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

2016 RESEARCH VESSEL PROGRAMME
REPORT: RV CEFAS ENDEAVOUR: SURVEY 20/16

STAFF:

Part One (10-21 Sept)	Part Two (23-30 Sept)
S Shaw (SIC)	S Shaw (SIC)
S Walmsley (2IC)	S Walmsley (2IC)
D Brown	S Barnett
G Thomas	G Thomas
T Gooding	O Williams
L Mann	R Beckett
C Marshall	C Mitchell
P Blowers (10-13 Sept)	S Miller (SWF)
L Vandecasteele (ILVO)	L Vandecasteele (ILVO)
E McQuillan (Irish Observer)	E McQuillan (Irish Observer)
K Weston (SWF) (10-13 Sept)	

DURATION: 10 September – 30 September 2016

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, haddock 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 (AE001) (K Leonard - Cefas).
8. To collect fish samples in support of other Cefas and non-Cefas projects and training courses.

NARRATIVE: (All times **GMT**)

Cefas scientists joined the vessel at 2000h 9th September for an early sailing the following morning. At 0200h 10th September, Cefas Endeavour sailed from Lowestoft and proceeded to carry out a ring net and water sample at the West Gabbard smart buoy at 07:21h for the Pelagic sciences team at Cefas. Once the sample collection had been completed, a 'tool-box' talk was held with the vessel officers and crew to discuss the survey operations followed by a general emergency muster drill.

At 1315h 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 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. This tow was a success so the vessel recommenced the steam to the first survey stations in the Bristol Channel. However, post-shakedown tow discussions led to the two sets of gear being compared for consistency. Beam 3 was found to have had a new ground rope fitted that was not set up to the standard specification for the survey. Despite there being no concerns that this would affect the way the gear fished, there were some concerns that it could make it more vulnerable to damage. Therefore, the decision was made to make beam 2 the main gear for the survey. A shake-down tow was carried out with beam 2 on the 11th of September in the English Channel at 1017h, this was completed successfully.

On 12th September at 0541h the first station in the Bristol Channel Outer sector (BCO) prime station 507 was successfully fished. Prime station 505 followed with this requiring, a slight alteration of the 'usual' tow direction due to the swell, before moving in to Bristol Channel Inner sector (BCI). Prime station 133 had to be repeated due to 'ghost fishing' crab pots being caught and flipping the beam. In total, 7 stations were completed successfully off the North Cornwall\Devon coast then the vessel steamed to the start of the water sampling set of locations in the Avon Estuary. Water sampling started at 2100h on the 12th September and was completed at 0900h the following morning. On the 13th September, 3 stations were completed working in to Swansea bay where two scientific staff were transported ashore by work boat at 1330h. This was followed by a further three fishing stations being sampled.

On 14th September, 11 BCI stations were completed successfully in Carmarthen Bay. Live missile firing at the Pendine gunnery range meant that the planned order of fishing stations on the 15th was changed as two inshore stations were within the range area and these stations were delayed until the range activity ceased. The first two stations of the day, primes 130 and 122 were fished successfully. At prime 120, a 'bang' was heard mid-tow and upon hauling it was found that the gear had suffered considerable damage with a total loss of the net. No damage has occurred to the fishing gear at this station in the past and on inspection of the beam it was evident that it had hit something hard. The crew swapped to beam 3, and the prime station was re-fished with the tow moved a short distance from the original position and fished for only 20 minutes. Seven stations were successfully completed that day. During the afternoon of the 15th September, the crew replaced the netting on beam 2 so that it could be used again the following day.

On the morning of the 16th September, Cefas Endeavour started the final day of fishing in the BCI sector, a 'bang' was heard on the third station of the day (prime 132). Given the previous day's events, the gear was hauled immediately but it was found that no damage had been taken. This station was repeated successfully and this marked the

completion of the BCI sector in the planned 5 days of fishing. Three further stations were completed in the BCO sector, prime station 502 area was observed as being fished by a commercial beam trawler. Cefas Endeavour then steamed overnight to Cardigan Bay to start the St. Georges Channel (SGC) sector completing all six stations on 17th September. The vessel then steamed overnight to start the second survey priority grid in the Irish Sea South (ISS) sector on 18th September. On this day, the Belgium fishing vessel Jasmine (Z483) joined the Cefas Endeavour to carry out a series of comparative tows as part of an ILVO industry initiative. Close communication between the Cefas Endeavour and this vessel ensured that this survey remained unaffected by its operations.

On the 18th of September, nine stations in ISS and one in the Irish Sea West (ISW) sector were completed north of Anglesey, several stations were reduced in tow duration due to history of large by-catches. Prime station 36 produced the only 'deck sort' during the whole survey with an estimated 25 baskets of mainly dead man's fingers (*Alcyonium digitatum)*. Nine stations were completed on the 19th around the windfarms off the north Wales coast in Liverpool Bay. This is becoming a very busy stretch of water but the only alteration to the survey grid was where one tow had to be reduced in duration due to a new cable.

Overnight the vessel travelled to the most northern stations in the survey. The stations were scheduled so that the shallowest tows would be completed at high tide on the 20th September. The first station of the day (prime 15) was sampled with no problems but at prime 2, the net had to be hauled early due to increased weight on the warps due to benthic catch. Prime 3 in Wigtown Bay was impossible to fish due to static gear, several fishing boats were observed hauling and shooting crab pots, the bridge crew were in contact with the vessels and after running the tow it was deemed impossible to fish, the static gear was evident all the way offshore to prime 4. Prime 3 was the only primary grid station missed during the survey. Seven stations were completed during this day. On the 21st September, six further stations were completed off Sellafield, prime station 9 had to be hauled early due to gunnery range activity.

Once survey operations were completed, Cefas Endeavour headed into Douglas, IOM for a mid-survey break, docking at 1618h 21st September. On 22nd 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.

Cefas Endeavour left Douglas, IOM on 23rd September at 0254h and headed directly to the nearest fishing station arriving at 0534hrs at prime station 22. Sampling of this station and prime 42 marked the completion of ISN and ISS sampling grids. The wind and swell were building all day as forecast and at the sixth station of the day (prime 425) it was a struggle to keep the towing speed below 5 knots due to these worsening conditions so the decision was made to seek shelter off the north-east coast of Anglesey. On 24th September, the vessel remained at anchor and no sampling was possible. The wind moderated during that evening and the vessel was able head back into the survey area and be on station (prime 425) at first light on the 25th September. At the third station of the day (prime 408), eight large cod were caught weighing a combined weight of 35.28kg. This is the largest catch weight observed at a single tow whilst using a beam trawl on the survey since 1998. Six stations were completed successfully in the offshore region of the Irish Sea.

Overnight the vessel steamed to the Irish coast and spent the 26th completing all the inshore stations down to Dublin Bay, with seven stations completed successfully. At the end of the day the Cefas Endeavour transited to the Anglesey coast to complete the five remaining stations between the Welsh and Irish coast. This left just three station in SGC to complete the following day, so the decision was taken to fish some additional stations in South-East Ireland (SEI) survey sector. These three SGC stations were completed on the 28th September and then a further two stations (primes 519 and 523) were completed in the SEI sector.

