

A Report of the Historical Changes on the Cefas Irish Sea (VIIa) and Bristol Channel (VII f & g) Beam Trawl Survey

Joanne Smith

A Report of the Historical Changes on the Cefas Irish Sea (VIIa) and Bristol Channel (VII f & g) Beam Trawl Survey

Joanne Smith

This report should be cited as: Smith, J. 2013. A Report of the Historical Changes on the Cefas Irish Sea (VIIa) and Bristol Channel (VI f & g) Beam Trawl Survey. Sci. Ser. Tech. Rep., Cefas Lowestoft, 148: 42pp.

Additional copies can be obtained from Cefas by e-mailing a request to infoservices@cefas.co.uk or downloading from the Cefas website www.cefas.defra.gov.uk.

© Crown copyright, 2013

This publication (excluding the logos) may be re-used free of charge in any format or medium for research for non-commercial purposes, private study or for internal circulation within an organisation. This is subject to it being re-used accurately and not used in a misleading context. The material must be acknowledged as Crown copyright and the title of the publication specified.

This publication is also available at www.cefas.defra.gov.uk

For any other use of this material please apply for a Click-Use Licence for core material at www.hms0.gov.uk/copyright/licences/core/core_licence.htm, or by writing to:

HMSO's Licensing Division
St Clements House
2-16 Colegate
Norwich
NR3 1BQ
Fax: 01603 723000
E-mail: licensing@cabinet-office.x.gsi.gov.uk

Contents

Contents	3	10. Survey number: Corystes 9/95	14
1. Introduction	5	10.1 Gear	14
		10.2 Trawl stations:	14
		10.3 Additional aims:	14
		10.4 Additional information:	14
2. Photograph and diagram of the gear used on the ISBC	6	11. Survey number: Corystes 11/96	15
		11.1 Gear:	15
		11.2 Trawl stations:	15
		11.3 Additional Aims:	15
		11.4 Additional information	15
3. Survey number: Corystes 7/88	7	12. Survey number: Corystes 10a/97	16
3.1 Gear:	7	12.1 Gear:	16
3.2 Trawl stations:	7	12.2 Trawl stations:	16
3.3 Additional Aims:	7	12.3 Additional Aims:	16
3.4 Additional Information	7		
4. Survey number: Corystes 10/89	8	13. Survey number: Corystes 9b/98	17
4.1 Trawl stations:	8	13.1 Gear:	17
4.2 Additional Aims:	8	13.2 Trawl stations:	17
4.3 Additional Information:	8	13.3 Additional Aims:	17
		13.4 Additional information	17
5. Survey number: Corystes 10/90	9	14. Survey number: Corystes 9/99	18
5.1 Trawl stations:	9	14.1 Trawl stations:	18
5.2 Additional aims	9	14.2 Confirmation of unusual fish and catches	18
5.3 Additional information:	9	14.3 Additional Aims:	18
		14.4 Additional information	18
6. Survey number: Corystes 9/91	10	15. Survey number: Corystes 12b/00	19
6.1 Trawl stations:	10	15.1 Trawl stations:	19
6.2 Additional aims:	10	15.2 Additional Aims:	19
6.3 Additional information:	10	15.3 Additional information	19
7. Survey number: Corystes 10B/92	11	16. Survey number: Corystes 9/01	20
7.1 Gear:	11	16.1 Trawl stations:	20
7.2 Trawl stations:	11	16.2 Additional Aims:	20
7.3 Additional aims:	11	16.3 Additional information	20
7.4 Additional information:	11		
8. Survey number: Corystes 10/93	12	17. Survey number: Corystes 13/02	21
8.1 Gear:	12	17.1 Trawl stations:	21
8.2 Trawl stations:	12	17.2 Additional Aims:	21
8.3 Confirmation of unusual fish and catches:	12	17.3 Additional information	21
8.4 Additional aims:	12		
8.5 Additional information:	12		
9. Survey number: Corystes 10/94	13		
9.1 Gear:	13		
9.2 Trawl stations:	13		
9.3 Additional aims:	13		
9.4 Additional information:	13		

18.	Survey number: Corystes 13/03	22	24.	Survey number: Cefas Endeavour 13/09	28
18.1	Gear:	22	24.1	Gear:	28
18.2	Trawl stations:	22	24.2	Trawl stations:	28
18.3	Additional Aims:	22	24.3	Confirmation of unusual fish and catches	28
18.4	Additional information	22	24.4	Additional Aims:	28
			24.5	Additional information	29
19.	Survey number: Corystes 14/04	23	25.	Survey number: Cefas Endeavour 14/10	30
19.1	Trawl stations:	23	25.1	Trawl stations:	30
19.2	Additional Aims:	23	25.2	Additional Aims:	30
19.3	Additional information	23	25.3	Additional information	30
20.	Survey number: Corystes 3/05	24	26.	Survey number: Cefas Endeavour 15/11	31
20.1	Gear:	24	26.1	Gear:	31
20.2	Trawl stations:	24	26.2	Trawl stations:	31
20.3	Additional Aims:	24	26.3	Additional Aims:	31
20.4	Additional information	24	26.4	Additional information	31
21.	Survey number: Corystes 5/06	25	Appendix I		32
21.1	Gear:	25	<hr/>		
21.2	Trawl stations:	25	Appendix II		33
21.3	Additional Aims:	25	<hr/>		
21.4	Additional information	25	Appendix III		36
22.	Survey number: Corystes 2/07	26	<hr/>		
22.1	Gear:	26	Glossary		37
22.2	Trawl stations:	26	<hr/>		
22.3	Confirmation of unusual fish and catches	26	References		38
22.4	Additional Aims:	26	<hr/>		
22.5	Additional information	26	<hr/>		
23.	Survey number: Corystes 3/08	27			
23.1	Trawl stations:	27			
23.2	Confirmation of unusual fish and catches	27			
23.3	Additional Aims:	27			
23.4	Additional information	27			

1. Introduction

The aim of this report is to give guidance on changes that have occurred during the time series of the Irish Sea and Bristol Channel Beam Trawl survey (ISBC) and to indicate why such changes were put into place. The report also lists references to papers or reports that used data collected on the beam trawl survey as part of an additional aim.

Irish Sea and Bristol Channel Survey

The survey is carried out to provide indices of abundance which are independent of commercial fisheries for all age groups of sole and plaice in the Irish Sea and Bristol Channel grounds for the ICES Celtic Seas Ecoregion Working group, and an index of recruitment of young plaice and sole prior to full recruitment to the fishery. The standard survey has a total of 108 tows of 30 minutes duration (primary stations), with 65 in VIIa and 43 in VIIf + g. These stations are stratified by sector and depth band. Primary survey stations total 34 in the eastern Irish Sea (ISN + ISS), 15 in the western Irish Sea (ISW), 16 in St Georges Channel (SGC), 32 in the inner Bristol Channel (BCI) and 16 in the outer Bristol Channel (BCO). The 67 stations in sector ISN, ISS and BCI are given top priority as they contribute to the VPA tuning and recruitment indices at the Working Groups. Historically, there was a seventh survey sector of South-East of Ireland (SEI), but this sector was 'dropped' in the late 1990's.

This survey is the NWGFS on the FSS.

Survey 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) (C Smedley EFS).

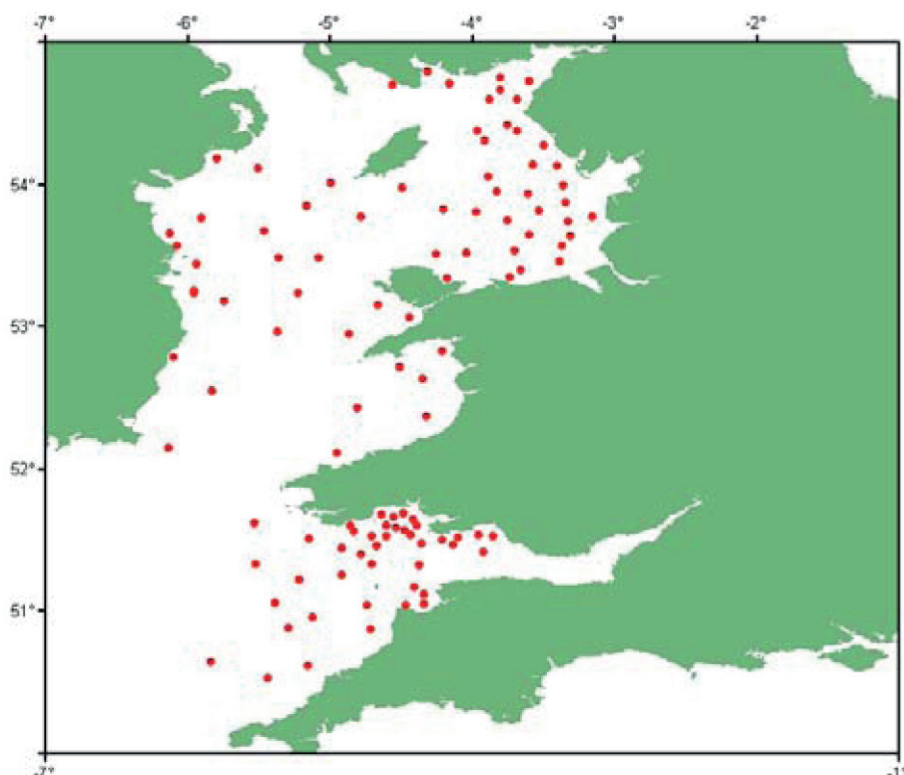


Figure 1: Position of stations sampled on the Irish Sea and Bristol Channel Beam Trawl Survey.

