Science Series
Technical Report no. 149

A Report of the Historical Changes on the Cefas Eastern English Channel (VIId) and Southern North Sea (IVc) Beam Trawl Survey

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Cefas

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Contents

1. Introduction

The aim of this report is to give guidance on changes that have occurred during the time series of the BTS7D survey and to indicate why such changes were put into place. The report also lists references to papers or reports that used data collected as part of an additional aim on the beam trawl survey.

BTS7D

Cefas has undertaken a beam trawl survey in the southern North Sea and Eastern English Channel since 1988, as part of an ICES co-ordinated research programme and in support of the requirements of the EU Data Collection Framework.

Survey Aims

1. To undertake a beam trawl survey as part of an international programme in the Southern North Sea and Eastern English Channel 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 additional biological data on non-commercial fish by-catch, and on commercially important non-quota species, especially turbot, brill and cuttlefish, to improve our knowledge of these poorly studied species.
3. To quantify the seabed sediments and epibenthos using both photographic and trawl by-catch data, and also the ROXANN acoustic seabed discrimination system, in order to describe the association between the distribution and abundance of invertebrate by-catch, and the substrate type. These data will enable us to more accurately assess the impact of towed gears on invertebrate populations (this aim covered the period from 1991 through to 2000).

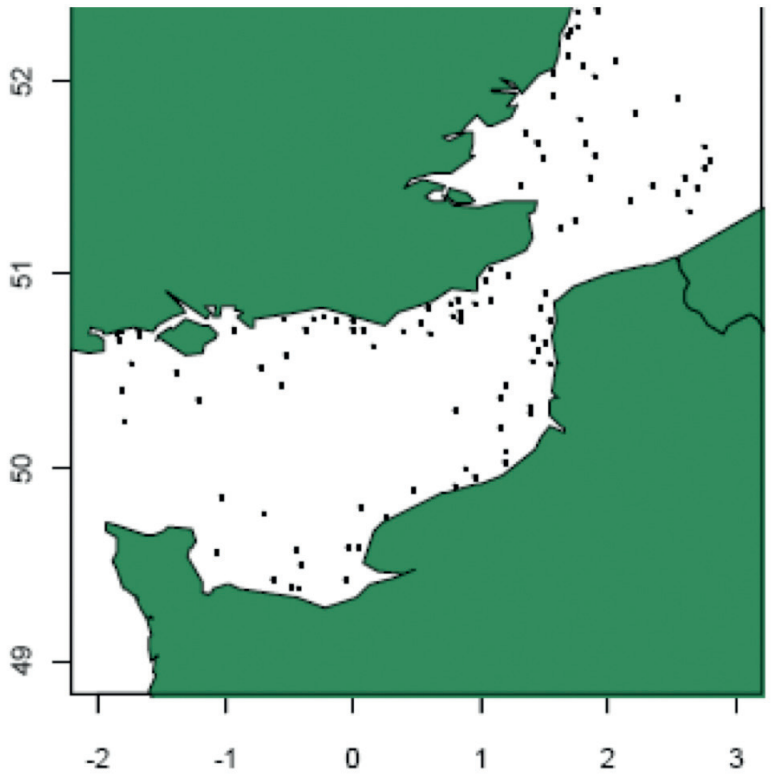

Figure 1: Position of stations sampled on the English Channel Beam Trawl Survey.

2. Photograph and diagram of the gear used on the BTS7D

Figure 2: Beam trawl used on the BTS7d.

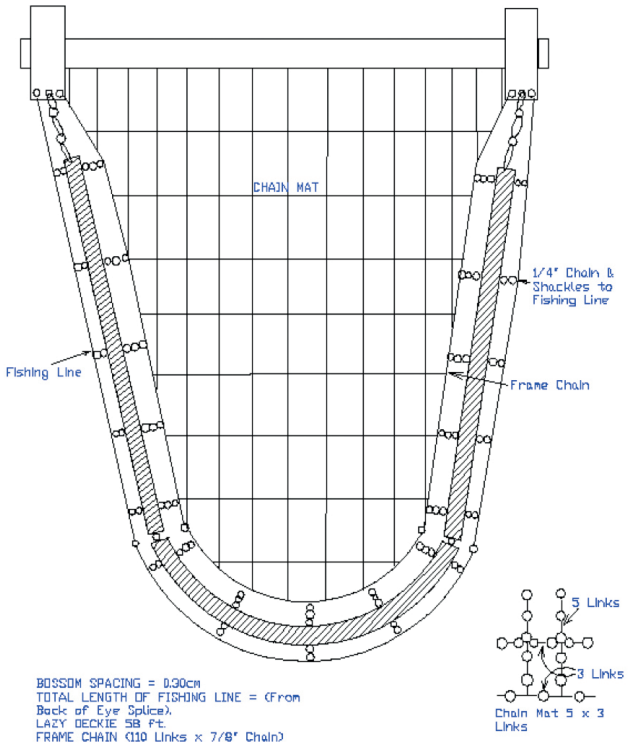

Figure 3: Diagram of the beam trawl layout.

3. Survey number: Suza 1/88

Scientist in charge: G.P. Arnold
Dates: 9th August – 19th August

3.1 Gear:

- The first survey was carried out on the fishing boat Suzanne.

3.2 Trawl stations:

- There were only 51 stations on this survey (this year only) (Appendix I).
- Only one type of gear was used during this survey and this was the beam trawl 4 m steel commercial 3/5 link mat flip up 40 mm double beam.

3.3 Additional information:

- Dragonets (*Callionymus lyra*) were grouped under the Cefas three letter code of DTX and not species identified (this year only).
- Otoliths were taken from sole (Solea solea), plaice (*Pleuronectes platessa*), dab (*Limanda limanda*), turbot (Scophthalmus maximus) and brill (*Scophthalmus rhombus*) (from this year onwards).
- Dab and plaice were input into the catch records as sexed but sole were entered as unsexed (from this year till 1993).
- All otolithed fish were measured to the nearest mm (this year only).
- No benthos was recorded on this survey.
- Table 1 shows which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 1.1 in Appendix II shows the station positions fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

4. Survey number: Corystes 9/89

Scientist in charge: J.D. Riley
Dates: 16th August – 28th August

4.1 Gear:

- This year the survey moved vessels onto Cefas's new research vessel RV Corystes.
- The gear was changed from the previous year to the beam trawl 4m steel commercial 3/5 link mat flip up 75mm ce 40 mm liner aft.

