

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

**2006 RESEARCH VESSEL PROGRAMME /REPORT**

**REPORT: RV CORYSTES: SURVEY 5/06**

**STAFF:**

I Holmes (SIC)  
M Parker-Humphreys (2IC)  
S Walmsley  
M Etherton  
S Shaw  
L Clancy  
K Sullivan (15<sup>th</sup> -27<sup>th</sup> Sept)  
R Humphreys (27<sup>th</sup> September – 5<sup>th</sup> October)  
D Walker – Univ. of Wales (15<sup>th</sup> - 23<sup>rd</sup> September)

**DURATION:**

15 September – 5 October 2006

**LOCATION:**

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

**AIMS:**

1. To carry out a 4m beam-trawl survey of groundfish to i) obtain fisheries independent data on the distribution and abundance of commercial flatfish species, and ii) derive age compositions of sole and plaice for use in the assessment of stock size.
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 regulations.
3. To determine the distribution and relative abundance of juvenile and adult sole and plaice.
4. To quantify epibenthos using 4m beam trawl by-catch.
5. To collect surface sea-water samples for processing on return to Lowestoft for the analysis of caesium and tritium (AE001) (D McCubbin EFS).
6. To collect fish samples in support of other CEFAS projects and training courses.
7. To collect samples in support of a project on the molecular identification of fish species project (DNA bar-coding).
8. To trial a new 4m beam trawl for comparability with other CEFAS sets of gear.

NARRATIVE: (All times GMT)

Cefas scientists arrived in Belfast at 1600h 14 September in order to join RV CORYSTES. On 15 September, all survey gear and associated equipment was loaded, assembled and tested prior to sailing. RV CORYSTES sailed from Belfast at 1334h on the same day. Fishing commenced in the Irish Sea West sector at 1807h and one further survey station was fished en-route to the Bristol Channel Inner (BCI) survey grid.

The first priority survey grid (BCI) was commenced at 1252h on 16 September. Fine weather ensured that RV CORYSTES was able to complete the BCI grid ahead of schedule and also fish a number of Bristol Channel Outer (BCO) stations prior to leaving the area. The BCI survey grid was completed at 1410h, 19 September. With strong southerly gales forecast for the following days, RV CORYSTES steamed north to continue the survey in the Irish Sea South (ISS) and Irish Sea North (ISN) sectors.

Fishing commenced here at 1033h on 20 September and continued until 1340h on 23 September when the survey was suspended and RV CORYSTES steamed to Whitehaven. En-route, the crew carried out an emergency drill with an engine room fire being simulated. The scientists very much appreciated the opportunity to participate in this exercise.

Having collected all required samples for DNA analysis, D Walker was put ashore at Whitehaven harbour by DOTI boat at 1640h. The survey recommenced at 1710h the same day and both ISS and ISN survey grids were completed at 1614h on 24 September. Having completed the prime survey areas, RV CORYSTES steamed west in order to continue the survey in the Irish Sea West (ISW) and St Georges Channel (SGC) sectors.

At 1620h on 26 September, all survey activities were suspended and RV CORYSTES steamed to Dublin in order to take on fresh water and supplies and to exchange one member of scientific staff. RV CORYSTES docked in Dublin at 2109h 26 September.

At 1107h on 28 September, RV CORYSTES left Dublin and headed to the nearest fishing station in SGC. Fishing recommenced at 1402h the same day and continued until 1046h on 1 October when the SGC survey area was completed. Unable to reach any remaining BCO fishing stations within daylight, RV CORYSTES fished two fishing stations in the South-East Ireland (SEI) sector. At these positions, no otolith collections were made, as there was little chance of completing the sector target for any species. However, given that these fishing stations had not been fished for some years, a full benthic sort was completed at both of these positions. Overnight, RV CORYSTES steamed back into the Celtic Sea in order to complete the BCO survey grid. With just one BCO station left unfished, and with failing light and a long steam to reach it, the survey was deemed to be complete at 1821h 2 October.

With the full survey grid now completed, RV CORYSTES embarked on a series of comparative fishing tows in BCI. Five prime stations within Carmarthen Bay and Swansea Bay were fished alternately with the standard survey beam trawl and a newly purchased beam trawl, made to the survey standard.

Upon completion of repeat fishing tows, RV CORYSTES then proceeded into the Bristol Channel in order to begin a collection of water samples for the analysis of tritium H3.

This collection began at 1850h 3 October and continued through the night and was completed at 0858h 4 October. Once completed, CEFAS scientists began the process of cleaning up and packing away of equipment in readiness for docking in Swansea.

RV CORYSTES docked in Swansea at 1340h 4 October and unloading took place on the morning of 5 October. Cefas scientists departed RV CORYSTES and returned to Lowestoft on 5 October.

## RESULTS:

### Aims 1, 2 & 3

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. All fish and selected commercial shellfish were identified to species, weighed and measured (large catches of an individual species were sub-sampled beforehand).

