LOWESTOFT LABORATORY, LOWESTOFT, SUFFOLK, NR33 OHT

2011 RESEARCH VESSEL PROGRAMME

REPORT: RV CEFAS ENDEAVOUR: SURVEY 15/11

STAFF:

Part One	Part Two
I Holmes (SIC)	I Holmes (SIC)
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J Pettigrew	L Nelson
R Beckett	D Doran
R Brittain	R Ball (Univ. Aberdeen)
R Judge (23-26 Sept)	
R Ball (Univ. Aberdeen 15 Sept - 4 Oct)	
K Panten (vTI Germany 15-26 Sept)	

DURATION: 12 September – 4 October 2011

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 the assessments of stock size.
2. To collect biological data including weight at age of sole (*Solea solea*), plaice (*Pleuronectes platessa*), lemon sole (*Microstomus kitt*) and other commercially important finfish species as part of Cefas' requirements under the EU Data Collection Framework.
3. To determine the distribution & relative abundance of juvenile/adult sole & 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 caesium and tritium (AE001) (C Smedley - Cefas).
8. To collect fish samples in support of other Cefas projects and training courses.
9. To collect alkalinity, nutrient & dissolved inorganic carbon (DIC) samples – (N Greenwood - Cefas)
10. To collect Thornback ray (*Raja clavata*) tissue samples to assess fish health – (R Ball Univ. Aberdeen)

NARRATIVE: (All times GMT)

Cefas scientists joined the vessel at 0600h 12 September to participate in vessel safety induction training and setting up of sampling equipment. However, due to inclement weather, sailing was delayed by two tides and Endeavour eventually sailed at 0800h 13 September. Shortly after sailing, 'toolbox' talks were held with the ship's officers/crew and scientists.

At a known 'clean' fishing tow off Benacre, the fishing gear was deployed, towed for 5 minutes and successfully retrieved to ensure that all was in good working order. The catch was also sorted and processed in order to adequately test the EDC system and FSS upload functions.

After an uneventful passage through the Channel, the survey commenced in the Bristol Channel Inner (BCI) sector at prime station 133 at 0504h 15 September with an ESM2/Niskin sample followed by the first beam trawl station of the survey. A further 5 BCI stations were successfully fished during that day. Cefas Endeavour then headed to Swansea in order to pick up two additional scientists with them arriving on-board at 1710h that day. Once aboard, a 'reduced grid' of caesium water samples were collected in the Bristol Channel between 1912h and 2256h that evening comprising 13 samples. At first light the following morning, the BCI fishing survey grid recommenced (0554h 16 September) and work in this survey grid continued without incident until completion at 1852h 18 September.

On 19 September, given the good sea conditions and fine weather forecast, the opportunity was taken to fish five offshore Bristol Channel Outer fishing stations. These positions are frequently left un-fished on the survey due to poor offshore sea conditions or strong south-westerly winds. On 20 September, the day was spent fishing the 6 Cardigan Bay stations in the St George's Channel sector (SGC) en-route to begin the Irish Sea South (ISS) priority survey grid. These stations were successfully fished without incident.

On 21 September at prime station 419 in the Irish Sea West (ISW) sector, whilst recovering the ESM2 profiler and niskin sampler, the starboard 'hydro' winch cable parted and the equipment was lost. The position was logged and attempts were made to recover the gear. A number of grappling tows and one short beam trawl tow were made over the logged position but to no avail and with deteriorating weather at this offshore position and with little hope of recovering the lost gear with the equipment on-board, the decision was taken after 2 hours searching, to cease the operation and to return to the fishing survey.

The fishing survey recommenced at 0931 21 September and despite the lost time, six fishing stations were successfully fished that day including five in the priority ISS sector. Prime station 40 in Red Wharf Bay was fished for the full 30 minutes and given the reasonable catch size brought aboard again this year, a standard tow duration of 30 minutes should be fished in future surveys.

On 22 September at prime station 28 (ISS), the beam was recovered with major net damage. The beam had 'flipped' over and the cod end had been torn off and was attached to the beam only by the 'lazy deckie'. It was suspected that the beam had been towed through a sand bank and it had filled the cod end. The spare beam (no.2)

was rigged up and was deployed at an alternative location 0.6nm north of the original tow and this was towed for a precautionary 15 minutes. When hauled the gear was streamed to expel a large quantity of sand once again but this tow was deemed valid.

At prime station 49, the gear was hauled after 15 minutes given the heavy catches of broken shell and sand caught in recent years. This year, approximately 3½ baskets of shell was caught. Again at prime station 54, a known problem fishing station, the gear was hauled after 15 minutes. On this occasion, the reduced tow duration resulted in a very large catch of broken shell. Only through the skill and determination of the vessels crew, did the gear get recovered undamaged. The catch was deposited over the stern and the tow declared invalid. Given the major problems of previous years and again this year, no attempt was made to find an alternative tow this year. Throughout the day, the damaged beam was repaired on the deck but this would not be usable until the gear could be hung up in port and confirmed that it was back to survey specification.

The following day (23 September), at prime station 53 (ISS), a test 5 minute tow was carried out in order to determine the likely catch from a tow of valid duration. This prime station had history of large by-catches of broken shell and given the experience at prime station 54 the previous day, a test tow was considered appropriate. Upon hauling, just 3 baskets of broken shell/QSC were caught and on that basis, the valid 15 minutes tow was attempted. Despite all efforts to ensure a large by-catch of broken shell was not caught, upon hauling of the 15 minute tow, the quantity of by-catch was still around 38 baskets and the weight of this had to be estimated.

At 1540h 23 September, survey operations were paused and the vessel headed towards Fleetwood in order to pick up the Cefas CEO for him to gain some experience of a fishing survey and to drop off fish samples collected for a student at Univ. Cumbria. This operation was completed at 1726h and Cefas Endeavour headed north to begin the Irish Sea North (ISN) survey grid beginning in Luce Bay prime station 2.

The ISN grid of stations was successfully completed over the course on the 24/25 September without incident and upon completion of the last fishing station, Cefas Endeavour headed into Douglas IOM for a mid-survey break, docking at 1745h 25 September. On 26 September there was a changeover of both scientific and ship's personnel and whilst in port the vessel took on fresh catering supplies and water. Whilst in port, the beam/net that had been damaged earlier in the survey (number 3) was 'hung-up' and re-rigged back to survey specification for use on the 2nd half of the survey. In addition, whilst in port the SIC gave a 'local interest' interview to the Manx Radio station outlining what survey work the vessel had been conducting prior to docking on the Island.

Cefas Endeavour left Douglas IOM on 27 September at 0515h and headed directly to the nearest fishing station in the Irish Sea West (ISW) sector arriving at 0700hrs at prime station 424. During this day, five ISW stations were successfully fished. The last station of the day (prime 425) had a history of large by-catches of broken shell with in excess of 5 tonne being landed in 2010 and the tow declared invalid. An alternative tow was fished 4nm south-west of the original tow and a small catch was landed from a 15 minute tow. Given the low catches at this alternate tow, the decision was made to re-visit the original tow again this year, initially fishing a 5 minute test tow at the north end of the track to determine the likely catch for a valid 15 minute tow. This resulted in a

small haul of <1/2 basket with no broken shell present. This was followed with a valid 15 minute tow resulting in a manageable haul of just 3 baskets.

Over the following three days (28-30 September), the remaining ISW fishing stations were fished without incident. Prime station 214 was fished for the full 30 minutes tow duration as in recent surveys, the tow had yielded manageable numbers of small plaice and dab (*Limanda limanda*) and this proved to be the case again this year even with the full tow duration.

In the afternoon of the 30 September, a MacMillan Cancer Care coffee 'morning' was held on-board in conjunction with a similar event being held at Cefas Lowestoft. This raised a total of £135 for this worthy cause. Thanks must go to the catering department for providing the cakes and to all on board for their support.

Fishing in the SGC sector was completed at 1056h 1 October. With significant daylight still available, and little prospect of reaching the nearest unfished station in the BCO sector, the decision was taken to complete three stations in the South East Ireland (SEI) sector – a sector not now routinely fished as part of this survey. At each of these stations, a full benthic sort was carried out. Overnight, Cefas Endeavour steamed to prime station 508 in the BCO sector. Given the requirement to cease fishing before 1730h 2 October in order to recover a smart buoy and still reach Lowestoft for the afternoon tide on 4 October, this prime station was fished in darkness.

The final survey fishing station was hauled at 1759h 29 September.

