CENTRE FOR ENVIRONMENT, FISHERIES AND AQUACULTURE SCIENCE LOWESTOFT LABORATORY, LOWESTOFT, SUFFOLK, NR33 OHT

2017 RESEARCH VESSEL PROGRAMME REPORT: RV CEFAS ENDEAVOUR: SURVEY 18/17

STAFF:

Part One (10-21 Sept)	Part Two (23-30 Sept)
S Shaw (SIC)	S Shaw (SIC)
S Walmsley (2IC)	S Walmsley (2IC)
L Mann	L Mann
G Eastley	G Eastley
D Brown	D Brown
R Masefield	S Roslyn
R Benedet	T Wilkinson
C Reeve	Z Radford
M Huk	M Huk
A Shine (Irish Observer)	A Shine (Irish Observer)
G Giljan (Southampton Uni)	G Giljan (Southampton Uni)
K James (SWF)	A Sleath (SWF)
	J Van Der Kooij (23 Sept only)
	M Whybrow (23 Sept only)
	A Bodle (23 Sept only)

DURATION:	6 September – 26 September 2017

LOCATION: Irish Sea (VIIa); Bristol Channel & Celtic Sea (VIIf&g)

AIMS:

- 1. To carry out a 4m beam-trawl survey of groundfish (Figure 1) to i) obtain fisheries independent data on the distribution and abundance of commercial flatfish species, and ii) derive age compositions of sole, plaice, cod and whiting for use in stock assessments.
- 2. To collect biological data including maturity and weight at age of sole, plaice, lemon sole and other commercially important finfish species as part of CEFAS' requirements under the EU Data Collection Framework.
- 3. To determine the distribution and relative abundance of juvenile and adult sole and plaice.
- 4. To collect surface & bottom temperature/salinity data using CTD and Niskin Bottle.
- 5. To quantify epibenthos using 4m beam trawl by-catch.
- 6. Collect length/weight & maturity information using individual fish measurements, in support of the EU Data Collection Framework.
- 7. To collect surface sea-water samples for processing on return to Lowestoft for the analysis of tritium and caesium (AE001) (K Leonard Cefas).

- 8. To collect fish samples in support of other Cefas and non-Cefas projects and training courses.
- 9. To deploy water sampling instrumentation provided by Southampton University during the night (M Huk Cefas\Southampton University)
- 10. To deploy a wave rider at West Pembrokeshire site (D Pearce Cefas)

NARRATIVE: (All times **GMT**)

Cefas scientists joined Cefas Endeavour at 2000h, 5 September for sailing the following morning, departing Lowestoft at 0800h, 6 September. Survey briefing tool-box talks were held with the vessel officers and crew to discuss the survey operations followed by a general emergency muster drill. At 1115h, a ring net and water sample collection was carried out at the West Gabbard smart buoy location for the Pelagic sciences team at Cefas.

At 1700h, a shakedown ESM2 logger and Niskin sampler 'dip' was successfully carried out at a position south of the Thames (7DBTS prime station 79). This was followed by successful shake-down beam trawl tow (beam number 3) at the same position to fully test the beam trawl deployment and the on-board fish sampling systems. The vessel recommenced the steam to the first survey stations in the Bristol Channel.

On 8 September at 0603h, the first station in the Bristol Channel Outer sector (BCO) prime station 505 was successfully fished followed by prime stations 133 and 128 in Bristol Channel Inner (BCI) survey sector. A short pause in survey operations allowed the engineers to replace a faulty valve on the engine cooling system. A further 4 valid stations were completed that day. With the wind expected to freshen from the north the following day, the decision was made to fish 12 stations in Carmarthen bay and this went as planned. With a further 2 days of westerly gale force winds being forecast, the decision was made to leave the Bristol channel and head to the east coast of Ireland to gain some lea and allow survey operations to continue in St Georges Channel (SGC) survey sector.

