

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

2005 RESEARCH VESSEL PROGRAMME

REPORT: RV CORYSTES: CRUISE 3/05

STAFF:

I Holmes (SIC)
M Parker-Humphreys (2IC)
S Walmsley
G Course
J Smith
O Wade
R Bush (21st Sept – 5th Oct)
K Leonard (16th-28th Sept only)
D McCubbin (21st-28th Sept only)
M Childs (21st-28th Sept only)

DURATION:

16 September – 5 October 2005
All times are GMT

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 seawater samples for processing on return to Lowestoft for the analysis of caesium and tritium (AE001) (D McCubbin EFS).
6. To collect seabed sediment samples for analysis of caesium and tritium upon return to Lowestoft. (C2170) (K Leonard EFS).
7. To collect fish samples in support of other CEFAS projects and training courses.

NARRATIVE:

CEFAS scientists arrived in Swansea at 1700h 14 September in order to join CORYSTES the following day. On 15 September, all survey gear and associated equipment was loaded, assembled and tested prior to sailing. CORYSTES sailed from Swansea at 0341h, Thursday 16 September and proceeded to the first fishing position within the Bristol Channel Inner (BCI) sector to start the beam trawl survey grid (using beam trawl number I) and fishing commenced the same day at 0549h. Excellent weather and vessel performance ensured that 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 1242h, 19 September.

Early analysis of BCI station catches showed that both catch numbers and catch weights of all major commercial flatfish species were significantly below those recorded on previous surveys. As a result, a request was made to CEFAS Lowestoft for further beam trawls to be prepared and delivered to CORYSTES in Liverpool. In addition, two BCI fishing positions (prime station numbers 119 and 120) were re-fished using the spare beam trawl on-board (beam trawl number IV). The comparative tows were inconclusive, but did show some differences in both quantities caught and the species composition between the two gear sets.

The survey recommenced in the St Georges Channel (SGC) on 20 September using the original gear set (beam trawl no I) and continued until 1237h 21 September when the survey was suspended and CORYSTES steamed to Liverpool. CORYSTES docked at 2030h 21 September to collect the additional fishing gear, extra CEFAS staff and to take on fresh water. CORYSTES sailed from Liverpool at 1040hrs 22 September and the fishing survey recommenced (using beam trawl number III) in the Irish Sea South (ISS) grid at 1334hrs. The survey continued with fishing operations taking place during daylight hours and core sampling operations taking place during the hours of darkness. It quickly became apparent that the Vibrocorer could not be safely deployed from the starboard gantry as had been planned due to the weight capacity of the winch. It was agreed that this equipment should be deployed off the stern but this led to reduced deployment opportunities due the necessity for calm seas in order to ensure the safety of all involved in the deployment and recovery. On stations where deployment of the Vibrocorer was not possible, the nioz corer was deployed instead. In addition, a day-grab and a water sample were taken at each corer position.

The ISS fishing survey grid was completed at 1149h on 26 September. At this time all survey operations were suspended due to worsening sea conditions caused by increasing south-westerly gales. CORYSTES steamed to Ramsay Bay to take shelter, arriving at an anchorage position at 1700h. At 0845h on 28 September, CORYSTES left its anchorage position in Ramsay Bay in order to attempt to rejoin the fishing survey grid in ISN. It soon became apparent that due to the heavy swell and impending south-westerly gales, no fishing would take place that day and CORYSTES returned to its anchorage point in Ramsay Bay. With no prospect of any further coring programme work within the next few days, the decision was taken to end this programme of work. The 3 EFS scientists were taken ashore by sea-rider to Ramsay harbour in order to make their way back to Lowestoft.

At 0300h on 29 September, CORYSTES once again left its mooring position and headed back to the ISN fishing grid. Fishing recommenced at 0610h the same morning. The remaining 6 fishing stations of the ISN fishing survey grid were completed that afternoon and CORYSTES then headed west to begin the Irish Sea West (ISW) survey grid. At three positions close to planned coring locations, 25 litre samples of seawater were taken for contract C2170. Fishing continued without disruption and the ISW and SGC fishing grids were both completed by 1429h on 2 October. CORYSTES steamed back into the Celtic Sea in order to complete the BCO survey grid. This was achieved at 1802h on 3 October.

