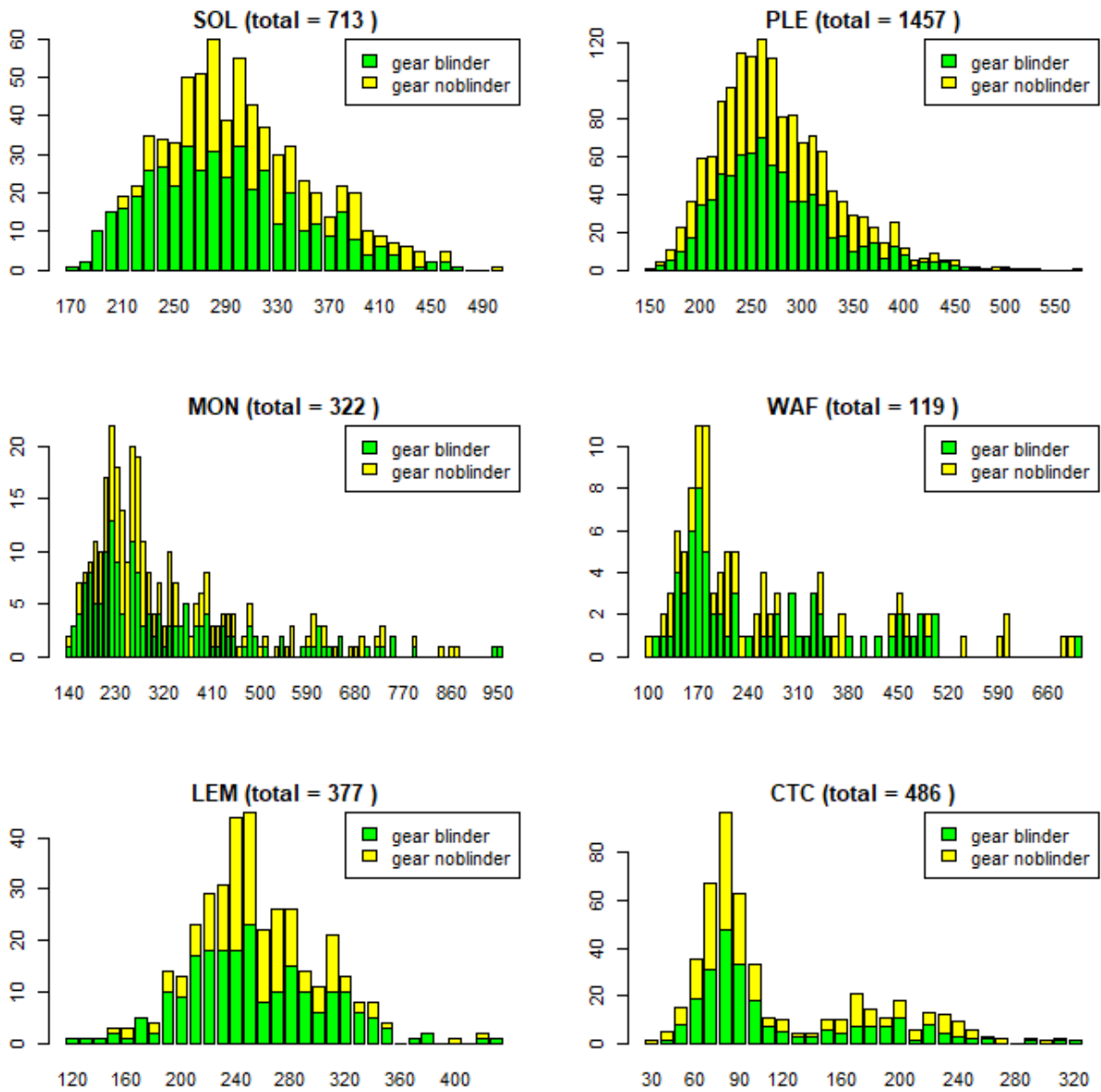


**Figure 3:** Species composition pie plots for Cend 5/18. Size of circles represents the size of the overall catch in numbers of the 40 most abundant species at a station with the size of the slice representing the relative proportion of each species encountered. For Cefas species codes see Table 2.



**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

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	15/03/2018 10:52	51.535	-5.308	51.535	-5.308		55				160	14	0.5	240	1.5	977	ESM2 and Niskin
2	15/03/2018 11:15	51.537	-5.314	51.537	-5.314		57				160	14	0.5	240	1.5	977	Ring nets
3	15/03/2018 11:44	51.530	-5.295	51.558	-5.324	2	58	60	140	1.3	160	16	0.5	250	1.5	977	4m Beam
4	15/03/2018 13:39	51.555	-5.319	51.555	-5.319		63				130	12	0.5		1.5	978.5	Hamon grab
5	15/03/2018 14:16	51.555	-5.319	51.555	-5.317		65				130	12	0.5		1.5	978.5	2m Beam
6	15/03/2018 17:45	51.166	-4.738	51.166	-4.738		41				150	15	0.5		1.5	978	Ring nets
7	15/03/2018 18:02	51.152	-4.730	51.148	-4.774	2.1	42	49	268	0.3	150	15	0.5		1.5	978	4m Beam
8	15/03/2018 19:06	51.153	-4.759	51.153	-4.759		49				150	15	0.5		1.5	979	Hamon grab
9	15/03/2018 19:23	51.153	-4.758	51.153	-4.756		50	51			150	15	0.5		1.5	979	2m Beam
10	15/03/2018 23:11	50.688	-5.068	50.688	-5.068		57				210	14	0.5	240	1.5	986	Ring nets
11	15/03/2018 23:31	50.689	-5.069	50.689	-5.069		57				210	14	0.5	240	1.5	986	Hamon grab
12	16/03/2018 01:33	50.489	-5.108	50.489	-5.108		38	38			210	17	0.5	240	1.5	986.5	ESM2 and Niskin
13	16/03/2018 01:46	50.492	-5.103	50.492	-5.103		40				210	17	0.5	240	1.5	986.5	Ring nets
14	16/03/2018 02:18	50.483	-5.108	50.483	-5.108		39				210	17	0.5	240	1.5	986.5	Hamon grab
15	16/03/2018 04:34	50.539	-5.450	50.539	-5.450		68		57	0.6	200	14	0.5	240	1.5	986	Ring nets
16	16/03/2018 04:56	50.538	-5.452	50.538	-5.452		69		57	0.6	200	14	0.5	240	1.5	986	Hamon grab
17	16/03/2018 06:17	50.534	-5.465	50.547	-5.418	2	66	66	180	0.2	200	13	0.5	240	1.5	987	4m Beam
18	16/03/2018 07:25	50.538	-5.451	50.539	-5.450	0	66	67	180	0.2	200	13	0.5	240	1.5	987	2m Beam
19	16/03/2018 09:55	50.687	-5.071	50.654	-5.078	2.1	58	57	324	0.1	300	13	0.5	240	1	983	4m Beam
20	16/03/2018 11:20	50.688	-5.068	50.688	-5.068		56	56									Flow cytometer and/or Multi-beam
21	16/03/2018 13:07	50.483	-5.107	50.484	-5.122	0.7	36	40	46	0.5	200	16	0.5	240	1.5	991	4m Beam
22	16/03/2018 15:51	50.474	-5.064	50.472	-5.095	1.2	31	36	68	0.5	200	12	0.5	240	1.5	991.5	4m Beam
23	16/03/2018 19:43	50.276	-5.932	50.276	-5.932		73						0.5	240	1.5	992	ESM2 and Niskin
24	16/03/2018 19:56	50.271	-5.935	50.274	-5.935		71						0.5	240	1.5	992	Ring nets
25	16/03/2018 20:12	50.286	-5.932	50.319	-5.924	2	73	73	210	0.7			0.5	240	1.5	992	4m Beam
26	16/03/2018 21:29	50.317	-5.925	50.317	-5.925		73						0.5	240	1.5	992	Hamon grab
27	16/03/2018 22:09	50.298	-5.975	50.298	-5.975		75	75	229	0.8	30	17	0.5	240	1.5	992	Ring nets
28	16/03/2018 22:36	50.289	-6.004	50.306	-5.959	2.1	74	73	229	0.8	30	17	0.5	240	1.5	992	4m Beam
29	16/03/2018 23:50	50.305	-5.960	50.305	-5.960		73	73	229	0.8	30	17	0.5	240	1.5	992	Hamon grab
30	17/03/2018 03:39	49.944	-6.580	49.944	-6.580		99	99	21	1.2	160	12	0.5	230	1.5	992	ESM2 and Niskin
31	17/03/2018 03:56	49.945	-6.578	49.945	-6.578		100				70	17	0.5	210	1.5	992	Ring nets
32	17/03/2018 04:15	49.942	-6.586	49.942	-6.586		99				70	17	0.5	210	1.5	992	Hamon grab
33	17/03/2018 06:07	49.908	-6.513	49.908	-6.513		91				70	19	0.5	210	1.5	992	Ring nets
34	17/03/2018 06:31	49.911	-6.495	49.911	-6.517		86	91			70	19	0.5	210	1.5	992	Flow cytometer and/or Multi-beam
35	17/03/2018 06:52	49.907	-6.510	49.930	-6.543	2	90	92	76	0.8	70	19	0.5	210	1.5	992	4m Beam
36	17/03/2018 08:18	49.930	-6.541	49.930	-6.541		94				80	17	1	210	1.5	993	Hamon grab
37	17/03/2018 09:13	49.917	-6.601	49.948	-6.585	2	96	96	193	1.2	80	17	1	2	1.5	993	4m Beam
37	17/03/2018 09:13	49.917	-6.601	49.948	-6.585	2	96	96	193	1.2	80	17	1	2	1.5	993	Caesium and Tritium
38	17/03/2018 11:16	49.803	-6.652	49.803	-6.652		94				110	12	1	210	1.5	993	Ring nets

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
39	17/03/2018 11:54	49.778	-6.674	49.801	-6.637	2.1	95	93	237	0.8	110	12	1	210	1.5	993	4m Beam
40	17/03/2018 11:45	49.773	-6.682	49.773	-6.682		96	96									Flow cytometer and/or Multi-beam
41	17/03/2018 13:05	49.810	-6.634	49.810	-6.634		96				90	27	1	100	1.5	996	Ring nets
42	17/03/2018 15:31	49.745	-6.354	49.745	-6.354		99				90	27	1.5	90	1.5	995	Ring nets
43	17/03/2018 15:42	49.746	-6.357	49.746	-6.357		98				90	27	1.5	90	1.5	995	ESM2 and Niskin
44	17/03/2018 16:06	49.745	-6.368	49.732	-6.416	2	98	101	53	1.2	90	27	1.5	90	2	996	4m Beam
45	17/03/2018 19:39	49.432	-6.126	49.432	-6.126		114	114			70	24	1.5	80	2.5	996	Ring nets
46	17/03/2018 19:58	49.432	-6.125	49.443	-6.076	2	113	112	183	0.7	50	24	1.5	80	2.5	997	4m Beam
47	17/03/2018 22:40	49.317	-6.475	49.317	-6.475		118	118			40	24	1.5	80	2.5	998	Ring nets
48	17/03/2018 22:59	49.322	-6.459	49.335	-6.412	2	116	114	263	0.5	50	26	1.5	80	2.5	998	4m Beam
49	18/03/2018 00:21	49.335	-6.413	49.335	-6.413		111	111			50	18	1.5	80	2.5	998	Hamon grab
50	18/03/2018 00:48	49.335	-6.412	49.336	-6.409		118	117			50	18	1.5	80	2.5	998	2m Beam
51	22/03/2018 03:39	49.617	-6.034	49.617	-6.034		106	106	47	1.2	30	15		60	1.5	997	Ring nets