With the full survey fishing grid now complete, Cefas Endeavour headed towards a position in Weymouth Bay in order to recover a Cefas Smart-Buoy due for recovery in early October. The Smart-Buoy was successfully retrieved at 0836h 3 October.

With the survey complete, Cefas Endeavour headed back to Lowestoft, and during this period, Cefas scientists began the process of cleaning up and packing away all scientific equipment in readiness for docking.

Cefas Endeavour docked in Lowestoft at 1500h 4 October.

RESULTS:

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

The survey gear was the standard 4m-beam trawl (number 3) with chain mat, flip-up ropes and the net was fitted with a 40mm cod-end liner. The spare 4m-beam was used during the period 22-25 September. All fish and selected commercial shellfish were identified to species, weighed and measured with large catches of an individual species were sub-sampled beforehand.

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, surface water was taken at each station and at the first and last fishing station on each working day a surface sample was taken simultaneously with a Niskin bottom water sample and an ESM2 or CTD profile.

All catch details and sample data were entered directly into the Electronic Data Capture (EDC) system and uploaded directly into the Fishing Survey System (FSS). Station details were manually entered into the FSS using information collected from the Transas bridge logging system and bridge logbook. The total number of survey otoliths/scales taken in each ICES Division is shown in Table 1.

Table 2 shows the top 10 species by both weight (kg) and number of individuals caught in core survey tows. Table 3 shows a list of measured species caught during the survey and number of stations at which they were recorded. The trawl survey covering the Irish Sea and Bristol Channel is divided up into six sectors consisting of 108 beam trawl tows, of which 107 were successfully fished (Figure 1), including 64 out of the 65 ISN, ISS and BCI stations used for tuning data for the Working Group of the Celtic Seas Eco-region (formerly the Northern and Southern Shelf Working Groups).

A total of 12 Prime stations – numbers 27 and 28 (off Blackpool), 49, 53 and 54 outer Liverpool Bay), 313 (Tremadoc Bay), 425 (SW of Isle of Man), 203 (Dundrum Bay), 220 (north of Dublin), 233 (south of Wicklow), 501 (southwest of Milford Haven) and 512 (off Padstow) were reduced from the standard 30-minute to 15-minute tows because of expected large catches of weed, broken shell or small flatfish. In addition, 4 stations were hauled a few minutes early due to either cables or static gear at the end of the tow. At two stations, a 5 minute 'test' tow was conducted prior to fishing a valid tow duration to determine the likely by-catch. A few other stations were moved short distances to avoid snagging undersea cables (an increasing problem in this busy sea area) or to avoid static gear.

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

Table 1: Numbers of fish otolithed by ICES division

	VIIa	**VIIf**	**VIIg**	**Total**
Anglerfish (*Lophius piscatorius*)	22	24	20	66
Anglerfish (*Lophius budegassa*)	0	0	0	0
Brill	26	6	0	32
Cod	39	6	1	46
Dab	206	245	16	467
Bass	0	13	1	14
Haddock	27	37	32	96
Hake	2	2	6	10
John Dory	2	29	6	37
Lemon Sole	58	71	41	170
Megrim	0	32	53	85
Plaice	1336	404	81	1821
Red Mullet	1	2	0	3
Sole	279	352	31	662
Turbot	2	14	3	19
Whiting	115	34	37	186
Total	**2115**	**1271**	**328**	**3714**

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

Weight caught (kg)				Number caught			
	2011	2010	2009		2011	2010	2009
Lesser spotted dogfish	1083	664	729	Dab	11502	11228	11787
Plaice	830	703	773	Plaice	8759	7948	7239
Dab	621	557	561	Solenette	5184	4776	6217
Sole	197	185	192	Poor cod	4180	2227	3470
Thornback ray	164	174	178	Common dragonet	2552	2399	2241
Common dragonet	103	100	102	Whiting	2522	1778	4666
Starry smoothhound	90	43	47	Lesser spotted dogfish	2353	1522	1712
Edible crab	90	78	74	Scaldfish	1636	1351	1958
Solenette	82	61	83	Sole	1425	1214	1736
Whiting	82	45	75	Thickback sole	1006	616	862
TOTAL (All species)	**4239**	**3246**	**3443**	**TOTAL (All species)**	**48099**	**39956**	**45751**

*Excludes 3 SEI stations

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	59	Microchirus variegatus	52
Ammodytidae	1	Micromesistius poutassou	1
Ammodytes tobianus	1	Microstomus kitt	38
Ammodytes marinus	3	Molva molva	1
Argentina sphyraena	1	Mullus surmuletus	3
Arnoglossus imperialis	3	Mustelus asterias	35
Arnoglossus laterna	64	Myoxocephalus scorpius	8
Aspitrigla cuculus	33	Nephrops norvegicus	15
Blennius ocellaris	3	Palinurus elephas	1
Buglossidium luteum	64	Pegusa (solea) lascaris	19
Callionymus lyra	91	Pholis gunnellus	3
Callionymus maculatus	4	Phrynorhombus norvegius	9
Callionymus reticulatus	2	Phrynorhombus regius	2
Cancer pagurus	59	Platichthys flesus	12
Capros aper	1	Pleuronectes platessa	88
Ciliata septentrionalis	3	Pollachius pollachius	1

Clupea harengus	4	Pomatoschistus minutus	34
Conger conger	6	Raja brachyura	12
Ctenolabrus rupestris	4	Raja clavata	54
Dicentrarchus (morone) labrax	9	Raja microocellata	10
Diplecogaster bimaculata	3	Raja montagui	51
Enchelyopus cimbrius	1	Scophthalmus maximus	12
Engraulis encrasicolus	2	Scophthalmus rhombus	20
Eutrigla gurnardus	64	Scyliorhinus canicula	97
Gadus morhua	17	Scyliorhinus stellaris	17
Gaidropsarus vulgaris	7	Solea solea	77
Glyptocephalus cynoglossus	7	Spondyliosoma cantharus	2
Gobius niger	2	Sprattus sprattus	9
Gobiesocidae	1	Syngnathus acus	7
Hippoglossoides platessoides	6	Taurulus bubalis	3
Homarus gammarus	8	Trachinus vipera	21
Hyperoplus lanceeolatus	3	Trachinus draco	2
Hyperoplus immaculatus	2	Trachurus trachurus	1
Leucoraja naevus	11	Trigla lucerna	64
Lepidorhombus whiffiagonis	11	Trigloporus lastoviza	1
Limanda limanda	91	Trisopterus esmarki	9
Liparis liparis	2	Trisopterus luscus	41
Lophius piscatorius	27	Trisopterus minutus	61
Melanogrammus aeglefinus	21	Zeugopterus punctatus	1
Merlangius merlangus	77	Zeus faber	14
Merluccius merluccius	7		

Table 4: Summary of gear deployments and sample collections

Gear	Valid	Additional	Replicate	Invalid	Total
Standard 4m Beam trawl with cod end liner	110	3	0	4	117
Water sample: Tritium (1 litre)	58	0	0	0	58
Water sample: Caesium (50 litre)	28	0	0	0	28
Surface salinity samples	105	0	0	0	105
ESM2 profile+Niskin sea-bed water samples+surface salinity	12*	0	0	1	13
CTD profile+Niskin sea-bed water samples+surface salinity	21	0	0	0	21
Dissolved inorganic carbon/ Nutrient and alkalinity samples	35	0	0	0	35

*Data lost.

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 last year's survey, 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 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 number and weight was up in all survey sectors except ISN and ISW compared to last year's survey. In BCI, plaice abundance increased for the sixth year running. Abundance by both number and weight caught in this year's survey is at the survey series high over the period 2001-11 with increases observed of 18% (numbers) and 34% (weight). Catch numbers of juvenile plaice (<21cm) in BCI fell in 2011 by around 48% from the high levels seen in 2010, with just 113 caught this year compared to 216 in 2010. In BCO, there was a small increase in the mean weights of plaice caught in BCO of 2%. Catch numbers in this sector remained at 2010 levels.

In the Irish Sea, ISN plaice abundance increased in terms of both numbers caught (30%) and weight caught (13%). Both numbers and weights caught are close to the survey average (2001-11). In ISS, plaice numbers and weights caught were higher than those observed in 2010 with increases of 42% and 33% respectively. Catch numbers of juvenile plaice (<21cm) in ISS/ISN remained close to the high levels observed in 2010 with most of these juvenile fish coming from the ISN sector. However numbers of recruited plaice (≥21cm) fell by around 40% compared to 2010. Catches numbers and weights in ISW decreased this year and are now at a series low (2001-11) whereas catches in SGC increased from those observed in 2010 with catch numbers up 26% and weights up 13%. Trends in survey catch rates over recent surveys are shown in Figure 6.