4.2 Trawl stations:

- The number of stations fished from the year 1989-1990 increased to approximately 200 (Appendix III).

4.3 Additional Aims:

- Simultaneous tows were due to be carried out with RV Belgica but were cancelled due to gale force winds.
- Live, small dabs were put ashore at Weymouth for experimental use.

4.4 Additional information:

- The survey took place on the later date of the 16th of August – 28th of August.
- All otolithed fish were measured to the nearest cm, instead of mm (from this year onwards).
- Dragonets were species identified from this year onwards to gain a better understanding of these species and their distribution.
- Octopus (*Eledone cirrhosa*) were weighed and measured in this year (this year only).
- Edible crabs (*Cancer pagurus*) were weighed and counted from this year on.
- Cuttlefish (*Sepia offivinalis*) were weighed and counted (this year to 2002).
- Squid were all weighed and counted (this year to 2004).
- Table 1 shows which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 4.1 in Appendix II shows the station positions fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

5. Survey number: Corystes 9/90

Scientist in charge: J.D. Riley
Dates:14th August – 29th August

5.1 Gear:

- For this year additional gears were added these were:
  - Vertical profile CTD type 8709.
  - Free drifting equipment argos buoy deployment.
  - Bottle casts nansen bottles reversing surface and bottom.

5.2 Additional Aims:

- Two new aims were added to the survey, the first was to describe the seabed sediment and epibenthos using photographic and acoustic methods.
- The second additional survey aim was to carry out further equipment trials on the sector scanner.
- Simultaneous tows were carries out with RV Belgica to produce comparative gear efficiency indicies between the standard heavy 4m DFR beam trawl and the 8m beam trawl used by the Belgium and Netherlands Fisheries Institutes, on the joint survey (R.Clerck *et al* 1990).
- Sector scanner trials were carried out off South Foreland.

5.3 Additional information:

- Edible crabs are now weighed, measured and sexed from this year onwards. This was to increase the biological data on these commercially important species.
- Lesser spotted dogfish (*Scyiorhinus canicula*) are now sexed, from this year onwards.
- Lemon sole (*Microstomus kitt*) otoliths were taken from this year onwards.
- Table 1 shows which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 4.1 in Appendix II shows the station positions fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

6. Survey number: Corystes 8/91

Scientist in charge: J.D. Riley
Dates: 16th August – 31st August

6.1 Trawl stations:

- The number of stations fished reduced to between 100 and 150 (1991 - present).

6.2 Additional Aims:

- An additional aim was added to this survey programme to test the Roxanne acoustic seabed discrimination system against photographic and grabbing methods.
- Simultaneous tows were carried out with RV Belgica to add to the 1990 data on comparative gear efficiency indicies between the standard heavy 4 m DFR beam trawl and the 8 m beam trawl used by the Belgian and Netherlands Fishery Institues.
- Adult sole were brought back to the lab live for fecundity experiments.
- Spider crabs and other benthic organisms were brought back for the University of East Anglia.
- Sole otoliths were, in addition, measured as part of the study on the value of the otolith as an indicator of overall fish size.

6.3 Additional information:

- Table 1 shows which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 4.1 in Appendix II shows the station positions fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

Figure 4: Photo of sole catch (*Solea solea*).

7. Survey number: Corystes 9/92

Scientist in charge: J.D. Riley
Dates: 29th July – 13th August

7.1 Additional Aims:

- A French observer was taken on board to observe the French coast stations.
- Additional tows were carried out in Rye Bay to study the length and age of sole and plaice in relation to depth.

7.2 Additional information:

- The survey moved to the earlier date of the 30th of July – 12th of August and stayed close to this date from this year onwards.
- Spider crabs (*Majidae*) were input under the Cefas code of MJX (until 1996) and were weighed and counted from this year on.
- Scallops (*Pecten Maximus*) were weighed and measured (this year to 1995).
- Queen scallops were weighed and counted (this year onwards).
- Table 1 shows which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 4.1 in Appendix II shows the station positions fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

8. Survey number: Corystes 8/93

Scientist in charge: R. Milner
Dates: 2nd August – 15th August

8.1 Additional information:

- Sole were sexed (this year onwards).
- Table 1 shows which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 4.1 in Appendix II shows the station positions fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

9. Survey number: Corystes 9/94

Scientist in charge: S. Rogers
Dates: 4th August – 22nd August

9.1 Additional Aims:

- Dredge indices of abundance for pre recruit and fishable scallops from the standard Lizard to Eddystone survey grid were obtained.
- Samples of scallops from each of the survey grid were collected for comparative biometric analysis.
- Samples of cuttle fish were frozen for processing at the laboratory.

9.2 Additional information:

- It was decided to sex and weigh all spider crabs in this year and in following years. This was to increase the biological data on these commercially important species.
- Solenette (*Buglossidium luteum*) and scaldfish (*Arnoglossus laterna*) were also otolithed (this year to 1998).
- Table 1 shows which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 4.1 in Appendix II shows the station positions fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

Figure 5: Photo of a Spider crab (*Maja brachydactyla*).

10. Survey number: Corystes 8/95

Scientist in charge: S. Rogers
Dates: 3rd August – 18th August

10.1 Gear:

- In addition to the ROXANN a new designed 35 mm camera mounted on the beam of the trawl was used to take photographs of the seabed at two-minute intervals during trawling. Photos will be used to ground truth ROXANN to a higher level of resolution than has previously been possible. The use of high- frequency images may also have potential for determining absolute abundance of selected species, particularly some benthic invertebrates such as species of starfish and crabs.

10.2 Additional Aims:

- The outer Thames and Coastal waters off Suffolk were surveyed more thoroughly than during the 1994 survey to gain a better understanding of the catch compositions in these areas (Appendix II).

10.3 Additional information:

- By catch of benthos at each station was photographed and a representative sample from 43 selected stations was sorted and, where possible, all fauna and flora were identified, counted and weighed (until 2004).
- Rocks were weighed and input into the catch records (from this year until 2009).
- Otoliths were taken from flounder (*Platichthys flesus*) and continued to do so in following years.
- Length, weight and maturity of all cuttlefish were recorded for this year and 2002.
- Otoliths were taken from European sea bass (*Dicentrarchus labrax*) and red gurnards (*Aspitrila cuculus*) in this year.
- Table 1 shows which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 4.1 in Appendix II shows the station positions fished for this year.

11. Survey number: Corystes 10/96

Scientist in charge: S. Rogers
Dates: 31st July – 16th August

11.1 Additional Aims:

- Samples of gill and liver tissue were collected from brill for analysis by the Fisheries Research Station, Belgium, as part of the EU programme.