On 10th September, the first station, prime 438, had to be moved due to a cable over the tow. Historically this tow has been within a TSS traffic flow, the new position is in the separation zone which will make it easier to fish in future surveys. Prime 233 had to be fished twice due to the first tow being cut short due to the presence of static gear. A total of 6 stations were completed working South to North along the Irish coast. Cefas Endeavour spent the night transiting to Dundrum Bay so that the 7 stations on the Irish coast could be completed while heading South. A south-westerly storm was forecast for 12th September so overnight on the 11 Sept, the vessel headed back to the Bristol Channel to complete the BCI sector.

At the 5th station on 12 September (prime 120), the first damage to the fishing gear was suffered. The belly was ripped but very little netting was lost so this was fixed within a couple of hours. A new position was found to the north for prime station 120 and this was completed successfully with a 15-minute tow. Upon completion of this station, the weather deteriorated meaning the ESM2 and Niskin could not be deployed and fishing

had to cease so at 1536h, Cefas Endeavour headed to Lundy Island to shelter for the night. During the early hours of 13 September, the wind direction moved to the north allowing for survey operation to recommence at 0854h in Swansea Bay.

After prime 105 was completed the weather became too windy to fish and survey operations were halted at 0938h, the vessel dodged until the conditions improved and at 1437h fishing started again. The final station of the day (prime 113), was of biological interest as many empty ray egg cases were caught. On 14 September, the final 6 stations in BCI sector were completed and the vessel headed Cardigan Bay. Plans to deploy the Cefas Wave-rider were not possible due to sea conditions and a fading light. Upon arrival in Cardigan Bay, just one station was completed on 15 September before Pendine range control contacted the vessel, they were closing most of Cardigan Bay due to live range activity. As a result, a new plan was put in place to steam to Anglesey to complete prime stations 442 and 305 before moving in to the Irish Sea South sector (ISS) to complete the last day's work before the mid-survey crew changeover. The wind and sea conditions were favourable for the first deployment of the deep-water incubator during the night, this was successful, and the equipment incubated the collected water for the following 36 hours. No other deployment during the first half of the survey was possible due to inclement sea conditions. Other water samples had been collected using the Niskin on the hydro wire, these samples were also incubated to test the sampling system.

The 16 September started with the best weather of the trip to date and 6 stations were completed before the vessel steamed to Douglas, Isle of Man, where it docked 1800h. On 17 September, there was a changeover of both scientific and ship's personnel and whilst in port the vessel took on fresh water and catering supplies. Staff from MIST joined the vessel to set up the EK60 calibration system in readiness for the following survey. Cefas Endeavour sailed at 0500h on 18 September and proceeded to the south coast of Isle of Man where the whole day was spent successfully fixing and calibrating the EK60 acoustics. After dropping off the MIST staff who were doing the calibration work, the vessel steamed to the most northern stations off Scotland.

On 19 September, 8 stations were completed with prime 2 was reduced to 15 minutes due to static gear over the tow. The last two stations (prime 7 and 5) were reduced in time to allow them both to be completed before sunset. On 20 September nine stations were completed working down the Cumbrian coast and the following day was spent completing six stations in the Irish Sea West (ISW) sector. On 22 September, eight stations were completed in Liverpool bay without incident with a further six stations completed the following day with these completing the ISS and ISW sectors. The next day, 5 stations were successfully fished leaving just two stations to be completed in the SGC sector. On 25 September the final two stations in SGC were completed before the firing range became active. The vessel successfully deployed the West Pembrokeshire Wave Rider later that day.

During the second half of the survey the sea conditions were more favourable for the deployment of the deep-water incubator. Every evening, a water sample was collected for this work either using the incubator or a traditional Niskin sampler. These water samples were then incubated for a period of 48 hours on board.

The final survey fishing day (26 September) was spent fishing three out of the remaining nine survey stations in the BCO survey sector. The final survey fishing station was hauled at 1209h, 26 September and once the associated Niskin deployment had been

completed, Cefas Endeavour headed to Swansea. During this period, scientists began the process of cleaning up and packing away all scientific equipment in readiness for docking. Due to time restraints 6 stations were not possible to fish this year in the BCO sector, these stations were prime 504, 508, 511, 512, 513 and 533.