52	18/03/2018 04:04	49.619	-6.032	49.602	-6.076	2	103	106	54	1.2	30	15	1	60	1.5	997	4m Beam
53	18/03/2018 05:05	49.605	-6.068	49.605	-6.068		107				30	15	1	60	1.5	997	ESM2 and Niskin
54	18/03/2018 05:29	49.604	-6.068	49.604	-6.068		106	106	71	1.2	30	14	0.5	60	1.5	997	Hamon grab
55	18/03/2018 05:52	49.604	-6.068	49.604	-6.076		106	107	86	1.2	30	14	0.5	60	1.5	997	2m Beam
56	18/03/2018 09:19	49.998	-6.234	50.035	-6.243		78	78			20	15	0.5	60	1.5	997	Flow cytometer and/or Multi-beam
57	18/03/2018 09:49	50.033	-6.249	50.033	-6.249		78				60	10	0.5	60	1.5	998	Ring nets
58	18/03/2018 10:18	49.995	-6.233	50.004	-6.235	0.6	76	77	224	1	20	15	0.5	60	1.5	997	4m Beam
59	18/03/2018 10:48	49.991	-6.255	50.014	-6.244		78	77	215	1	50	17	0.5	60	1.5	998	Flow cytometer and/or Multi-beam
60	18/03/2018 11:10	49.990	-6.203	49.990	-6.203		62	62			50	17	0.5	60	1.5	998	Flow cytometer and/or Multi-beam
61	18/03/2018 12:23	49.952	-5.969	49.966	-5.921	2.1	69	68	270	0.9	50	16	0.5	60	1.5	998	4m Beam
62	18/03/2018 13:53	49.891	-5.948	49.862	-5.923	2	77	81	340	0.9	40	10	0.5	40	1	998.5	4m Beam
63	18/03/2018 15:34	49.831	-5.791	49.799	-5.805	2	88	90	24	1	50	12	0.5	40	1	998	4m Beam
64	18/03/2018 17:43	49.910	-5.655	49.910	-5.655		80				40	26	1	40	1.7	999	Ring nets
65	18/03/2018 17:56	49.907	-5.652	49.897	-5.701	2	79	80	88	0.6	40	26	1	40	1.7	999	4m Beam
66	18/03/2018 18:59	49.898	-5.702	49.898	-5.702		81				40	28	1	40	2.2	999	Hamon grab
67	18/03/2018 20:57	49.941	-5.969	49.941	-5.969		73				40	25	1	40	2	1000	ESM2 and Niskin
68	18/03/2018 21:18	49.944	-5.966	49.944	-5.966		72				40	25	1	40	2	1000	Ring nets
69	18/03/2018 22:07	49.870	-5.932	49.870	-5.932		80				40	26	1	40	2	1000	Ring nets
70	18/03/2018 22:23	49.864	-5.927	49.864	-5.927		80				40	26	1	40	2	1000	Hamon grab
71	18/03/2018 23:39	49.801	-5.804	49.801	-5.804		86	86			40	30	1.5	40	2.5	1000	Hamon grab
72	18/03/2018 23:53	49.801	-5.808	49.801	-5.808		85	85			40	30	1.5	40	2.5	1000	Ring nets
73	19/03/2018 03:55	49.703	-5.397	49.703	-5.397		93	93			40	41	1.5	40	2.5	999.5	Ring nets
74	19/03/2018 03:51	49.701	-5.402	49.701	-5.402		92	92			40	41	1.5	40	2.5	999.5	ESM2 and Niskin
75	19/03/2018 04:31	49.718	-5.371	49.697	-5.409	2	92	92	53	1.1	40	31	1.5	40	2.5	999.5	4m Beam
75	19/03/2018 04:31	49.718	-5.371	49.697	-5.409	2	92	92	53	1.1	40	31	1.5	40	2.5	999.5	Caesium and Tritium
76	19/03/2018 05:41	49.709	-5.385	49.709	-5.385		95	95			50	30	1.5	40	2.5	1001	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
77	19/03/2018 08:08	49.992	-5.330	49.992	-5.330		45				50	21	1	40	2	1004	Ring nets
78	19/03/2018 08:21	49.988	-5.352	49.981	-5.395	1.7	46	49	109	0.5	50	21	1	40	1	1005	4m Beam
79	19/03/2018 09:12	49.981	-5.386	49.981	-5.386		50				50	21	1	40	1	1005	Hamon grab
80	19/03/2018 11:30	50.099	-5.517	50.099	-5.517		21	21			50	22	0.5	40	0.5	1007	Flow cytometer and/or Multi-beam
81	19/03/2018 16:38	50.214	-4.615	50.214	-4.615		62				40	18	1	40	1.5	1010	Ring nets
82	19/03/2018 17:04	50.213	-4.621	50.212	-4.569	2.1	62	63	85	0.2	40	18	1	40	1.5	1010	4m Beam
83	19/03/2018 18:04	50.246	-4.579	50.248	-4.631	2	57	57	75	0.4	40	19	1	40	1.5	1010	4m Beam
83	19/03/2018 18:04	50.246	-4.579	50.248	-4.631	2	57	57	75	0.4	40	19	1	40	1.5	1010	Caesium and Tritium
84	19/03/2018 18:56	50.248	-4.618	50.248	-4.618		57				40	15	0.5	40	1.5	1012	Ring nets
85	19/03/2018 19:09	50.249	-4.609	50.249	-4.609		58				40	15	0.5	40	1.5	1012	ESM2 and Niskin
86	19/03/2018 19:28	50.247	-4.598	50.247	-4.598		58				40	15	0.5	40	1.5	1012	Hamon grab
87	19/03/2018 19:46	50.247	-4.598	50.247	-4.600		57	57			40	13	0.5	40	1.5	1013	2m Beam
88	19/03/2018 20:21	50.215	-4.607	50.215	-4.607		63				40	13	0.5	40	1.5	1013	Hamon grab
89	19/03/2018 20:31	50.215	-4.608	50.214	-4.610		62	62			40	13	0.5	40	1.5	1013	2m Beam
90	19/03/2018 22:36	50.015	-4.422	50.011	-4.371	2	75	75	247	0.1	45	20	0.5	40	1.5	1013.5	4m Beam
91	20/03/2018 23:34	50.012	-4.379	50.012	-4.374		75	75			45	30	1	45	2	1013.5	Hamon grab
92	20/03/2018 23:42	50.013	-4.382	50.013	-4.382		74	74			45	30	1	45	2	1013.5	Ring nets
93	20/03/2018 01:08	50.005	-4.256	50.003	-4.205	2	72	72	268	1	50	29	1	50	2	1016.5	4m Beam
94	20/03/2018 02:06	50.006	-4.206	50.006	-4.206		71	71			50	26	1	50	2	1016.5	Ring nets
95	20/03/2018 02:15	50.004	-4.215	50.004	-4.215		73	73			50	26	1	50	2	1016.5	ESM2 and Niskin
96	20/03/2018 02:36	50.004	-4.221	50.004	-4.221		74	74			50	26	1	50	2	1016.5	Hamon grab
97	20/03/2018 04:04	50.105	-4.397	50.105	-4.397		74	74			50	24	1	50	1.5	1017.5	Ring nets
98	20/03/2018 04:20	50.105	-4.397	50.131	-4.370	2	72	72	317	0	50	24	1	50	1.5	1017.5	4m Beam
99	20/03/2018 05:17	50.129	-4.374	50.129	-4.374		73	73			45	18	0.5	50	1.5	1019	Hamon grab
100	20/03/2018 05:34	50.129	-4.374	50.124	-4.373		73	72			45	18	0.5	50	1.5	1019	2m Beam
101	20/03/2018 06:50	50.257	-4.254	50.257	-4.254		58	58			45	15	0.5	50	1.1	1020.5	Ring nets
102	20/03/2018 06:57	50.254	-4.246	50.263	-4.313	2	57	57	70	0.9	45	15	0.5	50	1.1	1020.5	4m Beam
103	20/03/2018 08:14	50.249	-4.297	50.249	-4.297		58				45	14	0.5	50	1	1021	Hamon grab
104	20/03/2018 08:36	50.249	-4.296	50.248	-4.298		58	58			45	12	0.5	50	0.2	1021.5	2m Beam
105	20/03/2018 10:56	50.156	-4.137	50.154	-4.189	2	65	64	237	0.1	45	12	0.5	50	0.5	1022	4m Beam