11.2 Additional information:

- Spider crabs were recorded under the Cefas code of SCR instead of MJX in this and in following years.
- Table 1 shows which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 4.1 in Appendix II shows the station positions fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

12. Survey number: Corystes 8/97

Scientist in charge: S. Rogers
Dates:1st August – 14th August

12.1 Additional information:

- Only flounders, sole and plaice were otolithed this year.
- Table 1 shows which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 4.2 in Appendix II shows the station positions fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

13. Survey number: Corystes 8/98

Scientist in charge: S. Rogers
Dates: 31st July – 14th August

13.1 Additional Aims:

- Stations between outer Thames estuary and the coast of west Sussex were dominated by the Bryozoan *Alcyonidium diaphanum*. May be different species so samples were collected for DNA analysis at Swansea University (J Porter *et al* 2006).
- Careful monitoring of presence of elasmobranches egg cases in the benthic by catch and the substrates to which they were attached were revealed, for example, that dogfish mainly deposit their eggs on the bryozoans *Flustra foliacea*, but also use erect sponges and hydroids. This is an example of the way the detailed analysis of benthic by catch can provided information on the distribution of Essential Fish habitat.
- Samples of starfish (*Asterias forbesi*) were examined for the presence of damage potentially caused by the passage of towed fishing gears. The values will be compared against the known distribution of fishing activity to show whether this species can be used as a widespread indicator of fishing impact.
- Samples of brill liver and gill tissue were preserved for further analysis of stock structure as part of a EU funded programme.

13.2 Additional information:

- Table 1 shows which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 4.2 in Appendix II shows the station positions fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

14. Survey number: Corystes 8/99

Sceintist in charge: S. Rogers
Dates: 24th August – 16th August

14.1 Gear:

- The QTC View was operated in 'unclassified' mode, which allowed all trawl stations to be clustered according to the similarity in their acoustic properties.

14.2 Additional Aims:

- The abundant filter feeding bryozoan *Alcyonidium* was collected from 20 stations in the channel for population genetics analysis. It is thought some species only colonise specific substrate (e.g. ascidians, hydroids). The material collected will also be used to investigate the extent of substrate choice in this genus (J Porter *et al* 2000).

14.3 Additional information:

- The survey moved back to an earlier date of the 24th of July – 4th of August due to other survey commitments. The survey continued to run close to these dates from this year onwards.
- Solenette and scaldfish were no longer otolithed from this year onwards (except for solenette in 2003).
- Table 1 shows which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 4.2 in Appendix II shows the station positions fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

15. Survey number: Corystes 10/00

Scientist in charge: R. Millner
Dates:25th July – 8th August

15.1 Gear:

- Quantification of the seabed,sediments and epibenthos was done using a 2m beam trawl by catch and remote acoustic seabed discrimination system (QTC) for this year only. The stations associated with this were labeled with the beginning letters QT.

15.2 Trawl stations:

- Prime station 26 was invalid because the codend was undone.
- Prime station QT10 was invalid because the codend was split and the liner was out.
- Prime station QTC9 was invalid because the net filled with sand and brittlestars.
- Prime station 18 was invalid because the net was not fishing properly.

15.3 Additional Aims:

- Biological data was collected on the reproductive cycle and population genetics of the ctenostomate bryozoan genus *Bowerbankia*. Samples of a variety of bryozoans were collected for the British Museum.
- Samples of live spider crabs (*Maia squinado*) were collected for Cambridge University.
- Live fish and invertebrate species were obtained for the local Sea Life Centre.

15.4 Additional information:

- Table 1 shows which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 4.2 in Appendix II shows the station positions fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

16. Survey number: Corystes 7/01

Scientist in charge: B. Harley
Dates: 25th July – 8th Aug

16.1 Gear:

- For the first time on this survey, a mini-CTD was attached to the headline of the beam trawl and continuous temperature, depth and salinity values were recorded whilst the beam was fishing (from this year onwards).

16.2 Trawl stations:

- Prime station 17 was reduced to 18 minutes due to stactic gear.
- Prime station 68 was reduced to 20 minutes because of a 3knot tide, 6 knots over ground on the tow.

16.3 Additional Aims:

- Samples of dab and whiting (*Merlangius merlangus*) tissue were taken for nitrogen stable isotope analysis (Leakey C *et al* 2008).
- Six species of goby (*Pomatoschistus microps*) were frozen for positive identification on return to the laboratory.
- Samples of live spider crabs were collected for Cambridge University.
- Additional sole otoliths were taken to be used by Cefas in an otolith staining experiment.
- Starfish tube feet from specimens of *Asterias rubens* were collected from three sites in area VIId, for genetic work by F. M. Harper, of Dalhousie University, Nova Scotia, Canada (Harper F *et al* 2004).
- Specimens of the hermit crab (*Pagurus bernhardus*) were collected at ten stations throughout the survey area.
- Tissue samples from eight species of echinoderm were collected; each species had one sample frozen and one placed in industrial methylated spirit.

16.4 Additional information:

- From this year onwards, sand gobies were input under Cefas's three-letter code of POM instead of SDG.
- No benthos was recorded for this year only.
- Table 1 shows which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 4.2 in Appendix II shows the station positions fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

17. Survey number: Corystes 10/02

Scientist in charge: B. Harley
Dates: 24th July – 7th August

17.1 Trawl stations:

- Prime station 49 was hauled early due to static gear.
- Prime station 59 was hauled after 15 minutes due to a bomb found at the end of the tow.
- Prime station 4 was hauled after 15 minutes due to large amounts of weed.
- Prime station 41 was hauled after 25 minutes due to a large weight in the codend.
- Prime station 74 was invalid due to the warp parting at the splice with all gear lost. The gear was recovered later in the survey.
- Prime station 23 was invalid because there was a hole in the codend.
- Prime station 62 was abandoned due to pots. An alternative tow could not be found.
- Prime stations 5 and 29 were invalid due to large amount of shell and brittle stars.
- Prime station 93 was invalid because the belly was damaged on uneven ground.

17.2 Additional Aims:

- Cuttlefish were weighed, measured, sexed and biological data (2002 only) was collected for this year onwards.
- As part of the new EU data regulations all ray (*Raja*) species caught were sampled for length, sex, maturity and weight (2002 - 2009).
- Samples of live spider crabs were collected for Cambridge University.
- Sole were collected and frozen for Melanie Bergmann of Bangor University. (Hilmar,H *et al* 2003 & Hilmar,H *et al* 2006)
- Samples of various fish species were collected for Terry Watson for the Cefas fish identification course.