With the full survey grid now completed, CORYSTES embarked on a series of repeated fishing tows in the northern area of the BCI sector. This was to facilitate comparison of catch rates and species composition of the beam trawl (no I) used for the full BCI grid on this year's survey and the survey beam trawl (no III). A selection of both inshore and offshore fishing positions within Carmarthen Bay and Swansea Bay areas were chosen to re-fish so that these comparisons could be made. A total of 11 fishing stations within BCI were fished again, of which 10 were considered to be valid tows.

Upon completion of repeated fishing tows, 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 1926h 4 October and continued through the night, completing at 0715h 5 October. Once completed, CEFAS scientists began the process of cleaning up and packing away of equipment in readiness for docking in Swansea.

CORYSTES docked in Swansea at 1730h 5 October and unloading took place on the morning of 6 October. CEFAS scientists departed CORYSTES and headed for Lowestoft at 1100h 6 October.

RESULTS:

Aims 1, 2 & 3

The survey gear was the standard 4m-beam trawl with chain mat, flip-up ropes and the net was fitted with a 40mm cod-end liner. Beam trawl number I was used in the Bristol Channel Inner (BCI) area and 10 fishing stations within St Georges Channel (SGC). All other fishing stations were fished with beam trawl number 3. 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 a SAIV mini CTD unit set up in the wet laboratory with a permanent flow of surface seawater passing over the probe. 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

	VIIa	VIIb	VIIg	Total
Anglerfish (<i>L.piscatorious</i>)	34	26	21	81
Anglerfish (<i>L.budegassa</i>)	0	0	0	0
Bass	0	14	0	14
Brill	6	13	5	24
Cod	93	11	1	105
Dab	250	219	16	485
Haddock	45	1	29	75
Hake	2	12	22	36
Lemon sole	65	58	18	141
Megrim	0	0	8	8
Plaice	1404	279	27	1710
Sole	295	367	49	711
Turbot	3	8	3	14
Whiting	138	22	42	202
Total	2335	1030	241	3606

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 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), 313 (Tremadoc Bay), 203 (Dundrum Bay), 214 and 220 (north of Dublin), 233 (south of Wicklow), 501 (southwest of Milford Haven), 401 and 425 (both SW of the Isle of Man) were reduced from the standard 30 minutes to 15 minute tows because of expected large catches of weed, shell/small flatfish or due to deteriorating weather conditions. Prime station number 419 (North of Anglesey) was moved slightly this year to avoid a known ‘snagging’ position encountered on an earlier DARD survey. The new position was approximately 500m north-east of the original tow but within the same depth contour. Prime station 425 was moved approx 8nm south of normal tow position and fished for only 15 minutes in order to ensure that tow was fished due to faltering light and deteriorating weather conditions. Again, the alternative tow was fished within the same depth contour. Prime station 502 was moved 2.6nm SE of original tow in order to avoid a new cable.

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.

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.

Plaice: Numbers of plaice in BCI per half-hour tow decreased by 28% from last year although the total weight increased by 10%, indicating that less small plaice were caught this year. ISS catch numbers decreased by 19% and weights by 24%, with only three fishing stations showing an increase in catch rates. ISN catch numbers also fell by 17% from the previous year with catch weights also falling by 11%. Elsewhere, plaice

catch rates increased by 160% in SGC and by 130% in BCO, but decreased by 42% in ISW. However, in most sectors, catch rates were similar to the survey averages.

Sole: Catch rates of sole per half-hour tow decreased in all survey sectors compared to the high levels caught in the 2004 survey. In BCI, catch numbers fell by 44% (catch weights by 46%), in ISS catch numbers fell by 58% (catch weights by 49%) and in ISN catch rates fell by 43% (catch weights by 47%). Elsewhere, catch numbers fell by 17% in BCO, by 64% in ISW and by 9% in SGC. Again, in most sectors, catch rates were similar to the survey averages.

Dab: Catch rates in all Irish Sea survey sectors fell substantially (ISS – 30%; ISN – 13%, ISW 76%; SGC – 39%) but catch rates increased substantially in the Bristol Channel survey sectors (BCI – 24%; BCO - 44%)

Noteworthy changes to the catch rates of other main species were large decreases in the numbers of lesser spotted dogfish, whiting and thornback rays caught throughout the whole Irish Sea and Bristol Channel area. This follows similar large increases in catch numbers noted for these species on the 2004 survey. Lemon Sole catch rates also fell in all survey sectors this year.

