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REPORT OF THE INTERNATIONAL BOTTOM TRAWL SURVEY WORKING GROUP (IBTSWG)

27–30 MARCH 2007

SÈTE, FRANCE



ICES International Council for the Exploration of the Sea
CIEM Conseil International pour l'Exploration de la Mer

International Council for the Exploration of the Sea
Conseil International pour l'Exploration de la Mer

H. C. Andersens Boulevard 44–46
DK-1553 Copenhagen V
Denmark
Telephone (+45) 33 38 67 00
Telefax (+45) 33 93 42 15
www.ices.dk
info@ices.dk

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Executive summary

Highlights

- The IBTSWG further developed its standard reporting format and users (e.g. assessment working groups) are invited to comment on it (Sections 4 and 5).
- Protocols to ensure high quality and consistency in collection and storage of future and historic IBTS data are improved and will be further developed (Sections 6, 8 and 10).
- ACFM and RMC are requested to officially clarify the current objectives of the IBTSWG in order for the working group to deal with requests to coordinate additional surveys (Sections 12.2 and 12.3).

The International Bottom Trawl Working Group (IBTSWG) met in Sète, France, from 27–30 March 2007. There were 23 participants from 12 countries all involved in designing and conducting bottom trawl surveys.

All the Terms of Reference have been met and full details are given in the relevant sections (see Table of Contents). Major developments, achievements and recommendations from the 2007 meeting are given below:

Presentation of survey results

Individual surveys coordinated by IBTSWG are presented using a second version of a reporting format bearing information on survey design, coverage, and aggregated results (in weight and number per tow) for the most important species given with an estimate of precision. Such a standard reporting format will provide a centralised and easily accessible overview of specific survey data sets, to those using the data.

The IBTSWG agreed that relevant Assessment Working Groups will be contacted in order to get feed back from these working groups about their desires from the IBTSWG report.

Inconsistency in gear parameters

During the meeting several inconsistencies in the presumed standardization of the gear parameters were discussed, which were observed during individual surveys and during comparative fishing experiments. Based on these findings, the IBTSWG recommends that all survey participants should review their protocols relating to the checking of their survey gear prior to deployment and to maintain the rigging of the survey gear to standard. Furthermore, a review of the reporting procedures of trawl, vessel and environmental parameters will be performed next year, as well as an analysis of changes in survey effort and/or constant catchability.

DATRAS database

The IBTSWG discussed the progress made within the new version of DATRAS. For further development of the database, it is important that working groups continuously provide DATRAS with feedback on recent updates, including the implementations of user requirements as defined by the workshop DATRAS URS. Also, the quality of future and historic IBTS data needs more attention: Detected errors in the database should always be reported and corrected, and protocols for the avoidance of misuse of existing data and for the prevention of future errors should be developed and implemented.

Sampling of biological parameters

The IBTSWG implemented the coordination of sampling the age and maturity of non-standard species in 2007, following the reports from the EU organized Regional Coordinating Meeting for data collection (RCM's) held in 2005 as well as the report from the ICES Planning Group on Commercial Catch, Discards and Biological Sampling (PGCCDBS) 2006 meeting. Although this additional sampling should only take place triennially or six annually, the IBTSWG has agreed that also in 2008 maturity data will be collected for a number of species in addition to the standard data collection.

Coordination of new surveys

Due to a new critical requisite for important DCR funding of surveys, i.e. 'international coordination', several contrasting surveys are seeking coordination through the IBTSWG. The traditional objective of the IBTSWG has always been to coordinate the collection of standardized data from international demersal trawl surveys, and to achieve this, a series of protocols have been agreed upon to standardize sampling gear and methodology.

With regard to the requests to coordinate these 'non-IBTS surveys', one option is to allocate more focus towards an increasingly broad spectrum of survey designs and objectives, which would enable other trawl surveys to be incorporated into the working group. Several criteria to facilitate possible coordination were discussed during the meeting.

However, first and foremost it is important that the IBTSWG gets it priorities straight. Although many problems across trawl surveys are often similar, how one approaches solving them is quite different depending on whether you take the more traditional IBTS track, or the new approach. Therefore, the IBTSWG would welcome official clarification from ICES ACFM and RMC of the objective(s) they envisage for the IBTSWG moving forward.

1 Terms of Reference and participation

The International Bottom Trawl Survey Working Group [IBTSWG] (Chair: R. ter Hofstede, The Netherlands) will meet in Sète, France, from 27–30 March 2007 to:

a) coordinate and plan North Sea and North-Eastern Atlantic surveys for the next twelve months including appropriate field sampling in accordance to the EU Data Collection Regulation;

b) further develop the standard reporting format for the most recent surveys for species of interest to assessment WG according to their response;

c) further develop standardization of all sampling strategies, computation of indices and estimation of precision;

d) review the findings from the SGSTS in respect to issues relevant to IBTS and respond;

e) review progress made in the updated DATRAS database and data access policy;

f) complete the shapefiles and supporting information for the agreed strata in the Eastern Atlantic;

g) coordinate the production and dissemination of identification keys for North Sea, and southern and western IBTS groundfish surveys;

h) consider the feasibility of collecting additional data in the surveys, in particular observations of mammals and birds, and the use of CUFES.

IBTSWG will report by 15 April 2007 for the attention of the Resource Management Committee.

A complete list of participants who attended the meeting in can be found in Annex 1.

2 Introduction

The International Bottom Trawl Working Group (IBTSWG) has its origin in the North Sea, the Skagerrak and the Kattegat where coordinated surveys have occurred since 1965. Initially these surveys only took place during the first quarter of the year, but between 1991 and 1996 coordinated surveys took place in all four quarters of the year. Pressure on ship time caused the number of surveys to be reduced and currently coordinated surveys in the North Sea are only undertaken in the first and third quarters.

The IBTSWG assumed responsibility for coordinating western and southern division surveys in 1994. Initially progress in coordination was slow but in the last few years there has been a marked improvement and whilst data exchange etc. is not at the level of that enjoyed in the North Sea, there is excellent cooperation between the participating institutes.

In recent years, the IBTSWG is developing the accessibility and quality of their data by storing these in a common database at ICES headquarters, i.e. DATRAS (Database for TRAwl Surveys). The IBTSWG aims to have all their surveys stored in this database, in order that all data are stored in the same format, and can be easily supplied to different users. Furthermore, it facilitates the detection and correction of errors in the historic data, and the prevention of storage of future errors, eventually resulting in one large, high quality database.

Also recently, there has been some amount of discussion about the lack of communication between survey coordinators and assessment working groups about the survey data used in assessments. Already the IBTSWG had started to modify the structure of the report to be more informative about the latest survey results. This year, the format is being further developed and in addition to general distribution maps for species of interest to assessment working group, main results for most surveys are given using the same formatted template and include some estimate of precision. Still, a better adaptation to the needs of assessment working groups is under development and cooperation with the assessment working groups is essential.

3 Review of IBTSWG 2006 recommendations

3.1 IBTS North Sea Q1 coordination – Section 4.1

The Working Group recommends for 2007 that participants of the North Sea IBTS Quarter 1 survey will aim to perform their cruise during the month February, in order to guarantee good overlap in the timing of the surveys.

This recommendation is in the process of being implemented, see Section 4.4.

3.2 Overlapping surveys – Section 7

The WG recommends that each of IFREMER, IEO and IPIMAR dedicates one day each year in their surveys to start building a data series of intercalibration hauls.

This recommendation is implemented and the different institutes are building up a data series of intercalibration hauls.

3.3 ICES Data access policy – Section 9

The discussion on open data access is not unique to ICES but is also taking place in relation to the new EU fishery data collection regulation. The IBTSWG therefore recommends that each institute discusses the issue internally and find out what legislations applies to data in their country. The group would prefer that ICES implement the access levels that the group proposed last year. This policy covered the groups concerns and at the same time opened up access to the data. The group recommends that each institute accept this access policy.

Each institute discussed the open access policy internally. The outcome is described in Section 8.1.

3.4 Collecting maturity samples – Section 13.1

The IBTSWG recommends that all countries at their surveys in 2006 and first half year of 2007 take as many images of gonads and testis for hake, anglerfish, cod, haddock, whiting and saithe as possible.

This recommendation is implemented, see Section 12.4.

3.5 Coordination of additional biological sampling – Section 13.1

The IBTSWG recommend that maturity data should be collected for a number of species in addition to the data collection for cod, haddock, whiting, saithe, Norway pout, mackerel, herring and sprat.

This recommendation is implemented, according to Table 13.1.1 in the IBTSWG report from 2006. See also Section 12.5.

4 North Sea and Eastern Atlantic Surveys (ToR a)

ToR a) coordinate and plan North Sea and North-Eastern Atlantic surveys for the next twelve months including appropriate field sampling in accordance to the EU Data Collection Regulation.

4.1 Q1 North Sea

Seven vessels participated in the quarter 1 survey in 2007: "Argos" (Sweden), "Dana" (Denmark), "Håkon Mosby" (Norway), "Scotia" (Scotland), "Thalassa" (France), "Tridens II" (Netherlands) and "Walter Herwig III" (Germany). The survey covered the period 8 January to 2 March (see Tables 4.1.1–4.1.3). In total, 374 GOV and hauls 636 MIK hauls were carried out (see Figure 4.1.1). All rectangles were covered, most of them by two or more GOV hauls. The number of MIK hauls was often below the intended 4 hauls per rectangle, but still the coverage of the MIK sampling can also be considered as good.

Table 4.1.1. Overview of the surveys performed during the North Sea IBTS Q1 survey in 2007.

Survey:	North Sea IBTS Q1	Dates:	8 January – 3 March 2007
Nation:	Vessel:	Period:	
Denmark	Dana	3 February – 20 February 2007	
France	Thalassa	29 January – 24 February 2007	
Germany	Walter Herwig III	17 January – 16 February 2007	
Netherlands	Tridens 2	29 January – 02 March 2007	
Norway	Håkon Mosby	8 January – 6 February 2007	
Scotland	Scotia	20 January – 10 February 2007	
Sweden	Argos	22 January – 8 February 2007	

Cruise	The North Sea IBTS Q1 survey aims to collect data on the distribution, relative abundance and biological information on a range of fish species in ICES area IIIa and IV. CTD was deployed at each trawl station and at one hydrographical section to collect temperature and salinity profiles. Age data were collected for cod, haddock, whiting, saithe, Norway pout, herring, mackerel and sprat. Sampling for herring larvae is carried out during night-time
Gear details:	The bottom trawl used is the GOV (Grand Ouverture Verticale), with ground gear A or B. Herring larvae are sampled with a MIK-net (Methot Isaac Kidd).
Notes from survey (e.g. problems, additional work etc.):	DENMARK: The cruise plan was fulfilled as planned. Scanmar data were collected during the hauls. Dana covered square 43F7, 43F6, 43F5 for Håkon Mosby (3 trawl hauls and 2 MIK 44F4). FRANCE: No major damage to the GOV trawl was reported during this survey. As additional work, the CUFES device (Continuous Underwater Fish Egg Sampler) was used during day and night; samples collected will be analysed in order to model spawning areas. GERMANY: 77 rectangles were allocated to W.H.III; five of these could not be fished due to rough fishing grounds (around Shetlands/Orkney), two due to shallow waters off the isle of Sylt (Germany), and six due to rough weather. Additional sampling: gonad samples and 1080 photos of 345 specimens for the ICES Workshop on sexual maturity staging in autumn 2007. NETHERLANDS: No problems were encountered, except for poor weather in the last week. In the eastern Channel the gear was seriously damaged twice. Never before such large catches of anchovy were observed. NORWAY: Rough weather during the whole period. Additional work included plankton sampling on the hydrographical section and taking photos and samples of cod, haddock, saithe, and whiting gonads. SCOTLAND: Only two short periods of work were lost due to weather conditions as the weather was generally good. This was the first year that Scotland used a standard MIK net and frame. In each statistical rectangle one haul was carried out with the standard frame

	and one with the FRS frame and net. Ship's thermo-salinigraph was run continuously throughout the cruise. SWEDEN: No problems during the survey. An intercalibration between Swedish RV "Ancylus" and RV "Argos" was made on 15 of the trawl stations. Additional sampling: a) cod gonads and photos of them from Skagerrak and Kattegatt to be used in an ICES Workshop autumn 2007, b) herring and cod samples for CEFAS, Lowestoft for radioactivity analysis, c) plaice gonads for a Master student.
Number of fish species recorded and notes on any rare species or unusual catches:	Almost 100 species were recorded. The exact number can not be given yet since data still need to be checked. There are certainly some species recorded which are unlikely to be correct, e.g. *Alosa agone* (a freshwater species!!) and *Mullus barbatus* (which normally occurs south of the Bay of Biscay).

Table 4.1.2. Overview of the number of hauls and used gear during the North Sea IBTS Q1 survey in 2006.

			Tows				
Gear	Vessel	ICES Divisions	planned	Valid	Invalid	% stations fished	Comments
GOV	ARG	III	48	48	-	100	
GOV	DAN2	IV	41	44	-	107	
Rockhopper	DAN2	IV	2	2	-	100	
GOV	HAV	IV	40	26	-	65	
GOV-a	SCO3	IV	47	49	1	104	
GOV-b	SCO3	IV	3	3	1	100	
GOV	THA2	IV	66	68	-	103	
GOV	THA2	VIId	5	8		160	
GOV	TRI2	IV	54	56	-	104	
GOV	TRI2	VIId	5	6	1	120	
GOV	WAH3	IV	77	64	-	83	
		TOTAL	388	374	3	96	
MIK	ARG	III	-	56		-	
	DAN2	IV	80	83		104	
	HAV	IV	56	48		86	
	SCO3	IV	100	104		104	
	THA2	IV	110	114		104	
	THA2	IIVd	10	18		180	
	TRI2	IV	108	76		70	
	TRI2	VIId	10	4		40	
	WAH3	IV	154	133		86	
		TOTAL	628	636		101	

Table 4.1.3. Overview of the biological samples taken during the North Sea IBTS Q1 in 2007.

NUMBER OF BIOLOGICAL SAMPLES (MATURITY AND AGE MATERIAL, *ADDITIONAL SINCE 2007, **OTHER):								
Species	GER	NOR	SCO	DEN	NED	SWE	FRA	**Total**
Clupea harengus	429		374	620	358	1394	386	**3561**
Gadus morhua	246	238	210	303	170	1093	193	**2453**
Melanogrammus aeglefinus	999	190	1127	280	364	275	227	**3462**
Merlangius merlangus	740	131	741	392	793		1062	**3859**
Pollachius virens	279	124	86	2		40		**531**
Sprattus sprattus	131		53	658	330	964	195	**2331**
Trisopterus esmarki	331	60	326	93	50	120	74	**1054**
**Lepidorhombus whiffiagonis*	90		71					**161**
**Lophius budegassa*			1					**1**
**Lophius piscatorius*	6	38	17	6				**67**
**Merluccius merluccius*	174		89	5		192		**460**
**Microstomus kitt*	257		190	108	29		100	**684**
**Mullus barbatus*	13		18				134	**165**
**Mullus surmulletus*				1	6			**7**
**Pleuronectes platessa*	305		202	491	238	1080	798	**3114**
**Psetta maxima*				4				**4**
**Raja clavata*								
**Raja naevus*								
**Raja montagui*								
**Scomber scombrus*	221		252					**473**
**Solea solea*				12		152	49	**213**
***Trisopterus minutus*							132	**132**
***Hippoglossoides platessoides*							97	**97**
***Trachurus trachurus*			166	67				**233**
***Chelidonichthys cuculus*							16	**16**
***Trisopterus luscus*							138	**138**
***Hippoglossus hippoglossus*			1		1			**2**
***Scophthalmus rhombus*			1				8	**9**

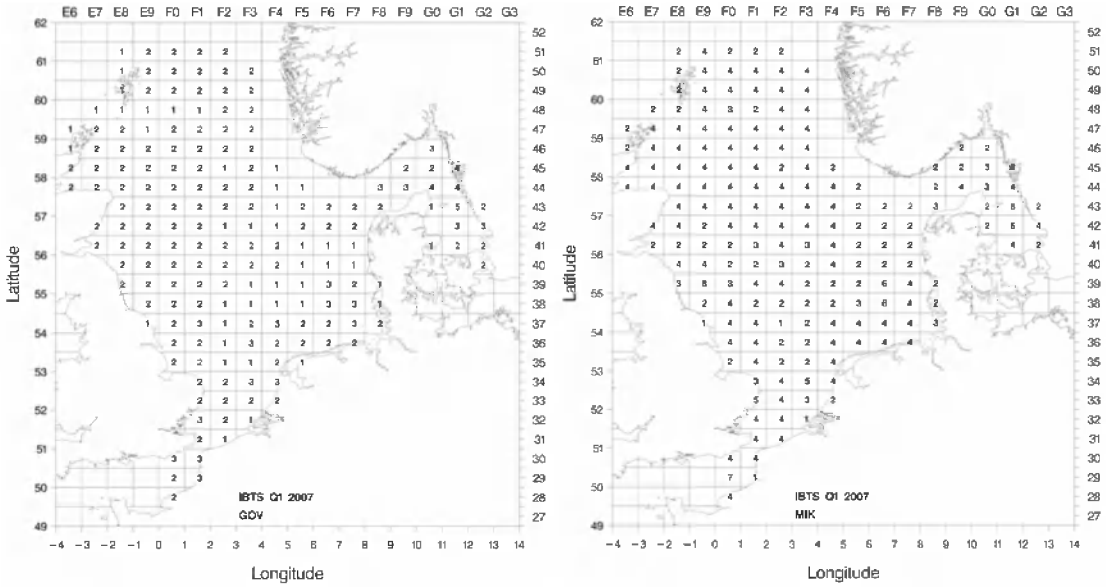


Figure 4.1.1. Number of hauls per ICES-rectangle with GOV (left) and MIK (right) during the North Sea IBTS Q1 2007.

4.1.1 Recruitment of commercial species

The preliminary indices and distribution of the recruits of seven commercial species based on the 2007 quarter 1 survey are shown in Figure 4.1.1.1 to 4.1.1.8. According to these preliminary results, only sprat produced a good year class in 2006, well above the long-term average for the years 1980–2006 (Figures 4.1.1.1 and 4.1.1.3). The index for 1-group mackerel is about average, but the catches are all from the northernmost part of the North Sea (Figures 4.1.1.1 and 4.1.1.8). The preliminary index for the five other species (herring, cod, haddock, whiting, as well as Norway pout) are all well below the long-term average. For herring this is the fourth poor year class in a row, for whiting it is the fifth consecutive poor year class.

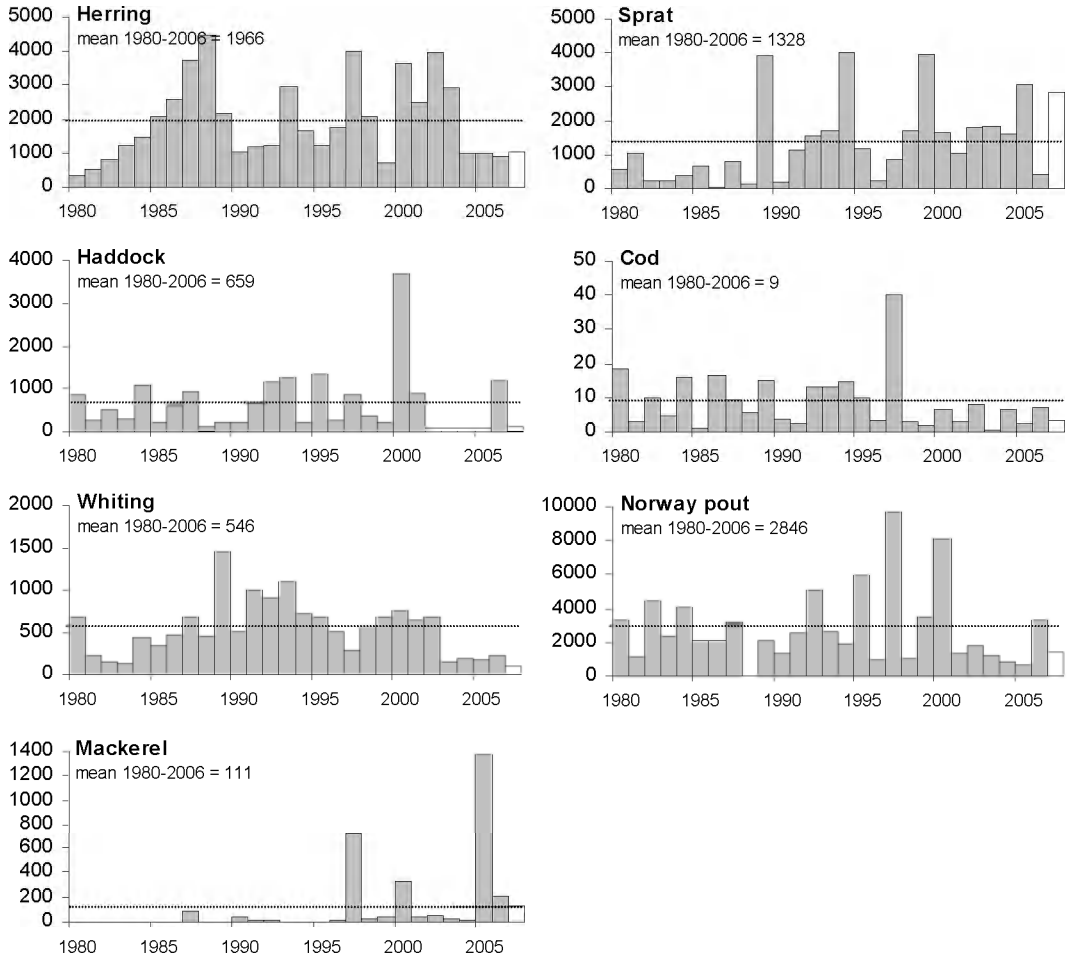


Figure 4.1.1.1. Time series of indices for 1-group (1-ring) mackerel caught during the quarter 1 IBTS survey in the North Sea, Skagerrak and Kattegat. Indices for the last year are preliminary, and based on a length split of the catches.

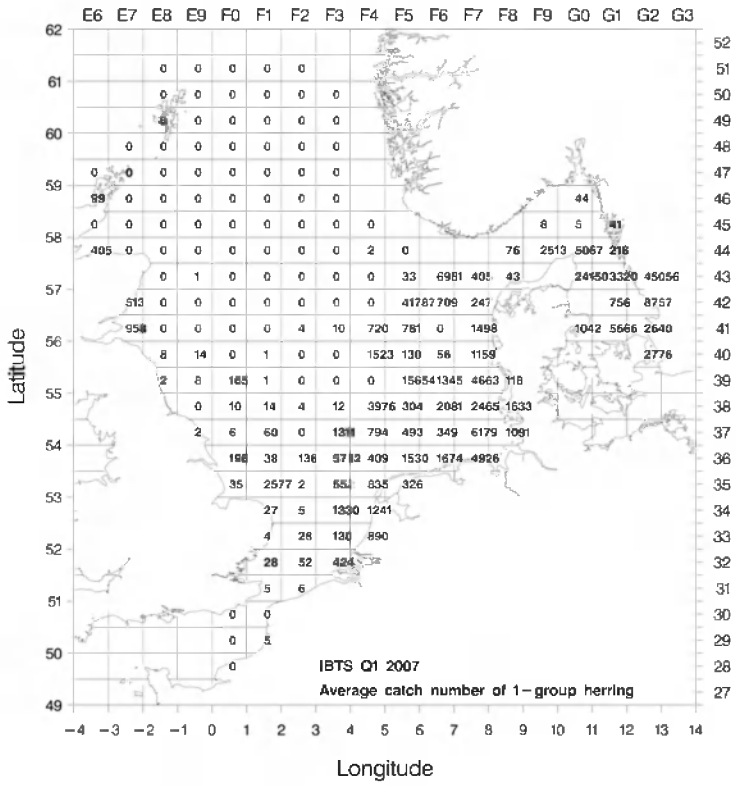


Figure 4.1.1.2. (Preliminary) distribution of 1-group (1-ring) herring caught during the IBTS Q1 2007 in the North Sea, Skagerrak and Kattegat.

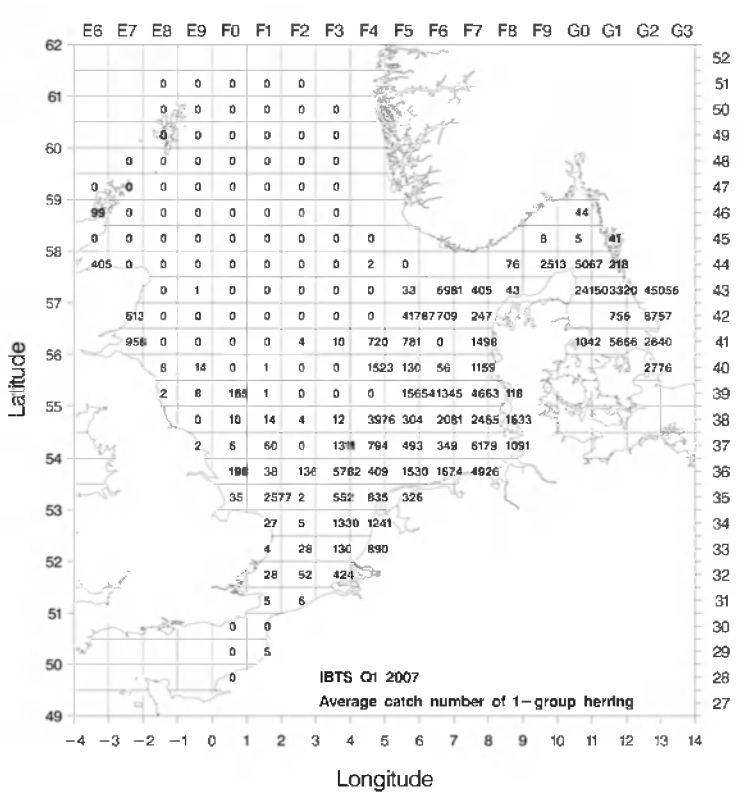


Figure 4.1.1.3. (Preliminary) distribution of 1-group (1-ring) sprat caught during the IBTS Q1 2007 in the North Sea, Skagerrak and Kattegat.

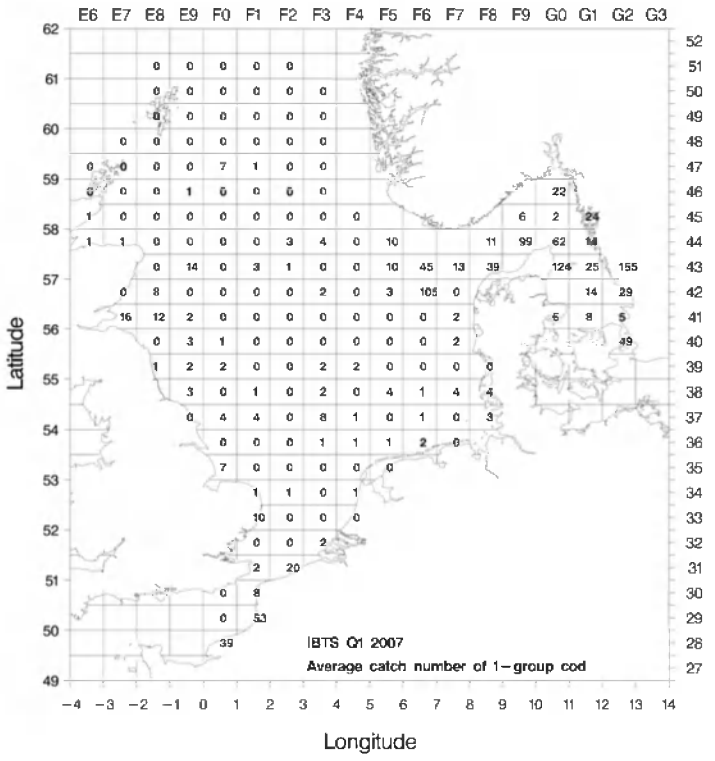


Figure 4.1.1.4. (Preliminary) distribution of 1-group (1-ring) cod caught during the IBTS Q1 2007 in the North Sea, Skagerrak and Kattegat.

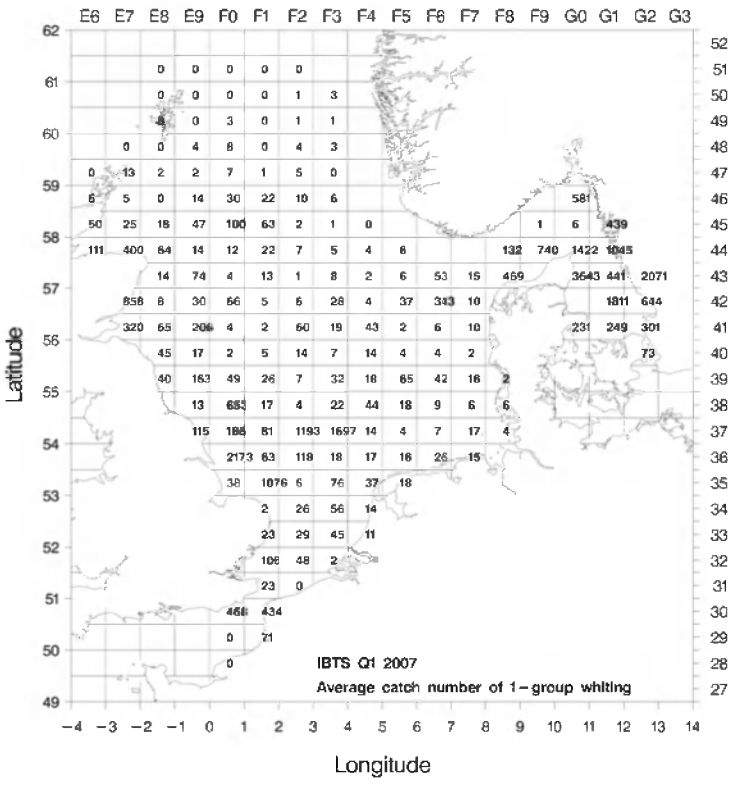


Figure 4.1.1.5. (Preliminary) distribution of 1-group (1-ring) whiting caught during the IBTS Q1 2007 in the North Sea, Skagerrak and Kattegat.

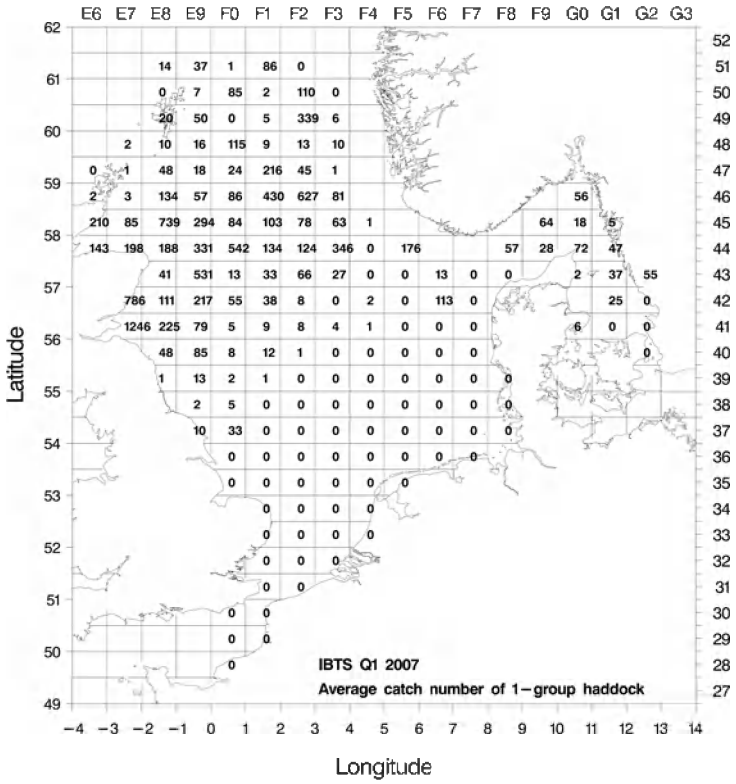


Figure 4.1.1.6. (Preliminary) distribution of 1-group (1-ring) haddock caught during the IBTS Q1 2007 in the North Sea, Skagerrak and Kattegat.

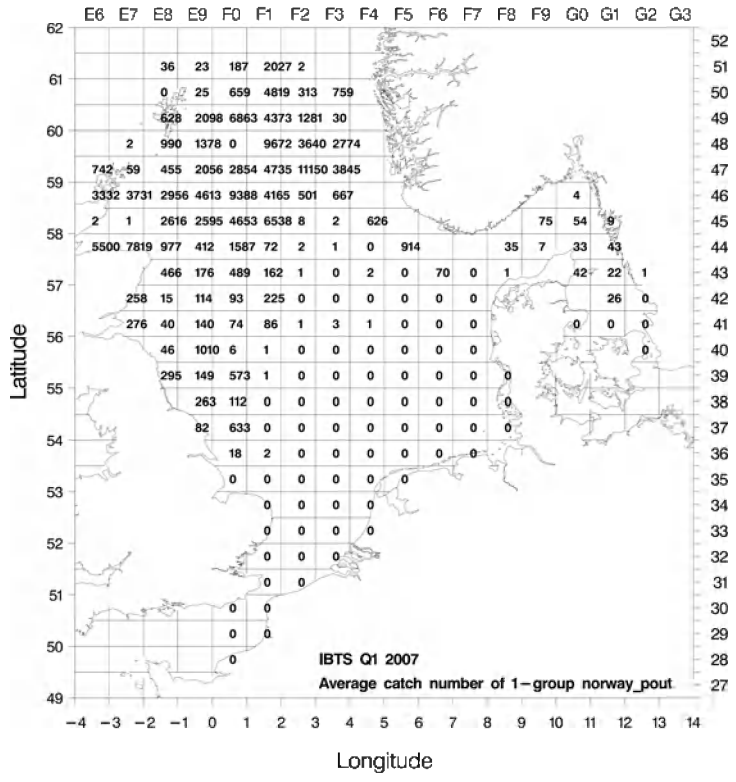


Figure 4.1.1.7. (Preliminary) distribution of 1-group (1-ring) Norway pout caught during the IBTS Q1 2007 in the North Sea, Skagerrak and Kattegat.

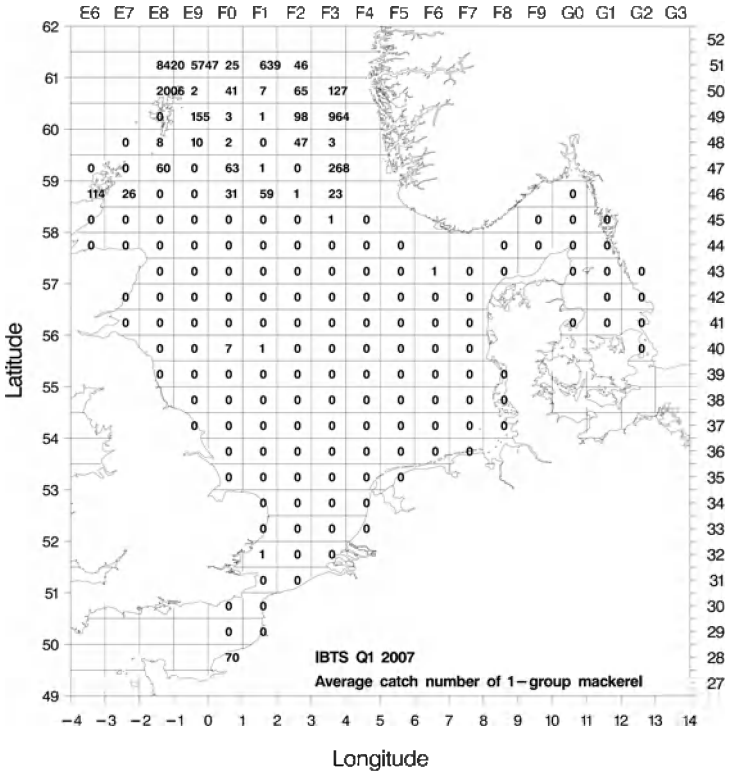


Figure 4.1.1.8. (Preliminary) distribution of 1-group (1-ring) mackerel caught during the IBTS Q1 2007 in the North Sea, Skagerrak and Kattegat.

4.1.2 MIK sampling

For the ICES Herring Assessment Working Group for the area South of 62°N (HAWG), the IBTS survey provides recruitment indices and abundance estimates of adults of herring and sprat. Sampling at night with fine-meshed nets (MIK; Methot Isaacs Kidd Midwater Trawl) was implemented from 1977 onwards, and the catch of herring larvae has been used for the estimation of 0-ringer abundance in the survey area.

This year's 0-ringer index is based on 636 hauls. Index values are calculated as described in the 1996 report of the Herring Assessment Working Group (ICES 1996/ACFM:10).

The index for the 2007 survey is the lowest since the estimate of the 1989 year class, and it continues a now 5 year long series of low recruitment estimates (the average for these 5 years is about 50% of the all-year average). The 0-ringers were predominantly distributed in two concentrations, one off the Scottish coast (in the central-western area) and one in the Southern Bight. Compared to the two preceding year classes, which are also shown in Figure 4.1.4, the distribution of 0-ringers from this year class is very restricted, without significant concentrations along the English coast. The long term trend in the distributional patterns of 0-ringers shows an increase of herring larvae in the western part of the North Sea. The relative abundance of the number of 0-ringers in the area west of 2°E relative to the total number of 0-ringers was 25% for year class 1982. In the last decade, the majority of 0-ringers have been distributed in the western part, and the calculated relative abundance of 86% for the present year class is in accordance with the long term trend.

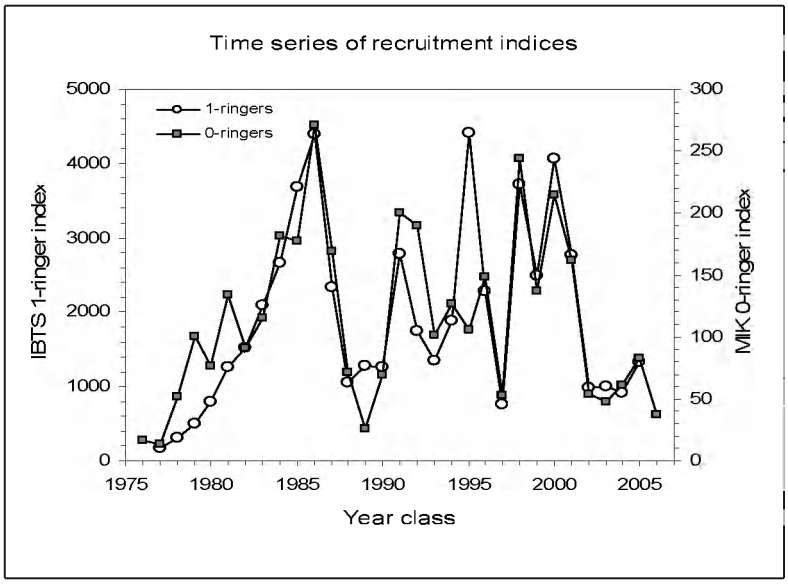


Figure 4.1.2.1. North Sea herring. Time series of 0-ringer and 1-ringer indices. Year classes 1976 to 2006 for 0-ringers, year classes 1977–2005 for 1-ringers.

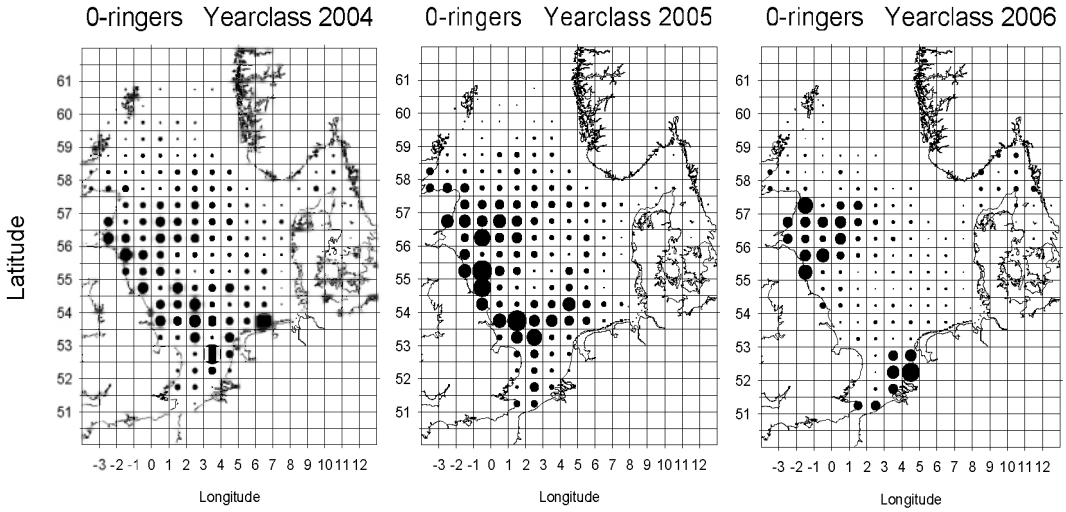


Figure 4.1.2.2. North Sea herring. Distribution of 0-ringer herring, year classes 2004–2006. Abundance estimates of 0-ringers within each statistical rectangle are based on MIK catches during IBTS in February 2005–2007. Areas of filled circles illustrate densities in no m^{-2}, the area of a circle extending to the border of a rectangle represents 1 m^{-2}.

4.1.3 Distribution of sampling for age, sex, and maturity

Information on age, sex and maturity is collected within 9 specified sampling areas (i.e. round fish areas) as illustrated in Figure 4.1.3.1 and described in the Manual (revision VII). In general, a minimum level of 8 samples per size class (1/2 cm for herring and sprat, 1 cm for other species) is maintained for each sampling area. All participants are encouraged to follow this procedure individually.

Since some round fish areas are covered by different numbers of participants, the number of samples collected differs as well. Only one country covers areas 8 and 9, meaning that (ideally) 8 samples per size class are collected. However, some round fish areas (2 and 6) are surveyed by even 4 different countries, which might lead to a collection of 4x8=32 otoliths per area.

Although it was discussed that the collection of this high amount of samples may be time consuming, the IBTSWG feels that it will be impossible to coordinate the effort put into the sampling during a survey and thereby limit the maximum number of samples that are being collected. The IBTSWG considers the high number of samples to be a luxury that even contributes to a higher quality of the data.

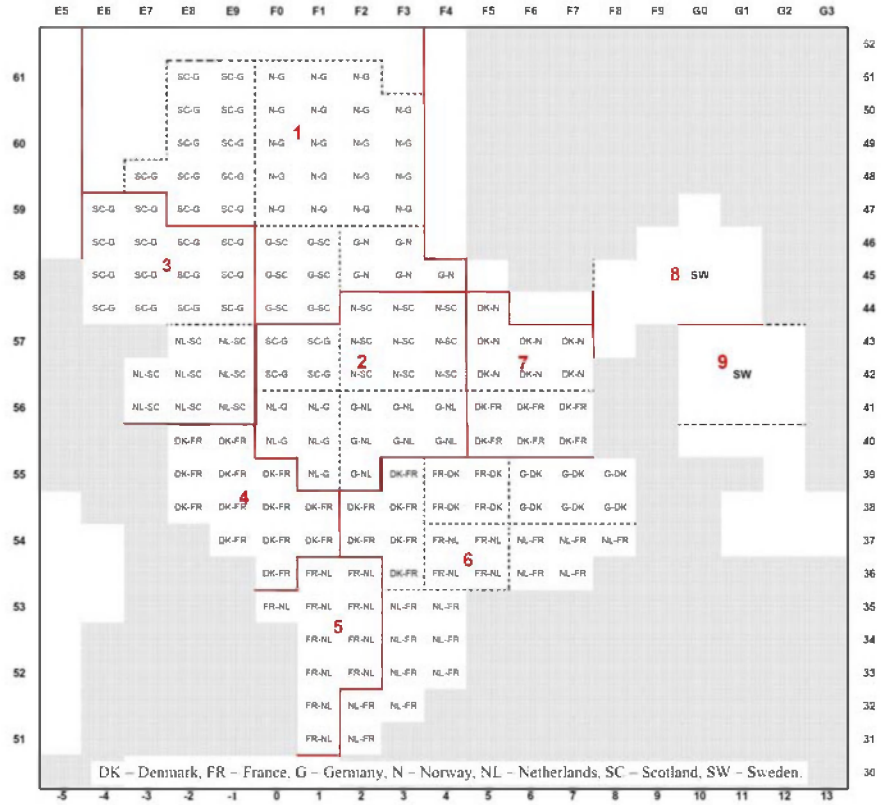


Figure 4.1.3.1. Survey grid by country compared to round fish area.

4.1.4 Participation in 2007

As in recent years, the timing of the surveys in 2007 has been rather widespread (see Table 4.1.1). The IBTSWG has discussed this (see also Section 4.4) and recommends that participants in the North Sea IBTS Quarter 1 survey in 2008 aim to perform their cruise during the month of February, in order to have good overlap of the different vessels participating in the survey.

Due to the International Polar Year Norway may have a problem to make ships time available for the quarter 1 survey in 2008, although the Norwegian contribution to the IBTS survey will have first priority.

4.2 Q3 North Sea

Six vessels participated in the quarter three survey in 2006: "Dana" (Denmark), "Walter Herwig III" (Germany), "Håkon Mosby" (Norway), "Argos" (Sweden), "CEFAS Endeavour" (England) and "Scotia" (Scotland). In all, 341 valid GOV hauls were made, allowing full coverage of the survey area. The North Sea, Skagerrak and Kattegat quarter 3 surveys have now completed 17 years in its coordinated form. Table 4.2.1 shows the effort ascribed to this survey over the time series. Good coverage of the area had continued until 2000 when, unfortunately Sweden withdrew their vessel at very short notice. As a consequence the Skagerrak and Kattegat were not surveyed that year. Up to the present time, only data from the separate Scottish and English elements of this survey have been used each year in the

Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK). However, at the 2007 working group the combined indices will be provided.

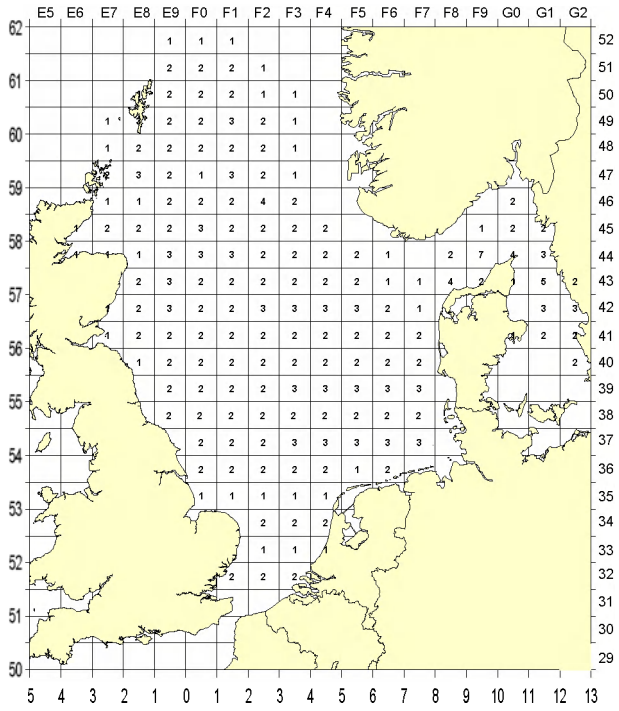


Figure 4.2.1. Plot of number of stations fished by rectangle by all participants of the 3rd Quarter IBTS survey 2006.

Table 4.2.1. Number of valid hauls and days at sea per country for quarter 3 surveys 1991–2006 and number of days proposed for 2007.

YEAR		DENMARK	FRANCE	GERMANY	NETHER-LANDS	NORWAY	SWEDEN	UK ENGLAND	UK SCOTLAND	TOTAL
1991	Days				19		15	27	20	81
	Hauls				73		52	87	90	302
1992	Days		17	12	11		15	31	20	106
	Hauls		61	48	32		52	72	87	353
1993	Days		19		17		15	27	20	98
	Hauls		70		65		53	71	87	346
1994	Days		19		10		15	23	20	87
	Hauls		55		42		53	73	89	312
1995	Days				9		15	30	20	74
	Hauls				34		53	74	89	250
1996	Days		32	8	5		15	27	20	107
	Hauls		56	32	17		53	79	85	323
1997	Days			8	8		15	26	20	77
	Hauls			32	18		46	74	88	258
1998	Days	14		8			15	28	18	83
	Hauls	51		28			48	74	77	278
1999	Days	15		9		26	15	28	21	114
	Hauls	53		32		75	47	74	83	364
2000	Days	15		7		21		28	18	89
	Hauls	60		26		69		75	87	317
2001	Days	16		8		20	15	28	22	109
	Hauls	56		29		49	46	74	87	341
2002	Days	18		13		28	15	32	23	129
	Hauls	47		32		57	46	75	85	342
2003	Days	18		10		26	23	32	26	134
	Hauls	46		29		61	48	75	86	345
2004	Days	18		11		30	15	29	27	130
	Hauls	46		29		56	46	75	87	339
2005	Days	18		11		30	15	32	27	130
	Hauls	46		32		55	49	74	87	343
2006	Days	18		11		30	18	32	25	134
	Hauls	46		29		57	47	*75***	87	341
*2007**	*Days*	*18*		*11*		*30*	*18*	*32*	*25*	*134*

***Preliminary**

****Hauls deemed non-standard**

4.2.1 Survey summaries

In 2006, to satisfy a request from WGNSDS, and to standardise the summary reports within this working group report, the survey summaries for all cruises are now provided in a standard form. The ICES DATRAS system now provides precision estimates for the survey area. They are provided below as plots over the time series.

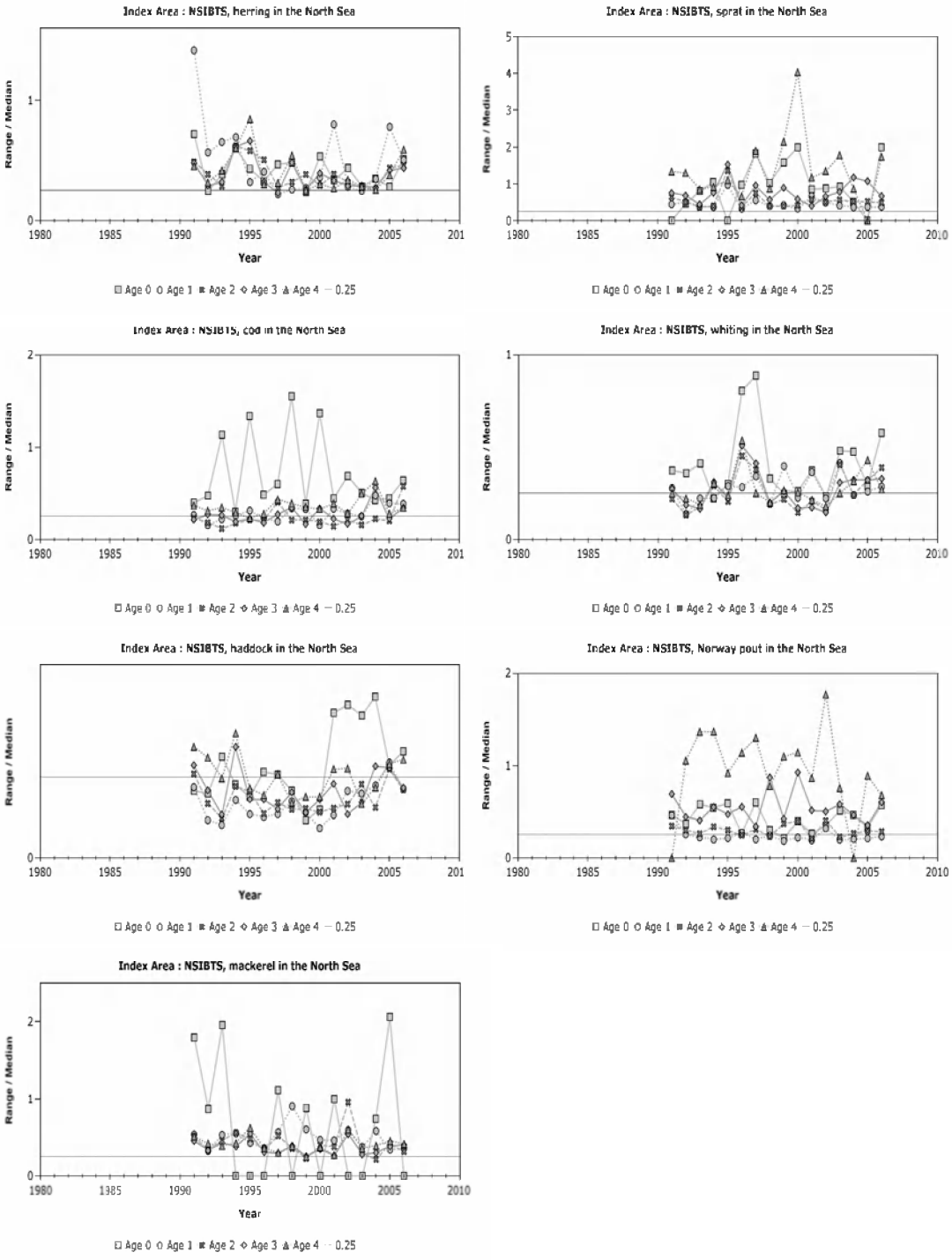


Figure 4.2.1.1. Precision estimates.

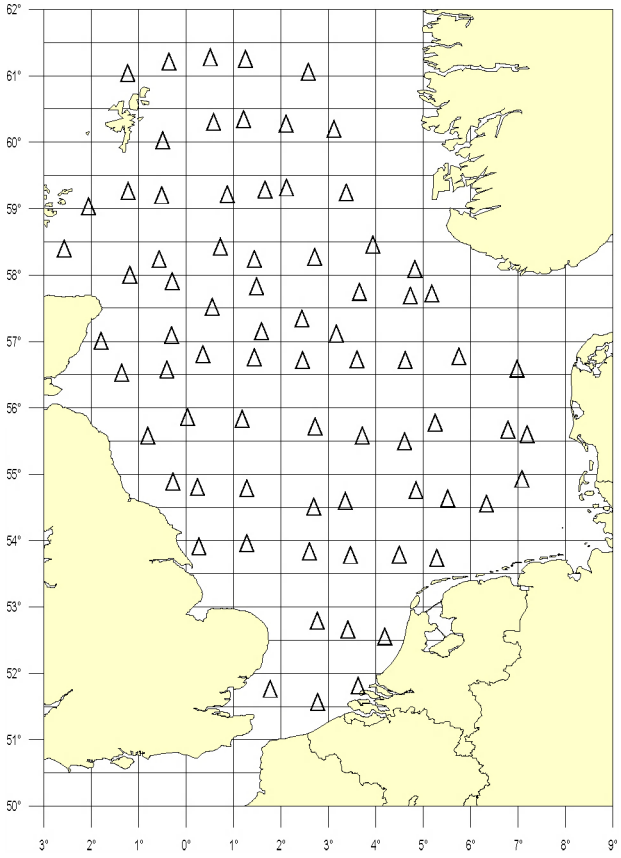
NATION:	UK (ENGLAND AND WALES)	VESSEL:	CEFAS ENDEAVOUR
Survey:	15/06	Dates:	8 August – 10 September 2006

Cruise	Q3 North Sea survey aims to collect data on the distribution and relative abundance, and biological information of commercial fish in IV. The primary species are cod, haddock and whiting, sprat, herring, mackerel, Norway pout, plaice and saithe.
Gear details:	IBTS standard GOV 36/47 with ground gear A, Exocet kite with Scanmar door, wing and headline height sensors. Also attached is the SAIV mini CTD.
Notes from survey (e.g. problems, additional work etc.):	An additional tow was carried out on the day of sailing to ensure gear could be deployed correctly and to test all the shipboard systems. Mid way through the survey it became apparent that the sweep length was incorrect. Survey continued with this set-up and analysis of the data was carried out back in the lab (see attached working document - ENGGFS Sweeps Analysis Report and recommendations). Report states data that for the key target species cod, haddock, whiting saithe, herring and plaice an effect was not detectable within the natural variation in the recorded data.
Number of fish species recorded and notes on any rare species or unusual catches:	Overall, 75 species of fish were recorded during the survey. Unusual fish species caught included one individual specimen of Allis shad *Alosa alosa* and one specimen of Eelpout *Zoarces viviparous*.

Stations fished (aims: to complete 75 valid tows per year)

ICES DIVISIONS	STRATA	GEAR	TOWS PLANNED	TOWS VALID	TOWS ADDITIONAL	TOWS INVALID	% STATIONS FISHED	COMMENTS
IV	N/A	Non-Standard. Sweep length 20m	75	75	7	0	100	6 additional stations fished with rock-hopper ground gear D
	TOTAL		75	75	7	0	100	

Number of biological samples (maturity and age material, *maturity only):			
Species	Age	Species	Age
Clupea harengus	919	*Limanda limanda*	382
Gadus morhua	597	*Scomber scombrus*	382
Melanogrammus aeglefinus	1597		
Merlangius merlangus	1588		
Pollachius virens	337	**Leucoraja naevus*	34
Sprattus sprattus	235	**Raja clavata*	33
Scophthalmus maximus	6	**Raja montagui*	10
Trisopterus esmarki	475		
Microstomus kitt	224		
Pleuronectes platessa	828		



Overview stations.

VARIANCE IN CATCH RATES AND ESTIMATES OF SAMPLING PRECISION								
			2006			2005		
SPECIES	STOCK AREA	VALID TOWS	MEAN CPUE (HR)	SE	RSE	MEAN CPUE (HR)	SE	RSE
Gadus morhua	IV	75	*21.6*	7.6	35.0	*10.1*	2.2	21.3
Melanogrammus aeglefinus	IV	75	536.0	104.7	19.5	1022.5	37.9	35.0
Merlangius merlangus	IV	75	489.6	144.0	29.4	643.6	246.7	38.3
Pollachius virens	IV	75	80.7	46.6	57.8	37.1	16.7	44.9
Scomber scombrus	IV	75	1257.7	145.2	38.4	153.9	44.0	28.6
Clupea harengus	IV	75	1598.9	402.8	25.2	1139.3	313.7	27.5
Pleuronectes platessa	IV	75	33.9	6.8	20.0	56.7	21.7	38.3
Trisopterus esmarki	IV	75	2718.3	739.1	27.2	2171.9	712.4	32.8
Sprattus sprattus	IV	75	2263.0	1569.5	69.4	3897.8	1565.9	40.2

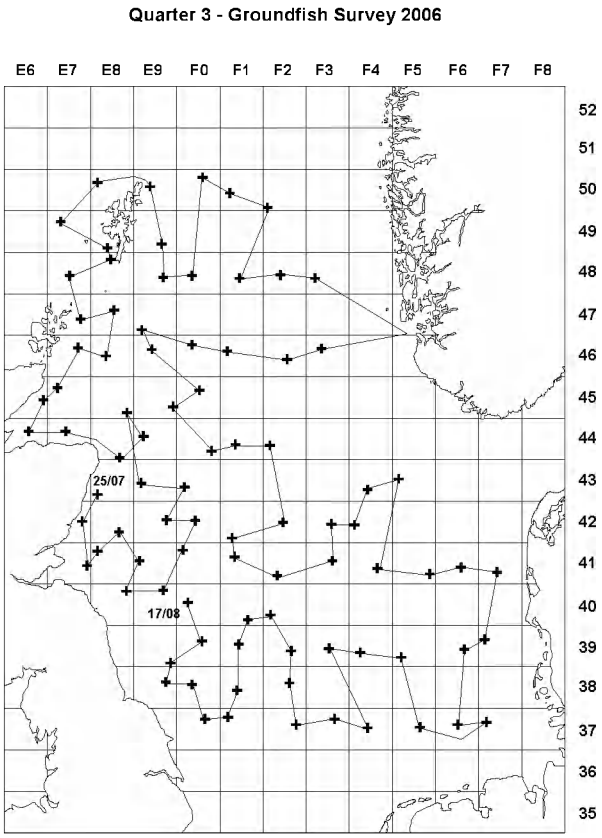
NATION:	UK (SCOTLAND)	VESSEL:	SCOTIA
Survey:	1206s	Dates:	25 July – 18 August 2006

Cruise	Q3 IBTS North Sea Groundfish survey aims to collect data on the distribution, relative abundance and biological information (in connection with EU Data Directive 1639/2001) on a range of fish species in ICES area IVa and IVb. Age data was collected for cod, haddock, whiting, saithe, Norway pout, herring, mackerel and sprat.
Gear details:	GOV using groundgear B on stations north of 57deg 30min North and groundgear A on stations south of 57deg 30min North.
Notes from survey (e.g. problems, additional work etc.):	No problems encountered. Ship's thermosalinigraph was run continuously throughout the cruise and a CTD deployed at each station. One box (of 3*3 nautical miles) mapped to determine habitat type and variability. Two days comparative fishing exercise with "Walther Herwig III" carried out.
Number of fish species recorded and notes on any rare species or unusual catches:	Number of juvenile cod, haddock and whiting were rather low. Number of 1-year old cod and haddock showed an increase on the previous 5 years. A total of 64 species were recorded during the survey with a total weight of 32,931 kgs.

Stations fished (aims: to complete 87 valid tows per year)

ICES DIVISIONS	STRATA	GEAR	TOWS PLANNED	VALID	VALID WITH ROCKHOPPER	ADDITIONAL	INVALID	% STATIONS FISHED	COMMENTS
IVa		GOV - A	37	37	-	0	0	100	
IVb		GOV - B	50	50	-	0	0	100	
	TOTAL		87	87	-	0	0	100	

NUMBER OF BIOLOGICAL SAMPLES (MATURITY AND AGE MATERIAL, *MATURITY ONLY):			
Species	Age	Species	Age
Clupea harengus	Na	**Scopthalmus rhombus*	1
Gadus morhua	329	**Lophius piscatorius*	39
Melanogrammus aeglefinus	1943	**Hippoglossus hippoglosus*	1
Merlangius merlangus	1581	**Anarichas lupus*	1
**Merluccius merluccius*	99	**Leucoraja naevus*	24
**Psetta maxima*	8	*Molva molva*	6
Pollachius virens	328	**Raja radiate*	61
Trisoperus esmarki	368	**Raja montagui*	20
**Microstomus kitt*	348		
**Pleuronectes platessa*	281		
**Lepidorhombus whiffiagonis*	41		



Overview stations.

VARIANCE IN CATCH RATES AND ESTIMATES OF SAMPLING PRECISION									
			2006			2005			
SPECIES	STOCK AREA	VALID TOWS	MEAN CPUE (HR)	SE	RSE	MEAN CPUE (HR)	SE	RSE	COMMENTS
Gadus morhua	IV	87	4.9	1.3	25.5	*15.9*	7.1	44.7	
Melanogrammus aeglefinus	IV	87	843.8	144.3	17.1	1798.8	584.1	32.5	
Merlangius merlangus	IV	87	357.3	61.0	17.1	485.2	98.5	20.3	
Pollachius virens	IV	87	29.7	13.1	44.0	28.4	16.2	57.0	
Scomber scombrus	IV	87	46.2	12.7	27.6	92.5	22.7	24.6	
Clupea harengus	IV	87	1512.7	540.6	35.7	3074.4	1077.7	35.1	
Pleuronectes platessa	IV	87	22.9	4.9	21.4	19.5	3.7	19.2	
Trisopterus esmarki	IV	87	2475.4	515.1	20.8	3564.9	1161.5	32.6	
Sprattus sprattus	IV	87	1858.2	1276.2	68.7	5348.3	2059.0	38.5	

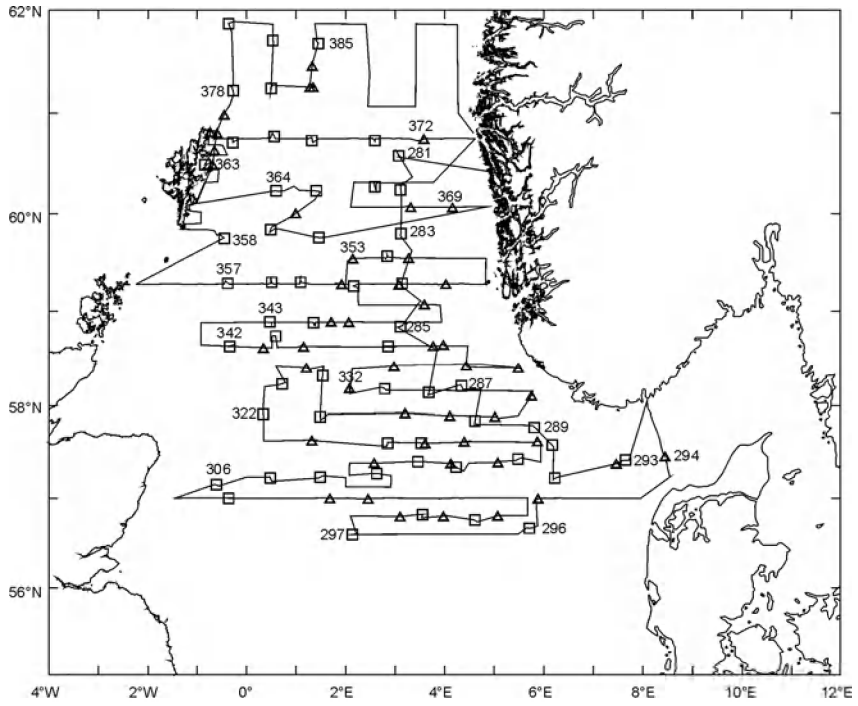
NATION:	NORWAY	VESSEL:	"JOHAN HJORT"
Survey:	2006210	Dates:	29 June – 4 August 2006

Cruise	In 2006 the Norwegian IBTS quarter 3/Saithe acoustics was merged with "the International Herring Survey" and a sandeel survey. The RV "Johan Hjort" started at 29 June and completed a total of 57 GOV stations in the period 1 – 27 July. CTD was deployed at each station and at four hydrographical sections to collect temperature and salinity profiles One of the main objectives of the survey is acoustic measurement of the herring and saithe stocks. Acoustic measurements are taken continually through the survey.
Gear details:	GOV with ground gear A using four Balmoral floats instead of the kite.
Notes from survey (e.g. problems, additional work etc.):	Nutrients were sampled on all hydrographical sections. Zooplankton and phytoplankton were sampled on two hydrographical sections. Trawl height was lower than usual because only four Balmoral floats were used.
Number of fish species recorded and notes on any rare species or unusual catches:	Overall, 56 species of fish were recorded.

