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Report of the Working Group on Beam Trawl Surveys (WGBEAM)

8-11 June 2010

Lowestoft, UK

ICES International Council for the Exploration of the Sea

CIEM Conseil International pour l'Exploration de la Mer

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Contents

Executive summary

The Working Group on Beam Trawl Surveys (WGBEAM) met in Lowestoft, UK, 8–11 June 2010. Eight participants representing five countries joined the meeting.

Terms of reference

a) Prepare a progress report summarizing the results of the 2009 offshore and inshore beam trawl surveys.

The majority of the standard output was prepared before WGBEAM. During WGBEAM an extra study on the distribution patterns of grey gurnard, tub gurnard, whiting and pout whiting was done.

The results of the comparison of day and night catches in the French offshore survey were presented. The potential influence of water depth on the catches was discussed and it was suggested to do an analysis taking into account water depth as a parameter and to do an analysis on the variability of the day and night catches separately.

For the UK inshore surveys the length distribution data collected for *Crangon* sp. was presented. A non-statistical analysis of the length distributions indicated that it might be possible for this specific survey to obtain viable length distributions from a selection of randomly selected stations.

b) Tabulate population abundance indices by age-group for sole and plaice in the North Sea, Division VIIa and Divisions VIId-g.

North Sea sole: The 2005 year class appeared as two year olds in 2007 although only seen as average recruitment in 2006. The 2005 year class is still clearly visible in 2008 and 2009.

Area VII sole: In VIId, the 2008 year class is seen as one year olds in 2009 as a strong year class, comparable to the size of the 2002 year class. VIIa and VIIf surveys show below average recruitment for sole.

North Sea plaice: The 2006 year class in the North Sea is well above the long-term mean which is shown by the UK and the Dutch "Tridens" survey in 2009. This is also evident in the 'Isis' survey at-age 1 but not at the older ages. The older age groups (including the 2006 year class) in the "Tridens" survey show an increase.

Area VII plaice: In VIId, the 2006, 2007 and 2008 year classes are above average, the 2008 year class being the highest in the series. In VIIe the age 1 year class index does not seem to represent the indices for the older ages. Since 2005, the year classes have been above the survey mean, with the 2007 year class being the highest of the time-series. In VIIf, recruitment has been poor in recent years with 2001 and most subsequent year classes below average. By contrast, recruitment in the Irish Sea (VIIa) has been increasing recently.

The Dutch 1996 and 1997 year class for inshore and offshore surveys was re-read and the index was updated using the new age readings. The index for the Dutch inshore SNS survey was recalculated since data prior to 2002 were transferred from text files to the main database, which resulted in minor revisions.

c) Further coordinate offshore and coastal beam trawl surveys in the North Sea and Divisions VIIa, VIId-g and VIIIa-b;

Most surveys were carried out according to planning; only the Belgian inshore survey faced serious problems resulting in a lower sampling coverage than planned.

A staff exchange for the offshore was planned for 2011: German staff will join a Cefas Endeavour survey, UK staff will join the "Tridens" survey, and Dutch staff will join the Solea survey.

In 2010, Belgian staff will go on board the Cefas Endeavour Irish Sea survey.

For the inshore surveys, UK staff will join the German survey and the Dutch Wadden Sea survey in 2010.

d) Evaluate and report population abundance indices, taking into account the key issues involved in the index calculation;

See b)

e) Continue development of a manual to improve standardization of sampling protocols, surveys gears and quality control aspects;

Suggestions were made for updates of the offshore survey manual (scheduled in 2011). A start was made with the manual for the inshore beam trawl surveys.

f) Continue work on developing and standardizing an international (fish and epifauna) database of offshore beam trawl survey data and coordinate such activities with those of the IBTSWG.

A timetable for the addition of offshore beam trawl survey data to DATRAS was made:

COUNTRY	SURVEY	DATA IN DATRAS	PRODUCTS FROM DATRAS	PLANS UNTIL WGBEAM 2011	ACTIONS NEEDED TO ACHIEVE GOAL
Belgium	Belgica	no	no	Upload 2008, 2009, 2010 data	
France	Gwen Drez	no	no	Upload 2008, 2009, 2010 data	ICES Data Centre: stretch accepted area for beam trawl survey
Germany	Solea	no	no	Upload 2008, 2009, 2010 data Data preparation < 2008 scheduled for 2010	SOL (old Solea) added to DATRAS as a vessel
Netherlands	Isis	1985–2009*	yes	Index calculation from DATRAS	See Section 9.1
	Tridens II	1996–2009**	yes		
UK	Cefas Endeavour, VIId/IVc	1990–2009***	no	Index calculation from DATRAS, upload species that were not accepted before.	See Section 9.1
	Cefas Endeavour,VIIfg, VIIa	1993–2009***	no		

COUNTRY	SURVEY	DATA IN DATRAS	PRODUCTS FROM DATRAS	PLANS UNTIL WGBEAM 2011	ACTIONS NEEDED TO ACHIEVE GOAL
	Carhelmar	no	no	Upload time-series to DATRAS	CHM added to DATRAS as valid vessel

For the inshore surveys WGBEAM agreed on organising a one-day workshop to allow upload of inshore beam trawl survey data to DATRAS.

Additional requests

There were four additional requests sent to WGBEAM.

- WKFLAT recommended that sole indices for the North Sea part of the UK IVc/VIId survey and the Belgian offshore survey should be calculated. The UK IVc index was already available to WGNSSK and for 2008 and 2009 Belgian sole indices were calculated. The UK and Belgian indices by year class were compared and showed similar patterns for 2008 and 2009.
- ICES Data Centre on reviewing the current index calculations for the Dutch offshore beam trawl survey.
- WGBEAM compared the Dutch offshore indices to the offshore indices as calculated by ICES Data Centre step by step and concluded that the main difference is in the handling of length data without age information.
- ICES Data Centre on species taxonomy
- WGBEAM reviewed the proposal by the ICES Data Centre to switch from ITIS species coding to ERMS/WoRMS species coding and supports the proposal.
- IMARES on adding additional information from industry survey to survey indices.
- WGBEAM put advice on the industry survey and the potential additional information for stock assessment purposes.

1 Opening of the meeting

The chair opened the meeting at 9.30 on 8 June 2010.

2 Adoption of the agenda

The adopted agenda is published in Annex 2.

3 Introduction

3.1 Terms of reference

The **Working Group on Beam Trawl Surveys** (WGBEAM), chaired by Ingeborg de Boois, Netherlands, will meet in Lowestoft, UK, 8–11 June 2010 to:

a) Prepare a progress report summarizing the results of the 2009 offshore and inshore beam trawl surveys;

b) Tabulate population abundance indices by age-group for sole and plaice in the North Sea, Division VIIa and Divisions VIId-g;

c) Further coordinate offshore and coastal beam trawl surveys in the North Sea and Divisions VIIa, VIId-g and VIIIa-b;

d) Evaluate and report population abundance indices, taking into account the key issues involved in the index calculation;

e) Continue development of a manual to improve standardization of sampling protocols, surveys gears and quality control aspects;

f) Continue work of developing and standardizing an international (fish and epifauna) database of offshore beam trawl survey data and coordinate such activities with those of the IBTSWG.

WGBEAM will report by 5 July 2010 (via SSGESST) for the attention of SCICOM, WGISUR and ACOM.

3.2 Participants

There were eight participants from five countries. Because of EU responsibilities, the French participant was only able to join WGBEAM for one day. A complete list of participants at the WGBEAM meeting is given in Annex 1 of the report.

4 Review of WGBEAM 2009 recommendations and other requests to WGBEAM

4.1 WGBEAM 2009 recommendations

1. WGBEAM recommends that once the offshore surveys are uploaded to the DATRAS database ICES data centre should be asked to provide precision estimates for inclusion in the next appropriate WGBEAM report.

To be followed up ICES Data Centre in cooperation with WGBEAM. Status: because not all offshore beam trawl data are uploaded to DATRAS yet, this recommendation was not followed up yet.

2. WGBEAM recommends that if time and weather allows, overlapping stations between the surveys of two countries should be considered.

Germany tried to do comparative fishing with Dutch survey (Isis) but could not get into contact with RV Isis. UK is doing additional tows at the Belgium coast which might be Belgium tows. Germany and Netherlands (Tridens) did do some comparative fishing.

Status: completed

3. WGBEAM encountered problems with the screening program from June 10 in the afternoon onwards. WGBEAM recommends ICES Data Centre to investigate the problem.

Followed up by ICES Data Centre. Status: Fixed/Completed

4. WGBEAM recommends that Denmark makes effort to extend the inshore survey to the Danish coast, in order to obtain a more complete coverage of the continental coast.

Status: unknown, there seem to be budgetary problems.

5. WGBEAM recommends further examination of the spatial distribution patterns in relation to water depth and distance to the coast

Status: incomplete, to be put on the list for WGBEAM 2011

6. WGBEAM recommends doing a re-run of the XSA model for North Sea plaice for the updated separate offshore Dutch indices as for the combined Dutch offshore index taking into consideration the points raised in Chapter 8.2.4 of the WGBEAM 2009 report.

This topic was carried out by WGNSSK: see Section 6.3.3.

Status: completed.

7. For WGBEAM 2010, WGBEAM recommends to come up with working documents on the following topics: gear efficiency, sensitivity of indices, species of the year.

Status: incomplete, to be put on the list for WGBEAM 2011. A working document on gear efficiencies was created during WGBEAM 2010 and can be found in Section 9.4.

8. WGBEAM recommends putting information on index revisions in the survey summary sheets from 2010 onwards.

Followed up by WGBEAM. Status: completed (see summary sheets, Section 5).

9. WGBEAM recommends the creation of a DATRAS user group, including members of all survey working groups.

A DATRAS User Advisory Panel was installed in October 2009. The group used the ICES sharepoint as a discussion board. Every individual working with DATRAS data

(upload and/or download) can be added as a member to the group. The coordinator of DUAP reports back to ICES WGDIM. It is recommended that WGBEAM evaluates the functioning of DUAP at WGBEAM 2011.

10. WGBEAM recommends ICES Data Centre to send a warning users when higher taxa levels are present in the selected data.

11. WGBEAM recommends to check for higher taxa levels when up-loading data and give a warning to the owner of the data when a higher taxon level is uploaded.

Both to be followed up by ICES Data Centre. Status: Both in progress see also Section 9.2.

4.2 Additional requests

WGBEAM received four additional requests to deal with:

- WKFLAT on sole indices UK Channel, Belgium (and Germany), see Section 6.4
- ICES Data Centre on reviewing the current index calculations for the Dutch offshore beam trawl survey. See Section 9.1.
- ICES Data Centre on species taxonomy, see Section 9.2.
- IMARES on adding additional information from industry survey to survey indices. See Section 9.3.

5 Results of 2009 surveys (ToR a)

ToR a) Prepare a progress report summarizing the results of the 2008 offshore and inshore beam trawl surveys

5.1 Offshore surveys

5.1.1 Participation and coverage of the area

Eight surveys were carried out, covering the North Sea, VIId, VIIe, VIIfg, VIIa, VIIIa and VIIIb. The participating vessels and time of the cruises is listed in Table 5.1.1.1. The coverage of the area by each of the participating countries' surveys and the number of stations sampled in 2009 is shown in Annex 6.

WGBEAM recommends that once the offshore surveys are uploaded to the DATRAS database ICES Data Centre should be asked to provide precision estimates for inclusion in the next appropriate WGBEAM report.

Table 5.1.1.1. Overview of surveys during 2009.

COUNTRY	VESSEL	AREA	DATES	GEAR
Belgium	Belgica	southern North Sea (IVb,c)	24 Aug – 4 Sept	4m beam
England	Endeavour	VIIc, VIId	17 Jul – 31 Jul	4m beam
England	Endeavour	VIIfg, VIIa	9 Sep –1 Oct	4m beam
England	Carhelmar	VIIe	9 Oct–16 Oct	4m beam
France	Gwen Drez	VIIIa, VIIIb	3 Nov – 16 Dec	4m beam
Germany	Solea	German Bight (IVb)	14–26 Aug	7 m beam
Netherlands	Tridens	central North Sea (IVa,b)	24 Aug – 14 Sep	8m beam + flip-up rope
Netherlands	Isis	southern North Sea (IVb,c)	10 Aug – 10 Sep	8m beam

5.1.2 Survey results

The German offshore survey was completed without incident and a number of additional tows were able to be carried out.

The IVc and VIId survey was done again carried out by Endeavour. The problems encountered in French compulsory pilotage areas in 2008 were overcome. However, a number of stations in the Baia de Seine meant that two stations normally fished had to be abandoned because of extremely large epifauna catches, these stations are unlikely to be included in the survey from 2010 onwards. The English VIIe survey had to abandon one station because of significant amounts of dead shell on the ground however, this station is not part of the index grid.

The French survey continued to carry out tows at night and the preliminary analysis of this was presented at WGBEAM (see Section 5.1.2.3). Bad weather did hamper some operations but the survey dates were extended and all primary stations were fished. Gérard Biais presented the French results, especially the differences between day and night catches. WGBEAM discussed the potential influence of water depth on the catches and advises to do an analysis taking into account water depth as a parameter and to do an analysis on the variability of the day and night catches sepa-

rately. WGBEAM advises not to change the sampling strategy unless based on statistical analysis results.

The Dutch offshore surveys were completed without major incident. During the Dutch survey, comparative towing was carried out with a commercial fishing vessel in order to study the need for an industry survey in near future. The fishing vessel UK45 fished parallel with both "Isis" and "Tridens" during two days. Plaice and sole were measured to the cm below to compare length frequency distributions. Since 2009 was only a trial to study the logistics of parallel fishing, there are not enough data available to draw conclusions on.

5.1.2.1 Catch results

Distribution plots for the offshore survey fish species are presented in Annex 6.2. Numbers per hour for fish species per ICES division and roundfish area (RFA) are in Annex 7 and 8. The time-series of the catch of epifauna species per RFA and for ICES Subdivisions VII and VIII is in Annex 9.

An extra analysis for whiting, pout whiting, tub gurnard and grey gurnard was done. Annex 17 and Figure 5.1.2.1 show plots of the average number of whiting, pout whiting, tub gurnard and grey gurnard caught per year (Figure 5.1.2.1 and per rectangle per year (Annex 17) throughout the beam trawl surveys for all offshore surveys (except for the French survey) combined.

The bubble plots show that the spatial distribution of whiting differs between years; in some years catches are clustered although in other years they are not. Overall, the average catch of whiting shows a decrease through time. For pout whiting no clear pattern is visible for the numbers caught per statistical rectangle per year. The average catches per year do not show a significant trend although the catches seem to decrease over years.

Through time the average catch of tub gurnard has been stable and low. No pattern can be detected in the spatial distribution of the catches of this species. For grey gurnard, on the other hand, a northwesterly shift is visible through time although the average catch per year of this species has remained relatively stable through time.

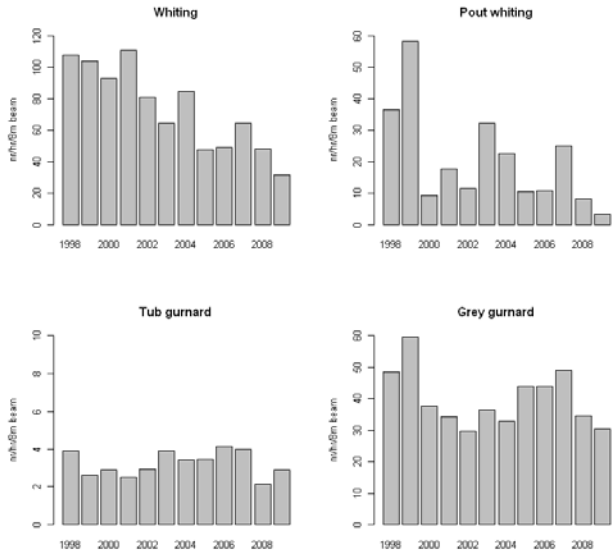


Figure 5.1.2.1. The average number caught per hour per 8m beam per year for whiting, pout whiting, tub gurnard and grey gurnard for all surveys (except the French survey) combined.

5.1.2.2 Comparative tows

"Tridens" and "Solea" carried out two additional tows for comparison purposes but no analysis of these has been undertaken.

Preliminary observations on daylight effect on sole abundance index in the Bay of Biscay

5.1.2.3 Results day and night comparison Bay f Biscay

The French beam trawl ORHAGO survey was launched in 2007 to get an abundance index of sole in the Bay of Biscay. In the context of an UE multiannual plan for restoring the state of this stock, the agreement of the industry on the survey protocol was considered to be a matter of particular importance for the future acceptance of assessments in which this survey will take part. An important point for this agreement appears to be the industry recommendation to trawl at night to maximize the sole catches.

The survey was consequently designed with a number of trawls as large as possible during the night. However, because the night trawling increases the cost of the survey (the working rules on French research vessels do not allow to work more than five hours during night), the survey programs have included a comparison of the catches during daylight and night on the same haul and during the same day to assess the advantage to work at night.

After three surveys, the collected data allow a first analysis of these comparative day/night hauls. This analysis was carried out by comparing the catch numbers of sole by 10 nautical miles. It confirms that the night catches are generally greater than day catches. Over the three years, night catches are about 10% above day catches (Figure 5.1.2.3.1). However, the night/day ratio of catch numbers may change from one year to another one: it was 1.5 in 2007, 1.2 in 2008 and 1 in 2009 (Table 5.1.2.3.1).

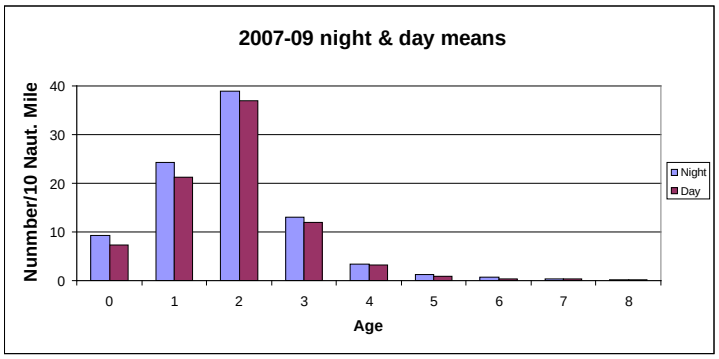


Figure 5.1.2.3.1. Sole Abundances indices (number/10 nautical miles) by daylight and at night.

Table 5.1.2.3.1. Night/day catch ratio by year and age group.

AGE	0	1	2	3	4	5	6	7	8	TOTAL
2007	2.0	1.6	1.4	1.3	1.4	1.5	1.4	1.4	0.7	1.5
2008	2.5	1.1	1.2	1.2	1.1	1.5	1.8	1.0	0.9	1.2
2009	1.1	1.0	1.0	0.9	0.8	0.7	1.2	0.6	1.3	1.0
total	1.3	1.1	1.1	1.1	1.0	1.2	1.5	1.0	1.1	1.1

Within years and among the age groups 0 to 4, which form the bulk of the catches, the ratios appear then to be different (higher) only at-age 0. From age 5 to 8+, there are also few ratios largely different from the annual mean but it is likely due a smaller precision of this ratio when age group abundance is lower.

Concerning the night/day catch ratio at-age 0, the spatial distribution of this age group can explain its higher value. Indeed, this age group 0 is only present in the coastal area and the catch at night are greater in this area that in deeper water with no relation with the fish length (Table 5.1.2.3.2).

Table 5.1.2.3.2. Night/day catch ratio by depth and length group (comparison for the central area of the Bay of Biscay which contributes for more than 90% to the annual abundance index).

DEPTH	<50M		>50M	
Fish length	<23 cm	>22 cm	<23 cm	>22 cm
2007	1.6	1.7	1.2	1.2
2008	1.2	1.3	0.8	1.0
2009	1.0	1.0	1.1	1.0

However, if the depth may explain some night/day variations of the catches in each year, the variations of the night/day catch ratio may be large between years on the same haul (Figure 5.1.2.3.2). There is obviously a local effect in these variations that must be investigated more closely by continuing the comparison between night and day catches during one or two years and, if possible, by looking at the spatial variations at small spatial scale.

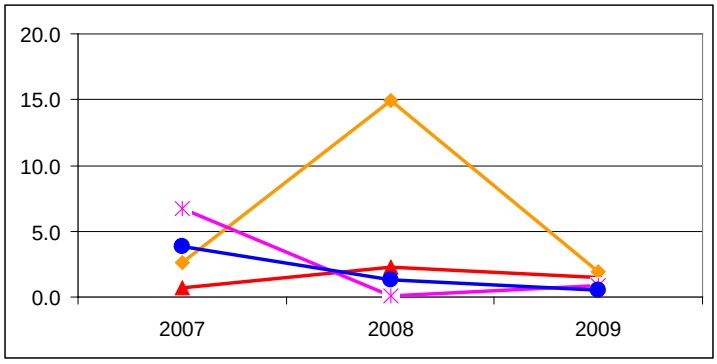


Figure 5.1.2.3.2. Examples of large variation of the night/day catch ratio on the same haul between years.

5.1.3 Survey summary sheets offshore surveys per country

5.1.3.1 Survey summary Belgium

Nation:	**Belgium**	Vessel:	RV "Belgica"
Survey:	Offshore North Sea Beam Trawl Survey	Dates:	24 August to 4 September 2009

Survey description:	An annual NSBTS survey is carried out in the southwestern part of the North Sea (IVb and IVc West) to sample the adult flatfish stocks, primarily targeting plaice and sole. Starting in 1992, the RV "Belgica" samples 62 fixed sampling stations in BTS Areas 2, 3 and 4.
Gear details:	All NSBTS sampling stations are fished for approx. 30 min, with a 4 m beam trawl, a 40 mm codend and chain mat.
Notes from survey (e.g. problems, additional work etc.):	59 valid stations done. Because of bad weather conditions during the second half of the survey, 3 stations were missed. Also no overlap with stations of the UK BTS could be realized. Number of otoliths: 25 ind per cm size class per BTS Area for cod, brill, turbot, plaice and sole. Indices for plaice and sole are the numbers per hour, averaged by ICES rectangle and averaged over all sampled ICES rectangles. The indices will be further investigated in cooperation with WGBEAM (See Section 6.4).
Target species catch rates:	

	TIME SERIES MEAN NR. PER HR	2009 MEAN NR. PER HR
Plaice	54.2	68.0
Sole	91.6	72.3

Number of fish species recorded and notes on any rare species or unusual catches:

The NS BTS measures all commercial fish species to the 5 mm below (no sub-sampling), and also records all other fish species by length (mostly all individuals, but sometimes based on subsamples). 52 different species of fish were caught.
The top 10 by number are:

SPECIES	TOTAL NUMBER
Limanda limanda	4041
Echiichthys vipera	2544
Solea solea	2133
Pleuronectes platessa	2006
Callionymus lyra	1477
Merlangius merlangus	925
Trisopterus luscus	772
Arnoglossus laterna	745
Buglossidium luteum	663
Agonus cataphractus	634

Number of epifauna species recorded	All individuals of epibenthic/benthic species and occasionally caught pelagic species are recorded on the species-level whenever possible (or the most detailed taxonomical level otherwise) based on complete catches (subsampling only for the bigger catches). A selected list, decided upon by WGBEAM, is presented to the WGBEAM.

Index revisions:	The number of otoliths collected per cm class per species per BTS Area was increased from 20 to 25.

Stations fished:

ICES Divisions	Strata	Gear	Indices stations	Comments
VIb, c	62 fixed stations	4 m beam trawl	59	
Number of biological samples (maturity and age material, *maturity only):				
25 otoliths per cm size class are collected per BTS Area for cod, brill, turbot, plaice and sole, and the fish these came from are also sexed. No maturity information is recorded (inappropriate period of the year), but gonads of rays are collected for maturity-studies and vertebrae for age-studies.				

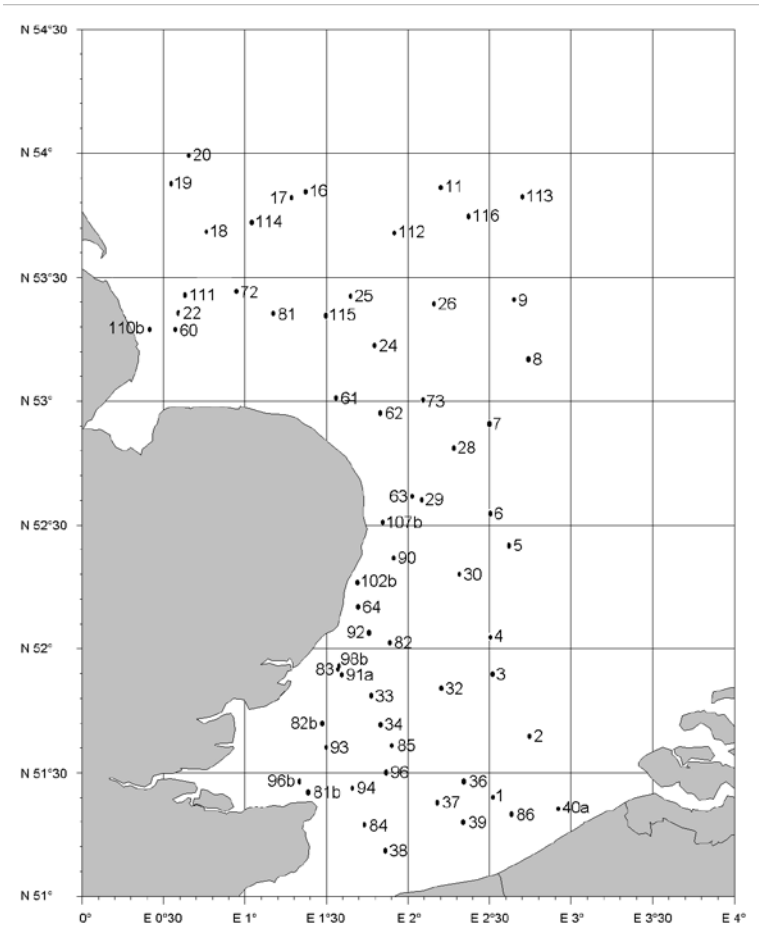


Figure 5.1.3.1.1. Towing positions "Belgica" 2009.

5.1.3.2 Survey summary England: VIId and IVc

Nation:	**UK (England and Wales)**	Vessel:	RV Cefas Endeavour
Survey:	11/09	Dates:	17–31 July

Survey description:	Q3 Eastern English Channel and Southern North Sea survey aims to collect data on distribution and relative abundance, with biological information on commercial fish species in VIId and IVc. The primary target species are sole and plaice, with additional species including lemon sole and cod.
Gear details:	Steel 4m-beam trawl with chain mat and single flip-up rope, 80mm trawl with 40mm codend cover. Also attached is the SAIV mini CTD.
Notes from survey (e.g. problems, additional work etc.):	Because of large catches of benthos and dead shell and sand a number of tows on the French side of Viid had to be either shortened in length or dropped completely (3 in total). Additionally 7 stations off the Belgium coast were fished in an attempt to get better coverage of the IVc area. It is likely that the invalid tows on the Frnech coast will be rationlised in 2010, to stop the problems that have been encountered over the last 3 years. In addition to the primary aims, length weight relationship data were collected at all stations.

Target species catch rates:

	Time series mean no. per hr	2009 mean no. per hr	Time series mean catch weight per hr (kg)	2009 mean catch weight per hr (kg)
Sole	64.59	84.39	6.87	8.72
Plaice	72.92	84.47	17.31	20.41

Number of fish species recorded and notes on any rare species or unusual catches:

65 separate species of finfish were caught. The top 10 by number are:

Callionymus lyra	3436
Pleuronectes platessa	2841
Solea solea	2839
Limanda limanda	2526
Buglossidium luteum	2238
Trisopterus luscus	666
Trisopterus minutus	578
Arnoglossus laterna	544
Merlangius mergangus	473
Trachinus (echiichthys) vipera Agonus cataphractus	439

Number of epifauna species recorded:	88 separate infauna species were observed during the 2009 survey across both ICES divisions.
Index revisions:	none

Stations fished:

ICES Divisions	Strata	Gear	Indices stations	Priority stations	Additional	Invalid	Total Valid	Comments
VIId and IVc	None	4m beam trawl	85	15	7	9	107	7 Additional stations off Belgium fished

Number of biological samples (maturity and age material, *maturity only):			
Species	Number	Species	Number
Pleuronectes platessa	1904	*Gadus morhua*	3
Solea solea	2320	*Platichthys flesus*	287
Limanda limanda	1867	*Scophthalmus rhombus*	13
Microstomus kitt	157	*Psetta maxima*	16

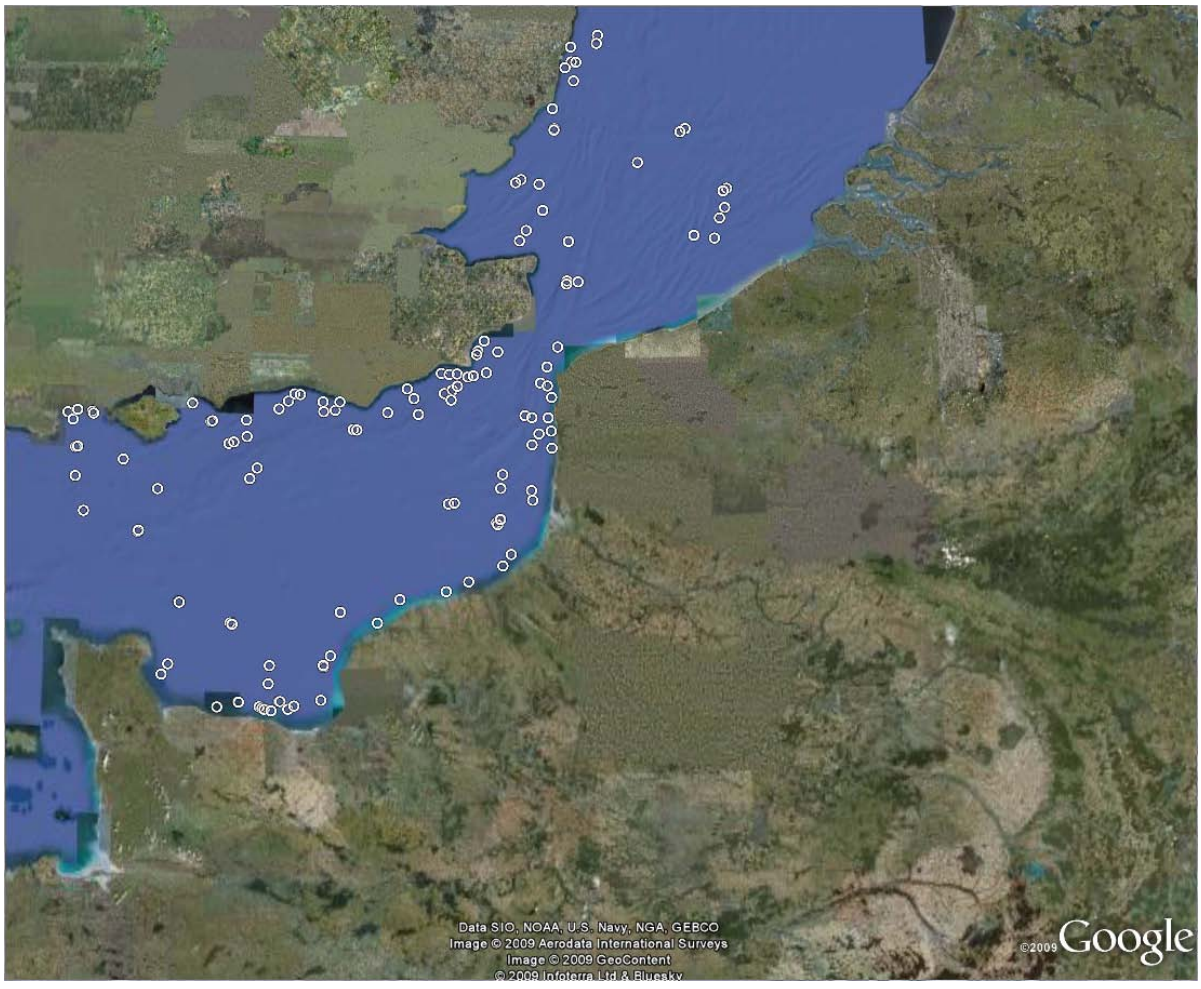


Figure 5.1.3.2.1. Towing positions UK VIId/IVc.

5.1.3.3 Survey summary England: VIIa and VIIf

Nation:	**UK (England and Wales)**	Vessel:	RV Cefas "Endeavour"
Survey:	13/09	Dates:	9 September – 1 October 2010

Survey description	Q3 Irish Sea and Bristol Channel survey aims to collect data on distribution and relative abundance, with biological information on commercial fish species in VIIa and VIIf. The primary target species are sole and plaice, with additional species including whiting, lemon sole and cod.
Gear details:	Steel 4m-beam trawl with chain mat and single flip-up rope, 80mm trawl with 40mm codend cover. Also attached is the SAIV mini CTD.
Notes from survey (e.g. problems, additional work etc.):	For the first time this survey was carried out on the RV Cefas Endeavour. The survey was completed without incident. Water sampling at stations in the Bristol Channel was carried out under external contract.A total of 8 stations had to be fished for less than 30 minutes. This was mainly because of large by catches of benthis or as a precaution agianst gear damage. A significant amount of additional aims were carried out. These incldued *Scophthalmus rhombus* and *Scophthalmus maximus* finclips for comparative population genetics structure, 15 *Scyliorhinus canicula* sampled to determine post mortality length and measurement changes and 98 specimens were photographed for maturity stage.

Target species catch rates:

	Time series mean no. per hr	2009 mean no. per hr	Time series mean catch weight per hr (kg)	2009 mean catch weight per hr (kg)
Sole VIIa	32.49	15.53	4.27	2.20
Sole VIIf	77.45	66.32	8.26	7.17
Plaice VIIa	210.07	221.77	18.68	22.05
Plaice VIIf	27.84	41.36	4.97	6.10

Number of fish species recorded and notes on any rare species or unusual catches:

72 separate species of finfish were caught. The top 10 by number are:

Limanda limanda	12743
Pleuronectes platessa	8124
Buglossidium luteum	7057
Trisopterus minutes	3798
Callionymus lyra	2517
Merlangius merlangus	2307
Scyliorhinus canicula	2186
Arnoglossus laterna	2048
Solea solea	1850
Eutrigla gurnardus	1162

Number of infauna species recorded	153 separate infauna species were observed during the 2009 survey across both ICES divisions.
Index revisions:	none

Stations fished:

ICES Divisions	Strata	Gear	Indices stations	Priority stations	Additional	Invalid	Total Valid	comments
VIIa,f	Depth band within stratum area	4m beam trawl	65	43	17	2	125	

Number of biological samples (maturity and age material, *maturity only):			
Species	Number	Species	Number
Pleuronectes platessa	1819	*Gadus morhua*	37
Solea solea	826	*Melanogrammus aeglefinus*	61
Limanda limanda	483	*Lophius piscatorious*	46
Microstomus kitt	150	*Scophthalmus rhombus*	37
Merluccius merluccius	32	*Lepidorhombus whiffiagonis*	64
Merlangius merlangus	227	*Scophthalmus maximus*	25

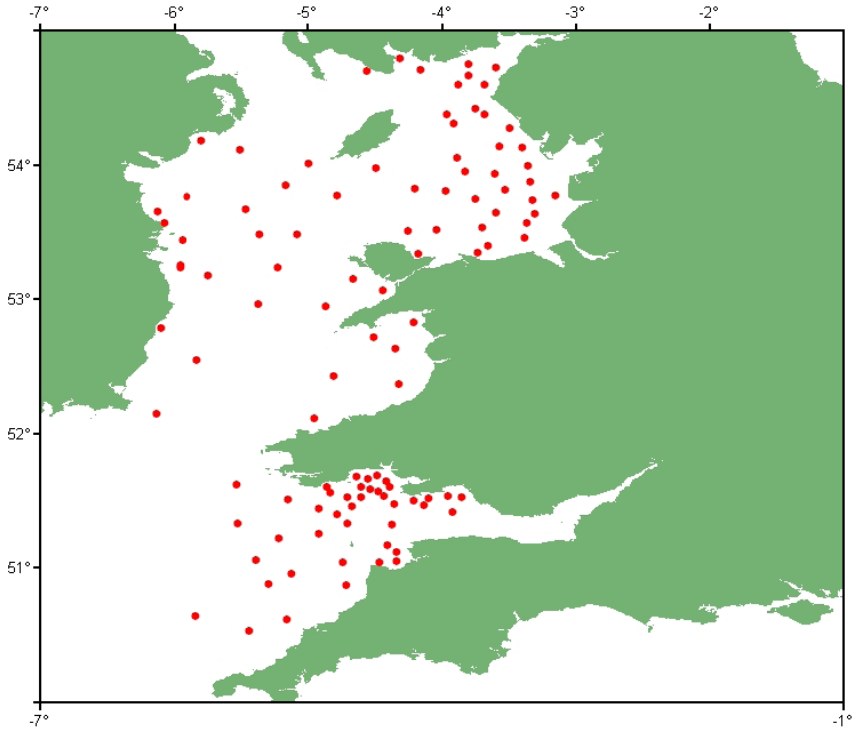


Figure 5.1.3.3.1. Towing positions UK Cefas "Endeavour" 13/09 Beam Trawl survey.

5.1.3.4 Survey summary England: VIIe

Nation:	**UK (England and Wales)**	Vessel:	FV "Carhelmar"
Survey:	2/09	Dates:	9–16 October 2009

Survey description	Q4 Western English channel beam trawl survey. The primary target species are sole and plaice, with additional species including lemon sole and monkfish.
Gear details:	Twin steel 4m-beam trawl with chain mat and single flip-up rope, 80mm trawl with 40mm codend cover. From 2006 a SAIV mini CTD has been attached to one beam.
Notes from survey (e.g. problems, additional work etc.):	Cefas has carried out this survey since 1984, firstly on the FV Bogey1, then from 1998 on the FV "Carhelmar". In 2002 the survey was switched to the RV "Corystes" for 3 years but since 2005 it has returned to FV "Carhelmar". In 2009, the survey was completed however, after 3 attempts, 1 station (prime E2) was abandomed after large catches of broken shell were caught and the tow invalidated. Weights are only recorded for individual biological samples.
Target species catch rates:	Time series mean no. per hr / 2008 mean no. per hr Sole: 7.37 / 8.51 Plaice: 8.68 / 13.11
Number of fish species recorded and notes on any rare species or unusual catches:	82 separate species of finfish were caught. The top 10 by number are: *Aspitrigla cuculus* 993 *Pleuronectes platessa* 747 *Scyliorhinus canicula* 552 *Solea solea* 488 *Limanda limanda* 451 *Eutrigla gurnardus* 234 *Lophius piscatorius* 203 *Trisopterus luscus* 193 *Merlangius merlangus* 167 *Microstomus kitt* 75
Number of infauna species recorded	For the first year epibenthos was recorded as observed on all stations. The most common species noted was *Pagurus prideau* at 89% of stations.
Index revisions	none

Stations fished:

ICES Divisions	Strata	Gear	Indices stations	Priority stations	Additional	Invalid	Total Valid	Comments
VIIe	Distance from shore	2 x 4m beam trawl	49	49	8	1	57	

Number of biological samples (maturity and age material, *maturity only):			
Species	Number	Species	Number
Pleuronectes platessa	340	*Solea solea*	336
Lophius piscatorious	156	*Gadus morhua*	2
Microstomus kitt	68		

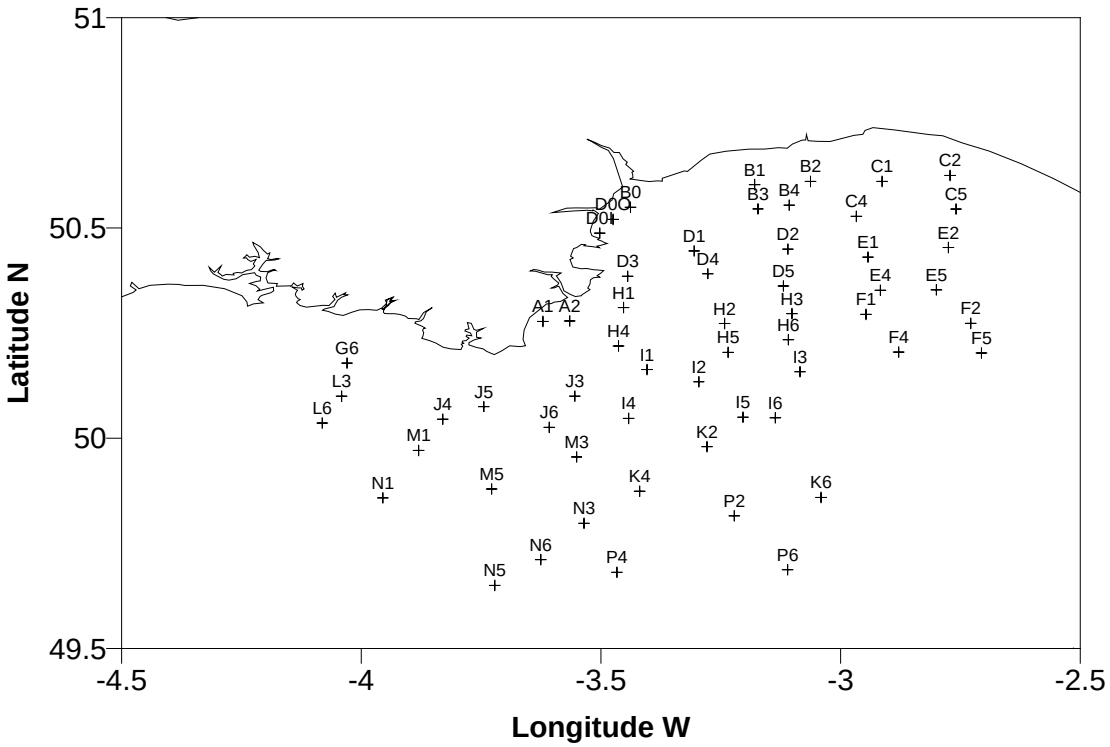


Figure 5.1.3.4.1. Towing positions UK "Carhelmar" 2/09 Beam Trawl survey.

5.1.3.5 Survey summary Germany

Nation:	**Germany**	Vessel:	RV "Solea"
Survey:	BTS	Dates:	14–26 August 2009

Survey description:	Q3 North Sea survey aims to collect data on distribution and relative abundance, with biological information, on commercial and other fish and invertebrate species in IVb to the west of Denmark. The distribution of young flatfish, particularly plaice, has particular attention (higher sampling density further inshore.)
Gear details:	7 meter beam trawl with 5 ticklers, 40 mm mesh in the codend, 80 mm mesh in the net.
Notes from survey (e.g. problems, additional work etc.):	56 hauls were carried out (approx. 28 hours fishing time).
Target species catch rates:	TIME SERIES MEAN NO. PER HR / 2009 MEAN NO. PER HR Sole: 4.01 / 4.5 Plaice: 265.29 / 166.89
Number of fish species recorded and notes on any rare species or unusual catches:	41 separate species of finfish were caught. The top 10 by number are: *Limanda limanda* 14863 *Pleuronectes platessa* 4664 *Buglossidium luteum* 2142 *Arnoglossus laterna* 1235 *Hippolossoides platessoides* 1068 *Eutrigla gurnardus* 559 *Microstomus kitt* 270 *Callionymus lyra* 263 *Raja radiata* 232 *Agonus cataphractus* 208 *Merlangius merlangus* 124
Number of epifauna species recorded:	20 epifauna (attached and free-living) species were observed during the 2009 survey.
Index revisions:	

Stations fished:

ICES Divisions	Strata	Gear	Indices stations	Priority stations	Additional	Invalid	Total Valid	Comments
North Sea IVb	N/A	7m beam trawl	56	56	**	0	56	

Number of biological samples (maturity and age material, *maturity only):			
Species	Number	Species	Number
Pleuronectes platessa	1392	*Limanda limanda*	1643

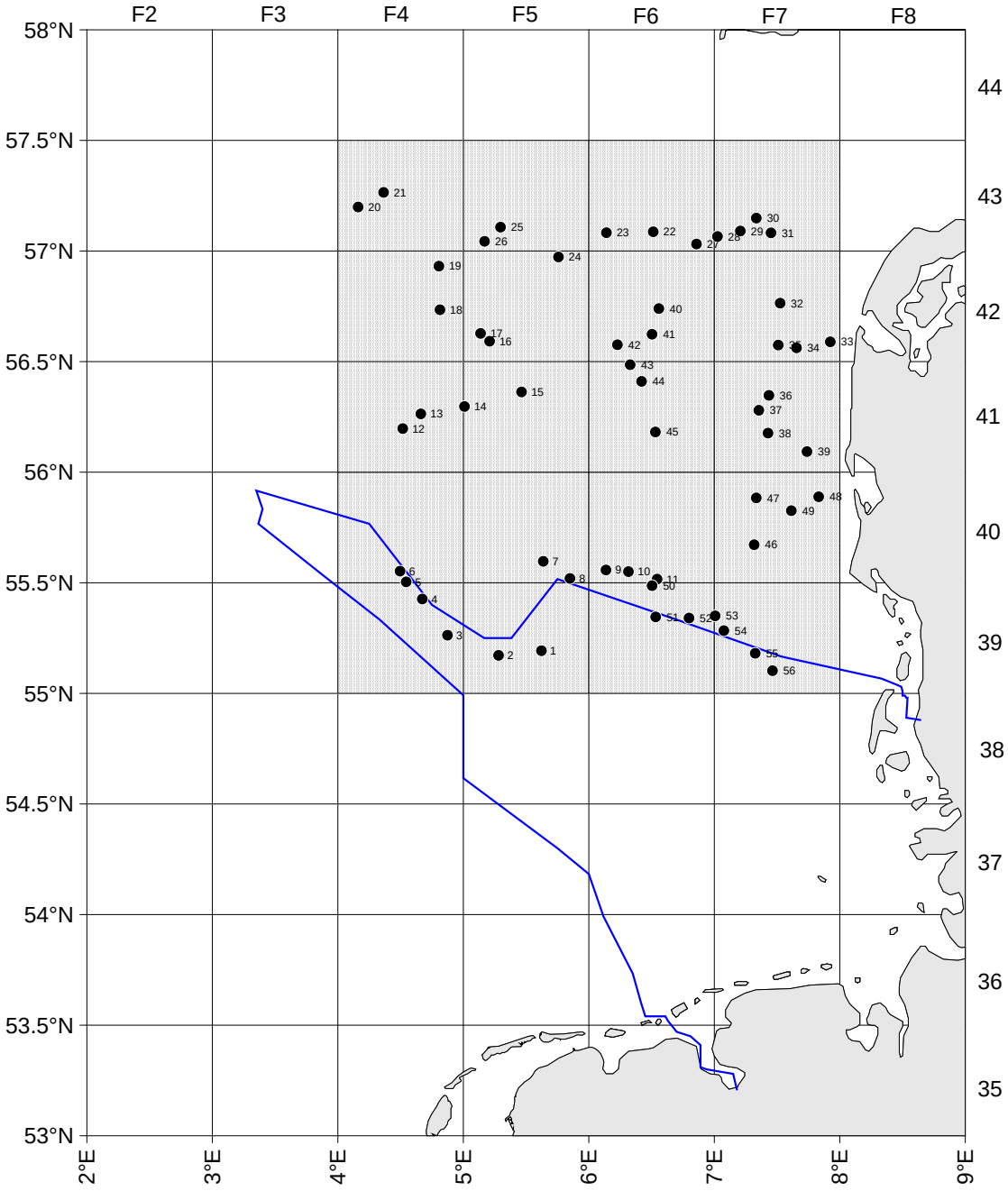


Figure 5.1.3.5.1. Towing positions Germany "Solea" Beam Trawl Survey.

5.1.3.6 Survey summary France

Nation:	FRANCE	Vessel:	NO "Gwen Drez"
Survey:	ORHAGO 09	Dates:	3 November – 16 December 2009

Survey description:	Q4 Bay of Biscay survey to collect data on benthic fish species distributions and relative abundances, with biological information on some commercial fish species in VIIIab. The principal target species is sole, with additional species including *Nephrops norvegicus*, sand sole, thickback sole and senegalese sole.
Gear details:	Steel 4m-beam trawl with chain mat, 50mm trawl with 45mm codend and 20mm purse.
Notes from survey (e.g. problems, additional work etc.):	117 hauls were carried out (approx. 54 hours fishing time). 51 replicate tows were made for day-night studies. Bottom temperatures were recorded for each haul.

Target species catch rates:

	Time series mean no. per hr	2009 mean no. per hr	Time series mean catch weight per hr	2009 mean catch weight per hr (kg)
Sole (day)	42.08	64.23	5.12	7.65
Sole (night)	50.72	73.19	5.89	7.60
Sole (total)	46.36	68.76	5.50	7.63

Number of fish recorded and note on any rare species or unusual catches:

67 separate species of finfish were caught at day and 61 separate species of finfish were caught at night. The top 10 by number per hr are:

Day		Night	
Trisopterus luscus	83.21	*Trisopterus luscus*	79.13
Solea vulgaris	69.64	*Solea vulgaris*	69.71
Trisopterus minutus	59.73	*Arnoglossus laterna*	54.19
Arnoglossus laterna	55.83	*Trisopterus minutus*	46.60
Callionymus lyra	40.79	*Callionymus lyra*	45.48
Merluccius merluccius	33.44	*Buglossidium luteum*	34.48
Gadiculus argenteus	33.09	*Microchirus variegatus*	33.49
Microchirus variegatus	30.56	*Gobius niger*	19.50
Buglossidium luteum	28.68	*Trachurus trachurus*	19.46
Dicologlossa cuneata	19.15	*Gadiculus argenteus*	17.10

Number of epifauna species recorded:	34 separates epifauna species at day and 30 separates epifauna species at night were observed during the 2009 survey across VIIIab ICES division.

Stations fished:

ICES Divisions	Strata	Gear	Indices stations	Priority stations	Additional	Invalid	Total valid	Comments
VIIIab	N/A	4m beam trawl	51		11	4	113	51 replicate tows for day-night studies.

Number of biological samples (*age materiel only)			
Species	Number	Species	Number
Solea solea maturity and age	818	Red mullet *	118
Solea solea maturity only	2 499	*Merluccius merluccius* *	333
Argyrosomus regius *	40	*Lophius piscatorius* *	96

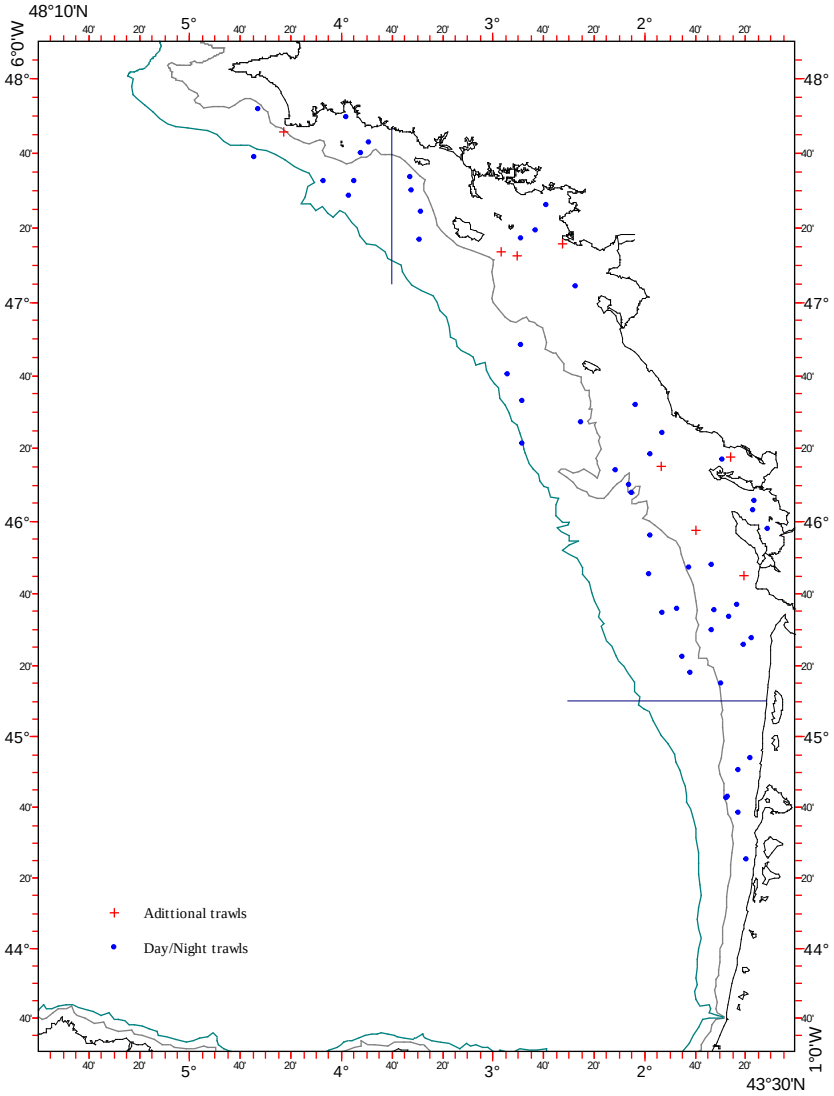


Figure 5.1.3.6.1 Towing positions France (day and night).

5.1.3.7 Survey summary Netherlands: Tridens

Nation:	**Netherlands**	Vessel:	RV "Tridens"
Survey:	BTS (Beam Trawl Survey)	Dates:	24 August – 14 September 2009

Survey description	The BTS aims to (i) monitor fish fauna by sampling length frequency distributions of all fish species and age composition of flatfish species, (ii) monitor species composition of epibenthos species by counting and weighing (if possible), (iii) create a fishery-independent estimate of age density for plaice and sole in the North Sea for stock assessment, (iv) monitor sex- and length composition of *Cancer pagurus*, *Nephrops norvegicus* and elasmobranch species.
Gear details:	8 meter beam trawl with 8 ticklers, 40 mm mesh in the codend, 120 mm mesh in the net and a flip-up rope.
Notes from survey:	68 hauls were carried out (approx. 34 hours fishing time). The survey was completed with minor incidents. Net damage was repaired within a few hours. Vertical CTD measurements were carried out after each haul. In 2009, the net on port side was slightly adjusted to have a proper net lay-out. To study the effect of the changes, for each station starbord and porrtside net were sorted for plaice and sole. The differences in catch rates were not statistically significant. Based on this results, the starboard net will be adjusted in 2010.
Target species catch rates:	TIME SERIES MEAN NO. PER HR / 2009 MEAN NO. PER HR Sole: No index Plaice: 78.07 / 162.98
Number of fish species recorded and notes on any rare species or unusual catches:	50 separate species of finfish were caught. The top 10 by number are: *Limanda limanda* 22880 *Pleuronectes platessa* 5397 *Hippoglossoides platessoides* 4036 *Arnoglossus laterna* 2307 *Echiichthys vipera* 2130 *Eutrigla gurnardus* 1878 *Microstomus kitt* 1238 *Buglossidium luteum* 1205 *Merlangius merlangus* 1017 *Callionymus lyra* 698
Number of epifauna species recorded:	141 epifauna (attached and free-living) species were observed during the 2009 survey.
Index revisions:	1996 yearclass plaice for 1997 and 1998 survey revised to the dataseries (age reading checked and revised)

Stations fished:

ICES Divisions	Strata	Gear	Indices stations	Priority stations	Additional	Invalid	Total Valid	Comments
North Sea	N/A	8m beam trawl			0	0	68	

Number of biological samples (maturity and age material, *maturity only):			
Species	Number	Species	Number
Pleuronectes platessa	1102	*Microchirus variegatus*	34
Limanda limanda	551	*Psetta maxima*	23
Microstomus kitt	376	*Scophthalmus rhombus*	9
Hippoglossoides platessoides	260	*Zeugopterus norvegicus*	6
Solea solea	161	*Molva molva*	3
Gadus morhua	136	*Lepidorhombus whiffiagonis*	3
Arnoglossus laterna	65	*Platichthys flesus*	2
Buglossidium luteum	43	*Pollachius virens*	2
Merluccius merluccius	35		

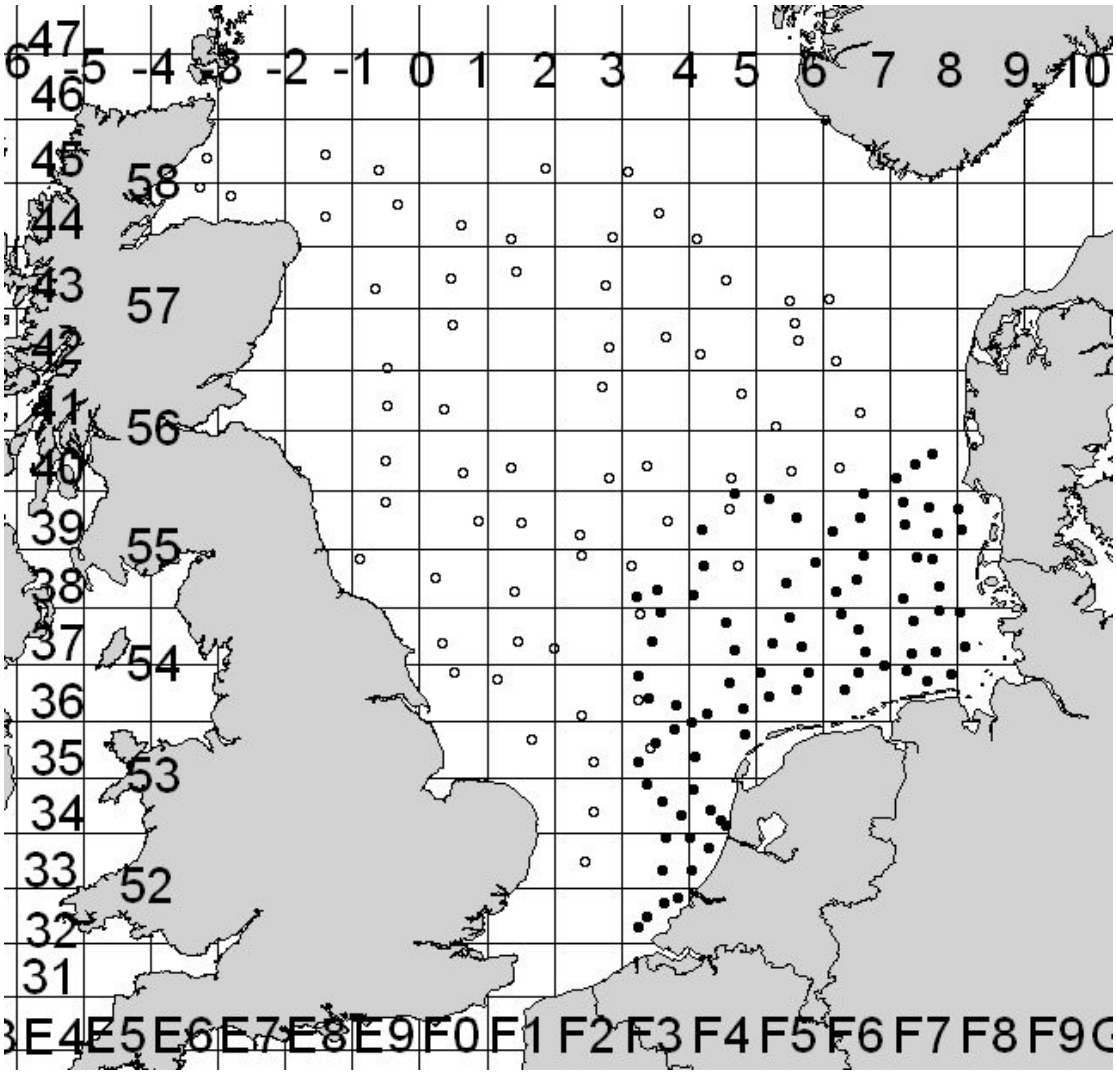


Figure 5.1.3.7.1. Towing positions Dutch Beam Trawl survey: open rounds=Tridens, black bullets=Isis.

5.1.3.8 Survey summary Netherlands: Isis

Nation:	**Netherlands**	Vessel:	RV "Isis"
Survey:	BTS (Beam Trawl Survey)	Dates:	10 August – 10 September 2009

Survey description	The BTS aims to (i) monitor fish fauna by sampling length frequency distributions of all fish species and age composition of flatfish species, (ii) monitor species composition of epibenthos species by counting, (iii) create a fishery-independent estimate of age density for plaice and sole in the North Sea for stock assessment, (iv) monitor sex- and length composition of *Cancer pagurus*, *Nephrops norvegicus* and elasmobranch species.
Gear details:	8 meter beam trawl with 8 ticklers, 40 mm mesh in the codend, 120 mm mesh in the net.
Notes from survey:	83 hauls were carried out (approx. 41 hours fishing time). All priority ICES rectangles planned were sampled.
Target species catch rates:	
Number of fish species recorded and notes on any rare species or unusual catches:	43 separate species of finfish were caught. The top 10 by number are: *Pleuronectes platessa* 46401 *Limanda limanda* 45854 *Arnoglossus laterna* 10891 *Buglossidium luteum* 10393 *Callionymus lyra* 3140 *Merlangius merlangus* 2470 *Agonus cataphractus* 1629 *Solea solea* 1354 *Echiichthys vipera* 950 *Eutrigla gurnardus* 653
Number of epifauna species recorded:	50 epifauna (attached and free-living) species were observed during the 2009 survey.
Index revisions:	1996 yearclass plaice for 1997 and 1998 survey revised to the dataseries (age reading checked and revised)

	TIME SERIES MEAN NO. PER HR	2009 MEAN NO. PER HR
Sole	49.50	34.23
Plaice	776.02	1140.09

Stations fished:

ICES Divisions	Strata	Gear	Indices stations	Priority stations	Additional	Invalid	Total Valid	Comments
North Sea	N/A	8m beam trawl	83	0	0	0	83	

Number of biological samples (maturity and age material, *maturity only):			
Species	Number	Species	Number
Pleuronectes platessa	642	*Microstomus kitt*	77
Solea solea	432	*Scophthalmus rhombus*	59
Limanda limanda	272	*Gadus morhua*	5
Psetta maxima	105		

5.2 Inshore surveys

5.2.1 Participation and coverage of the area

The inshore surveys in the North Sea are carried out by Belgium (Demersal Young Fish Survey-DYFS), Germany (DYFS), the Netherlands (Demersal Fish Survey-DFS) and UK (Young Fish Survey-YFS).

The Sole Net Survey (SNS), which is carried out by the Netherlands in the North Sea, is classified as an inshore survey, but 'nearshore' may be more appropriate because the area covered is further offshore than the other inshore surveys.

The participating vessels and time of the cruises is listed in Table 5.2.1.1. Details on areas covered by country are given in Annex 5. Details on depth strata fished are given in Annex 11.

Table 5.2.1.1. Overview of surveys during 2009.

COUNTRY	VESSEL	AREA	DATES	GEAR
Belgium	Hinders/ Broodwinner	Belgian coastal zone	11 Sep – 25 Sep	6 m shrimp trawl
UK	F.V. Suvera and F.V. Fisher Lassie	Thames estuary	28 Aug – 25 Sep	2 m shrimp trawl
UK	F.V. Challenge	Northeast English coastal zone	26 Aug – 11 Sep	2 m shrimp trawl
Germany	Chartered Cutters	German Bight and German Wadden Sea	8 Sep –3	3 m shrimp trawl
Netherlands (SNS)	Isis	Dutch coastal zone	15 Sep – 29 Sep	6 m beam trawl
Netherlands	Schollevaar	Scheldt estuary	7 Sep - 24 Sep	3 m shrimp trawl
Netherlands	Stern	Dutch Wadden Sea	31 Aug – 30 Sep	3 m shrimp trawl
Netherlands	Isis and Jakoriwi	Dutch coastal zone and German Bight	01 Oct – 22 Oct 2009 and 02 Nov – 05 Nov 2009	6 m shrimp trawl

5.2.2 Survey results

In 2009, Netherlands encountered technical problems during the Isis survey in the Dutch coastal zone and German Bight. It was not possible to finish the survey using Isis, so the commercial vessel "Jakoriwi" was hired to finish the survey, using the standard survey gear and design.

From the 23 stations that were fished by Belgium, one station was considered invalid. The Belgian vessel the 'Broodwinner' was not available throughout the whole survey period in 2009. A commercial vessel (O.191), using the standard survey gear and the regular towing speed and duration, was therefore chartered to sample part of the stations.

For the UK there were no significant problems encountered although it was not possible to fish one of the 161 stations due the presence of a wind farm. It is intended that a similar "new" station will be identified to replace it next year. Gary Burt did a presentation on the results of the UK inshore surveys, highlighting the introduction of more extensive benthic sampling and the collection of length frequency distributions for *Crangon* sp., for the first time, which meant that the duration of the surveys had to be extended. However, these difficulties were overcome and the survey went well in this respect (see also Annex 18).

The German inshore survey did not face any difficulties.

5.2.2.1 Catch results

The species composition per country per area for the continental surveys (Coastal, Wadden Sea, Scheldt Estuary) and aggregated for Thames and Humber for the UK surveys is listed in Annex 14. The selection of species is described in the WGBEAM 2008 report.

For the UK length distribution data collected for *Crangon* sp. shows that there are no distinctive size class groups across the survey areas and that they were most abundant off the Lincolnshire coast. A non-statistical analysis of the length distributions indicated that it might be possible to obtain viable length distributions from a selection of randomly selected stations (see also Annex 18).

Comparative tows

In 2008, Germany performed 15 more hauls to add to the comparison between the German and Dutch rigging of the survey trawl with respect to catches of 0 group plaice (ICES 2008a). The results did not suggest continuing this comparison study. See also Section 9.4, gear efficiency.

5.2.3 Survey summary sheets inshore surveys per country

5.2.3.1 Survey summary Belgium

Nation:	**Belgium**	Vessel:	O.29 'Broodwinner'
Survey:	Inshore Demersal Young Fish and Brown shrimp Survey	Dates:	11–25 September 2009

Survey description	As part of the international Demersal Young Fish (and Brown Shrimp) Survey, an annual autumn sampling survey is carried out in the Belgian coastal waters, to collect data on the abundance of juvenile flatfish (primarily plaice, *Pleuronectes platessa*, and sole, *Solea solea*) and brown shrimp (*Crangon crangon*). Since 1973, 33 fixed sampling stations are fished. Untill 1982, the research vessel Hinders was used, from 1983 onwards the survey was carried out with the training and research vessel O.29 'Broodwinner' (LOA 27.2 m; engine power 221 kW). The location of the sampling area matches the main flatfish nursery grounds along the Belgian coast.
Gear details:	All DYFS sampling stations are fished for approx. 30 min, with a standard shrimp beam trawl (beam length 6 m; codend mesh size 18 mm, no tickler chains), at 3 knots against tide.
Notes from survey (e.g. problems, additional work etc.):	Because of unavailability of the usual vessel O.29 during part of the intended survey-period, only 23 sampling stations were fished as planned. 22 stations were valid (station 91 invalid). For 9 of these stations (the ones fished on 23–25/09), the (commercial) vessel O.191 was used (LOA 37.8m; engine power 882 kW), but with the same gear normally used on this the survey, and at the regular survey towing speed and duration.
Target species catch rates: 2009 data	TIME SERIES MEAN NR. PER 1000 M² / 2009 MEAN NR. PER 1000 M² Plaice * 6.79 Sole * 6.23 *no time-series means available because of omitting data
Number of fish species recorded and notes on any rare species or unusual catches:	The DYFS focuses on measuring the most important commercial fish (value and/or volume) species to the cm below being cod, whiting, plaice, flounder, dab, sole, brill and turbot. From 2009 on, the species list is extended to cover all commercial fish species caught (e.g. including lesser spotted dogfish, gurnards, lemon sole, …). In this way, 12 species were documented in 2009. Ordered by number, these are: Species Total number *Limanda limanda* 3845 *Merlangius merlangus* 3064 *Pleuronectes platessa* 2787 *Solea solea* 2556 *Eutrigla gurnardus* 121 *Platichthys flesus* 109 *Microstomus kitt* 63 *Gadus morhua* 10 *Psetta maxima* 4 *Scyliorhinus canicula* 1 *Scomber scombrus* 1 *Scophthalmus rhombus*
Number of epifauna species recorded:	Appr. 500 brown shrimp per station are measured in 5 mm size classes. No other epifauna species are recorded.
Index	The number of DYFS-stations that were succesfully fished in 2009 is too low,

revisions:	potentially influencing the indices.