Replicated tows

Once the full survey grid had been completed and with over a day left before the survey was due to end, it was decided to re-fish some Bristol Channel Inner (BCI) stations. Having originally fished this sector with beam trawl number I, and finding that catch rates of all flatfish species appeared to be low, this was an excellent opportunity to carry out a series of comparative tows using beam trawl number III.

11 BCI fishing stations were selected from the South Wales coast that covered both the Carmarthen and Swansea Bay sea areas and also covered both depth bands. The catches were processed in the normal manner but no otolith samples were taken and no mini CTD data or salinity samples were collected on these fishing stations.

Early analysis of these data compared catch numbers and catch weights of sole (*Solea solea*), plaice (*Pleuronectes platessa*), lesser spotted dogfish (*Scylliorhinus canicula*), solenette (*Buglossidium luteum*); dab (*Limanda limanda*); thornback ray (*Raja clavata*) and the benthic by-catch. Simple averages of catch numbers and catch weights were calculated for both groups of fishing stations and the results compared.

Table 2 shows a summary of the relative catch rates (numbers and weights) and shows the increase/decrease in the averages.

Although the results are not conclusive, it does show that for most of the flatfish species, the catch rates were better with beam trawl number 3, although catch rates of both sole and Thornback ray fell. It is recommended that further statistical analysis of these comparative tows should be carried out to determine the true effect of the change of gear set.

Table 2 - Summary of the relative catch rates (numbers and weights)					Note - All weights are in Kg.				
Sole					Lemon Sole				
	Beam 1		Beam 3			Beam 1		Beam 3	
Prime stn	Nos	Wt	Nos	Wt	Prime stn	Nos	Wt	Nos	Wt
109	57	9.9	21	3.11	109	1	0.47	0	0
121	37	5.5	39	5.665	121	0	0	0	0
134	46	5.47	46	5.906	134	0	0	0	0
102	52	3.415	75	5.5575	102	0	0	0	0
104	47	3.601	39	2.35	104	1	0.058	0	0
137	56	5.03	52	5.14	137	0	0	0	0
111	21	1.515	5	0.71	111	0	0	0	0
113	45	4.005	43	7.28	113	0	0	1	0.19
116	8	1.435	9	1.535	116	0	0	0	0
105	17	2.89	18	4.46	105	0	0	1	0.305
average	38.6	4.276	34.7	4.171	average	0.2	0.053	0.2	0.050
Beam 3 compared to beam 1		Nos	11% less		Beam 3 compared to beam 1		Nos	Same	
		Wt	2.5% less				Wt	6% less	
Plaice					Dab				
	Beam 1		Beam 3			Beam 1		Beam 3	
Prime stn	Nos	Wt	Nos	Wt	Prime stn	Nos	Wt	Nos	Wt
109	8	1.798	10	3.905	109	7	0.474	9	0.975
121	25	6.764	22	5.47	121	104	7.746	125	6.57
134	23	3.73	28	4.4	134	7	0.435	6	0.192
102	9	1.905	38	6.565	102	14	0.402	30	1.695
104	38	4.64	30	4.045	104	50	2.041	76	2.265
137	36	4.705	47	6.775	137	234	5.618	288	7.932
111	18	3.935	9	1.895	111	37	0.77	12	0.98
113	1	0.55	1	0.75	113	1	0.002	7	0.229
116	0	0	0	0	116	6	1.55	9	0.04
105	0	0	3	1.8	105	7	0.012	13	0.03
average	15.8	2.803	18.8	3.561	average	46.7	1.905	57.5	2.091
Beam 3 compared to beam 1		Nos	19% more		Beam 3 compared to beam 1		Nos	23% more	
		Wt	27% more				Wt	10% more	
LSD					Thornback Ray				
	Beam 1		Beam 3			Beam 1		Beam 3	
Prime stn	Nos	Wt	Nos	Wt	Prime stn	Nos	Wt	Nos	Wt
109	11	8.08	4	3.02	109	10	12.732	1	0.01
121	1	0.265	2	3.34	121	14	8.58	5	5.906
134	8	3.82	7	3.85	134	7	4.55	6	5.228
102	0	0	2	1.5	102	3	2.55	4	2.085
104	1	0.74	1	0.69	104	8	1.65	7	1.095
137	7	4.77	1	0.69	137	6	1.055	3	0.765
111	0	0	7	5.78	111	3	5.663	1	0.135
113	1	0.48	16	9.615	113	5	0.785	7	9.58
116	9	5.43	4	2.39	116	0	0	1	0.015
105	5	3.42	71	47.275	105	2	0.43	5	10.5
average	4.3	2.701	11.5	7.815	average	5.8	3.800	4	3.532
Beam 3 compared to beam 1		Nos	167% more		Beam 3 compared to beam 1		Nos	31% less	
		Wt	189% more				Wt	7% less	
Solinette					Benthos				
	Beam 1		Beam 3			Beam 1		Beam 3	
Prime stn	Nos	Wt	Nos	Wt	Prime stn	Nos	Wt	Nos	Wt
109	28	0.39	6	0.09	109		22.24		0.565
121	35	0.565	126	1.668	121		284		6.24
134	721	4.606	321	2.575	134		113.16		21.32
102	418	4.586	615	4.925	102		5.56		4.94
104	100	0.87	144	1.285	104		83.16		16.5
137	980	10.385	1753	15.888	137		392.08		298.76
111	11	0.145	9	0.123	111		4.66		4.22
113	2	0.025	3	0.04	113		18.58		15.6
116	0	0	3	0.046	116		0.345		14.72
105	3	0.012	0	0	105		139.74		19.42
average	229.8	2.158	298	2.664	average		106.353		40.229
Beam 3 compared to beam 1		Nos	30% more		Beam 3 compared to beam 1		Wt	62% less	
		Wt	23% more						