Stations fished (aims: to complete 55 valid tows per year)

ICES DIVISIONS	STRATA	GEAR	TOWS PLANNED	TOWS VALID	VALID WITH ROCKHOPPER	ADDITIONAL	INVALID	% STATIONS FISHED	COMMENTS
IV	N/A	Standard	57	57	-			100	
	TOTAL		57	57				100	

Number of biological samples (maturity and age material, *maturity only):			
Species	Age	Species	Age
Clupea harengus	1134	*Scomber scombrus*	32
Gadus morhua	499	*Pollachius virens*	231
Melanogrammus aeglefinus	356	*Trisopterus esmarki*	122
Merlangius merlangus	284	*Lophius piscatorius*	39



Overview stations

VARIANCE IN CATCH RATES AND ESTIMATES OF SAMPLING PRECISION									
			2006			2005			
SPECIES	STOCK AREA	VALID TOWS	MEAN CPUE (HR)	SE	RSE	MEAN CPUE (HR)	SE	RSE	COMMENTS
Gadus morhua	IV	57	28.6	8.0	28.0	7.7	2.1	27.0	
Melanogrammus aeglefinus	IV	57	402.8	119.1	29.6	169.1	52.0	30.8	
Merlangius merlangus	IV	57	236.8	75.5	31.9	44.3	9.2	20.9	
Clupea harengus	IV	57	599.9	368.9	61.5	359.2	159.2	44.3	
Pleuronectes platessa	IV	57	7.8	2.2	28.0	135.6	18.3	31.4	
Pollachius virens	IV	57	44.8	13.1	29.1	-	-	-	No catch in 2005
Scomber scombrus	IV	57	-	-	-	0.2	-	-	No catch in 2006
Trisopterus esmarki	IV	57	3041.5	673.0	22.1	546.5	184.8	33.8	
Sprattus sprattus	IV	57	16.4	7.4	45.0	3.7	1.0	26.9	

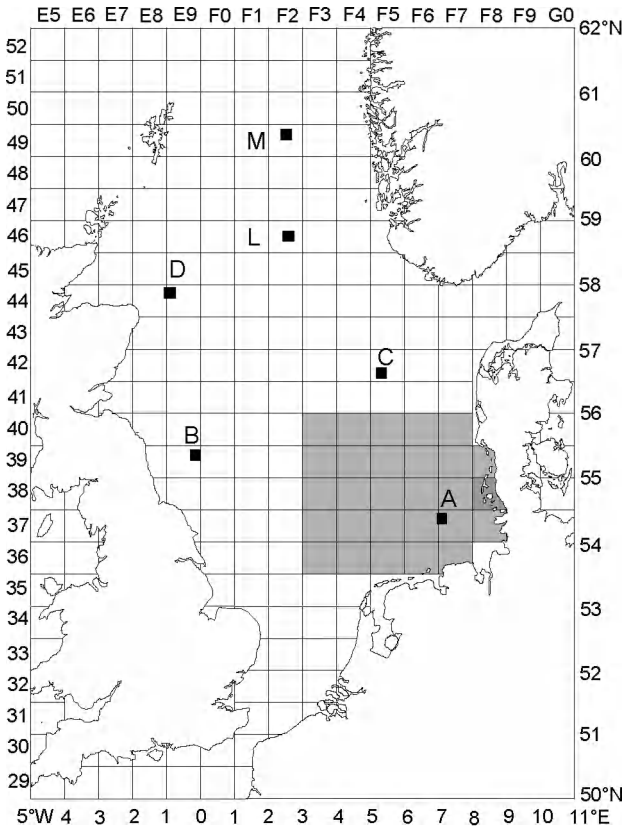
NATION:	GERMANY	VESSEL:	"WALTHER HERWIG III"
Survey:	290	Dates:	17 July – 15 August 2006

Cruise	The objectives of that cruise were to participate in the Q3 IBTS in the North Sea and to monitor the fish fauna and the benthic epifauna in 6 small areas (part of the German Small-Scale Bottom Trawl Survey; GSBTS). North Sea IBTS Q3 survey aims to collect data on the distribution and relative abundance and biological information of commercial fish in subareas 4a,b and c. The primary species are cod, haddock, whiting, saithe, Norway pout, herring, sprat and mackerel.
Gear details:	Standard GOV with ground gear A (standard) was used.
Notes from survey (e.g. problems, additional work etc.):	At the allocated 30 stations of IBTS Q3 survey, the GOV in the standard version was used and a CTD combined with a water sampler was deployed to get temperature and salinity profiles and data on nutrients. The 2m-beamtrawl and the "van Veen" grab were also used to sample the benthic epifauna and to get information on sediment. Additionally 2 bird watchers joined the cruise. For survey standardisation a comparison fishing experiment was carried out at 2 days together with the Scottish FRV "Scotia"
Number of fish species recorded and notes on any rare species or unusual catches:	

Stations fished (aims: to complete 29 valid tows per year)

ICES DIVISIONS	STRATA	GEAR	TOWS PLANNED	VALID	VALID WITH ROCKHOPPER	ADDITIONAL	INVALID	% STATIONS FISHED	COMMENTS
IV	N/A	Standard	29	28	-	03	0	97	
	TOTAL		29	28		03	0	97	

Number of biological samples (maturity and age material, *maturity only):			
Species	Age	Species	Age
Clupea harengus	350	*Scomber scombrus*	260
Gadus morhua	493	*Sprattus sprattus*	145
Melanogrammus aeglefinus	167	*Trachurus trachurus*	207
Merlangius merlangus	378	*Trisopterus esmarki*	25
Pollachius virens	17	*Sardina pilchardus*	5



Overview stations.

VARIANCE IN CATCH RATES AND ESTIMATES OF SAMPLING PRECISION

Species	Stock Area	2006 Valid tows	2006 Mean CPUE (hr)	2006 SE	2006 RSE	2005 Mean CPUE (hr)	2005 SE	2005 RSE	Comments
Gadus morhua	IV	29	47.1	18.2	38.6	*32.6*	8.1	34.1	
Melanogrammus aeglefinus	IV	29	222.1	132.5	59.7	130.0	59.0	45.3	
Merlangius merlangus	IV	29	458.9	207.6	45.2	334.0	139.6	41.8	
Clupea harengus	IV	29	29.0	1607.7	36.1	1.2	0.6	48.9	
Pleuronectes platessa	IV	29	16.3	2.9	18.1	405.1	280.0	69.1	
Pollachius virens	IV	29	1.4	1.4	-	8356.8	1477.3	30.3	
Scomber scombrus	IV	29	160.4	55.0	34.3	27.1	5.3	19.6	
Trisopterus esmarki	IV	29	287.4	272.3	94.7	300.2	53.1	59.1	
Sprattus sprattus	IV	29	15257.9	5190.3	34.0	36293.8	15617.9	43.0	

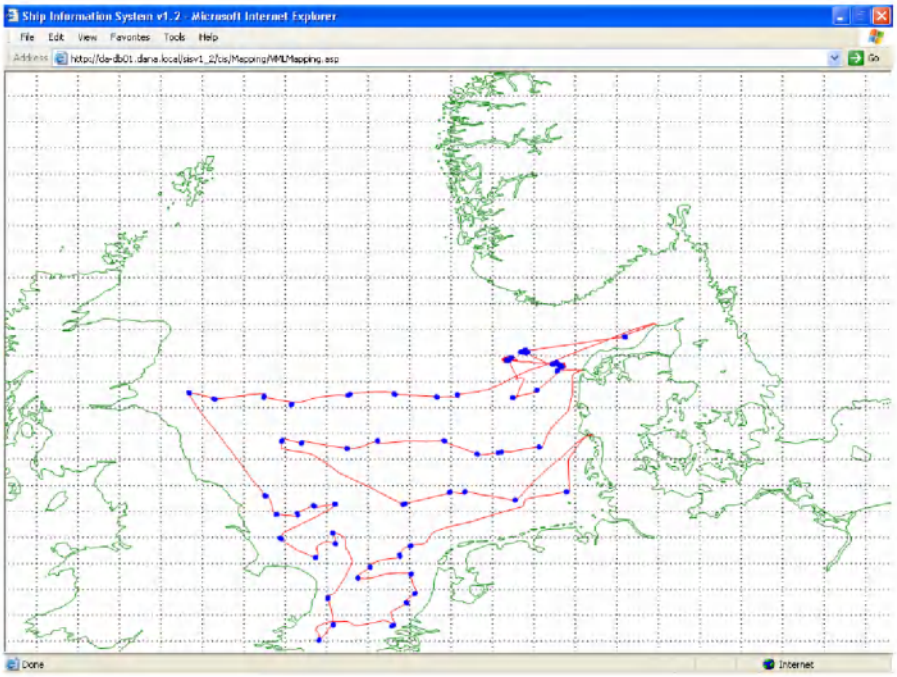
NATION:	DENMARK	VESSEL:	"DANA"
Survey:	07/06 IBTS 3Q 2006	Dates:	24. July – 13. August 2006

Cruise	Q3 NS IBTS. To collect data to estimate year-class strength of the cod, haddock, whiting, Norway pout, herring, sprat, saithe and mackerel stocks in the North Sea, Skagerrak and Kattegat. The survey is coordinated by ICES and is carried out in cooperation with research vessels from England, Germany, Norway, Scotland and Sweden. The survey is carried out as a bottomtrawl survey using the GOV-trawl as the standard gear. To monitor water temperature and salinity at all trawl stations using CTD.
Gear details:	Two gear survey, using a modified GOV with rockhopper ground gear on hard ground stations, and GOV with ground gear A on fine ground stations.
Notes from survey (e.g. problems, additional work etc.):	The cruise plan was fulfilled as planned.
Number of fish species recorded and notes on any rare species or unusual catches:	Overall, 65 species of fish were recorded during the survey.

Stations fished (aims: to complete 46 valid tows per year)

ICES DIVISIONS	STRATA	GEAR	TOWS PLANNED	VALID	VALID WITH ROCKHOPPER	ADDITIONAL	INVALID	% STATIONS FISHED	COMMENTS
IVb-c		Standard	43	43				100	
		Rock hopper	3		3			100	
	TOTAL		46	43	3			100	

Number of biological samples (maturity and age material, *maturity only):			
Species	Age	Species	Age
Clupea harengus	615	*Sprattus sprattus*	562
Gadus morhua	280	*Trisopterus esmarkii*	37
Melanogrammus aeglefinus	499	*Pleuronectes platessa*	770
Merlangius merlangus	682	*Pollachius virens*	13
Scomber scombrus	216		



OVERVIEW STATIONS

VARIANCE IN CATCH RATES AND ESTIMATES OF SAMPLING PRECISION									
			2006			2005			
SPECIES	STOCK AREA	VALID TOWS	MEAN CPUE (HR)	SE	RSE	MEAN CPUE (HR)	SE	RSE	COMMENTS
Gadus morhua	IVb-c	46	23.7	10.5	44.3	7.5	3.1	40.8	
Melanogrammus aeglefinus	IVb-c	46	219.5	76.5	34.8	861.5	574.0	66.6	
Merlangius merlangus	IVb-c	46	1403.1	616.3	43.9	682.5	218.7	32.0	
Clupea harengus	IVb-c	46	2602.2	1334.2	51.3	4267.0	2806.3	65.8	
Pleuronectes platessa	IVb-c	46	93.8	38.8	41.4	71.3	17.3	24.3	
Pollachius virens	IVb-c	46	0.7	0.6	86.9	*0.0*	-	-	Only 2 specimens caught in 2005
Scomber scombrus	IVb-c	46	28.9	9.6	33.3	23.7	6.3	26.4	
Trisopterus esmarki	IVb-c	46	6.8	4.5	66.0	-	-	-	Zero catch
Sprattus sprattus	IVb-c	46	2263.0	3451.7	54.3	15137.3	7808.5	5.6	

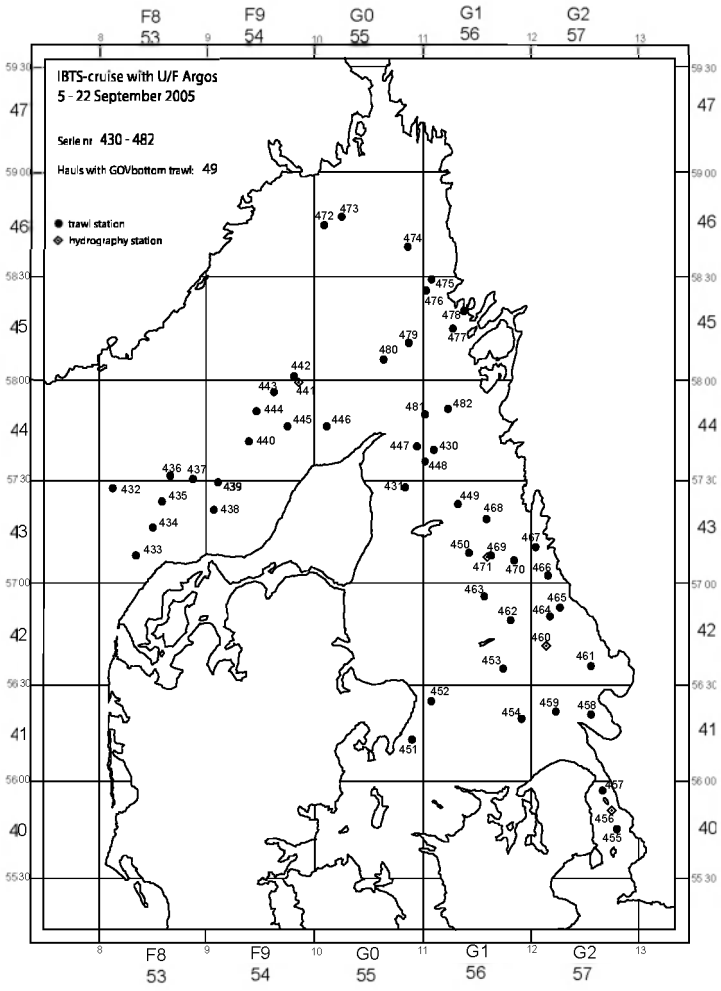
NATION:	SWEDEN	VESSEL:	"ARGOS"
Survey:	13/06	Dates:	4 – 22 September 2006

Cruise	Q3 IBTS To collect data to estimate year-class strength of the cod, haddock, whiting, Norway pout, herring, sprat, saithe and mackerel stocks in the North Sea, Skagerrak and Kattegat. The survey is coordinated by ICES and is carried out in cooperation with research vessels from England, Germany, France, Norway, Scotland and Sweden. The survey is carried out as a bottomtrawl survey using the GOV-trawl as the standard gear.
Gear details:	GOV with ground gear A. No damaged on the trawl during the survey.
Notes from survey (e.g. problems, additional work etc.):	The survey Q3 in Skagerrak is a random depth stratified design including 26 stations. During the survey we had problem with the trawl and the gear in general (trawl caught in the propeller and one of the doors was lost). In all, 12 hauls were made with the wrong type of doors (Hälsö/Fotö, also used together with the GOV before 1992). The hauls, where the wrong type of doors was used, only took place in the Kattegat and in the Sound. These hauls may be excluded after analysis of the gear geometry. To increase the number of haul stations in both areas, 59 new stations were checked for rough bottoms with the echo sounder. Additional sampling: a) collection of herring for toxicity analysis, b) herring and cod samples to CEFAS, Lowestoft, for radioactivity analyse, c) and the ornithologist, Jørn Lennart Larsen, Copenhagen University, was onboard during week 37 and 38 to count birds.
Number of fish species recorded and notes on any rare species or unusual catches:	Overall, 62 species of fish were recorded during the survey.

Stations fished (aims: to complete 49 valid tows per year)

ICES DIVISIONS	STRATA	GEAR	TOWS PLANNED	VALID	VALID WITH ROCKHOPPER	ADDITIONAL	INVALID	% STATIONS FISHED	COMMENTS
VII a	Skag	Standard	26	26	-	0	0	100	
	Katt	Standard	19	19	-	0	0	100	
	Sound	Standard	2	2	-	0	0	100	
	TOTAL		47	47		0	0	100	

Number of biological samples (maturity and age material, *maturity only):			
Species	Age	Species	Age
Clupea harengus	931	*Pollachius virens*	161
Gadus morhua	952	*Trisopterus esmarcki*	133
Melanogrammus aeglefinus	297	*Pleuronectes platessa*	787
Sprattus sprattus	561		



Overview stations.

VARIANCE IN CATCH RATES AND ESTIMATES OF SAMPLING PRECISION									
			2006			2005			
SPECIES	STOCK AREA	VALID TOWS	MEAN CPUE (HR)	SE	RSE	MEAN CPUE (HR)	SE	RSE	COMMENTS
Gadus morhua	IIa	47	196.1	41.2	21.0	*297.9*	100.9	33.9	
Melanogrammus aeglefinus	IIa	47	850.9	325.5	38.2	982.6	431.9	40.9	
Merlangius merlangus	IIa	47	2246.3	451.9	20.1	701.7	380.5	17.5	
Clupea harengus	IIa	47	4842.2	1158.2	23.9	19.6	16.4	54.7	
Pleuronectes platessa	IIa	47	123.9	31.9	25.8	98.1	1.7	53.2	
Pollachius virens	IIa	47	16.1	6.9	42.5	2551.9	814.2	26.4	
Scomber scombrus	IIa	47	16.1	4.4	27.7	54.8	27.6	24.4	
Trisopterus esmarki	IIa	47	532.2	199.6	37.5	1564.8	228.4	34.0	
Sprattus sprattus	IIa	47	9027.4	3473.8	38.5	9629.7	4343.3	30.8	

4.2.2 0-group plots

Plots of mean numbers of 0-group catches for cod, haddock, whiting, herring, mackerel and Norway pout were produced from preliminary data obtained from individual institutes.

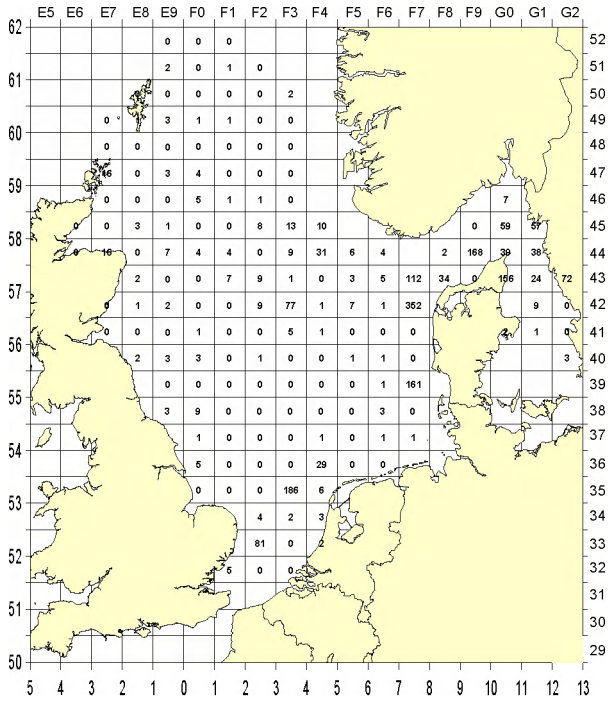


Figure 4.2.2. Plot of mean catch numbers per hour of O-group cod by rectangle.

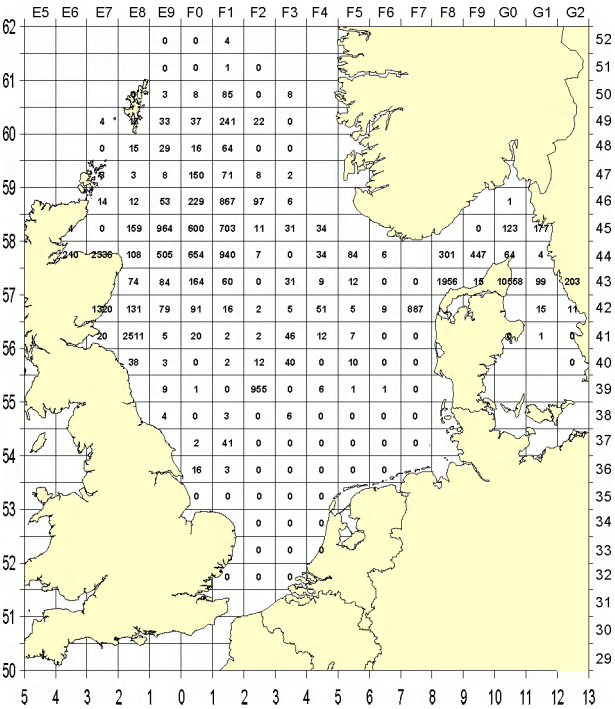


Figure 4.2.3. Plot of mean catch numbers per hour of O-group haddock by rectangle.

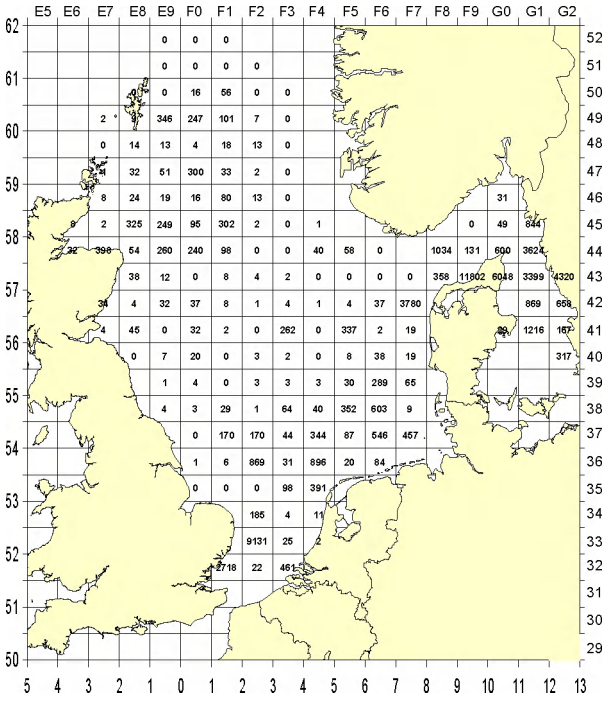


Figure 4.2.4. Plot of mean catch numbers per hour of O-group whiting by rectangle.

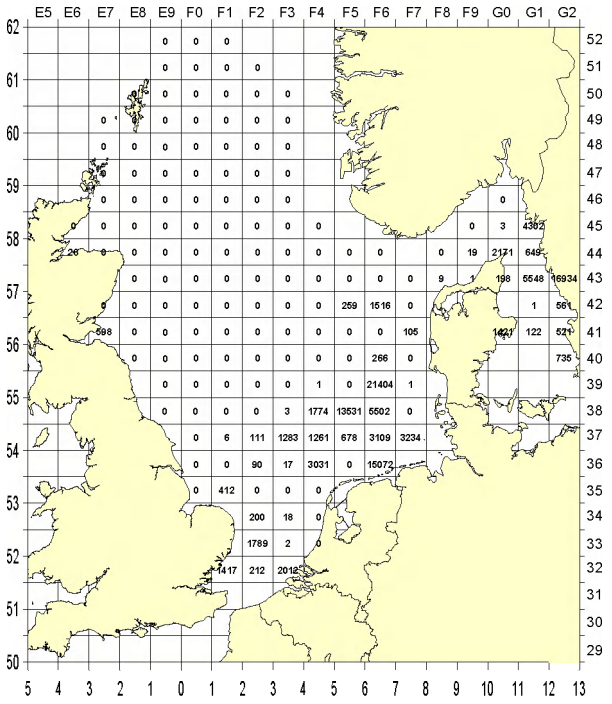


Figure 4.2.5. Plot of mean catch numbers per hour of O-group herring by rectangle.

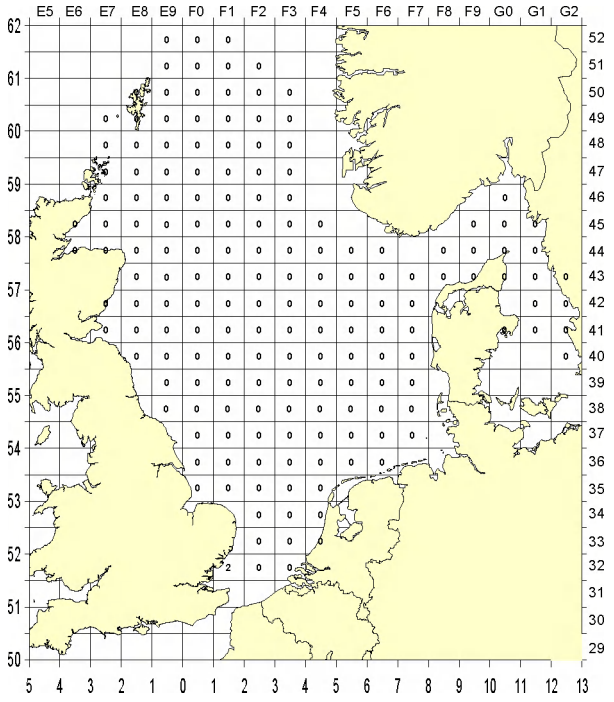


Figure 4.2.6. Plot of mean catch numbers per hour of O-group mackerel by rectangle.

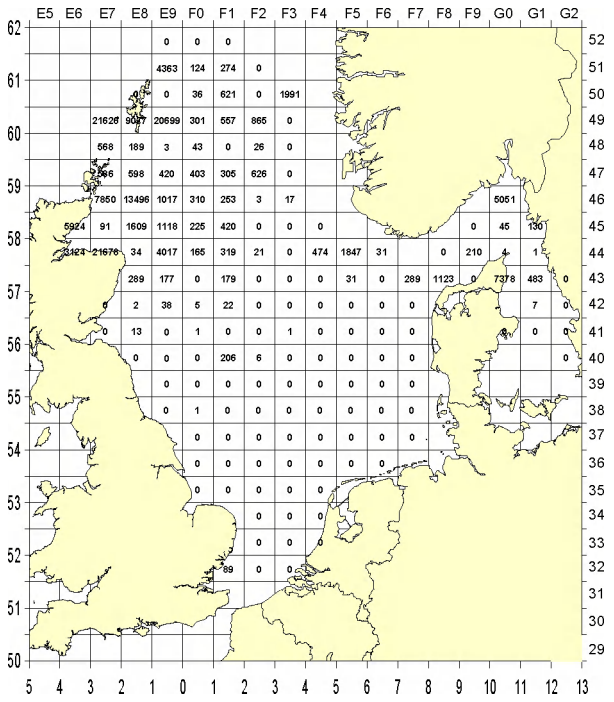


Figure 4.2.7. Plot of mean catch numbers per hour of O-group Norway pout by rectangle.

4.2.3 Staff exchange in 2006

An exchange of staff between England and Scotland occurred during the Scottish quarter 4 Westerly IBTS. As Cefas representative to IBTSWG and 3rd quarter IBTS coordinator, Brian Harley arranged to participate in an FRS survey in 2006. Initially it was to be the 1st quarter survey in the North Sea; however it was postponed to the 4th quarter survey in waters to the west of Scotland.

The Cefas 3rd quarter IBTS coordinator travelled to Ireland to meet the FRS research vessel, Scotia, in Killybegs on Tuesday 28 November and in appalling weather the ship sailed just

before lunch on the same day. In winds approaching 50 knots the FRS team were able to shoot the gear away on that day. He was extremely impressed by the way the officers and crew were able to handle the gear on board the vessel and the fact that they could safely deploy a GOV in such weather is a testament to both their skill and the outstanding gear handling ability of the vessel. The weather continued to be stormy for the entire trip but the vessel was able to continue fishing. At the same time Cefas Endeavour was in the South West and during the same period that Scotia fished in excess of 20 stations Endeavour only managed seven. In its favour Scotia has a stability system that works; it has a ramp and guiding on and off systems for the sweeps and bridles. Combining these makes the Scotia a very stable platform to carry out research in the 21st Century. Once the fish are on board the fish handling facilities differ from those used on Cefas Endeavour. There is a large hopper on the port side of the vessel, this is static and all fish sorting and measuring is carried out in the fish house, inside of the vessel. They have a conveyer system that brings the fish into the lab and gates are manually open to guide fish onto small sorting benches. These same benches are then used to carry out all sampling. There is limited space within the fish room and boxes and baskets of fish can pile up and be in the way. FRS are using paper recording and they have a system of coloured sheets on which similar species are recorded. Along with otolith packets for the biological data this information is then entered into a database. This database is in the process of being re-written. Due to the relatively small size of the fish room, in its present layout, Scotia could not use the Cefas EDC system for survey sampling.

The opportunity to participate in this survey was extremely useful and it allowed many insights into the workings, which are both similar and different, between FRS and Cefas. There is hope that a member of the FRS team will be able to take part in an exchange on the 3rd quarter IBTS survey in 2007, and another member of Cefas is available to join the Irish vessel on their 4th quarter survey in October 2007, if space allows.

4.2.4 Participation in 2007

All the participants of the third quarter 2006 survey have advised that they will be participating fully in the programme in 2007. The timing of the surveys will be broadly in line with recent years. Norway will continue to start their survey on 1 July, as their IBTS survey is combined with an acoustic survey but they will still cover their allotted area.

4.2.5 Non-standard gear use in English Quarter 3 IBTS

The Centre for the Environment Fisheries an Aquaculture Science (Cefas) conducts an annual third quarter groundfish survey of the North Sea as part of the ICES coordinated IBTS, using the standard *Grande Ouverture Vertical* (GOV) trawl rigged with ground gear A. Data from the resultant survey time series is used in the stock assessment of roundfish species by the ICES Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK). During the 2006 survey, at station 48 of 75, it was noticed that the rigging of the GOV trawl had not been carried out as described in the IBTS Working Group manual. A 20m length of sweep (a wire between the net doors and the net bridle) had been used on the GOV trawl instead of the standard 50m sweep. For consistency, the decision was taken to complete the remainder of the survey with the 20m sweeps. Working Document titled "ENGGFS Sweeps Analysis Report and recommendations" describes the analysis of the data that was carried out to investigate the potential effects of this non-standard gear deployment. As a result of the error Cefas have amended their internal operating procedure to ensure this kind of error cannot occur in the future.

The IBTSWG notes that the Cefas used a 20m sweep instead of the standard 50m sweep in its Q3 IBTS survey. Analysis of the data by the Cefas found that

i) Gear parameters were low but mainly within in the confidence interval described in the IBTSWG manual (revision VII)

ii) For the key target species cod, haddock, whiting saithe, herring and plaice an effect was not detectable within the natural variation in the recorded data.

Despite this, due to the fact that the gear was not rigged as described in the IBTS manual (revision VII), the IBTSWG considers that the gear was outside the constraints expected for the standard North Sea IBTS gear and would have affected catchability unpredictably.

As a result the IBTSWG recommends that the data be flagged as non-standard in the DATRAS database and before the use of the data; Cefas will inform relevant assessments groups of the issue. This gives the assessment working groups the opportunity to study the Working Document (see Appendix 9) and to decide whether it is likely that use of the data are of any impact on the assessments. Further recommendations are to ensure that all survey participants review their protocols relating to checking of their survey gear prior to deployment and to maintain the rigging of the survey gear to the standard described in the IBTSWG manual (revision VII). If deviation from the standard rigging of the survey gear occurs then it should be brought to the attention of the IBTSWG.

4.3 Eastern Atlantic

4.3.1 Surveys overview

In 2006 a total of 13 IBTS groundfish surveys were carried out in the ICES Western and Southern Area of the Eastern Atlantic, with a total of 906 valid tows. Scotland reported significant loss of time due to bad weather in 2006, for Q4 VIa. The UK and France were also impacted by weather last year, particularly the UK in the Celtic Sea.

Scotland ceased fishing in its small number of VIIa stations on foot of discussions at IBTS regarding coordinated survey effort, and transferred this time to VIa. Survey effort is now less duplicated in VIIa with comprehensive coverage by the UK. Existing and extensive survey effort by Northern Ireland will from 2007 also be coordinated by IBTS. These developments have facilitated a more comprehensive and coordinated coverage on the Irish and Scottish west coasts, appropriate to target species distribution in these areas.

Five days intercalibration was again carried out between the IEO Porcupine Survey and the MI IGFS Survey which provided a further 14 valid tows. Preliminary analysis of the now 28 valid parallel tows shows some distinct trends in catch abundance between the two contrasting survey gears, but length frequency differences are less distinct so far. Further discussion is available elsewhere in the IBTS 2007 report. During the IFREMER EVHOE 2006 survey, one day was devoted for fishing in Spanish waters on five IEO Spanish North Coast Survey positions (4 of them were successful).

Over the last year there has been limited feedback from assessment working groups to the pilot standardised reporting format attempted last year. However, recent developments toward standard precision outputs from DATRAS prompted IBTS to suggest that this output will be worked into the survey summaries for next years report on the 2007 survey season. This will be done on a vessel basis with the assessment working groups being approached for input as to which might be priority indices to comment on in the first instance. As a consequence relative standard error has not been routinely reported on here in the interim.

4.3.2 UK-Scotland

4.3.2.1 Western Division Bottom Trawl Survey – Quarter 4 2006 (1805S)

NATION:	UK (SCOTLAND)	VESSEL:	"SCOTIA"
Survey:	1806S	Dates:	16 November–7 December 2006

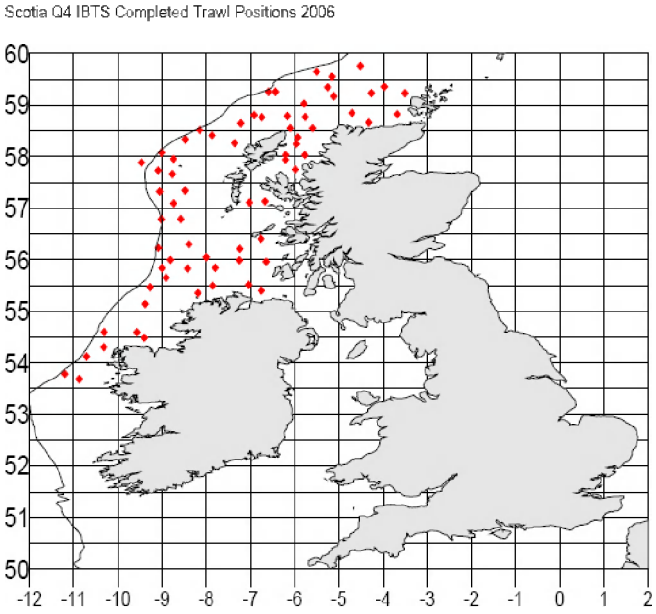
Cruise	Q4 Western Groundfish survey aims to collect data on the distribution, relative abundance and biological information (in connection with EU Data Directive 1639/2001) on a range of fish species in ICES areas VIa. Age data was collected for cod, haddock, whiting, saithe, herring, mackerel and sprat. This year after consultation with Ireland a decision was made to discontinue sampling in area VIIa. This should result in a much more intensive survey being undertaken within area VIa which will also incorporate a greater degree of stratification in the design. This stratification will be developed even further in future years.
Gear details:	GOV with ground gear C for all stations.
Notes from survey (e.g. problems, additional work etc.):	Weather conditions were unfavourable throughout the whole survey and a significant period of fishing time was lost. This resulted in 12 stations being dropped, 11 of which were within area VIa. Despite this 66 valid tows were completed. Additional work undertaken included the collection of temperature and salinity data from the seabed and surface at each trawl station. Sampling of Herring for the presence of viral haemorrhagic septicaemia virus (VHSV) and sampling of cod, anglerfish, herring, and mackerel to determine levels of specific parasitic fauna were also undertaken. All benthic species caught were identified and quantified. Gear parameters were monitored throughout each haul and in addition a bottom contact sensor was used and the readings recorded. Some limited swathe bathymetry work with accompanying grab sampling were also undertaken during nights when the weather allowed.
Number of fish species recorded and notes on any rare species or unusual catches:	83 species were encountered during the survey for a total catch weight of 17,604kg.

Stations fished (aims: to complete 78 valid tows per year)

ICES DIVISIONS	STRATA	GEAR	TOWS PLANNED	TOWS VALID	VALID WITH ROCKHOPPER	ADDITIONAL	INVALID	% STATIONS FISHED	COMMENTS
VIa		GOV-C	72	61	-	0	5	85	Weather curtailed fishing operations as well as gear damage
VIIb		GOV-C	6	5	-	0	0	83	
	TOTAL		78	66	-	0	5	85	

Biological samples

Number of biological samples (maturity and age material, *maturity only):			
Species	Age	Species	Age
Clupea harengus	551	**Lophius budegassa*	16
Gadus morhua	79	**Lophius piscatorius*	154
Melanogrammus aeglefinus	1008	**Raja brachyura*	1
Merlangius merlangus	597	*Pollachius virens*	67
**Merluccius merluccius*	505	*Scomber scombrus*	648
**Psetta maxima*	1	**Leucoraja naevus*	72
**Molva molva*	10	**Raja batis*	27
**Lepidorhombus whiffiagonis*	193	**Raja clavata*	52
**Trachurus trachurus*	245	**Raja montagui*	60
**Scopthalmus aquosus*	1		



Overview stations

Q4 SCOGFS CPUE data for major species

Species	Strata	Mean nos/hr	Mean kgs/hr
Gadus morhua	All	2.617	2.923
Melanogrammus aeglefinus	All	158.840	51.697
Merlangius merlangus	All	94.213	12.843
Merluccius merluccius	All	139.309	8.155
Pollachius virens	All	2.298	2.433
Lepidorhombus whiffiagonus	All	8.202	1.898
Lophius piscatorius	All	4.979	8.317
Pleuronectes platessa	All	18.319	2.915
Microstomus kitt	All	34.979	3.78

4.3.2.2 West of Scotland Deepwater Survey – 2006 (1406S)

NATION:	UK (SCOTLAND)	VESSEL:	"SCOTIA"
Survey:	1406S	Dates:	8 – 15 September 2006

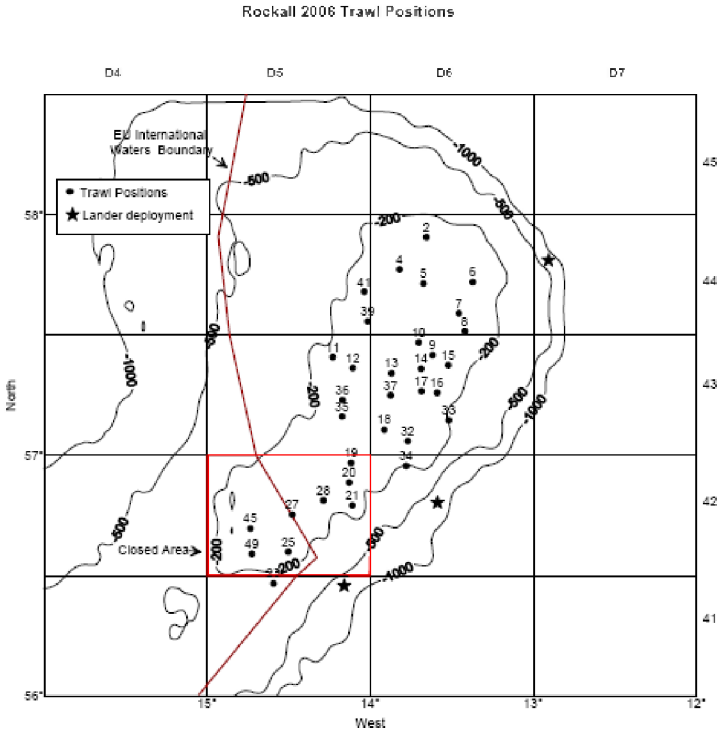
Cruise	Q3 Rockall survey aims to collect data on the distribution, relative abundance and biological information (in connection with EU Data Directive 1639/2001) on a range of fish species on the Rockall Bank. Age data was collected for cod, haddock, whiting, saithe, Norway pout, herring and mackerel.
Gear details:	GOV with ground gear C was used on the Rockall Bank.
Notes from survey (e.g. problems, additional work etc.):	Weather was not a significant problem for this survey and only half of a day was lost as a result. Additional work undertaken included the collection of temperature and salinity data from the seabed and surface at each trawl station; all benthic species caught were identified and quantified. The occurrence of *Nephrops* was investigated on the Rockall plateau using a combination of TV sledge and camera drop frame equipment. Aberdeen and Bristol University deployed a freefall lander at three locations around the deewater fringes on the eastern edge of the Rockall Bank in an attempt to capture ostracods.(see attached map for locations)
Number of fish species recorded and notes on any rare species or unusual catches:	A total of 38 species were recorded for a combined weight of 12,614kgs.

Stations fished (aims: to complete 42 valid tows per year) Time constraints constrained the survey duration this year.

ICES DIVISIONS	STRATA	GEAR	TOWS PLANNED	VALID	VALID WITH ROCKHOPPER	ADDITIONAL	INVALID	% STATIONS FISHED	COMMENTS
Rockall	All	GOV- C	36	32	-	0	1	89	Boulder in net – Foul haul

Biological samples

Number of biological samples (maturity and age material, *maturity only):			
Species	Age	Species	Age
Clupea harengus	1	*Hippoglossus hippoglossus	1
Gadus morhua	8		
Merlangius merlangus	3		
Melanogrammus aeglefinus	1201		
**Lepidorhombus whiffiagonis*	233		
Pollachius virens	34		
**Lophius piscatorius*	37		
**Raja batis*	1		



Overview stations

Q4 Rockall Haddock Survey CPUE data for major species.

Species	Strata	Mean nos/hr	Mean kg/hr
Gadus morhua	All	0.507	4.082
Melanogrammus aeglefinus	All	2843.702	513.410
Pollachius virens	All	2.598	6.874
Lepidorhombus whiffiagonus	All	15.523	3.602
Lophius piscatorius	All	2.344	4.168
Microstomus kitt	All	124.752	11.065

4.3.2.3 Western Division Bottom Trawl Survey – Quarter 1 2006 (0406S)

NATION:	UK (SCOTLAND)	VESSEL:	"SCOTIA"
Survey:	0406S	Dates:	11 – 31 March 2006

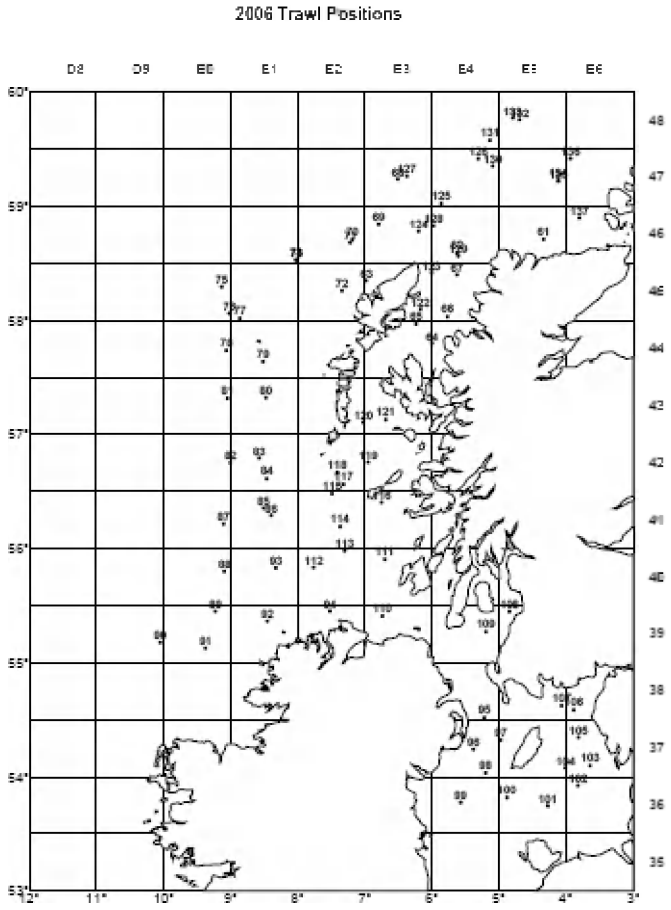
Cruise	Q1 Western Groundfish survey aims to collect data on the distribution, relative abundance and biological information (in connection with EU Data Directive 1639/2001) on a range of fish species in ICES areas VIa and VIIa. Age data was collected for cod, haddock, whiting, saithe, Norway pout, herring, mackerel and sprat.
Gear details:	GOV with ground gear C.
Notes from survey (e.g. problems, additional work etc.):	Weather was not a significant problem for this survey and only a part day was lost as a result. Additional work undertaken included the collection of temperature and salinity data from the seabed and surface at each trawl station, evaluation of the NOAA bottom contact sensor and the identification and quantification of all benthic species caught. All hauls were carried out during the hours of daylight.
Number of fish species recorded and notes on any rare species or unusual catches:	A total of 82 different species were recorded during the survey. Cod numbers were up on previous year but still well below the 10 year average. Haddock and whiting returned slightly higher values than in 2005 but both species were still well short of the 10year average. A total of 41 tonnes of mackerel was caught in 50 hauls the overwhelming majority of which (90%) were 1 year old fish.

Stations fished (aims: to complete 62 valid tows per year)

ICES DIVISIONS	STRATA	GEAR	TOWS PLANNED	TOWS VALID	VALID WITH ROCKHOPPER	VALID WITH ADDITIONAL	INVALID	% STATIONS FISHED	COMMENTS
VI a		GOV- C	49		-	6	9	112	
VIIa		GOV-C	13		-	0		100	
	TOTAL		62	68	-	4	9	110	

Biological samples

Number of biological samples (maturity and age material, *maturity only):			
Species	Age	Species	Age
Clupea harengus	Na	**Lophius budegassa*	10
Gadus morhua	27	**Lophius piscatorius*	37
Melanogrammus aeglefinus	1048	*Trisopterus esmarki*	226
Merlangius merlangus	782	*Pollachius virens*	30
**Merluccius merluccius*	363	**Leucoraja naevus*	44
**Molva molva*	11	**Raja batis*	68
**Lepidorhombus whiffiagonis*	75	**Raja clavata*	40
**Trachurus trachurus*	177	**Glyptocephalus cynoglossus*	17



Overview station

Q1 0406S CPUE data for major species.

Catch rates					
Species	Strata	Valid tows	Mean no/hr	Mean Kg/hr	Comments
Gadus morhua	All	68	0.83	3.70	
Melanogrammus aeglefinus	All	68	238.25	50.24	
Merlangius merlangus	All	68	340.57	22.02	
Merlucius merlucius	All	68	71.02	5.93	
Pollachius virens	All	68	1.44	1.37	
Lepidorhombus whiffiagonis	All	68	3	0.69	
Pleuronectes platessa	All	68	33.53	4.57	
Lophius piscatorius	All	68	1.09	1.58	
Microstomus kitt	All	68	25.03	2.53	

4.3.3 Ireland

4.3.3.1 Irish Groundfish Survey Q4 – IGFS06

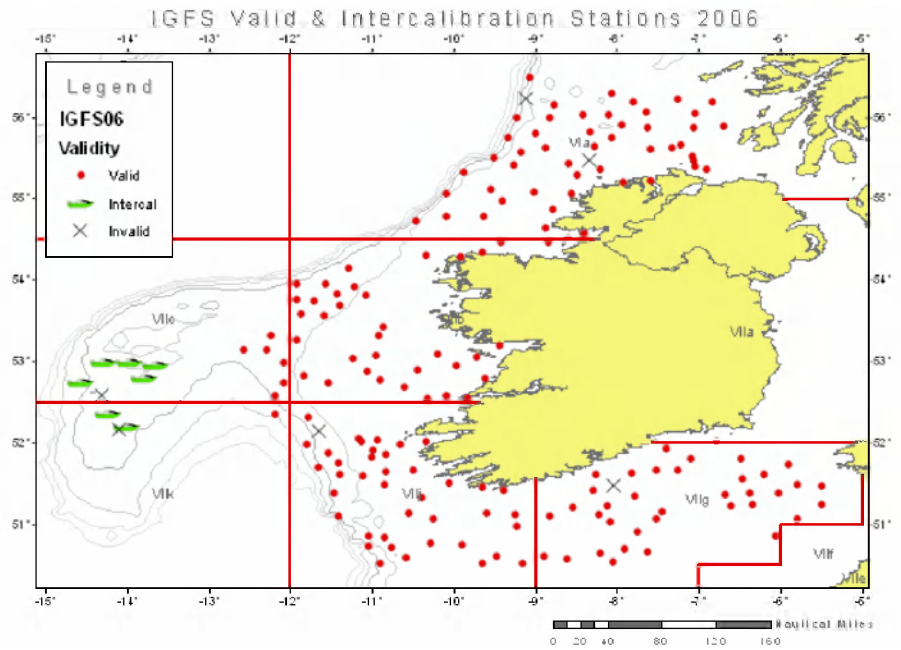
NATION:	IRELAND	VESSEL:	"CELTIC EXPLORER"
Survey:	IGFS	Dates:	24 October – 1 December

Cruise	Q4 Western Groundfish survey aims to collect data on the distribution, relative abundance and biological parameters of commercial fish in VIaS, VIIb, VIIgN & VIIjN. The currently assessed species are haddock, whiting, plaice and sole with similar data collected for other demersal fish (e.g. cod, white & black anglerfish, megrim, lemon sole, hake, saithe, ling, blue whiting and a number of elasmobranchs) as well as several pelagics (herring, horse mackerel and mackerel).
Gear details:	Two gear survey since 2004, using GOV ground gear "A" and "D" modified to reduce the traditional gap between the footrope and fishing line from 30cm to 10cm (described in SGSTG 2004, IBTS 2005). The D gear was a response severe damage encountered in the first year of the time series (IGFS03) as well as catchability concerns and is adopted throughout Via. The A gear is used throughout the remainder of the survey.
Notes from survey (e.g. problems, additional work etc.):	Very little gear damage or poor weather so only about three days fishing lost overall. Following agreement at IBTS 2005 (see report) effort from VIIa was re-allocated to the shelf edge as an additional strata (200–600m) to better cover distributions of hake, monkfish and megrim. Second year of intercalibration with IEO Survey on Porcupine carried out, but westerly hauls outside IGFS survey area omitted from valid survey data time series (see map of survey stations).
Number of fish species recorded and notes on any rare species or unusual catches:	In 2006 approximately 92 species of fish and 16 elasmobranch species were encountered. Rarer catches included a haul of 65 tope (*Galheorhinus galeus*) as well as 46 sea bass (*Dicentrarchus labrax*) over a couple of hauls in the Celtic Sea.

Stations fished (aim to complete 170 valid tows per year)

ICES DIVISIONS	STRATA	GEAR	TOWS PLANNED	VALID	ADDITIONAL	INVALID	% STATIONS FISHED	COMMENTS
VIa	All	D	50	50	2	2	100	
VIIb,c	All	A	39	41	11	2	105	
VIIg	All	A	38	36	0	2	95	
VIIj	All	A	44	41	0	1	93	
	TOTAL		170	168	13	7	98	

NUMBER OF BIOLOGICAL SAMPLES (MATURITY AND AGE MATERIAL, *MATURITY ONLY):			
Species	No.	Species	No.
Clupea harengus	263	*Lophius budegassa*	101
Gadus morhua	172	*Lophius piscatorius*	203
Melanogrammus aeglefinus	1394	*Molva molva*	124
Merlangius merlangus	927	*Solea solea*	120
Merluccius merluccius	1496	*Scomber scombrus*	539
Micromesistius poutassou	887	*Trachurus trachurus*	587
Pollachius virens	157	**Raja brachyura*	12
Lepidorhombus whiffiagonis	1175	**Raja clavata*	211
Microstomus kitt	648	**Leucoraja naevus*	121
Pleuronectes platessa	647	**Raja montagui*	291



Map of Survey Stations completed by the Irish Groundfish Survey in 2006. Valid = red circles; Invalid = crosses; Intercalibration outside survey area = green ship symbols; Additional stations not shown.

Q4 IGFS CPUE data for major species.

CATCH RATES FOLLOWED BY % DIFFERENCE FROM PREVIOUS YEAR						
Species	**Strata**	**Mean No. hr^{-1}**	**% diff from 2005**	**Mean Kg hr^{-1}**	**% diff from 2005**	**Comments**
Gadus morhua	All	8	59	11.4	79	
Melanogrammus aeglefinus	All	372	0	58.7	25	
Merluccius merluccius	All	106	7	12.1	49	
Lepidorhombus whiffiagonis	All	13	-24	2.2	16	
Lophius piscatorius	All	3	14	7.4	60	
Pleuronectes platessa	All	39	62	6.8	62	
Pollachius virens	All	16	92	20.5	94	
Solea solea	All	4	42	1.0	27	
Merlangius merlangus	All	792	66	69.6	54	

4.3.4 UK – England

4.3.4.1 Western Groundfish Survey Q4 – 19/06

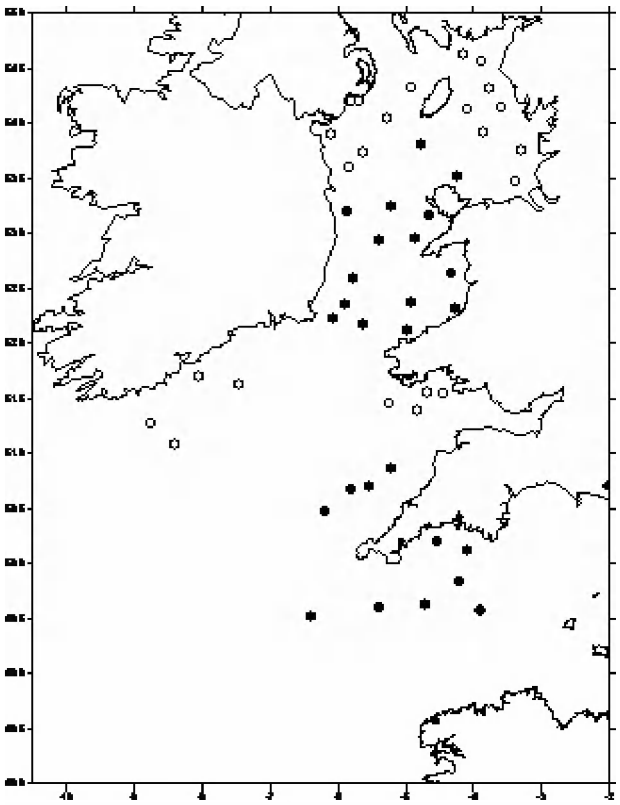
NATION:	UK (ENGLAND AND WALES)	VESSEL:	"CEFAS ENDEAVOUR"
Survey:	19/06	Dates:	6 November – 6 December 2006

Cruise	Q4 Western Groundfish survey aims to collect data on the distribution, relative abundance, and biological information of commercial fish in VIIa and VIIe-h. The primary species are cod, haddock and whiting, with data also collected for other demersal fish (e.g. skates and rays, anglerfish, plaice, megrim,) and pelagic fish (herring and mackerel). Data on the distribution and relative abundance of non-target fish and the benthic bycatch are also recorded.
Sampling design	Sampling is undertaken over a fixed grid, with prime station numbers identified with an alpha-numeric code, reflecting the various strata surveyed.
Gear details:	Two gear survey, using the modified rockhopper GOV with ground gear D on hard ground stations, and GOV with ground gear A on fine ground stations (though with extra floats instead of kite and the toggle chains set to 10 cm). This year the modified rockhopper was made from polyethylene (nylon nets were used in previous years), a lifting bag of 200 mm mesh size (double 4 mm twine) covered the cod-end to minimise damage to the codend when bringing the net on board and emptying the codend, and a length of 75 cm of chain was used to join the ground gear to the fish plate, so as to ensure that the fishing line and ground gear were tight.
Notes from survey (e.g. problems, additional work etc.):	A shakedown tow was undertaken prior to commencing the survey grid. This was the first year in which a polyethylene net was used on the rockhopper GOV, and this gear had only limited gear damage, with most stations around the Cornish peninsula and in St George's Channel fished without incident. Once hard ground stations were completed, the GOV on ground gear A was rigged and stations in the Irish Sea fished successfully. Severe weather conditions severely restricted fishing operations for much of the survey, especially in the second half and only a few stations in the Celtic Sea were fished (which resulted in low biological sampling of species such as hake and megrim). Additional work undertaken included CTD casts and grab sampling at selected trawl stations, epibenthic sampling (with 2m-beam trawl), and a tag/release protocol for various species of dogfish and skate (Rajidae).
Number of fish species recorded and notes on any rare species or unusual catches:	Overall, 92 species of fish were recorded during the survey. Three species were recorded for the first time in this survey, with single specimens of sea trout *Salmo trutta* and salmon *Salmo salar* caught in Cardigan Bay and Dundalk Bay respectively, and a single specimen of tompot blenny *Parablennius gattorugine* was recorded in the Irish Sea. Other unusual fish species caught included a 105 cm electric ray Torpedo nobiliana just south of Milford Haven, and specimens of the little-known Steven's goby *Gobius gasteveni* were recorded in the western English Channel.

Stations fished (aim to complete 72 valid tows per year)

ICES Divisions	Strata	Gear	Tows planned	Valid	Additional	Invalid	% stations fished	Comments
VII a	A-B	Standard	9	10	1		111.1	Additional tow in Dundrum Bay
	C	Standard	4	4			100.0	
	H	Rockhhopper	15	14	1		93.3	One tow with some gear damage treated as an additional tow
VII e-h	D-E	Standard	19	5		1	26.3	Severe gear damage at one tow of southern Ireland (Invalid)
	F	Standard	15	2			13.3	
	G	Rockhopper	10	11			110.0	
TOTAL			72	46	2	2	63.9	

Number of biological samples (maturity and age material, *maturity only):					
Species	Stock	No.	Species	Stock	No.
Gadus morhua	VIIa	40	*Scomber scombrus*	Northern	196
Gadus morhua	VIIe-k	25	*Psetta maxima*	-	7
Melanogrammus aeglefinus	VIIa	253	*Scophthalmus rhombus*	-	7
Melanogrammus aeglefinus	VIIe-k	153	*Microstomus kitt*	-	108
Merlangius merlangus	VIIa	279	*Lophius budegassa*	-	24
Merlangius merlangus	VIIe-k	174	*Lophius piscatorius*	-	4
Pleuronectes platessa	VII a	675	*Mullus surmuletus*	-	22
Pleuronectes platessa	VII e and VII f-g	91	*Dicentrarchus labrax*	-	5
Solea solea	VII a	54	**Leucoraja naevus*	-	46
Solea solea	VII e and VII f-g	54	**Raja brachyura*	-	27
Clupea harengus	VII a	200	**Raja clavata*	-	163
Clupea harengus	Celtic Sea	37	**Raja microocellata*	-	93
Merluccius merluccius	Northern	85	**Raja montagui*	-	67
Lepidorhombus whiffiagonis	VIIb,c,e-k, VIIIa,b,d	25			



Map of survey area indicating stations fished in 2006 with GOV with ground gear A (open circle) and modified GOV with rockhopper ground gear (solid circle).

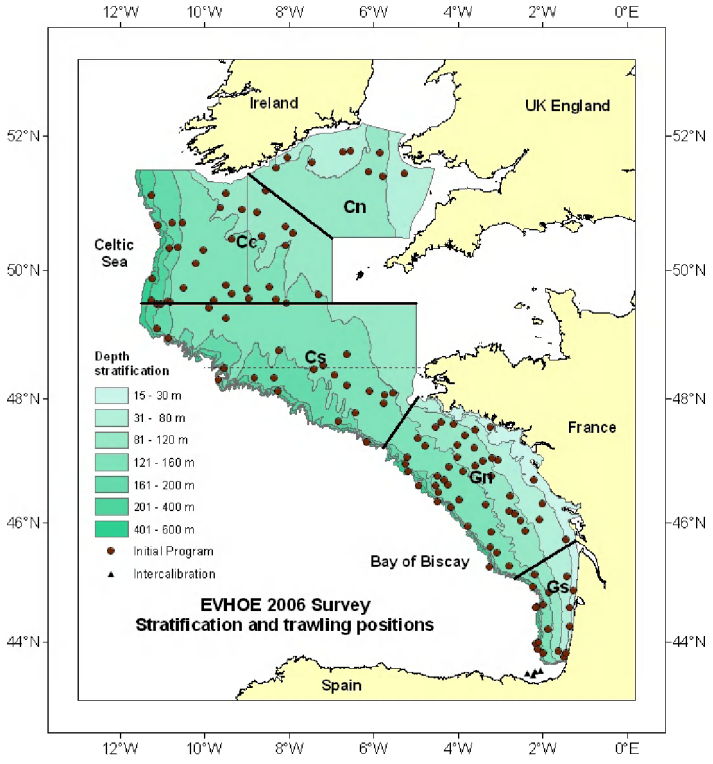
VARIANCE IN CATCH RATES OF COMMERCIAL STOCKS					
SPECIES/STOCK	STOCK AREA	AREA SURVEYED	GEAR	VALID TOWS	MEAN CATCH ($NO.H^{-1}$)
G. morhua	VII a	VII a	A	14	4.29
			D	14	2.71
	VII e-k	VII e-g	A	*7*	*1.14**
			D	11	4.00
M. aeglefinus	VII a	VII a	A	14	386.82
			D	14	303.03
	VII e-k	VII e-g	A	*7*	*4.29**
			D	11	329.31
M. merlangus	VII a	VII a	A	14	3639.25
			D	14	461.69
	VII e-k	VII e-g	A	*7*	*792.20**
			D	11	46.00
M. merluccius	North	VIIa, e-g	A	21	15.43
			D	25	3.96
L. piscatorius	VIIb-k, VIIIa,b	VII a,e-g	A	21	1.57
			D	25	0.72
S. acanthias	NE Atlantic	VIIa, e-g	A	21	2.67
			D	25	3.24
*** Due to severe weather, only limited sampling in the Celtic Sea was undertaken**					

4.3.5 France

4.3.5.1 EVHOE Groundfish Survey Q4 – EVHOE2006

NATION:	FRANCE	VESSEL:	"THALASSA"
Survey:	EVHOE 2006	Dates:	20 October – 4 December 2006

Cruise	EVHOE Groundfish survey aims to collect data on the distribution and relative abundance, and biological information of all fish and selected commercial invertebrates in Subareas VIIf-j VIIIa,b. The primary species are hake, monkfishes, anglerfishes, megrim, cod, haddock and whiting, with data also collected for all other demersal and pelagic fish. CTD temperature and salinity profiles recorded at each trawling position. Sampling design is stratified random.
Gear details:	A GOV with standard Ground gear (A) but no kite replace by 6 extra floats.
Notes from survey (e.g. problems, additional work etc.):	83% of the initial program was achieved. Bad weather encountered in the Celtic Sea. Due National defence restrictions some modification to the initial sampling program had to be made but this will have no effect on the results. 4 valid tows were conducted on positions also trawled by Spain.
Number of fish species recorded and notes on any rare species or unusual catches:	148 species encountered. Unusual catches of *Entelurus aequoreus* in the Celtic Sea as in most recent years.



Overview stations

Stations fished

ICES DIVISIONS	STRATA	TOWS PLANNED	VALID	ADDITIONAL	% STATIONS FISHED	COMMENTS
VII	Cc3	9	8		89%	
	Cc4	20	14		70%	
	Cc5	3	3		100%	
	Cc6	3	3		100%	
	Cc7	2	2		100%	
	Cn2	7	5		71%	
	Cn3	7	4		57%	
	Cs4	20	15		75%	
	Cs5	10	6		60%	
	Cs6	3	3		100%	
	Cs7	2	2		100%	
VIII	Gn1	3	3		100%	
	Gn2	4	4		100%	
	Gn3	16	16		100%	
	Gn4	21	17		81%	
	Gn5	3	3		100%	
	Gn6	2	1		50%	
	Gn7	2	2		100%	
	Gs1	3	3		100%	
	Gs2	3	3		100%	
	Gs3	3	3		100%	
	Gs4	3	3		100%	
	Gs5	2	2		100%	
	Gs6	2	2		100%	
	Gs7	2	2		100%	
TOTAL		155	129	0	83%	

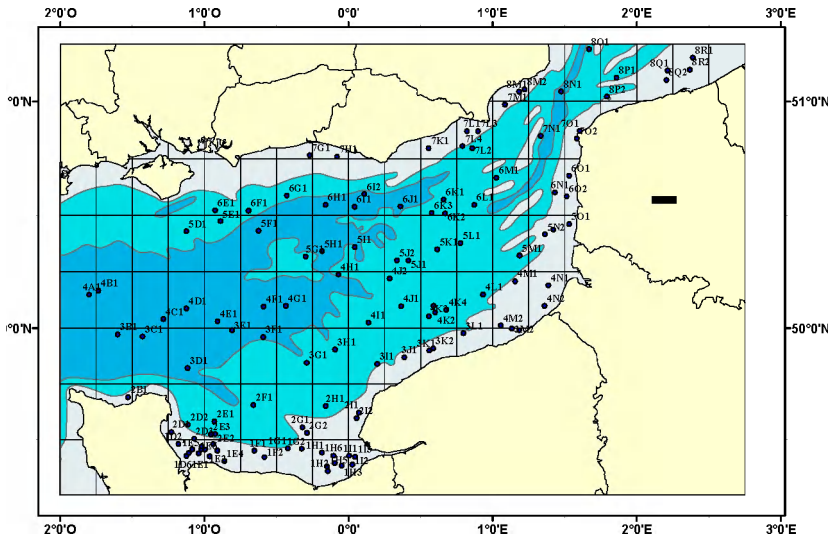
Q4 EVHOE CPUE data for major species

Species	Area	Valid tows	Kg/set	RSE	Nb/set	RSE	Comments
Merluccius merluccius	Cn, Cc, Cs, Gn, Gs	129	3.67	8.4%	77.12	11.2%	
Merlangius merlangius	Cn, Cc, Cs	65	3.18	35.5%	29.86	28.2%	
Melanogrammus aeglefinus	Cn, Cc, Cs	64	4.73	25.8%	27.10	40.4%	
Gadus morhua	Cn, Cc, Cs	64	1.64	34.8%	0.38	34.2%	
Lepidorhombus whiffiagonnis	Cn, Cc, Cs, Gn, Gs	129	1.75	8.6%	16.60	14.8%	
Lophius budegassa	Cn, Cc, Cs, Gn, Gs	129	0.80	15.0%	1.60	11.3%	
Lophius piscatorius	Cn, Cc, Cs, Gn, Gs	129	3.17	16.1%	1.94	12.4%	
Scomber scombrus	Cn, Cc, Cs, Gn, Gs	129	29.62	42.3%	365.87	53.3%	
Trachurus trachurus	Cn, Cc, Cs, Gn, Gs	129	73.4	21.1%	1602.41	29.2%	
Scylorhinus canicula	Cn, Cc, Cs, Gn, Gs	129	8.31	19.7%	28.37	24.7%	
Leucoraja naevus	Cn, Cc, Cs, Gn, Gs	129	1.07	17.8%	1.77	23.7%	
Raja clavata	Cn, Cc, Cs, Gn, Gs	129	0.33	36.4%	0.25	36.0%	
Nephrops norvegicus	Cn, Cc, Cs	65	1.18	80.5%	76.05	88.9%	
Nephrops norvegicus	Gn, Gs	64	0.46	28.3%	21.91	31.1%	

4.3.5.2 The Channel Groundfish Survey – CGFS

NATION:	FRANCE	VESSEL:	"GWEN DREZ"
Survey:	CGFS	Dates:	1 October – 29 0ctober 2006

Cruise	Channel Ground Fish Survey aims to collect data on the distribution and relative abundance, and biological information of commercial fish in VIId. Main species are cod, whiting, red gurnard, red mullet and plaice with data also collected for all other demersal and pelagic fish (mackerel). This survey is carried out every years since 1986. The Eastern Channel and the southern part of the North sea (Divisons VIId and IVc4) are divided in 15' latitude and 15' longitude squares. In each square, the same hauls (two in coastal waters and one offshore) are fished every year. The haul duration is 30 minutes, temperature and salinity are recorded during each haul.
Gear details:	A GOV 19,70/25,90 bottom trawl with a 20mm mesh size double codend was used.
Notes from survey (e.g. problems, additional work etc.):	111 hauls were made during this survey. Temperature and salinity were also recorded at each haul.
Number of fish species recorded and notes on any rare species or unusual catches:	



Overview Channel Ground Fish Survey sample area.

4.3.6 Spain

4.3.6.1 The Porcupine Groundfish Survey Q3 – P06

NATION:	SP (SPAIN)	VESSEL:	"VIZCONDE DE EZA"
Survey:	P06	Dates:	3 September – 3 October 2006

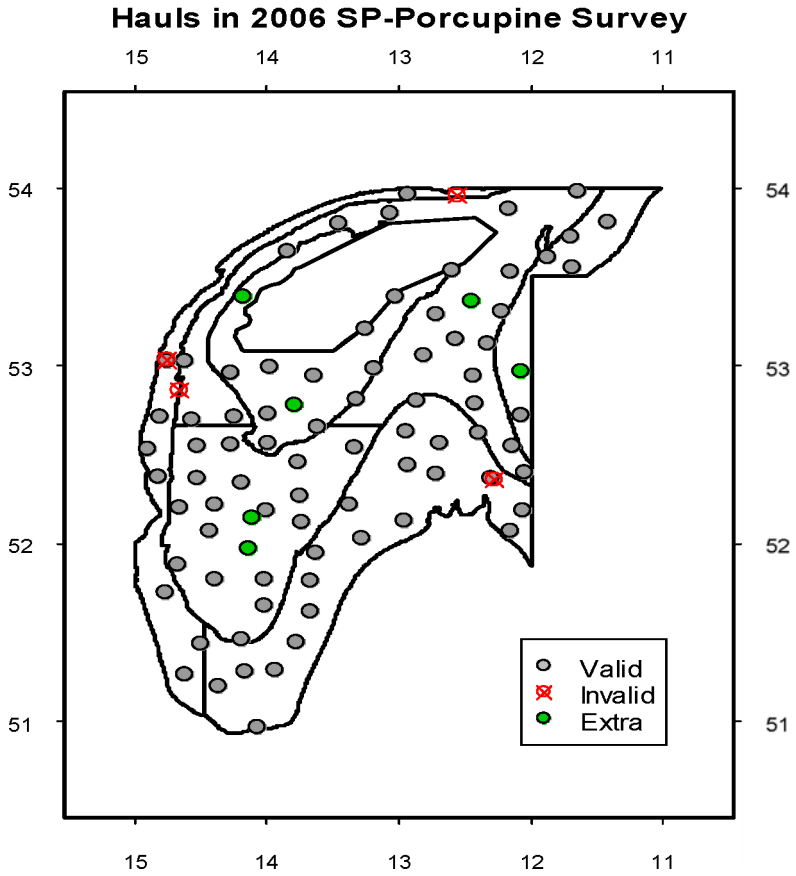
Cruise	Spanish Porcupine bottom trawl survey aims to collect data on the distribution and relative abundance, and biological information of commercial fish in Porcupine bank area (ICES Division VIIb-k). The primary species are hake, monkfish, white anglerfish and megrim, which abundance indices are estimated by age, with abundance indices also estimated for Nephrops, four-spot megrim and blue whiting. Data collection is also collected for other demersal fish species and invertebrates.
Survey Design	This survey is random stratified with two geographical strata (northern and southern) and 3 depth strata (170–300 m, 301–450 m, 451–800 m). Stations are allocated at random according to the strata surface.
Gear details:	Porcupine baca 39/52
Notes from survey (e.g. problems, additional work etc.):	Additional work undertaken included CTD stations at most trawl stations, and tagging of monkfish species. 14 paired hauls with the Celtic Explorer were carried out during the survey continuing with the series started in 2005.
Number of fish species recorded and notes on any rare species or unusual catches:	Overall, 86 species of fish, 44 crustaceans and 33 molluscs were recorded during the survey.