Stations fished:

ICES Divisions	Strata	Gear	Indices stations	Priority stations	Additional	Invalid	Total Valid	Comments
IVc	N/A	6m beam trawl	33	33	0	1	22	10 stations not fished (see above)

Number of biological samples (maturity and age material, *maturity only):
None

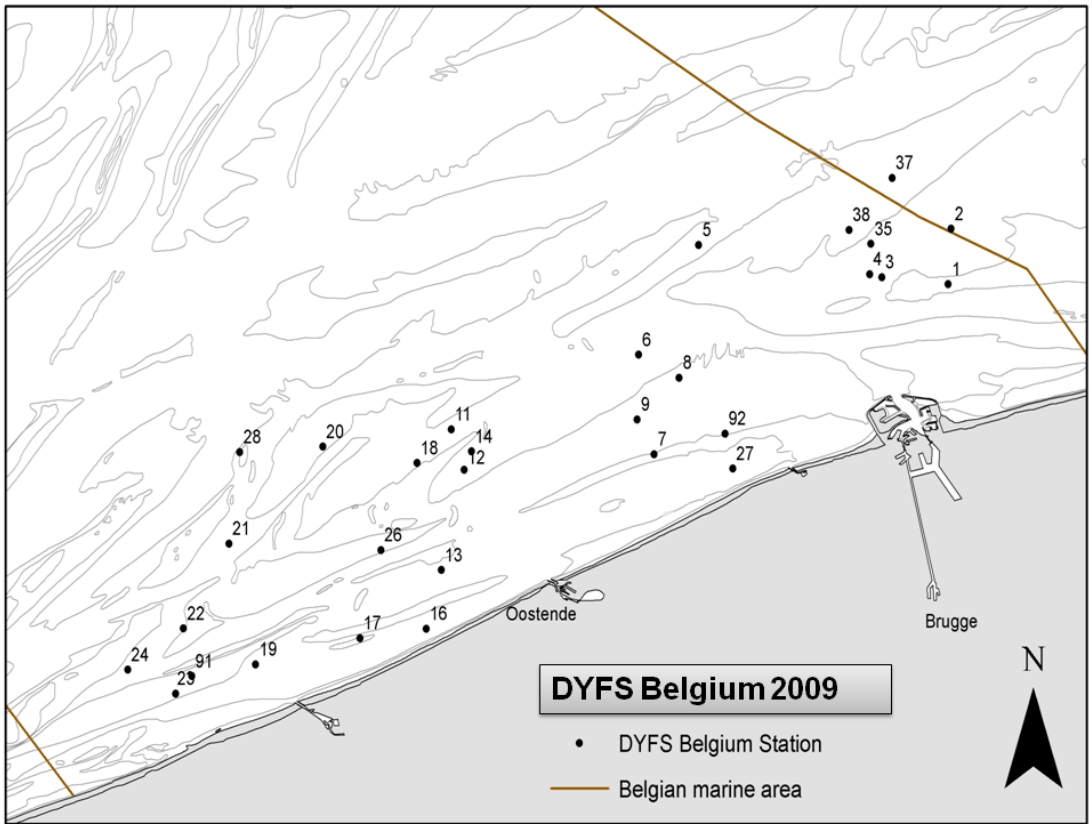


Figure 5.3.21.1. Station positions for inshore Belgian sampling.

5.2.3.2 Survey summary: UK

Nation:	**UK (England and Wales)**	Vessel:	FV "Challenge", (NE coast and Humber) FV "Fisher Lassie" (N Thames), FV "Suvera" (S Thames)
Survey:	Humber 1/09; Thames 1/09	Dates:	26 August – 25 September 2009

Survey description

The North Sea Young Fish Survey aims to collect data on the distribution and relative abundance of small fish (primarily juvenile sole and plaice) caught in inshore waters between the River Humber and Margate. A total of 161 (81 – NE coast and Humber; 80 – Thames) stations are surveyed annually between late August and early September. Biological information is collected for sole and plaice. Temperature and salinities are recorded at each station, dissolved oxygen content recorded at the Humber stations and the shrimp catch and the epifauna quantified.

Gear details:

A wooden 2m-beam trawl rigged with a fine mesh net with a codend liner of 4 mm knotless mesh, a light chain footrope and three tickler chains stretched loosely between the shoes.

Notes from survey (e.g. problems, additional work etc.):

The survey was completed as planned. It was not possible to complete one of the Thames stations because of the presence of a wind turbine. For the 2009 survey the duration of the survey was increased by an additional five days in order to obtain additional epifauna catch data and length distributions of the shrimp catch.

Target species catch rates:

	TIME SERIES MEAN NO . PER 1000M² (2000 – 2009)	2009 MEAN NO. PER 1000M²
Plaice IVc	7.93	2.85
Sole IVc	7.82	5.94

Number of fish species recorded and notes on any rare species or unusual catches:

39 species / genera of finfish were caught. The top 10 by number were:

Gobies (*Pomatoschistus spp*)	9536
Nilsson's Pipefish (*Syngnathus rostellatus*)	1142
Sole (Dover Sole; *Solea solea*)	923
European Plaice (*Pleuronectes platessa*)	394
Dab (*Limanda limanda*)	293
Pogge (Armed Bullhead; *Agonus cataphractus*)	282
Lesser Weever Fish (*Echiichthys* (*Trachinus*) *vipera*)	174
Sea Snail (*Liparis liparis*)	157
Whiting-Pout (Bib; *Trisopterus luscus*)	110
Common Dragonet (*Callionymus lyra*)	97

Number of epifauna species recorded:

Introduced for the 2009 survey, epifauna species / genera were identified and quantified from a standard list at each station as follows:

Up to 7 species / genera of colonial species were observed.

Up to 13 species /genera (as identified by the Beam Trawl WG) were counted.

Up to 7 species of shell-fish (in addition to above) were counted.

The shrimp catch was quantified volumetrically and a length distribution (carapace length to the nearest mm) was obtained from approxiamtely 50 individuals per haul.

Stations fished:

ICES Divisions	Strata	Gear	Indices stations	Total Valid	Comments
Humber 1/09			81	81	
Thames 1/09			80	79	1 station not fished because of presence of a wind turbine.
IVc Total	Depth band within stratum area	2m beam trawl	161	160	

Number of biological samples (maturity and age material):

Species	Number	Species	Number
Pleuronectes platessa	80	*Solea solea*	141

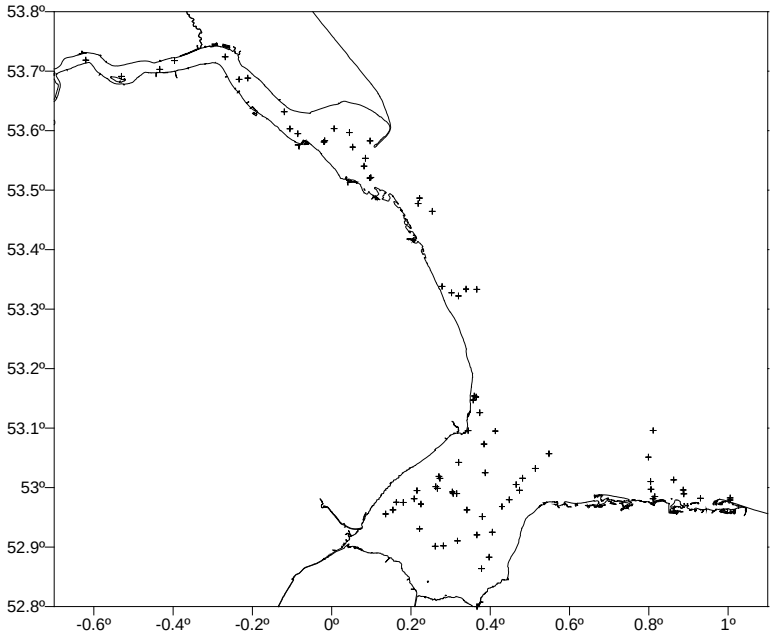


Figure 5.3.2.2.1a. Station positions for Humber 1/09.

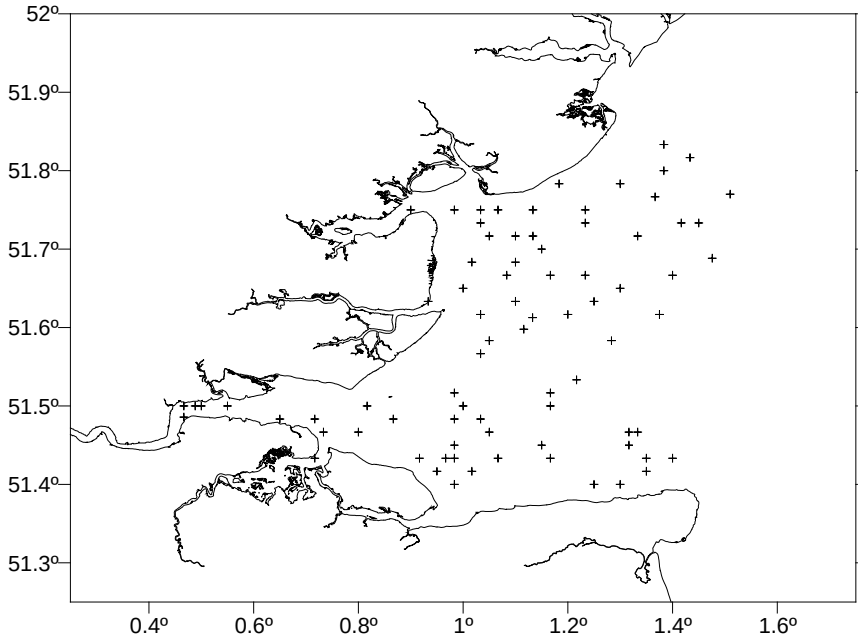


Figure 5.3.2.2.1b. Station positions for Thames 1/09.

5.2.3.3 Survey summary Germany

Nation:	**Germany**	Vessel:	Chartered Cutters
Survey:	DYFS	Dates:	8–30 September 2009

Survey description	The DYFS (Demersal Young Fish and Brown Shrimp Survey) aims to collect data on distribution and relative abundance, with biological information on fish and crustacean species in the Wadden Sea region. The primary target species are plaice and sole, with additional species including whiting, cod and brown shrimp.
Gear details:	Steel 3m- shrimp-beam trawl without tickler chain, 20mm codend. An electronic mini sensor for time, temperature and pressure (light optional) is attached.
Notes from survey (e.g. problems, additional work etc.):	BFAFi –ISH operates the survey since 1974. Weser estuary and Jade were included from 2005 onwards. Spring series were terminated. There is no fixed position grid, but the same channel systems and all depth strata covered within and outside the island chain down to approx. 12m water depth are sampled on a yearly basis. The deeper gullies are taken into account, too. Single station data are available. Time series indices are only avilable for Schleswig-Holstein area at present, the other areas are in a validation process. 2006 data are also available for entire German coastal zone. Data of only a limited number of "standard" invertebrates are stored in the ISH database. (Species list has changed also over years)

Target species catch rates:

	Time series mean (Schleswig-Holstein only) n/1000m²	2009 mean (Schleswig-Holstein only) n/1000m²	Time series mean	2009 mean (coastal Zone all along Germany) n/1000m²
Plaice	14.40	9.32		9.36
Sole	0.97	0.76		0.74
Cod	0.98	0.95		0.76
Whiting	2.23	5.26		3.49
Brown shrimp	1899	1158.22		1679.44

Number of fish species recorded and notes on any rare species or unusual catches:

The top 10 by number are:

54 taxa of finfish were caught from 2001 to 2009. The top 10 by number in 2009 out of 36 taxa:

Pleuronectes platessa	5911
Pomatoschistus minutus	5240
Osmerus eperlanus	3112
Syngnathus rostellus	2400
Limanda limanda	1353
Merlangius merlangus	1216
Agonus cataphractus	856
Liparis liparis	677
Platichthys flesus	611
Myoxocephalus scorpius	313

Number of epifauna species recorded:

All epifauna found are recorded on protocols, however, only selected species are available in the SF database. For 2009 they were

Crangon crangon	1155442
Mytilus edulis	292813

	Ophiurida	86874
	Macropipus holsatus	13928
	Asterias rubens	2913
	Carcinus maenas	2827
	Pandalus montagui	779
	Crangon almanni	677
	Paguridae	355
	Buccinum undatum	71
Index revisions:		

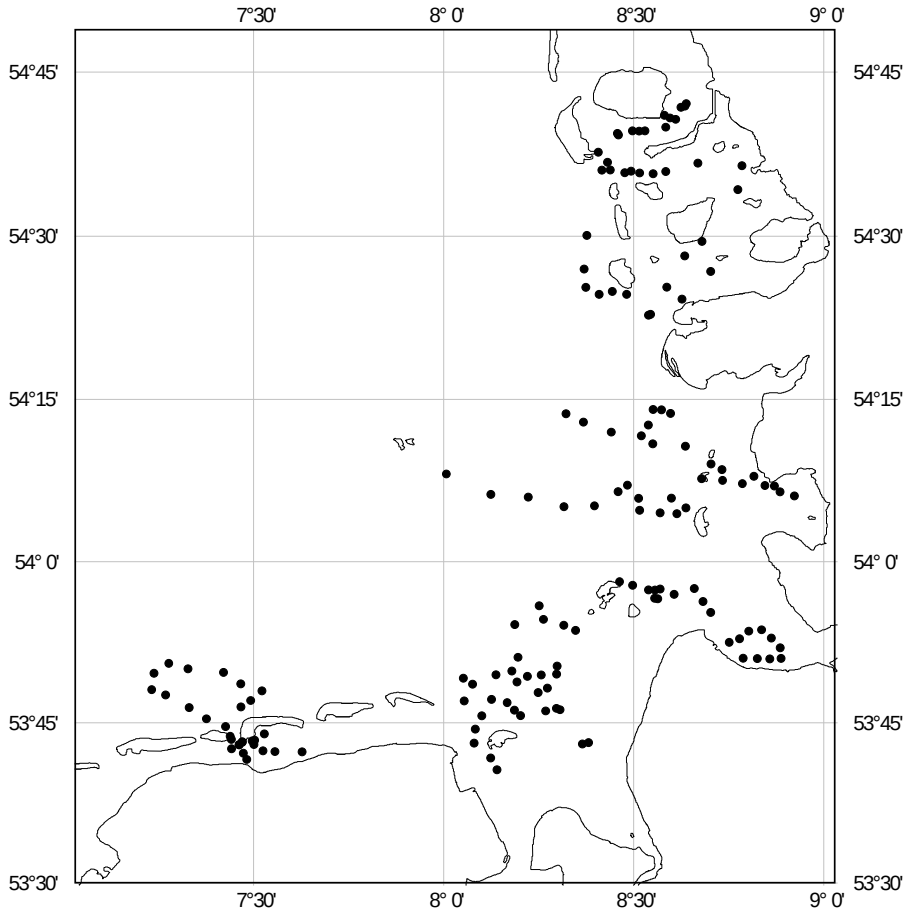


Figure 5.3.2.3.1. Stations sampled in the German DYFS 2009.

5.2.3.4 Survey summary Netherlands: Schollevaar

Nation:	**Netherlands**	Vessel:	RV "Schollevaar"
Survey:	DFS (Demersal Fish Survey)	Dates:	7–24 September 2009

Survey description	The DFS aims to (i) monitor fish fauna by sampling length frequency distributions of all fish species and age compositions of flatfish species, (ii) monitor species composition of epibenthos species by counting, (iii) create a fishery-independent index of abundance by age group (0- and 1-group) for plaice and sole in the North Sea for stock assessment, (iv) collect data on length frequency distribution of brown shrimp (*Crangon crangon*).
Gear details:	3 meter beam trawl with 1 tickler chain and a bobbin rope ("shrimp net").
Notes from survey (e.g. problems, additional work etc.):	81 hauls were carried out. A CTD was attached to the net.
Target species catch rates:	TIME SERIES MEAN NO./1000M² / 2009 MEAN NO./1000M² Sole 3.47 3.76 Plaice 10.07 8.64 Note: without area based weighting as used in the index calculations
Number of fish species recorded and notes on any rare species or unusual catches:	35 separate species of finfish were caught. The top 10 by number are: *Pomatoschistus sp.* 3267 *Pleuronectes platessa* 2487 *Clupea harengus* 1492 *Solea solea* 1053 *Platichthys flesus* 904 *Limanda limanda* 732 *Trisopterus luscus* 165 *Dicentrarchus labrax* 125 *Myoxocephalus scorpius* 78 *Merlangius merlangus* 74
Number of epifauna species recorded:	34 epifauna (attached and free-living) species were observed during the 2009 survey.
Index revisions:	1996 yearclass plaice revised to the dataseries (age reading checked and revised)

Stations fished:

ICES Divisions	Strata	Gear	Indices stations	Priority stations	Additional	Invalid	Total Valid	Comments
IVc: Scheldt estuary	area and depth class	3m beam trawl	81		0	0	81	

Number of biological samples (maturity and age material):			
Species	Number	Species	Number
Pleuronectes platessa	121	*Limanda limanda*	34
Platichthys flesus	99	*Scophthalumus rhombus*	4
Solea solea	97		

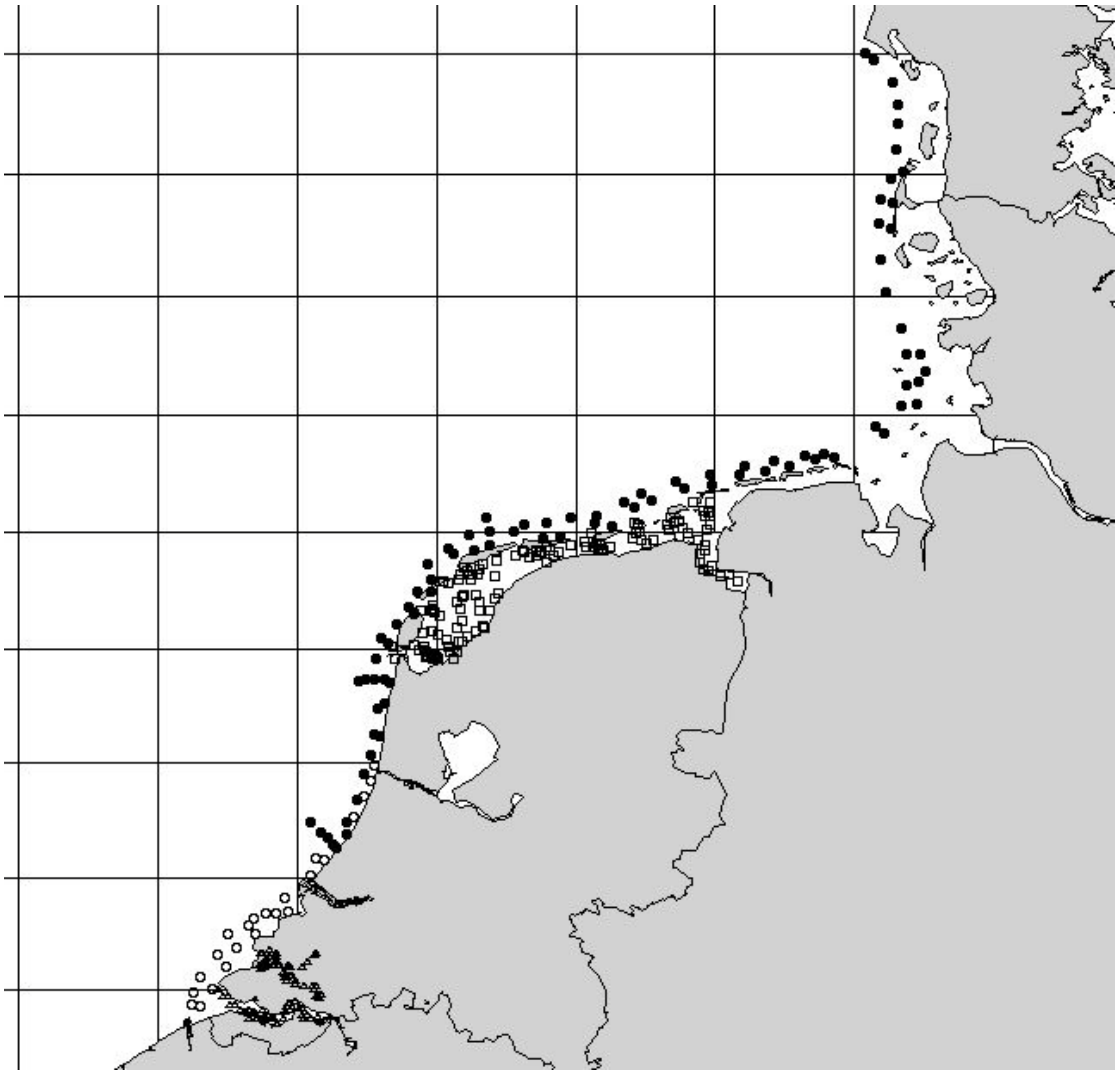


Figure 5.2.3.4.1. Station positions for Dutch DFS: black dots: Isis, circles: Jakoriwi, open squares: Stern, triangles: Schollevaar.

5.2.3.5 Survey summary Netherlands: Stern

Nation:	**Netherlands**	Vessel:	RV "Stern"
Survey:	DFS (Demersal Fish Survey)	Dates:	31 August – 30 September 2009

Survey description	The DFS aims to (i) monitor fish fauna by sampling length frequency distributions of all fish species and age compositions of flatfish species, (ii) monitor species composition of epibenthos species by counting, (iii) create a fishery-independent index of abundance by age group (0- and 1-group) for plaice and sole in the North Sea for stock assessment, (iv) collect data on length frequency distribution of brown shrimp (*Crangon crangon*).
Gear details:	3 meter beam trawl with 1 tickler chain and a bobbin rope ("shrimp net").
Notes from survey (e.g. problems, additional work etc.):	122 hauls were carried out. A CTD was attached to the net.
Target species catch rates:	TIME SERIES MEAN NO./1000M² / 2009 MEAN NO/1000M² Sole 5.06 1.94 Plaice 31.41 5.64 Note: without area based weighting as used in the index calculations
Number of fish species recorded and notes on any rare species or unusual catches:	35 separate species of finfish were caught. The top 10 by number are: *Pomatoschistus sp.* 8322 *Pleuronectes platessa* 2848 *Solea solea* 968 *Ciliata mustela* 904 *Platichthys flesus* 632 *Agonus cataphractus* 438 *Syngnathus rostellatus* 424 *Clupea harengus* 411 *Osmerus eperlanus* 372 *Myoxocephalus scorpius* 367
Number of epifauna species recorded:	22 epifauna (attached and free-living) species were observed during the 2008 survey.
Index revisions:	1996 yearclass plaice revised to the dataseries (age reading checked and revised)

Stations fished (see Figure 5.3.2.4.1 for map):

ICES Divisions	Strata	Gear	Indices stations	Priority stations	Additional	Invalid	Total Valid	Comments
IVc: Wadden Sea	area and depth class	3m beam trawl	122		0	0	122	

Number of biological samples (maturity and age material):			
Species	Number	Species	Number
Platichthys flesus	219	*Scophthalmus rhombus*	8
Pleuronectes platessa	197	*Limanda limanda*	6
Solea solea	185		

5.2.3.6 Survey summary Netherlands: Isis (DFS)

Nation:	**Netherlands**	Vessel:	RV "Isis" and "Jakoriwi"
Survey:	DFS (Demersal Fish Survey)	Dates:	1–22 October 2009 and 2– 5 November 2009

Survey description	The DFS aims to (i) monitor fish fauna by sampling length frequency distributions of all fish species and age compositions of flatfish species, (ii) monitor species composition of epibenthos species by counting, (iii) create a fishery-independent index of abundance by age group (0- and 1-group) for plaice and sole in the North Sea for stock assessment, (iv) collect data on length frequency distribution of brown shrimp (*Crangon crangon*).
Gear details:	6 meter beam trawl with 1 tickler chain and a bobbin rope ("shrimp net").
Notes from survey (e.g. problems, additional work etc.):	110 hauls were carried out. A CTD was attached to the net. Because of technical problems with RV Isis a commercial fishing vessel using the research gear was used to complete the sampling.
Target species catch rates:	TIME SERIES MEAN NO./1000M² / 2009 MEAN NO./1000M² Sole 6.21 / 0.82 Plaice 20.41 / 8.64 Note: without area based weighting as used in the index calculations
Number of fish species recorded and notes on any rare species or unusual catches:	41 separate species of finfish were caught. The top 10 by number are: *Pomatoschistus sp.* 85480 *Limanda limanda* 33621 *Pleuronectes platessa* 10852 *Buglossidium luteum* 5061 *Merlangius merlangus* 4226 *Agonus cataphractus* 2685 *Callionymus lyra* 2599 *Solea solea* 802 *Ammodytes sp.* 693 *Arnoglossus laterna* 556
Number of epifauna species recorded:	31 epifauna (attached and free-living) species were observed during the 2009 survey.
Index revisions:	1996 yearclass plaice revised to the dataseries (age reading checked and revised)

Stations fished (see Figure 5.3.2.4.1 for map):

ICES Divisions	Strata	Gear	Indices stations	Priority stations	Additional	Invalid	Total Valid	Comments
IVc: Dutch coast	area and depth class	6m beam trawl	75	0	0	0	75	

Number of biological samples (maturity and age material):			
Species	Number	Species	Number
Limanda limanda	477	*Platichthys flesus*	52
Pleuronectes platessa	276	*Psetta maxima*	11
Solea solea	131	*Scophthalmus rhomus*	10

5.2.3.7 Survey summary Netherlands: Isis (SNS)

Nation:	**Netherlands**	Vessel:	RV "Isis"
Survey:	SNS (Sole Net Survey)	Dates:	15–29 September 2009

Survey description	The SNS aims to (i) monitor fish fauna by sampling length frequency distributions of all fish species and age compositions of flatfish species, (ii) monitor species composition of epibenthos species by counting, (iii) create a fishery-independent index of abundance by age group (1-, 2-, 3- and 4-group) for plaice and sole in the North Sea for stock assessment.
Gear details:	6 meter beam trawl with 4 tickler chains, mesh size 40 mm in the codend.
Notes from survey (e.g. problems, additional work etc.):	51 hauls were carried out (approx. 13 hours fishing time). A CTD was attached to the net.
Target species catch rates:	
Number of fish species recorded and notes on any rare species or unusual catches:	35 separate species of finfish were caught. The top 10 by number are: *Limanda limanda* 9241 *Pleuronectes platessa* 8827 *Pomatoschistus sp.* 2647 *Buglossidium luteum* 2160 *Arnoglossus laterna* 1956 *Merlangius merlangus* 930 *Callionymus lyra* 835 *Agonus cataphractus* 660 *Solea solea* 579 *Echiichthys vipera* 224
Number of epifauna species recorded:	33 epifauna (attached and free-living) species were observed during the 2009 survey.
Index revisions:	1996 yearclass plaice for 1997 and 1998 survey revised to the dataseries (age reading checked and revised). Complete series checked and revised, no major changes (see Section 6.3.1)

	TIME SERIES MEAN NO./100 HR	2009 MEAN NO/100 HR
Sole	6716	4731
Plaice	66794	70705

Stations fished (see Figure 5.3.2.4.1 for map):

ICES Divisions	Strata	Gear	Indices stations	Priority stations	Additional	Invalid	Total Valid	Comments
IVc: Wadden Sea	area and depth class	6m beam trawl	51	0	0	0	51	

Number of biological samples (maturity and age material):			
Species	Number	Species	Number
Pleuronectes platessa	653	*Platichthys flesus*	37
Limanda limanda	616	*Scophthalmus rhombus*	29
Solea solea	215	*Psetta maxima*	18

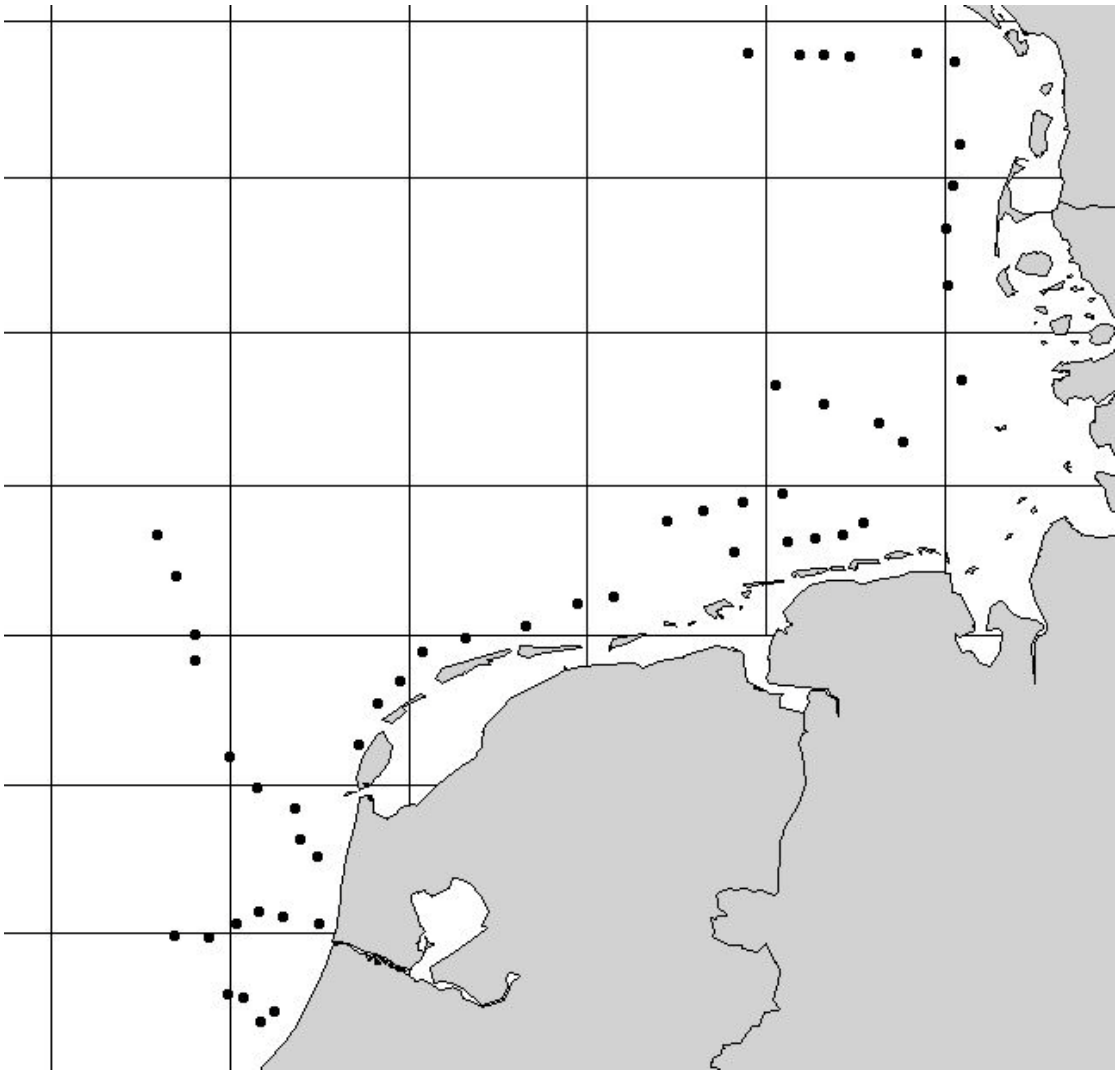


Figure 5.3.2.7.1. Station positions for Isis (SNS).

6 Population abundance indices (ToR b and d)

6.1 Abundance indices by age-group for plaice and sole for the offshore surveys

Annex 10 and Figures 6.1.1.1–6.1.1.2 present the abundance indices by age for sole and plaice from each of the offshore survey areas separately, updated with the indices for 2009.

The revision history until 2009 can be found in the WGBEAM 2009 report (ICES, 2009).

To ensure consistency with the data given to the WGNSSK and WGCSE, Annex 10 has been updated to include the UK tuning indices data calculated for each of the working groups. For WGNSSK this gives data for sole and plaice for age groups 1-10+ per hour for an 8m-beam trawl. For the WGCSE (fusion of the former NSDSWG and SSDSWG) this gives total catch at-age for sole and plaice for a 4m-beam trawl with the total distance fished in kilometres.

6.1.1 Sole

North Sea sole

Figure 6.1.1.1a shows the time-series trends in sole for the North Sea, based on the Netherlands Isis offshore surveys. This survey indicates that recent year classes have been mainly poor with 2003 and 2004 year classes substantially below the long-term arithmetic mean at all ages. There was a significant increase in the number of three year olds caught in the 'Isis' survey this year. This 2005 year class appeared as two year olds in 2007 but was only seen as average recruitment in 2006. The 2005 year-class is still clearly visible in 2008 and 2009.

The spatial coverage of the Netherlands "Tridens" survey makes it unsuitable for monitoring sole abundance.

Area VII sole

The indices for sole from area VII stocks are summarized in Figure 6.1.1.1b-e. In recent years the two adjacent areas VIId and VIIe have both shown above average recruitment but not for the same year classes; however in 2008 both areas are showing poor, below average recruitment. In VIId, 2001 and 2004 year classes were above average whereas, in VIIe, 2002 and 2003 appear to be above average at least at-age 1. However, there is a lack of resolution on older ages in VIIe and no consistent indication of strong year classes is evident. In both stocks, the 2006 year class appears to be very poor. In VIIf and VIIa, there has been poor recruitment in 2003–2007, with the 2005 year class being one of the poorest for the past 10 years. In VIId, the 2008 year class is seen as one year olds in 2009 as a strong year class, comparable to the size of the 2002 year class. VIIa and VIIf surveys show below average recruitment for sole.

6.1.2 Plaice

6.1.2.1 Correction of Dutch plaice indices for year class 1996

For many years the 1- and 2-group indices for plaice were missing in the time-series of the BTS. This omission was because of age reading problems for the 1996 year class, which occurred in catch year 1997. The age reading problems were caused by the formation of false growth checks in the otoliths of plaice from the 1996 year class, in combination with the inexperience of the age reader at that time. All plaice otoliths

from the BTS, which were collected in 1997, were recently re-read. The new age readings were used to recalculate the BTS indices in 1997.

6.1.2.2 Population abundance indices

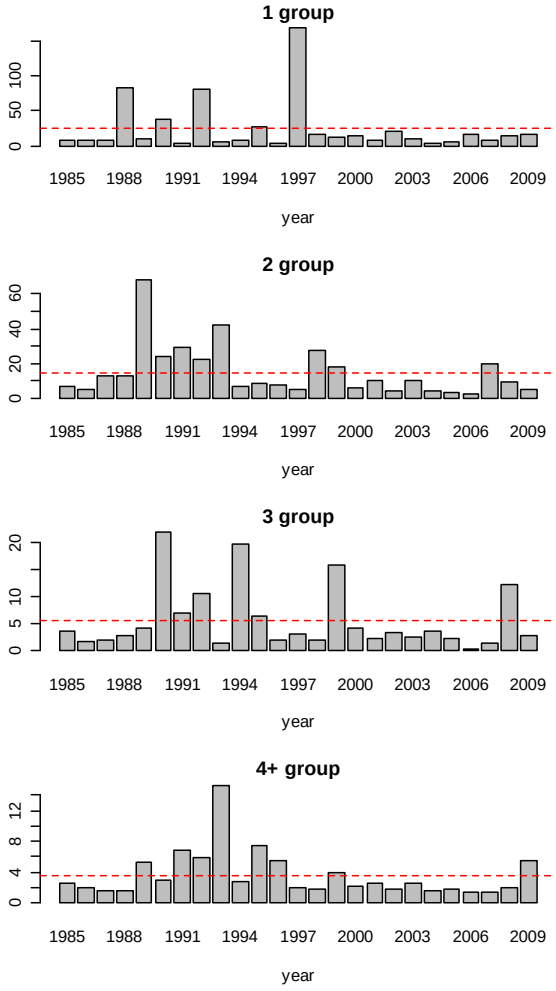
North Sea plaice

Trends in the indices for North Sea plaice from the Netherlands "Isis" and "Tridens" surveys are shown in Figures 6.1.2.2a and 6.1.2.2 b. The Isis survey covers mainly the southern North Sea, whereas the "Tridens" extends substantially further north and west. The Isis survey indicates that recruitment has been well below average since the strong 2001 year class. The "Tridens" survey confirmed the strong 2001 year class and indicated that the 2003 year class was also above average at both 2 and 3 year olds.

The 2006 year class in the North Sea is well above the long-term mean which is shown by the UK and the Dutch "Tridens" survey. This is also evident in the 'Isis' survey at-age 1 but not at the older ages. The older age groups (including the 2006 year class) in the "Tridens" survey show an increase. It is not clear where the increase comes from.

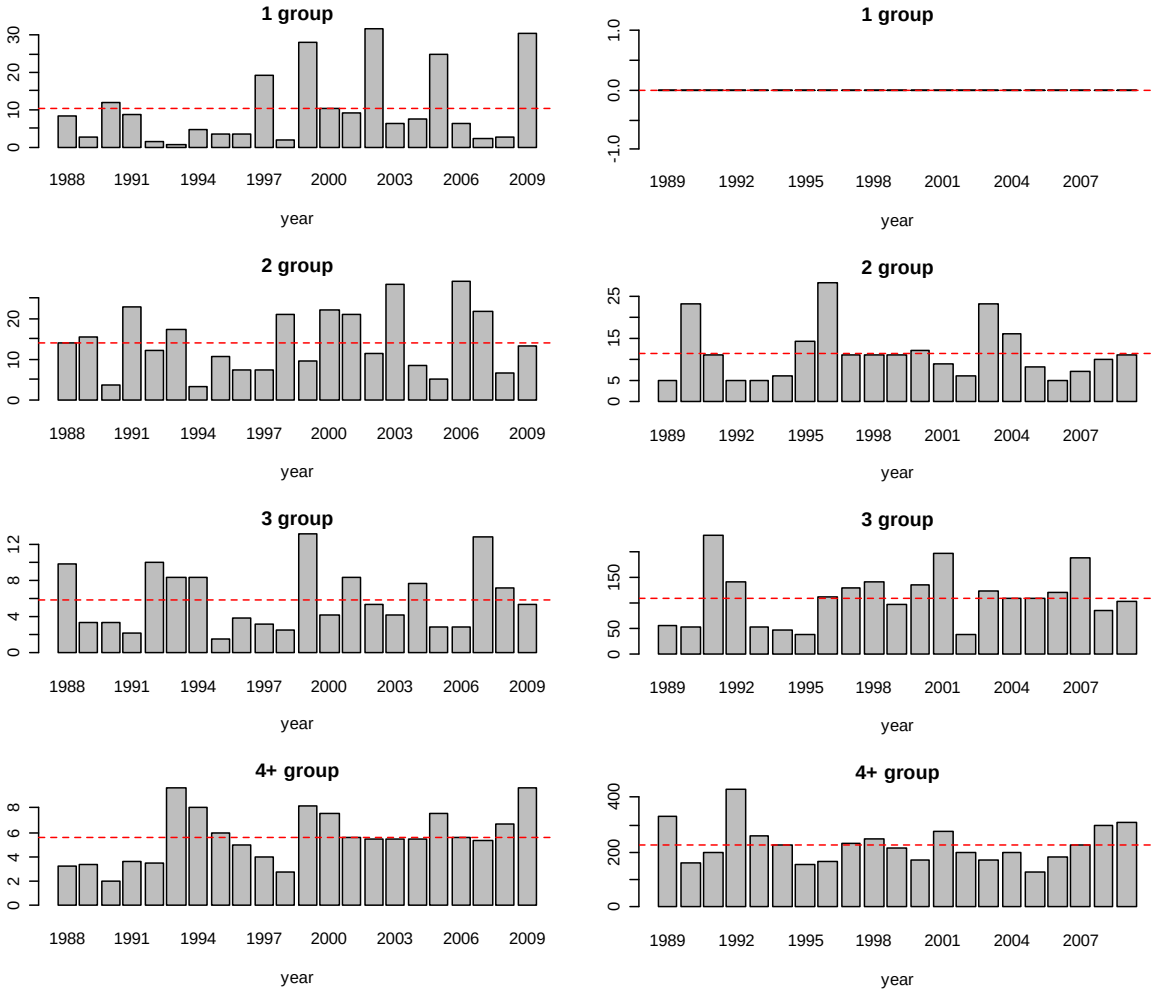
Area VII plaice

Plaice indices for area VII stocks are shown in Figures 6.1.2.2c-f. In VIId, the 2006, 2007 and 2008 year classes are above average, the 2008 year class being the highest in the series. In VIIe the age 1 year class index does not seem to represent the indices for the older ages. Since 2005, the year classes have been above the survey mean, with the 2007 year class being the highest of the time-series. In VIIf, recruitment has been poor in recent years with 2001 and most subsequent year classes below average, however there has been an above average catch of the 2006 year class (at-age 3), which was not evident at-age 1 but was clear as age 2 in 2008. By contrast, recruitment in the Irish Sea (VIIa) has been increasing recently. The 2006 year class at-age 1 is well above the long-term mean and is continuing to show at the older ages.



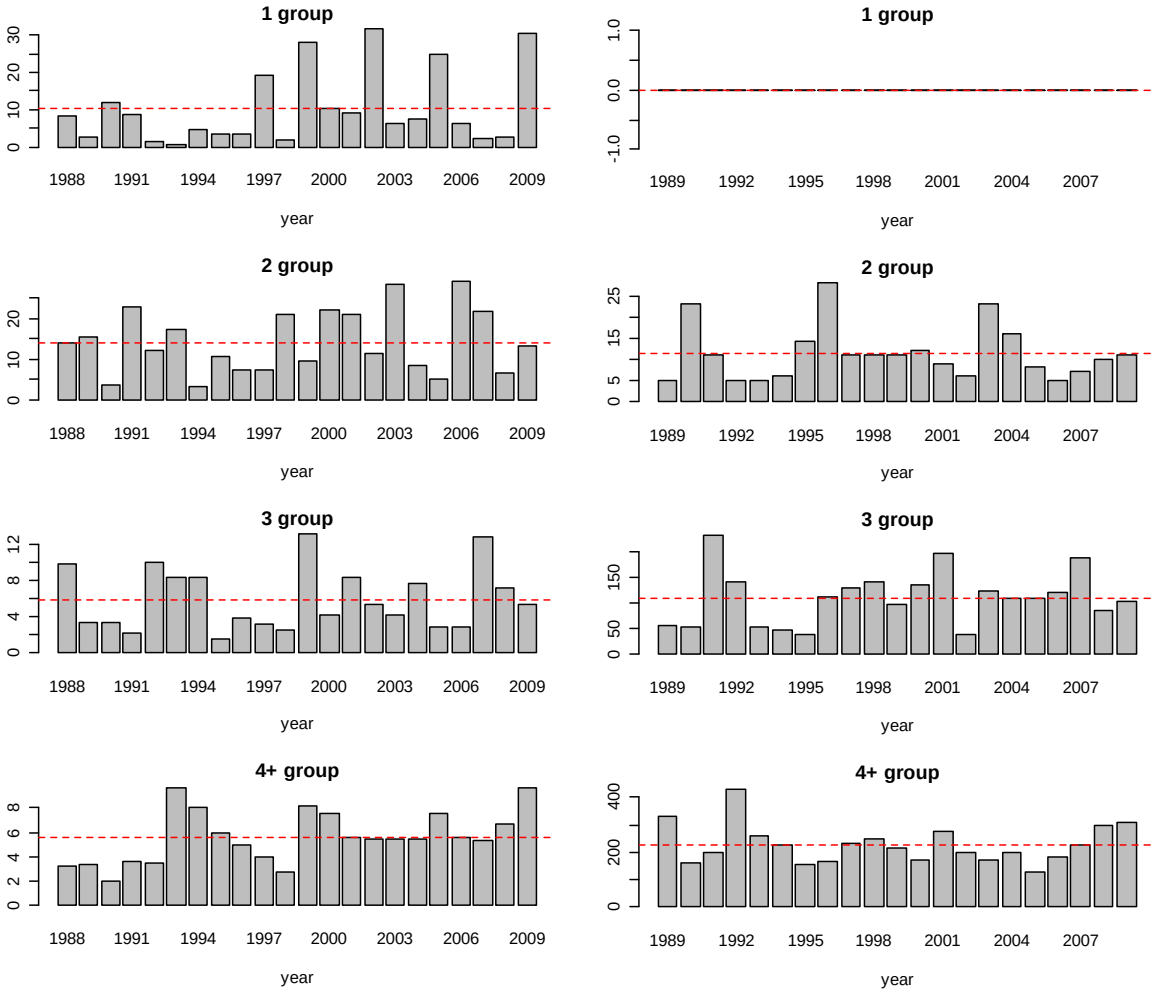
a) Netherlands: sole (N.hr^-1/8m trawl) North Sea (IV) RV "Isis"

Figure 6.1.1.1. Catch rate of sole from Netherlands and UK surveys in the North Sea and VII d, a, e, f and g. (Horizontal line=long-term mean for the period presented).



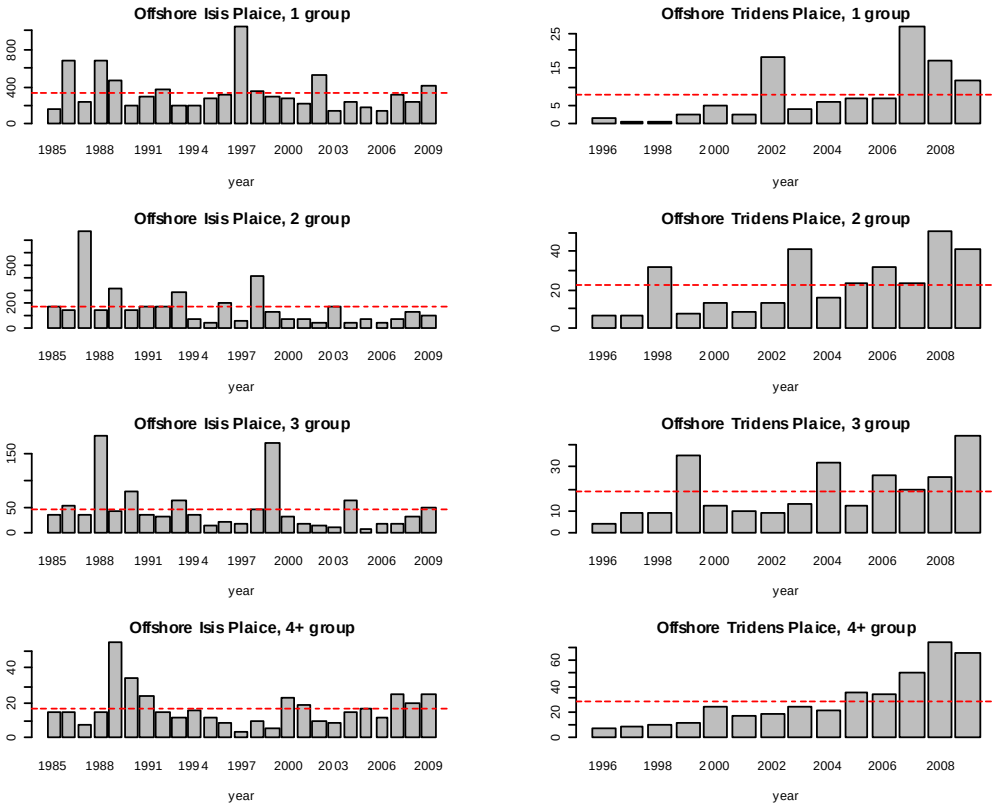
b) UK sole (N.hr^-1/8m beam trawl) Eastern English Channel (VIId)	c) UK: Sole (mean numbers per km towed for 2*4m beam trawl) Western English channel (VIIe)

Figure 6.1.1.1. Continued.



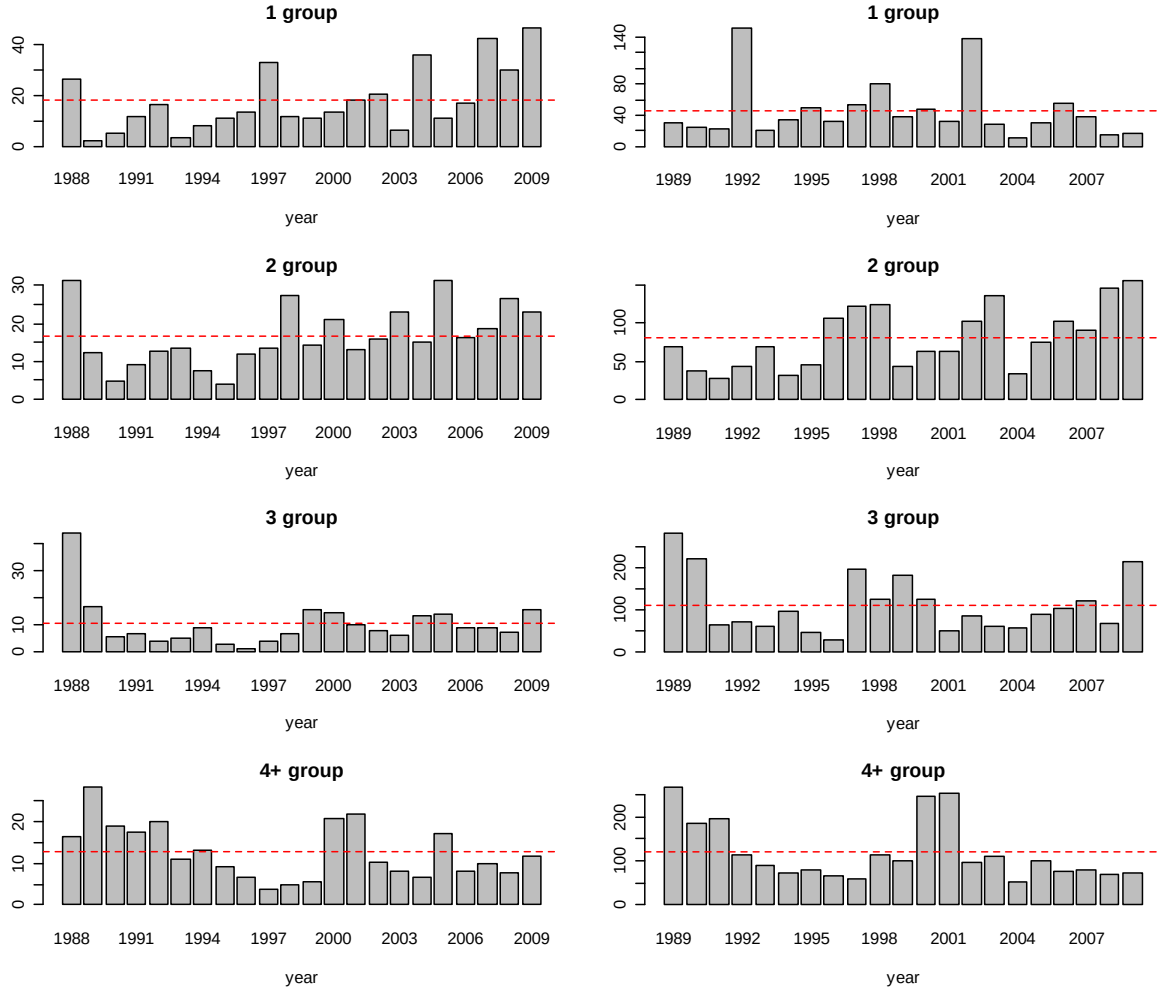
d) UK: sole (mean numbers per km towed for 4m beam trawl) Bristol Channel (VIIf)	**(e) UK: sole (mean numbers per km towed for 4m beam trawl) Eastern Irish Sea (VIIa)**

Figure 6.1.1.1. Continued.



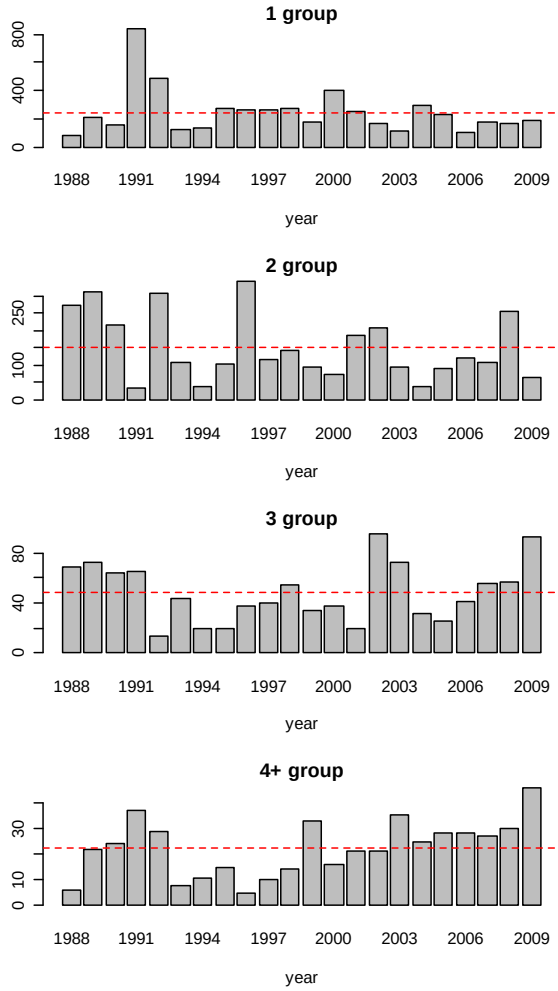
(a) Netherlands: plaice (N.hr^-1/8m trawl) North Sea (IV) RV "Isis"	b) Netherlands: plaice (N.hr^-1/8m trawl) North Sea (IV) RV "Tridens"

Figure 6.1.1.2. Catch rate of plaice from Netherlands and UK surveys in the North Sea and VII d, a, e, f and g. (Horizontal line=long-term mean for the period presented).

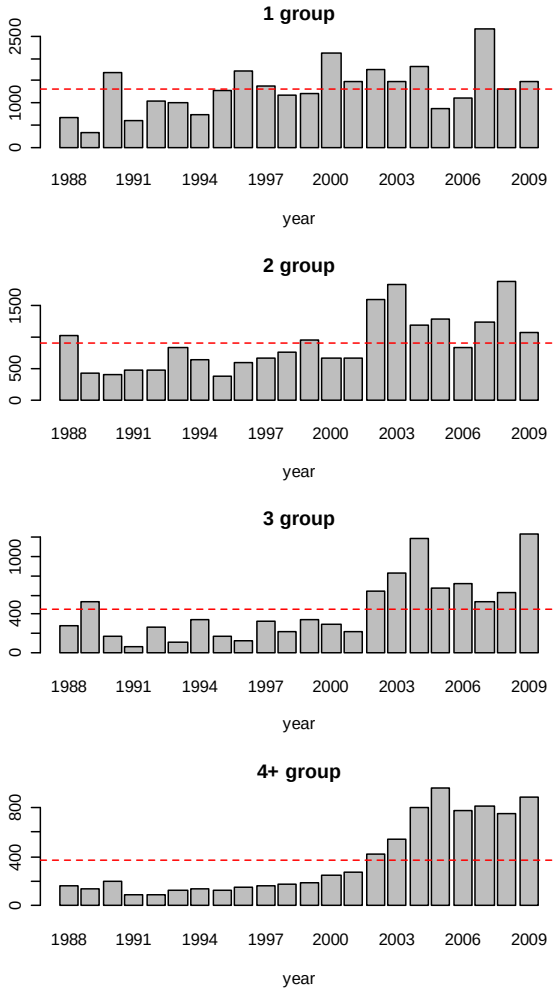


(c) UK: plaice (N.hr^-1/8m beam trawl) Eastern English Channel (VIId)	(d) UK: plaice (mean numbers per km towed for 2*4m beam trawl) Western English Channel (VIIe)

Figure 6.1.1.2. Continued.



(e) UK: plaice (mean numbers per km towed for 4m beam trawl) Bristol Channel (VIIf)



(f) UK: plaice (mean numbers per km towed for 4m beam trawl) Eastern Irish Sea (VIIa)

Figure 6.1.1.2. continued.

6.2 Abundance indices by age-group for plaice and sole for the inshore surveys

The abundance indices for the inshore surveys covering the full period of each survey are shown in Annex 15 and Figures 6.2.1.1–6.2.1.2.

In VIId, the indices used by WGNSSK are the English inshore beam trawl survey for plaice and the combined English and French surveys for sole. WGBEAM did not have the French survey data available at the meeting and as a result, only the English survey data has been tabulated and discussed. There are no inshore surveys in other parts of area VII which are used by the relevant Working Groups or coordinated by WGBEAM. Since 2007, UK no longer carries out the VIId inshore survey because of financial reasons.

The DYFS, DFS and YFS indices for the North Sea are combined to derive an international inshore index. The combined indices of 0- and 1-group plaice and sole are used

by the WGNSSK to estimate recruitment. Both the national and the international indices are presented in Annex 15, only the combined index is presented in Figures 6.2.1.1–6.2.1.2.

The SNS (North Sea) abundance indices of plaice and sole for age groups 0–4, are also used by WGNSSK for estimating recruitment and/or for tuning of the XSA model.

A notable change in the abundance indices of the North Sea inshore surveys is the almost complete disappearance of 1 group plaice in the combined index in the last approx. 10 years. This decrease is mainly driven by the Dutch indices and less obvious in the Belgian and UK indices. The decrease in abundance of 1 group plaice in the inshore areas is thought to be caused by a change in distribution (Grift *et al*., 2004). In effect, the combined inshore index is currently not sufficiently sampling the distribution area of 1 group plaice.

6.2.1 Sole

The North Sea 0-group sole in 2009 in the international index is about the same size (below average) as the years before. From the SNS 0-group index this year class seems to be more prominent. However, because of the mesh size, the SNS gear is not designed for targeting 0-group flatfish so no conclusions can be made based on its 0-group index.

6.2.2 Plaice

The North Sea 0-group plaice is slowly increasing in the international index. The patterns in the international inshore index and the SNS look alike. There is no strong year class visible in the index series for 0 and 1-group plaice.

6.2.2.1 Correction of Dutch plaice indices for year class 1996 (SNS)

For many years the 1- and 2-group indices for plaice were missing in the time-series of the SNS. This omission was because of age reading problems for the 1996 year class, which occurred in catch year 1997. The age reading problems were caused by the formation of false growth checks in the otoliths of plaice from the 1996 year class, in combination with the inexperience of the age reader at that time. All plaice otoliths from the SNS, which were collected in 1997, were recently re-read. The new age readings were used to recalculate the SNS indices in 1997.

The results of this re-read exercise combined with the results of the re-read of the BTS (see Section 6.1.2.1) led us to doubt the validity of the Dutch DFS age readings for the 1996 year class (at young ages). Therefore the otoliths collected in 1996 and 1997 during the DFS were re-read as well. The Dutch DFS indices have not yet been revised based on these new age readings.

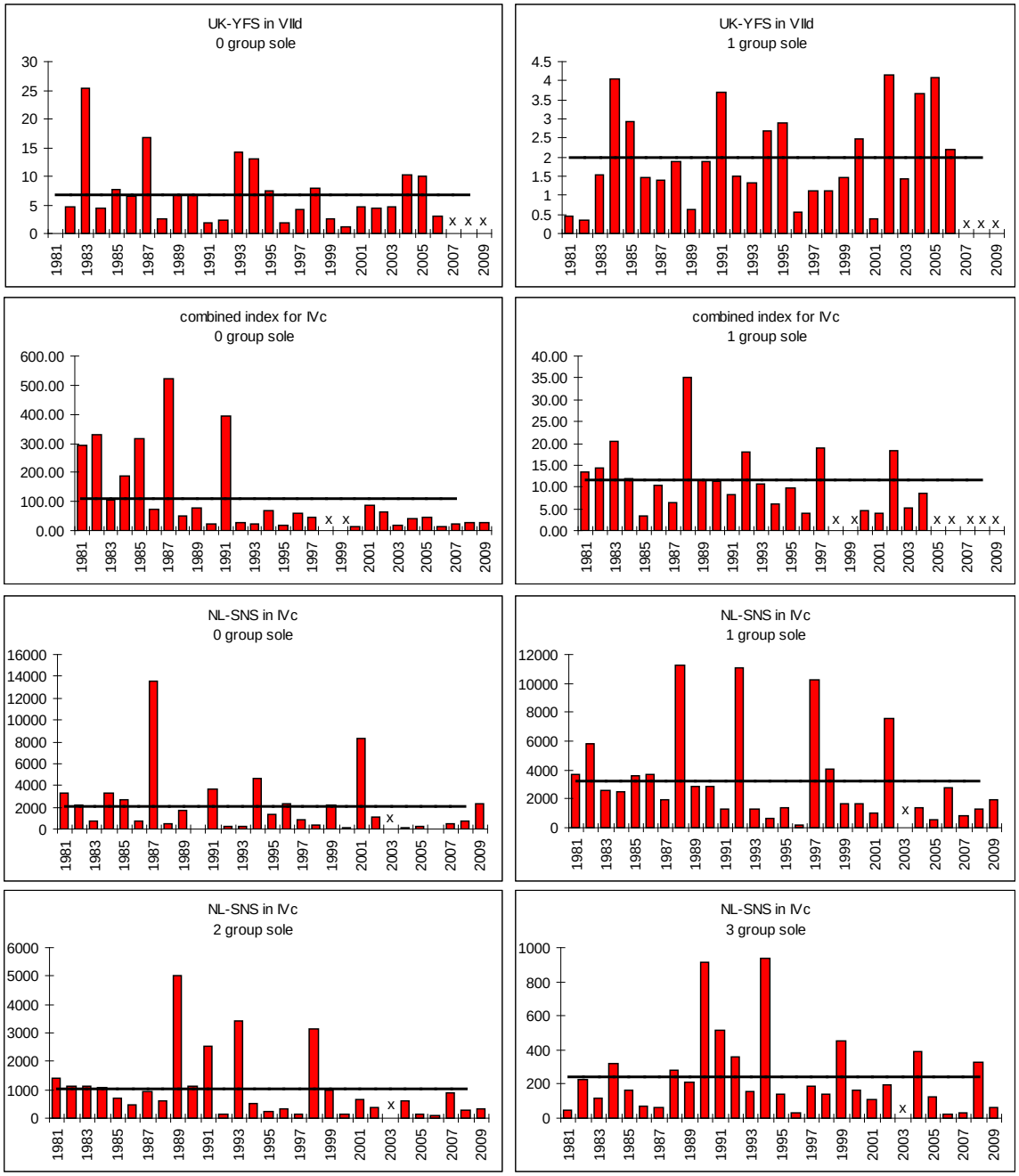


Figure 6.2.1.1. Indices of juvenile sole abundance from inshore beam trawl surveys. Young fish surveys (YFS / DFS / DYFS): abundance indices are given as numbers per 1000 m² (Netherlands, Belgium and Germany) and as millions of fish sampled (UKYFS and international index). Sole Net Survey (SNS): abundance indices are given as numbers per 100 hour fishing. (Horizontal line=long-term mean for the period presented, x=no data available).

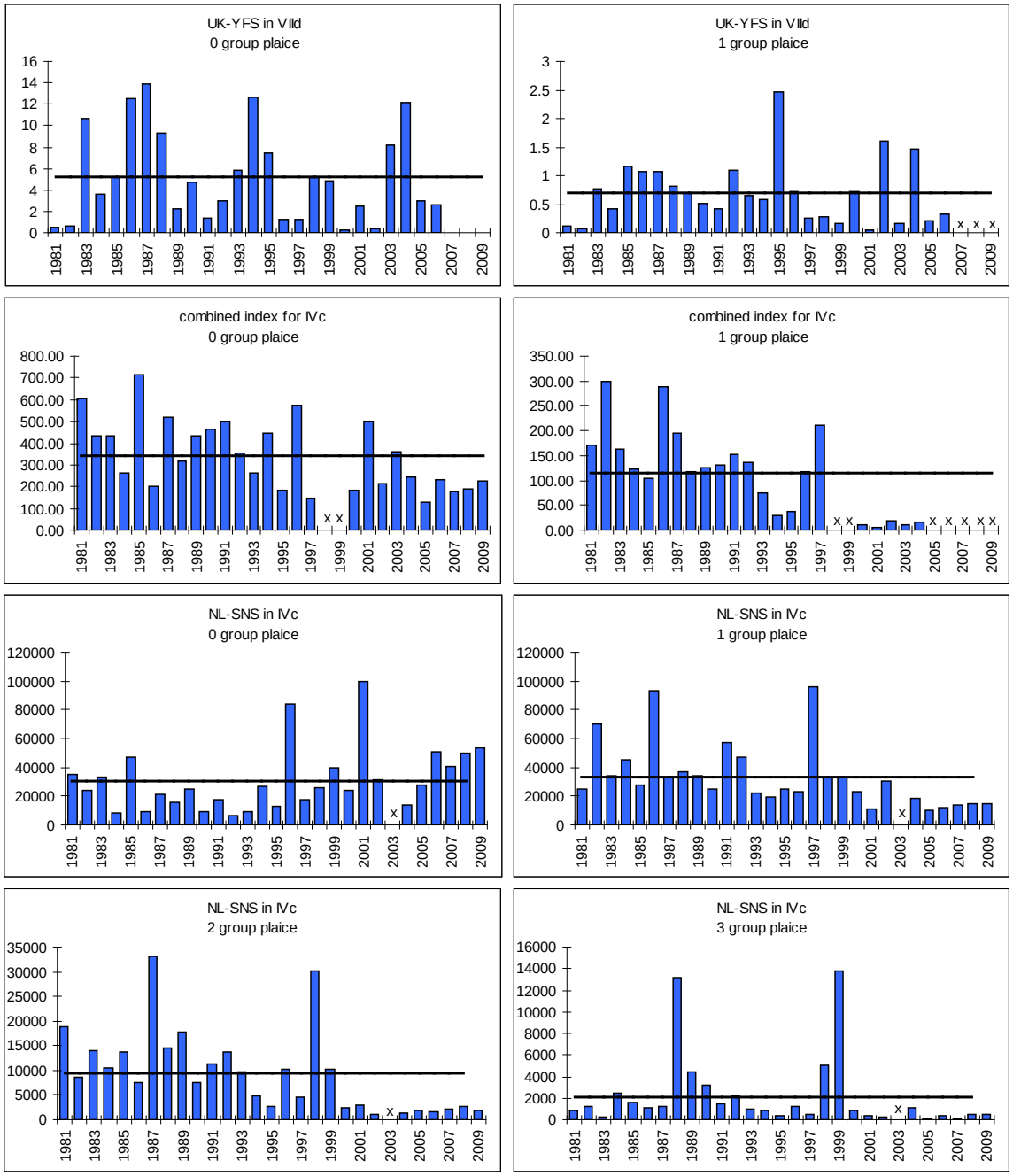


Figure 6.2.1.2. Indices of juvenile plaice abundance from inshore beam trawl surveys. Young fish surveys (YFS / DFS / DYFS): abundance indices are given as numbers per 1000 m² (Netherlands, Belgium and Germany) and as millions of fish sampled (UKYFS and international index). Sole Net Survey (SNS): abundance indices are given as numbers per 100 hour fishing. (Horizontal line=long-term mean for the period presented, x=no data available).