106	20/03/2018 11:37	50.156	-4.199	50.156	-4.199		64	64			50	8	0.5	50	0.5	1022	Flow cytometer and/or Multi-beam
107	20/03/2018 11:51	50.154	-4.195	50.154	-4.195		63	63			50	8	0.5	50	0.5	1022	Ring nets
108	20/03/2018 12:15	50.155	-4.184	50.155	-4.184		63	63			30	13	0.5	50	0.5	1024	Hamon grab
109	20/03/2018 12:31	50.155	-4.185	50.156	-4.183		63	63			30	13	0.5	50	0.5	1024	2m Beam
110	20/03/2018 13:00	50.157	-4.191	50.157	-4.191		62	62			30	12	0.5	50	0.5	1024	ESM2 and Niskin
111	20/03/2018 13:57	50.208	-4.080	50.212	-4.030	2	56	53	267	0.7	30	18	0.5	40	0.5	1023.5	4m Beam
112	20/03/2018 14:48	50.214	-4.048	50.214	-4.048		53	53			30	18	0.5	40	0.5	1023.5	Ring nets
113	20/03/2018 15:06	50.208	-4.025	50.208	-4.025		53	53			30	14	0.5	40	0.5	1024	Hamon grab
114	20/03/2018 15:19	50.212	-4.031	50.213	-4.029		53	53			30	14	0.5	40	0.5	1024	2m Beam
115	20/03/2018 16:21	50.092	-3.974	50.076	-3.928	2	71	72	286	0.6	30	14	0.5	40	0.5	1024	4m Beam

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
116	20/03/2018 17:45	50.045	-4.037	50.045	-4.037		75				30	12	0.5	40	0.5	1024	Ring nets
117	20/03/2018 17:56	50.045	-4.050	50.045	-4.101	2	74	75	91	0.5	30	12	0.5	40	0.5	1024	4m Beam
118	20/03/2018 18:51	50.046	-4.086	50.046	-4.086		76				30	13	0.5	40	0.5	1025	Hamon grab
119	20/03/2018 19:06	50.046	-4.086	50.046	-4.088		75	75			30	13	0.5	40	0.5	1025	2m Beam
120	20/03/2018 20:05	50.086	-3.956	50.086	-3.956		75				30	14	0.5	40	0.5	1025.5	Hamon grab
121	20/03/2018 20:21	50.086	-3.956	50.087	-3.958		74	74			30	14	0.5	40	0.5	1025.5	2m Beam
122	20/03/2018 20:40	50.087	-3.960	50.087	-3.960		74				30	10	0.5	40	0.5	1025.5	Ring nets
123	21/03/2018 22:20	49.874	-4.082	49.874	-4.082		77				350	15	0.5	40	0.5	1026	Ring nets
124	20/03/2018 22:32	49.868	-4.097	49.849	-4.140	2	77	77	245	0.1	350	10	0.5	40	0.5	1026	4m Beam
125	20/03/2018 23:36	49.855	-4.125	49.855	-4.125		77	77			350	10	0.5	40	0.5	1026	Hamon grab
126	20/03/2018 23:50	49.855	-4.124	49.856	-4.123		77	76			20	11	0.5			1026.5	2m Beam
127	21/03/2018 01:02	49.767	-4.173	49.770	-4.121	2	76	76	258	0.9	20	11	0.5			1026.5	4m Beam
128	21/03/2018 02:13	49.770	-4.138	49.770	-4.138		77	77			20	11	0.5			1026.5	Hamon grab
129	21/03/2018 02:31	49.770	-4.141	49.770	-4.141		77	77			20	11	0.5			1026.5	Ring nets
130	21/03/2018 04:07	49.690	-4.530	49.690	-4.530		85	85			340	12	0.5			1026	ESM2 and Niskin
131	21/03/2018 04:23	49.690	-4.518	49.690	-4.467	2.1	83	85	63	0.2	340	12	0.5			1026	4m Beam
132	21/03/2018 05:27	49.691	-4.495	49.691	-4.495		87	87			340	12	0.5			1026	Hamon grab
133	21/03/2018 05:45	49.691	-4.494	49.691	-4.494		79	79			340	12	0.5			1026	Ring nets
134	21/03/2018 06:47	49.605	-4.642	49.593	-4.689	2.1	90	92	65	1.2			0.5			1026.5	4m Beam
135	21/03/2018 08:07	49.596	-4.683	49.596	-4.683		92	92			20	12	0.5			1027	Ring nets
136	21/03/2018 08:29	49.596	-4.683	49.596	-4.683		92	92			20	12	0.5			1027	Hamon grab
137	21/03/2018 10:58	49.697	-4.146	49.706	-4.096	2	79	80								1026.5	4m Beam
137	21/03/2018 10:58	49.697	-4.146	49.706	-4.096	2	79	80								1026.5	Caesium and Tritium
138	21/03/2018 11:25	49.697	-4.146	49.706	-4.096		81	81								1026.5	Flow cytometer and/or Multi-beam
139	21/03/2018 11:56	49.703	-4.108	49.703	-4.108		80	80								1026.5	Hamon grab
140	21/03/2018 12:14	49.703	-4.110	49.703	-4.110		80	80					0.3			1026	Ring nets
141	21/03/2018 14:08	49.700	-3.858	49.700	-3.858		77	77					0.3			1025.5	ESM2 and Niskin
142	21/03/2018 14:18	49.698	-3.864	49.698	-3.864		75	75					0.3			1025.5	Ring nets
143	21/03/2018 14:32	49.700	-3.855	49.707	-3.805	2	76	76	258	1			0.3			1025.5	4m Beam
144	21/03/2018 16:03	49.753	-3.673	49.753	-3.673		75	75					0.3			1025	Ring nets
145	21/03/2018 16:13	49.753	-3.663	49.763	-3.614	2.1	74	73	254	0.6			0.3			1025	4m Beam
146	21/03/2018 18:32	49.844	-3.179	49.844	-3.179		73	73					0.5			1024	Ring nets
147	21/03/2018 18:41	49.844	-3.189	49.849	-3.240	2	73	73	105	0.4			0.5			1024	4m Beam
147	21/03/2018 18:41	49.844	-3.189	49.849	-3.240	2	73	73	105	0.4			0.5			1024	Caesium and Tritium
148	21/03/2018 19:34	49.848	-3.221	49.848	-3.221		74	74			290	12	0.5			1023.5	Hamon grab
149	21/03/2018 20:58	49.876	-3.012	49.871	-3.063	2	73	73	56	1.7	300	13	0.5			1022	4m Beam
150	21/03/2018 22:09	49.872	-3.061	49.872	-3.061		73	73			280	16	0.5	280	0.5	1022	Hamon grab
151	21/03/2018 22:19	49.872	-3.060	49.872	-3.060		74	74			280	16	0.5	280	0.5	1022	Ring nets
152	22/03/2018 00:40	50.157	-2.806	50.157	-2.806		63	63	94	1	280	20	0.5	280	0.5	1021	Ring nets
153	22/03/2018 00:57	50.157	-2.812	50.157	-2.864	2	63	63	94	1	280	20	0.5	280	0.5	1021	4m Beam
154	22/03/2018 01:54	50.157	-2.853	50.157	-2.853		62	62			280	20	0.5	280	0.5	1021	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
155	22/03/2018 02:12	50.158	-2.852	50.157	-2.855		62	62			280	20	0.5	280	0.5	1021	2m Beam
156	22/03/2018 03:34	50.315	-2.862	50.315	-2.862		56	56			286	18	0.5	280	0.5	1019	ESM2 and Niskin
157	22/03/2018 03:47	50.317	-2.866	50.317	-2.866		56	56			280	18	0.5	280	0.5	1019	Ring nets
158	22/03/2018 03:56	50.317	-2.852	50.318	-2.893		56	56			286	18	0.5	280	0.5	1019	Flow cytometer and/or Multi-beam
159	22/03/2018 04:27	50.318	-2.892	50.317	-2.840	2	56	56	264	1.7	280	20	0.5	280	0.5	1019	4m Beam
160	22/03/2018 05:32	50.318	-2.858	50.318	-2.858		57	57			280	20	0.5	280	0.5	1019	Hamon grab