2. Photograph and diagram of the gear used on the ISBC



Figure 2: Beam trawl used on the ISBC

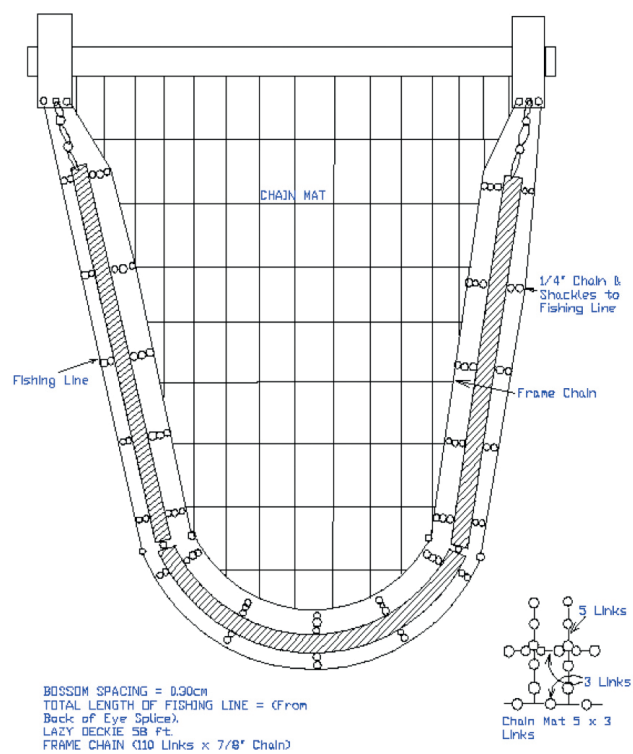


Figure 3: Diagram of the beam trawl layout on the ISBC.

3. Survey number: Corystes 7/88

Scientist in charge: D J Symonds

Dates: 20th September – 13th October

3.1 Gear:

- This was the first year using the new research vessel Corystes and the commercially rigged 4m beam trawl because of this no comparison were made with previous year's results.
- Comparative fishing was carried out in relatively poor conditions with the 3m beam trawl, as rigged on the previous year's flat fish survey, and the commercial 4m beam trawl. This was to make comparison between the 4m and 3m beam trawl. The alternative hauls approach was generally used but, on three tows, the two gears were towed simultaneously from each quarter.

3.2 Trawl stations:

- A survey for 0 and 1 group gadoids in the Irish Sea was carried out using the Granton trawl (1988–1993).
- 55 stations in the eastern Irish sea were fished using the 4m beam trawl, with a small meshed liner. 25 were fished in depths of 0–20m, 21 were fished in depths of 21–40m and 9 were fished in depths above 41m.
- 24 stations in the Bristol Channel were fished using the 4m beam trawl.
- The 4m beam trawl stations were fished for 15 minutes (1988–1993).

3.3 Additional Aims:

- Ten out of the twelve gadoid survey stations were repeated using the 4m beam trawl. It was obvious that this gear does not perform well on muddy substrate which is widespread to the west of the Isle of Man. Shortening the length of towing warp and increasing the towing speed did not improve catches.
- An engineer and cameraman from British Marine Technology, Newcastle came on board to make observations and to film the propeller.
- Proposed trial tows in Cardigan Bay with the commercial 4m beam trawl were cancelled due to bad weather conditions.
- Pre recruit sole were tagged off north Wales's coast, Red Wharf Bay and off the River Ribble.
- Two 18 hour sampling sequences were carried out to study the variation in catch rates of sole (*Solea solea*), plaice (*Pleuronectes platessa*) throughout these periods.
- Otoliths of 979 fish from 9 species were taken for pre recruit and biological studies and to augment the market sampling programme (this year only).
- Selected flatfish were deep frozen for the laboratory's fish identification course (1988–1992, 1998, 2001 & 2009).

3.4 Additional Information

- Benthos was recorded at every station (1989–2003).
- Depth, profiles of salinity, temperature and turbidity were recorded at most beam trawl survey stations (1988–present).
- Squids were weighed and counted (1988–2004).
- Lobsters (*Homarus gammarus*) were weighed and counted but not sexed (1988–1991).
- Gobies (*Gobiidae*) were recorded using the Cefas three letter code of GPA (1988–2001).
- Octopus (*Eledone cirrhosa*) were weighed and counted (1988–present).
- Cod (*Gadus morhua*), lemon sole (*Microstomus kitt*), plaice, sole, witch (*Glyptocephalus cynoglossus*) and whiting (*Merlangius merlangus*) were otolithed.
- Table 1 in Appendix I show which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 6.1 in Appendix II shows the position of the stations fished for this year.
- Table 2 in Appendix III shows the number of planned/actual stations fished for this year.

4. Survey number: Corystes 10/89

Scientist in charge: D J Symonds

Dates: 6th September – 27th September

4.1 Trawl stations:

- 12 stations of the pre-recruit gadoid survey were fished using the Granton trawl.
- 54 stations in the eastern Irish Sea were fished using the 4m beam trawl.
- 24 stations in the Bristol Channel were fished using the 4m beam trawl.

4.2 Additional Aims:

- Three successful 24 hour sampling sequences were carried out to investigate the variation in pre-recruit soles and plaice catch rates.
- Twenty-four tows with the 4m beam trawl were completed outside and westward of Constable Bank to establish the distribution and abundance of 1 and 2 grouped sole in the area not normally sampled during the North Wales inshore survey carried out by charter vessel from Conwy.
- The catch rates of the 4m beam trawl as used on Corystes and the double beamer annually chartered to survey the western English Channel were compared.
- Selections of commercial fish were collected from Liverpool Bay for Mr A Franklin. This is for the Clean Seas Environment Monitoring Programme (previously known as the National Marine Monitoring Programme) to access mercury levels in fish to ensure compliance with a range of EC Directives (Annually for 1990–1992 and every four years for more recent years).
- Livers from dabs (*Limanda limanda*) and flounders were preserved for Dr D Bucke (Bucke *et al.* 1993).
- Following the theft of the brood stock from the Conwy Laboratory, about 50 live sole were landed at Conwy to replenish their stock (this year only).
- A water sample for isotopic analysis was taken for Dr P Dare from the scallop (*Pecten maximus*) grounds 10 miles of the Calf of Man (this year only) (Dare & Deith.1991).

4.3 Additional Information:

- Edible crabs (*Cancer pagurus*) were weighed and counted (1988–1990).
- Due to a recurring fault in the hardware, no survey data were input into the computer.
- Table 1 in Appendix I show which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 6.1 in Appendix II shows the position of the stations fished for this year.
- Table 2 in Appendix III shows the number of planned/actual stations fished for this year.

5. Survey number: Corystes 10/90

Scientist in Charge: D J Symonds

Dates: 6th September – 27th September

5.1 Trawl stations:

- 13 stations of the pre-recruit gadoid survey were fished using the Granton trawl.
 - 54 stations in the eastern Irish Sea were fished using the 4m beam trawl.
 - 23 stations in the northern part of the Bristol Channel were fished using the 4m beam trawl.
-

5.2 Additional aims

- Sole were tagged on Constable Bank and off Ribble in conjunction with a study on the variability of sole and plaice catches over 24 hours.
 - Scallops and soles were landed live for the Conwy Morfa (this year only).
 - Benthos and spider crabs were brought back live for the Royal Zoological Society and the University of East Anglia (1990–1992).
-

5.3 Additional information:

- Sailing from Douglas after the mid cruise break was delayed to effect satisfactory repairs to the SIMRAD sounder and to allow a westerly gale to abate.
- Edible crab were weighed and measured from this year on but not sexed.
- Table 1 in Appendix I show which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 6.1 in Appendix II shows the position of the stations fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

6. Survey number: Corystes 9/91

Scientist in charge: D J Symonds

Dates: 10th September – 1st October

6.1 Trawl stations:

- 12 stations of the pre-recruit gadoid survey were fished using the Granton trawl.
 - 53 stations in the eastern Irish Sea were fished using the 4m beam trawl.
 - 33 stations in the northern part of the Bristol Channel were fished using the 4m beam trawl.
-

6.2 Additional aims:

- This year comparative fishing with the Granton trawl was carried out with Dani's RV Lough Foyle to compare catch rates of gadoids (this year only).
 - Anglerfish gonads were collected for Dr M. Greer-Walker for fecundity studies (this year only).
-

6.3 Additional information:

- Records were kept and photographs taken of benthos caught at most stations (1991–1993).
- Edible crabs were weighed, measured and sexed (1991–present).
- Table 1 in Appendix I show which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 6.1 in Appendix II shows the position of the stations fished for this year.
- Table 2 in Appendix III shows the number of planned/actual stations fished for this year.

7. Survey number: Corystes 10B/92

Scientist in Charge: D J Symonds

Dates: 28th August – 21st September

7.1 Gear:

- All trawl data were input to the Fishing Survey suite on the VAX computer. However, problems were encountered in producing output documents.
-

7.2 Trawl stations:

- 12 stations of the pre-recruit gadoid survey were fished using the Granton trawl.
 - 53 stations in the eastern Irish Sea were fished using the 4m beam trawl.
 - 34 stations in the northern part of the Bristol Channel were fished using the 4m beam trawl.
-

7.3 Additional aims:

- The catch rate of sole and plaice in 15 and 30 minute trawls was compared (this year only).
 - Lesser weavers were collected for Dr Nash (Port Erin) (1992, 1993, 1998, 1999, 2000, 2001 (including Greater weavers) and 2003).
 - The states of sexual maturity of rays (mainly *R.clavata*) were recorded to gain a better biological understanding of this species (1992–2010).
 - Notes were made on the incidence and extent of ambicoloration in sole caught on all 30 minute hauls with the beam (this year only).
-

7.4 Additional information:

- Lobsters were weighed, measured and sexed (1992–present).
- Table 1 in Appendix I show which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 6.1 in Appendix II shows the position of the stations fished for this year.
- Table 2 in Appendix III shows the number of planned/actual stations fished for this year.

8. Survey number: Corystes 10/93

Scientist in charge: D J Symonds

Dates: 2nd September – 27th September

8.1 Gear:

- All trawl data was input into the fishing Survey system on the VAX computer. However, problems were encountered in producing output documents and the system requires exhaustive testing before further use in the field.