6.3 Evaluation of abundance indices

6.3.1 Recalculation of Dutch inshore indices (SNS)

The full time-series of the Dutch Sole Net Survey (SNS) indices has been recalculated because of a change in the database. The age data are now included in the oracle database, whereas before the data were stored in text files. This data transfer caused minor differences in the age length keys by area, and hence in the age compositions (not in the total catches). All these changes were checked and were related to correc-

tions of the sample area. Comparison of indices (plaice and sole) before and after these database corrections are presented in Annex 16. The differences are negligible with exception of the 1 and 2-group indices for plaice in 1997. These exceptions are related to corrections in the age determinations (see Section 6.2.2.1) and not to the database transfer.

6.3.2 Recommendation recalculation of international inshore indices

It is recommended to recalculate the full time-series of the international inshore indices because of the following changes:

- revision Dutch series because of transfer age database (minor changes expected)
- revision UK series 2001–2008 (minor changes expected)
- revision of the complete German series, including more stations
- correction age data in 1996 and 1997 in Dutch series
- omission of the German series from the 1-group indices (1-group series stopped in 2005 + approach different compared to other countries)
- new weighting of survey areas based on new estimations of surface of areas for the continental inshore surveys
- redistribution of depth strata and prioritizing of stations for the UK inshore survey
- re-evaluation of ALK's for the UK inshore survey
- new insights with regard to relative gear efficiency (see Section 9.4)

6.3.3 Combined Dutch offshore plaice indices in XSA

Combining the BTS-Tridens and BTS-Isis surveys into one has minimal effect on the perception of the stock: a short deviation from SPALY (same procedure as last year) estimates in the early 1990s and a slightly higher estimate of SBS and very slight lowering of the estimate of F in the recent period (Figure 6.3.3.1). This is most likely because of the weightings at age used in combining the two indices being very similar to the relative weightings at age assigned to each index when fit separately in the XSA. Similar to separate index runs, when the SNS series is excluded and only the combined index is used in the XSA, a much higher estimate of SSB (and correspondingly lower estimate of F) is produced.

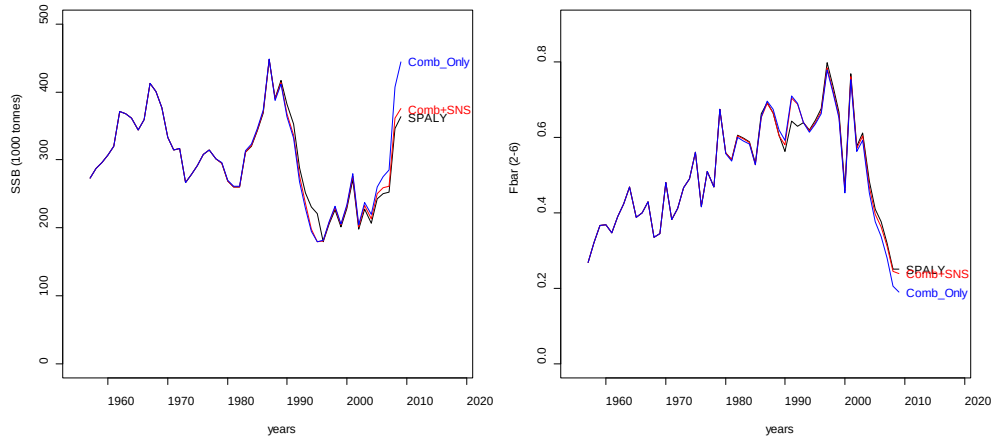


Figure 6.3.3.1 North Sea plaice XSA results with respect to SSB (left) and F (right) estimates using the combined BTS survey (BTS-Isis and BTS-Tridens) with different permutations of the available survey tuning indices. Labels indicate used tuning indices (SPALY=same procedure as last year i.e. BTS-Isis and BTS-Tridens separate with SNS survey).

6.4 Request on calculation of UK and Belgian offshore sole indices in IVc (WKFLAT/WGNSSK)

6.4.1 Request from WKFLAT

It is recommended that WGBEAM evaluates the Belgian and UK (Corystes) surveys in terms of their potential use in assessing the Sole IV stock. Also examine possibility of extending BTS survey for sole to cover this area or explain why this area is not currently included.

6.4.2 Index calculation UK

It should be noted that the UK has produced an index (1995–2009), which was available for the stock assessment but was not used.

In order to produce the UK index, individual station length distributions (LD) are combined by rectangle. Similarly, a rectangle age length key (ALK) is created. A rectangle age composition (AC) is then created combining the rectangle LD with the rectangle ALK. The UK survey covers 3 rectangles (31F1, 32F1 and 33F1). These three rectangles ACs are then combined. To calculate the mean number of fish at age, this combined AC is then divided by the total number of hauls for the rectangles (in this case 16). In order to be consistent with the other indices created by WGBEAM, this is then raised to an 8m beam for a one hour tow. The indices provided to the working group are shown in Table 6.4.2.1.

Table 6.4.2.1. UK sole index for IVc based on the VIId/IVc offshore beam trawl survey (numbers per hour fishing per 8 m beam trawl), for 31F1, 32F2, 33F1.

YEAR	ALL AGES	0	1	2	3	4	5	6	7	8	9	10+
1995	178.87	0.53	41.60	86.43	17.13	16.10	9.81	5.19	0.86	0.78	0.00	0.43
1996	186.32	3.33	75.48	52.47	22.89	8.98	8.33	8.77	1.30	1.81	0.73	2.22
1997	187.99	4.49	70.49	63.17	19.81	9.34	5.56	3.52	7.10	1.77	1.77	0.97
1998	101.73	7.91	10.59	63.34	15.71	1.77	0.89	0.86	0.00	0.44	0.00	0.22
1999	170.45	8.96	103.75	18.49	24.53	9.36	0.86	0.30	1.09	0.59	1.56	0.99
2000	397.29	3.22	192.51	157.89	15.03	14.08	7.00	2.60	0.67	0.37	0.91	3.01
2001	329.99	5.87	91.45	174.90	45.70	2.99	4.57	1.83	0.82	0.63	0.24	1.00
2002	244.76	2.22	125.78	47.31	33.28	21.97	3.61	4.39	1.79	0.90	1.15	2.38
2003	266.74	0.91	69.91	129.31	16.26	23.56	14.71	0.77	6.43	1.52	0.86	2.50
2004	229.33	24.63	58.65	57.77	50.15	12.46	10.14	8.58	0.65	2.15	1.15	3.00
2005	283.43	37.64	107.01	55.54	19.82	37.68	3.29	10.42	5.63	0.56	1.20	4.64
2006	387.00	7.02	202.50	82.19	20.64	14.03	35.20	6.72	9.17	5.34	0.36	3.83
2007	170.47	9.41	40.71	77.34	19.25	4.40	2.78	11.41	0.94	2.19	1.08	0.96
2008	233.02	1.00	98.84	59.97	39.34	13.45	0.63	3.41	10.73	2.55	1.79	1.32
2009	272.96	1.01	35.21	82.39	58.21	56.85	12.23	1.99	3.39	10.18	6.27	5.23

6.4.3 Index calculation Belgium

As the full time-series of Belgian data are not yet available in the required format, the following analysis uses only the 2008 and 2009 data when comparing the UK and Belgian indices. Combining the UK and Belgian indices should be encouraged and not lead to major problems because the gears used in both surveys are similar, so there is no gear efficiency difference to be expected.

The UK-regime described in Section 6.4.2 was then repeated for the Belgian data for two different areas. Firstly for the total survey area (14 rectangles) then for only those rectangles sampled by the UK (3 rectangles). The results are shown in Figure 6.4.3.1 and Table 6.4.3.1 this shows that there are very similar trends, particularly when comparing only those areas that both Belgium and the UK fish.

Table 6.4.3.1. UK and Belgium sole index for statistical rectangles in 2008 and 2009, as numbers per hour per 8 m beam trawl.

YEAR	ALL AGES	0	1	2	3	4	5	6	7	8	9	10+
UK 2008	233.02	1.00	98.84	59.97	39.34	13.45	0.63	3.41	10.73	2.55	1.79	1.32
BEL 2008*	339.6	7.6	152.6	68.2	46	25.4	5.4	9.2	16	0.6	0.4	8.20
BEL 2008**	149.71	3.11	78.10	36.89	11.56	5.651	4.70	6.35	0.95	0.51	1.40	0.51
UK 2009	272.96	1.01	35.21	82.39	58.21	56.85	12.23	1.99	3.39	10.18	6.27	5.23
BEL 2009*	318.59	5.88	59.06	153.41	35.29	43.29	8	0.71	4.24	6.35	1.18	1.18
BEL 2009**	143.12	4.41	35.32	34.58	31.93	17.76	6.37	2.10	4.07	3.53	1.29	1.76

***Index for sole from Belgian offshore survey, only overlapping statistical rectangles taken into account (31F1, 32F2, 33F1)**

****Index for sole from Belgian offshore survey, all stations**

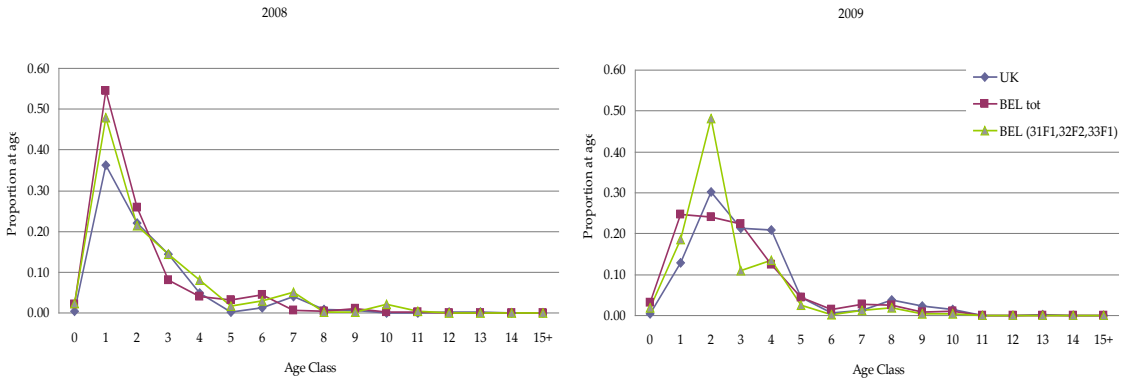


Figure 6.4.3.1. UK and Belgium sole index, as proportion (of total nr of sole caught) at age, for 2008 and 2009.

6.4.4 Discussion

While carrying out this analysis, it became clear that Belgium collected very few age data in certain rectangles. Main reason for this is the use of ALK-areas, representing a far lower spatial resolution than rectangles, as spatial units for the collection of otoliths. This can and does result in very small numbers of otoliths taken from certain rectangles. This is especially the case when the numbers to be taken per ALK-area were almost or fully reached in other rectangles within the same ALK-area. It is recommended that Belgium re-evaluates its biological sampling protocol to increase spatial resolution from an area based ALK to a rectangle based sampling design for the biological data, at least for plaice and sole.

Separate indices for the UK survey area and the Belgian survey area as well as a combined index for the combined survey area can be created. The separate UK series for IVc is already available, the series for Belgium and the combined series will follow the upload of data in DATRAS (see Section 7.1.3).

It is the recommendation of the working group that the Belgian offshore beam trawl survey data are uploaded to DATRAS so that a time-series for the sole index can be created, along the lines of the UK index. It will then be possible for both the Belgian and the UK IVc sole index (and potentially a combined one for the commonly fished rectangles) to be available to the assessment working group.

WGBEAM cannot think of other possible sources for fisheries independent data in the North Sea to derive sole indices from. The Dutch offshore Isis survey is already taken into account in WGNSSK and the Dutch offshore Tridens survey and the German offshore (Solea) are outside sole distribution area.

7 Coordination and standardization of beam trawl surveys (ToR c)

ToR c) Further coordinate offshore and coastal beam trawl surveys in the North Sea and Divisions VIIa, VIId-g and VIIIa-b;

7.1 Offshore beam trawl surveys

7.1.1 Timing and area coverage

Annex 5.1 lists the offshore surveys together with the geographic area covered, the gear used and the date started.

WGBEAM recommends that if time and weather allows, overlapping hauls will be carried out by countries operating in the same area.

Table 7.1.1.1. Timing of the surveys in 2010.

COUNTRY	VESSEL	AREA	DATES	GEAR
Belgium	Belgica	southern North Sea	23 Aug – 3 Sep	4m beam
UK	Cefas Endeavour	VIId, IVc	17 – 31 Jul	4m beam
UK	Cefas Endeavour	VIIfg, VIIa	11 Sep – 3 Oct	4m beam
UK	Carhelmar	VIIe	9 – 16 Oct	4m beam
France	Gwen Drez	VIIIa, VIIIb	3 Nov – 9 Dec	4m beam
Germany	Solea	German Bight	12 – 27 Aug	7m beam
Netherlands	Tridens	central North Sea	23 Aug - 16 Sep	8m beam + flip-up rope
Netherlands	Isis	southern North Sea	9 Aug - 10 Sep	8m beam

***: planned**

7.1.2 Staff exchange

In 2010, staff from Belgium (Kelle Moreau) will join the UK "Cefas Endeavour" VIIfg survey. Details will be arranged between parties.

For 2011 the following staff exchange during the offshore beam trawl surveys will take place:

UK (Rob Bush/Richard Ayers) Netherlands "Tridens" (10 days in week 35/36 or week 37/38 2011)

NL (Sieto Verver/Henk Heessen) Germany "Solea" 18 Aug – 3 Sep 2011

Germany (Kay Panten) UK VIId/IVc. If not possible, UK VIIfg, VIIa

WGBEAM recommends that a report is made from all staff exchanges by the members of staff doing the exchange. The reports will be published in the WGBEAM report.

7.1.3 Database developments (ToR f)

ToR f) Continue work of developing and standardizing an international (fish and epifauna) database of offshore beam trawl survey data and coordinate such activities with those of the IBTSWG.

WGBEAM is encouraging the upload of all offshore beam trawl survey data as coordinated by WGBEAM. This will create the possibility to work with an agreed international dataset and will allow direct output for the assessments. In 2008 and 2009, all countries delivered their offshore beam trawl data to the WGBEAM database as DATRAS format files. Since the reference values for the different surveys were discussed in 2008 with the ICES Data Centre (ICES, 2008), no problems should occur when uploading the offshore beam trawl data. The only exception might be France, because that survey was not taken into account in the meeting between WGBEAM and the ICES Data Centre.

Table 7.1.1.4.1 lists the current offshore data available in DATRAS by country and ship and includes planning for further uploads.

Table 7.1.1.3.1. DATRAS offshore beam trawl data.

COUNTRY	SURVEY	DATA IN DATRAS	PRODUCTS FROM DATRAS	PLANS UNTIL WGBEAM 2011	ACTIONS NEEDED TO ACHIEVE GOAL
Belgium	Belgica	no	no	Upload 2008, 2009, 2010 data	
France	Gwen Drez	no	no	Upload 2008, 2009, 2010 data	ICES Data Centre: stretch accepted area for beam trawl survey
Germany	Solea	no	no	Upload 2008, 2009, 2010 data Data preparation < 2008 scheduled for 2010	SOL (old Solea) added to DATRAS as a vessel
Netherlands	Isis	1985–2009*	yes	Index calculation from DATRAS	See Section 9.1
	Tridens II	1996–2009**	yes		
UK	Cefas Endeavour, VIId/IVc	1990–2009***	no	Index calculation from DATRAS, upload species that were not accepted before.	See Section 9.1
	Cefas Endeavour,VIIfg, VIIa	1993–2009***	no		
	Carhelmar	no	no	Upload time-series to DATRAS	CHM added to DATRAS as valid vessel

***1985, 1986, 2007 data cannot be downloaded from DATRAS although the files have been sent to ICES**

**** 2007, 2008 data cannot be downloaded from DATRAS although the files have been sent to ICES**

***** operated by Corystes until 2007/2008. 2008 (VIId/IVc) and 2009 (all areas) data cannot be downloaded from DATRAS although the files have been sent to ICES**

WGBEAM recommends that the automatic uploading facility as is operational for IBTS since 2010 will be applied in due time for the beam trawl surveys.

WGBEAM recommends that the French survey area will be incorporated in the range of the allowable values for latitude and longitude.

7.2 Inshore beam trawl surveys

7.2.1 Timing and area coverage

Annex 5.2 lists the offshore surveys together with the geographic area covered, the gear used and the date started.

Table 7.2.1.1. Timing of the surveys in 2010.

COUNTRY	VESSEL	AREA	DATES	GEAR
Belgium	Broodwinner	Belgian coastal zone	6 Sep – 17 Sep	6 m shrimp trawl
UK	F.V. Suvera and F.V. Fisher Lassie	Thames estuary	20 Aug – 15 Sep*	2 m shrimp trawl
UK	F.V. Challenge	Northeast English coastal zone	20 Aug – 15 Sep*	2 m shrimp trawl
Germany	Chartered vessels	German Bight and German Wadden Sea	30 Aug – 1 Oct	3 m shrimp trawl
Netherlands (SNS)	Isis	Dutch coastal zone	13 - 23 Sep	6 m beam trawl
Netherlands	Schollevaar	Scheldt estuary	6 – 24 Sep	3 m shrimp trawl
Netherlands	Stern	Dutch Wadden Sea	6 Sep - 8 Oct	3 m shrimp trawl
Netherlands	Isis	Dutch coastal zone and German Bight	27 Sep - 29 Oct	6 m shrimp trawl

***: Planned**

The UK survey in the Eastern English Channel coastal zone will not be done in 2010.

7.2.2 Staff exchange

The organization of staff exchange on inshore surveys is more complicated than for the offshore surveys because the inshore surveys take place on smaller vessels with less staff on board and so, it is more complicated to exchange experienced staff without causing problems on the own survey.

Table 7.2.1.2 shows information on the logistics of the inshore trips that are relevant to staff exchange.

Table 7.2.1.2. information in inshore trips

COUNTRY	SHIP	SLEEP ASHORE	EXTRA SLEEPING FACILITIES ON BOARD	TRIP LENGTH
Belgium	Broodwinner*	yes	-	Day
Germany	Commercial cutters	yes	-	Day
Netherlands	Stern, Schollevaar	no	No	Day
	Isis	no	No	Week
UK	All	yes	-	Day

***NB: extra staff might cause problems.**

In 2010, Cefas staff will join the German inshore survey. This will be combined with a visit to the Dutch Wadden Sea inshore surveys. Details will be arranged between parties (Uli Damm, Gary Burt and Marcel de Vries (NL)).

7.2.3 Database developments (ToR f)

The inshore WGBEAM dataset containing length frequencies and station information is held at IMARES. All countries involved in inshore surveys do add their data to this database. Historically, all countries used their own reporting format, which resulted in a lot of work to add the data in one dataset. For the 2009 surveys, countries sent the inshore data in DATRAS format, which resulted in fewer errors in the international inshore dataset. There is an international index derived from the inshore data which is used in the assessments for plaice and sol by WGNSSK. The international index is calculated at IMARES.

WGBEAM recommends the upload to DATRAS of all inshore beam trawl survey data as coordinated by WGBEAM. This will create the possibility to work with an agreed international dataset and will allow direct output for the assessments.

To allow upload of inshore beam trawl survey data, the checks as carried out before uploading files to DATRAS have to be discussed by representatives of the countries running the inshore surveys together with the ICES Data Centre as was done in 2008 for the offshore beam trawl surveys (ICES, 2008).

WGBEAM recommends that a one-day meeting is organized, attended by at least one representative of the ICES Data Centre and representatives of Belgium, Germany, Netherlands and UK with expertise on the data of the inshore surveys (one representative per country). The meeting will be scheduled the day before WGBEAM 2011.

8 Development of manual (ToR e)

ToR e) Continue development of a manual to improve standardization of sampling protocols, surveys gears and quality control aspects;

8.1 Offshore beam trawl survey manual

8.1.1 Addition of flow diagrams on gear checking and catch processing

WGBEAM discussed the flow diagrams on gear checking and catch processing as published in the IBTS manual (ICES, 2010).

In general, WGBEAM thought the flow diagrams will be an addition to the manual. WGBEAM decided to separate the steps in the flow diagram where the research crew is responsible for from the steps that are outside the responsibility of the researching institute (e.g. being responsibility of the vessel's crew) by different colouration.

Gear checking

WGBEAM will add the recording on damaged/defect groundgear and wires to the registration of damaged/defect nets on the register.

Catch processing

The work done on the offshore beam trawl surveys corresponds to this flow diagram. However, in some cases data from papers are not all put onto PC yet during the cruise, but completed at the institute after the cruise.

Changing text on estimate of the catch and subsample weight is needed because procedures do not match the flow diagram.

WGBEAM decided to incorporate the flow diagrams on gear checking and catch processing in the offshore beam trawl manual, taking into account the comments. The flow diagrams will be added to the first updated version of the manual which will be scheduled for WGBEAM 2011.

Because the manuals of the surveys are published as separate documents on the DATRAS website, it is recommended that the numbering of survey manuals is independent of the survey group report. It would be very desirable to have a universal ICES system that clearly labelled any type of electronic document coming from the EG's.

8.1.2 Extension of table containing biological sampling

WGBEAM updated the offshore biological sampling table with numbers collected.

	UK					Netherlands		Germany	Belgium	France
Species	VIIa	VIIf	VIIe	VIId	IVc	Isis	Tridens			
Arnoglossus laterna	N	N	N	N	N	N	5/cm/strata	N	N	N
Buglossidium luteum	N	N	N	N	N	N	5/cm/strata	N	N	N
Dicentrachus labrax	All	All	N	All	All	N	N	N	N	N
Gadus morhua	10/cm	10/cm	All	10/cm	10/cm	5/cm/strata	5/cm/strata	N	Y	N
Hippoglossoides platessoides	N	N	N	N	N	N	5/cm/strata	N	N	N
Hippoglossus hippoglossus	All	All	All	All	All	-	5/cm/strata	N	N	N
Lepidorhombus whiffiagonis	-	10/cm	10/cm	N	N	-	5/cm/strata	N	N	Y
Limanda limanda	5/cm/sex	5/cm/sex	N	5/cm/sex	5/cm/sex	5/cm/strata	5/cm/strata	3/cm/sex/statrec	N	N
Lophius piscatorious	10/cm	10/cm	10/cm	10/cm	10/cm	N	N	N	N	Y
Melanogrammus aeglefinus	10/cm	10/cm	-	N	N	-	N	N	N	N
Merlangius merlangus	10/cm	10/cm	-	N	N	N	N	N	N	Y
Microstomus kitt	10/cm	10/cm	10/cm	10/cm	10/cm	5/cm/strata	5/cm/strata	N	N	N
Mullus surmuletus	N	N	N	N	N	N	N	N	N	Y
Phrynorhombus norvegicus	N	N	N	N	N	-	5/cm/strata	N	-	-
Pleuronectes platessa	8/cm/sex/strata	8/cm/sex/strata	1–8/cm/sex/strata*	2/cm/sex/strata	10/cm/sex	1/cm/statrec	1/cm/statrec	3/cm/sex/statrec	Y	N
Psetta maxima	10/cm	10/cm	10/cm	10/cm	10/cm	5/cm/strata	5/cm/strata	N	Y	N
Raja brachyura	10/cm/sex	10/cm/sex	10/cm/sex	10/cm/sex	10/cm/sex	N	N	N	Y	N
Raja clavata	10/cm/sex	10/cm/sex	10/cm/sex	10/cm/sex	10/cm/sex	N	N	N	Y	N
Raja microccellata	10/cm/sex	10/cm/sex	10/cm/sex	10/cm/sex	10/cm/sex	N	N	N	Y	N
Raja montagui	10/cm/sex	10/cm/sex	10/cm/sex	10/cm/sex	10/cm/sex	N	N	N	Y	N
Raja naevus	-	10/cm/sex	10/cm/sex	10/cm/sex	10/cm/sex	N	N	N	Y	N
Scophthalmus rhombus	10/cm/sex	10/cm/sex	10/cm/sex	10/cm/sex	10/cm/sex	5/cm/strata	5/cm/strata	N	Y	N
Solea solea	8/cm/sex/strata	8/cm/sex/strata	1–8/cm/sex/strata*	2/cm/sex/strata	10/cm/sex	1/cm/statrec	1/cm/statrec	Y	Y	Y

*** Depending on length**

8.2 Inshore beam trawl survey manual

A start was made in setting up a survey manual for the inshore surveys. The first draft of the inshore manual can be found in Annex 20.

9 Other subjects

9.1 Request on Dutch offshore index calculation (ICES Data Centre)

The indices for the Dutch beam trawl survey as calculated at ICES based on the data available at ICES, are not similar to the indices as calculated by IMARES. For this reason, a comparison of the intermediate products of the index calculation was done by WGBEAM. The results of the comparison and the actions to be undertaken are in this section.

9.1.1 Raw data

The data used were the 2004 beam trawl survey data for plaice (*Pleuronectes platessa*). ICES data were derived from DATRAS, WGBEAM data were derived from the IMARES database FRISBE.

Table 9.1.3.1. Raw data for plaice in the 2004 Dutch offshore beam trawl survey as calculated by IMARES and ICES respectively.

VARIABLE	IMARES (FRISBE)	ICES (DATRAS)	AGREED
Number of hauls Isis	83	83	Yes
Number of hauls Tridens II	75	75	Yes
Number at length plaice Isis	24400	24400 (hlnoatlength*subfact)	Yes
Number at length plaice Tridens II	3072	3072 (hlnoatlength*subfact)	Yes
Number at-age plaice Isis	744 (1 without age info)	743	Yes
Number at-age plaice Tridens II	893 (5 without age info)	888	Yes

9.1.2 Age-length key

Basically, the age-length key (ALK) is derived from the records containing age information. The ALK can be derived from the DATRAS CA records and should add up to the number-at-age for the two ships combined. As the numbers from the IMARES database and DATRAS are similar, the ALK should be similar for both datasets, too.

Table 9.1.2.1. ALK per BTS index area for plaice in the 2004 Dutch offshore beam trawl survey as calculated by IMARES and ICES respectively.

VARIABLE	IMARES (FRISBE)	ICES (DATRAS)	AGREED
Number at length area 701	198	9	No
Number at length area 702	248	12	No
Number at length area 703	285	9	No
Number at length area 704	268	3	No
Number at length area 705	249	17	No
Number at length area 706	138	8	No
Number at length area 707	245	11	No
	1631	69	

When recalculating the CA data to an ALK by adding the ALK areas to the CA file, similar numbers for the ALK from the IMARES dataset and the DATRAS dataset can be created. It is unclear how the ALK file is created at ICES. The table to relate statistical rectangles to beam trawl survey ALK areas is in Annex 10.3.

9.1.3 Cpue per age per haul

By combining the length frequency distribution and the ALK at an index area basis, the cpue per age per haul can be derived.

Table 9.1.3.1. Cpue per length per haul for plaice in the 2004 Dutch offshore beam trawl survey as calculated by IMARES and ICES respectively.

VARIABLE	IMARES (FRISBE)	ICES (DATRAS)	AGREED
Number of hauls Isis	81	81	Yes
Number of hauls Tridens II	74	53	No

The discrepancy in the number of hauls taken into account for Tridens II is caused by the revision of the indices as described in the WGBEAM 2009 report (ICES, 2009).

For the IMARES data, the number per haul is used to calculate this file. At ICES Data Centre, the numbers per hour are used for the creation of the CPUE per age per haul. For this reason, the result is expected to be different, but should be identical when IMARES data are raised to numbers per hour. The data were compared for a number of hauls from both vessels and were identical, taking into account the raising to numbers per hour for the IMARES data.

9.1.4 Dealing with missing age information

In the next step, at IMARES dummy ALK records are created for length classes without age information. If there is no age connected to the length of a fish in an index area, the data of the nearest index area are used to fill the gap. If there are still missing ages at length, an ALK is created for the complete series of that year. In recent years, after this step there is no missing age information at length. However, the historical data (prior to 2002) might even then still have missing ALK information. To solve this, dummy records are created by smoothing the length frequency distribution of the age data. In this way, data from the nearest length class will be used to fill the gaps in the ALK file.

There is no information how ICES Data Centre deals with missing ALK information. This should be sorted out because this is crucial to the index calculation.

9.1.5 Final index

The final index for 2004 plaice as calculated by ICES Data Centre and IMARES respectively can be found in Table 9.1.1.5.1.

The table shows the indices do vary although not too extremely. This might be a sign that the major discrepancies are caused by the way the models deal with missing information.

Table 9.1.5.1. Indices for plaice, offshore beam trawl survey 2004 (numbers per hour fishing).

AGE	IMARES_ISIS	ICES_ISIS	AGREED	IMARES_TRIDENS II	ICES_TRIDENS II	AGREED
0	197.94	124.156	No	0.01	0	No
1	233.71	230.607	No	5.98	5.51	No
2	39.62	42.28	No	15.78	11	No
3	61.91	65.111	No	31.49	29.946	No
4	6.15	6.896	No	9.43	7.734	No
5	2.46	2.082	No	4.32	3.945	No
6	1.49	1.62	No	2.44	2.447	No
7	0.95	1.018	No	1.24	1.084	No
8	2.84	3.044	No	2.5	1.861	No
9	0	0	Yes	0.41	0.382	No
10+	0.01	0.019	No	1.41	1.175	No

9.1.6 Conclusion and action points

Comparing the index calculation for plaice in the Dutch offshore beam trawl survey as done by IMARES and ICES, leads to the following conclusions:

- the raw data used for the calculation by both models are identical
- the ALK as published on the DATRAS website is different from the ALK as calculated by IMARES and needs to be revised by ICES Data Centre
- although the ALK is different, the cpue per age per haul does not seem to be affected by this. WGBEAM has the impression that the ALK file as published on the DATRAS website differs from the ALK file used in the index calculation done by ICES.
- the cpue per age per haul is not identical because of a shift in the index areas (update by WGBEAM 2009) for Tridens. The statistical rectangles used for the index calculation need to be revised by ICES Data Centre.
- there is no insight in the way ICES Data Centre deals with missing age information in the length distribution. This needs to be sorted out because it is a crucial step in the index calculation, mainly for historical data.

9.1.7 Follow-up

After ICES Data Centre has implemented the changes and additions as described in Section 9.1.6, there has to be another check of the index calculation. In case the revision of the offshore beam trawl index calculation is done throughout the year, this might be done by correspondence between IMARES and ICES Data Centre intersessionally. When the results for the index calculation are identical, WGBEAM should approve the calculation as done by the ICES Data Centre in the 2011 meeting, based on the report of the intersessional comparison. The report will be added to the WGBEAM 2011 report.

When the results for the index calculation of the Dutch offshore beam trawl survey are approved, the index calculation should be applied to the UK data that are stored in DATRAS and checked to the original UK indices as sent to the assessment working groups.

9.2 Request on species taxonomy (ICES Data Centre)

WGBEAM received a request by the ICES Data Centre on a change in the taxonomic coding system as used by ICES.

9.2.1 Proposal from Data Centre on Species vocabularies

9.2.1.1 Background on Species vocabularies

Because ICES covers a number of thematic areas and geographic regions, there have been a number of different species vocabularies/lists employed at different time for different purposes. The Data Centre does not have the capacity or knowledge to maintain their own list, nor would it be wise to do so, therefore we continue to rely on the best available vocabularies managed by networks of taxonomist. Currently the Data Centre supports reporting of species as:

- NODC codes (Deprecated – lookup in ITIS)
- ITIS (International Taxonomic Information System)
- ERMS and WoRMS (European and World Register of Marine Species)
- HELCOM Phytoplankton Expert Group Baltic Species list

Increasingly, the ICES Data Centre and data output services have relied on ERMS and WORMS, there are a number of advantages of using these vocabularies, including the web services, user tools, comprehensiveness of species information and a close link to the data projects that ICES is involved in (OBIS, EurOBIS and EMODNET Biological). To this end, the ICES Data Centre has made a recommendation to both OSPAR and HELCOM, through their monitoring groups, to standardize their data submissions to ICES on ERMS vocabulary. This will reduce the number of errors in mapping between lists and ensure a standard throughout the region is maintained.

In essence, ICES Data Centre already does a conversion of Trawl survey species to ERMS codes, as the DATRAS data are harvested into the ICES Data warehouse (http://ecosystemdata.ices.dk), where all species are viewed by scientific name, validated by ERMS.

9.2.1.2 WGBEAM Request 2009

"WGBEAM recommends to check for higher taxa levels when up-loading data and give a warning to the owner of the data when a higher taxon level is uploaded."

This request kick-started this proposal as the answer from the Data Centre was:

"We are using the ITIS database for comparing and checking TSN and NODC code. There is no family – genus relation we can see in this database, because of this if there is higher taxa level present in the submission then it is not possible to find it out on base reported TSN or NODC code. However, this kind of check would be possible using the ERMS database, but this would require mapping all the codes over and supporting an extra vocabulary within DATRAS."

Therefore the advantage to WGBEAM and all the trawl survey groups would be better taxonomic control and possibilities to apply taxonomic checks on the data.

9.2.1.3 Proposal to WGBEAM

1) To align with the request to OSPAR and HELCOM, we would ask WGBEAM to consider the adoption of ERMS as their species vocabulary for Trawl Surveys. Recognizing that this request affects all the trawl survey

groups using DATRAS, we would ask the WGBEAM forwards this recommendation to the other groups for consideration.

2) The implications would be:

- ICES to provide lookup lists (NODC<->TSN<->ERMS)
- A change to reporting format (to accept AphiaID's) and remove SpecCodeType
- A change to the Screening programme (DATSU) to validate against the ERMS database
- Data submitters to change their export programmes accordingly to use ERMS

9.2.2 WGBEAM reaction on the proposal

1) Although WGBEAM has no problems with the present system and procedures, it would support the switch to another taxonomic coding system (ERMS) as proposed by the ICES Data Centre, acknowledging the usefulness of standardization across data contributors, regular updating and online availability. This holds in particular when other expert groups using DATRAS would opt in the same way.

As far as WGBEAM could see, by using the ERMS sending a notification to the client doing a database search or upload when a higher taxon is detected (which may comprise the sought item), may be accomplished relatively easy because the online version of the databank (http://www.marbef.org/data/erms.php) indicates the respective taxonomic level and links automatically to the "parent" (=next higher taxon). So the respective pointers are available somewhere and need not be constructed. The numeric taxonomic code ("AphiaID") itself does not appear to be hierarchical.

2) The implications -additional work for ICES and national labs- are listed by the Data Centre. For WGBEAM, the implications are minor compared to the advantages of the incorporation of the ERMS vocabulary. When a downloadable lookup table is available containing the various coding types per species, national labs should be able to convert one code to another.

9.3 Request on adding fisheries survey information to indices (IMARES)

9.3.1 Request by IMARES on industry survey advice

The Dutch flatfish fishery wants to set up an industry survey together with IMARES and the ministry of Agriculture, Nature and Food Quality. The aim of this survey is to collect additional information on plaice and sole, which can be used in stock assessment of these species. Could WGBEAM give us an indication of the requirements for such a survey?

9.3.2 WGBEAM advice

WGBEAM wants to direct attention to the existence of a UK industry survey on plaice and sole in ICES division 7e of which plaice is used in the stock assessment, an Irish industry survey in Irish waters and a Scottish monkfish survey which is used in the stock assessment.

9.3.2.1 Collecting additional data

First of all, when setting up a new survey, it is important to identify which additional information on the target species is planned to be collected. For example, information of areas not covered by the research survey, a different length range of the stock in an area that is already covered by a research survey, an increase of the sampling density in a research survey area.

By setting the goals for additional information it will be easier to set up a sampling strategy for the industry survey and it will increase the chance on valuable data coming from the industry survey.

9.3.2.2 Setting up a survey

In order to be a valuable source of information for fisheries science such as stock assessments, a survey on fish species has to at least been carried out for 5 years in order to get information on the variability of the stock over time. Building a proper time-series requires a standard sampling strategy (i.e. gear, haul duration, fishing speed, mesh size, area coverage, sampling time in the year) throughout the years. This is highlighted by the UK 7e industry survey as in 2009 the survey did not match the standard sampling protocol and for this the 2009 data were not used for the stock assessment.

It is important to decide which species will be focused on and how the species will be processed. Whatever is decided (one species or all, subsampling strategy, length measurements, collection of biological information), it is crucial to standardize the processing of the catch throughout the series (consistency).

WGBEAM advises that the organizers of the fish surveys let the survey plan been reviewed by experts on surveys.

9.3.2.3 The use of the survey for stock assessment

WGBEAM calculates the survey indices for plaice and sole that is used in stock assessment. From this experience it can be concluded that length and age information on the target species is crucial in order to give information to the stock assessment models.

It is however not within the expertise of WGBEAM to decide whether or not the results of an industry survey in the end will be valuable for the stock assessment.

WGBEAM advises that the WGNSSK is asked for advice on the conditions for adding a new series to the stock assessment.

9.4 Calculation of relative gear efficiencies

Recommendation 7: For WGBEAM 2010, WGBEAM recommends to come up with working documents on the following topics: gear efficiency, sensitivity of indices, and species of the year.

9.4.1 Introduction

The offshore beam trawl surveys coordinated by WGBEAM all started as national surveys and have their own time-series and sampling strategy. The inshore survey on 0 and 1 group fish started as a Dutch survey (Boddeke, 1970) and was copied by Belgium and Germany and coordinated by the flatfish working group (ICES, 1985) and so, the continental inshore survey is the most internationally standardized survey

coordinated by WGBEAM. The UK coast inshore survey started as a separate survey with a different gear. This results in use of different gears for various surveys.

There are two main reasons for sorting out the relative gear efficiency of the used gears:

- for the calculation of combined indices as used in the stock assessment
- for the combining information on the abundance of species in the surveys, and so, trends in species abundance

This document is meant as a starting point to study the relative gear efficiency factors of the surveys coordinated by WGBEAM.

9.4.1.1 Offshore surveys

WGBEAM 2009 (ICES, 2009) summarized the difference in 8 meter beam trawl with and without flip-up rope as follows:

"It is difficult to obtain reliable gear efficiency estimates. Data based on simultaneous hauls from the same vessel are scarce and comparing hauls that differ in time, space and vessel may be biased. Therefore it is impossible to estimate gear efficiency for different bottom structures and detailed size/age classes (as WKFLAT requested) based on the existing data. This will require a substantial survey effort focusing on this issue. Nevertheless, it is recommended that the existing data and the previous analyses are scrutinised and combined in a comprehensive analysis into a publication."

The studies underlying, are summarized in Table 9.4.1.1.

Table 9.4.1.1. Relative gear efficiency estimates for BTS-gear with and without flip-up rope. Estimates given are for α in relationship: Nisis= α * Ntridens (in which N=catch rate).

Source	Groeneveld & Rijnsdorp, 1990			ICES, 2005	
age or size group	0-2 gr.	3-5 gr.	6+ gr.	<15 cm	≥ 15 cm
Plaice	2.5	ns	0.7	2.9	1.5
Sole	4.0	ns	ns	2.8	2.6

ns = non significant relationship

9.4.1.2 Inshore surveys

For the inshore surveys, in 1983 the North Sea flatfish working group derived raising factors for the different gears used in the continental and UK coast DYFS (ICES, 1985). Until now, these factors are used in the calculation of the international inshore plaice and sole indices.

9.4.2 Data available

9.4.2.1 Offshore surveys

The offshore surveys partly overlap between countries. UK and Belgium are fishing in more or less the same area and Germany and Netherlands have overlap in their sampling area. WGBEAM encourages comparative fishing when time and weather allows and so, there are some hauls in the same year on the same position within a time frame of one to two days, done by different countries.

9.4.2.2 Inshore surveys

For the inshore surveys, Germany carried out comparative tows with 3 meter shrimp trawls rigged with and without tickler chain in the Wadden Sea. This is the only difference between the German and the Dutch gear used in the Wadden Sea.

The Netherlands has a dataset containing parallel fishing with the 6 meter beam trawl as used in the SNS and the 6 meter shrimp trawl as used in the coastal DFS. Those data are collected in the 1980's by fishing with one gear on one side of the ship and the other gear on the other side.

Apart from those datasets there might be some overlapping stations for Netherlands and Germany in the Wadden Sea and Belgium and Netherlands on the Belgian coast, but that presumably only applies for a small number of tows.

9.4.3 Factors to evaluate

WGBEAM is looking for a generic method to compare beam trawl gear efficiencies in the North Sea and Wadden Sea, taking into account:

- the scarcity of overlapping data
- the spatial coverage of the surveys
- temporal coverage of the surveys (seasonal patterns)
- gear efficiencies for different species
- gear efficiencies for certain size ranges
- the offshore gears (4 m beam trawl UK, 4 m beam trawl Belgium, 7 m beam trawl Germany, 8 m beam trawl Netherlands, 8 m beam trawl with flip-up rope Netherlands)
- the inshore gears (2 m beam trawl UK, 3 m beam trawl Germany, 3 m beam trawl Netherlands, 6 m beam trawl Belgium, 6 m beam trawl DFS Netherlands, 6 m beam trawl SNS Netherlands)

There are two ways forward for calculation of new gear efficiency factors:

- Study the problem intersessionally (geostatistics). IMARES to lead
- Comparative towing on one ship with two different gears. Belgium and UK to study possibilities.

9.5 Adopting new maturity scales

In January 2010, the workshop on Maturity Staging of Sole, Plaice, Dab and Flounder met in IJmuiden, Netherlands. The workshop proposed new maturity scales for the four flatfish species, based on a 6 point scale as adopted for gadoids. The executive summary of WKMSSPDF is in Annex 19.

The most important message for WGBEAM is: "As it is difficult to identify the proper maturity stage when fish is not clearly developing, data collection for maturity ogives is recommended during the prespawning season. This implies that sampling for maturity staging for sole, plaice, dab and flounder should be done during late fourth quarter until the end of the first quarter." For the surveys coordinated by WGBEAM, this means that for none of the four species maturity information should be collected during the inshore and offshore surveys, except the French Bay of Biscay survey. If an institute decides to collect maturity information outside the optimal sampling period, WKMSSPDF recommends that histological samples are taken.

10 References

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Annex 1: List of participants

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Annex 2: Agenda

Agenda WGBEAM 2010, 8–11 June 2010

Tuesday 9 June, start 9.30

Welcome and Logistics

am

General issues:

1. Terms of Reference and main aims
2. Working documents
3. Chapter responsibilities
4. Review of recommendations
5. Reports from:
   - IBTS WG – Brian
   - WGDIM – Ingeborg
   - WGNSSK – Uli/Sven
   - WKMSSPDF – Ingeborg
   - Other?
6. Presentations:
   - Gérard on Bay of Biscay survey
7. Additional requests:
   - WKFLAT on sole indices UK Channel, Belgium (and Germany)
   - IMARES on adding additional information from industry survey to survey indices: UK sole FSP 7e, Scottish monkfish survey is used in the series. Examples in Celtic Seas Ecoregion. Irish industry survey too.
   - ICES Data Centre on reviewing the current index calculations for the Dutch offshore beam trawl survey: UK data use as validation set.
   - ICES Data Centre on species taxonomy

ToR a) prepare a progress report summarizing the results of the 2009 offshore and inshore beam trawl surveys;

Short feedback on the 2009 by all countries: did people face problems during the survey, how were they solved involvement of fisheries in the beam trawl surveys: experiences, nice things to know, etc.

Prepare standard output:

- area coverage (Figures 3.1.1–3.1.4)
- standard reporting formats
- finalize survey summary sheets if not ready

ToR b) tabulate population abundance indices by age-group for sole and plaice in the North Sea, Divisions VIIa, VIId-g and VIIIa-b;

- as last year: similar plots and text as in 2009 report

- changes in population distribution

ToR d) Evaluate and report population abundance indices, taking into account the key issues involved in the index calculation;

pm

work on chapter responsible for

Wednesday 10 June

am

ToR c) further coordinate offshore and coastal beam trawl surveys in the North Sea and Divisions VIIa, VIId-g and VIIIa-b for 2010 and 2011;

Review all aspects of surveys which could be more effectively coordinated:

- survey timing and gear
- staff exchange
- overlapping of survey days for gear inter-calibration to be discussed
- QA issues, List of fish species in offshore and inshore beam trawl surveys
- For 2011 offshore surveys: concrete exchange plan (including names and who goes where)

ToR e) Continue development of a manual to improve standardization of sampling protocols, surveys gears and quality control aspects;

- check the offshore manual for updates
- start creating a coastal beam trawl manual

Inshore surveys:

- Presentation Gary
- update database inshore surveys
- discussion on recalculating inshore indices

pm

Work on: (How) Can we get more out of WGBEAM? (create -scientific- output)

Thursday 11 June

am

ToR f) Continue work of developing and standardizing an international (fish and epifauna) database of offshore beam trawl survey data and coordinate such activities with those of the IBTSWG.

- for BEL and GER: use the DATRAS screening program to screen the DATRAS format offshore files

Other issues:

- collection of maturity photos and samples – discuss WKMSSPDF – Workshop on Maturity Staging of sole, plaice, dab and flounder and WKMSTB - Workshop on Maturity Staging of Turbot and Brill

pm

- Recommendations
- Analysis and text writing

Friday 12 June

am

New chair

Date and time of next meeting

ToRs for 2011 meeting

Recommendations

Text checking

1300 finish

Annex 3: WGBEAM terms of reference for the next meeting

The **Working Group on Beam Trawl Surveys** (WGBEAM), chaired by Brian Harley*, UK, will meet in Hamburg, Germany, 7–10 June 2011 to:

a) Prepare a progress report summarizing the results of the 2010 offshore and inshore beam trawl surveys;

b) Tabulate, report and evaluate population abundance indices by age-group for sole and plaice in the North Sea, Division VIIa and Divisions VIId-g, taking into account the key issues involved in the index calculation;

c) Further coordinate offshore and coastal beam trawl surveys in the North Sea and Divisions VIIa, VIId-g and VIIIa-b;

d) Continue development of a manual to improve standardization of sampling protocols, surveys gears and quality control aspects;

e) Continue work of developing and standardizing an international (fish and epifauna) database of offshore beam trawl survey data and coordinate such activities with those of the IBTSWG.

f) Look into the details of a (selection of) species caught in inshore or offshore beam trawl surveys. The selection of the species can be done based on the output tor a, b or based on an external request.

WGBEAM will report by 10 July 2011 (via SSGESST) for the attention of SCICOM, WGISUR and ACOM.

Supporting Information

Priority	The current activities of this Group will lead ICES into issues related to the ecosystem affects of fisheries, especially with regard to the application of the Precautionary Approach. Consequently, these activities are considered to have a very high priority.
Scientific justification	**Term of Reference a)** Several countries are conducting or have recently completed significant studies in this area and the subject would benefit from a review of progress and an evaluation of the results obtained. The last review of significant studies occurred in 1996 by the ICES Study Group on Unaccounted Mortalities. A review of more recent work will determine the need for revision and update on planning and methodology for studying this subject. **Term of Reference b)** All fishing activities have influences that extend beyond removing target species. The approach recommended by FAO is that responsible fisheries technology should achieve management objectives with a minimum of side effects and that they should be subject to ongoing review. WGFTFB members and others are currently undertaking a range of research programmes to provide the means to minimize side effects.
Resource requirements	The research programmes which provide the main input to this group are already underway, and resources are already committed. The additional resource required to undertake additional activities in the framework of this group is negligible.
Participants	The Group is normally attended by some 20–25 members and guests.
Secretariat facilities	None.
Financial	No financial implications.

Linkages to advisory committees	There are no obvious direct linkages with the advisory committees.
Linkages to other committees or groups	There is a very close working relationship with all the groups of the Fisheries Technology Committee. It is also very relevant to the Working Group on Ecosystem Effects of Fisheries.
Linkages to other organizations	The work of this group is closely aligned with similar work in FAO and in the Census of Marine Life Programme.

Annex 4: Recommendations

RECOMMENDATION	FOR FOLLOW UP BY:
1. WGBEAM recommends that once the offshore surveys are uploaded to the DATRAS database ICES data centre should be asked to provide precision estimates for inclusion in the next appropriate WGBEAM report.	WGBEAM members, ICES Data Centre
2. WGBEAM recommends that if time and weather allows, overlapping stations between the surveys of two countries should be considered.	Responsible chief scientists
3. WGBEAM recommends that Denmark makes effort to extend the inshore survey to the Danish coast, in order to obtain a more complete coverage of the continental coast.	Denmark
4. WGBEAM recommends further examination of the spatial distribution patterns in relation to water depth and distance to the coast	WGBEAM related institutes
5. It is recommended that WGBEAM evaluates the functioning of DUAP at WGBEAM 2011.	WGBEAM 2011
6.It is the recommendation of the working group that the Belgian offshore beam trawl survey data are uploaded to DATRAS so that a time-series for the sole index can be created, along the lines of the UK index.	ILVO
7. It is recommended that Belgium re-evaluates its biological sampling protocol to increase spatial resolution from an area based ALK to a rectangle based sampling design for the biological data, at least for plaice and sole.	ILVO
8. WGBEAM recommends that a report is made from all staff exchanges by the members of staff doing the exchange. The reports will be published in the WGBEAM report.	Personnel involved in staff exchange
9. WGBEAM recommends that the automatic uploading facility as is operational for IBTS since 2010 will be applied in due time for the beam trawl surveys. WGBEAM recommends that the French survey area will be incorporated in the range of the allowable values for latitude and longitude.	ICES Data Centre
10. WGBEAM recommends the upload to DATRAS of all inshore beam trawl survey data as coordinated by WGBEAM. This will create the possibility to work with an agreed international dataset and will allow direct output for the assessments. A one-day meeting will organized, attended by at least one representative of the ICES Data Centre and representatives of Belgium, Germany, Netherlands and UK with expertise on the data of the inshore surveys (one representative per country). The meeting will be scheduled the day before WGBEAM 2011. (see also Section 7.2.3)	WGBEAM members in cooperation with ICES Data Centre
11. WGBEAM recommends that the full time-series of the international inshore indices will be calculated, taking into account Section 6.3.2 of this report	WGBEAM members (IMARES to lead)
12. It would be very desirable to have a universal ICES system that clearly labelled any type of electronic document coming from the EG's.	ICES Secretariat/PUBCOM

Annex 5: Details on offshore and inshore beam trawl surveys

Annex 5.1. Details of the beam trawl surveys currently undertaken by each country.

	BELGIUM	FRANCE	GERMANY	NETHERLANDS	NETHERLANDS	UK	UK	UK
Survey area:	IVb and c west	VIIIab	IVb east	IVb and c east	Central N Sea	VIId	VIIe	VIIa, f and g
Year survey started:	1992	2007	1991	1985	1996	1988	1988	1988
Dates:	August	November	mid August	August-early September	mid August-mid September	late July	late September/ early October	September
Usual start date	week 33	week 48	week 32	week 32/33	week 34	week 30	week 39/40	Week 36/37
Number of survey days	10		11	20	16–20	15	8	21–24
Ship:	RV Belgica	Gwen Drez	RV Solea	RV Isis	RV Tridens	RV Corystes/ RV Cefas Endeavour	MFV Carhelmar	RV Corystes
Ship length:	50 m		42 m#	28 m	73.5	53 m	22 m	53 m
Beam trawl length:	4 m	4 m	7 m	8 m	8 m	4 m	4 m	4 m
Number of beams fished:	1	1	2	2	2	1	2	1
Number of beams sorted:	1	1	1	1	1	1	2	1
Trawl duration (min):	30		30	30	30	30	30	30
Tow speed (knots):	4		4	4	4	4	4	4
Cod end stretched mesh (mm):	40		80 Liner: 44 mm	40	40	75 Liner: 40 mm	75 Liner: 40 mm	75 Liner: 40 mm
Number of ticklers:	0		5	8	8	0	0	0
Gear code:	BT4M		BT7	BT8	BT8F	BT4FM	BT4FM	BT4FM
Attachment:	*		(none)	(none)	**	*	*	*
Station positions:	fixed		pseudo-random	pseudo-random	pseudo-random	Fixed	fixed	Fixed
Av No stns/yr	53		63	88	63–73	100	57	94
Benthos sampling since:	1992		1992	1985	1996	1991	1992	1992

 # New vessel since 2004; previously 35m

*** chain mat and flip-up rope**

**** flip-up rope only**

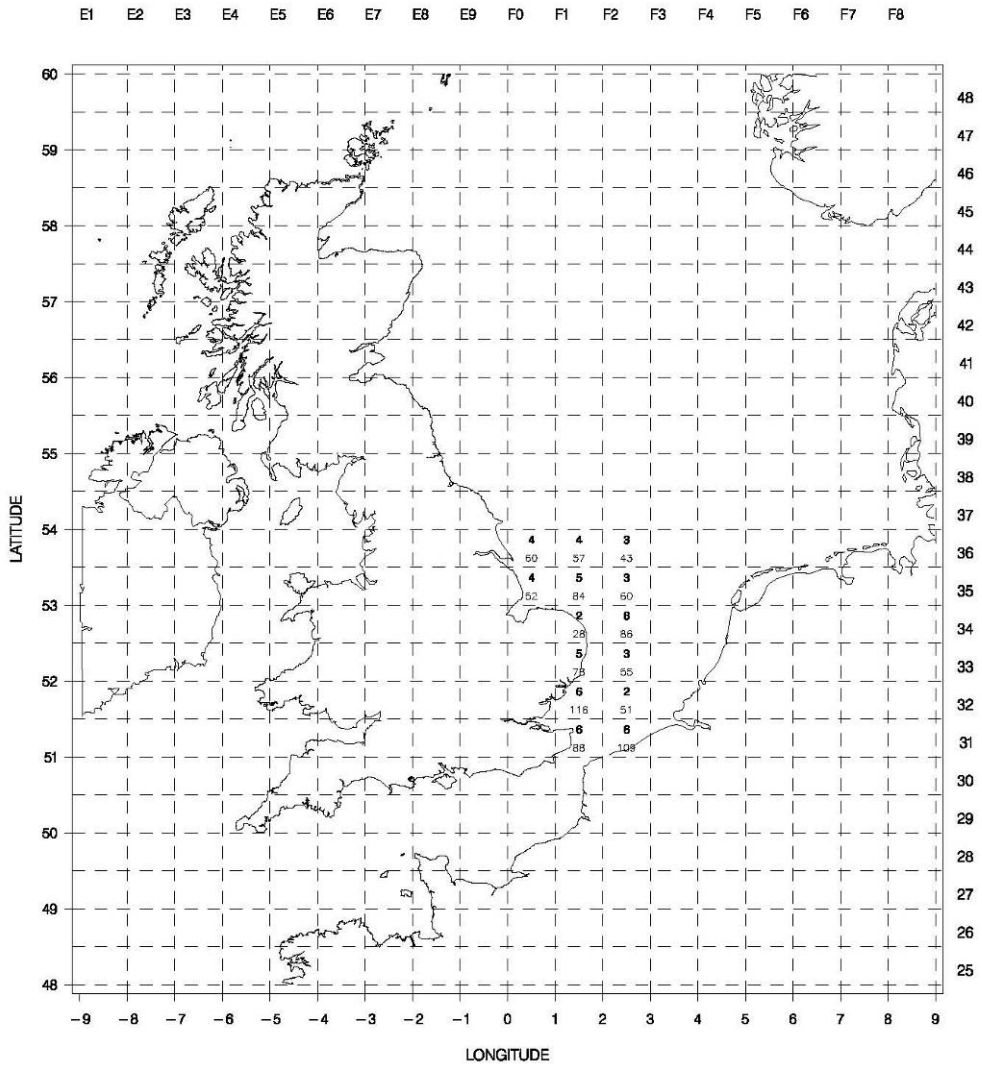
Annex 5.2. Inventory of the inshore beam trawl surveys.

Country	Netherlands (SNS)		Netherlands (DFS)		UK (YFS)	Belgium (DYFS)	Germany (DYFS)	
Geographical Area	Scheveningen (NL) to Esbjerg (DK)	Wadden Sea	Scheldt Estuary	Dutch coast to Danish coast	Eastern/South-Eastern English-Coast	Belgian Coast	NiedersachsenWadden Sea +Elbe Estuary	Schlesweig-Holstein Wadden Sea
Ship	Tridens / Isis	Stern / Waddenzee	Schollevaar	Isis / Beukels / WR17 / GO29	Chartered vessels	Hinders / Brood-winner	Chartered vessels	Chartered vessels
ship size (m)	73m / 28m	21m / 21m	21m	± 28m	8–10m	27m	12–16m	12–18m
Date started	1969	1970	1970	1970	1973–2007	1970	1972	1974
Sampling Period	Apr/May ('69–'89) Sept/Oct	Apr/May ('70–'86) Sept/Oct	Apr/May ('70–'86) Sept/Oct	Apr/May ('70–'86) Sept/Oct	Sept/Oct	Sept/Oct	Apr/May ('74–'04) Sept/Oct	Apr/May ('74–'04) Sept/Oct
Usual Start date	12 Sept	29 Aug	5 Sept	26 Sept	1 Sept	1–14 Sept	15 Sept	5 Sept
Number of days per period	8–9 within 2 weeks	20 within 5 weeks	12 within 3 weeks	16 within 5 weeks	3 surveys x 8 days	7 within 2 weeks	5	5 – 7
Beam trawl type	6m beam trawl	3m shrimp trawl	3m shrimp trawl	6m shrimp trawl	2m shrimp trawl	6m shrimp trawl	3m shrimp trawl	3m shrimp trawl
Tickler Chains	4	1	1	1	3	0	0	0
Mesh size net	80mm	35mm	35mm	35mm	10mm	40mm	32mm	32mm
Mesh size codend	40mm	20mm	20mm	20mm	4mm	22mm	18mm	18mm
Speed fished	3.5–4 knots	3 knots	3 knots	3 knots	1 knot	3 knots	3 knots	3 knots
Time Fished	15 min	15 min	15 min	15 min	10 min	15 min	15 min	15 min
Approx. number of stations per year	55	120	80	100	82	33		
Target species	0– 4 group sole and plaice	0–1 group sole and plaice	0–1 group sole and plaice	0–1 group sole and plaice	0–1 group sole and plaice	0–2 group sole and plaice	0–1 group sole and plaice	0–1 group sole and plaice
Catch rate and LF distribution	All fish species	All fish species *Crangon*	All fish species *Crangon*	All fish species *Crangon*	All fish species	Commercial fish species *Crangon* (1973–92, 2004–05)	All fish species *Crangon*	All fish species *Crangon*
Catch rate	Epibenthos (quantity)	Epibenthos (quantity)	Epibenthos (quantity)	Epibenthos (quantity)	*Crangon* (volume)	*Crangon* (weight)	Epibenthos (quantity)	Epibenthos (quantity)
Age data for plaice and sole	All years	All years	All years	All years	Since 2003	None	None	None

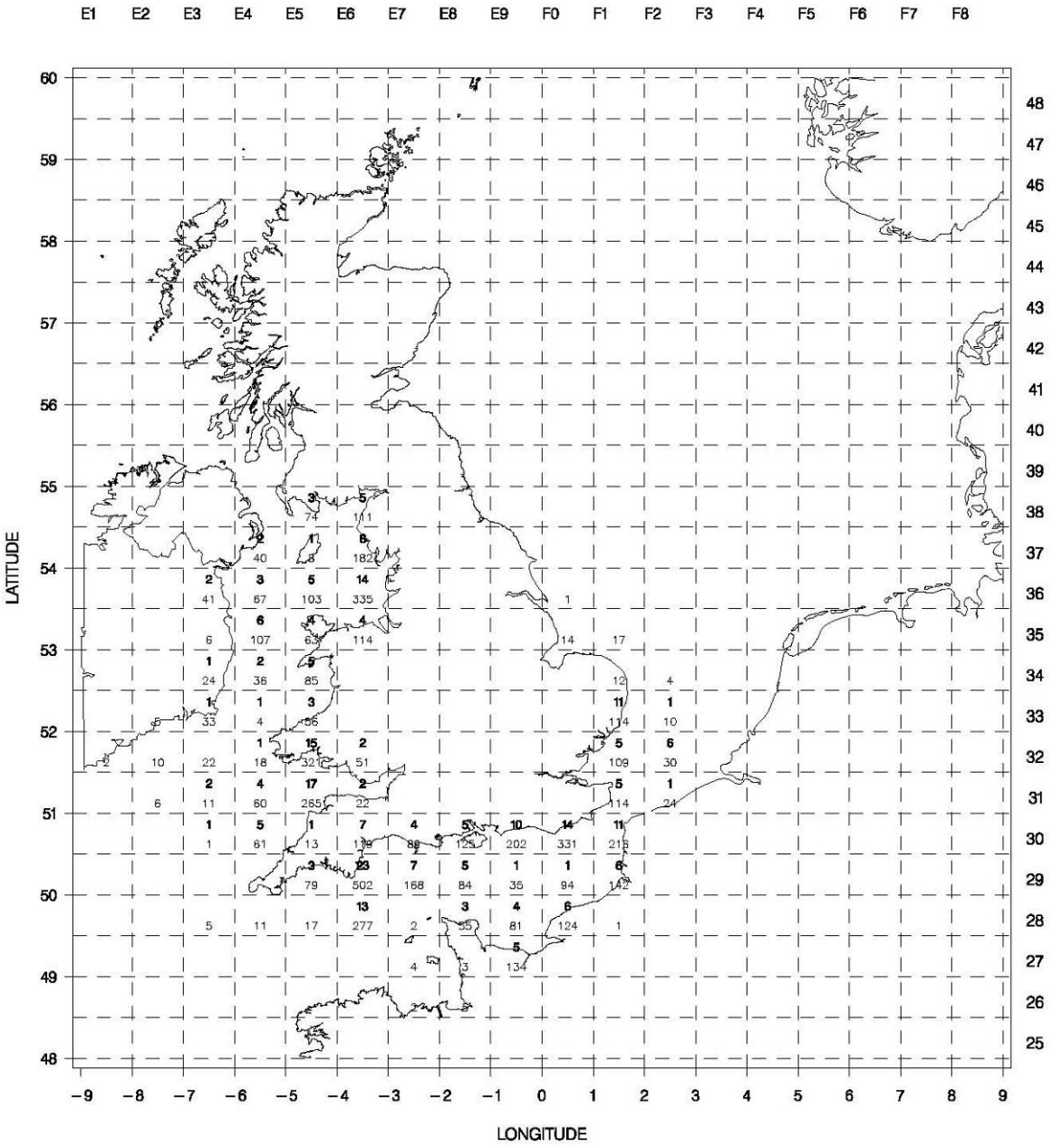
Annex 6: Spatial distribution of sampling and fish species for the offshore surveys

Annex 6.1 Spatial sampling coverage per country

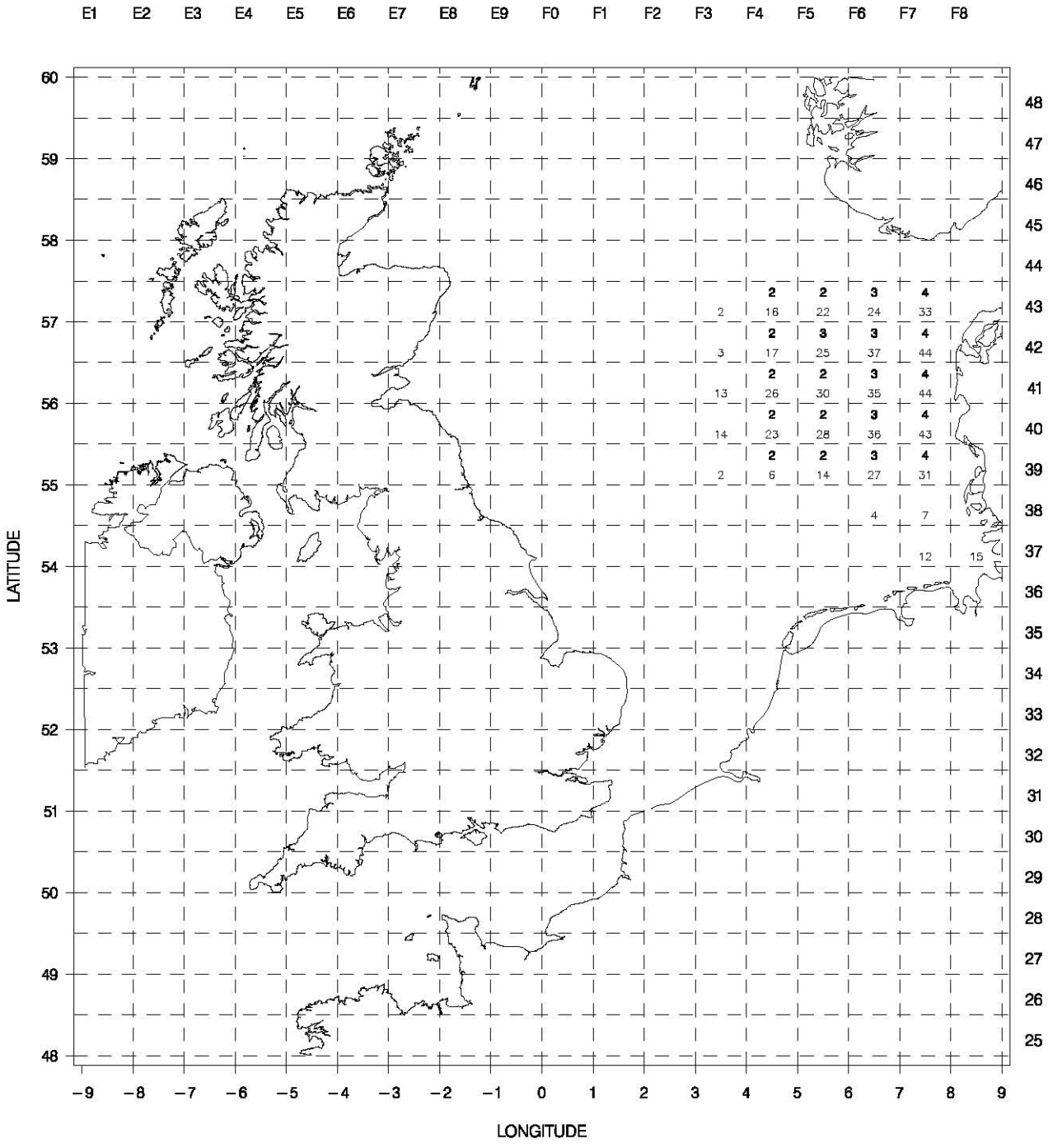
Annex 6.1.1 Total number of offshore beam trawl hauls per rectangle.
Total hauls in 2008 (above) and total for 1992–2009 (below) for Belgium .