Sole: Abundance by number are consistent in all survey sectors to those observed in 2010 with the exception of ISS where catch numbers increased. Catch weights are up in all sectors except BCI which saw a small decrease. Catch numbers of sole caught are up by 8% in BCI, but catch weights are down by 10%. Catch numbers of juvenile sole (<21cm) were almost 4 times higher in 2011 (458 fish) than those seen in 2010 (115 fish), but numbers of recruited sole caught have fell by around 35% this year. Catch rates of sole in BCO remained similar to those observed in 2010.

In the ISS and ISN sectors, both catch numbers and catch weights of sole increased from those seen in 2010. In 2011 there has been in increase in numbers caught of 52% and weight caught of 50% but despite these increases, catch rates are only just above the series low (2011-11). Numbers of juvenile sole in ISS/ISN (<21cm) increased by almost 300% (103) from that observed in 2010 (38). The numbers of recruited sole (>=21cm) remained at similar levels to those seen in 2010. In SGC catches were higher than those observed in 2010 but are still at low levels whereas in BCO, there was a small decrease in catch numbers and a small increase in catch weights. ISW catch numbers and weights remained close to the levels observed in 2010. Trends in survey catch rates over recent surveys are shown in Figure 7.

Dab: Dab catches in BCI increased again in 2011 and both catch numbers and catch weights are at a series high for the period 2001-11. Numbers of juvenile dab in BCI (<16cm) have increased by 55% since 2010, but are still lower than those observed in

2007 (691 in 2007; 568 in 2011). In BCO, abundance fell for the third consecutive survey.

Catch numbers in ISS increased by 46% with a similar increase in the catch weight compared to the 2010 survey. However ISN and ISW both showed significant falls in catch rates with catch numbers falling by 27% and 66% respectively. Catch rates in SGC remained relatively stable. The number of juvenile dab in ISS/ISN (<16cm) has increased by 35% since 2010. 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 but did show increases in BCI, ISN and ISW. Trends in survey catch rates over recent surveys are shown in Figure 9

Other noteworthy changes to the catch rates of other main species are decreases in the catches of cod over the entire survey with catch numbers falling from 107 in 2010 to just 46 in 2011. Total numbers of haddock caught this year remained at similar levels to those observed in 2010, however numbers of juvenile haddock (<21cm) fell by around 50%.

Catches of thornback ray were generally up over the survey with the largest increase seen in the ISN sector. Small-eyed ray catches in BCI increased by 36% from the low levels seen in 2010 and many of those caught were juvenile. Catches of lesser-spotted dogfish increased significantly in all survey sectors with the largest increases observed in the ISN and BCO sectors. Catches of nurse-hound have now risen in the last two years with just 10 caught in 2009, 21 in 2010 and now a total of 39 in 2011. All of these specimens were tagged and released. In addition to this, catch numbers of starry smooth-hound increased by around 50% from the catch seen in 2010.

Aim 4 - Surface and bottom water sampling

At each fishing station, a surface water salinity sample was taken using on-board sea-water supply taken from a depth of 5m. The starboard gantry with the ‘hydrographic’ wire was used in the collection of bottom water samples initially with a niskin sampler and an ESM2 logger, but once this equipment had been lost, a SAIV Micro CTD unit (S/N 452) was used instead. The sample was routinely taken at around 3-4m off the seabed and a total of 34 bottom water samples were collected. CTD profiles were recorded at every ‘dip’ where the Saiv mini CTD unit was used. All data collected using the ESM2 profiler was lost with the equipment.

Aim 5 - Epibenthos

At 25 selected fishing stations, samples of the epi-benthic by-catches were sorted and 32 ‘core species’ identified and quantified. A standard operating procedure (SOP) for the processing of this by-catch was provided. Some 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 53 in the ISS sector

where the by-catch was very heavy and had to be estimated. In addition, benthic observations were recorded from the catches at non-benthic stations. At the three fishing stations fished in the SEI survey sector, a full benthic sort was carried out as these towing positions are rarely visited on this survey.

Aim 6 - Length weight & maturity information

A total of 706 length/weight measurements were collected on the survey in addition to the length weight information routinely collected with survey otoliths. Species were targeted this year to supplement those measurements taken on the 2009/2010 surveys. The main species sampled in 2011 are shown in Table 5.

Table 5: Main species sample for length/weight

Species	**No of length/weight measurements.**
Pogge (*Agonus cataphractus*)	138
Lesser spotted dogfish (Scyliorhinus canicula)	130
Thick-back Sole (*Microchirus variegatus)*	57
Starry smoothhound (*Mustelus asterias*)	33
Nursehound (*Scyliorhinus stellaris*)	32
Sandsole (*Pegusa lascaris*)	30
Sand Goby (*Pomatoschistus minutus*)	26
Pout whiting (*Trisopterus luscus*)	24
Bullrout (*Myoxocephalus scorpius*)	24
Common dragonet (*Callionymus lyra*)	21

Aim 7 – Tritium and Caesium water sampling

1 litre surface seawater samples were collected from 29 stations in the Bristol Channel & Severn Estuary for Tritium H-3 analysis and a further 29 stations in the Irish Sea. In addition, 50 litre samples for Caesium analysis were also collected from 28 stations in the Irish Sea for Trevor Bailey. (Cefas, Lowestoft).

Aim 8 - Additional sample collection

Additional samples were taken in support of other CEFAS projects:

A) All monkfish had illicia taken to supplement the otoliths collection. S Songer (CEFAS, Lowestoft).

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

C) A total of 40 Bullhuss (*Scyliorhinus stellaris*), 2 Spotted ray (*Raja montagui*) and 5 Cuckoo ray (*Leucoraja naevus*) were tagged and released. J Ellis (Cefas, Lowestoft).

D) A total of 6 sightings of Cetaceans were recorded during the survey. Details of location, date/time and identification were noted on each occasion. All six sightings were of common dolphin (*Delphinus delphis*) and details were collected for the Sea Watch Foundation.

D) Details of the by-catch of litter caught at all fishing stations were recorded. In total, litter by-catch was categorized by 'type', weighed and categorized by size at a total of 76 fishing stations. In addition details of any attached organisms were recorded. Photographs of all litter items were also taken.

E) No specimens of sea trout or any other diadromus species were caught and retained as part of the EU Interreg – Celtic Sea Trout Project (Ted Potter)

F) Samples of dab, lesser spotted dogfish, spider crabs (*Maia squinado)*, spotted ray, (*Raja montagui*), Edible crab and octopus (*Eledone cirrhosa*) were collected for the radiological monitoring programme from the northern part of the Irish Sea. No specimens of cuttlefish (*Sepia officinalis*) were caught in the required sea areas. P Rumney (Cefas, Lowestoft).

G) Several samples of benthic material were frozen for post-survey identification.

H) A total of 236 measurements of jellyfish caught were taken. These were identified to species and measured across the 'umbrella' disc. D Righton (Cefas Lowestoft).

I) It was not possible to collect the 5 requested day grab samples for Jon Barber (Cefas Lowestoft) due to difficulties with the fishing survey whilst in the general location of the grab location.

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

K) Samples of queen scallops (*Chlamys opercularis*) were collected at 17 separate fishing survey stations and each specimen was both weighed and measured prior to freezing. In addition, photographs of the samples being landed and sampled were taken. Dr Ian McCarthy (Bangor University).

L) Samples of Brown shrimp (Crangon crangon), haddock, sole, plaice, whiting were collected for stomach contents analysis and dissection purposes. These samples were offloaded by 'work-boat' at Fleetwood during the survey. Suzie Miller – University of Cumbria.

M) Specimens of a number of commercial species were collected for a fish identification display as part of the Cefas Day 2011 event. M Etherton (Cefas Lowestoft).

Aim 9 - Additional sample collection

At every CTD/ESM2 profile station, samples were taken for dissolved inorganic carbon, nutrients and alkalinity analysis. Samples were collected using the standard operating procedures and training provided earlier in the survey programme. A total of 35 sample collections were taken, of which 34 were taken from the surface (5m) sea-water supply running through the 'ferrybox' system.