Surface temperature and salinity readings were logged at every station using the AFBI Seabird continuous logging system. In addition, a SAIV Micro CTD unit was attached to the 4m-beam trawl in order to record the temperature and salinity depth profile at each fishing station fished. All catch details and sample data was 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 provided by the officer of the watch. The total number of otoliths/scales taken in each ICES Division is shown in Table 1 below.

Table 1. Numbers of fish otolithed by ICES division

	<b>VIIa</b>	<b>VIIb</b>	<b>VIIg</b>	<b>Total</b>
Anglerfish ( <i>L.piscatorious</i> )	18	17	8	43
Anglerfish ( <i>L.budegassa</i> )	0	0	0	0
Bass	0	19	0	19
Brill	19	9	1	29
Cod	65	9	1	75
Dab	241	220	0	461
Haddock	31	14	18	63
Hake	1	2	2	5
Lemon sole	64	93	11	168
Megrim	0	10	2	12
Plaice	1426	307	14	1747
Sole	371	357	34	762
Turbot	10	8	2	20
Whiting	121	24	11	156
<b>Total</b>	<b>2367</b>	<b>1089</b>	<b>104</b>	<b>3560</b>

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 all 65 ISN, ISS and BCI stations used for tuning data in the Northern and Southern Shelf assessment Working Groups. A total of 10 Prime stations – numbers 27

(Morecambe Bay), 40 (Red Wharf Bay), 2 (Luce Bay), 313 (Tremadoc Bay), 203 (Dundrum Bay), 214 and 220 (north of Dublin), 233 (south of Wicklow), 501 (southwest of Milford Haven) 443 (Cardigan Bay) were reduced from the standard 30 minutes to 15 minute tows because of expected large catches of weed, shell/small flatfish or due to fixed nets being across the tow. Prime station number 4 (Solway Firth) was moved slightly this year as the Kirkcudbright firing range was active and the standard tow position fell within the range area.

A few other stations were either moved short distances or hauled early to avoid snagging undersea cables (an increasing problem in this busy sea area), to avoid static gear or to safely avoid being pushed into shallow waters by strong winds. Table 2 shows the number of gear deployments undertaken on the survey.

**TABLE 2:** Summary of gear deployments

Gear	Valid	Additional	Replicate	Invalid	Total
Standard 4m Beam trawl with cod end liner	109	5	5	0	119
Water sample collection	41	0	0	0	41

Abundances of juvenile (pre-recruit) plaice and sole in the Irish Sea and Bristol Channel are shown in Figures 2 and 3. Pre-recruit plaice were most abundant off the east coast of Ireland, in inshore waters off north Wales and northwest England. Pre-recruit sole were most abundant in the Bristol Channel and in inshore waters off north Wales and Liverpool Bay. Abundances of juvenile (pre-recruit) dab and lemon sole are shown in Figures 4 and 5.

**Plaice:** Numbers of plaice caught increased from the previous year's survey in all sectors except SGC and ISS where large falls were observed. However, in all survey sectors, the catch numbers observed this year are close to the average over the last 6 years (Figure 6). This year, catch weights of plaice also increased in all survey sectors except SGC and ISS. In ISN, the large increase in catch numbers this year (28%) is mainly attributable to the large catches of small plaice in the depth-band 1 (0-20m) fishing positions.

**Sole:** Numbers of sole caught decreased from the previous year's survey in all surveys sectors except ISN and BCO. In most survey sectors, the current catch rates are at the lowest level in 6 years. Even with the moderate increase in ISN catch numbers (27%), the current catch rates is still well below the survey average over this period (Figure 7). Catch weights of sole also fell in all survey sectors except ISN and BCO.

**Dab:** Small increases in catch rates of dab from the previous year's survey were observed in ISN, ISW and SGC, with significant falls recorded in the other survey sectors. In ISN, year-on-year increases in catch rates have led to a survey 'high' in the most recent 6 years. However in both ISW and SGC, catch rates are at survey 'lows' over the same time period – well below the high levels caught in 2003/4 (Figure 8). Recent trends in catch weights generally follow the same pattern as catch numbers.

Lemon sole: Catch rates of lemon sole remain low in all survey sectors, but this year saw a large increase in BCO with a 106% increase in catch numbers and a 143% increase in catch weights (Figure 9).

Noteworthy changes to the catch rates of other main species were large increases in the numbers of lesser-spotted dogfish caught in ISS, ISW and BCI but catch levels are still well down on the high levels caught in 2004. Whiting catch rates continue to decrease in BCI and BCO but a large increase was found in ISW (catch numbers up 255% and catch weights up by 181%). In the ISS and ISN survey sectors, large numbers of juveniles were caught.

Other significant changes of note were larger catches of queen-scallops and nephrops than encountered in recent years. The queen scallops also appeared to be larger than those caught previously. Nephrops seemed to be caught at more inshore ISW fishing positions than seen previously.

#### Aim 4 - 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. It was not possible to complete this additional work at two stations due to all staff being fully employed in processing of the fish catch. On these stations, a sample of the epi-benthic by-catch was labelled and frozen for subsequent analysis upon return to Lowestoft. In addition to these benthic analyses, 2 extra fishing stations had a full benthic sort carried out as these SEI fishing positions had not been fished for several years.