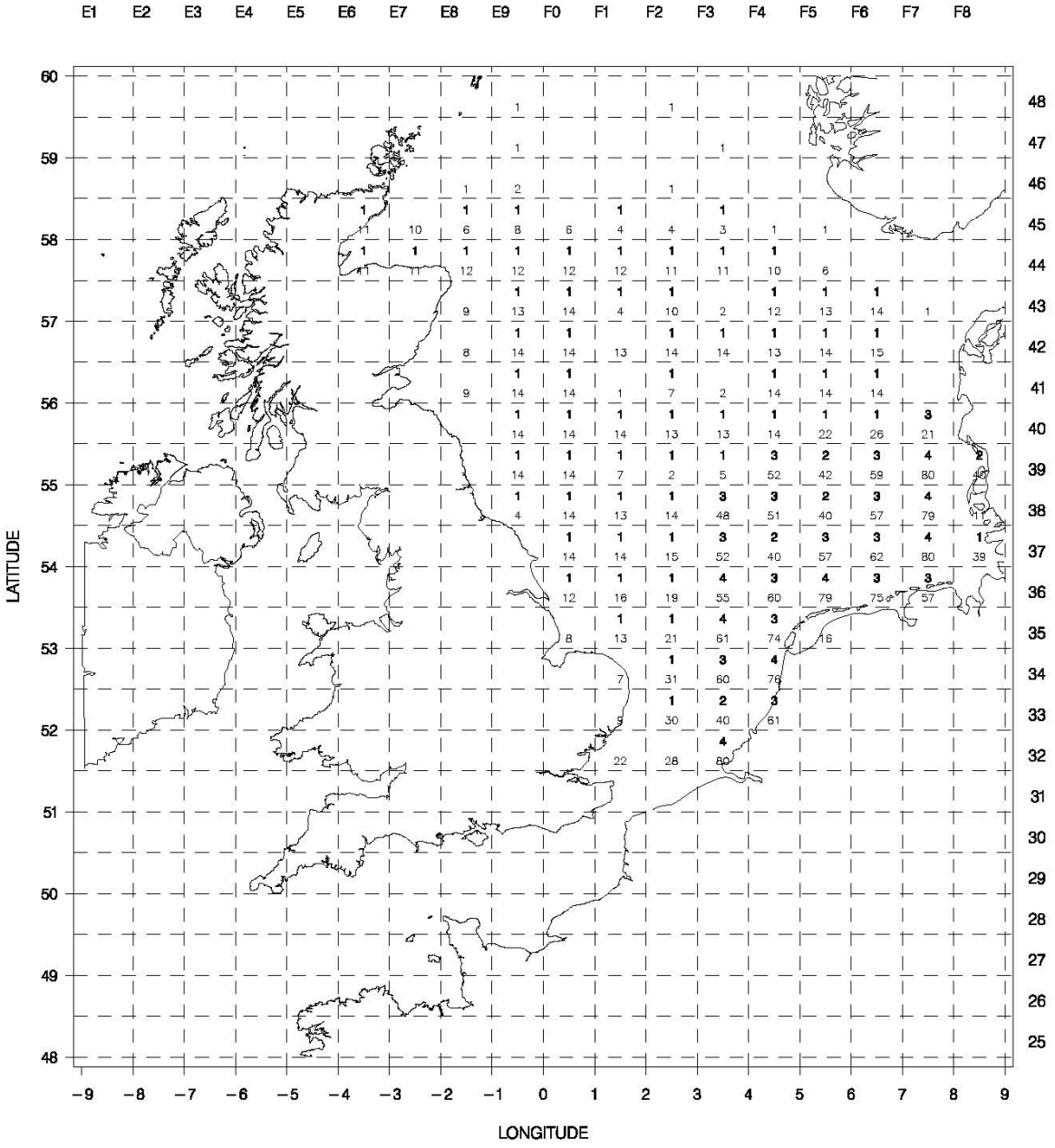
Annex 6.1.2 Total number of offshore beam trawl hauls per rectangle.
Total hauls in 2008 (above) and total for 1990 – 2009 (below) for England .



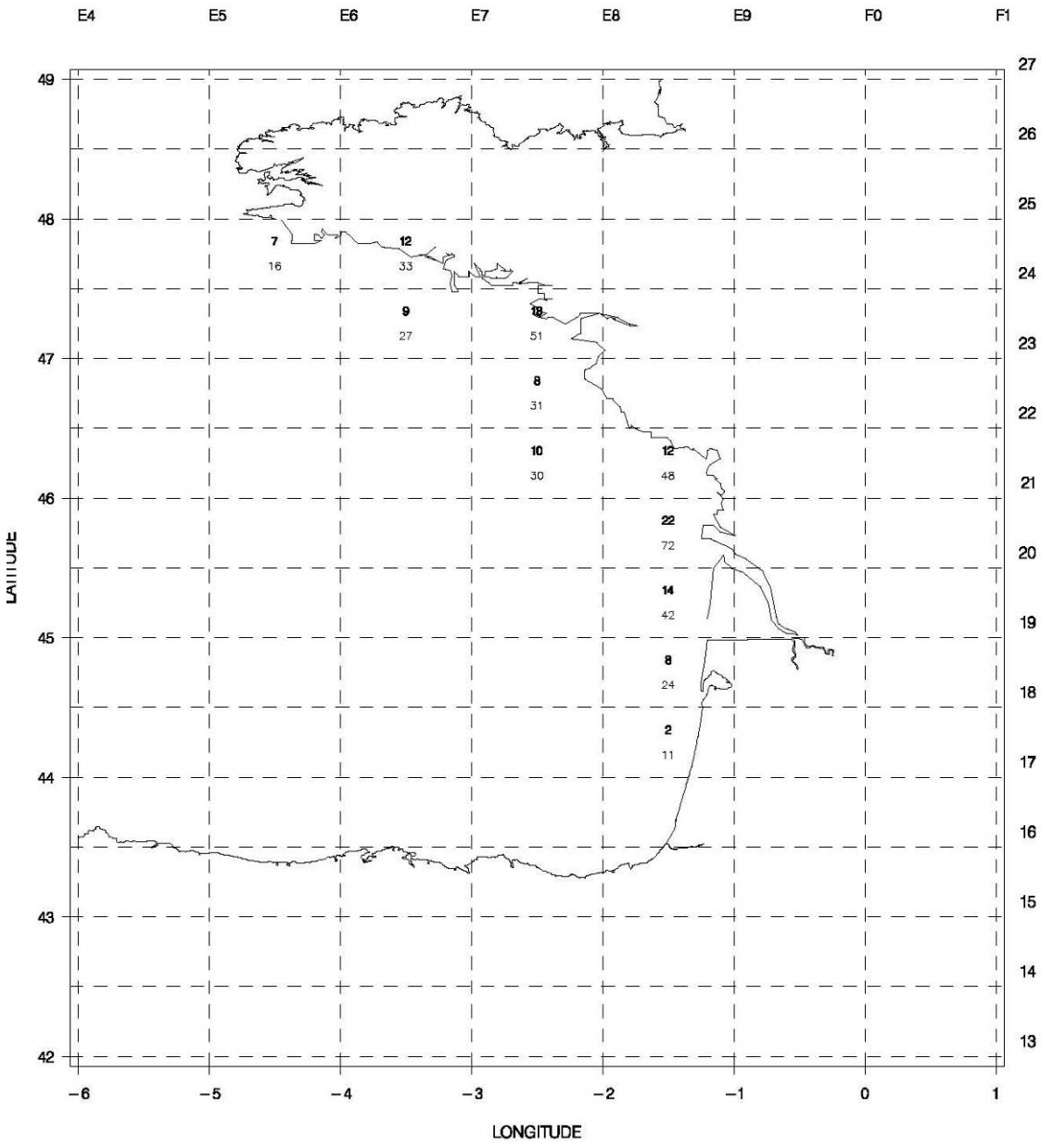
Annex 6.1.3 Total number of offshore beam trawl hauls per rectangle.
Total hauls in 2008 (above) and total for 1997–2009 (below) for Germany .



Annex 6.1.4 Total number of offshore beam trawl hauls per rectangle.
Total hauls in 2008 (above) and total for 1990 – 2009 (below) for Netherlands .



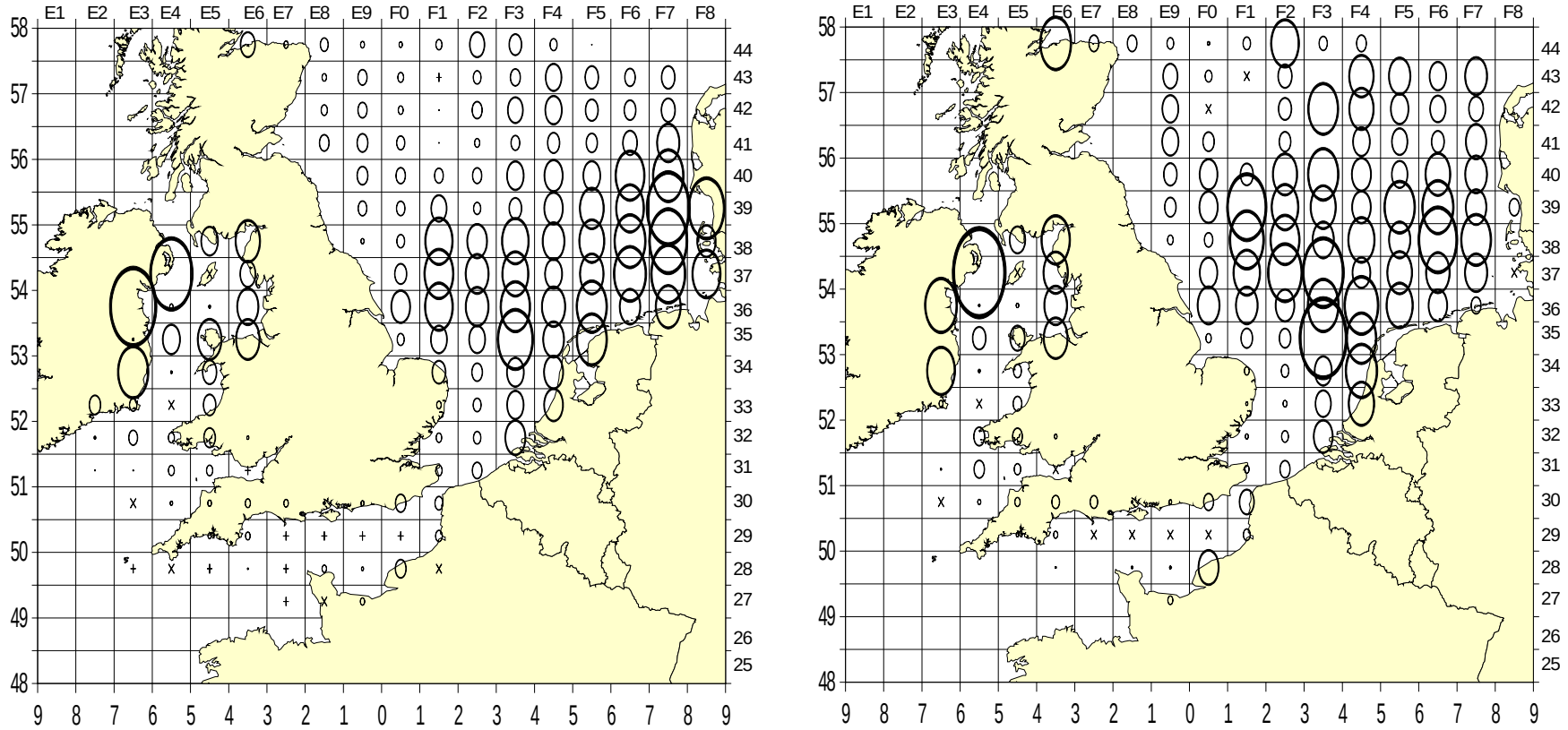
Annex 6.1.5 Total number of offshore beam trawl hauls per rectangle.
Total hauls in 2008 (above) and total for 2007–2008 (below) for France .



Annex 6.2 Spatial distribution per species

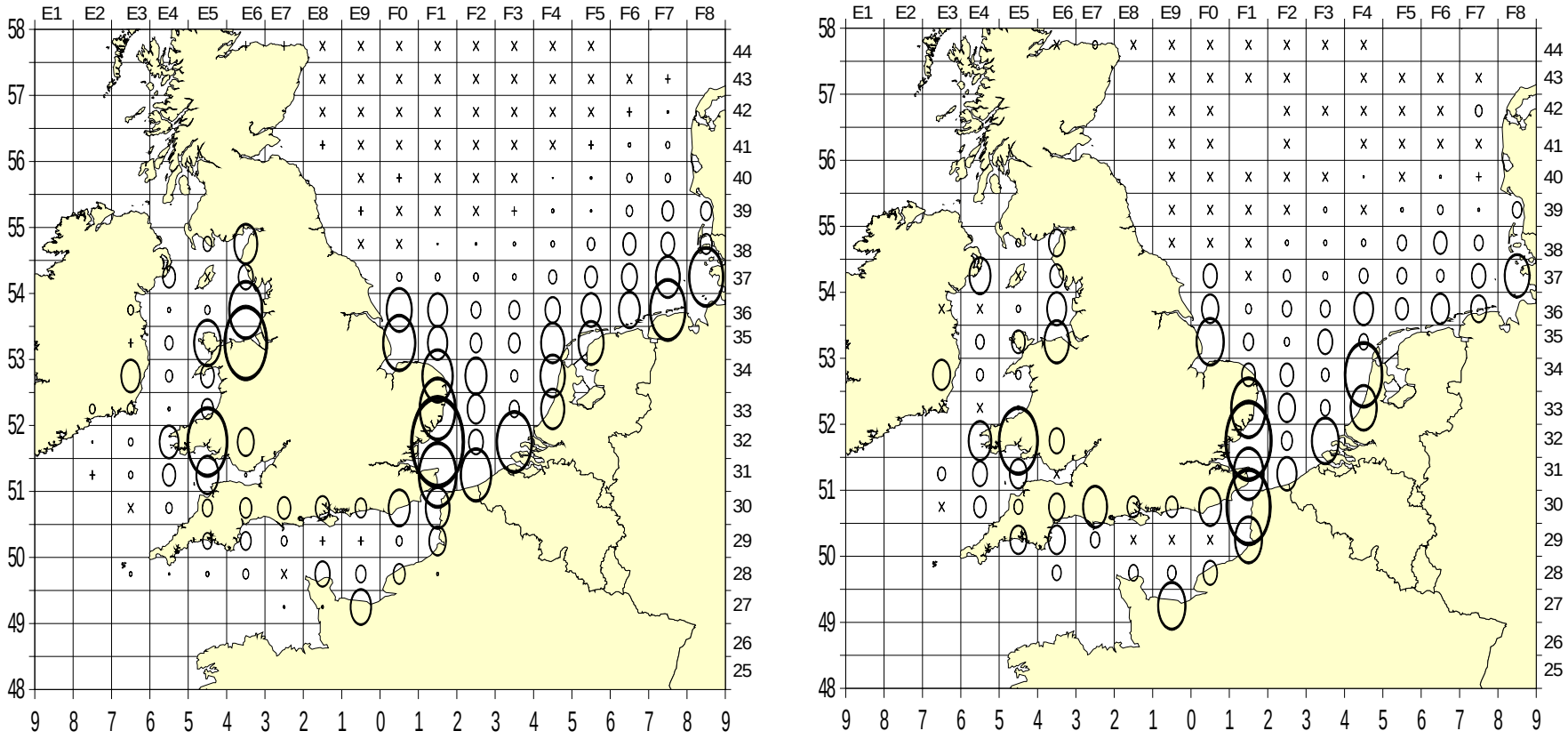
Annex 6.2.1 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

Dab



Annex 6.2.2 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

Sole



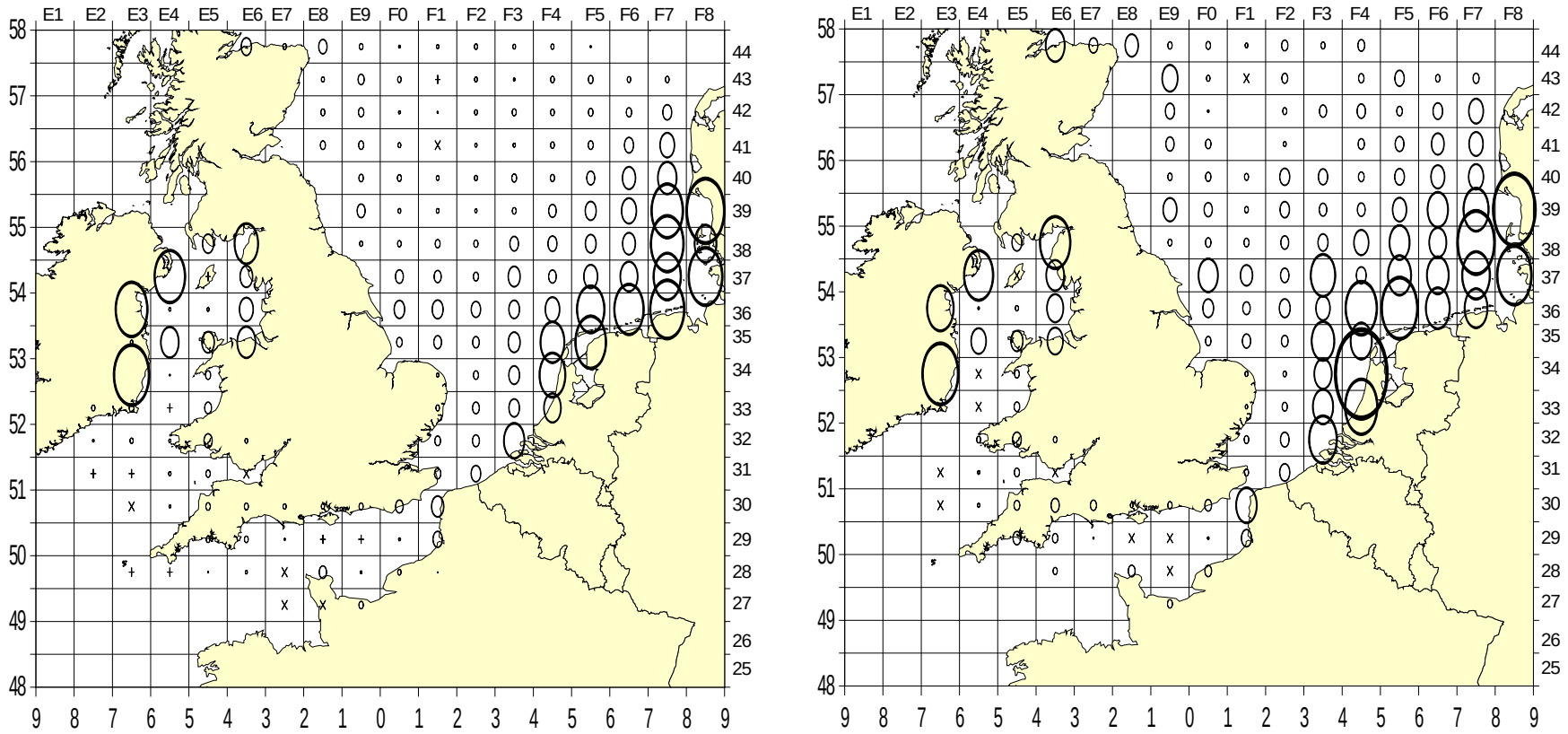
\+ <1 per hr/8m beam

400 per hr/8m beam

X Zero catch

Annex 6.2.3 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

Plaice



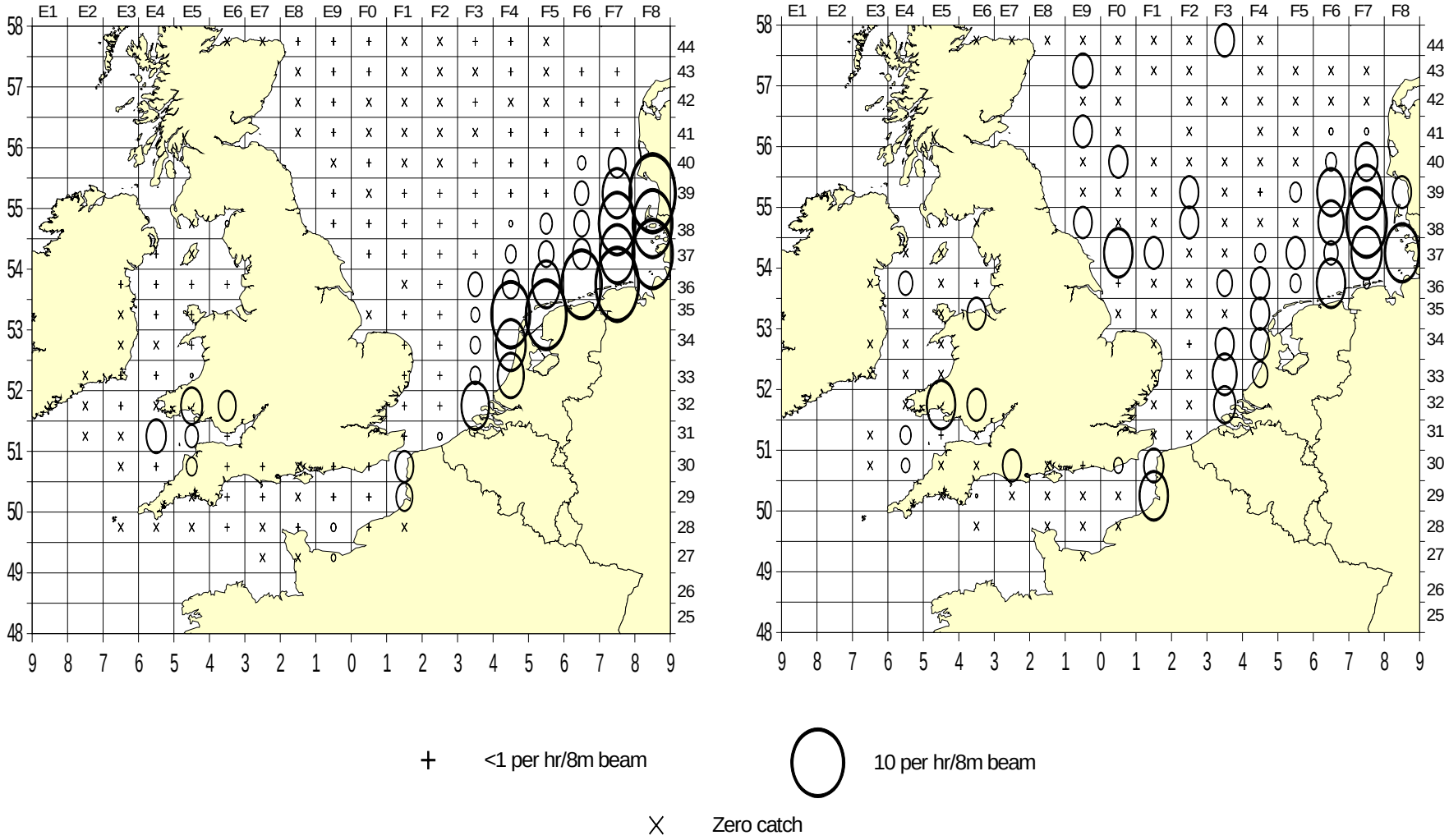
\+ <1 per hr/8m beam

4000 per hr/8m beam

X Zero catch

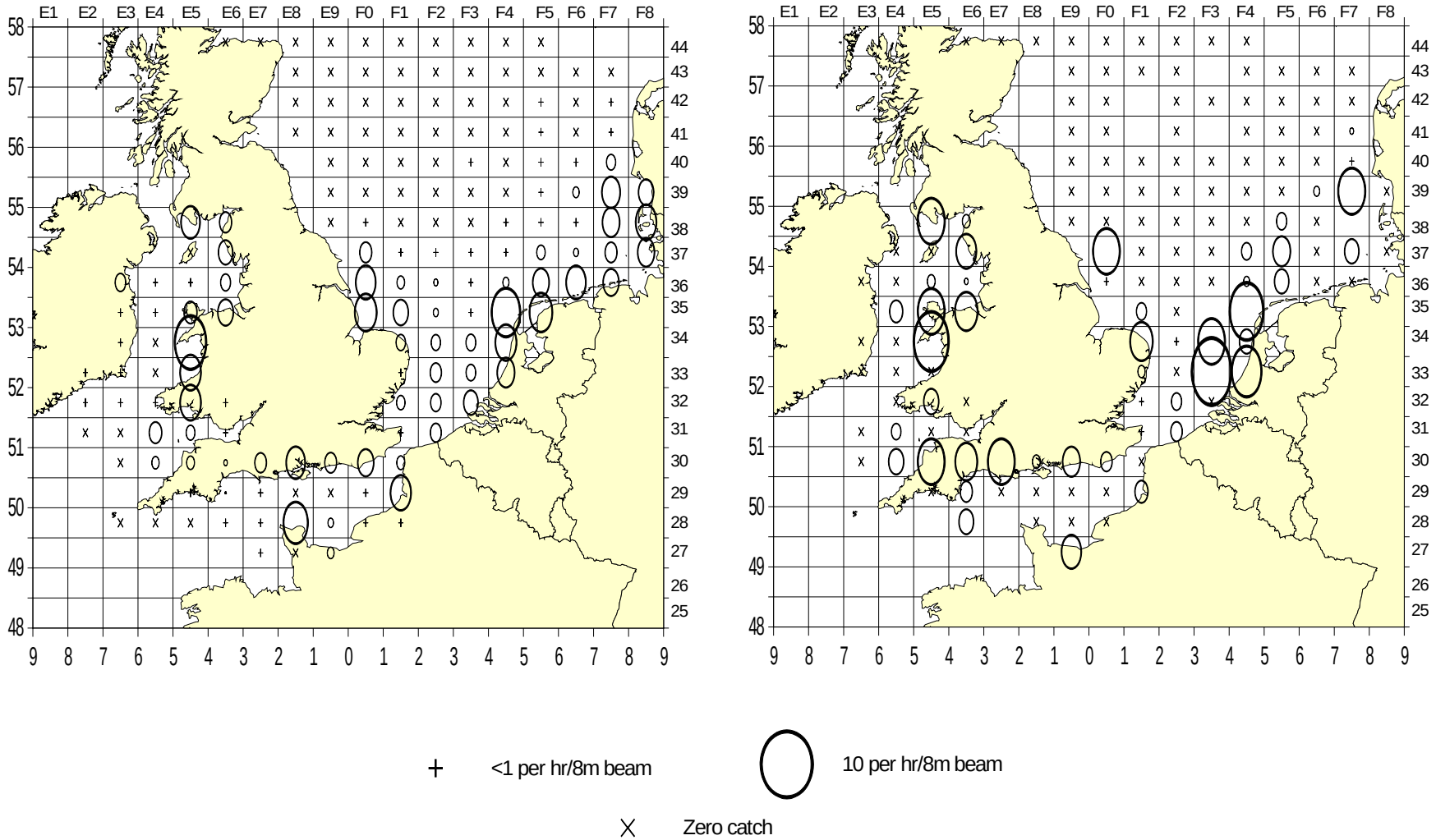
Annex 6.2.4 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

Turbot



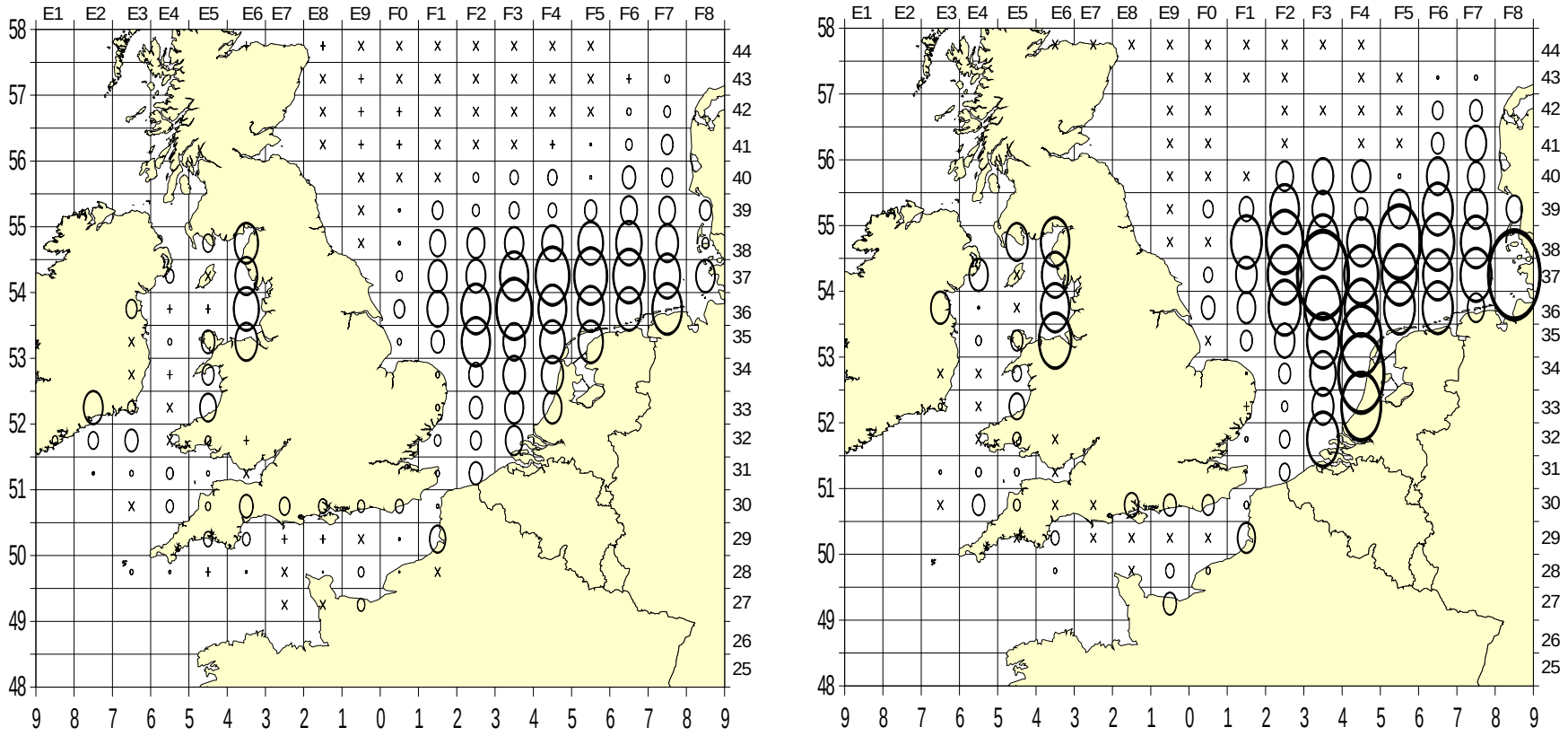
Annex 6.2.5 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

Brill



Annex 6.2.6 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

Scaldfish



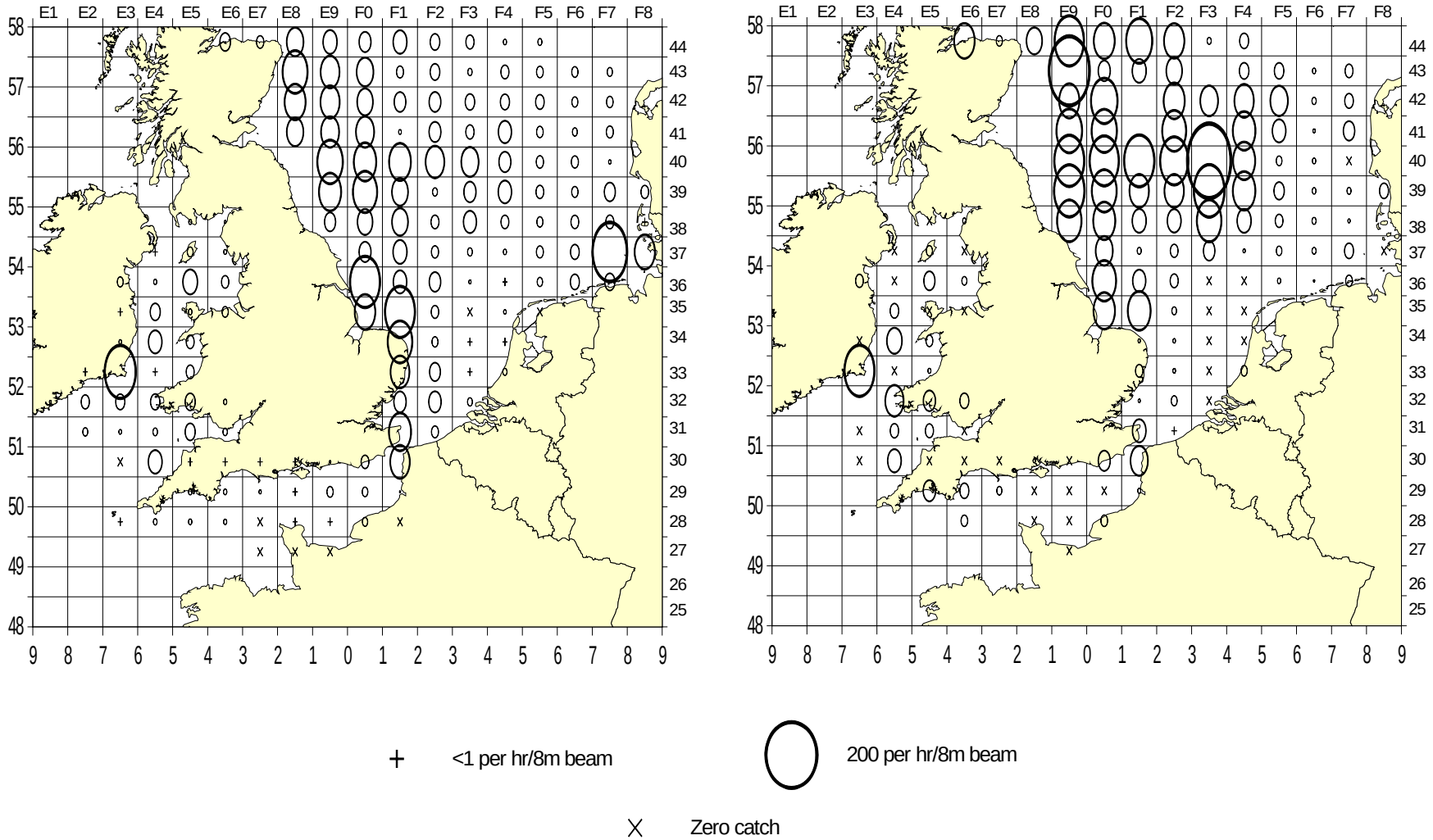
\+ <1 per hr/8m beam

650 per hr/8m beam

X Zero catch

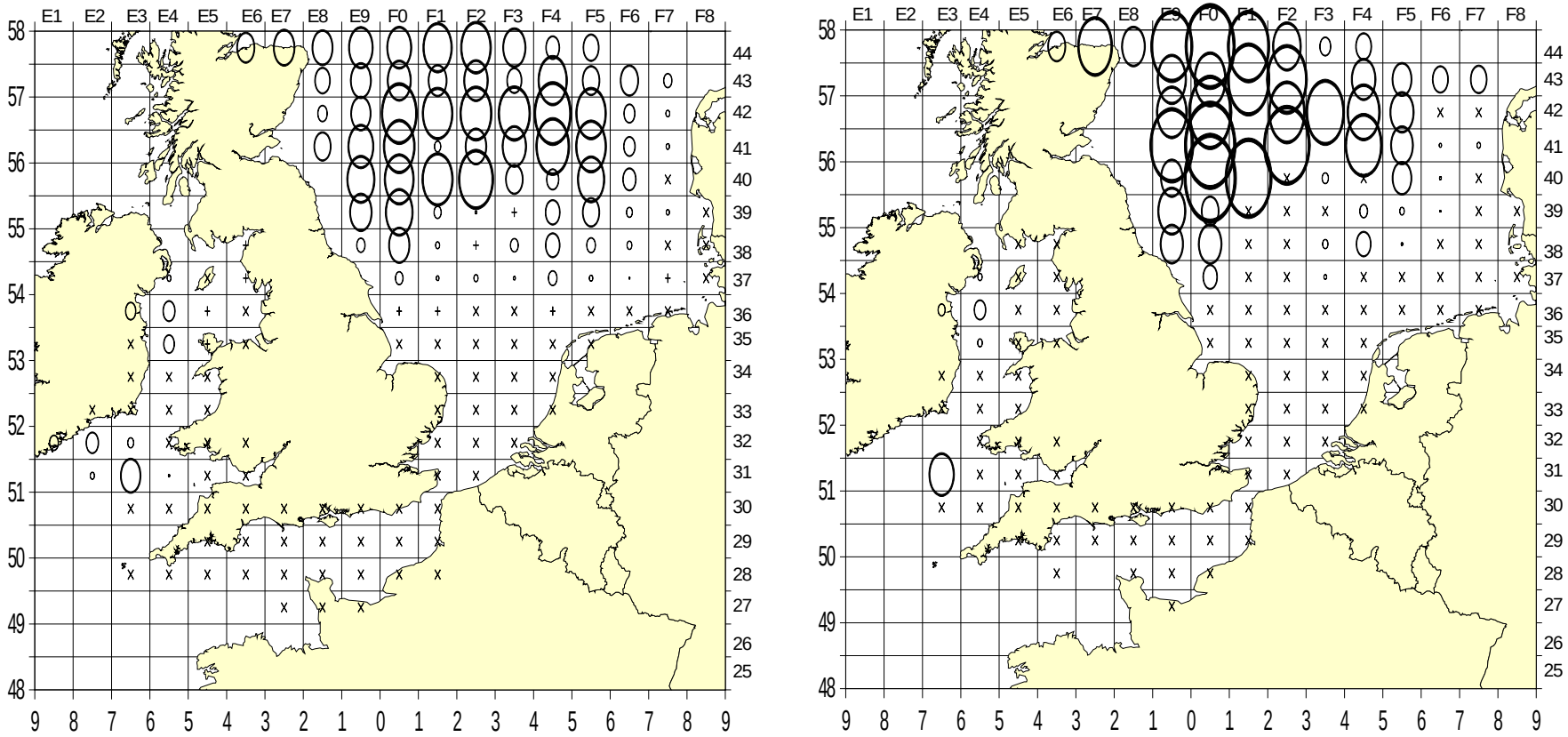
Annex 6.2.7 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

Lemon sole



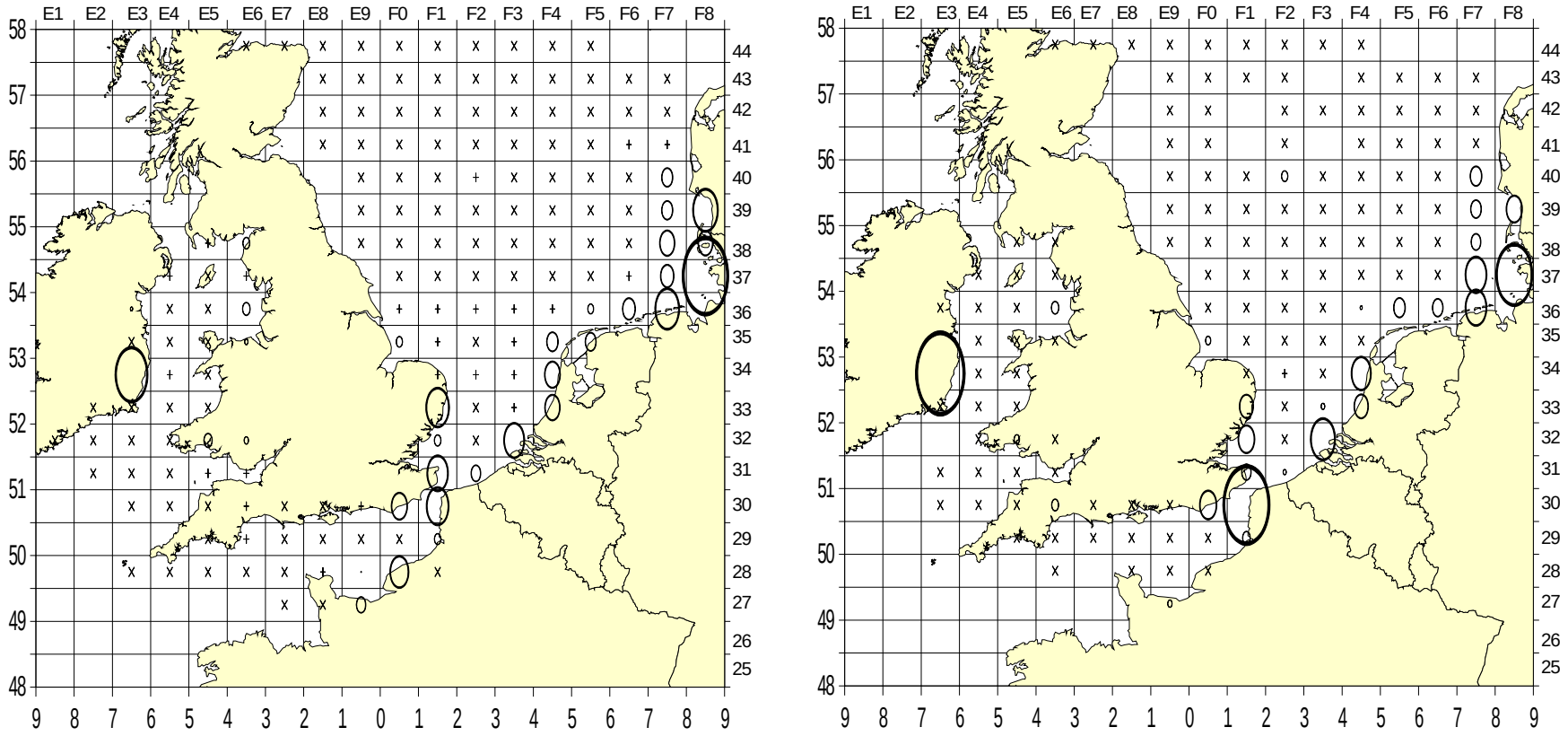
Annex 6.2.8 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

American plaice (long rough dab)



Annex 6.2.9 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

Flounder



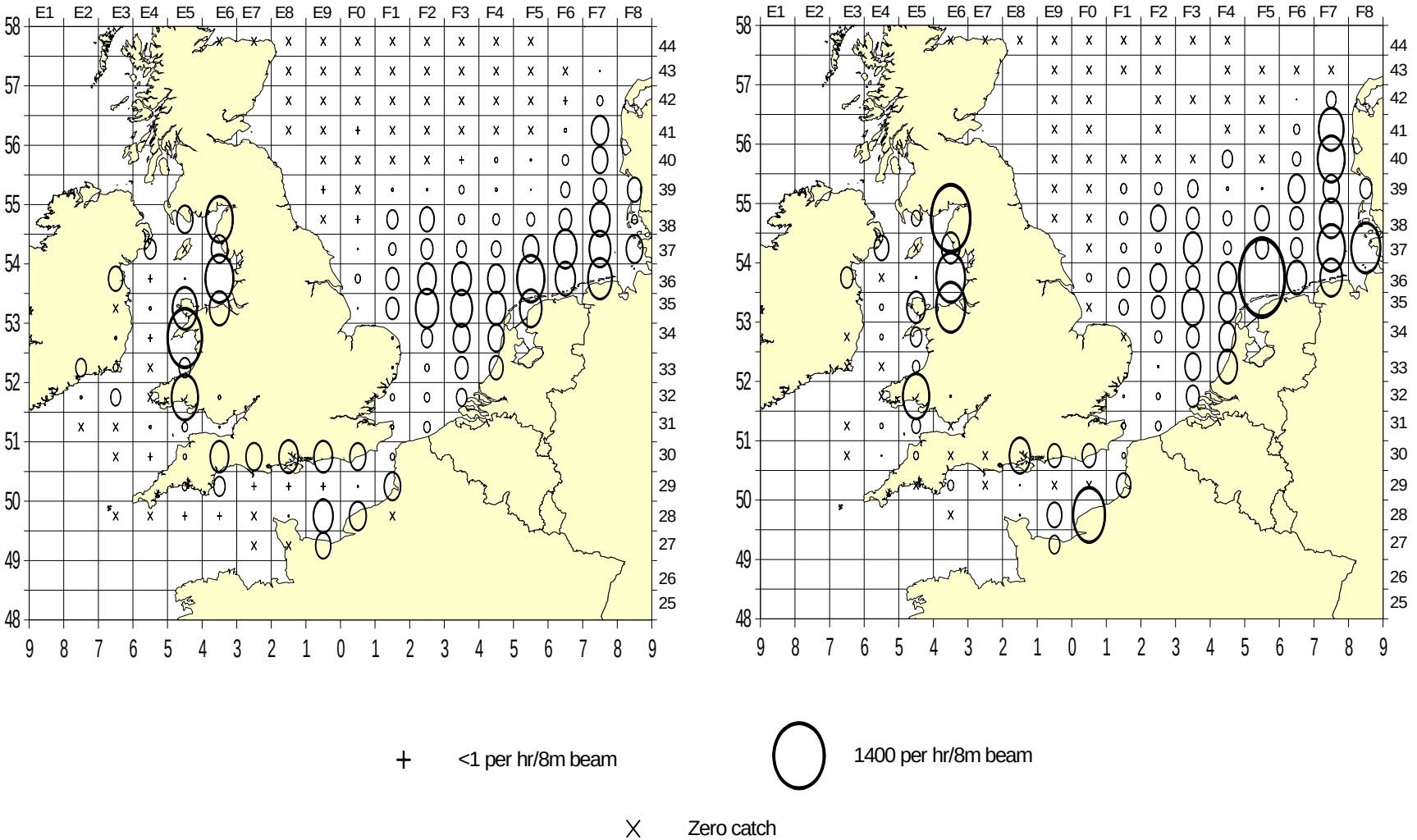
\+ <1 per hr/8m beam

100 per hr/8m beam

X Zero catch

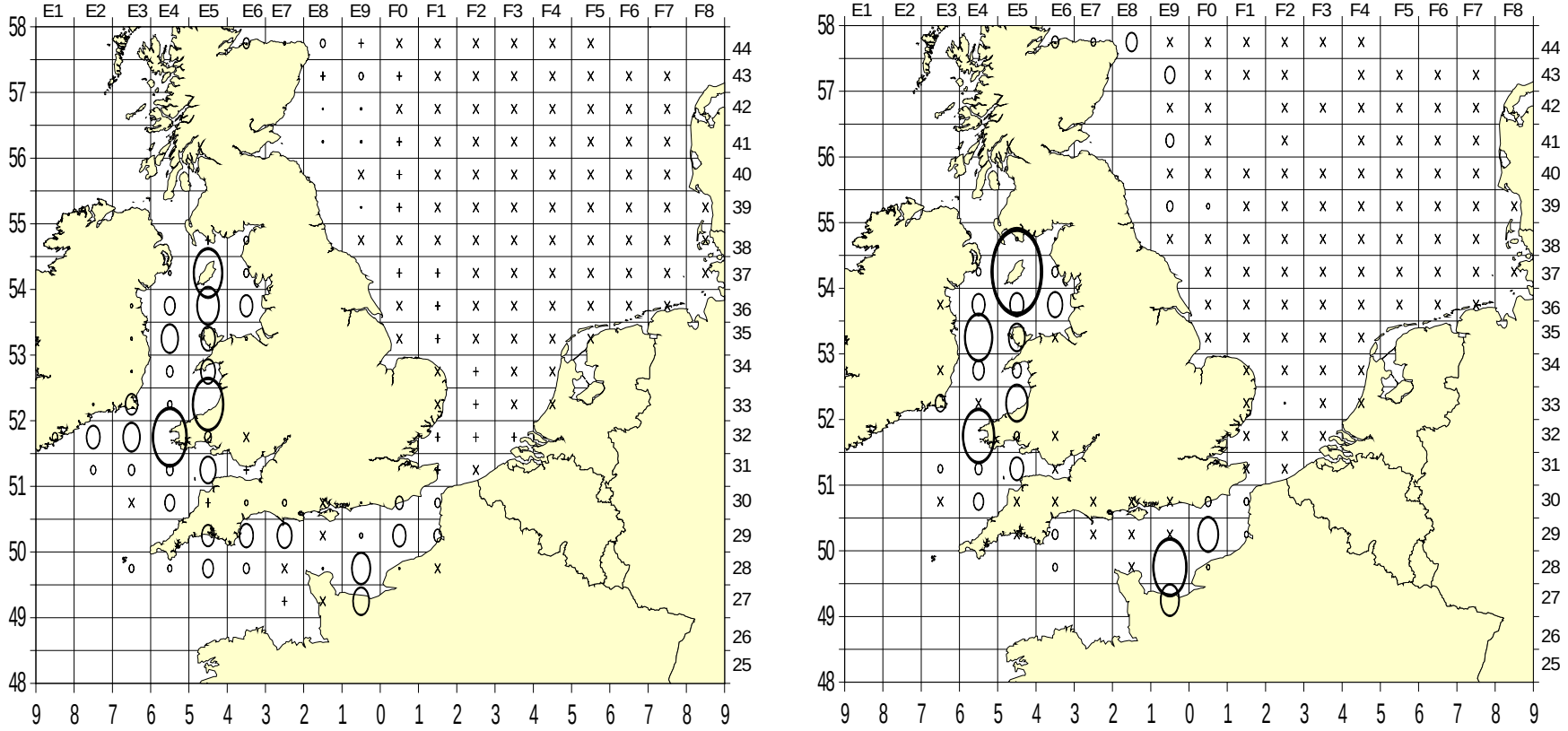
Annex 6.2.10 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

Solenette



Annex 6.2.11 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

Thickback sole



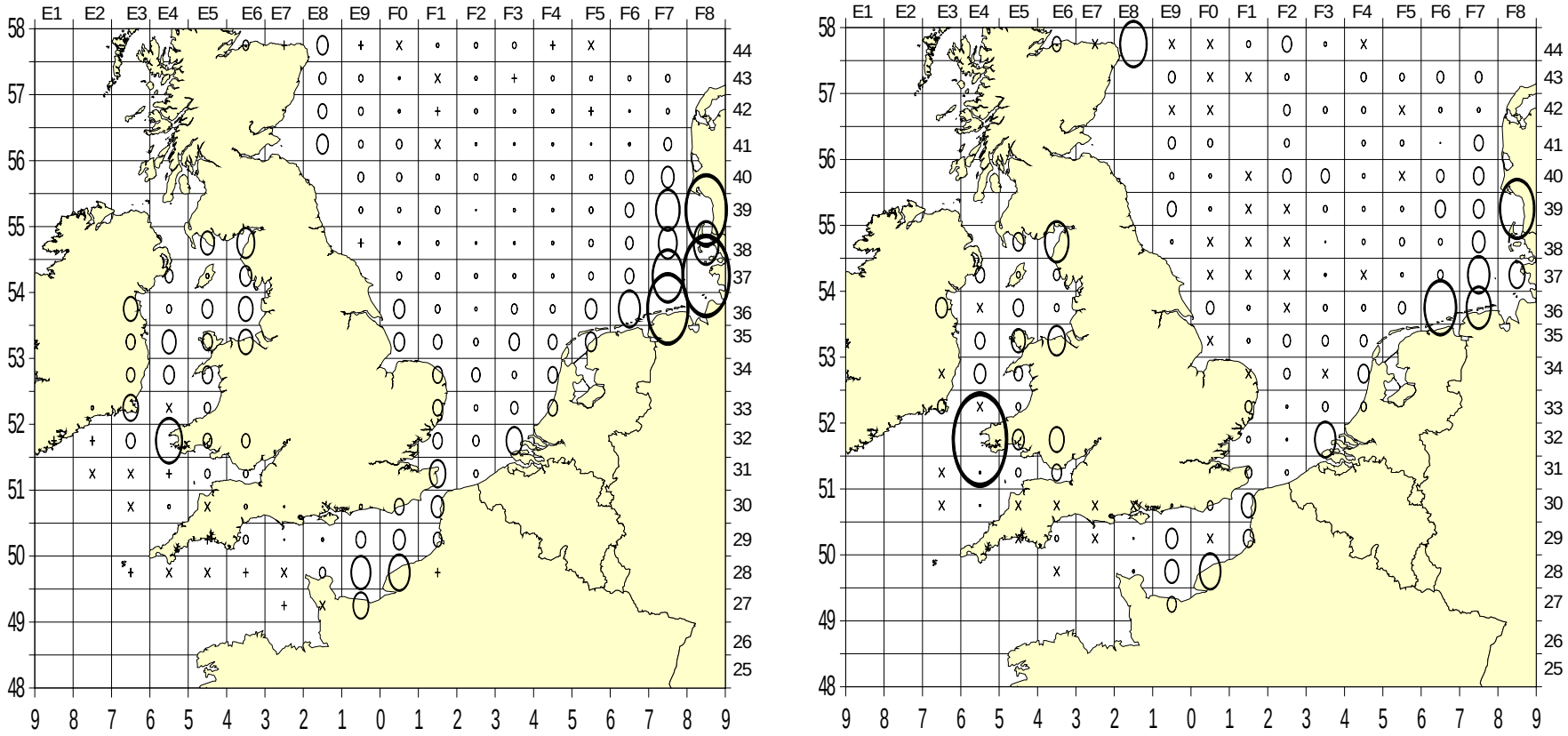
\+ <1 per hr/8m beam

400 per hr/8m beam

X Zero catch

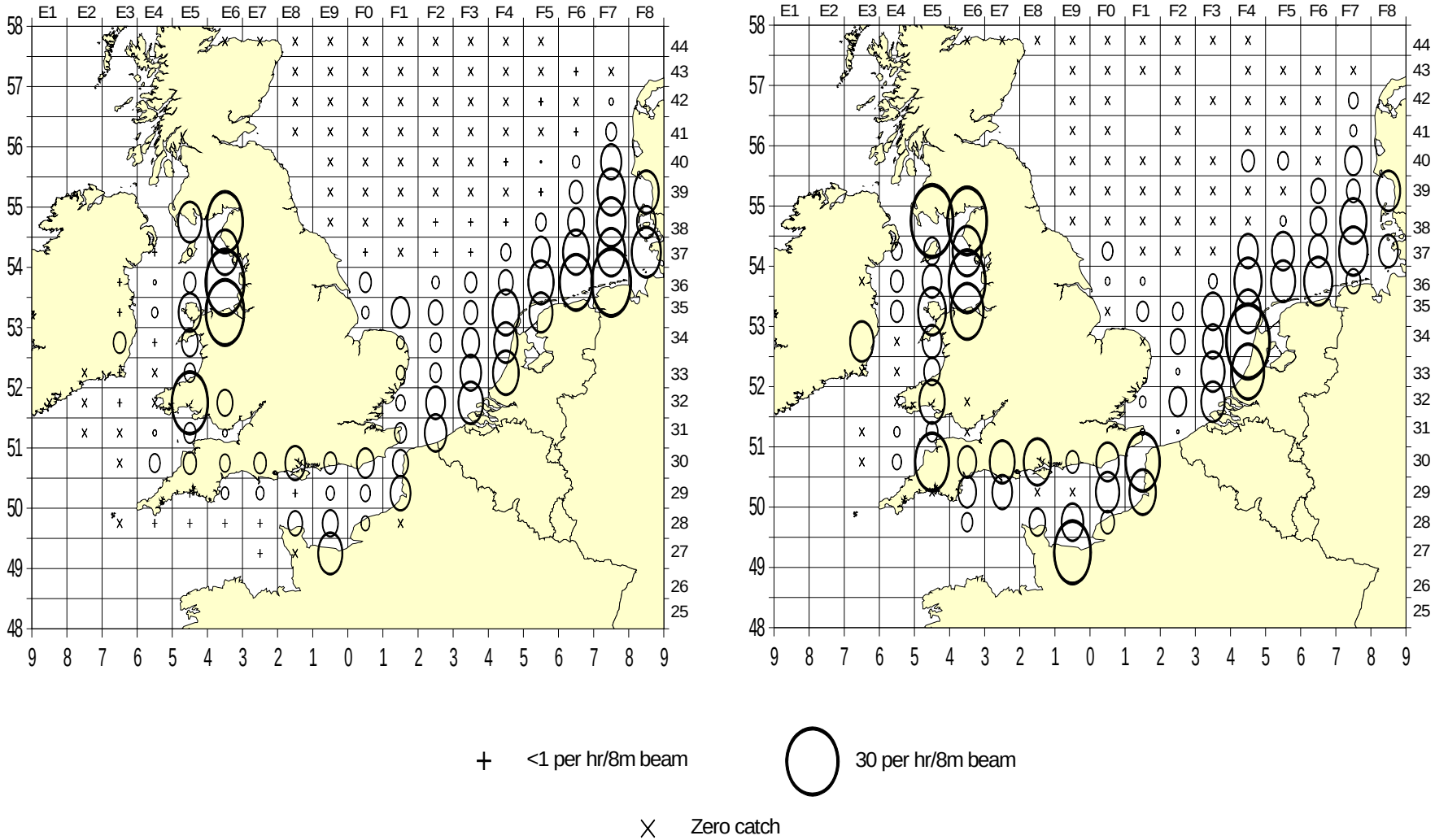
Annex 6.2.12 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

Pogge



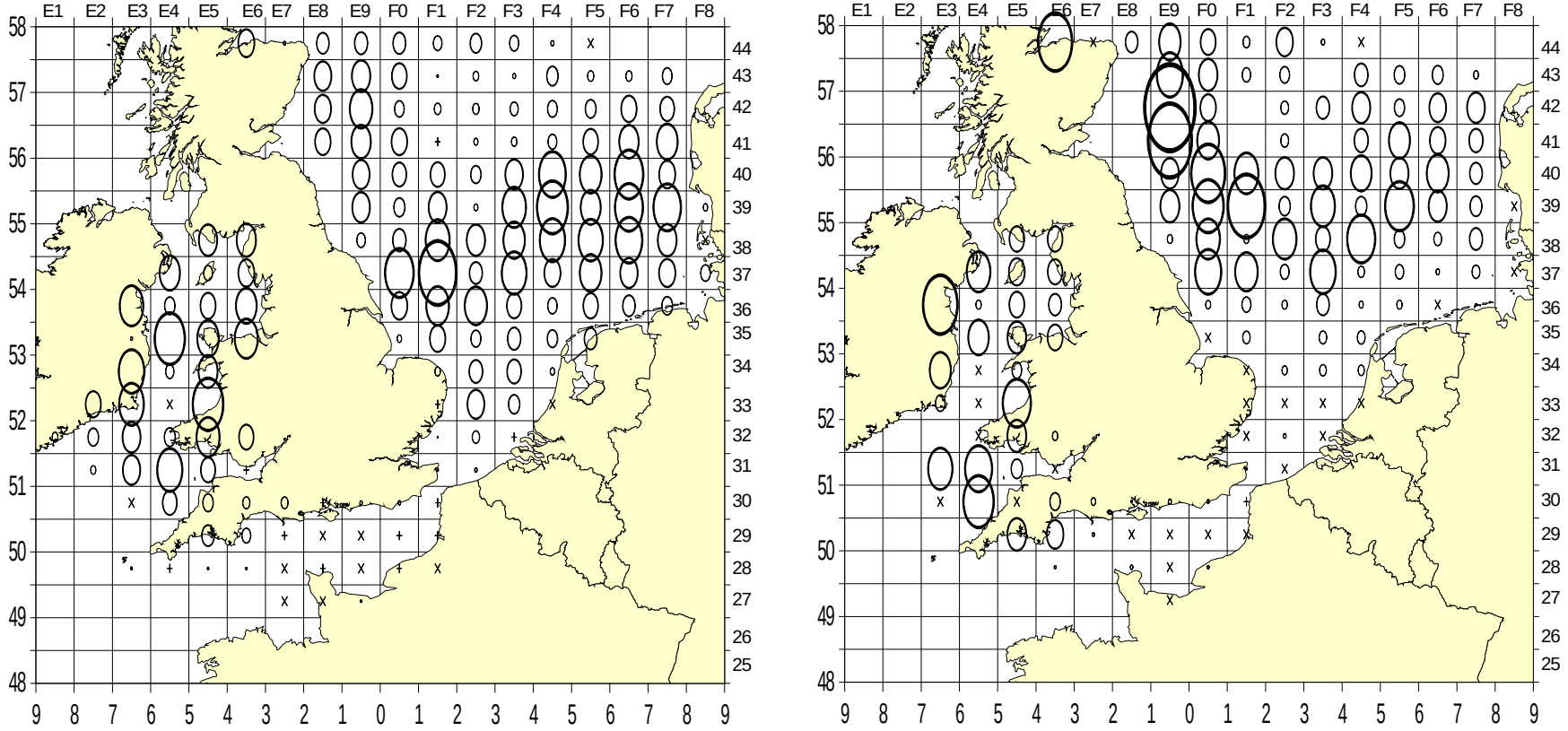
Annex 6.2.13 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

Tub gurnard



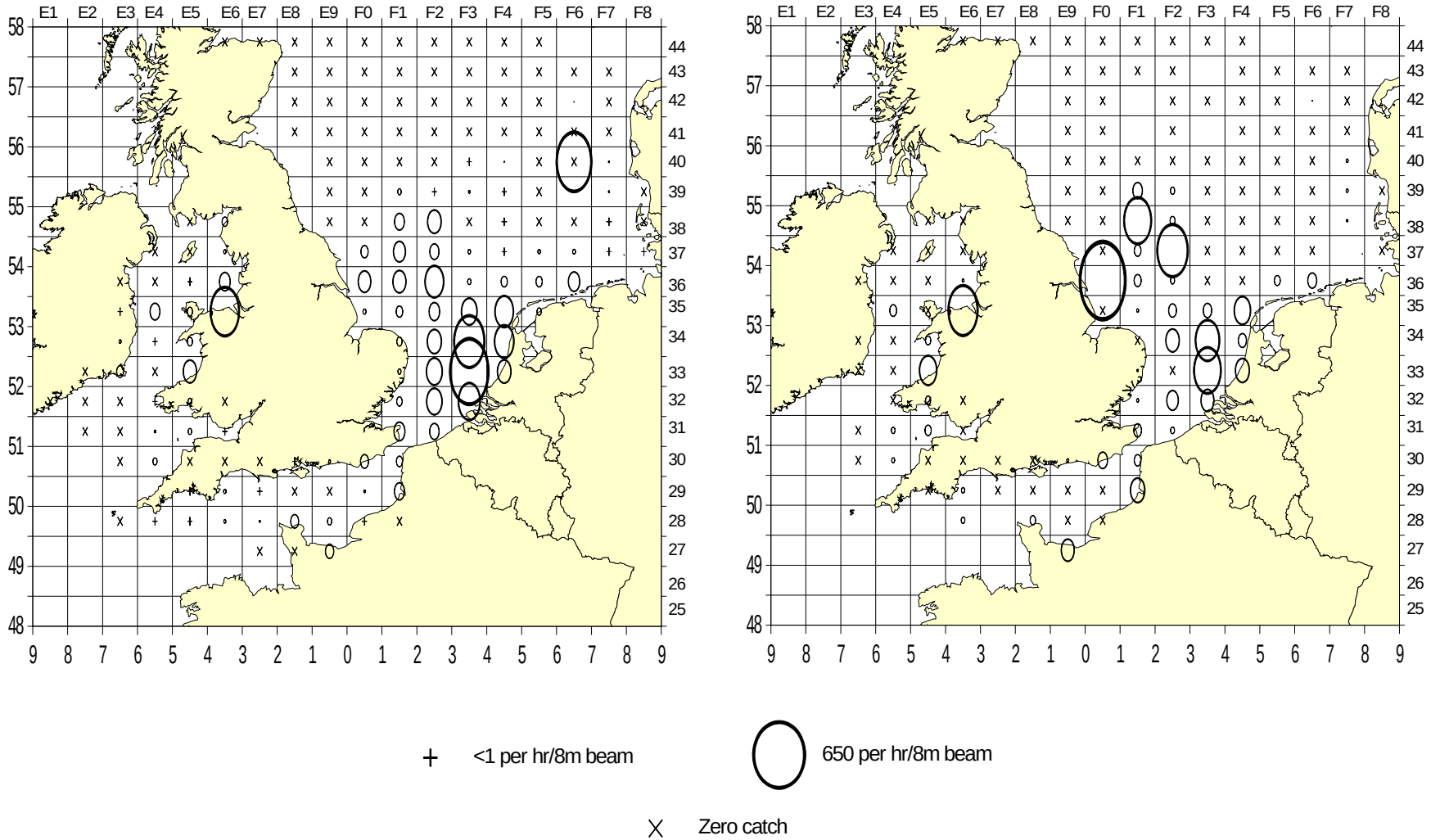
Annex 6.2.14 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

Grey gurnard



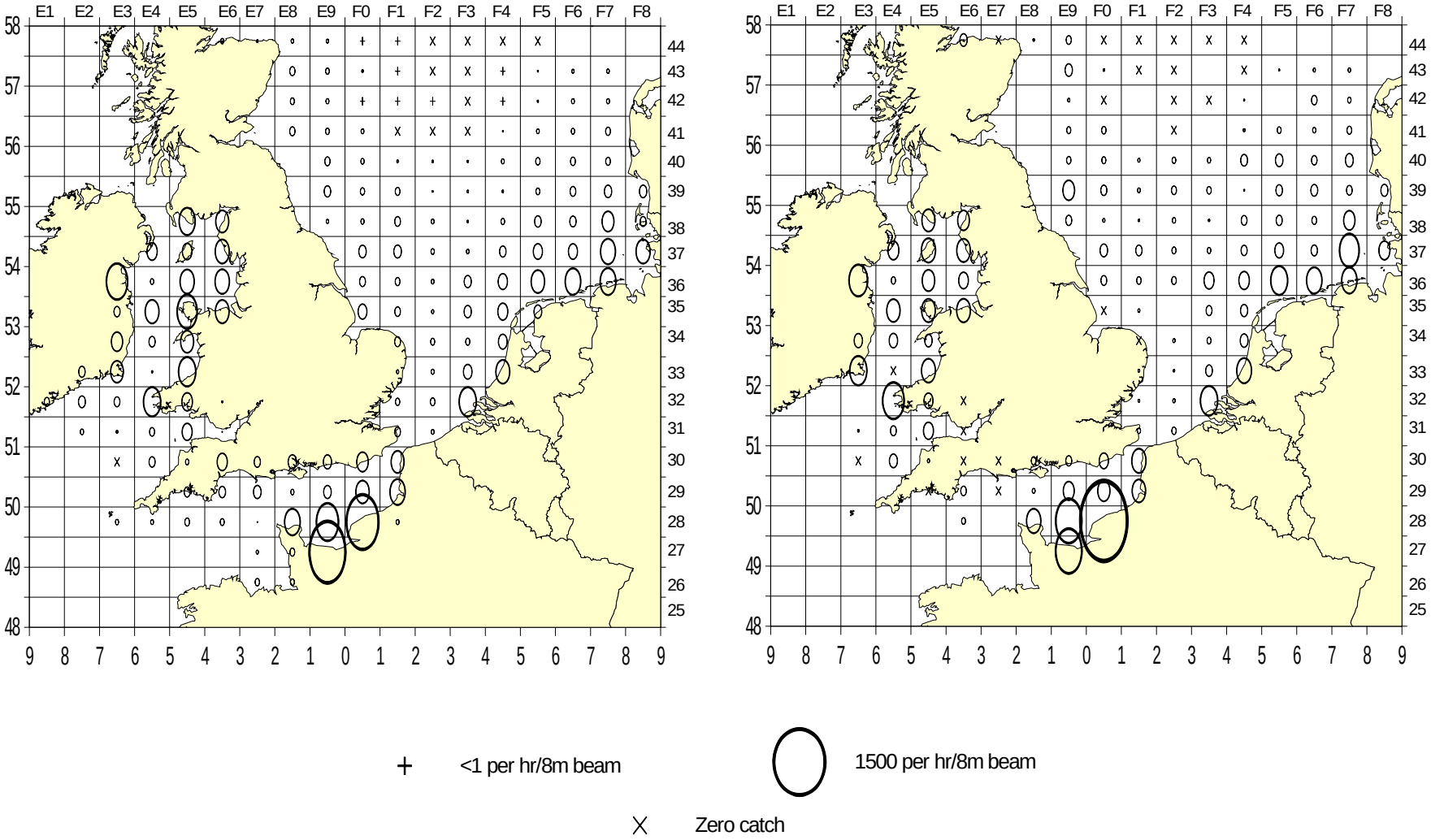
Annex 6.2.15 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