161	22/03/2018 05:47	50.318	-2.858	50.318	-2.856		57	57			17	20	1	280	1	1019	2m Beam
162	22/03/2018 08:17	50.197	-3.383	50.197	-3.383		66				270	15	0.5	280	1.5	1017	Ring nets
163	22/03/2018 08:49	50.196	-3.378	50.184	-3.427	2	65	66	43	0.9	260	18	0.5	260	1.5	1017	4m Beam
164	22/03/2018 09:46	50.187	-3.419	50.187	-3.419		66				260	16	0.5	260	1.5	1016	Hamon grab
165	22/03/2018 10:30	50.143	-3.428	50.126	-3.473	2.1	66	67	53	1.3	260	10	0.5	260	1.5	1016	4m Beam
166	22/03/2018 11:25	50.132	-3.457	50.132	-3.457		67				260	15	0.5	260	1.5	1016	Hamon grab
167	22/03/2018 11:41	50.132	-3.457	50.131	-3.460		68	67			260	18	0.5	260	1	1015	2m Beam
168	22/03/2018 12:09	50.126	-3.451	50.126	-3.451		66				260	18	0.5	260	1	1015	Ring nets
169	22/03/2018 12:19	50.130	-3.464	50.130	-3.464		65				260	18	0.5	260	1	1015	Flow cytometer and/or Multi-beam
170	22/03/2018 13:15	50.087	-3.694	50.087	-3.694		70	70			250	20	0.5	260	1	1031.5	Ring nets
171	22/03/2018 13:28	50.089	-3.693	50.089	-3.693		70	70			250	20	0.5	260	1	1013.5	ESM2 and Niskin
172	22/03/2018 13:53	50.083	-3.709	50.093	-3.660	2	69	68	234	0.5	250	20	0.5	260	1	1013.5	4m Beam
172	22/03/2018 13:53	50.083	-3.709	50.093	-3.660	2	69	68	234	0.5	250	20	0.5	260	1	1013.5	Caesium and Tritium
173	22/03/2018 14:46	50.094	-3.662	50.094	-3.662		69				250	20	0.5	260	1	1013.5	Hamon grab
174	22/03/2018 15:11	50.094	-3.661	50.094	-3.659		69	68			240	19	0.5	250	1	1012	2m Beam
175	22/03/2018 16:25	50.235	-3.495	50.265	-3.472	2	57	57	206	1.2	240	17	0.5	250	1	1011.5	4m Beam
176	22/03/2018 17:42	50.262	-3.473	50.245	-3.473		56				220	17	0.5	250	1.5	1009	Hamon grab
177	22/03/2018 17:55	50.262	-3.473	50.263	-3.472		56	56			220	17	0.5	250	1.5	1009	2m Beam
178	22/03/2018 18:18	50.265	-3.469	50.265	-3.469		58				230	18	0.5	240	1.5	1009	Ring nets
179	22/03/2018 20:40	50.316	-3.208	50.316	-3.208		60				230	24	0.5	230	1.5	1004	Ring nets
180	22/03/2018 20:54	50.315	-3.207	50.293	-3.246	2	59	61	45	0.9	230	24	0.5	230	1.5	1004	4m Beam
181	22/03/2018 21:57	50.295	-3.245	50.295	-3.245		62				230	0.5	0.5	230	1.5	1004	Hamon grab
182	22/03/2018 23:44	50.376	-3.002	50.366	-3.053	1.9	57	57	78	0.8	210	29	0.5	230	2	1002	4m Beam
182	22/03/2018 23:44	50.376	-3.002	50.366	-3.053	1.9	57	57	78	0.8	210	29	0.5	230	2	1002	Caesium and Tritium
183	23/03/2018 00:55	50.369	-3.043	50.369	-3.043		57				210	29	0.5	230	2	1002	Hamon grab
184	23/03/2018 01:11	50.371	-3.041	50.371	-3.041		57				210	29	0.5	230	2	1002	Ring nets
185	23/03/2018 01:55	50.424	-3.092	50.424	-3.092		52				210	29	1	230	2	1000	Ring nets
186	23/03/2018 02:03	50.427	-3.090	50.427	-3.090		53				200	28	1	230	2	999	ESM2 and Niskin
187	23/03/2018 02:16	50.424	-3.095	50.403	-3.136	2	51	51	148	0.2	200	28	1	230	2	999	4m Beam
188	23/03/2018 03:21	50.406	-3.127	50.406	-3.127		53				200	29	1	230	2	998	Hamon grab
189	23/03/2018 06:03	50.476	-3.407	50.476	-3.407		29				230	13	0.5	220	1.5	996	Ring nets
190	23/03/2018 06:10	50.480	-3.403	50.510	-3.382	2	28	26	211	0.5	230	13	0.5	220	1	996	4m Beam
190	23/03/2018 06:10	50.480	-3.403	50.510	-3.382	2	28	26	211	0.5	230	13	0.5	220	1	996	Caesium and Tritium
191	23/03/2018 06:58	50.504	-3.386	50.504	-3.386		27				230	13	0.5	220	1.5	996	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
192	23/03/2018 07:11	50.504	-3.387	50.505	-3.385		26	27			230	14	0.5	220	1.5	995.5	2m Beam
193	23/03/2018 08:05	50.518	-3.269	50.495	-3.299	1.8	34	34	18	0.2	250	17	0.5	15	0.5	995	4m Beam
194	23/03/2018 09:02	50.504	-3.288	50.504	-3.288		36				250	18	0.5	220	1.5	994.5	Hamon grab
195	23/03/2018 09:12	50.504	-3.287	50.504	-3.287		36				250	18	0.5	220	1.5	994.5	Ring nets
196	23/03/2018 09:58	50.557	-3.168	50.557	-3.168		34				250	17	0.5	220	1.5	994.5	Ring nets
197	23/03/2018 10:06	50.553	-3.175	50.536	-3.220	2	33	33	67	0.5	250	18	0.5	220	1.5	994.5	4m Beam
198	23/03/2018 10:56	50.539	-3.212	50.539	-3.212		34	34			245	13	0.5	220	1	994	Hamon grab
199	23/03/2018 11:09	50.539	-3.211	50.538	-3.213		34	34			245	13	0.5	220	1	994	2m Beam
200	23/03/2018 11:41	50.539	-3.211	50.539	-3.211		34	34			220	14	0.5	220	1	994	SPI camera
201	23/03/2018 12:34	50.530	-3.028	50.530	-3.028		40				220	14	0.5	220	1	994	Flow cytometer and/or Multi-beam
202	23/03/2018 13:12	50.517	-2.859	50.517	-2.859		43	43			180	13	0.5	200	0.7	994	ESM2 and Niskin
203	23/03/2018 13:23	50.518	-2.854	50.518	-2.854		42	42			180	13	0.5	200	0.7	994	Ring nets
204	23/03/2018 13:33	50.520	-2.861	50.522	-2.913	2	42	42	95	0.5	180	13	0.5	200	0.7	994	4m Beam
204	23/03/2018 13:33	50.520	-2.861	50.522	-2.913	2	42	42	95	0.5	180	13	0.5	200	0.7	994	Caesium and Tritium
205	23/03/2018 16:14	50.523	-2.908	50.523	-2.908		42	42			200	10	0.5	200	0.5	990	Hamon grab
206	23/03/2018 16:28	50.523	-2.908	50.523	-2.905		42	42			200	10	0.5	200	0.5	990	2m Beam
207	23/03/2018 19:08	50.456	-2.451	50.462	-2.400	2	46	50	250	2	140	19	0.5	200	1	990	4m Beam
208	23/03/2018 20:03	50.462	-2.409	50.462	-2.409		49	49			140	22	0.5	200	1	988.5	Hamon grab
209	23/03/2018 20:12	50.463	-2.409	50.463	-2.409		49	49			140	22	0.5	200	1	988.5	Ring nets
210	23/03/2018 22:16	50.229	-2.450	50.229	-2.450		62	62			140	21	0.5	200	1	986.5	Ring nets
211	23/03/2018 22:32	50.224	-2.457	50.212	-2.505	2	62	63	72	1.1	140	21	0.5	200	1	986.5	4m Beam
212	24/03/2018 08:50	50.090	-4.599	50.090	-4.599		74	74			150	20	1	240	2.7	990	ESM2 and Niskin