The final survey fishing day (29th September) was spent fishing the six remaining survey stations in the BCO survey sector, the weather was poor so transit between stations was slow. There were problems with static gear on prime 512 but the station did not need moving as in 2015. The final survey fishing station was hauled at 1816h 29th September and once the associated Niskin deployment had been completed Cefas Endeavour headed to Portland. During this period, scientists began the process of cleaning up and packing away all scientific equipment in readiness for docking.

Cefas Endeavour docked in Portland at 1900h 30th September.

RESULTS:

Aims 1, 2 & 3

The survey gear was the standard 4m-beam trawl (Beam number 2 was used for all stations except 71 to 75 when the gear was swapped to beam 3 while the main gear was being repaired) 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 one were successfully fished (Figure 1), including 64 of 65 ISN, ISS 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 – numbers 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 9 prime stations were hauled early – Number 9 (off Pembroke Coast), 419 (north of Anglesey), 36 (off Rhyl), 32 (off the Wirral), 2 (Luce Bay), 9 (off Ravenglass), 409 (Irish Sea west deep), 512 (off Padstow) and 513 (outer Celtic Sea). All tow reductions were due to expected large catches of weed, broken shell or small flatfish, static gear over the tow 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).

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

	VIIa	**VIIf**	**VIIg**	**Total**
Anglerfish (Lophius piscatorius)	21	19	12	52
Brill	33	2	3	38
Cod	34	9	0	43
Dab	141	127	3	271
Bass	0	9	0	9
Grey Gurnard	68	61	2	131
Red Gurnard	63	16	1	80
Streaked Gurnard	3	0	0	3
Tub Gurnard	62	24	0	86
Haddock	32	20	30	82
Hake	0	6	4	10
John Dory	1	6	0	7
Lemon Sole	40	46	5	91
Megrim	1	9	21	31
Plaice	1503	410	46	1959
Red Mullet	5	8	0	13
Sole	504	392	40	936
Turbot	7	3	0	10
Whiting	134	35	23	192
Total	**2655**	**1202**	**190**	**4044**

Table 2: Summary of the main species caught over the entire survey

*Excludes SEI stations

Weight caught (kg)				**Number caught**			
	2016*	2015*	2014		2016*	2015*	2014
Plaice	1149	1143	1151	Dab	16760	16515	21382
Lesser spotted dogfish	885	820	914	Plaice	10230	11375	11930
Dab	770	761	894	Solenette	3226	3581	8633
Thornback ray	367	204	261	Whiting	2469	2016	2648
Sole	279	221	206	Sole	2201	2060	1732
Common dragonet	145	121	154	Common Dragonet	2159	2804	4076
Spotted ray	115	98	87	Poor Cod	2157	2367	3462
Whiting	97	80	95	Lesser spotted dogfish	1750	1752	2074
Edible crab	62	93	79	Scaldfish	1412	1455	1762
Starry Smooth Hound	59	51	69	Grey gurnard	1086	1267	1540
TOTAL (All species)	**4611**	**4358**	**4751**	**TOTAL (All species)**	**49022**	**51469**	**69130**

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

Species	Stations	Species	Stations
Agonus cataphractus	44	*Ammodytes marinus*	1
Ammodytes tobianus	8	*Argentinidae*	1
Arnoglossus imperialis	1	*Arnoglossus laterna*	64
Aspitrigla (chelidonichthys) cuculus	29	*Blennius ocellaris*	9
Buenia jeffreysii	1	*Buglossidium luteum*	51
Callionymus lyra	92	*Callionymus maculatus*	3
Callionymus reticulatus	1	*Cancer pagurus*	55
Chaetopterus tubes	13	*Ciliata mustela*	4
Conger conger	2	*Ctenolabrus rupestris*	3
Dicentrarchus labrax	8	*Diplecogaster bimaculata*	2
Echiichthys (trachinus) vipera	24	*Enchelyopus cimbrius*	1
Eutrigla (chelidonicthys) gurnardus	89	*Gadus morhua*	17
Gaidropsarus vulgaris	1	*Galeorhinus galeus*	1
Glyptocephalus cynoglossus	9	*Gobius gasteveni*	2
Gobius niger	1	*Hippoglossoides platessoides*	2
Homarus gammarus	8	*Hyperoplus immaculatus*	1
Hyperoplus lanceolatus	1	*Lepidorhombus whiffiagonis*	6
Lesueurigobius friesii	1	*Leucoraja naevus*	11
Limanda limanda	87	*Liparis montagui*	4
Loligo (alloteuthis) subulata	8	*Loligo forbesi*	17
Loligo vulgaris	13	*Lophius piscatorius*	26
Maja squinado	49	*Melanogrammus aeglefinus*	19
Merlangius merlangus	85	*Merluccius merluccius*	4
Microchirus variegatus	50	*Micromesistius poutassou*	1
Microstomus kitt	26	*Molva molva*	2
Mullus surmuletus	8	*Mustelus asterias*	32
Myoxocephalus scorpius	5	*Necora puber*	23
Nephrops norvegicus	24	*Pecten maximus*	23
Pegusa (solea) lascaris	17	*Pholis gunnellus*	2
Platichthys flesus	4	*Pleuronectes platessa*	90
Pomatoschistus spp	34	*Raja brachyura*	25
Raja clavata	73	*Raja microocellata*	13
Raja montagui	66	*Scomber scombrus*	1
Scophthalmus maximus (psetta maxima)	9	*Scophthalmus rhombus*	21
Scyliorhinus canicula	102	*Scyliorhinus stellaris*	12
Sepia officinalis	4	*Solea solea*	89
Spondyliosoma cantharus	1	*Sprattus sprattus*	4
Syngnathus acus	6	*Taurulus bubalis*	1
Trachinus draco	4	*Trachurus trachurus*	1
Trigla (chelidonichthys) lucerna	55	*Trigloporus (chelidonichthys) lastoviza*	1
Trisopterus esmarki	14	*Trisopterus luscus*	28
Trisopterus minutus	64	*Zeugopterus (phrynorhombus) norvegius*	4
Zeugopterus punctatus	2	*Zeus faber*	7

Table 4: Summary of gear deployments and sample collections

Gear	Valid	Additional	Invalid	Total
Standard 4m Beam trawl with cod end liner	107	4	5	116
Surface salinity samples	30	0	0	30
ESM2 profile+Niskin sea-bed water samples	31	0	0	31
Chlorophyll Sample	1	0	0	1

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.

Plaice

Abundance by both catch numbers and catch weight in 2016 remained at similarly high levels to those observed in 2013, 2014 and 2015 with a small decrease in the BCI sector.

In BCI, both the numbers and weight caught decreased by 27% and 21% respectively, decreasing from the high levels observed in 2015. In BCO the numbers of fish caught decreased by 1% from 2016 and the weight of fish caught increased by 22%. Plaice catches are just below the survey high (2015) in both Bristol Channel survey sectors. Catch numbers of juvenile plaice (<22cm) in BCI/BCO have decreased from 235 in 2014, 143 in 2015 to 63 in 2016 and this is below the average (149) over the period 2001-16. Catch numbers of recruited plaice (>22cm) fell to 834 fish which remains above the survey average of 574.