Lesser weever



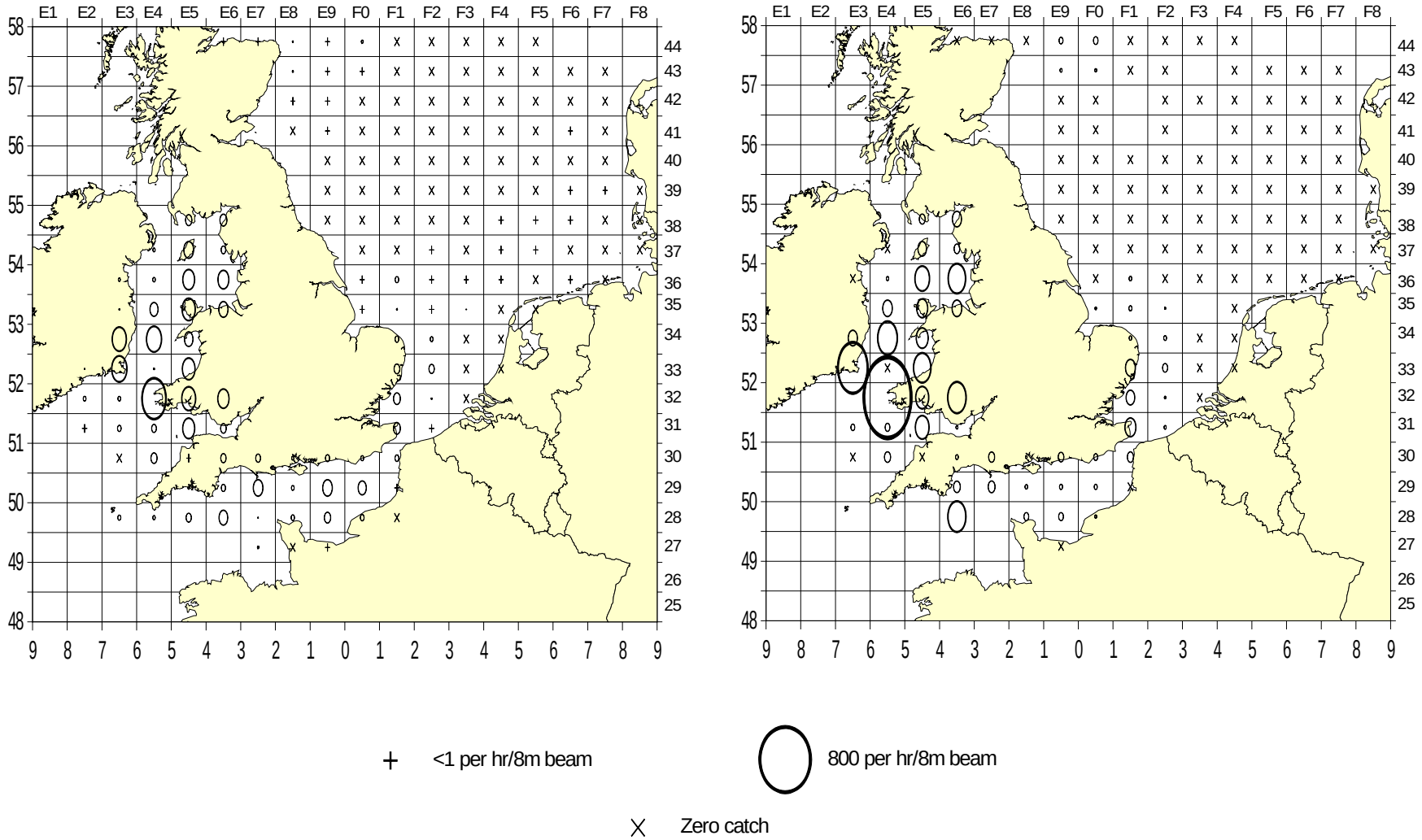
Annex 6.2.16 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

Common dragonet



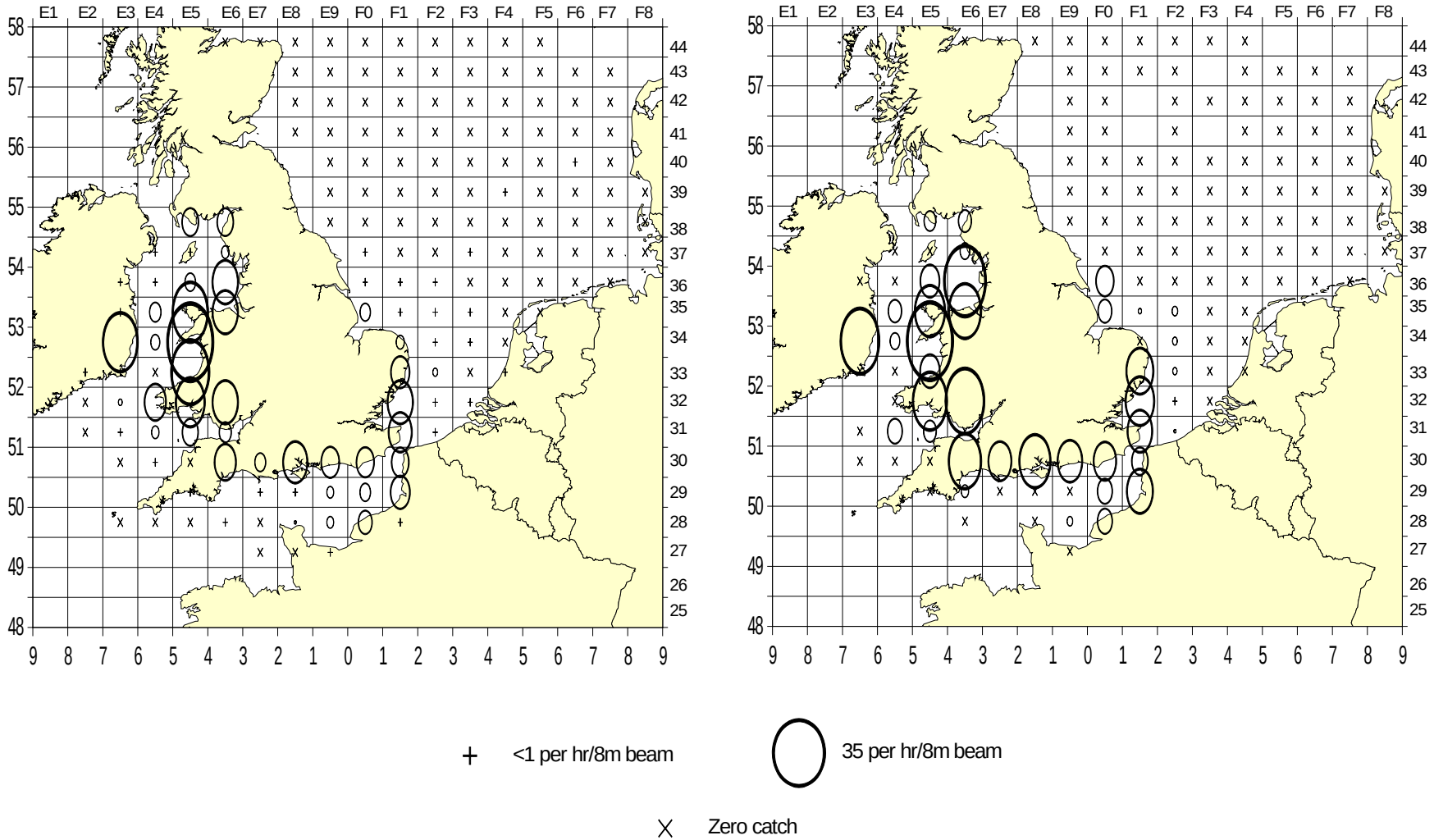
Annex 6.2.17 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

Lesser spotted dogfish



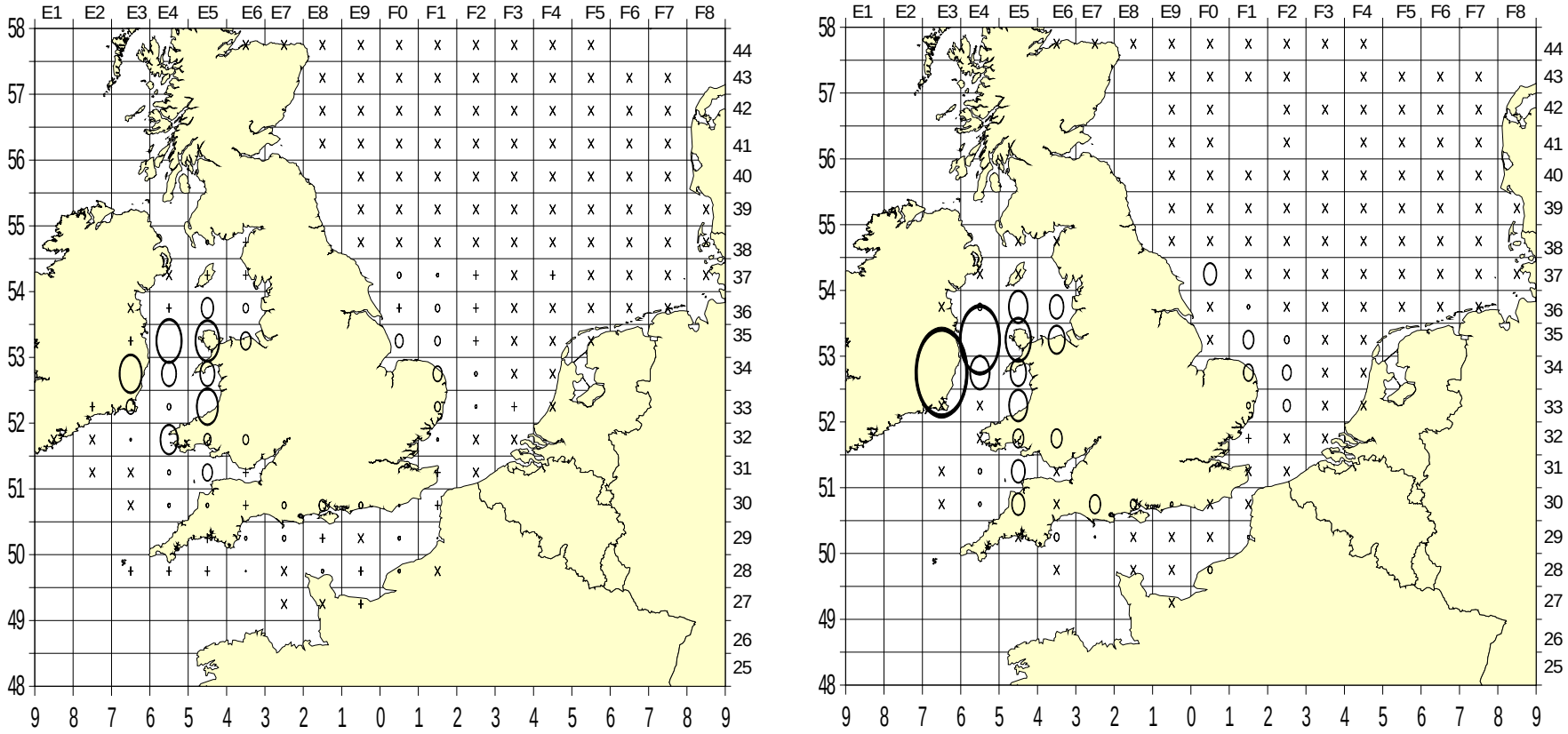
Annex 6.2.18 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

Thornback ray



Annex 6.2.19 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

Spotted ray



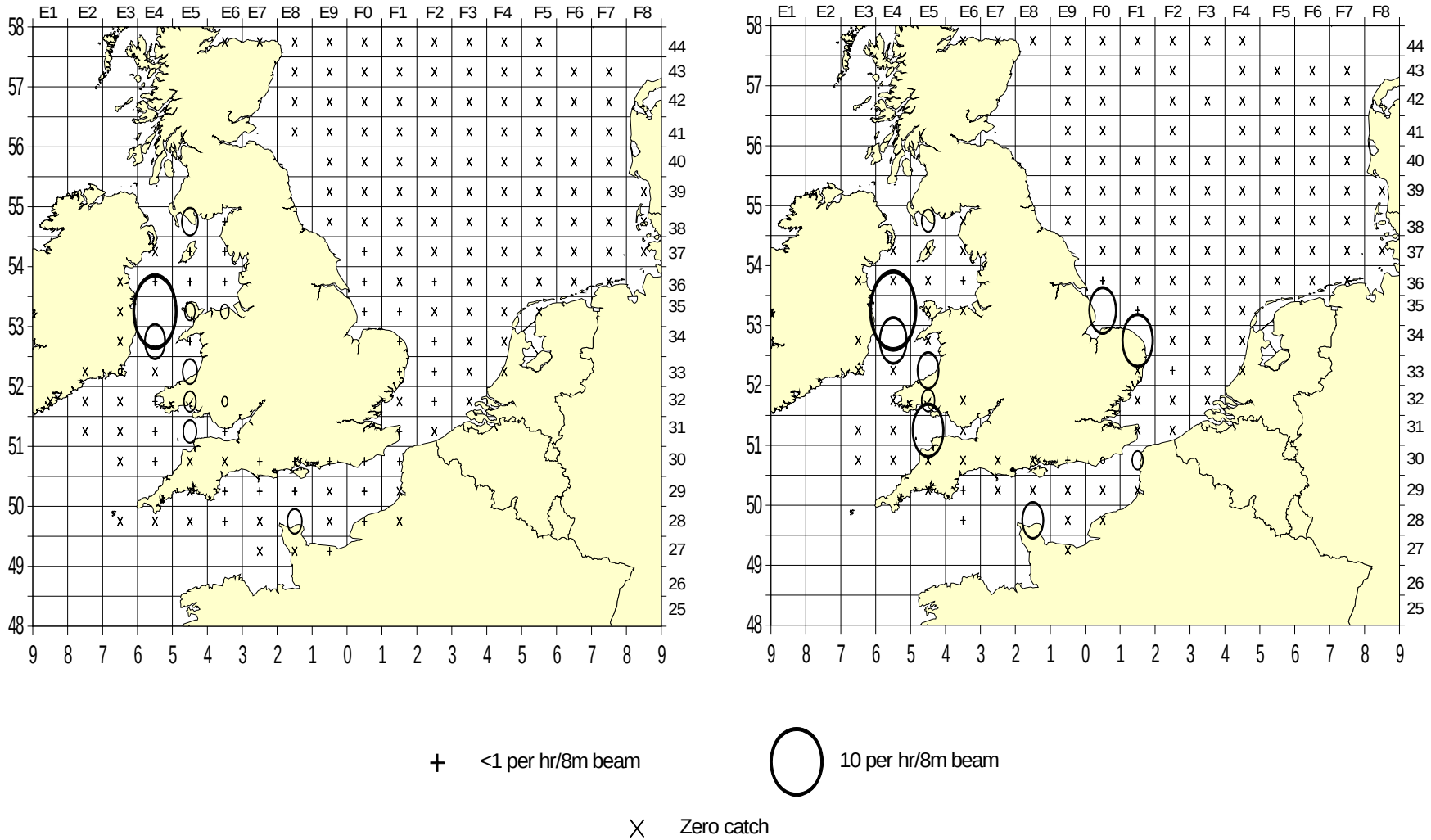
\+ <1 per hr/8m beam

120 per hr/8m beam

X Zero catch

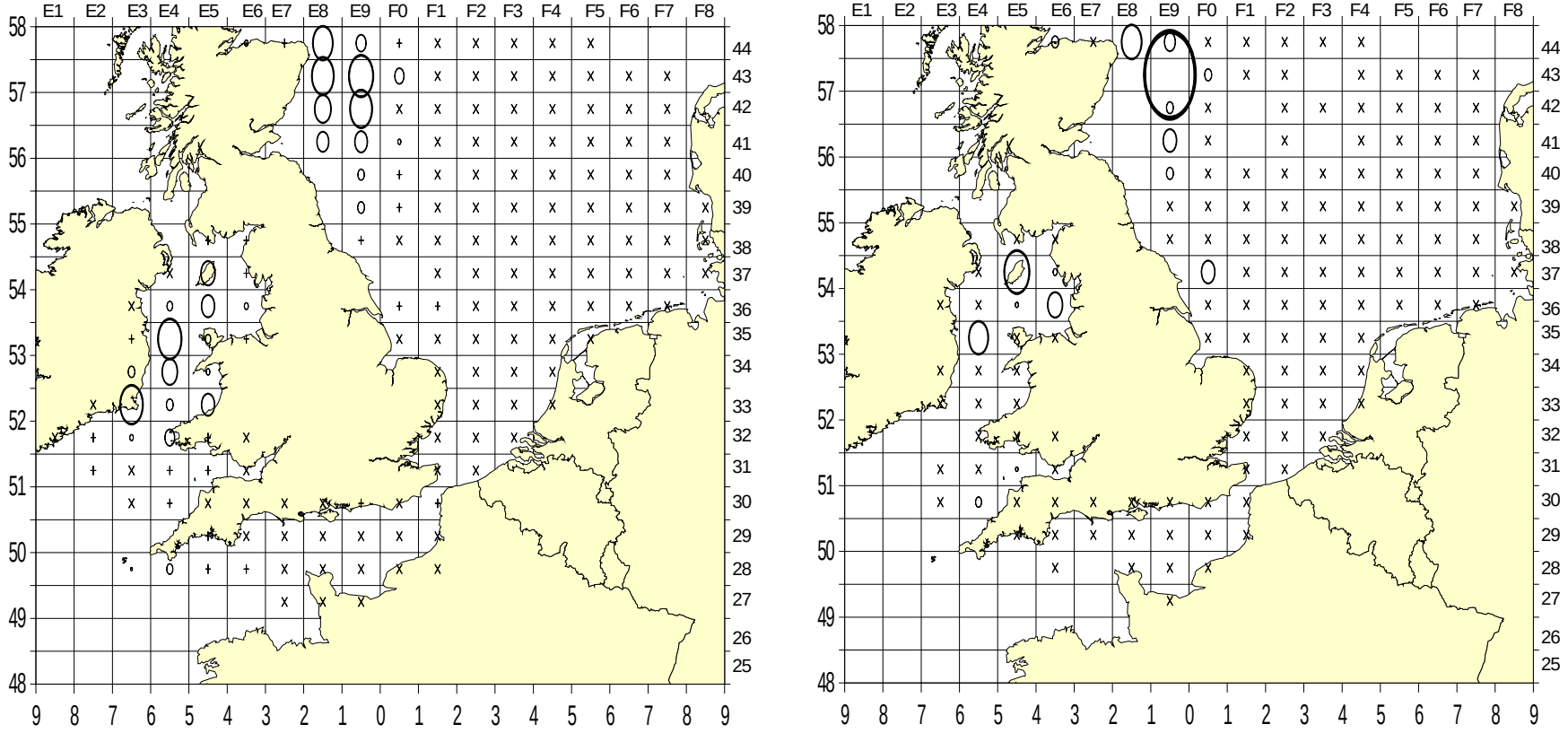
Annex 6.2.20 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

Blonde ray



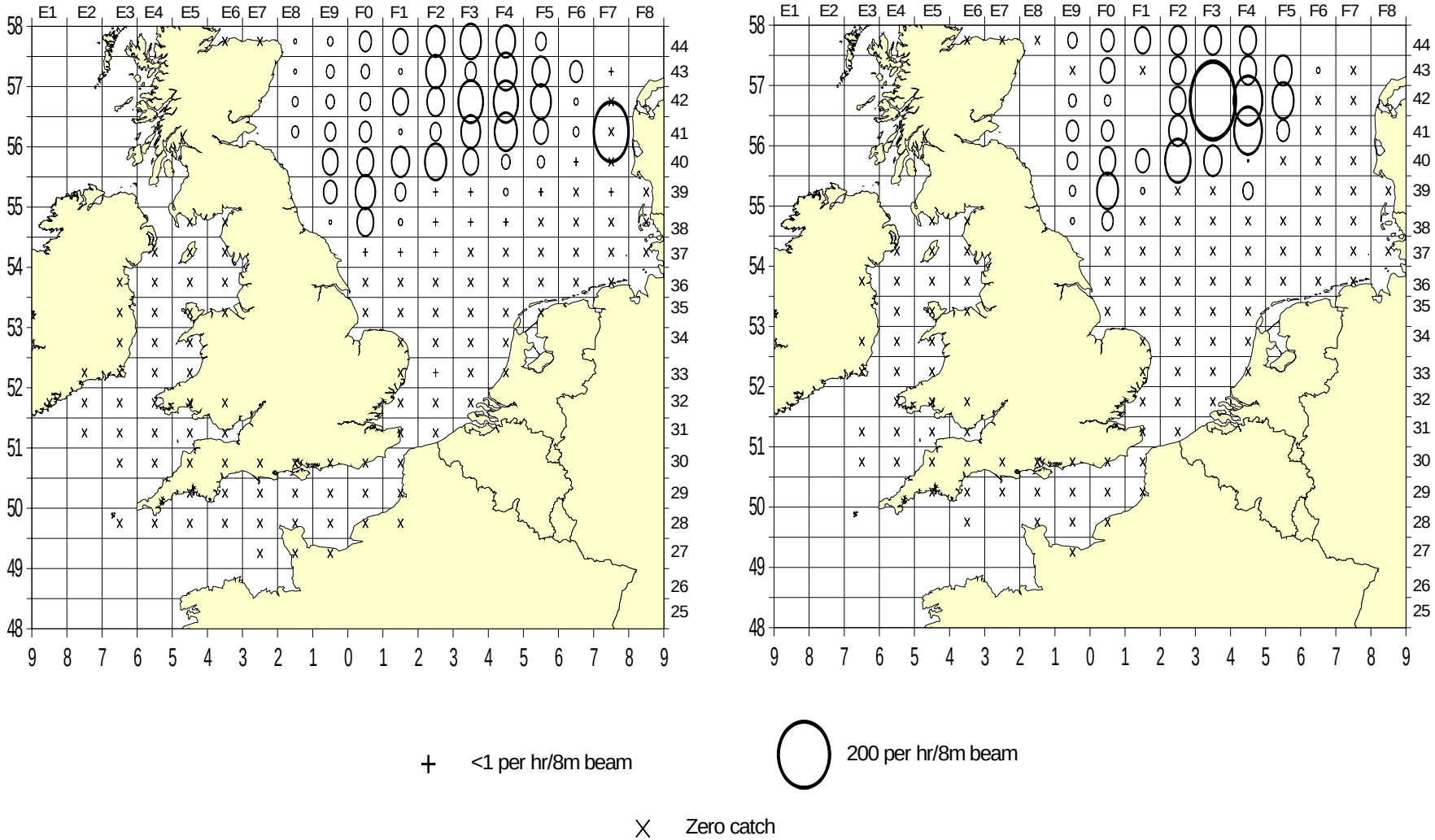
Annex 6.2.21 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

Cuckoo ray



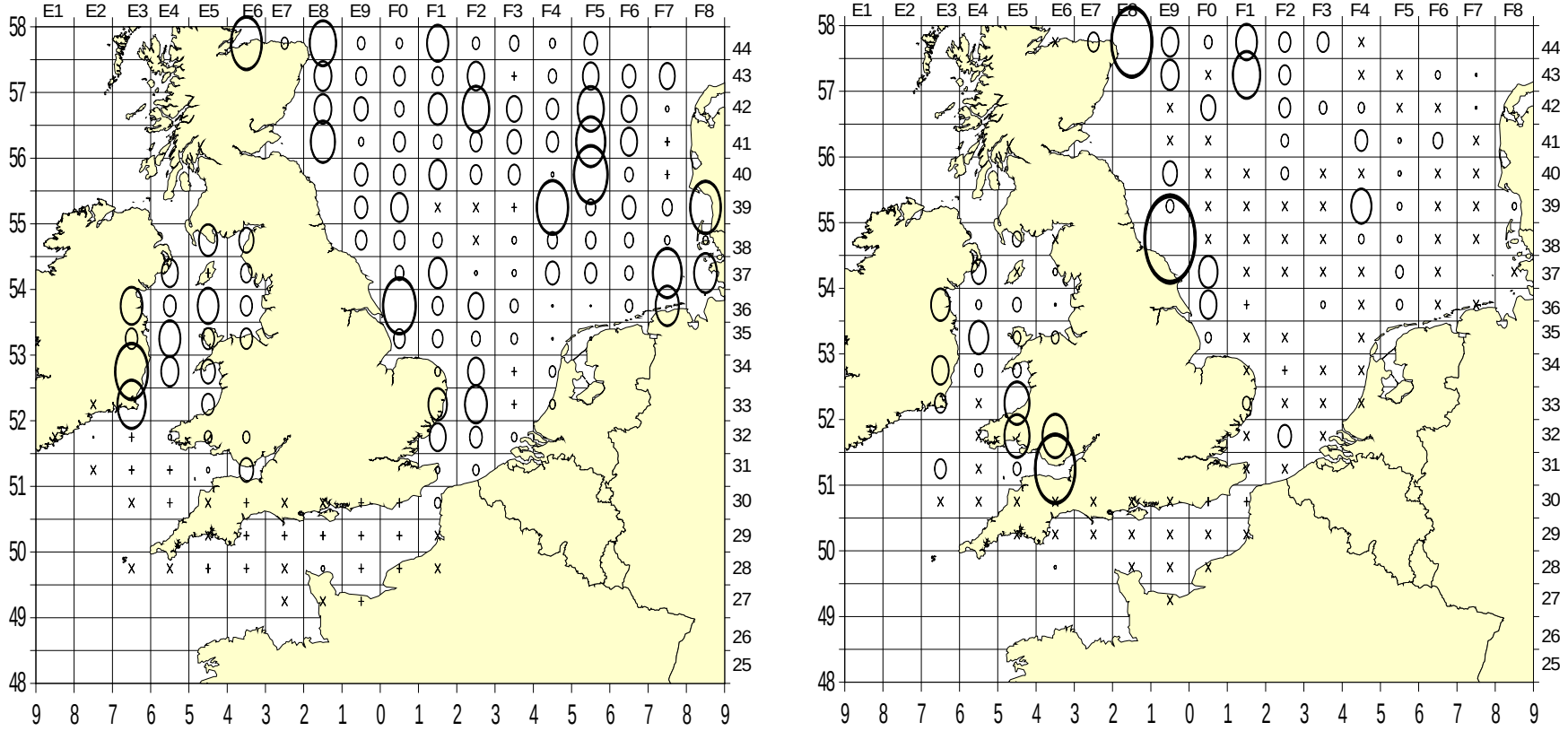
Annex 6.2.22 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

Starry ray



Annex 6.2.23 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

Cod



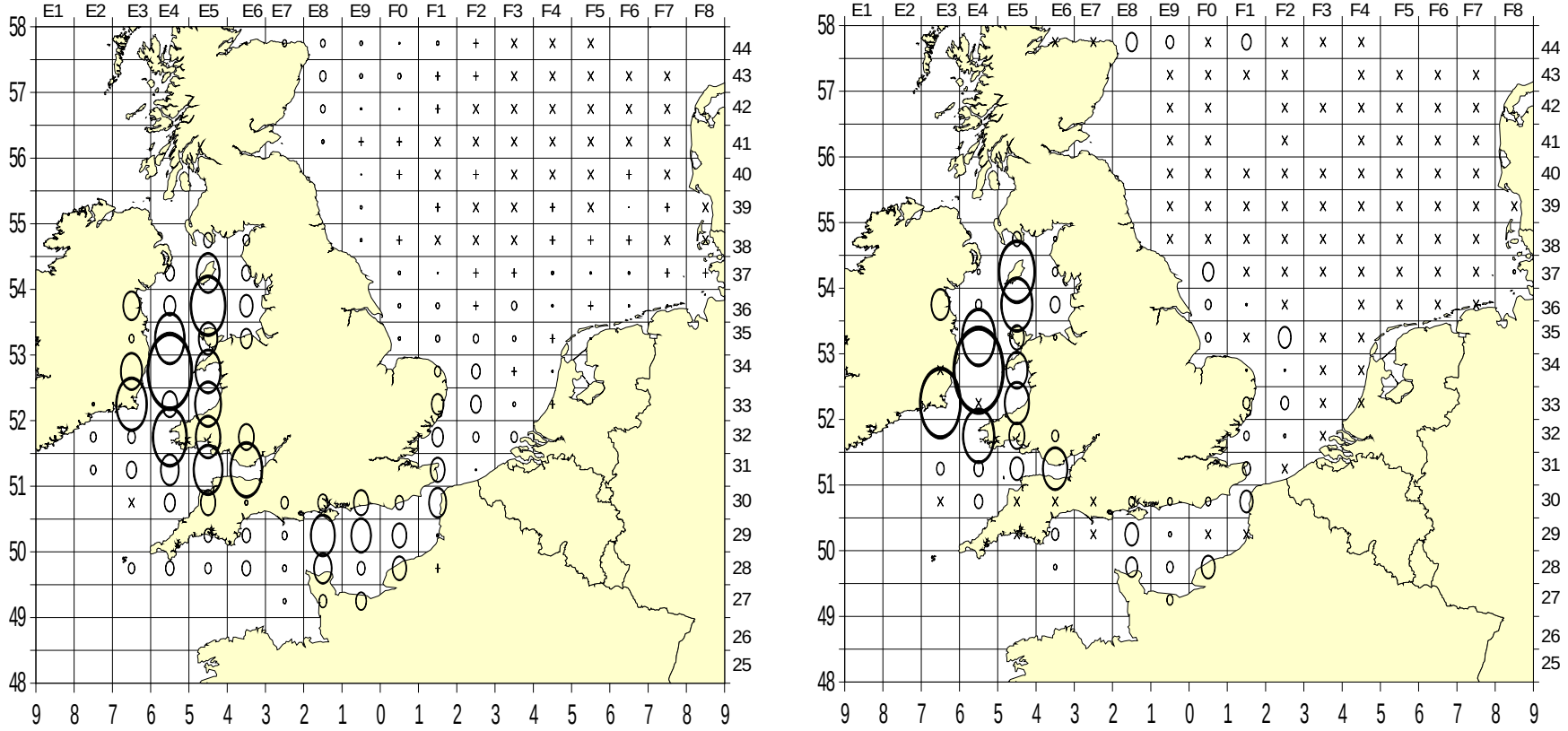
\+ <1 per hr/8m beam

70 per hr/8m beam

X Zero catch

Annex 6.2.24 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

Poor cod



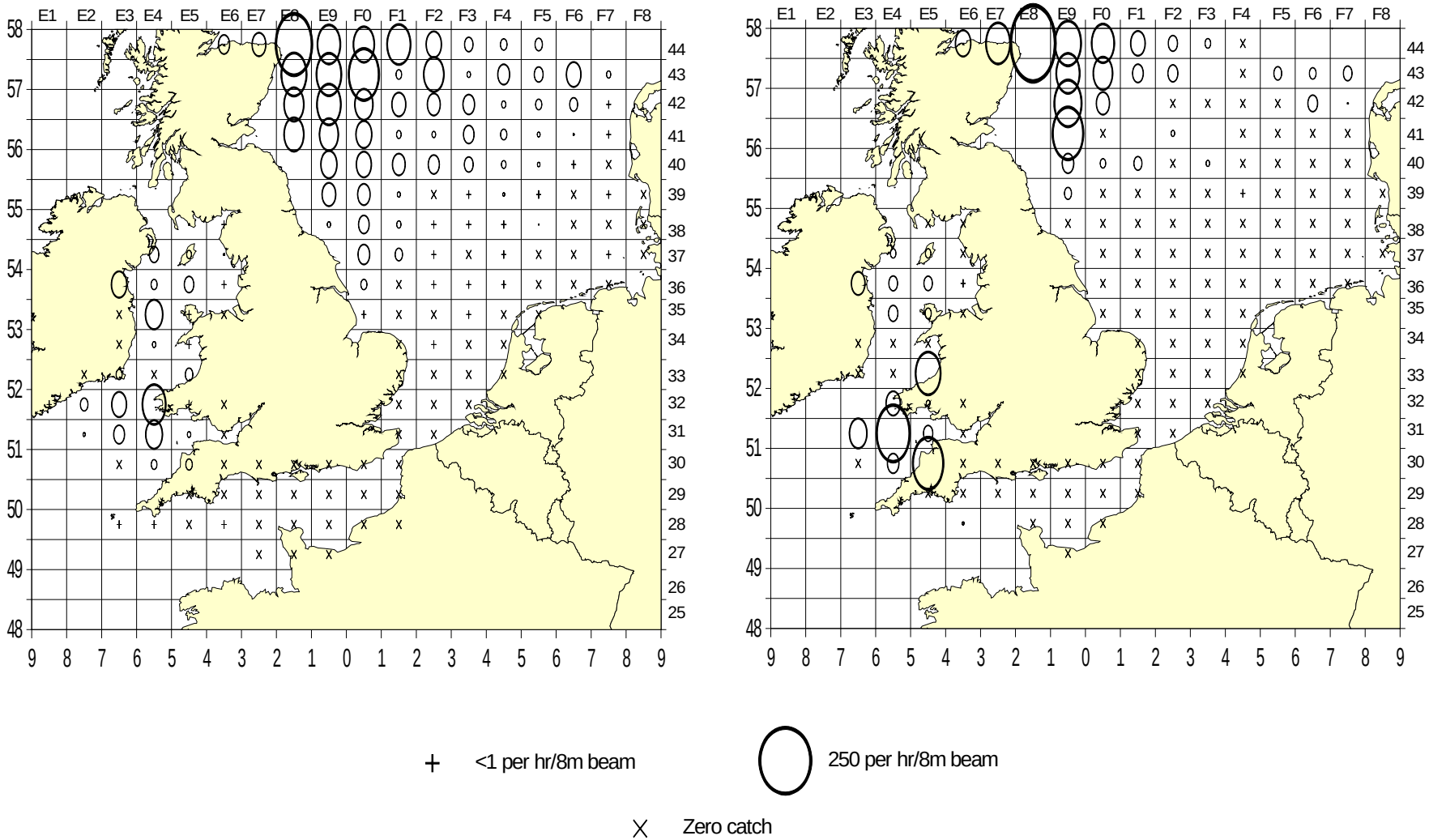
\+ <1 per hr/8m beam

1000 per hr/8m beam

X Zero catch

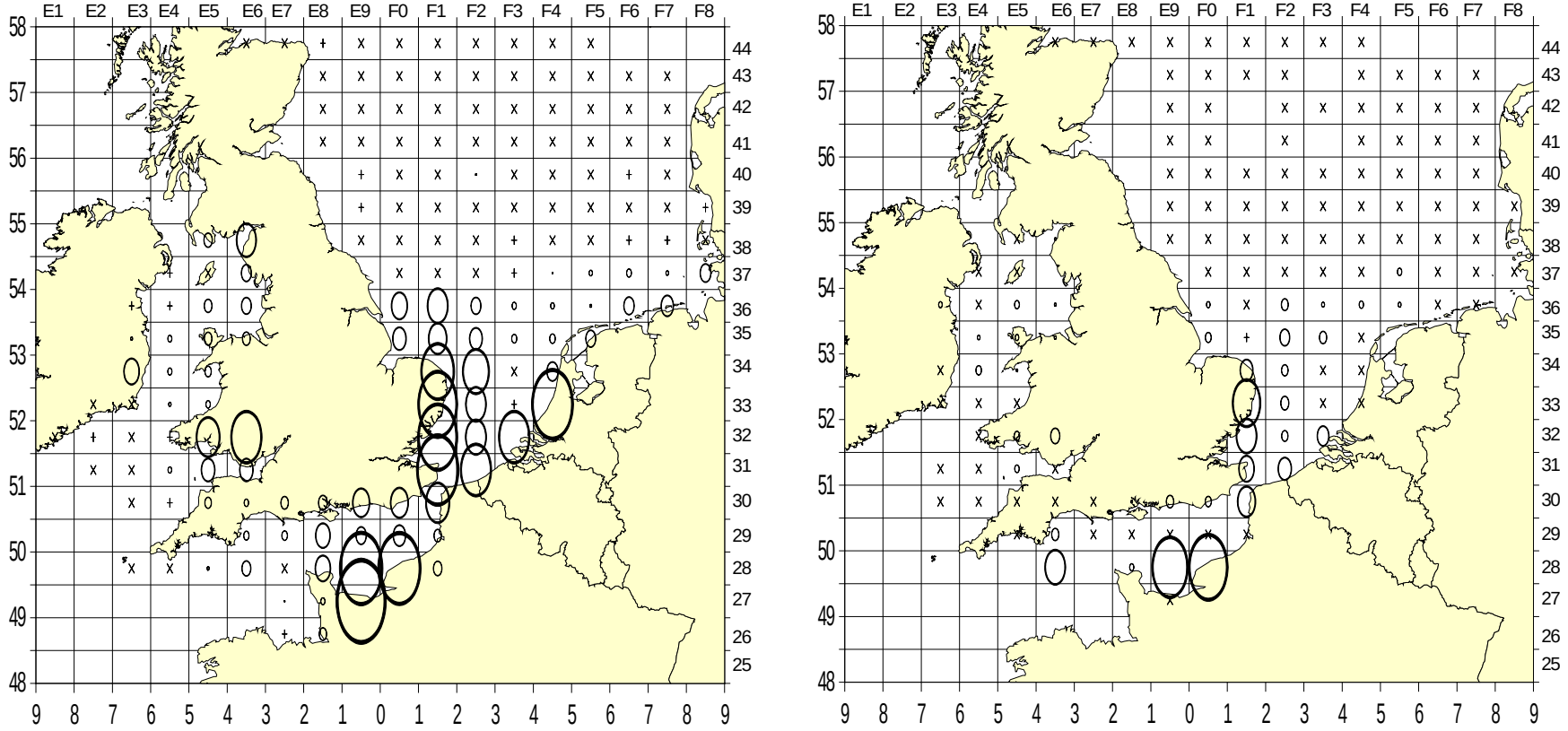
Annex 6.2.25 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

Haddock



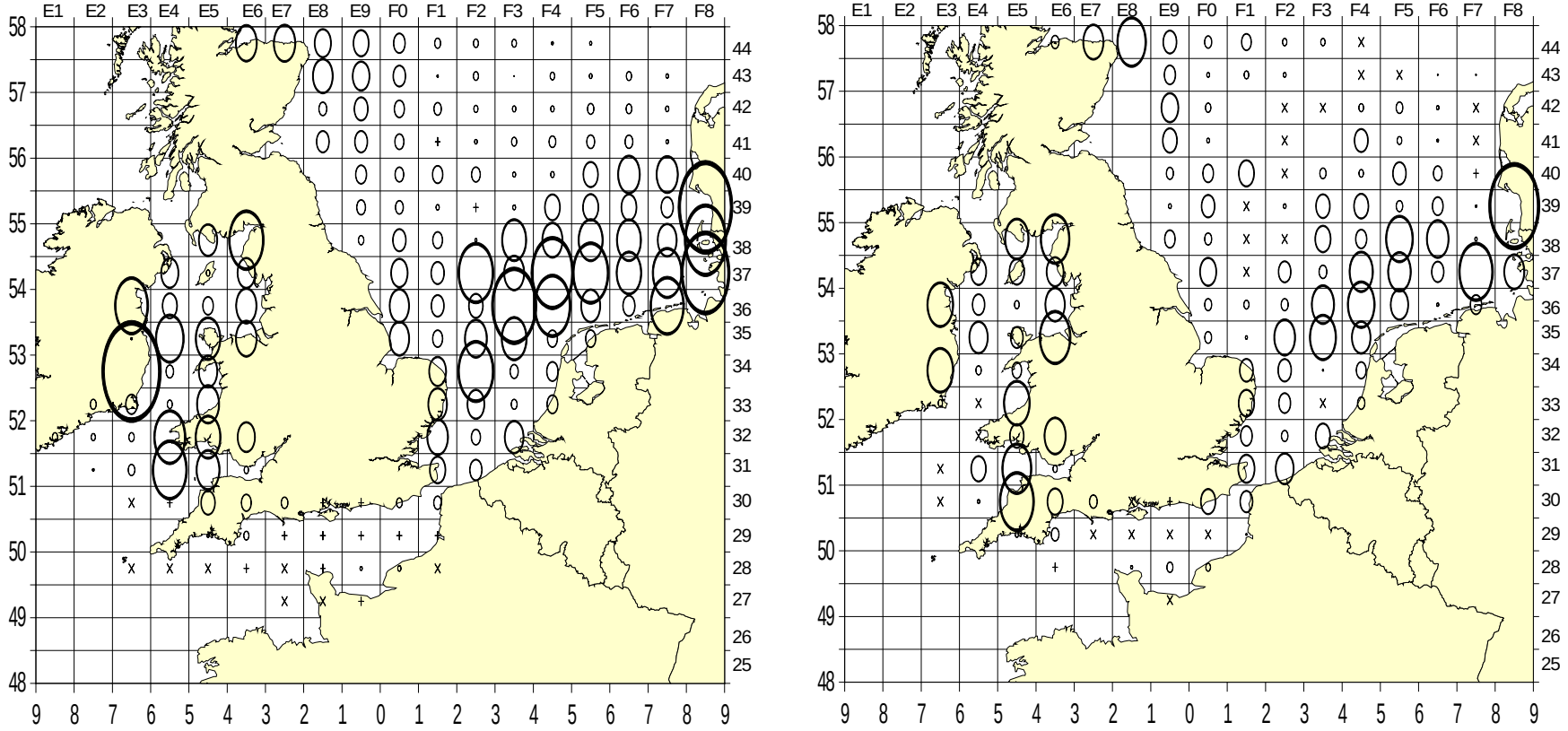
Annex 6.2.26 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

Pout whiting



Annex 6.2.27 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

Whiting



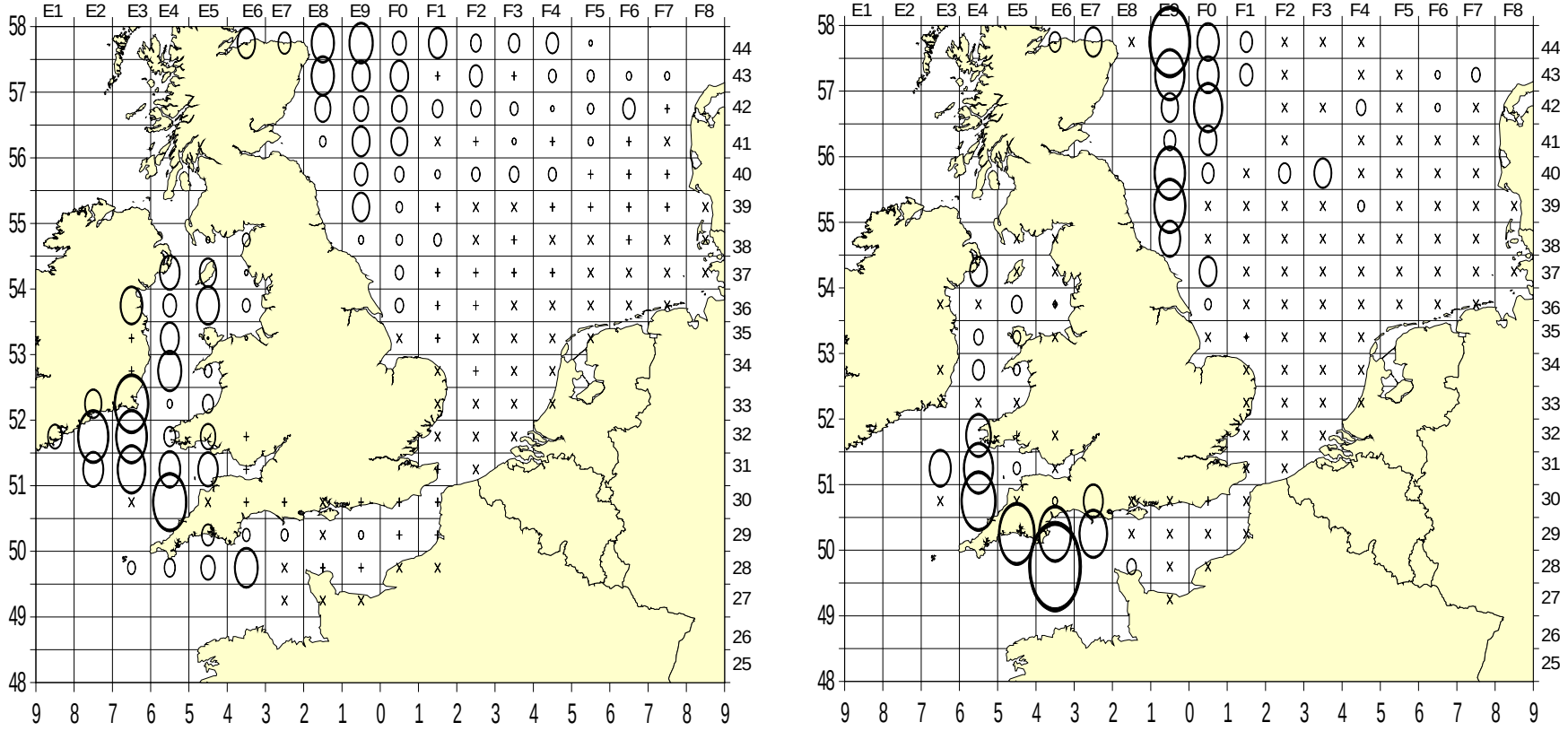
\+ <1 per hr/8m beam

500 per hr/8m beam

X Zero catch

Annex 6.2.28 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

Monkfish



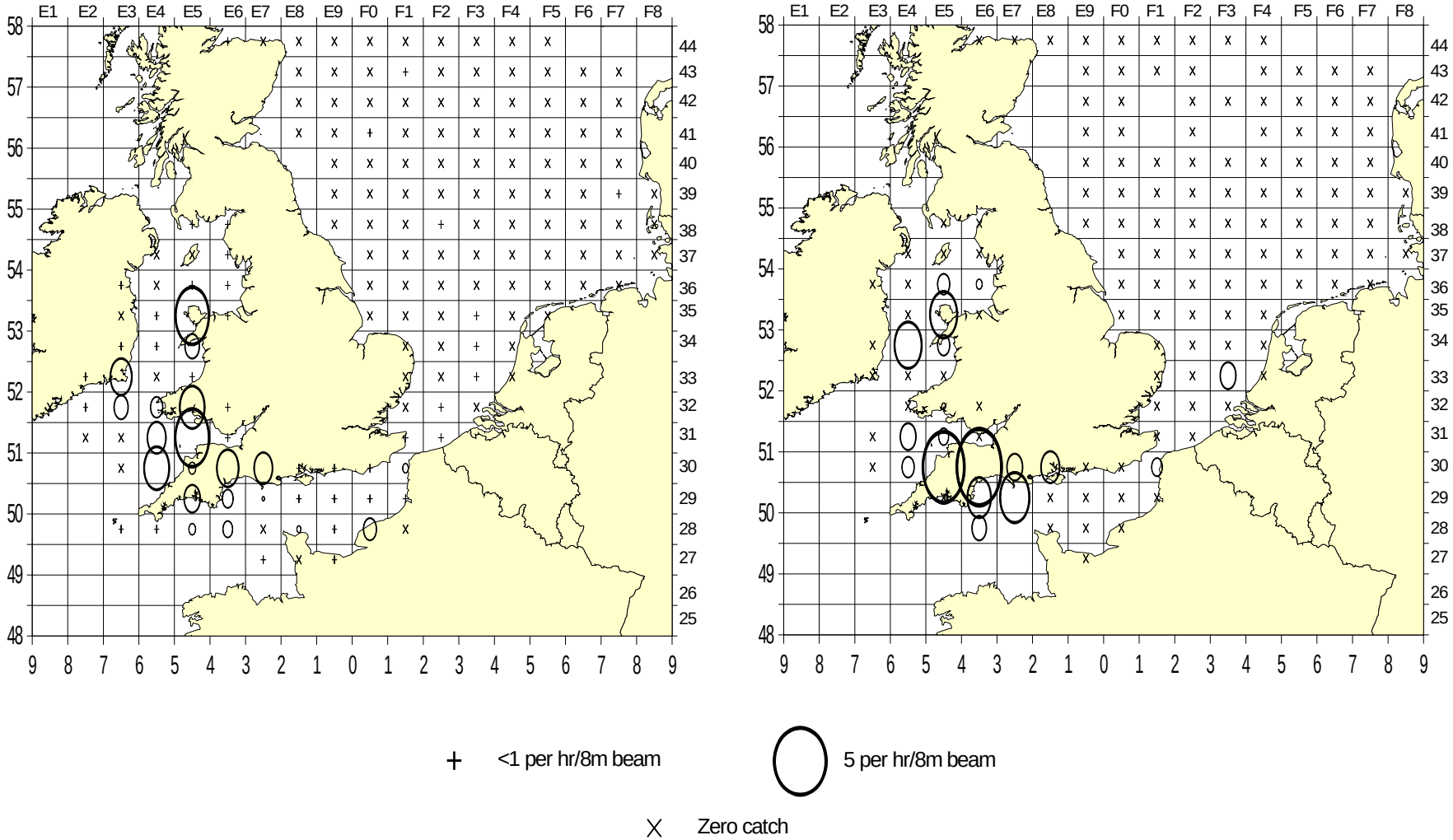
\+ <1 per hr/8m beam

20 per hr/8m beam

X Zero catch

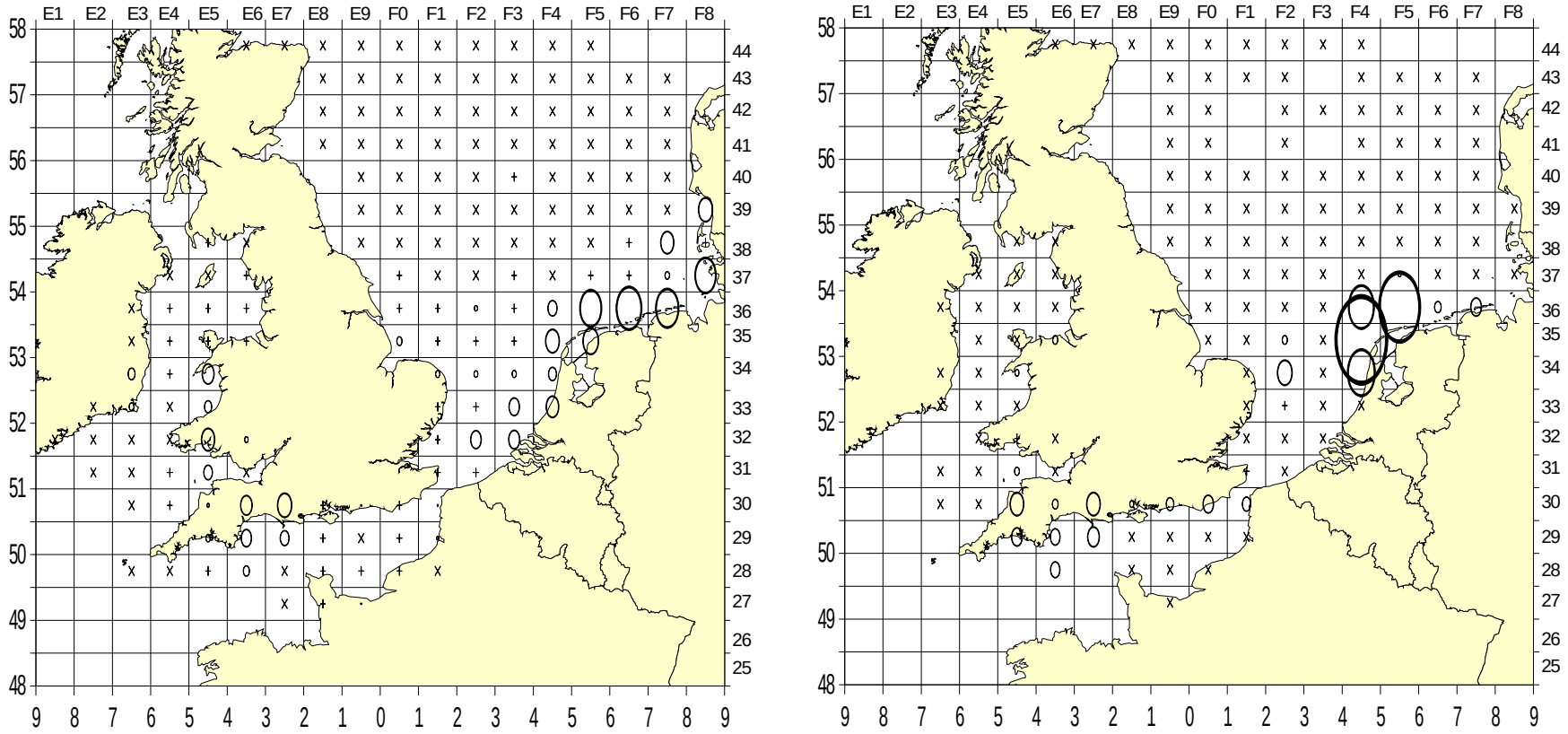
Annex 6.2.29 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

John Dory



Annex 6.2.30 International offshore beam trawl survey 1990-2009
Catches are number/hr/8m beam
left plot mean of time series, right plot current year.

Red mullet



\+ <1 per hr/8m beam

50 per hr/8m beam

X Zero catch

Annex 7: Abundance of fish species for the offshore surveys by Subdivision

Annex 7 a) Abundance of fish species (per hour fishing) in subarea VIIa per year.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
AMERICAN PLAICE (LR DAB)	10	1	1	2	4	8	4	14	4	3
ANGLERFISH (MONK)	1	2	2	4	3	3	3	2	2	2
BRILL	2	2	1	2	1	1	2	1	1	1
COD	25	10	4	23	15	8	8	6	1	10
COMMON DRAGONET	131	149	211	197	175	134	127	141	123	162
DAB	398	348	224	381	549	480	412	586	516	772
EUROPEAN PLAICE	220	142	180	298	273	272	246	358	341	371
FLOUNDER (EUROPEAN)	2	1	2	1	1	1	1	2	2	1
GREY GURNARD	46	47	99	90	81	43	45	56	51	56
HADDOCK	1		1	1	12	2	8	4	3	11
JOHN DORY	1	1	1	1	1	1	1	1	1	1
LEMON SOLE	3	2	3	13	11	13	9	12	10	8
LESSER SPOTTED DOGFISH	15	19	27	23	19	18	20	40	34	29
LESSER WEEVER FISH	9	24	51	45	55	52	19	33	29	26
POGGE (ARMED BULLHEAD)	56	37	44	65	57	52	46	39	38	32
POOR COD	170	82	92	219	124	151	104	139	94	179
RED GURNARD	1	6	3	4	6	3	5	9	10	11
RED MULLET		1	1	1		1		1	1	1
SCALD FISH	17	37	36	40	47	33	46	40	49	66
SOLE (DOVER SOLE)	129	174	161	76	66	59	78	128	112	89
SOLENETTE	96	249	146	210	196	248	167	240	230	284
THICKBACK SOLE	8	20	34	30	24	22	26	24	27	26
TUB GURNARD	5	7	15	8	7	7	9	9	13	10
TURBOT	1	1	1	1	1	1	1	1	1	1
WHITING	51	45	78	98	83	171	82	124	101	87
WHITING POUT (BIB)	27	27	27	7	2	11	3	16	29	11

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
AMERICAN PLAICE (LR DAB)	2	1	1	1	11	2	2	2	1	2
ANGLERFISH (MONK)	1	2	4	2	2	3	1	1	1	1
BRILL	1	2	1	1	1	1	1	2	2	2
COD	11	5	2	1	8	7	5	2	2	3
COMMON DRAGONET	188	103	124	164	155	97	111	128	138	99
DAB	724	758	634	1271	1168	801	789	638	677	660
EUROPEAN PLAICE	456	399	466	546	588	491	519	529	486	418
FLOUNDER (EUROPEAN)	1	4	1	2	1	2	1	1	1	2
GREY GURNARD	50	48	33	48	50	45	64	64	60	34
HADDOCK	3	6	1	7	17	10	23	3	1	6
JOHN DORY	1	1	1	1	1	1	1	1	1	1
LEMON SOLE	8	10	11	14	12	7	5	5	4	5
LESSER SPOTTED DOGFISH	27	38	35	32	62	38	49	40	44	60

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
LESSER WEEVER FISH	57	17	33	20	25	18	23	19	28	21
POGGE (ARMED BULLHEAD)	42	30	35	32	55	30	23	28	21	27
POOR COD	162	72	94	232	335	204	331	216	173	147
RED GURNARD	10	11	9	14	12	10	13	18	16	15
RED MULLET	1	1	1	1	1	1	2	1	1	1
SCALD FISH	101	94	112	124	97	95	123	106	146	108
SOLE (DOVER SOLE)	93	62	51	56	66	31	32	32	34	29
SOLENETTE	304	303	596	304	417	250	276	230	292	273
THICKBACK SOLE	37	28	31	28	38	20	34	35	45	34
TUB GURNARD	11	10	9	12	10	11	8	7	10	11
TURBOT	1	1	1	1	1	1	1	1	1	1
WHITING	60	80	65	83	207	118	144	57	102	71
WHITING POUT (BIB)	7	6	7	6	4	2	1	3	3	1

Annex 7 b) Abundance of fish species (per hour fishing) in subarea VIId per year.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
ANGLERFISH (MONK)	1			1	1		1	1	1	
BRILL	2	1	1	1	1	2	2	1	1	1
COD			1	1	1	1	1	1	1	1
COMMON DRAGONET	124	211	270	220	297	123	203	254	489	274
DAB	46	83	187	66	129	68	47	69	33	51
EUROPEAN PLAICE	51	59	66	58	35	31	63	66	111	53
FLOUNDER (EUROPEAN)	1	5	12	4	2	2	15	3	3	3
GREY GURNARD	1	1	1	1	1	1	1	1	1	2
JOHN DORY		1	1	1	1	1	1	1	1	1
LEMON SOLE	7	3	3	7	11	13	8	3	2	1
LESSER SPOTTED DOGFISH	3	5	7	11	6	6	5	10	5	6
LESSER WEEVER FISH	10	5	11	12	11	5	10	5	8	9
POGGE (ARMED BULLHEAD)	15	24	41	41	43	35	26	53	20	32
POOR COD	177	81	59	49	96	97	69	55	50	95
RED GURNARD	8	8	7	7	12	9	12	7	11	9
RED MULLET	1		1	1		1	1	1	1	1
SCALD FISH	6	18	13	15	10	6	8	10	8	14
SOLE (DOVER SOLE)	30	47	37	58	33	27	29	38	32	55
SOLENETTE	103	187	156	186	175	77	145	140	92	153
THICKBACK SOLE	2	4	6	9	7	6	8	9	10	8
TUB GURNARD	4	2	5	6	4	3	2	3	3	4
TURBOT	1	1	1	1	1	1	1	1	1	1
WHITING	1	1	6	1	2	4	1	1	1	1
WHITING POUT (BIB)	270	38	49	33	61	46	64	91	136	91

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
ANGLERFISH (MONK)					1	1	1		1	1
BRILL	1	1	1	1	1	1	1	2	1	1
COD	1	1	1	1	1	1	1	1	2	1
COMMON DRAGONET	184	210	167	184	154	105	207	200	241	247
DAB	35	62	64	92	69	28	99	41	40	146
EUROPEAN PLAICE	70	76	71	65	98	80	77	90	96	147
FLOUNDER (EUROPEAN)	5	4	8	9	8	7	8	4	6	15
GREY GURNARD	1	1	1	1	1	1	1	1	1	1
JOHN DORY	1	1	1	1	1	1	1	1	2	1
LEMON SOLE	4	7	8	12	7	8	5	5	12	8
LESSER SPOTTED DOGFISH	5	6	9	5	8	9	5	8	8	7
LESSER WEEVER FISH	12	14	8	9	16	13	23	15	14	17
POGGE (ARMED BULLHEAD)	19	38	44	33	34	14	42	24	16	24
POOR COD	40	54	45	79	105	60	18	52	55	29
RED GURNARD	12	13	9	14	12	8	8	8	15	12
RED MULLET	1	1	1	1	1	1	1	1	1	1
SCALD FISH	8	7	9	12	22	10	18	29	32	29
SOLE (DOVER SOLE)	43	44	64	57	40	41	55	46	30	87
SOLENETTE	84	90	89	119	155	94	195	185	140	148
THICKBACK SOLE	9	17	12	19	14	10	14	11	19	16
TUB GURNARD	2	3	3	5	3	2	5	6	5	8
TURBOT	1	1	1	1	1	1	1	1	1	1
WHITING	3	2	9	1	6	4	1	1	13	14
WHITING POUT (BIB)	20	67	15	139	60	46	50	57	54	30

Annex 7 c) Abundance of fish species (per hour fishing) in subarea VIIe per year (no sampling in 2008).

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
ANGLERFISH (MONK)	1	1	1	2	1	2	1	1	1	1
BRILL	1	1	1	1	1	1	1	1	1	1
COD			1		1			1	1	1
COMMON DRAGONET	13	42	1	1	1	1	1	1	1	1
DAB	17	12	8	10	32	21	20	19	16	20
EUROPEAN PLAICE	19	10	14	9	9	9	15	34	20	21
FLOUNDER (EUROPEAN)				1		1	1		1	1
GREY GURNARD	6	3	2	4	10	3	6	3	6	12
HADDOCK						1				
JOHN DORY	1	1	1	2	1	1	1	1	1	1
LEMON SOLE	2	2	1	1	1	1	1	1	1	1
LESSER SPOTTED DOGFISH	9	2	1	14	11	15	13	28	20	27
LESSER WEEVER FISH	1	1	1	1	1	1	1	1	1	1
POGGE (ARMED BULLHEAD)	1	1	1	1	1	1	1	1	1	1
POOR COD	9	31	5	1	1	1	1	1	1	8
RED GURNARD	34	8	23	33	51	31	25	21	21	31

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
RED MULLET	1	1	1	1	1	2	2	2	1	4
SCALD FISH	2	1	1	1	1	1	1	1	1	1
SOLE (DOVER SOLE)	10	20	22	13	11	9	13	18	16	15
SOLENETTE	1	1	1	1	1	1	1	1	1	1
THICKBACK SOLE	5	2	1	1	1	1	1	1	1	1
TUB GURNARD	1	1	1	1	1	1	1	1	1	1
TURBOT	1	1	1	1	1	1	1	1	1	1
WHITING	1	12	5	11	2	4	4	7	4	2
WHITING POUT (BIB)	13	17	11	8	4	1	5	14	8	2

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
ANGLERFISH (MONK)	1	1	2	2	1	3	2	1		15
BRILL	1	1	1	1	1	1	1	1		1
COD	1	1	1	1			1	1		1
COMMON DRAGONET	2	15	134	206	189	9	11	4		11
DAB	10	42	56	34	15	19	32	12		30
EUROPEAN PLAICE	22	27	15	13	12	12	16	14		47
FLOUNDER (EUROPEAN)	1	1					1	1		1
GREY GURNARD	8	1	8	12	6	9	7	10		19
HADDOCK			1	1	1		1			1
JOHN DORY	1	2	1	1	1	1	1	1		2
LEMON SOLE	1	1	2	2	3	1	1	1		5
LESSER SPOTTED DOGFISH	13	25	15	23	22	25	25	19		39
LESSER WEEVER FISH	1	1	5	8	4	1	1	1		3
POGGE (ARMED BULLHEAD)	1	1	14	16	15	2	1	1		1
POOR COD	5	6	66	202	112	26	8	5		9
RED GURNARD	28	10	31	34	44	30	32	14		75
RED MULLET	2	4	1	7	3	3	8	2		2
SCALD FISH	1	6	68	94	85	4	1	6		8
SOLE (DOVER SOLE)	14	19	9	19	15	10	13	17		35
SOLENETTE	1	20	339	444	369	8	1	9		10
THICKBACK SOLE	3	4	101	133	112	8	8	2		3
TUB GURNARD	1	1	1	2	1	1	2	5		4
TURBOT	1	1	1	1	1	1	1	1		1
WHITING	1	5	5	4	1	13	3	7		12
WHITING POUT (BIB)	1	1	5	1	2	2	6	4		13

Annex 7 d) Abundance of fish species (per hour fishing) in subarea VIIf per year.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
ANGLERFISH (MONK)	1	3	11	5	5	3	2	1	1	9
BRILL	2	3	2	1	2	3	2	2	1	1
COD	1	1	1	1	1	1	1	1	1	2
COMMON DRAGONET	19	40	76	44	119	50	86	46	40	74
DAB	63	78	153	99	167	83	105	81	123	179
EUROPEAN PLAICE	95	122	101	28	37	41	72	48	60	69
FLOUNDER (EUROPEAN)	1	1	1	1	2	2	1	1	1	1
GREY GURNARD	15	52	85	53	45	25	23	24	33	56
HADDOCK					1		1	1		
JOHN DORY	1	2	1	3	1	1	1	2	1	3
LEMON SOLE	2	2	3	4	9	6	12	5	4	6
LESSER SPOTTED DOGFISH	69	86	101	41	40	32	34	47	51	84
LESSER WEEVER FISH	1	3	1	3	3	3	3	1	2	3
POGGE (ARMED BULLHEAD)	1	2	3	7	3	4	5	3	16	11
POOR COD	306	294	335	251	113	113	122	167	381	323
RED GURNARD	1	5	1	6	10	7	9	6	1	4
RED MULLET	2	1		1	1	1	1	1		3
SCALD FISH	1	2	1	1	3	3	4	3	1	2
SOLE (DOVER SOLE)	113	137	130	68	110	53	59	89	189	417
SOLENETTE	107	280	153	116	247	116	111	69	141	246
THICKBACK SOLE	7	27	31	23	24	23	23	16	10	23
TUB GURNARD	9	7	13	2	9	7	6	6	11	21
TURBOT	1	2	1	1	2	2	1	1	1	5
WHITING	81	87	123	138	53	55	91	141	73	178
WHITING POUT (BIB)	242	100	29	11	5	7	15	158	114	54

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
ANGLERFISH (MONK)	1	2	6	2	3	5	2	2	1	2
BRILL	4	1	1	1	1	2	1	2	1	1
COD	3	1	1		1	1	1	3	1	10
COMMON DRAGONET	87	43	36	45	65	59	68	115	86	54
DAB	125	118	94	98	107	150	133	125	114	83
EUROPEAN PLAICE	69	58	49	38	58	48	41	48	56	63
FLOUNDER (EUROPEAN)	3	5	3	1	1	1	1	2	2	1
GREY GURNARD	62	42	43	32	21	45	43	90	56	37
HADDOCK	1		1	1	1	1	1	12		10
JOHN DORY	2	6	3	3	3	3	2	2	2	1
LEMON SOLE	7	9	17	21	19	11	16	26	11	10
LESSER SPOTTED DOGFISH	47	37	47	24	98	33	67	74	78	60
LESSER WEEVER FISH	8	4	3	4	6	9	11	5	4	8
POGGE (ARMED BULLHEAD)	9	7	8	14	19	11	14	41	28	18
POOR COD	297	80	155	349	275	269	392	308	375	76

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
RED GURNARD	5	11	11	12	19	8	6	12	1	11
RED MULLET	2	3	1	9	2	15	6	2	1	1
SCALD FISH	3	4	4	9	10	13	8	23	11	13
SOLE (DOVER SOLE)	313	165	128	120	156	97	104	86	155	105
SOLENETTE	184	153	125	197	460	486	196	438	248	188
THICKBACK SOLE	28	15	17	12	14	8	13	27	21	15
TUB GURNARD	10	8	11	11	13	11	11	14	5	5
TURBOT	3	1	2	1	1	2	1	2	2	2
WHITING	68	20	63	42	106	93	54	94	310	89
WHITING POUT (BIB)	12	17	42	22	28	7	9	58	42	3

Annex 7 e) Abundance of fish species (per hour fishing) in subarea VIIg per year.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
AMERICAN PLAICE (LR DAB)				22	87	56	42	22		
ANGLERFISH (MONK)				13	26	19	9	5	7	9
BRILL	4		4	1	1				4	
COD				1	1	1	1	1		3
COMMON DRAGONET		4	4	51	97	60	42	40	33	67
DAB		4		75	65	51	43	98	183	340
EUROPEAN PLAICE		12	4	7	7	8	11	18	52	28
GREY GURNARD		32	4	62	99	49	38	25	128	133
HADDOCK				18	44	16	20	17	1	67
JOHN DORY				1	1		1		3	5
LEMON SOLE				13	19	16	13	6	16	4
LESSER SPOTTED DOGFISH			8	10	14	17	15	46	4	36
LESSER WEEVER FISH		4			1		1			
POGGE (ARMED BULLHEAD)				19	10	12	5	16	29	41
POOR COD	6	468	180	126	68	52	52	162	139	215
RED GURNARD				3	2	1	1	2	3	1
RED MULLET										
SCALD FISH				53	44	41	44	21	87	71
SOLE (DOVER SOLE)	6	60	16	13	13	11	8	23	11	53
SOLENETTE			4	49	44	38	9	21	125	95
THICKBACK SOLE		8		52	68	65	47	36	61	176
TUB GURNARD		4					1	1	1	1
TURBOT	2		4	1		1			3	
WHITING	10	108	40	43	19	33	29	124	95	793
WHITING POUT (BIB)		12	4		1			7	1	

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
AMERICAN PLAICE (LR DAB)			11	15	21	24			28	29
ANGLERFISH (MONK)		3	6	9	6	5	6	4	5	8
BRILL						1	1	2		1
COD				1			1			1
COMMON DRAGONET	4	65	32	27	195	96	99	106	115	52
DAB	4	92	40	39	15	76	66	100	162	107
EUROPEAN PLAICE	12	4	6	7	3	12	23	18	12	7
GREY GURNARD	8	87	46	61	23	47	63	130	142	64
HADDOCK		21	29	3	8	100	54	301	19	76
JOHN DORY			3	1	3	3		2	2	1
LEMON SOLE		4	1	3	3	2	13	10	7	8
LESSER SPOTTED DOGFISH	8	139	207	20	47	46	48	100	110	112
LESSER WEEVER FISH						1		10		2
POGGE (ARMED BULLHEAD)		16	97	15	22	5	98	114	111	84
POOR COD	232	57	108	77	273	300	263	332	453	69
RED GURNARD		3			2			2		2
RED MULLET								1		
SCALD FISH		1	12	11	17	16	33	16	22	5
SOLE (DOVER SOLE)	28	81	16	33	37	33	33	40	16	29
SOLENETTE							37	2	9	4
THICKBACK SOLE		80	133	57	153	49	44	34	59	24
TUB GURNARD				1		1	1			1
TURBOT	4	4	2	1	1	1	1	2	1	1
WHITING	308	167	47	53	145	118	21	238	482	22
WHITING POUT (BIB)			1	1		3			1	

Annex 7 f) Abundance of fish species (per hour fishing) in subarea VIII per year.