Aim 4 - Epibenthos

At 26 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 one station due to all staff being fully employed in processing of the fish catch. On this station, a sample of the epi-benthic by-catch was labelled and frozen for subsequent analysis upon return to Lowestoft. If this cruise aim is to continue on future surveys, the provision of a scientist dedicated to this work should be considered.

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 3 stations 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 and Severn Estuary for Tritium H-3 analysis. These were taken for David McCubbin (CEFAS, Lowestoft). In addition, the EFS team collected twelve 25 litre surface seawater samples at each of the corer positions visited.

Aim 6 – Seabed sediment sample collection

This objective was to estimate the inventory of ^{99}Tc in the sub-tidal sediments of the Irish Sea. The work programme required the collection of 16 sediment cores from a variety of locations around the Irish Sea (Figure 4), representative of the different surface substrates and of sufficient depth (up to 2 m) to ensure reaching the limit of ^{99}Tc contamination. Deployment of the Vibrocorer from the starboard winch was not possible as this equipment exceeded the maximum safe load of this winch. Therefore the Vibrocorer had to be deployed from the stern gantry/winch and as a result, deployment was only possible in the calmest of sea conditions and even then, only due to the excellent skills and determination of the officers and crew. Despite the best efforts of all involved, the performance of the Vibrocorer was disappointing. It was suspected that the corer's motor tripped or burnt out on the first deployment, and at subsequent core stations this equipment was used only as a 'gravity' corer (i.e. collection of deep cores was restricted to muddy areas). The Day Grab and Nioz corers functioned well, albeit that their usage was also impaired by unfavourable weather conditions.

Sampling began on the evening of the 22nd September with two successful deployments of the Vibrocorer in Liverpool bay. Inclement weather ensured that no coring operations took place on the evening of the 23rd September. Sampling in the critical area close to Sellafield on the evening of September 24th, was severely restricted due to unfavourable weather conditions with southwesterly winds ensuring that no attempt was made to deploy the Vibrocorer. It was possible to deploy the Nioz corer, although conditions made retrieval a hazardous operation. On the evening of September 25th more favourable weather conditions meant that four sampling positions were visited and sampling with the Vibrocorer was possible. On the 26th September day, bad weather suspended the survey and CORYSTES took shelter in Ramsay Bay. It became clear that no further coring operations were going to be possible in the time remaining aboard, and the decision was taken for the EFS scientists to leave CORYSTES by sea-

rider at Ramsay IOM. When fishing resumed, 25 litre surface seawater samples were taken at 3 positions close to designated core sample stations. A summary of core sampling activity is shown in Table 3 below.