Cefas Endeavour docked in Swansea at 2130h, 26 September and the survey demobbed the following day.

RESULTS:

<u>Aims 1, 2 & 3</u>

The survey gear was the standard 4m-beam trawl (Beam number 3 was used for all stations) with chain mat, flip-up ropes and the net was fitted with a 40mm cod-end liner. All fish 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 4m-beam trawl in order to record the temperature and salinity depth profile at each station fished. In addition, at the first and last fishing station most days, a surface water sample was taken simultaneously with a Niskin bottom water sample and an ESM2 logger profile.

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. The total number of survey otoliths/scales taken in each ICES Division are shown in Table 1.

Table 2 shows the top 10 species by both weight (kg) and number of individuals caught on the survey in the past three years. Table 3 shows a list of measured species caught during the survey and number of stations at which they were caught. The trawl survey covering the Irish Sea and Bristol Channel is divided up into six sectors consisting of 108 beam trawl tows, of which all bar six were successfully fished (Figure 1), including all ISN, ISS, ISW, SGC and BCI stations used for tuning data for the Working Group of the Celtic Seas Eco-region.

Table 4 shows the number of gear deployments undertaken on the survey.

A total of 13 prime stations – primes 27 and 28 (off Blackpool), 40 (Red Wharf Bay), 47, 53 and 54 outer Liverpool Bay), 313 (Tremadoc Bay), 214 (Skerries), 203 (Dundrum Bay), 220 (north of Dublin), 233 (south of Wicklow), 425 (midway Anglesey/IOM) and 501 (southwest of Milford Haven) were reduced from the standard 30-minute tow to either a 20 or 15-minute tow.

In addition, a total of 8 prime stations were hauled early – prime 36 (off Rhyl), 2 (Luce Bay), 409 (Irish Sea west deep), 23 (Off Fleetwood), 5 (Workington Channel), 120 (Pembroke coast), 112 (Stackpole Head) and 7 (off Workington). All tow reductions were due to expected large catches of weed, broken shell or small flatfish, static gear over the

tow, fading light or fishing a new tow location. A few stations were moved short distances to avoid undersea cables (an increasing problem in this busy sea area).

	VIIa	VIIf	Vllg	Total
Anglerfish (Lophius piscatorius)	18	10	3	31
Brill	28	3	0	31
Cod	36	1	0	37
Dab	137	123	12	272
Bass	0	8	1	9
Grey Gurnard	61	48	4	113
Red Gurnard	46	11	1	58
Streaked Gurnard	0	1	0	1
Tub Gurnard	50	36	0	86
Haddock	17	2	21	40
Hake	4	6	1	11
John Dory	8	10	1	19
Lemon Sole	40	38	1	79
Megrim	0	0	0	0
Plaice	1250	291	30	1571
Red Mullet	7	0	0	7
Sole	444	297	46	787
Turbot	6	9	1	16
Whiting	135	33	10	178
Total	2287	927	132	3346

 Table 1: Numbers of otolith/scale samples taken by ICES division

Weight c	Weight caught (kg)				Number caught			
	2017	2016*	2015*		2017	2016*	2015*	
Plaice	959	1149	1143	Dab	10108	16760	16515	
Lesser spotted dogfish	808	885	820	Plaice	7848	10230	11375	
Dab	463	770	761	Sole	2556	2201	2060	
Thornback ray	401	367	204	Whiting	1865	2469	2016	
Sole	266	279	221	Solenette	1805	3226	3581	
Spotted ray	110	115	98	Lesser spotted dogfish	1601	1750	1752	
Starry smooth hound	99	59	51	Common dragonet	1333	2159	2804	
Whiting	84	97	80	Poor cod	1209	2157	2367	
Common dragonet	60	145	121	Scaldfish	1022	1412	1455	
Tub gurnard	52	50	53	Grey gurnard	856	1086	1267	
TOTAL (All species)	3796	4611	4358	TOTAL (All species)	34528	49022	51469	

Table 2: Summary of the main species caught over the entire survey *Excludes SEI stations

Table 3: List of measured species caught during the survey and number ofstations at which they were recorded.