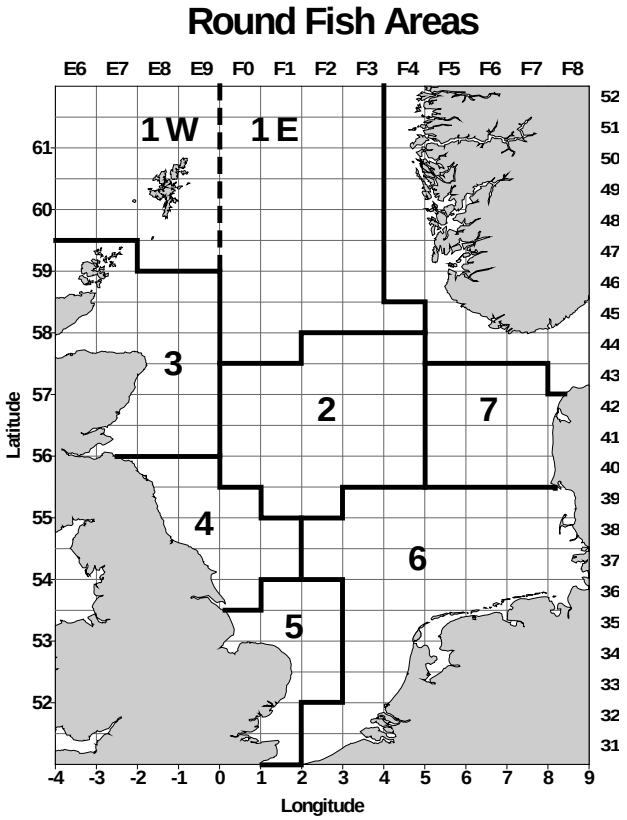
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
AMERICAN PLAICE (LR DAB)										
ANGLERFISH (MONK)								3	4	6
BRILL								1	1	1
COD										
COMMON DRAGONET								38	66	83
DAB										
EUROPEAN PLAICE								1	1	1
FLOUNDER (EUROPEAN)										
GREY GURNARD								9	4	6
HADDOCK									1	1
JOHN DORY								1	1	1
LEMON SOLE									1	
LESSER SPOTTED DOGFISH								3	2	5
LESSER WEEVER FISH								1	3	6
POGGE (ARMED BULLHEAD)										

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
POOR COD								11	35	75
RED GURNARD								1	1	1
RED MULLET								8	17	17
SCALD FISH								65	106	82
SOLE (DOVER SOLE)								58	88	122
SOLENETTE								26	64	49
THICKBACK SOLE								22	37	43
TUB GURNARD								1	1	1
TURBOT								1	1	1
WHITING								1	4	8

Annex 7 f) Abundance of fish species (per hour fishing) in subarea VIII per year, day and night separated.

SPECIES	DAY	NIGHT
AMERICAN PLAICE	N/A	N/A
ANGELRFISHES	4	2
BRILL	0	0
COD	N/A	N/A
DAB	N/A	N/A
DOVER SOLE	70	70
DRAGONET	41	45
EUROPEAN PLAICE	0	N/A
FLOUNDER (EUROPEAN)	N/A	N/A
GREY GURNARD	3	3
HADDOCK	0	0
JOHN DORY	0	0
LEMON SOLE	N/A	N/A
LESSER SPOTTED DOGFISH	0	0
POGGE (ARMED BULLHEAD)	N/A	N/A
POOR COD	60	47
RED GURNARD	0	0
RED MULLET	11	7
SCALDFISH	56	54
SOLENETTE	29	34
THICKBACK SOLE	31	33
TUB GURNARD	0	0
TURBOT	0	N/A
WEEVERFISHES	7	9
WHITING	5	3
WHITING POUT (BIB)	83	79

Annex 8: Abundance of fish species for the offshore surveys by roundfish area



Annex 8 a) Abundance of fish species (per hour fishing) in roundfish area 1 per year.

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
AMERICAN PLAICE (LR DAB)	17	177	150	101	116	142	218	180	189	212	187	223
ANGLERFISH (MONK)	3	9	4	1	7	12	4	3	3	3	6	5
COD	31	7	5	5	8	2	9	5	11	8	21	9
COMMON DRAGONET		1		1	1	1		1			2	1
DAB	5	109	73	68	54	98	111	83	29	37	103	140
EUROPEAN PLAICE	12	10	8	7	5	11	4	17	3	6	21	29
GREY GURNARD	4	25	7	3	16	19	15	22	9	66	22	18
HADDOCK	45	102	132	56	58	24	48	39	91	82	85	82
LEMON SOLE	15	20	9	10	20	8	13	24	4	27	22	34
LESSER SPOTTED DOGFISH						1		1		3	4	2
POGGE (ARMED BULLHEAD)			1	1		1	4	1		4	3	4
POOR COD					1	20	1	1	6	1	2	8
TURBOT	1										1	
WHITING	11	27	66	11	34	11	35	4	8	11	6	11

Annex 8 b) Abundance of fish species (per hour fishing) in roundfish area 2 per year.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
AMERICAN PLAICE (LR DAB)							25	36	131	66
ANGLERFISH (MONK)	1	1	1	2	1	1	1	1	1	1
BRILL	1	1	1	1	1	1	1	1	1	1
COD			1	1	1	1	7	2	3	3
COMMON DRAGONET	72	158	205	167	180	80	141	152	302	151
DAB	15	33	42	15	39	25	46	82	167	99
EUROPEAN PLAICE	23	19	27	17	15	14	14	44	32	30
FLOUNDER (EUROPEAN)	1	1	1	1	1	1	9	1	1	2
GREY GURNARD	3	1	2	2	6	1	7	9	12	11
HADDOCK						1	4	4	5	10
JOHN DORY	1	1	1	1	1	1	1	1	1	1
LEMON SOLE	3	2	1	1	2	2	3	2	7	4
LESSER SPOTTED DOGFISH	8	5	7	17	11	14	10	17	11	13
LESSER WEEVER FISH	5	2	3	4	5	2	5	2	3	4
POGGE (ARMED BULLHEAD)	8	15	14	20	24	26	15	30	13	19
POOR COD	78	67	40	26	41	42	34	25	21	26
RED GURNARD	27	10	20	27	40	27	20	14	16	19
RED MULLET	1	1	1	1	1	1	1	1	1	2
SCALD FISH	4	11	10	10	6	3	3	3	4	5
SOLE (DOVER SOLE)	19	25	21	18	11	9	13	23	18	21
SOLENETTE	24	49	30	53	40	27	30	31	20	37
THICKBACK SOLE	4	3	3	3	3	3	4	5	5	4
TUB GURNARD	2	1	3	4	2	2	1	1	2	2
TURBOT	1	1	1	1	1	1	1	1	1	1
WHITING	1	5	3	1	1	1	5	4	8	4
WHITING POUT (BIB)	108	35	48	32	33	29	50	60	87	49

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
AMERICAN PLAICE (LR DAB)	49	46	65	62	38	33	50	35	97	50
ANGLERFISH (MONK)	1	1	2	1	1	2	1	1	1	8
BRILL	1	1	1	1	1	1	1	1	1	1
COD	1	1	1	1	1	1	1	1	1	1
COMMON DRAGONET	145	138	132	168	158	78	125	115	218	148
DAB	62	114	140	138	117	69	142	114	230	228
EUROPEAN PLAICE	25	24	19	19	26	24	27	47	69	50
FLOUNDER (EUROPEAN)	3	1	1	1	1	1	1	1	2	1
GREY GURNARD	10	9	9	13	10	13	9	12	20	20
HADDOCK	21	14	5	5	3	2	9	2	5	1
JOHN DORY	1	1	1	1	1	1	1	1	1	1
LEMON SOLE	3	5	6	6	7	8	11	11	24	15
LESSER SPOTTED DOGFISH	8	15	11	13	13	16	14	12	2	21
LESSER WEEVER FISH	5	5	4	7	8	5	10	6	8	8

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
POGGE (ARMED BULLHEAD)	11	25	29	23	22	9	24	15	13	12
POOR COD	30	20	49	125	73	43	12	21	30	15
RED GURNARD	20	12	20	24	32	19	21	11	10	45
RED MULLET	1	2	1	3	2	1	3	1		1
SCALD FISH	3	3	20	34	37	8	9	21	21	18
SOLE (DOVER SOLE)	17	15	10	14	13	8	19	20	7	28
SOLENETTE	36	30	111	149	172	60	91	74	54	63
THICKBACK SOLE	7	12	59	85	73	11	13	7	17	12
TUB GURNARD	2	1	1	2	1	1	3	3	2	4
TURBOT	1	1	1	1	1	1	1	1	1	1
WHITING	4	5	6	5	3	5	3	2	4	6
WHITING POUT (BIB)	13	35	8	79	30	28	35	34	22	22

Annex 8 c) Abundance of fish species (per hour fishing) in roundfish area 3 per year.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
AMERICAN PLAICE (LR DAB)	7	1	1	2	9	8	7	9	6	10
ANGLERFISH (MONK)	1	1	3	4	5	3	2	1	1	3
BRILL	2	2	1	1	1	1	2	1	1	1
COD	16	5	2	10	6	4	3	3	1	5
COMMON DRAGONET	104	99	160	123	144	87	85	82	80	101
DAB	296	216	248	234	331	253	212	310	291	438
EUROPEAN PLAICE	168	112	138	157	133	130	139	181	211	190
FLOUNDER (EUROPEAN)	2	3	6	2	1	2	3	1	1	1
GREY GURNARD	32	35	68	55	52	27	27	32	34	45
HADDOCK	1		1	2	8	2	8	9	5	16
JOHN DORY	1	1	1	1	1	1	1	1	1	1
LEMON SOLE	4	2	3	10	12	13	11	9	8	7
LESSER SPOTTED DOGFISH	17	27	30	21	19	16	17	32	26	31
LESSER WEEVER FISH	8	16	33	26	26	24	10	20	16	15
POGGE (ARMED BULLHEAD)	39	20	37	41	32	26	24	22	23	20
POOR COD	174	111	110	165	103	113	82	111	126	164
RED GURNARD	2	5	3	4	6	4	6	6	6	6
RED MULLET	1	1	1	1	1	1	1	1	1	1
SCALD FISH	13	22	23	26	26	19	25	21	25	35
SOLE (DOVER SOLE)	101	126	122	68	66	47	53	83	94	130
SOLENETTE	102	231	166	180	203	152	138	160	162	231
THICKBACK SOLE	6	16	25	24	23	20	20	16	16	19
TUB GURNARD	5	5	12	5	6	5	5	6	9	9
TURBOT	1	1	1	1	1	1	1	1	1	1
WHITING	42	43	68	77	52	86	55	96	67	105
WHITING POUT (BIB)	97	37	24	9	14	13	7	49	40	22

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
AMERICAN PLAICE (LR DAB)	7	12	7	10	14	10	12	11	8	15
ANGLERFISH (MONK)	1	1	3	2	2	3	1	1	1	2
BRILL	2	1	1	1	1	1	1	2	1	1
COD	5	2	2	2	5	6	4	2	2	4
COMMON DRAGONET	98	72	91	119	117	60	77	96	107	68
DAB	347	376	304	534	539	337	419	315	493	408
EUROPEAN PLAICE	212	195	215	242	283	209	248	247	258	256
FLOUNDER (EUROPEAN)	2	4	4	5	4	4	3	2	3	6
GREY GURNARD	34	32	27	34	31	31	42	52	47	31
HADDOCK	12	18	7	8	11	12	17	15	4	13
JOHN DORY	1	2	1	1	1	1	1	1	1	1
LEMON SOLE	9	11	14	23	16	12	12	13	14	10
LESSER SPOTTED DOGFISH	20	24	32	20	50	25	40	36	43	44
LESSER WEEVER FISH	26	11	15	12	16	12	16	12	15	13
POGGE (ARMED BULLHEAD)	24	18	25	22	33	17	21	26	24	23
POOR COD	117	58	80	188	236	153	239	168	189	83
RED GURNARD	7	8	7	10	10	7	8	10	9	10
RED MULLET	1	1	1	3	1	4	3	1	1	1
SCALD FISH	41	38	59	69	63	39	54	53	75	56
SOLE (DOVER SOLE)	106	73	71	69	75	52	56	45	62	65
SOLENETTE	177	171	331	283	365	211	182	218	220	178
THICKBACK SOLE	19	16	22	17	25	11	19	21	28	18
TUB GURNARD	7	6	6	9	7	7	7	8	7	8
TURBOT	1	1	1	1	1	1	1	1	1	1
WHITING	48	44	49	51	114	73	71	54	140	60
WHITING POUT (BIB)	8	17	15	12	12	9	4	19	27	4

Annex 8 d) Abundance of fish species (per hour fishing) in roundfish area 4 per year.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
AMERICAN PLAICE (LR DAB)							39	66	73	103
ANGLERFISH (MONK)							2	1	2	2
BRILL				11	3	4	4	3	1	1
COD			16	21	3	20	13	176	9	5
COMMON DRAGONET	64		1	1	1	1	12	9	15	14
DAB	68		48	632	253	582	692	598	222	548
EUROPEAN PLAICE	4		72	187	67	518	70	84	35	89
FLOUNDER (EUROPEAN)							1			
GREY GURNARD	4				5	48	157	46	40	130
HADDOCK						12	28	36	29	12
LEMON SOLE	60		24	91	48	174	92	158	34	34
LESSER SPOTTED DOGFISH										1
LESSER WEEVER FISH			1	1	1	1	72	2	6	9
POGGE (ARMED BULLHEAD)	16		1	1		1	1	4	2	22

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
POOR COD				3				2	1	1
RED GURNARD			64	32	16	34				
RED MULLET									1	
SCALD FISH						30	75	11	2	14
SOLE (DOVER SOLE)			80	69	152	260	75	57	55	35
SOLENETTE						78	74	61	9	5
THICKBACK SOLE										
TUB GURNARD			8	27		6				
TURBOT						2		1		
WHITING				40	25	252	49	73	166	17
WHITING POUT (BIB)				64	84	16	17	36	2	5

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
AMERICAN PLAICE (LR DAB)	56	65	68	85	57	53	51	70	46	40
ANGLERFISH (MONK)	1	1	2	1	1	1	3	3	1	3
BRILL	1		1	1	1	1	1	1	1	1
COD	5	3	13	4	9	13	4	6	2	10
COMMON DRAGONET	39	21	20	22	19	74	52	61	57	27
DAB	504	447	347	550	349	564	1467	774	866	634
EUROPEAN PLAICE	81	69	76	186	120	155	183	98	159	174
FLOUNDER (EUROPEAN)										
GREY GURNARD	44	81	29	32	48	110	99	68	80	35
HADDOCK	32	34	16	11	6	7	10	4	2	2
LEMON SOLE	48	49	78	58	45	56	56	72	53	50
LESSER SPOTTED DOGFISH					1		1		2	
LESSER WEEVER FISH	9	6	16	55	53	5	13	7	11	258
POGGE (ARMED BULLHEAD)	20	9	80	7	15	16	43	12	16	7
POOR COD	1	1	2		11	5		6	1	9
RED GURNARD							1			
RED MULLET	1		1					1		
SCALD FISH	15	19	11	31	23	92	37	38	57	48
SOLE (DOVER SOLE)	56	15	59	22	9	22	42	18	13	19
SOLENETTE	14	11	4	31	4	33	4	8	39	11
THICKBACK SOLE	1					1	1	1	1	1
TUB GURNARD	1		1		1			1	1	1
TURBOT	1	1		1		1	1	1	1	1
WHITING	73	38	72	63	17	22	37	13	33	14
WHITING POUT (BIB)	19	5	49	4			8	7	1	1

Annex 8 e) Abundance of fish species (per hour fishing) in roundfish area 5 per year.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
AMERICAN PLAICE (LR DAB)										
ANGLERFISH (MONK)			1							1
BRILL	2	1	1	1	2	2	2	1	1	1
COD	1	1	3	1	7	3	4	37	5	3
COMMON DRAGONET	49	22	3	2	2	35	30	3	5	11
DAB	80	40	322	97	174	367	406	484	194	320
EUROPEAN PLAICE	29	30	35	35	73	97	81	98	87	73
FLOUNDER (EUROPEAN)	9	4	2	1	4	11	6	10	2	8
GREY GURNARD	8	12	29	9	36	22	28	45	26	32
HADDOCK									1	
JOHN DORY										
LEMON SOLE	12	19	7	37	74	57	88	50	27	19
LESSER SPOTTED DOGFISH	8	14	4	8	3	3	3	2	4	4
LESSER WEEVER FISH	33	38	69	26	32	2	66	33	14	21
POGGE (ARMED BULLHEAD)	37	30	10	15	15	60	53	24	6	12
POOR COD	131	145	19	19	26	23	9	6	12	20
RED GURNARD	1	1	3	1	1	16	4	2	1	1
RED MULLET		1	1	1	1	1	1	1	1	1
SCALD FISH	21	5	78	49	26	133	69	47	34	45
SOLE (DOVER SOLE)	125	141	54	228	330	195	135	230	167	200
SOLENETTE	31	4	125	30	13	150	170	121	81	60
THICKBACK SOLE		1		1				1	1	
TUB GURNARD	1	1	4	9	2	1	1	1	1	1
TURBOT	1	1	1	1	1	1	1	1		1
WHITING	76	15	26	78	79	83	73	79	221	104
WHITING POUT (BIB)	135	78	17	35	211	187	56	71	186	282

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
AMERICAN PLAICE (LR DAB)			1							
ANGLERFISH (MONK)	1			1		1		1		1
BRILL	1	1	1	1	1	1	1	1	1	1
COD	2	3	3	1	2	5	31	3	2	1
COMMON DRAGONET	9	38	7	7	17	23	16	23	60	5
DAB	292	249	249	245	165	287	290	398	172	127
EUROPEAN PLAICE	68	65	117	78	51	86	63	65	72	46
FLOUNDER (EUROPEAN)	8	6	32	7	1	3	3	1	1	4
GREY GURNARD	10	10	15	5	9	19	14	7	3	2
HADDOCK	1									
JOHN DORY							1		1	
LEMON SOLE	24	32	33	23	16	13	10	34	12	12
LESSER SPOTTED DOGFISH	8	5	20	7	26	4	19	14	29	21
LESSER WEEVER FISH	15	17	24	29	35	22	33	37	95	11
POGGE (ARMED BULLHEAD)	26	37	16	24	27	17	32	20	24	6

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
POOR COD	10	30	28	22	89	41	18	74	39	15
RED GURNARD	1	1	1	1	1	2	1	1	1	
RED MULLET	1	1	1	1	1	1	1	1	1	1
SCALD FISH	46	28	41	41	45	109	58	46	25	32
SOLE (DOVER SOLE)	192	146	163	245	127	249	288	190	117	121
SOLENETTE	98	48	64	59	27	73	62	53	18	31
THICKBACK SOLE		1	1	1	1	1	1	1	1	1
TUB GURNARD	2	1	2	2	2	4	4	3	2	1
TURBOT	1	1	1	1	1	1	1	1	1	1
WHITING	118	85	130	77	114	79	85	61	55	34
WHITING POUT (BIB)	81	196	77	169	131	80	32	151	81	33

Annex 8 f) Abundance of fish species (per hour fishing) in roundfish area 6 per year.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
AMERICAN PLAICE (LR DAB)	3	2	1	1	2	2	3	8	34	14
ANGLERFISH (MONK)			1	1	1	1	1			
BRILL	2	1	3	3	2	1	1	2	2	1
COD	5	10	3	1	11	9	9	25	4	1
COMMON DRAGONET		1	1	1	1	139	14	111	103	114
DAB	1937	1143	1176	1140	1075	769	1483	1391	1387	1275
EUROPEAN PLAICE	524	668	625	657	599	526	785	1214	1076	817
FLOUNDER (EUROPEAN)	10	16	5	9	5	8	10	12	5	2
GREY GURNARD	24	24	35	35	61	37	36	37	60	95
HADDOCK				1		1			1	
JOHN DORY					1		1			
LEMON SOLE	2	2	1	3	14	10	10	86	7	6
LESSER SPOTTED DOGFISH	1	1	1		1			1		1
LESSER WEEVER FISH	28	24	33	44	58	59	19	50	37	48
POGGE (ARMED BULLHEAD)	45	62	63	40	157	111	58	189	158	40
POOR COD	3	1	1	1	1	5	2	1	6	2
RED GURNARD		1	1	1		1	2	1	1	1
RED MULLET	1	1	1	1	4	2	1	1	1	13
SCALD FISH	93	70	79	191	92	84	20	43	91	89
SOLE (DOVER SOLE)	89	52	139	82	53	62	30	161	82	51
SOLENETTE	79	77	131	178	166	141	37	90	68	297
THICKBACK SOLE	1	1				1			1	
TUB GURNARD	8	6	14	13	11	6	6	4	7	4
TURBOT	5	4	4	3	5	3	2	3	3	3
WHITING	370	72	79	80	121	110	40	53	219	172
WHITING POUT (BIB)	27	3	7	2	7	34	5	57	54	101

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
AMERICAN PLAICE (LR DAB)	6	4	9	5	8	6	6	1	3	2
ANGLERFISH (MONK)	1	1	1	1		1	1	1		1
BRILL	2	1	1	1	1	1	1	1	1	1
COD	3	2	1	1	1	3	3	6	2	1
COMMON DRAGONET	64	68	124	95	65	37	64	83	106	61
DAB	988	935	798	853	542	627	463	803	1156	907
EUROPEAN PLAICE	590	1209	759	501	451	463	379	575	616	895
FLOUNDER (EUROPEAN)	3	4	4	5	6	6	3	5	6	4
GREY GURNARD	44	25	37	36	36	49	27	26	23	19
HADDOCK	1	1	1	1	1	1	1		1	1
JOHN DORY					1	1	1	1	1	1
LEMON SOLE	5	8	10	18	10	4	5	18	12	8
LESSER SPOTTED DOGFISH	1		1	1	1	1	1	1	1	1
LESSER WEEVER FISH	37	74	41	61	55	37	45	39	55	22
POGGE (ARMED BULLHEAD)	44	60	86	59	44	23	26	37	71	31
POOR COD	1	1	2	2	6	1	1	7	4	1
RED GURNARD	1	1	1	1	1	1	1	1	1	1
RED MULLET	1	2	4	10	2	1	2	1	1	4
SCALD FISH	78	140	168	226	233	171	80	163	192	224
SOLE (DOVER SOLE)	40	42	75	34	16	17	44	34	33	31
SOLENETTE	397	220	269	149	192	137	70	107	148	194
THICKBACK SOLE		1			1	1	1			
TUB GURNARD	6	5	5	8	6	7	7	8	6	6
TURBOT	5	3	3	4	3	3	3	3	3	2
WHITING	179	270	104	81	55	33	19	113	67	53
WHITING POUT (BIB)	23	16	13	14	14	5	4	29	43	3

Annex 8 g) Abundance of fish species (per hour fishing) in roundfish area 7 per year.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
AMERICAN PLAICE (LR DAB)	27	28		73			184	75	200	63
ANGLERFISH (MONK)		1					3	1	2	1
BRILL				1			1	1	1	1
COD	1	3		2			101	15	18	3
COMMON DRAGONET							6	1	11	9
DAB	2799	1532		3382			1646	467	1622	574
EUROPEAN PLAICE	871	692		286			200	291	644	215
FLOUNDER (EUROPEAN)	7	3		1			6	2	1	1
GREY GURNARD	110	86		92			84	34	111	63
HADDOCK							3	5	2	5
LEMON SOLE	8	3		1			10	9	8	2
LESSER SPOTTED DOGFISH										
LESSER WEEVER FISH				5						1
POGGE (ARMED BULLHEAD)	35	52		84			27	9	25	4

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
POOR COD								1		
SCALD FISH	5	18		21					4	3
SOLE (DOVER SOLE)	16	12		9			4	1	7	2
SOLENETTE	5	3		24			2	1	1	1
TUB GURNARD	3			2			5	6	3	1
TURBOT	2	1		1			1	1	1	1
WHITING	659	152		89			11	2	9	9
WHITING POUT (BIB)	1									

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
AMERICAN PLAICE (LR DAB)	116	88	126	70	63	49	47	10	24	32
ANGLERFISH (MONK)	2	1	1	1	1	1	1		1	1
BRILL	1			1	1	1		1	1	1
COD	15	7	7	17	3	4	2	4	1	1
COMMON DRAGONET	7	3	5	33	28	24	17	4	31	17
DAB	2849	649	473	742	732	723	372	72	541	552
EUROPEAN PLAICE	671	89	92	155	145	278	102	31	309	196
FLOUNDER (EUROPEAN)	1			1	1	1		1	2	1
GREY GURNARD	251	51	36	27	27	95	44	15	40	29
HADDOCK	46	13	2	4	3	8	3	1	1	3
LEMON SOLE	7	8	10	10	7	6	2	2	7	7
LESSER SPOTTED DOGFISH									1	
LESSER WEEVER FISH			1	1				1	1	1
POGGE (ARMED BULLHEAD)	24	5	2	13	11	5	3	1	13	9
POOR COD										
SCALD FISH	54	15	10	38	57	38	8	4	42	39
SOLE (DOVER SOLE)	10	2	1	1	1	1	1	1	1	1
SOLENETTE	27	13	14	168	211	50	3	1	198	117
TUB GURNARD	2	1	1	1	1	2	1	1	1	1
TURBOT	4	1	1	1	1	1	1	1	1	1
WHITING	43	153	25	12	10	7	4	1	12	
WHITING POUT (BIB)										

Annex 9: Abundance (n/hour) of 13 epifauna species for the offshore surveys by roundfish area or Subdivision

Annex 9 a) Abundance of epifauna species (per hour fishing) in roundfish area 1 per year

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Aphrodita aculeata	84	20	242	52	79	154	82	46	52	93	40	66
Asterias rubens	420	385	83	127	213	1080	16	23	10	20	74	885
Astropecten irregularis	183	184	2846	1018	2853	9776	160	402	2292	948	447	308
Buccinum undatum	8	24	18	10	50	220	26	41	40	48	99	60
Cancer pagurus						16				8	6	
Corystes cassivelaunus										4		
Echinocardium sp.	1920	2	88	20	46	63	10			16		
Liocarcinus depurator	96		107	26	113	109	88	27	138	96	20	152
Liocarcinus sp.	138	116	56	11	67	42	20	48	23	96	33	125
Nephrops norvegicus	12		102	21	69	571	16	8	90	54		
Ophiothrix fragilis					422	94		33			4	
Ophiura sp.	30	944	142	57	98	154	14	36	32	318	373	229
Pagurus sp.	84	536	52	63	326	664	62	232	152	336	556	512

Annex 9 b) Abundance of epifauna species (per hour fishing) in roundfish area 2 per year

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Aphrodita aculeata	171	126	75	98	71	76	224	100	110	93	76	156	97	39
Asterias rubens	8340	31310	87	385	702	366	581	550	745	809	764	735	1031	904
Astropecten irregularis	6581	2605	575	2051	2984	1874	1851	1757	3428	3456	5379	6785	13503	10634
Buccinum undatum	668	29	99	125	101	104	164	121	241	373	335	364	458	544
Cancer pagurus	10	10			2		6	12	12	5	24	24	13	12
Corystes cassivelaunus	504	364	2	22	28	9	28	27	94	53	38	39	44	83
Echinocardium sp.	578	141	57	161	114	155	145	71	458	391	139	194	275	602
Liocarcinus depurator			194	230	11	222	493	103	268	341	286	144	397	517
Liocarcinus sp.	485	3134	90	262	153	47	201	56	131	184	314	294	120	394
Nephrops norvegicus		24				59	50	12	19	4	4	5	12	4
Ophiothrix fragilis			251	2109	438	104	1523	703	12	163	76	64	72	16
Ophiura sp.	8557	2100	87	232	95	43	121	49	60	32	41	53	38	80
Pagurus sp.	247	87	209	196	110	126	186	243	314	334	490	907	888	909

Annex 9 c) Abundance of epifauna species (per hour fishing) in roundfish area 3 per year

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Aphrodita aculeata	140	552	120	47	86	56	84	68	128	105	72	56	106	73
Asterias rubens	4541	25829	668	942	607	903	4998	2692	189	359	877	279	1119	591
Astropecten irregularis	4784		66	245	294	384	460	720	191	653	876	184	195	208
Buccinum undatum	216	3200	64	28	21	14	54	63	70	53	27	49	157	135
Cancer pagurus	7	314	7	3	4	3	48	52	13	10	32	16	12	10
Corystes cassivelaunus				4						16				
Echinocardium sp.	3984		81	34	31	58	368	16	10	16	418	331		
Liocarcinus depurator			36	33	110	82	115	656	661	426	701	229	229	186
Liocarcinus sp.	483	9739	121	227	62	35	235	273	606	370	168	138	228	229
Nephrops norvegicus			76	193	132	297	39	1170	131	1032	512	118		326
Ophiothrix fragilis			84	9	60	11	1808	2837	20	11	48	21	159	34
Ophiura sp.	496	26123	118	322	62	215	846	120	207	260	226	290	268	383
Pagurus sp.	72	768	307	395	147	69	195	571	429	277	213	584	953	681

Annex 9 d) Abundance of epifauna species (per hour fishing) in roundfish area 4 per year

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Aphrodita aculeata							924		40	75
Asterias rubens							10648	12455	210	411
Astropecten irregularis							728	56	178	773
Buccinum undatum							96		48	29
Cancer pagurus	232						3	5	29	9
Corystes cassivelaunus									22	25
Echinocardium sp.							1280		47	100
Liocarcinus depurator										
Liocarcinus sp.							2566	2137	175	822
Nephrops norvegicus							16			
Ophiothrix fragilis									49	19
Ophiura sp.							264	744	59	69
Pagurus sp.							80	136	94	102

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Aphrodita aculeata	115	65	136	38	80	81	82	86	158	115
Asterias rubens	590	186	885	583	168	1098	355	1219	1717	1689
Astropecten irregularis	1072	218	578	687	2445	1457	2281	1682	4242	1567
Buccinum undatum	763	24	169	62	22	86	94	178	66	106
Cancer pagurus	18	11	22	14	13	40	12	12	19	23
Corystes cassivelaunus	40	23	26	65	99	122	255	34	176	29
Echinocardium sp.	12	8	16		50	225	28	8		
Liocarcinus depurator			330	68	423	270	302	403	125	76
Liocarcinus sp.	529	108	542	220	1136	1143	601	1438	392	933
Nephrops norvegicus	6		16	32	4	4		4		4
Ophiothrix fragilis	38507	11	373	61	276	133	94804	540	696	17
Ophiura sp.	101	35	259	58	121	46	70	306	360	148
Pagurus sp.	220	74	241	221	387	580	366	437	765	341

Annex 9 e) Abundance of epifauna species (per hour fishing) in roundfish area 5 per year

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Aphrodita aculeata	48		16	24			76	39		
Asterias rubens	32	10295	1049	97	872	12	856	3268	637	1939
Astropecten irregularis		43	2488				16	128	112	184
Buccinum undatum	16	245	629	142	32		48	96	3	534
Cancer pagurus	48	12	7	7	1	569	34	12	103	54
Corystes cassivelaunus			505	51					6	16
Echinocardium sp.	72	2609	6300	53	392		100	210	2	
Liocarcinus depurator									69	8
Liocarcinus sp.	208	1746	775	3268	784	256	3118	2032	839	1555
Nephrops norvegicus			5				16	1		18
Ophiothrix fragilis									32	64
Ophiura sp.	160	536	915	121	416	112	251	90	20	465
Pagurus sp.	648	2244	769	791	472	360	448	1096	57	1356

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Aphrodita aculeata	176	2	103	36	202	866	205	241	6	
Asterias rubens	4697	4886	1405	1064	821	2069	1423	3743	408	5152
Astropecten irregularis	97		242	581	80	823	1956	4648	40	160
Buccinum undatum	60	6	67	44	158	588	780	164	11	96
Cancer pagurus	276	753	132	18	69	19	82	35	9	4
Corystes cassivelaunus	41	14	26	22	49	85	62	57	58	46
Echinocardium sp.	64	178	832	583	1761	1785	1141	5938		37
Liocarcinus depurator	2632	4510	211	421	202	496	771	1373	30	67
Liocarcinus sp.	2981	2234	3004	2706	3465	45443	7454	3256	512	3720
Nephrops norvegicus						431	490	2320		0
Ophiothrix fragilis	165	8	477	303109	8	117	228	187	2	
Ophiura sp.	431	53	13969	593	420	1482	47113	854	193	926
Pagurus sp.	320	43	199	138	147	373	630	634	228	243

Annex 9 f) Abundance of epifauna species (per hour fishing) in roundfish area 6 per year

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Aphrodita aculeata	212	241	541	291	433	196	604	428	190	306
Asterias rubens	4009	7396	7529	4964	2852	3912	3929	4618	14469	24057
Astropecten irregularis	4001	3407	2651	2268	2127	2023	3510	995	3099	7325
Buccinum undatum	77	113	68	67	248	66	130	17	942	213
Cancer pagurus	2	2	1	6	2	4	60	4	25	14
Corystes cassivelaunus	134	206	275	130	427	188	720	335	185	434
Echinocardium sp.	2614	2546	1296	2270	1398	952	1548	10716	141	5413
Liocarcinus depurator										
Liocarcinus sp.	1777	2391	3715	3106	4211	4971	2129	2471	4721	8487
Nephrops norvegicus	20	132	214	69	34	2	45	265	62	53
Ophiothrix fragilis	96	99	36	16	16	40	112		50	220
Ophiura sp.	574	9370	6487	4350	14599	698	22189	18127	4658	11772
Pagurus sp.	327	293	285	282	509	168	456	287	704	431

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Aphrodita aculeata	375	329	281	453	280	331	495	51	121	156
Asterias rubens	10073	251	8981	7547	7211	5093	4012	5903	6441	4195
Astropecten irregularis	4878	1508	13182	12222	10419	9274	8490	7222	9457	###
Buccinum undatum	237	14	31	109	135	28	50	863	440	410
Cancer pagurus	14	3	73	26	18	23	36	28	23	14
Corystes cassivelaunus	254	94	214	600	436	496	348	160	378	265
Echinocardium sp.	526	186	1343	2810	1286	587	566	486	283	2069
Liocarcinus depurator	114	95	184	684	445	330	627	223	383	244
Liocarcinus sp.	3286	540	8604	14438	13200	32050	5762	9549	6389	7505
Nephrops norvegicus	1553	8	175	114	171	60	869	340	49	110
Ophiothrix fragilis	70	116	112	52	768	90	111	36	102	175
Ophiura sp.	5815	217	1870	1221	1232	1037	2679	1983	3037	3353
Pagurus sp.	440	58	317	382	227	269	210	457	542	522

Annex 9 g) Abundance of epifauna species (per hour fishing) in roundfish area 7 per year

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Aphrodita aculeata	320	371		304			319	1	41	267
Asterias rubens	3404	1948		1549			659	10155	138	1129
Astropecten irregularis	2265	4679		1934			1967	48	2761	2987
Buccinum undatum	48			6			11	232	65	219
Cancer pagurus	1	129		4			4	7	4	7
Corystes cassivelaunus	64	443		81			4376	14	9	86
Echinocardium sp.	41593	44889		7294			1111	4	9	1120
Liocarcinus depurator										
Liocarcinus sp.	484	255		797			528	867	198	632
Nephrops norvegicus		1		5			15			126
Ophiothrix fragilis	192			16					188	115
Ophiura sp.	1333	2571		48			872	2240	342	210
Pagurus sp.	201	238		203			213	187	151	119

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Aphrodita aculeata	174	281	407	166	369	58	380	147	75	80
Asterias rubens	425	195	475	2347	523	1073	466	459	612	3228
Astropecten irregularis	2656	1323	2379	1916	2388	4142	11348	6853	8831	8162
Buccinum undatum	209	89	357	261	166	223	240	222	109	139
Cancer pagurus	4	12	12	4	4	11	3	8	13	8
Corystes cassivelaunus	223	97	102	22	26	72	118	53	27	117
Echinocardium sp.	924	154	566	219	1774	656	501	333	134	10315
Liocarcinus depurator	106	69	207	300	509	166	68	325	452	396
Liocarcinus sp.	262	101	182	175	392	1268	366	823	813	1127
Nephrops norvegicus	14	58	44	230	357	107	9	213	289	386
Ophiothrix fragilis	10	56	4	21	16	28				
Ophiura sp.	239	112	238	274	278	66	27	98	104	49
Pagurus sp.	82	249	400	745	469	209	245	384	447	543

Annex 9 h) Abundance of epifauna species (per hour fishing) in ICES Sub-division VIIa per year

	2004	2005	2006	2007	2008	2009
Aphrodita aculeata	1136	420	672	644	364	648
Asterias rubens	15060	23980	22188	23268	17552	19728
Astropecten irregularis	1696	3968	1652	4844	2516	1824
Buccinum undatum	1148	1332	564	1396	2372	420
Cancer pagurus	180	124	156	104	68	244
Corystes cassivelaunus		16	4		64	12
Echinocardium sp.	108	236	236	364	408	764
Liocarcinus depurator	948	592	1168	304	1492	880
Liocarcinus sp.	1888	1804	2804	3980	3096	6168
Nephrops norvegicus	628	428	1032	504	488	728
Ophiothrix fragilis	3492	16	224	224	80	1124
Ophiura sp.	1372	11256	2688	14392	25452	8028
Pagurus sp.	4176	1412	4664	4272	12368	2024

Annex 9 i) Abundance of epifauna species (per hour fishing) in ICES Sub-division VIId per year

	2004	2005	2006	2007	2008	2009
Aphrodita aculeata	352	1492	148	668	452	836
Asterias rubens	18672	7452	8592	69460	63520	36824
Buccinum undatum	1524	544	148	268	1236	1268
Cancer pagurus	16	4	20	28	8	8
Corystes cassivelaunus	0	4	0	8	4	12
Echinocardium sp.	28	88	145600	508	52	128
Liocarcinus depurator	432	80	88	4240	10752	2756
Liocarcinus sp.	10248	9404	11888	4684	12376	12336
Ophiothrix fragilis	33656	133520	1073120	104204	1304	0
Ophiura sp.	2844	12	288	768	2176	1240
Pagurus sp.	280	728	512	92	2484	1332

Annex 9 j) Abundance of epifauna species (per hour fishing) in ICES Sub-division VIIe per year

	2004	2005	2006	2007	2008	2009
Aphrodite aculeata	104	8	128	60	72	252
Asterias rubens	1076	60	2088	512	30224	27784
Astropecten irregularis	36	48	164	540	276	204
Buccinum undatum	2032	1460	680	44	3136	380
Cancer pagurus	28	0	4	8	0	44
Corystes cassivelaunus	0	4	12	0	4	4
Echinocardium sp.	8	48	80	4	24	28
Liocarcinus depurator	536	0	0	0	0	0
Liocarcinus sp.	3176	556	1504	1864	7100	832
Ophiothrix fragilis	0	0	12	0	0	0
Ophiura sp.	168	40	384	224	6420	2172
Pagurus sp.	740	44	700	324	424	228

Annex 9 k) Abundance of epifauna species (per hour fishing) in ICES Sub-division VIIIa,b per year

SPECIES	DAY	NIGHT
Aphrodita aculeata	N/A	N/A
Asterias rubens	N/A	N/A
Astropecten irregularis	N/A	N/A
Buccinum undatum	22	15
Cancer pagurus	N/A	N/A
Corystes cassivelaunus	N/A	N/A
Echicardium sp.	N/A	N/A
Liocarcinus depurator	N/A	N/A
Liocarcinus sp.	N/A	N/A
Nephrops norvegicus	74	60
Ophiotrix fragilis	N/A	N/A
Ophiura sp.	N/A	N/A
Pagurus sp.	N/A	N/A

Annex 10: Population abundance indices for sole and plaice, offshore surveys

Annex 10.1: Catch rate of sole from Netherlands and UK surveys in the North Sea and VII d, a, e, f and g.

a) Netherlands: sole (N.hr^-1/8m trawl) North Sea (IV) RV "Isis".

YEAR/AGE	0	1	2	3	4	5	6	7	8	9	10+
1985	0.000	7.031	7.121	3.695	1.654	0.688	0.276	0.000	0.000	0.000	0.000
1986	0.000	7.168	5.183	1.596	0.987	0.623	0.171	0.158	0.000	0.018	0.052
1987	0.041	6.973	12.548	1.834	0.563	0.583	0.222	0.228	0.058	0.000	0.022
1988	0.000	83.111	12.512	2.684	1.032	0.123	0.149	0.132	0.103	0.014	0.126
1989	0.490	9.015	68.084	4.191	4.096	0.677	0.128	0.242	0.000	0.051	0.034
1990	0.019	37.839	24.487	21.789	0.778	1.081	0.770	0.120	0.115	0.025	0.048
1991	0.815	4.035	28.841	6.872	6.453	0.136	0.135	0.063	0.045	0.013	0.059
1992	0.024	81.625	22.284	10.449	2.529	3.018	0.090	0.162	0.078	0.020	0.077
1993	0.018	6.350	42.345	1.338	5.516	3.371	6.199	0.023	0.084	0.053	0.061
1994	2.172	7.660	7.121	19.743	0.124	1.636	0.088	0.983	0.009	0.000	0.008
1995	0.429	28.125	8.458	6.268	5.129	0.363	0.805	0.316	0.734	0.039	0.036
1996	0.161	3.975	7.634	1.955	1.785	2.586	0.326	0.393	0.052	0.264	0.055
1997	0.542	169.343	4.919	2.985	0.739	0.710	0.380	0.096	0.035	0.042	0.055
1998	0.371	17.108	27.422	1.862	1.242	0.073	0.015	0.391	0.000	0.000	0.000
1999	6.338	11.960	18.363	15.783	0.584	1.920	0.310	0.218	0.604	0.003	0.310
2000	0.190	14.594	6.144	4.045	1.483	0.263	0.141	0.060	0.007	0.150	0.069
2001	9.200	7.998	9.963	2.156	1.564	0.684	0.074	0.037	0.028	0.000	0.163
2002	5.908	20.989	4.182	3.428	0.886	0.363	0.361	0.032	0.069	0.000	0.052
2003	0.321	10.507	9.947	2.459	1.670	0.360	0.187	0.319	0.000	0.020	0.000
2004	0.685	4.192	4.354	3.553	0.644	0.626	0.118	0.070	0.073	0.000	0.012
2005	0.083	5.534	3.395	2.377	1.303	0.167	0.171	0.077	0.047	0.000	0.018
2006	0.060	17.089	2.332	0.278	0.709	0.479	0.151	0.088	0.000	0.007	0.030
2007	0.714	7.498	19.504	1.464	0.565	0.315	0.537	0.031	0.009	0.000	0.024
2008	3.092	15.247	9.062	12.298	1.313	0.222	0.279	0.202	0.028	0.047	0.000
2009	4.911	15.950	4.999	2.858	4.791	0.252	0.124	0.272	0.079	0.000	0.000

b) United Kingdom: sole (N.hr^-1/8m trawl) Eastern Channel (VIId).

YEAR/AGE	0	1	2	3	4	5	6	7	8	9	10+
1988		8.2	14.2	9.9	0.8	1.3	0.6	0.1	0.1	0.2	0.2
1989		2.6	15.4	3.4	1.7	0.6	0.2	0.2	0.0	0.0	0.7
1990		12.1	3.7	3.4	0.7	0.8	0.2	0.1	0.2	0.0	0.0
1991		8.9	22.8	2.2	2.3	0.3	0.5	0.1	0.2	0.1	0.1
1992		1.4	12.0	10.0	0.7	1.1	0.3	0.5	0.1	0.2	0.6
1993		0.5	17.5	8.4	7.0	0.8	1.0	0.3	0.2	0.0	0.4
1994		4.8	3.2	8.3	3.3	3.3	0.2	0.6	0.1	0.3	0.3
1995		3.5	10.6	1.5	2.3	1.2	1.5	0.2	0.3	0.2	0.3
1996		3.5	7.3	3.8	0.7	1.3	0.9	1.1	0.1	0.5	0.4
1997		19.0	7.3	3.2	1.3	0.2	0.5	0.4	0.9	0.0	0.7
1998		2.0	21.2	2.5	1.0	0.9	0.1	0.3	0.0	0.1	0.3

YEAR/AGE	0	1	2	3	4	5	6	7	8	9	10+
1999		28.1	9.4	13.2	2.5	1.7	1.3	0.2	0.9	1.1	0.5
2000		10.5	22.0	4.1	4.2	1.0	0.6	0.3	0.0	0.2	1.2
2001		9.1	21.0	8.4	1.2	1.9	0.5	0.6	0.3	0.0	1.0
2002		31.8	11.4	5.4	3.5	0.3	0.7	0.4	0.1	0.0	0.6
2003		6.5	28.5	4.1	2.5	1.6	0.3	0.4	0.2	0.1	0.5
2004		7.4	8.5	7.7	1.6	1.4	1.0	0.2	0.4	0.2	0.6
2005		25.0	5.0	2.9	3.5	1.6	1.0	0.7	0.1	0.3	0.4
2006		6.3	29.2	2.8	2.0	1.9	0.3	0.4	0.6	0.0	0.3
2007		2.1	21.9	12.9	1.2	0.8	1.2	0.3	0.2	0.6	1.0
2008		2.9	6.5	7.2	4.8	0.2	0.5	0.4	0.3	0.2	0.2
2009		30.5	13.3	5.4	4.3	3.8	0.4	0.2	0.3	0.2	0.5

c) United Kingdom: sole (total numbers for 2*4m beam trawl) Western Channel (VIIe).

YEAR/AGE	0	1	2	3	4	5	6	7	8	9	10+	DISTANCE FISHED (KM)
1989		5	56	120	107	34	40	17	5	7	12	165.66
1990		23	52	76	31	24	7	15	3	6	11	175.66
1991		11	231	79	51	23	21	5	17	4	15	171.68
1992		5	140	316	44	36	12	7	5	11	11	196.60
1993		5	54	115	105	14	10	9	3	3	10	189.19
1994		6	47	106	62	44	5	5	2	3	7	205.87
1995		14	37	44	42	26	31	4	5	5	13	187.15
1996		28	112	67	25	32	20	17	3	2	9	184.37
1997		11	130	126	43	14	16	13	14	5	15	184.74
1998		11	141	114	76	22	10	14	6	8	11	185.49
1999		11	97	128	47	23	8	4	4	4	17	187.89
2000		12	136	70	52	23	16	5	3	5	9	180.37
2001		9	197	162	52	31	12	12	4	1	7	177.98
2002		6	37	113	48	27	6	3	2	0	12	179.74
2003		23	124	78	56	28	6	1	1	2	4	182.24
2004		16	110	120	24	15	10	16	9	4	4	163.99
2005		8	110	39	53	12	12	6	2	4	4	186.60
2006		5	120	95	26	37	10	7	9	0	5	184.74
2007		7	188	135	50	11	23	3	3	1	4	181.02
2008		10	85	158	77	40	2	14	3	6	7	174.66
2009		11	104	126	96	49	13	13	12	1	8	172.05

d) United Kingdom: sole (total numbers for 4m beam trawl) Bristol Channel (VIIf).

YEAR/AGE	0	1	2	3	4	5	6	7	8	9	10+	DISTANCE FISHED (KM)
1988	22	60	242	36	14	4	0	0	0	0	6	74.12
1989	132	204	304	162	18	14	6	4	2	2	4	91.91
1990	21	269	219	35	11	3	5	2	0	0	1	69.86
1991	40	297	638	83	21	18	5	0	3	2	1	123.41
1992	5	493	325	174	37	23	12	1	2	1	5	125.08

YEAR/AGE	0	1	2	3	4	5	6	7	8	9	10+	DISTANCE FISHED (KM)
1993	3	201	379	51	23	1	2	2	1	1	2	127.67
1994	1	407	473	121	17	9	8	0	0	2	2	120.82
1995	31	142	255	60	13	7	14	1	1	1	4	104.14
1996	3	178	251	64	27	7	3	4	1	3	3	122.11
1997	37	498	207	21	13	14	5	3	6	0	4	116.18
1998	104	885	472	57	11	9	5	2	1	5	5	104.69
1999	29	2922	297	38	16	7	4	5	1	0	9	117.11
2000	16	1086	1608	37	26	6	0	2	1	1	4	105.99
2001	26	449	711	307	23	9	6	2	0	2	8	118.22
2002	9	786	283	151	121	14	7	2	3	0	4	116.92
2003	14	465	628	55	30	56	9	3	3	0	1	111.92
2004	63	862	434	99	15	22	42	4	3	0	5	101.92
2005	44	407	267	38	16	7	5	17	1	2	0	119.11
2006	13	324	238	47	16	8	0	2	12	0	1	120.56
2007	104	424	128	51	16	13	7	3	4	14	3	118.59
2008	6	1232	124	15	18	7	9	4	3	5	8	118.59
2009	1	604	377	29	8	10	4	3	3	2	11	118.59

e) United Kingdom: sole (total numbers for 4m beam trawl) in Irish Sea (VIIa).

YEAR/AGE	0	1	2	3	4	5	6	7	8	9	10+	DISTANCE FISHED (KM)
1988	2	118	196	180	410	76	40	4	0	4	6	100.06
1989	4	218	304	180	74	284	56	32	8	6	16	129.71
1990	4	1712	534	122	42	88	194	40	20	6	4	128.97
1991	4	148	1286	122	26	16	14	55	19	7	4	123.78
1992	2	220	309	657	142	34	22	7	75	17	6	129.52
1993	0	78	320	158	208	28	16	5	14	39	27	131.19
1994	0	62	431	193	95	128	43	10	11	6	36	124.89
1995	24	246	154	253	110	30	67	12	5	5	24	124.34
1996	4	886	126	32	76	46	23	31	8	2	11	127.49
1997	5	1158	577	72	24	55	27	16	30	7	10	132.86
1998	2	539	716	292	18	6	24	23	5	18	9	129.34
1999	3	385	293	255	203	29	8	26	5	6	21	125.26
2000	0	354	464	147	219	91	13	2	13	6	24	123.22
2001	1	91	284	192	65	96	64	6	3	12	11	127.30
2002	0	205	61	121	126	42	79	49	2	1	19	120.26
2003	0	242	210	51	97	81	40	43	26	1	13	121.00
2004	0	406	240	119	27	77	45	41	17	19	11	113.96
2005	0	53	165	69	25	13	35	25	4	6	17	119.70
2006	0	107	110	90	45	36	9	16	15	10	20	123.74
2007	0	125	93	49	57	41	11	4	6	12	22	126.00
2008	0	126	125	60	21	43	23	6	2	9	17	123.30
2009	0	57	150	68	39	23	30	12	7	1	16	126.00

Annex10.2. Catch rate of plaice from Netherlands and UK surveys in the North Sea and VII d, a, e, f and g.

a) Netherlands: plaice (N.hr^-1/8m trawl) North Sea (IV) RV "Isis".

AGE	0	1	2	3	4	5	6	7	8	9	10+
1985	595.271	136.759	173.893	36.059	10.997	1.273	0.973	0.336	0.155	0.091	0.229
1986	9.303	667.441	131.704	50.173	9.208	3.780	0.400	0.418	0.147	0.070	0.188
1987	44.126	225.822	764.186	33.841	4.880	1.842	0.607	0.252	0.134	0.078	0.186
1988	29.623	680.173	146.993	182.312	9.991	2.810	0.814	0.458	0.036	0.112	0.254
1989	31.862	467.877	319.272	38.660	47.305	5.850	0.833	0.311	0.661	0.132	0.075
1990	27.000	185.344	146.071	79.339	26.351	5.469	0.758	0.189	0.383	0.239	0.198
1991	152.176	291.378	159.424	33.955	13.569	4.313	5.659	0.239	0.204	0.092	0.107
1992	26.814	360.890	174.526	29.253	5.961	3.748	2.871	1.186	0.346	0.050	0.089
1993	74.272	188.988	283.400	62.783	8.272	1.128	1.130	0.584	0.464	0.155	0.071
1994	284.479	193.260	77.139	34.458	10.586	2.667	0.600	0.800	0.895	0.373	0.030
1995	108.101	265.634	40.618	13.218	7.527	1.110	0.806	0.330	1.051	0.202	0.119
1996	222.510	310.287	206.883	21.469	4.470	3.134	0.838	0.044	0.161	0.122	0.110
1997	65.515	1046.845	59.241	17.180	2.670	0.257	0.358	0.157	0.111	0.000	0.031
1998	255.654	347.575	402.657	44.960	8.294	1.224	0.339	0.149	0.213	0.072	0.081
1999	257.559	293.253	121.551	171.254	3.391	1.956	0.127	0.130	0.027	0.030	0.079
2000	209.293	267.473	69.252	29.349	22.359	0.570	0.162	0.502	0.027	0.012	0.052
2001	807.932	206.531	72.236	17.840	9.174	8.716	0.270	0.131	0.038	0.040	0.170
2002	248.356	519.224	44.475	14.901	4.991	2.539	1.321	0.085	0.128	0.000	0.092
2003	225.619	132.754	159.120	10.057	5.550	1.426	1.133	0.638	0.111	0.096	0.018
2004	197.940	233.707	39.623	61.912	6.152	2.464	1.492	0.952	2.842	0.000	0.012
2005	270.775	163.046	66.176	6.759	12.790	1.084	1.164	0.290	0.152	0.492	0.041
2006	250.800	128.615	36.385	18.115	2.982	5.890	0.867	0.757	0.040	0.269	0.387
2007	298.086	311.997	67.169	19.707	14.416	2.942	6.085	0.684	0.831	0.156	0.651
2008	387.592	221.567	120.728	30.108	9.075	7.205	0.618	1.715	0.292	0.229	1.046
2009	555.472	408.995	105.222	45.975	13.013	4.029	3.474	0.574	2.128	0.278	0.929

b) Netherlands: plaice (N.hr^-1/8m trawl) North Sea (IV) – RV "Tridens".

YEAR/AGE	0	1	2	3	4	5	6	7	8	9	10+
1996	0.000	1.643	6.021	4.451	2.903	2.039	1.566	0.721	0.415	0.190	0.468
1997	0.000	0.221	7.119	9.127	3.252	2.105	1.523	0.401	0.819	0.354	0.429
1998	0.000	0.228	32.249	9.572	4.874	2.202	1.274	0.929	0.762	0.304	0.540
1999	0.054	2.692	7.711	35.228	5.558	2.498	1.928	0.633	0.761	0.309	0.331
2000	0.043	4.795	13.445	12.910	16.957	2.882	1.716	0.933	0.805	0.218	0.530
2001	0.178	2.154	8.612	9.901	6.681	7.360	1.055	0.592	0.418	0.505	0.543
2002	0.000	18.553	12.912	9.541	6.411	4.181	4.420	0.743	0.741	0.394	0.933
2003	0.338	3.975	41.692	13.378	9.059	5.077	2.806	3.920	0.703	0.740	1.562
2004	0.014	5.985	15.784	31.488	9.430	4.316	2.439	1.242	2.500	0.409	1.405
2005	0.043	6.876	23.366	12.234	17.672	2.824	6.871	1.565	0.567	3.574	2.482
2006	0.236	6.725	32.192	25.727	11.367	10.918	1.985	3.897	0.864	0.723	3.262
2007	0.000	26.571	23.735	19.551	23.175	4.900	10.147	1.974	3.786	0.323	5.471
2008	0.000	17.467	50.462	25.585	18.392	18.974	6.243	12.747	2.657	6.749	8.411
2009	0.116	12.110	41.685	43.331	19.126	12.052	11.768	3.081	10.119	1.567	8.025

c) United Kingdom: plaice (N.hr^-1/8m trawl) Eastern Channel (VIId).

YEAR/AGE	0	1	2	3	4	5	6	7	8	9	10+
1988		26.5	31.3	43.8	7.0	4.6	1.5	0.8	0.7	0.6	1.2
1989		2.3	12.1	16.6	19.9	3.3	1.5	1.3	0.5	0.3	1.7
1990		5.2	4.9	5.8	6.7	7.5	1.8	0.7	1.0	0.8	0.4
1991		11.8	9.1	7.0	5.3	5.4	3.2	1.2	1.0	0.1	1.2
1992		16.5	12.5	4.2	4.2	5.6	4.9	3.4	0.7	0.5	0.7
1993		3.2	13.4	5.0	1.7	1.9	1.6	2.0	2.8	0.4	0.6
1994		8.3	7.5	9.2	5.6	1.9	0.8	0.9	1.8	1.2	0.8
1995		11.3	4.1	3.0	3.7	1.5	0.6	0.6	1.3	0.8	0.8
1996		13.2	11.9	1.3	0.7	1.3	0.9	0.4	0.3	0.4	2.8
1997		33.1	13.5	4.2	0.6	0.3	0.3	0.2	0.2	0.2	1.9
1998		11.4	27.3	7.0	3.1	0.3	0.2	0.2	0.1	0.0	1.0
1999		11.3	14.1	15.9	2.9	1.0	0.2	0.1	0.3	0.1	0.9
2000		13.2	21.0	14.4	13.8	3.5	0.9	0.6	0.2	0.4	1.5
2001		17.9	13.0	10.0	7.1	10.9	1.9	0.5	0.3	0.2	1.0
2002		20.7	15.9	7.7	3.5	1.8	3.5	0.7	0.1	0.1	0.6
2003		6.2	22.8	6.0	2.9	1.6	0.8	1.8	0.6	0.1	0.3
2004		36.2	15.0	13.2	3.4	0.9	0.2	0.7	1.2	0.2	0.2
2005		10.8	31.2	13.8	10.3	2.9	1.2	0.8	0.4	0.9	0.7
2006		17.2	16.1	9.2	3.3	2.6	0.8	0.6	0.3	0.1	0.5
2007		42.6	18.8	8.7	3.9	1.7	2.0	0.8	0.3	0.1	1.1
2008		30.3	26.5	7.2	3.0	2.3	1.1	0.5	0.4	0.1	0.3
2009		46.7	22.8	15.8	5.1	2.0	1.7	0.7	0.8	0.3	1.0

d) United Kingdom: plaice (total numbers for 2*4m beam trawl) Western Channel (VIIe).

YEAR/AGE	0	1	2	3	4	5	6	7	8	9	10+	DISTANCE FISHED (KM)
1989	0	31	70	281	188	23	11	14	8	6	18	165.66
1990	0	25	38	220	87	75	2	6	1	6	7	175.66
1991	2	22	27	63	79	62	41	9	0	1	3	171.68
1992	0	152	44	72	24	40	20	17	3	5	4	196.60
1993	0	21	70	60	24	13	25	13	11	2	2	189.19
1994	0	34	32	98	30	10	2	9	13	8	2	205.87
1995	0	50	46	45	48	12	4	5	6	1	4	187.15
1996	1	33	106	30	17	25	5	1	3	7	8	184.37
1997	0	53	122	197	24	6	12	7	1	1	7	184.74
1998	0	81	125	125	85	9	6	7	4	0	3	185.49
1999	1	38	44	182	53	30	3	2	6	4	2	187.89
2000	0	48	63	125	179	38	22	1	2	0	5	180.37
2001	21	32	64	51	111	97	25	13	0	3	5	177.98
2002	0	138	102	87	23	23	40	5	2	0	2	179.74
2003	0	29	137	60	50	5	18	27	7	0	2	182.24
2004	0	11	33	59	23	10	3	1	10	0	4	163.99
2005	2	30	75	91	70	13	3	3	5	2	3	186.60
2006	0	55	102	103	30	31	3	4	0	5	2	184.74
2007	0	37	91	121	34	27	6	6	1	3	4	181.02
2008	0	15	146	68	31	12	8	10	4	1	3	174.66
2009	3	16	156	214	29	15	11	8	5	1	3	172.05

e) United Kingdom: plaice (total numbers for 4m beam trawl) Bristol Channel (VIIf).

YEAR/AGE	0	1	2	3	4	5	6	7	8	9	10+	DISTANCE FISHED (KM)
1988	0	77	271	69	0	2	2	0	0	2	0	74.12
1989	2	206	313	72	15	5	0	2	0	0	0	91.91
1990	12	161	215	64	15	6	0	0	2	0	1	69.86
1991	2	841	33	65	21	12	3	0	1	0	0	123.41
1992	3	487	307	13	5	15	2	5	0	0	2	125.08
1993	4	121	107	43	2	5	0	1	0	0	0	127.67
1994	150	131	39	19	10	1	0	0	0	0	0	120.82
1995	1	275	103	19	3	8	2	0	0	2	0	104.14
1996	10	265	342	37	1	3	1	0	0	0	0	122.11
1997	8	259	117	40	5	2	2	1	0	0	0	116.18
1998	6	272	144	54	10	2	1	0	0	0	1	104.69
1999	192	181	94	34	23	8	0	0	2	0	0	117.11
2000	100	403	75	37	8	7	0	1	0	0	0	105.99
2001	42	251	185	19	10	5	4	2	0	0	0	118.22
2002	1	162	208	95	7	7	2	4	1	0	0	116.92
2003	72	117	95	72	26	3	2	1	1	2	0	111.92
2004	188	297	38	31	15	3	1	1	3	0	2	101.92

Year/Age	0	1	2	3	4	5	6	7	8	9	10+	Distance fished (km)
2005	3	228	89	25	10	13	3	1	0	0	1	119.11
2006	96	102	121	41	11	2	11	0	3	1	0	120.56
2007	41	178	109	56	18	2	3	1	2	1	0	118.59
2008	7	167	257	57	19	6	1	3	0	0	1	118.59
2009	222	192	66	93	25	13	5	2	0	1	0	118.59

f) United Kingdom: plaice (total numbers for 4m beam trawl) Irish Sea (VIIa).