Table 3. Summary of core sampling activity

C2170 Site No.	Ships Station	Date	Vibrocorer	Water Sample	Day Grab	Nioz
1	53	Sept. 22 nd	~ 1 m core	✓	✓	Not required
2	71	Sept. 24 th	Bad weather ∅	✓	✓	17 cm #
3	54	Sept. 22 nd	~ 1.5 m core*	✓	✓	Not required
4	73 & 85	Sept. 24/25 th	Failed	✓	✓	Bad weather ∅
5	72	Sept. 24 th	Failed	✓	✓	~50 cm #
6	83	Sept 25th	Core taken*	✓	✓	Not required
7	84	Sept 25th	Core taken*	✓	✓	Not required
8	X	-	X	X	X	Not required
9	81	Sept 25th	Bad weather ∅	✓	✓	Bad weather ∅
10	63	Sept. 24 th	Corer failed	✓	✓	21 cm #
11	X	-	X	X	X	Not required
12	X	-	X	X	X	Not required
13	107	Sept. 30 th	Bad weather ∅	✓	X	Bad weather ∅
14	X	-	X	X	X	Not required
15	100	Sept. 30 th	Bad weather ∅	✓	X	Not required
16	111	Oct. 1 st	Bad weather ∅	✓	X	Not required

* Vibrocorer used as 'gravity' corer # Nioz core used as 'substitute' for Vibrocore

∅ Unfavourable weather conditions meant impossible to safely deployed

Aim 7 - Additional sample collection

Additional samples were taken in support of other CEFAS projects and training courses:

A) Samples of either dead or damaged ocean quahog (*Artica Islandica*) and samples of live dog cockles (*Glycymeris glycymeris*) were collected from one station in the Bristol Channel for Dr J Ellis – (CEFAS, Lowestoft)

B) 15 specimens of bullhuss (*Scyliorhinus stellaris*) and 5 specimens of starry smooth hound (*Mustelus asterias*) were tagged with Peterson discs and released. Dr J Ellis (CEFAS, Lowestoft)

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

D) The following specimens of swimming crabs were collected for genetic analysis. Dr J Ellis (CEFAS, Lowestoft)

3 specimens of flying crab (*Liorcarinus holsatus*)

3 specimens of Henslow's swimming crab (*Polybius henslowi*)

3 specimens of velvet swimming crab (*Necora puber*)

1 specimen of marbled swimming crab (*Liorcacrinus marmoreus*)

3 specimen of corrugated swimming crab (*Liorcacrinus corrugatus*)

E) Three bags of mixed crustaceans were taken from fishing stations in Carmarthen Bay. Dr J Ellis (CEFAS, Lowestoft).

F) Samples of spider crabs (*Maia squinado*), cuttlefish (*Elodine cirrosa*), dab, lesser spotted dogfish and mixed ray (*Raja spp.*) were collected for the radiological monitoring programme. P Rumney (CEFAS, Lowestoft).

G) 8 'sets' of selected species (each with 15 individual species) were collected and frozen as part of the on-going CEFAS fish ID quality control programme. In addition, all scientific staff participating in the survey were tested on their fish identification skills at 3 fishing stations during the survey. M Etherton (CEFAS, Lowestoft).

H) Samples of cod (*Gadus morhua*), plaice, whiting (*Merlangius merlangus*), dab, sole and flounder (*Platichthys flesus*) were collected. A Franklin (CEFAS, Burnham on Crouch)

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

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

K) Illicia were collected from all monkfish (*Lophius piscatorius*) caught. S Warne (CEFAS, Lowestoft).

L) Samples of Nephrops (*Nephrops norvegicus*), edible crab (*cancer pagurus*) and plaice were collected from fishing positions in the Irish Sea. D McCubbin (CEFAS, Lowestoft)

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. However initial problems with the down loading of the recorded data led to the spare unit (SAIV Micro CTD unit no 426) being placed on the beam trawl for all subsequent fishing days. After consultation with the SIGs team in Lowestoft the data was successfully recovered. Unit 426 successfully recorded data on all but one fishing day. This failure was due to unit being left 'on' whilst CORYSTES was sheltering from inclement weather and when fishing resumed, the unit's memory had reached its capacity. In total, successful CTD data collection amounted to 102 out of a total 109 fishing stations. The CTD unit was not used on the replicate tows in the Inner Bristol Channel.

Continuous CTD data collection

A SAIV Micro CTD unit was placed in the wet-lab sink with a constant flow of surface seawater being passed over the probe. The information being recorded was also displayed on a laptop PC in the dry lab. Initially, unit number 426 was used for this data collection, but the problems encountered in down loading the beam trawl CTD data from unit 427 meant that this unit was placed on the fishing gear from day two of the survey. Once the down loading problem had been resolved with unit number 427 on fourth day of the survey, this unit was used as the continuous CTD recording unit and successfully recorded data for the remainder of the survey.