Aim 10 - Thornback tissue sample collection

During the Cefas Endeavour Irish Sea Beam trawl survey a number of biological samples were collected from 110 adult and sub adult *Raja clavata* specimens in order to assess health. These comprised DNA, RNA, blood serum, liver, gonad, spiral intestine and vertebrae. Both gonad histology, blood serum and RNA (vitellogenin expression) will be used establish reproductive health and parasite load and diversity in the gut will provide a measure of general health. These will later be correlated with ecotoxicological analyses of liver samples in order to determine any relationship between the absorption of endocrine disrupting chemicals from the environment and reproductive and general health.

To examine adaptive divergence, photographs of over 400 rajiids were collected during the survey along with a DNA samples from different stations. Using active appearance computer modelling, this will allow a comparison between genotypic and phenotypic variation to infer natural selection and local adaptation.

Micro CTD

The SAIV Micro CTD unit number 717 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 111 successful CTD data collections were made.

Our thanks go to all the officers and crew of RV Cefas Endeavour for their help, support and advice given during this survey. It is a due to their skill and co-operation that all survey aims were achieved. Finally, I would like to thank all personnel on-board for their generosity and support of the Cefas MacMillan coffee 'morning' with special mention to the catering staff for providing the refreshments to ensure the event was a success.

I D Holmes
4th October 2011

INITIALLED: B Harley

SEEN IN DRAFT: Master: Capt. T Byrne
First Officer: R Reynolds

DISTRIBUTION:
Basic List +

I Holmes
M Etherton
D Brown
S Walmsley
J Pettigrew
R Beckett
R Brittain
R Judge
B Hatton
L Nelson
D Doran
R Ball (Uni. Aberdeen)
K Panten (vTI Germany)
T Owen (P&O)
Master (Cefas Endeavour)
B Harley
S Kupschus
Cefas Intranet
R Briggs (AFBI NI, Belfast)
P Connolly (DOM, Dublin)
FCO (for Republic of Ireland)
Marine management Organisation
Welsh Assembly Government (WAG)
Devon & Severn IFCA
Cornwall IFCA
Isles of Scilly IFCA
North Western IFCA

Figure 1 - Station Positions for CEND 15/11. Blue dots represent survey station positions; red dots represent additional tows.

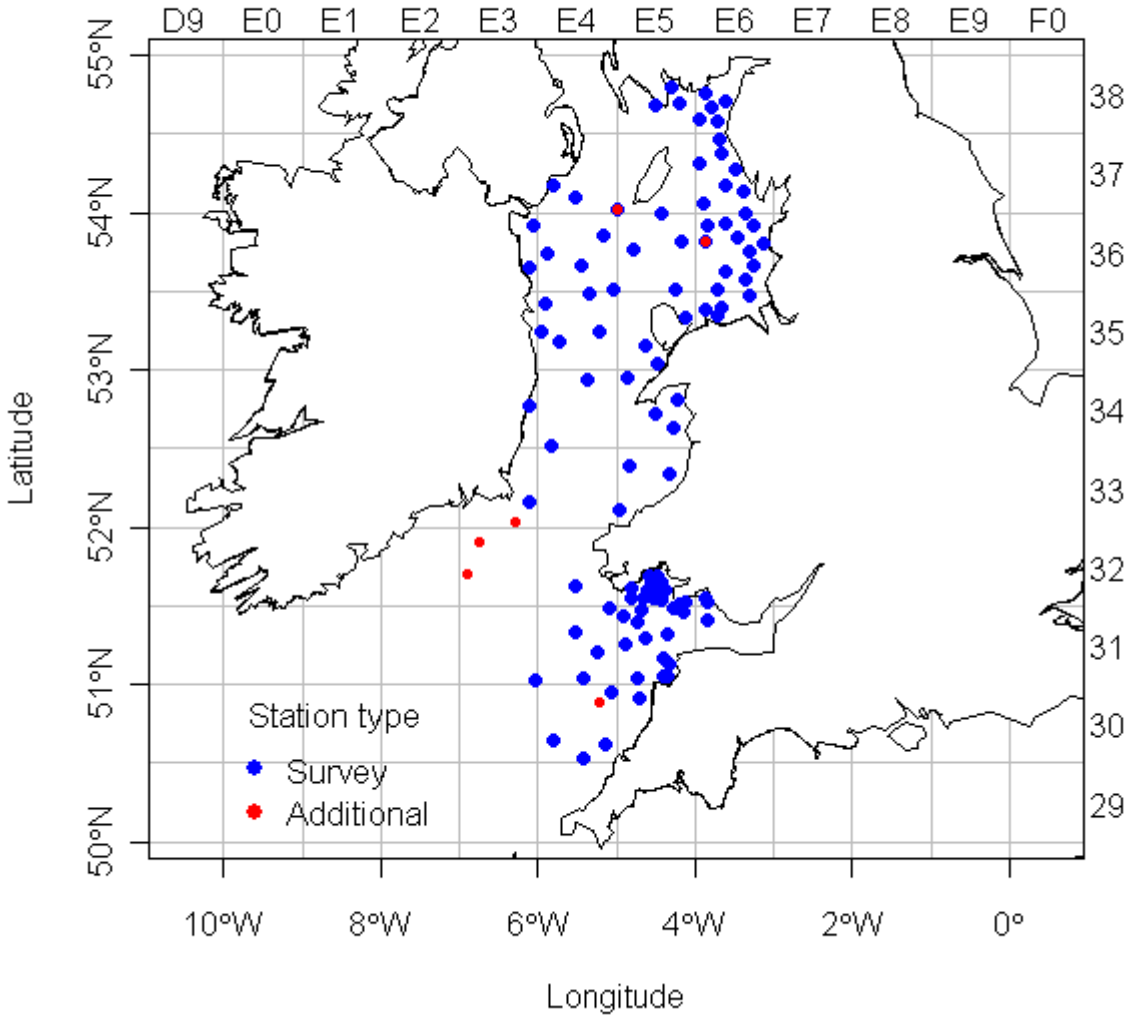
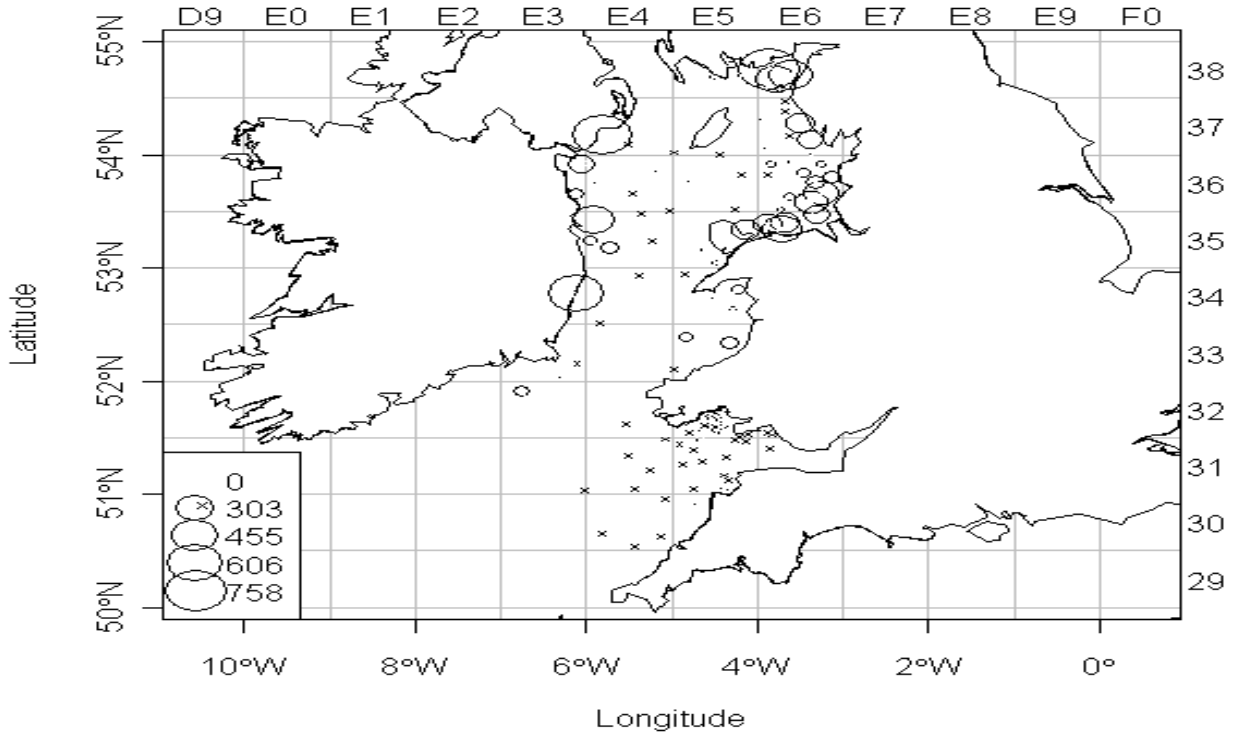