8.2 Trawl stations:

- The pre-recruit gadoid survey is no longer carried out on the ISBC.
- The 4m beam trawl stations were increased from 15 minutes (in previous years) to 30 minutes (1993–present).
- Thirty minute tows with the 4m commercial beam trawl with a 40mm codend were carried out at the standard 34 stations of the Bristol Channel survey and the north-east Irish Sea survey.
- In addition, 38 and 16 stations were completed in the rest of the Irish Sea and the Celtic Sea respectively.

8.3 Confirmation of unusual fish and catches:

- A triggerfish (*Balistes carolinensis*) was caught in Carmarthen Bay.

8.4 Additional aims:

- Bass (*Dicentrarchus labrax*) were collected for Mr Eaton.
- Elasmobranches material was collected for Mr Ellis (Swansea) for his PHD entitled Biology and ecology of elasmobranches fishes in the Bristol Channel and Irish Sea with emphasis on their feeding habits.
- Butterfly blennies (*Blennius ocellaris*) were collected and frozen for Dr Kaiser (this year only) (Kaiser *et al.* 2005).
- 0 group cod were collected for Dr Brander (this year only) (Brander *et al.* 1984).

8.5 Additional information:

- All otolithed fish were individually weighed from this year on.
- All otolithed fish were individually matured from this year until 2010.
- Photographs were taken of benthic catch at each fishing station (1993) and the abundance of major animal groups was recorded (1994 and 1995).
- Table 1 in Appendix I show which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 6.1 in Appendix II shows the position of the stations fished for this year.
- Table 2 in Appendix III shows the number of planned/actual stations fished for this year.

9. Survey number: Corystes 10/94

Scientist in charge: D J Symonds

Dates: 26th August – 19th September

9.1 Gear:

- Data from the Roxann ground discrimination system and the continuous temperature and salinity system were logged.
-

9.2 Trawl stations:

- A total of 121 valid 30 minute tows with the 4m beam trawl fitted with chain mat, flip-up ropes and a 40mm cod-end liner were fished in the Bristol Channel, Celtic Sea and Irish Sea.
 - Station 18 was hauled early due to fixed gears and rough ground.
-

9.3 Additional aims:

- The incidence of the microsporean parasite *Spraguea Lophii* in otoliths anglerfish were noted (1994 & 1995).
 - The immature ovaries of sole and plaice from the Irish Sea were preserved for laboratory validation of macroscopic maturity staging and the identification of fish which will spawn next year (this year only).
-

9.4 Additional information:

- Table 1 in Appendix I show which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 6.1 in Appendix II shows the position of the stations fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

10. Survey number: Corystes 9/95

Scientist in Charge: M R Vince

Dates: 24th August – 17th September

10.1 Gear

- Trials were carried out with the Optical plankton counter (OPC) and the Longhurst Hardy Plankton Recorder (LHPR). These stations allowed scientists to make comparisons between the particulate size recorded by the OPC and the plankton caught in various depth bands by the LHPR.
 - The Roxann ground discrimination system was not used due to a 'no signal' message showing.
-

10.2 Trawl stations:

- A total of 119 valid tows were carried out with the 4m beam trawl.
 - After hauling prime station 151, there seemed to have been problems with the gear. The ground rope wire was found to be parted in the centre.
-

10.3 Additional aims:

- Majority of rays caught were individually weighed and measured for length and wing-width prior to examining for maturity (1995, 1997, 2008, 2009, 2010).
-

10.4 Additional information:

- All BCI sector otoliths from plaice and sole were aged at sea and the data was faxed to Lowestoft for use at the Southern Shelf Working Group meeting (1995 & 1996).
- Table 1 in Appendix I show which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 6.1 in Appendix II shows the position of the stations fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

11. Survey number: Corystes 11/96

Scientist in charge: M R Vince

Dates: 23rd August – 16th September

11.1 Gear:

- Sextant navigational equipment was used at most stations.
 - CTD deployments were carried out three times a day to collect 'bottom' water samples (this year only).
-

11.2 Trawl stations:

- A total of 122 valid tows were carried out with the 4m beam trawl.
 - Station 82 was invalid due to mud and shell in the net.
-

11.3 Additional Aims:

- Carry out trials with a micro wire tag detector system were demonstrated by Dr Solomon (this year only).
 - Live male plaice were collected for the Lowestoft laboratory.
 - Quantification of the seabed sediments and epibenthos was carried out using the ROXANN acoustic seabed discrimination system and trawl by catch (1996 and 1997).
 - Brill were sampled for liver and gills for stock determination (Dr R Millner) (this year only).
-

11.4 Additional information

- All spider crabs (*Majidae*) were weighed, sexed and counted (1996–present).
- All otoliths from plaice and sole were aged at sea and the data was faxed to Lowestoft for use at the Southern Shelf Working Group meeting.
- All spider crabs were weighed, sexed and counted (1996–present).
- All otoliths from plaice and sole were aged at sea and the data was faxed to Lowestoft for use at the Southern Shelf Working Group meeting.
- Table 1 in Appendix I show which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 6.2 in Appendix II shows the position of the stations fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

12. Survey number: Corystes 10a/97

Scientist in charge: M R Vince

Dates: 15th September – 6th October

12.1 Gear:

- The Roxann sea bed discrimination system was not used due to on board problems.
-

12.2 Trawl stations:

- A total of 110 valid tows were carried out with the 4m beam trawl.
 - Two hauls were invalid due to large catches of dead shell in the net.
 - The remainders of the stations were not completed because of static gear.
-

12.3 Additional Aims:

- Surface sea water samples for caesium and tritium radionuclide were collected for processing on return to the laboratory (1997–2010).
- A small number of diseased plaice samples were collected for S. Feist (this year only) (Gozlan *et al.* 2005).
- Samples of whelks and hermit crabs were collected and frozen for M. Kaiser (Conwy) (this year only). (Kaiser *et al.* 2005).
- Liver and gill samples were collected and preserved for R. Milner (this year only).
- Small bags of crabs were frozen for lobster feeding (R Turner) (1997 and 1998).
- Starfish 'damage' was recorded at two stations.
- All anglerfish caught were sampled for otoliths and vetabrae for aging studies (1997 and 1998) (Erlend Moksness, 2000).
- Due to the survey commencing three weeks later than usual, it was decided to work into the Irish Sea early in the cruise in order that the North Eastern sector was completed as near as possible to the usual period.
- Benthos was weighed at all stations. At station 59, the benthic catch was sorted by species (sub-sampled as necessary) and at the unsorted stations, the main species were recorded.
- Table 1 in Appendix I show which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 6.2 in Appendix II shows the position of the stations fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

13. Survey number: Corystes 9b/98

Scientist in charge: M R Vince

Dates: 8th September – 28th September

13.1 Gear:

- On the 17th of September the cable on the CTD parted and the CTD was lost. Despite attempts later in the trip no recovery was made.

13.2 Trawl stations:

- A total of 101 valid tows were carried out with the 4m beam trawl.

13.3 Additional Aims:

- Surface sea water samples were taken in the Irish Sea and passed through iron exchange columns to extract ⁹⁹Tc and Cs radionuclide (this year only).
- Quantification of the seabed sediments and epibenthos was carried out using the QTC acoustic seabed discrimination system and trawl by catch (1998–present).
- The precision CTD was deployed successfully on 10 stations to obtain a temperature and salinity profile and large volume surface and bottom water samples. This was carried out to determine the accumulation of ⁹⁹Tc due to summer stratification.
- One litre samples of surface water were collected in the Bristol Channel for the analysis of tritium (B.D. Smith).
- Four additional hauls to those of the survey were used to collect about 40 live plaice and 90 live sole that were later transferred to a local fishing boat for transport to the laboratory in Conwy (S. Baynes) (this year only).
- The spiral valve and a sample of liver were taken from a small number of smooth hounds. The spiral valves were for a parasitologist in America (Janine Caira) to look at the cestode community (1998–1999) (Janine Caira, 2000).
- Length, wing width, weight and maturity of all rays caught were recorded to gain a better understanding of their biology (M. Vince) (1998–2009).
- A sample of commercial sized male plaice were otoliths to augment Irish Sea market samples (M. Vince) (this year only).
- Anglerfish were sampled for otolith and vertebrae for aging studies (T. Watson) (1998–2000).
- The benthic catch was sorted by species at almost every fishing station (1998–1999, 2001, 2003) (Dr J. Ellis, Cefas).
- Starfish damage was also recorded at each station (1998–1999).

13.4 Additional information

- This was a multi-disciplinary trip with 4 E & E staff on-board to collect water and core samples and process them whilst at sea during the night. A port-a-cabin was onboard for this purpose.
- This was the first year that Corystes had been used for a multi disciplinary survey and it seemed to work well.
- Strong winds, the additional stations to sample radionuclide and the loss of the CTD contributed to an effective reduction of about 5 days fishing survey time.
- Table 1 in Appendix I show which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 6.2 in Appendix II shows the position of the stations fished for this year.
- Table 2 in Appendix III shows the number of planned/actual stations fished for this year.