17.3 Additional information:

- In this and following years cod and whiting were otolithed.
- Table 1 shows which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 4.2 in Appendix II shows the station positions fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

18. Survey number: Corystes 10/03

Scientist in charge: S. Rogers
Dates:26th July – 8th Aug

18.1 Gear:

- New style micro CTD 7504 was fitted on the trawl, but this was changed to the smaller SD204 mini CTD due to damage on the first haul.

18.2 Trawl stations:

- Prime stations 301-312 were additional 15 minutes stations. They were part of a survey grid in the vicinity of dredging site on Shingle Bank.
- Prime station 119 was only valid for 11 minutes because the gear did not pull out correctly.
- Prime station 27 was invalid because the cod end was not tied up.

18.3 Additional Aims:

- Additional biological data in support of the EU data collection regulation were taken for measurements of spider crab (*Maja squinado*).
- Comparative environmental data was collected for the two types of mini CTD at four trawl stations.
- Juvenile flatfish were preserved for fish ID course for new staff participating in the 2003 young fish survey.
- Temperature and salinity data was collected at all stations.
- Tissue samples from *Raja* species, mainly thornback, were collected for Jim Ellis.
- Live spider crabs were collected for Stuart Hetherington.

18.4 Additional information:

- Thick back sole, solenette, sand soles, gurnards and European sea bass were otolithed for this year only.
- All otolithed fish were individually weighed from this year on (1993–present).
- All otolithed fish were individually matured from this year until 2010.
- Table 1 shows which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 4.2 in Appendix II shows the station positions fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

19. Survey number: Corystes 11/04

Scientist in charge: J. Dann
Dates: 26th July – 9th August

19.1 Trawl station:

- Prime station 5 in the Bay de Seine was abandoned as the net filled up with a mixture of weed and sand, which caused problems when trying to haul the gear.
- Prime station 17, 33, 43, 47 and 80 were shortened to 15 minutes tows because of static gear.
- Prime station 19 was a repeat of station 24 for 15 minutes towing south to north owing to fixed nets.

19.2 Additional aims:

- Otoliths were collected from lemon sole, dab, turbot, brill, flounder, sole, whiting, cod and plaice and no longer from thick back sole, solenette, sand sole and gurnards.
- Spider crabs were collected for Cambridge University.
- Squat lobster (*Munida rugosa*) samples were collected from the Eastern Channel for genetic studies for Deborah Bailie at Queens University Belfast (Baillie,D 2003).
- Tissue samples from rays, mainly thornbacks (*R clavata*) were collected from the Eastern Channel and the southern North Sea for genetic studies.
- Samples of plaice, sole and whiting were collected from the North Sea for Chris Leakey for micro-chemical analysis of otoliths and isotopes analysis of muscle tissue (Leakey,C *et al* 2008).
- A sample of juvenile plaice were collected from the French coast for Audrey Darnaude to carry out otolith micro-milling analysis.
- Live plaice were collected for tank experiments at the Lowestoft laboratory. A total of 70 fish were caught of which 35 survived.
- A variety of fish species were collected for use in fish identification at the laboratory.

19.3 Additional information:

- A new benthos protocol was established from this year onwards with recording of ten sentinel species at every station and quantification of other benthos on selected stations on the grid. Unidentified benthos was put in and weighed as a mix under the Cefas code BEN.
- Spider crabs were recorded under the three letter code of MJX instead of SCR for this year only.
- Squid were weighed and measured from this year on.
- Table 1 shows which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 4.2 in Appendix II shows the station positions fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

20. Survey number: Corystes 2/05

Scientist in charge: S. Rogers
Dates: 31st July – 16th August

20.1 Gear:

- The vessel is now owned by DARDNI. (Agri-Food & Biosciences Institute, based in Northern Ireland) (from this year onwards).
- The Electronic Data Capture (EDC) system was used for the first time on this survey.
- A malfunction of an engine component meant sailing had to be delayed by two days whilst repairs were carried out.

20.2 Trawl stations:

- Prime 37 was invalid because the winch pulled out and the net was damaged.
- Prime 9 was invalid due to a small hole in the cod end.
- Prime 15 was invalid because the net filled up with sand.

20.3 Additional aim:

- Live and frozen flounders were collected for John Thain. These were for work being carried out on endocrine distribution on flounders found offshore to assess background / reference values. The live fish were to be used for plasma extraction and the frozen samples were for complimentary chemical analysis.

20.4 Additional information:

- The vessel started the survey from Weymouth instead of Lowestoft due to now being owned by DARDNI. (Agri-Food & Biosciences Institute, based in Northern Ireland) (from this year onwards).
- From this year on otoliths were taken from European sea bass.
- Monkfish (*Lophius piscatorius*) otoliths were taken for this year and 2010 onwards.
- Table 1 shows which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 4.3 in Appendix II shows the station positions fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

21. Survey number: Corystes 4/06

Scientist in charge: J. Dann
Dates: 25th July – 8th August

21.1 Trawl stations:

- Prime stations 6, 7, 10, 44, 45 and 47 were all cut short due to fixed gear.
- Prime station 61 was fished for 60 minutes because station 203 could not be fished due to busy traffic in separation zone and two visible cables.
- Prime station 94 was reduced due to pots on the tow.
- Prime stations 1, 2 and 15 were 15 minutes tows due to sand and brittle stars.
- Prime stations 78 and 79 were reduced to 15 minutes due to a wreck.
- Prime station 4 was invalid due to a net full of weed and sand.
- Prime station 49 was dropped because of inaccessibility due to tide state.
- Primes stations 8 and 12 were dropped because of the abundance of brittle stars and shell in the area making them impossible to work.
- Prime station 25 was dropped to enable the vessel to get the tide into Weymouth.

21.2 Additional aims:

- A total of 280 specimens of ray, mainly thornback, were biologically sampled.
- Length data and catch rates of sole in differing areas of the survey were collected for analysis at a later date.