Figure 2 - Abundance (number caught per 30 minute tow) of pre-recruit (a) (<21 cm TL) and recruited (b) (≥21 cm TL) - plaice.

a)



b)

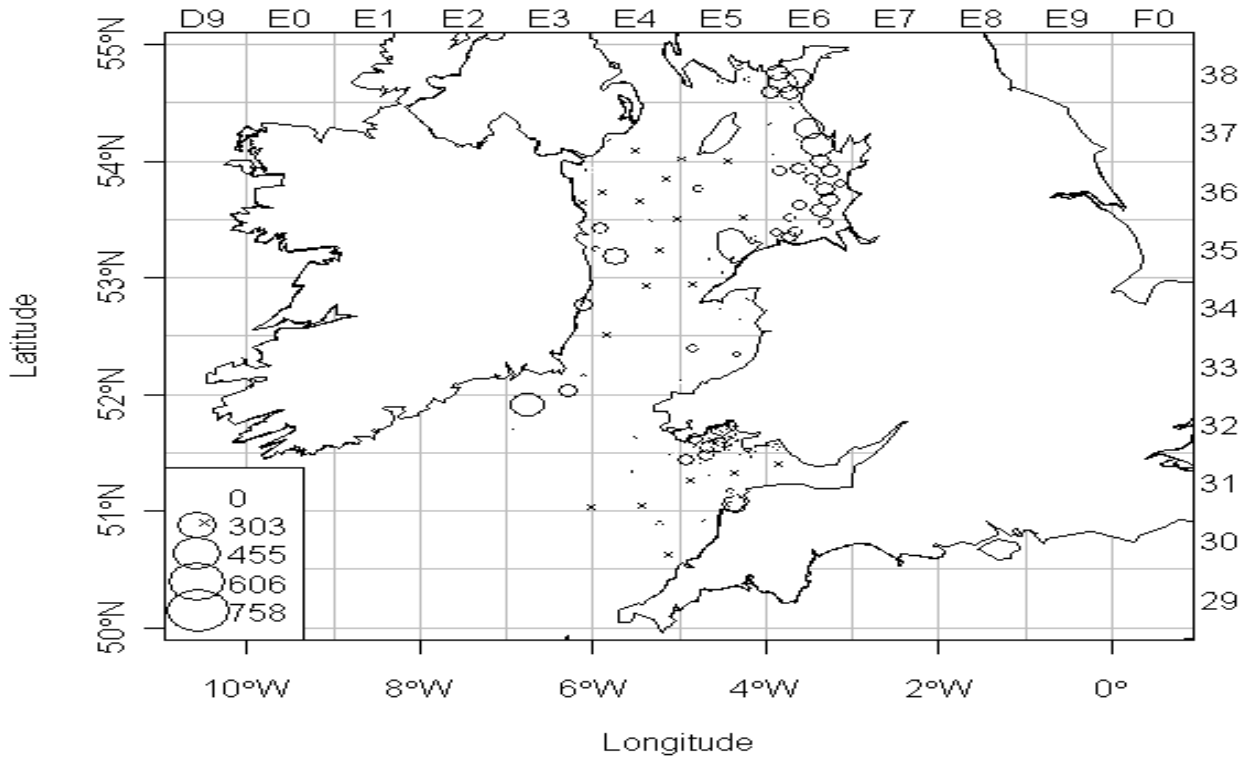
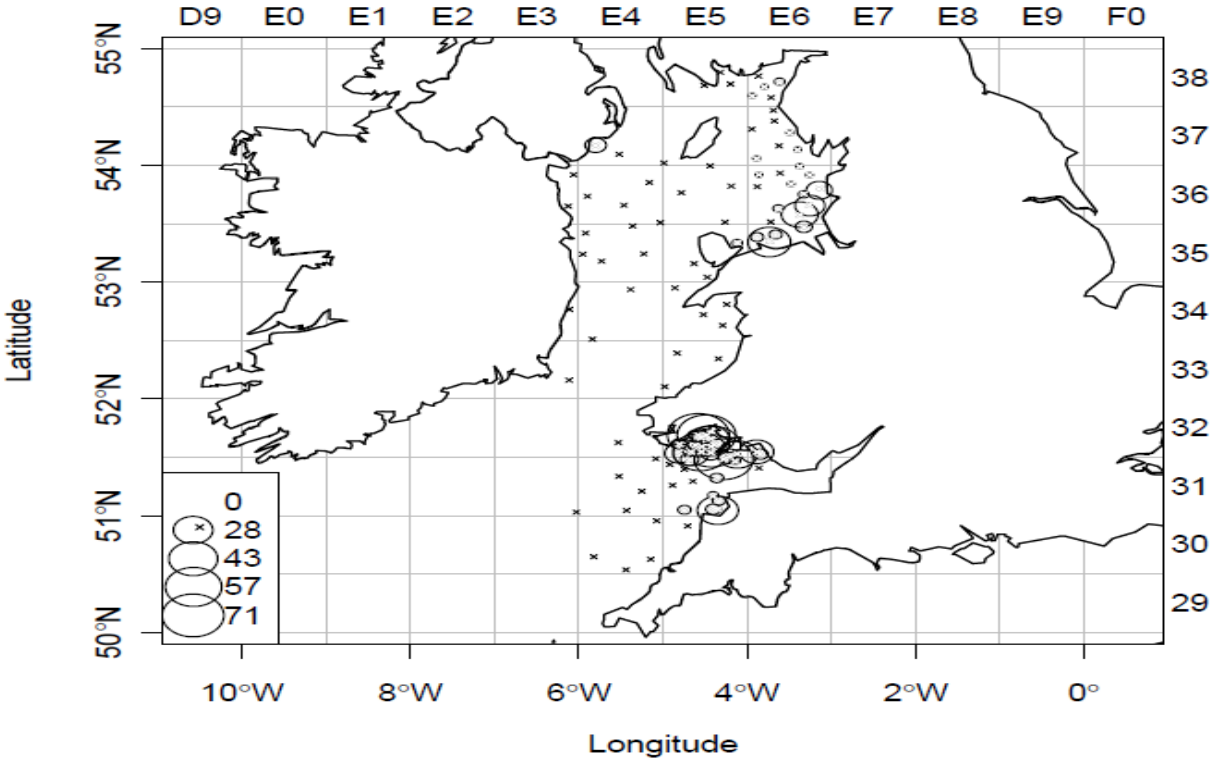


Figure 3 - Abundance (number caught per 30 minute tow) of pre-recruit (a) (<21 cm TL) and recruited (b) (≥21 cm TL) - sole.

a)



b)