213	24/03/2018 09:01	50.092	-4.603	50.092	-4.603		75	75			150	20	1	240	2.7	990	Ring nets
214	24/03/2018 09:24	50.087	-4.600	50.072	-4.646	2	74	74	68	0.2	50	17	1	240	2.5	991	4m Beam
215	24/03/2018 10:19	50.076	-4.634	50.076	-4.634		76	76			50	17	1	240	2.5	991	Hamon grab
216	24/03/2018 10:49	50.056	-4.623	50.035	-4.664	2	76	76	56	0.3	50	17	1	240	2.5	991	4m Beam
217	24/03/2018 11:50	50.043	-4.646	50.043	-4.646		78	78			50	12	1	240	2	993	Hamon grab
218	24/03/2018 12:06	50.043	-4.647	50.042	-4.649		77	77			50	12	1	240	2	993	2m Beam
219	24/03/2018 12:28	50.041	-4.653	50.041	-4.653		78	78			50	12	1	240	2	993	Ring nets
220	24/03/2018 12:30	50.041	-4.655	50.041	-4.655		77	77			50	12	1	240	2	993	Flow cytometer and/or Multi-beam
221	24/03/2018 21:16	49.469	-5.676	49.469	-5.676		109				20	17	1	240	2.2	998	Ring nets
222	25/03/2018 21:30	49.466	-5.673	49.466	-5.673		110				20	17	1	240	2.2	998	ESM2 and Niskin
223	24/03/2018 21:48	49.465	-5.689	49.464	-5.740	2	108	110	81	0.7	20	17	1	240	2.2	998	4m Beam
224	24/03/2018 22:46	49.465	-5.738	49.465	-5.738		109	109			10	20	1	270	2.5	998	Hamon grab
225	25/03/2018 03:33	49.655	-6.453	49.655	-6.453		107				0	22	1.5	270	2	1001.5	ESM2 and Niskin
226	25/03/2018 03:45	49.650	-6.454	49.650	-6.454		106				0	22	1.5	270	2	1001.5	Ring nets
227	25/03/2018 03:59	49.652	-6.443	49.665	-6.394	2.2	105	104	262	0.7	0	22	1.5	270	2	1001.5	4m Beam
228	25/03/2018 05:05	49.660	-6.408	49.660	-6.408		106				0	20	1	270	2	1005	Hamon grab
229	25/03/2018 07:33	49.509	-6.563	49.485	-6.599	2.1	110	112	18	0.4	0	23	1	270	2	1002.5	4m Beam
230	25/03/2018 07:30	49.493	-6.586	49.493	-6.586		112				0	21	1	270	2	1004	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
231	25/03/2018 07:42	49.492	-6.585	49.492	-6.585		112				0	21	1	270	2	1004	Ring nets
232	25/03/2018 10:43	49.336	-7.046	49.336	-7.046		126	126			0	14	1	270	2	1006.5	Ring nets
233	25/03/2018 10:58	49.334	-7.066	49.328	-7.116	2.1	124	126	148	0.3	0	14	1	270	2	1006.5	4m Beam
234	25/03/2018 11:12	49.331	-7.091	49.331	-7.091		123	123			0	14	1	270	2	1006.5	Flow cytometer and/or Multi-beam
235	25/03/2018 12:12	49.330	-7.107	49.330	-7.107		126	126			0	17	1	270	2	1008	Hamon grab
236	25/03/2018 12:37	49.331	-7.107	49.332	-7.108		125	127			0	17	1	270	2	1008	2m Beam
237	25/03/2018 13:08	49.332	-7.110	49.332	-7.110		126	126			0	15	1	280	2	1008	ESM2 and Niskin
238	25/03/2018 19:50	50.072	-7.708	50.072	-7.708		114				330	10	0.5	300	1.5	1011	Ring nets
239	25/03/2018 20:12	50.072	-7.701	50.069	-7.650	2	114	115	6	0.4	330	10	0.5	300	1.5	1011	4m Beam
240	25/03/2018 21:10	50.070	-7.652	50.070	-7.652		116				300	10	0.5	300	1.5	1011	Hamon grab
241	25/03/2018 21:35	50.068	-7.654	50.067	-7.655		117	117			300	10	0.5	300	1.5	1011	2m Beam
242	26/03/2018 00:21	50.375	-7.763	50.375	-7.763		112				300	8	0.5	300	1.5	1011	ESM2 and Niskin
243	26/03/2018 00:39	50.375	-7.757	50.375	-7.757		112				300	8	0.5	300	1.5	1011	Ring nets
244	26/03/2018 00:54	50.375	-7.771	50.381	-7.822	2.2	111	111	65	0.2	300	10	0.5	300	1.5	1011	4m Beam
245	26/03/2018 02:01	50.380	-7.806	50.380	-7.806		112				250	10	0.5	300	1	1011	Hamon grab
246	26/03/2018 02:20	50.380	-7.805	50.380	-7.805		113				250	10	0.5	300	1	1011	SPI camera
247	26/03/2018 02:58	50.380	-7.806	50.380	-7.809		111	111			250	10	0.5	300	1	1010.5	2m Beam
248	26/03/2018 07:04	50.610	-8.622	50.610	-8.622		115	115			200	17	0.5	290	2	1009	Ring nets
249	26/03/2018 07:10	50.611	-8.621	50.624	-8.658		115	123			200	17	0.5	290	2	1009	Flow cytometer and/or Multi-beam
250	26/03/2018 07:52	50.615	-8.666	50.612	8.614	2.1	122	115	326	0.3	210	15	0.5	280	2	1008.5	4m Beam
251	26/03/2018 11:09	50.988	-8.567	50.988	-8.567		113	113			210	14	0.5	280	2	1007	ESM2 and Niskin
252	26/03/2018 11:21	50.992	-8.564	50.992	-8.564		113	113			210	14	0.5	280	2	1007	Ring nets
253	26/03/2018 11:36	50.989	-8.577	50.975	-8.625	2	111	111	63	0.2	210	14	0.5	280	2	1007	4m Beam
254	26/03/2018 11:30	50.989	-8.577	50.989	-8.577		111	111			210	14	0.5	280	2	1007	Flow cytometer and/or Multi-beam
255	26/03/2018 15:06	51.314	-8.620	51.314	-8.620		99	99			220	12	0.5	210	1.5	1004	Ring nets
256	26/03/2018 15:47	51.319	-8.605	51.337	-8.560	2	98	96	223	0.1	220	12	0.5	210	1.5	1004	4m Beam
257	26/03/2018 17:29	51.361	-8.160	51.361	-8.160		92	92			270	14	0.5	210	2	1004	Ring nets
258	26/03/2018 17:42	51.365	-8.139	51.378	-8.089	2	91	91	243	0.2	270	17	0.5	230	2	1003.5	4m Beam
259	26/03/2018 20:01	51.504	-7.691	51.504	-7.691		84	84			270	11	0.5	230	1.5	1003	Ring nets
260	26/03/2018 20:14	51.512	-7.675	51.536	-7.638	2	83	82	267	0.1	245	20		230	1.5	1002	4m Beam
261	27/03/2018 00:20	51.941	-7.061	51.941	-7.061		68				260	22	0.5	230	1.5	999.5	Ring nets
262	27/03/2018 00:56	51.939	-7.055	51.906	-7.068	2	66	70	14	0.1	260	22	0.5	230	1.5	999.5	4m Beam
263	27/03/2018 03:04	51.767	-6.927	51.767	-6.927		75				250	23	0.5	230	1.5	998	Ring nets
264	27/03/2018 03:12	51.769	-6.924	51.769	-6.924		75				250	23	0.5	230	1.5	998	ESM2 and Niskin
265	27/03/2018 03:26	51.761	-6.920	51.729	-6.938	2.1	75	75			250	23	0.5	230	1.5	998	4m Beam
266	27/03/2018 05:04	51.623	-6.984	51.623	-6.984		76				250	26	1	240	2	998	Ring nets
267	27/03/2018 05:15	51.617	-6.990	51.589	-7.021	2	75	75	57	0.1	250	26	1	240	2	998	4m Beam
268	27/03/2018 08:55	51.222	-6.552	51.222	-6.552		118	118			320	26	0.5	280	2	1001	Ring nets