21.3 Additional information:

- Table 1 shows which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 4.3 in Appendix II shows the station positions fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

22. Survey number: Corystes 1/07

Scientist in charge: G. Course
Dates: 21st July – 4th August

22.1 Trawl stations:

- Prime stations 47 and 49 were hauled after 20 minutes due to static gear.
- Prime station 25 fished for 15 minute due to an invalid previous tows caused by flint rocks.
- Prime stations 14, 18, 19, 20 and 21 were only fished for 20 minutes due to broken shell.
- Prime stations 1, 3, 5, 6 and 11 were cut to 20 minutes tows to protect the gear and winches.
- Prime station 69 was hauled after 20 minutes due to a ferry channel exclusion zone.
- Prime station 119 come fast after 14 minutes.
- Prime stations 83, 93, 96, 97, 98 and 99 were reduced due to sand and pebbles.
- Prime stations 25, 50 and 53 were all invalid due to problems with the codend.

22.2 Additional information:

- Table 1 shows which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 4.3 in Appendix II shows the station positions fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

23. Survey number: Cefas Endeavour 14/08

Scientist in charge: G. Course
Dates: 18th July – 1st August

23.1 Gear:

- The survey is now carried out on RV Endeavour and no longer on RV Corystes.
- Richard Ayres brought the new EDC hardware to sea to test it in a live environment and with real data and conditions. This proved to be a complete success and the hardware proved to be working perfectly.

23.2 Trawl stations:

- Prime station 56 and 54 had to be reduced to 25 minutes to avoid catching static gear.
- Prime station 49 was dropped because it lies in a zone where the Southampton port authority requires all vessels over 61m (including fishing vessels) to carry a pilot. It was suggested that it should be removed from the survey or a suitable alternative found for next year.
- Prime station 11, 16, 21 and 69 were all moved positions because they were in the 'pilot area'.
- Prime station 1 had to be completely dropped off from the survey because there is no suitable or 'pilot free' are within 5 miles off the original station.
- All moved stations have been labelled with the suffix "A" after the original
- prime station number.
- Prime station 46 had to be dropped because the water was too shallow for the vessel.
- An alternative tow at the end of prime station 62 had to be used because there was static gear all over the original 62 tow.
- On prime station 50 the warp ratio was shortened to 3:1 and tow to 20 minutes to protect the gear as it had ripped in previous years.
- Prime station 25 was invalid due to poor ground contact caused by the current. This tow was repeated at the next station.
- On prime station 43 fishing had to be moved 250 m to north of the tow and run parallel because of static gear on the tow.
- On prime station 9 the lifting becket parted at the shackle due to sand weight. The gear was retrieved successfully and the tow was valid.
- Prime station 14 was run on an alternative tow because of pipeline cutting the end off the original tow.
- Prime station 2 produced a large catch of shell and gravel (approx 30 baskets).
- Prime station 77 was hauled early after the Grenay radio called to say fishermen said there was gear around.
- Prime station 76 had to have its course changed and was hauled early because of poorly marked static gear.
- Prime station 119 had to be towed north to south because of the shape of the sand banks.

23.3 Additional aims:

- Elasmobranches were tagged and released at the request of Dr Jim Ellis.
- Tidal tracking tags labelled with blue lettering were released for Julian Metcalfe at the shooting time and position for prime station 78 as requested.
- Gonad samples were taken from female plaice for historical research under the request of Dr Peter Whittames.
- Photographs were taken of different fish species and benthos to enable easier and more accurate identification.

23.4 Additional information:

- A new six-stage maturity key was created for round fish.
- Table 1 shows which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 4.3 in Appendix II shows the station positions fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

24. Survey number: Cefas Endeavour 11/09

Scientist in charge: R. Ayers
Dates: 17th July – 31st July

24.1 Gear:

- Problems with the Mini CTD meant it failed to download all of the stations despite logging whilst checked during the day.The unit was swapped on the 22nd of July for the backup.
- On the 21st of July operations were changed over to the winch on port side due to problems with the starboard winch brake. The operations were switched back on the 24th of July.

24.2 Trawl stations:

- Prime station 44 and 47 were hauled early due to static gear.
- Prime station 49 was hauled early (20 minutes) to avoid the site of an historic wreck at the end of the tow.
- Prime station 55 was hauled early (20 minutes) to avoid static gear.
- Prime station 51 was invalid due to damage to the codend caused by large catches of rocks.
- Prime staion 9 was hauled early to avoid static gear.
- Prime station 6 was reduced to 20 minutes and the warp was shortened to 3:1 to avoid a large catch of shell and gravel.
- Prime station 5 tow time was reduced to 20 minutes with warp at 3:1, but despite this a heavy catch of mud and a tear resulted. The station was invalid due to the large amount of mud and damage.
- The station was repeated for 10 minutes with an empty net and for 20 minutes with a net full of mud and broken shell. The station was once again invalid and the decision was taken to abandoned this station for the following reasons;
  - Risk of loosing or seriously damaging the gear.
  - The low likelihood of getting a scientifically valid sample.
  - Increased health and safety threat posed to the crew when dealing with such a large weight.
- Prime station 4 and 2 were reduced to 20 minutes with warp at 3:1 to reduce the chance of large catches of mud.
- Prime station 2, 3, 4, 5, 6 and 9 were reduced to 20 minute tows to reduce the risk of large catches. Despite this there was a large catch of brittle star at station 3 and it was therefore invalid.
- Prime station 41 was invalid due to several tonnes of sand. It was repeated from the other end for 20 minutes with the same results. No further fishing was carried out on this site.
- Prime station 95 was invalid on the first attempt, as the net hung up and there were stones in the belly. The tow was repeated successfully for 20 minutes.

24.3 Additional information:

- Rocks are no longer recorded in the catch (from this year onwards).
- Otoliths were taken from all gurnards to help gain a better understanding of these commercially important species (from this year onwards).
- Table 1 shows which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 4.3 in Appendix II shows the station positions fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

25. Survey number: Cefas Endeavour 12/10

Scientist in charge: S. Songer
Dates: 17th July – 31st July

25.1 Trawl stations:

- Prime station 49 was hauled after ten minutes due to excessive amounts of stactic gear, shallow water and an historic wreck in the vicinity, this station was invalid.
- Prime station 9 was hauled after 20 minutes to avoid large catches of brittle stars.
- Prime station 14 and 15 was reduced to 20 minutes with the warp at at ratio of 3:1, to avoid a large catch of shell and gravel. These stations were invalid as it appeared the gear would have not fished properly.
- Prime station 6 and 7 were also fished for 20 minutes with the warp ratio of 3:1; both stations were valid, although 7 did contain a lot of mud.
- Prime station 2 was invalid due to a large catch of shell and gravel that would have prevented the gear from fishing correctly.
- It was recommended that prime stations 14, 15 and 2 be assessed for their contribution to the assessment weighted against the cost and risk involved.
- Prime station 16 was hauled after 20 minutes in an attempt to avoid static gear.
- Prime station 29 was fished for 20 minutes to avoid a large catch of sand.
- Prime station 71 was fished for 20 minutes to avoid a large catch of sand.
- Prime station 70 was invalid due to a large catch of brittle star. A second tow was made slightly west to the original and with a warp ratio of 3:1 and fished for 20 minutes. A similar catch was made and the station was abandoned.
- Station 68 was hauled after 20 minutes to avoid stactic gear and station 95 was fished for 20 minutes with a warp ratio of 3:1 to avoid a large catch of sand.
- Prime station 97 was invalid on the first attempt, due to a large catch of sand and shell. The tow was repeated for 20 minutes with a warp ratio of 3:1 and this time was successful.