Year/Age	0	1	2	3	4	5	6	7	8	9	10+	Distance fished (km)
1988	19	670	1035	275	3	117	13	4	0	8	12	100.06
1989	13	309	441	530	77	13	44	3	0	0	3	129.71
1990	57	1688	405	176	90	54	30	3	1	20	5	128.97
1991	35	591	481	68	47	4	4	24	3	0	8	123.78
1992	41	1043	470	267	23	19	14	14	3	0	11	129.52
1993	7	1007	836	111	90	11	5	9	2	1	6	131.19
1994	100	736	642	339	63	29	12	16	9	2	9	124.89
1995	281	1283	387	179	84	16	18	0	1	3	8	124.34
1996	105	1701	601	124	74	49	9	11	1	2	8	127.49
1997	31	1363	668	322	65	50	23	8	7	0	7	132.86
1998	169	1167	767	212	95	34	23	14	3	1	7	129.34
1999	180	1189	965	344	113	38	17	7	7	4	0	125.26
2000	132	2112	659	298	141	73	22	7	3	3	5	123.22
2001	249	1468	663	218	130	89	28	10	7	6	4	127.30
2002	16	1734	1615	647	243	79	51	16	17	5	7	120.26
2003	258	1480	1842	827	296	122	62	39	10	4	4	121.00
2004	218	1816	1187	1184	404	261	57	57	14	4	3	113.96
2005	288	869	1295	666	499	297	111	17	17	9	11	119.70
2006	485	1120	840	722	411	178	83	59	16	15	6	123.74
2007	186	2667	1255	525	417	196	95	45	37	6	10	126.00
2008	438	1293	1893	628	339	243	76	55	33	5	0	122.30
2009	150	1460	1083	1225	310	189	251	65	31	20	13	126.00

Annex10.3. Offshore index areas Dutch survey

SHIP	NEW INDEXAREA	OLD INDEXAREA
Isis	32F3	32F3
Isis	33F3	33F3
Isis	33F4	33F4
Isis	34F3	34F3
Isis	34F4	34F4
Isis	35F3	35F3
Isis	35F4	35F4
Isis	36F3	36F3
Isis	36F4	36F4
Isis	36F5	36F5
Isis	36F6	36F6
Isis	36F7	36F7
Isis	37F3	37F3
Isis	37F4	37F4
Isis	37F5	37F5
Isis	37F6	37F6
Isis	37F7	37F7
Isis	37F8	
Isis	38F3	38F3
Isis	38F4	38F4
Isis	38F5	38F5
Isis	38F6	38F6
Isis	38F7	38F7
Isis		39F4
Isis		39F5
Isis		39F6
Isis		39F7
Tridens II		34F1
Tridens II		35F0
Tridens II	35F1	35F1
Tridens II	35F2	35F2
Tridens II	36F0	
Tridens II	36F1	36F1
Tridens II	36F2	36F2
Tridens II	37F0	37F0
Tridens II	37F1	37F1
Tridens II	37F2	37F2
Tridens II	37F3	37F3
Tridens II	38F0	38F0
Tridens II	38F1	38F1
Tridens II	38F2	38F2
Tridens II	38F3	38F3
Tridens II	38F4	38F4
Tridens II	39E9	39E9

Ship	New indexarea	Old indexarea
Tridens II	39F0	39F0
Tridens II	39F4	39F4
Tridens II	40E9	40E9
Tridens II	40F0	40F0
Tridens II	40F1	40F1
Tridens II	40F2	40F2
Tridens II	40F3	40F3
Tridens II	40F4	40F4
Tridens II	40F5	40F5
Tridens II	40F6	40F6
Tridens II		41E8
Tridens II	41E9	41E9
Tridens II	41F0	41F0
Tridens II	41F4	41F4
Tridens II	41F5	41F5
Tridens II	41F6	41F6
Tridens II		42E8
Tridens II	42E9	42E9
Tridens II	42F0	42F0
Tridens II	42F1	42F1
Tridens II	42F2	42F2
Tridens II	42F3	42F3
Tridens II	42F4	42F4
Tridens II	42F5	42F5
Tridens II	42F6	42F6
Tridens II		43E8
Tridens II	43E9	43E9
Tridens II	43F0	43F0
Tridens II	43F4	
Tridens II	43F5	43F5
Tridens II	43F6	43F6
Tridens II		43F7
Tridens II	44E8	
Tridens II	44E9	
Tridens II	44F0	
Tridens II	44F1	
Combined*	34F2	

*** The combined index area is the combination of the Isis and the Tridens area. 34F2 is only used in the combined index and not in the separate indices. The rectangles as used for the ship separate indices are used in the combined index, too.**

Annex 11: Planimetric data for the continental inshore surveys

The area definitions used for the GIS analyses are presented in Figure 1. These new definitions are an approximation of the old figure (see last year's report). The estimation of the surface area (in km2) by area and depth class is presented in Table 1. The aggregation of the data into regions conform the old table with raising factors is presented in the report.

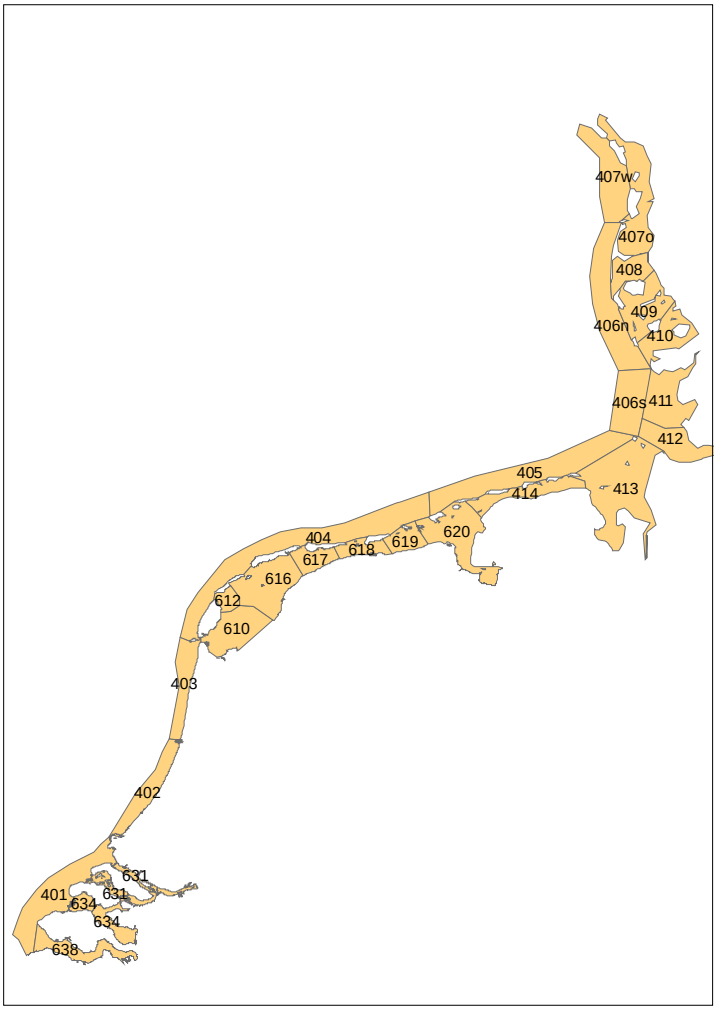


Figure 11.1. Area definitions for the Dutch DFS and German DYFS.

Surface area (km²) by area and depth class for the Dutch DFS and German DYFS.

Area	Depth class							Total	Total
	<0m (>LW)	0-5m	5-10m	15-20m	20-25m	25-30m	>30m	<LW	
401	0.3	329.7	370.2	192.1	58.1	28.0	7.1	985	986
402		44.0	78.3	174.2	199.4	3.1	0.3	499.3	499
403	0.9	50.8	92.5	176.3	121.7	18.9	4.6	464.8	466
404	6.4	275.6	420.1	393.8	484.9	132.4	0.4	1707.2	1714
Dutch coast	8	700	961	936	864	182	12	3656	3664
405	47.2	256.3	271.9	295.5	337.5	104.2	9.2	1274.5	1322
406n	4.3	246.4	322.4	489.0	14.3	1.0	0.0	1073.1	1077
406s	3.2	92.9	214.2	257.6	39.2	20.8	0.1	624.7	628
407w		193.1	323.5	214.3	5.5	0.2	0.1	736.7	737
German Bight	55	789	1132	1256	396	126	9	3709	3764
407o		767.4	26.9	15.4	3.7	2.2	0.8	816.4	816
408	158.5	118.3	19.5	7.6	1.8	0.3	0.1	147.7	306
409	323.0	184.8	47.2	18.2	10.8	4.6	0.2	265.8	589
410	233.2	83.3	39.4	32.6	8.9	2.0	0.2	166.3	400
411	324.3	220.3	56.8	21.3	1.3	0.0		299.9	624
412	198.3	126.2	93.9	46.0	24.5	5.1	0.6	296.3	495
413	740.1	325.8	161.2	106.6	50.7	12.0	1.6	657.9	1398
414	295.7	83.8	9.4	3.6	0.6	0.0		97.4	393
German & Danish WS	2273	1910	454	251	102	26	4	2748	5021
610	13.6	434.6	71.1	40.9	22.0	12.7	5.4	586.7	600
612	20.7	102.3	10.7	1.5	0.1			114.7	135
616	42.5	686.0	52.8	27.7	9.6	2.6	3.1	781.8	824
617	35.5	207.1	15.7	4.5	3.8	1.2	0.5	232.7	268
618	40.5	159.0	16.5	5.6	1.0			182.0	223
619	67.4	169.7	17.4	2.4	0.7			190.2	258
620	281.0	304.9	89.7	78.6	33.5	4.5	1.6	512.7	794
Dutch WS	501	2064	274	161	71	21	11	2601	3102
634	1.4	39.4	11.4	12.6	10.1	6.2	7.1	86.9	88
638	49.8	76.8	92.2	60.6	63.4	29.5	17.0	339.5	389
Scheldt estuary	51	116	104	73	74	36	24	426	478
Total	2888	5578	2925	2678	1507	392	60	13140	16028

Annex 12: Number of hauls by area and year for the inshore surveys

Annex 12 a) Number of hauls by area and year for the Dutch inshore survey (Tridens data are excluded).

region	Belgian Coast	Dutch Coast				German Bight			Scheldt Est			Dutch Wadden Sea						
Area code	400	401	402	403	404	405	406	407	631	634	638	610	612	616	617	618	619	620
1970		6	11	11	22				13	31	26	23		24	16	10	12	20
1971		9	9	13	19				4	29	30	25		28	14	8	12	22
1972		8	15	11	20				5	29	28	18		25	11	10	10	20
1973		8	9	8	19				5	30	31	18	2	24	11	9	9	22
1974		8	16	11	19				6	32	32	19	7	24	12	10	11	21
1975		8	11	10	19				4	31	26	21	7	25	14	9	10	21
1976									6	30	26	21	7	25	13	10	10	21
1977		10	16	9	23				8	28	27	21	7	26	13	10	11	21
1978		1	15	10	23	8	16	18	5	30	28	21	7	26	13	10	10	21
1979			15	8	13	7	18	19	6	28	28	21		26	13	10	10	21
1980		9	7	10	26	7	16	23	6	27	29	21	7	26	13	10	10	21
1981		10	9	9	25	10	10		6	28	27	19	6	28	13	10	10	21
1982	3	18	8	9	28	14	21	6	6	28	27	21	7	26	13	10	10	21
1983		18	13	6	15	8	21	6	7	27	27	21	7	26	13	10	9	21
1984		23	13	8	31	15	22	4	6	27	27	22	7	25	12	10	10	21
1985		17	12	9	28	15	20	7	6	26	27	21	7	26	12	10	8	20
1986		17	13	9	28	15	21	5	6	26	27	21	7	26	13	10	9	21
1987		18	13	9	28	15	21	6		30	28	17	7	30	13	10	8	23
1988		18	14	8	29	14	22	5		24	27	21		26	13	9	8	22
1989		26	13	9	28	10	23	6		40	30	21		26	13	10	8	23
1990		25	13	9	28	15	21	6		39	29	21		25	13	11	8	23
1991		16	13	9	28	15	21	6		31	31	23	5	25	13	10	10	24
1992		26	16	13	28	15	21	6		36	28	23	6	26	12	6		28
1993		22	20	9	28	15	21	5		31	27	23		27	14	11	8	29
1994		21	16	13	28	15	19	6		35	33	24		26	12	10	7	25
1995		17	13	9	25	14	22	6		41	33	31		23	15	10	9	26
1996		17	12	10	29	14	21	6		43	33	28	6	28	15	10	9	27
1997		17	13	9	28	13				43	34	27		28	15	11	9	27
1998		9	10	8						43	34	27	6	29	15	10	10	27
1999		17	14	8	14	1				43	35	28		31	14	13	10	22
2000		15	7	2	17	10	19	6		45	43	42		26	15	11	10	26
2001			13	5	28	15	19	3		45	49	28		27	14	11	10	26
2002		21	13	8	26	14				44	41	27		26	13	11	9	26
2003		16	14	9	28	15	18	6		42	36	29		27	13	9	9	26
2004		17	13	4	19	15	17	6		41	31	28	6	27	14	10	8	27
2005		17	14	14	30	15	15	8		43	36	29	6	25	13	11	9	34
2006		15	14	10	28	15	17	6		41	36	28	7	28	16	8	9	29
2007		17	16	13	30	15	17	6		41	36	30	9	25	13	11	8	25
2008		16	11	8	19	11	4	6		41	37	30	7	24	12	9	9	30
2009		16	13	16	28	15	16	6		44	37	32	6	26	12	10	8	28

Annex 12 b) Number of hauls by area and year for the German DYFS.

Region	German Bight				German/DK Wadden Sea							
area_code	405	406	NF	OF	408	409	410	411	412	413	414	(blank)
1971	4										44	
1972									10	8	29	
1973	3	1							36	27	34	
1974	6	17	1	3	10	18	15	42	6		12	
1975		14			9	18	14	46	11			
1976		14		59	8	18	14	46				
1977		14		19	8	18	14	46	59	2	32	
1978		11			4	18	14	45	34			
1979	4	14			8	18	14	46	43		30	
1980		11			9	17	14	46	33		55	
1981	1	10			8	22	14	43	65		64	1
1982		10			8	22	14	46	63		79	
1983		5			4	11	7	32	47		87	1
1984	6	8			8	16	13	40	55		78	2
1985	21	11					70		57		64	
1986	29	39				12	15	44	52		69	2
1987	22	91					5		50		64	
1988	18	104							52		78	
1989	17	64					24	9	52		82	
1990	22	27			3	37	44	30	62		79	
1991	23	17			5	16	43	45	54		71	1
1992	20	20			3	25	35	41	53		84	
1993	28	22				27	20	39	54		51	
1994	17	28		33	10	29	19	32	50		11	
1995	17	28			7	13	14	36	10		60	
1996	13	22				45	26	49	48		48	
1997	62	36				38	18	51	51		9	
1998	30	53			9	46	33	87	45		39	
1999	14	51				28	26	70	49		54	
2000	29	34			6	34	30	56	48		52	
2001	29	32				31	28	58	45		49	
2002	21	31				28	26	50	47		47	
2003	12	26				29	30	65	46		49	
2004	12	28				29	28	48	49		44	
2005	8	25			6	16	12	22	21	32	25	
2006	5	16			5	14	11	23	28	26	25	
2007		2						33	22	31	41	
2008	13	28				15	14	22	22	26	22	1
2009	13	29			24	7	19	10	20	17	13	

Annex 12 c) Number of hauls by area and year for the Belgian DYFS.

Region	Belgian Coast
area_code	400
1973	35
1974	35
1975	35
1976	35
1977	29
1978	27
1979	29
1980	31
1981	33
1982	33
1983	33
1984	32
1985	33
1986	33
1987	33
1988	29
1989	33
1990	33
1991	33
1992	24
1993	33
1994	33
1995	33
1996	33
1997	33
1998	33
1999	31
2000	27
2001	33
2002	33
2003	33
2004	33
2005	33
2006	33
2007	32
2008	31
2009	23

Annex 12 d) Number of hauls by year for the English DYFS.

region	Other
area_code	
1981	290
1982	312
1983	239
1984	304
1985	271
1986	292
1987	288
1988	323
1989	322
1990	367
1991	373
1992	361
1993	385
1994	370
1995	372
1996	373
1997	364
1998	360
1999	377
2000	433
2001	469
2002	469
2003	477
2004	395
2005	407
2006	406
2007	159
2008	156
2009	161

Annex 13: Number of hauls by depth class, country and year for the inshore surveys

Annex 13 a) Number of hauls by depth class, year and country for the continental coastal areas.

Region	Belgian Coast						Dutch Coast				German Bight							
depth zone	0–5	5–10	10–20	10–20	20-		0–5	5–10	10–20	20-	0–5	0–5	5–10	5–10	10–20	10–20	20-	20-
country	BEL	BEL	BEL	NED	BEL	BEL	NED	NED	NED	NED	GFR	NED	GFR	NED	GFR	NED	GFR	NED
1970							1	18	25	6								
1971								17	24	9	2		2					
1972								18	30	6								
1973		14	18		3			16	18	10			1		3			
1974		12	16		7			13	30	11	18		5		3		1	
1975		10	22		3			12	23	13	7		7					
1976		10	19		6						53		17		3			
1977		12	16		1		12	15	26	5	7		14		12			
1978		9	18					21	22	6	4		7	16		25		1
1979		11	14		4		1	20	15		10	1	8	20		23		
1980		12	17		2		22	11	15	4	4	22	7	18		6		
1981		9	20		4		22	10	21		3	3	8	4		13		
1982		15	15	3	3		19	18	24	2	2	14	8	13		14		
1983	4	13	15		1		26	9	17		1	13	4	13		9		
1984	2	12	17		1		19	15	31	10	3	5	8	16	3	19		1
1985	3	12	16		2		20	16	26	4	7	11	18	18	7	13		
1986	4	12	14		3		13	23	24	7	23	12	36	11	9	18		
1987	5	15	10		3		27	10	27	4	58	12	46	13	9	17		
1988	3	15	10		1		10	26	30	3	54	3	54	18	14	20		
1989	9	14	9		1		4	37	28	7	40	1	23	20	18	18		
1990		9	21		3		8	40	22	5	14	6	18	14	17	22		
1991	2	17	14				13	21	26	6	12	5	12	23	16	14		
1992	4	12	7		1		19	21	27	16	16	9	14	15	10	18		
1993	3	20	8		2		14	30	29	6	8	6	19	18	23	17		
1994	8	13	11		1		18	17	30	13	43	5	21	12	14	23		
1995	5	14	12		2		11	22	25	6	11	3	16	25	18	14		
1996	5	15	12		1		1	36	27	4	10	1	9	21	14	19	2	
1997	4	16	12		1		1	31	29	6	41		39	7	18	6		
1998	7	18	6		2			12	15		18		39		20		6	
1999	3	17	9		1	1		8	37	8	16		32		17	1		
2000	1	11	15					16	18	7	10		32	13	20	22	1	
2001	4	16	11		2			7	26	13	15		27	2	19	31		4
2002	2	19	9		3		5	27	29	7	14		27	5	10	9	1	
2003						33	9	32	26		7	1	18	26	13	12		
2004						33	1	21	28	3	8		18	17	14	21		
2005						33	2	35	29	9	7	2	17	16	8	20	1	
2006						33	3	27	31	6	2	1	14	18	5	19		
2007						32	4	28	36	8	1		1	16		22		
2008	2	16	11		2		7	26	16	5	15	2	16	11	4	8	1	
2009	7	9	7				4	28	33	8	10	1	15	20	14	16	3	

Annex 13 b) Number of hauls by depth class, year and country for the Wadden Sea.

Region	Dutch Wadden Sea					German/DK Wadden Sea			
depth zone	0–6	6–12	13–20	20-	(blank)	0–6	6–12	13–20	20-
Country	NED	NED	NED	NED	NED	GFR	GFR	GFR	GFR
1970	64	39	2						
1971	50	56	3			28	15	1	
1972	44	40	9	1		7	33	7	
1973	39	51	5			7	82	7	1
1974	37	59	8			85	18		
1975	45	57	5			75	21	2	
1976	53	47	7			72	14		
1977	44	54	11			151	26	2	
1978	46	51	11			101	14		
1979	40	51	10			139	20		
1980	46	52	10			158	16		
1981	41	55	11			187	29		
1982	48	49	11			198	33	1	
1983	56	40	11			154	32	2	
1984	50	48	9			183	26	1	
1985	50	45	9			141	48	1	1
1986	58	42	6	1		130	54	8	
1987	54	42	12			96	23		
1988	55	33	11			114	14	2	
1989	47	40	14			149	18		
1990	45	46	10			204	49	2	
1991	59	45	6			181	45	7	1
1992	45	51	5			192	44	5	
1993	60	44	8			132	51	8	
1994	58	39	7			102	44	4	1
1995	55	50	9			93	43	3	1
1996	62	51	10			147	63	5	1
1997	62	44	10	1		130	31	4	2
1998	54	52	15	3		181	61	15	2
1999	50	54	12	2		174	43	10	
2000	42	71	15	2		181	37	8	
2001	49	55	11	1		152	48	11	
2002	54	45	12	1		159	35	4	
2003	43	59	11			166	44	8	1
2004	40	59	16	3	2	144	44	10	
2005	47	59	19	1	1	96	30	8	
2006	51	55	17	1	1	94	32	5	1
2007	42	56	22	1		56	24	6	
2008	44	54	21	2		58	24	7	2
2009	47	47	26	1	1	78	28	4	

Annex 13 c) Number of hauls by depth class and year for the Scheldt estuary.

Region	Scheldt Estuary			
depth zone	0–5	5–10	10–20	20-
Country	NED	NED	NED	NED
1970	11	36	21	2
1971	11	36	15	1
1972	8	44	9	1
1973	11	42	13	
1974	4	47	18	1
1975	3	48	10	
1976	2	29	28	3
1977	1	9	42	11
1978		15	40	8
1979		10	45	7
1980	7	17	29	9
1981		16	41	4
1982		16	43	2
1983		20	37	4
1984	17	20	21	2
1985	8	24	25	2
1986	7	27	25	
1987	10	19	27	2
1988	8	21	19	3
1989	22	14	29	5
1990	1	20	32	15
1991	1	17	40	4
1992	15	19	23	7
1993	1	16	34	7
1994	13	18	27	10
1995	12	22	30	10
1996	15	19	33	9
1997	15	22	30	10
1998	14	21	34	8
1999	14	26	25	13
2000	12	20	48	8
2001	17	27	39	11
2002	22	24	31	8
2003	21	19	26	12
2004	23	20	23	6
2005	17	15	34	12
2006	12	22	32	11
2007	15	23	28	11
2008	16	22	29	9
2009	16	22	34	9

Annex 14: Abundance of fish species and *Crangon* sp. in the inshore surveys

Annex 14 a) Abundance of fish species and *Crangon* sp. for the continental coastal areas.

Dutch coast

Dutch data

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
	16	148	62	8.8	26	72		36	64	8.5	3.5	76	15	13	27
								1.2			0.14	19	335		
	9.3	29	224	31	9.8	14		3.7	0.94	0.13	0.95	111	17	3.3	3.9
	54	2.3	2.3	63	44	21		32	3.2	1	3.3	9.2	16	21	31
	121	48	52	335	189	237		140	32	1.6	10	29	189	65	59
	233	5.5	3.2	0.38	2.9	0.25		31	70	381	641	519	2130	703	135
	61	2.2	2.2	2.2	2.5	3.3		12	15	15	9	13	15	33	4
	1690	4481	1823	5948	4025	3209		794	2189	0.5	5238	8971	1897	2114	446
	0.71	4	1.5	0.43	0.55	0.37		0.5	0.65		0.66	2.4	0.71	0.31	0.57
	699	3193	99	668	593	482		141	5839	1396	3642	1076	1243	1627	733
	69	55	35	35	113	110		150	181	686	274	514	238	999	51
	14		0.07		0.06	0.13				0.38		0.44	16	5.3	
	2.3	5	3.2	1.3	1.9	6		11	22	1.1	22	7.9	25	17	5.5
	682	1695	289	300	135	301		128	365	808	718	1135	1609	1289	403
	1117	1725	27	587	84	448		17	310	1030	1390	584	1374	685	554
	0.32	0.63	2.2	0.59	0.71	0.26		1.6	0.1	15	283	41	134	1.9	0.61
	15557	26676	19790	56811	52207	69184		14726	39136	35304	193910	82073	94616	69514	43483

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	207	73	64	22	10	3.4	26	5.8	29	11	15	24	21	16	19
		0.11			0.92										
	23	3.8	4.1	9	47	23	28	11	10	25	25	117	25	7.4	50
	16	2.2	38	47	26	57	71	159	213	412	73	32	34	13	208
	61	18	213	80	1899	277	211	324	407	37	57	18	77	506	148
	104	63	171	86	33	39	211	18	37	61	481	319	146	7.5	120
	5.8	4.5	2.3	4.9	1.3	1.6	1.2	0.16	0.12	0.8	3.7	2.8	4.6	19	2.4
	1873	227	9406	2707	5000	1585	2520	1602	2845	1589	2517	4538	6484	574	3859
	1.4	0.34	1.5	0.48	4.5	5	3.6	5.9	3.8	11	23	6.8	3.4		3.2
	808	918	1774	9818	1782	876	1243	541	461	805	1478	655	515	434	614
	46	117	64	29	38	41	44	20	8.8	35	41	23	31	49	45
		0.32	0.36	0.03	2.2		1.2				1.4	8.9	0.57		0.47
	2.3	3.3	6.1	2.7	1.5	4.7	3.6	2.8	2.5	2.7	3	1.9	1.5	0.46	1.3
	1817	900	1105	227	450	193	540	318	310	204	218	1121	426	223	420
	497	275	3024	98	96	25	1120	36	29	38	17	108	79	45	99
	1.9	1.4	2.7	0.75	3	2.4	0.64	1.7	7	42	4	3.8	6.2	2.3	23
	106897	23845	119221	22719	35679	21914	26108	34693	22403	40619	44096	45950	46444	12040	35421

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	3.5	16	19	5.7	15	4.9	6.3	13	77	110
			0.05	0.39		1.4	0.25			
	8.5	5.8	11	7.2	3.5	23	27	58	32	23
	133	55	32	166	160	116	144	170	126	192
	38	58	151	202	101	310	217	85	69	85
	65	42	121	154	45	108	1237	122	45	14
	1.1	10	2.8	1.7	6.4	2.6	13	5.9	2.1	2.4
	2102	797	2436	7073	2511	3004	4303	2232	1389	4524
	2	1.1	3.2	9.6	4.8	3.5	1.5	3.6	5.5	3.5
	298	274	223	1320	417	528	199	713	437	1697
	81	164	241	75	130	38	40	273	97	133
	0.07		1.2	1.6	0.14	1.1	2.1	4.7		1.5
	2.5	1.2	16	3.1	2.5	0.93	1.5	4.6	5	4.2
	239	414	339	573	398	171	666	193	366	324
	29	226	23	62	10	66	23	14	52	45
	3	5.6	68	14	2.4	4.9	76	11	22	8.5
	39141	16636	28942	47496	21036	29468	46472	13105	35317	57722

German Bight

Dutch data

1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
								25	29	23	31	99	41	38
										0.04	0.8	20		
								4.2	1.4	7.1	1.7	14	1.2	4.8
								0.88				3.4	0.5	3.3
								38	2.3	2.6	63	91	21	8.2
								20	37	121	27	474	114	26
								339	637	50	102	13	387	9.6
								499		1097	893	2810	166	914
								5.5	0.17	3.3	1.2	1.8	0.48	2.9
								566	709	1150	467	705	979	1112
								308	287	99	164	104	1158	95
								6.8	4.1	5.1	30	39	8	2.5
								16	14	51	36	32	14	22
								338	706	608	1051	1848	1157	596
								11	134	629	603	52	20	224
								0.72	1.4	16	8.9	200	4.2	
								18842	35533	85419	28766	94817	18674	36030

1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
52	61	45	90	53	170	25	23	30	92	70	43	26		3
15	9.2	9.9	61	22	71	146	45	26	17	92	50	54		2
0.27	2.4	1.1	3.2	12	24	2.8	53	122	44	22		0.62		
1.7	6.9	19	21	77	18	14	80	56	88	17	0.71	3.5		4
42	92	51	27	14	18		11	44	16	34	18	13		
184	84	27	29	5	53	19	3.3	2.1	26	16	103	4.1		
639	309	1242	968	857	329	598	479	688	456	738	3021	1329		64
0.4	0.21	5.6	2.8	0.43	0.38	4.4	0.53	0.14	52	6.9	2.9	0.92		
1391	5299	986	2775	1059	1154	647	346	157	173	302	629	203		7
165	594	146	97	42	1814	80	25	111	396	202	24	11		1
5.7	9.4	11	4.4	8	2.3	4.2	11	2.1	4.5	24	33	4.5		
2.3	7.7	13	10	6.5	7.1	12	12	7	5.6	12	3.3	2.4		
1945	5444	938	464	626	1021	748	419	317	619	152	787	167		6
335	37	217	28	57	5.3	126	19	12	57	2.2	26	12		
6.4	1.7	14	1.2	9.4		1.8	41	0.81	11	0.9	11	6.3		
38685	38940	69830	38224	25017	13095	24791	40439	18740	51177	10671	49547	12052		1568

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
54	61	31	9.5	20	5.2	2	37	67	66
			1.3		0.07	1.2			
8.3	3.5	0.57	0.47	6.2	12	142	12	15	7
20	11	1.3	26	4	11	3	35	5.6	13
32	55	4	36	59	16	37	53	36	15
9.5	9.4	0.43	4.4	13	0.39	35	6	42	8.7
3.4	57	0.21	1.8	12	4.8	5.2	21	3	11
1092	1130	581	1022	3007	1781	1476	552	390	1234
5.1	7.1	0.43	4.1	3.4	1.6	0.83	3	5	1.6
62	345	80	24	393	92	26	325	247	401
255	808	201	16	55	4.3	11	94	77	96
22	6.3	0.93	7.6	42	39	43	24		28
3.1	2.6	1.1	4.3	2.6	1.7	10	4.7	4	2.2
217	559	78	284	163	103	127	130	176	456
3.2	4.5	11	4.7	2	11	4.1	1.8	14	4
108	4.5	163	47	12	28	18	2.2	13	14
28703	19054	12105	27057	25414	40865	84103	14800	24763	28275

German data

1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
	1.2		7	3	2.1	2.3	1.6	0.68	2.4	2.5	1.9	0.63	2.9	2
						0				0.02				
	0.84			0.06	0.07	0.05	0.18	0.09	0.07		0.2			
			0.08		0.07	0.04	0.38	0.02					0.05	
	0.64		0.75	0.01			0.78							0.21
				0.09		0.05	0.02	0.68	0.73	0.07	0.08	0.2	0.2	0.79
			0.25	0.38	0.3	0.99	1.8	1.9	43	0.56	0.73	0.4		0.27
			113	130	7.6	24	7.1	2.7	13	5.3	13	23	7.4	20
						0.04	0.09							0.03
	2.8		8.8	84	11	27	12	5.1	117	6.5	37	7	3	11
				2.7	1	3.4	1.2	0.93	0.27	2.1	0.95	0.55	0.2	0.94
	0.15		5.5	1.3	0.04	0.38	1.1	0.05	0.21	0.52	0.28	0.1	0.7	0.06
	0.94		0.83	0.68		1.7	0.19	0.32	0.32	0.84	0.38	0.33	0.6	0.16
	106		13	12	3.7	17	13	11	54	12	106	9.1	7.1	55
	1.1		0.08	0.32	0.75	0.19	3.8	0.16	112	0.89	5.6	0.68	2.7	7.1
	0.08			1.1	0.14	0.69	36	0.18	3.5	0.02	1.1	0.48	0.2	0.13
	154		675	3133	1317	5779	582	1023	10169	878	1425	1575	1524	937

1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
2.6	8.6	8.3	19	14	7	11	2.2	4.2	16	4	3.3	5.3	1.8	
										0.01	0.01		0.1	
	0.03	0.12	0.08	0.59	0.23	0.03	0.18	0.05			0.24	0.04	0.08	
	0.17	1.3	0.1	0.16	0.05	2.2	0.64	1.1	5.4	0.56		0.02	0.13	
	0.02		0.29	0.35	1.7	0.4	0.39	0.43	0.07	0.01	0.02	0	0.45	
8.5	1.7	6.4	0.92	1.2	5.2	0.3		1.8	3.2	2	0.16	1.3	1.2	
0.3	0.48	0.25	0.36	0.2	1.1	1.8	0.01	0.01	0.42	0.6	1.1	0.82	0.9	
24	76	6	12	38	2.8	22	2.8	7.5	15	7.6	35	39	4.4	
0.33	0.21				0.03		0.04	0.02	0.02			0.02	0.06	
38	55	36	59	24	63	100	20	12	28	12	20	16	31	
0.51	11	9.9	13	4.9	21	15	0.7	0.82	3.5	3.7	0.92	0.67	6	
0.02	0.47	2.6	10	2.3	0.4	0.28	0.29	0.22	0.52	0.57	0.57	3.7	0.97	
0.77	0.28	1.1	2.8	0.93	1.1	0.27	0.38	0.07	1.7	0.17	0.1	1.4	0.17	
21	52	80	67	18	40	79	10	10	12	9.4	87	28	5.9	
1.1	3.4	2.9	10	2.7	2.5	2.5	1.1	0.37	0.44	0.1	2.6	1.1	0.18	
1	0.58	0.53	1.3	4.2	0.56	0.18	0.19	9	4.8	0.17	0.29	0.3	0.97	
1471	1712	2806	1388	1359	468	1171	818	727	1494	692	2085	3555	1139	

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
2	4.5	7	1.4	2.4	0.25	0.06	118	1	3.3
	0.02	0.1		0.04	0.09	0.06			
0.02	0.08	0.02	0.03		0.05			0.12	0.12
0.78	0.56	0.09	1	3		0.8			0.1
2.1	2	1.3	0.79	2.4	0.11	3.8		0.88	1.1
0.11	1.5	0.75	0.05	0.38	0.07	0.26	1.6	39	0.54
0.05	1.2	0.01	0.02	0.02	0.03	0.2	5.2	0.07	0.53
8.4	11	13	5.9	15	10	27	6	24	5.1
0.91	0.05	0.02	0.01		0.05	0.06		0.08	0.07
19	21	5.4	1.7	17	2.3	2.1	4.5	3.7	2.9
1	12	1.2	0.4	0.08	0.04		13	1.7	3.8
0.68	0.97	1.9	0.68	4.1	2.2	1.6	21	48	4.6
0.22	0.12	0.37	0.15	0.18	0.06	0.13		0.59	0.2
3.3	12	3.6	2.2	4.4	2.7	10	20	15	8.5
0.05	0.13	0.58	0.04	0.08	0.2	0.13		0.07	0.29
0.79	1.8	3.9	7.4	9.9	5.6	3.6	4	27	1.5
1247	683	1857	1126	2078	2092	6179	4756	3459	

Belgian data

1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
									150	103	106	47	112	120
			8.7	2.3	12	2.7	2.9	8.8	16	8.4	22	7.1	14	6
			26	2.1	49	8.2	6.4	46	390	134	11	76	41	53

1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
152	72	229	312	40	102	26	34	19	43					
62	35	35	36	4.1	23	20	9	5.6	39	61	135	127	86	54
156	36	18	9.7	8	3.6	44	8.7	9.9	16	26	74	46	86	52

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
			0.12			4	10	0.58	0.43
		29	83	93	30	11	343	404	167
			74			53	1	223	133
									4.7
48	48	165	74	115	82	33	85	76	121
11	190	320	43	234	142	38	39	9.2	111

Annex 14 b Abundance of fish species and *Crangon* sp. for the Wadden Sea.

Dutch data

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
	20	18	10	23	13	32	5.3	78	70	14	29	14	14	39	65
	0.5	0.15	2		0.5	0.1	0.08	1.4	0.18	0.05	1.3	0.25	27	0.88	
	6.1	0.92	0.53	0.81	1.7	4.8	4.5	2.6	3.7	0.71	0.83	0.48	5.1	6.5	9.6
	0.83	0.08	0.64	0.55	0.87	1.4	1	5.6	1.8		0.38	2.8	0.83	3.8	4.7
	8.4	3.6	2	15	24	7.9	7.8	7.3	40	112	45	151	185	455	310
	115	1.8	0.49	0.13	2.8	0.04	44	128	166	58	54	15	1.2	98	2.9
	256	149	337	760	1450	1792	817	99	346	40	414	481	941	540	714
	0.09		0.04	0.04	0.09	0.11		0.32	0.3	0.31	0.09	1.2	1.1	0.22	1.3
	2017	1437	150	1921	1893	952	1903	1481	5304	622	1723	893	881	1865	1224
	54	24	26	19	81	50	137	95	197	165	107	94	50	384	93
	19		19	49	123	87	24	31	33	24	96	21	74	145	104
	22	26	23	94	46	84	54	32	18	19	44	43	21	64	33
	373	642	216	649	436	876	1867	657	2672	1229	1064	1731	1131	3408	2039
	438	604	59	102	57	76	165	118	324	561	692	209	225	128	145
	69	3.4	19	53	41	38	35	10	5.2	5.2	149	100	1918	181	116
	77134	94762	74567	82994	88978	86618	110112	20019	86832	97394	130347	43794	128503	112866	119295

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	12	21	37	20	15	13	24	5	6	87	53	18	68	16	2.7
	4.2	12			11	0.2		0.48	0.03	2.1	0.03	0.04	0.37	0.07	0.33
	11	6.4	1.3	3.9	2.4	1.2	0.7	0.69	0.23	0.73	1.5	4.5	6.7	3.5	2.6
					0.08										
	0.43	2.5	0.38	1	1.7	4.1	0.04	0.33	0.51	0.04	0.31	0.07	1	0.83	1.8
	149	376	285	81	48	221	43	93	109	255	794	90	48	108	84
	16	7.2	2	4	0.64	0.87	8.4	0.21	1.3	14	4.9	8.1	5	9.8	0.29
	671	20	619	481	417	302	6915	412	675	1225	455	1889	1020	355	915
	3.1	0.36	0.35	0.19	0.12		0.04	0.15	0.38	0.3	2.4	0.55	0.36	1	0.32
	459	748	263	3108	766	526	1280	206	159	119	440	164	16	55	126
	41	54	160	44	22	289	39	57	18	184	41	9.4	6.3	22	27
	176	100	426	44	40	138	9.7	52	54	141	69	122	23	29	70
	7.9	26	27	24	23	18	35	11	20	112	55	38	15	11	63
	1728	1015	1723	1811	821	760	840	240	615	489	617	1567	359	484	314
	192	113	869	62	67	8.4	233	8.7	45	9.6	8.6	103	69	25	97
	2.9	11	241	168	334	154	186	89	606	245	104	109	186	139	315
	110127	86095	173902	81243	57356	24292	105672	50752	60403	90409	37803	136230	75015	27238	87913

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	4.7	5.2	5.4	11	3.4	1.5	1.5	16	4.4	24
		0.09		1.9	0.04	0.26	6		0.11	
	4	11	15	8.9	24	2.7	0.34	1.6	12	0.94
				0.04						
	0.55	1.3	0.37		0.7	0.03	0.07	0.13	0.08	0.08
	36	90	22	78	260	31	44	433	377	19
	2.7	9.6	0.45	0.59	3.4	0.95	2.4	13	1.2	1.6
	288	574	272	252	1299	1236	111	346	256	415
	0.69	0.65	0.95	0.66	0.26	0.15	0.25	0.62	0.57	0.67
	13	789	2.6	5.3	76	20	0.27	89	2.6	3
	16	35	6.4	1.7	4.9	5.3	2	40	13	12
	150	49	55	16	14	132	82	82	103	21
	57	178	18	38	23	27	38	48	81	47
	297	552	131	546	237	176	396	214	333	124
	107	74	105	21	34	183	60	56	48	72
	141	83	306	295	114	260	19	11	81	24
	57465	80663	37291	55285	97350	72659	41510	42081	91125	70272

German data

1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
	0.41	2.7	6.7	19	10	2.1	11	4.4	3.4	10	12	3.9	5.1	2.8
					0.05	0.1	0.05	0.17		0.01		0.01	0.01	
	0.04	0.05	0.2	0.47	0.36	0.57	1.4	0.9	0.39	0.3	0.57	1.2	0.35	1.3
	0.01	0.01	0.06		0.09	0.05	0.35	0.11						
	0.04	0.07	2.3				1.9		0.04	0.1	0.02	0.07	0.01	0.14
	0.02	0.33	0.09	0.23	0.62	0.2	1.3	1.9	5.4	5.7	4	6.3	5.3	8.8
	0.23	0.24	0.41	1.9	2.3	5.8	25	8.3	7.4	11	5.1	1.9	22	2.8
	1.7	40	40	118	88	57	43	11	29	55	59	57	20	55
							0.01		0.03		0.1	0.03	0.01	0
	8	9.7	55	121	161	59	157	59	102	205	221	21	23	85
	0.01	2	1.4	3.3	1.5	2	6.9	5.9	0.89	2.3	3.1	0.94	20	3
	0.6	3.2	2.9	3.2	3.5	3.9	21	33	49	24	18	21	9.3	13
	1.2	1.2	1.6	1.5	0.44	0.83	26	16	4.2	9.5	10	7.2	5.6	3.4
	26	14	21	80	54	68	139	94	148	139	182	79	99	42
	2.7	5.7	9.9	1.1	10	1.3	11	5.2	67	22	14	2.7	5.4	5.4
	0.31	4.7	1.8	7.2	6.1	5.2	4.4	3	1.2	2.5	1.6	7.8	11	0.49
	522	7710	3627	8513	11884	6625	5562	7567	17273	13775	6474	7927	3996	5544

1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
7.5	7.6	4.4	8.3	16	12	12	9.4	5.1	11	4.5	11	12	6.2	
0.13	0.33		0.02	0.29	0.12	0.01	0.06	0.04	0.2	0.04	0.12	0.03	0.03	
0.15	0.23	0.3	0.42	0.59	0.51	0.48	0.13	0.33	0.26	0	0.05	0.21	0.45	
	0.02	0.28				0.1	0	0.08	1.7	0.12		0.12		
0.05	0.03	0.15	0.01	0.02	0.04	0.08	0.03	0.07		0.02		0.14	0.38	
22	14	23	8	9.1	14	8.1	6.1	21	9.1	1.3	4.3	5.9	3.1	
2.4	5.3	0.37	1.5	2.2	2.2	3.4	0.45	0.37	3.6	1.1	3.2	4.7	7.7	
122	94	33	26	145	15	84	141	49	51	5.4	34	115	38	
0.11	0.49				0.09	0.13	0.02	0.34	0.11		0.04		0.07	
91	69	8.1	33	82	42	62	21	4.3	2.8	18	11	20	13	
1.3	10	5.3	0.52	4.6	36	20	1.3	1.9	11	1.4	0.51	2.1	27	
8.5	15	14	7.6	15	5.6	9.4	11	7.7	41	21	10	22	18	
2.9	5.6	5.3	16	14	8.4	7.8	8.6	3.7	29	52	7.7	6.6	3.9	
82	52	43	57	114	91	101	91	48	67	85	167	73	43	
2.5	8.9	14	15	15	6.6	9.9	9.7	1.9	3.5	7.5	5.9	7	1.7	
5.7	9.4	3.3	12	62	8.7	4.4	46	35	133	2.7	0.26	15	7.9	
4611	8903	3938	2041	10161	3057	9539	9116	7463	18576	3617	5923	7420	5426	

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
2.8	2.5	5.3	5.5	2.5	1.9	6.3	71	9.6	8.8
0.22	0.03	0.07	0.07	1.1	0.17	5.2	0.05	0.05	
0.21	0.28	0.15	0.33	0.19	0.15	1.2	0.72	0.62	0.47
0.01	0.1	0.04	0.22	0.06				0.28	
1.1	0.71	0.02	0.12	0.16	0.09	0.59	0.12	2.4	0.12
2.8	6.2	3.6	2.2	6.6	0.79	3.5	85	121	3.5
0.6	4	0.08	0.05	0.61	0.39	7.1	30	0.75	1
47	30	50	61	69	93	151	57	40	83
0.02	0.05	0.04	0.05	0.04	0.03	0.14	0.09	0.07	0.06
4.2	2.6	3.3	0.9	9.5	13	2.7	23	16	17
2.9	52	3	0.75	1.6	0.31	1.5	71	10	11
15	17	14	22	29	21	64	91	221	45
6.6	11	6.9	3.8	5.8	3.2	28	29	29	9.7
36	92	20	39	35	25	248	138	132	94
0.76	0.49	1.1	0.34	0.51	4.2	5.8	5.1	2.4	2.7
16	11	54	28	30	23	2477	28	53	42
6755	3786	7253	7815	6768	12892	57778	13820	18089	

Annex 14 c) Abundance of fish species and *Crangon* sp. for the Scheldt estuary.

Dutch data

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
	7.7	2.5	0.31	2.8	4.1	3.2	2.3	6	15	3.7	9.4	7.4	0.76	6	10
		0.03													
		0.2	2	0.5	1.9	0.97	0.21	1.1	0.17	0.67	0.62	13	2.1	6.8	5
							0.04								
	1.3	2.7	0.28	1.4	0.82	1.6	1.5	2.2	0.9	3.9	0.59	1.7	1.5	6	12
	9.9	0.87	0.07	16	1.4	0.17	1.4		3.5	6.5	4.6	3.4	3.7	14	31
	0.46	0.4	0.21	0.23	0.22	0.17	0.29	1.1	1.8	4.1	0.36	1.5	0.81	1	0.33
	220	182	103	260	110	277	231	66	127	312	591	345	270	206	478
	0.35	0.03		0.2			0.1		1	0.29	1.4				1
	75	17	11	26	224	36	9.3	164	245	75	314	97	43	103	317
	0.64	0.41	1.1	0.96	3.7	1.2	11	3.8	3.1	10	1.1	8.5	2.9	22	1.8
	2.8	2.4	0.21		0.33		0.17	0.04	0.1		0.04	0.15		0.04	
	12	7.2	2.5	2.2	1.5	2	4	6.2	4.6	3	8.1	5.6	1.6	2.4	11
	75	42	30	75	44	73	33	70	99	49	154	97	73	164	198
	126	52	3.7	46	16	20	9.9	25	57	67	216	52	38	55	91
	3.6	0.31	0.11	9.5	1.9	4.8	1.7	4.8	2.2	8.3	2.9	1.2	1.1	4.2	2.2
	10614	11423	8942	14466	7606	7641	9708	3107	5125	14866	11725	7159	8750	10838	15390

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	1.2	12	6.8	2	1.3	2.5	3.2	0.84	0.2		0.78	0.51	4.5	3.7	0.59
		0.04			0.03						0.03				
	1.1	1.6	0.18	2.7	0.11	1.3	2.2	0.29	0.23	0.48	0.27	2.3	1.5	1.8	0.53
	2	8.5	5.3	7.3	2.4	10	0.71	0.98	1.3	8.3	5.2	5.7	0.87	10	3
	16	79	25	30	2.7	24	14	48	2.3	58	0.08	4.9	66	28	13
	3.4	0.63	1.2	2	0.03	0.07	0.26			0.3	0.06	0.31	0.31	2.1	0.48
	171	262	466	244	138	122	477	230	99	316	63	57	218	228	95
	0.15	0.23	0.1	0.48	0.33	0.03	0.32	0.57	0.18	0.03	0.37	0.71	0.4	0.26	0.14
	23	330	169	568	11	46	69	22	5.4	9.7	35	33	7.5	45	24
	6.5	19	9.5	3	0.27	1.3	1.2	4.2	0.95	0.48	0.08	8.2	1.6	7.6	4
						0.03				0.12		0.03	0.29	0.46	0.09
	6.4	6.4	5.8	2.2	1.4	0.67	1.5	8.7	1.1	2.3	6.8	12	2	1.7	1.3
	111	468	265	432	45	145	34	52	27	53	60	140	61	146	60
	22	25	66	27	3.1	22	12	13	11	5.1	14	29	19	13	16
	0.94	11	3	0.56	0.34	4.1	3.2	1.6	0.75	0.26	0.3	0.38	0.77	4	1.2
	7408	22133	11622	5238	4936	1501	5102	17142	2206	7518	1185	3628	4243	1341	1616

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	5.7	1.9	1.7	1.2	0.83	1.4	0.26	0.32	0.21	0.34
	1	0.55	0.47	0.38	2.5	1.2	1	0.39	0.7	0.33
						0.51				
	14	7.3	12	3.7	3.9	4.5	6	1.5	0.29	0.35
	44	147	80	116	26	10	40	39	77	40
	0.05	0.25	0.51	0.06	0.05	2.1	0.58	0.71	0.34	0.14
	276	209	212	78	251	167	200	188	71	86
	0.32	0.21	0.05	0.15	0.17	0.29	0.37	0.35	0.35	0.47
	61	37	19	2.4	10	13	0.07	28	5.2	18
	1.1	3.8	0.14	1.5	1.8	4.4	0.77	5.6	3.8	1.7
	0.37	0.29	0.05	0.17	0.2	0.06	0.14	0.17	0.3	1.3
	1.9	8.4	5.7	3.1	3.7	1.1	1.4	15	33	24
	97	90	45	122	79	92	64	95	104	62
	46	49	27	16	12	48	12	47	38	28
	2.6	0.97	0.64	1.7	0.79	2.9	2.5	0.39	0.3	0.6
	1588	4825	2003	1796	1203	3957	2086	1485	1562	3574

Annex 14 d) Abundance of fish species and *Crangon* sp. for the UK coastal waters.

UK data

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	13	7.9	12	7.4	4.8	3.7	3.5	7.3	8	12
				0.03						
					0.04	0.07	0.14		0.8	
	0.76	0.18	0.19	0.13	0.12	1.7	0.14	0.71	1	2
	9.2	4.9	6.4	5.7	12	8.8	4.1	13	11	4.9
	0.74	0.64	0.68	0.5	0.63	0.33	0.5	0.35	2.2	0.28
					0.35	0.48	1.8	0.05		0.08
	172	0.12	0.66		0.07	0.02			306	433
	14	101	31	50	104	9.7	28	42	38	16
	24	13	6	5	8	12	7.4	6.3	6.3	5.1
	1.8	0.11	0.06	1.1			0.78		0.26	0.66
	2.4	1	0.81	2.2	2.4	1.6	1.3	0.33	1.4	2.3
	31	97	53	43	83	21	70	54	32	18
	46	84	69	26	63	40	53	72	58	46
	79	36	24	44	22	27	57	11	14	42

Annex 15: Population abundance indices for sole and plaice, inshore surveys

Annex 15.1. Indices of juvenile sole abundance from inshore beam trawl surveys.

a) Young fish surveys. Sole abundance indices are given as numbers per 1000 m² (Netherlands, Belgium and Germany) and as millions of fish sampled (UKYFS and international index).

	UKYFS (VIId)		UKYFS (IVc)		Netherlands DFS		Belgium DYFS		Germany DYFS		International (IV)	
Age	0	1	0	1	0	1	0	1	0	1	0	1
1970					25.79	1.96						
1971					19.96	0.97						
1972					0.50	0.11						
1973					6.88	0.25	3.82	0.01				
1974					1.34	0.51	0.2	0.05	0.21	0.31		
1975					9.90	0.12	6.44	0.02	3.79	0.47		
1976					3.47	0.20	1.23	0.08	0.55	0.35		
1977					1.15	0.23	0.77	0.1	2.8	0.93		
1978					2.50	0.02	8.27	0.01	3.1	0.43		
1979					10.64	0.04	63.91	0.02	1.33	0		
1980					20.94	1.05	12.97	6.64	3.56	2.73		
1981	0.11	0.45	32.06	5.99	16.78	0.43	0.92	0.55	2.1	0.87	293.93	13.39
1982	4.63	0.36	26.99	4.02	17.00	0.60	14.2	0.77	1.11	0.17	328.52	14.28
1983	25.45	1.52	70.66	5.64	4.14	0.73	3.65	0.8	2.14	1.28	104.38	20.32
1984	4.33	4.04	59.84	11.3	9.18	0.26	5.49	0.8	1.14	0.36	186.53	11.89
1985	7.65	2.94	20.53	2.8	16.13	0.09	16.27	0.16	0.03	0.18	315.03	3.43
1986	6.45	1.45	28.98	3.1	3.47	0.26	2.47	0.97	0.31	0.7	73.22	10.47
1987	16.85	1.38	20.87	1.89	30.83	0.27	2.36	0.05	1.27	0.4	523.86	6.43
1988	2.59	1.87	35.55	9.7	1.81	0.56	0.67	0.49	3.17	7.11	50.07	35.04
1989	6.67	0.62	47.2	3.78	3.63	0.22	1.06	0.13	0.43	2.12	77.80	11.59
1990	6.7	1.9	36.82	12.27	0.52	0.17	0.35	0.05	0.23	1.37	21.09	11.25
1991	1.81	3.69	22.72	19.69	22.88	0.02	2.17	0.01	0.87	0.37	391.93	8.26
1992	2.26	1.5	33.45	5.21	0.89	0.53	0.08	0.39	0.19	2.06	25.30	17.90
1993	14.19	1.33	36.42	24.46	0.80	0.03	0.25	0.03	0.12	0.51	25.13	10.67
1994	13.07	2.68	27.32	9.14	3.57	0.01	0.65	0.12	0.15	0.81	69.11	6.18
1995	7.53	2.91	33.55	13.04	0.26	0.12	1.71	0.09	0.09	0.99	19.07	9.82
1996	1.85	0.57	50.16	6.78	1.79	0.01	5.2	0.47	0.55	0	59.62	3.99
1997	4.23	1.12	14.87	4.91	2.17	0.31	1.4	0.82	0.03	3.3	44.08	19.02
1998	7.97	1.12	37.99	2.12	*		3.63	2.7	0.18	0.32		
1999	2.63	1.47	19.02	7.67	*		2.13	0.43	0.10	0.25		
2000	1.16	2.47	13.54	9.76	0.59	0.03	0.56	0.1	0.12	0.08	15.51	4.53
2001	4.75	0.38	42.12	3.83	2.81	0.02	9.91	0.62	0.05	0.1	85.31	3.93
2002	4.45	4.15	31.12	7.30	1.40	0.04	12.19	4.33	0.18	0.43	64.97	18.19
2003	4.55	1.44	8.91	4.46	0.72	0.12	0.75	0.44	0.1	0.07	16.82	5.19
2004	10.19	3.65	20.77	2.40	0.29	0.03	10.98	2.33	0.05	0.01	40.10	8.68
2005	9.97	4.07	16.03	6.79	1.42	0.03	6.1	1.33	0.99	*	46.81	*
2006	3.09	2.21	17.56	5.69	0.50	0.16	0.35	2.54	0.12	*	14.69	*
2007	*	*	35.93	3.67	0.49	0.02	1.7	0.23	0.05	*	23.51	*
2008	*	*	28.70	8.40	1.02	0.01	0.47	0.06	0.02	*	26.74	*
2009	*	*	20.30	3.40	1.05	0.04	**	**	0.31	*	25.36	*

*** No (valid) survey**

**** Data not yet available, for international index 2008 values taken**

b) Sole Net Survey (SNS): Sole abundance indices are given as numbers per 100 hour fishing

	NETHERLANDS SNS					
AGE	0	1	2	3	4	5
1970	623	5410	734	238	35	4
1971	10685	903	1831	113	3	29
1972	16	1455	272	149	0	28
1973	896	5587	935	84	37	13
1974	174	2348	361	65	0	0
1975	577	525	864	177	18	0
1976	465	1399	74	229	27	6
1977	1585	3743	776	104	43	32
1978	10370	1548	1355	294	28	99
1979	3923	94	408	301	77	0
1980	5146	4313	89	109	61	3
1981	3241	3737	1413	50	20	0
1982	2147	5856	1146	228	7	10
1983	769	2621	1123	121	40	0
1984	3334	2493	1100	318	74	8
1985	2713	3619	716	167	49	4
1986	742	3705	458	69	31	17
1987	13610	1948	944	65	21	0
1988	523	11227	594	282	82	10
1989	1743	2831	5005	208	53	18
1990	51	2856	1120	914	100	50
1991	3640	1254	2529	514	624	27
1992	303	11114	144	360	195	285
1993	231	1291	3420	154	213	0
1994	4693	652	498	934	10	59
1995	1375	1362	224	143	411	7
1996	2322	218	349	30	36	90
1997	803	10279	154	190	26	58
1998	328	4095	3126	142	99	0
1999	2188	1649	972	456	10	21
2000	70	1639	126	166	118	0
2001	8340	970	655	107	35	56
2002	1128	7547	379	195	0	31
2003	*	*	*	*	*	*
2004	162	1370	624	393	69	53
2005	305	568	163	124	0	21
2006	16	2726	117	25	30	0
2007	467	849	911	33	40	14
2008	755	1259	259	325	0	10
2009	2291	1932	344	62	103	0

*** No survey.**

Annex 15.2. Indices of juvenile plaice abundance from inshore beam trawl surveys.

a) Young fish surveys: Plaice abundance indices are given as numbers per 1000 m² (Netherlands, Belgium and Germany) and as millions of fish sampled (UKYFS and international index).

	UKYFS (VIId)		UKYFS (IVc)		Netherlands DFS		Belgium DYFS		Germany DYFS		International (IV)	
Age	0	1	0	1	0	1	0	1	0	1	0	1
1970					22.02	9.97						
1971					16.04	2.31						
1972					4.83	5.35						
1973					3.16	10.05	1.21	0.01				
1974					2.23	2.32	0.01	0.3	14.38	5.38		
1975					4.35	3.63	1.12	0.02	9.02	10.31		
1976					7.76	4.64	0.18	0.08	37.09	2.22		
1977					3.98	7.25	0.13	0.17	39.12	19.74		
1978					8.06	3.90	1.47	0.13	26.37	10.94		
1979					18.09	8.98	1.49	0.63	22.21	14.61		
1980					5.85	11.13	0.11	0.59	21.48	35.06		
1981	0.55	0.11	59.24	5.95	29.90	8.57	1.69	0.11	34.3	14.33	605.96	169.78
1982	0.58	0.06	11.65	13.15	24.98	15.94	0.54	0.57	6.37	14.47	433.67	299.36
1983	10.71	0.77	74.11	6.86	19.65	8.77	1.02	0.37	26.41	7.32	431.72	163.53
1984	3.62	0.41	76.52	10.85	11.65	6.76	0.45	0.19	6.01	1.04	261.80	124.19
1985	5.18	1.16	48.33	13.74	40.16	5.25	3.76	0.15	5.51	1.81	716.29	103.27
1986	12.53	1.08	23.62	17.93	10.48	15.88	1.6	0.81	3.38	4.68	200.11	288.27
1987	13.95	1.07	20.38	5.41	28.49	11.25	3.16	1.8	13.46	1.32	516.84	195.87
1988	9.31	0.81	28.12	7.72	16.22	5.97	0.72	1.77	14.93	4.74	318.36	116.45
1989	2.26	0.70	27.8	12.90	22.92	6.37	0.38	0.13	19.09	4.89	435.70	125.72
1990	4.73	0.52	31.75	10.25	23.78	6.85	2.39	1.21	23.59	3.18	465.47	130.13
1991	1.34	0.43	14.89	9.06	26.97	7.65	1.19	0.19	21.24	10.79	498.49	152.35
1992	2.92	1.09	26.16	5.64	19.55	6.82	0.31	0.2	4.72	12.03	351.59	137.08
1993	5.77	0.64	43.10	7.96	13.49	3.80	0.14	0.13	3.86	2.73	262.26	75.16
1994	12.63	0.59	19.14	9.38	25.15	0.93	1.03	0.33	7.71	3.42	445.66	30.60
1995	7.42	2.47	51.58	11.65	7.29	0.98	2.83	0.79	10.44	5.56	184.51	37.74
1996	1.22	0.72	60.16	4.07	25.44	6.77	14.25	0.31	41.77	0.45	572.80	116.89
1997	1.2	0.26	11.19	5.48	6.37	10.94	2.02	4.46	16.67	10.71	149.19	209.92
1998	5.23	0.29	40.26	0.92	*	*	3.01	1.74	8.11	1.36	*	
1999	4.83	0.16	14.38	1.65	*	*	1.2	1.79	2.94	1.07	*	
2000	0.29	0.72	10.57	4.82	9.30	0.17	1.48	1.1	10.28	1.18	183.83	11.31
2001	2.52	0.05	78.80	1.64	23.40	0.17	1.63	0.63	27.47	0.24	500.43	5.90
2002	0.33	1.61	36.75	3.18	10.40	0.08	4.73	5.28	1.12	2.9	210.70	17.79
2003	8.20	0.16	28.18	3.38	19.11	0.32	2.95	1.35	9.2	0.26	359.59	11.31
2004	12.20	1.46	64.38	1.82	10.68	0.54	4.84	2.16	4.7	0.45	243.15	14.97
2005	3.00	0.21	9.89	4.33	6.55	0.10	4.35	0.3	2.68	*	129.25	*
2006	2.63	0.33	37.13	3.96	11.79	0.19	1.24	0.79	4.00	*	232.28	*
2007	*	*	56.82	1.04	6.88	0.12	4.63	0.26	5.41	*	175.65	*
2008	*	*	22.90	3.40	9.52	0.09	4.24	0.76	2.23	*	186.87	*
2009	*	*	14.20	1.40	11.62	0.17	**	**	9.05	*	227.98	*

*** No (valid) survey.**

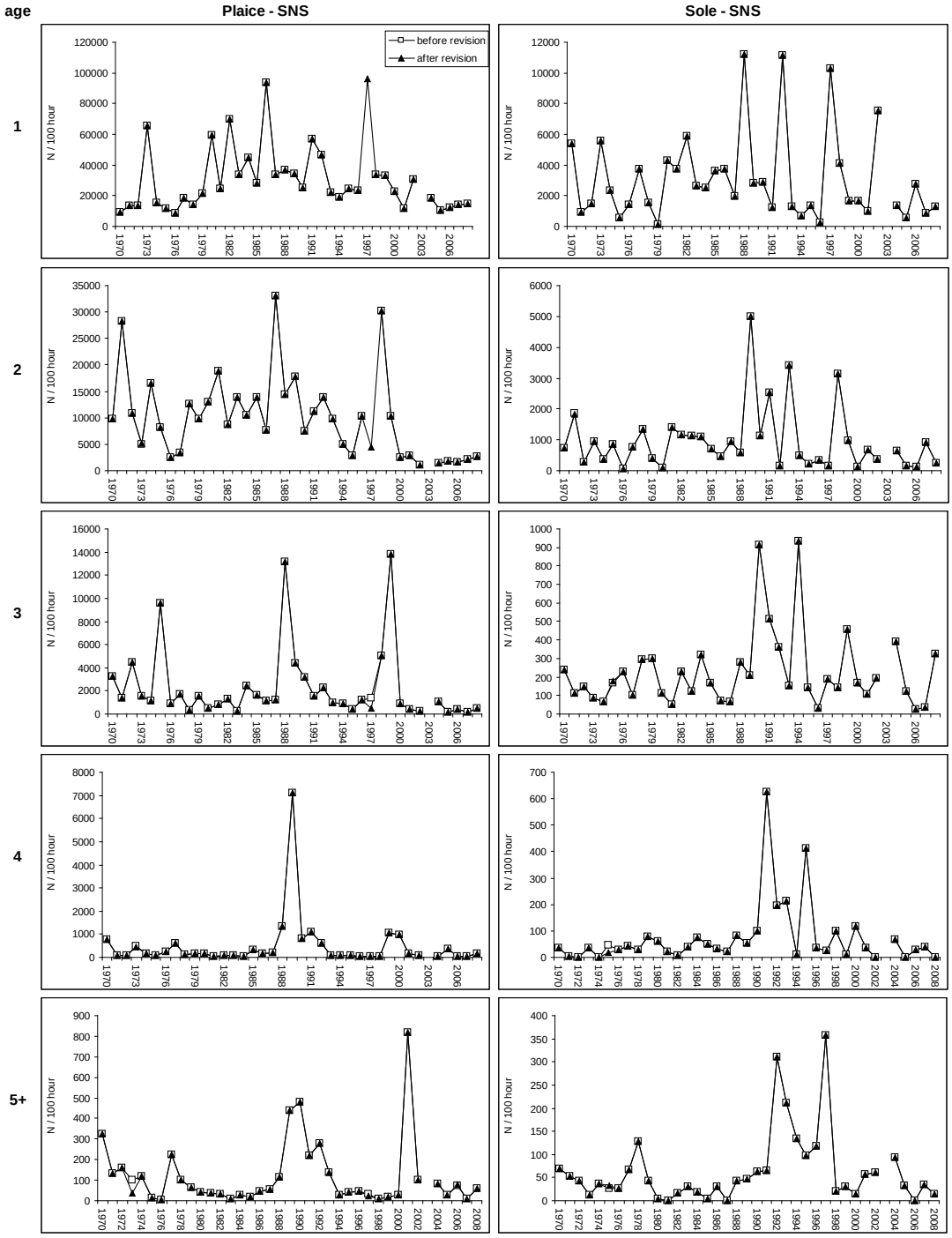
**** Data not yet available, for international index 2008 values taken.**

b) Sole Net Survey (SNS): Plaice abundance indices are given as numbers per 100 hour fishing

	Netherlands SNS					
Age	0	1	2	3	4	5
1970	1200	9311	9732	3273	770	170
1971	4456	13538	28164	1415	101	50
1972	7757	13207	10780	4478	89	84
1973	7183	65643	5133	1578	461	15
1974	2568	15366	16509	1129	160	82
1975	1314	11628	8168	9556	65	15
1976	11166	8537	2403	868	236	0
1977	4372	18537	3424	1737	590	213
1978	3267	14012	12678	345	135	45
1979	29058	21495	9829	1575	161	17
1980	4210	59174	12882	491	180	24
1981	35506	24756	18785	834	38	32
1982	24402	69993	8642	1261	88	8
1983	32942	33974	13909	249	71	6
1984	7918	44965	10413	2467	42	0
1985	47256	28101	13848	1598	328	17
1986	8820	93552	7580	1152	145	30
1987	21335	33402	32991	1227	200	30
1988	15670	36609	14421	13153	1350	88
1989	24585	34276	17810	4373	7126	289
1990	9368	25037	7496	3160	816	422
1991	17257	57221	11247	1518	1077	128
1992	6472	46798	13842	2268	613	176
1993	9234	22098	9686	1006	98	60
1994	26781	19188	4977	856	76	23
1995	12541	24767	2796	381	97	38
1996	84042	23015	10268	1185	45	47
1997	17344	95901	4473	497	32	0
1998	25522	33666	30242	5014	50	10
1999	39262	32951	10272	13783	1058	17
2000	24214	22855	2493	891	983	17
2001	99628	11511	2898	370	176	691
2002	31202	30809	1103	265	65	69
2003	*	*	*	*	*	*
2004	13537	18202	1350	1081	51	27
2005	27391	10118	1819	142	366	8
2006	51124	12164	1571	385	52	54
2007	40581	14175	2134	140	52	0
2008	50179	14706	2700	464	179	34
2009	53259	14860	2019	492	38	20

*** No survey.**

Annex 16: Comparison of Dutch Sole Net Survey (SNS) indices before and after database corrections