14. Survey number: Corystes 9/99

Scientist in charge: M R Vince

Dates: 10th September – 1st October

14.1 Trawl stations:

- A total of 101 valid tows were carried out with the 4m beam trawl.
-

14.2 Confirmation of unusual fish and catches

- A triggerfish (*Balistes carolinensis*) was caught in Dundrum Bay.
-

14.3 Additional Aims:

- Blood samples were taken from plaice for an EEC funded study of stock structure (S. Flatman).
 - Gill arches were taken from haddock and hake to be used in a genetic diversity project (C. Fox) (1999 & 2000).
 - Fish and shellfish were collected to be analysed for short lived radionuclide (Young).
 - Various fish/benthic species were frozen from a haul off Sella field to be used to assess trophic transfer of radionuclide within the marine food chain
 - Plaice infected with *Lymphocystis* were frozen (S. Feist) (1999 & 2000) (Stentiford *et al.* 2009).
-

14.4 Additional information

- Abnormally large number of pre-recruit sole were taken on several of the tows in the Bristol Channel this year compared to previous years.
- A regular occurrence of 0 group cod was seen for this year.
- Table 1 in Appendix I show which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 6.2 in Appendix II shows the position of the stations fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

15. Survey number: Corystes 12b/00

Scientist in charge: S Rogers

Dates: 12th September – 3rd October

15.1 Trawl stations:

- A total of 118 valid tows were carried out with the 4m beam trawl.
 - Between the dates of the 26th–29th of September only 15 stations were fished due to strong southerly winds.
-

15.2 Additional Aims:

- Adult nurse hounds were tagged and released. This was to provide data describing the daily movements of these poorly studied fish.
 - Edible crabs were collected from Cardigan Bay for radioactivity studies.
-

15.3 Additional information

- Table 1 in Appendix I show which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 6.2 in Appendix II shows the position of the stations fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

16. Survey number: Corystes 9/01

Scientist in charge: Myrtle J Boon

Dates: 9th September – 4th October

16.1 Trawl stations:

- A total of 120 valid tows were carried out with the 4 m beam trawl.
- One station in Tremadoc Bay (Prime 313) and two stations off the Irish coast (Prime 214 & 220) were reduced to 15 minute tows because of expected large catches of weed or small flatfish (permanent changes).
- Prime station 1 in Luce Bay was not fished due to potential unexploded ordnance, and Prime 2 was moved southeast out of the restricted area (permanent changes).
- A few other stations were moved short distances to avoid snagging undersea cables (an increasing problem in this busy sea area).
- Up to 25 commercial size fish of each species (cod, whiting, dab, flounder, plaice and sole) were frozen from eight selected stations, for later contaminant analysis by Dr A. Franklin (Cefas, Burnham).
- White muscle tissue was collected from 3 whiting (240-260 mm) and 3 dabs (190-210 mm) at every 4 m beam trawl station, as available. Up to 5 queen scallops (*Aequipecten opercularis*) (50-60 mm) per station were also collected. The samples were frozen for later isotope analysis by Dr S. Jennings (Cefas, Lowestoft) (Leakey *et al.* 2008 & Jennings *et al.* 2008).
- All spider crabs (*Maia squinado*) caught on part 2 of the survey (about 25 in total) were kept alive in a seawater tank for R. Turner (Cefas, Lowestoft) (this year only).

16.2 Additional Aims:

- Melanie Bergmann (University of Wales) joined Corystes after the mid-cruise break in Workington to collect roundfish stomachs and livers as part of a collaborative project on 'Essential Fish Habitats' between Cefas Lowestoft (Stuart Rogers) and the School of Ocean Sciences (University of Wales, Bangor) (2001 and samples were collected for her in 2002) (Hilmar *et al.* 2003 & 2006).
- Stomachs of cod, haddock and whiting were taken for dietary analyses from fish at selected stations throughout the Irish Sea.
- Livers were also sampled for subsequent lipid content analysis, and tissue samples taken for nitrogen stable isotope analysis. These analyses will be used to evaluate the quality of different Irish Sea habitats for gadoid fish species (this year only).
- Linda Ahern (University of Galway) joined Corystes after the mid-cruise break in Workington to look for the toxic diatom species *Pseudonitzschia* by taking vertical seawater samples with a small phytoplankton net (mesh size 10 µm). Stations were chosen mainly for their close proximity to known physical oceanographic features such as the Western Irish Sea and Celtic Sea Fronts, where stratified water columns are known to support the seasonal growth of the diatoms. Additional stations were sampled in other areas to facilitate comparison with the frontal areas (2001 & 2002).
- Otoliths were taken from lemon soles in the size range 5-20 cm for M. Easey (2001 & 2002).
- Gobies were input using the Cefas three letter code of POM instead of GPA (2001-present).
- Samples of 100 whelks (*Buccinum undatum*) were frozen from stations in Carmarthen Bay, Liverpool Bay, Solway Firth and off eastern Ireland for a study on population genetics (University of Hull).

16.3 Additional information

- Table 1 in Appendix I show which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 6.2 in Appendix II shows the position of the stations fished for this year.
- Table 2 in Appendix III shows the number of planned/actual stations fished for this year.

17. Survey number: Corystes 13/02

Scientist in charge: Myrtle J Boon

Dates: 6th September – 3rd October 2002

17.1 Trawl stations:

- A total of 120 valid tows were carried out with the 4m beam trawl.
- An AML micro CTD unit was attached to the beam trawl to record a temperature/salinity profile at each fishing station.
- Prime stations 40 (Red Wharf Bay), 313 (Tremadoc Bay), 203 (Dundrum Bay), 214 & 220 (north of Dublin), 233 (south of Wicklow) and 501 (southwest of Milford Haven) were reduced to 15 minute tows because of expected large catches of weed, shell or small flatfish.
- A few other stations were moved short distances to avoid snagging undersea cables.
- Prime Station D3 was hauled with turns in the net. This would have caused loss of fish above the cod-end liner so the tow was deemed to be invalid and was repeated without incident.
- Prime station 106 in BCI was invalid due to gear damage over rough ground, and it is recommended that this station is omitted in future surveys.
- Twelve exploratory tows were fished in Vlle to supplement the Carhelmar grid.

17.2 Additional Aims:

- Julio Neves de Araujo (University of Leicester) joined Corystes after the mid-cruise break in Dublin to collect and preserve stomach contents of 17 species of fish (up to 30 stomachs per species) for subsequent identification in the laboratory. These samples will provide some of the data necessary for structuring a trophic ecosystem model (Ecopath with Ecosim) of the Western English Channel.
- Samples of plaice, sole and lemon sole were collected for Melanie Bergmann (University of Wales) as part of a collaborative project on 'Essential Fish Habitats' between CEFAS Lowestoft (Stuart Rogers) and the School of Ocean Sciences.
- Samples of 100 whelks were frozen from stations in Carmarthen Bay, Liverpool Bay, Solway Firth and off eastern Ireland for a study on population genetics.
- Samples of plaice, sole and whiting were frozen whole for otolith removal training for I. Holmes (this year only).
- All pogges (*Agonus cataphractus*) caught in ISS, ISN and BCI were frozen for M. Parker-Humphreys (this year only).
- Samples of pipefish were frozen for J. Ellis (Cefas, Lowestoft).
- Five hake (*Merluccius merluccius*) were frozen for the Institute of Food Research, Norwich (this year only).

17.3 Additional information

- In previous years, the FV Carhelmar was chartered to conduct the Vlle Beam Trawl survey in the Brixham Bay area. However, in order to increase the survey coverage and improve sampling levels on all species of finfish and epibenthos, it was decided to use the RV Corystes to conduct the survey from this year on (2001–2002 only).
- The use of RV Corystes on this part of the survey meant that for the first time, all fin-fish and commercial crustaceans were weighed and measured at each haul. Otoliths were taken from stratified samples of sole, plaice, lemon sole and dab, and from all turbot, brill, cod, haddock, hake, anglerfish, megrim and whiting. All otolithed fish were weighed individually, and the sex and maturity stage recorded.
- The benthic catches were sorted on the second half of the survey only (BCO/Vlle) – on the first half of the survey presence/absence was recorded only.
- Table 1 in Appendix I show which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 6.2 in Appendix II shows the position of the stations fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

18. Survey number: Corystes 13/03

Scientist in charge: Ian Holmes (part 1); Myrtle Boon (part 2)

Dates: 4th September – 4th October 2003

18.1 Gear:

- The SAIV Micro CTD (number 427) was successful in collecting data until the battery failed during the first station and no data was recovered that day. Unit 427 was replaced with SAIV Micro CTD unit number 426 the next morning and this unit worked successfully for the rest of the survey. 172 successful profiles were collected from 189 fishing stations. On 2 days, both the SAIV and the AML mini CTD units were fitted to the beam to provide SIGS with comparative data.
- Specimens of nine selected flatfish species caught in ICES Division VIIe were frozen individually for fish identification purposes (S. Kupschus Cefas, Lowestoft) (this year only).
- Length/weight relationship information was collected for various fish species: Bib (*Trisopterus luscus*), black sea-bream (*Spondyliosoma cantharus*), horse mackerel, (*Trachurus trachurus*), long-rough dab (*Hippoglossoides platessoides*), poor cod (*Trisopterus minutus*), thick-back sole (*Microchirus variegatus*), tub gurnard (*Trigla lucerna*) and lesser weever (*Echiichthys vipera*) from each ICES Division fished during the survey (Richard Ayers Cefas, Lowestoft) (this year only).

18.2 Trawl stations:

- A total of 108 valid tows were carried out with the 4m beam trawl.
- Prime station 27, 40, 313, 203, 214, 220, 233 and 501 were reduced from the standard 30 minutes to 15 minute tows because of expected large catches of weed, shell or small flatfish.
- Prime station 27 was moved again this year due to a large cable being laid over the revised tow used last year. The new position was due north of the original position within the same depth contour, but cable positions reduced this new tow to just 15 minutes.
- Prime stations 1, 106 and 305 were not fished due to potential unexploded ordnance, potential gear loss/damage, and static gear (no clear tow) respectively.
- A few of the Carhelmar stations were moved slightly due to new cables, or reduced to 15 minutes to avoid known areas of large quantities of weed or excessive abundance of small fish.
- Collection of tissue samples from all thornback ray (*Raja clavata*) and selected samples of other ray species caught were taken for genetic studies (Dr J. Ellis Cefas, Lowestoft) (2003–2009).
- Five whole mature female plaice were frozen for a fecundity sampling workshop (P. Witthames Cefas, Lowestoft) (this year only).

18.4 Additional information

- Table 1 in Appendix I show which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 6.2 in Appendix II shows the position of the stations fished for this year.
- Table 2 in Appendix III shows the number of planned/actual stations fished for this year.