Species	Stations	Species	Stations
Lophius piscatorius	21	Mullus surmuletus	4
Loligo (alloteuthis) subulata	10	Nephrops norvegicus	12
Blennius ocellaris	4	Zeugopterus norvegius	3
Trisopterus luscus	45	Trisopterus esmarki	13
Scophthalmus rhombus	20	Loligo forbesi	10
Raja brachyura	21	Hippoglossoides platessoide	s 2
Capros aper	1	Pleuronectes platessa	92
Myoxocephalus scorpius	6	Trisopterus minutus	55
Callionymus lyra	85	Agonus cataphractus	42
Gadus morhua	13	Pomatoschistus spp	23
Conger conger	11	Raja microocellata	13
Cancer pagurus	40	Callionymus reticulatus	1
Sepia officinalis	19	Pecten maximus	8
Leucoraja naevus	18	Maja squinado	44
Limanda limanda	83	Arnoglossus laterna	50
Scyliorhinus stellaris	9	Raja montagui	66
Syngnathus typhle	1	Mustelus asterias	37
Zeugopterus regius	1	Callionymus maculatus	5
Dicentrarchus labrax	5	Sepia elegans	2
Platichthys flesus	2	Solea solea	90
Ciliata mustela	1	Pegusa (solea) lascaris	18
Ctenolabrus rupestris	1	Buglossidium luteum	47
Syngnathus acus	4	Sepiola atlantica	2
Hyperoplus lanceolatus	1	Sprattus sprattus	6
Eutrigla gurnardus	79	Illex illecebrosus	2
Aspitrigla cuculus	27	Liparis liparis	1
Trigloporus lastoviza	1	Taurulus bubalis	1
Melanogrammus aeglefinus	17	Gaidropsarus vulgaris	3
Merluccius merluccius	8	Microchirus variegatus	39
Trachurus trachurus	7	Raja clavata	73
Arnoglossus imperialis	1	Diplecogaster bimaculate	2
Zeus faber	11	Ammodytes tobianus	6
Homarus gammarus	4	Trigla lucerna	54
Microstomus kitt	22	Scophthalmus maximus	14
Molva molva	2	Trachinus draco	3
Loligo vulgaris	14	Echiichthys vipera	16
Scyliorhinus canicula	94	Merlangius merlangus	75
Necora puber	30	Glyptocephalus cynoglossus	8

Table	4 : Sum	marv of	dear	deploy	vments	and	same	ole c	ollections
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Gear	Valid	Additional	Invalid	Total	
Standard 4m Beam trawl with cod end liner	102	1	3	106	
Surface salinity samples	34	0	0	34	
ESM2 profile+Niskin sea- bed water samples	34	0	0	34	
Ring net sample	1	0	0	1	
Deep water incubator – water samples collected by Rosette or Niskin	11	0	0	11	

Abundances of pre-recruit and recruited plaice and sole in the Irish Sea and Bristol Channel are shown in Figures 2 and 3. As with previous surveys, pre-recruit plaice were most abundant off the east coast of Ireland and in inshore waters off North Wales and northwest England. Pre-recruit sole were most abundant in the Bristol Channel, particularly Carmarthen Bay and Bideford Bay and in inshore waters off north Wales and Liverpool Bay. Abundances of pre-recruit and recruited dab and lemon sole are shown in Figure 4 and Figure 5.

Please note that results for the BCO sector are an average over the 5 stations sampled out of the 11 prime stations in this area.

<u>Plaice</u>

Abundance by both catch numbers and catch weight in 2017 decreased from the high levels observed in 2013-2016 with the largest falls observed in the ISW and SGC sectors.

In BCI, both the catch numbers and weight caught decreased by 16% and 15% respectively, decreasing for the second year from the high levels observed in 2015. In BCO the numbers of fish caught decreased by 26% from 2016 and the weight of fish caught fell by 21%. Plaice catches are below the survey high (2015) in both Bristol Channel survey sectors. Catch numbers of juvenile plaice (<22cm) in BCI/BCO have decreased from 235 (2014), 143 (2015), 63 (2016) to just 60 in 2017 and this was below the survey average (143) over the period 2001-17. Catch numbers of recruited plaice (>22cm) fell to 624 fish but this remains above the survey average of 576.