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 on all except 1 station where the by-catch was very heavy and had to be estimated. The weight of rocks caught in the trawl was also recorded at each station.

#### Aim 5 – Water sampling

1 litre surface seawater samples were collected from 41 stations in the Bristol Channel & Severn Estuary for Tritium H-3 analysis for David McCubbin (CEFAS, Lowestoft).

#### Aim 6 - Additional sample collection

Additional samples were taken in support of other CEFAS projects:

A) Nine specimens of bullhuss (*Scyliorhinus stellaris*) were tagged with Peterson discs and released. Dr J Ellis (CEFAS, Lowestoft)

B) No rare or unusual fish were caught during the survey

C) Samples of spider crabs (*Maia squinado*), dab (*limanda limanda*), lesser spotted dogfish (*scyliorhinus canicula*) and mixed ray (*Raja spp.*) were collected for the radiological monitoring programme from the northern part of the Irish Sea. No specimens of cuttlefish (*Elodine cirrosa*) were caught in the required sea areas. P Rumney (CEFAS, Lowestoft).

D) Samples of whiting (*Merlangius merlangus*) and norway lobster (*Nephrops norvegicus*) were collected for the radiological monitoring programme from ICES rectangle 38E6. No specimens of cod (*Gadus morhua*) were caught in the required sea area. P Rumney (CEFAS, Lowestoft).

E) Samples of cod, plaice, dab and sole were collected as part of the National Monitoring Programme. A Franklin (CEFAS, Burnham on Crouch)

F) No plaice/flounder hybrids were collected. Dr C Fox (CEFAS, Lowestoft).

G) No specimens of 'berried' edible crab were collected. D Eaton (CEFAS, Lowestoft).

H) All monkfish (*Lophius piscatorius*) had illicia taken. S Warne (CEFAS, Lowestoft).

I) Measurements of all whole jellyfish caught were identified to species and measured across the 'umbrella' disc. D Righton (CEFAS Lowestoft)

J) Two samples requiring confirmation of species identification and species sex were frozen. J Ellis (CEFAS, Lowestoft)

K) 10 red mullet (*Mullus surmeletus*) were frozen for age analysis. M Etherton (CEFAS, Lowestoft).

#### Aim 7 : DNA bar-coding sample collection

220 muscle sample specimens were taken from 35 different species of fin-fish. In addition digital images were taken of each specimen prior to freezing. The frozen specimens and DNA samples will be taken back to University of Wales, Bangor for sequencing of mitochondrial DNA. Specimens were taken from surveys stations 1-18, 20 and 37-45 in survey fishing sectors BCI and ISS.

#### Aim 8 : Comparative tows

Once the full survey grid had been completed, a series of comparative fishing tows in the BCI sector were fished in order that a comparison of the relative catch rates and species composition of the standard survey beam trawl (no 3) and a new set of gear (beam trawl no 5) could be made. Five selected survey positions within Carmarthen Bay and Swansea Bay were fished with both beams. The beams were fished within an hour of each other and towed in the same direction with the same tidal conditions and prevalent weather conditions.

The catches from these hauls were processed in the normal manner but all usual 'sexed' species were treated as unsexed, with the exception of rays which were sexed and the usual biological information recorded. No otolith samples were taken from these catches and no mini CTD data, continuous data or salinity samples were collected on these fishing stations. At one of the fishing positions, the beam was towed through a mud 'bank' and this clearly affected the subsequent catch compared to the other set of gear. This tow has been excluded from the analysis. Figure 10 shows the relative proportions of each species caught from the two tows at each prime station position.

Preliminary results indicate that both sets of gear caught the same species but not necessarily in the same proportions. It is recommended that further statistical analysis of these comparative tows should be carried out to determine whether there are any differences in the catch rates of the two gears.

### Micro CTD

The SAIV Micro CTD unit number 427 was attached to the 4m-beam trawl in order to record the temperature and salinity depth profile at each station fished and this was successful in recording data on all fishing days. A total of 109 successful CTD data collections out of a total of 109 fishing stations were made. The CTD unit was not used on the replicate tows in the Inner Bristol Channel.

### Continuous CTD data collection

The on-board Seabird continuous monitoring system was used to collect surface temperature and salinity. This successfully collected data for all bar one day of the survey.

Finally, our thanks go to all the officers and crew of RV CORYSTES for their help, support and advice during this survey. It is largely due to their dedication that all of the survey aims were achieved. In addition, our thanks go also to the CEFAS staff from SIGS section and Pinbush Road net store for providing an excellent service in provision of fishing and associated sampling equipment and the setting up of the EDC system prior to sailing. The senior fishing-mate and the SIC were especially pleased with the presentation and condition of the beam trawls provided for this survey.