In the Irish Sea, ISN plaice abundance increased in terms of numbers caught (3%) and in terms of weight caught (13%), both catch numbers and weight caught are above the survey average (2001-16). In ISS, plaice catch numbers fell for the second year by 6% while catch weight increased by 6% but both measures of abundance are above the survey average (2001-16). In ISW, both catch numbers and weights decreased for the first time in three years by 18% and 1% respectively. These three survey sectors continue to be the most productive for plaice. Catch numbers in SGC fell by 6% from those observed in 2015 whilst catch weights increased by 1%.

Catch numbers of juvenile plaice (<22cm) in these four Irish Sea survey sectors has decreased in 2016 to the lowest level seen in the past 7 years, now dropping 7% below the survey average observed (2001-16). Trends in survey catch rates over recent surveys are shown in Figure 6

Sole

Abundance by catch number increased in all survey sectors except in ISS (14% fall) compared to 2015, whilst catch weights increased in all sectors except in BCO (12% fall). 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 eleven years despite recent increases.

In BCI, catch numbers and weight increased by 11% and 35% respectively compared to the 2015 survey. Catch numbers and weight in 2016 remain above the series average over period 2001-16. In BCO catch weight decreased by 12% and catch weights increased by 16% compared to the 2015 survey. Catch numbers of juvenile sole in BCI/BCO (<22cm) were around 16% lower in 2016 (718 fish) than those seen in 2015 (859 fish) and are currently at around 17% above the average observed over the period 2001-16. Numbers of recruited sole (>21cm) caught increased 85% from the low level seen in 2015 (333 fish) to around 615 fish.

In the Irish Sea, ISN, catch numbers and catch weights increased by 65% and 50% respectively compared to 2015 with both measures increasing to above the series average (2001-16). In the ISS survey sector, an increase was observed in catch weight but not numbers (+16% and -14% respectively) compared to 2015, and as with ISN these measures remain close to the series average (2001-16). ISW saw increase in both catch numbers (34%) and catch weights (19%) but catches remain low compared to the ISS/ISN survey sectors. In SGC, both catch numbers (16%) and catch weights (54%) increased from those observed in 2015 and remain near the series average (2001-16). Recruited (>21cm) and juvenile (<21cm) sole numbers (556 and 311 fish respectively) remain above the survey average (396 and 258) observed over the period 2001-16. Trends in survey catch rates over recent surveys are shown in Figure 7.

Dab

Abundance of dab by catch number increased in all survey sectors within the Irish Sea except SGC and ISW while a decrease was observed in the Bristol Channel. The abundance by catch weight decreased in the ISW, ISS, BCO and SGC sector while increasing in all other sectors. 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 fell by 7% and catch weight increased by 27% in 2016 and remain at average levels (2001-16). In BCO, abundance by number caught and weight fell but these changes were minor compared to 2015 and remain close to survey average. Numbers of juvenile dab in BCI/BCO (<17cm) decreased in 2016 (221) compared to 2015 (483) and drop further below the average over the period 2001-16 (601). However, the numbers of recruited dab (>16cm) increased in 2016 (1231) by 13% compared to 2015 (1092). These numbers make 2016 an above average year in terms of recruited dab.
In the Irish Sea, ISS catch numbers and catch weights both remained similar to the 2015 survey and the abundance is still above average (2001-16) after being at a series low in 2013. The survey sectors of ISN showed small increases in catch numbers and weights to those seen in 2015, 15% and 10% respectively, while ISW showed a small fall in both catch weight and number. Both sectors currently have abundance at above average levels. In the SGC survey sector, catch numbers and weights decreased by 13% and 9% respectively, the catch levels remain around the survey average.

The number of juvenile (<17cm) dab in the Irish Sea survey sectors decreased by 45% in 2016 compared to the previous survey and are just above average over the period 2001-16. Numbers of recruited dab (>16cm) increased by 73% in 2016 (556) and are observed to being close to the survey high in 2004 (796). 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 increase in both catch numbers and catch weights ISW survey sectors. In all survey sectors, both catch numbers and catch weights are either at or close to the series low over the period 2001-16. Of particular note were the catches of lemon sole in the eastern Irish Sea where in ISS just five individuals were caught in 2016, and in ISN where, none were caught in 2016.

In the Irish Sea, juvenile numbers (<20cm) fell from 26 in 2015 to 17 in 2016 and are now below average levels (2001-16). Numbers of recruited lemon sole (>19cm) in 2016 (30 fish) decreased from 2015 (51) and remain below the series average (67 fish).

In the Bristol Channel, juvenile numbers increased in 2016 (13) from 2015 (11) and are currently below the series average (2001-16). Recruited lemon sole decreased by around 25% in 2016 (43) 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 2016 (46) were down compared to 2015 (81) of which 33% were juvenile (<21cm). In total, 80% of the Cod caught in 2016 were taken in the Irish Sea.

Haddock - total catch numbers in 2016 (229) were down compared to 2015 (625). Juvenile catch numbers (<21cm) in both the Irish Sea and the Bristol Channel were significantly lower than those observed in 2015 when they were three times the average (2001-15).

Whiting - total catch numbers in 2016 (2469) were 22% up on those caught in 2015 (2016) with the only increase observed in the Irish Sea survey sectors (up 69%) while a decrease of 67% was observed in the Bristol Channel. Juvenile catch numbers (<21cm) increased by 21% from 2015 and are still below average (2001-16) in both the Bristol Channel.

Thornback ray - total catch numbers in 2016 (683) were up compared to 2015 (453) and 35% were juvenile (<27cm). In the Irish Sea survey sectors, the numbers of juvenile thornback ray caught in 2016 (216) were 45% up on 2015 and remain above the average 2001-16 (96). Juvenile thornback ray catches in the Bristol Channel survey sectors in 2016 (27) were doubled compared to 2015 (11).

Monk (*Lophius piscatorius*) - total catch numbers in 2016 (63) dropped from the survey high in 2015 (109) and the proportion of these being juvenile fish (<21cm) was less than

observed in 2015 (9% compared to 26% in 2015). The monk caught on the survey were more spread out over the survey areas but the Bristol Channel sea area accounted for 55% of the fish caught.

Lesser spotted dogfish - total catch numbers in 2016 (1750) remained similar to 2015 (1752) with just 2% being juvenile (<35cm). Both Irish Sea and Bristol Channel catch proportions remained similar to the previous year. The numbers of juvenile LSD caught in the Bristol Channel in 2016 (7) was 10% of the average observed over the period 2001-16 (67). Juvenile LSD catches in the Irish Sea survey sectors (33) were below the average caught over the period 2001-16 (84).

Total catch numbers of grey gurnard in 2016 (1086) decreased compared to 2015 (1267) but the weight caught in 2016 (41kg) decreased from 2015 (58kg) due to a smaller number of larger individuals being caught. This was particularly evident in the Irish Sea where numbers of 'adult' grey gurnard (>15cm) decreased. Red gurnard total catch numbers in 2015 (295) decreased in 2016 (201) with a similar decrease in catch weight observed.

Poor-cod numbers in 2016 (2157) were down compared to 2015 (2367) and the proportion of smaller juvenile individuals (<12cm) remained similar to 2015. Pogge catch numbers increased in 2016 by 27% with a rise in the weight caught also observed. Red mullet catch numbers in 2016 (13) were again down compared with the 2015 survey when 280 were caught, with total catch weight also being reduced. Solenette catch numbers in 2016 (3226) were similar compared with the 2015 survey when 3581 were caught. Starry Smoothhound catches increased from 120 in 2015 to 232 in 2016, the increase was due to greater number of juvenile fish being caught.