269	27/03/2018 09:12	51.226	-6.530	51.237	-6.479	2	117	118	206	0.5	320	26	0.5	280	2	1001	4m Beam
270	27/03/2018 10:21	51.231	-6.506	51.231	-6.506		118	118			320	25	0.5	280	2	1002	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
271	27/03/2018 10:41	51.231	-6.506	51.231	-6.506		118	118			320	25	0.5	280	2	1002	SPI camera
272	27/03/2018 11:16	51.247	-6.463	51.247	-6.463		117	117			280	16	0.5	280	2	1002.5	Flow cytometer and/or Multi-beam
273	27/03/2018 12:56	51.301	-6.311	51.301	-6.311		106	106			208	17	0.5	280	2	1002.5	ESM2 and Niskin
274	27/03/2018 13:07	51.302	-6.305	51.302	-6.305		108	108			280	17	0.5	280	2	1002.5	Ring nets
275	27/03/2018 13:29	51.302	-6.296	51.290	-6.346	2	107	109	60	0.2	280	17	0.5	280	2	1002.5	4m Beam
276	27/03/2018 14:34	51.292	-6.338	51.292	-6.338		110	110			280	19	0.5	280	2	1002.5	Hamon grab
277	27/03/2018 14:50	51.292	-6.338	51.292	-6.338		110	110			280	18	1	280	2	1003	SPI camera
278	27/03/2018 15:23	51.292	-6.340	51.292	-6.342		110	109			280	18	1	280	2	1003	2m Beam
279	27/03/2018 16:40	51.295	-6.190	51.295	-6.190		113	113			280	17	1	280	2	1003	Ring nets
280	27/03/2018 16:54	51.296	-6.170	51.298	-6.118	2	109	105	309	0.3	208	17	1	280	2	1003	4m Beam
281	27/03/2018 17:49	51.298	-6.126	51.298	-6.126		106	106			270	15	0.5	270	1.5	1003	Hamon grab
282	27/03/2018 18:01	51.298	-6.126	51.298	-6.126		105	105			270	15	0.5	270	1.5	1003	SPI camera
283	27/03/2018 18:29	51.298	-6.127	51.298	-6.129		106	105			270	15	0.5	270	1.5	1003	2m Beam
284	27/03/2018 20:03	51.129	-6.160	51.129	-6.160		96				270	16	0.5	270	2	1002	Ring nets
285	27/03/2018 20:16	51.132	-6.052	51.145	-6.003	2.1	94	93	210	0.3	270	16	0.5	270	2	1002	4m Beam
286	27/03/2018 21:11	51.145	-6.008	51.145	-6.008		93				270	16	0.5	270	2	1002	Hamon grab
287	27/03/2018 21:22	51.145	-6.009	51.145	-6.009		93				270	16	0.5	2	2	1002	SPI camera
288	27/03/2018 23:11	50.985	-6.118	50.985	-6.118		99				270	15	0.5	270	2	1001	ESM2 and Niskin
289	27/03/2018 23:23	50.986	-6.112	50.986	-6.112		98				270	15	0.5	270	2	1001	Ring nets
290	27/03/2018 23:36	50.985	-6.093	50.984	-6.040	2	97	97	102	0.3	270	15	2	270	0.5	1001	4m Beam
291	28/03/2018 00:36	50.985	-6.047	50.985	-6.047		99	99			270	16	0.5	270	2	1001	Hamon grab
292	28/03/2018 00:52	50.985	-6.047	50.985	-6.047		97				270	16	0.5	270	2	1001	SPI camera
293	28/03/2018 01:26	50.984	-6.048	50.984	-6.051		99	98			270	14	0.5	270	2	1000.5	2m Beam
294	28/03/2018 07:14	50.888	-7.193	50.888	-7.193		102	102			300	18	0.5	270	2	1000.5	Ring nets
295	28/03/2018 07:28	50.885	-7.210	50.884	-7.263	2	99	99	235	0.3	300	18	0.5	270	2	1000.5	4m Beam
296	28/03/2018 08:28	50.885	-7.245	50.885	-7.245		101	101			300	17	0.5	270	2	1000	Hamon grab
297	28/03/2018 11:16	50.914	-7.726	50.896	-7.681	2	103	106	25	0.1	300	19	0.5	270	2	1001	4m Beam
298	28/03/2018 11:41	50.899	-7.688	50.899	-7.688		105	105			300	19	0.5	270	2	1001	Flow cytometer and/or Multi-beam
299	28/03/2018 12:10	50.887	-7.654	50.887	-7.654		111	111			300	18	0.5	270	2	1001	Ring nets
300	28/03/2018 12:22	50.888	-7.646	50.888	-7.646		113	113			300	18	0.5	270	2	1001	ESM2 and Niskin
301	28/03/2018 16:08	50.532	-7.115	50.512	-7.073	2	110	108	54	0.3	250	15	0.5	270	2	999.5	4m Beam
302	28/03/2018 17:00	50.510	-7.082	50.510	-7.082		109	109	107	0.1	250	14	0.5	270	2	999	Ring nets
303	05/04/2018 00:49	49.549	-3.438	49.549	-3.438		115	115			310	25	1	260	2	1003	Ring nets
304	05/04/2018 01:01	49.548	-3.437	49.548	-3.437		115	115	283	0.6	310	25	1	260	2	1003	ESM2 and Niskin
305	05/04/2018 01:38	49.555	-3.458	49.569	-3.411	2	80	78	257	0.8	310	22	1	260	2	1003	4m Beam
305	05/04/2018 01:38	49.555	-3.458	49.569	-3.411	2	80	78	257	0.8	310	22	1	260	2	1003	Caesium and Tritium
306	05/04/2018 05:31	49.172	-3.070	49.172	-3.070		70	70	108	2.8	310	11	0.5	260	2	1007	Ring nets
307	05/04/2018 05:50	49.167	-3.054	49.177	-3.102	2.1	70	71	108	3.2			0.5	260	2	1008	4m Beam
308	05/04/2018 09:19	48.874	-2.807	48.881	-2.831	1	48	47	96	0.6						1009.5	4m Beam
309	05/04/2018 09:55	48.881	-2.833	48.881	-2.833		47	47			150	1				1010	Ring nets

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	05/04/2018 10:56	48.834	-2.800	48.834	-2.800		44	44								1010	Flow cytometer and/or Multi-beam
311	05/04/2018 12:05	48.786	-2.884	48.793	-2.843	1.7	24	34	306	1.6	90	11	0.2			1010.5	4m Beam
312	05/04/2018 13:11	48.800	-2.861	48.800	-2.861		35	35			90	12	0.2			1010	ESM2 and Niskin
313	05/04/2018 13:12	48.799	-2.861	48.799	-2.861		34	34			90	12	0.2			1010	Ring nets
314	05/04/2018 14:27	48.682	-2.748	48.665	-2.705	2	26	25	308	1	90	20	0.5			1008.5	4m Beam
315	05/04/2018 15:17	48.673	-2.704	48.673	-2.704		25	25			90	20	0.5			1008.5	Ring nets
316	05/04/2018 16:36	48.706	-2.557	48.738	-2.574	2.1	26	30	117	0.2	90	16	0.5			1008.5	4m Beam
317	05/04/2018 17:24	48.731	-2.569	48.731	-2.569		30	30			90	16	0.5			1008.5	Ring nets
318	05/04/2018 18:47	48.857	-2.646	48.880	-2.682	2	45	48	129	1.8	90	10	0.5			1007.5	4m Beam
319	05/04/2018 19:43	48.864	-2.661	48.864	-2.661		50	50			95	8	0.5			1007	Ring nets
320	05/04/2018 21:48	48.880	-2.196	48.883	-2.247	2	40	42	76	0.2	130	10	0.5			1008	4m Beam
321	05/04/2018 22:51	48.888	-2.252	48.888	-2.252		43	43			15	11				1007	Ring nets
322	06/04/2018 01:21	49.036	-2.523	49.036	-2.523		49	49	299	1.2	130	17	0.5			1004.5	Ring nets