I D Holmes  
4 October 2006

INITIALLED: B Harley

SEEN IN DRAFT: Master: Capt A Hughes  
Senior Fishing Mate: A Lincoln

DISTRIBUTION:

Basic List +

I Holmes

M Parker-Humphreys

S Walmsley

M Etherton

S Shaw

L Clancy

K Sullivan

R Humphreys

D Walker

R S Millner

S Flatman

B Harley

R Briggs (AFBI NI, Belfast)

P Connolly (DOM, Dublin)

FCO (for Republic of Ireland)

Sea Fisheries Committees:

Cumbria

North Western and North Wales

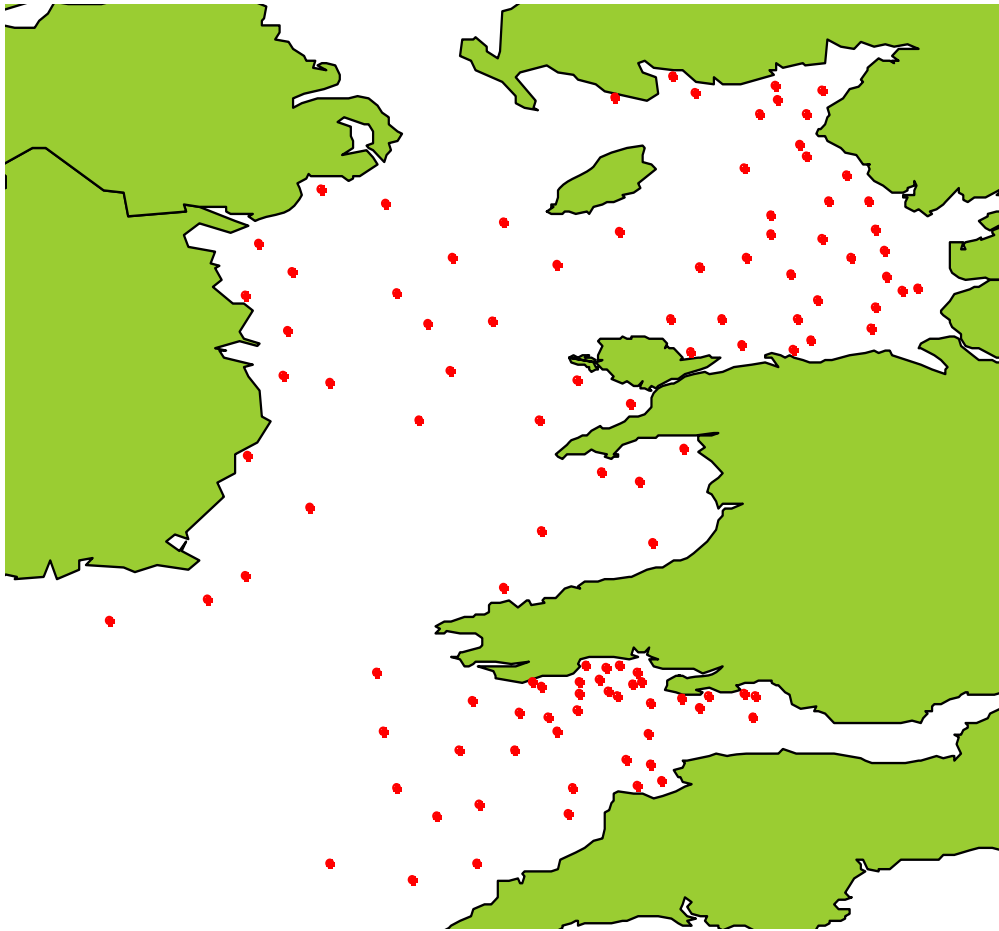
South Wales

Devon

Cornwall



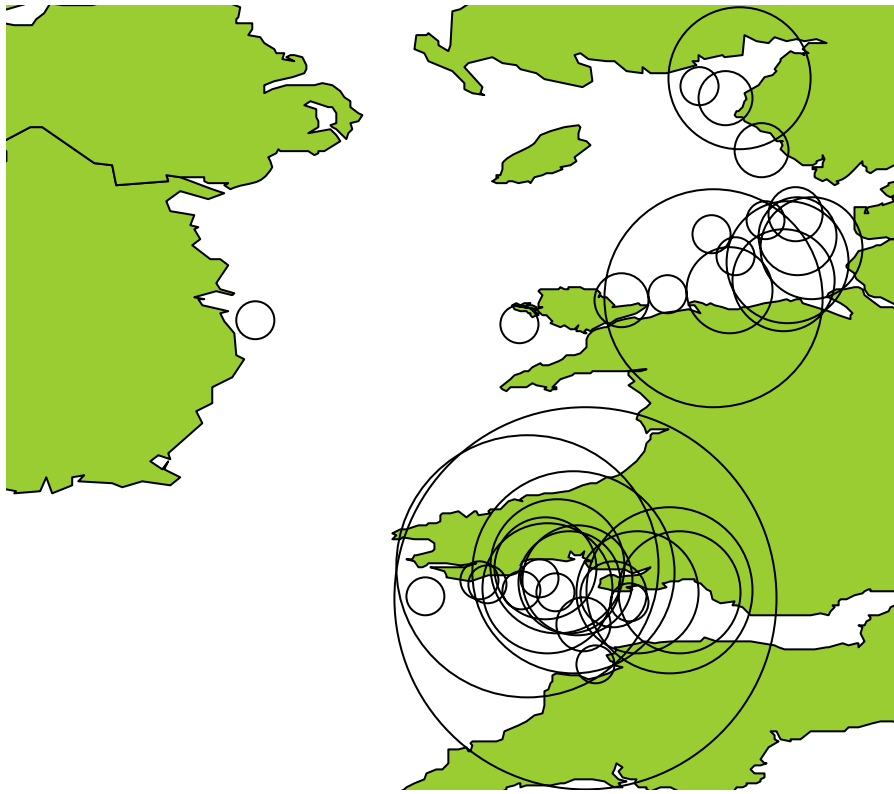