In the Irish Sea, ISN plaice abundance decreased in terms of numbers caught (16%) and by weight caught (14%). Catch numbers fell below the survey average whilst weight caught remained above (2001-17). In ISS, plaice catch numbers fell for the third year running with another fall of 8%, whilst catch weight decreased by 14%. Both measures of abundance were above the survey average (2001-17). In ISW, both catch numbers and weights decreased for the second year running with decreases of 55% and 36%

respectively. These three survey sectors continue to be the most productive for plaice. Catch numbers in SGC fell by 31% from those observed in 2017 whilst catch weight also decreased by 26%.

Catch numbers of juvenile plaice (<22cm) in these four Irish Sea survey sectors decreased in 2016 to the lowest level seen in 8 years, now falling 37% below the survey average observed (2001-17). Trends in survey catch rates over recent surveys are shown in Figure 6

<u>Sole</u>

Abundance by catch number increased in all survey sectors except in ISS and ISN (11% and 8% falls respectively) compared to 2016, whilst catch weights decreased in all sectors except in BCI and ISW (5% and 110% increases respectively). The BCI survey sector continues to be the most productive but historically this sector was 'matched' by similar catch rates in the ISS survey sector but this has ceased to be the case in the past twelve years despite recent increases.

In BCI, catch numbers and weight increased by 34% and 5% respectively compared to the 2016 survey and remain above the series average over period 2001-17. In BCO catch weight decreased by 11% whilst catch numbers increased by 10% compared to the 2016 survey. Catch numbers of juvenile sole in BCI/BCO (<22cm) were around 81% higher in 2017 (1301 fish) than those seen in 2016 (718 fish) and are now at average levels observed over the period 2001-17. Numbers of recruited sole (>21cm) caught decreased 36% from the high level seen in 2016 (615 fish) to around 394 fish.

In the Irish Sea, ISN catch numbers and catch weights both decreased by 11% compared to 2016 with both measures remaining above the series average (2001-17). In the ISS survey sector, a decrease was observed in both catch weight and numbers (8% and 14% respectively) compared to 2016, and as with ISN these measures remain close to the series average (2001-17). ISW saw increases in both catch numbers (73%) and catch weights (110%) but catches remain low compared to the ISS/ISN survey sectors. In SGC, catch numbers increased (12%) whilst catch weights decreased (7%) from those observed in 2016 and remain near the series average (2001-17). Recruited (>21cm) sole numbers (270) fell below the survey average (388) while juvenile (<21cm) sole numbers (591) remain above the survey average (278) observed over the period 2001-17. Trends in survey catch rates over recent surveys are shown in Figure 7.

<u>Dab</u>

Abundance of dab by catch number decreased in all survey sectors within the Irish Sea while an increase was observed in the Bristol Channel. The abundance by catch weight decreased in the all sectors except BCO. The most productive survey sectors remain ISS/ISN/ISW and the survey sectors of BCI/BCO generally see the smallest catches of dab.

In BCI catch numbers increased by 13% and catch weight fell by 15% in 2017 and remain at average levels (2001-17). In BCO, abundance by number caught and weight increased, but these changes were not comparable to previous years as not all stations were completed. Numbers of juvenile dab in BCI/BCO (<17cm) increased in 2017 (534) compared to 2016 (221) and are close to the survey average over the period 2001-17

(600). However, the numbers of recruited dab (>16cm) decreased by 10% in 2017 (1107) compared to 2016 (1232) but remain above average.

In the Irish Sea, ISS catch numbers and catch weights both decreased compared to the 2016 survey and are below the abundance averages (2001-17). Both measures are now at the lowest levels observed over this period. The survey sectors of ISN showed decreases in both catch numbers and weights (37% and 38% respectively) to those seen in 2016. ISW showed decreases in both catch weight and number. Both sectors currently have abundance at below average levels. In the SGC survey sector, catch numbers stayed the same while catch weights decreased by 5% and both measures remain around the survey average (2001-17).