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 fishing 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 30 surface and 31 bottom salinity samples were collected.

Aim 5 – Epi-benthos

At 25 selected fishing stations and the 2 additional fishing stations (SEI), 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 with the exception of prime station 36 (ISS) where the by-catch was estimated. In addition, 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 levels and Fukushima pollution

A total of 26 water sampling stations were sampled in the Bristol Channel for tritium levels at fixed positions off the fishing survey grid and were collected over one night. All other samples were collected at fishing stations. A further six water samples were collected to monitor possible pollution from the Fukushima Daiichi nuclear incident, with one sample collected either end of the English Channel, another one at either end of the Bristol Chanel and the final two taken at the north and south limits of the Irish Sea.

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 18 Nursehound (*Scyliorhinus stellaris*) and 7 Starry smooth-hound (*Mustelus asterias*), were tagged and released. J Ellis (Cefas, Lowestoft).

C) Thirty-eight cetacean sightings were recorded during the survey. Details of location, date/time and identification were noted on each occasion. Twelve of the sightings were of common dolphin (*Delphinus delphis*), twenty-one Harbour Porpoise (*Phocoena phocoena*), three Bottlenose Dolphin (*Tursiops truncatus*), one unidentified Dolphin species and one Minke Whale (*Balaenoptera acutorostrata*). Sea Watch Foundation.

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 (Ted Potter)

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

F) A total of 520 measurements of jellyfish caught were taken in 2016 and this was over 150 more than those taken in each year 2013-2015. Each individual was identified to species, measured across the ‘umbrella’ disc and weighed. C Lynam (Cefas Lowestoft). In addition, 5 Jellyfish ‘flesh’ samples were collected to allow baseline isotopic signature to be determined in order to compare these with the isotopic signatures of higher trophic level species. Using these isotope maps it should be possible to geolocate different commercially important and ecologically important species to their feeding origins within UK waters. K St. John Glew (Southampton University)

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

H) At three 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) Assist with the collection of Sole samples for the Belgium project IRIS2, report is attached as annex 1. L Vandecasteele (ILVO)

Litter by-catch information

Details of the by-catch of litter caught at all fishing stations were recorded. In total, litter by-catch was categorized by 'type', weighed, photographed and categorized by size at a total of 83 fishing stations with a total of 539 individual items. 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 in order to record the temperature, salinity and depth profile at each station fished and this was successful in recording data on all fishing days and a total of 113 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 all survey aims were achieved again this year. Finally, I would also like to thank all personnel on-board for their generosity and support of the Cefas MacMillan coffee 'morning' held on board on 25th September with special mention to the catering staff for providing the refreshments to ensure the event was a success. The event and various social activities raised an on-board total of £292 for this worthy cause.

S Shaw(Scientist-in-charge)
21 October 2016

INITIALLED:

DISTRIBUTION:

I Holmes	J Maitland (P&O)
S Shaw	B Salter (P&O)
S Walmsley	Master (Cefas Endeavour)
T Gooding	Cefas Fisheries Survey's SICs/2ICs
O Williams	Cefas Trim
G Thomas	P-J Schon (AFBI NI, Belfast)
L Mann	P Connolly (MI, Dublin)
C Marshall	FCO (for Republic of Ireland)
P Blowers	Marine Management Organisation
D Brown	Welsh Government (WG)
S Barnett	Devon & Severn IFCA
R Beckett	Cornwall IFCA
C Mitchell	Isles of Scilly IFCA
L Vandecasteele (ILVO)	North Western IFCA
E McQuillan (Irish Observer)	Crown Estate
K Weston (SWF)	
S Miller (SWF)	

Figure 1 – Beam trawl station positions for CEND 20/16.

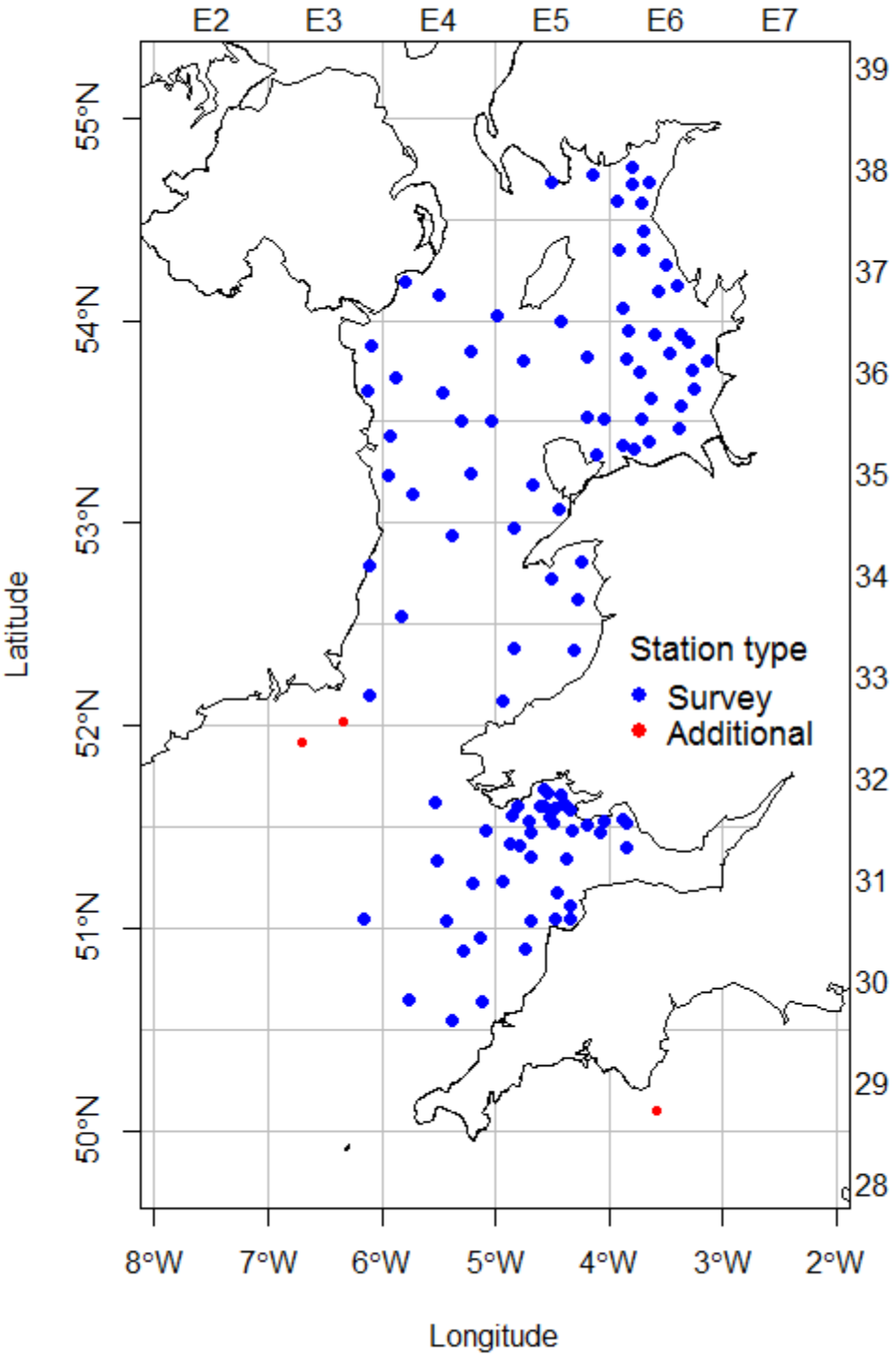
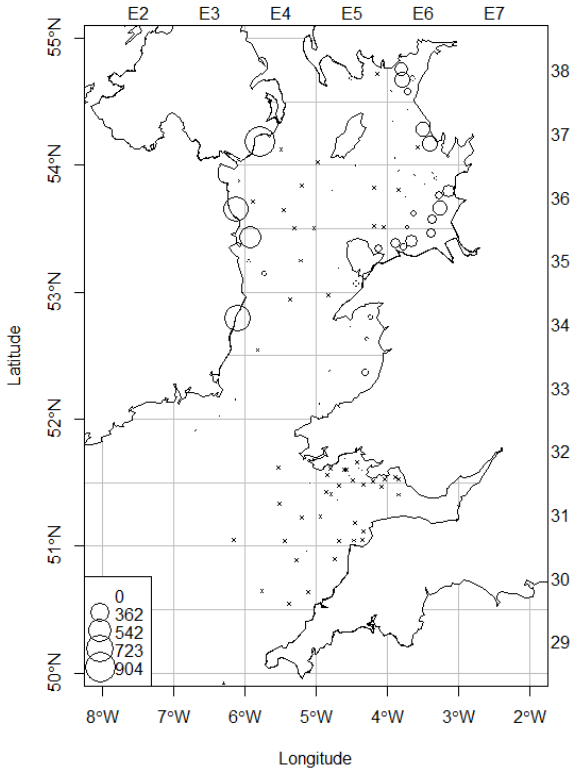