Stations fished (aims: to complete 80 valid tows per year)

ICES Divisions	Strata	Gear	Tows planned	Valid	Additional	Invalid	% stations fished	comments
VIIb-k	All	Porcupine baca 39/52	80	79	6	4	99%	Also available by depth and geographical strata
	TOTAL		80	79	6	4	99%	

Biological samples

Number of biological samples (maturity and age material, *maturity only):			
Species	Age	Species	Age
Merluccius merluccius	716	*Lophius budegassa*	29
Lepidorhombus whiffiagonis	611	*Lophius piscatorius*	141
Lepidorhombus boscii	303		



Overview survey

Variance and precision

Variance in catch rates and estimates of sampling precision							
Species	Strata	Valid tows	M catch Kg/.5h	RSE	M catch no./.5h	RSE	Comments
Merluccius merluccius	All	79	10.49	7.94	28.51	32.75	
Lepidorhombus whiffiagonis	All	79	6.03	16.05	125.37	19.31	
Lepidorhombus boscii	All	79	5.46	12.78	72.53	12.89	
Lophius budegassa	All	79	0.57	38.43	0.27	23.98	
Lophius piscatorius	All	79	8.46	15.70	2.42	11.76	
Micromesistius poutassou	All	79	254.26	9.35	3388.07	10.81	
Nephrops norvegicus	All	79	0.30	32.22	4.59	32.15	

4.3.6.2 Spanish North Coast Survey – N06

NATION:	SP (SPAIN)	VESSEL:	"CORNIDE DE SAAVEDRA"
Survey:	N06	Dates:	24 September – 25 October 2006

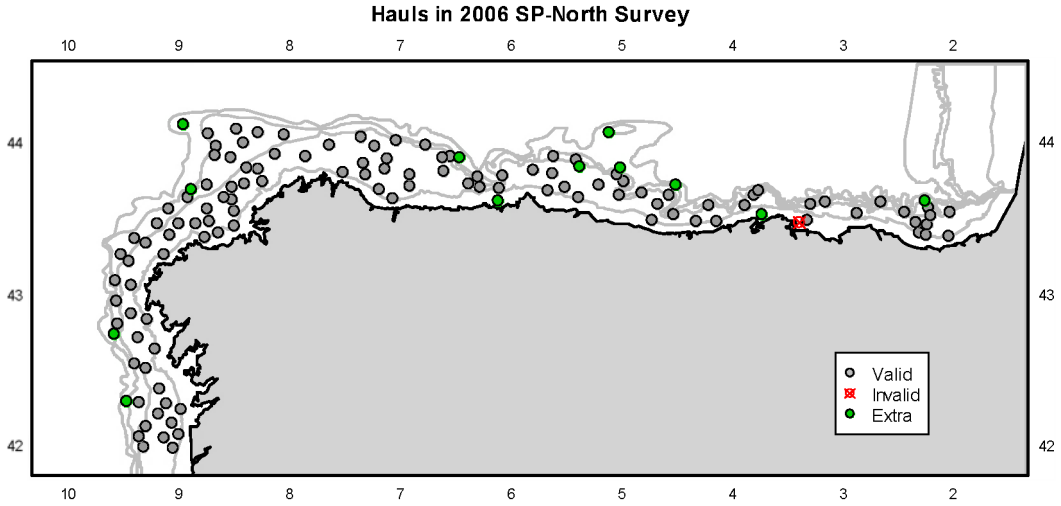
Cruise	Spanish North Coast bottom trawl survey aims to collect data on the distribution and relative abundance, and biological information of commercial fish in ICES Divisions VIIIc and Northern IXa. The primary species are hake, monkfish and white anglerfish, megrim, four-spot megrim, blue whiting and horse mackerel abundance indices are estimated by age, with abundance indices also estimated for Nephrops, and data collection for other demersal fish and invertebrates.
Survey Design	This survey is random stratified with five geographical strata along the coast and 3 depth strata (70–120 m, 121–200 m, 201–500 m). Stations are allocated at random within the trawlable stations available according to the strata surface.
Gear details:	Standard baca 36/40
Notes from survey (e.g. problems, additional work etc.):	Additional work undertaken included CTD stations at all trawl stations, and tagging of lesser spotted dogfish. Three additional hauls were done to cover shallow stations between 30 and 70 m, and another 8 hauls to sample deeper stations between 500 and 700 m.
Number of fish species recorded and notes on any rare species or unusual catches:	Overall, 119 species of fish, 55 crustaceans and 41 molluscs were recorded during the survey.

Stations fished (aims: to complete 116 valid tows per year)

ICES DIVISIONS	STRATA	GEAR	TOWS PLANNED	VALID	ADDITIONAL	INVALID	% STATIONS FISHED	COMMENTS
VIIIc-IXa	All	Standard baca	115	115	11	0	100	Also available by depth and geographical strata
	TOTAL		115	115	11	0	100	

Biological samples

Number of biological samples (maturity and age material, *maturity only):			
Species	Age	Species	Age
Merluccius merluccius	N/A	*Lophius piscatorius*	N/A
Lepidorhombus whiffiagonis	N/A	*Trachurus trachurus*	N/A
Lepidorhombus boscii	N/A	*Micromesistius poutassou*	N/A
Lophius budegassa	N/A	*Scomber scombrus*	N/A



Overview survey

Variance and precision

Variance in catch rates and estimates of sampling precision							
Species	Strata	Valid tows	M catch Kg/.5h	RSE	M catch no./.5h	RSE	Comment
Merluccius merluccius	All	115	5.50	7.07	224.46	9.76	
Lepidorhombus whiffiagonis	All	115	1.03	17.89	6.38	18.20	
Lepidorhombus boscii	All	115	2.56	9.20	41.47	7.28	
Lophius budegassa	All	115	1.08	20.47	1.16	16.71	
Lophius piscatorius	All	115	1.88	21.16	2.86	10.42	
Micromesistius poutassou	All	115	71.92	18.37	4279.58	22.21	
Nephrops norvegicus	All	115	0.01	37.87	0.34	39.77	
Trachurus trachurus	All	115	13.36	40.31	165.40	35.47	
Scomber scombrus	All	115	6.71	36.84	125.82	42.53	

4.3.6.3 Spanish Gulf of Cadiz Bottom Trawl Survey – GC06

NATION:	SP (SPAIN)	VESSEL:	"CORNIDE DE SAAVEDRA"
Survey:	GC06	Dates:	6 – 17 November 2006

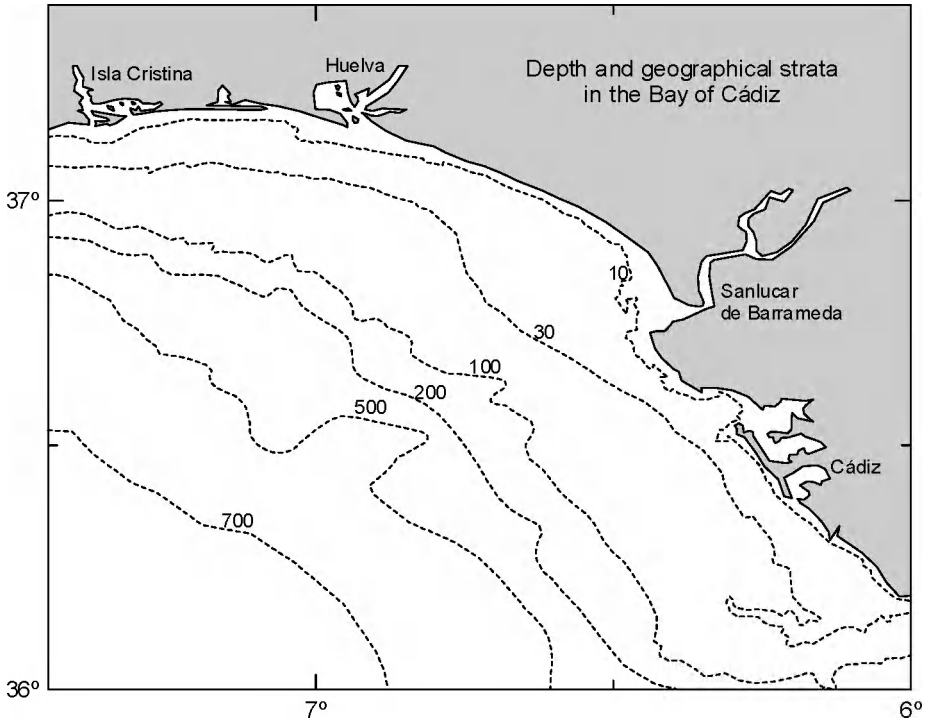
Cruise	Spanish Gulf of Cadiz bottom trawl survey aims to collect data on the distribution and relative abundance, and biological information of commercial fish in the Gulf of Cadiz area (ICES Division IXa). The primary species are hake, horse mackerel, wedge sole, sea breams, mackerel and Spanish mackerel. Data and abundance indices are also collected and estimated for other demersal fish species and invertebrates as rose & red shrimps, Nephrops, and cephalopod molluscs.
Gear details:	Standard baca 36/40
Notes from survey (e.g. problems, additional work etc.):	Additional work undertaken included CTD stations from one at every trawl stations.
Number of fish species recorded and notes on any rare species or unusual catches:	Overall, 153 species of fish, 52 of crustacean and 54 of mollusca were recorded during the survey.

Stations fished (aims: to complete 41 valid tows per year)

ICES DIVISIONS	STRATA	GEAR	TOWS PLANNED	VALID	VALID WITH ROCKHOPPER	ADDITIONAL	INVALID	% STATIONS FISHED	COMMENTS
IXa	All	Standard baca 36/40	41	41	-	-	-	100%	Also available by depth
	TOTAL		41	41	-	-	-	100%	

Biological samples

Number of biological samples (maturity and age material, *maturity only):			
Species	Age	Species	Age
Merluccius merluccius	364	*Loligi vulgaris**	494
*Merluccius merluccius**	1056	*Loligo forbesi**	108
*Parapenaeus longirostris**	459	*Sepia officinalis**	195
*Nephrop novergicus**	197	*Eledone cirhorra**	26
*Octopus vulgaris**	144	*Eledone moschat**	471



Overview survey

Variance and precision

Variance in catch rates and estimates of sampling precision

Species	Strata	Valid tows	M catch Kg/hour	RSE	M catch no./hour	RSE	Comments
Merluccius merluccius	ALL	41	5.00	2.00	222	157	
Micromesistius poutassou	ALL	41	0.89	0.41	15	8.9	
Nephrops norvegicus	ALL	41	0.72	0.23	37	12.2	
Parapenaeus longirostris	ALL	41	0.22	0.07	49	12	
Octopus vulgaris	ALL	41	1.57	0.63	3	1.1	
Loligo vulgaris	ALL	41	1.89	0.33	12	2.0	
Sepia officinalis	ALL	41	2.11	0.70	4	1.6	

4.3.6.4 Q1 Spanish Gulf of Cadiz Bottom Trawl Survey – GC06

NATION:	SP (SPAIN)	VESSEL:	"CORNIDE DE SAAVEDRA"
Survey:	GC_spring 06 (ARSA)	Dates:	8– 21 March 2006

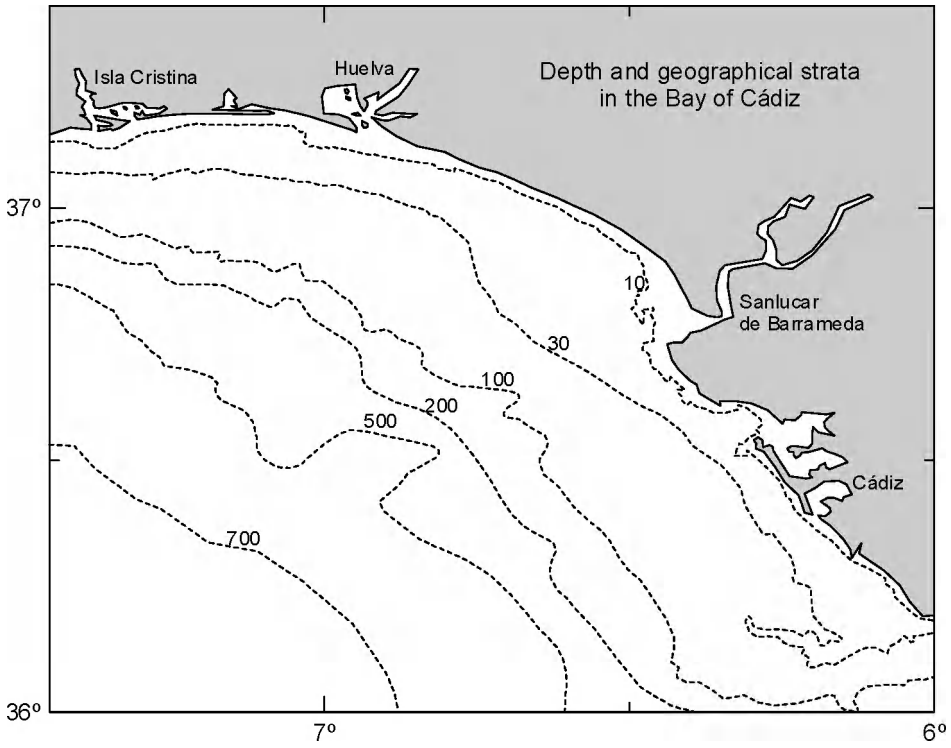
Cruise	Spanish Gulf of Cadiz bottom trawl survey aims to collect data on the distribution and relative abundance, and biological information of commercial fish in the Gulf of Cadiz area (ICES Division IXa). The primary species are hake, horse mackerel, wedge sole, sea breams, mackerel and Spanish mackerel. Data and abundance indices are also collected and estimated for other demersal fish species and invertebrates as rose & red shrimps, Nephrops, and cephalopod molluscs.
Gear details:	Standard baca 36/40
Notes from survey (e.g. problems, additional work etc.):	Additional work undertaken included CTD stations from one at every trawl stations.
Number of fish species recorded and notes on any rare species or unusual catches:	Overall, 142 species of fish, 47 of crustacean and 49 of mollusca were recorded during the survey.

Stations fished (aims: to complete 42 valid tows per year)

ICES DIVISIONS	STRATA	GEAR	TOWS PLANNED	VALID	VALID WITH ROCKHOPPER	ADDITIONAL	INVALID	% STATIONS FISHED	COMMENTS
IXa	All	Standard baca 36/40	42	42	-	-	-	100%	Also available by depth
	TOTAL		42	42	-	-	-	100%	

Biological samples

Number of biological samples (maturity and age material, *maturity only):			
Species	Age	Species	Age
Merluccius merluccius	294	*Loligi vulgaris**	
*Merluccius merluccius**		*Loligo forbesi**	
*Parapenaeus longirostris**		*Sepia officinalis**	
*Nephrop novergicus**		*Eledone cirhorra**	
*Octopus vulgaris**		*Eledone moschat**	



Overview survey

Variance and precision

Variance in catch rates and estimates of sampling precision

Species	Strata	Valid tows	M catch Kg/hour	RSE	M catch no./hour	RSE	Comments
Merluccius merluccius	ALL	42	N/A	N/A	N/A	N/A	
Micromesistius poutassou	ALL	42	N/A	N/A	N/A	N/A	
Nephrops norvegicus	ALL	42	N/A	N/A	N/A	N/A	
Parapenaeus longirostris	ALL	42	N/A	N/A	N/A	N/A	
Octopus vulgaris	ALL	42	N/A	N/A	N/A	N/A	
Loligo vulgaris	ALL	42	N/A	N/A	N/A	N/A	
Sepia officinalis	ALL	42	N/A	N/A	N/A	N/A	

4.3.7 Portugal

4.3.7.1 Winter Groundfish Survey – winter 2006

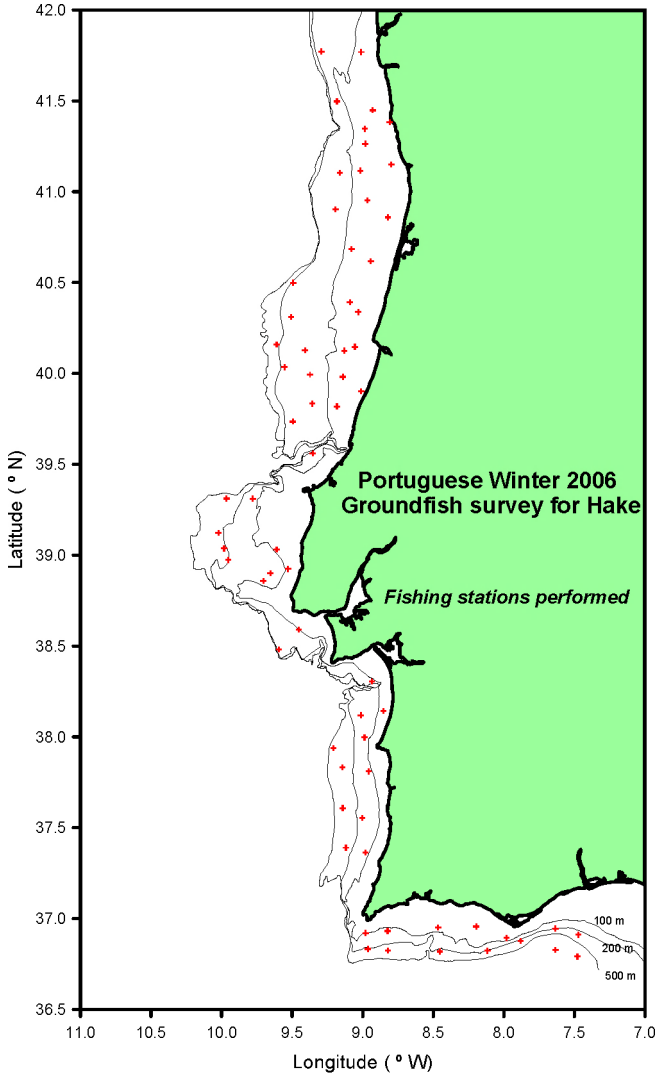
NATION:	PORTUGAL	VESSEL:	"NORUEGA"
Survey:	Winter 2006 – Groundfish survey for Hake	Dates:	7 March – 5 April 2006

Cruise	Winter Groundfish survey aims to: (i) to estimate distribution and abundance of hake in spawning season, (ii) to estimate indices of abundance and biomass of the most important commercial species, (iii)to estimate biological parameters, maturity, sex-ratio, weight, food habits, (iv) to estimate the length and/or age compositions for the main commercial species. The primary species are hake, horse mackerel, blue whiting, mackerel, Spanish mackerel, anglerfish, megrim and Norway lobster.
Area	Portuguese continental waters (Div. IXa, from 20 to 500 m depth.
Survey design	75 fishing stations, 66 at fixed (grid) positions and 9 at random. Tow duration is 60 min, with a trawl speed of 3.5 knots, during day light.
Gear details:	CAR bottom gear type FGAV019 without rollers in the groundrope. The mean horizontal opening between the wings is 25 m and the mean vertical opening was 2.5 m. Codend mesh size 20 mm.
Notes from survey (e.g. problems, additional work etc.):	Temperature was recorded with a CTD (Conductivity, Temperature, Depth) equipment.
Number of fish species recorded and notes on any rare species or unusual catches:	Overall, 111 species of fish, 18 of cephalopods and 30 of crustaceans were recorded during the survey.

ICES DIVISIONS	STRATA	GEAR	TOWS PLANNED	VALID	INVALID	% STATIONS FISHED	COMMENTS
IXa	ALL	CAR	75	67	1	89	

Biological samples

Number of biological samples		
Species	Samples	Otoliths
Merluccius merluccius	62	1324
Trachurus trachurus	59	624
Micromesistius poutassou	32	458
Scomber japonicus	42	*Na*
Scomber scombrus	39	*Na*
Lophius budegassa	8	*Na*
Lophius piscatorius	7	*Na*
Lepidorhombus whiffiagonis	0	*Na*
Lepidorhombus boscii	29	*Na*
Nephrops norvegicus	11	



Overview stations

Variance and precision (RSE is defined as: 100% × standard error / estimate (Jessen 1978)).

Variance in catch rates and estimates of sampling precision							
Species	Strata	Valid tows	Mean catch n/hour	RSE	Mean catch kg/hour	RSE	Comments
Merluccius merluccius	ALL	67	385.4	16.1	15.9	12.0	
Trachurus trachurus	ALL	67	2689.3	30.8	82.3	23.3	
Micromesistius poutassou	ALL	67	345.1	27.5	17.5	28.3	
Scomber japonicus	ALL	67	95.4	0.0	5.7	18.1	
Scomber scombrus	ALL	67	233.8	60.7	19.6	36.2	
Lophius budegassa	ALL	67	0.2	21.9	0.1	27.2	15 ind. caught
Lophius piscatorius	ALL	67	0.2	42.3	0.5	37.7	10 ind. caught
Lepidorhombus whiffiagonis	ALL	67	-	-	-	-	
Lepidorhombus boscii	ALL	67	8.2	24.3	0.6	22.8	
Nephrops norvegicus	ALL	67	1.10	27.3	0.03	41.7	

4.3.7.2 Autumn Groundfish Survey – Autumn 2006

NATION:	PORTUGAL	VESSEL:	"NORUEGA"
Survey:	Autumn 2006	Dates:	25 September – 22 October 2006

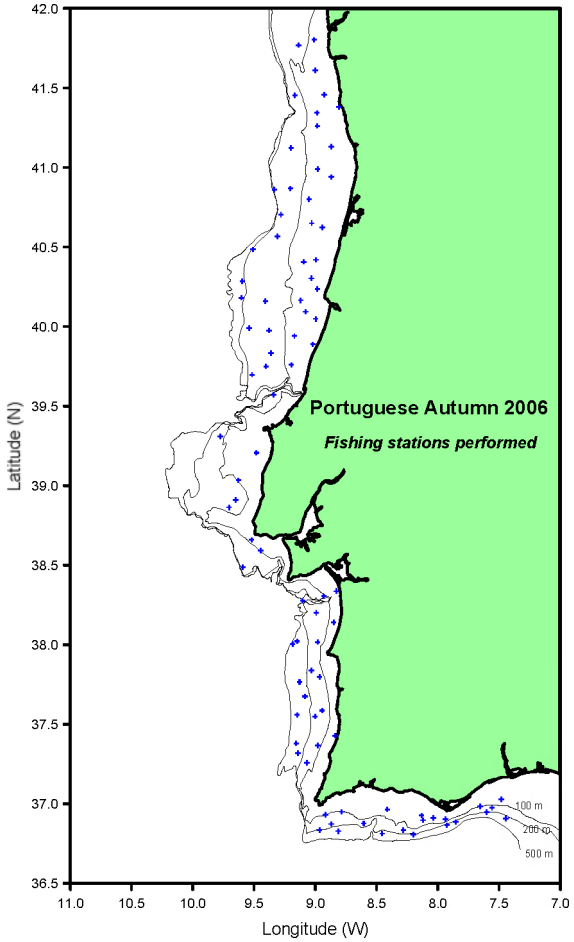
Cruise	Autumn Groundfish survey aims (i) to estimate the abundance and distribution of hake and horse mackerel recruits, (ii) to estimate indices of abundance and biomass of the most important commercial species (iii) to estimate biological parameters, e.g. maturity, ages, sex-ratio, weight, food habits. The primary species are hake, horse mackerel, blue whiting, mackerel, Spanish mackerel, anglerfish, megrim and Norway lobster.
Area	Portuguese continental waters (Div. IXa), from 20 to 500 m depth.
Survey design	96 fishing stations, 66 at fixed (grid) positions and 30 at random. Tow duration is 30 min, with a trawl speed of 3.5 knots, during day light.
Gear details:	NCT (Norwegian Campbell Trawl) gear with rollers in the groundrope. The mean horizontal opening between the wings was 14.7 m and the mean vertical opening was 4.4 m. Codend mesh size 20 mm.
Notes from survey (e.g. problems, additional work etc.):	Temperature was recorded with a CTD (Conductivity, Temperature, Depth) equipment.
Number of fish species recorded and notes on any rare species or unusual catches:	Overall, 100 species of fish, 14 of cephalopods and 27 of crustaceans were recorded during the survey.

Stations fished

ICES DIVISIONS	STRATA	GEAR	TOWS PLANNED	VALID	INVALID	% STATIONS FISHED	COMMENTS
IXa	ALL	NCT	96	88		92	

Biological samples

Number of biological samples		
Species	Samples	Otoliths
Merluccius merluccius	79	1146
Trachurus trachurus	63	543
Micromesistius poutassou	35	266
Scomber japonicus	54	*Na*
Scomber scombrus	52	*Na*
Lophius budegassa	0	*Na*
Lophius piscatorius	1	*Na*
Lepidorhombus whiffiagonis	2	*Na*
Lepidorhombus boscii	14	*Na*
Nephrops norvegicus	13	



Overview stations

Variance and precision (RSE is defined as: 100% × standard error / estimate (Jessen 1978)).

Variance in catch rates and estimates of sampling precision							
Species	Strata	Valid tows	Mean catch n/hour	RSE	Mean catch kg/hour	RSE	Comments
Merluccius merluccius	ALL	88	126.2	8.7	16.5	11.0	
Trachurus trachurus	ALL	88	579.4	24.8	25.0	22.2	
Micromesistius poutassou	ALL	88	3580.5	31.7	94.7	27.5	
Scomber japonicus	ALL	88	119.7	26.9	9.0	21.4	
Scomber scombrus	ALL	88	940.4	30.6	50.5	30.5	
Lophius budegassa	ALL	88	-	-	-	-	
Lophius piscatorius	ALL	88	0.0	79.1	0.4	79.1	1 ind. caught
Lepidorhombus whiffiagonis	ALL	88	0.0	56.0	0.0	54.7	1 ind. caught
Lepidorhombus boscii	ALL	88	1.1	34.6	0.1	32.1	
Nephrops norvegicus	ALL	88	2.14	7.4	0.06	16.9	

4.3.8 Maps of species distribution

Maps of the distribution of several species in the Eastern Atlantic area are produced (see Appendix 4), based on the surveys shown in Figure 4.3.8.1. Although differences in catchability cannot at present be corrected by use of calibration/conversion factors, raw numbers per hour are provided. The main target species are presented using a length split to indicate approximate pre- and post-recruit abundance. Relevant species for the Northern Ireland Groundfish Survey (NIGFS) have also been included this year.

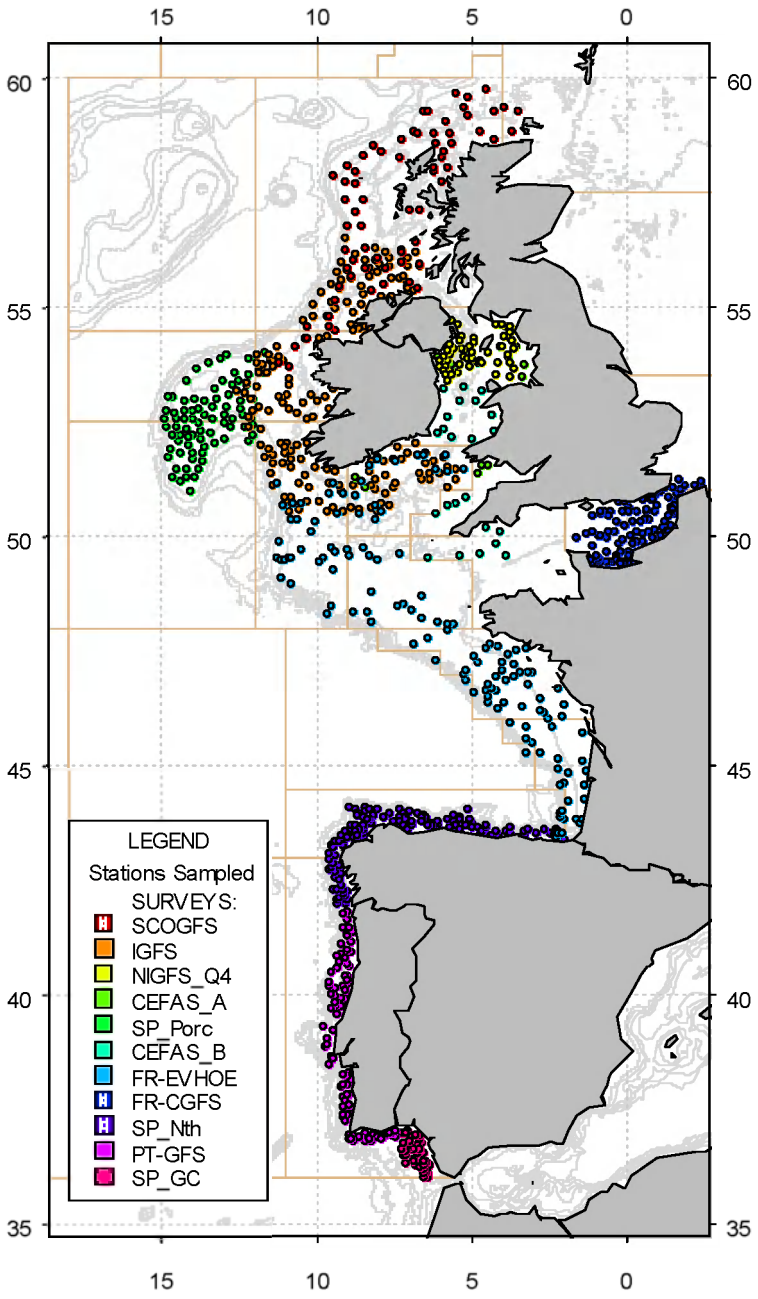


Figure 4.3.8.1. Station positions for the IBTS Surveys carried out in the Western and Southern Area in the autumn/winter of 2006.

4.3.9 Schedule for 2007

SURVEY	CODE	STARTING	ENDING	NO. EXPECTED HAULS	INTERCAL.
UK-Scotland Rockall & Deep Water	1307S	5 Sep	28 Sep	76	None
UK-Scotland Western (autumn)	SCOGFS	13 Nov	4 Dec	78	None
UK-Scotland Western (spring)	-	1 Mar	21 Mar	65	None
UK-North Ireland	NIRGFS	Not updated			CEFAS
Ireland – Groundfish Survey VIa	IGFS07 I	21 Sept	30 Sept	50	SP-PO
Ireland – Groundfish Survey VIIb,g,j	IGFS07 II	2 Nov	29 Nov	120	None
UK-England & Wales	CEFAS	Not updated			NIRGFS
France - EVHOE	EVHOE	Not updated			None
France - Western Channel	CGFS	Not updated			None
Spain - Porcupine	SP-P07	3 Sept	3 Oct	80	IGFS
Spain - North Coast	SPGFS07	26 Sept	27Oct	116	None
Spain - Gulf of Cádiz (Autumn)	SPGFP07	1 Nov	12 Nov	42	None
Spain - Gulf of Cádiz (Spring)	ARSA07	27 Feb	10 Mar	42	None
Portugal - Winter	PGFS_W	9 Mar	3 Apr	75	None
Portugal - Autumn	PGFS_A	18 Sept	17 Oct	96	None

4.4 Timing of surveys

In the manual it is stated that every effort should be made to perform the Q1 survey during February and in Q3 the target is August. However it has been noticed that some of the countries start earlier than the target month and this was thought to be a concern for data quality. It was decided that a preliminary analysis should be performed to determine if the haul date, together with other factors of the hauls, had an effect on the CPUE values. A GLM model was set up including factors; day, period (Q1 and Q3), year, depth and rectangle using two different species, cod and herring. The preliminary model was used on both swept area corrected and uncorrected CPUE measures. The general outcome of the model, using AIC procedure, suggested that day, within period, was the only non significant factor in the model and all other factors had a significant effect on the CPUEs on both species and periods. Before concluding that equal timing of the survey makes no difference for the outcome of the survey, further analysis is necessary.

The IBTSWG recognizes that coordinating ship time can be difficult for individual countries. However, the IBTSWG recommends that all countries make every effort to set up most of their survey time during the specified target month.

5 Surveys reporting format (ToR b)

ToR b) further develop the standard reporting format for the most recent surveys for species of interest to assessment WG according to their response.

In 2005, the IBTSWG decided that there was a need to provide more information on the various surveys under its coordination. The best practical way to do so is to provide the information through a standard formatted support including general information on the survey program and particular information on the latest survey's results. Intersessionnally, there was a demand from assessment Working Group to provide some estimate of precision for the indices used in the assessment process. Taking all that into consideration, the IBTSWG agreed in 2006 on a first draft reporting format that has been used dealing with survey's overview.

This year, the standard reporting format is further developed, but more intersessional feedback from different assessment working groups on what extra information would be needed is very welcome.

5.1 Standard format

The IBTSWG explored the feasibility of applying survey based assessment methods to the survey data, as suggested by WGNSDS (see Section 5.2). Performing such analyses have admittedly not been part of the traditional role of the IBTSWG, but were nevertheless considered. The IBTSWG is concerned that performing detailed survey based assessments might results in duplication of work preformed at the IBTSWG and the various assessment working groups. The IBTSWG, as a first step, could provide and comment on survey specific exploratory plots, e.g. standard survey indices by year class and by year, catch curves and bi-variate plots by age (as generated by SURBA software package). This could form part of the standard survey data format provided to assessment working groups, but the IBTSWG would require feedback from the assessment working groups before exploring this possibility any further.

5.2 Response assessment working groups

The Working Group on the Assessment of Northern Shelf Demersal Stocks (WGNSDS) was the only assessment working group that responded to the request of the IBTSWG to comment on the proposed standard data format in which survey information will be conveyed to the assessment working groups. The WGNSDS welcomed the provision of distribution maps, recent survey specific information and the provision of estimates of precision for surveys. WGNSDS acknowledged that the information can, currently, only be used in a largely qualitative manner, but suggested that members of IBTSWG apply current survey based assessment methods (e.g. SURBA) to the data that they provide so as to increase understanding of how such information is being used by assessment working groups. In terms of the time-scale of data provision, data were requested 2 to 3 weeks prior to the assessment working group meeting to allow sufficient time for data collation and preliminary analyses to be conducted.

Other assessment working groups are strongly encouraged to provide similar responses, including comments on the revised format presented in this year's report.

6 Standardization of sampling strategies, computation of indices and estimation of precision (ToR c)

ToR c) further develop standardization of all sampling strategies, computation of indices and estimation of precision.

6.1 Standard check of gear characteristics

In 2005, Ifremer has initiated a program to implement a quality assurance approach to data collection and survey gear control is included in this program. Discussions took place on the proper and most efficient way of implementing this approach and some of the conclusions were:

- Controls should be made once a year on all survey gears outside the time of the survey;
- A "logbook" should be created for each gear and kept updated with all operations and events related to the life of the gear (damage, mending, replacement of panels etc…);
- Forms used for control and follow up should be easy to fill and easy to be read in order to facilitate the transfer to a database.

Following these conclusions draft logbooks and gear-check forms were made and used in the EVHOE 2007 and NSIBTS French survey (logbook) and in the first checking operation conducted in January 2007. Some of the conclusions that were drawn from the gear checking operation were:

1) The complete checking of one GOV takes one full day with 4 people;

2) The use of the Omega Gauge is very handy but there is no conversion table between the mesh opening gauge measurements and the stretched mesh values on the drawings;

3) There is no official conversion between the Rtex units and the other units used in drawings;

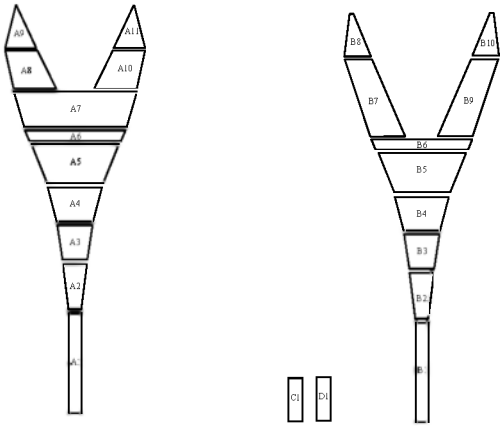
4) Tolerance values are still needed for most parameters;

5) The operation was conducted on the RV "Thalassa" and this was found convenient as winches and crane are needed;

6) The forms used were practical and easy to use (a draft version is given in Figure 6.1.1).

From this operation, a checking protocol is being developed and a complete version will be presented at the 2008 IBTSWG meeting including checking forms. The next step scheduled is to develop the database needed to assure a complete transparency of the quality control procedure.

GOV 36/47 Fiche de contrôle 1/7



Les mailles de couture ne sont pas prises en compte sur les largeurs indiquées.

Dessus

Nappe	Largeur antérieure		Largeur postérieure		Hauteur		Coupe gauche		Coupe droite		Maillage (mm)		Force de fil	
PA	Nombre de mailles		Nombre de mailles		Nombre de mailles						Maille étirée	Maille à la jauge	m/kg	oui/non
A1	120		120		400		tm		tm		50		400	
A2	240		120		180		1p1m		1p1m		50		400	
A3	200		150		75		1p1m		1p1m		80		360	
A4	200		134		50		4p1m		4p1m		120		360	
A5	228		150		40		tp		tp		160		270	
A6	200		182		10		tp		tp		200		270	
A7	240		200		30		4p1m		4p1m		200		270	
A8	74		92		36		2p1m		tp		200		270	
A9	3		74		42		5p1m		tp		200		270	
A10	74		92		36		tp		2p1m		200		270	
A11	3		74		42		tp		5p1m		200		270	

Figure 6.1.1. Ifremer Gear Checking form – example of the layout (draft).

6.2 GOV rigging issue

The various configurations of the GOV Survey Trawl currently in existence have been highlighted by a number of study groups (ICES, 2001, 2003), as well as the current Study Group for Survey Trawl Standardisation. As part of the work of the latter there was agreement by study group participants to carry out detailed measurements of the GOV's in use by the Institutes, and provide these measurements to the Marine Lab in Aberdeen for comparison against the standard net plan. Further, this data will be simulated in the IFREMER Dynamit software to predict what, if any, the implications of these differences might be.

Interim work by the Marine Institute revealed that it was not possible to achieve the 2.1m stretch mesh measurement for the centre 200mm mesh section in either the top or bottom panels. In the bottom panel, for example, the centre section mounted on to the footrope is 56 meshes across (Figure 6.2.1).

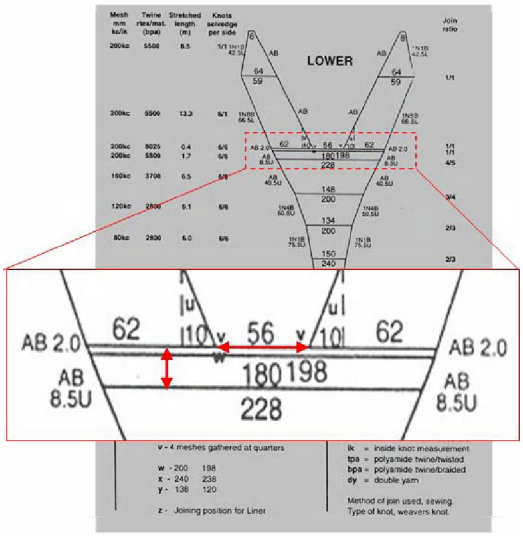


Figure 6.2.1. Drawing of lower panel for the GOV 36/47. Horizontal arrow shows the 56 mesh centre section and the vertical arrow indicates the 2.1m measurement required.

This centre section is currently mounted on to a 5m frame rope that means meshes are attached approximately every 8–9cm. As a result meshes are unnaturally held open and will not close sufficiently when stretched to achieve the 2.1m. For comparison the same mesh was mounted onto combination at this ratio and also at an equivalent ratio for a 3m frame rope (Figure 6.2.2).



Figure 6.2.2. 200mm mesh mounted at a ratio of 56 meshes per 5m frame rope (Panel A on right of figure); same panel mounted at 56 meshes per 3m frame rope (Panel B on left of figure). The distance between meshes mounted on to the combination in panel A is approximately 9cm with the equivalent for panel B being about 5.4 cm. The lateral stretching in panel A is evident.

The consequence of the extra strain being placed on meshes in this area is that, even when meshes are mounted with twine worked into the combination, meshes are strained and break and panels ultimately pull towards the centre to equalise the strain over the entire panel. The resulting damage and movement of panels means that:

i) catchability is unlikely to be constant while the trawl stabilises with mesh openings and spaces between fishing line and groundgear being irregular and unpredictable;

ii) the trawl is quite complex to repair often requiring remounting of panels;

iii) documented damage found in the wings and quarters by surveys in the western areas in particular may well be linked to slack in those areas resulting from this unusual mounting design.

Findings were presented to the IBTSWG and survey managers of GOV based surveys agreed to make similar measurements of their respective trawls to evaluate how universal an issue this may be, and what, if any, solution may have to be employed to rectify it.

6.3 Comparative fishing experiment of FRV "Scotia" and FRV "Walther Herwig III" in 2006

A comparative fishing experiment of FRV "Walther Herwig III" and FRV "Scotia" took place within 2 days from July the 28th to 29th. Box D is an area of 10 to 10 nm in between ICES-Rectangles 44E8 and 44E9 off the Scottish east coast (see Working document in the Annex). The GOV trawls were rigged according to the IBTS manual using the standard rubber disc groundrope (type A) and 50 m sweep length. Both vessels fished independently on randomly selected stations and towing directions. Both ships conducted 7 hauls each day. Altogether 14 valid hauls per vessel were available for further examination. According to the findings during the last two decades of fisheries research in Box D the analysis for the comparative fishing experiment focussed on the six dominant species: herring, mackerel, Norway pout, whiting, haddock and cod.

The overall results of the comparative fishing experiment documented differences of the catch efficiency of the fishing power of FRV "Walther Herwig III" and FRV "Scotia". FRV "Scotia" caught a higher proportion of the juvenile gadoid dominants of the sampled fish community. Significantly higher abundances of AG 0 group fish were observed for haddock, whiting and Norway pout. Also a significantly higher proportion of AG I whiting seemed to be caught by "Scotia". The efficiency of catching cod was found to be lower for "WH III". In contrast for herring and mackerel there was no indication for a certain difference of the fishing power of both vessels found.

While the geometry of the trawls differed significantly, the fact that "Walther Herwig III" covered a larger swept area it was thought that net spread was not the reason for the increased catches of age group 0+ by "Scotia" but that the increased headline height may be a factor. Also the possibility that the selection of age 0 group fish in the codend could have been caused by different length of the inlet was rejected to be a certain justification for the deviating efficiencies of age 0-group fish in the catches. An uneven spatial and temporal distribution of herring and mackerel leaded to the solution to exclude these species from further analysis of the study. Additionally whiting was excluded as a key species for comparing the catchability of the GOV because of the detection of the spatial patchiness of age 1 group whiting.

As a possible reason that might have affected the catch contribution the specific noise character was assumed but not tested to have had a remarkable influence on the catch composition. Last but not least the observed differences could be linked to the use of distinct net material. The GOV of FRV "Scotia" is made of Polyethylene twine. In contrast the GOV of "Walther Herwig III" is manufactured of Polyamid (Nylon). Presently the extent of the influence on catchability of the different use of net material stays unclear.

The IBTSWG recommends that: i) more comparative fishing experiments should be conducted in order to identify the actual causes of catchability differences observed in the results of the intercalibration experiments that are already carried out; and ii) comparisons of the trawl parameters of all vessels and nations related to depth should be undertaken on the basis of a separate study.

6.4 Standardisation of data collection for shellfish and cephalopods

Although standardised data collection for fish is well established in IBTS protocols, and these data are submitted to DATRAS, there is no standardised approach to the submission of data on the catches and size distribution of cephalopods and shellfish.

IBTSWG agreed that the species listed in Table 6.4.1 should be recorded in all IBTS surveys and data should be submitted to the DATRAS database. This data collection will be implemented from 2008 onwards.

Some national laboratories record other invertebrate species ("benthos"), though no agreed protocols for the collection and submission of data exist, as the levels of taxonomic expertise on board vessels can be variable. Hence, national laboratories collecting information on benthos should continue to do so, though such data should not be reported to DATRAS until rigorous quality assurance and reporting procedures are in place, so as to ensure that data are of high quality.

Table 6.4.1. Shellfish to be recorded during surveys.

TSNCODE	COMMON NAME	SCIENTIFIC NAME	RECORDING	MEASUREMENT	UNIT
Crustaceans					
98682	Golden crab	*Cancer bellanius*	Male/Female	Carapace width	mm below
98681	Edible crab	*Cancer pagurus*	Male/Female	Carapace width	mm below
98908	Deep-water red crab	*Geryon affinis*	Male/Female	Carapace width	mm below
97315	European lobster	*Homarus gammarus*	Male/Female	Carapace length	mm below
97657	Crawfish/spiny lobster	*Palinurus elephas*	Male/Female	Carapace length	mm below
552966	Pink spiny lobster	*Palinurus mauritanicus*	Male/Female	Carapace length	mm below
199961	Spider crab	*Maja (Maia) squinado*	Male/Female	Carapace length	mm below
97317	Norway lobster	*Nephrops norvegicus*	Male/Female	Carapace length	mm below
97943	Stone crab	*Lithodes maja*	Male/Female	Carapace length	mm below
Bivalves					
79683	Edible scallop	*Pecten maximus*	Sexes combined	-	-
79716	Queen scallops	*Aequipecten opercularis*	Sexes combined	-	-
79885	Common oyster	*Ostrea edulis*	Sexes combined	-	-
Cephalopods					
82363	Cuttlefish	*Sepia officinalis*	Sexes combined	Mantle length	cm below
82362	Cuttlefish	*Sepia elegans*	Sexes combined	Mantle length	cm below
82364	Cuttlefish	*Sepia orbignyana*	Sexes combined	Mantle length	cm below
-	Squids	*Teuthoidea**	Sexes combined	Mantle length	cm below
82646	Lesser octopus	*Eledone cirrhosa*	Sexes combined	-	-
82603	Octopus	*Octopus vulgaris*	Sexes combined	-	-
-	Bobtail squids etc.	*Sepiola/Rossia/Sepietta**	Sexes combined	-	-

*** to species level where possible, though juveniles may need to be aggregated**

6.5 References

ICES. 2001. International Program of Standardised Trawl Surveys (IPROSTS). EU Study contract 98–057 Contract Reference DG XIV Study Contract 98–057.

ICES. 2003. Study Group on Survey Trawl Gear for the IBTS Western and Southern Areas (SGSTG). in SGSTG, Vigo, Spain.

7 Review the findings from the SGSTS in respect to issues relevant to IBTS and response (ToR d)

ToR d) review the findings from the SGSTS in respect to issues relevant to IBTS and respond.

This Study Group was set up to develop recommendations and protocols to improve standardisation and hence quality assurance in the use and design of survey trawls within and beyond the ICES area.

One of the aspects comprised in 2006 SGSTS report was to provide guidance on the use of Survey trawl in all their aspects, including detailed information on:

- The use of Trawl surveillance sensors and analysis of the information, including an important distinction between key parameters that should be recorded in every haul, and a complete list of additional parameters that have potential impact on catchability and therefore can be used to help defining protocols to standardize surveys and quality control. The SGSTS report also provides several practical examples of ongoing use and analysis in different surveys in the ICES Area, showing available tools to define tolerance ranges for gear performance.
- A practical guide to checking and maintaining GOV and Campelen trawls while at sea during a survey. Also in this case the report makes a distinction between checking procedures for new gears before going to sea, and guidance on what is important to check on used gears at sea, stressing the importance of reducing the list of checks to the essential, since a comprehensive check at sea is difficult to perform and potentially leading to be disregarded.
- Advice on when and how calibrate changes to survey gears is updated and extended from 2005 SGSTS report.

Furthermore, a brief summary is provided on the review and comparison of the GOV equipment used by the different surveys and the development of the Norwegian Survey Trawl Project.

Finally the report defines the contents and chapters of the Cooperative Research Report that will be the final outcome of the SGSTS. The structure and chapters defined are considered comprehensive enough, and the IBTS considers more appropriated to wait for the CRR to study the protocols and tools provided, to consider their adoption within the IBTS standard protocols.

ICES. 2006. Report of the Study Group on Survey Trawl Standardisation (SGSTS), 1–2 April 2006, Izmir, Turkey. ICES CM 2006/FTC:05. 67 pp.

8 DATRAS database (ToR e)

ToR e) review progress made in the updated DATRAS database and data access policy.

8.1 Data policy

During the previous meeting in 2006, the IBTSWG reviewed the new ICES data policy that allows open access to all data stored at ICES, and was implemented at May 1st 2006. It was concluded that in general the IBTSWG is positive towards an open data policy as it will encourage use of data. However, the group found that the policy does not take into consideration the problems that an open policy could create, with main concerns being that data can be misinterpreted by users not knowing the survey, gear and changes made during the overall time series, and that the existing database contains some errors that have not as yet been corrected.

The IBTSWG therefore recommended in 2006 that each institute should discusses the issue internally in order to impose ICES to implement the access levels that the group proposed in 2005. This proposal covers the groups concerns and at the same time opens up access to the data.

Each nation discussed the open access policy within their institute. All institutes now conform to the ICES open access policy, except for the Netherlands institute IMARES who defines access procedures for its survey-data submitted to ICES. Their policy is based on the access levels that the IBTSWG proposed in 2005 and in short says that the use for all ICES-related work is without access limitations, but the use for work that is not related to ICES can be restricted, depending on species and aggregation level. A detailed description of the IMARES data access policy is given in Appendix 5.

If ICES gets a request for the supply of restricted data, IMARES should be informed about the request, and the release of the data has to be approved (maximum of 2 week notice) before the request is granted.

8.2 Progress in DATRAS

ICES has got a 50% EU funded project to further develop and improve the DATRAS database. The project started in April 2006. The project has two phases, one focussed on calculation of indices and variance analyses, the other to identify user requirements. The first phase lasted from April 2006 to February 2007, the second phase started in February 2007 and will last to the end of 2007.

8.2.1 Calculation of indices and variance estimations

In the first phase the DATRAS database was expanded to include indices calculations for Scottish groundfish survey, French survey in Celtic Sea and Bay of Biscay (EVHOE) and the Dutch Beam Trawl Survey in the North Sea, with the possibility to calculate the variance estimation of the indices for all the surveys stored in DATRAS. The result from the variance analyses has been presented as a report at the STEFC Sub-Group on Research Needs (SGRN), ICES Report to EU commission on survey variance 2007.

How to implement a variance estimation of all the indices calculated by the DATRAS database was defined by a workshop held in the ICES HQ in May 2006. It was decided to use the bootstrap method and the arguments for this choice can be found in the report from the meeting (ICES DATRAS Report 2006). How the final bootstrap was implemented can be found in the report to EU and analyses to verify the methods used can be found in the paper, Larsen, L.I. et. al. 2006, presented at the Annual Science Conference 2006.

In order to run the variance estimation all the old code was converted from VBA to VB.net and to further improve performance when doing the calculations the code is presently updated to run as batch.

8.2.2 DATRAS User Requirement Specification

In the second phase there has been a workshop which identified the user requirements for the update of data screening, loading and downloading. The requirements from this workshop have been specified in the user specification (URS) (DATRAS User Requirement Specification, ICES HQ 2007) and it will be the basis for design and the development in the second phase of the project.

The IBTSWG was presented with the overall plan for the new development in DATRAS and the group discussed relevant issues in relation to the future plans.

The areas discussed were:

1) Data quality control and loading

2) Data download facilities and products

3) Updates to the exchange format

8.2.2.1 Data quality control

A check on minimum length of species will be included in the data screening utility (DATSU) and the list of species and the related maximum length will be updated for each survey to ensure that only species actually caught in, e.g. the North Sea, are included into the database and that the length of these species correspond with actual size of the species.

8.2.2.2 Data download facilities and products

The IBTSWG welcomed the plans for improving the download facilities to provide the user with a more user friendly web front-end to the database. In addition to the data products already provided by the database, maturity ogive and weight at age will be developed within the new version of the database.

The methods to use for the new data products were developed by the user group workshop and were documented in the URS from the workshop.

When downloading data the user will have to accept the survey "health warning" and the survey description already found at the DATRAS web page. The texts were reviewed and revised by the IBTSWG and the new version of the text will be provided on the web (see Section 8.3).

8.2.2.3 Updates to the exchange format

During the last years there have been a number of requests for new flags in the exchange format in order to handle the diversity of the data being uploaded into the DATRAS database.

*Sub sample flag: In considering species biodiversity, the IBTSWG requests that a flag for sub samples are included in the HH record. The flag should indicate occasions when a method of sub sampling took place, resulting in the possibility that some species were not sampled (i.e. only a fraction of the total catch was sampled). Where no sub sampling took place or where sub sampling was restricted to sorted fish, the flag should indicate "T". Where sub sampling of the total catch took place, the flag should be "S". The flag will be placed after DataType and before NetOpening.

Codes: S = sub sample; T = total catch (no sub sample)

*Flag for calibration hauls: Within the IBTSWG a number of calibrations surveys are carried out where catches are compared between different surveys. In these surveys a haul can both be a valid haul and a calibration haul at the same time. This means that the HH record has to be expanded with a calibration flag, which will be placed after HaulVal and before HydroStNo.

Codes: C = calibration; N = no calibration

*Age reading quality flag: One of the most important reasons for uncertainties of the stock indices of cod in the Baltic Sea is ageing. Different study groups and analyses have documented different interpretation of the structure of otoliths and the effects concerning the stock assessment.

To improve the possibilities for analysing the effects of different interpretation it is therefore proposed by the WGBIFS to add a quality flag, which describe the certainty of the reader concerning the interpretation. The flag will be placed after AgeRing and before NoAtAge.

Codes: 1 = Certain interpretation; 2 = Uncertain interpretation; 3 = Not interpretable.

These updates to the exchange format will be done during 2007 in a time period with few data submissions. ICES will send a notification to the data submitters when the updates have been done and ask them to update their export facilities before submitting data again.

*Other Flagging: In the English third quarter NS-IBTS survey England has used a 20m sweep rather than a 50m sweep as described in the survey manual (see Section 4.2.5). The IBTSWG therefore decided to flag these hauls as non-standard with a haul validity code S and leave it to the assessment working group to decide whether these data should be included in the indices calculations or not.

In order for the Scottish to provide their deep water survey into DATRAS they need to have identified how the length measurement for each species is conducted as not all species are measured as described in the IBTS survey manual. Rather than make a new flag in the HL record, the IBTSWG would prefer that a table with the different types of length measurements in relation to the species are provided on the web and the user is notified about the different length measurements when downloading the data. Scotland will investigate if this is a possible approach.

8.3 Revision of text on IBTS surveys on the ICES DATRAS website

The IBTSWG assumed the task of re-formatting the text describing the IBTS surveys on the ICES DATRAS website. In order to make the text more readable (Appendix 6), three headings were identified: (i) History, giving an overview of the survey from inception to the present day; (ii) Gear, describing the gear and vessel, if appropriate used during the survey; and (iii) Sampling protocols, describing the standard sampling regime and survey protocols specific to the survey.

It was also suggested that the health warning given when using a data extraction should be revised, however, other than a change to the position of a paragraph, it was deemed more than adequate to describe the possible problems in the data held by DATRAS (Appendix 7).

8.4 References

ICES Datras Report 2006. Report of the Workshop on Implementation in DATRAS of Confidence Limits Estimation of Abundance Indices from Bottom Trawl Survey Data, ICES Headquaters, Copenhagen.

STEFC Sub-Group on Research Needs (SGRN): Review of list of surveys at sea (Appendix XIV of EU Commission Regulation No 1581/2004) with their priorities. (meeting coded SGRN 07-01) Brussels, 12–16 February 2007.

ICES. Report to EU commission on survey variance 2007. Confidence Limits Estimation of Abundance Indices from Bottom Trawl Survey Data: Implementation in DATRAS, February 2007, ICES Headquarters, Copenhagen.

Larsen, L.I. *et al.* Measuring Uncertainty in Trawl Surveys: Implementation in DATRAS. ICES Annual Science Conference 19–23 September 2006.

9 Shape files and supporting information for the agreed strata in the Eastern Atlantic (ToR f)

ToR f) complete the shapefiles and supporting information for the agreed strata in the Eastern Atlantic.

The IBTSWG agreed in 2005 on a stratification for the Celtic Sea and the Bay of Biscay and a description of the strata should was provided. In 2006 Similar information was made available for the area Via west of Scotland. The Porcupine area stratification was also presented to the IBTSWG in 2002.

This year, shapefiles were provided for the north of Spain and the Gulf of Cadiz.

All available shapefiles to date are shown in Figure 9.1. There are still three areas to be completed: West of Ireland, Irish Sea and West Portugal. The IBTSWG agreed that those elements will be worked at intersessionally and that the complete stratification scheme will be provided at the 2007 meeting. This scheme will include all shapefiles, strata descriptions, computed areas and the information used for the strata definition.

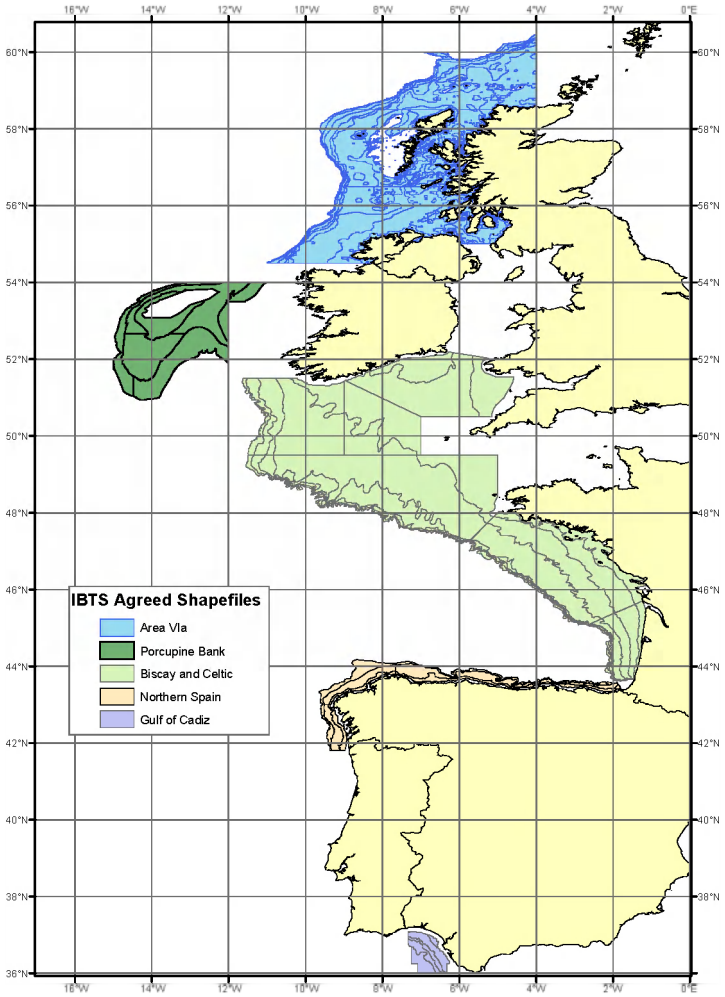


Figure 9.1. Western and Southern divisions stratification shapefiles.

10 Identification keys for North Sea, and southern and western IBTS groundfish surveys (ToR g)

ToR g) coordinate the production and dissemination of identification keys for North Sea, and southern and western IBTS groundfish surveys.

10.1 Introduction

The increased use of IBTS data for studies on fish assemblages and diversity has resulted in the requirements for improved species identification and improved data checking to ensure that DATRAS data can be used in ecosystem studies, and IBTSWG has considered this issue in recent years (See Section 9 of ICES, 2003; Section 13 of ICES, 2004; Section 5.3 of ICES, 2005 and Section 11 of ICES, 2006).

10.2 Outcome of WKTQD

In 2006, both WGFE and IBTSWG recommended that a one-off workshop be convened to address taxonomic data quality issues in the existing DATRAS. Specifically to:

a) Identify and correct taxonomic mis-identifications and input errors in DATRAS;

b) Develop protocols for ensuring the appropriate treatment of data reported at higher taxonomic levels;

c) Develop improved protocols to ensure that species identification in trawl surveys is appropriate for fish community studies, including the development of photo-ID keys for nations participating in surveys;

d) Develop protocols for (i) improving quality control during the submission of data to DATRAS and (ii) the future checking and quality assurance of DATRAS data.

10.2.1 Correcting changes in historical data in the DATRAS database

In terms of identifiable errors, WKTQD identified several types of error in the DATRAS database, though no corrections have been made. These errors, which may be simple input errors, be due to inappropriate use of higher taxonomic levels or be due to erroneous identifications during trawl surveys, and include (a) inconsistent taxonomy, (b) taxa from outside their geographical range, (c) species outside their normal size distribution and (d) more fundamental problems in the misidentification of problem taxa.

It should be noted that ICES has made some corrections to data held on DATRAS and, although national laboratories have been notified of these changes, ICES cannot guarantee that national databases were also corrected. Hence, the data held on DATRAS may differ from the survey data held in the national laboratories. Protocols to ensure that survey data held on DATRAS and in the national laboratories are consistent are therefore required.

The WKTQD highlights many of the more obvious errors, though it is recommended that national laboratories undertake a critical analysis of their data (see below). If there are only a few erroneous records, it may be best that national databases are updated and ICES will be requested to update DATRAS accordingly. If a large number of changes are required, the national laboratory should request their data from ICES in the data exchange format correct these data and then re-submit to DATRAS, so as to ensure that any previous corrections are not lost.

10.2.2 Consistent taxonomy

Some genera in the North Sea are only represented by a single species (e.g. *Leseurigobius, Buglossidium, Microchirus*), and so the code for the genus is redundant and data for these genera should be treated as invalid in this survey area.

Similarly, some families are only represented by only one genus (e.g. Anarhichadidae by *Anarhichas*, and Callionymidae by *Callionymus*), and so data at the family level are redundant. If such taxa cannot be identified to species level, they should be submitted as a genus and not at a family level.

Though such errors may be input errors (hence original data should be checked prior to any amendments being made), they also stem from the inappropriate use of the taxonomic hierarchies. Hence, laboratories should ensure that appropriate staff training is provided to reduce such mistakes in the future.

10.2.3 Inappropriate taxa for the North Sea

The DATRAS database holds some records of species that are either very unlikely to have been recorded in the North Sea (e.g. Lampididae and *Zenopsis ocellata*) and even species that are not known to occur in the North-eastern Atlantic (e.g. *Leucoraja lentiginosa* and *Acentronura*). These are likely to be due to simple input errors and these records are likely to be easily corrected.

10.2.4 Geographical distribution

The DATRAS database also holds some records of species that may have been recorded well outside their normal geographic range. Such records may be due to mis-identifications, input errors or may be valid. Nevertheless all such records should be examined critically by national laboratories, and corrected where possible. If there is some doubt as to the validity of a record, national laboratories have the option of re-allocating the record to a higher taxonomic level. If a national laboratory has regular reports of a species outside its normal geographical range, they should provide a voucher specimen (i.e. deposited and authenticated in a national museum) so that the geographical distribution range for a species can be justifiably expanded.

10.2.5 Problematic taxa

There are also several problematic taxa, such as topknots and rocklings (see Section 11.1 of ICES, 2006 for a full list of problematic taxa), and national laboratories may need to examine data for these taxa more critically, so as to ensure that there is both spatial and temporal consistency in species records. This type of analysis should also be done internationally, possibly as part of IBTSWG meetings.

10.2.6 Length frequency

The DATRAS database also holds records of species that may have been recorded outside their normal size range (whether $> L_{max}$ or $< L_{min}$). Such records may be due to mis-identifications, input errors or, in the case of skates (Rajidae), may be due to length data being treated as width data and conversion factors applied. The size distribution of spurdog *Squalus acanthias* (Figure 10.1) indicates that there are records of spurdog at 10 cm (less than the size at birth) and 128 and 148 cm (Lmax= 120 cm), with latter records possibly input errors or misidentified tope.

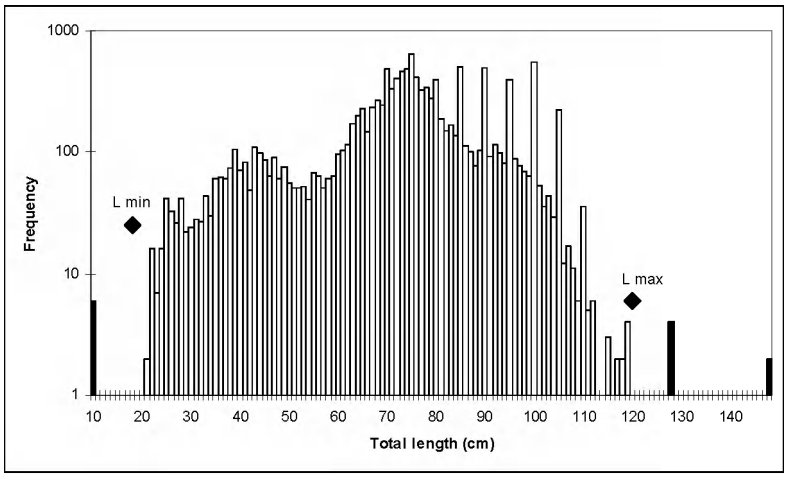


Figure 10.1. Length distribution of spurdog in the North Sea (DATRAS data) with Lmin and Lmax indicated.

10.2.7 Ensuring improved data quality in the future

WKTQD suggested several ways of improving the quality of taxonomic data in IBTS surveys, including:

- Survey managers should attempt to ensure that all staff carrying out groundfish surveys include at least one person (or one person per shift for cruises working 24 hours) who has a high level of experience regarding identification of species, their distribution, and life history.
- Electronic ID guides and photo catalogues should be further developed for all problematic taxa. These guides should be checked in the field by the various fishery institutes and updated, improved and expanded where appropriate.
- Electronic distribution maps should be produced and updated regularly, based on reliable DATRAS information, excluding any data flagged as questionable.
- Survey reports should include a list of species recorded during the survey (including the number of specimens) with special notes clarifying the details of any records of rare and unusual fish and shellfish species. Key taxonomic features (if possible supplemented by photographs) for records of unusual species could also be included. These reports should be presented at the relevant survey working group for quality control.
- If a species new to a survey is recorded, the specimen should be retained and deposited in a museum collection (in the case of large, obvious species or those that are rare, photographic evidence would suffice).
- Deck personnel should be instructed to photograph and retain any species that cannot be identified with certainty at sea for subsequent verification at the laboratory. Similarly, any species of unusual size or place of capture or any aberrant specimens (e.g. differing colour pattern) should also be retained and photographs added to the catalogue. For problematic taxa, additional photographs of key taxonomic features should be collected.
- National museums might be able to verify and hold a reference collection of the fish species taken during the various surveys. Similarly, institutes should consider keeping and maintaining a reference collection, if resources were available.
- The IBTS manual should update its section on fish identification, including protocols for ensuring improved data collection, as well as standardised and correct use of higher taxa (genus/family).
- Fishery institutes should attempt to maintain a certain level of taxonomic expertise, and also improve staff training for species identification (e.g. more in-house training, staff exchange programmes, participation in ring tests etc.).

Several institutes run fish identification courses and there may be a role for ICES in coordinating/promoting such courses.

- Any data inputting at sea should try to include filters for size ranges (Lmin and Lmax) etc. to ensure that species of unusual size can be flagged and checked as soon as possible (note that Lmin is also needed as there are several records of elasmobranchs that are less than the size at birth/hatching). These filters also help to reduce input errors in respect of size rather than errors in species identification!
- During the surveys, one voucher specimen of selected problem taxa could be retained for a one-day workshop, so that national participants can compare their actual species identification. Such a workshop could be convened, for example, prior to IBTSWG.

In addition, improved data filters in national databases and in DATRAS could also usefully flag questionable records for checking (see Section 8.2).

10.3 Update of Zeus and other electronic field guides

In recent years, there has been a growing concern for the quality control of survey data. Important aspects of concern include the correct species identification and proper recording of maturity stages.

In order to facilitate the improved species identification of fish and epibenthic invertebrates, several laboratories that are involved in internationally coordinated surveys have photo-catalogues of fish and benthos. IMARES has taken the lead in the developing the ZEUS programme, a taxonomic catalogue to which several laboratories have now supplied photographs.

The setup of the photo collection held on ZEUS is based on a taxonomic tree-structure, using scientific species names, and with the option of giving names in other languages. Concise and relevant comments on distinguishing features of the species are included. The application is available on a CD-ROM and includes an installer. The copyright of all photos remains with the photographer (or his/her laboratory). If someone wants to use the photos in a publication, the photographer has to be contacted for permission.