The number of juvenile (<17cm) dab in the Irish Sea survey sectors decreased by 45% in 2017 compared to the previous survey and are at 50% of the average over the period 2001-17. Numbers of recruited dab (>16cm) decreased by 44% in 2017 and are also observed as being below the survey average. Trends in survey catch rates over recent surveys are shown in Figure 8.

Lemon sole

Catch rates of lemon sole remain low in all survey sectors despite small increases in both catch numbers and catch weights in ISN, ISS and BCI survey sectors. In all survey sectors, both catch numbers and catch weights are either at or close to the series low over the period 2001-17.

In the Irish Sea, juvenile numbers (<20cm) fell from 17 in 2016 to 11 in 2017 and are now below average levels (2001-17). Numbers of recruited lemon sole (>19cm) in 2017 (39 fish) increased from 2016 (30) and but also remain below the series average (62 fish).

In the Bristol Channel, juvenile numbers increased in 2017 (26) from 2016 (13) and are currently below the series average (2001-17). Recruited lemon sole decreased by around 53% in 2017 (20) and are also observed as being below average levels. Trends in survey catch rates over recent surveys are shown in Figure 9.

Other species

Cod – total catch numbers in 2017 (39) were down compared to 2015 (81) and 2016 (46) of which 90% were juvenile (<21cm). In total, 38 Cod caught in 2017 were taken in the Irish Sea.

Haddock - total catch numbers in 2017 (270) were slightly up compared to 2016 (229). Juvenile catch numbers (<21cm) in both the Irish Sea and the Bristol Channel were significantly higher than those observed in 2016, they are now near the survey average (2001-17).

Whiting - total catch numbers in 2017 (1866) were 24% down on those caught in 2016 (2469) with the largest decrease observed in the Irish Sea survey sectors (down 30%) while a small decrease of 5% was observed in the Bristol Channel. Juvenile catch

numbers (<21cm) decreased by 30% from 2016 and remain below average (2001-17) in both the Bristol Channel and Irish Sea.

Thornback ray - total catch numbers in 2017 (662) were down compared to 2016 (683) but the total weight caught increased by 34kg in the same period. Monk (*Lophius piscatorius*) total catch numbers in 2017 (35) continued to drop from the survey high in 2015 (109) and the proportion of these being juvenile fish (<21cm) was greater than those observed in 2016 (36% compared to 9% in 2016). In 2016, 55% of the monk fish were caught in the Bristol channel, in 2017 this reduced to 41%, but this is likely due to several stations with high catch rates not being fished in 2017.

Lesser spotted dogfish - total catch numbers in 2017 (1601) decreased compared to 2016 (1750) with just 2% being juvenile (<35cm). The numbers of juvenile LSD caught in the Bristol Channel in 2017 (4) was just 6% of the average observed over the period 2001-17 (64). Juvenile LSD catches in the Irish Sea survey sectors (31) were also below the average caught over the period 2001-17 (81).

Total catch numbers of grey gurnard in 2017 (856) decreased compared to 2016 (1086) and the weight caught in 2017 (25kg) decreased from 2016 (41kg). This was particularly evident in the Irish Sea where numbers of 'adult' grey gurnard (>15cm) decreased. Red gurnard total catch numbers in 2016 (201) decreased in 2017 (133) with a similar decrease in catch weight observed.

Poor-cod numbers in 2017 (1209) were down compared to 2016 (2157) and the proportion of smaller juvenile individuals (<12cm) were similar to 2016. Pogge catch numbers decreased in 2017 by 45% with a fall in the weight caught also observed. Red mullet catch numbers in 2017 (8) were low compared with the 2016 survey when 13 were caught, while total catch weight increased due to larger fish. Solenette catch numbers in 2017 (1805) decreased compared with the 2016 survey (3226). Starry Smoothhound catches decreased from 232 in 2016 to just 198 in 2017 with the decrease being due to fewer juvenile fish being caught in the Bristol Channel.