**Fig 1. Station Map for Cory 5/06**



**Fig 2. Abundance of plaice < 21cm  
max value = 2496**



**Fig 3. Abundance of sole < 21cm**  
**max value = 94**



**Fig 4. Abundance of dab < 21cm**  
**max value = 1648**



**Fig 5. Abundance of lemon sole < 21cm  
max value = 52**



Figure 6. *Corystes* 5/06 - mean number and weight of plaice caught per 30 minute tow by survey area

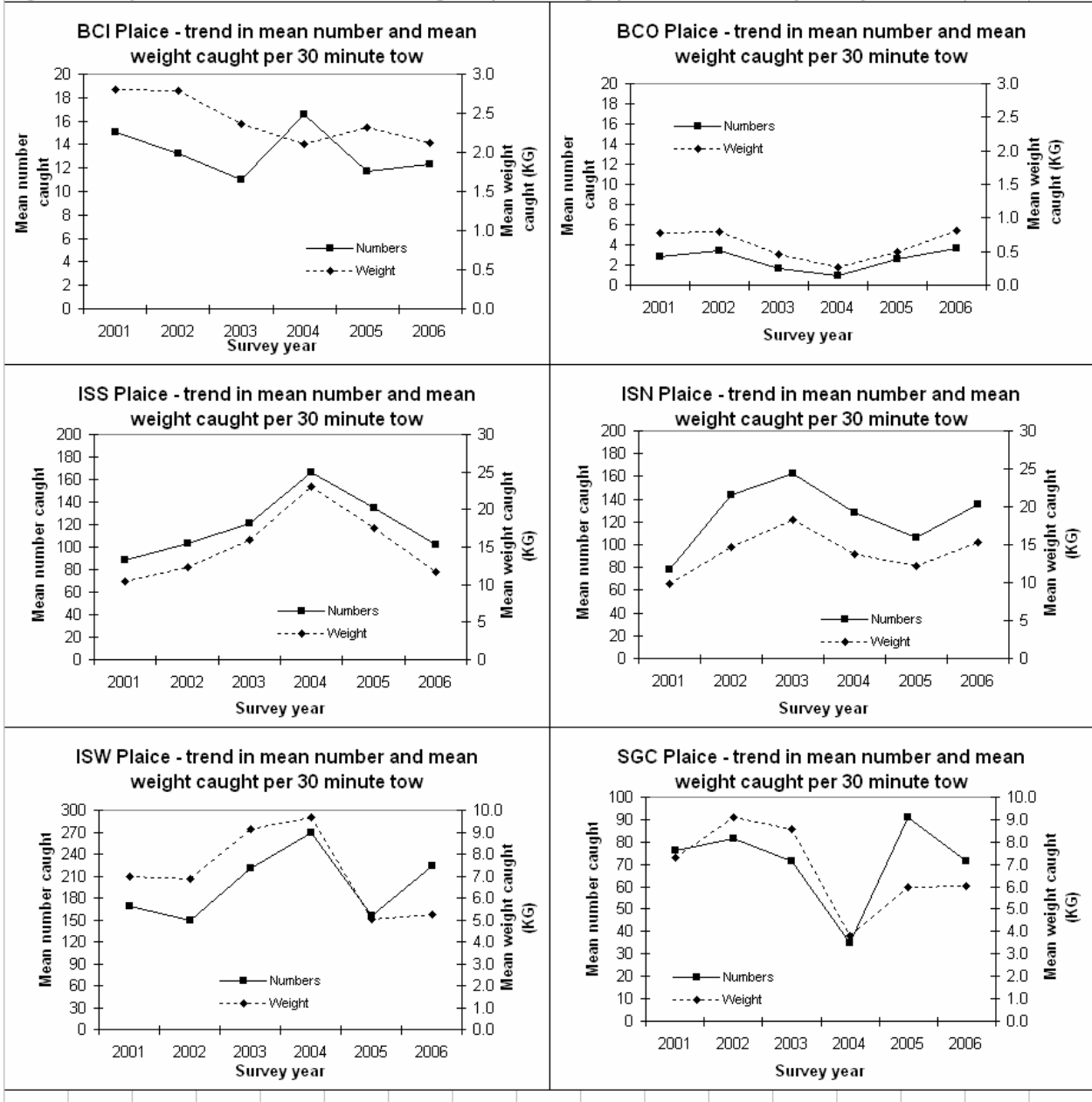


Figure 7. Corystes 5/06 - mean number and weight of sole caught per 30 minute tow by survey area