Photographs of some further species were provided during the meeting (Table 10.1), though there are still many species for which good photographic images are still required (Table 10.2). Members of the IBTSWG are requested to try supply photographs of these species if they are recorded in surveys. The protocol for the submission of the photos is as follows:

- In the right hand corner the name of the photographer should be included as embedded information: a copyright symbol, the name of the institute (acronym), the name of the photographer and the year, e.g. "© FRS Marine Laboratory/Finlay Burns/2004". This text should be in black or white, in italics, and in Arial 10.
- Apart from the name of the photographer there should be no text on the photo, but distinguishing features may be highlighted by arrows or circles.
- There is no preference for a particular background used, but preferably a cm-scale should be visible.
- The images should be JPEG files, with a critical resolution necessary for presentation on full screen: width of 15x20 cm, resolution 120, quality 7 (medium to high compression), and a size limit of approximately 150 kB.
- File names of fish or benthos species should consist of the scientific name and an image number, e.g.: Gadus_morhua_01.jpg

Table 10.1. List of species for which photographs were supplied at the 2007 meeting.

SCIENTIFIC NAME	ENGLISH NAME
Pagellus erythrinus	Pandora
Aspitrigla obscura	Longfin gurnard
Liza aurata	Golden grey mullet
Malacocephalus laevis	Softhead grenadier
Pagellus bogaraveo	Red seabream
Luvarus imperialis	Louvar
Cyclopterus lumpus	Lumpsucker
Lampris guttatus	Opah
Chirolophis ascanii	Yarrell's blenny
Alosa fallax	Twaite shad

Table 10.2. Preliminary list of fishes for which photos are required.

BISCAY - NORTH SEA SPECIES	SOUTHERLY FISH SPECIES	DEEP-WATER SPECIES
Anguilla anguilla	*Isurus oxyrinchus*	*Hydrolagus mirabilis*
Salmo salar	*Prionace glauca*	*Rhinochimaera atlantica*
Antonogadus macropthalmus	*Squalus blainvillei*	*Hexanchus griseus*
Gaidropsarus mediterraneus	*Torpedo torpedo*	*Apristurus laurussoni*
Lophius budegassa	*Muraena helena*	*Galeus murinus*
Lepadogaster candollei	*Serranus cabrilla*	*Pseudotriakis microdon*
Lepadogaster lepadogaster	*Dicentrarchus punctatus*	*Somniosus microcephalus*
Apletodon microcephalus	*Trachurus mediterraneus*	*Centrophorus granulosus*
Atherina boyeri	*Trachurus picturatus*	*Centrophorus squamosus*
Pungitius pungitius	*Seriola dumerili*	*Centrophorus uyato*
Spinachia spinachia	*Brama brama*	*Dalatias licha*
Syngnathus typhle	*Taractichthys longipinnis*	*Etmopterus princeps*
Hippocampus hippocampus	*Pagrus pagrus*	*Oxynotus centrina*
Hippocampus ramulosus	*Pagellus bogaraveo*	*Oxynotus paradoxus*
Nerophis lumbriciformis	*Pagellus erythrinus*	*Centroscyllium fabricii*
Nerophis ophidion	*Dentex macropthalmus*	*Centroscymnus coelolepis*
Trigla lyra	*Dentex dentex*	*Centroscymnus crepidater*
Aspitrigla obscura	*Sparus pagurus*	*Scymnodon obscurus*
Liparis montagui	*Mullus barbatus*	*Echinorhinus brucus*
Liza ramada	*Mugil cephalus*	*Bathyraja pallida*
Liza aurata	*Coris julis*	*Bathyraja spinicauda*
Centrolabrus exoletus	*Acantholabrus palloni*	*Notacanthus bonaparti*
Ctenolabrus rupestris	*Xiphias gladius*	*Notacanthus chemnitzii*
Blennius ocellaris	*Arnoglossus thori*	*Synaphobranchus kaupi*
Ammodytes tobianus		*Molva dypterygia*
Ammodytes marinus		*Coryphaenoides rupestris*
Gymnammodytes semisquamatus	NORTHERLY FISH SPECIES	*Coelorinchus coelorhinchus*
Hyperoplus immaculatus	*Amblyraja hyperborea*	*Malacocephalus laevis*
Gobius paganellus	*Dipturus nidarosiensis*	*Nezumia aequalis*
Gobius gasteveni	*Rajella fyllae*	*Trachyrhynchus trachyrhynchus*
Crystallogobius linearis	*Dipturus lintea*	*Trachyrhynchus murrayi*
Gobiusculus flavescens	*Artediellus europaeus*	*Antimora rostrata*
Pomatoschistus minutus	*Myoxocephalus quadricornis*	*Laemonema latifrons*

BISCAY - NORTH SEA SPECIES	SOUTHERLY FISH SPECIES	DEEP-WATER SPECIES
Pomatoschistus pictus	*Taurulus lilljeborgi*	*Mora moro*
Pomatoschistus microps	*Cottunculus microps*	*Lepidion eques*
Pomatoschistus norvegicus	*Lycenchelys sarsi*	*Halargyreus affinis (H.johnsonii)*
Lesueurigobius friesii	*Lycodes vahlii*	*Ophidion barbatum*
Buenia jeffreysii	*Lycodes esmarkii*	*Beryx splendens*
Thorogobius ephippiatus	*Leptoclinus maculatus*	*Trachyscorpia cristulata*
Arnoglossus imperialis	*Anarhichas minor*	*Hoplostethus atlanticus*
Phrynorhombus regius	*Reinhardtius hippoglossoides*	*Hoplostethus mediterraneus*

10.4 Bibliography of useful reference guides for fish and benthos

A summary of some of the more useful field guides for the identification and taxonomy of European marine fishes and epibenthic invertebrates that may be encountered in trawl surveys is provided in Annex 8. This list updates the bibliography produced last year (ICES, 2006).

10.5 Museum collection

A concern during the IBTS surveys is to accurately determine the different fish species and it was discussed if the different national museums could aid in the fish species identification. However, the IBTSWG felt that there was a low interest from the different museums to collect and help identification of species. The IBTSWG contacted Sven O Kullander, the senior curator of ichthyology at the Vertebrate Department of the Swedish Museum of Natural History, and asked him if he could be contacted when unusual fish species were caught and aid in species identification. He was positive to this question and therefore the different countries could contact him when there is a finding of unusual fish species.

Sven O Kullander, Senior Curator of Ichtyology
Phone: +468 519 541 16 Fax: +46 8-5195 4212
E-mail: sven.kullander@nrm.se
Address: Department of Vertebrate Zoology
Swedish Museum of Natural History
Box 50007, SE-104 05 Stockholm

10.6 References

ICES. 2003. Report of the International Bottom Trawl Survey Working Group. ICES CM 2003/D:05, 468 pp.

ICES. 2004. Report of the International Bottom Trawl Survey Working Group. ICES CM 2004/D:05, 128pp.

ICES. 2005. Report of the International Bottom Trawl Survey Working Group (IBTSWG). ICES CM 2005/D:05, 131 pp.

ICES. 2006. Report of the International Bottom Trawl Survey Working Group (IBTSWG). ICES CM 2006/RMC:03, 298 pp.

ICES. 2007. Workshop on Taxonomic Quality Issues in the DATRAS Database (WKTQD). ICES *In prep.*

11 Collecting additional data (ToR h)

ToR h) consider the feasibility of collecting additional data in the surveys, in particular observations of mammals and birds, and the use of CUFES.

11.1 Additional sampling

For the last couple of years there have been several requests to the IBTSWG as to whether the surveys could be used as a platform for additional data collection. In particular, it has been discussed within the EU member countries and the EU Commission that the present fish and fisheries data collection programme will be extended to include collection of ecosystem data.

Furthermore, at the IBTSWG meeting in 2006 the working group held a joined session together with representatives from the ICES REGNS Study Group to discuss additional sampling during the IBTS surveys. It was agreed that additional data collection related more to the needs of other sectoral interests, such as observations of seabirds and cetaceans, nutrients and eutrophication, contaminants monitoring or other measurements i.e. acoustic seabed mapping, towing for plankton and benthos, etc. An important part of the discussion recognised that there are different levels of coordination and integration of these parameters within the IBTS, some are more practical and cost effective than others, but in all cases additional funding outside the IBTS would be needed to cover the time and effort required for such observations. A concept of 3 levels of integration was discussed:

- level 1 represents existing sample collection with minimal disruption to the survey;
- level 2 would require additional observations and effort, although this is happening already in some cases (e.g. benthos in trawl); and,
- level 3 would require significant additional and/or ongoing effort and close coordination with other fisheries and oceanographic fieldwork.

At last years meeting it was concluded that a coordinated programme of seabird and cetacean observers could be developed in the first instance without additional costs. This conclusion can only be reiterated. It should however, be mentioned that the present number of scientists onboard when conducting IBTS surveys will not be able to do this additional work. Accommodating seabird and cetacean observers on the IBTS cruises would appear to be a relatively straightforward way of adding value to the cruise programme in the context of integrated assessment. It should be noted that for many fisheries research institutes, work on birds and marine mammal's falls outside their field of responsibility.

Nutrients and chlorophyll analysis of water samples collected for salinity analysis on CTD casts, sediment and water samples for contaminants analysis, as well as additional tows for plankton or benthos data are expensive additions in terms of time and effort and are therefore unlikely to be funded at this stage. Other observations could be made at night (e.g. towed CTD, acoustic survey of seabed) but this would not be integrated into the IBTS survey per se.

11.2 Use of Continuous Underwater Fish Egg Samplers (CUFES)

Results from a pilot test of the use of a CUFES in the eastern English Cannel made by IFREMER were presented. The IBTSWG was not in a position to evaluate whether data collected with this sampler could add valuable information to the scientific community. If the national institutes have the resources to use such a sampler the IBTSWG support its' use.

12 Other business

12.1 Extension of the NS-IBTS Q1 into the Eastern Channel

In the eastern English Channel the winter spawning Downs herring stock is exploited by different fleets mainly at the end of the year during its migration. The rest of the year, this stock component is mixed with the overall population of North Sea herring. This pattern seems to have changed as according to French fishermen, unusual herring shoals were seen until April since 2005 while their catches in the North Sea were very low.

At the end of the 2006 IBTS survey, the French RV "Thalassa" recorded acoustics data during its trip to Brest. These recordings confirmed the fishermen observations. Shoals of significant size were observed in coastal waters in ICES rectangle 30F1. Some trawl hauls were made and the catches consisted of herring with a mean length of 25 cm.

During the last IBTSWG in March 2006, the extension of the IBTS 1st quarter survey area in the Eastern English Channel was considered: additional GOV hauls carried out in this area would provide more information on Downs herring and its distribution at this period of the year. The HAWG supported the idea and the extension of the IBTS area was implemented at the 1st quarter IBTS 2007. Both the RV "Tridens" and the RV "Thalassa" carried out GOV trawls and MIK samples in the area, the results of the RV "Thalassa" are given in detail below.

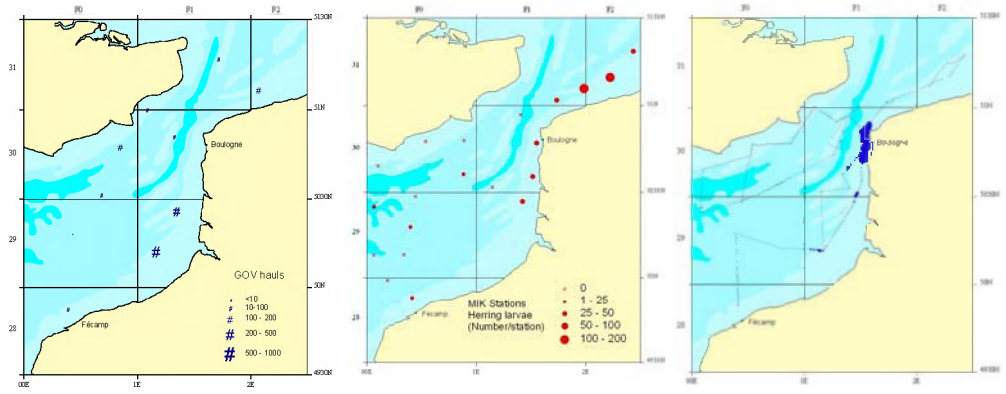
During four days, (30 January – 2 February 2007) the RV "Thalassa" surveyed the Eastern English Channel. According to IBTS protocol, 8 GOV hauls and 20 MIK stations were carried out in this area (Figure 12.1.1). In addition, acoustic data were recorded during day and night and five pelagic hauls made when significant echo-traces were observed. The CUFES (Continuous Underway Fish Eggs Sampler) was also carried out during this survey. Because of intensive sea traffic in this area, lack of time and the position of sandbanks, it was not possible to follow a correct sampling strategy. Nevertheless, two acoustics transects were surveyed along the English and French coasts and a third one in the middle of the English Channel (Figure 12.1.1).

The most important detections were found along the French coast and the catch composition of pelagic hauls revealed mainly mixed herring and sardine in the southern area and herring in the northern one. About herring; mean length was about 26 cm and age between 3 and 6 years old (Figure 12.2.2).

According to fishermen observations, very high and continuous shoals of herring were found during this survey in a local area, concentrated along sandbanks and once more observed at the end of the survey in February. Nevertheless, it is impossible to estimate accurately the biomass because of the heterogeneity of the spatial distribution of the detections. The dense schools observed along the transects during some miles cannot be extrapolated. The sampling strategy should certainly be improved in order to determinate the real spatial distribution of these shoals. Nevertheless, a mean density has been estimated according to some local aggregations at 500 to 1 500 tonnes per square nautical mile. Unfortunately, these values are only representative of the herring behaviour through their aggregation pattern in this area but cannot be extrapolate to a biomass estimate.

It was the first year that such a survey was carried out in this area in January and it must be considered as a preliminary study. With an improved acoustic sampling strategy, it would probably be possible to get more reliable data on herring biology and change in behaviour during the spawning period but rather difficult to get a biomass estimate of herring during its migration through the English Channel .

Nevertheless, in this area, the IBTSWG recommends that the first priority must be given to GOV hauls and MIK samples as required in the IBTS protocol, the recording of acoustic data and CUFES samples are not considered priority and carried out only if it does not delay the IBTS programme.



GOV hauls MIK stations Acoustic transects

Figure 12.1.1. Acoustic transects in the Eastern Channel. Herring schools are mainly concentrated in the northern part (in front of Boulogne).

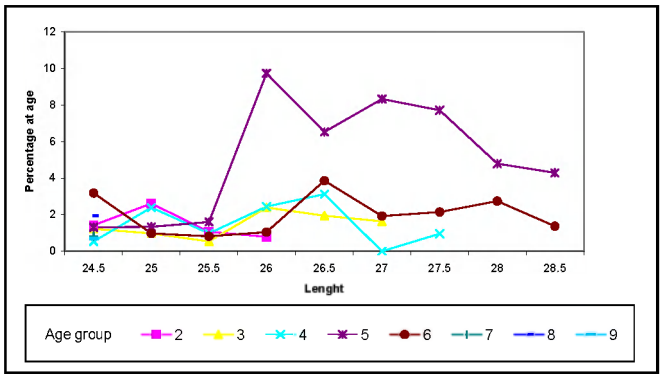


Figure 12.1.2. Age composition of catches from the pelagic hauls.

12.2 Coordination of new trawl surveys

12.2.1 Objectives of the IBTS Working Group

The traditional objective of the IBTSWG has been to coordinate the collection of standardised data from international demersal trawl surveys operating over wide spatial areas of the ICES area. These surveys aim to provide information to the assessment working groups on the distribution and relative abundance of commercial fish stocks and biological information on these species. Recently there has also been an increased emphasis on the surveys also providing information on the wider ecosystem. To achieve this, a series of protocols have been agreed upon to standardise sampling gear and methodology (see IBTS Manuals).

Coordination of surveys has now become a critical requisite for important DCR funding and therefore increasingly surveys are seeking international coordination through the important coordination body for ICES demersal trawl surveys, IBTSWG. It is namely also a rationale that another objective of IBTSWG might be to oversee the collection of high quality fishery independent data from more non-IBTS bottom trawl surveys for use by ICES assessment groups.

Although the IBTSWG feels that 'funding' shouldn't be the mere motive for surveys to request coordination by any working group, it is important that the IBTSWG gets it priorities straight, in order to deal with requests for coordination of 'new surveys'. If RMC wishes that the objective of the IBTSWG would be to allocate more focus towards an increasingly broad spectrum of survey designs and objectives, then there would be the possibility that other trawl surveys could be incorporated into the group, irrespective of the spatial scale of the survey or the gear used (noting that not all fish species/life-history stages are sampled effectively by existing IBTS surveys). While many problems across trawl surveys are often similar, how one approaches solving them will be quite different depending on whether you take the more traditional IBTS track, or the new approach. The IBTSWG would therefore welcome official clarification from ICES ACFM and RMC of the objective(s) they envisage for the IBTSWG moving forward.

12.2.2 Criteria to facilitate coordination of new trawl surveys

Any request from a survey to be coordinated within the IBTSWG should first be considered and approved by a relevant ICES assessment working group. If an ICES assessment working group has reviewed the utility of an existing non-coordinated survey of relevance to their stock(s) and can justify the importance of the survey for the assessment process (i.e. the data are either currently being used in accepted assessments, or are new surveys designed to provide data following a specific request from an assessment working group), then there could be a rationale for this survey being included within the auspices of IBTSWG, providing that it fulfils several criteria, including:

1) A brief outline of the management need/context for the survey provided by the assessment working group;

2) It is a bottom trawl survey (noting that some crustacean trawl surveys and coastal surveys may be better included within other ICES working groups, such as WGBEAM, WGBIFS etc.);

3) The survey either has appropriate sampling methods and protocols (including gear descriptions) that conform to the standards encouraged by the IBTSWG, or that can be improved after joining IBTSWG;

4) The survey should aim to enhance existing IBTS surveys and improve data collection for important stocks. For example, proposed surveys for inclusion within IBTSWG should (i) overlap and extend existing surveys and use comparable gear, or (ii) operate on more specific grounds/times of year with a gear more appropriate for the target species;

5) Submit their data to the DATRAS database;

6) Attend and present data at the annual meetings of IBTSWG;

7) Assessment working groups should confirm (e.g. after a five year period) that any surveys targeting specific stocks and not using gears used in the standard IBTS surveys are still providing data of high quality and use to the assessment.

Based on the above criteria and a willingness to reach consensus on survey design and methodology, the IBTSWG can provide whatever support and coordination is possible to the candidate survey. Further, the IBTSWG can provide an annual survey summary to the sponsoring assessment working group until such time as both working groups can agree the utility, or not, of the survey. This review period is not envisaged to take longer than five years however.

12.3 Surveys that requested coordination by the IBTSWG

12.3.1 Rockall Survey (FRS, Scotland)

As a consequence of the outcomes of the SGRN 07–01 Review of List of Surveys at Sea, Fisheries Research Services, Scotland presented a working document (Annex 9) on the history of their Rockall survey. The IBTSWG agrees that details of the Rockall survey have been included in the planning and coordination section of the annual report in recent years. However, it appears that there may have been some confusion about the name of this survey as there have been occasions recently when the survey was referred to as a joint Deep-Water / Rockall survey.

Given that the IBTSWG protocols and the standard GOV (with ground gear 'C') are used for the Rockall survey, the IBTSWG agree that they accept responsibility for the coordination of this survey within the Western and Southern areas. The IBTSWG also notes that FRS, Scotland are committed to uploading the Rockall survey data set to DATRAS in the near future. This will facilitate the access of data to the wider scientific community.

12.3.2 GSBTS (German Small-Scale Bottom Trawl Survey) (BFA-ISH, Germany)

The GSBTS is embedded in the German part of the IBTS Q3 survey. Additional to the allocated rectangles 12 selected areas each of 100nm² and distributed over the whole North Sea are fished under IBTS protocol conditions. In 6 areas also nutrients, benthos and occasionally sea birds are monitored.

The GSBTS has established a multi-disciplinary scientific survey time series (20 years; ca. 4300 hauls). Beside the evaluation of long-term shifts in benthic and fish species assemblages in relation to fishing pressure and climate change, the high-intensity sampling at small spatial and temporal scales allows for additional process studies which cannot be conducted in the frame of routine large-scale surveys like the IBTS. The IBTSWG agrees that the outcomes of this survey and especially the additional studies like comparative fishing experiments are very useful for a further standardisation of the IBTS. Recently the survey fulfils none of the 3 criteria given in the SGRN report.

A detailed description of the methods of the GSBTS and a review of the results are given in a paper by Ehrich *et al.* (2007).

12.3.3 Portuguese Crustacean Survey and Portuguese Groundfish Survey for hake (IPIMAR; Portugal)

a. The main objectives of the Portuguese Crustacean Trawl Surveys are to estimate the relative abundance and the geographical distribution in space and time of *Nephrops*, as well as of other crustacean species (deepwater rose shrimp, red shrimp) and accompanying species. Surveys have been carried out since the early 1980s using IPIMAR's research vessels. Surveys usually take place during the second quarter. The Portuguese crustacean surveys have been conducted since 1981, in different areas and seasons. The sampling design was adapted from the bottom trawl surveys (stratified random sampling) and formed the basis for data collection for the crustacean surveys in the period 1997–2004. For the purpose of standardization, only the surveys carried out with the RV "Noruega" in the period 1997–2006 will be considered. The gear design is described in detail in Annex 9.

The produced survey information was mainly used for the analysis of *Nephrops* abundance trends, as a tuning fleet in the assessment of *Nephrops* stocks and to define the closed areas for the Southern Hake and Iberian *Nephrops* stocks recovery plans.

b. The main objectives of the Portuguese Groundfish Survey are to estimate distribution, abundance and abundance indices of hake and the most important commercial species during

spawning season. Furthermore biological parameters such as maturity, sex-ratio, weight, food habits, and length and/or age compositions are estimated. Besides hake main target species are: horse mackerel and blue whiting. This survey started in 2005 and will be performed annually. The surveys are carried out in the first quarter over a period of about 30 days. The survey is conducted in Portuguese continental waters (Division IXa). The sampling design is adapted from the Autumn Groundfish Survey. The survey is conducted with the Portuguese RV "Noruega". The fishing gear used is a bottom trawl.

The produced survey information is mainly used by the ICES Working Group on the assessment of hake, monkfish and megrim.

The IBTSWG was requested to coordinate these two surveys. Due to the new criteria set by STECF Sub-group on Research Needs (SGRN) both surveys only accomplish the criteria 3. The IBTSWG is only willing to coordinate both surveys if recommended by the assessment working groups.

12.3.4 The Swedish west coast survey with RV "Ancylus" (IMR-SE; Sweden)

During the meeting the Swedish west coast survey was presented. The coastal trawl survey from the Öresund in the south and to the Norwegian border in the north has been carried out by RV "Ancylus" since 2001. The stations were selected partly on previously used trawling stations or information from fishers. The survey in the Kattegat is conducted twice a year, i.e. in May and November 2001–2006. In total, 16 trawling stations have been established in the Kattegat. Of them, 14 were included from the start in 2002, whereas two more stations were added to the survey in 2004. Between 11 to 16 hauls have been considered as valid per seasonal survey in Kattegat. The gear is a 140-feet *Nephrops* trawl (Ulmestrand and Larsson, 1991), with small bobbins (10 cm in diameter) and a codend mesh size of 70 mm. All hauls were made in full daylight at a speed of 2.5 knots; haul duration is 30 min. After sorting by species catch weights of all demersal fish species were recorded (0.1 kg). The total length (TL) of all caught cod was measured and no random subsamples were taken between 2002 and 2005. Since 2006 the whole catch is sorted. The results for all valid hauls regarding recorded mean depth, positions, kg per hour, number per hour and the age distributions are stored in a national database which can be uploaded into DATRAS.

The increasing uncertainty in collected landing statistics, due to black landings, misreporting, discarding and high grading, limits the value of present stock assessment work and lays stress on the need for additional fishery independent data. While such data are likely to have a greater variance than landings at age data, as they are collated from fewer samples, they are also under direct control and unlikely to be affected by deliberate distortion (Needle, 2002). Overall, catchability of "Ancylus" is consistent between years and areas and the handling of the fish is performed in a similar fashion as is done during traditional IBTS surveys. This makes the survey appropriate for assessment purposes in the Kattegat.

During the meeting it was discussed whether this survey could be a part of the IBTSWG or the WGBIFS. However, during the meeting it was decided that the Swedish Coastal Survey should be included and coordinated by the Baltic survey group (WGBIFS) instead (after contact with their new Chair Henrik Degel).

During the meeting it was discussed whether this survey could be a part of the IBTSWG or the WGBIFS (Baltic International Fish Survey Working Group). The WGBIFS is the working group that coordinates surveys that provide data to the WGBFAS (Baltic Fisheries Assessment Working Group). As the Kattegat cod is the main target species for the Swedish west coast survey and the species is dealt with by the WGBFAS, it was found natural that this survey should be coordinated by the WGBIFS. An agreement was made with WGBIFS and its new Chair Henrik Degel that the Swedish west coast survey will be coordinated by that working group.

12.3.5 The Irish Sea surveys (AFBI, Northern Ireland)

As a consequence of the outcomes of the SGRN 07–01 Review of List of Surveys at Sea, the Agri-Food & Biosciences Institute, Northern Ireland presented an overview of their quarter 1 and 4 groundfish surveys in Division VIIa. The Northern Ireland surveys (NIGFS) have been carried out in March and October since 1992. Details of the survey area, season, sampling design and gear used, given in the "Manual for the International Bottom Trawl Surveys in the Western and Southern areas", were summarised. Information of a vessel change in 2005 was given, as well as the upgrade to the net monitoring system used since 2006.

It was highlighted that the ICES Working Group on the Assessment of Northern Shelf Demersal Stocks (WGNSDS) has become increasingly dependent on the use of the NIGFS surveys in recent years for the assessment of a number of species. In addition, the surveys also target a species that is under an EC Recovery Plan.

The IBTSWG agrees that the surveys have been included under the remit of the working group in the past and recommend that it should be reinstated. IBTSWG agree that they are willing to coordinate these surveys within the Western and Southern areas. The IBTSWG notes that AFBI are committed to undertake an intercalibration exercise and are committed to uploading the survey data sets to DATRAS in the near future. This will facilitate the access of data to the wider scientific community.

AFBI also presented an overview of their summer MIK net surveys conducted since 1996. The surveys are used by the WGNSDS as recruitment indices for the gadoid species. IBTSWG noted that due to the sampling gear not being a bottom trawl gear the surveys do not fall under the remit of the working group.

12.3.6 ORHAGO survey (Observation des Ressources HAlieutiques benthiques du GOlfe de Gascogne) (IFREMER La Rochelle, France)

The ORHAGO survey aims mainly to collect abundance indices for the sole stock in the Bay of Biscay. This resource is the main one in the Bay of Biscay, according to the value of landings, and since several years ICES has classified it as being at risk of reduced reproductive capacity and harvested unsustainably. This assessment is tuned almost entirely by commercial fleets of the 4 countries (France, The Netherlands, Belgium and UK) fishing for sole in the Bay of Biscay. The lack of fishery-independent survey data for this stock is considered to be an important deficiency of the assessment and also of the prediction when estimating the incoming recruitment. The ORHAGO survey was designed to fill in this gap. This survey is carried out with 30 min hauls by night in November with a twin trawls (2*11 m width) in 2 strata (0–50 m and 50–100 m) of the Bay of Biscay by systematic sampling.

The IBTSWG recommends that WGBEAM will be asked to consider taking the survey under their responsibility.

12.3.7 Spanish ARSA survey (IEO; Cadiz, Spain)

The spring time series of the Spanish survey in the Gulf of Cadiz (ARSA) has been reported and coordinated regarding dates and stations performed in the IBTSWG reports (2002–2005). In 2006 no information on the results of the 2005 Gulf of Cadiz spring survey were provided, since there was an extra effort to produce the new map plots combining the information on the catches of all surveys on the Southern and Western area for the 4th quarter, and since the Gulf of Cadiz (spring) was the only one carried out in that season in the Southern and Western area it was not possible to include them in the distribution maps. In fact dates for 2006 spring survey were included in the table of surveys that were going to be performed in 2006 (IBTSWG06 report).

Therefore Gulf of Cadiz spring survey is being coordinated within the IBTS, since it follows the same protocols, and shares the same gear, stratification, design and protocols than the Gulf of Cadiz autumn survey, and has been reported in IBTSWG reports previous to 2006. At present working is carried out in order to prepare the data to be uploaded in the ICES DATRAS data base.

12.4 Sexual maturity sampling

The Data Collection Regulation (Data Collection Regulation (DCR), EC Reg. 1639/2001 and 1581/2004) programme covers extensive sampling of maturity stages, but up-to-date results are rarely used in the assessment of the Spawning Stock Biomass (SSB). In several cases, calculation of the proportion of mature fish is based on information collected far outside the spawning season, or on incomplete coverage of the stock distribution area. Market sampling, fishery independent stock surveys and observer programmes provide information on the timing of the spawning season. Samples shortly preceding, or in the early phase of the spawning season may achieve adequate spatial coverage. Improved sampling programmes, further analyses and consideration of the consequences of interannual variation in maturity on stock assessments, will further eliminate the current problems in the maturity sampling programmes.

The Data Collection Regulation (DCR) programme covers extensive sampling of maturity stages for stocks within EU Community waters, mostly on a triannual basis. The current Regulation prescribes a predefined precision level (level 3, the highest: 5% precision), but sampling strategy and the actually achieved precision have hardly been addressed yet. ICES stock assessments are often based on time invariant maturity ogives, derived from information collected outside the spawning season and/or covered the spatial distribution of the stocks incompletely.

The Workshop on Sexual Maturity Sampling (WKMAT) was set up to develop sound approaches to maturity sampling for the wide range of species included in the Data Collection Regulation programme. Appendix XVI of the DCR lists all stocks for which maturity data need to be collected. This includes over 150 stocks, each of which has its details and peculiarities. Rather than specifying maturity sampling protocols for each and every species/stock, a proper identification of maturity stages for a small number of species/stocks will be the subject of a series of workshops; Workshop on Sexual Maturity Staging of Hake and Monk (WKMSHM), Workshop on Sexual Maturity Staging of Mackerel and Horse Mackerel (WKMSMAC) and Workshop on Sexual Maturity Staging of Cod, Whiting, Haddock and Saithe (WKMSCWHS). These workshops will be held during 2007.

In order to collect material for these workshops it was at the IBTSWG 2006 meeting recommended that all countries at their surveys in 2006 and first half year of 2007 take as many images of gonads and testis for hake, anglerfish, cod, haddock, whiting and saithe as possible.

12.4.1 Workshop on Sexual Maturity Sampling

The WKMAT was held in Lisbon (Portugal), January 2007. At the WKMAT it was realised that the coding schemes in use (varying from a 4grade scale to a 10grade scale), and the interpretation of particular stages (in particular immature versus post spawning or skipped spawning), might give rise to misinterpretations, both with respect to the actual biological maturity stage, as to the assessment of the spawning stock biomass. An improved 5-stage maturity scale is proposed, which accommodates for these problems, while allowing consistent mapping of the more detailed scales. It is recommended that this proposal is further considered by the species specific workshops later this year.

The majority of species/stocks covered by the DCR spawn during a limited time interval of the year, nearly always in restricted spawning areas. Sampling protocols, therefore, should accommodate for temporal and spatial variation in maturity composition. Additionally, length selectivity of gears might influence the sampling. Market sampling, stock surveys and observer programmes constitute sources of information on the maturity status of stocks. Market sampling most easily provides full temporal coverage, but catches might be stripped before landing, or the fishery may target the spawning component of the stock disproportionably. Stock surveys, primarily set up for year class abundance estimation, will not necessarily match the spawning season. Manpower on observer trips often does not allow for additional sampling for maturity.

Sampling protocols on board research surveys, as well as market sampling procedures, differ between countries, between stocks, and even between different surveys for the same stock. Evidently, problems occur with respect to the sampling protocols, as well as the raising of the data for usage in stock assessments. However, it is also apparent from this overview, that up-to-date information on maturity is often not used by assessment working groups.

Main outcome of the workshop are:

- Where possible all maturity staging should be carried out on board using comprehensive and illustrated manuals where the scales used have been validated histologically or by other appropriate method.
- There is a strong recommendation to include a fifth maturity stage (Omitted Spawning – OS) in the IBTS 4 stage scheme. Recent work has shown significant levels of postponed spawning, particularly in the younger ages of mature fish, which if unaccounted for will bias sampling and significantly impact on SSB estimates.
- Gonads recovering after spawning are often indistinguishable from virgin gonads that will not spawn in the current season, even when examined histologically. Samples should obviously be collected at the appropriate time of the year to determine spawning activity, not just potential, and the highest agreement between macro and microscopic examination of gonads tends to be just prior to peak spawning.
- Because trends in maturity are known to exist, the inter-annual variability for each stock would need to be evaluated in order to determine whether a three-yearly cycle of updating maturity information is appropriate. It needs to be noted that variation between years can be a consequence of sampling variability or real changes in the population. Therefore, frequent updates of maturity ogives might improve the accuracy but deteriorate the precision of SSB estimates.
- There is evidence to show that while mature fish migrate to spawning grounds, immature fish of the same age and length may remain in feeding areas (Armstrong 2004). This will result in biased sampling if spatial coverage is not complete for both spawning and non spawning components, particularly for those lengths/ages where the transition from immature to mature occurs. This is not consistent across species however (e.g. Gerritsen, 2003).

12.4.2 Maturity data used for assessments

As pointed out by the WKMAT the Data Collection Regulation (DCR) programme covers extensive sampling of maturity stages, but up-to-date results are rarely used in the assessment of the Spawning Stock Biomass SSB. In several cases, calculation of the proportion of mature fish is based on information collected far outside the spawning season, or on incomplete coverage of the stock distribution area. Market sampling, fishery independent stock surveys and observer programmes provide information on the timing of the spawning season. Samples shortly preceding, or in the early phase of the spawning season may achieve adequate spatial coverage. Improved sampling programmes, further analyses and consideration of the

consequences of inter-annual variation in maturity on stock assessments, will further eliminate the current problems in the maturity sampling programmes.

12.4.3 Status of the sampling of material for the WKMSCWHS

The Danish Institute for Fisheries Research (DIFRES) is hosting this workshop in the autumn of 2007 and has offered to analyse the collected material and photos of gonads and testes. At the 1st quarter IBTS in the North Sea and Division IIIa following material has been collected:

Cod:	Females: 174	Males: 184
Whiting:	Females: 133	Males: 124
Haddock:	Females: 118	Males: 115
Saithe:	Females: 52	Males: 60

It is expected that the workshop will finalize a comprehensive and illustrated manual that should be used when sampling sexual maturity data on the species from 2008 and onwards.

12.5 Additional sampling of age and sexual maturity during the 2008 IBTS surveys

In order to ensure coordinated collection of species which need only to be collected triennially or six annually, the IBTSWG have agreed to review the coordination of this data collection. Annex XVI of the DCR (Commission Regulation 1581/2004) has been used as a starting point. The time of year where maturity data can be collected during spawning has been accounted for and listed for each area and species as well as a first attempt to identify the relevant coordinator for each species and area (see Table 12.5.1).

The IBTSWG recommend that maturity data should be collected for a number of species in addition to the data collection for cod, haddock, whiting, saithe, Norway pout, mackerel, herring and sprat (see Table 12.5.1).

It was decided that an overview of the volume of the 2006–2007 of age and sexual maturity samples/data for less common species during IBTS surveys should be presented at this years EU Regional Coordination Meetings where also non EU member countries are participating. On this basis it will be decided which species are to be prioritised in 2008.

It was also agreed that the survey coordinators; IBTS North Sea and Division IIIa Q1: Remment ter Hofstede, IBTS North Sea and Division IIIa Q3: Brian Harley and IBTS Western and Southern area: David Stokes will incorporate a maturity data collection plan for each of respective surveys. Furthermore, it was recognised that concerns raised at the WKMAT workshop in Lisbon, 2007, and elsewhere, in relation to the potential for spatial bias in applying spatially clustered maturity keys should be investigated. Therefore sampling schemes should endeavour to spread the biological sampling evenly over the survey area, particularly for those age classes where first maturity occurs. If a maturity key is constructed largely from data from a spawning aggregation encountered at one point during a survey, and then applied to a surrounding population either feeding or at another stage in the yearly cycle, there it the potential for biased estimates for SSB. Once unbiased samples can be collected in reasonable numbers this issue will be evaluated further.

Likewise, survey data would be of use for investigating temporal trends in biological parameters and should be investigated.

Table 12.5.1. Other biological sampling of growth, maturity, fecundity and sex ratio.

Species		Area/Stock	Growth		Maturity		Fecundity		Sex ratio		Maturity sampling season	Year of sampling	Sampling platform
			Length	Weight	Length	Age	Length	Age	Length	Age			
North Sea (Skagerrak) ICES area IIIa (north)													
Sandeel	Ammodytidae	IIIa N	T	T	T	T			T	T	Q4		
Eel	Anguilla anguilla	IIIa N	T	T									
Herring	Clupea harengus	IV, VIId, IIIa/22-24, IIIa	T	T	T	T			T	T	Q1 and Q3	Every year	IBTSWG/ PGHERS
Cod	Gadus morhua	IV, VIId, IIIa	T	T	T	T			T	T	Q1	Every year	IBTSWG
Haddock	Melanogrammus aeglefinus	IV, IIIa N	T	T	T	T			T	T	Q1	Every year	IBTSWG
Hake	Merluccius merluccius	IIIa, IV, VI, VII, VIIIab	T	T	T	T			T	T	Q1	**2007**	IBTSWG
Blue whiting	Micromesistius poutassou	I-IX, XII, XIV	T	T	T	T			T	T	Q1		PGNAPES
Norway lobster	Nephrops norvegicus	Functional unit	S	S	S				T				
Northern shrimp	Pandalus borealis	IIIa, IVa east	T	T	T				T				
Plaice	Pleuronectes platessa	IIIa	T	T	T	T			T	T	Q1	Every year	IBTSWG
Saithe	Pollachius virens	IV, IIIa, VI	T	T	T	T			T	T	Q1	Every year	IBTSWG
Mackerel	Scomber scombrus	IIIa, IVbc, VIId	T	T	T	T			T	T	Q1	Every year	IBTSWG
Sole	Solea solea	IIIa	T	T	T	T			T	T	Q1	**2007**	IBTSWG
Sprat	Sprattus sprattus	IIIa	T	T	T	T			T	T	Q3	Every year	IBTSWG
Norway pout	Trisopterus esmarki	IV, IIIa	T	T	T	T			T	T	Q1	Every year	IBTSWG
ICES area III (excluding Skagerrak) including Baltic													
Eel	Anguilla anguilla	IIIa (excluding IIIaN)	T	T									
Herring	Clupea harengus	22-24/25-29, 32/30/31/Golf of Riga	T	T	T	T			T	T	Q1 and Q3	Every year	WGBIFS
Flounder	Platichthys flesus	IIIb-d	T	T	T	T			T	T	Q1		WGBIFS
Cod	Gadus morhua	IIIa S/22-24, IIId/25-32	T	T	T	T			T	T	Q1 and Q3	Every year	IBTSWG and WGBIFS
Norway lobster	Nephrops norvegicus	Functional unit	S	S	S				T				
Plaice	Pleuronectes platessa	IIIa S	T	T	T	T			T	T	Q1	Every year	IBTSWG
Salmon	Salmo salar	IIIb-d, 22-31/32	T	T	T	T			T	T			
Sea trout	Salmo trutta	IIIb-d	T	T	T	T			T	T			
Sole	Solea solea	IIIa	T	T	T	T			T	T	Q1	**2007**	IBTSWG and WGBIFS
Sprat	Sprattus sprattus	IIIa S/IIIb-d	T	T	T	T			T	T	Q3	Every year	IBTSWG and WGBIFS
North Sea and Eastern Channel ICES areas IV, VIId													
Sandeel	Ammodytidae	IV	T	T	T	T			T	T			
Eel	Anguilla anguilla	IV, VIId	T	T									
Argentine	Argentina spp.	IV	T	T	T	T			T	T			
Herring	Clupea harengus	IV, VIId, IIIa	T	T	T	T			T	T		Every year	IBTSWG/ PGHERS
Shrimp	Crangon crangon	IV, VIId	T	T	T				T		Q3	Every year	DYFS
Sea bass	Dicentrarchus labrax	IV, VIId	T	T	T	T			T	T			
Cod	Gadus morhua	IV, VIId, IIIa	T	T	T	T			T	T	Q1	Every year	IBTSWG
Four-spot megrim	Lepidorhombus boscii	IV, VIId	T	T	T	T			T	T			
Megrim	Lepidorhombus whiffiagonis	IV, VIId	T	T	T	T			T	T	Q1	*Every year*	IBTSWG
Black-bellied angler	Lophius budegassa	IV, VIId	T	T	T	T			T	T	Q1	**2007**	IBTSWG
Anglerfish	Lophius piscatorius	IV, VI	T	T	T	T			T	T	Q1	**2007**	IBTSWG
Haddock	Melanogrammus aeglefinus	IV, VIId	T	T	T	T			T	T	Q1	Every year	IBTSWG
Whiting	Merlangius merlangus	IV, VIId	T	T	T	T			T	T	Q1	Every year	IBTSWG
Hake	Merluccius merluccius	IIIa, IV, VI, VII, VIIIab	T	T	T	T			T	T	Q1	**2007**	IBTSWG
Blue whiting	Micromesistius poutassou	I-IX, XII, XIV	T	T	T	T			T	T	Q1		PGNAPES
Lemon sole	Microstomus kitt	IV, VIId	T	T	T	T			T	T	Q1 and Q3	**2006/2007**	IBTSWG
Mullet	Mullus barbatus	IV, VIId	T	T	T	T			T	T	Q1		
Red mullet	Mullus surmuletus	IV, VIId	T	T	T	T			T	T	Q1	*Every year*	IBTSWG
Norway lobster	Nephrops norvegicus	Functional unit	S	S	S				T				
Northern shrimp	Pandalus borealis	IIIa, IVa east/IVa	T	T	T				T		Q1		
Plaice	Pleuronectes platessa	IV/VIId	T	T	T	T			T	T	Q1	**2007**	IBTSWG
Saithe	Pollachius virens	IV, IIIa, VI	T	T	T	T			T	T	Q1	Every year	IBTSWG
Turbot	Psetta maxima	IV, VIId	T	T	T	T			T	T	Q1	**2007**	IBTSWG
Thornback ray	Raja clavata	IV, VIId	T	T	T				T				IBTSWG
Spotted ray	Raja montagui	IV, VIId	T	T	T				T				IBTSWG
Cuckoo ray	Raja naevus	IV, VIId	T	T	T				T				IBTSWG

Table 12.5.1 (continued). Other biological sampling of growth, maturity, fecundity and sex ratio.

North-east Atlantic and Western Channel ICES areas II, V, VI, VII (excluding d) VIII, IX, X, XII, XIV

Eel	Anguilla anguilla	all areas	T	T									
Scabbardfish	Aphanopus spp.	IXa, X	T	T	T	T			T	T		*Every year*	WGDEEP
Argentine	Argentina spp.	All areas											
Alfonsinos	Beryx spp.	X	T	T	T	T			T	T			Market
Edible crab	Cancer pagurus	All areas	T	T	T				T				Market
Gulper shark	Centrophorus granulosus	All areas	T	T	T				T			*Every year*	WGDEEP
Leafscale gulper shark	Centrophorus squamosus	All areas	T	T	T				T			*Every year*	WGDEEP
Portuguese dogfish	Centroscymnus coelolepis	All areas	T	T	T				T			*Every year*	WGDEEP
Herring	Clupea harengus	VIa, VIaN/VIaS/VIIbc/VII a/VIIj	T	T	T	T			T	T	Q1 and Q4	Every year	IBTSWG
Conger	Conger conger	X	T	T	T	T			T	T		*Every year*	IBTSWG and WGDEEP
Roundnose grenadier	Coryphaenoides rupestris	All areas	T	T	T	T			T	T		*Every year*	WGDEEP
Sea bass	Dicentrarchus labrax	All areas, excluding IX	T	T	T	T			T	T			
Anchovy	Engraulis encrasicolus	IXa (only Cadiz)	T	T	T	T	T	T	T	T			
Anchovy	Engraulis encrasicolus	VIII	T	T	T	T	Y	Y	Y	Y			
Cod	Gadus morhua	Va, Vb, VIa, VIb, VIIa, VIIe-k	T	T	T	T			T	T	Q1	Every year	IBTSWG
Bluemouth rockfish	Helicolenus dactylopterus	IXa, X	T	T	T	T			T	T		*Every year*	WGDEEP
Lobster	Homarus gammarus	All areas	T	T	T				T			*Every year*	Market
Orange roughy	Hoplostethus atlanticus	All areas	T	T	T	T			T	T			
Four-spot megrim	Lepidorhombus boscii	VIIIc, IXa	T	T	T	T			T	T		*Every year*	IBTSWG and WGDEEP
Megrim	Lepidorhombus whiffiagonis	VI/VII, VIIIabd/VIIIc, IXa	T	T	T	T			T	T	Q1	**2007**	IBTSWG
Common squid	Loligo vulgaris	VIIIc, IXa	T	T	T				T				
Black-bellied angler	Lophius budegassa	IV, VI/VIIb-k, VIIIabd/VIIa/VIIb-k	T	T	T	T			T	T	Q1 and Q4	**2007**	IBTSWG and WGDEEP
Anglerfish	Lophius piscatorius	IV, VI/VIIb-k, VIIIabd/VIIa/VIIb-k	T	T	T	T			T	T	Q1 and Q4	**2007**	IBTSWG and WGDEEP
Haddock	Melanogrammus aeglefinus	Va/Vb, VI, XII, XIV/VIa/VIb/VIIa/VII b-k	T	T	T	T			T	T		Every year	IBTSWG
Whiting	Merlangius merlangus	VIII/IX, X	T	T					T				
Whiting	Merlangius merlangus	Vb/VIa/VIb/VIIa/ VIIe-k	T	T	T	T			T	T	Q1	Every year	IBTSWG
Hake	Merluccius merluccius	IIIa, IV, VI, VII, VIIIab, VIIIc, IXa	T	T	T	T			T	T	Q1	**2007**	IBTSWG
Blue whiting	Micromesistius poutassou	I-IX, XII, XIV	T	T	T	T			T	T			Market
Blue ling	Molva dypterygia	X	T	T	T	T			T	T		*Every year*	WGDEEP
Ling	Molva molva	All areas	T	T	T	T			T	T		*Every year*	IBTSWG
Red mullet	Mullus surmuletus	All areas	T	T	T	T			T	T		*Every year*	IBTSWG
Norway lobster	Nephrops norvegicus	Functional unit	S	S	S				T				
Common octopus	Octopus vulgaris	VIIIc, IXa	T	T	T				T				
White shrimps	Parapenaeus longirostris	IXa	T	T	T				T				
Forkbeard	Phycis phycis	X	T	T	T	T			T	T			
Plaice	Pleuronectes platessa	VIIa, VIIe-g	T	T	T	T			T	T	Q1	Every year	IBTSWG and WGBEAM
Saithe	Pollachius virens	Va/Vb/IV, IIIa, VI/VII, VIII	T	T	T	T			T	T	Q1	Every year	
Wreckfish	Polyprion americanus	X	T	T	T	T			T	T		*Every year*	IBTSWG
Blond ray	Raja brachyura	All areas	T	T	T				T			*Every year*	IBTSWG
Thornback ray	Raja clavata	All areas	T	T	T				T			*Every year*	IBTSWG
Spotted ray	Raja montagui	All areas	T	T	T				T			*Every year*	IBTSWG
Cuckoo ray	Raja naevus	All areas	T	T	T				T			*Every year*	IBTSWG
Other rays and skates	Rajidae	All areas	T	T	T				T			*Every year*	IBTSWG
Greenland halibut	Reinhardtius hippoglossoides	V, VI, XIV	T	T	T	T			T	T			
Sardine	Sardina pilchardus	VIIIabd,/VIIIc, IXa	T	T	T	T	T	T	T	T			
Spanish mackerel	Scomber japonicus	VIII, IX	T	T	T	T			T	T			

12.6 References

Ehrich, S., Adlerstein, S., Brockmann, U., Floeter, J., Garthe, S., Hinz, H., Kröncke, I., Neumann, H., Reiss, H., Sell, A.F., Stein, M., Stelzenmüller, V., Stransky, C., Temming, A., Wegner, G., Zauke, G.-P. (2007): 20 years of the German Small-Scale Bottom Trawl Survey (GSBTS): A review. Senckenbergiana marit. 37(1): 13–82.

Needle, 2002. Survey-based assessment with SURBA. WD at the ICES WGMFSA.

Ulmestrand, M. and Larsson, P.-O. 1991. Experiments with a square mesh window in the top panel of a *Nephrops* trawl. ICES CM 1991/B:50.

13 Suggested ToRs for 2007

The **International Bottom Trawl Survey Working Group** [IBTSWG] (Chair: R. ter Hofstede, The Netherlands) will meet in Cadíz, Spain, from 31 March – 4 April 2008 to:

a) coordinate and plan North Sea and North-Eastern Atlantic surveys for the next twelve months including appropriate field sampling in accordance to the EU Data Collection Regulation;

b) Further develop the standard reporting format for the annual surveys for species of interest to assessment working groups according to their response.

c) Further evaluate and standardise criteria for ensuring quality and consistency in collection and reporting of survey data. These include (i) review of abundance indices and estimates of precision in DATRAS; and (ii) review the reporting procedures of trawl, vessel and environmental parameters and analyse changes in survey effort and/or constant catchability.

d) Review recent updates within DATRAS, including the implementations of user requirements as defined by the workshop DATRAS URS.

e) Improve the quality of future and historic IBTS data by: (i) the production and dissemination of identification keys for IBTS groundfish surveys; (ii) the examination of DATRAS data, i.e. to analyse size distributions, geographical distributions, and consistency of taxonomic use, and to correct data where possible.

f) review the outcome from the SGSTS in respect to issues relevant to IBTS and implement recommendations where agreed;

g) Agree on strata and their definitions for surveys in the Eastern Atlantic (including shapefiles and supporting information; shapefiles to be completed inter-sessionally and prior to the Q4 survey)

IBTSWG will report by 30 April 2008 for the attention of the Resource Management Committee.

Supporting Information

PRIORITY:	Essential.
SCIENTIFIC JUSTIFICATION AND RELATION TO ACTION PLAN:	The general need for monitoring fish abundance using surveys is evident in relation to fish stock assessments and in biodiversity studies. The meeting is based on the following needs: a) This is a core function of the IBTSWG. It is an important forum for coordination and evaluation of standardized bottom trawl surveys in the Eastern Atlantic Area, to ensure good survey coverage in relation to stocks and areas, intercalibration work, and high quality of data. b) The move towards a standard reporting format is intended to provide a brief, structured overview of the main results and difficulties from individual vessel surveys annually. A standard reporting format will provide a centralised and easily accessible overview of specific survey data sets, to those using the data. IBTSWG will continue to revue feedback and implement modifications.

SCIENTIFIC JUSTIFICATION AND RELATION TO ACTION PLAN CONTINUED:	c) In order to achieve the required level of quality in survey data, there is an urgent demand for clear international protocols on sampling strategies and data analysis. The surveys coordinated by the IBTSWG have different sampling strategies and there is a need to define the best adapted methods for computing indices and estimating precision. d) The development of DATRAS needs to be evaluated. IBTSWG will comment on the new version of DATRAS and will recommend on desired further developments. e) Detected errors in the database (e.g. DATRAS) should be corrected and protocols for the avoidance of misuse of existing data and for the prevention of future errors will be developed and implemented. f) Aspects of quality in survey design, sampling strategies and analysis of data are of prime importance for IBTSWG. Many aspects of trawl standardisation and intercalibration being examined by SGSTS are pertinent to IBTS and review of recommendations is essential. g) GIS *.shapefiles have now been made available for strata used by most of the surveys in the Eastern Atlantic area. The IBTSWG will further develop a scheme that will include all shapefiles, strata descriptions, computed areas and the information used for the strata definition.
RESOURCE REQUIREMENTS:	A five day IBTS meeting. Pre-prepared documents from members. Eight days Chair's time to edit. It is estimated that each ToR will require at least 8 hours pre-preparation
PARTICIPANTS:	All members will participate in all ToRs, although leads for each ToR will be allocated. It would be highly beneficial to have the person responsible for the ICES DATRAS participating for some days.
SECRETARIAT FACILITIES:	None
FINANCIAL:	None
LINKAGES TO ADVISORY COMMITTEES:	ACFM
LINKAGES TO OTHER COMMITTEES OR GROUPS:	Assessment Working Groups, WGBEAM, WGBIFS f) Cooperation with SGSTS
LINKAGES TO OTHER ORGANIZATIONS:	IOC, GOOS
SECRETARIAT MARGINAL COST SHARE:	ICES: 100%

Annex 1: List of participants

NAME	ADDRESS	PHONE/FAX	EMAIL
Remment ter Hofstede *(Chair)*	IMARES P.O. Box 68 1970 AB Ijmuiden The Netherlands	P: +31 255564686 F: +31 255564644	remment.terhofstede@wur.nl
Ann-Christin Rudolphi	IMR-SE Swedish Board of Fisheries Turistgatan 5, Box 4 SE-45321 Lysekil Sweden	P: +46 52318724 F: +46 52313977	ann-christin.rudolphi@fiskeriverket.se
Are Salthaug	Institute of Marine Research P.O. Box 1870 Nordnes N-5817 Bergen Norway	P: +47 55238673 F: +47 55238687	ares@imr.no
Brian Harley	Cefas, Lowestoft Laboratory Pakefield Road Lowestoft Suffolk, NR33 0HT United Kingdom	P: +44 1502524254 F: +44 1502524254	brian.harley@cefas.co.uk
David Stokes	Marine Institute Rinville, Oranmore, Co. Galway Ireland	P: +35 391387200 F: +35 391387201	david.stokes@marine.ie
Don Clark	DFO/MPO Biological Station 531 Brandy Cove Road St. Andrews, NB E5B 2L9	P: 506 5291091 F: 506 5295862	clarkd@mar.dfo-mpo.gc.ca
Findlay Burns	Fisheries Research Services Marine Laboratory P.O. Box 101 Victoria Road Aberdeen AB11 9DB United Kingdom		burnsf@marlab.ac.uk
Francisco Valesco	Instituto Español de Oceanografia Laboratorio de Santander Apdo 240 E-39080 Santander Spain	P: +34 942291060 F: +34 942275072	francisco.velasco@st.ieo.es
Henk Heessen	IMARES P.O. Box 68 1970 AB Ijmuiden The Netherlands	P: +31 255564692 F: +31 255564644	henk.heessen@wur.nl
Jean Claude Mahé	IFREMER 8, Rue François Toullec F-56100 Lorient France	P: +33 297873818 F: +33 297873836	jcmahe@ifremer.fr
Jean Pierre Léauté	IFREMER Place du séminaire BP 7 17137 L'Houmeau France	P : +33 546500671 F :	jean.pierre.leaute@ifremer.fr
Jim Ellis	Cefas, Lowestoft Laboratory Pakefield Road Lowestoft Suffolk, NR33 0HT United Kingdom	P: +44 1502524300 F: +44 1502524225	jim.ellis@cefas.co.uk

NAME	ADDRESS	PHONE/FAX	EMAIL
Joakim Hjelm	IMR-SE Swedish Board of Fisheries Turistgatan 5, Box 4 SE-45321 Lysekil Sweden	P: +46 52318751 F: +46 52313977	joakim.hjelm@fiskeriverket.se
Jorgen Dalskov	DIFRES Charlottenlund castle DK2920 Charlottenlund Denmark	+45 33963380 +45 33963333	jd@difres.dk
Ken Coull	Fisheries Research Services Marine Laboratory P.O. Box 101 Victoria Road Aberdeen AB11 9DB United Kingdom	P: +44 1224295399 F: +44 1224295511	coullka@marlab.ac.uk
Lena Larsen	ICES H.C. Andersens Blv. 44-46 1553 Copenhagen V Denmark	P: +45 33386700 F: +45 33934215	lena@ices.dk
Odd Smedstad	Institute of Marine Research P.O. Box 1870 Nordnes N-5817 Bergen Norway	P: +47 55238683 F: +47 55238687	odd.smedstad@imr.no
Palle Brogaard	DIFRES Charlottenlund castle DK2920 Charlottenlund Denmark	+45 33963398 +45 40303391	pb@difres.dk
Pieter-Jan Schön	AFBI Newforge Lane Belfast BT9 5PX, UK	P: +44 2890255015 F: +44 2890255004	pieter-jan.schon@afbini.gov.uk
Richard Millner[1]	Cefas, Lowestoft Laboratory Pakefield Road Lowestoft Suffolk, NR33 0HT, UK	P: +44 1502524434 F: =44 1502524225	richard.millner@cefas.co.uk
Rudolf Kafemann	BFAFI-ISH Palmaille 9 22767 Hamburg Germany	P:+49 4038905166 F:+49 4038905263	rudolf.kafemann@ish.bfa-fisch.de
Siegfried Ehrich	BFAFI-ISH Palmaille 9 22767 Hamburg Germany	P:+49 4038905179 F:+49 4038905263	siegfried.ehrich@ish.bfa-fisch.de
Yves Vérin	IFREMER 150 quai Gambetta BP 699 62 321 Boulogne s. mer France	P: +33 321995600 F: +33 321995601	yves.verin@ifremer.fr

[1]**Attended part of the meeting.**

Annex 2: Recommendations

RECOMMENDATION	ACTION
1. IBTS North Sea Q1 and Q3 coordination – Section 4.1, 4.2, 4.4. In order to guarantee good overlap in the timing of the surveys, the IBTSWG recommends that all countries make every effort to perform most of their survey time during the specified target month, i.e. February for the Q1 survey and August for the Q3 survey.	To be implemented by North Sea IBTS Q1 and Q3 participants.
2. 4.2.5 Non-standard gear use in English Q3 IBTS Section 4.2.5: As a result of incorrect rigging of the GOV by Cefas during part of the 2006 Q3 IBTS, the IBTSWG recommends that the data be flagged as non-standard in the DATRAS database and before the use of the data, Cefas will inform relevant assessment groups of the problem.	To be implemented by Cefas and ICES DATRAS
3. Correct rigging Sections 4.2.5. All survey participants are recommended to review their protocols relating to checking of their survey gear prior to deployment and to maintain the rigging of the survey gear to the standard described in the IBTSWG manual (revision VII). If deviation from the standard rigging of the survey gear occurs then it should be brought to the attention of the IBTSWG.	To be implemented by all national institutes.
4. Comparative fishing experiments Section 6.3. The IBTSWG values the outcome of (limited) comparative fishing exercises and recommends that (i) more intercalibration experiments be conducted between countries, in order to identify the actual causes of catchability differences; (ii) a separate study should be carried out to compare the trawl parameters of all vessels in relation to depth.	To be implemented by all national institutes and relevant Assessment WG's
5. Standardisation of data collection for shellfish and cephalopods – Section 6.4. The IBTSWG agreed that the species listed in Table 6.5.1 should be recorded in all IBTS surveys and data should be submitted to the DATRAS database from 2008 onwards.	To be implemented by all national institutes.
6. Correcting historical data – Section 10.2.1. Survey data stored in DATRAS should be consistent with the data held in the national laboratories. Therefore the IBTSWG recommends that national laboratories undertake a critical analysis of their data and provide DATRAS with an update when needed.	To be implemented by all national institutes.
7. Extension of NS-IBTS Q1 into the Eastern Channel – Section 12.1. The IBTSWG recommends that the extension of the North Sea IBTS programme with 5 rectangles into the Eastern Channel will also take place in 2008, however emphasizes that the first priority must be given to GOV hauls and MIK samples as required in the IBTS protocol, and that additional surveying (e.g. acoustics, CUFES samples) are carried out only if it does not delay the regular IBTS programme.	To be implemented by IFREMER and IMARES.
8. Coordination of new surveys – Section 12.2 The IBTSWG should approach ACFM and RMC for an official clarification of the objective(s) they envisage for the IBTSWG moving forward.	To be implemented by the Chair of IBTSWG
9. Additional sampling of age and sexual maturity – Section 12.5 The IBTSWG recommends that also in 2008 maturity data should be collected for a number of species in addition to the data collection for cod, haddock, whiting, saithe, Norway pout, mackerel, herring and sprat (see Table 12.5.1).	Survey coordinators and all national institutes.

Annex 3: Agenda

Tuesday 27 March

9:30h:

- Opening + introduction of all participants
- Outline of agenda and appointment of ToR-leaders
- Short presentation on the history and development of the IBTSWG by Henk Heessen

10:00h:

Review of IBTSWG 2006 recommendations:
1. IBTS North Sea Q1 coordination – Section 4.1:
The Working Group recommends for 2007 that participants of the North Sea IBTS Quarter 1 survey will aim to perform their cruise during the month February, in order to guarantee good overlap in the timing of the surveys.

2. Overlapping surveys – Section 7:
The WG recommends that each of IFREMER, IEO and IPIMAR dedicates 1 day each year in their surveys to start building a data series of intercalibration hauls.

- Presentation by Rudi/Siegfried/Ken: "Results of a comparative fishing experiment of FRV "Walther Herwig III" and FRV "Scotia" in 2006."

3. ICES Data access policy – Section 9:
The discussion on open data access is not unique to ICES but is also taking place in relation to the new EU fishery data collection regulation. The IBTSWG therefore recommends that each institute discusses the issue internally and find out what legislations applies to data in their country. The group would prefer that ICES implement the access levels that the group proposed last year. This policy covered the groups concerns and at the same time opened up access to the data. The group recommends that each institute accept this access policy.

4. Coordination of biological sampling – Section 13.1:
The IBTSWG recommends that all countries at their surveys in 2006 and first half year of 2007 take as many images of gonads and testis for hake, anglerfish, cod, haddock, whiting and saithe as possible.

5. Coordination of biological sampling – Section 13.1
The IBTSWG recommend that maturity data should be collected for a number of species in addition to the data collection for cod, haddock, whiting, saithe, Norway pout, mackerel, herring and sprat.

12:30h–13:30h

Lunch

13:30h

TOR b) further develop the standard reporting format for the most recent surveys for species of interest to assessment WG according to their response;
A first version of a reporting format has been used in the 2006 WG report. After feed back from Assessment WG, the reporting format will be updated to answer in the most proper way to expectations. (Action Plan 1.11)

TOR c) further develop standardization of all sampling strategies, computation of indices and estimation of precision;
In order to achieve the required level of quality in survey data, there is an urgent demand for clear international protocols on sampling strategies and data analysis. The surveys coordinated by the WG have different sampling strategies and there is a need to define the best adapted methods for computing indices and estimating precision. (Action Plan 1.11)

- Presentation by Jean-Claude on protocol for standardisation of gear check.

TOR d) review the findings from the SGSTS in respect to issues relevant to IBTS and respond;
Aspects of quality in survey design, sampling strategies and analysis of data are of prime importance for IBTSWG. Therefore outcome from dedicated Study Groups and Workshops have to be considered within the IBTSWG. (Action Plan 1.10, 1.11, 1.13).

Wednesday 28 March

9:00h:

TOR e) review progress made in the updated DATRAS database and data access policy;
A new data access policy has been proposed and IBTS WG has commented on it in 2006. There will also be a new DATRAS version in development and IBTSWG will comment on the outputs of this new version. (Action Plan 1.11, 6.1.)

- Presentation on the outcome of DATRAS URS by Lena.

12:30h–13:30h

Lunch

13:30h:

TOR g) coordinate the production and dissemination of identification keys for North Sea, and southern and western IBTS groundfish surveys;
Maintaining a high level of expertise in fish identification is a high priority. A way to achieve this is through development of adapted tools to be used by the scientific staff onboard the vessels. (Action Plan 1.10).

- Presentation on the outcome of WKTQD by Jim?
- Collect pictures for an update of ZEUS, including pictures from Workshops on maturity staging

Thursday 29 March

9:00h:

TOR a) coordinate and plan North Sea and North-Eastern Atlantic surveys for the next twelve months including appropriate field sampling in accordance to the EU Data Collection Regulation;
This is the main stay of the work of the Working Group and since the 2002 Dublin meeting participants have made more effort in the actual Working Group to coordinate and plan future surveys. Coordination of North Sea Surveys is fairly standard with most effort directed towards rationalising biological collection. However, the western and southern surveys still need considerable input from the appropriate participants, as many surveys are relatively new. (Action Plan 1.8, 1.11)

- Present outcomes of different surveys by coordinators NS-IBTS Q1 (Remment), NS-IBTS Q3 (Brian), Western and Southern IBTS (Dave).
- Presentation on problems with sweep length during CEFAS IBTS Q3 survey

TOR h) consider the feasibility of collecting additional data in the surveys, in particular observations of mammals and birds, and the use of CUFES.
There is a growing interest in collecting additional data underway in the surveys coordinated by the IBTSWG. This is not necessarily without problems, and the WG should consider to what extent such data can be collected, without corrupting the prime purpose of the surveys.

- Discuss document Dave
- Discuss the aging and maturing of additional species according to new EU DCR

TOR f) complete the shapefiles and supporting information for the agreed strata in the Eastern Atlantic;
It has been agreed that supporting information for the stratification and shape files should be provided. It was also agreed that this process would be extended to the North and South and should therefore cover all Eastern Atlantic. (Action Plan 1.11).

12:30h–13:30h

Lunch

13:30h:

Other affairs

- Presentation on extension of the NS-IBTS Q1 into the Eastern Channel by Yves
- Non-IBTS surveys:
- Presentation on GSBTS by Siegfried
- Presentation on PESCADA-BD and CTSV by Fatima
- Presentation on ORHAGO by Jean-Pierre
- Presentation on SKCS4 by Joakim
- Presentation on AFBI-GFS by Pieter-Jan
- Presentation Rockall survey by Ken
- Presentation on ARSA by Fran

15:30h:

- Report (IBTSWG will report by 15 April 2007 for the attention of the Resource Management Committee and ACFM).