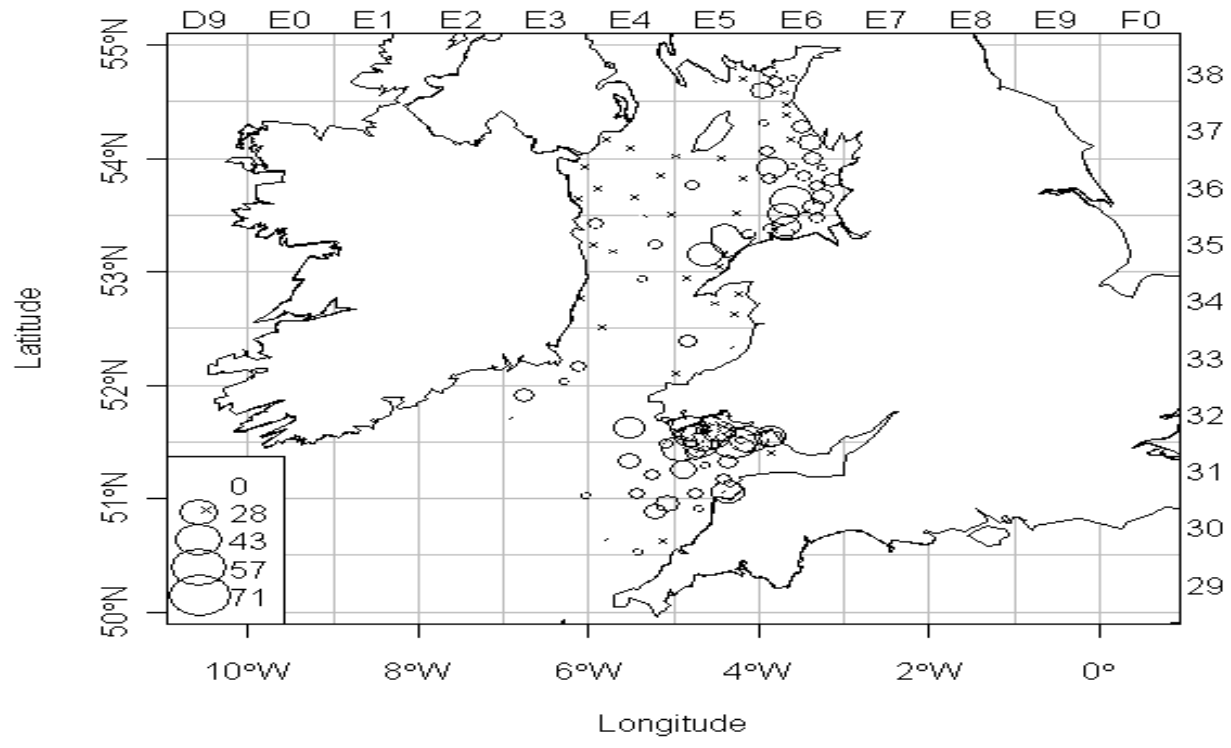
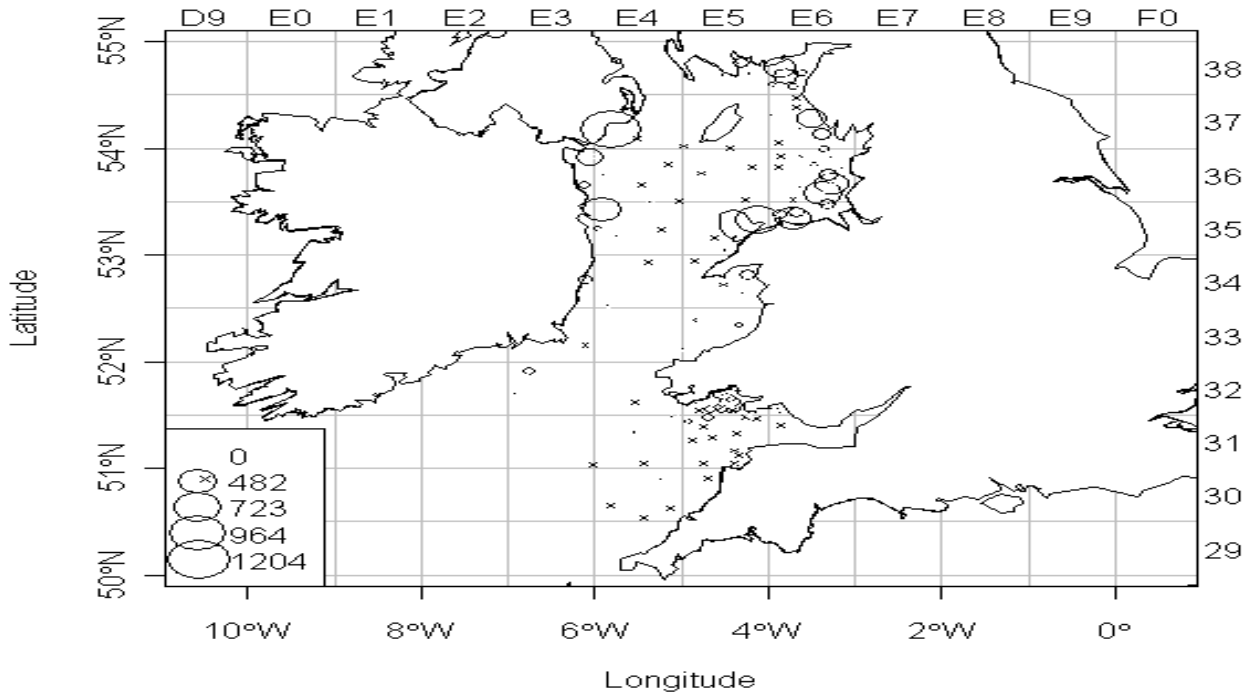


Figure 4 - Abundance (number caught per 30 minute tow) of pre-recruit (a) (<16 cm TL) and recruited (b) (≥16 cm TL) - dab.
a)



b)

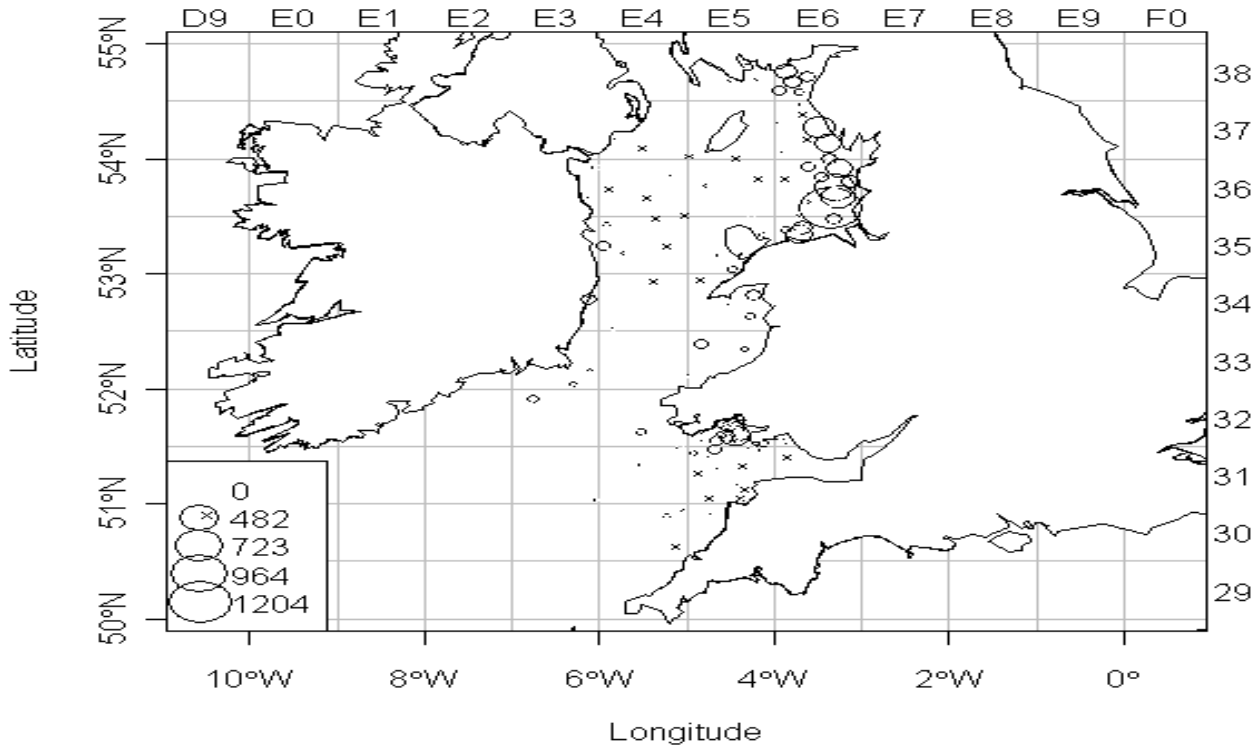
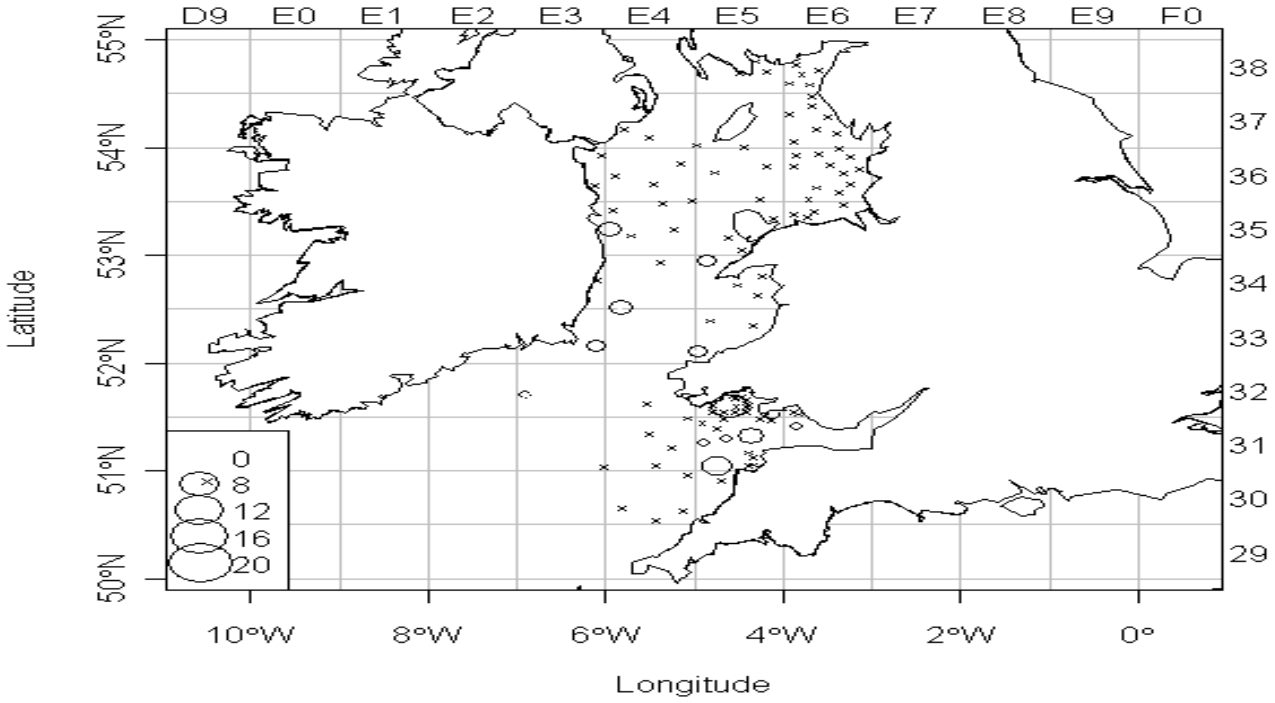