18.3 Additional Aims:

- James Kennedy came aboard in order to collect plaice fecundity samples and some liver plaice. Additional fishing stations were fished in order to collect live plaice samples. The planned landing of these live fish to the quayside in Douglas IOM was cancelled as the IOM authorities did not give the necessary permission to land these fish 'live' (Kennedy *et al.* 2007).
- On completion of the Carhelmar grid, RV Corystes began a survey of eight new exploratory inshore tows between Start Point and Lands End.
- Samples of whiting otoliths were collected from each ICES Division fished, for an otolith staining project J. Keable (Cefas, Lowestoft).

19. Survey number: Corystes 14/04

Scientist in charge: Ian Holmes (part 1); Myrtle Boon (part 2)

Dates: 8th September – 10th October

19.1 Trawl stations:

- A total of 9 prime stations – numbers 12 (Walney Island), 27 (Morecambe Bay), 40 (Red Wharf Bay), 313 (Tremadoc Bay), 203 (Dundrum Bay), 214 and 220 (north of Dublin), 233 (south of Wicklow) and 501 (southwest of Milford Haven) were reduced from the standard 30 minutes to 15 minute tows because of expected large catches of weed, shell or small flatfish.
- Prime station 131 (E. of Lundy Island) was not fished due to static gear (no clear tow). 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) or to avoid static gear.
- Prime station 43 (ISS) saw exceptionally large numbers of small plaice (20–25cm). Over ten times the maximum ever caught before were seen this year. These fish were located in 'muddy' hollow area and it is suspected that these fish were sheltering from inclement weather. Exclusion of this station from the indices work – up should be considered.
- An 18m ledge was trawled over at the beginning of Prime station F1, and although there was no damage to the gear, the net took about 3 tonnes of sandy gravel.
- From this year on it was decided that at 36 selected fishing stations, samples of the epi-benthic by-catches would be sorted and 32 'core species' identified and quantified. A standard operating procedure (SOP) for the processing of this by-catch was provided (2004–present).
- Also at all fishing stations on the survey, catches of 9 sentinel taxa of benthic invertebrates should be recorded (2004–present).
- Due to early completion of the survey 5 new exploratory stations were fished southwest of Lands End (named X & Y).
- The last station (Y3) was then fished again by both sets of 4m-beam trawl gear together on the starboard and port winches in order to compare the fishing behaviour of the different sets of gear. Because of the low catches of fish this year, it was decided to fish both beams together after the last haul of the cruise to see if the catch rates were influenced by the gear. Generally, catches were similar to the original tow, but the starboard side gear appeared slightly more efficient than the port side gear, which suggests that the gear was fishing efficiently throughout the cruise.

19.2 Additional Aims:

- James Kennedy joined again this year in order to collect some more plaice, to collect fecundity and muscle samples in support of plaice recruitment project (MO423) (this year only) (Kennedy *et al.* 2007).
- Specimens of Bullhuss (*Scyliorhinus stellaris*) were tagged with Peterson discs and released (Dr J. Ellis Cefas, Lowestoft) (2004–2009).
- Samples of squat lobsters were preserved (Dr. J. Ellis Cefas, Lowestoft) (this year only).
- 1 mantis shrimp (*Meiosquilla desmaresti*) was frozen for J. Herbert (Marine Conservation Society) (this year only).
- Illicia from all otolithed anglerfish (*Lophius piscatorius* & *L. budegassa*) were removed and placed in the otolith packet with the otoliths (S. Songer Cefas, Lowestoft) (2003 to present).
- In addition, all scientific staff participating in the survey was tested on their fish identification at 4 stations during the survey (M. Etherton Cefas, Lowestoft) (2004–2009).
- SAIV CTD unit successfully collected profiles at every fished station (2004–present).

19.3 Additional information

- Weight of rocks caught was recorded at every station (2004–present).
- On the 23rd of September engine failure meant that the survey had to cease. Corystes took anchor off Walney Island whilst repairs were carried out. The survey continued on the 25th of September after a change of staff in Workington.
- All sole caught on the Carhymar grid of stations were aged on – board in order to provide estimates of abundance at age prior to ICES advice being agreed.
- Table 1 in Appendix I show which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 6.3 in Appendix II shows the position of the stations fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

20. Survey number: *Corystes* 3/05

Scientist in charge: Ian Holmes

Dates: 16th September – 5th October

20.1 Gear:

- This survey sailed without the 'usual' survey gears, sailing with beam 1 and 4 instead of 2 and 3. The survey used beam trawl number 1 until the 21st of September when the survey was suspended and *Corystes* docked in Liverpool to collect the 'usual' fishing gear, extra Cefas staff and to take on fresh water. The survey continued on the 22nd of September using beam trawl number 3 in the Irish Sea South (ISS).
- Beam trawl number 1 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.
- Comparative tows were carried out in BCI to compare catches of used gear (beam 1) and usual gear (beam 3) (this year only).

20.2 Trawl stations:

- A total of 107 valid tows were carried out with the 4m beam trawl.
- Prime station 27, 40, 313, 203, 214, 220, 233, 501, 401 and 425 were reduced from the standard 30 minutes to 15 minute tows because of expected large catches of weed, shell or deteriorating weather conditions.
- Prime station 419 as moved approximately 500m north-east of the original tow to avoid a known 'snagging' position encountered on an earlier DARD survey.
- Prime station 425 was moved approximately 8nm south of the normal tow position and fished for only 15 minutes in order to ensure that the tow was fished due to faltering light and deteriorating weather conditions.
- Prime station 502 was moved 2.6nm SE of original tow 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.
- Fishing stations were carried out during daylight hours and core sampling operation was carried out during the hours of darkness. Problems with deploying the Vibrocorer became apparent because it could not safely be deployed from the starboard gantry due to the weight capacity of the winch. The decision was taken to deploy the equipment off the stern but this led to reduced deployment opportunities due to the necessity for calm seas in order to ensure safety during deployment. On stations where it was not possible to deploy the Vibrocorer, the Nioz corer was deployed instead.
- The coring programme work was ended on the 28th of September due to bad weather conditions and the three EFS scientists were taken ashore.

20.3 Additional Aims:

- 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).
- 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).
- 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 (*Liorcacinus marmoreus*)
 - 3 specimen of corrugated swimming crab (*Liorcacinus corrugatus*)
- 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).
- Selected 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 was tested on their fish identification skills at 3 fishing stations during the survey (M. Etherton Cefas, Lowestoft).
- Samples of cod (*Gadus morhua*), plaice, whiting (*Merlangius merlangus*), dab, sole and flounder (*Platichthys flesus*) were collected (A. Franklin Cefas, Burnham on Crouch).

20.4 Additional information

- This survey was carried out on RV *Corystes* – chartered from AFBI in Northern Ireland after the vessel had been sold (2005–2008).
- The electronic data capture system (EDC) was used in routine sample collection for the first time on this survey (2005–current).
- This was a multi-disciplinary survey with EFS colleagues collecting core samples in order to estimate the inventory of ⁹⁹Tc in the sub-tidal sediments of the Irish Sea. At each core station, a water sample and a day grab sample was also taken.
- Table 1 in Appendix I show which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 6.3 in Appendix II shows the position of the stations fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

21. Survey number: Corystes 5/06

Scientist in charge: Ian Holmes

Dates: 15th September – 5th October

21.1 Gear:

- Comparative tows were carried out in the BCI sector between the standard survey beam trawl (no.3) and a new set of gears (no.5). Preliminary results indicate that both sets of gear caught the same species but not necessarily in the same proportion.
-

21.2 Trawl stations:

- A total of 107 valid tows were carried out with the 4m beam trawl.
 - Prime station number 4 was moved slightly in this year as the Kirkcudbright firing range was active and the standard tow position fell within this range area.
 - Prime stations 27, 40, 2, 313, 203, 214, 220, 233, 501 and 443 were reduced from the standard 30 minutes to 15 minute tows because of expected large catches of weed, shell or due to fixed nets being across the tow.
-

21.3 Additional Aims:

- Measurements of all whole jellyfish caught were identified to species and measured across the 'umbrella' disc (D. Righton Cefas, Lowestoft) (2006–present).
 - 10 red mullet (*Mullus surmeletus*) were frozen for age analysis (M. Etherton Cefas, Lowestoft) (this year only).
 - David Walker (University of Wales) collected muscle sample specimens from different species of fin fish for sequencing of mitochondrial DNA (Bangor University) (this year only).
 - Samples of cod, plaice, dab and sole were collected as part of the national monitoring Programme (A. Franklin).
 - The on-board Seabird continuous monitoring system was used to collect surface temperature and salinity (2006–2008).
-

21.4 Additional information

- Table 1 in Appendix I show which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 6.3 in Appendix II shows the position of the stations fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

22. Survey number: Corystes 2/07

Scientist in charge: Ian Holmes

Dates: 16th September – 6th October

22.1 Gear:

- Corystes set sail on the 16th of September but was forced to return to the port of Belfast due to a faulty autopilot system. The autopilot system was fixed and Corystes set sail again later on that day.
- On the 18th of September Corystes returned to Belfast port so that the winches could be fixed. It was discovered that each winch only had pulling power of 4.4 tonnes with the winch drum $\frac{3}{4}$ full of warp. The normally expected power was 5.1 tonnes with the drum $\frac{1}{2}$ full and 3.3 tonnes with a full drum. Various options for increasing this were explored but most would have had some impact on way the gear fished so these were disregarded. The decision was taken to reduce the amount of warp on the winch being used from 1200m to 500m ($<\frac{1}{2}$ full), as this would increase the pulling power of the winch without altering the way the gear fished. The result of this was an increase in the pulling power to 5.2 tonnes. This was considered adequate for this survey.

22.2 Trawl stations:

- A total of 107 valid tows were carried out with the 4m beam trawl.
- Prime station 27, 40, 313, 203, 214, 220, 233 and 501 were reduced from the standard 30-minutes to 15 minute tows because of expected large catches of weed and shell.
- Prime station 229 was invalid because of major problems with the winch hydraulics causing the hauling to take many hours.
- Prime station 10 and 19 were fished for only 20 minutes as a precaution. These tows were over muddy grounds and there were concerns regarding large hauls.