Friday 30 March

9:00h:

Report

16:00h:

Closure

Annex 4: Species distribution, Eastern Atlantic Surveys

Table 4.3.8.1. Species and age classes for which maps of their distribution are produced:

COMMON NAME (AGE)	SCIENTIFIC NAME	COMMON NAME (AGE)	SCIENTIFIC NAME
0-group cod	*Gadus morhua*	monkfish	*Lophius piscatorius*
1+ cod	*Gadus morhua*	black anglerfish	*Lophius budegassa*
0-group haddock	*Melanogrammus aeglefinus*	0-group plaice	*Pleuronectes platessa*
1+ group haddock	*Melanogrammus aeglefinus*	1+ group plaice	*Pleuronectes platessa*
0-group herring	*Clupea harengus*	0-group whiting	*Merlangius merlangus*
1+ group herring	*Clupea harengus*	1+ group whiting	*Merlangius merlangus*
0-group horse mackerel	*Trachurus trachurus*	0-group hake	*Merluccius merluccius*
1+ group horse mackerel	*Trachurus trachurus*	1+ group hake	*Merluccius merluccius*
0-group mackerel	*Scomber scombrus*	*Nephrops*	*Nephrops norvegicus*
1+ group mackerel	*Scomber scombrus*	lesser spotted dogfish	*Scyliorhinus canicula*
megrim	*Lepidorhombus whiffiagonis*	cuckoo ray	*Leucoraja naevus*
four-spotted megrim	*Lepidorhombus boscii*	spurdog	*Squalus acanthis*
0-group blue whiting	*Micromesistius poutassou*	tope	*Galeorhinus galeus*
1+ group blue whiting	*Micromesistius poutassou*	starry smooth hound	*Mustelus asterias*

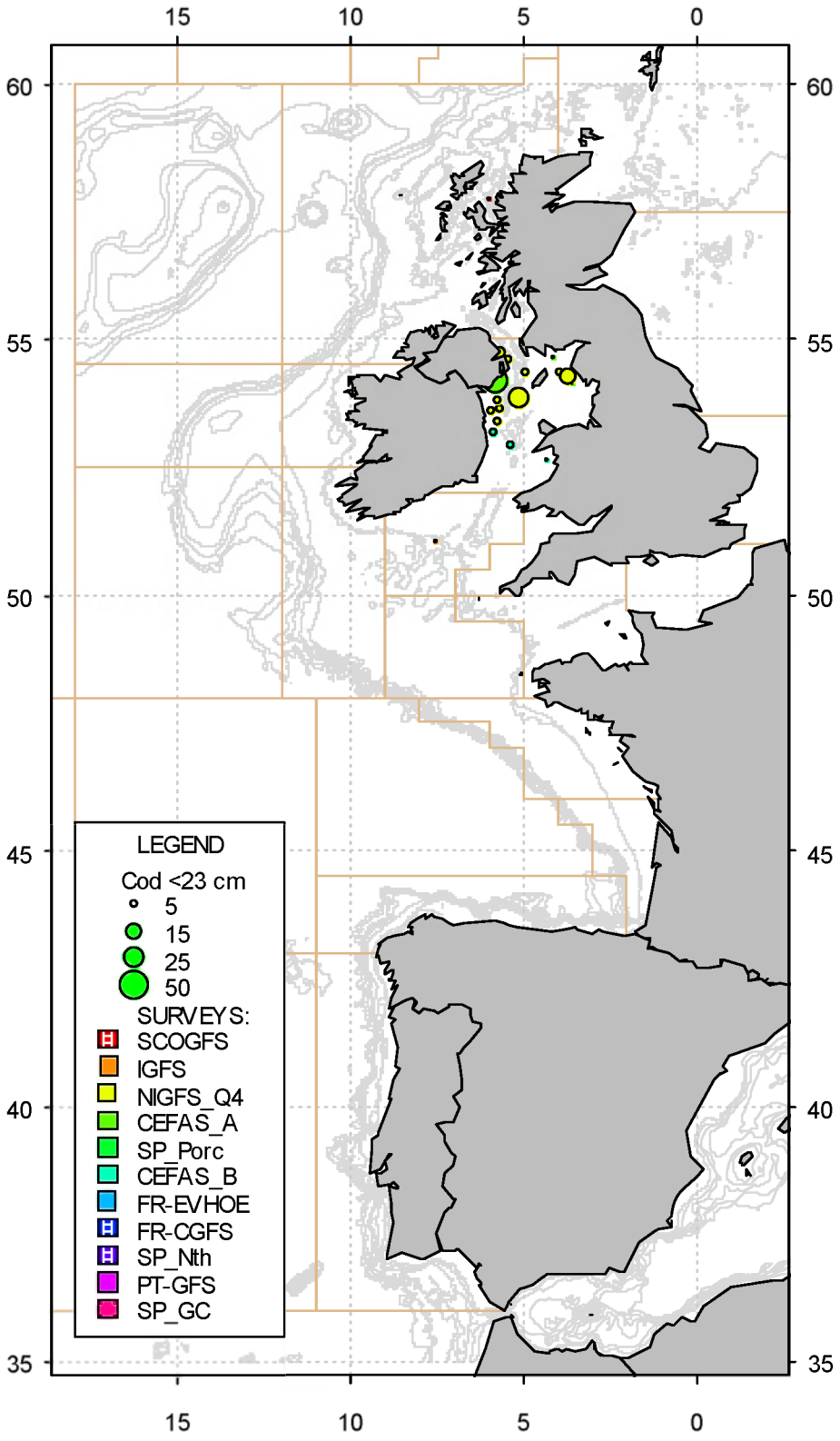


Figure 4.3.8.2. Catches in numbers per hour of 0-group Cod, Gadus morhua (<23cm), in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

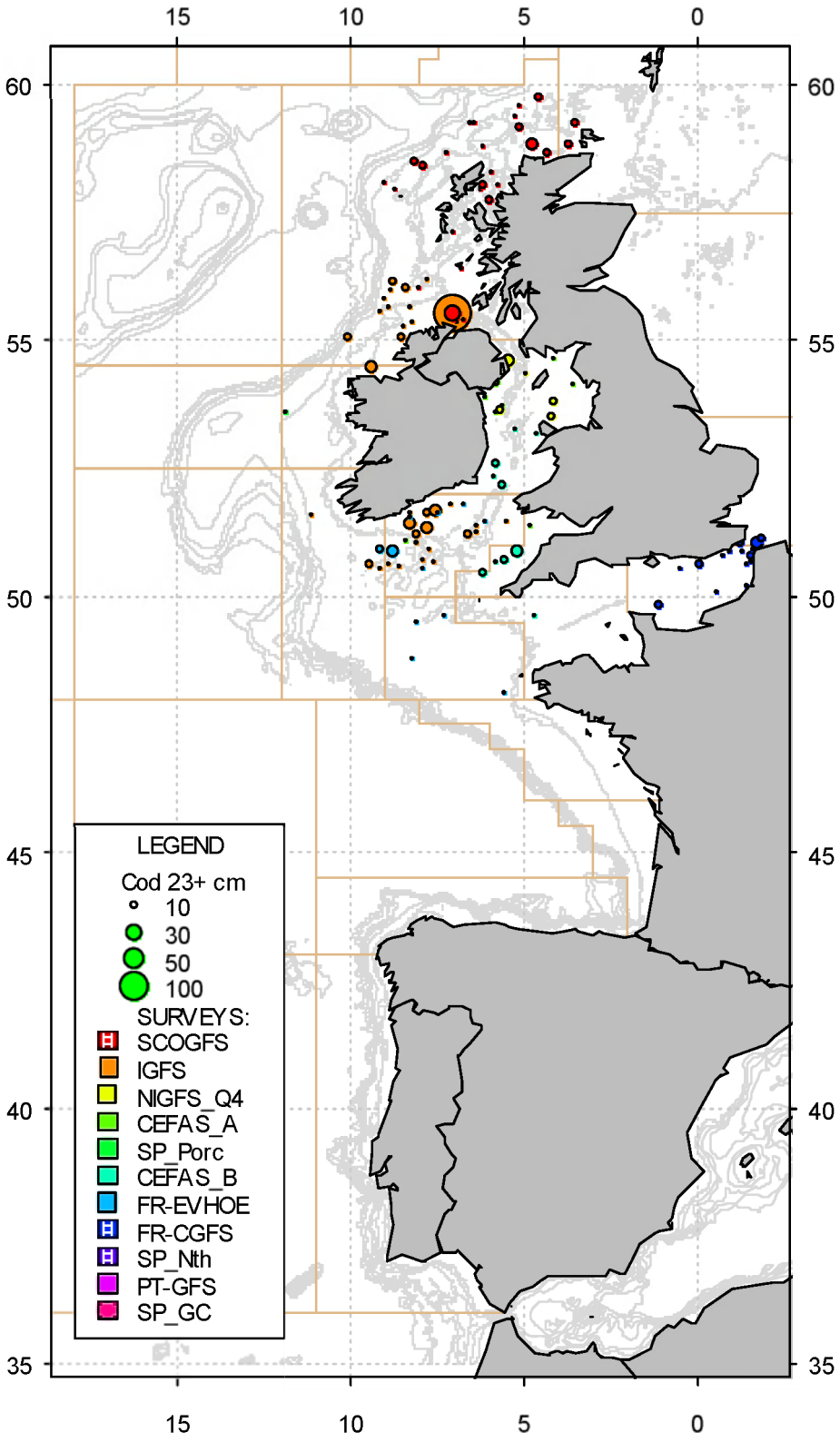


Figure 4.3.8.3. Catches in numbers per hour of 1+ cod, *Gadus morhua* (≥23cm), in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

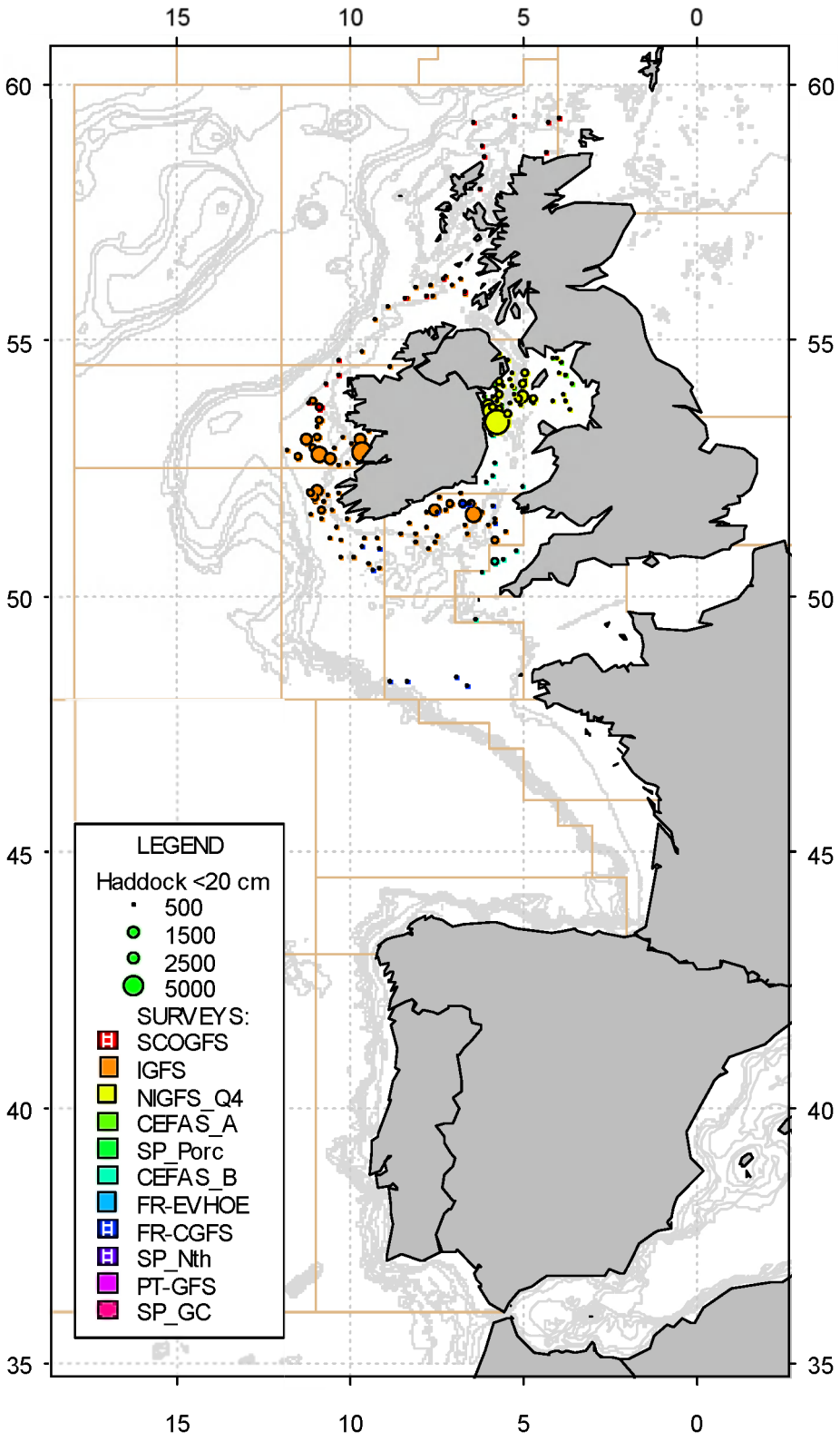


Figure 4.3.8.4. Catches in numbers per hour of 0-group haddock, *Melanogrammus aeglefinus* (<20cm), in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

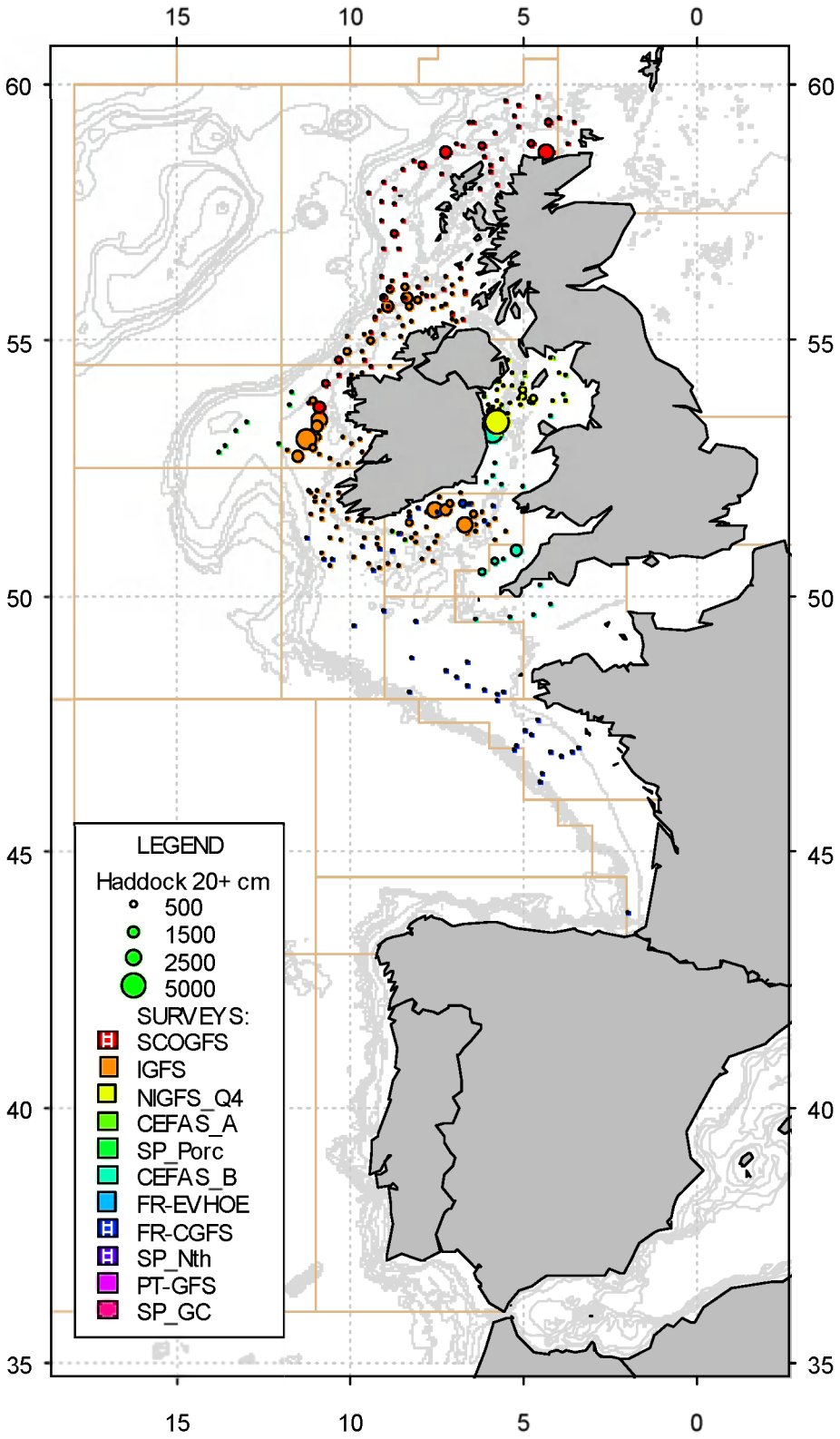


Figure 4.3.8.5. Catches in numbers per hour of 1+ group haddock, *Melanogrammus aeglefinus* (≥20cm), in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

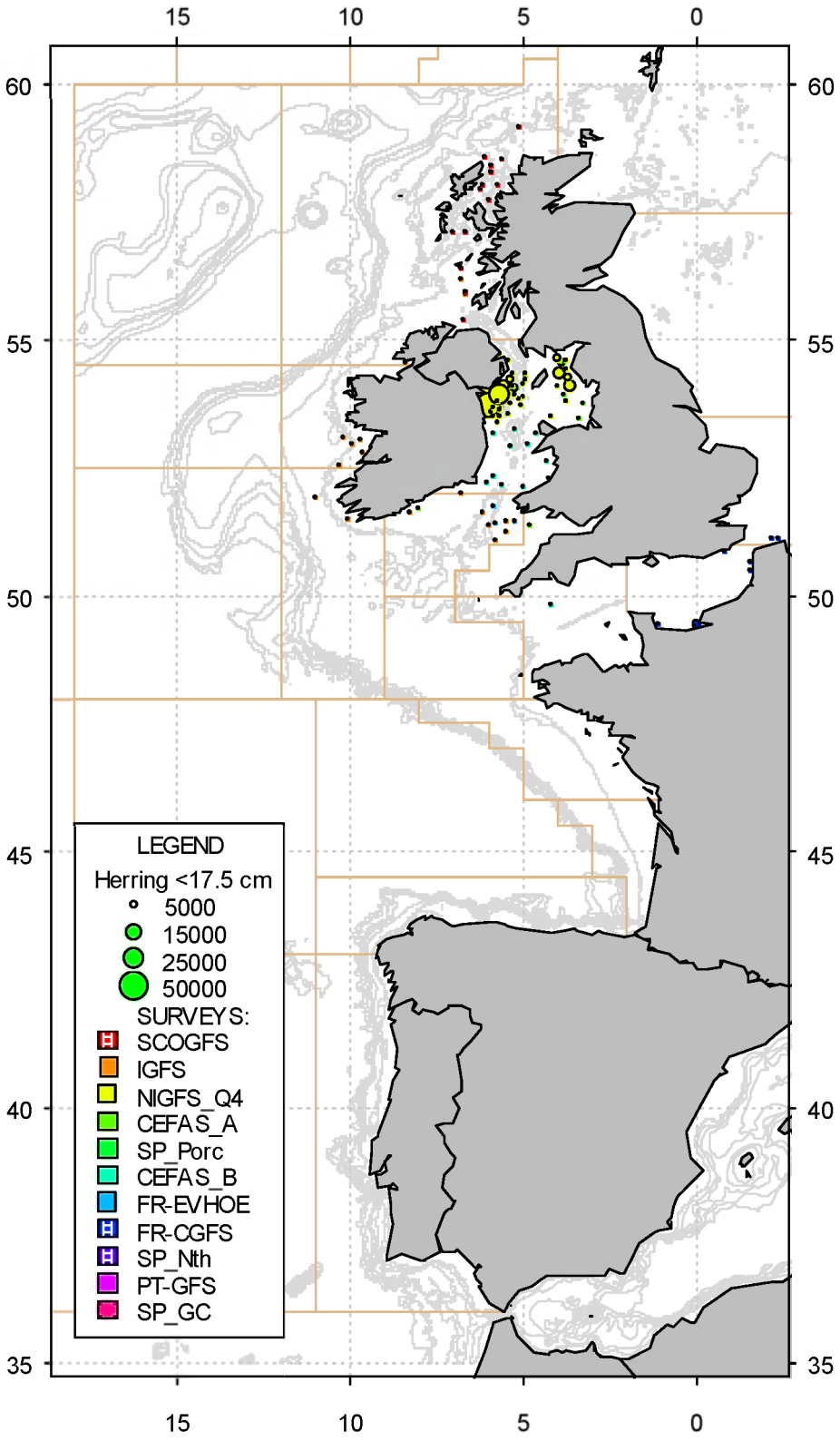


Figure 4.3.8.6. Catches in numbers per hour of 0-group herring, *Clupea harengus* (<17.5 cm), in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

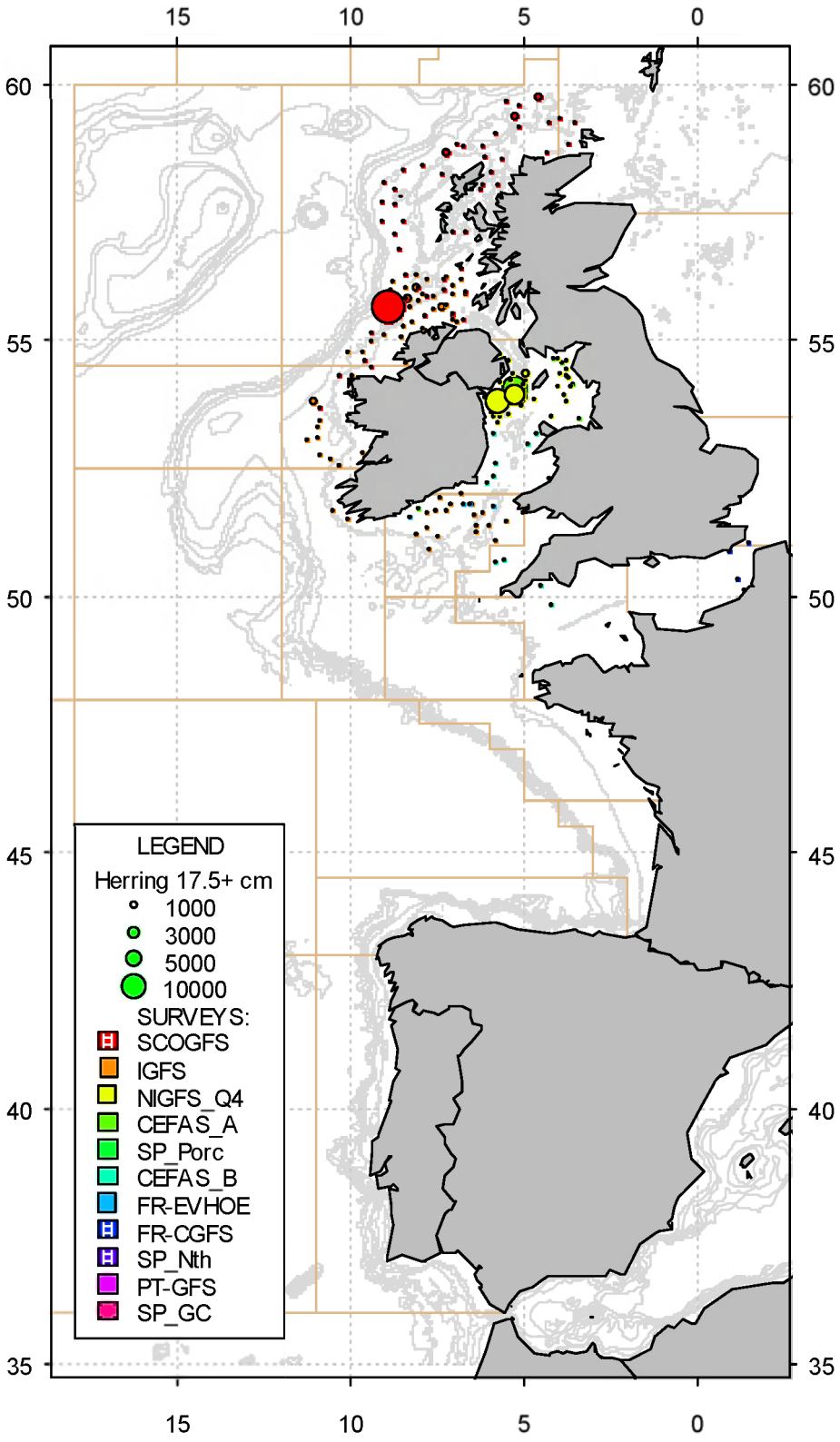


Figure 4.3.8.7. Catches in numbers per hour of 1+ group herring, *Clupea harengus* (≥17.5 cm), in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

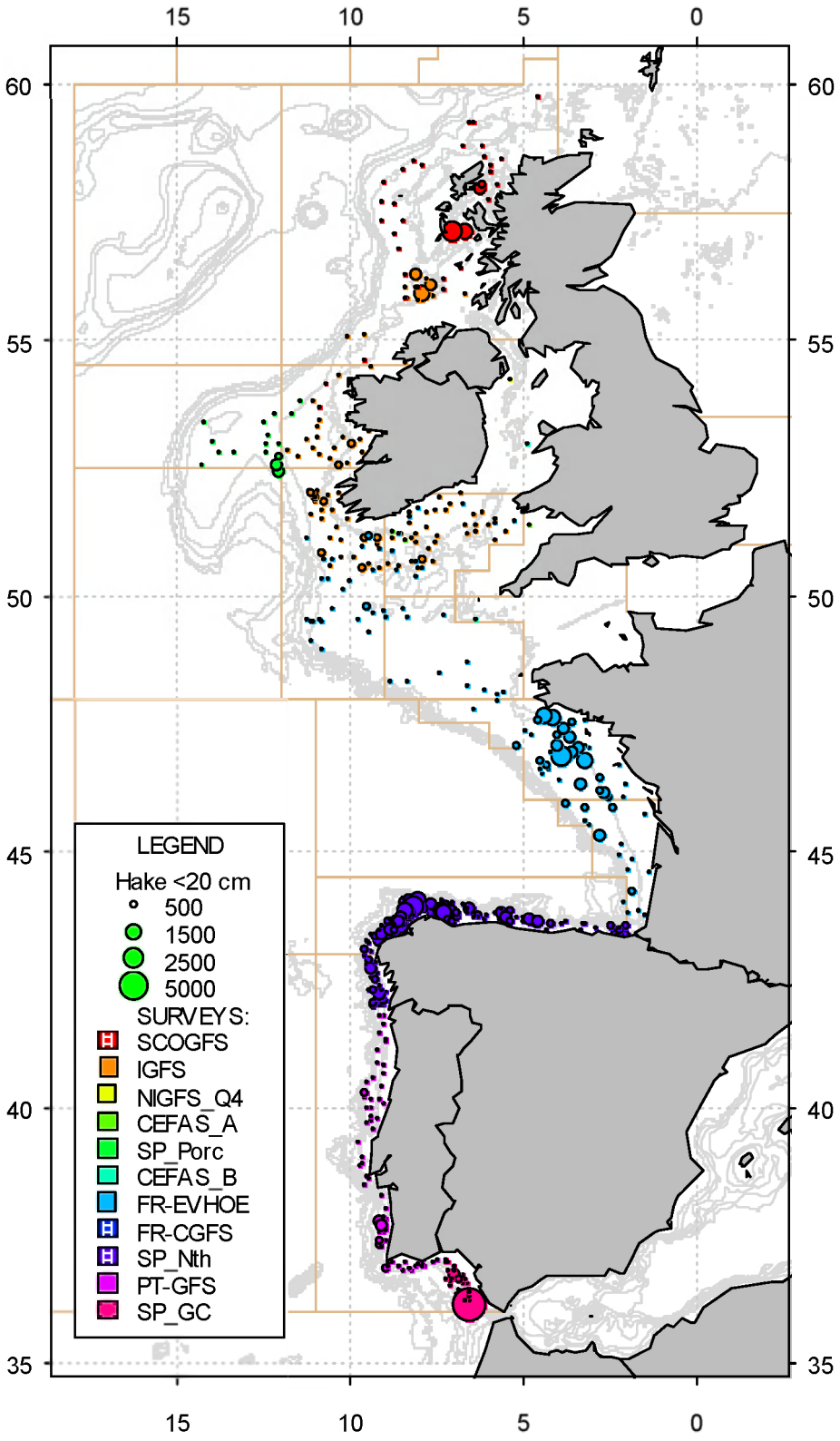


Figure 4.3.8.8. Catches in numbers per hour of 0-group hake, *Merluccius merluccius* (<20 cm), in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

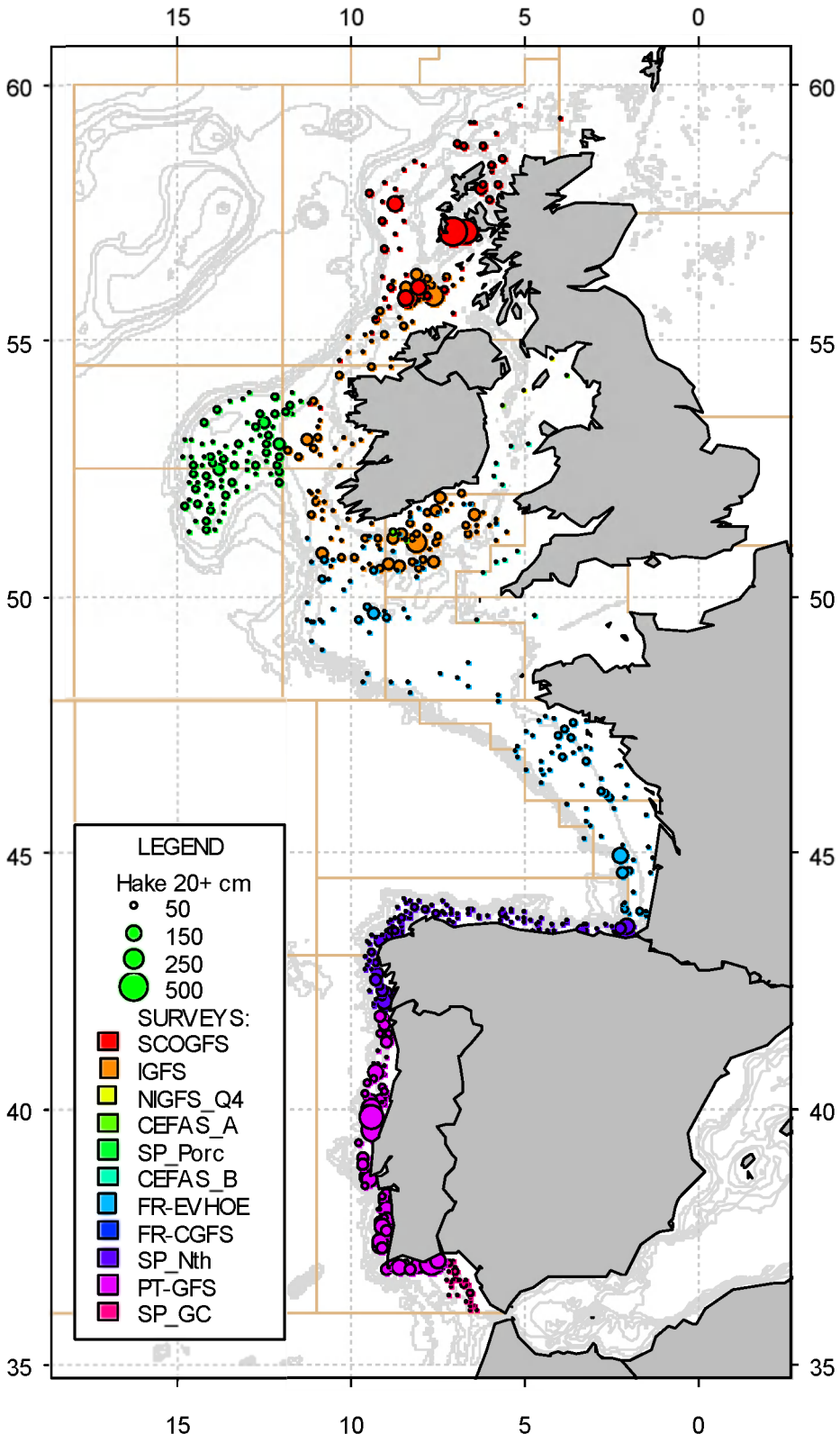


Figure 4.3.8.9. Catches in numbers per hour of 1+ group hake, *Merluccius merluccius* (≥20 cm), in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

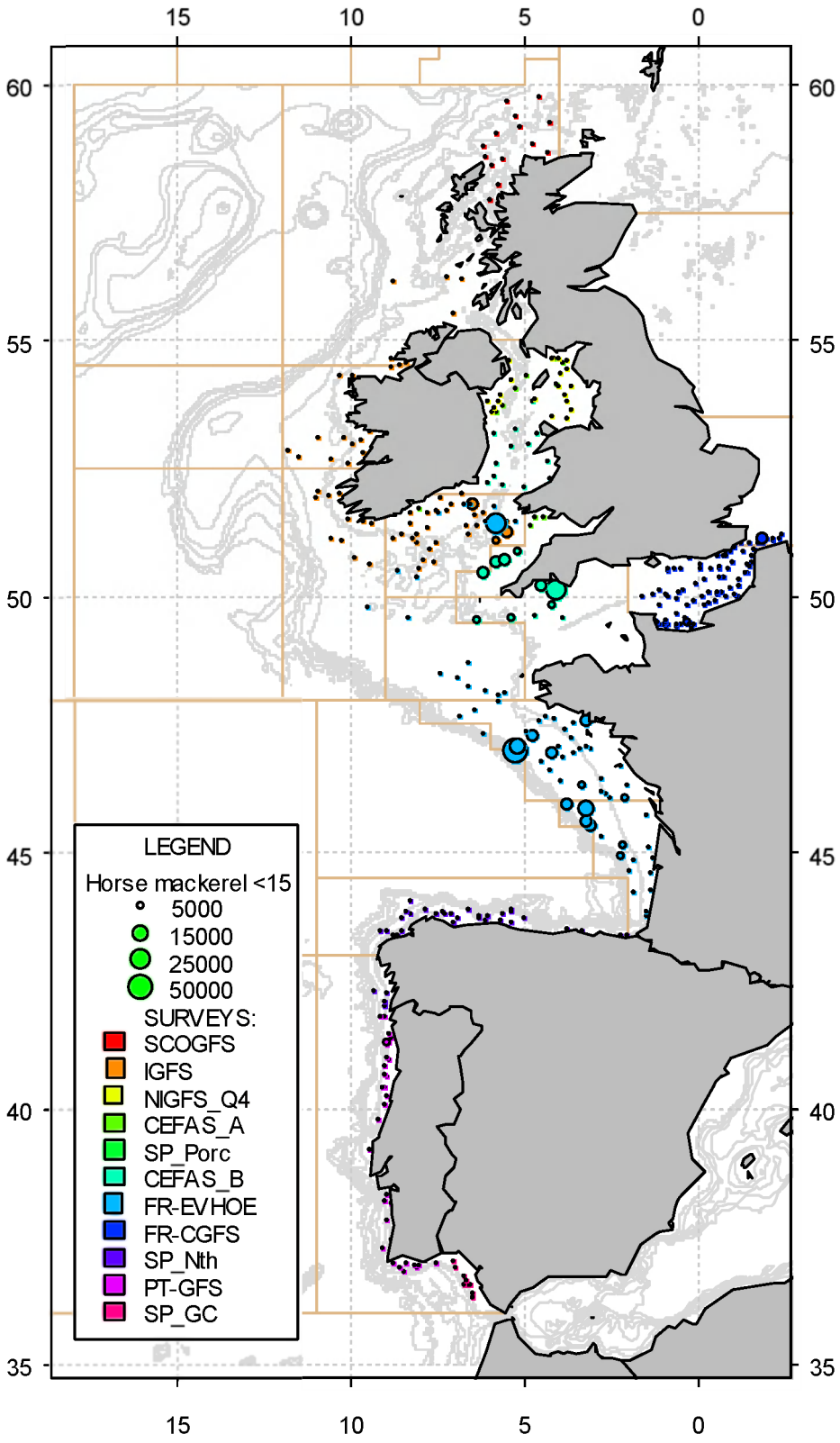


Figure 4.3.8.10. Catches in numbers per hour of 0-group horse mackerel, *Trachurus trachurus* (<15 cm), in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

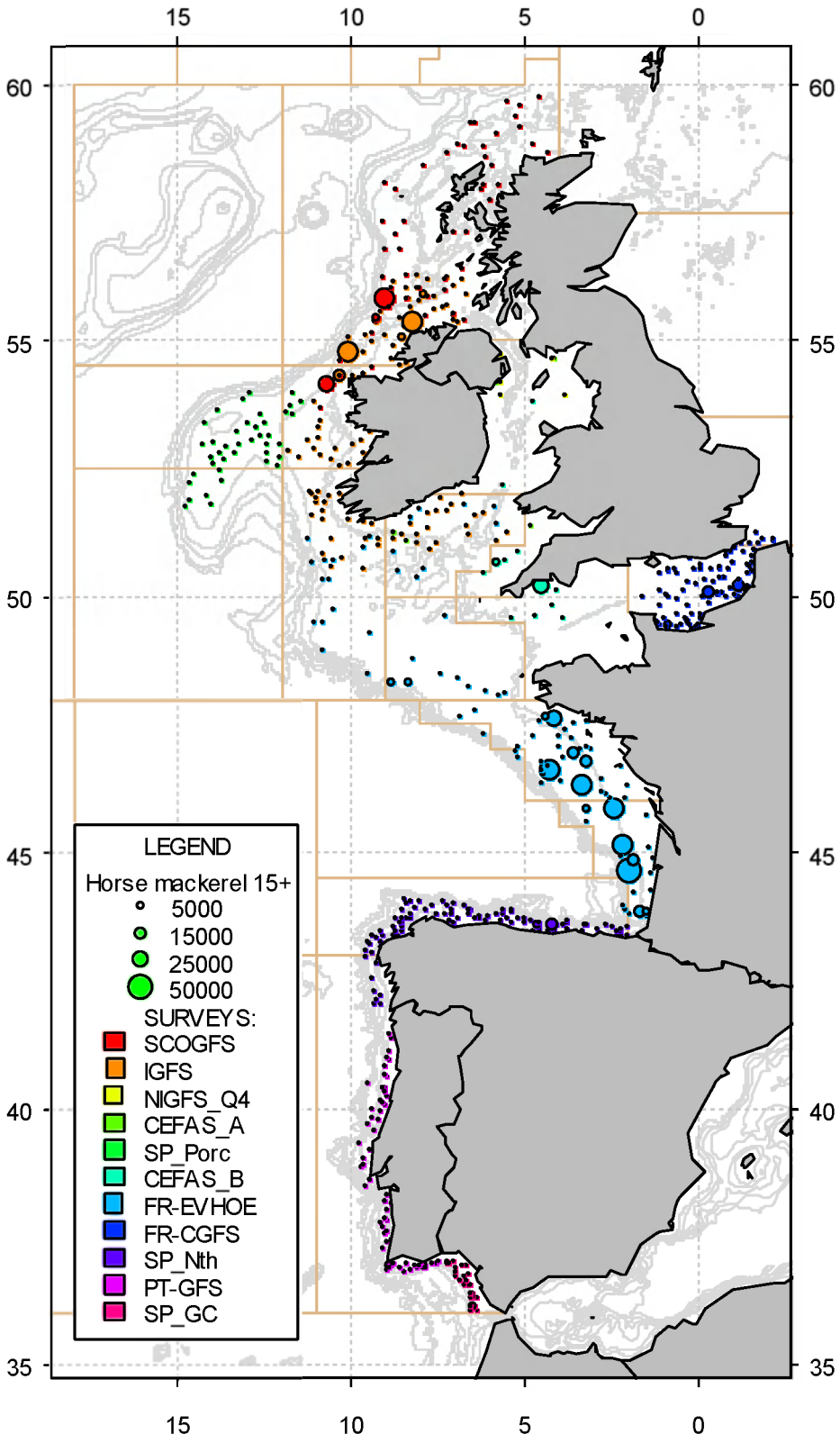


Figure 4.3.8.11. Catches in numbers per hour of 1+ group horse mackerel, *Trachurus trachurus* (≥15 cm), in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

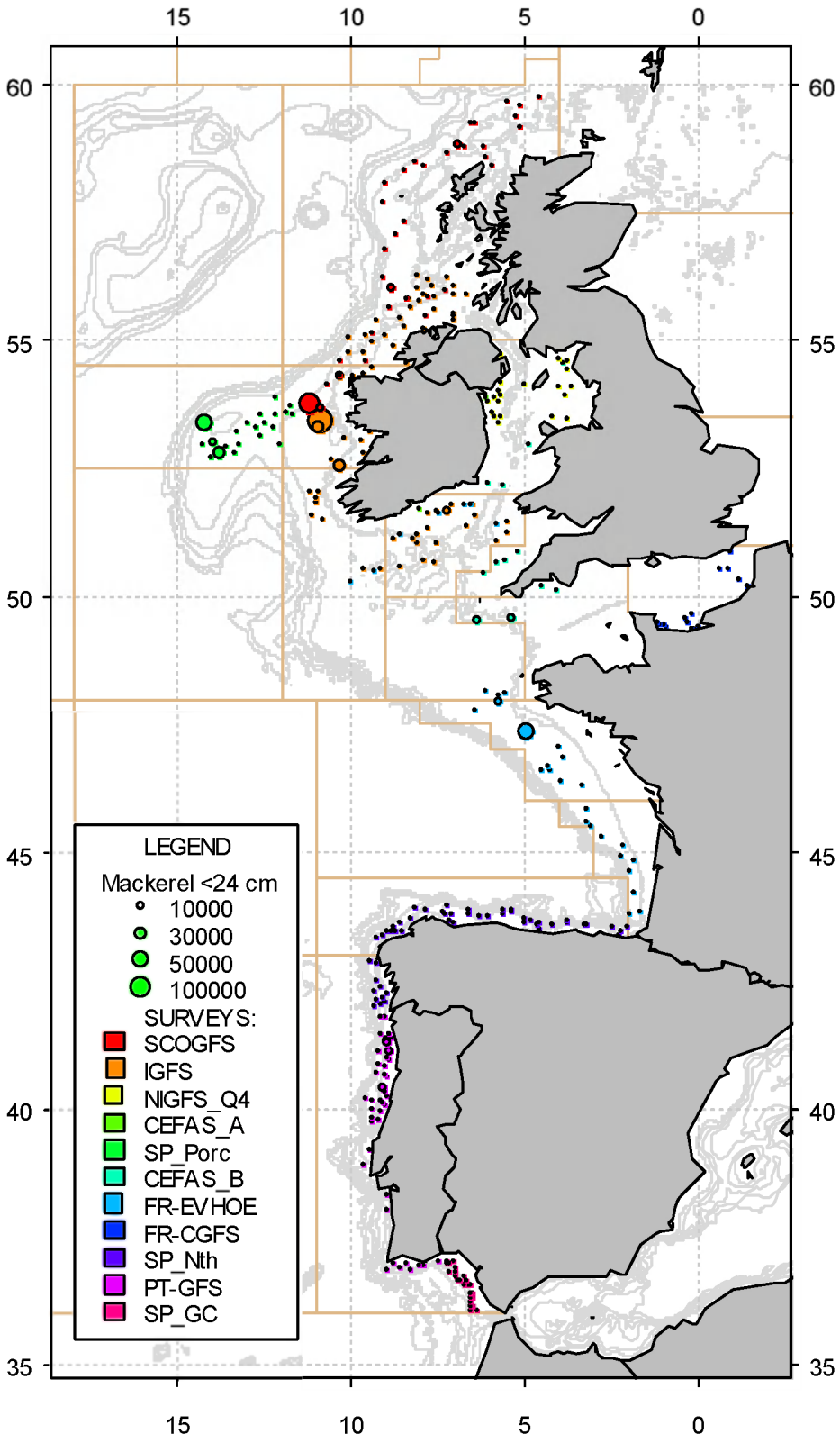


Figure 4.3.8.12. Catches in numbers per hour of 0-group mackerel, *Scomber scombrus* (<24 cm), in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

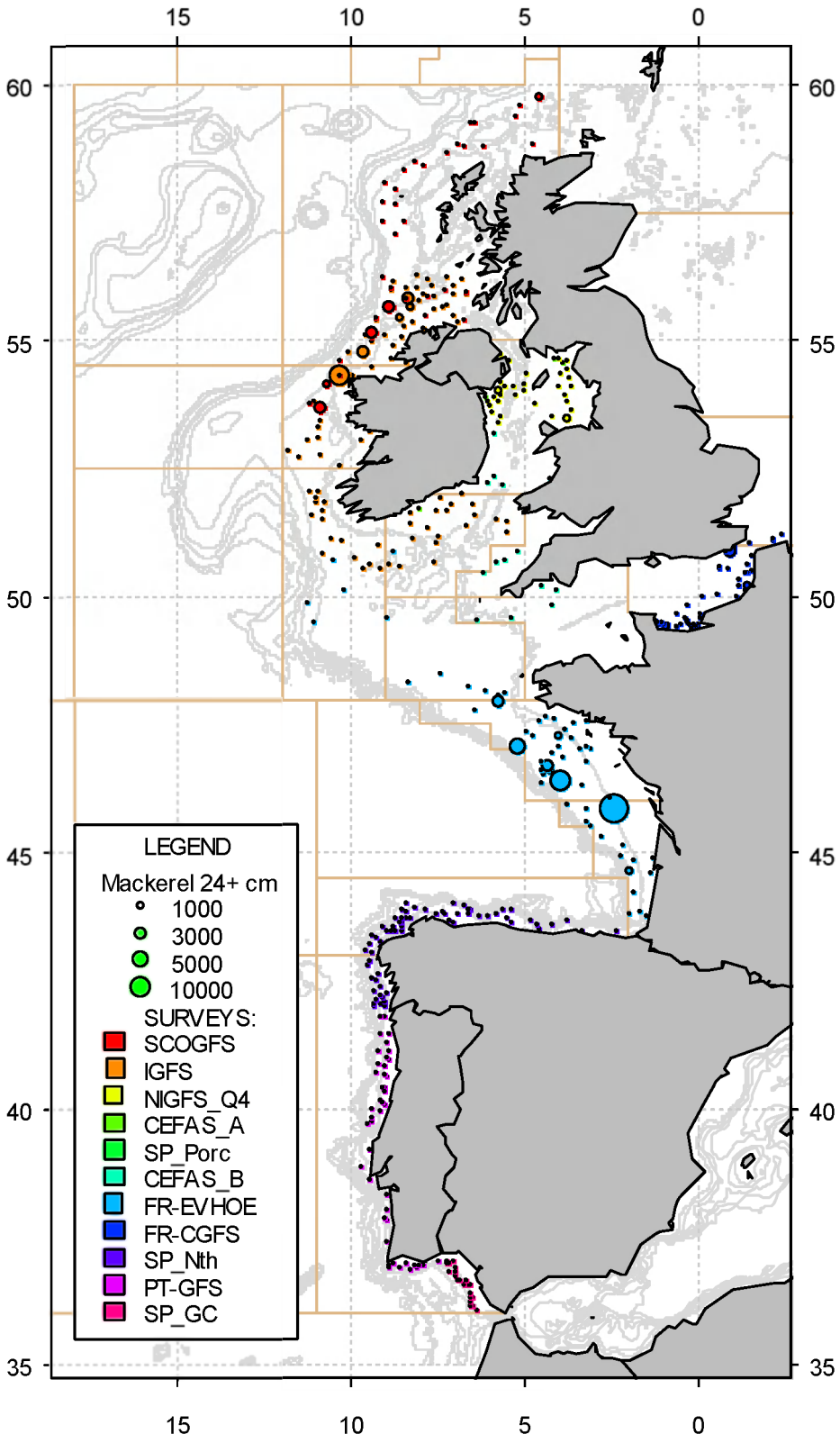


Figure 4.3.8.13. Catches in numbers per hour of 1+ group mackerel, *Scomber scombrus* (≥24 cm), in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

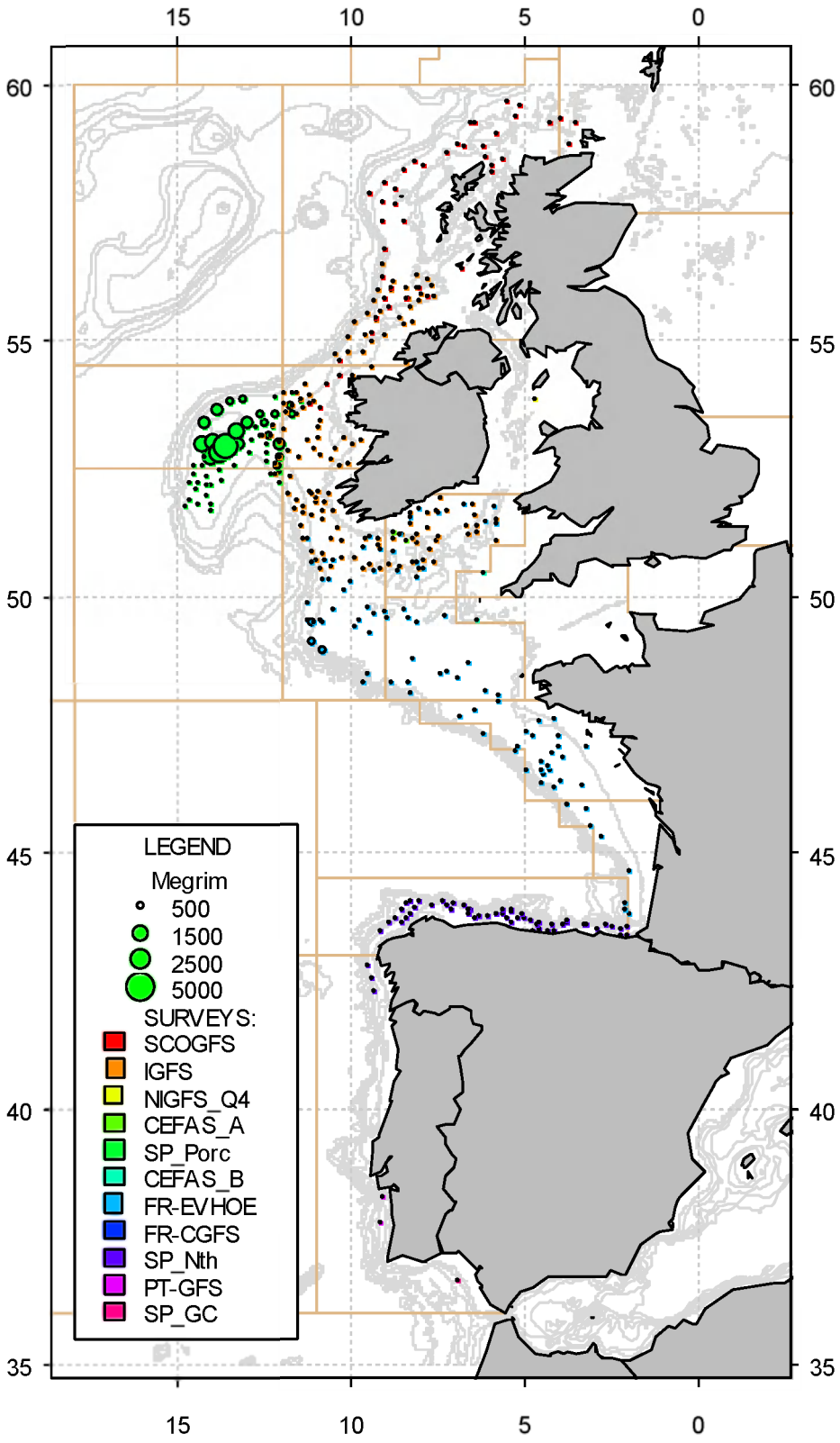


Figure 4.3.8.14. Catches in numbers per hour of megrim, *Lepidorhombus whiffiagonis*, in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

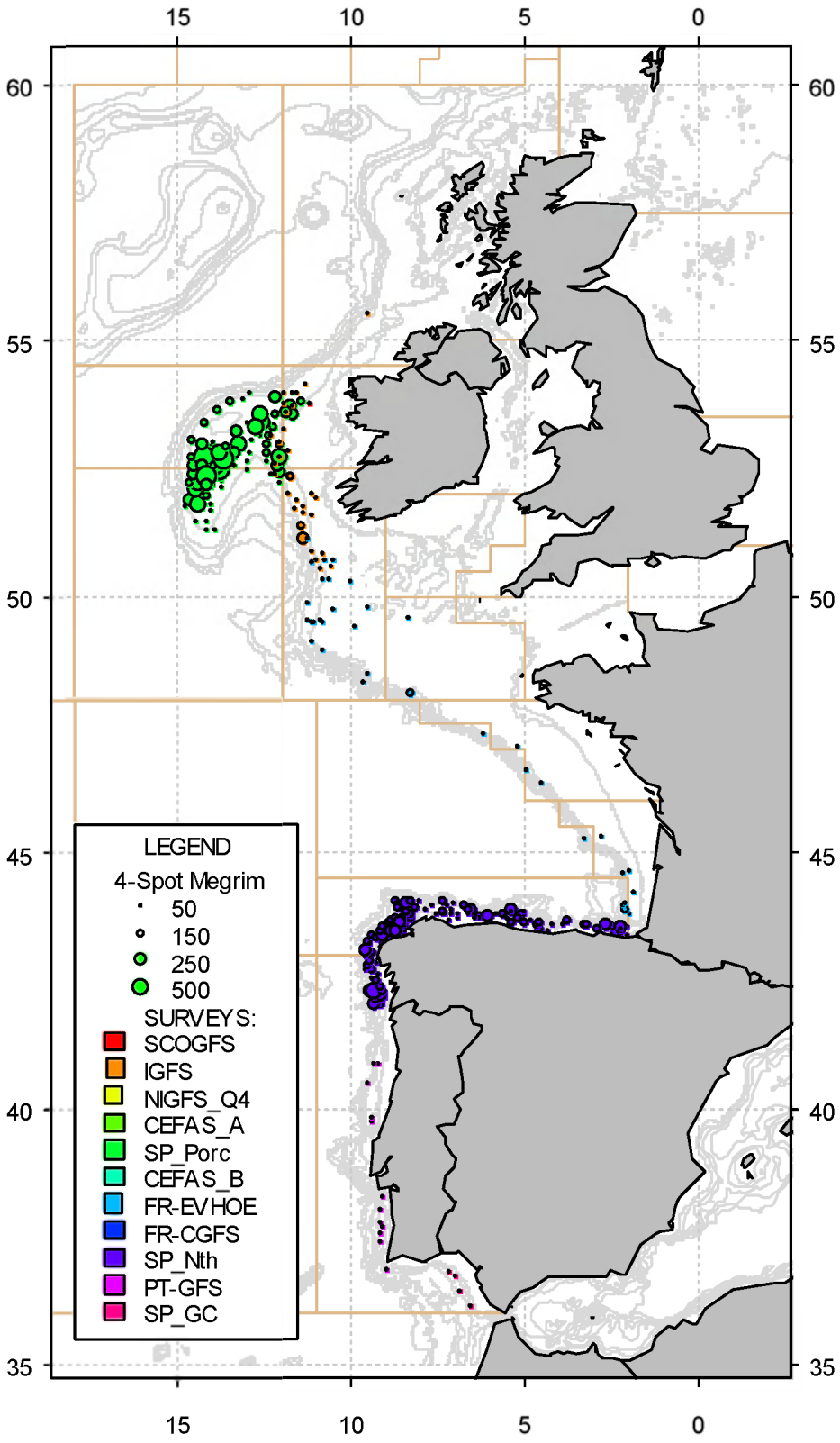


Figure 4.3.8.15. Catches in numbers per hour of four-spotted megrim, *Lepidorhombus boscii*, in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

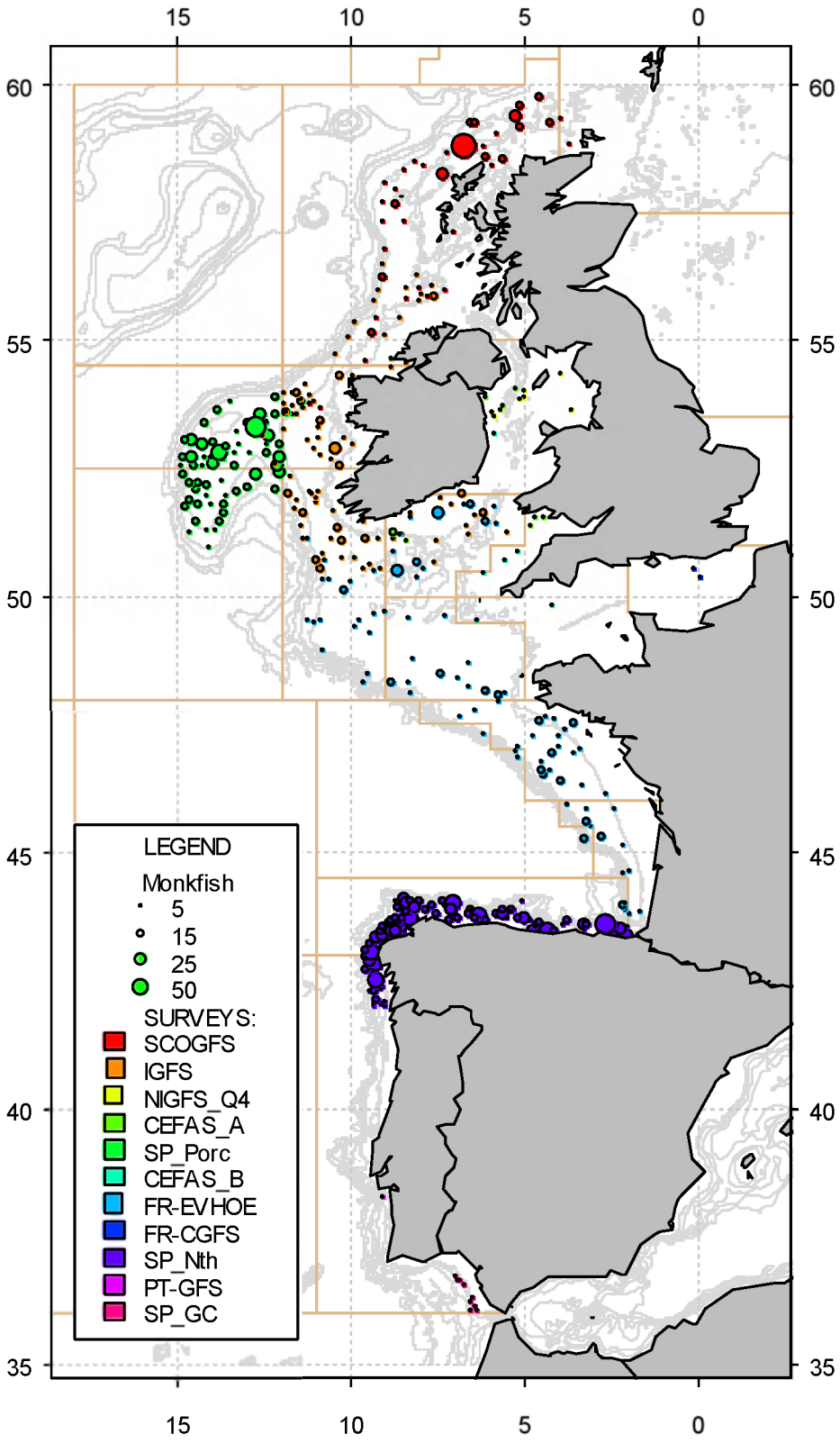


Figure 4.3.8.16. Catches in numbers per hour of monkfish, *Lophius piscatorius*, in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

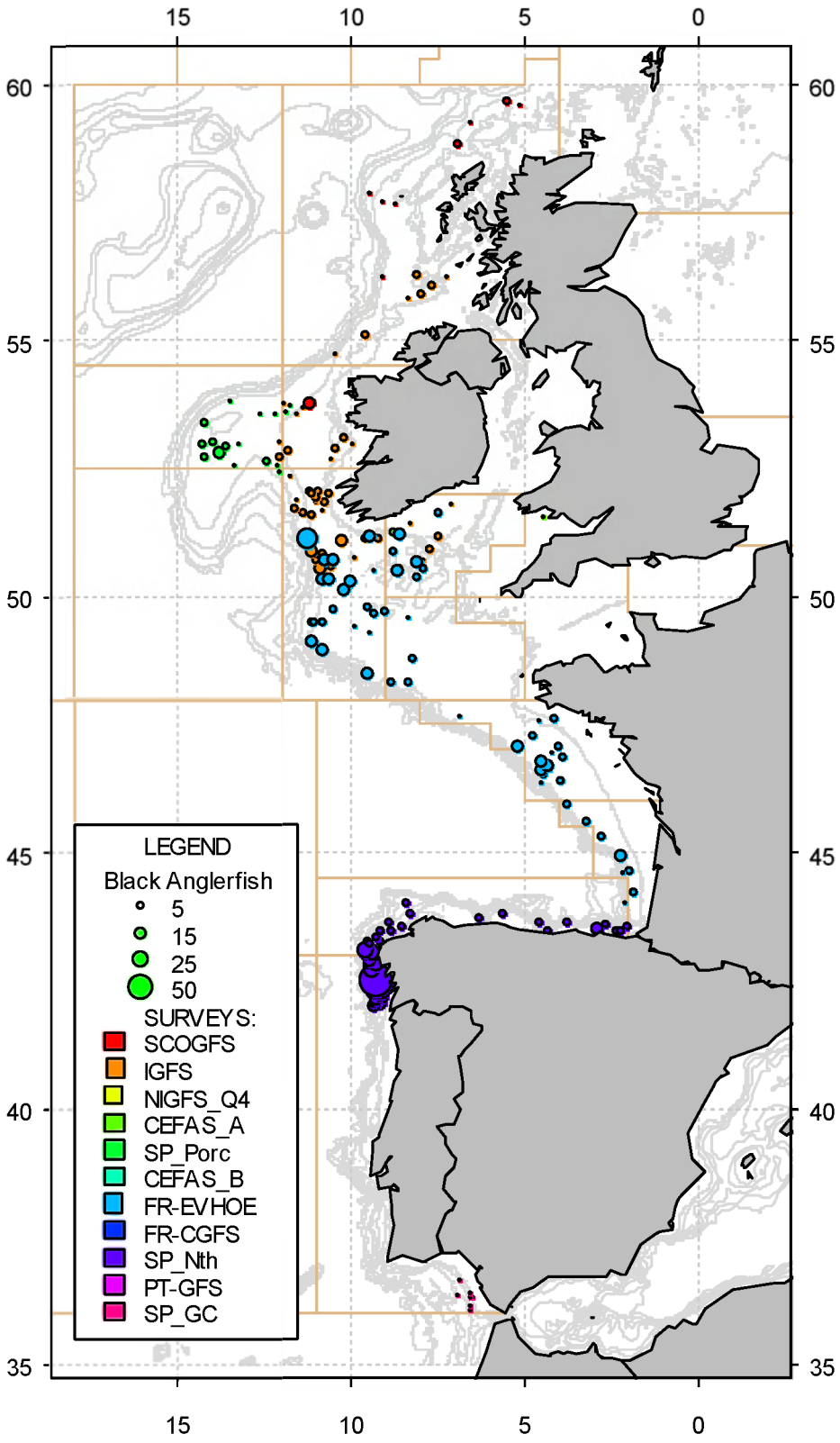


Figure 4.3.8.17. Catches in numbers per hour of black anglerfish, *Lophius budegassa*, in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

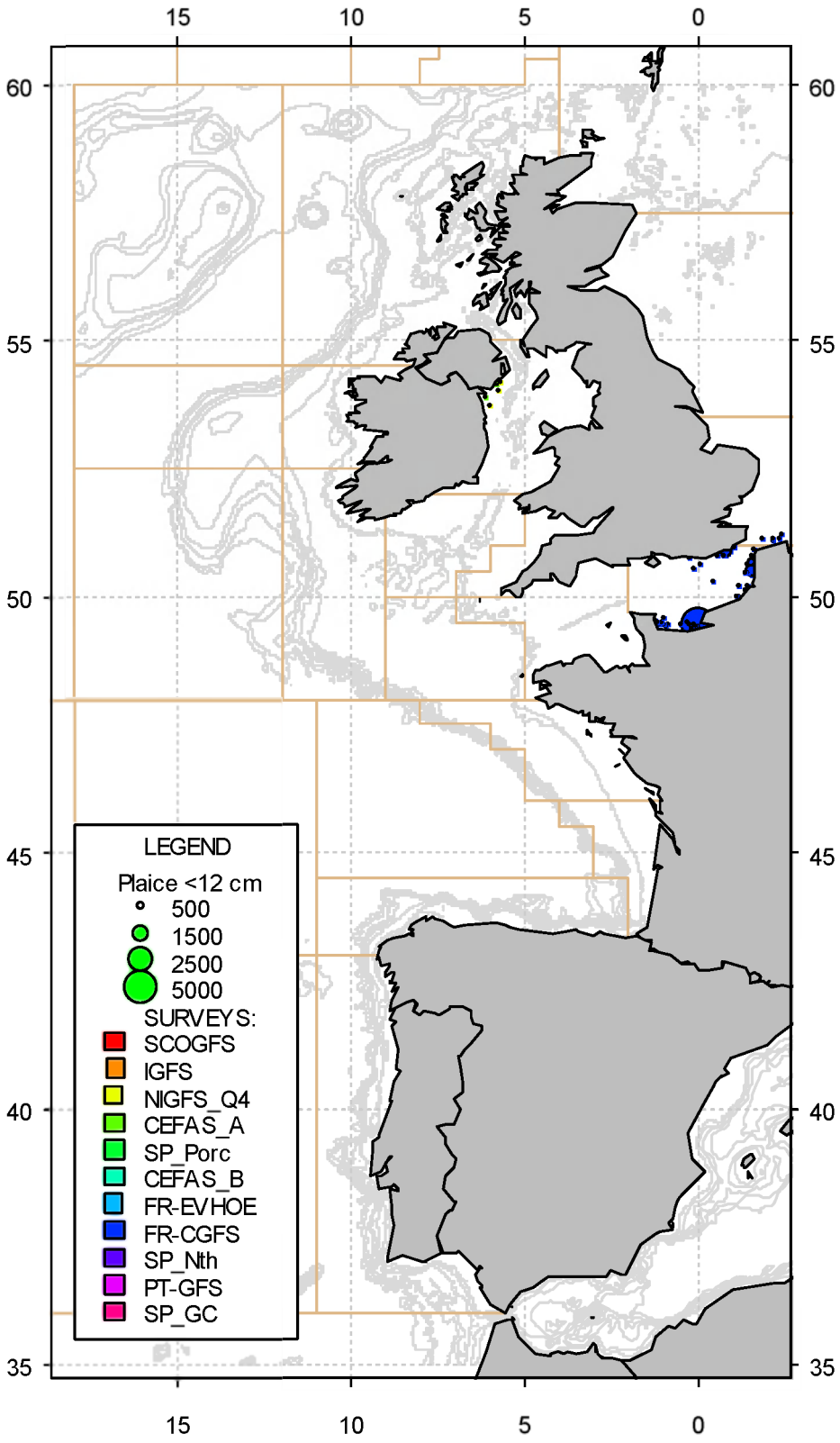


Figure 4.3.8.18. Catches in numbers per hour of 0-group plaice, *Pleuronectes platessa* (<12 cm), in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

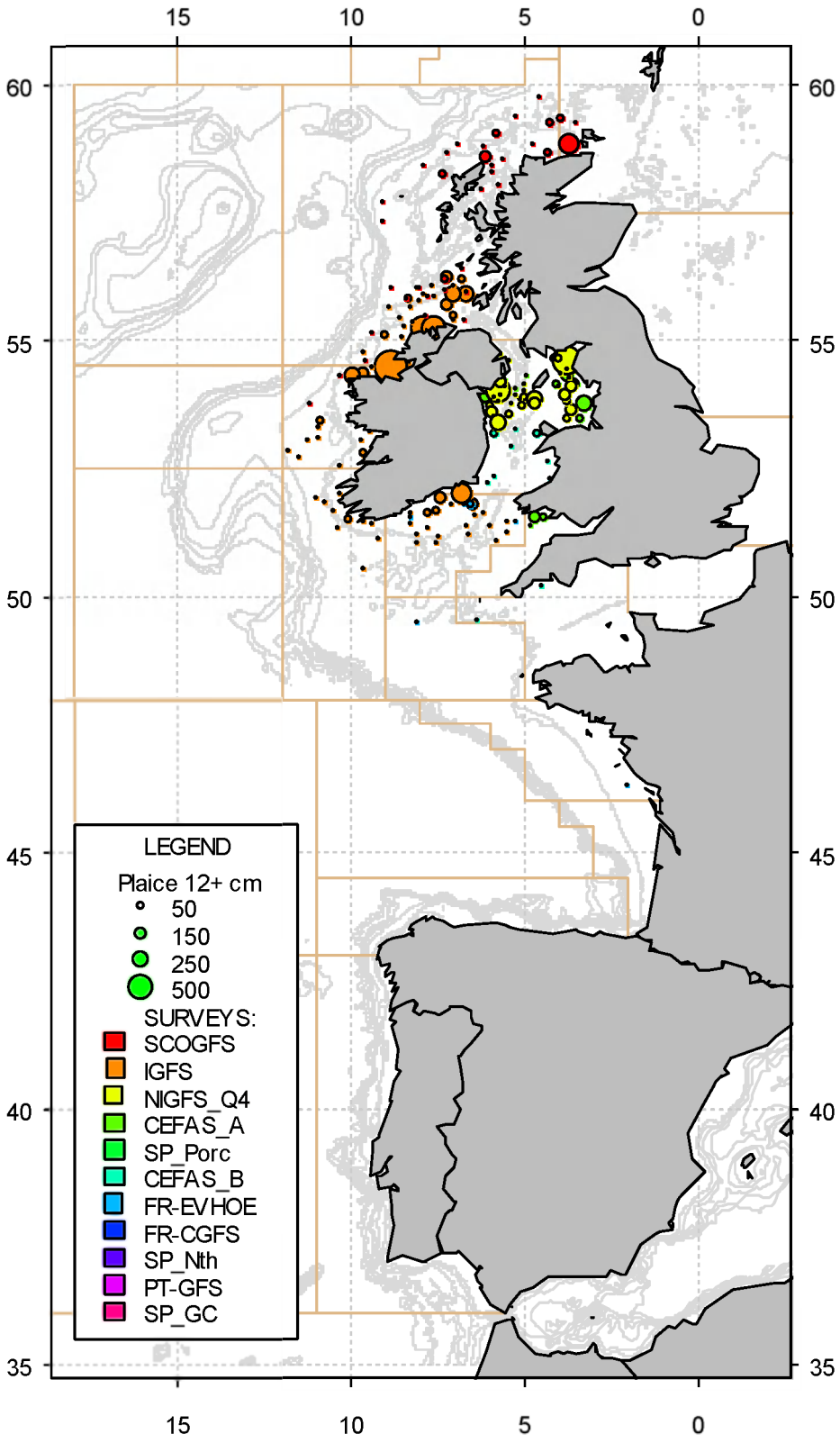


Figure 4.3.8.19. Catches in numbers per hour of 1+ group plaice, *Pleuronectes platessa* (≥12 cm), in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