Note – Irish sea survey sectors are ISS/ISN/ISW/SGC and the Bristol Channel survey sectors are BCI/BCO.

Aim 4 - Surface and bottom water sampling

At the start and end of most survey days, a surface water salinity sample was taken using on-board sea-water supply taken from a depth of 4m. The starboard gantry with the 'hydrographic' wire was used in the collection of bottom water samples using a Niskin sampler and an ESM2 logger (S/N PR007). The sample was routinely taken at around 2-3m off the seabed. A total of 34 surface and 34 bottom salinity samples were collected.

<u>Aim 5 – Epi-benthos</u>

At 24 selected fishing stations, samples of the epi-benthic by-catches were sorted, identified and quantified. A standard operating procedure (SOP) for the processing of this by-catch was provided. Non-SOP benthic species were identified where on-board expertise allowed.

At all fishing stations on the survey, catches of 9 sentinel taxa of benthic invertebrates were recorded. The total weight of the remaining by-catch of epi-benthic invertebrates was recorded at all stations, benthic observations were recorded from the catches at non-benthic stations.

Aim 6 - Length weight & maturity information

Length weight and maturity information were collected for all fish that were biologically sampled.

Aim 7 – Collection of water samples for analysis of tritium and caesium levels

A total of 44 one litre water samples were collected at fishing stations for the analysis of tritium levels. No samples were collected away from the survey grid due to time constraints. In the Irish Sea a further 35 fifty litre samples were collected for the detection of Caesium levels.

Aim 8 - Additional sample collections

Additional samples were taken in support of other projects:

A) No rare or unusual species were caught on this survey.

B) A total of 9 Nurse-hound (*Scyliorhinus stellaris*) and 6 Starry smooth-hound (*Mustelus asterias*), were tagged and released. J Ellis (Cefas, Lowestoft).

C) In total 38 sightings of marine mammals were recorded, totalling 223 individuals and four species, please see extra narrative for details.

Species	Number of sightings	Estimated number
bottlenose dolphin	1	11
common dolphin	31	203
harbour porpoise	2	2
risso's dolphin	1	3
unidentified dolphin	3	4

D) No specimens of sea trout or any other diadromous species were caught and retained as part of the EU Interreg – Celtic Sea Trout Project.

E) Five samples of fish and benthic species were frozen for subsequent species identification confirmation in the laboratory. J Ellis (Cefas, Lowestoft).

F) One sample of Starry smooth-hounds (*Mustelus asterias*), were frozen for biological sampling. J Ellis (Cefas, Lowestoft)

G) No collection of Shad (Allis or Twaite) or Lamprey was possible on the survey. A Walker (Cefas, Lowestoft)

H) At 11 fishing stations, samples of whelk (*Buccinum undatum*) and hermit crabs (*Eupagurus bernhardus*) were collected for analysis as part of an on-going Cefas project. V Laptikhovsky (Cefas, Lowestoft)

I) Squid samples were collected at twenty-two fishing stations for species identification confirmation and further biological sampling in the laboratory. V Laptikhovsky (Cefas, Lowestoft)

J) Thirty-nine samples of various organisms and litter samples were collected to quantify microplastic pollution. T Wilkinson and T Maes (Cefas, Lowestoft)

Aim 9 - To deploy water sampling instrumentation provided by Southampton University

Sea conditions and water incubation time limited the number of possible deployments of the deep-water incubator and most deployments were completed during the second half of the survey. The aim of this sampling was to test the equipment for future deployments in deep water by other vessels and these operations did lead to several improvements being made to the equipment to make the process more efficient and reliable.

Aim 10 - To deploy a wave rider at West Pembrokeshire site

The site of deployment was passed several times during the trip but due to poor sea conditions the rider could not be deployed until the afternoon of the 25 September. The deployment of the instrument was successful.

Litter by-catch information

Details of the by-catch of marine litter caught at all fishing stations were recorded and are summarised in Figure 10. Litter by-catch was categorized by 'type', weighed, photographed and categorized by size at a total of 102 fishing stations with a total of 253 individual items being observed. In addition, details of any attached organisms were recorded. Photographs of all litter items were taken.