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 so many of the survey aims were achieved. Special mention should be made of the Officer's & crew's determination to successfully deploy the corer equipment, without which the CEFAS EFS team would have returned home largely empty-handed.

I D Holmes
5 October 2005

INITIALLED: Dr R. Millner

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

DISTRIBUTION:

Basic List +

I Holmes

M Parker-Humphreys

S Walmsley

G Course

J Smith

O Wade

R Bush

D McCubbin

K Leonard

M Childs

R S Millner

S Flatman

B Harley

R Briggs (DARDNI, Belfast)

P Connolly (DOM, Dublin)

FCO (for Republic of Ireland)

Sea Fisheries Committees:

Cumbria

North Western and North Wales

South Wales

Devon

Cornwall

Figure 2.

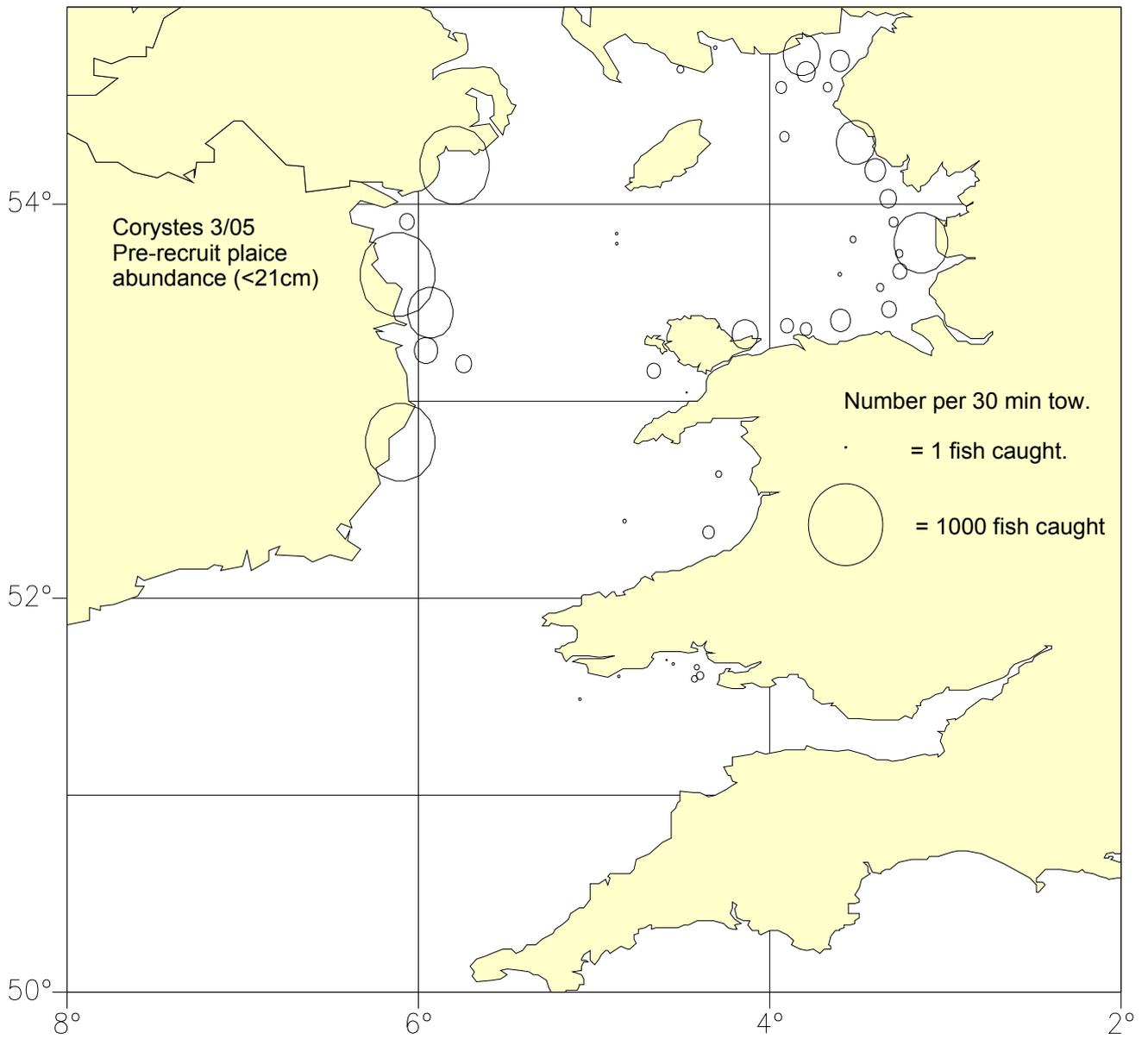


Figure 3.