Figure 2 - Abundance (number caught per 30-minute tow) of pre-recruit (a) (<21 cm TL) and recruited (b) (≥21 cm TL) - plaice.

a)



b)

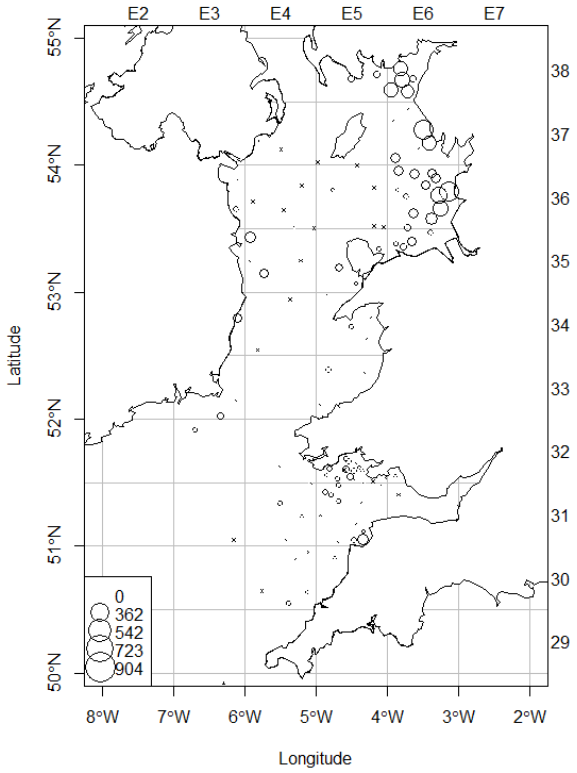
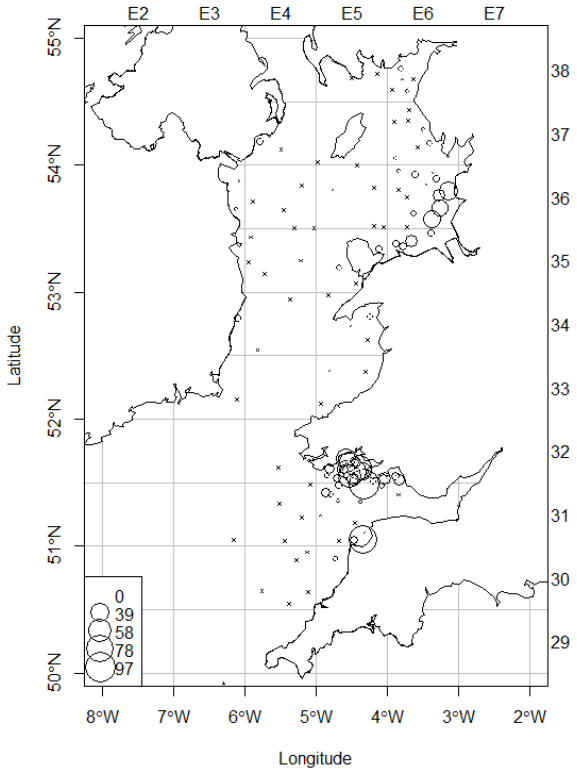


Figure 3 - Abundance (number caught per 30-minute tow) of pre-recruit (a) (<21 cm TL) and recruited (b) (≥21 cm TL) - sole.

a)



b)

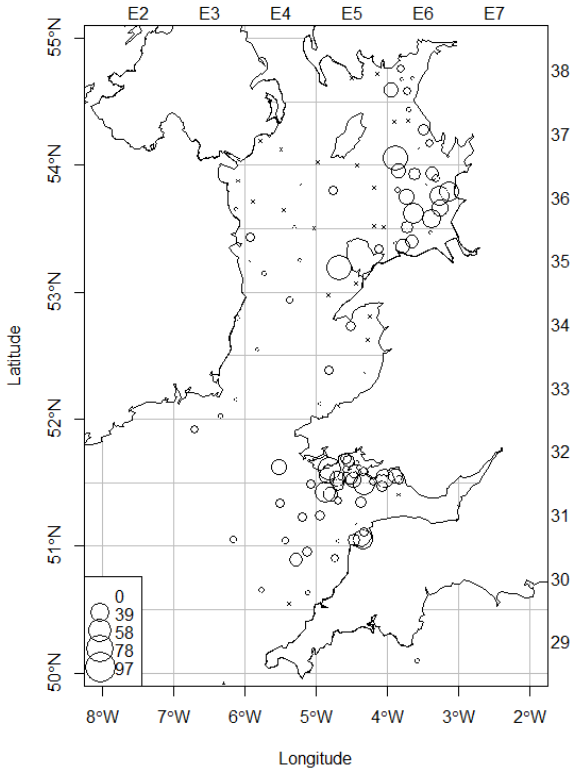
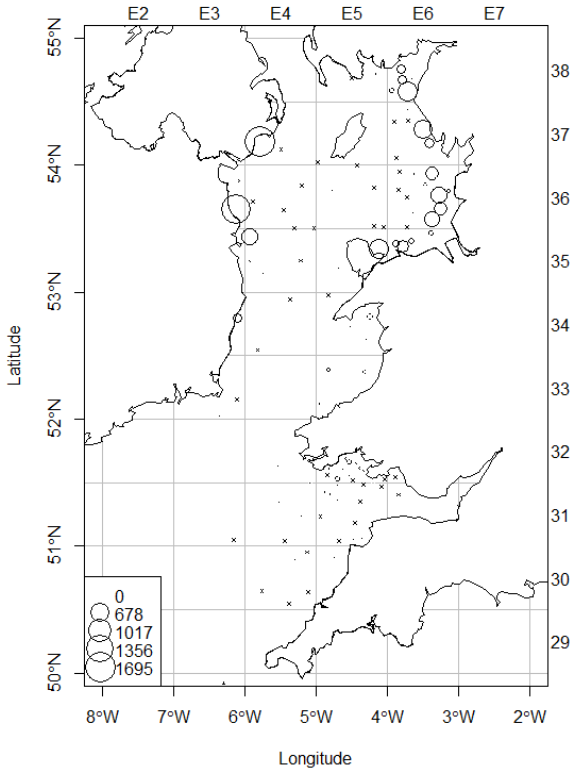