Figure 5 - Abundance (number caught per 30 minute tow) of pre-recruit (a) <19 cm TL) and recruited (b) (≥19 cm TL) - lemon sole.

a)



b)

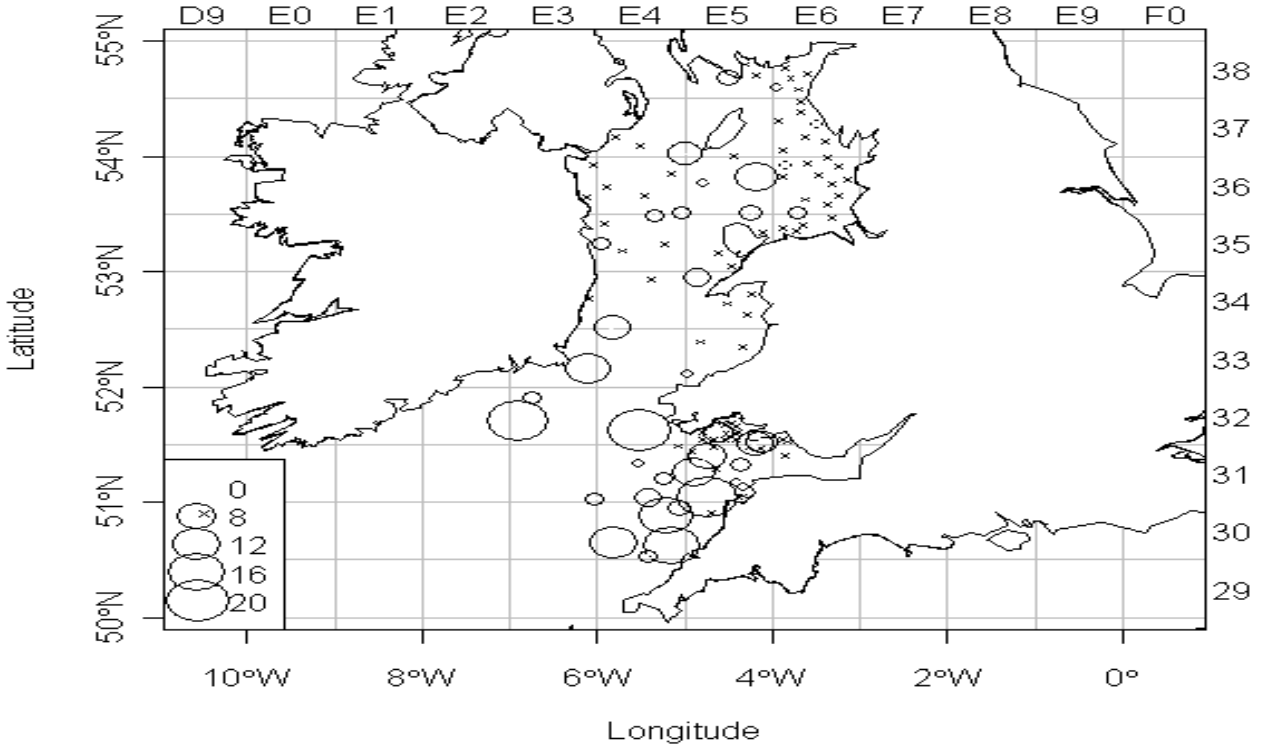


Figure 6 – Mean number and weight of plaice (*Pleuronectes platessa*) caught per 30-minute tow - by survey area

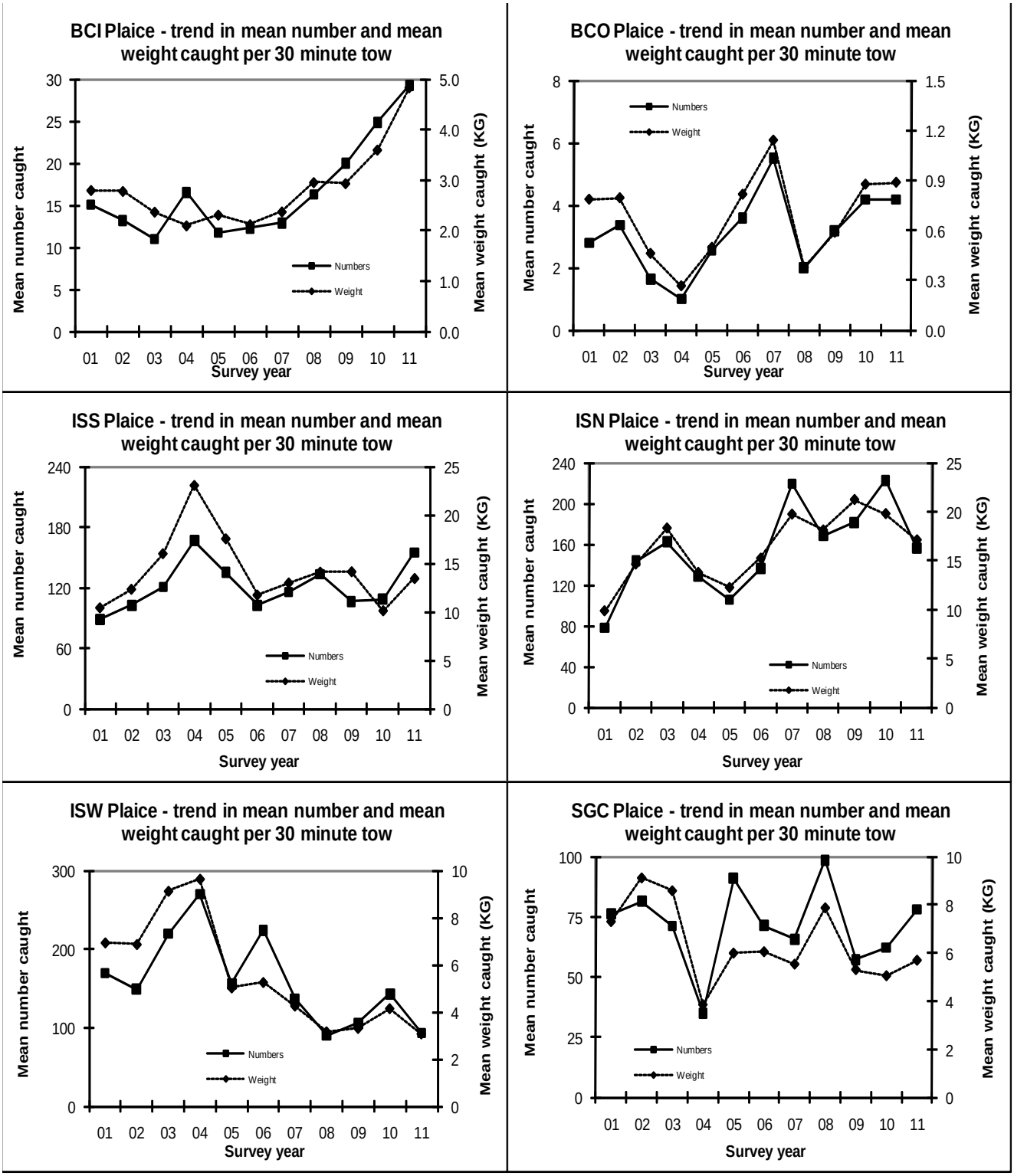


Figure 7 - Mean number and weight of sole (*Solea solea*) caught per 30-minute tow - by survey area.