22.3 Confirmation of unusual fish and catches

- A common triggerfish was caught in the Irish Sea for the first time on this survey since 1999.

22.4 Additional Aims:

- Specimens of dab, lesser spotted dogfish, rays, lobsters and edible crabs were collected for radiological monitoring programme (P. Rumney) (2007 & 2008).
- Ninety specimens of sole were individually bagged and frozen for the Marine Fisheries Agency (MFA).
- Photographs were taken of 13 different species for the Cefas photo fish identification catalogue.
- Niskin bottom water samples were collected on this survey for the first time (2007–current).

22.5 Additional information

- Due to bad weather conditions Corystes started fishing in Irish Sea West (ISW) and moved onto softer grounds off the Irish Sea South (ISS). During the first tow of this area the codend filled with over 5 tonnes of sand and shell and the winch struggled to get the beam on board. Once onboard safety issues were discussed and the gear was inspected, resulting in the discovery that the cod end liner had 30% more meshes around the circumference of the net than specified in the gear specification. This was the probable cause of the large haul as the number of meshes in the liner would have prevented sand and shell particles to pass through the net and this quickly built-up to the weight eventually hauled. After consultation with Cefas shore staff it was agreed to change the liner to the agreed specification.
- Table 1 in Appendix I show which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 6.3 in Appendix II shows the position of the stations fished for this year.
- Table 2 in Appendix III shows the number of planned/actual stations fished for this year.

23. Survey number: Corystes 3/08

Scientist in charge: Dr Sarah Walmsley

Dates: 16th of September – 6th of October

23.1 Trawl stations:

- A total of 98 valid tows were carried out with the 4m beam trawl.
- On prime station 53 a large bag of queen scallops (approx 6 tonnes) were caught and the net could not be brought aboard or released because the beam had turned on hauling. After effort from the crew the gear was brought aboard and upon inspection 3 missing links were identified in the chain mat and several bosom meshes had split. The tow was repeated the following day, for fifteen minutes and at a perpendicular angle to the previous tow. Again, the net filled beyond capacity, splitting the net and liner beyond repair so they were replaced.
- Due to the large catch found at prime station 53, prime station 423, which is in close proximity to 53 was only fished for 15 minutes as a precaution.
- Prime station 27, 40, 313, 203, 214, 220, 233 and 501 were reduced from the standard 30 minute tows to 15 minute tows because of expected large catches of weed and shell.
- Three prime stations were reduced to 15 or 20 minutes as a precaution, following the large catches seen at these stations in 2007.

23.2 Confirmation of unusual fish and catches

- An electric ray (*torpedo nobiliana*) was captured in the Outer Bristol Channel for the first time on this survey (Figure 4).

23.3 Additional Aims:

- 1 litre surface seawater samples were collected from 38 stations in the Bristol Channel and Severn Estuary for Tritium H-3 analysis (Carol Smedley).
- Six experimental tows were undertaken within the current North Devon Fisherman's Association voluntary seasonal closed area. Tows varied in duration from 7–20 minutes due to the high presence of static gear in the area. These tows were looked at for evidence of juvenile rays or egg cases – but few were found (2008–2009).
- Three SEI stations were fished and the BCO grid was dropped in favor of the Lundy tows.
- Female whiting were sampled for Gonadosomatic Index (GSI) and photographs were taken of the gonads in situ and dissected from the body (this year only).

23.4 Additional information

- Table 1 in Appendix I show which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 6.3 in Appendix II shows the position of the stations fished for this year.
- Table 2 in Appendix III shows the number of planned/actual stations fished for this year.
- Figure 4 Photo of an electric ray (*torpedo nobiliana*).



Figure 4: Photo of an electric ray (*torpedo nobiliana*).

24. Survey number: Cefas Endeavour 13/09

Scientist in charge: Ian Holmes

Dates: 9th September – 1st October

24.1 Gear:

- This was the first year that this survey was conducted aboard RV Cefas Endeavour.

24.2 Trawl stations:

- A total of 108 valid tows were carried out with the 4m beam trawl.
- Prime stations 27, 40, 313, 214, 233 and 501 were reduced from the standard 30 minute to 15 minute tows because of expected large catches of weed and shell.
- Prime stations 40 and 313 were re-fished successfully for 30 minutes later in the survey.
- On prime station 54 the net filled with sand, the trawl parted and the beam flipped over causing major damage. The net was replaced with the spare (no.5) whilst the damaged trawl was being repaired.
- A new towing position was allocated for prime 54 and it was re-fished for 15 minutes to prevent further damage.
- Prime station 53 could not be fished due to static gear. An alternative track was selected and this was fished for two precautionary 5 minute (darkness) tows over the track.
- On previous year's surveys RV Corystes had been unable to successfully fish this station due to large catches of queen scallops (*Chlamys opercularis*). These two exploratory tows were carried out in order to determine to extent of the queen scallop population in the area this year. The resultant small catches led to the station being fished for a precautionary 20 minutes.
- Prime station 203 and 220 are normally only fished for 15 minutes but they were fished for the full 30 minutes this year.
- In previous years prime station 40 and 313 were reduced in tow duration due to the large catches encountered in previous years. Due to catches falling the tow were increased to the full 30 minutes again.
- There was a heavy catch of weed on prime station 313 presumably at the north end, early on because of this the tow should be moved south west to avoid this in the future.
- The opportunity was taken to locate and fish an additional 3 tows in ICES rectangles where we have no beam trawl fishing stations. At each of these positions, Cefas Endeavour steamed over the tow in advance of shooting to determine the ground profile. No net CTD data was collected and the beam was towed for 15 minutes only on two of these stations. A full benthic sort was carried out at each of these stations. One of these new tows was fished at a position used by the Q4 SWGFS (prime station E9).

24.3 Confirmation of unusual fish and catches

- An angel shark (*Squatina squantina*) was caught at prime station 313 for the first time on any Cefas surveys for over 10 years and only the third specimen caught by Cefas survey in around 23 years. Details were recorded and made available to the National Marine Aquarium, Plymouth (Figure 5).

24.4 Additional Aims:

- 173 cod had otoliths taken using non-metallic forceps to be used for a trace metal project (C. Fox) (this year only).
- Length/weight measurements were collected on the survey in addition to the length weight information routinely collected with survey otoliths (2009–10).
- 412 pairs of otoliths from 58 different fish species were collected to supplement the Cefas reference otolith collection set (M. Etherton) (2009 & 2011).
- Selected fish species were photographed for inclusion in the new photo ID key being developed at Cefas. (J. Ellis & D. Brown) (this year only).
- Bullhuss were tagged and released.
- Lesser spotted dogfish were measured at capture and at various times after capture to determine post mortality length and measurement change (J. Ellis).
- Brill and turbot finclips were taken in support of a study into the comparative population genetic structure. (S. Vandamme, IVLO Belgium) (2009 & 2010) (Vandamme *et al.* 2009).

24.5 Additional information

- There was no mid-survey break (this year only).
- Table 1 in Appendix I show which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 6.3 in Appendix II shows the position of the stations fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.
- Figure 5 Photo of an angel shark (*Squatina squantina*).



Figure 5: Photo of an angel shark (*Squatina squantina*).

25. Survey number: Cefas Endeavour 14/10

Scientist in charge: Ian Holmes

Dates: 10th September – 2nd October

25.1 Trawl stations:

- A total of 108 valid tows were carried out with the 4m beam trawl.
- Prime stations 27, 313, 203, 214, 220, 233 and 501 were reduced from the standard 30 minute to 15 minute tows because of expected large catches of weed and shell.
- Following a successful 30 minute tow at prime station 40 in 2009, this was fished again for the full 30 minutes.
- Prime station 32 was hauled after 11 minutes due to problems with the winches and the gear. The problem was fixed and the tow was re-fished for 20 minutes further west of the normal tow.
- Prime station 49 caught approximately 40 baskets of broken shell. This tow has a recent record of similar catch and therefore should be considered for a 15 minute tow in the future.
- At prime station 54 where the station had been moved in 2009 to avoid heavy catches of broken shell was caught once again. It was suggested that this tow be reduced.
- Prime station 53 was hauled after 25 minutes due to a heavy catch of broken shell and sand. This tow has a recent record of similar catch and therefore should be considered for a 15 minute tow in the future.
- Prime station 12 had to be moved 0.8nm SW along the same track in order to avoid a newly laid wind-farm power cable.
- Prime station 425 has a history of heavy catches of broken shell so load tests were carried out. However, after 18 minutes the gear was hauled due to the significant increase in the load being registered. On hauling, it became clear that it would be impossible to get the catch aboard despite much of the weight being 'streamed' away. Eventually, a large bag of broken shell was brought aboard and once the cod-end had been opened, the catch was dumped over the stern and the tow declared invalid.
- An alternative tow was found to prime 425, 4 miles southwest of the original tow. This will be prime 425 in the future.
- Prime station 512 was hauled after 15 minutes due to possible heavy catch. The catch was normal and valid.
- Prime 40 (ISS) fished for 30 minutes based on 'test' 30 minute tow in 2009.

25.2 Additional Aims:

- Large numbers of 1-group cod and haddock were caught.
- Brill and finclip were taken by S Vandamme (IVLO, Belgium) in support of a study into the comparative population genetic structure (Vandamme *et al.* 2009).
- Litter was recorded at each station where time permitted. (This was collected for Manuel Nicolaus. The data has been worked up and a report will follow shortly. Previous reports are referenced (2010 onwards) (Nicolaus M, 2009).
- Detailed photographs of otolith extraction techniques were taken for 14 species (Mark Etherton).
- Fish and queen scallops (*Chlamys opercularis*) samples were collected for isotope analysis in support of food web studies (S. Jennings) (Leakey *et al.* 2008)
- Photographs of brill and turbot gonads were taken for the Workshop on Maturity Staging of brill and turbot in 2012.
- Rays specimens were tagged / released after a period of time in a deck tank – in order to determine the survivability of these species.
- Live dab tows were fished in the Bristol channel and off Dungeness (M. Eade).
- A smart-buoy off Weymouth was successfully retrieved (D. Pearce).
- Detailed photographs of otolith extraction techniques were taken for 14 species (Mark Etherton).