25.2 Additional aims:

- 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 (a previous report has been referenced) (2010 onwards). (Nicolaus M, 2009)
- Isotope samples were collected (Simon Jennings, Cefas).
- Live dab were collected as a brood stock (Stuart Hetherington, Cefas).
- Rays were tagged and released for a beam trawl survival rate study (Dr Jim Ellis, Cefas).
- Species were collected for radiochemical analysis (Paul Rumney, Cefas) (2010 & 2011).

25.3 Additional information:

- Neil Pearson (Cefas HSEQ manager) carried out an 18001 audit on this survey (2010 & 2011).
- The additional depth feed provided during the last dry dock was incorporated into the bridge logging software and successfully tested.
- Test software was written for the DEM scale for the following cruise to assess performance during less favourable weather conditions.
- The new RFID (Radio Frequency Identification) measuring board system was rolled out live successfully, it proved to be quicker to use and was unanimously agreed to be very impressive. The original six wands issued at the start of the trip were still in use at the end, proving the new hardware is markedly more robust than its predecessor.
- Previous problems with communications with the POLS balances were investigated and rectified, a combination of badly corroded data leads, bad connections, inconsistencies in POLS firmware and associated instructions and incorrect wiring all contributed to the issues encountered by previous trips.Once corrected, no further problems were found with POLS communication, and again, the same kit was in use at the end of the trip as at the start.
- 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 shows which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 4.3 in Appendix II shows the station positions 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 13/11

Scientist in charge: S. Songer
Dates: 20th July – 2nd August

26.1 Gear:

- There was a marked increase in stactic gear for this year.

26.2 Trawl stations:

- The codend ripped on prime station 24 but this station was refished successfully.
- Prime station 4 was moved 300m to the south to avoid stactic gear.
- Prime station 12 was moved slightly to the west of its designated position to avoid towing over a cable on the sea bed.
- Prime station 14 encountered a large catch of shell/ gravel and caused damage to the net. As a result of this prime station 15, which was nearby, was abandoned to prevent further damage.
- It was recommended that station 14 and 15 should be dropped in future surveys, due to their history of large catches and gear damage.
- Prime stations 43 and 45 had to be abandoned due to stactic gear. Two attempts were made to fish these during the survey.
- Prime station 49 and 56 could not be fished due to stactic gear also.
- Prime station 50 was hauled early to avoid a wreck at the end of the tow.
- On prime 65 a massive catch of mud and starfish was made, this tow was invalidated but a repeat tow of shorter duration was carried out with a smaller warp ratio and this time the catch was valid

26.3 Additional Aims:

- On the 27th of July Dave Limpeny, Sue Ware and Allan Emery joined the vessel to carry out a feasibility study assessing potential for carrying out multi disciplinary work on fishing surveys, doing grabs, camera studies and multi beam lines during the night.
- One live berried lobster was collected for Stuart Hetherington for brood stock.
- Samples of queen scallops were collect for Simon Jennings for isotope sampling.
- Samples of queen scallops were collected at the designated stations for Bangor University.
- Water samples for nutrient analysis, were taken at the requested sites (Naomi Greenwood, Cefas).
- Detailed length/weight data, to mm and 0.1g were collect on 56 individual fish (Joana Silva, Cefas).

26.4 Additional information:

- The EDC system (Deckmaster and Measure) was upgraded to incorporate communication with the newly acquired DEM marine scales.
- Table 1 shows which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.
- Figure 4.3 in Appendix II shows the station positions fished for this year.
- Table 2 in Appendix III shows the number of planned/ actual stations fished for this year.

Appendix 1

Table 1: A table to show which species have been subject to biological sampling (length, weight, sex, maturity and, for teleosts, collection of otoliths and/or scales) by year.

Species	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
BLL							✓	✓	✓		✓			✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
BLR															✓				✓	✓	✓	✓	✓	✓
COD															✓		✓	✓	✓	✓	✓	✓	✓	✓
CUR																					✓		✓	✓
DAB		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓			✓	✓
ESB								✓								✓		✓	✓	✓	✓	✓	✓	✓
FLE								✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
GUG																✓					✓	✓	✓	✓
GUR								✓								✓						✓	✓	✓
GUS																✓								
LEM							✓	✓	✓		✓		✓	✓	✓		✓		✓	✓	✓	✓	✓	✓
MON																		✓					✓	✓
PLE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PTR																			✓	✓	✓	✓	✓	✓
SDF							✓	✓	✓		✓													
SDR															✓			✓	✓	✓	✓	✓	✓	✓
SHR																						✓		
SOL	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SOS																✓								
SOT							✓	✓	✓		✓					✓								
TBS											✓					✓								
THR															✓			✓	✓	✓	✓	✓	✓	✓
TUB																✓								
TUR		✓					✓	✓	✓		✓			✓	✓		✓	✓	✓	✓	✓	✓	✓	✓