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 all fishing days except 19th September. A total of 95 successful CTD data collections were made.

Once again, our thanks go to the officers and crew of RV Cefas Endeavour for their help, support and advice given during this survey and it is largely due to their skill and co-operation that most survey aims were achieved again this year.

S Shaw (Scientist-in-charge) 20 October 2017

INITIALLED: IDH

DISTRIBUTION:

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, M Whybrow
A Bodle

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Figure 1: Beam trawl station positions for CEND 18/17.





a)



Figure 2: Abundance (number caught per 30-minute tow) of pre-recruit (a) (<21 cm TL) and recruited (b) (≥21 cm TL) - plaice.







Figure 3: Abundance (number caught per 30-minute tow) of pre-recruit (a) (<21 cm TL) and recruited (b) (≥21 cm TL) - sole.

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Figure 4: Abundance (number caught per 30-minute tow) of pre-recruit (a) (<16 cm TL) and recruited (b) (≥16 cm TL) - dab.





a)



Figure 5: Abundance (number caught per 30-minute tow) of pre-recruit (a) <19 cm TL) and recruited (b) (\geq 19 cm TL) - lemon sole.



Figure 6: Mean number and weight of plaice (*Pleuronectes platessa*) caught per 30minute tow - by survey area



Figure 7: Mean number and weight of sole (*Solea solea*) caught per 30-minute tow - by survey area.



Figure 8: Mean number and weight of dab (*Limanda limanda*) caught per 30-minute tow - by survey area per 30-minute tow.



Figure 9: Mean number and weight of lemon sole (*Microstomus kitt*) caught per 30-minute tow - by survey area per 30-minute tow.



Figure 10: Composition of marine litter caught at fishing stations CEND 18/17.

ANNEX 1:

Narrative from Sea Watch Foundation staff members:

Setting out from Lowestoft and heading south and then west down the east coast of England and into the English Channel, no sightings were recorded by the marine mammal observer despite two full days of surveying in reasonable conditions. This was not wholly unexpected given abundance estimates and species diversity in the region. However, an unidentified dolphin was reported by one of the boat crew members on the evening of the 7th September offshore south Cornwall. On the morning of 8th September we had reached the North Devon side of the Bristol Channel and we began to record sightings of common dolphins (individual sightings attached). The Bristol Channel remained productive for common dolphin sightings for the two further days we stayed in the area despite unfavourable sea conditions. Travels up and then down the east coast of Ireland on the 10th and 11th yielded just two sightings, offshore Newcastle (N.I.) and offshore Dublin. This did, however, add a new species in the form of a harbour porpoise. The following three days saw the vessel back in the Bristol Channel which was once again productive for common dolphin sightings which frequently came to bow-ride the boat. Observations were minimal on the 15th because of a particularly severe sea state. The last day of the first leg saw the most favourable observing conditions of the trip so far, but no cetaceans were recorded in the transect through Liverpool Bay.

The first two days of the second half of the survey heading north from the Isle of Man to southwest Scotland featured fantastic conditions but unfortunately no sightings. The first sighting was a pod of six common dolphins observed by a member of the boat crew on the evening of the 21^{st} September. On the mornings of the 22^{nd} and 23^{rd} September the first sightings were recorded by the marine mammal observer, however these were both unidentified cetacean species. The evening of the 23^{rd} September brought the first (of many) common dolphin sightings west of Anglesey with the pod leaping and bow-riding. The 24^{th} September provided greater diversity with three sightings of grey seals, a pod of three Risso's dolphins and a porpoise. Travelling south through Cardigan Bay resulted in an increase in sightings: four individual groups of common dolphins and a large pod of bottlenose dolphins all of which were keen to interact with the vessel. The final day of the survey in the Bristol Channel featured particularly calm water and the greatest number of sightings of the second half of the trip – a total of eight individual sightings of common dolphins with a number of calves within the groups. These final sightings were concentrated early on in the day, corresponding with being further offshore.