Figure 4 - Abundance (number caught per 30-minute tow) of pre-recruit (a) (<16 cm TL) and recruited (b) (≥16 cm TL) - dab.

a)



b)

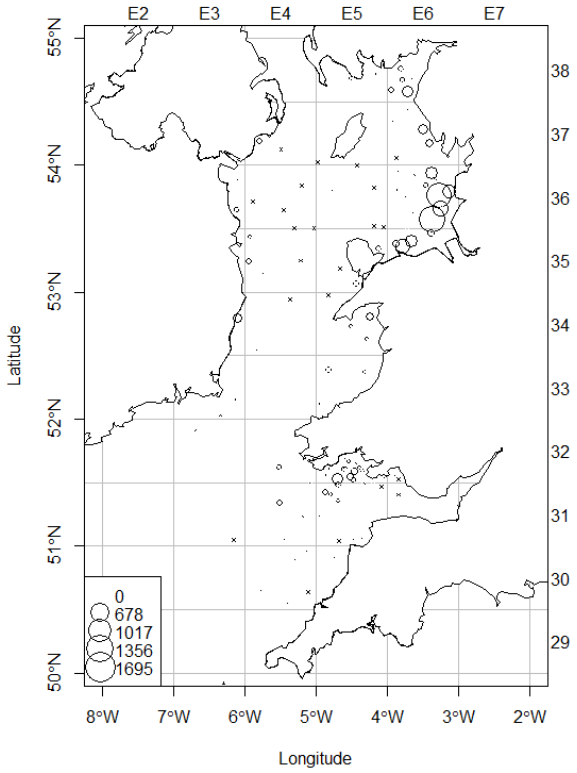
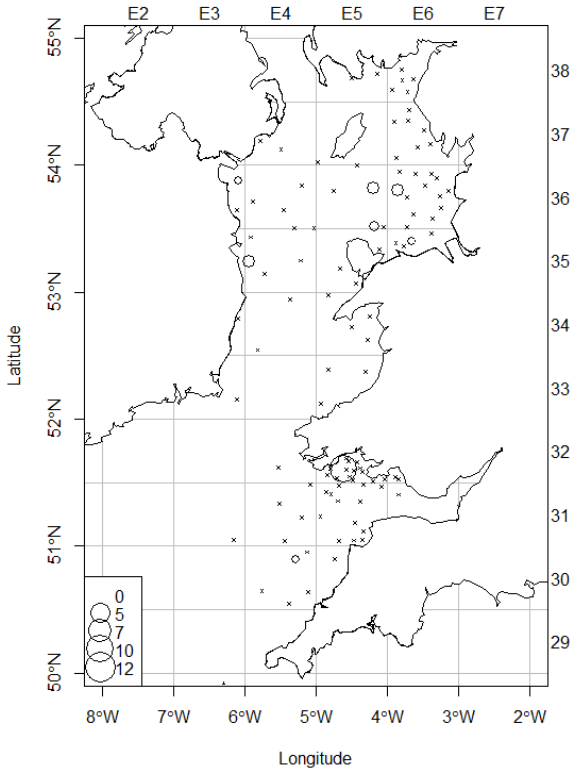


Figure 5 - Abundance (number caught per 30-minute tow) of pre-recruit (a) <19 cm TL) and recruited (b) (≥19 cm TL) - lemon sole.

a)



b)

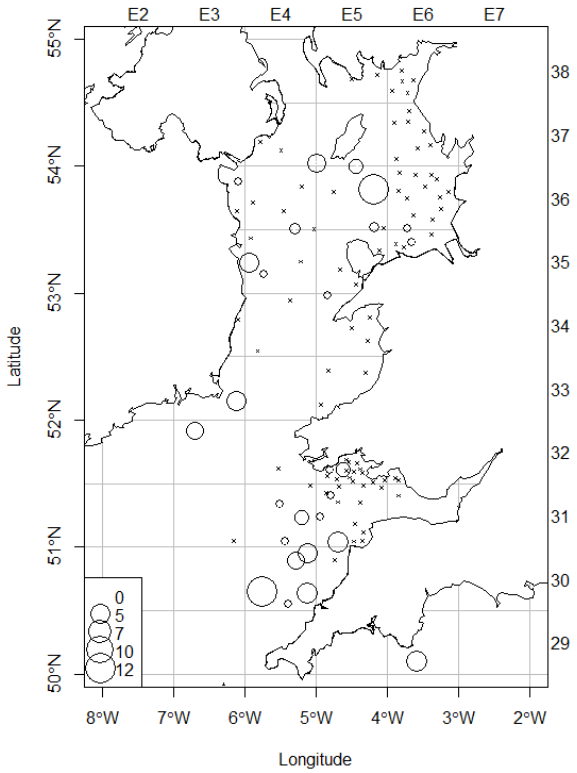


Figure 6 – Mean number and weight of plaice (*Pleuronectes platessa*) caught per 30-minute tow - by survey area