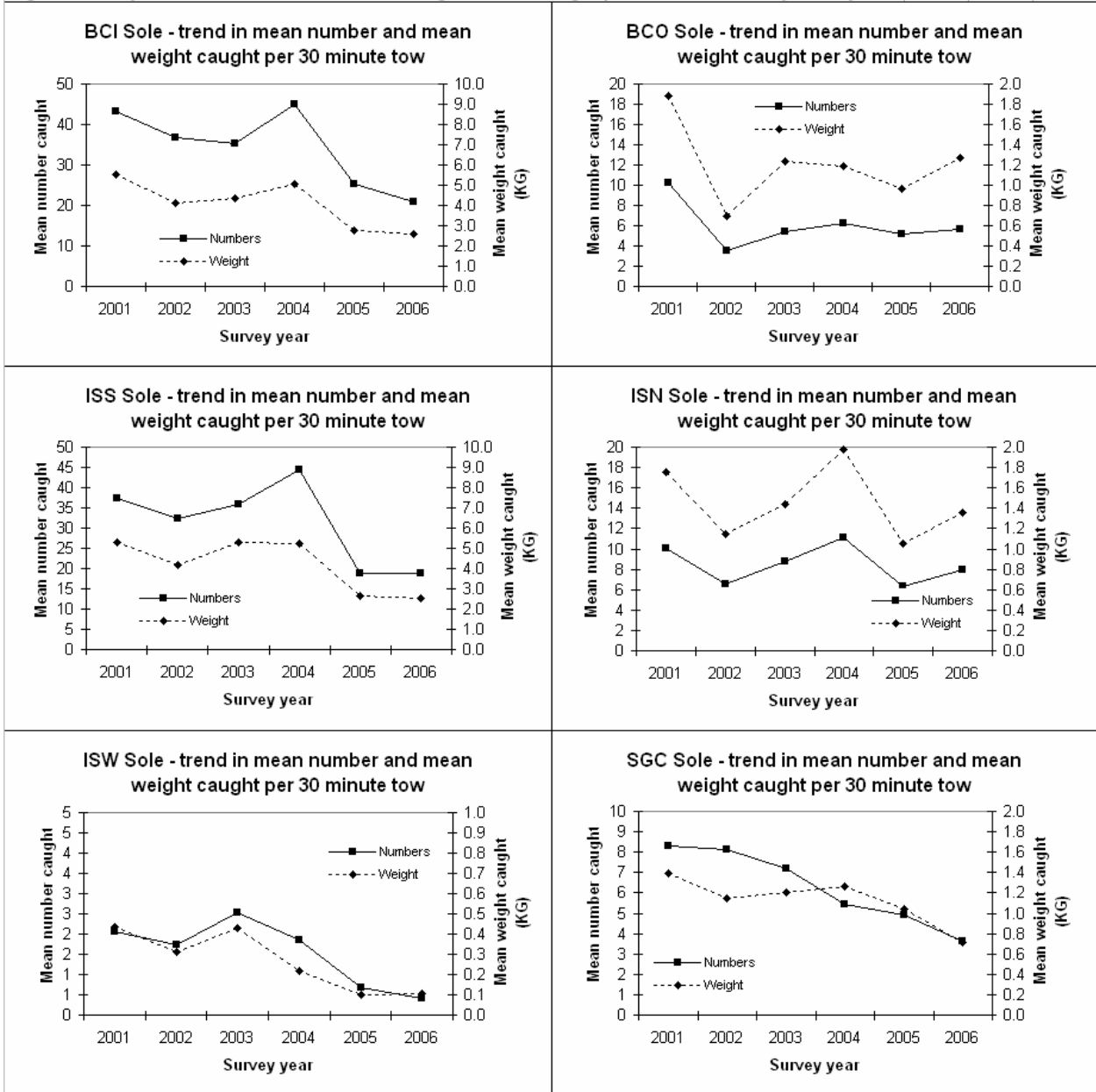


Figure 8. *Corystes* 5/06 - mean number and weight of dab caught per 30 minute tow by survey area