323	06/04/2018 01:29	49.038	-2.529	49.038	-2.529		50	50	299	1.2	130	17	0.5			1004.5	ESM2 and Niskin
324	06/04/2018 01:42	49.038	-2.528	49.015	-2.491	2	50	47	299	1.2	130	21	0.5			1004	4m Beam
325	06/04/2018 04:38	49.177	-2.941	49.177	-2.941		68	68	219	0.1	130	20	0.5	120	1	1002	Ring nets
326	06/04/2018 04:54	49.178	-2.920	49.179	-2.873	1.9	68	66	126	0.4	130	22	0.5	120	1.5	1001	4m Beam
327	06/04/2018 08:17	49.191	-2.446	49.203	-2.493	2	56	59	115	1.3	130	25	1	120	1.5	999	4m Beam
328	06/04/2018 09:07	49.203	-2.485	49.203	-2.485		59	59			130	25	1	120	1.5	999	Ring nets
329	06/04/2018 09:59	49.203	-2.339	49.192	-2.363	1.2	47	50	12	0.6	130	22	1	120	1.5	999	4m Beam
330	06/04/2018 10:39	49.202	-2.355	49.202	-2.355		50	50	348	0.9	130	22	1	120	1.5	999	Ring nets
331	06/04/2018 10:59	49.253	-2.349	49.253	-2.349		52	52			130	17	0.5	120	1	998.5	Flow cytometer and/or Multi-beam
332	06/04/2018 12:33	49.348	-2.208	49.348	-2.208		50		347	1	140	14	0.5	120	1	999.5	Ring nets
333	06/04/2018 12:42	49.351	-2.207	49.351	-2.207		50		347	1	140	14	0.5	120	1	999.5	ESM2 and Niskin
334	06/04/2018 16:21	49.560	-1.969	49.579	-1.979	1.1	25	27	186	1.5			0.5			999	4m Beam
335	06/04/2018 17:26	49.560	-1.976	49.576	-1.983	1	27	28	180	1.4			0.5			999	4m Beam
336	06/04/2018 18:01	49.582	-1.990	49.582	-1.990		30		170	1.9			0.2			999	Ring nets
337	06/04/2018 19:18	49.485	-2.246	49.502	-2.242	1	49	49	165	1.4			0.2			999	4m Beam
338	06/04/2018 20:01	49.484	-2.239	49.484	-2.239		51		142	1.2			0.2			999	Ring nets
339	06/04/2018 23:53	50.028	-2.230	50.028	-2.230		64	64	73	1.4	90	13	0.5	220	2	997	Ring nets
340	07/04/2018 00:02	50.030	-2.222	50.030	-2.222		66	66	76	1.5	90	13	0.5	220	2	997	ESM2 and Niskin
341	07/04/2018 00:19	50.024	-2.224	49.995	-2.252	2.1	65	67	75	1.4	90	0.5	0.5	220	2	997	4m Beam
342	07/04/2018 03:43	49.714	-2.558	49.714	-2.558		69	69	246	0.7			0.2	240	1.5	994	Ring nets
343	07/04/2018 04:07	49.707	-2.587	49.719	-2.539	1.9	71	67	244	1			0.2	240	1.5	994	4m Beam
344	07/04/2018 05:24	49.717	-2.555	49.730	-2.539	1	69	78	235	1.7			0.2	240	1	994	4m Beam
345	07/04/2018 07:13	49.632	-2.832	49.632	-2.832		74	74	202	1			0.2	240	1	994	Ring nets
346	07/04/2018 07:23	49.638	-2.828	49.667	-2.802	1.9	74	74	200	0.9			0.2	240	1	994	4m Beam
347	07/04/2018 08:58	49.576	-2.898	49.576	-2.898		76	76	79	0.5				240	2	996	Ring nets
348	07/04/2018 09:08	49.573	-2.909	49.565	-2.959	2	75	76	73	0.5				240	2	996	4m Beam
349	07/04/2018 11:16	49.506	-2.721	49.506	-2.721		73				270	10	0.5	240	2	998	Flow cytometer and/or Multi-beam

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
350	07/04/2018 11:30	49.500	-2.717	49.500	-2.717		71				270	10	0.5	240	2	998	Ring nets
351	07/04/2018 11:36	49.502	-2.712	49.502	-2.712		69				270	10	0.5	240	2	998	ESM2 and Niskin
352	07/04/2018 11:58	49.502	-2.709	49.482	-2.749	1.9	68	69	37	1.4	270	19	0.5	240	2	998	4m Beam
353	07/04/2018 16:17	49.364	-3.503	49.372	-3.453	2	80	80	247	0.8	260	11	0.2	260	2	1000	4m Beam
353	07/04/2018 16:17	49.364	-3.503	49.372	-3.453	2	80	80	247	0.8	260	11	0.2	260	2	1000	Caesium and Tritium
354	07/04/2018 17:06	49.368	-3.463	49.368	-3.463		82				260	10	0.2	260	2	1000.5	Ring nets
355	07/04/2018 18:52	49.120	-3.505	49.120	-3.505		78						0.2	260	1.5	1001	Ring nets
356	07/04/2018 19:05	49.115	-3.518	49.104	-3.566	2.1	80	81	89	0.7			0	260	1.5	1001	4m Beam
357	07/04/2018 22:32	49.106	-2.926	49.106	-2.926		69		101	0.7				260	1.5	1001	Ring nets
358	07/04/2018 22:45	49.106	-2.937	49.103	-2.987	2	69	70	99	0.6			0	260	1.5	1001	4m Beam
359	08/04/2018 00:45	48.982	-3.166	48.982	-3.166		70		283	0.6				260	1.5	1001	Ring nets
360	08/04/2018 00:59	48.981	-3.167	48.981	-3.167		69		280	0.7				260	1.5	1001	ESM2 and Niskin
361	08/04/2018 01:12	48.981	-3.156	48.974	-3.107	2	69	64	276	0.9				260	1.5	1001	4m Beam
362	08/04/2018 04:13	48.936	-3.594	48.936	-3.594		74							260	1	1001	Ring nets
363	08/04/2018 04:26	48.940	-3.590	48.941	-3.539	2.1	73	72	275	0.6				260	1	1001	4m Beam
364	08/04/2018 09:33	48.782	-4.460	48.782	-4.460		97		74	0.7				260	1	1010	Ring nets
365	08/04/2018 10:01	48.787	-4.431	48.780	-4.480	1.9	96	97	75	0.5				260	1	1010	4m Beam
366	08/04/2018 11:15	48.795	-4.566	48.795	-4.566		100							260	1	1009.5	Flow cytometer and/or Multi-beam
367	08/04/2018 14:11	49.063	-4.401	49.063	-4.401		98		265	0.4	60	10	0	260	1	1010	Ring nets
368	08/04/2018 14:18	49.063	-4.404	49.063	-4.404		98		265	0.9	60	10	0	260	1	1010	ESM2 and Niskin
369	08/04/2018 14:39	49.064	-4.394	49.066	-4.343	2	97	96	265	0.5	70	8		260	1	1010	4m Beam
370	08/04/2018 16:47	49.287	-4.385	49.287	-4.385		93		258	0.4	70	10	0	260	1	1011	Ring nets
371	08/04/2018 17:02	49.293	-4.372	49.314	-4.332	2	91	91	258	0.4	70	9	0	260	1	1010	4m Beam
372	08/04/2018 18:53	49.276	-4.572	49.276	-4.572		97		340	0.1			0	260	1	1012	Ring nets
373	08/04/2018 19:06	49.275	-4.589	49.271	-4.639	2	97	99	5	0.1			0	260	1	1012	4m Beam
374	08/04/2018 21:25	49.233	-4.948	49.233	-4.948		105		63	0.7	345	8	0.2	260	1	1012.5	Ring nets
375	08/04/2018 21:48	49.230	-4.962	49.220	-5.011	2	104	105	64	0.7	345	8	0.2	260	0.5	1012.5	4m Beam
376	09/04/2018 00:31	49.172	-5.368	49.172	-5.368		109		100	0.4	310	10	0.2	260	0.5	1013.5	Ring nets
377	09/04/2018 00:45	49.171	-5.369	49.171	-5.369		110		103	0.4	340	12	0.2	260	0.5	1012.5	ESM2 and Niskin