25.3 Additional information

- Cefas Endeavour had to make an unscheduled diversion to Douglas in order to drop off a member of the crew.
- Two tritium water samples close to the Avon Bridge were abandoned due to increase fog.
- Maturity staging on cod, haddock, whiting, sole, plaice and dab is no longer carried out in quarter 3. This decision was made when studies revealed that it was not possible to obtain good estimates of maturity during this quarter.
- Table 1 in Appendix I show which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 6.3 in Appendix II shows the position of the stations fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

26. Survey number: Cefas Endeavour 15/11

Scientist in charge: Ian Holmes

Dates: 12th September – 4th October

26.1 Gear:

- Whilst hauling the ESM2 profiler, at prime station 419, the starboard hydro winch cable parted and the equipment was lost. Despite numerous attempts, there was no success in recovering the gear.
- Major damage to the net at prime station 28 resulted in a change of beam trawl from number 3 to 2. It was believed the damage was caused by the beam 'flipping over' and being fished along a large sand bank. Beam number 3 was mended whilst in port and used on the 2nd half of the survey.
- 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).
- 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 (this year onwards).

26.2 Trawl stations:

- Prime station 425 had a history of large by catches of broken shell. Due to this an alternative tow was fished 4nm south-west of the original tow. This resulted in a small catch so the original tow was revisited and hauled with a manageable sample of 3 baskets.
- 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.
- During the Cefas Endeavour Irish Sea Beam trawl survey a number of biological samples were collected from 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 to 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.

26.3 Additional Aims:

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

26.4 Additional information

- On the 23rd of 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.
- In the afternoon of the 30th 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.
- Table 1 in Appendix I show which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 6.3 in Appendix II shows the position of the stations fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

Appendix II

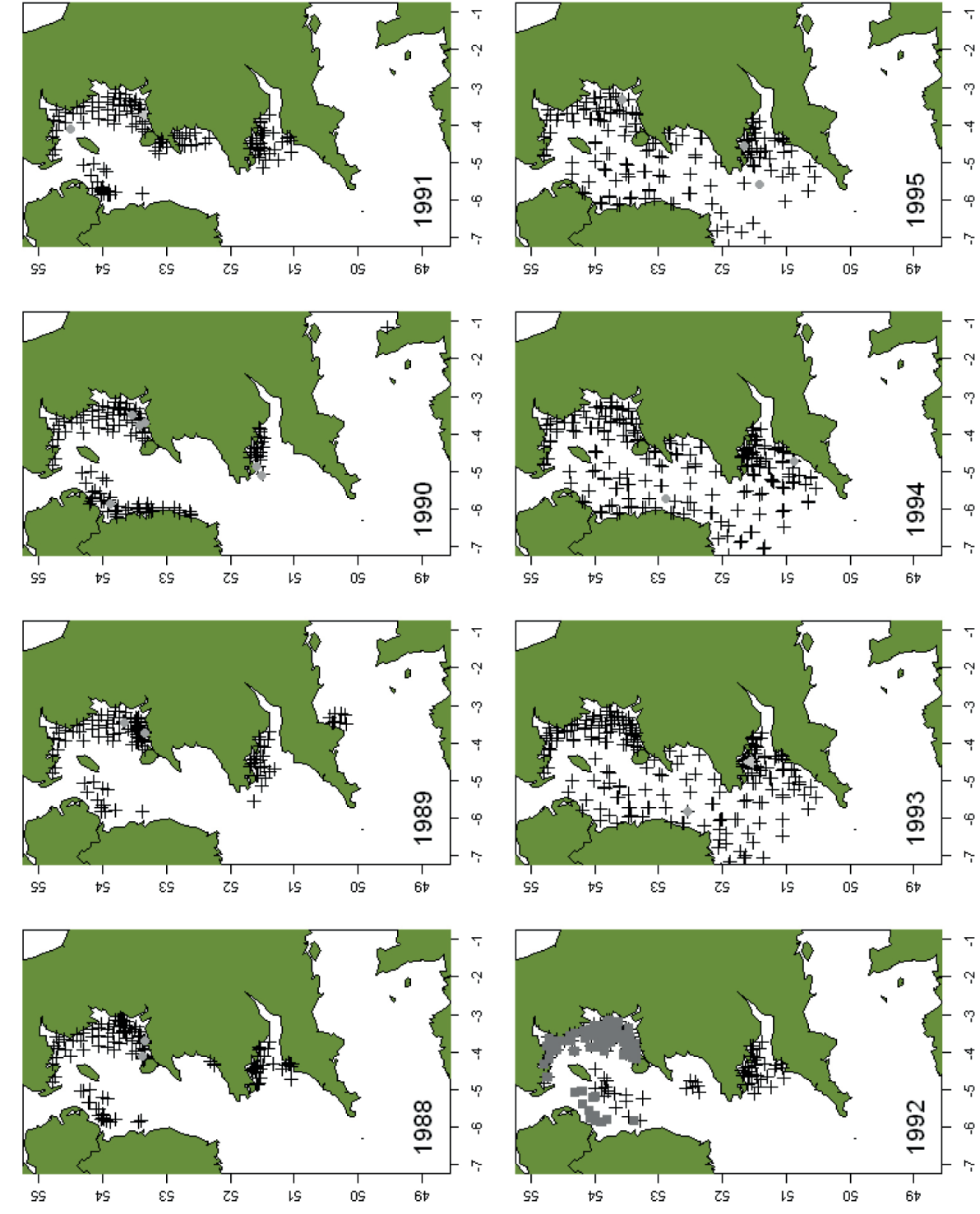


Figure 6.1: Station positions by year on the ISBC (1988–1995).

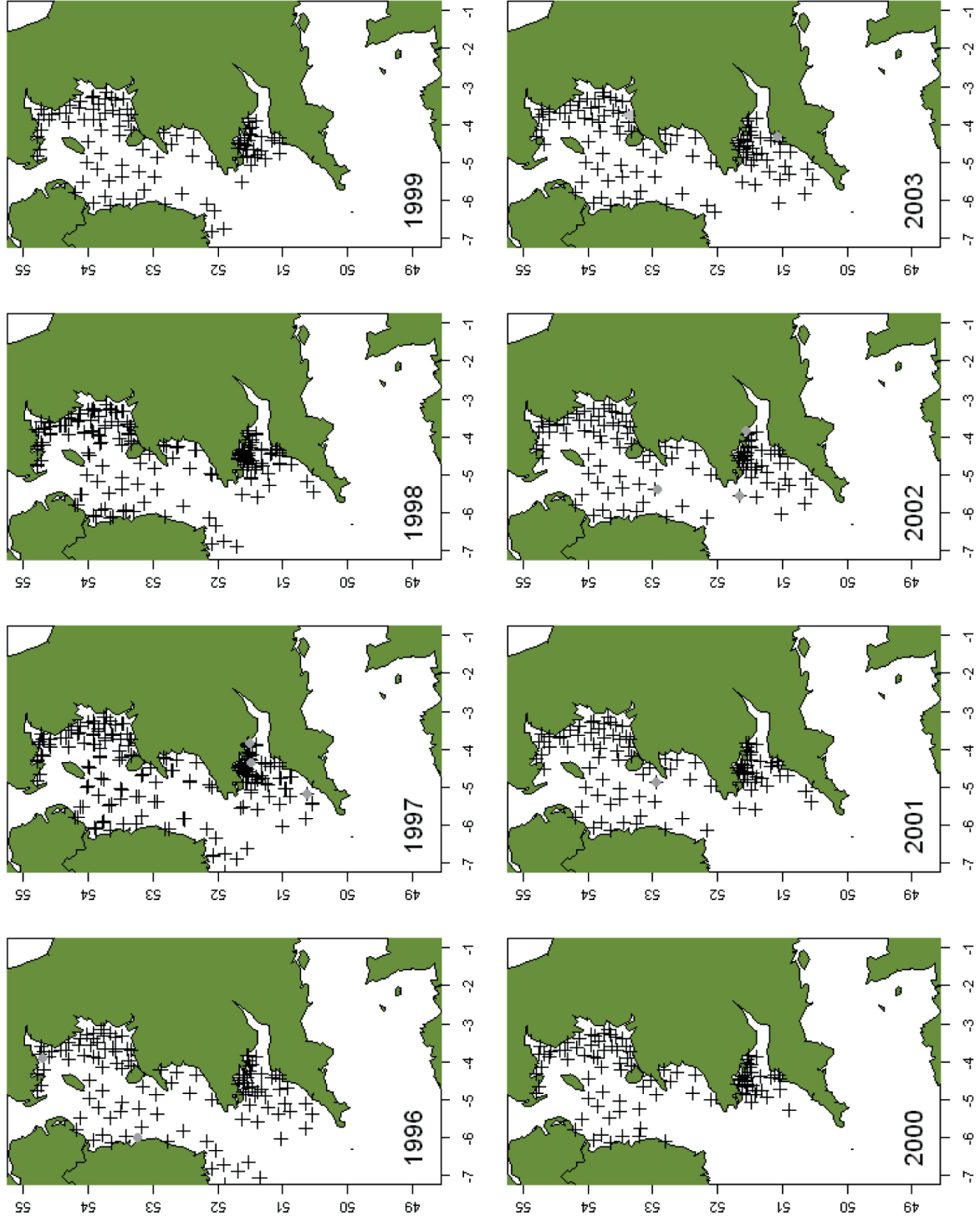


Figure 6.2: Station positions by year on the ISBC (1996–2003).