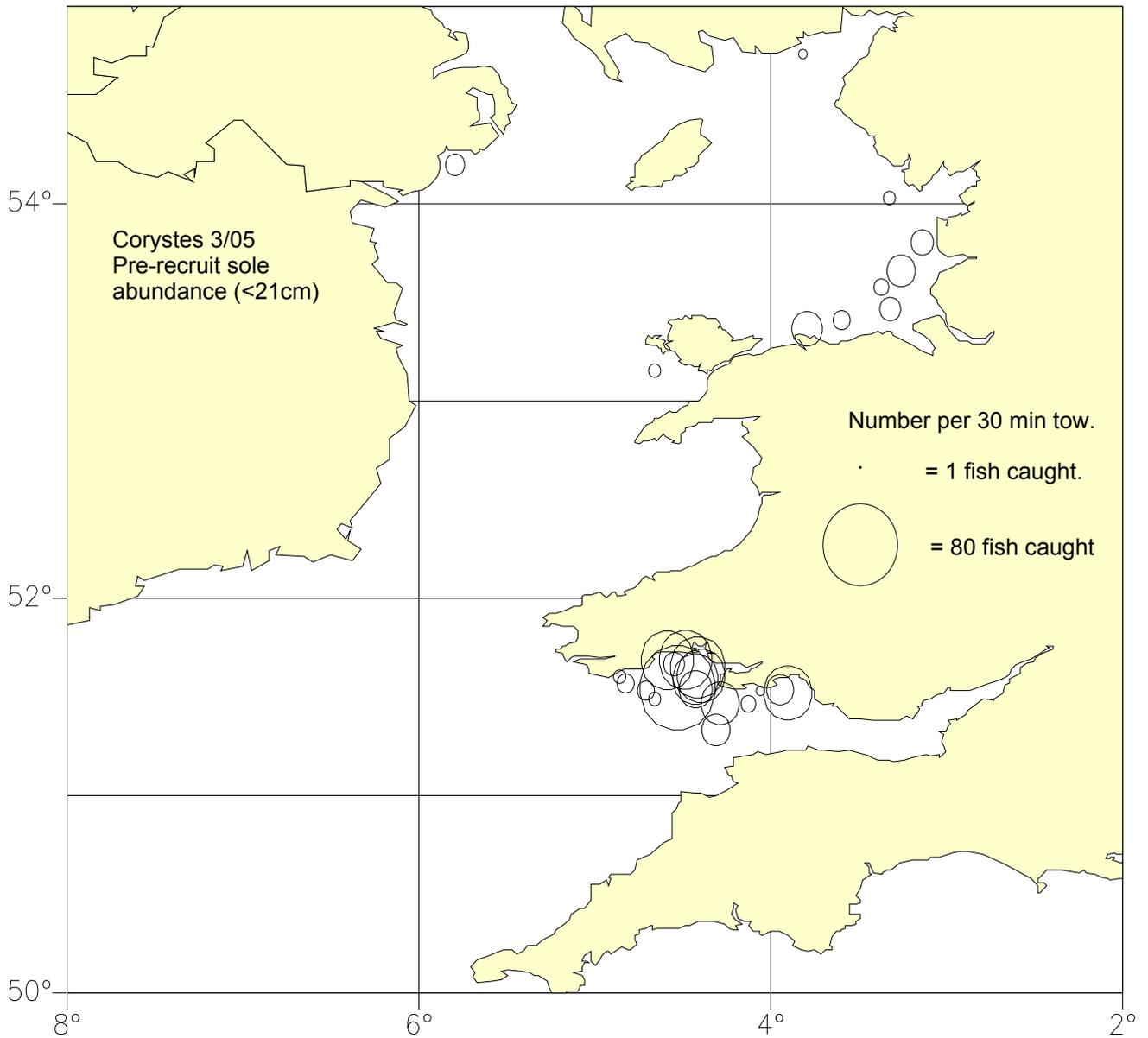


Figure 4.