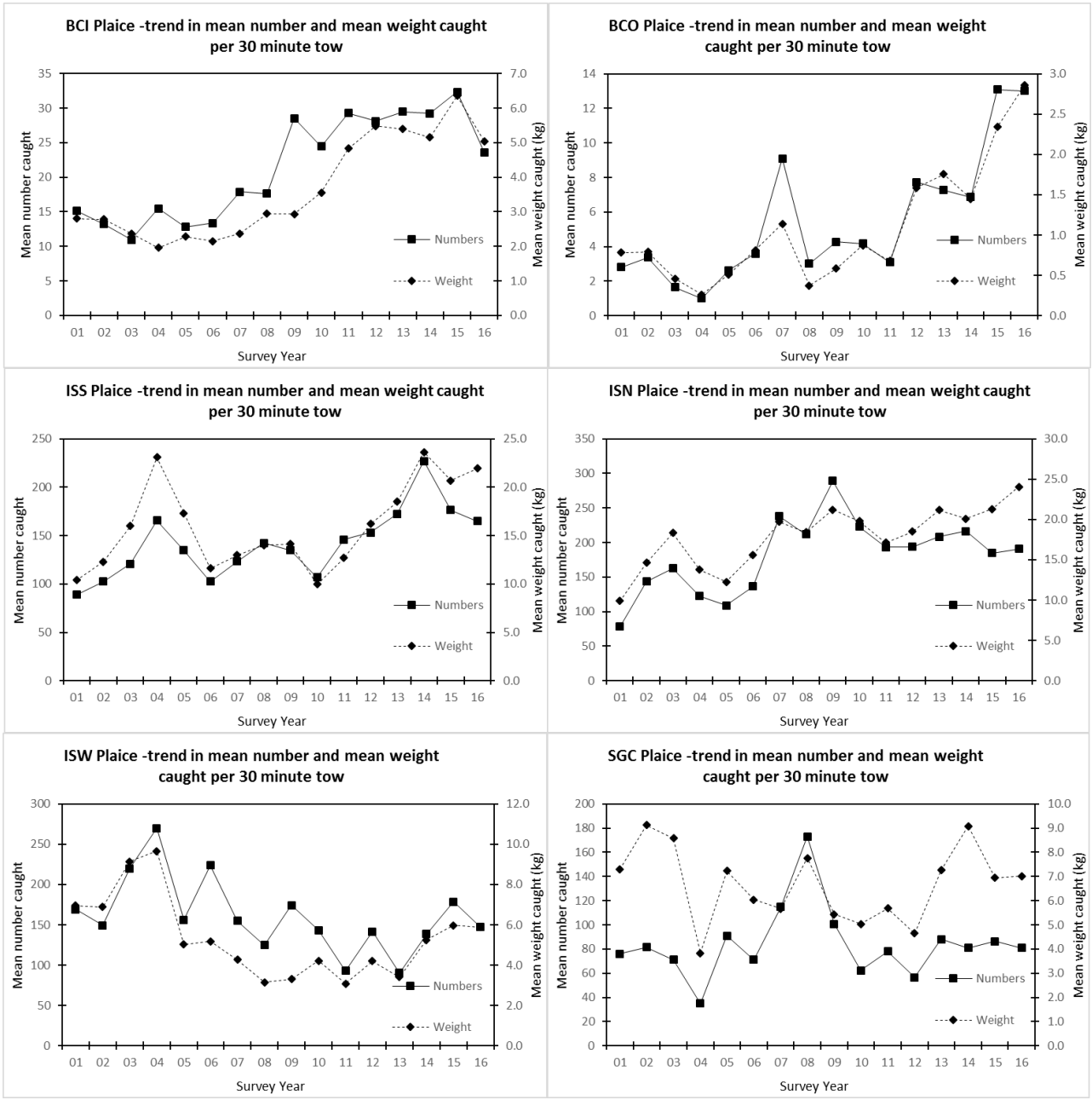


Figure 7 - Mean number and weight of sole (*Solea solea*) caught per 30-minute tow - by survey area.

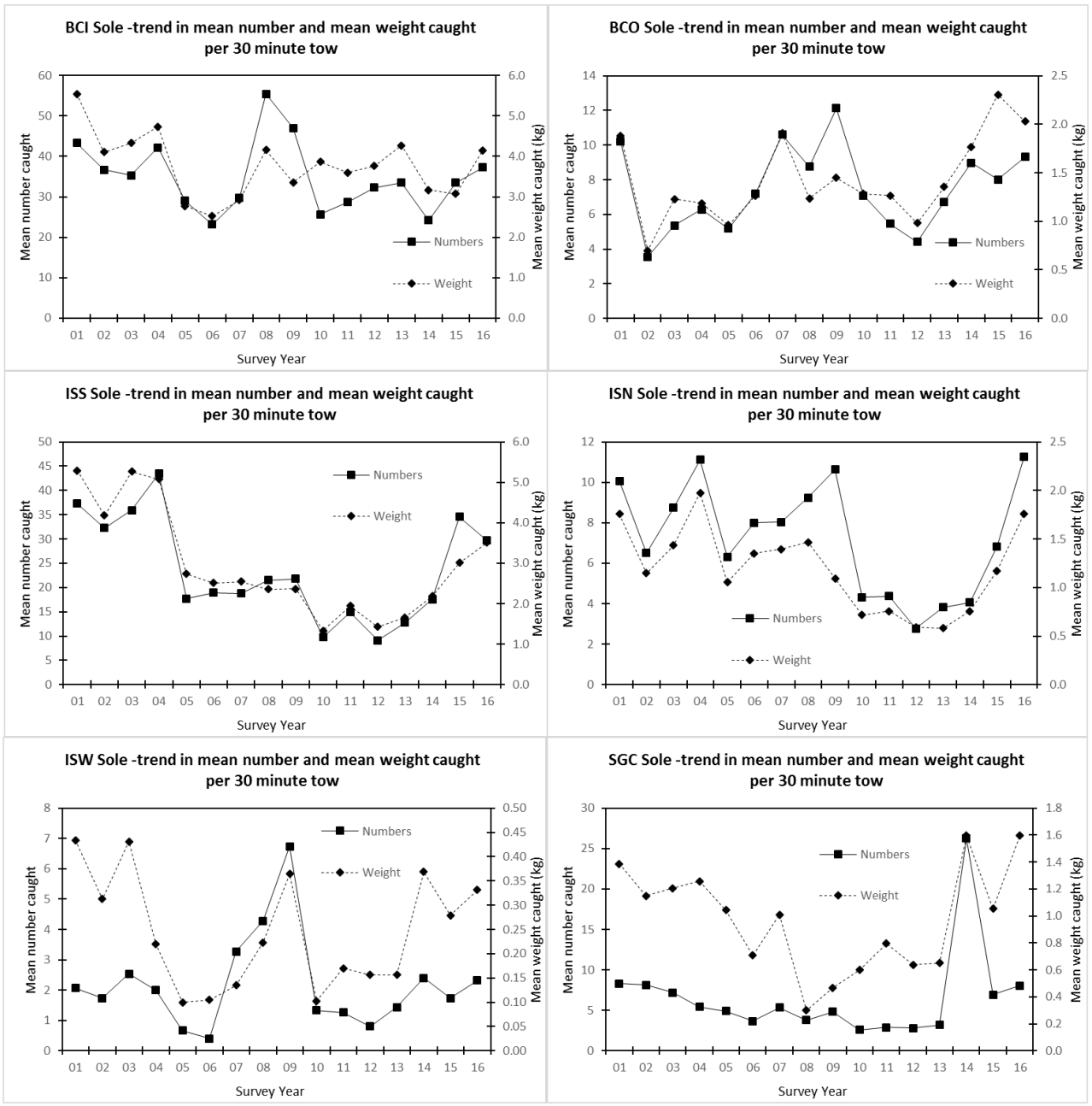


Figure 8 - Mean number and weight of dab (*Limanda limanda*) caught per 30-minute tow - by survey area per 30-minute tow.