Appendix II

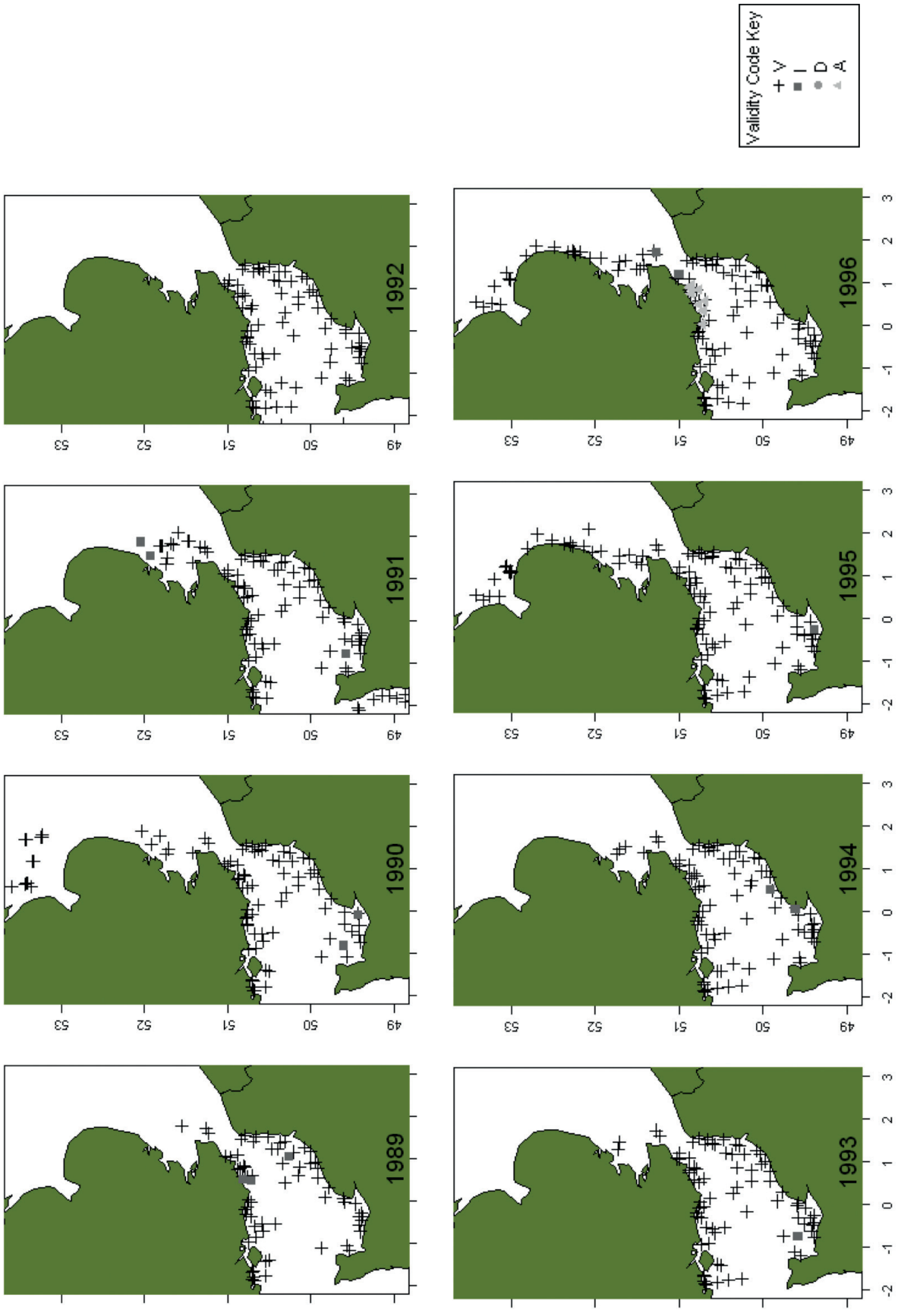

Figure 6.1: Station positions by year on the BTS7D (1989-1996).

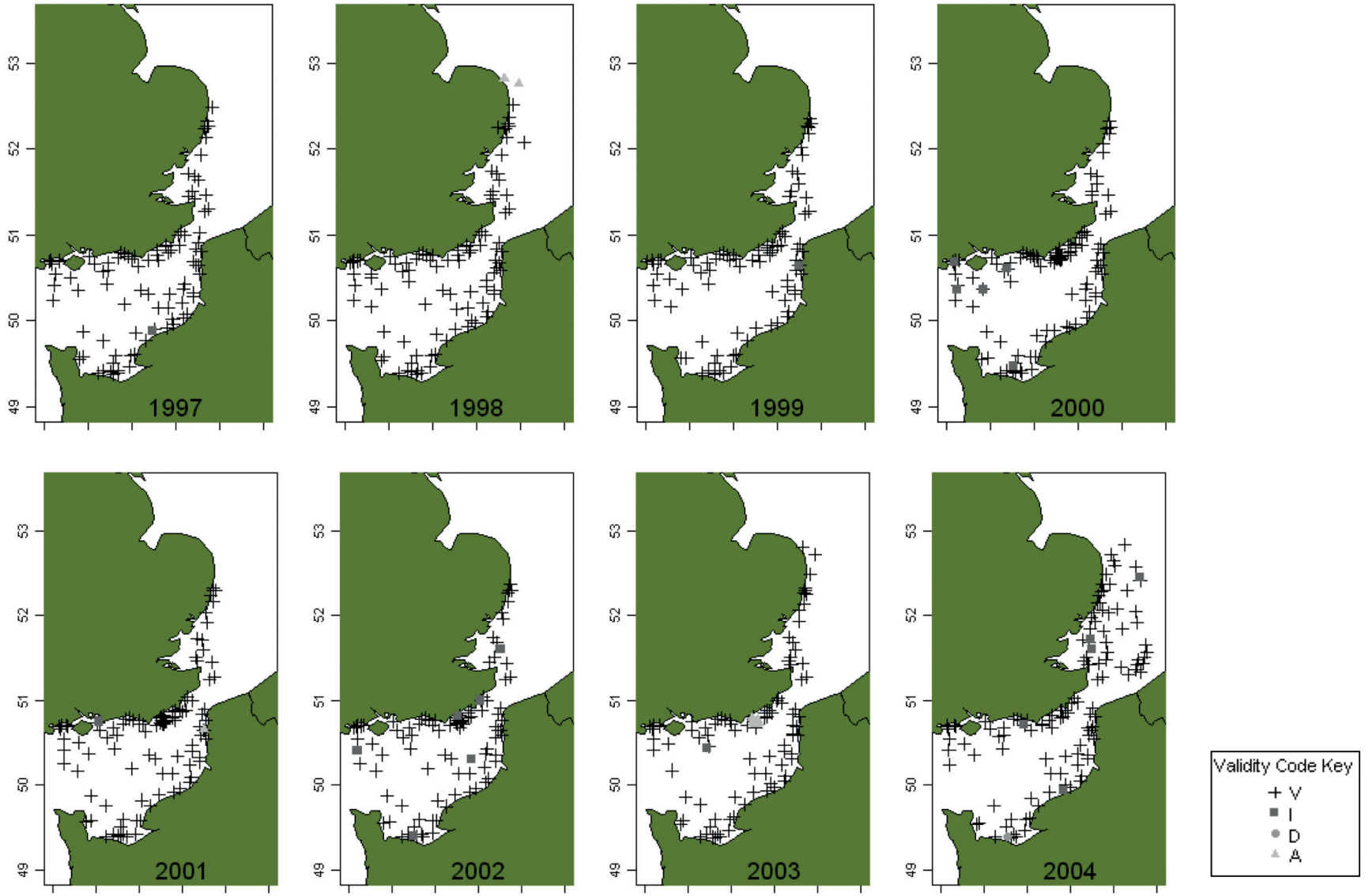

Figure 6.2: Station positions by year on the BTS7D (1997–2004).