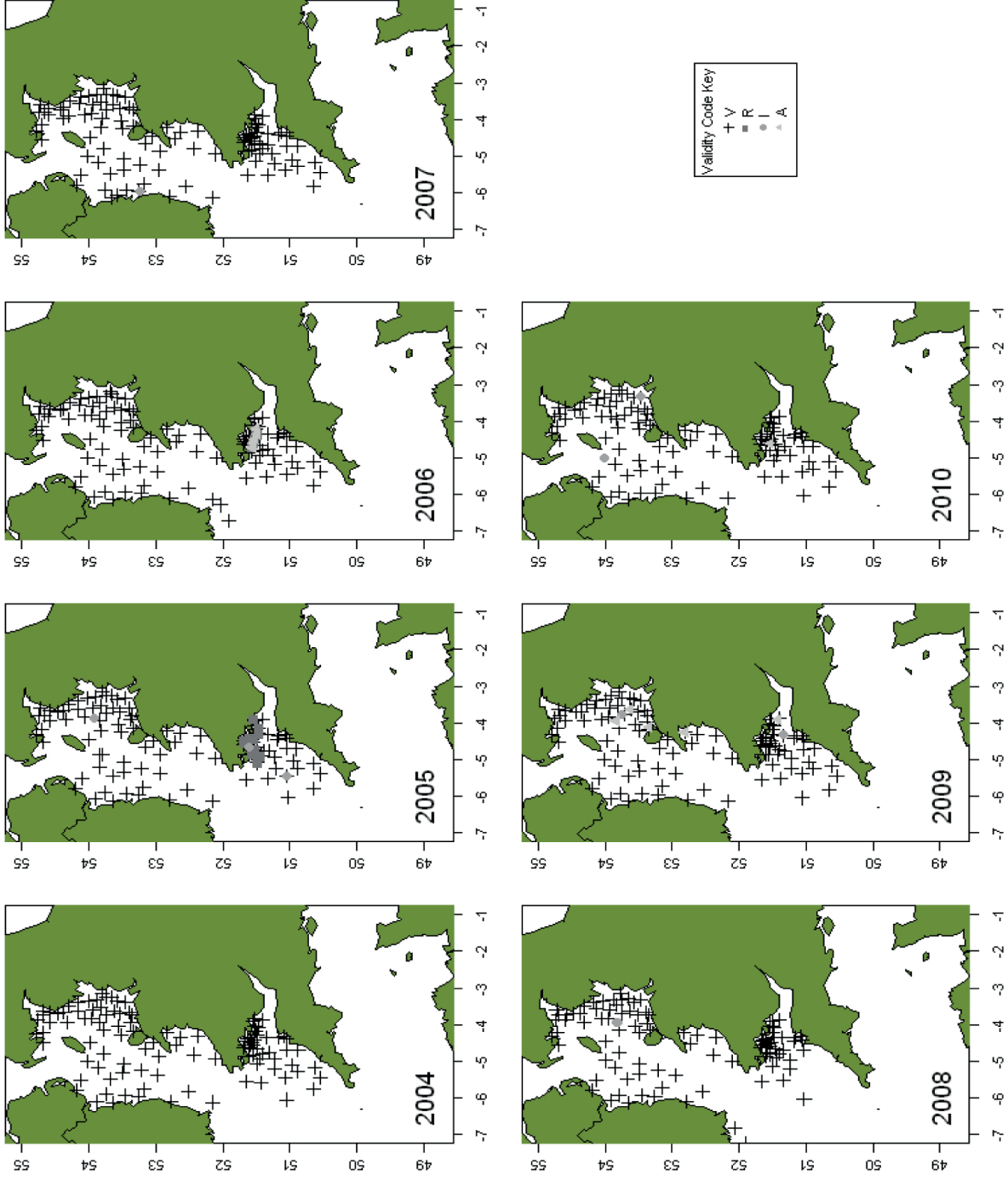


Figure 6.3: Station positions by year on the ISBC (2004–2010).

Appendix III

Table 2: Number of planned and unplanned stations by year

Year	Planned number of stations	Actual number of Stations	Invalid Prime and Station Number
1988	94	90	13 & 38
1989	94	90	79 & 126
1990	97	90	10,12,18,19,112,151,164
1991	99	98	44
1992	100	100	
1993	88	88	
1994	123	121	1,111
1995	119	119	
1996	125	122	82, 114, 161
1997	113	110	137, 143, 152
1998	101	101	
1999	101	101	
2000	118	118	
2001	121	120	71
2002	123	120	100,16,40
2003	109	108	59
2004	107	107	
2005	107	107	
2006	107	107	
2007	108	107	1
2008	98	98	78,79
2009	110	108	10,56
2010	110	109	100
2011	110	110	

Glossary

CTD

A device used to measure conductivity, temperature and depth.

Epibenthos

The animals and plants living on the sea bottom between the low tide and a depth of 100 fathoms.

EDC

Electronic data capture system.

FSS

Fisheries survey system.

HP 1000 Computer

This was a mainframe server (similar to today's FSS).

ICES

International council for the Exploration of the Sea

ISBC

Irish Sea and Bristol Channel Beam Trawl QTC acoustic seabed discrimination system AGDS that gave info on the sea bed type. This was an upgrade from the Roxann.

Reineck corer

A box corer for sediment / benthic sampling at sea.

Roxann ground discrimination system

Acoustic Ground Discrimination System (AGDS) that gave info on the sea bed type.

RV Belgica

Is a research vessel owned by the Belgium government and operated on their behalf by the Management Unit of the North Sea Mathematical Models. Her main purpose is to monitor the North Sea marine environment by collecting all sorts of biological, chemical, physical, geological and hydrodynamic data.

RV Cefas Endeavour

This is Cefas's current research vessel and she was delivered to Cefas from Fergusons Shipbuilders on the 31st March 2003.

RV Corystes

This is a research vessel previously owned by Cefas and now owned by AFBINI. She can carry up to 11 scientific personnel and participates in a wide variety of survey work.

SAIV micro CTD

A device placed on the beam trawl to collect conductivity, temperature and depth data.

Simrad sounder

An echo sounder.

Vax computer

This was a mainframe server (similar to today's FSS).

References

- BRANDER, K. M., AND SYMONDS, D. J. 1984 Gadoid recruitment surveys, Irish Sea 1979–1981. *Annales Biologiques*, 38: 256–259
- BUCKE, D., FEIST, S.W., 1993. Histological changes in the livers of dab, *Limanda limanda* (L.). *Journal of Fish Diseases* 16, 281–296
- DARE, P.J. & DEITH, M.R., 1991. Age determination of scallops, *Pecten maximus*, using stable oxygen isotope analysis, with some implications for fisheries management in British waters. 7th Internat Pectinid Workshop, p118–133.
- ERLEND MOKSNESS (2000). 3rd International Ageing Workshop on European Anglerfish. <http://www.efan.no/NewsAndReports/EFAN%20Report%202-2000.htm> (online). Accessed on 15/3/2010
- GOZLAN R.E., ST-HILAIRE S., FEIST S.W., MARTIN P. & KENT M.L. 2005. Disease threats on European fish. *Nature*. Vol 435, 1045.
- HILMAR, H., BERGMANN, M., KAISER, M.J., & ROGERS, S., ARMSTRONG, M (2003). Ecological relevance of temporal stability in regional fish catches, *Journal of Fish Biology* 1219–1234.
- HILMAR, H., BERGMANN, M., SHUCKSMITH, R., KAISER, M.J., & ROGERS, S. (2006). Habitat association of plaice, sole, and lemon sole in the English Channel. *ICES Journal of Marine Science*, 912–927.
- JANINE CAIRA (2000). <http://www.saske.sk/pau/workshop/datab.html> (online), accessed 11/11/2010
- JENNINGS, S., VAN HAL, R., HIDDINK, J.G., & MAXWELL, T.A.D. (2008). Fishing effects on energy use by North Sea fishes. *Journal of Sea Research*, 60, 74–88.)
- KAISER M J, HINZ H, CALLAWAY RM, NALL A & BILES CL 2005. Resource degradation: a subtle effect of bottom fishing *Marine Biology* 146: 401–408.
- KAISER M.J., HINZ H., CALLAWAY R.M., NALL A. & BILES C.L. 2005. Resource degradation: a subtle effect of bottom fishing. *Marine Biology* 146: 401–408.
- Kennedy, J., P. R. Witthames, and R. D. M. Nash 2007 The concept of fecundity regulation in plaice (*Pleuronectes platessa* L.) tested on three Irish Sea spawning populations *Can. J. Fish. Aquat. Sci.* 64:587-601.
- LEAKEY, C.B.D., ATTRILL, M.J., JENNINGS, S., & FITZSIMONS, M.F. (2008). Retrospective quantification of estuarine feeding activity by coastally caught marine fishes. *Journal of Sea Research*, 60, 210-214.)
- LEAKEY, C.B.D., ATTRILL, M.J., JENNINGS, S., & FITZSIMONS, M.F. (2008). Stable isotopes in juvenile marine fishes and their invertebrate prey from the Thames Estuary, UK, and adjacent coastal regions. *Estuarine, Coastal and Shelf Science*, 77, 513-522.)
- NICOLAUS M., (2009) BENTIC MARINE LITTER. <http://www.dorsetforyou.com/media/pdf/q/2/> (Online), accessed 21/11/2010
- STENTIFORD G., BIGNELL J, LYONS B. & FEIST S. 2009. Site-specific disease profiles in fish and their use in environmental monitoring *Marine Ecology Progress Series* Vol 381: pg 1-15
- VANDAMME, S, MOREAU K, MAES G, DELBARE D, HOFFMAN S (2009). Connectivity of turbot and brill populations in European waters as a basis for sustainable management (poster) KU Leuven/ILVO: Oostende



Head Office

Centre for Environment,
Fisheries & Aquaculture Science
Pakefield Road, Lowestoft,
Suffolk NR33 0HT, UK

Tel +44 (0) 1502 56 2244

Fax +44 (0) 1502 51 3865

Web www.cefasc.defra.gov.uk

Cefas is an executive agency of Defra