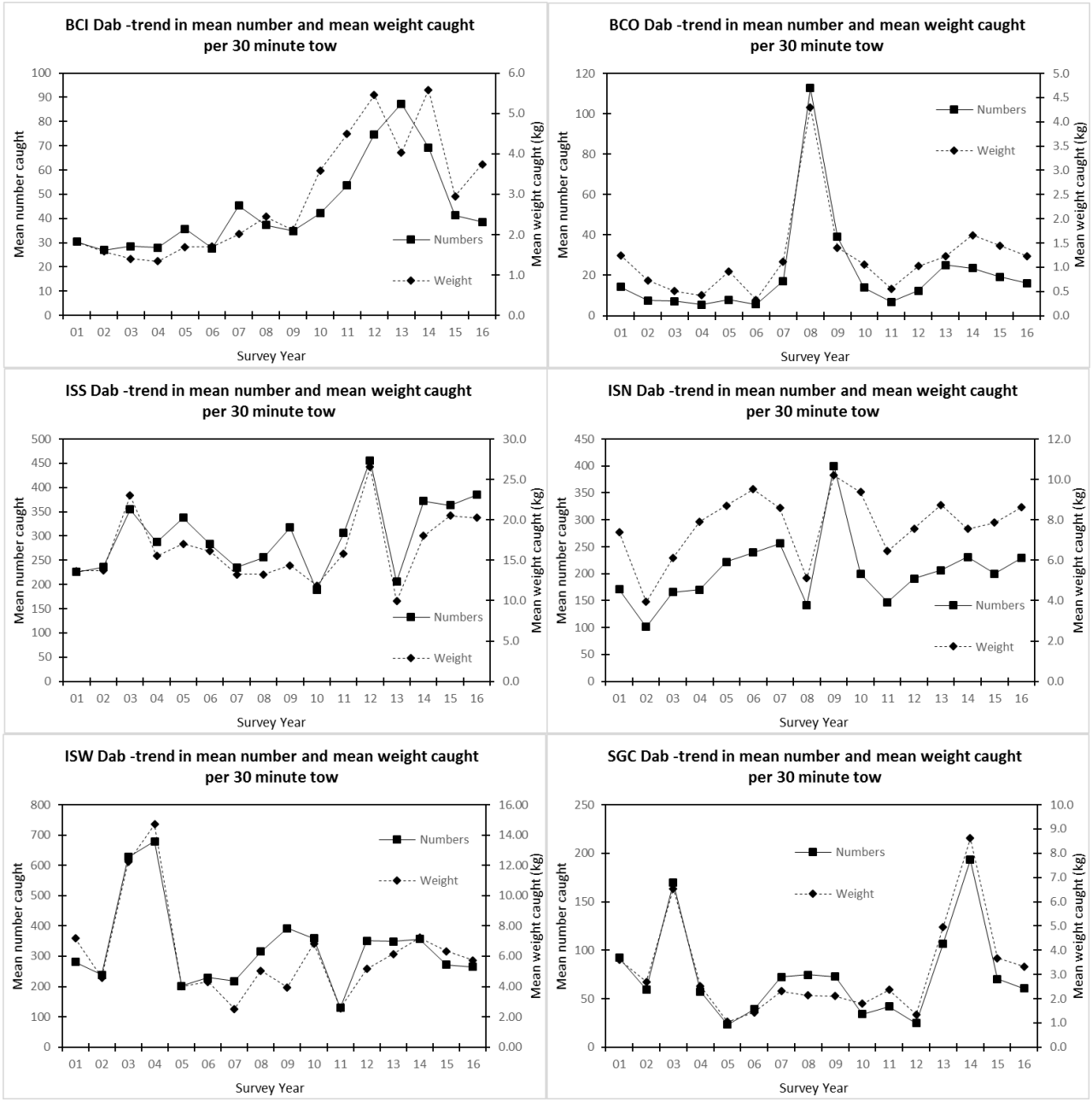
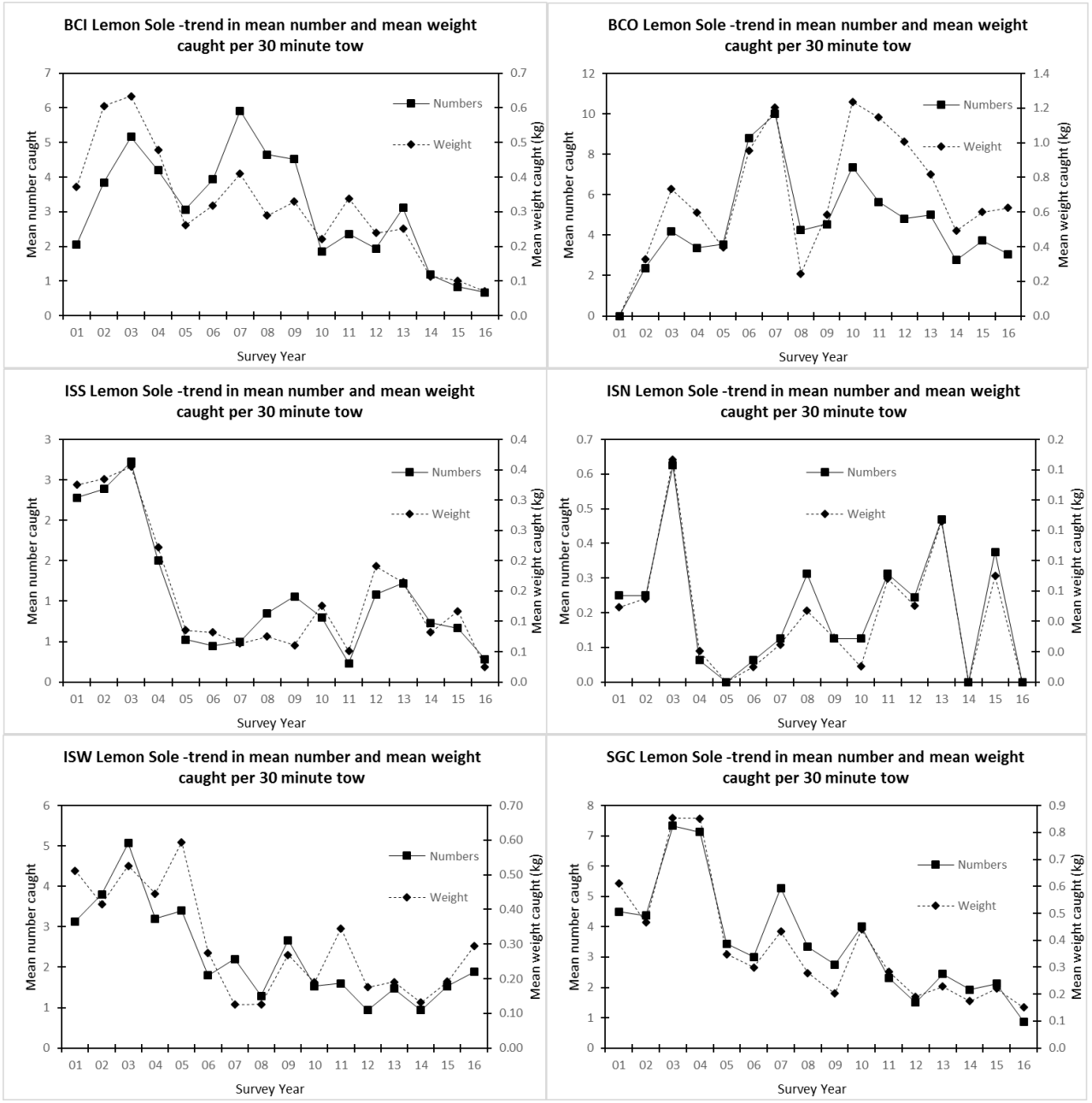


Figure 9 - Mean number and weight of lemon sole (*Microstomus kitt*) caught per 30-minute tow - by survey area per 30-minute tow.



Annex 1 – ILVO survey report (Double click header page to read document)

Vlaanderen

PRELIMINARY FINDINGS

Data collection IRIS2

CEND 20/16

ILVO
Instituut voor Landbouw-
en Visserijonderzoek

www.ilvo.vlaanderen.be