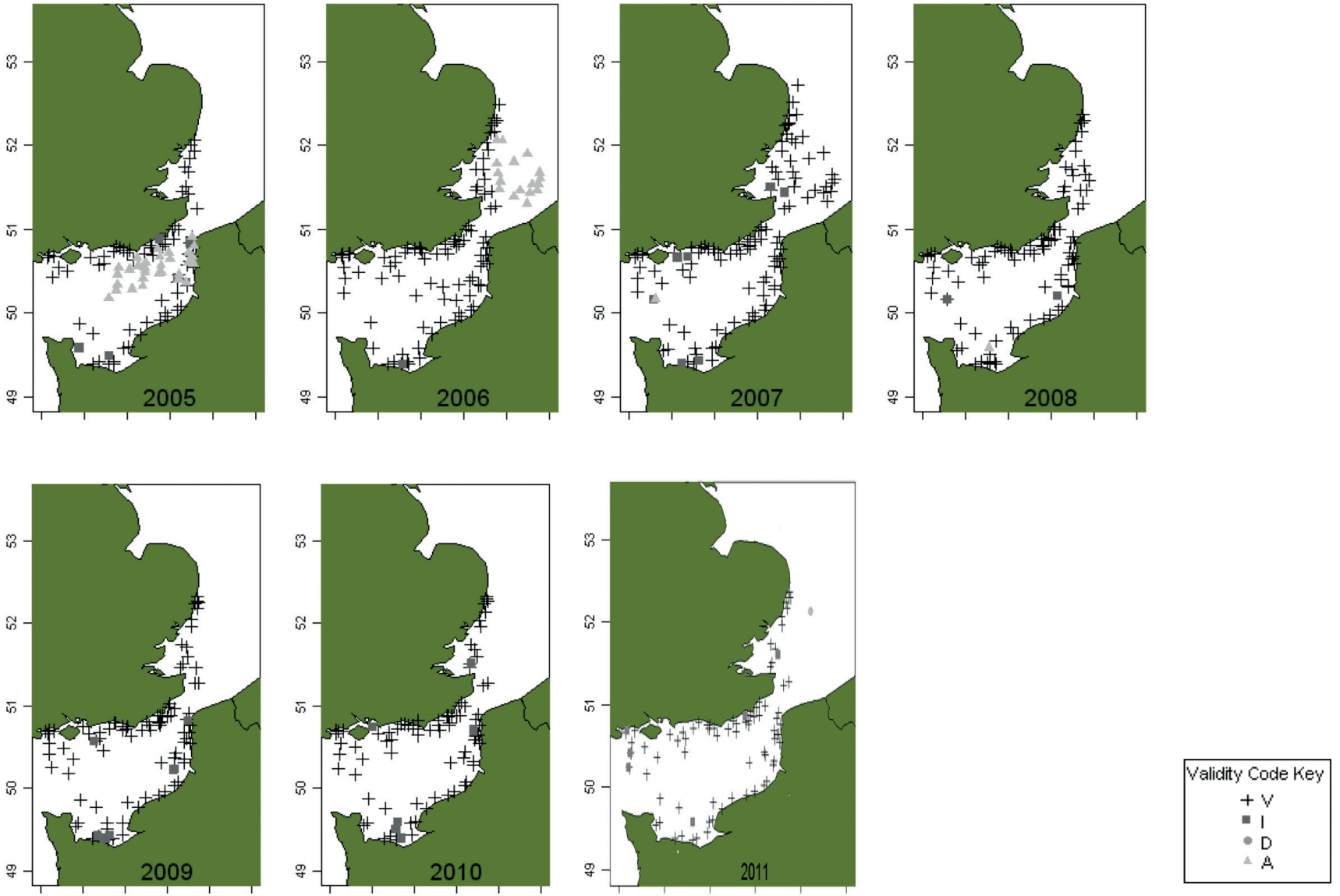

Figure 6.3: Station positions by year on the BTS7D (2005–2011).

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
2011	112	106	43 23 24 93 65 14
2010	129	122	49 14 15 2 70 97
2009	135	126	51 6 5 3 41 95
2008	108	106	25 41
2007	113	106	25 50 53 7 3 119 97
2006	109	108	4
2005	108	102	37 35 68 65 9 15
2004	128	122	17 58 93 82 B46
2003	107	106	27
2002	106	105	75 74 23 62 5 29 93
2001	112	111	102 49
2000	162	158	65 26 QT10 QTC9
1999	190	188	93 77
1998	99	99	
1997	94	93	18
1996	115	112	75 78
1995	86	82	2
1994	108	107	18 21 **11 12**
1993	95	94	13
1992	104	102	**33 101**
1991	104	101	82 83
1990	207	205	13 1
1989	70	67	36 159 166
1988	52	48	**22 30 47 51**

Glossary

BTS7D
Beam Trawl Survey, area 107D and 104C.

CTD
A device used to measure conductivity, temperature and depth.

EDC
Electronic data capture system. A system used at each fishing station, that captures catch composition, size and biological samples, the system also manages the targeting of biological sampling to meet cruise requirements. The data is fed into FSS which combines this data with the other cruise data elements to provide a complete data set.

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

FSS
Fisheries Survey System. A database and software application that stores, reports, processes and acts as a data source for external processes the data (positional, environmental, gear parameters, catch composition, size and biological samples) from fisheries surveys.

ICES
International council for the Exploration of the Sea.

Reineck corer
A box corer for sediment / benthic sampling at sea.

RV Belgica
This 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 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.

RV Cefas Endeavour
This is Cefas's current research vessel, delivered to Cefas from Fergusons Shipbuilders on the 31st March 2003.

RV Corystes
This is a research vessel previously owned by Cefas (1989–2005) and now owned by DARDNI (Agri-Food & Biosciences Institute, based in Northern Ireland).

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

QTC
Remote acoustic seabed discrimination system.

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