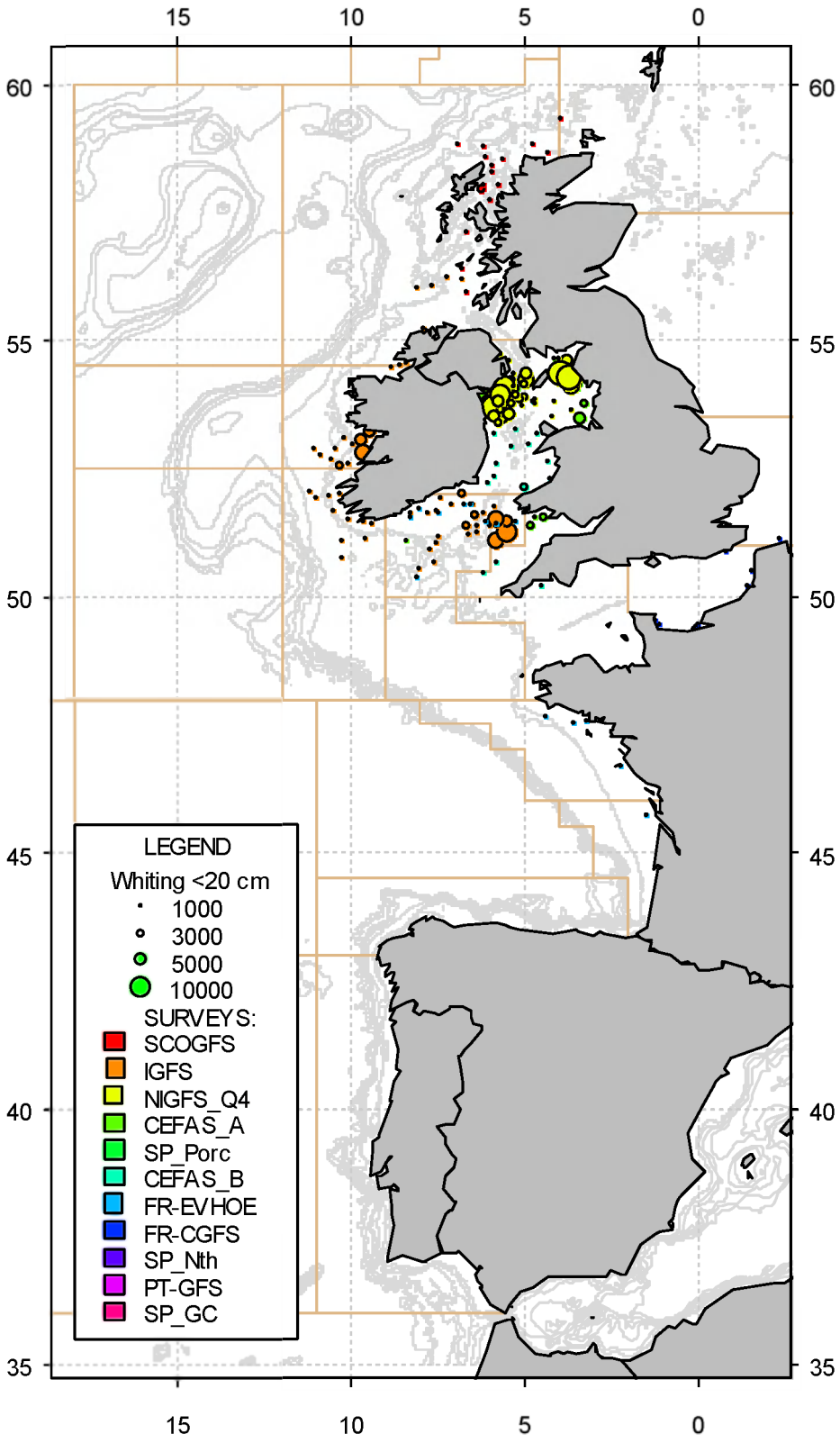


Figure 4.3.8.20. Catches in numbers per hour of 0-group whiting, *Merlangius merlangus* (<20 cm), in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

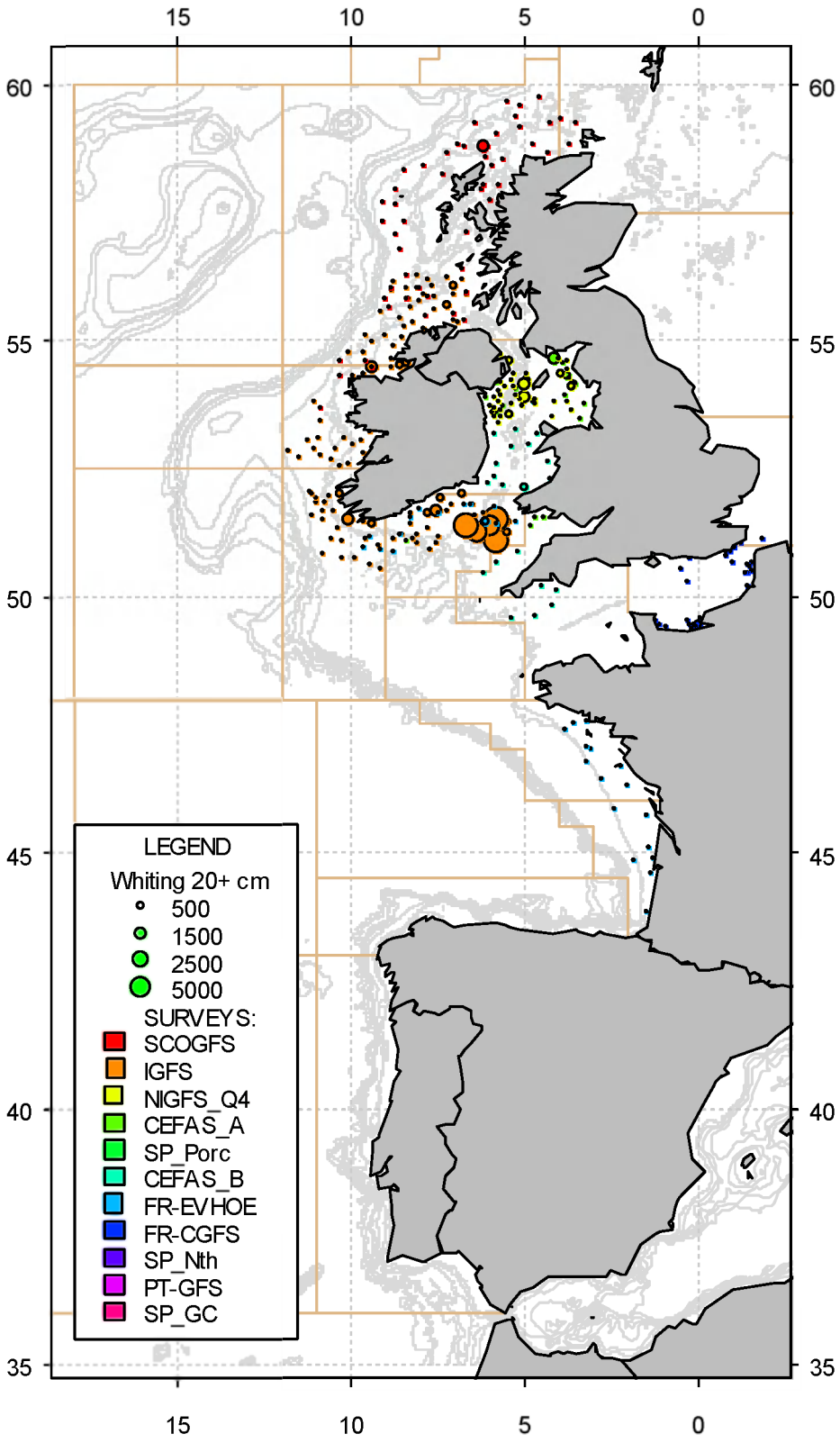


Figure 4.3.8.21. Catches in numbers per hour of 1+ group whiting, *Merlangius merlangus* (≥20 cm), in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

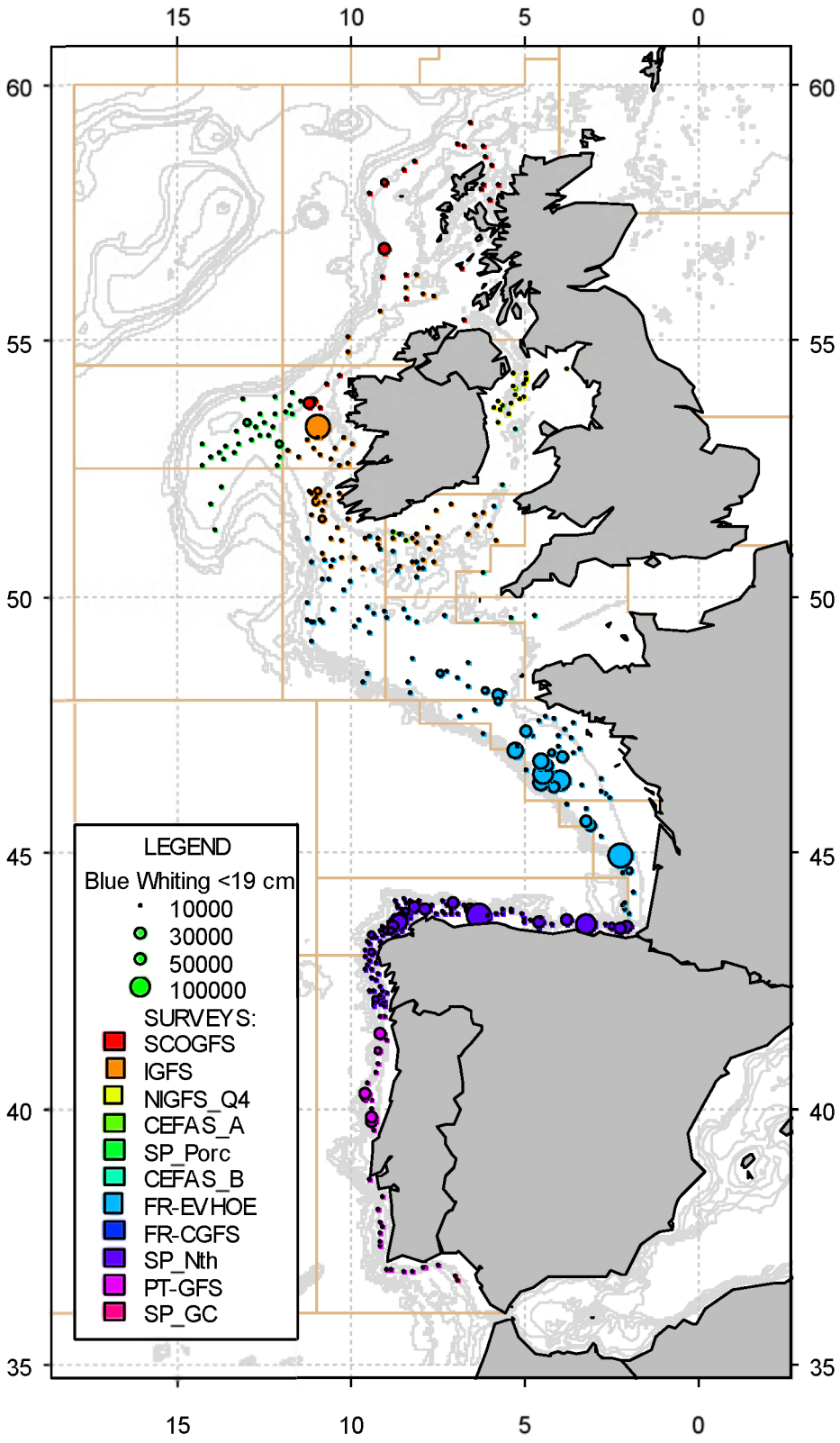


Figure 4.3.8.22. Catches in numbers per hour of 0-group blue whiting, *Micromesistius poutassou* (<19 cm), in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

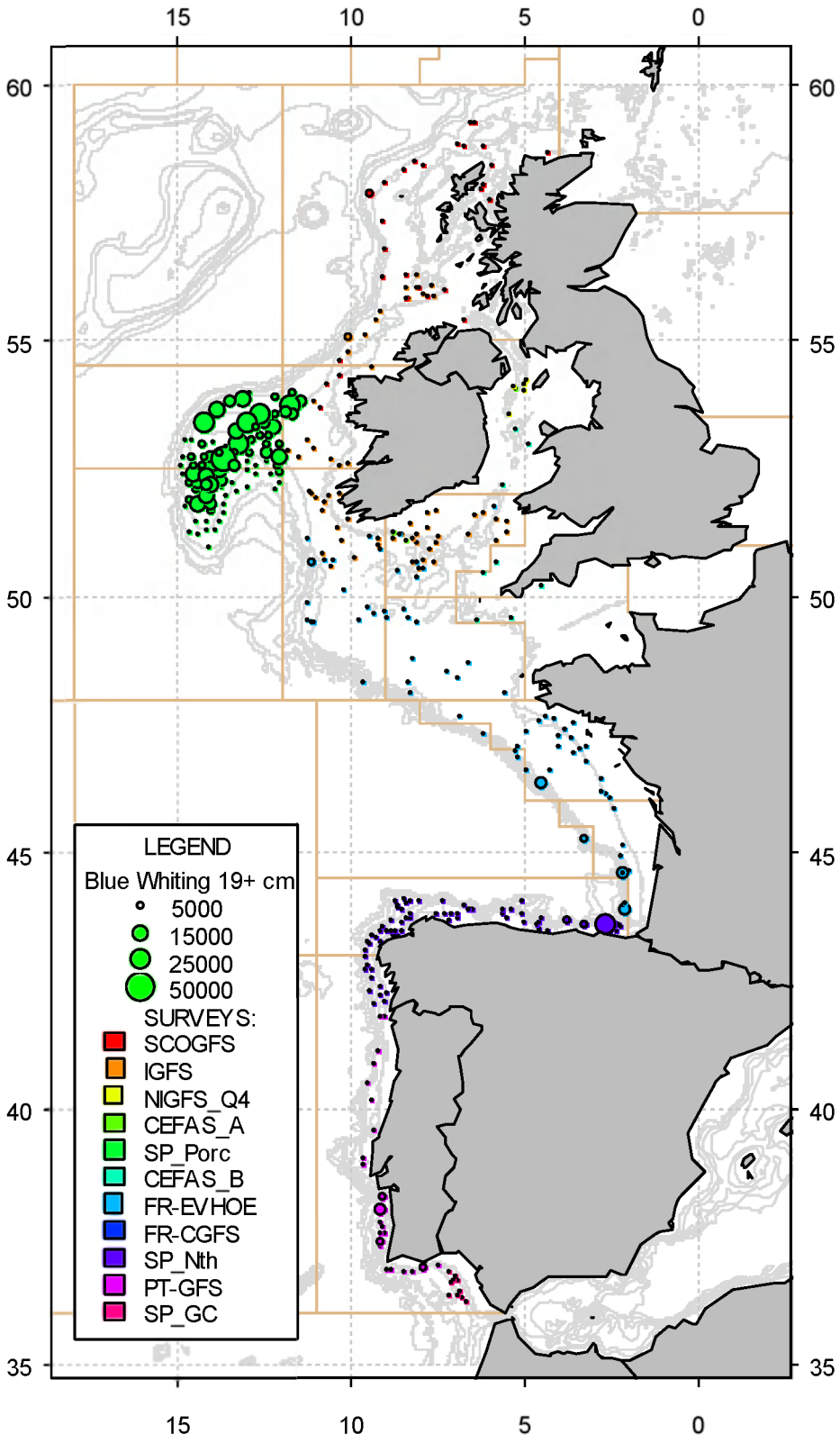


Figure 4.3.8.23. Catches in numbers per hour of 1+ group blue whiting, *Micromesistius poutassou* (≥19 cm), in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

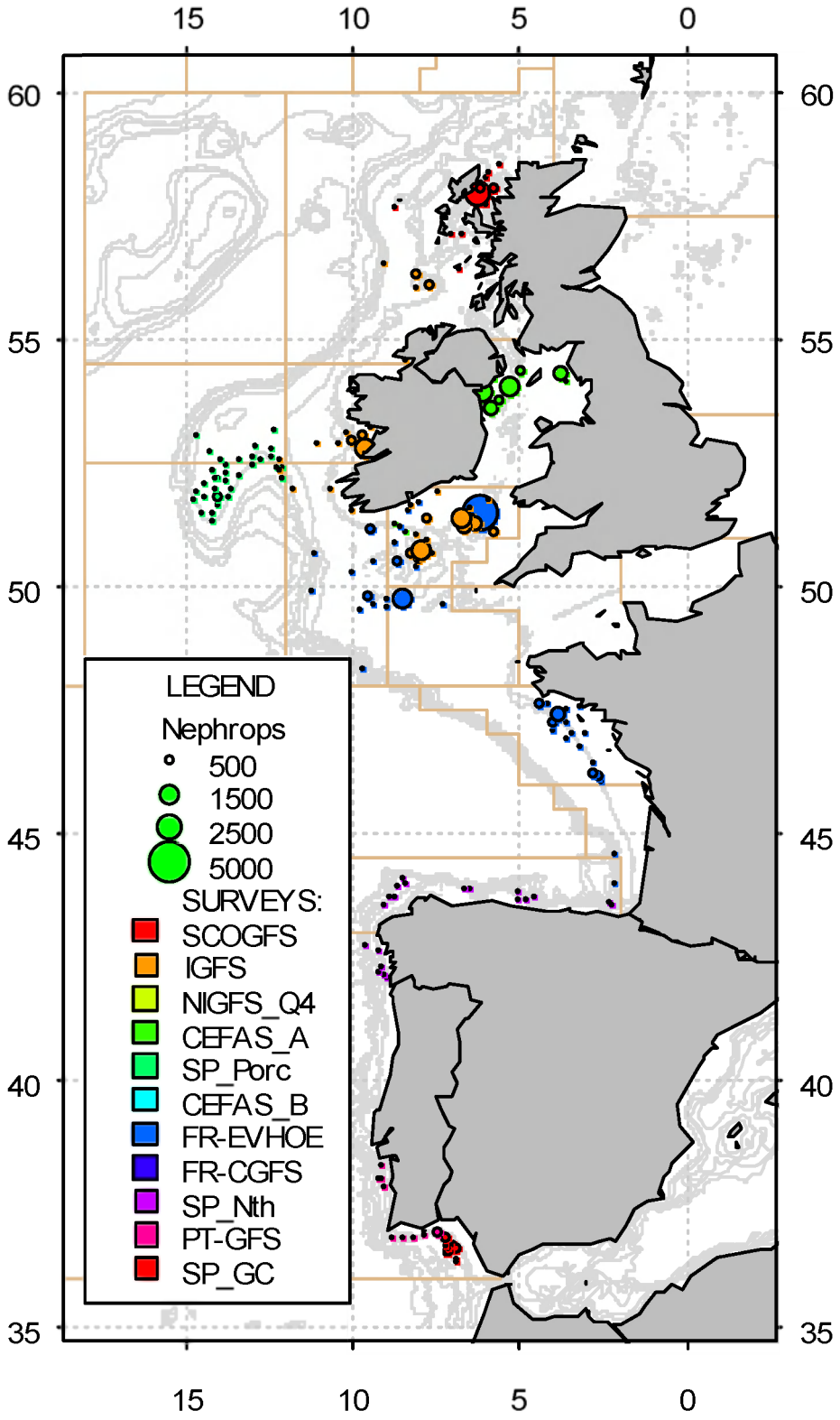


Figure 4.3.8.24. Catches in numbers per hour of Nephrops, *Nephrops norvegicus*, in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

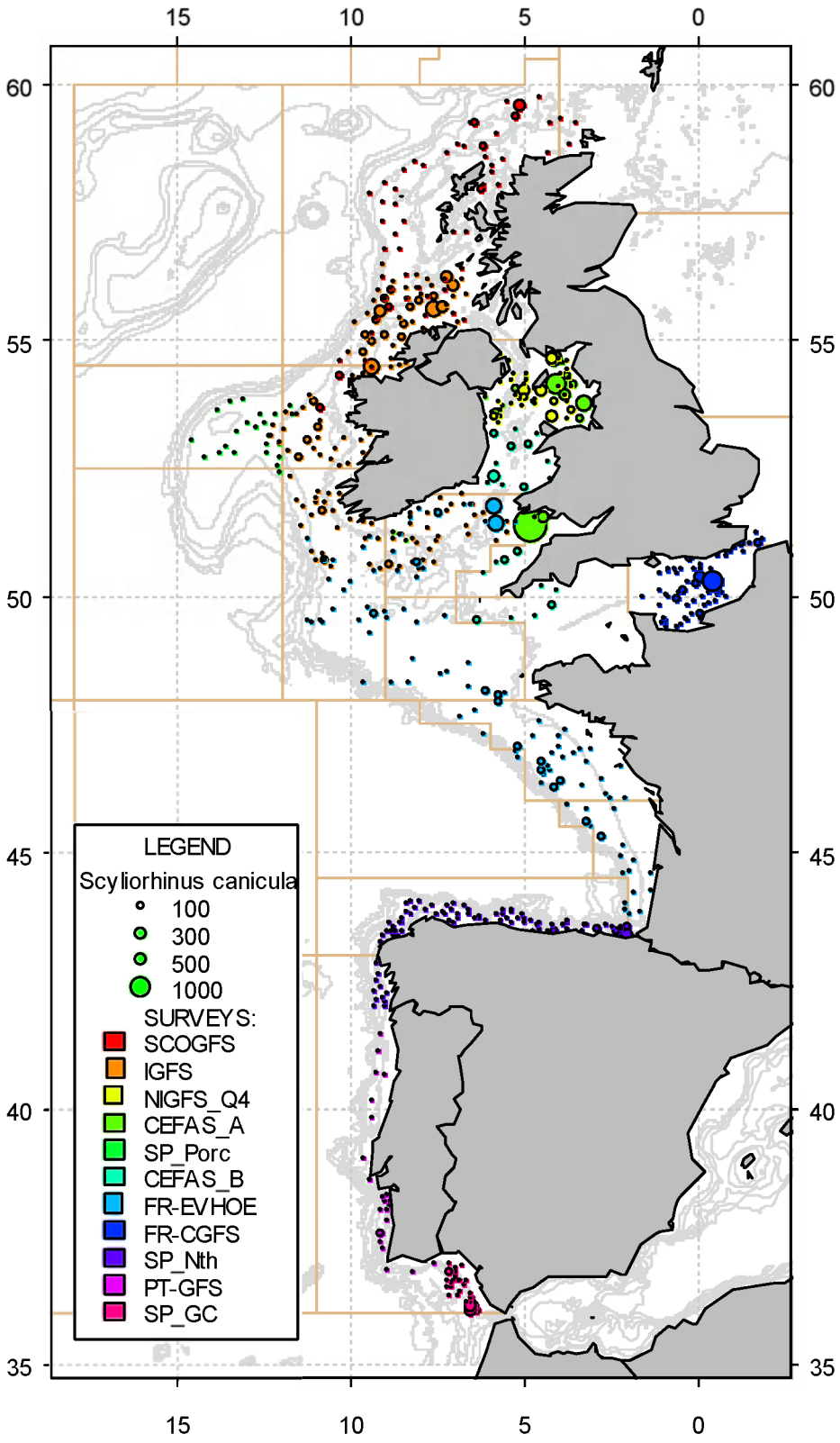


Figure 4.3.8.25. Catches in numbers per hour of lesser spotted dogfish, *Scyliorhinus canicula*, in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

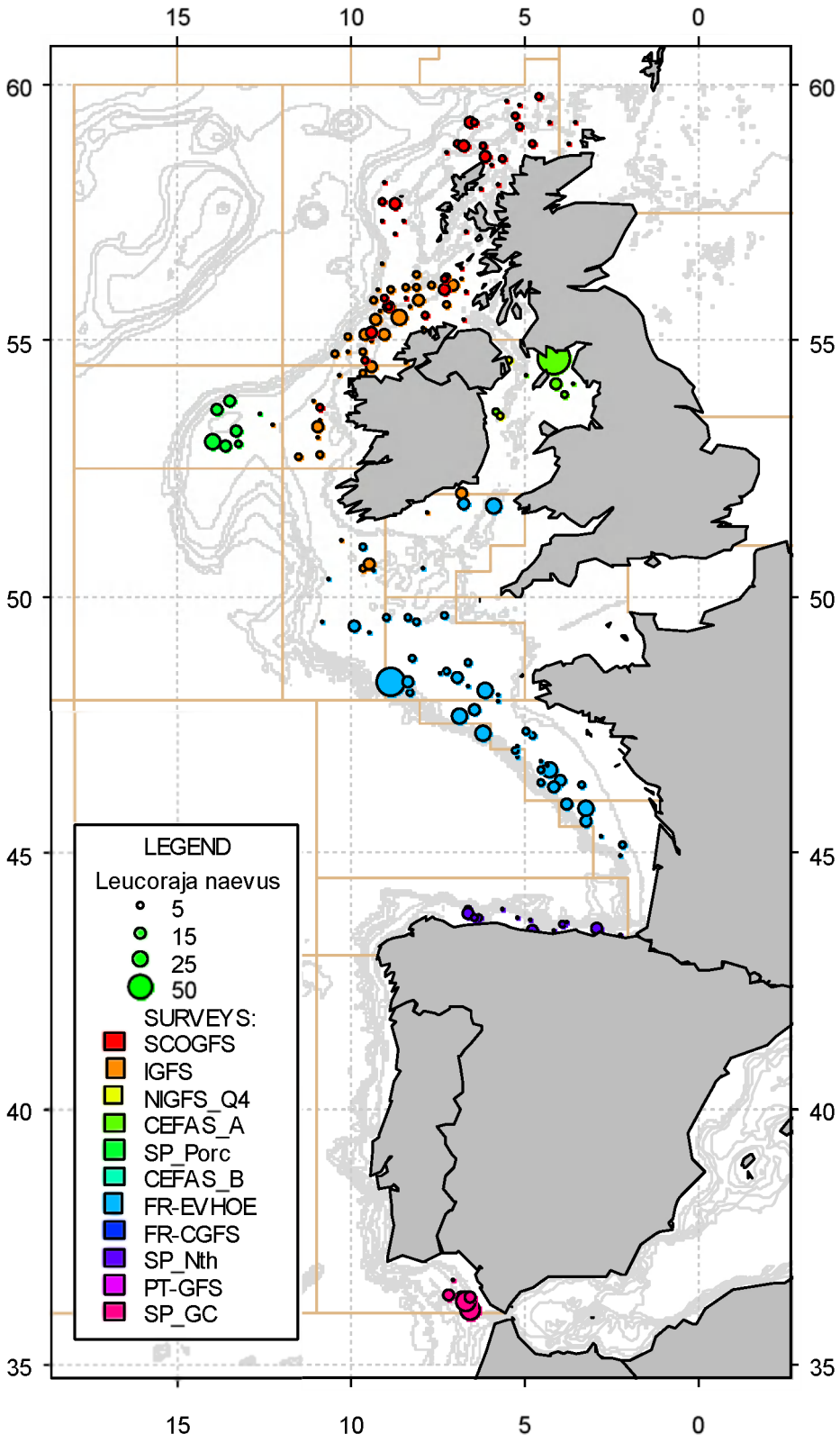


Figure 4.3.8.26. Catches in numbers per hour of cuckoo ray, *Leucoraja naevus*, in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

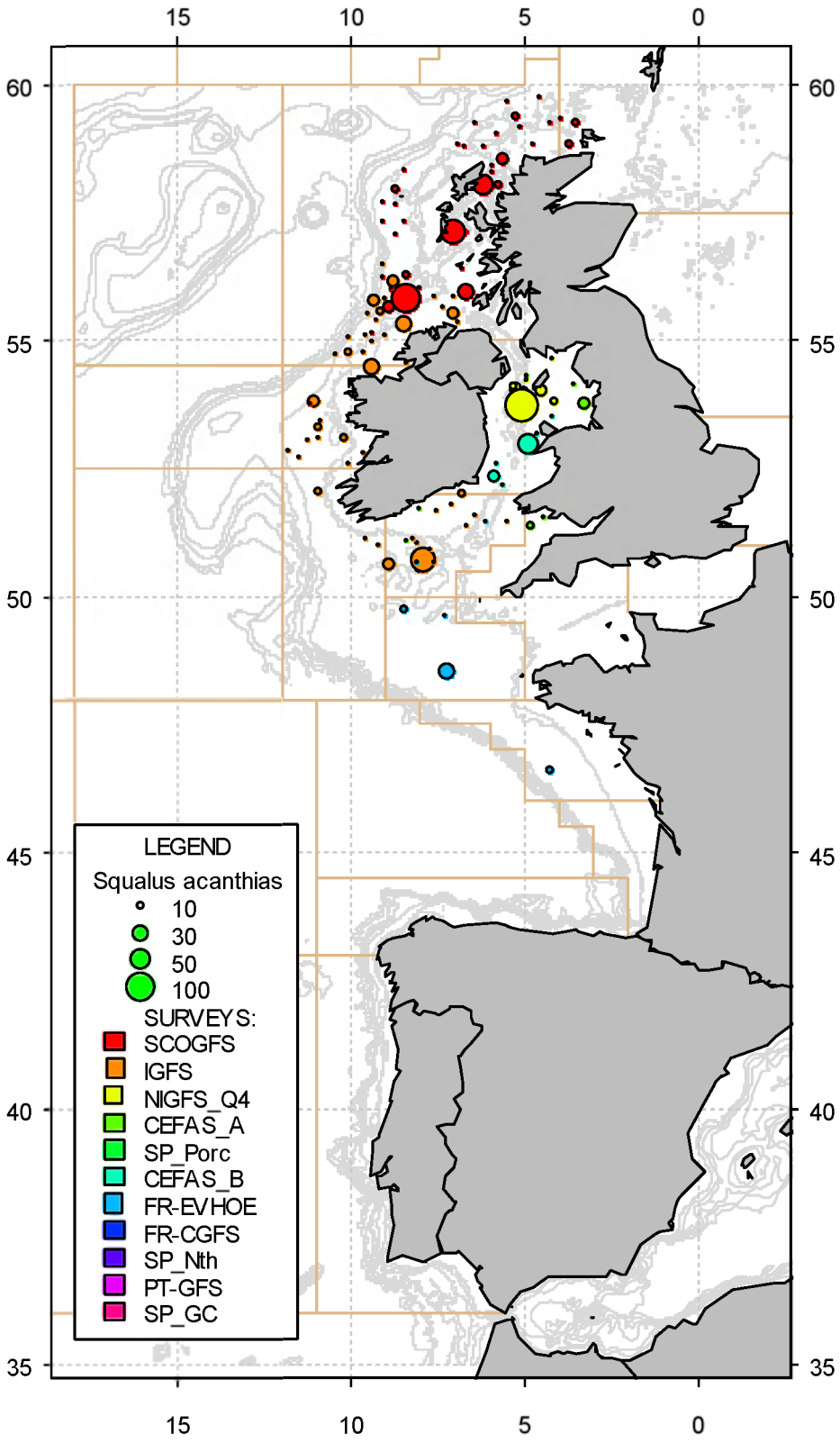


Figure 4.3.8.27. Catches in numbers per hour of spurdog, *Squalus acanthis*, in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

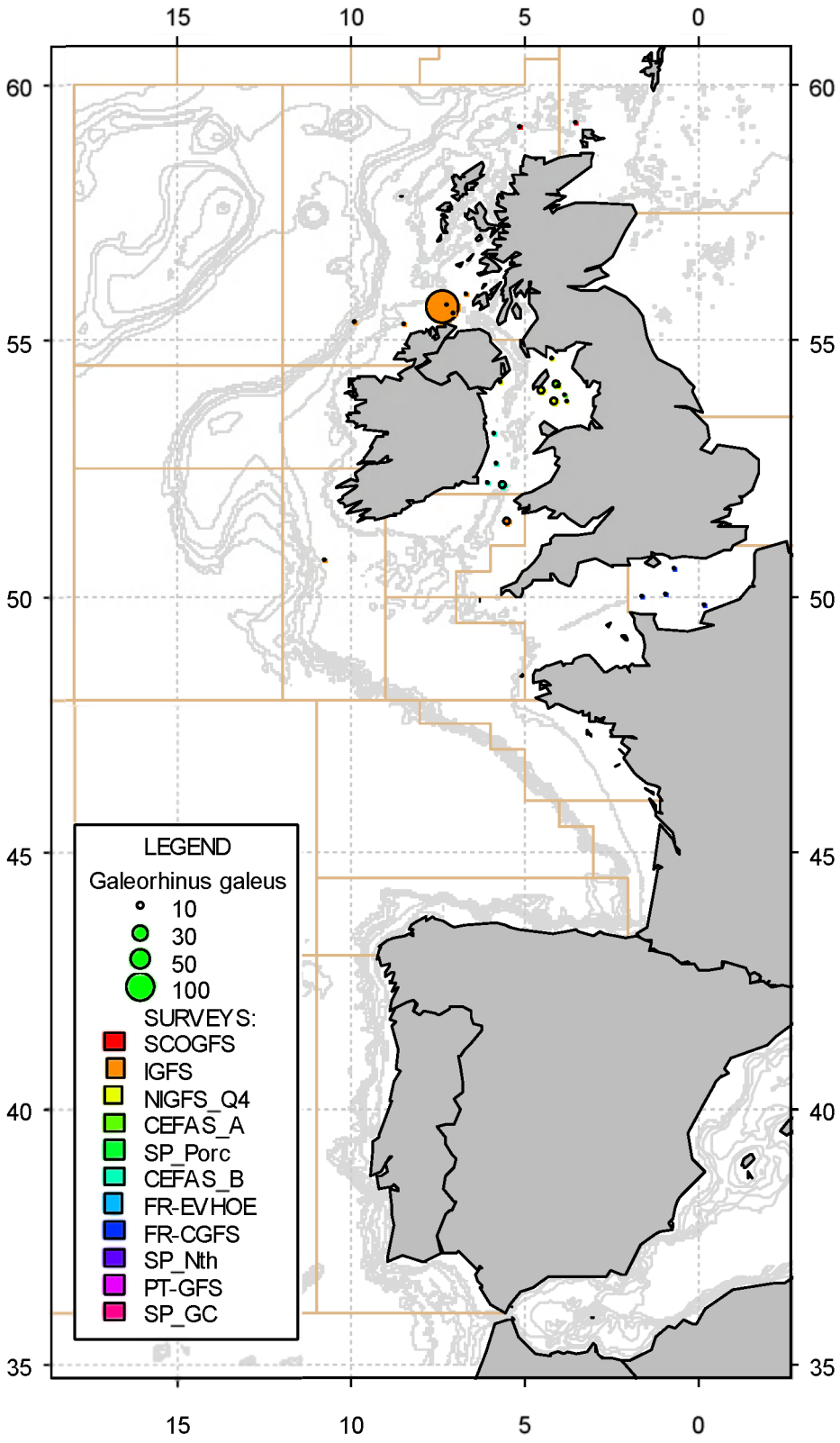


Figure 4.3.8.28. Catches in numbers per hour of tope, *Galeorhinus galeus*, in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

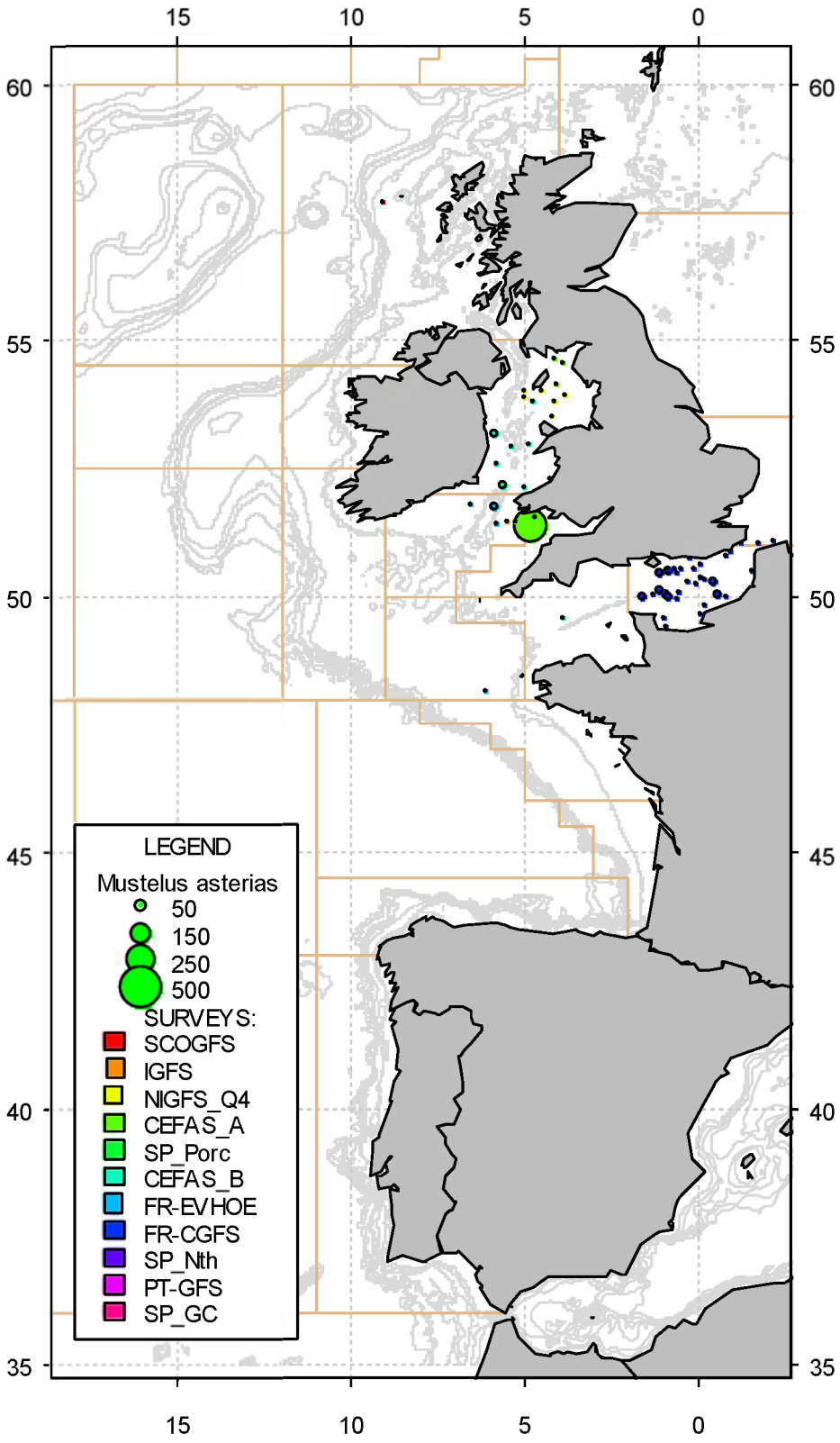


Figure 4.3.8.29. Catches in numbers per hour of starry smooth hound, *Mustelus asterias*, in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

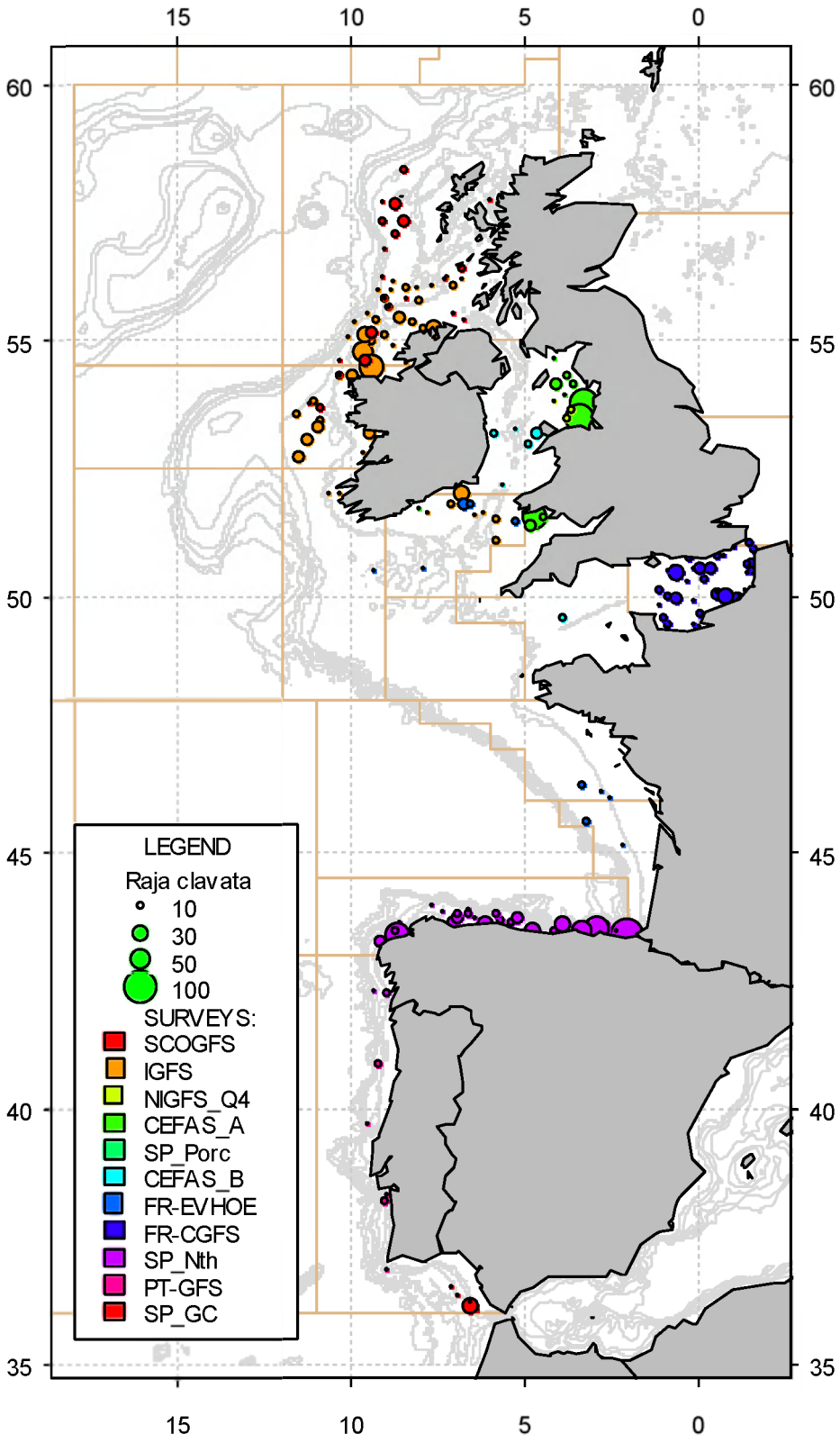


Figure 4.3.8.30. Catches in numbers per hour of thornback ray, *Raja clavata*, in autumn/winter 2006 IBTS surveys. The catchability of the different gears used in these surveys is not constant; therefore these maps do not reflect proportional abundance in all the areas but within each survey.

Annex 5: IMARES data access policy

Wageningen IMARES terms concerning data submitted to ICES

Wageningen IMARES (Institute for Marine Resources and Ecosystem Studies) has reviewed the new ICES data policy and is in general positive towards an open data policy as it will encourage the use of data. However, proper data interpretation requires insight in sampling design, compilation and analysis, and in order to avoid misinterpretation of the data by the users, Wageningen IMARES defines access procedures for its data submitted to ICES.

Wageningen IMARES therefore requests ICES to treat all *survey*-data submitted by Wageningen IMARES according to the following:

	USER CATEGORY	
	1) ICES work	**2) Non-ICES work**
a) Aggregated data for dominant species	**Free access through ICES**	**Free access through ICES, 3 year time lag**
b) Aggregated data for all species	**Free access through ICES**	**On request through ICES**
c) Raw data	**Free access through ICES**	**On request through ICES**

Notes:

USER CATEGORIES:

1) ICES-work: all the work performed within ICES context. Users include Data suppliers to the same dataset and members of all ICES Working Groups.

2) Non-ICES work: all the work performed outside of the ICES context. Users include the general public and other parties.

TYPE OF DATA:

a) Aggregated data for dominant species:

i) The minimum level of aggregation is ICES-rectangle or stratum, depending on the dataset.

ii) dominant species are:

- gadoids: *Gadus morhua, Melanogrammus aeglefinus, Merlangius merlangus, Trisopterus esmarki, Trisopterus minutus, Merluccius merluccius, Molva molva, Pollachius virens*;
- flatfish: *Limanda limanda, Hippoglossoides platessoides, Microstomus kitt, Pleuronectes platessa, Glyptocephalus cynoglossus, Lepidorhombus whiffiagonis*;
- other demersal species: *Eutrigla gurnardus, Lophius piscatorius, Lophius budegassa, Echiichthys vipera, Amblyraja radiata, Raja clavata, Scyliorhinus canicula*;
- pelagics: *Clupea harengus, Scomber scombrus, Trachurus trachurus, Sprattus sprattus.*

b) Aggregated data for all species

i) The minimum level of aggregation is ICES-rectangle or stratum, depending on the dataset:

ii) No species restrictions.

c) Raw data. These are: catch (numbers at length and/or numbers at age) data on a haul-by-haul basis, and SMALK (Sex, Maturity, Age-Length-Keys) data per individual.

ACCESS LEVELS:

i) Free access through ICES:

- ICES is free to supply the data to the user.
- The received data should be destroyed within 3 months, in order to avoid the existence of out-dated copies of the dataset.
- The users should provide feedback to the IMARES contact person regarding obvious mistakes in the data.

ii) Free access through ICES, 3 year time lag:

- ICES is free to supply the data to the user, excluding the three most recent years.
- The received data should be destroyed within 3 months, in order to avoid the existence of out-dated copies of the dataset.
- The users should provide feedback to the Wageningen IMARES contact person regarding obvious mistakes in the data.

iii) On request through ICES:

- Before ICES supplies the data to the user, the Wageningen IMARES contact person has to be informed on the request and has to approve the release of the data.
- The received data should be destroyed within three months, in order to avoid the existence of out-dated copies of the dataset.
- The users should provide feedback to the Wageningen IMARES contact person regarding obvious mistakes in the data.
- Regarding data type c): Raw data: Wageningen IMARES retains "intellectual property rights" of the data and users must at least acknowledge Wageningen IMARES or the ICES data base that contains the data.

Annex 6: Trawl Survey Details

INTERNATIONAL BOTTOM TRAWL SURVEY

The IBTS consists of a number of national surveys that aim at improving standardisation and collaboration between surveys. There are two IBTS areas; IBTS North Sea and IBTS Western and Southern.

Although there are marked similarities between these two areas and both are represented in the ICES IBTS working group it was established at the 1999 meeting of this working group that due to the considerable difficulties in merging the protocols used in the North Sea with those used in the western and southern divisions, two separate manuals are the standard.

IBTS North Sea

History

In the North Sea the IBTS started in the 1960's as a survey that was directed at juvenile herring and was at that time called the International Young Herring Survey (IYHS). The survey also yielded valuable information for other fish species, such as cod and haddock, and the objectives were broadened and the survey was renamed into the International Young Fish Survey (IYFS). Besides the IYFS, which was carried out in the first quarter, a number of national surveys developed in the 1970s and 1980s that were mainly carried out in the third quarter. In 1990 ICES decided to combine the international and the national surveys into the IBTS. The IBTS is carried out twice per year (1st and 3rd quarter) since 1997 and on a quarterly basis in the period 1991–1996. Data from these surveys are used by the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK).

Gear

Prior to 1977 there was no standardisation of gear although all ships used bottom trawls with a small mesh cover. In 1977 ICES recommended that all ships should use a GOV trawl as specified by the Institut des Peches Maritimes, Boulogne. A detailed description of the net is to be found in the manual (Anon. 2004). The GOV trawl has been gradually phased in, e.g. in 1979 only 3 vessels were equipped with the GOV trawl, but by 1983 all 8 nations were using this gear. It should be noted that although the gear is now standard, variations in the rigging exist between the various countries.

Sampling protocol

The fishing method is also standardized and described in the manual (Anon. 2004). Fishing speed is 4 knots over the ground. In 1977 ICES also recommended that the duration of a tow should be reduced from an hour to half an hour with the catch data to be expressed in numbers per hour. All nations accepted this recommendation although it was a number of years before 30 minutes became the standard.

IBTS Western and Southern areas

In 1994, it was suggested to extend the remit of the IBTS working group to coordinate the surveys in the western and southern areas (i.e. Channel, Celtic Sea, Bay of Biscay, eastern Atlantic waters from the Shetlands to the strait of Gibraltar) and contacts were established with the national laboratories involved to coordinate and standardise these surveys.

International coordination of surveys in this region began in 1997 and was based on a previous EU project – SESITS (South-western European Shelf International Trawl Surveys). The surveys covered in this project concentrate on the third quarter and involve France, Spain and Portugal. Each country conducts surveys in adjacent areas with no overlapping.

Scottish Surveys

History

The Quarter 1 Scottish Groundfish survey – started in 1981 and was initially intended to cover the fishing grounds on the continental shelf to the west of Scotland; in 1996 the survey area was extended to include the northern Irish Sea; however this area has now been removed from their standard grid.

This survey uses a similar; ICES rectangle based sampling strategy to that used in the North Sea. Trawl stations are selected at one tow per rectangle based on a library of clear tows. Since 1999 the potential for using a depth rather than rectangle based stratification has been under investigation. To this end, and where possible, those rectangles which display substantial internal depth variation have been sampled twice at different depths. The recent inclusion of samples collected between 200 and 500m would suggest that depth stratification should be initiated as soon as possible.

The survey covers Division VIa and extends into the northern part of the Irish Sea and NW of Ireland. The depth range covered has been 20 to 500m since 2000. The survey is usually carried out in March of each year. The target species are cod, haddock, whiting, saithe and herring and age frequencies are constructed for these species. All other fish species encountered are also sampled for at least length frequencies.

Indices of abundance at age are calculated for all the target species and these data are used at the Northern Shelf Assessment Working Group and also made available for the Herring Assessment Working Group.

The Scottish Quarter 3 Rockall survey – began in 1985 and was carried out annually until 1997. However, in 1998 it was decided to make the survey a bi-annual event; however it reality the survey now covers area annually.

The survey covers only a relatively small area, in the order of eight ICES rectangles. Trawl stations are on known clear tows and vary between 2 and 8 per rectangle depending on the proportion of the area within the 250m depth contour.

The Scottish Mackerel recruit Quarter 4 – survey began in 1990 and has a depth range of 20–500m. The survey extended to the area west of the British Isles between 56 and 61 N and bounded by the 200m depth-contour and the coast. Initially the survey area did not include the area of the Minch and the north channel of the Irish Sea but gradually the spatial coverage has been altered until now it mimics the Quarter 1 survey.

In 1998 the new research vessel Scotia III was used and the duration of the hauls was decreased from 60 minutes to 30 minutes.

Up until 1995 the target species for this survey was mackerel but the Mackerel Assessment Working Group detected a discrepancy between the survey index and the VPA derived recruitment index. This led to a withdrawal of the survey index from the assessment. Given this situation the whole survey was re-designed to follow more closely the demersal quarter 1 survey.

Gear

The gear deployed on all the Scottish surveys is the 36/47 GOV trawl fitted with heavy ground gear 'C' and a 20 mm internal liner. The vessel undertaking this survey changed to Scotia III in March 1998 from the previous Scotia. The gear includes a full suite of Scanmar sensors; headline height, wing and door spread and speed through the water.

Sampling protocols

Haul duration is 4 knots over the ground with duration of 30 minutes. The target species include cod, haddock, whiting, saithe and herring as well as the original target species mackerel.

Northern Ireland surveys

History

The surveys have been carried out in March and October since 1992. From March 1992 to March 2001, the survey extended from 54° 43' N to 53° 22' N. From October 2001 the survey is extended into the St George's Channel to 52° 18' N. Depth range is from 20 to 120m.

Gear

The surveys are carried out on the R.V. Lough Foyle, a 43.5m stern trawler of 880 kw and GRT 547 tonnes. The fishing gear is a rock-hopper otter trawl with a 17m footrope fitted with 250 mm non-rotating rubber discs. The gear has a mean vertical opening of 3 m. The door spread varies from around 25m at 20 m depth to 40m at 80m depth. A 20mm (inside mesh) codend is fitted.

Sampling protocols

In the Northern Ireland surveys, the sampling design is stratified with fixed-position stations. Stratification is by depth and seabed type. Haul duration is 3 nautical miles at 3 knots over the seabed. Stations in the St George's Channel are 1 nautical mile at 3 knots and have only been surveyed since October 2001. Number of stations is 45 in northern Irish Sea and 12 in St George's Channel. Tows are during day time only.

Irish surveys

Irish West Coast Groundfish Survey

History

Started in 1990 and for the first two years consisted of circa 25 stations concentrated around the Irish coast in ICES Areas VIa South and VIb. Adverse weather in 1992 limited station coverage to only 4 stations which effectively broke the time series. This survey is carried out in two parts: Part A covers ICES Division VIa (south) and VIIb (north); Part B covers ICES Division VIIb and VIIj. The survey is conducted from 15 to 300 m depths during the fourth quarter (October - November).

The survey is carried out on chartered commercial fishing vessels. Whilst the same vessel (MFV Marliona, 224 gross tonnage and 30 m LOA) has normally been used each year for Part A and Sionann for Part B, in 2001 Part B was conducted from the MFV Regina Ponti (34.5 m LOA).

Gear

Both vessels use a Rockhopper net with 12 inch discs and 11 inch Thyboron doors. The nets are fitted with a 20-mm codend liner. Gear performance throughout the survey is monitored using Furuno Ch24 (Headline Monitor).

Sampling protocol

The survey was re-established in 1993 and has consisted of circa 70 stations, for Parts A and B combined, since then. Spatial coverage was extended west out to the 200m contour, but remains as VIa South and VIb.

Due to the restrictions of the current and previous research vessel commercial trawlers have been contracted to carry out the survey work. Wherever possible continuity of vessel and gear has been maintained and standard IBTS methodology applied. However, due to the reduced staffing possible on commercial vessels it has rarely been possible to completely sort the catch.

Until 2000 all cod were sorted from the catch and then a sub-sample of two baskets was taken and completely sorted. From 2001 onwards, in response to an overall review of survey sampling undertaken during the IPROSTS Project (Anon 2001), the catch is completely sorted for all target species and a qualitative assessment made of the residual catch as a minimum.

The Irish survey use an ICES rectangle based sampling strategy. The sampling design attempts to allocate at least two stations per rectangle (where the sea area is appropriate). Stations are selected randomly within each rectangle from known clear tow positions.

Irish Sea Celtic Ground Survey

History

Commenced in 1997 and evolved from an earlier Irish Sea Juvenile Fish Survey. As a consequence early survey stations concentrated largely, though not exclusively, around a number of shallow spawning areas along the Irish east coast in VIIa. These positions were expanded in combination with clear tows provided by the industry and CEFAS as well as some exploratory tows.

Spatial coverage therefore extended into the western Irish Sea from 2001 into the area around the Isle of Man, Liverpool and Cardigan Bays and the Welsh coast. The survey is carried out on the Irish research vessel the R.V. Celtic Voyager.

Gear

Polyvalent doors (Type AA4.5) are used and gear performance is monitored throughout the survey using the SCANMAR (RX400) net monitoring system (Headline height, Door spread).

Sampling protocol

The sampling procedure on board conforms to the IBTS standard protocols and as such all cod are sampled and aged, the entire catch is sorted and then sub-sampled as and where appropriate.

The Irish survey in the Irish Sea and Celtic Sea covers ICES Division VIIa and VIIg. The survey is conducted from 10 to 150 m depths during the fourth quarter (November-December) by the RV "Celtic Voyager". This vessel is 32 m in length with gross tonnage of 340 t. The fishing gear used is a GOV 28.9/37.1 Trawl with Morgere Kite (0.85 by 0.85m). Mean vertical opening is 6 m and door spread 48 m. Morgere

Trials on the new 65m research vessel, the R.V. Celtic Explorer, are due to commence in late 2002. Therefore, from 2003 onwards all Irish Surveys will be conducted on this new vessel, starting around mid October through to late November.

English surveys

History

Cefas Quarter 4 IBTS groundfish survey – A fourth quarter survey is currently being established, as part of the internationally coordinated survey for southern and western waters. The first survey was conducted in 2002 on RV "Cirolana", and used a Baca trawl. Due to major gear damage, the survey switched to a PHHT for the remainder of that year.

Gear

During 2003, a modified GOV was used with rock hopper groundgear, deployed from RV "CEFAS Endeavour". The survey now uses a modified GOV with rock hopper groundgear and a standard GOV with a kite replaced by additional floatation.

Sampling protocols

The fishing method is also standardized and described in the manual (Anon. 2004). Fishing speed is 4 knots over the ground and fishing for 30 minutes.

French surveys

History

The French demersal survey began in 1987. The survey area was first limited to the Bay of Biscay (ICES Divisions VIIh, VIIIa, b, c and d) and in 1990; the survey area was extended towards the north to cover the grounds of Celtic sea deeper than 100 meters (ICES divisions VIIe, f, g, h and j).

For the 1987 to 1996 period, the survey was conducted in the Bay of Biscay on an annual basis with the exception of the years 1993 and 1996. Most years it was conducted in the third or fourth quarter (October-November) except in 1991 when it took place in May. In 1988 two surveys were conducted, one in May the other in October.

The Celtic Sea was surveyed from 1990 to 1994 but the sampling was restricted to a small geographical area. The duration is between 40 to 45 days depending on year and availability of ship. Since 1997, the survey covered all the Celtic Sea and Bay of Biscay during the 4th quarter.

Prior to 1997, the sampling designs were as follows: In the Bay of Biscay (ICES divisions VIIh, VIIIa, b, c and d) a stratified sampling scheme was originally used.

Gear

Since 1997, the French survey has been carried out on the RV "Thalassa", a stern trawler of 73.7 m length by 14.9 m wide, gross tonnage of 3022 t. The fishing gear used is a GOV 36/47 without exocet Kite which is replaced by six additional floats. In average, the gear has a horizontal opening of 20 m and a vertical opening of 4 m. The doors are plane-oval with 1350 Kg.

Sampling protocol

The area was divided according to latitude into 3 blocks and the hauls were distributed in seven depth zones (15–30, 31–80, 81–120, 121–160, 161–200, 201–400, and 401–600 m). 100 hauls were made at fixed locations and 35 at changeable stations from year to year. Since 1989, all the hauls (mean number by survey 135) are made at the same locations.

In the Celtic Sea (ICES divisions VIIe,f,g,h and j) the sampling design was systematic, stations were located at the intersection points of a grid of lines 25 nautical miles apart both in latitude and in longitude. The mean number of sets was 56.

From 1997 onwards the whole area has been separated in 5 geographical strata or sectors: southern Bay of Biscay (GS) and northern Bay of Biscay (GN), southern Celtic Sea (CS), central Celtic sea (CC) and northern Celtic sea (CN). In each sector a depth-stratified sampling strategy has been adopted with 7 depth ranges: 0 – 30m, 31 – 80 m, 81–120 m, 121 – 160 m, 161 – 200 m, 201 – 400 m and 401 – 600m.

The sampling design is a stratified random allocation. The number of hauls per stratum is optimised by a Neyman allocation taking into account the most important commercial species in the area (hake, monkfish and megrim). Minimum of two stations per stratum is sampled and 140 fishing stations are planned every year. This number of hauls is adjusted according to the ship time available at sea.

Catch weight and catch numbers were recorded for all species, only selected finfish and shellfish species were measured until 1990. Since 1991, all finfish and a selection of shellfish (mainly Nephrops and squids) are measured.

Spanish surveys

Spanish Survey on Porcupine bank

History

The Spanish survey in the Porcupine bank began in 2001 and covers ICES Division VIIb,k corresponding to the Porcupine Bank and adjacent area in western Irish waters from longitude 12° W to 15° W and from latitude 51° N to 54° N. The survey takes place in the third quarter (August-September) and covers depths between 180 and 800 m.

Gear

Fishing gear used is a Porcupine baca 60/72 with 59.46 m footrope and a 71.96 headline. Doors are oval with 800 kg and 4.5 m^2 surface. The diameter of warp used is 20 mm; of sweeps is 55 mm and the groundrope 98 mm with a double synthetic coat. Mean vertical opening is 3.5 m and door spread 120 m. Codend mesh size is 20 mm. The survey is carried on the RV "Vizconde de Eza". This vessel is a stern trawler of 53 m length and 13.5 m wide with gross tonnage of 1400 t.

Sampling Protocol

The sampling design is random stratified with proportional allocation and a minimum of two stations per stratum with a total of 80 fishing stations. The survey area has been separated in two geographical strata and three depth strata (less than 200 m, 200–400, 400–800 m), resulting in 5 strata, given that there are no grounds shallower than 200 m in Outer geographical strata.

North Spanish coast

History

From 1980 the fishing resources of Divisions VIIIc and IXa of ICES were monitored through surveys, with the objective of following variations in the abundance of demersal and benthic species of commercial interest by means of indices independent of fishing activity. At the same time estimations were obtained of the strength of recruitment of diverse species (principally hake) during the autumn. Surveys are performed on board the RV "Cornide de Saavedra", except in 1989 when another research vessel (N/V F. de P. Navarro) was used to conduct the survey. Several modifications were applied over time to this stern trawler: the engine power increased in 1983 (from 1700 Kw to 2651 Kw), in 1984 it was modified from its original 56 m (LL) and 990 GRT to 67 m and 1133 GRT at present, and a new bridge was used in 1990 (GPS, colour Echosounder, Plotter, Doppler log, etc.).

Gear

The gear used is a Baka trawl 44/60 with a 43.6 m footrope and a 60.1 headline. The traditional trawl doors used are rectangular, weighting 650 Kg and 3.6 m^2 of surface (2.67*1.34 m). The diameter of warp used is 22 mm (1.9 Kg/m). The mean vertical opening is

1.8 m and the horizontal opening is 21 m. Mesh size is 80 mm all along the gear and an internal 20 mm mesh codend liner is used.

Sampling Protocol

The northern Spanish groundfish survey covers ICES Division VIIIc and the northern part of IXa corresponding to the Cantabrian Sea and off Galicia waters. This survey is conducted during the third and the fourth quarter (September-October) and covers a depth range of 35 to 700 m. Stratification is based on three depth strata (80–120, 121–200, 201–500 m) and 5 geographic sectors. Additional hauls both in deeper water (500–700 m) and shallower waters (30–80 m) may be conducted depending on the ship time available at sea. The coverage is approximately 5.4 hauls for every 1000 Km^2 (120 hauls per survey).

Gulf of Cadiz Surveys

History

Surveys in the Gulf of Cadiz started being performed in February-March in 1995 covering the Gulf of Cadiz area since strong hake recruitment signals were detected in that season. In 1997 a new autumn series was started to match the 4th quarter surveys in the rest of the IBTS Southern and Western area (especially the Portuguese and North Spanish Coast surveys). Since then both series: spring (ARSA) and autumn one have been performed yearly but in 2003,when the spring survey was not carried out since the vessel was involved on the surveys to assess the impact of Prestige Oil Spill.

The area surveyed is the Gulf of Cadiz between the Spanish-Portuguese border, Gibraltar Strait and 36° N, covering a depth range from 15 to 900 m.

Gear

The gear used is the same as in the North Spanish Coast. A Baka trawl 44/60 with a 43.6 m footrope and a 60.1 headline. The traditional trawl doors used are rectangular, weighting 650 Kg and 3.6 m^2 of surface (2.67*1.34 m). The diameter of warp used is 22 mm (1.9 Kg/m). The mean vertical opening is 1.8 m and the horizontal opening is 21 m. Mesh size is 80 mm all along the gear and an internal 20 mm mesh codend liner is used.

Sampling protocol

Stratification is based on five depth strata (15–30, 30–100, 100–200, 201–500 and 500–800 m). Additional hauls both in deeper water (800–900 m) are conducted depending on the ship time available at sea. Hauls last 1 hour and abundance indices per 1 h trawl are obtained together with estimations base on swept area.

Portuguese surveys

History

The Portuguese groundfish surveys have been conducted twice a year (in Summer and Autumn), with RV "Noruega". Initially the main objectives of the surveys were to estimate the abundance and study the distribution of the most important commercial species in the Portuguese trawl fishery: hake, horse mackerel, blue whiting, seabream and Norway lobster.

Recruitment indices of abundance and distribution for hake and horse mackerel were also evaluated in the autumn surveys. Additionally, trawl selectivity experiments for hake and horse mackerel with 40 mm mesh size, were also conducted during 1981 surveys using the covered codend method.

A stratified random sampling design was adopted during 1979–1989. The number of strata changed during this period: from 1979 to 1980 the surveyed area was divided into 15 strata

and from 1981 onwards into 36 strata. Based on the statistical analysis of the previous surveys the design was revised in order to decrease the variance within stratum. The new strata are smaller than the previous ones and can be combined to get the previous ones.

The aim of increasing the number of strata was to increase the probability of spreading the random sampled units in order to decrease the total variance of the species' mean abundance indices. The stratification is based on depth and geographical areas. The depth ranges used during 1979–1988 were 20–100m, 101–200m and 201–500m. Each stratum was divided into units of approximately 25 nm^2, sequentially numbered.

During 1979–1980 the number of random hauls per stratum was based on the previous information of the relative abundance of the target species in each geographical area and on the ship time available. During 1981–1989, when the number of strata was 36, two random units were sampled by stratum whenever possible, to achieve an estimate of the standard error of the stratified mean by stratum.

The Portuguese surveys cover Division IXa in Portuguese waters. The area surveyed extends from latitude 41°20' N to 36°30' N, and from 20 to 750 meters depth.

Gear

The surveys are carried with the RV "Noruega", which is a stern trawler of 47.5 m length, 1500 horse power and 495 G.T.R. The fishing gear used is a bottom trawl (type Norwegian Campell Trawl 1800/96 NCT) with a 20 mm codend mesh size. The main characteristic of this gear is the groundrope with bobbins. The mean vertical opening is 4.6 m and the mean horizontal opening between wings and doors is 15.1 m and 45.7 m, respectively. The polyvalent trawl doors used are rectangular (2.7 m x 1.58 m) with an area of 3.75 m^2 and weighting 650 Kg.

Sampling protocol

The tow duration was 60 minutes during 1979–1985 at a trawling speed of 3.5 knots, changing to 30 minutes during 1986–1988, and changed back again to 60 minutes in 1989 as it was observed that the large adults of horse mackerel were not caught in 30 minutes tows at this trawling speed.

In the Portuguese surveys the sampling design is based on fixed stations. A total of 97 fixed stations are planned, spread over 12 sectors. Each sector is subdivided into 4 depth ranges: 20–100m, 101–200m, 201–500m and 501–750 m, with a total of 48 strata. The positions of the 97 fixed stations were selected based on common stations made during 1981–1989 surveys and taking into account that at least two stations per stratum should be sampled. A maximum of 30 supplementary stations are planned, fixed in each season, to be carried out if ship time is available or to replace positions that due to particular factors are not possible to sample.

Annex 7: DATRAS 'Health' warning

Users are urged to treat the data with caution. If the user has any queries on the validity of the data or the conclusions to be drawn they should contact either the ICES Secretariat or the Chairs of the relevant Working Group (IBTS, BITS or BEAM)

Whilst both the supplying institutes and ICES have extensively checked the data there are inherent flaws in gathering the information. For example:

- In spite of the fact that now all bottom trawl surveys are in the same database and often at least partially overlap in time period or area covered, there are differences between the surveys that do not allow the combination of data from different surveys in one analysis unless this point is specifically addressed.
- There is no guarantee that the gears deployed adequately sample all species (e.g. catchability of flatfish in beam trawls is markedly higher than that of GOV). It should be realized that each survey gear catches a gear-dependent subset of the fish community.
- A common property of all surveys is that over time species determination skills improve. As a result new taxa will emerge in the dataset that were previously reported as part of another closely related taxon.
- Over time the sampling procedures, gear characteristics, timing of the survey or the area covered may have changed thereby influencing the catches. To guide the users of the trawl data the relevant working groups have provided the users with an expert advice. Please read this before using the data.

Annex 8: Bibliography of useful field guides

General field guides and lists of European marine fauna

Hayward, P.J. & Ryland, J.S. (Eds.) 1990. The Marine Fauna of the British Isles and North-West Europe, Volume I. Introduction and protozoans to athropods. Oxford University Press, 1–627 pp.

Hayward, P.J. & Ryland, J.S. (Eds.) 1990. The Marine Fauna of the British Isles and North-West Europe, Volumes II. Molluscs to Chordates. Oxford University Press, 628–996 pp.

Hayward, P.J. & Ryland, J.S. (Eds.) 1995. Handbook of the Marine Fauna of North-West Europe. Oxford University Press, 800 pp.

Costello, M.J., Bouchet, P., Boxshall, G., Emblow, C., Vanden Berghe, E. (2004). European Register of Marine Species: A Check-list of the Marine Species in Europe and a Bibliography of Guides to their Identification. Collection Patrimoines Naturels 50, 463 pp.

Howson, C.M. and Picton, B.E. (Ed.) 1997. The species directory of the marine fauna and flora of the British Isles and surrounding seas. Ulster Museum Publication, 276. The Ulster Museum: Belfast, 508 pp. (+ cd-rom).