378	09/04/2018 01:00	49.169	-5.383	49.177	-5.433	2	108	110	115	0.4	340	12	0.2	260	0.5	1012.5	4m Beam
379	09/04/2018 03:26	48.941	-5.474	48.941	-5.474		113		227	0.6	340	11	0.2	260	0.5	1012.5	Ring nets
380	09/04/2018 03:40	48.948	-5.468	48.973	-5.435	1.9	111	110	233	0.6	340	10	0.2	260	0.5	1013	4m Beam
381	09/04/2018 05:42	48.862	-5.191	48.862	-5.191		108		257	0.5	350	14	0.5	260	1	1012.5	Ring nets
382	09/04/2018 05:55	48.863	-5.176	48.866	-5.126	2	110	108	261	0.4	350	14	0.5	260	1	1012.5	4m Beam
383	09/04/2018 07:40	48.804	-5.290	48.804	-5.290		110		3	0.2	350	15	0.5	290	1.5	1011	Ring nets
384	09/04/2018 07:52	48.806	-5.305	48.814	-5.354	2.1	109	110	16	0.3							4m Beam
385	09/04/2018 11:11	48.978	-5.775	48.978	-5.775		118				340	13	0.5	290	1.5	1010	Flow cytometer and/or Multi-beam
386	09/04/2018 13:04	48.863	-6.105	48.863	-6.105		129		173	0.1	320	8	0.5	290	1.5	1009	Ring nets
387	09/04/2018 13:16	48.861	-6.104	48.861	-6.104		126		201	0.1	320	8	0.5	290	1.5	1009	ESM2 and Niskin
388	09/04/2018 13:35	48.863	-6.088	48.877	-6.042	2	125	123	209	0.1	320	7	0.5	290	1.5	1009	4m Beam

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
389	09/04/2018 14:29	48.888	-6.020	48.888	-6.020		122				320	8	0.5	290	1.5	1009	Flow cytometer and/or Multi-beam
390	09/04/2018 23:11	48.650	-7.697	48.650	-7.697		157		112	0	290	18	0.5	290	2	998	Ring nets
391	09/04/2018 23:29	48.658	-7.686	48.685	-7.656	2	161	160	112	0	310	17	0.5	290	2	996.5	4m Beam
392	10/04/2018 00:47	48.675	-7.669	48.675	-7.669		161				340	16	0.5	290	2	996.5	Hamon grab
393	10/04/2018 03:09	48.914	-7.435	48.914	-7.435		149		218	0.1	320	17	0.5	290	1.5	995.5	Ring nets
394	10/04/2018 03:27	48.912	-7.431	48.912	-7.431		148		220	0.1	320	17	0.5	290	1.5	995.5	ESM2 and Niskin
395	10/04/2018 03:56	48.925	-7.419	48.941	-7.463	1.9	142	141	227	0.2	290	16	0.5	290	1.5	995	4m Beam
396	10/04/2018 05:00	48.934	-7.443	48.934	-7.443		145				300	12	0.5	290	1.5	996	Hamon grab
397	10/04/2018 06:42	49.045	-7.712	49.062	-7.754	2	142	141	275	0.1	310	10	0.5	290	2	997	4m Beam
398	10/04/2018 07:33	49.062	-7.752	49.062	-7.752		139		286	0.1	310	10	0.5	290	2	997	Ring nets
399	10/04/2018 07:52	49.060	-7.747	49.060	-7.747		141		316	0.1	310	10	0.5	290	2.5	998	Hamon grab
400	10/04/2018 15:21	50.037	-8.416	50.037	-8.416		134		196	0.2	10	16	0.5	290	3.5	1004	Flow cytometer and/or Multi-beam
401	10/04/2018 15:47	50.081	-8.448	50.081	-8.448		137		186	0.2	20	10	0.5	290	2.5	1005	Ring nets
402	10/04/2018 15:59	50.079	-8.450	50.079	-8.450		137		189	0.2	20	10	0.5	290	2.5	1005	ESM2 and Niskin
403	10/04/2018 16:28	50.095	-8.448	50.091	-8.396	2	132	132	201	0.2	20	10	0.5	290	2.5	1005	4m Beam
404	10/04/2018 17:37	50.093	-8.403	50.093	-8.403		134				20	17	0.5	290	2.5	1006	Hamon grab
405	10/04/2018 23:04	50.137	-7.315	50.137	-7.315		114		26	0.4	30	22	1	290	2	1008	Ring nets
406	10/04/2018 23:19	50.135	-7.316	50.135	-7.316		114		30	0.4	30	22	1	290	2	1008	ESM2 and Niskin
407	10/04/2018 23:59	50.150	-7.283	50.132	-7.328	2.1	114	114	46	0.4	30	21	1	290	2	1008.5	4m Beam
408	11/04/2018 01:15	50.134	-7.325	50.134	-7.325		115				30	19	1	290	2	1008.5	Hamon grab
409	11/04/2018 11:44	49.883	-5.340	49.883	-5.340		80				90	7	0.2	290	1.5	1009	Flow cytometer and/or Multi-beam

## Appendix 2: Survey priority stations not worked on CEND 5/18

Stratum	Priority number	P Reference number	Reason for not working	Alternative priority station worked
1	1	P16334	Attempted at stn 58, tow only 0.6nm (Invalid tow) - static gear prevented further attempt	Str 1 stn 6
2	5	P20344	Informed by vessel ((the three J's) of static gear over area	Str 2 Stn 6
4	10	P26916	Location in IFCA no-trawl zone, permission not granted to fish there	Str 4 Stn 11
5	2	P29580	Location in MPA - permission not granted to fish there	Str 5 Stn 10
5	9	P27023	Location in IFCA no-trawl zone, permission not granted to work there	Str 5 Stn 10
10	3	P28294	Area covered by static gear per Guernsey Authority + vessels direct	Str 10 Stn 9
10	6	P28192	Invalid tow at stn 326 on poor ground. Extensive damage to cod-end. Did not repeat	Str 10 Stn 11
10	7	P28344	Area covered by static gear per Guernsey Authority + vessels direct	Str 10 Stn 12
10	10	P27607	Area closed to fishing activity	Str 10 Stn 13
11	1	P28151	Contacted by vessel/coastguard - extensive whelk gear in area (seen)	Str 11 Stn 8
11	2	P27955	In estuary, shallow water	Str 11 Stn 9
11	3	P29838	Too shallow	Str 11 Stn 10
11	4	P29904	Too shallow	Str 11 Stn 13
11	6	P27624	Too shallow	Str 11 Stn 15
11	11	P30046	Littered with static gear - all visible	Str 11 Stn 15
11	12	P29877	Too shallow	Str 11 Stn 15
11	14	P30162	Too shallow	Str 11 Stn 15
12	1	P22723	Too shallow + explosives dumping ground	Str 12 Stn 6
G	3	P6000	No time to complete work	N/A
G	4	P8822	No time to complete work	N/A
G	5	P8709	No time to complete work	N/A
H	5	P11392	No time to complete work	N/A
I	1	P7645	No time to complete work	N/A
I	2	P4286	No time to complete work	N/A
I	3	P14717	No time to complete work	N/A
I	4	P7448	No time to complete work	N/A
I	5	P15151	No time to complete work	N/A
J	1	P18887	No time to complete work	N/A
J	2	P22616	No time to complete work	N/A
J	3	P18492	No time to complete work	N/A
J	4	P19012	No time to complete work	N/A
J	5	P19485	No time to complete work	N/A
K	5	P19106	No time to complete work	N/A