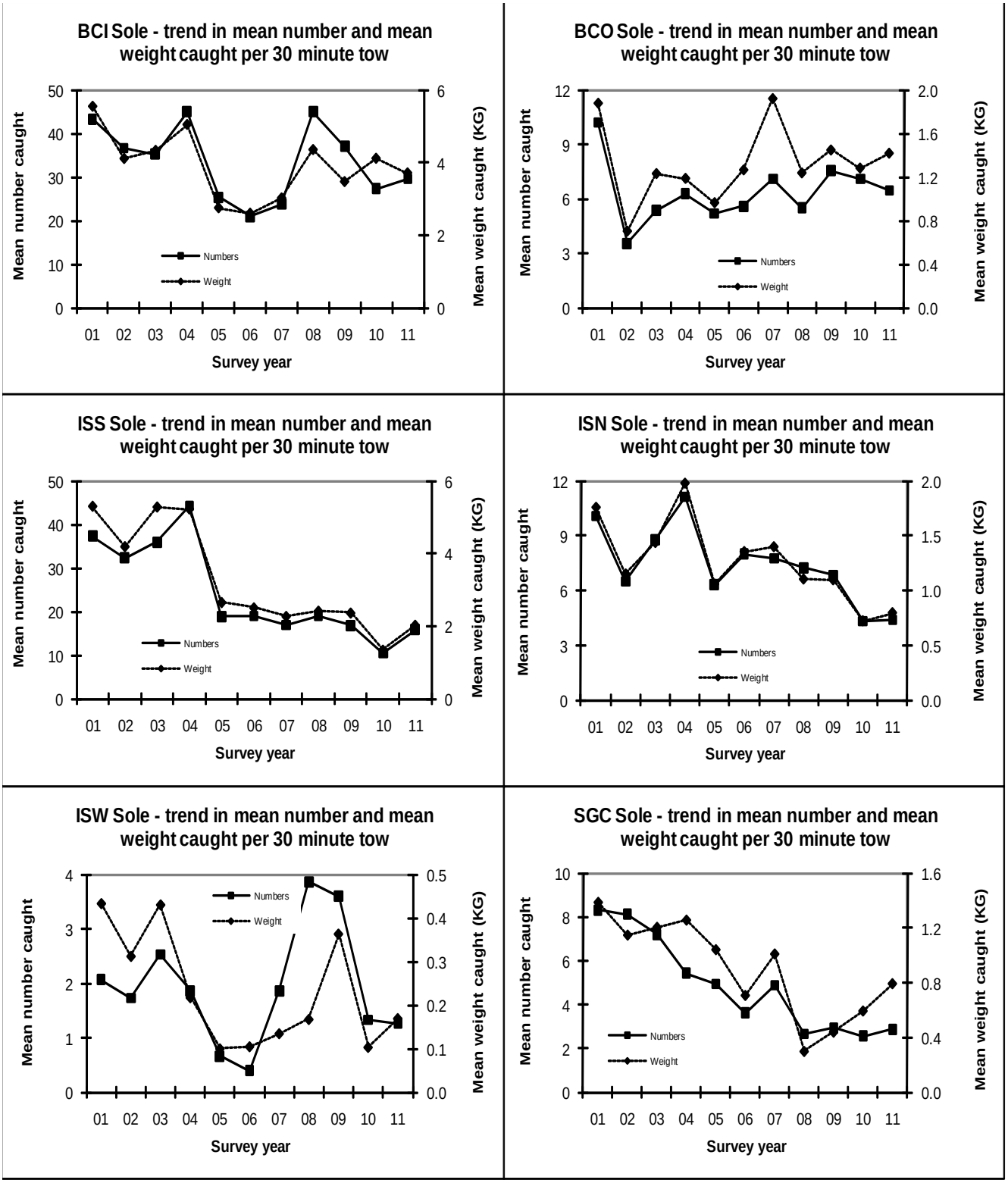


Figure 8 - Mean number and weight of dab (*Limanda limanda*) caught per 30-minute tow - by survey area per 30-minute tow.

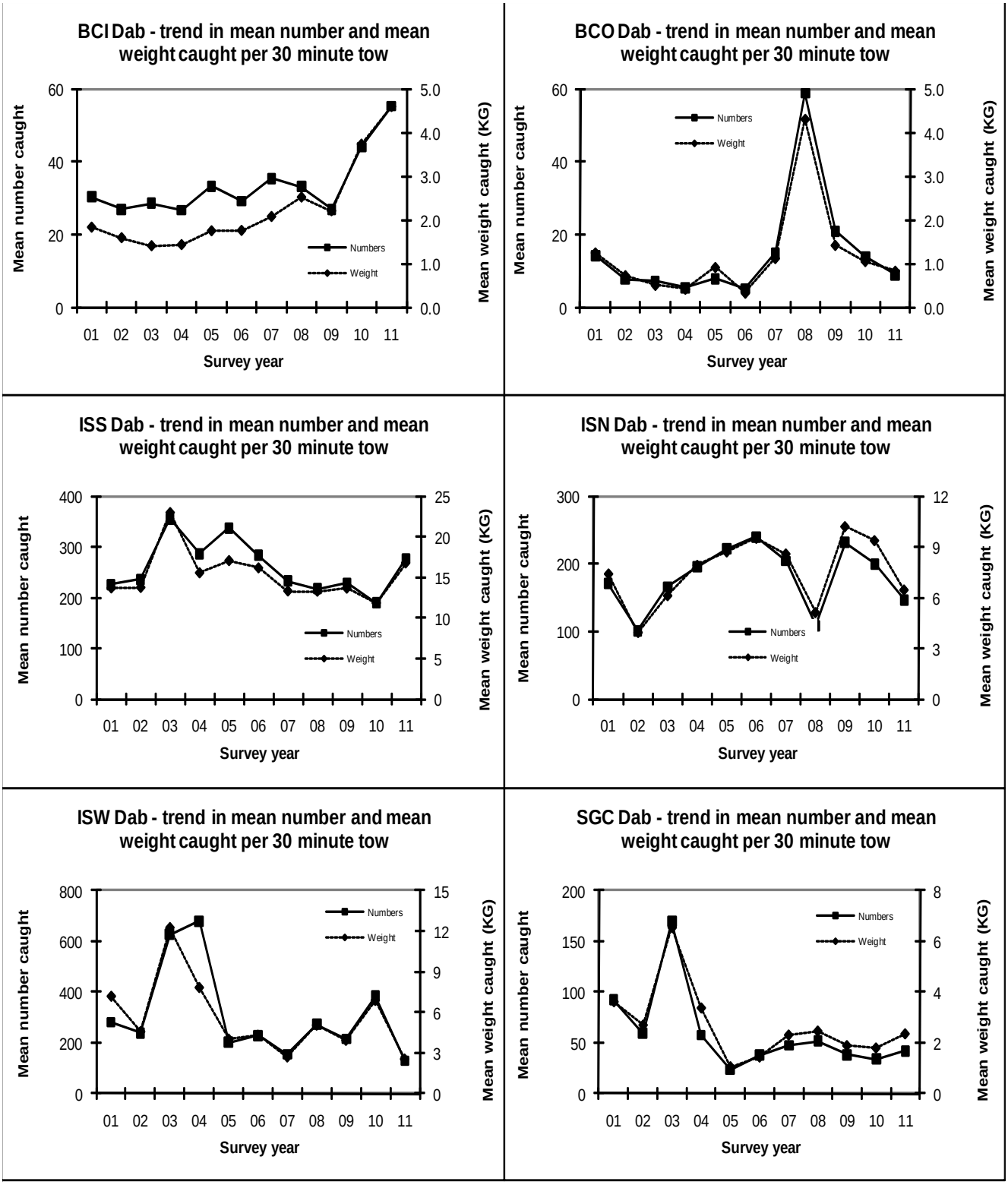


Figure 9 - Mean number and weight of lemon sole (*Microstoma kitt*) caught per 30-minute tow - by survey area per 30-minute tow.