Sponges

Soest van, R.W.M., Picton, B. and Morrow, M. (1999). Sponges of the North East Atlantic. ETI, Amsterdam (CD-Rom)

Cnidarians

Cornelius, P.F.S. (1995). North-West European thecate hydroids and their Medusae: Part 1 Introduction, Laodiceidae to Haleciidae. Synopses of the British Fauna (New Series), 50. Field Studies Council, 347 pp.

Cornelius, P.F.S. (1995). North-West European thecate hydroids and their Medusae: part 2 Sertulariidae to Campanulariidae. Synopses of the British Fauna (New Series), 50. Field Studies Council, 416 pp.

Garcia Corrales, P., Aguirre Incharrbe, A. and Gonzalez Moya, D. (1978). Contribución al conocimiento de los hidrozoos de las costas españolas. Parte 1: Halecidos, Campanuláridos y Plumuláridos. Boletín del Instituto Español de Oceanografia, 253: 5–73.

Garcia Corrales, P., Aguirre Incharrbe, A. and Gonzalez Moya, D. (1979). Contribución al conocimiento de los hidrozoos de las costas españolas. Parte 2: Lafoeidae, Campanulinidae y Syntheciidae. Boletín del Instituto Español de Oceanografia, 273: 5–39.

Garcia Corrales, P., Aguirre Incharrbe, A. and Gonzalez Moya, D. (1980). Contribución al conocimiento de los hidrozoos de las costas españolas. Parte 3: Sertulariidae. Boletín del Instituto Español de Oceanografia, 296: 5–67.

Kirkpatrick, P.A. and Pugh, P.R. (1984). Siphonophores and velellids. Synopses of the British Fauna (New Series), 29. E.J. Brill/W. Backhuys: Leiden, 154 pp.

Manuel (1988) British Anthozoans (Coelenterates: Octocorallia and Hexacorallia. Synopses of the British Fauna (New Series), 18. E.J. Brill: Leiden, 241 pp.

Sipunculida, Echiura and Priapulida

Cuénot, L. (1922). Sipunculiens, Echiuriens, Priapuliens. Faune de France 4. P. Lechevalier, Paris. 29pp.

Gibbs, P.E. (1977) British Sipunculans. Synopses of the British Fauna (New Series), 12. Linnean Society, London. 35pp.

Gibbs, P.E. (2001) British Sipunculans. Synopses of the British Fauna (New Series), 12 (Revised). Field Studies Council, Shrewsbury, 46pp.

Stephen, A.C. (1960). British echiurids (Echiuroidea), sipunculids (Sipunculoidea) and priapulids (Priapuloidea). Synopses of the British Fauna, 12. London. 27pp.

Stephen, A.C. and Edmons, S.J. (1972). The phyla Sipuncula and Echiura. British Museum of Natural History, London. 528pp.

Annelids

Campoy, A. (1982). Fauna de annelidos poliquetos de la Peninsula Iberica. Fauna de España, 7, 781pp.

Chambers, S.J. (1985). Polychaetes from Scottish waters Part 2: Families Aphroditidae, Sigalionidae and Polyodontidae. Royal Scottish Museum Studies, Edinburgh, 38pp.

Chambers, S.J. and Garwood, P. (1992). Polychaetes from Scottish waters Part32: Family Nereidae. Royal Scottish Museum Studies, Edinburgh, 65pp.

Chambers, S.J. and Muir, A.I. (1997). Polychaetes: British Chrysopetaloidea, Pisionoidea and Aphroditoidea. Synopses of the British Fauna (New Series), 54. Field Studies Council, Shrewsbury, 202pp.

Fauchald, K. (1977). The polychaete worms, definitions and keys to the orders, families and genera. Natural History Museum of Los Angeles County, Los Angeles, 188 pp.

Fauvel, P. (1923). Polychètes errantes. Faune de France, 5. P. Lechevalier, Paris, 488pp.

Fauvel, P. (1927). Polychètes sédentaires, addenda aux errantes, Archiannélides, Myzostomaires. Faune de France, 16. P. Lechevalier, Paris, 494pp.

George, J.D. & Hartmann-Shroder, G. (1985). Polychaetes: British Amphinomida, Spintherida and Eunicida. Synopses of the British Fauna (New Series), 32. E.J. Brill/Dr W Backhuys, Leiden, 221pp.

Hartmann-Shroder, G. (1996). Annelida, borstenwürmer, Polychaeta. Die Tierwelt Deutschlands, 648pp.

Pleijel, F. and Dales, R.P. (1991). Polychaetes: British Phyllodocoideans, Typhloscolecoideans and Tomopteroideans. Synopses of the British Fauna (New Series), 45. Dr W Backhuys, Leiden, 202pp.

Tebble, N. and Chambers, S. (1982). Polychaetes from Scottish waters Part 1: Family Polynoidae. Royal Scottish Museum Studies, Edinburgh, 73pp.

Westheide, W. (1990). Polychaetes: interstitial families. Synopses of the British Fauna (New Series), 44. Dr W Backhuys, Leiden, 152pp.

Pycnogonids

Bouvier, E.-L. (1923). Pycnogonides. Faune de France, 7. P Lechevalier, Paris, 69 pp.

King, P.E. (1974). British Sea Spiders. Synopses of the British Fauna (New Series), 5. Linnean Society, London, 68pp.

King, P.E. (1986). Sea Spiders: A revised key to the adults of littoral Pycnogonida in the British Isles. AIDGAP guides 6, Field Studies Council, Shrewsbury, 493–516.

Crustaceans

Allen, J.A. (1967). The fauna of the Clyde Sea area: Crustacea: Euphausiacea and Decapoda, with an illustrated key to the British Species. Scottish Marine Biological Association, Millport, 116pp.

Bouvier, E.-L. (1940). Décapodes marcheurs. Faune de France, 37. P. Lechevalier, Paris, 404pp.

Christiansen, M.E. (1969). Crustacea Decapods Brachyura. Marine invertebrates of Scandinavia, Oslo, 2, 143pp.

Falciai, L. and Minervini, R. (1995) Guia de los crustaceos decapodos de Europa. Omega, Barcelona, 299pp.

Falciai, L. and Minervini, R. (1996) Guide des homards, crabes, langoustes, crevettes et autres crustacés decapods d'Europe. Delachaux & Niestle, Paris, 287pp.

Holdich, D.M. and Jones, J.A. (1983). Tanaids. Synopses of the British Fauna (New Series), 27. Cambridge University Press, 98pp.

Ingle, R.W. (1980). British crabs. British Museum of Natural History, London, 222pp.

Ingle, R.W. (1993). Hermit crabs of the northeastern Atlantic Ocean and Mediterranean Sea. Chapman and Hall, London, 495pp.

Ingle, R.W. (1996). Shallow-water crabs (2nd edition). Synopses of the British Fauna (New Series), 25. Field Studies Council: Shrewsbury, 243 pp.

Ingle, R.W. and Christiansen, M.E. (2004). Lobsters, mud shrimps and anomuran crabs. Synopses of the British Fauna (New Series), 55. Field Studies Council: Shrewsbury, 271 pp.

Jones, N.S. (1976). British cumaceans. Synopses of the British Fauna (New Series), 7. Linnean Society, London, 62pp.

Lincoln, R.J. (1979). British marine Amphipoda: Gammaridea. British Museum (Natural History): London, 658 pp.

Makings, P. (1977). A guide to the British coastal Mysidacea. Field Studies 4, 575–595.

Mauchline, J. (1984). Euphausiid, stomatopod and leptostracan crustaceans: keys and notes for the identification of the species. Synopses of the British Fauna (New Series), 30. E.J. Brill; W. Backhuys: London, 91 pp.

Naylor, E. (1972). British marine isopods. Synopses of the British Fauna (New Series), 3. Linnean Society, London, 89 pp.

Nobre, A. (1936). Crustaceos, decapods e stomatopodes marinhos de Portugal. Fauna marinha de Portugal 4, 213pp.

Smaldon, G., Holthuis, L.B. and Fransen, C.H.J.M. (1993). Coastal Shrimps and Prawns (Second Edition). Synopses of the British Fauna 15. Field Studies Council: Shrewsbury, 142 pp.

Zariquiey Alvarez, R. (1968). Crustáceos decápodos ibéricos. Investigaciòn Pesquera, 32, 510 pp.

Molluscs

Fretter, V. and Graham, A. (1976). The prosobranch molluscs of Britain and Denmark. Part 1: Pleurotomariacea, Fissurellacea and Patellacea. Journal of Molluscan Studies, Supplement 1, 1–37.

Fretter, V. and Graham, A. (1977). The prosobranch molluscs of Britain and Denmark. Part 2: Trochacea. Journal of Molluscan Studies, Supplement 3, 39–100.

Fretter, V. and Graham, A. (1978). The prosobranch molluscs of Britain and Denmark. Part 3: Neritacea, Viviparacea, Valvatacea, terrestrial and freshwater Littorinacea and Rissoacea. Journal of Molluscan Studies, Supplement 5, 101–153.

Fretter, V. and Graham, A. (1978). The prosobranch molluscs of Britain and Denmark. Part 4: Marine Rissoacea. Journal of Molluscan Studies, Supplement 6, 153–241.

Fretter, V. and Graham, A. (1980). The prosobranch molluscs of Britain and Denmark. Part 5: Marine Littorinacea. Journal of Molluscan Studies, Supplement 7, 243–284.

Fretter, V. and Graham, A. (1981). The prosobranch molluscs of Britain and Denmark. Part 6: Cerithiacea, Strombacea, Hipponicacea, Calyptraeacea, Lamellariacea, Cypraeacea, Naticacea, Tonnacea, Heteropoda. Journal of Molluscan Studies, Supplement 9, 285–363.

Fretter, V. and Graham, A. (1982). The prosobranch molluscs of Britain and Denmark. Part 7: 'Heterogastropoda' (Cerithiopsacea, Triforacea, Epitoniacea, Eulimacea). Journal of Molluscan Studies, Supplement 11, 363–434.

Fretter, V. and Graham, A. (1985). The prosobranch molluscs of Britain and Denmark. Part 8: Neogastropoda. Journal of Molluscan Studies, Supplement 15, 435–556.

Fretter, V., Graham, A. and Andrews, E.B. (1986). The prosobranch molluscs of Britain and Denmark. Part 9: Pyramidellacea. Journal of Molluscan Studies, Supplement 16, 557–649.

Graham, A., (1988). Molluscs: prosobranchs and pyramellid gastropods (2nd ed.). Synopses of the British Fauna (New Series). Leiden: E.J. Brill/Dr W. Backhuys, 662pp.

Guerra, S.A. (1992). Mollusca, Cephalopoda. Fauna Iberica 1. Museo Nacional de Ciencias Naturales, Consejo Superior de Investigaciones Cientificas. 327pp.

Jones, A.M. and Baxter, J.M. (1987). Molluscs: Caudofoveata, Solenogastres, Polyplacophora and Scaphopoda. Synopses of the British Fauna (New Series), 37. E.J. Brill; W. Backhuys: London, 154 pp.

Oliver, P.G.; Killeen, I.J.; Ockelmann, K.W. (2002). The Thyasiridae (Mollusca: Bivalvia) of the British Continental Shelf and North Sea oil fields: an identification manual. Studies in Marine Biodiversity and Systematics from the National Museum of Wales. BIOMÔR Reports, 3. National Museums & Galleries of Wales: Cardiff. 73 pp.

Picton, B.E. & Morrow, C.C. (1994). A Field Guide to the Nudibranchs of the British Isles. Immel Publishing, London, 143pp.

Poppe, G.T. and Goto, Y. (1991). European seashells Volume I: Polyplacophora, Caudofoveta, Solenogastra, Gastropoda. Hemmen: Verlag Christa, 352pp.

Poppe, G.T. and Goto, Y. (1993). European seashells Volume II: Scaphopoda, Bivalvia, Cephalopoda. Hemmen: Verlag Christa, 221pp.

Smith, S.M. and Heppell, D. (1991). Checklist of the British Marine Mollusca. National Museums of Scotland Information Series No. 11, 114pp.

Tebble (1976) British Bivalve Seashells. British Museum of Natural History, London. 213pp.

Thompson, T.E. (1988) Molluscs: Benthic Opisthobranchs (Linnean Society). Synopses of the British Fauna (New Series). Linnean Society, 356pp.

Bryozoans

Hayward, P.J. (1985). Ctenostome bryozoans. Synopses of the British Fauna (New Series), 33. E.J. Brill; W. Backhuys: London, 169 pp.

Hayward, P.J. and Ryland, J.S. (1979). British ascophoran bryozoans. Synopses of the British Fauna (New Series), 14. Linnean Society, London, 312 pp.

Hayward, P.J. and Ryland, J.S. (1985). Cyclostome bryozoans. Synopses of the British Fauna (New Series), 34. E.J. Brill; W. Backhuys, London, 154 pp.

Hayward, P.J. and Ryland, J.S. (1998). Cheilostomatous Bryozoa: 1. Aeteoidea – Cribrilinoidea (2nd edition). Synopses of the British Fauna (New Series), 10. Field Studies Council, Shrewsbury, 366 pp.

Hayward, P.J. and Ryland, J.S. (1999). Cheilostomatous Bryozoa: part 2 Hippothooidea – Celleporoidea (2nd edition). Synopses of the British Fauna (New Series), 14. Field Studies Council, Shrewsbury, 416 pp.

Prenant, M. and Bobin, G. (1956). Bryozoaires. Parte 1: Entoproctes, Phylactolemes, Ctenostomes. Faune de France, 60, P. Lechevalier, Paris, 398 pp.

Prenant, M. and Bobin, G. (1966). Bryozoaires. Parte 2: Chilostomes Anasca. Faune de France, 68, P. Lechevalier, Paris, 647 pp.

Ryland, J.S. and Hayward, P.J. (1977). British anascan bryozoans: Cheilostomata: Anasca. Synopses of the British Fauna (New Series), 10. Linnean Society, London, 118 pp.

Zabala, M. and Maluquer, P. (1988). Illustrated keys for the classification of Mediterranean Bryozoa. Treballs del Museu de Zoologia, Barcelona, 294 pp.

Brachiopods

Brunton, C.H.C. and Curry, G.B. (1979). British brachiopods. Synopses of the British Fauna (New Series), 17. Linnean Society, London, 64 pp.

Echinoderms

Clark, A.M. and Downey, M.E. (1992). Starfishes of the Atlantic. Chapman and Hall, London, 794 pp.

Koehler, R. (1921). Echinoderms. Faune de France, 1. P. Lechevalier, Paris, 210 pp.

Koehler, R. (1924). Les echinoderms des mers d'Europe 1. G. Douin, Paris, 362 pp.

Koehler, R. (1927). Les echinoderms des mers d'Europe 2. G. Douin, Paris, 339 pp.

Madsen, F.J. and Hansen, B. (1994). Echionodermata Holthuroidea. Marine Invertebrates of Scandinavia 9. Scandinavian University Press, 143 pp.

Mortensen, Th. (1977). Handbook of the echinoderms of the British Isles. Reprinted ed. W. Backhuys: Rotterdam, 471 pp.

Nobre, A. (1931). Echinodermes de Portugal. Fauna marinha de Portugal 2, 176 pp.

Picton, B.E. (1993). A Field Guide to the Shallow-Water Echinoderms of the British Isles. Immel Publishing, London, 96 pp.

Southwood, E.C. and Campbell, A.C. (2006). Echinoderms. Synopses of the British Fauna (New Series), 56. Field Studies Council, Shrewsbury, 471 pp.

Tortonese, E. (1965). Echinodermata. Fauna d'Italia 6. Calderini, Bologna, 424 pp.

Ascidians

Harant, H. and Vernieres, P. (1933). Tuniciers: Ascidies. Faune de France 27. P. Lechevalier, paris, 101 pp.

Millar, R.H., (1970). British Ascidians. Tunicata: Ascidiacea. Synopses of the British Fauna (New Series), 1. Linnean Society, London, 99 pp.

Fish

Bauchot, M.L. and Prtas, A. (1980). Guide des possons marins d'Europe. Delachaux & Niestle, 427 pp.

Hureau, J.-C. (ed.) (1995–1996). Fishes of the North-Eastern Atlantic and the Mediterranean. CD-ROM. ETI, Amsterdam; Springer-Verlag, Berlin. 1995: MacIntosh version; 1996: PC version.

Muus, B.J., Nielsen, J.G., Dahlstrom, P.D. and Nystrom, B.O. (1998). Peces de mar de Atlantico y del Mediterraneo. Omega, Barcelona, 337 pp.

Nobre, A. (1935). Vertebrados (mammiferos, reptis e peixes). Fauna marinha de Portugal 1, 574 pp.

Poll, M. (1947). Poissons marins. Faune de Belgique, 452pp.

Quero, J.C., Porche, P. and Vayne, J.J. (2003). Guide les poisons de l'Atlantique europeen. Delachaux & Niestle, Paris, 465 pp.

Russell, F.S. (1976). The eggs and planktonic stages of British marine fishes. Academic Press, London, 524 pp.

Tortonese, E. (1956). Leptocardia, Cyclostoma, Selachii. Fauna d'Italia 2. Calderini, Bologna, 334 pp.

Tortonese, E. (1970). Osteichthyes. Pesci ossei (parte 1). Fauna d'Italia 10. Calderini, Bologna, 565 pp.

Tortonese, E. (1975). Osteichthyes. Pesci ossei (parte 2). Fauna d'Italia 11. Calderini, Bologna, 636 pp.

Wheeler, A. (1969). The fishes of the British Isles and North-west Europe. Michigan State University Press, 613 pp.

Wheeler (1978) Key to the Fishes of Northern Europe. Warne, London, 380 pp.

Wheeler, A. (1992). A list of the common and scientific names of fishes of the British Isles. Journal of Fish Biology, 41(Supplement A): 1–37.

Whitehead, P.J.P., Bauchot, M.-L., Hureau J.-C., Nielsen J., and Tortonese E. (eds) (1984–1986). Fishes of the North-Eastern Atlantic and the Mediterranean. 3 Vols, UNESCO, Paris 1473 pp.

Annex 9: Working documents presented to the IBTSWG 2007

WD 1: Cardador, F., Chaves, C. 2007. Portuguese groundfish surveys for hake (PESCADA-BD).

WD 2: Silva, C., Leotte, F. 2007. Portuguese Nephrops in FU 28+29 (CTVS) survey.

WD 3: Biais, G. 2007. ORHAGO survey: the need and the methodology.

WD 4: Newton, A.W., Peach, K.J., Coull, K.A., Gault, M., Needle, C.L. 2007. Rockall and the haddock fishery.

WD 5: Kafemann, R., Ehrich, S., Coull K.J. 2007. Results of a comparative fishing experiment of FRV "Walther Herwig III" and FRV "Scotia" in 2006.

Working Document to be presented at the 2007 International Bottom Trawl Survey Working Group Meeting, Sète, 27th – 30th March 2007.

PORTUGUESE GROUNDFISH SURVEYS FOR HAKE (PESCADA-BD)

Fátima Cardador & Corina Chaves

IPIMAR, Lisbon, Portugal

1. INTRODUCTION

This survey started in 2005 and since then is performed annually.

Justification

The Southern Stock of Hake (ICES Div VIIIc+IXa) is outside safe biological limits.

In December 2005 a recovery plan for the southern stock of hake was approved and implemented in January 2006 (EC Reg. No 2166/2005). The objective is to increase the spawning stock biomass to levels that should rebuild the stock. Under this circumstance groundfish survey data constitutes an important source of information that allows monitoring annually the abundance of the spawning component in Portuguese waters. This estimate shall provide an indicator on the response and reaction of the stock biomass to the measures established by the recovery plan.

Additionally, a survey in the spawning season would benefit other species, namely horse mackerel, mackerel and blue whiting, since the main spawning season occurs at the same period as it is for hake. The data collected in this survey will provide biological information to accomplish the needs of each species in the Data Collection Regulation (DCR), such as growth, sex maturity and fecundity.

2. OBJECTIVES

The main objectives of this survey are:

(i) to estimate distribution and abundance of hake in spawning season,

(ii) to estimate indices of abundance and biomass of the most important commercial species,

(iii) to estimate biological parameters, maturity, sex-ratio, weight, food habits,

(iv) to estimate the length and/or age compositions for the main commercial species.

The primary species is hake and the secondary species are horse mackerel, blue whiting, mackerel, Spanish mackerel, anglerfish, megrim and Norway lobster.

3. SURVEYED AREA AND SEASON

Portuguese continental waters (Division IXa) extending from latitude 41°20' N to 36°30' N, 07° 30´W, and covering depths from 20 to 500 m depth. These surveys are carried out in the first quarter, with duration of around 30 days.

4. SAMPLING DESIGN

The sampling design is adapted from the autumn groundfish survey, with 75 fishing stations, 66 at fixed (grid 5´x 5´) positions and 9 at random. Fishing stations are spread over 12 sectors; each sector is subdivided into 3 depth ranges: 20–100m, 101–200m, 201–500m, with a total of 36 strata (Figure 1).Tow duration is 60 min, with a trawl speed of 3.5 knots, during day light. This tow duration was adopted in order to catch a significant number of individuals for biological studies.

5. VESSEL AND GEAR

The survey is conducted with the Portuguese RV "Noruega", which is a stern trawler of 47.5 m length, 1500 horse power and 495 G.T.R. The fishing gear used is a bottom trawl (type FGAV019, CAR) with a 20 mm codend mesh size.

The gear design is in Figure 2 and its operational characteristics are the following:

Gear Type:	FGAV019 – four panels fish bottom trawl
Headline (m):	44.3
Groundrope (m):	54.6
Wing mesh size (mm)	160
Body mesh size (mm)	160,140,100 and 60
Vertical opening (m)	2.2
Horizontal opening between wings (m)	25.4
Groundrope:	no rollers.

The main characteristic of this gear is the groundrope without rollers. The adoption of this gear without rollers allows increasing the catchability on anglerfish and megrims. The polyvalent trawl doors used are rectangular (2.7 m x 1.58 m) with an area of 3.75 m^2 and weighting 650 Kg.

6. TECHNICAL DESCRIPTION OF THE HAULS

The starting time of the haul is defined when the winches are stopped and the net is stable, and the end of a haul is defined as the start of pull back. Scanmar equipment is expected to be used in near future.

7. BIOLOGICAL DATA

The catch is sorted by species, counted and weighted. In the case of a huge catch of one dominant species, only a fraction of the catch is sorted.

All fish species are measured, as well as selected crustacean and cephalopods species. Biological parameters (length, weight, status of maturity among others) and hard structures (otoliths and illicia) are collected.

8. ENVIRONMENTAL DATA

CTD equipment is used in the end of the trawl station in order to collect salinity and temperature data by depth.

9. DEBRIS DATA

The main debris caught during the trawl operations are collected, weighted and counted by categories (plastic, wood, metal, glass, etc.).

10. DATABASE

Data are recorded in the database CRUZDEM created for the Portuguese groundfish surveys and described in section 10 of Manual for the International Bottom Trawl Surveys in the Western and Southern Areas (Revision II) (ICES, 2002).

11. LIST OF SURVEYS

Summary of the Portuguese groundfish survey for hake:

YEAR	DATES	VALID HAULS	AREA	VESSEL
2005	02/03 – 31/03	70	Whole	*Noruega*
2006	07/03 –03/04	67	whole	*Noruega*

12. USE OF SURVEY INFORMATION

- Geographical distribution of mature hake, horse mackerel, blue whiting and European squid in 2005 and 2006 were presented at the 2007 Workshop on Sexual Maturity Sampling in a Working document titled *Portuguese maturity sampling levels in the period 2004–2006* (Morgado *et al.*, 2007);
- Maturity ogive for southern stock of hake in 2006 and used by the ICES Working Group on the assessment of Hake, Monkfish and Megrim (ICES, 2006);
- Abundance of spawning stock biomass for hake (internal IPIMAR information).
- Maturity data for several species like horse mackerel, mackerel, Spanish mackerel, blue whiting and megrim.

References

ICES. 2002. Manual for the international bottom trawl surveys in the western and southern areas, Revision II, Addendum to ICES CM 2002/D:03 Ref.: G ACFM, ACE, 27p.

ICES. 2006, b. Report of the Working Group on the Assessment of Southern Shelf Stocks of Hake, Monk and Megrim (WGHMM). Bilbao, Spain, 9–18 May 2006. ICES CM 2006/ACFM:29, 800 pp.

Morgado, *et al.* 2007. Portuguese maturity sampling levels in the period 2004–2006, WD presented at 2007 Workshop on Sexual Maturity Sampling, 41 pp.

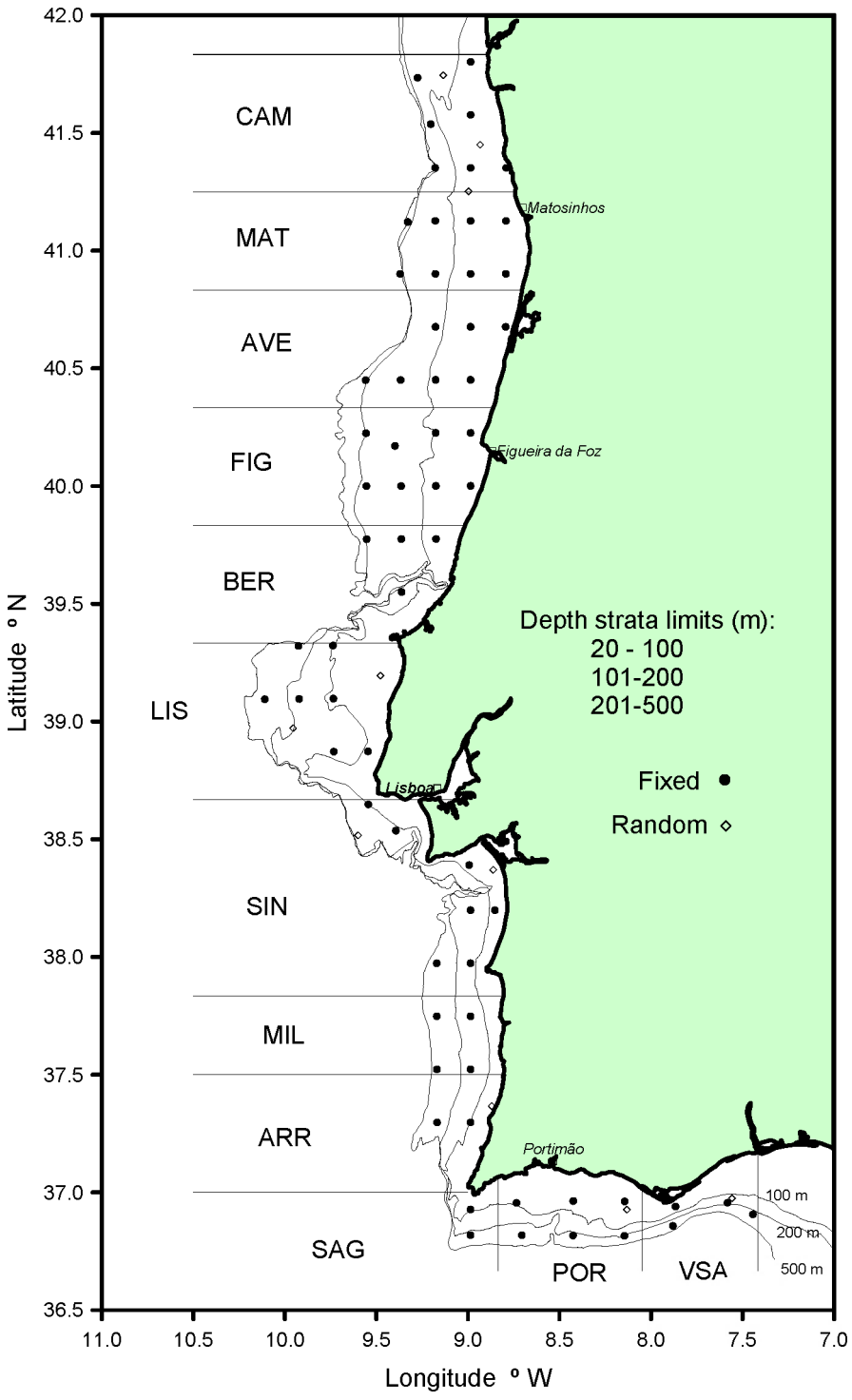


Figure 1. Stratification used in the Portuguese Groundfish survey for Hake.

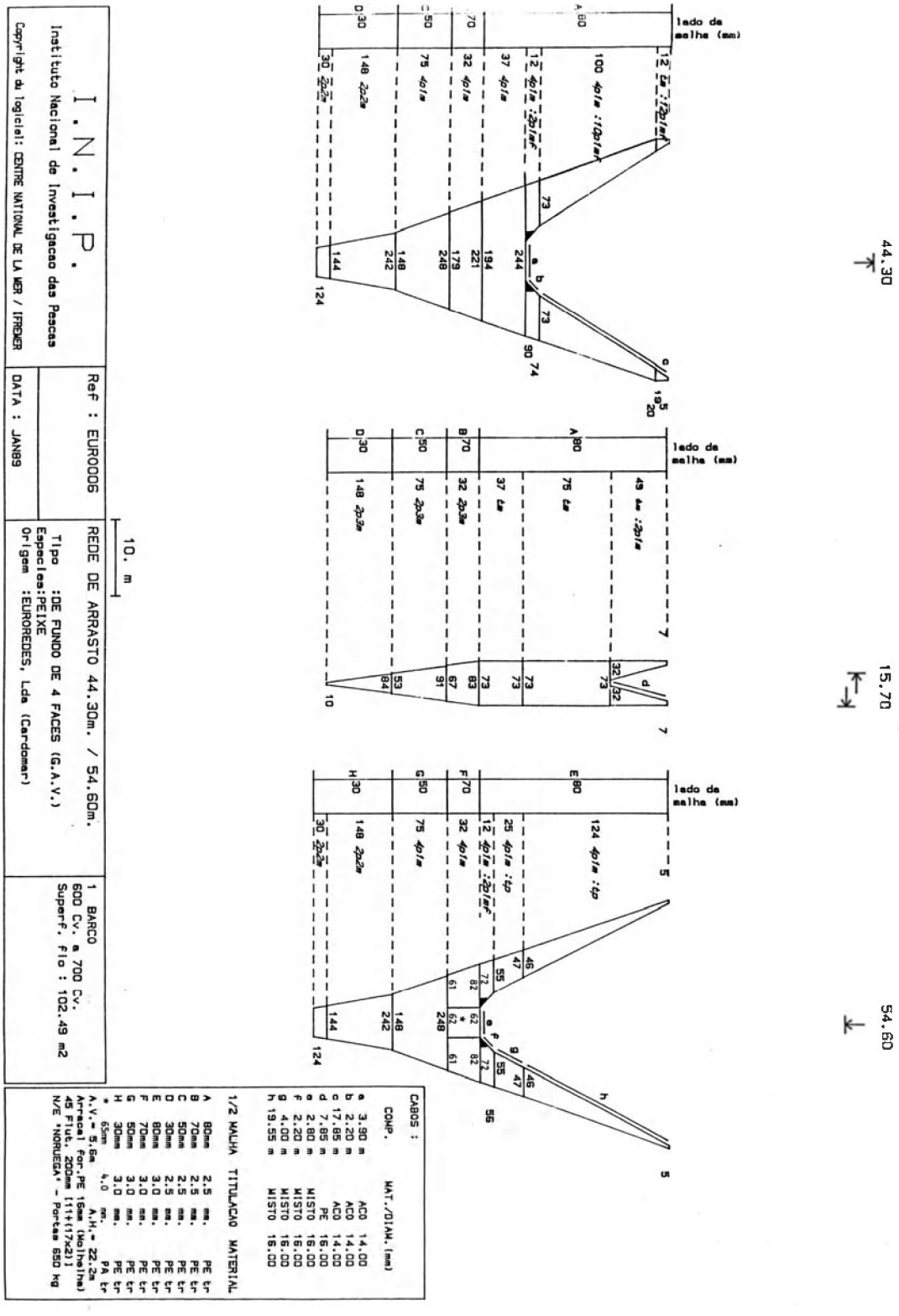


Figure 2. Scheme of the FGAV019 trawl gear used in the Portuguese groundfish survey for hake surveys.

Working Document to be presented at the 2007 International Bottom Trawl Survey Working Group Meeting, Sète, 27th – 30th March 2007.

PORTUGUESE NEPHROPS IN FU 28+29 (CTVS) SURVEY

Cristina Silva & Francisco Leotte

IPIMAR, Lisbon, Portugal

1. Introduction

The crustacean surveys are the only independent means of assessing the status of the Portuguese crustacean resources. Surveys have been carried out since the early 1980s using IPIMAR's research vessels. These surveys usually take place during the second quarter, generally late May – early July.

2. Objectives

The main objectives of the Portuguese Crustacean Trawl Surveys are:

i. to estimate the relative abundance of *Nephrops*, as well as of other crustacean species (deepwater rose shrimp, red shrimp) and accompanying species

ii. to study their geographical distribution in space and time

iii. to collect data for the determination of biological parameters (sex-ratio, length-weight relationships, maturity, growth).

3. Surveyed area and season

The Portuguese crustacean surveys have been conducted since 1981, in different areas and seasons. The areas surveyed in each cruise varied, extending from 36° 59' N northwards to 41° 51' N and 7° 51' W to 9° 57' W and covering depths from 150 down to 750 m off the continental shelf.

Since 1997, the crustacean survey has been conducted once a year, during the 2nd quarter, covering the southwest and south coasts of Portugal, which correspond to the Functional Units (FU) 28 and 29 of ICES Division IXa, respectively.

4. Sampling design

The sampling design was adapted from the bottom trawl surveys (stratified random sampling) and formed the basis for data collection for the crustacean surveys in the period 1997–2004. The southwest and south coasts of Portugal were divided in sectors and each sector splitted in depth strata (Figure 1). The number of trawling stations in each stratum was dependent on *Nephrops* and rose shrimp abundance variance, with a minimum of 2 stations per stratum. The average number of stations in the period was 60.

Due to the small number of samples in some strata and to the random selection of the positions, this design does not allow the use of geostatistical methods. For this purpose, a regular grid composed by 77 rectangles is used since 2005 (Figure 2), with one station within each rectangle. Each rectangle has 6.6 minutes of latitude x 5.5 minutes of longitude for the SW coast and vice-versa for the south coast, corresponding approx. to 33 nm^2. The abundance observed at a particular point within the rectangle will reflect the relative abundance of the resource at that geographical area and it is assigned to the centre of the rectangle. The stations may be grouped *a posteriori* in the strata used previously and the results compared with the former surveys.

5. Vessels and gears

Along the time, two different vessels were used: the RV "Mestre Costeiro" and the RV "Noruega". For the purpose of standardization, only the surveys carried out with the RV "Noruega" in the period 1997–2006 will be considered.

The characteristics of the vessel are already described in Table II of IBTS Manual.

The gear design is in Figure 3 and its operational characteristics are the following:

Gear Type:		FGAV020
Depth range (m):	150–750	
Trawling speed (knots):	3	
Doors weight (kg):		650
Doors surface (m^2):		3.75
Sweep length (m):		No
Diameter of Lower Bridle (mm):	No	
Diameter of Upper Bridle (mm):	No	
Diameter of Middle Bridle (mm):	No	
Exocite kite:		No
Floats in Headline/winglines:		9
Mean vertical opening (m):		1.5–2.0
Mean doors spread (m):	60	
Mean horizontal opening (m):	30	
Groundrope:		Synthetic wrapped wire core + chain.

6. Technical description of the hauls

Start time of the haul is defined as the moment when the vertical net-opening and door spread are stable. Stop time is defined as the start of pull back. Equipment to monitor the trawl net parameters is not used on a regular basis. The hauls are carried during daylight at a mean speed of 3.0 knots. Until 2004, the haul duration was 60 minutes but since 2005, the duration was reduced to 30 minutes in order to increase the sampling effort.

7. Biological data

The catch is sorted by species, counted and weighted. In the case of a large catch of one dominant species, only a fraction of the catch is sorted.

Length distributions are recorded for all crustacean, fish and other commercial species caught. Length is measured:

- 1 mm below for commercial crustaceans (cephalothorax and total length)
- 1 mm below for commercial cephalopods (mantle length)
- 0.5 cm below for small pelagic fish (total length)
- 1 cm below for all other fish species (total length).

Biological data (i.e. sex, length, weight, maturity stage) are collected. Hard structures (otoliths and *illicia*) are collected for some of fish species (The specification of the sampling level of otoliths and *illicia* is described in Table III of IBTS Manual).

8. Environmental data

No environmental data has been collected during the course of the surveys. CTD equipment will be used in the future. Sediment samples have been collected in the 2005–2006 surveys with the aim to study the characteristics of the *Nephrops* fishing grounds.

9. Database

Data are recorded in the database created for the Portuguese groundfish surveys (already described), designated CRUZDEM.

10. Crustacean Surveys history

The Portuguese crustacean surveys started in 1981. The surveys were carried out with the research vessels "Mestre Costeiro" and "Noruega" and the main areas covered were the southwest coast (Alentejo or FU 28) and the south coast (Algarve or FU 29). The main objectives were to estimate the abundance, to study the distribution and the biological characteristics of the main crustacean species, namely *Nephrops norvegicus* (Norway lobster), *Parapenaeus longirostris* (rose shrimp) and *Aristeus antennatus* (red shrimp).

In 1997, a stratified sampling design was adopted, based on the design for the demersal resources. The sectors and depth strata were the same used for the groundfish surveys, from 200 to 750 meters in the southwest coast and from 100 to 750 meters in the south coast. The number of hauls in each stratum was dependent on *Nephrops* and rose shrimp abundance variance, with a minimum of 2 stations per stratum. The average total number of stations in the period 1997–2004 was 60. These surveys were carried out in May-July and had a total duration of 20 days.

Since 2005, sampling was based on a regular grid superimposed on the area of *Nephrops* distribution. This sampling procedure allows a more powerful use of data, especially considering the use of geostatistical tools. The total duration of the survey was the same (20 days) and the haul duration had to be reduced from 60 to 30 minutes in order to cover all the rectangles (77) of the grid.

Summary of the Portuguese Crustacean Surveys in the period 1997–2006:

YEAR	DATES	HAULS	AREA	VESSEL
1997	03/06 – 19/06	50	SW+S	Noruega
1998	13/06 – 29/06	57	SW+S	Noruega
1999	28/05 – 14/06	30	S	Mestre Costeiro
2000	01/06 – 19/06	64	SW+S	Noruega
2001	10/06 – 28/06	68	SW+S	Noruega
2002	12/06 – 27/06	54	SW+S	Noruega
2003	07/06 – 26/06	67	SW+S	Noruega
2004	25/06 – 11/07	61	SW+S	Capricórnio (*)
2005	26/05 – 12/06	76	SW+S	Noruega
2006	25/05 – 11/06	79	SW+S	Noruega

(*) The gear didn't work properly. Abundance results cannot be used.

11. Use of the survey information

Examples where the Portuguese Crustacean Surveys data have been used:

- for the analysis of *Nephrops* abundance trends,
- as a tuning fleet in the assessment of FUs 28–29 *Nephrops* stocks (ICES,2006b),
- to define the closed areas for the Southern Hake and Iberian Nephrops stocks Recovery Plan (STECF/SGMOS,2004 and EC Reg. No 2166/2005)
- to estimate the male and female L_{50} for maturity (ICES, 2006a),
- to estimate length-weight relationships.

12. Problems

Portugal has 3 Functional Units of the ICES Division IXa. This survey covers two of them, which include the most important *Nephrops* fishing grounds. FU 27 (Northern Portugal) is not covered due to lack of vessel time. To cover this FU, an extra 10-day period would be needed. As fishing with the crustacean trawl is difficult and limited to specific areas, the stations shall be fixed after an exploratory survey.

13. Development

Due to uncertainties of age determination, VPA analytical assessments are not used anymore in most of *Nephrops* stocks. ACFM has recommended the use of Underwater TV (UWTV) surveys for *Nephrops* abundance estimation. The Portuguese *Nephrops* stocks are deeper than the further north stocks where this technique has been used. In these stocks, the burrows counting is done in real time with a camera mounted in a sledge and connected to the vessel with an umbilical cord. For the Portuguese stocks, a combined trawl and UWTV survey will be carried out in 2007. These depths will be covered with a stand-alone UWTV camera and recorder placed in the trawl head rope and the *Nephrops* burrows will be counted *a posteriori*.

As the bottoms are very deep it is necessary to continue with the trawl surveys until the technique is controlled and assured.

References

ICES. 2006 a. Report of the Workshop on Nephrops Stocks (WKNEPH). ICES CM 2006/ACFM:12, 81p.

ICES. 2006, b. Report of the Working Group on the Assessment of Southern Shelf Stocks of Hake, Monk and Megrim (WGHMM). Bilbao, Spain, 9–18 May 2006. ICES CM 2006/ACFM:29, 800 pp.

STECF/SGMOS. 2004. Recovery plans of Southern hake and Iberian Norway lobster stocks. Lisbon, 9 – 13 June, 2003. SEC(2004) 178.

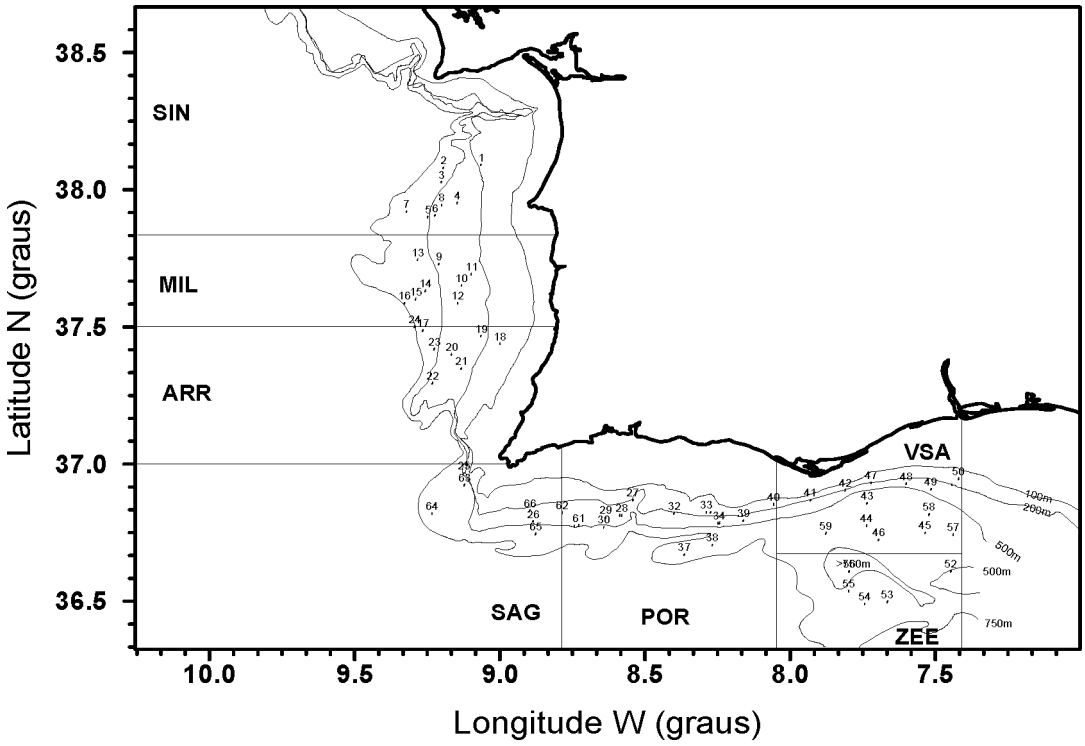


Figure 1. Stratification of SW and S Portugal used in Portuguese Crustacean Trawl survey in the period 1997–2004.

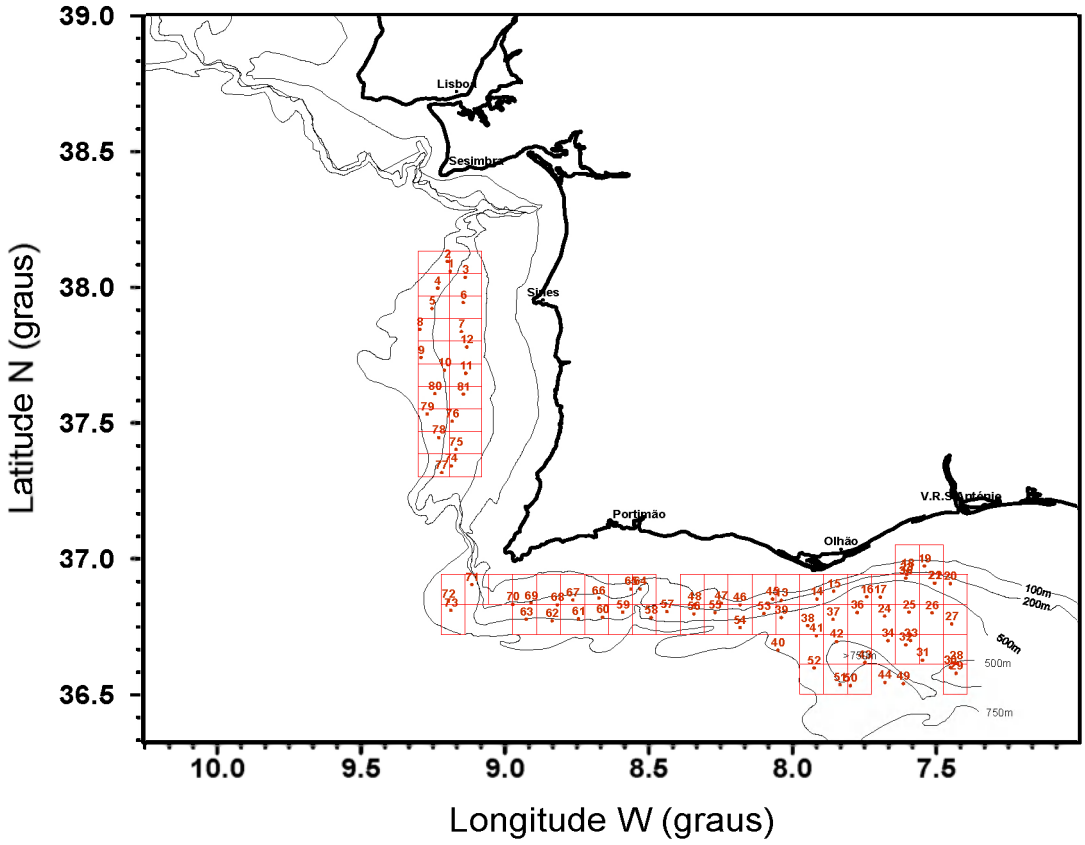


Figure 2. Regular grid used since 2005 in Portuguese Crustacean Trawl survey.

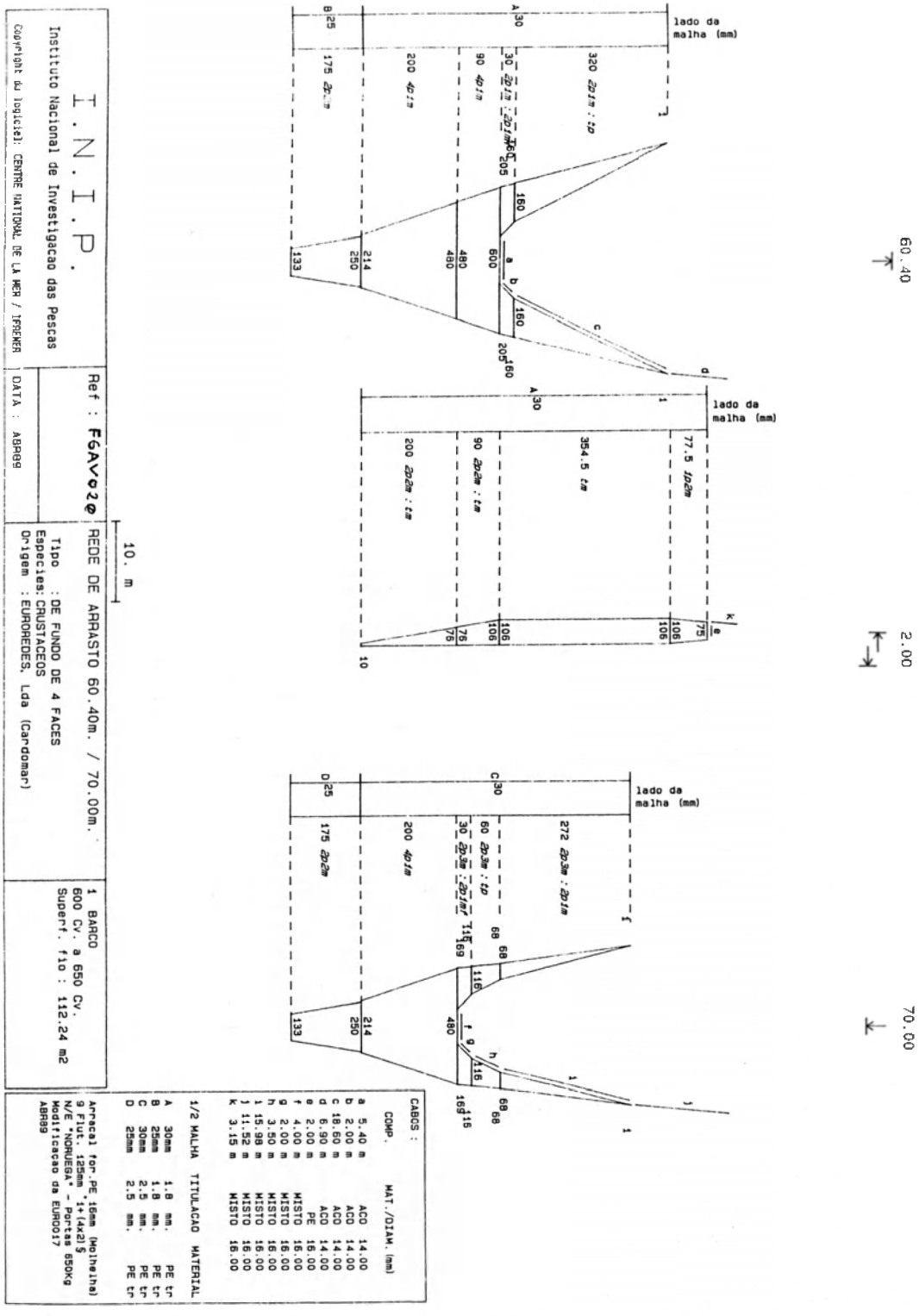


Figure 3. Scheme of the FGAV020 trawl gear used in the Portuguese Crustacean Trawl surveys.

ORHAGO survey: the need and the methodology

(Observation des Ressources HAlieutiques benthiques du GOlfe de Gascogne)

Gérard BIAIS

IFREMER La Rochelle, France

The ORHAGO survey aims mainly to collect an abundance index series for the sole stock in the Bay of Biscay. This resource is the main one in the Bay of Biscay, according to the value of landings, and since several years ICES have classified it as being at risk of reduced reproductive capacity and harvested unsustainably. This assessment has led UE to agree a management plan in February 2006. The objective is to bring the spawning stock biomass above 13 000 tonnes in 2008. Once the SSB is evaluated by ICES to be equal to or above this level, a long-term target fishing mortality shall be decided as well as a rate of reduction to reach it.

The quality of the assessment is therefore a major issue because of its political, social and economic consequences. In this regard, there is a need of a survey directed on Biscay sole as pointed out by ICES in its comments on the uncertainties in the assessment and forecast of this stock: "This assessment is tuned almost entirely by commercial fleets. Although the data examination conducted in 2005 allows some confidence in the LPUE trends, they may not reflect the abundance trend exactly. The lack of fishery-independent survey data for this stock is considered to be an important deficiency of the assessment, and also of the prediction when estimating the incoming recruitment. The catch forecast and SSB is driven by the assumed mean recruitment (80% of the 2007 landings and 60% of the 2008 SSB). The apparent increased frequency of weak year classes in recent years leads to increased uncertainty in the predictions" (Anon., 2006).

The ORHAGO survey was designed to fill in this gap. Because concerns on possible bias in the evaluation of sole abundance trend as well as in measurement errors that could arise from the choices made for the fishing gear, the period or the working area, a technological survey and a methodological survey were planed in May and November 2003. The first abundance survey could then be planned on the vessel programme in November 2006.

The fishing gear

Because the motor power of the research vessel (440 kW) that can be used for this survey, a large beam trawl must be excluded. A twin trawl (horizontal opening 2*14m) was considered to be the best other fishing gear for catching sole. The otterboards are fixed as near as possible to the wing tip to avoid driving effect of legs and sweeps, which may increase variability of catches. This special rig was set during the technological survey carried out in 2003. The trawl opening in width and height is controlled by net and wing tip sounders. The stretched mesh size in the codend is 20 mm as usual for such surveys.

The working period

November was chosen as working period for two reasons:

- the catchability age group 1 is better because the fish length of this age group at the end of the year and also because age group 1 leaves the shadow waters when these latter ones become colder;
- the spawners are not yet concentrating and that avoid sampling problems due to larger spatial variability in abundance.

The sampling strategy

According to fishermen observations, sole catchability is higher during the night. To check this daily variability was considered necessary because the possible bias that its may cause. Four series of five hauls were carried out on sole fishing grounds in November 2003 from 7am to 7pm on the same position, the first and the last haul being so in complete darkness in this season. The results confirmed the increase of cpue during the night. That implies the need to standardize the daily working period and preferably to work by night.

The choice to work by night limits the number of daily hauls as, because social agreements, it is impossible to trawl all the night long on the French research vessels but only from 6am to 7am and from 7pm to 11pm. Setting an haul duration to 30mn, time lapse which seemed to be adapted to sole abundance in the Bay of Biscay according to the November 2003 survey, and considering the travel time between hauls, the daily number of hauls at night is limited to three during the working period. The duration of the survey was set to 18 days at sea to allow carrying out at least 45 hauls at night.

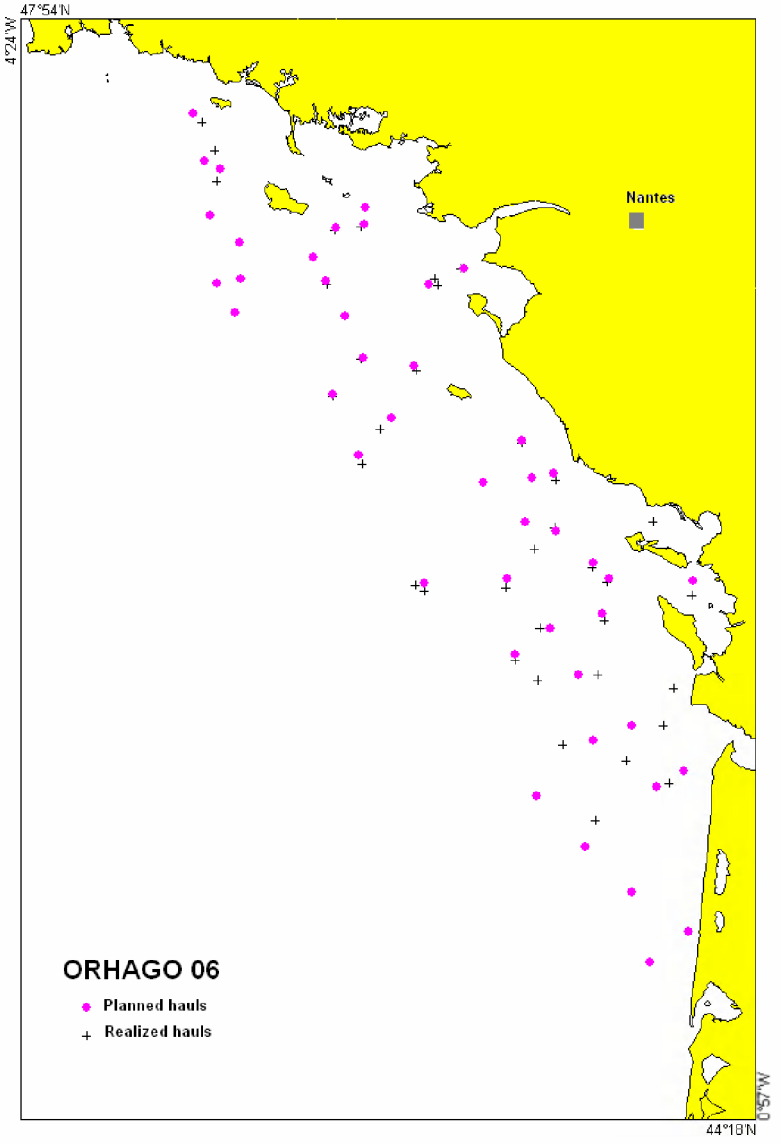


Figure 1. Planned and realized hauls during the ORHAGO 06 survey.

A systematic sampling was preferred to cover all the sole fishing grounds in the Bay of Biscay. The fishermen were consulted to have a collection of haul positions on which they are used to catch sole. From this information, it is difficult to define a regular pattern. Hauls were chosen to be spaced from 5 to 15 nautical miles and to cover the Bay of Biscay sole distribution area (Figure 1). Once defined, this pattern must be kept unchanged for the future surveys. The trend in abundance should therefore not be affected by the bias that the selected set of hauls may present.

The collected data

The catch of the two twin trawls are added because they cannot be considered independent samples. The whole catch of each haul is sorted by species, eventually by sex, measured and weighted, if necessary by sub-sampling. Otoliths are collected for some species (sole, hake and meagre in 2006). The survey series must then provide abundance series for the benthic ichthyologic fauna on sole fishing grounds.

Information from the first 2006 survey

A provision of 3 days overtime for eventual bad weather conditions was not sufficient. 5 days more are planned for the next survey.

The abundance repartition shows that two depth strata may be defined 0–50m and 50–100m. The allocation of number of hauls shall be revised in each of them to be proportional to the surface, observed 2006 cpue and observed 2006 variance.

Reference:

Anon. 2006. ICES Advice 2006, Book 7, 113 p.

Rockall and the Haddock Fishery

A. W. Newton, K. J. Peach, K. A. Coull, M. Gault and C. L. Needle

FRS Marine Laboratory, PO Box 101, Victoria Road, Aberdeen

(Extract revised March 2007)

4. Research Vessel Surveys

Given the relatively low importance of the Rockall haddock fishery to the overall Scottish fishing industry, it is no surprise that scientists at the Marine Laboratory in Aberdeen have, historically, only put the minimum of resources into monitoring this stock. During the 1960's and 1970's this monitoring amounted to the market sampling of some catches landed in Aberdeen and, if time permitted, a couple of survey tows by a research vessel. These surveys were almost invariably done as part of a more general survey of the shelf waters of the Scottish west coast and the Rockall survey was only undertaken if there was sufficient time during the more important west coast survey. If hauls were made at Rockall they were generally less than 10 in number, concentrated around the rock itself and generally resulted in a lot of net damage with no significant scientific results.

However, at the beginning of the 1980s the Rockall haddock fishery began to become more important and this fact, coupled with an extremely lucrative squid fishery, meant that the Marine Laboratory began to put more resources into this region. Starting in 1985 there has been a dedicated survey to Rockall in September of every year except for 1998 and 2000 (in 1997 it was decided that the Rockall survey would become a biannual event with a deep water survey occurring in the intervening year).

Initially the survey was done on a chartered vessel (M/v *Clarkwood* in 1985 and M/v *Dawn Sky* in 1986), but starting in 1987 the survey has been undertaken by a research vessel belonging to the Marine Laboratory. These surveys have taken on a further significance in so far as that Germany and Russia no longer survey this area and data from the Scottish surveys are now the only fisheries independent data available from this region.

Whilst the survey time has been standardised since 1985, there have been some changes in the gear over the years. Commercial trawls were used on the two commercial vessels and then between 1987 and 1997 an Aberdeen 48' bottom trawl was used. With the advent of a new research vessel in 1999 the switch was made to the GOV trawl fitted with ground gear C (as defined in Manual for the International Bottom Trawl surveys). A summary of the vessel, gear and haul durations is given in Table 4.1.

TABLE 4.1: SUMMARY OF SURVEYS UNDERTAKEN ON ROCKALL PLATEAU 1985–2006

Year	Vessel	Fishing Gear	Duration of Haul
1985	Clarkwood	Commercial	60 minutes
1986	Dawn Sky	Commercial	60 minutes
1987 – 1997	Scotia II	Aberdeen 48' Trawl (BT 101)	60 minutes
1999, 2001–2003, 2005–2006	Scotia III	GOV trawl (C) (BT 147)	30 minutes

4.1 List of Standard Stations

Prior to 1985 the stations surveyed by the Marine Laboratory tended to generate a lot of net damage but during the early 1980s' Scottish fishermen were also extending their knowledge of the grounds on the plateau. One of these skippers generously offered a copy of known clear tows to the Laboratory. A subset of these tows became the core of the stations now considered standard for this region; the list is given in Table 4.2 and illustrated in Figure 4.1.1.

TABLE 4.2: LIST OF SCOTTISH STANDARD TRAWLING STATIONS AT ROCKALL

			Shooting		Hauling	
Station No	ICES Sq.	Depth	Lat.	Long.	Lat.	Long.
1	44D6	152	57 51N	13 37W	57 48N	13 33W
2	44D6	180	57 54N	13 36W	57 45N	13 42W
4	44D6	146	57 45N	13 47W	57 47N	13 53W
5	44D6	144	57 42N	13 44W	57 43N	13 37W
6	44D6	154	57 45N	13 26W	57 42N	13 22W
7	44D6	143	57 38N	13 30W	57 35N	13 26W
8	44D6	182	57 32N	13 23W	57 28N	13 27W
9	43D6	165	57 28N	13 33W	57 25N	13 36W
10	43D6	148	57 28N	13 41W	57 26N	13 45W
11	43D5	183	57 23N	14 13W	57 24N	14 14W
12	43D5	165	57 19N	14 10W	57 22N	14 05W
13	43D6	153	57 12N	13 49W	57 19N	13 54W
14	43D6	156	57 20N	13 44W	57 22N	13 39W
15	43D6	190	57 22N	13 32W	57 22N	13 25W
16	43D6	182	57 17N	13 33W	57 14N	13 36W
17	43D6	174	57 13N	13 43W	57 16N	13 40W
18	43D6	175	57 04N	16 59W	57 06N	13 53W
19	42D5	183	56 58N	14 11W	56 58N	14 03W
20	42D5	188	56 52N	14 08W	56 51N	14 08W
21	42D5	198	56 44N	14 11W	56 46N	14 08W
23	41D5	200	56 27N	14 39W	56 27N	14 36W
24	42D5	200	56 31N	14 34W	56 33N	14 30W
25	42D5	198	56 35N	14 32W	56 37N	14 27W
27	42D5	194	56 44N	14 29W	56 46N	14 28W
28	42D5	190	56 49N	14 17W	56 45N	14 17W
29	42D5	181	56 56N	14 26W	56 56N	14 19W
30	43D5	172	57 03N	14 20W	57 07N	14 18W
31	43D5	167	57 04N	14 07W	57 03N	14 10W
32	43D6	184	57 03N	16 46W	57 00N	13 51W
33	43D6	194	57 07N	13 33W	57 08N	13 31W
34	42D6	188	56 57N	13 47W	56 58N	13 41W
35	43D5	170	57 09N	14 12W	57 10N	14 05W
36	43D5	178	57 12N	14 12W	57 14N	14 09W
37	43D6	160	57 16N	13 52W	57 13N	13 56W
38	43D5	180	57 21N	14 11W	57 23N	14 05W
39	44D5	152	57 30N	14 01W	57 32N	14 01W
40	44D5	150	57 38N	14 06W	57 34N	14 02W
41	44D5	162	57 40N	14 04W	57 41N	13 57W
44	44D6	160	57 45N	13 49W	57 48N	13 45W
45	42D5	186	56 41N	14 44W	56 44N	14 43W
46	42D5	187	56 55N	14 37W	56 52N	14 32W
49	42D5	190	56 34N	14 49W	56 35N	14 43W

Missing Station numbers relate to tows that have been deleted due to excessive net damage

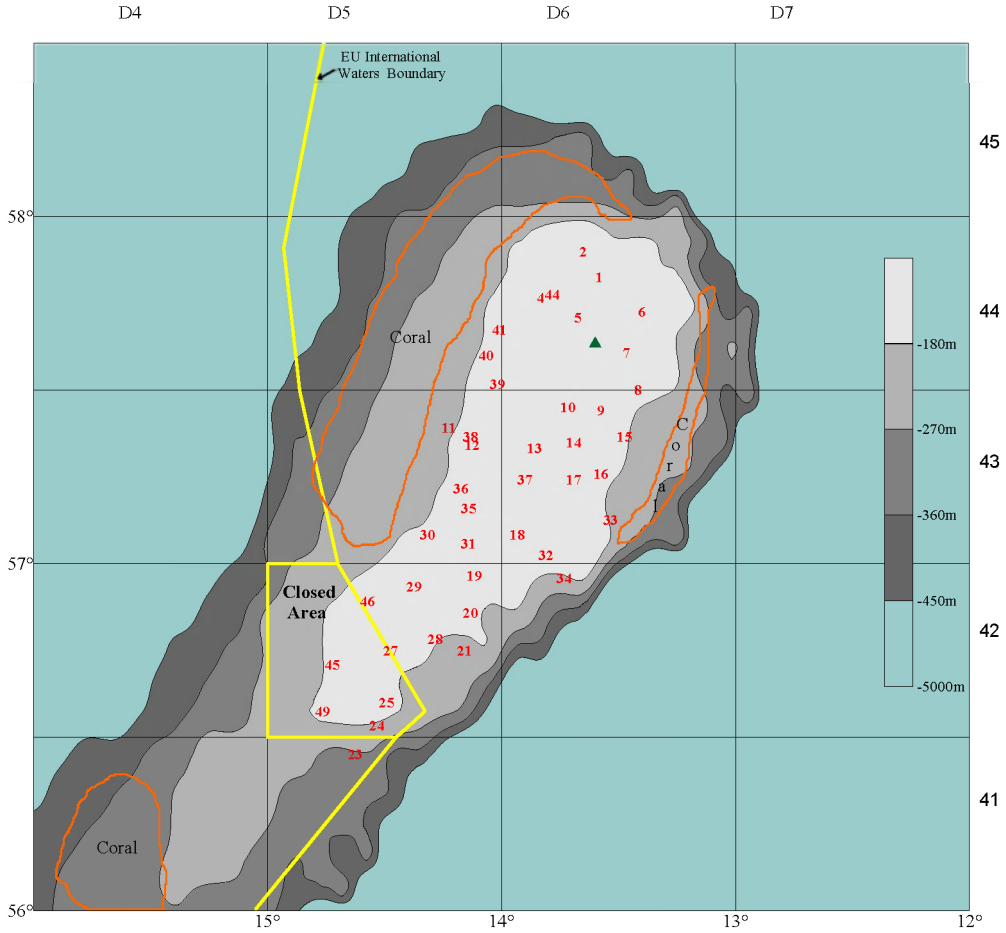


Figure 4.1.1. Rockall Haddock Survey Trawl Stations.

4.2 Indices

During a Scottish survey haddock are processed according to the Marine Laboratory's Standard Protocols. This means that wherever possible all haddock are sampled for length, if too many are caught then a process of sub-sampling is initiated. In all cases the final result is a length frequency distribution that is standardised to the number of haddock caught per cm length interval per hour. At the same time one otolith per cm measured per haul is extracted for age determination purposes. This means that if the survey successfully completes 45 hauls (the average for a survey) then potentially there are 45 age-length keys. However, all acquired age readings are combined to form a single area key. Similarly, the corresponding 45 length distributions are combined to form one area length distribution. By applying the age-length key to the length distribution the numbers of haddock at each age can be determined (age-frequency distribution). Finally the latter is adjusted to give an index of the numbers of haddock at each age caught per 10 hours fishing. These indices are used to tune the assessment.