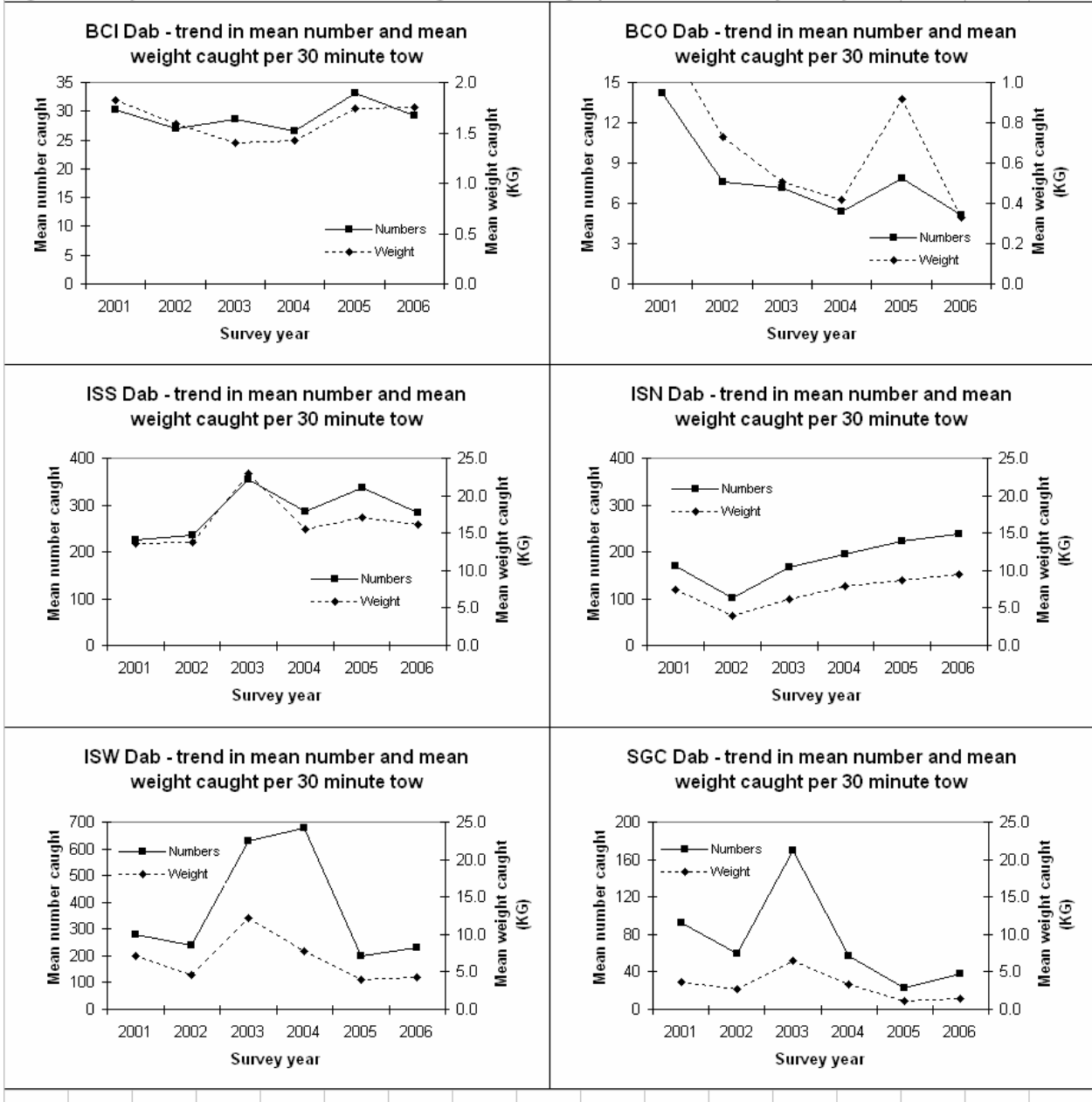
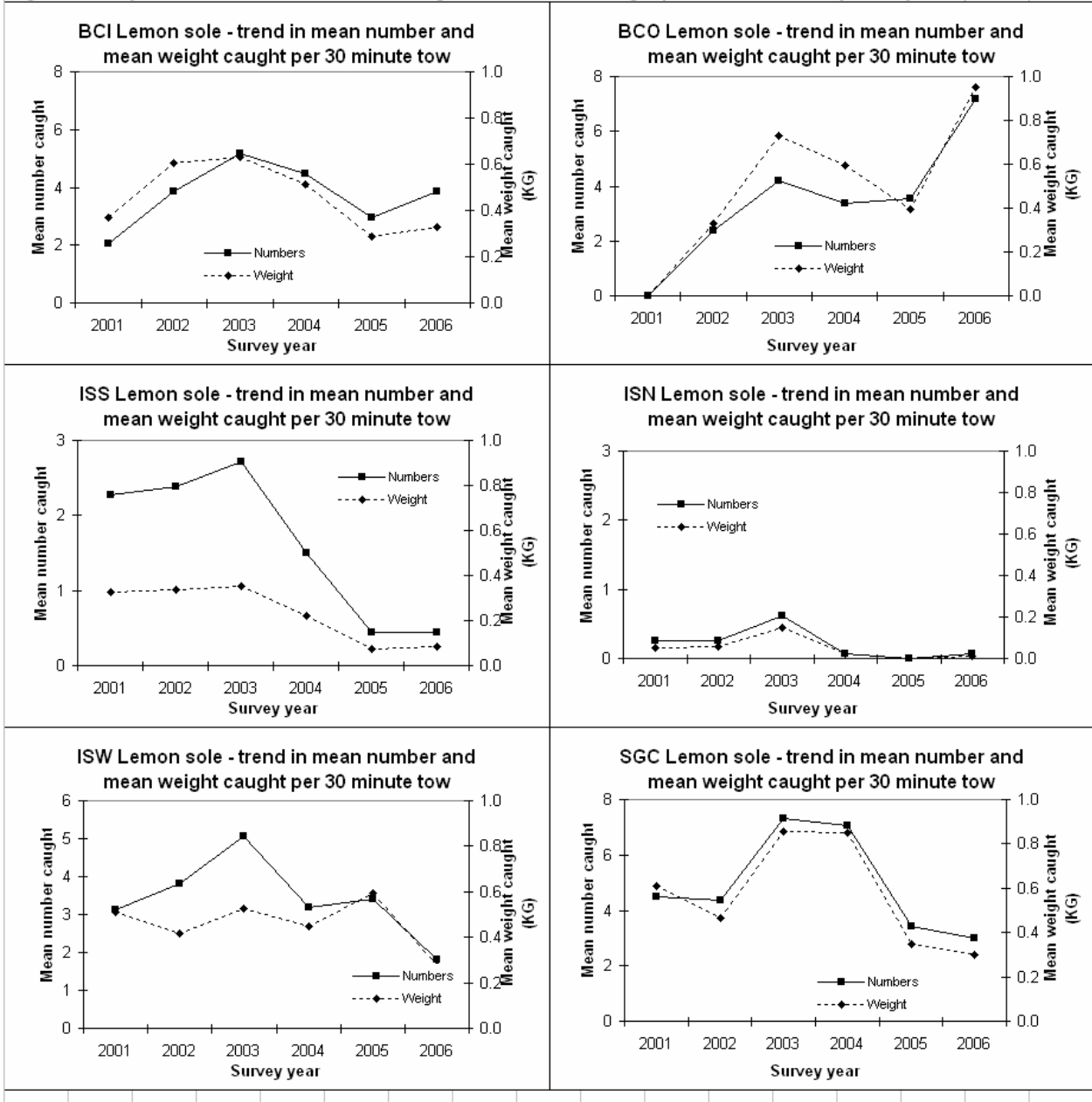