TABLE 4.2.1: NUMBERS OF HADDOCK PER 10 HOURS FISHING AT ROCKALL (SCOTTISH SURVEYS)

Year	Month	Age								
		0	1	2	3	4	5	6	7	8+
1967		9	11	153	115	124	150	174	168	215
1968		21302	69	11	76	66	66	60	50	58
1969		0	7431	78	8	28	25	13	19	29
1970		0	11	9746	68	25	27	22	20	34
1971		No Survey								
1972		No Survey								
1973		No Survey								
1974		42250	5410	400	180	20	50	0	20	0
1975		No Survey								
1976		No Survey								
1977		0	6117	13581	2587	4366	54	0	80	163
1978		No Survey								
1979		0	212	819	6110	686	843	119	0	3
1980		0	153	796	4927	11943	292	1373	458	311
1981		39329	32098	16596	613	1675	17320	0	236	808
1982		0	24940	17677	300	249	1172	4363	71	534
1983		1	6	18541	7961	233	24	193	1210	103
1984		No Survey								
1985	Sept	489	51284	214	31	4218	676	1	2	145
1986	Sept	3577	17309	62196	85	139	2568	225	0	52
1987	Sept	698	11672	2917	8530	105	267	249	71	1
1988	Sept	8640	8170	5799	810	2107	5	2	91	17
1989	Sept	23580	10799	3531	1889	268	765	2	7	25
1990	Sept	16388	10612	1231	388	307	39	140	2	5
1991	Sept	14458	16398	4431	683	315	228	37	64	3
1992	Sept	20336	44912	14631	3150	647	127	200	4	32
1993	Sept	15220	37959	15689	3716	1104	183	38	73	21
1994	Sept	23474	13287	11399	4314	969	203	30	12	4
1995	Sept	16923	16971	6648	5993	1935	483	200	16	-
1996	Sept	33578	19420	5903	1940	1317	325	69	6	1
1997	Sept	28897	10693	2384	538	292	281	71	9	1
1998	Sept	No Survey								
1999	Sept	9934	9708	2603	779	291	186	103	66	23
2000	Sept	No Survey								
2001	Sept	31813	7455	521	284	154	39	14	12	14

4.3 Distribution on Plateau

The fundamental level of sampling on a survey is at haul level but as demonstrated in Section 4.2 these data can be compiled to produce information at a high level of aggregation i.e. indices for the entire Plateau. Given that the original data are obtained at haul level it is also possible to provide information at an intermediate level – the ICES statistical square. In this situation the haul length frequency distributions are combined for the relevant ICES squares and then the area age-length key is applied to the seven length frequencies generated. From this can be calculated the numbers at age for each square.

The number of haddock encountered on the Plateau can vary considerably from year to year. One theory advanced for variable recruitment is that haddock are normally retained on the Plateau by anti-clockwise circulating surface currents; however, on occasion these currents are thought to change direction and proceed directly across the Plateau from a north-westerly direction displacing eggs and the planktonic phase of haddock at the same time (Blacker, 1982). Not withstanding the variation in stock strength there does appear to be an age related distribution of haddock on the Plateau. Figures 4.3.1–4.3.4 show a five-year mean of distribution of haddock by four age classes. The 0-group, that is, those spawned in the year of survey; tend to be fairly widely dispersed with the highest levels found to the immediate south of Rockall itself. One-year haddock display a south/south-west movement and the major concentration is found in square 42D5 which also contains the closed area (see section 7.1). Two-year haddock also concentrate in square 42D5 with a graduated level of concentration reducing to the north-east. At age three and greater haddock appear to have returned to the grounds to the north of the Rock and these age groups are more evenly spread over the whole Plateau. All these observations relate to the month of September: see Section 7 for more recent work on distributions in April/May.

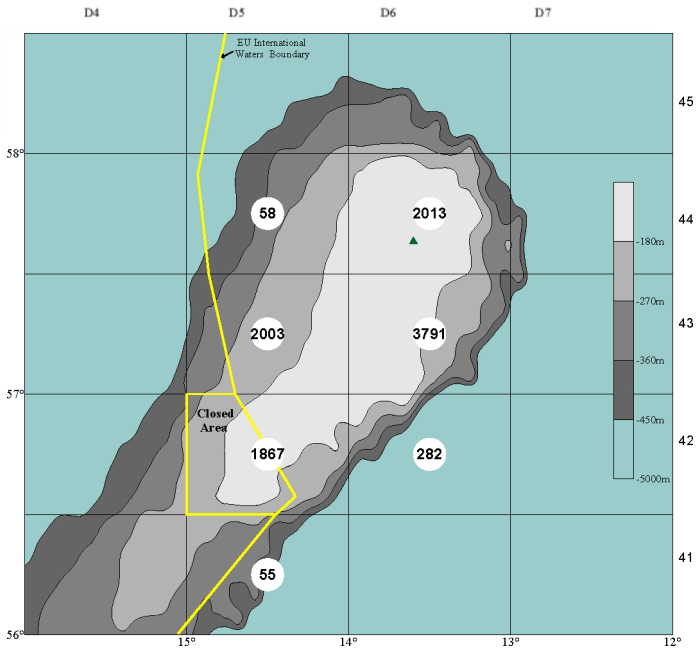


Figure 4.3.1. Scotia Rockall Haddock numbers per hour for age-0 (5 year mean).

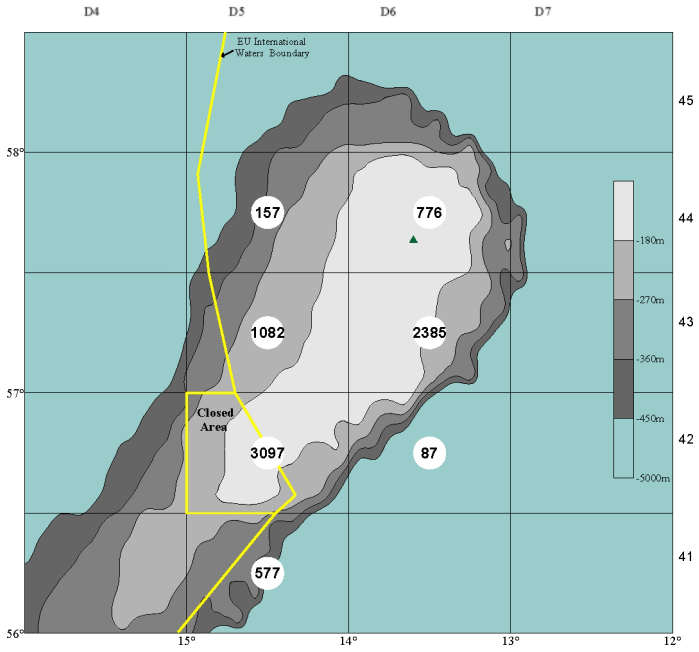


Figure 4.3.2. Scotia Rockall Haddock numbers per hour for age-1 (5 year mean).

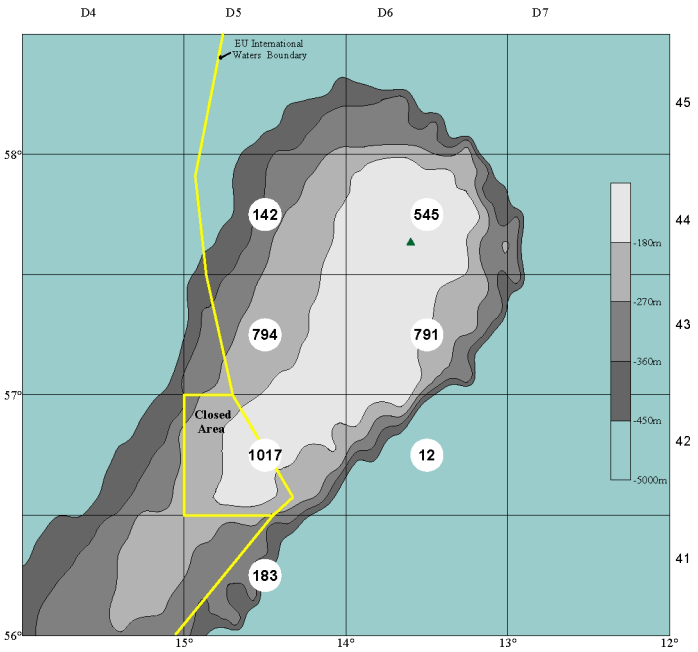


Figure 4.3.3. Scotia Rockall Haddock numbers per hour for age-2 (5 year mean).

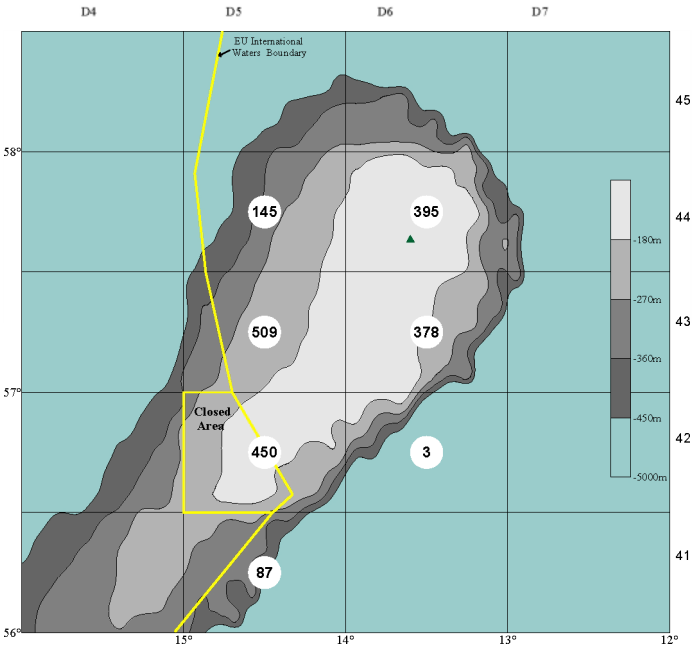


Figure 4.3. Scotia Rockall Haddock numbers per hour for age-3+ (5 year mean).

4.4 Coordination

During the Annual Science Conference in St. John's, Newfoundland in 1994 the recommendation was made that the International Bottom Trawl Survey Working Group should also incorporate the coordination of bottom trawl surveys in ICES Subareas VI, VII and VIII and Division IXa (these areas are designated as the western and southern areas).

Due to the fact that FRS is the only institute currently carrying out surveys at Rockall it has not been regarded as a coordinated survey. However, the proposed sampling plans and reports of this survey have been recorded in the annual report of International Bottom Trawl Survey Working Group in recent years. FRS propose that this survey be regarded as a coordinated survey and will provide the relevant information to the International Bottom Trawl Survey Working Group each year.

4.5 Data

Catches from the Rockall survey are collected and recorded according to the Manual for the International Bottom Trawl Surveys. The data are uploaded to the Fisheries Management Database at FRS in the standard format as used for Bottom Trawl Surveys and can easily be uploaded to Datras. This has been confirmed by ICES. If International Bottom Trawl Survey Working Group accepts this survey as a coordinated survey, FRS proposes to produce a schedule for uploading the historic dataset for the Rockall survey to Datras in the near future.

ICES 2007 IBTSWG – Working Document

Results of a comparative fishing experiment of FRV "Walther Herwig III" and FRV "Scotia" in 2006

Rudolf Kafemann[1], Siegfried Ehrich[1] & Kenny Coull[2]

[1] Institute for Sea Fisheries, Federal Research Centre for Fisheries, Palmaille 9, D-22767 Hamburg, Germany

[2] FRS, Marine Laboratory, PO Box 101, Victoria Road, Aberdeen, AB11 9DB, UK

Introduction

The International Bottom Trawl Survey (IBTS) in the North Sea is a highly standardized multi vessel survey. The results of this survey are mainly used by the assessment working groups to calculate the recruitment indices for the gadoids and herring and for tuning the assessment models.

Each year the standardization of the gear and the methods is one of the main topics during the IBTS Working Group meeting to optimise the survey and to make the results more accurate. Possible sources of error are differences in the fishing power of the participating vessels. Therefore, during the meeting in 2006 it was planned to carry out a comparison fishing experiment between the Scottish vessel "Scotia" and the German vessel "Walther Herwig III" to detect possible differences.

Within the German Small Scale Bottom Trawl Survey the FRV "Walther Herwig III" fished for 4 days (28.7. – 31.7.2006) in Box D, a small fixed area plotted in figure 1, under North Sea IBTS protocol conditions. During that period the FRV "Scotia" joined the FRV "W. Herwig III" for 2 extra days within the IBTS Q3 survey.

Materials and methods

The comparative fishing experiment of FRV "Walther Herwig III" and FRV "Scotia" took place within 2 days from July the 28th to 29th. Box D is an area of 10 to 10 nm in between ICES-Rectangles 44E8 and 44E9 off the Scottish east coast (Figure 1).

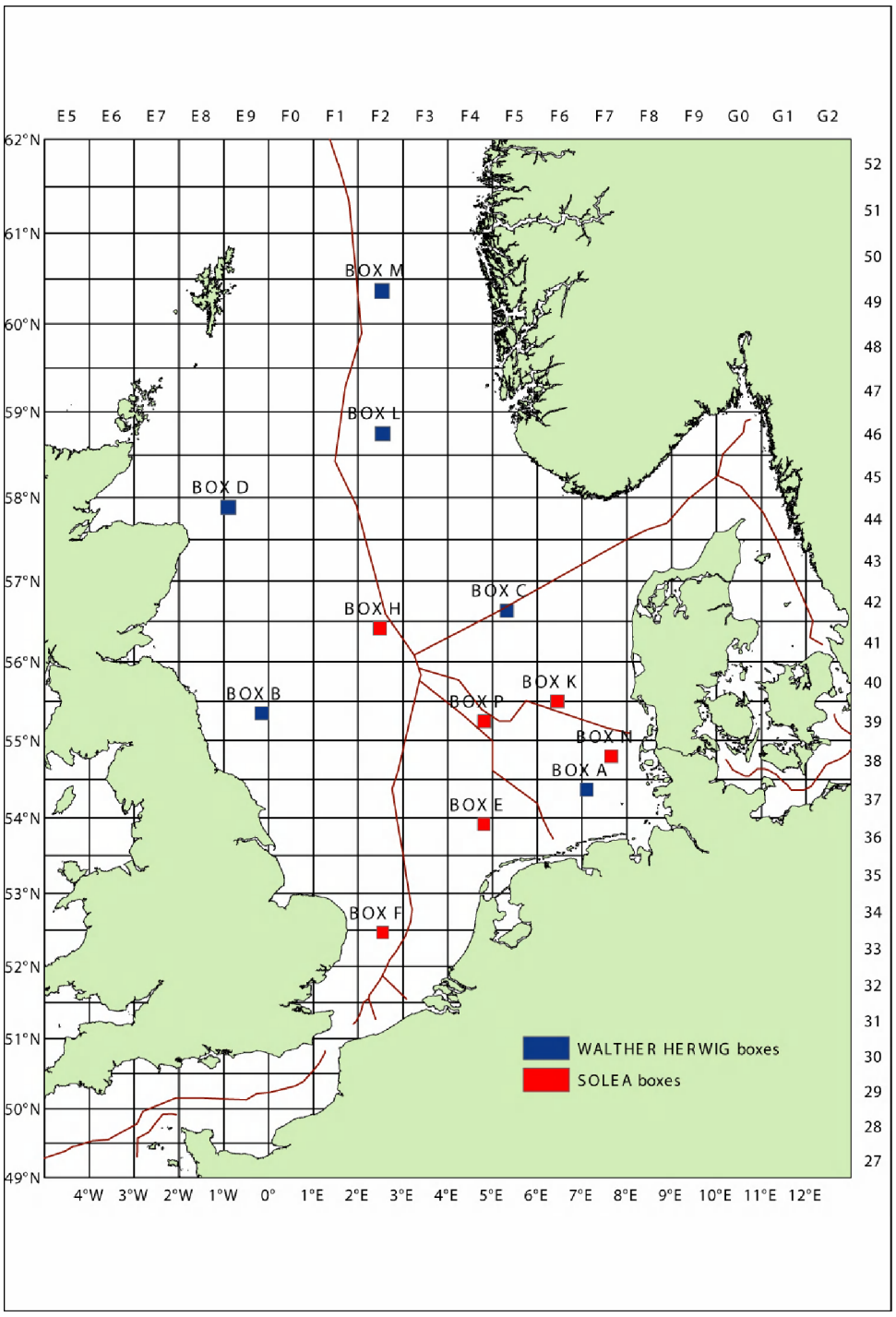


Figure 1. Boxes of the German Small-scale Bottom Trawl Survey (GSBTS). Comparative fishing between "W. Herwig III" and FRV "Scotia" was conducted in Box D. The red line indicates the national EEZ boundary.

According to the IBTS manual both vessels used the standard GOV-trawl rigged with the standard rubber disc groundrope (type A). Basic information on gear, on the rigging, on the catching and handling procedures are given in the IBTS-manual. Both vessels fished independently on randomly selected stations and towing directions to smoothen out the effects of weather, current and tides on the catch.

The manual recommends a trawl speed of 4 knots and a haul duration of 30 min. The parameters of the net geometry should be recorded during the hauls. In Table 1 details of the

trawl configuration of FRV "Walther Herwig III" and FRV "Scotia" during the fishing experiment are listed.

Table 1. Trawl characteristics and gear parameters.

	FRV "WALTHER HERWIG III"	FRV "SCOTIA"
Ground gear [type]	A	A
Sweep length [m]	60	60
	Mean values of 14 hauls	Mean values of 14 hauls
Warp length [m]	450	450
Opening width net [m]	21.6	18.1
Opening width otter b. [m]	87.2	76.9
Opening height [m]	4.5	5.7
Speed [knots]	3.5	3.7
Distance trawled [nm]	1.945 (3.602 km)	1.845 (3.417 km)
Fishing depth [m]	95.7	97.9
Swept area [m^2]	77,803	61,848
Swept volume [m^3]	350,114	352,531

Both ships conducted 7 hauls each day. Altogether 14 valid hauls per vessel were available for further examination. The hauls were sorted and fish were identified to species level. The numbers of individuals, length distributions and total weight per species were recorded. On board of the FRV "Scotia" the total weight per haul was determined only for six species: *Clupea harengus, Gadus morhua, Melanogrammus aeglefinus, Merlangius merlangus, Scomber scombrus, Trisopterus esmarki*.

Figures 2 and 3 shows the positions of each station in Box D. The trawling directions of the individual hauls of FRV "Walther Herwig III" and FRV "Scotia" were plotted separately for the first and the second day of the experiment.

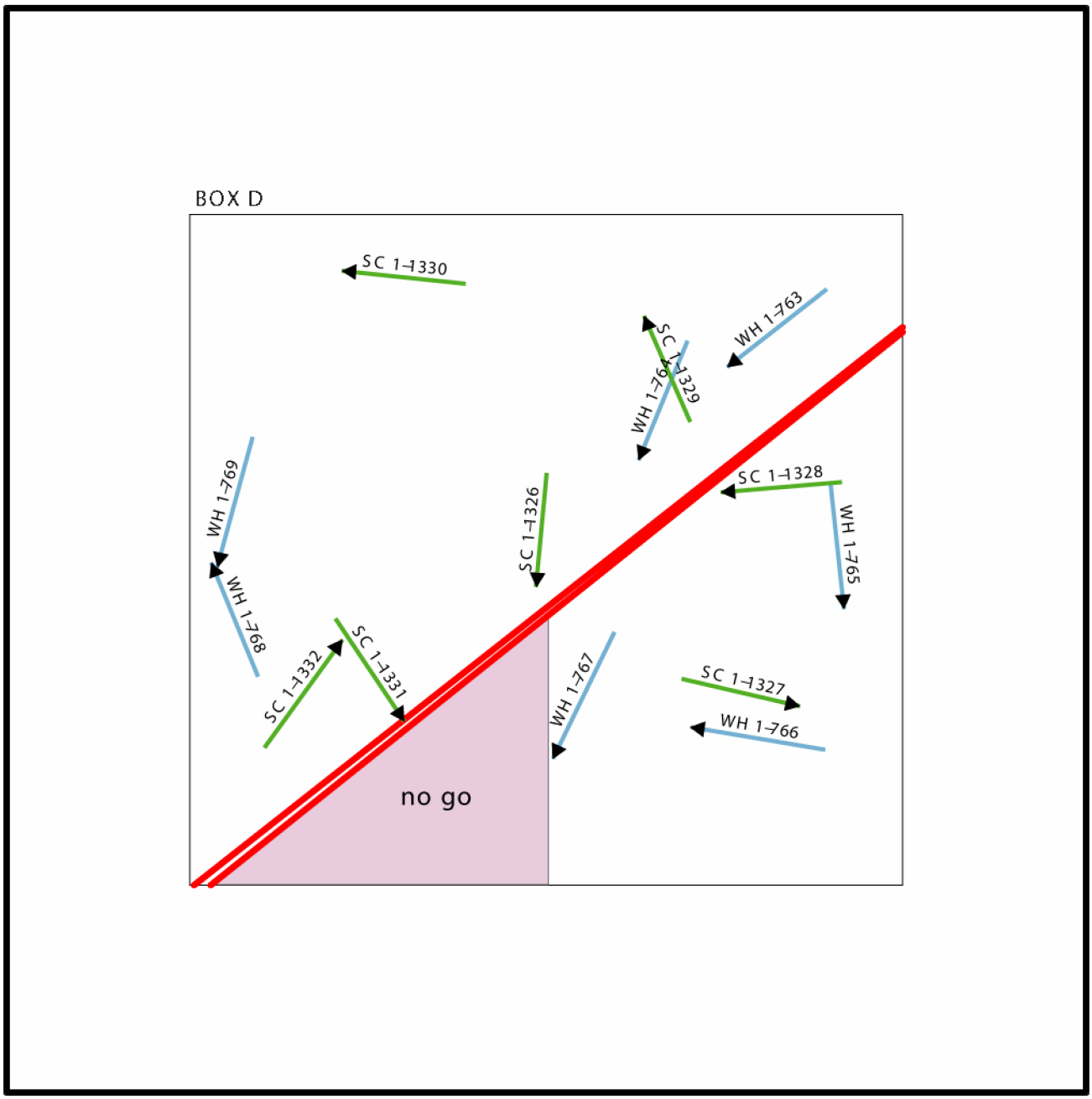


Figure 2. Location of the stations and towing directions of FRV "Walther Herwig III" (WH) and FRV "Scotia" (SC) during the first day of the comparative fishing experiment in Box D, 28.07.2006.

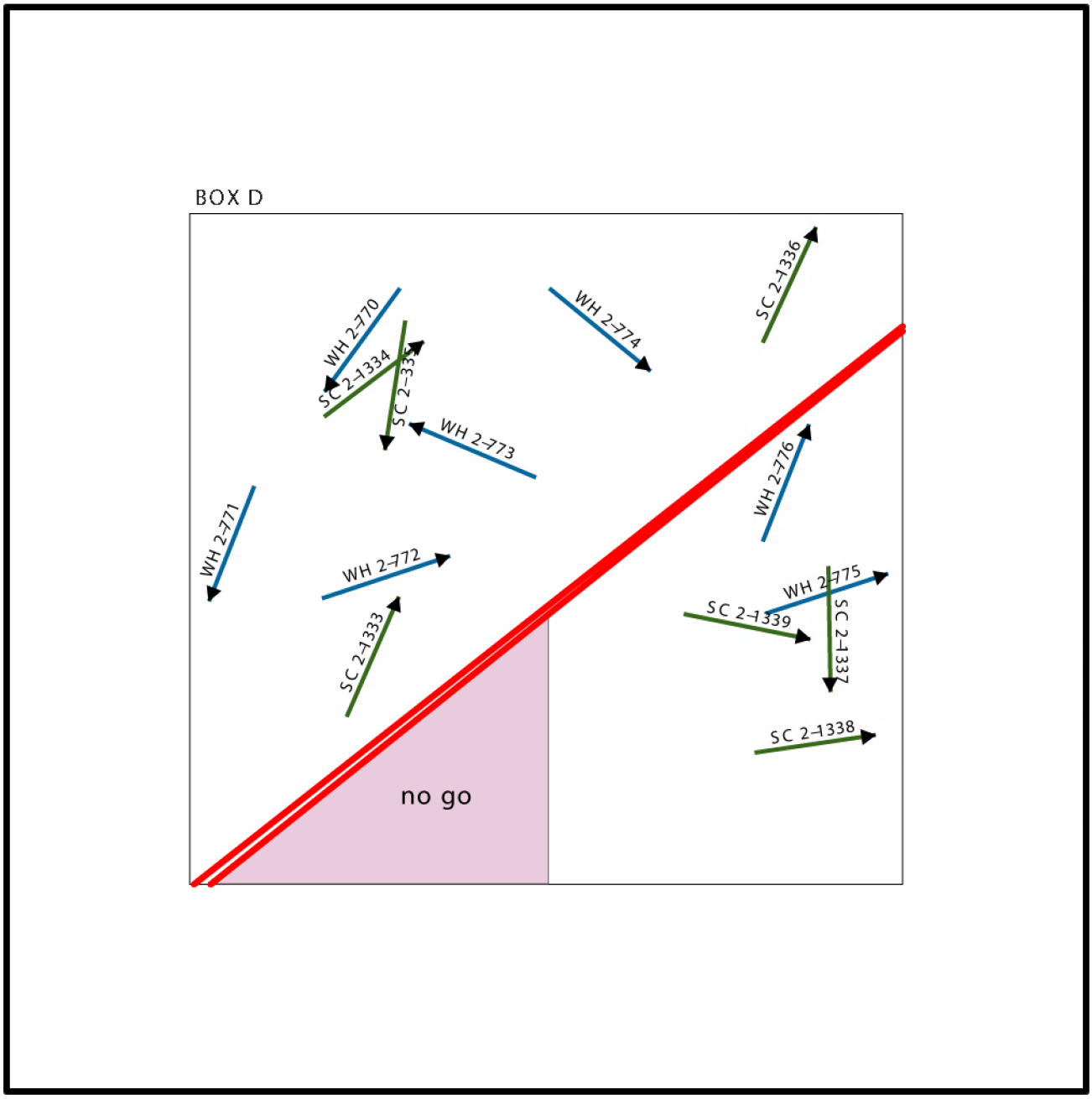


Figure 3. Location of the stations and towing directions of FRV "Walther Herwig III" (WH) and FRV "Scotia" (SC) during the second day of the comparative fishing experiment in Box D, 29.07.2006.

The station number, the time and duration of the single hauls are listed in Table 2.

Table 2. Haul specifications.

		FRV "WALTHER HERWIG III"				FRV "SCOTIA"				
			Trawling time				Trawling time			
	Haul	Station	Start [hh:mm]	End [hh:mm]	Duration [hh:mm]	Station	Start [hh:mm]	End [hh:mm]	Duration [hh:mm]	Deviation of the start time [hh:mm]
First Day	1	763	07:36	08:06	00:30	1326	06:17	06:47	00:30	+ 01:19
	2	764	08:37	09:07	00:30	1327	08:00	08:30	00:30	+ 00:37
	3	765	10:03	10:33	00:30	1328	09:43	10:13	00:30	+ 00:20
	4	766	11:23	11:53	00:30	1329	11:59	12:29	00:30	- 00:36
	5	767	13:03	13:33	00:30	1330	13:58	14:28	00:30	- 00:55
	6	768	14:38	15:08	00:30	1331	15:44	16:14	00:30	- 01:06
	7	769	15:46	16:16	00:30	1332	17:24	17:54	00:30	- 01:38
Second day	8	770	07:35	08:05	00:30	1333	06:15	06:45	00:30	+ 01:20
	9	771	08:35	09:05	00:30	1334	07:40	08:10	00:30	+ 00:55
	10	772	09:56	10:26	00:30	1335	09:26	09:56	00:30	+ 00:30
	11	773	11:31	12:01	00:30	1336	11:13	11:43	00:30	+ 00:18
	12	774	12:43	13:13	00:30	1337	13:16	13:46	00:30	- 00:33
	13	775	14:14	14:44	00:30	1338	15:19	15:49	00:30	- 01:05
	14	776	15:39	16:09	00:30	1339	17:44	18:14	00:30	- 02:05

3. Results

3.1 Description of Box D

The fish fauna in Box D has been monitored by the Federal Research Centre for Fisheries with FRV "Walther Herwig II" (1986–1996) and FRV "Walther Herwig III" (1997–2006) during summer on a yearly basis since two decades. The catch during this period was dominated by five fish species. Herring (45%), haddock (26%), whiting (14%), Norway pout (6%) and mackerel (5%) made up more than 90% of the mean total average biomass over the last 20 years.

The trawlable biomass varied strongly due to the presence or absence of herring shoals in the area. For this comparative fishing experiment Box D was selected being an area where high catches with relatively low variability for cod, haddock and whiting are expected on the basis of previous experiments.

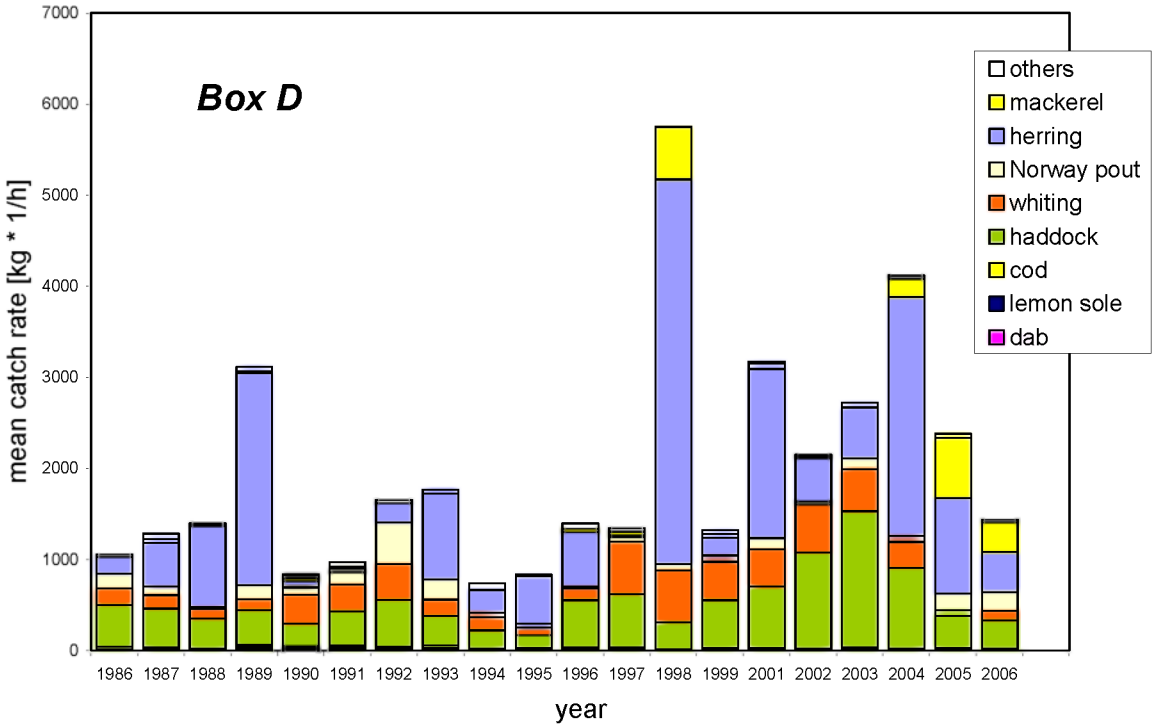


Figure 4. Box D. Scottish coast. Species composition [kg*1/h] from 1986 to 2006.

3.2. Comparative fishing experiment

According to the findings during the last two decades of fisheries research in Box D the analysis for the comparative fishing experiment focussed on the six dominant species: herring, mackerel, Norway pout, whiting, haddock and cod.

Firstly differences of the length composition were examined. Therefore the numbers of individuals caught per length class and species within 14 hauls conducted by each vessel were added and plotted.

Additionally to the length frequency analysis possible differences of the age composition per haul, species and vessel were examined. The allocation of a fish length to an age group was performed on the basis of the ICES age-length-key for Roundfish area 3 in 2006, quarter 3. The ICES key was completed with other meaningful age-length-data sampled available for the investigation area.

Herring was caught in lengths between 16.5 and 30.5 cm (Figure 5, above). Within the catches of both vessels the highest abundance values were reached for the size class of 24.5 cm. The observed differences of the abundances per length class were only slight, showed no directed trend and were tested as not statistically significant (t-test, ($p>0.05$).

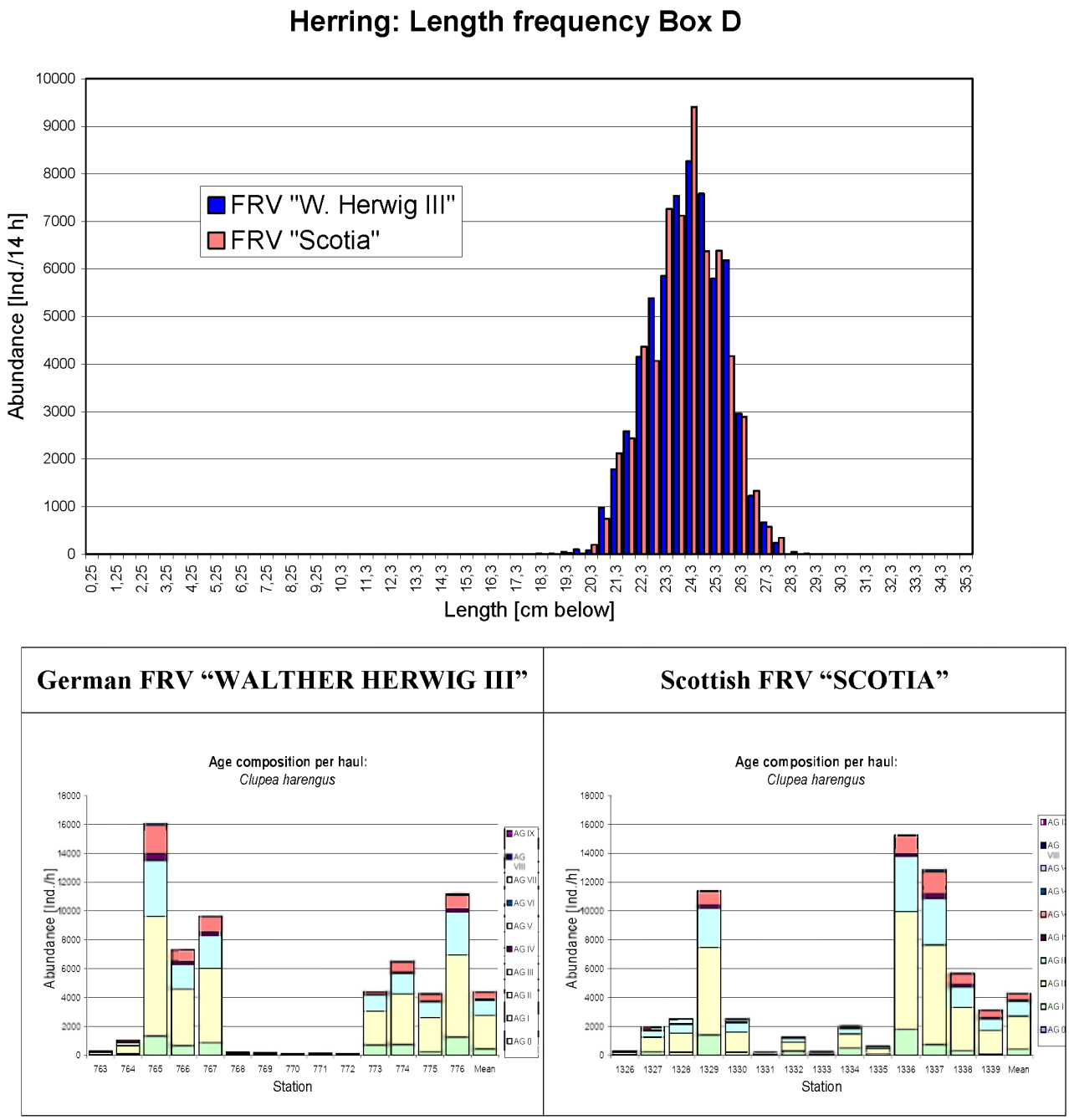


Figure 5. Herring. Comparative fishing experiment conducted by FRV "Walther Herwig III" and FRV "Scotia" in Box D, 2006.

Above: Length frequency diagram, abundance (sum) per length class of 14 hauls conducted per vessel.

Below: Age composition (abundance per age class and station) and mean of all hauls (right column).

Five dominant age groups (AG I to AG V) were identified for herring (Figure 5, below). The proportion of their presence in the hauls of FRV "Walther Herwig III" and FRV "Scotia" showed no significant differences. The variance of the total catch of herring seemed to follow

a daily as well as a spatial pattern (see also Table 2). Herring was most abundant in the catch during midday and in the eastern part of the box.

Overall the efficiency of both trawl configurations to catch herring seemed similar. No significant differences of the observed abundances of the dominant age groups of herring were detected (U-test, p>0.05).

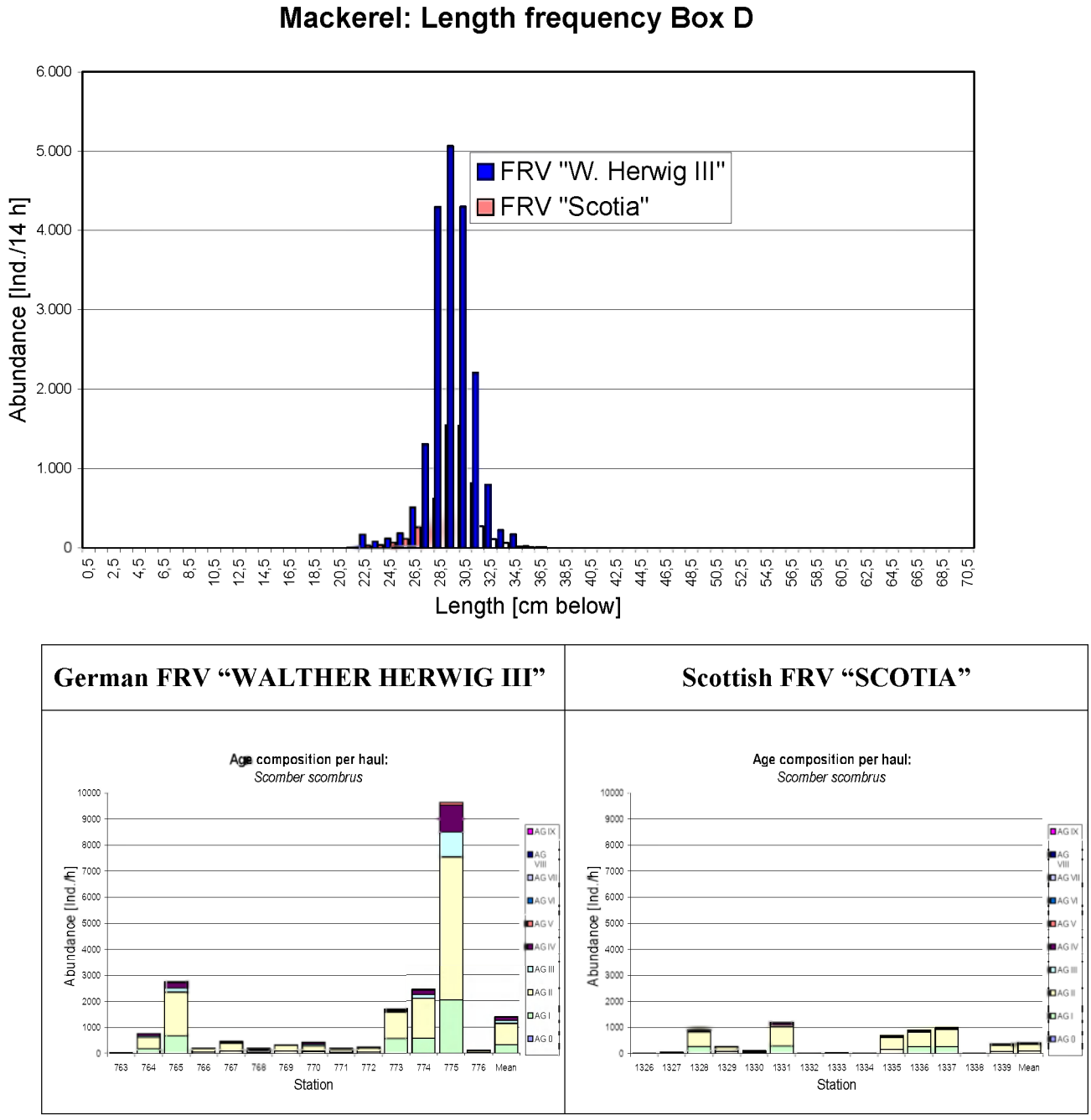
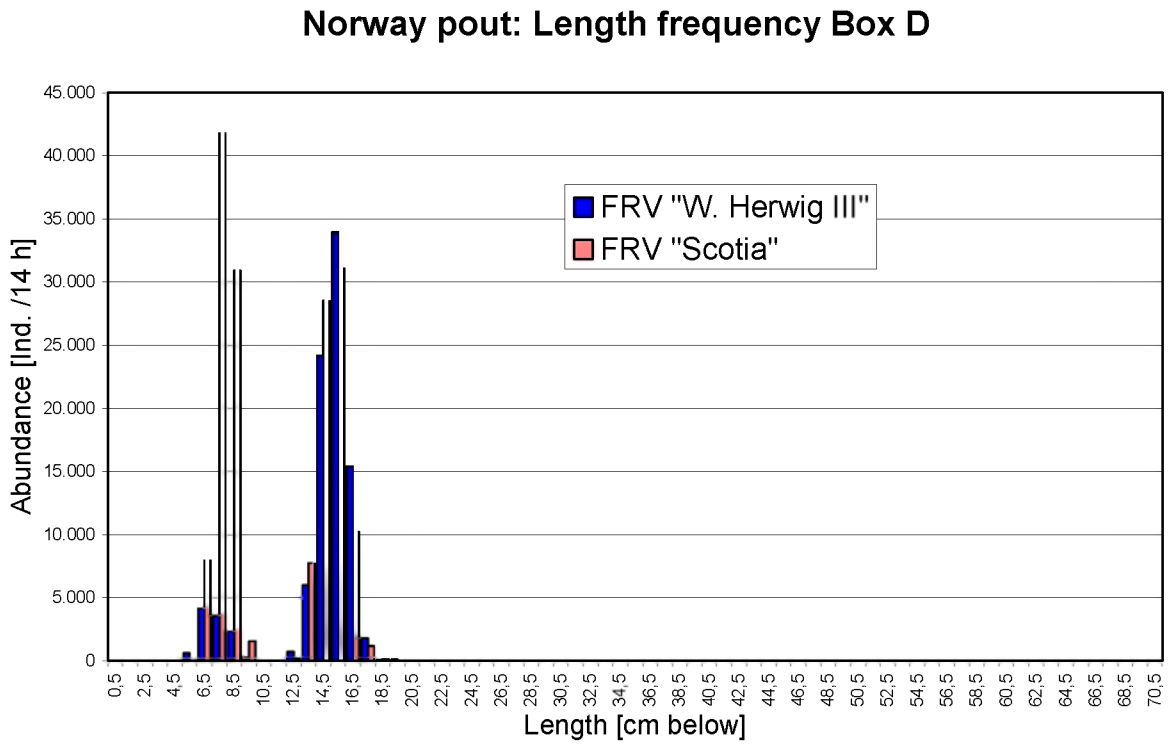


Figure 6. Mackerel. Comparative fishing experiment conducted by FRV "Walther Herwig III" and FRV "Scotia" in Box D, 2006.

Above: Length frequency diagram, abundance (sum) per length class of 14 hauls conducted per vessel.

Below: Age composition (abundance per age class and station) and mean of all hauls (right column).

The lengths of mackerel in the catch of both vessels varied from 21 to 36 cm. The mean catch in number of "W. Herwig III" was four times higher compared to "Scotia". Taking the higher vertical opening of "Scotia" into account this result is not understandable for a pelagic species. This result was mainly caused by one haul of "W. Herwig III" of more than 9,000 individuals at station 775 (Figure 6 below). Due to this uneven distribution within the Box mackerel is unsuited to be a target species of a comparison fishing experiment like this one.



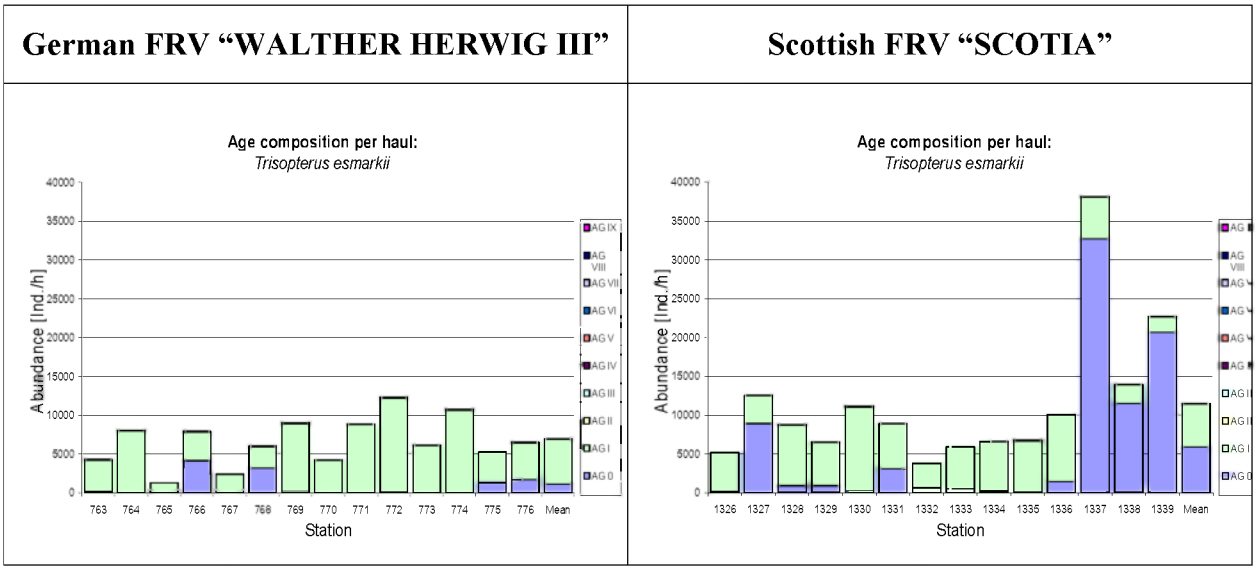


Figure 7. Norway pout. Comparative fishing experiment conducted by FRV "Walther Herwig III" and FRV "Scotia" in Box D, 2006.

Above: Length frequency diagram, abundance (sum) per length class of 14 hauls conducted per vessel.

Below: Age composition (abundance per age class and station) and mean of all hauls (right column).

The length frequency diagram for **Norway pout** showed no remarkable differences of the number of individuals caught in the range from 12 cm to 18 cm. Individuals of less than 10 cm were caught in much higher numbers from FRV "Scotia". The vessel differences in bigger fish were tested to be not significant (t-test, $p>0.05$).

The age composition of the single hauls confirmed a significant higher presence of AG 0 in most of the catches done by FRV "Scotia". For age group 1 the differences were not significant (U-test, Wilcoxon-test $p>0.05$).

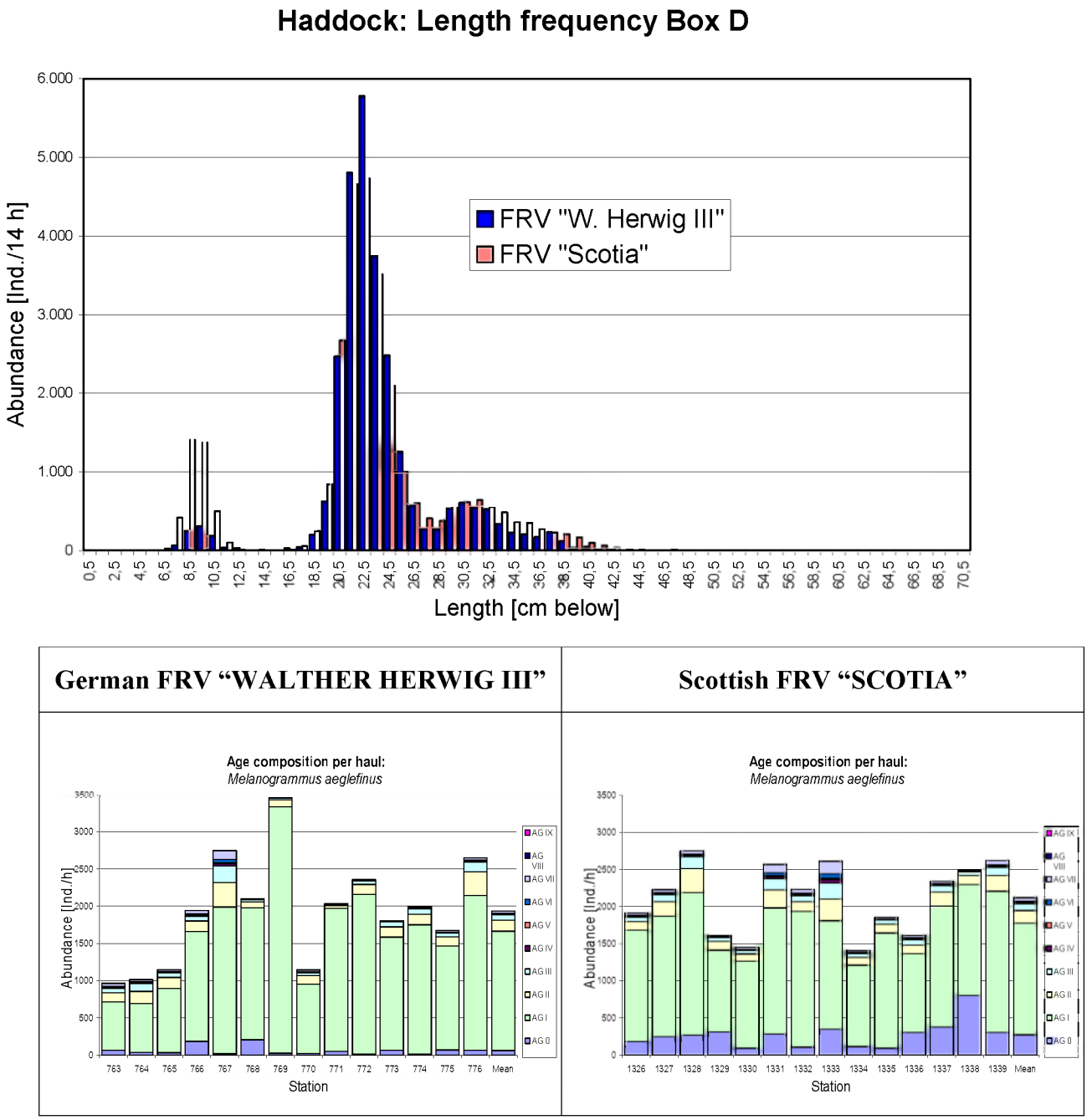


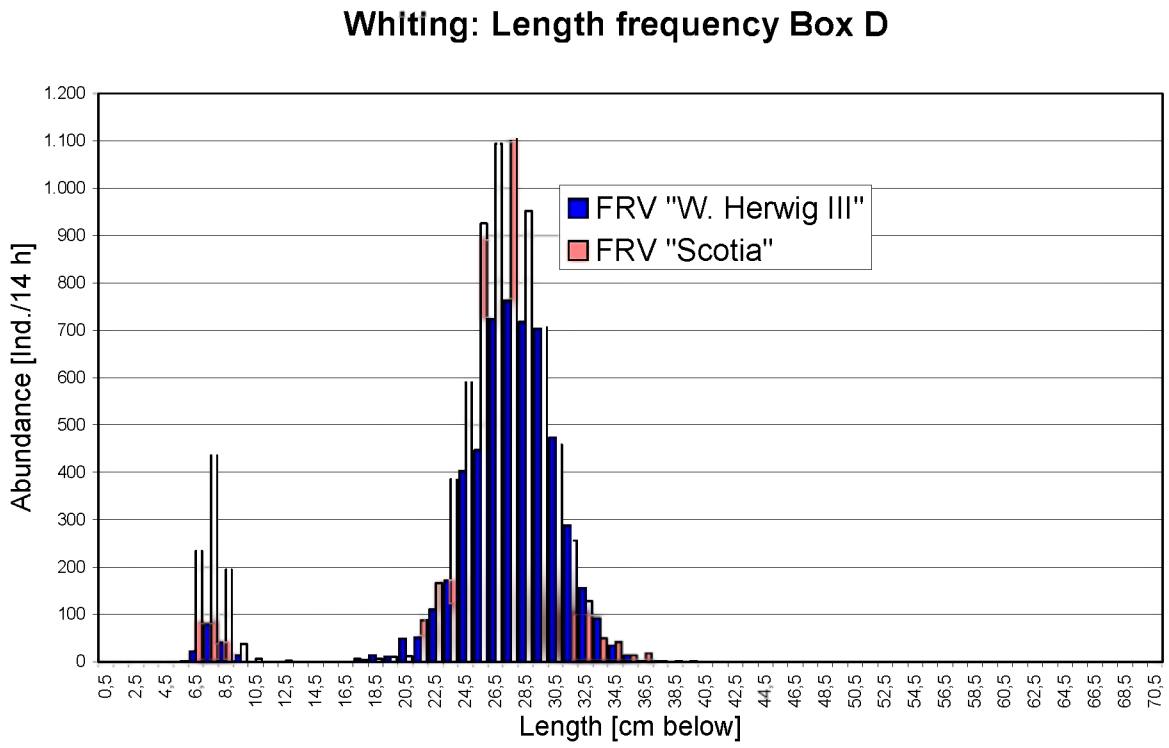
Figure 8. Haddock. Comparative fishing experiment conducted by FRV "Walther Herwig III" and FRV "Scotia" in Box D, 2006.

Above: Length frequency diagram, abundance (sum) per length class of 14 hauls conducted per vessel.

Below: Age composition (abundance per age class and station) and mean of all hauls (right column).

Comparing the length distributions of the two gadoid species **haddock** (Figure 8) and **whiting** (Figure 9) O-group fish of a length less than approximately 16 cm was collected to a higher degree by FRV "Scotia". The presence of O-group haddock and whiting was up to eleven respectively ten times higher in the catches from FRV "Scotia". Differences of the observed length frequency for haddock >16cm were tested to be not significant (t-test, $p>0.05$). The length composition of whiting with length of more than 17 cm differed significantly (t-test,

p=0.02). Age composition were significantly different for AG 0 and AG I for whiting (U-test p=0.02; Wilcoxon-test p=0.006). For haddock only for AG 0 differences were found to be highly significant (U-test p=0.005, Wilcoxon-test p<0.0009).



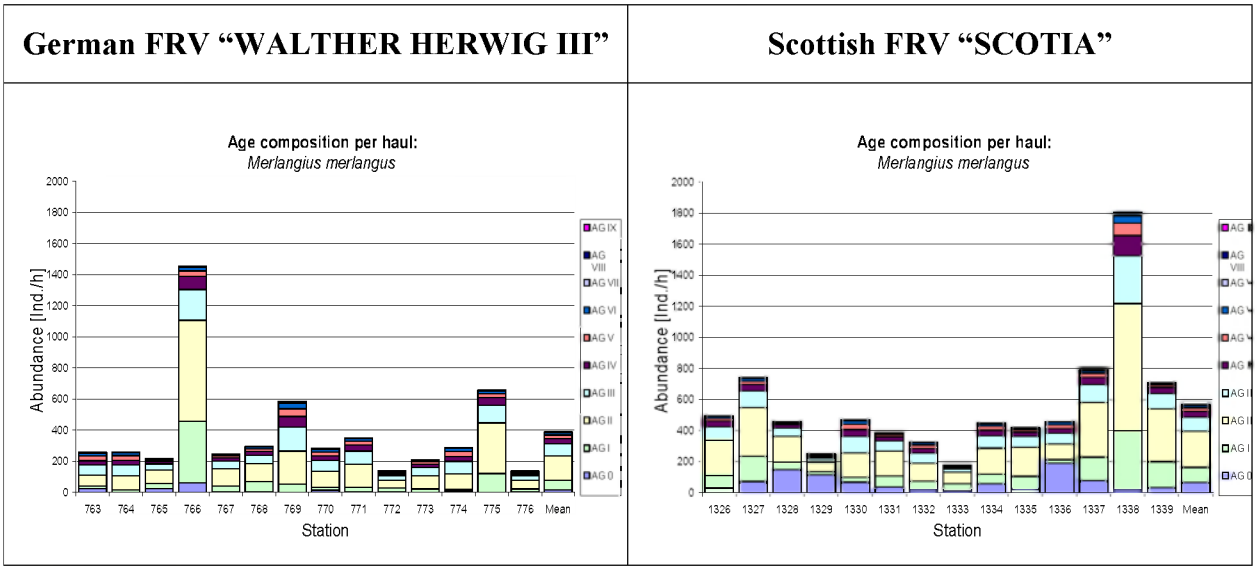
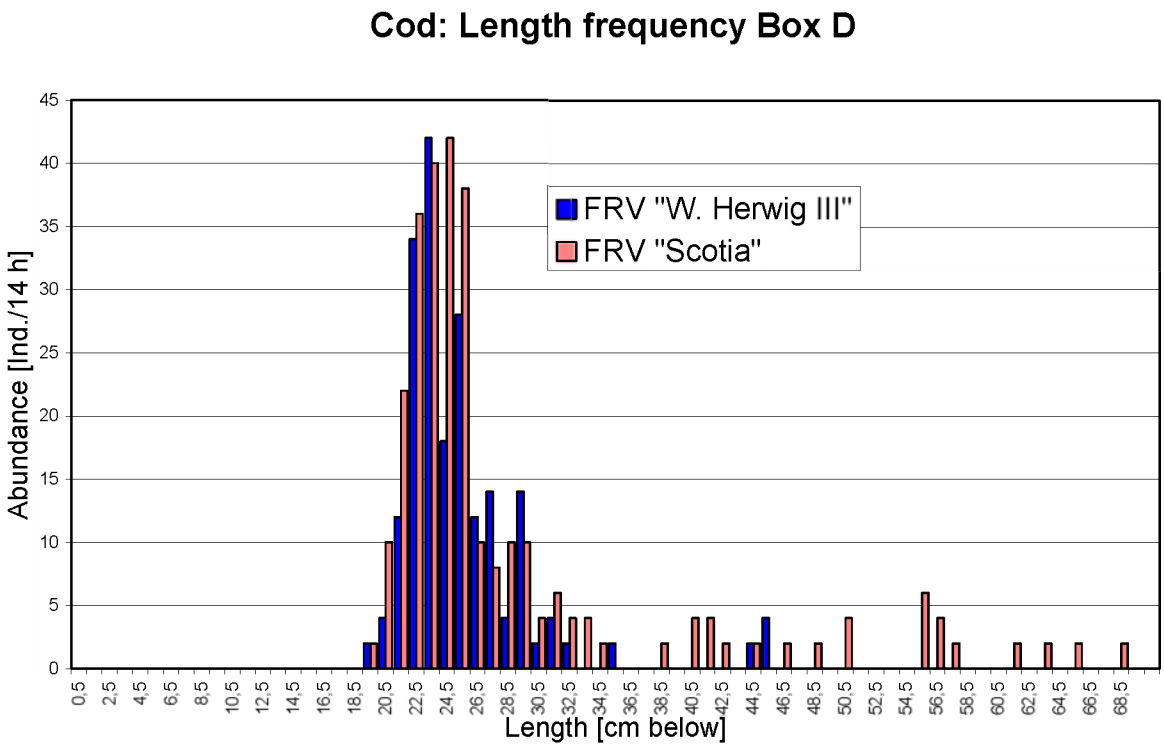


Figure 9. Whiting. Comparative fishing experiment conducted by FRV "Walther Herwig III" and FRV "Scotia" in Box D, 2006.

Above: Length frequency diagram, abundance (sum) per length class of 14 hauls conducted per vessel.

Below: Age composition (abundance per age class and station) and mean of all hauls (right column).



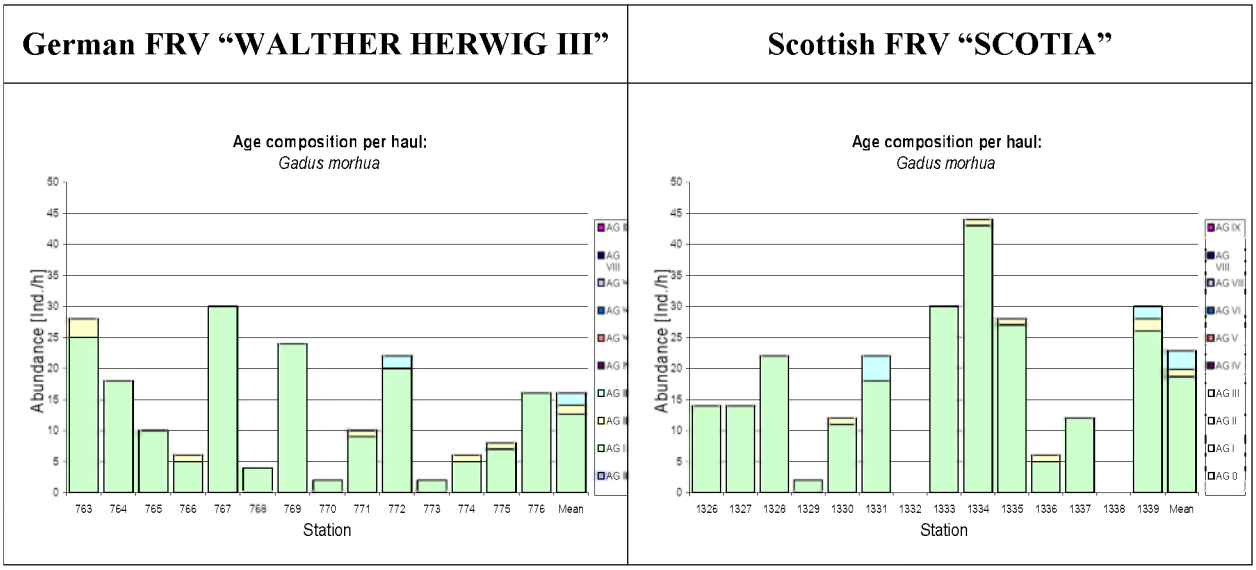


Figure 10. Cod. Comparative fishing experiment conducted by FRV "Walther Herwig III" and FRV "Scotia" in Box D, 2006.

Above: Length frequency diagram, abundance (sum) per length class of 14 hauls conducted per vessel.

Below: Age composition (abundance per age class and station) and mean of all hauls (right column).

Cod seemed to be caught by FRV "Scotia" with a higher efficiency. Cod between the length classes of 18 and 68 cm were caught.

Figure 10 illustrates the presence of AG's I to III in the catches of both vessels. Most of the individuals belong to AG I. The reason for a possible misinterpretation of Figure 10 is that with the overall age-length key from ICES for RA 3 not all of the caught fish, especially cod

of higher length groups, could be grouped to an age class. The age-length key does not contain age classifications for all length classes fished. Only 186 of 200 cod collected with FRV "Walther Herwig III" and 236 of 290 cod within the catches of FRV "Scotia" could be classified to an age group. In this respect many individuals of an age of 4 years and older were not included in Figure 10.

As an overall assumption the Scottish trawl configuration seems to fish cod more efficiently. On average FRV "Walther Herwig III" caught 14 and FRV "Scotia" 22 individuals per hour trawled (ind./h). The calculated mean catch weight was 2.51 kg/h for "Walther Herwig III" and 3.93 kg/h for "Scotia".

4. Discussion

The overall results of the comparative fishing exercise documented differences of the catch efficiency of the fishing power of FRV "Walther Herwig III" and FRV "Scotia". FRV "Scotia" caught a higher proportion of the juvenile gadoid dominants of the sampled fish community. Significantly higher abundances of AG 0 group fish were observed for haddock, whiting and Norway pout. Also a significantly higher proportion of AG I whiting seemed to be caught by "Scotia". The efficiency of catching cod was found to be lower for "WH III". In contrast for herring and mackerel there was no indication for a certain difference of the fishing power of both vessels found.

There are some possible reasons for these observations to be discussed:

- Net geometry and rigging of the gear
- Selectivity in the codend
- Spatial or temporal patchiness of species
- Material/twine of the net
- Noise level.

The investigated geometry of the trawls differed obviously. The estimated opening width of the net was found to be on average 3.5 m wider for FRV "Walther Herwig III" (Table 1). Also the mean acquired distances per haul were found to be 0.1 nm longer for FRV "Walther Herwig III". As a result the GOV of "Walther Herwig III" swept an area of 77,803 m^2 whereas with the trawl of "Scotia" swept only 61,848 m^2. The biological observation was that "Scotia" caught at least more small fish. If this observation would have been caused by differences of the swept area, one would expect that "Scotia" has covered a wider area with the GOV. This is not the case. Rather FRV "Walther Herwig III" swept 125% of the area fished by FRV "Scotia".

In contrast the vertical opening was 1.2 m lower for "Walther Herwig III" which means 120% of the bottom water column were fished by "Scotia" in relation to "Walther Herwig III". This resulted in the calculation of an average swept volume which differed only by less than 1% for both trawls. Two nearly equal values of the swept volumes also do not provide an explanation for the observed differences.

While the geometry of the trawls differed significantly, the fact that "Walther Herwig III" covered a larger swept area it was thought that net spread was not the reason for the increased catches of age group 0+ by "Scotia" but that the increased headline height may be a factor.

As one more probable explanation the selectivity of the codends in both nets must be taken into account. As described within the manual of the IBTS a small meshed inlet has to be fitted to the rear section of the codend. Thereby only the last 8 m of the 18 m of total length of the codend should be lined by the 20 mm inlet. A selectivity experiment conducted in 1996 indicated that up to ¾ of 0-group cod could escape through the codend in front of the inserted small meshed codend liner. Thus an unequal length of the inlet could result in remarkable

differences of the selectivity of age 0 group gadoids. "Scotia" and "Walther Herwig" both used an inlet lining 8 m of the rear section of the 18 m long codend according to the IBTS manual. Therefore selection in the codend caused by different length of the inlet serves not to be a certain justification for the deviating efficiencies of age 0-group fish in the catches.

Indications for a spatial or temporal patchiness of two pelagic species are described in the result section of this study. The uneven distribution of herring and mackerel leaded to the solution to exclude these species from further analysis of the study. Additionally with the figure 11 the local distribution of the semi-pelagic whiting in Box D is given. Compared to AG I group haddock (see also Figure 11) the abundance of AG I whiting showed a spatial patchiness. In the south-eastern zone of Box D the density of whiting seemed to be higher. Since the "Scotia" conducted more hauls in the south-eastern part of Box D the higher total abundance of AG I of whiting within the catches of "Scotia" could be related to a spatial patchiness of the species. In consequence whiting, as decided for mackerel and herring before, should be excluded as a key species for comparing the catchability of the GOV.

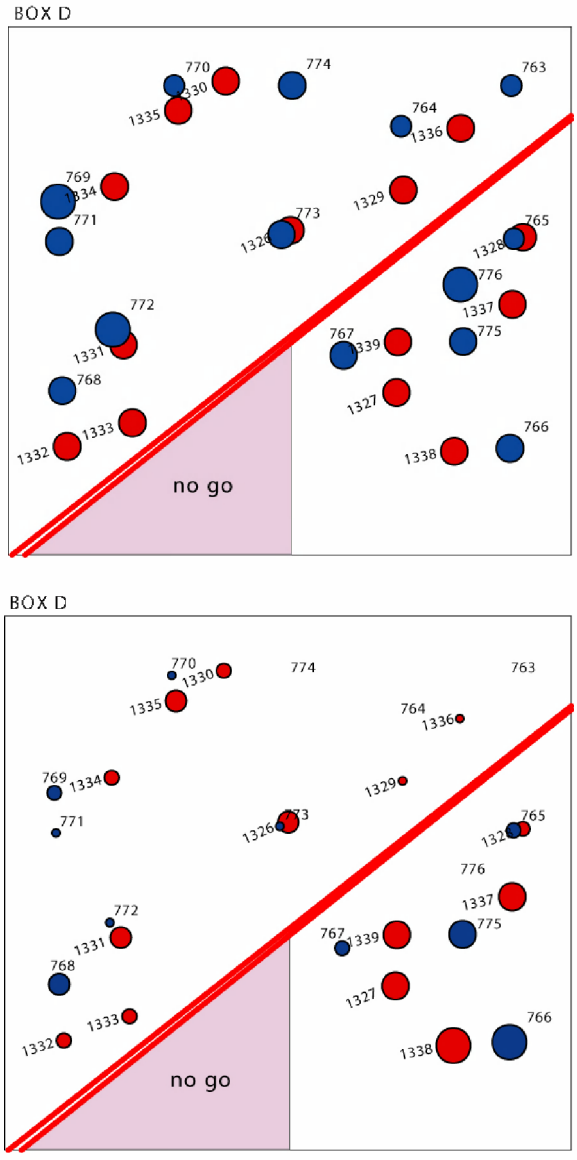


Figure 12. Whiting. Spatial distribution of catches (age-groups in number).

Furthermore the specific noise character of each ship could have affected the catch contribution. The "Scotia" meets the ICES-specification for a low noise vessel. The "Walther Herwig III" operates on a higher noise level and does not meet the ICES-specification. It is assumed but not testified with this study that different noise characteristics of the vessels could have been responsible for the lower catchability of the cod by "Walther Herwig III".

Last but not least an explanation for the observed differences could be the application of distinct net material. The GOV of FRV "Scotia" is made of Polyethylen twine. In contrast the GOV of "Walther Herwig III" is manufactured of Polyamid (Nylon). Presently the extent of the influence on catchability of the different use of net material stays unclear.

5. Recommendations

- More comparative fishing experiment should be conducted in order to identify the actual causes of catchability differences observed in the results of the experiment.
- Comparisons of the trawl parameters of all vessels and nations related to depth should be undertaken on the basis of a separate study.
- The Assessment Working Group should be aware of the results of this (limited) comparison exercise and take this into account when using combined survey indices.