Figure 9. *Corystes* 5/06 - mean number and weight of lemon sole caught per 30 minute tow by survey area



**Figure 10 – Component catches and relative proportions of total catch (by species).**

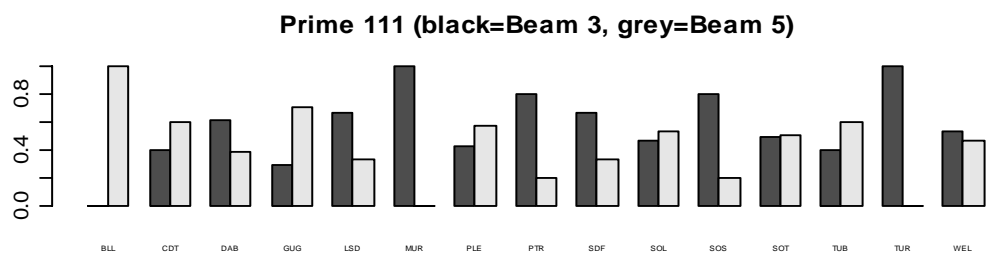
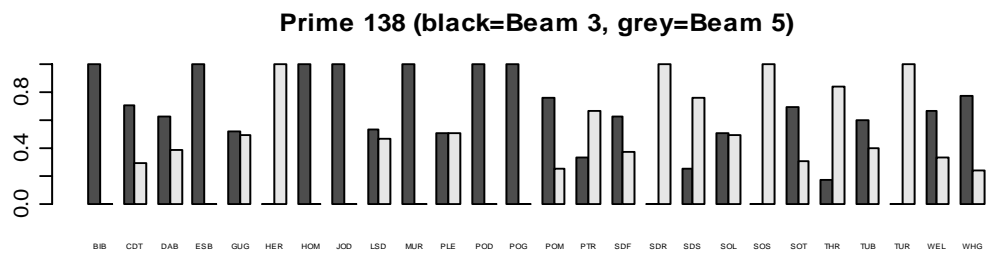
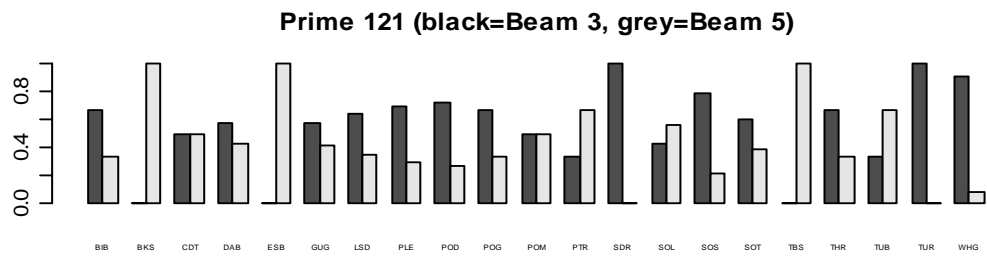


Figure 6 – Cont..