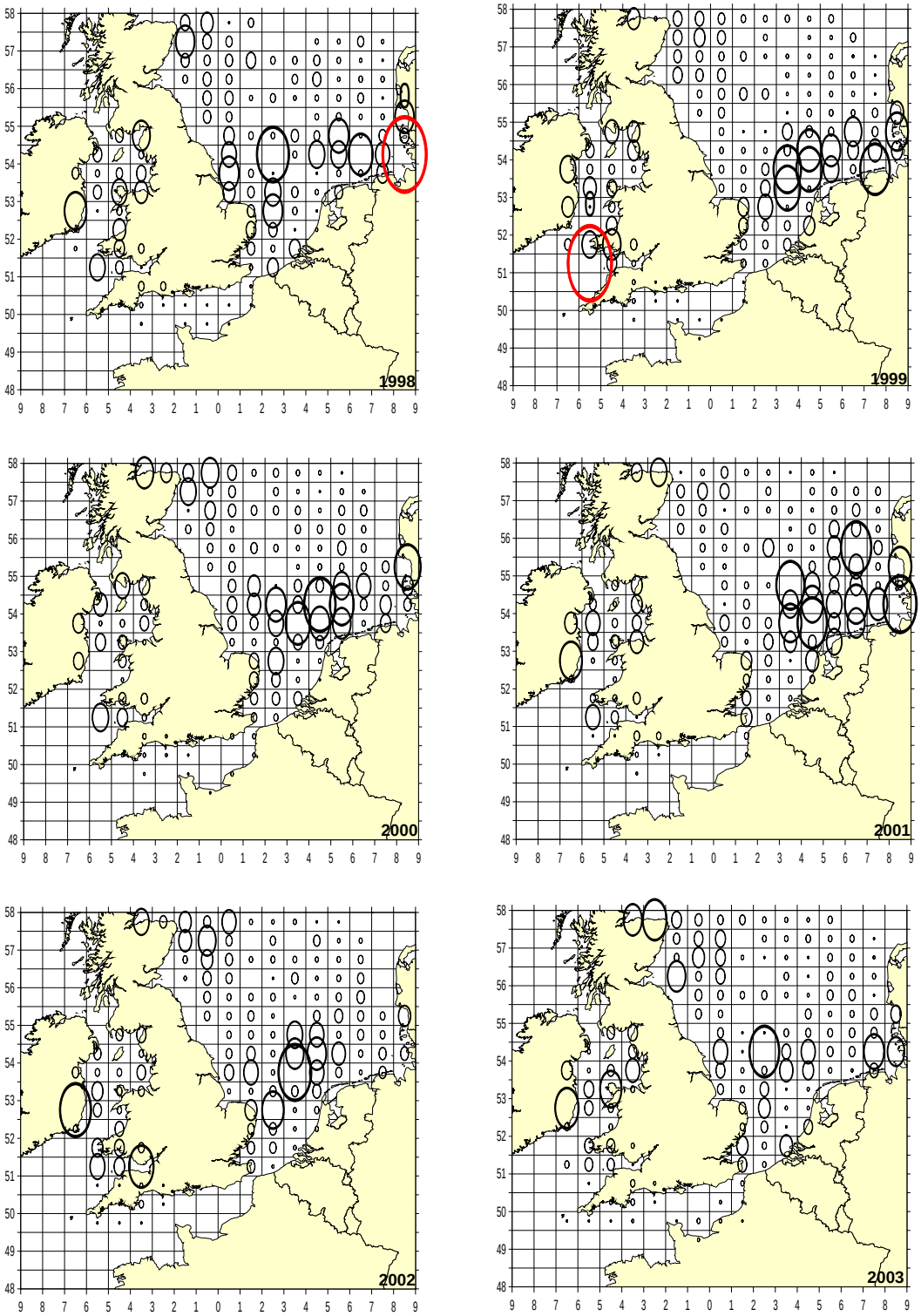
Annex 17: Spatial distribution of whiting, pout whiting, tub gurnard and grey gurnard in offshore survey per year

International offshore beam trawl survey for 1998-2009
Bubbles indicate catches in number/hr/8m beam

Whiting

1750 per hr/8m beam

> 2000 per hr/8m beam

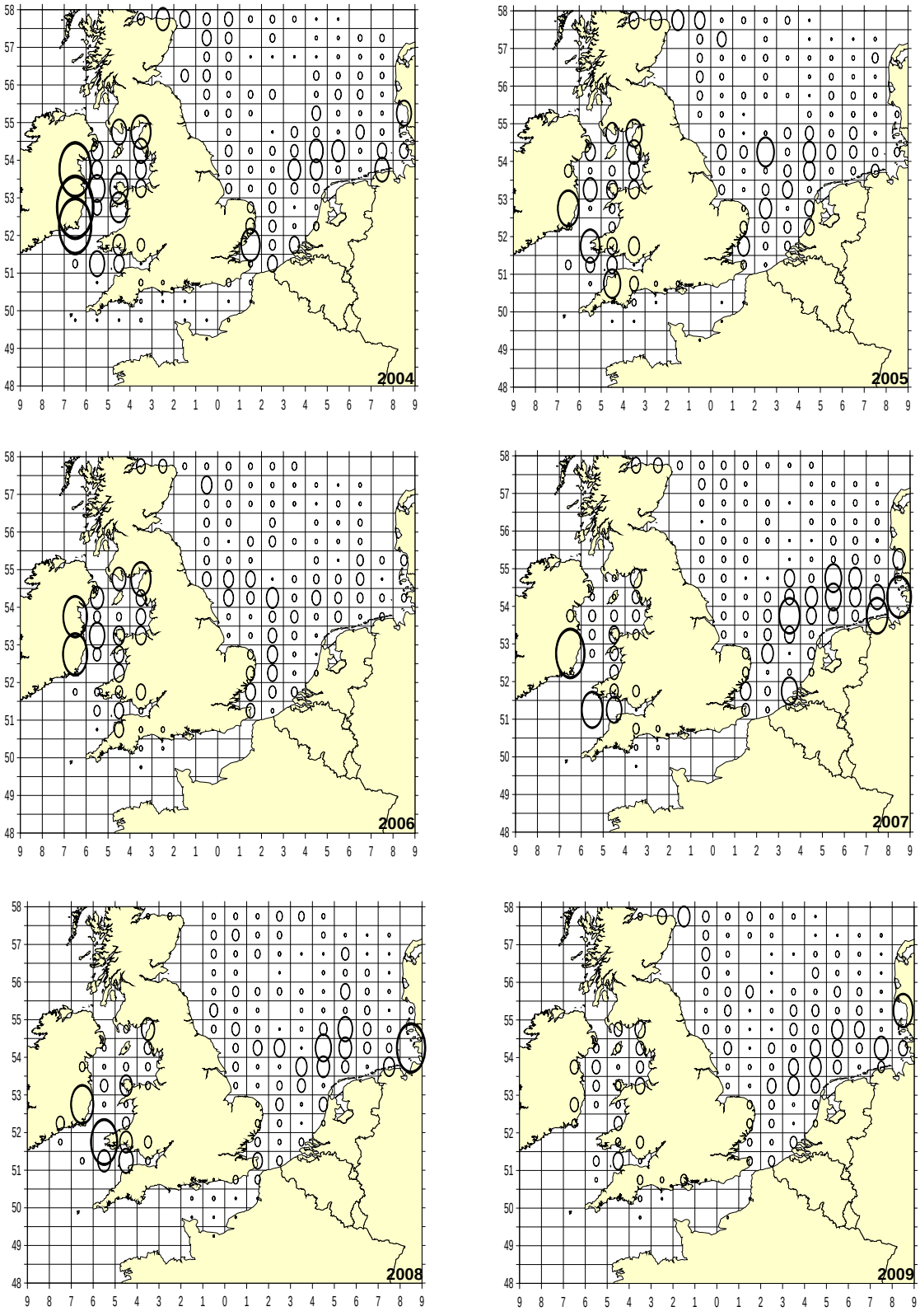


International offshore beam trawl survey for 1998-2009
Bubbles indicate catches in number/hr/8m beam

Whiting

1750 per hr/8m beam

> 2000 per hr/8m beam

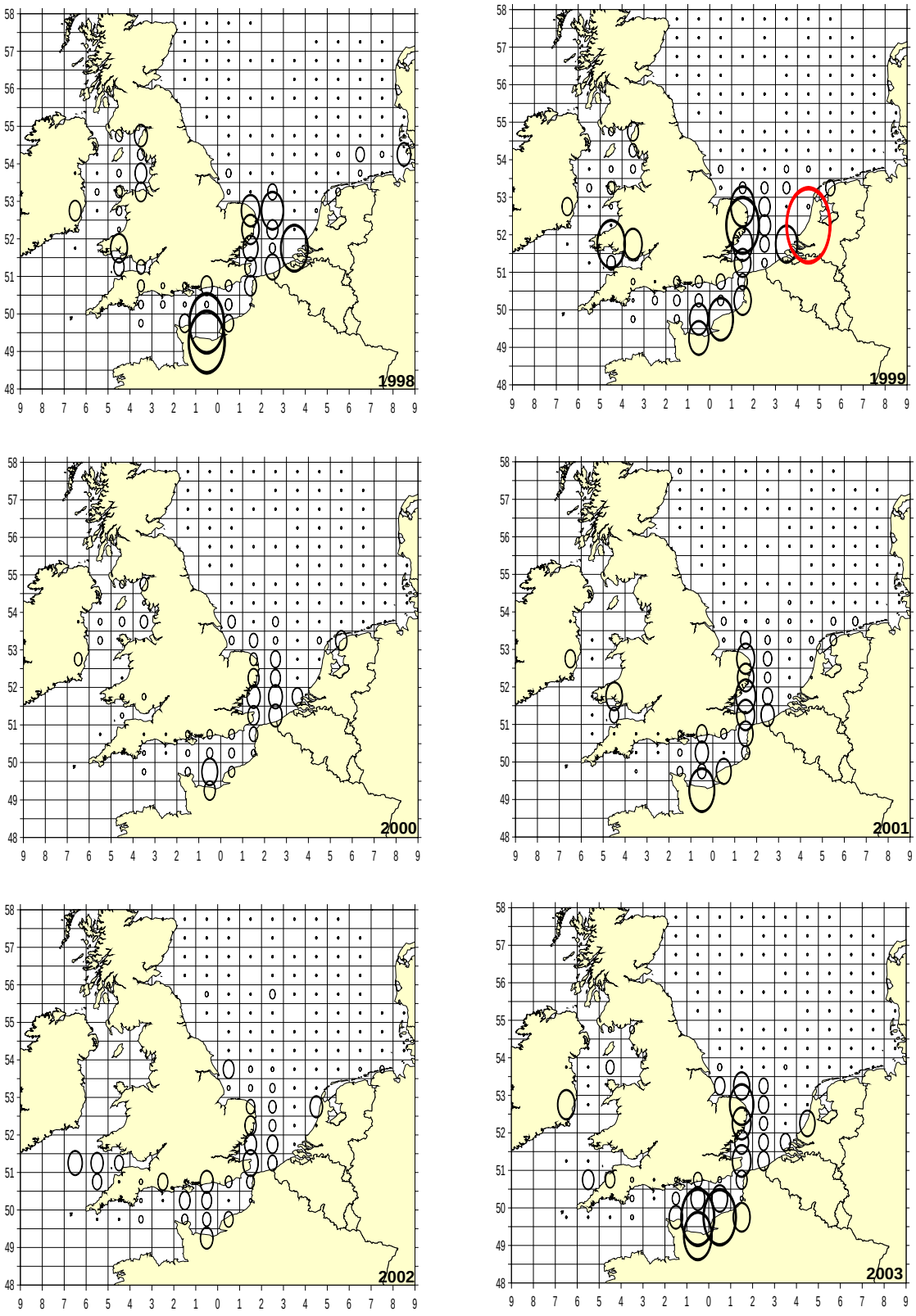


International offshore beam trawl survey for 1998-2009
Bubbles indicate catches in number/hr/8m beam

Pout whiting

900 per hr/8m beam

> 3000 per hr/8m beam

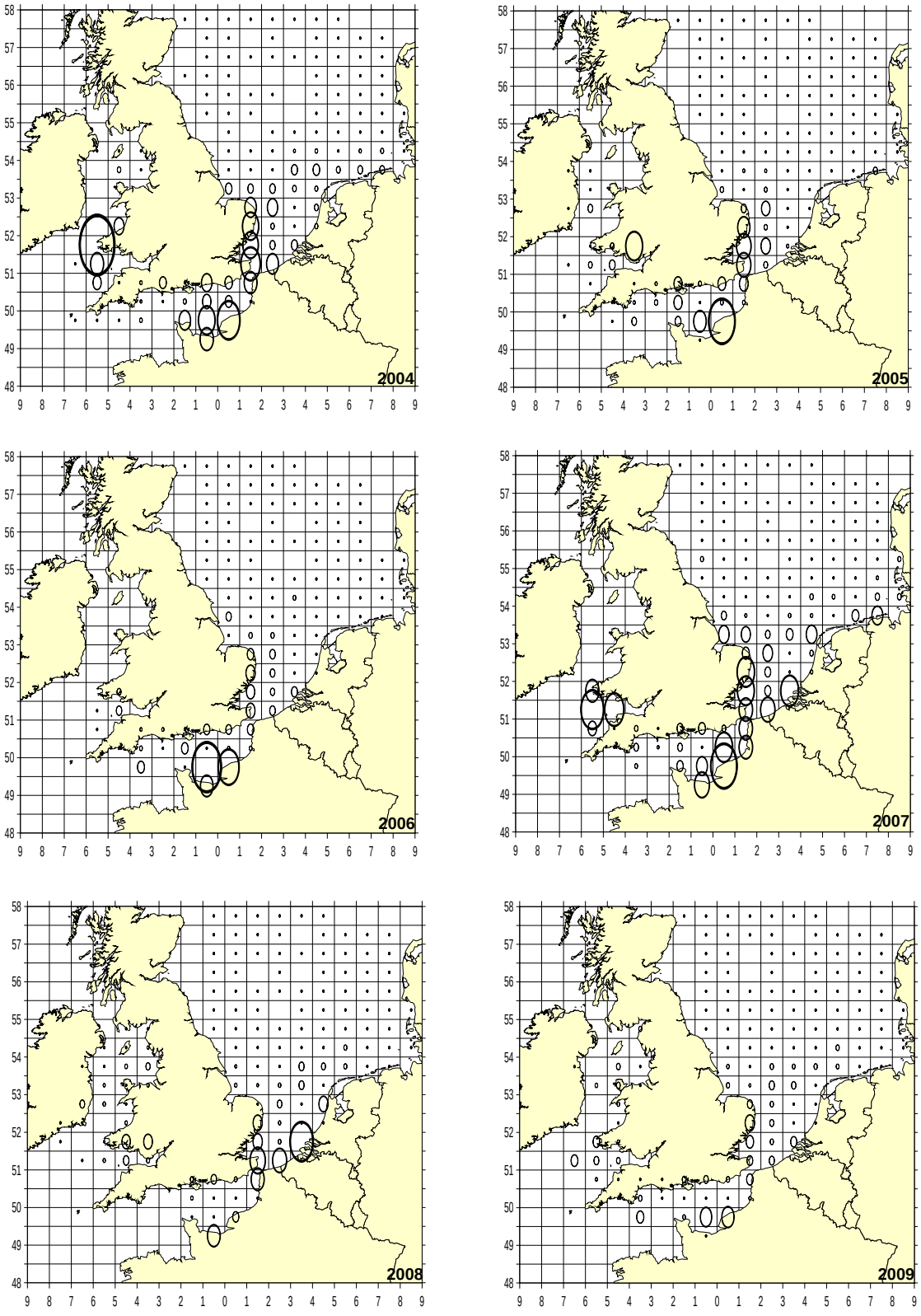


International offshore beam trawl survey for 1998-2009
Bubbles indicate catches in number/hr/8m beam

Pout whiting

1750 per hr/8m beam

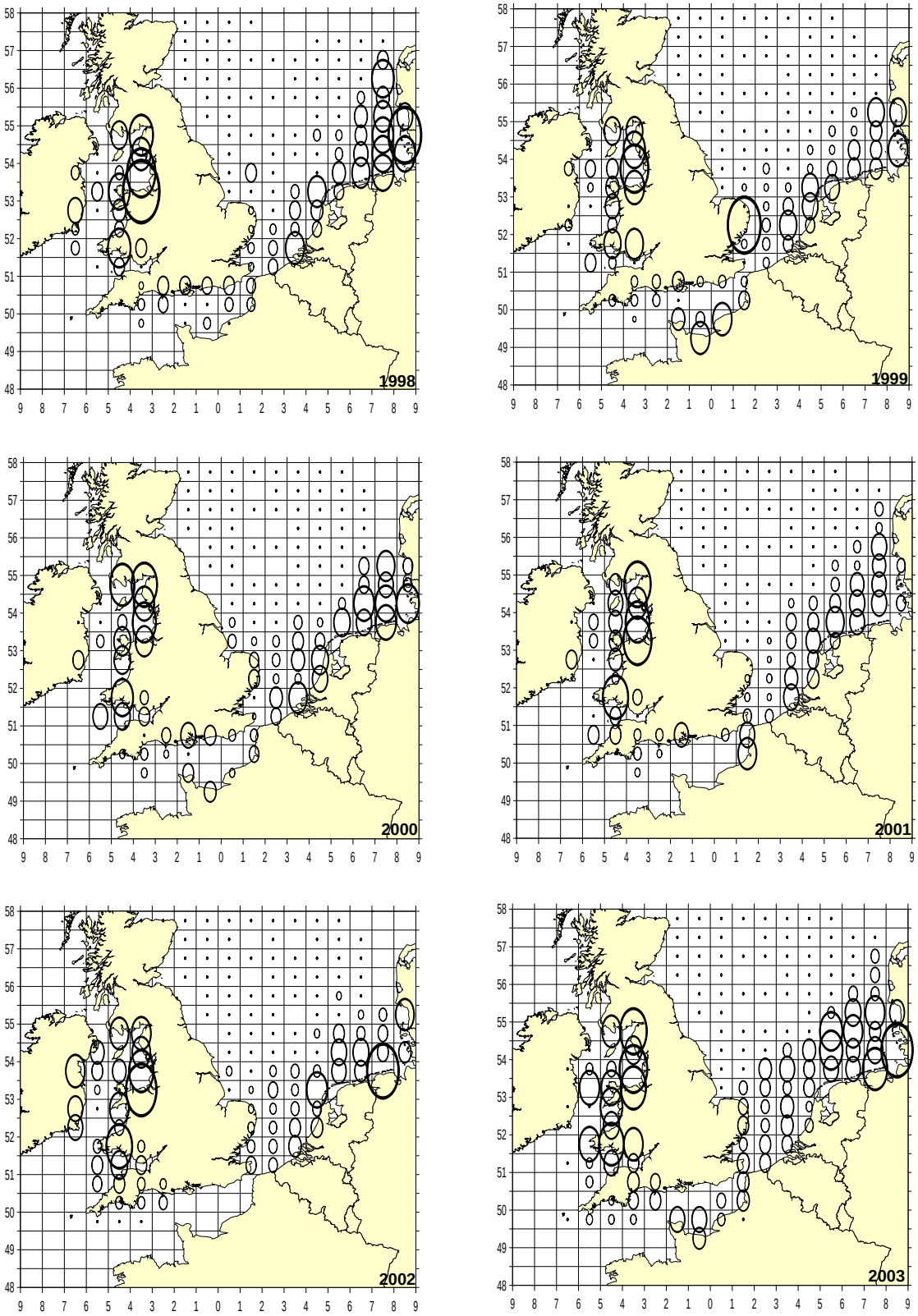
> 2000 per hr/8m beam



International offshore beam trawl survey for 1998-2009
Bubbles indicate catches in number/hr/8m beam

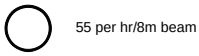
Tub gurnard

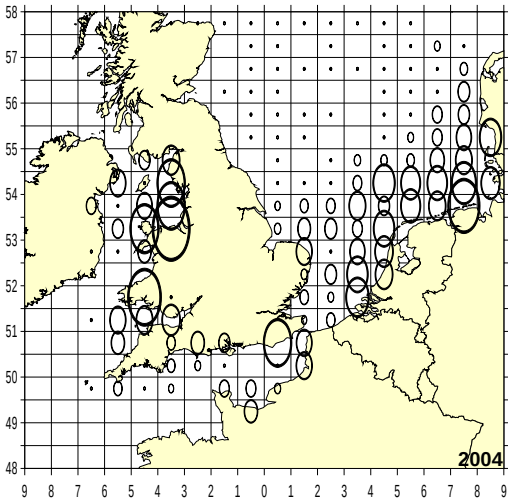
55 per hr/8m beam

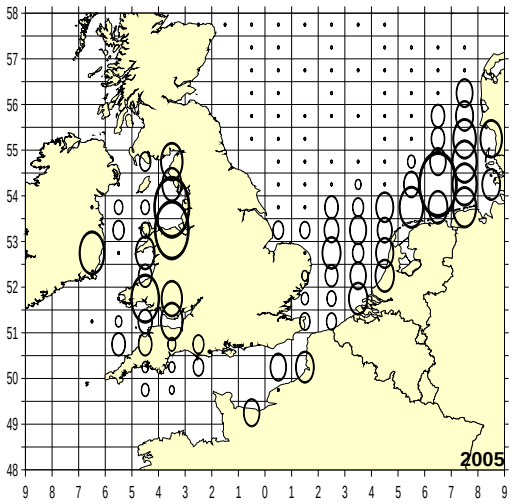


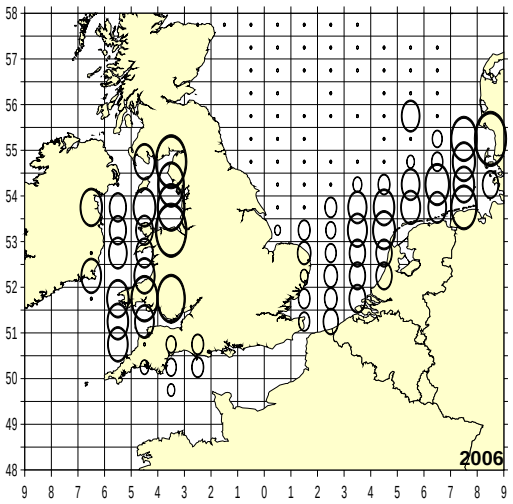
International offshore beam trawl survey for 1998-2009
Bubbles indicate catches in number/hr/8m beam

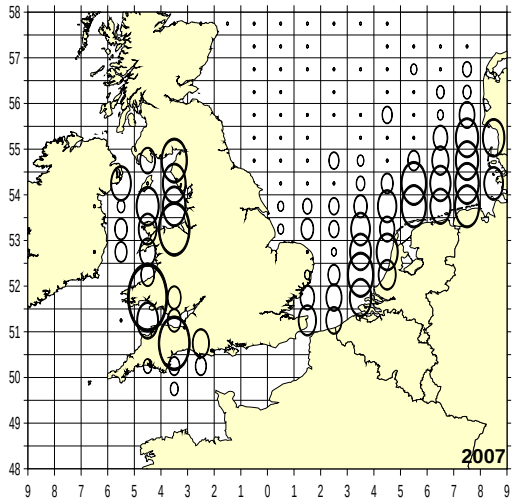
Tub gurnard

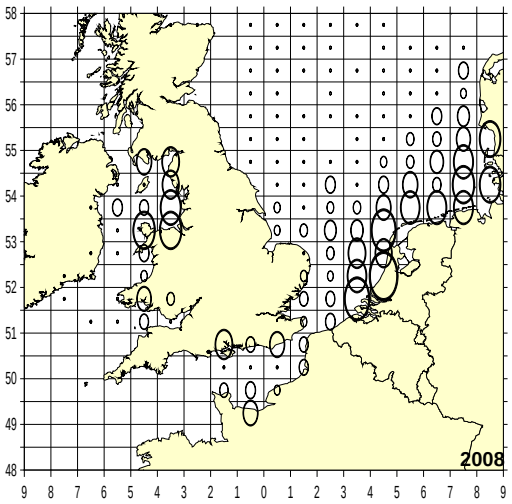


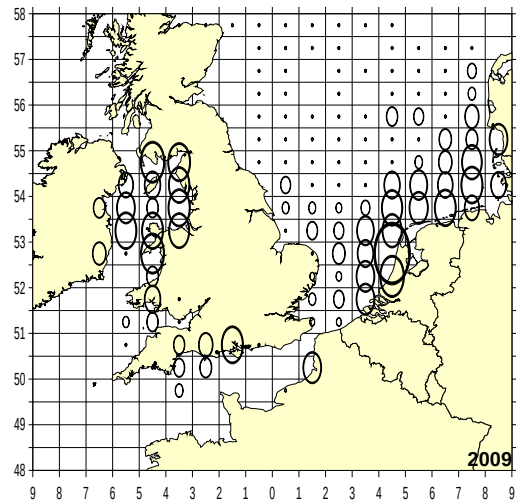




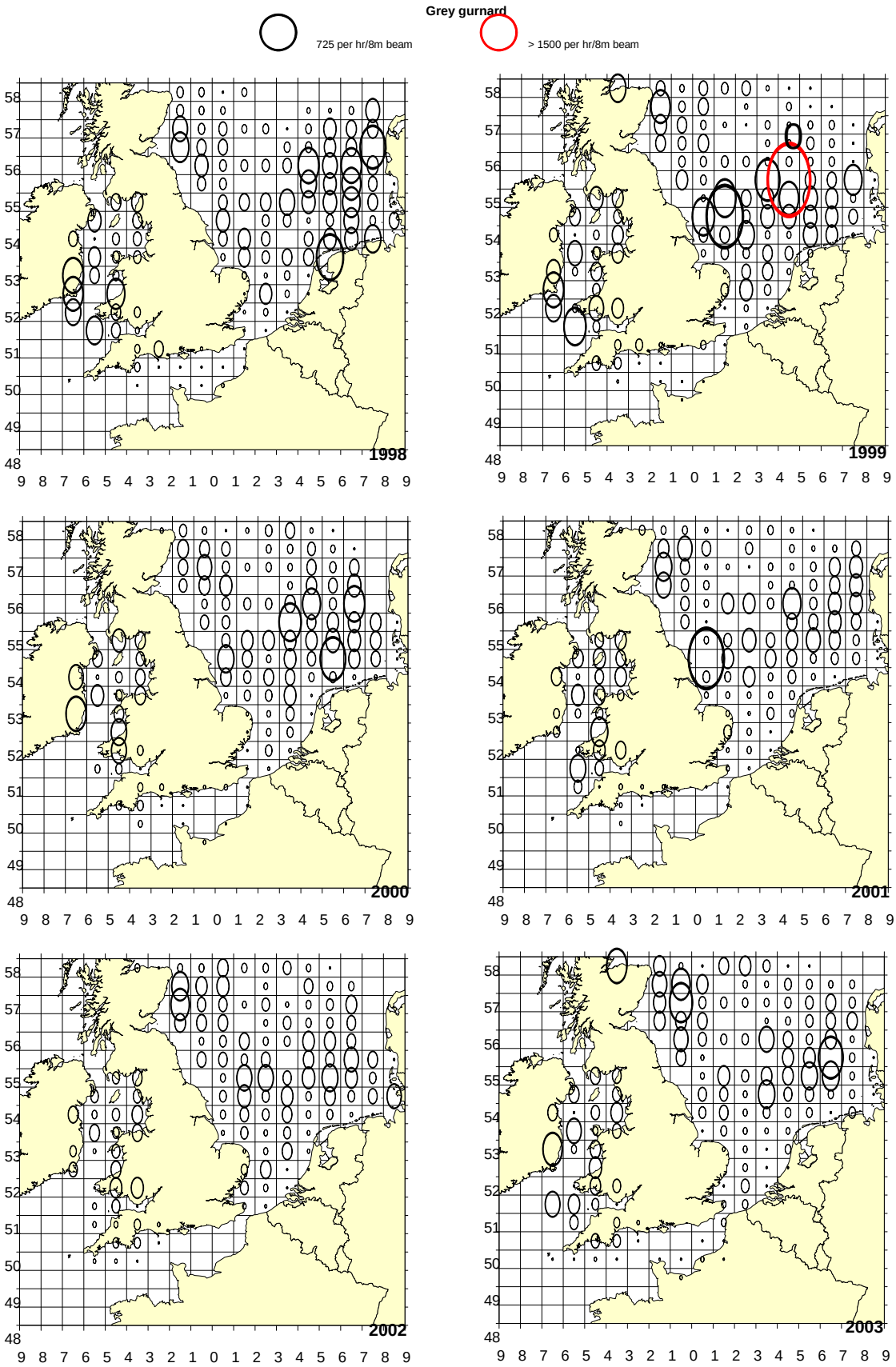








International offshore beam trawl survey for 1998-2009
Bubbles indicate catches in number/hr/8m beam

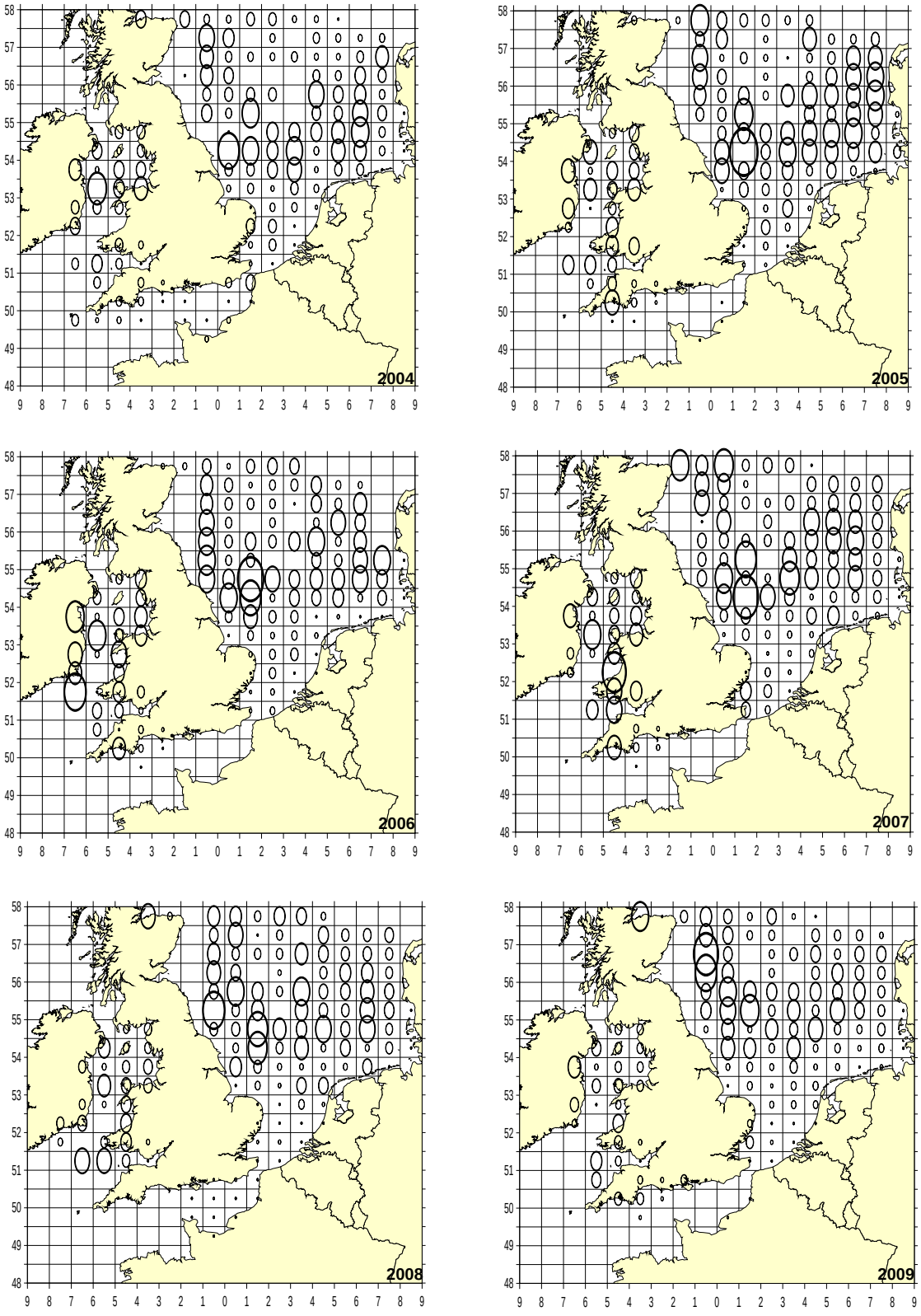


International offshore beam trawl survey for 1998-2009
Bubbles indicate catches in number/hr/8m beam

Grey gurnard

725 per hr/8m beam

> 1500 per hr/8m beam



Annex 18: Summary of the results of the Cefas 2009 Young Fish Survey invertebrate catch

Gary Burt, Cefas, Lowestoft, June 2010

Introduction

With the availability of additional funding last year, which has been secured for this financial year, the opportunity arose for Cefas to increase the level of detail that it was possible to record invertebrates for the survey. These changes went some way to align the invertebrate sampling protocols undertaken by Cefas with the other countries engaged in similar surveys. The increase in funding allowed for an additional 5 days of sea-time (increasing the survey duration from 16 to 21 days) as well as laboratory-time to collect further measurement data.

This report presents a summary of the invertebrate catch data collected during the 2009 survey, with analyses to compare the results from the catch data collected against the recommendations of what the 2008 ICES WGBEAM agreed to report on (refer to ICES WGBEAM Report 2008 (Annex 9)).

A brief history invertebrate catch data collected prior to 2009

- Prior to 2002. Invertebrates were observed only.
- 2002–2006. In accordance with a checklist colonial taxa were observed and free-living species recorded using an abundance scale of occasional (1–10), several (11–20), common (21–50) and abundant (>50).
- 2007–2008. At all stations predetermined species were counted (primarily shell-fish) and at 20% of the stations that remained fixed from year to year, in accordance with a checklist, 11 species/genera were counted.
- The shrimp catch was estimated volumetrically in litres, throughout the duration of the survey.

Invertebrate catch data collected during the 2009 survey

The invertebrate catch was recorded on a standard sampling sheet (Appendix 1), and the following data were collected at each station:

- Presence of 7 colonial taxa.
- 20 species were counted (13 as recommended by the WGBEAM plus an additional 7 species of shell-fish, which were considered to be of commercial importance).
- Because it was not feasible to count all species, an abundance estimate was obtained for a further 10 species that were considered to be important components of the benthic community but were not recorded as a count.
- Length distributions (carapace length to mm below) were obtained for the shrimp species. A subsample of approximately 50 individuals was measured per haul that was raised to the catch by volume.
- Additional useful information regarding the catch was also recorded, namely: sediment; the volume of the total catch; the dominant invertebrate fauna (by bulk).

Results

A total of 160 prime stations out of a total of 161 were successfully sampled (Figure 1). The results for the invertebrate catch (excluding shrimp) are provided in Tables 1, 2 and 3.

Invertebrates (ex. Shrimp)

Table 1. Invertebrate species counted during the survey. (a) The numbers caught, standardized to cpue (No/1000m2) and (b) % of valid hauls with a positive catch, for each survey area.

*	Sea mouse	68	10%	41	24%	109	17%
*	spp. [1]	396	59%	779	77%	1,175	68%
*	Harbour crab	46	10%	137	15%	183	13%
*	Swimming crabs spp. [2]	755	63%	1,029	82%	1,784	73%
*	Edible crab	29	4%	4	4%	33	4%
	Lobster						
*	Dublin Bay prawn						
*	Masked crab			1	1%	1	1%
	Spider crab						
	Velvet swimming crab	19	2%	2	3%	20	3%
*	Common whelk	295	25%	561	49%	856	37%
	Scallop						
	Queen scallop			37	5%	37	3%
	European (native) oyster			53	9%	53	4%
	Pacific oyster			5	3%	5	1%
*	Sand star			15	1%	15	1%
*	Common starfish	11,907	69%	11,181	76%	23,088	73%
*	Brittlestar	9,608	11%	751	14%	10,359	13%
*	Brittlestars ( )	50,188	46%	60,109	70%	110,298	58%
*	Sea Potatoes spp.	19	6%	34,766	16%	34,786	11%

Table 2. The most dominant species encountered at each station, shown as a % of the total number of stations sampled for each survey area.

*	Common shrimp	47%	14%	31%
*	Brittlestars ( )	12%	19%	16%
*	Common starfish Asterias rubens	10%	16%	13%
	Shore crab	17%	4%	11%
	Green sea urchin	5%	14%	9%
	Curly weed	1%	9%	5%
*	Swimming crabs spp.		6%	3%
	Hornwrack	4%	1%	3%
	Hydroids	1%	4%	3%
*	Sea Potatoes spp.		4%	2%
*	Brittlestar		3%	1%
	spp.	1%	1%	1%
	spp.		1%	1%
*	Slipper limpet		1%	1%
*	Common cockle		1%	1%
*	spp		1%	1%
*		1%		1%

*** - Denotes invertebrate species ICES WGBEAM Report 2008 (Annex 9) decided reporting on**

Of the species that were counted, the most commonly encountered species were swimming crabs (*Liocarcinus* spp.) and common starfish (*Asterias rubens*) that occurred at nearly three-quarters of the stations sampled (Table 1). The most abundant

species (in terms of numbers) were brittlestars (*Ophiura albida, O.ophiura*), which were recorded at over half of the stations, although they were more frequently encountered in the Thames survey area. For the commercial shell-fish species, European (native) oyster *Ostrea edulis* was encountered the most, all of which were found in the Thames survey area.

A summary of the dominant fauna recorded for each station and the species where an abundance estimate was recorded is shown in Tables 2 and 3, respectively. An analysis of these data provides evidence of species that are important components of the benthic community for the UK coast but are not currently included on the WGBEAM list of species to be recorded. After common shrimp (*Crangon crangon*), brittlestars (*Ophiura albida, O.ophiura*) and common starfish (*Asterias rubens*), Shore crab (*Carcinus maenas*) and green sea urchin (*Psammechinus miliaris*) were the most commonly recorded dominant species (Table 2), that occurred at 57% and 28% at the station, respectively (Table 3). Of the other species, although not recorded to be dominant, spider crabs were also frequently encountered (at 55% of stations sampled) and occurred in numbers >100 at nearly 9% of the stations.

Table 3. Estimated species abundance (for those species where abundance was recorded for), shown as a % of the total number of stations for each survey area.

Shore crab	19%	12%	10%	11%	30%	81%	13%	6%	8%	3%	3%	32%	57%
Spider crabs	14%	12%	10%	4%	5%	44%	23%	14%	6%	10%	13%	66%	55%
Green sea urchin	4%	4%	1%		7%	16%	11%	9%	1%	4%	14%	39%	28%
Slipper limpet	9%	2%			1%	12%	14%	5%	3%	4%	1%	27%	19%
Common sun star	16%	2%	4%			22%	1%		1%			3%	13%
Plumose anemone	4%					4%	13%	1%	1%			15%	9%
Common mussel	1%					1%	6%	6%	1%		1%	15%	8%
Common cockle	1%					1%	6%		1%			8%	4%
							6%	1%	3%			10%	5%
Square crab			1%		1%	2%	3%	1%				4%	3%

Abundance scale: < or = 10 Occasional (O); 11-20 Several (S); 21-50 Common (C); 51-100 Abundant (A); >100 Profuse (P)

Shrimp

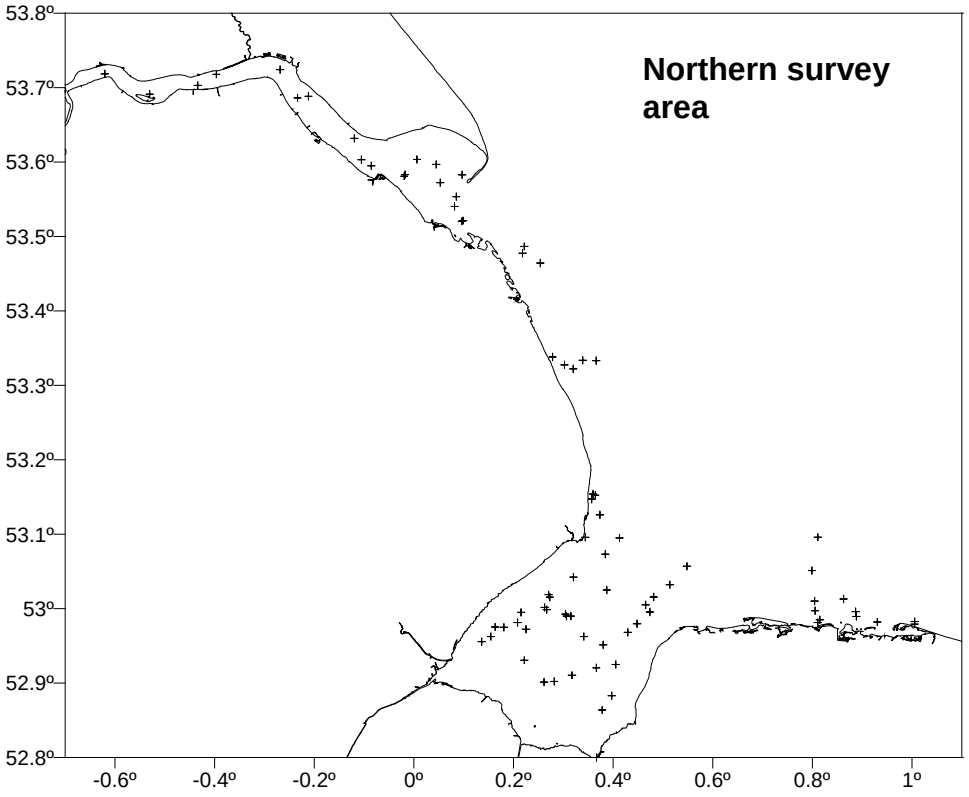
The results for the shrimp catch are shown in Figures 2 to 5. 97% (by number) of the catch composed of common shrimp (*Crangon crangon*), although they were found to be more abundant in the Northern survey area (Figure 2). The high catch rates encountered off the south Lincolnshire coast (Figure 3a) was substantiated during the survey where commercial shrimp vessels were observed to be operational in the area. Two other species of shrimp were identified during the survey, pink shrimp (*Pandalus montagui*) and common prawn (*Palaemon serratus*), both of which were more abundant in the Thames survey area, the latter of which was absent from the Northern area.

An analysis of the carapace length distributions (Figure 4) shows that for common shrimp there is no distinctive size class groups for either of the areas or both areas combined, although the proportion per length-group differed, with no obvious modal length group for the Thames survey area. The bulk of this length distribution would probably equate to a 0-group that was just then beginning to be recruited to the fishery (information from Cefas shellfish team). However, for pink shrimp there was a difference in the length distributions between the two areas that were generally of a smaller size for the Thames survey area. A basic analysis of variance in the length

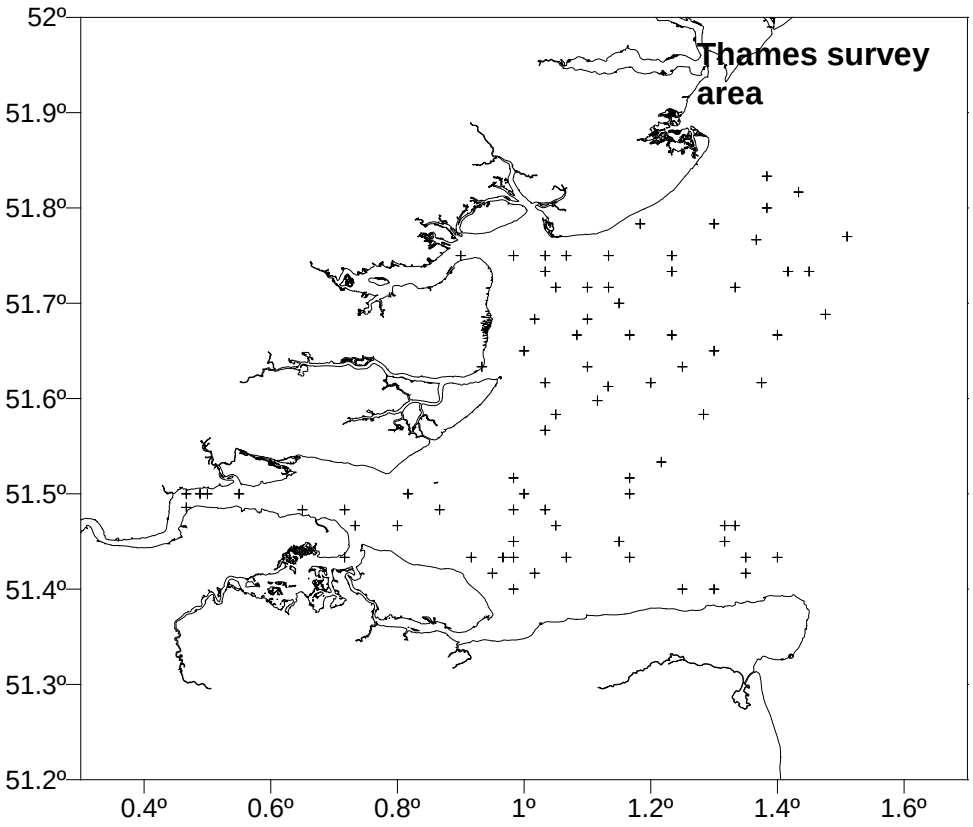
distributions between station for 10 randomly selected stations for the Northern survey shows that length distributions vary between stations but when averaged out are similar to the length distribution for the whole of the Northern survey area (Figure 5). However, this was not subjected to more rigorous statistical testing.

Conclusions

- The "current" list of benthic species provided by the WGBEAM is not sufficient enough to cover those species that are important components of the benthic community for UK waters.
- In light of discussions with the Cefas shell-fish team regarding the introduction of the revised sampling protocols for the shrimp catch further consideration could be given to this area of sampling. Their comments were as follows:
    - The length distribution for common shrimp was primarily comprised of the one (0-group) year class. Natural mortality is regarded to be high with few individuals surviving through to the following year.
    - What is the *utility* of collecting length distributions once a year?
    - Length distributions can be used for modal progression analysis with regular sampling throughout the year.
    - The team was not aware of any length data being used for stock assessment purposes.
    - Cefas does provide data to the Shrimp WG but at the moment these data do not include any collected as part of ECYFS. Currently data are not used for analytical purposes.
    - There is value in recording abundances but volumes/counts would be sufficient, although it would be beneficial if volumes were recorded accurately rather than "guesstimates" as they have been in the past.
    - More accurate abundance estimates for common shrimp and other invertebrates would be preferred over length distributions of shrimps.
- An initial analysis of the common shrimp length distributions suggests that it may be possible to obtain a viable length distribution from randomly selected stations, although this would first benefit from a more rigorous statistical analysis.



(a)



(b)

Figure 1. The Young Fish Survey standard survey positions for (a) River Humber to the north Norfolk coast and (b) the Thames Estuary.

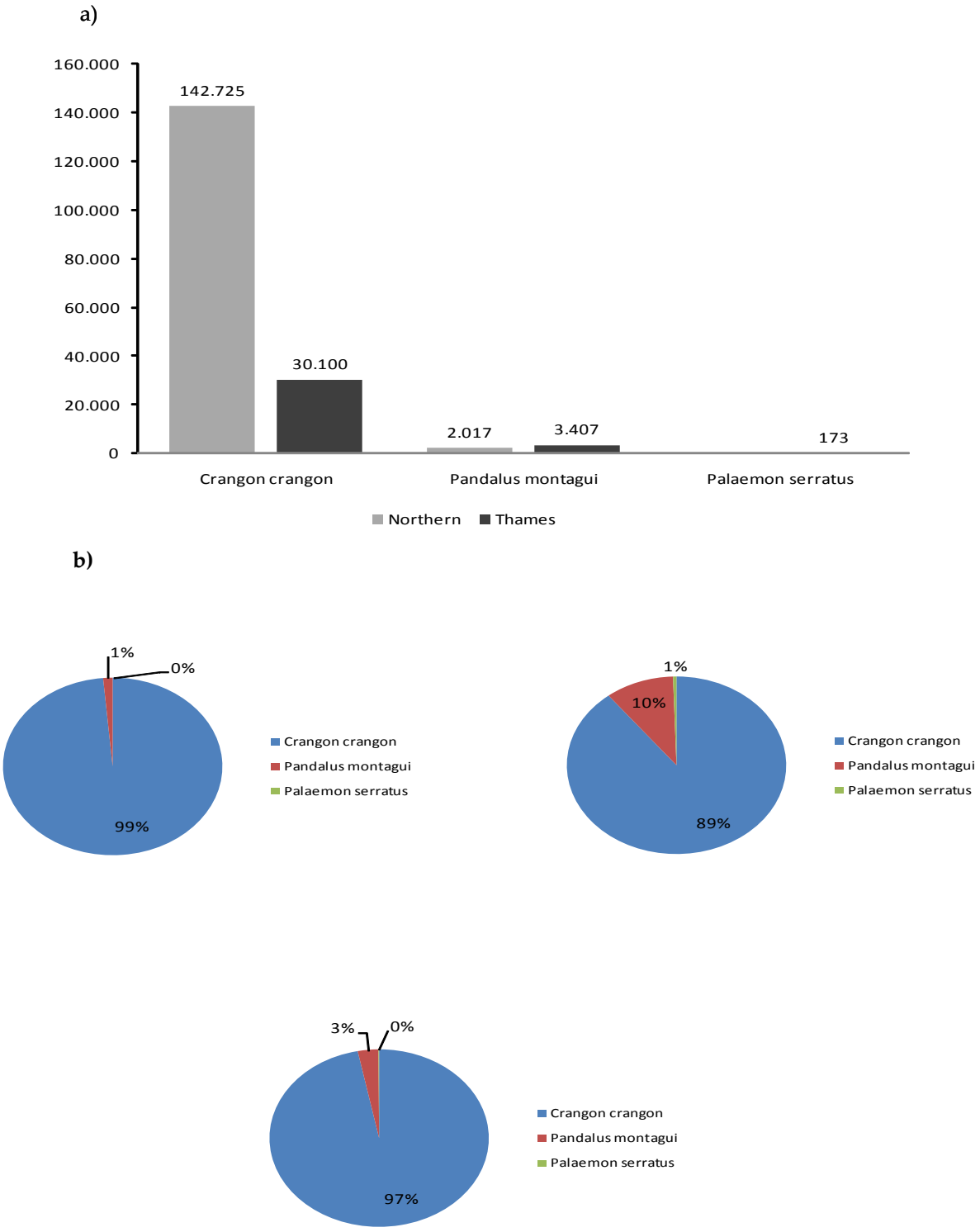
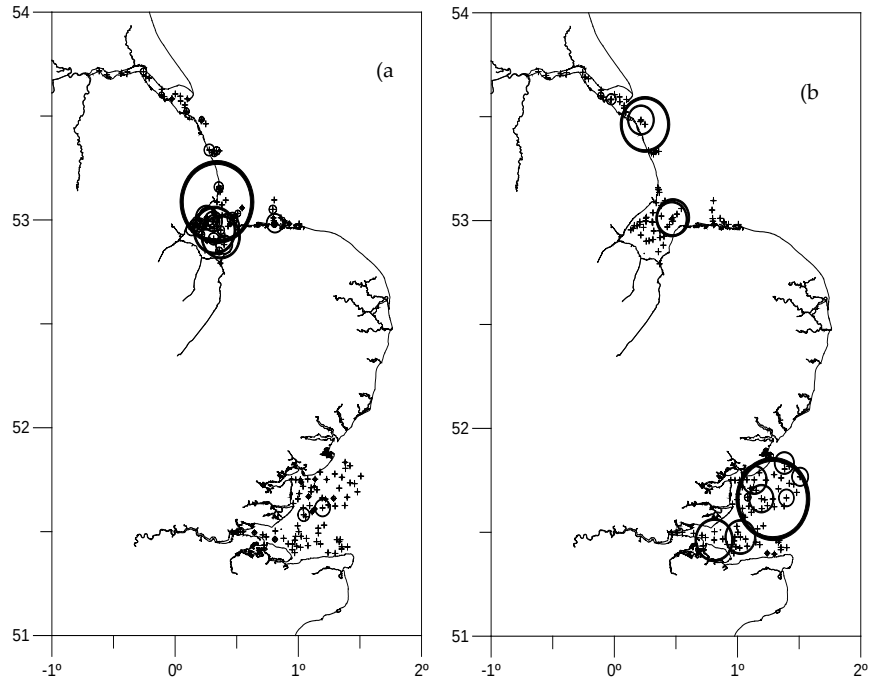
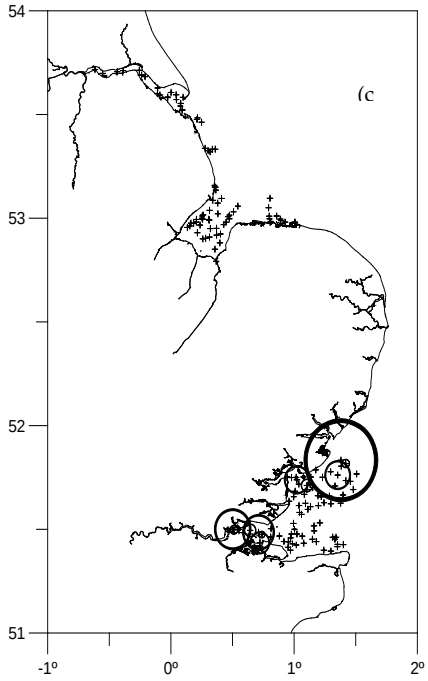


Figure 2. Shrimp abundance by survey area. (a) Total numbers. (b) % species allocation by numbers. (Numbers standardized to cpue (No/1000m²)).



maximum bubble size - 18,389 / 1000m²

maximum bubble size - 902 / 1000m²



maximum bubble size - 47 / 1000m²

Figure 3. Distribution and relative abundance (No/1000m² for (a) *Crangon crangon,* (b) *Pandalus montagui* and (c) *Palaemon serratus*.

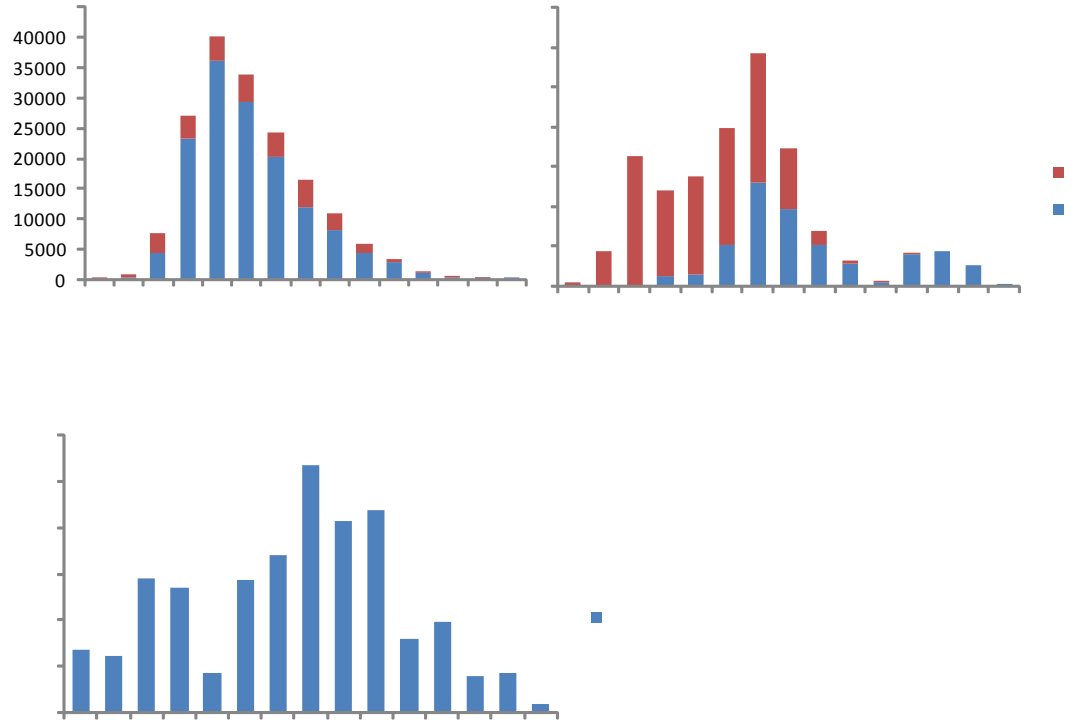


Figure 4. Carapace length distributions. Total numbers of individuals caught standardized to cpue (No/1000m²)).

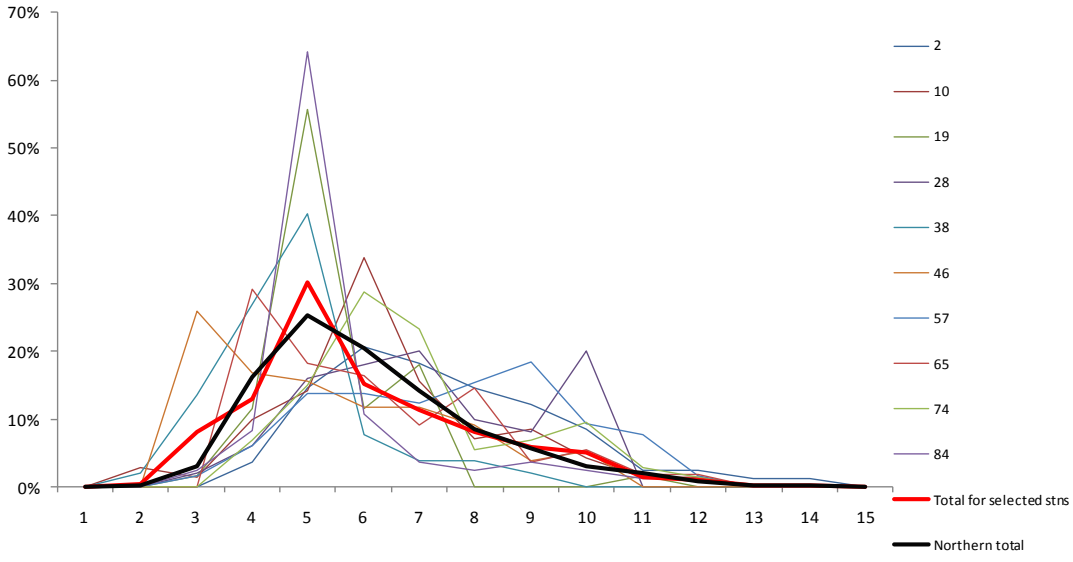


Figure 5. Length distributions of common shrimp (*Crangon crangon;* shown as a %) for 10 randomly selected stations from the Northern survey area compared against the length distributions for the stations combined and the whole of Northern survey area.

Appendix 1. Invertebrates recorded during the 2009 Young Fish Survey

INVERTEBRATES (EPIFAUNA) ON YOUNG FISH SURVEY

Vessel / cruise:	Date:	Station:	Prime:

Clean	Mud	Sand	Gravel	Shell hash	Broken shells	Pebbles	Rocks	Plant

Number of fish boxes:		Litres:	
Number of fish baskets:		Convert catch to litres:	

Species	Code	Present
Sponges	PFZ	
Hydroids	HYD	
Dead mans fingers	DMF	
spp.	RCL	

Species	Code	Present
Hornwrack	FAF	
Curly weed	ALG	
Ascidians	SSX	

	Species	Code	Count No.	RF	Total No.
*	Sea mouse	AAC			
*	spp. [1]	PAY			
*	Harbour crab	LMD			
*	Swimming crabs spp. [2]	PUZ			
*	Edible crab	CRE			
*	Edible crab	CRE			
	Lobster	LBE			
	Lobster	LBE			
*	Dublin Bay prawn	NEP			
*	Masked crab	CCV			
	Spider crab	SCR			
	Velvet swimming crab	MLP			
*	Common whelk	WHE			
	Scallop	SCE			
	Queen scallop	QSC			
	European (native) oyster	OYF			
	Pacific oyster	OYG			
*	Sand star	API			
*	Common starfish	STH			
*	Brittlestar	OPF			
*	Brittlestars ( )	BSY			
*	Sea Potatoes spp.	ECC			
	Ray egg cases (live)	RES			
	Dogfish egg cases (live)	DEG			

Record total numbers using the following abundance scale:

< or = 10 Occasional (O) 11-20 Several (S) 21-50 Common (C) 51-100 Abundant (A) >100 Profuse (P)

Species / group name	Code	Abundance
Plumose anemone	PMA	
Spider crabs [3]	MJX	
Square crab	GOR	
Shore crab	CRG	
	PHP	

Species / group name	Code	Abundance
Slipper limpet	ASL	
Common cockle	COC	
Common mussel	MUS	
Common sun star	CTP	
Green sea urchin	PMM	

Dominant fauna:

Other comments:

Appendix 1 (contd), Invertebrates recorded during the 2009 Young Fish Survey

SHRIMP CATCH ON YOUNG FISH SURVEY

	Common shrimp	Pink shrimp	Shrimp	Common prawn
	CSH	PRM	CGA	CPR
Total volume (litres)				
Sample volume (litres)				
RF				
0,1				
0,2				
0,3				
0,4				
0,5				
0,6				
0,7				
0,8				
0,9				
1,0				
1,1				
1,2				
1,3				
1,4				
1,5				
1,6				
1,7				
1,8				
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2,4				
2,5				
2,6				
2,7				
2,8				
2,9				
3,0				
3,1				
3,2				
3,3				
3,4				
3,5				
3,6				
3,7				
3,8				
3,9				
4,0				
Total				

Note:
Common prawn not to be included as part of a percentage split
Length distribution: if not all, aim to measure approximately 50 per sample
Carapace length (back of eye socket to end of carapace): measure to mm, recorded as cm

Comments:

Annex 19: Executive summary – Workshop on Sexual Maturity Staging of sole, plaice, dab and flounder (WKMSSPDF)

Introduction of common maturity scale

When assigning maturity stages to fish, it is important to have an understanding of the biology of the fish and its reproductive cycle in the sampling area. This helps to distinguish the transitions between the different stages.

WKMSSPDF 2010 proposed to adopt the 6 point scale as proposed by the gadoid workshop WKMSCWHS 2007 (ICES, 2008). From wide ranging discussions it has become evident that outside the spawning period it is not reliably possible to distinguish between what is described as a resting stage 5 and a re-maturing stage 2 (histological pictures have given credence to this). To this end it is recommended for flatfish, stage 5 should only be used during the proposed sampling period (see 'Optimal sampling time') and only to describe a skipped spawning fish.

It is recommended that institutes carry out in-house workshops on the reproductive biology of the fish and maturity staging, also as a follow-up of WKMSSPDF2010 to introduce the new common scale. An important aspect of the introduction of the new common scale is to take care that all institutes will be able to transpose their own scale into the common scale. This will give the flexibility for the institutes sometimes to keep their own scale but to internationalise their data in an easy way.

Classification criteria for maturity stages

For all species, classification criteria were defined in subgroups and presented in a similar way. Plaice and dab were discussed in the same subgroup because only a few experts on dab were present at the workshop. As far as possible, the subgroups worked on a reference picture collection per species per sex.

Comparison of stagings

The stagings were done by 19 readers, in three rounds (picture-fresh-picture). The first staging (from pictures) had low agreement (<60%) for all species. The fresh staging had a clearly higher agreement (>75%) for all species. In the third staging (from pictures) progress was made in percentage agreement compared to the first staging, but there was still a lower agreement on the stages then the staging from fresh material. This is not surprising because touching is one of the ways to identify maturity stages in fish.

Comparison of macroscopic staging with histology

The comparison between the macroscopic staging and histological slides shows that there is an early development stage in gonads seen in the histological samples which cannot easily be indentified macroscopically. The general percentage of agreement between histological slides and macroscopic scales is very low. This might be caused by the number of samples outside the recommended sampling period.

Optimal sampling time

As it is difficult to identify the proper maturity stage when fish is not clearly developing, data collection for maturity ogives is recommended during the prespawning season. This implies that sampling for maturity staging for sole, plaice, dab and flounder should be done during late fourth quarter until the end of the first quarter.

For assessment purposes, only data from one month before the spawning season (to be identified based on the collected data) until the start of the spawning season should be used for the estimation of maturity ogives for sole, plaice, dab and flounder. Any macroscopic staging outside this period can be misinterpreted and should not be used for maturity ogives.

However, collecting maturity information outside the defined period might be interesting for scientific purposes other than stock assessment. For these purposes, it is recommended that histological staging is done.

Future workshops

Judging from WKMSSPDF a workshop on maturity staging for other commercial flatfish species (turbot, brill, lemon sole, witch flounder) might be useful. However, the lemon sole staging during WKMSSPDF shows that having the expertise in staging one species of flatfish can be adequate to stage other species of flatfish.

To define whether a workshop is necessary, it is recommended to do a calibration exercise prior to organising a workshop based on pictures, for example using the WebGR tool (see http://webgr.berlios.de/doku.php).

Before setting up the next meeting, the number of pictures to stage during the workshop should be considered in order to meet the need for time to discuss individual cases as well as maintaining statistical accuracy. Based on the experiences of WKMSSPDF it is recommended that roughly 30 fish per species would be an adequate number to judge at each round during the workshop. This applies for fresh samples as well as pictures. It is recommended that the process of trial-discussion-retrial is based on fresh samples. This means that at least two staging sessions on fresh material have to be done during future workshops. As a consequence, for all species named in a workshop fresh material has to be available in the neighbourhood of the hosting institute.

A workshop on maturity staging should take place when the diversity in maturity stages is high and maturity stages are distinguishable.

WKMSSPDF 2010 developed a set of criteria for pictures to be made for a maturity staging workshop.

Annex 20: Manual for the inshore beam trawl surveys –version 0.1

Report of the Working Group on Beam Trawl Surveys (WGBEAM)

8-11 June 2010

Lowestoft, UK

1. Introduction

Four countries are participating in the inshore beam trawl surveys coordinated by the Working Group on Beam Trawl Surveys (WGBEAM). An overview of the main characteristics of the different surveys is given in Annex 1.

The continental (B, NL, D) surveys date back to a joint international programme that started in 1969 (van Beek *et al.*, 1989). A combined index, including UK data, for pre-recruit (0- and 1-group) sole and plaice was first prepared for the North Sea Flatfish WG in 19??. Since 19??, WGBEAM is responsible for coordinating the surveys. While initially two seasons were covered by the surveys, the spring campaign was dropped country by country such that actually only autumn surveys are conducted.

There is no agreed standard gear across the surveys, a situation which lasts since the beginnings. The different countries all have their own sampling areas along their coast with little or no overlap. Because the gears used vary, it is not possible to change sampling protocols from one country to the other without any thorough scientific study beforehand. For the purpose of deriving the combined flatfish indices, a set of conversion factors was compiled, based on experiments (ICES 1985). Additionally, WGBEAM tries to increase standardization in sampling by staff exchange during the surveys and by publishing this manual.

The paragraphs are primarily split up by country to point out clearly differences in the surveys.

2. WGBEAM surveys

2.1 History of the surveys

2.1. Belgium

The Belgian inshore beam trawl survey, collecting fisheries independent data primarily for juvenile 0- and 1-group plaice and sole along the Belgian coast (IVc), started in 1973. The continuous time-series using a 6m beam trawl as the standard gear started in 1973. 33 fixed stations are fished for 30min at 4 knots. Besides the target species, plaice and sole, only dab, brill, turbot, flounder, cod and whiting have been measured.

2.1.2 Germany

For the "DYFS – Demersal Young Fish Survey" the sampling records date back to 1971–1977, depending on the sampling location. Since 1977, four regions were regularly sampled: East Frisia (from Accumersiel), Elbe estuary (from Cuxhaven), Schleswig-Holstein (from Büsum and Husum). In 2005, a new series for the Weser-Jade estuary (from Wremen and Dorum) was initiated. The trips cover the respective estuary, or the local tidal channels plus an adjacent area seaward of the island chain.

At present, the survey is conducted only in autumn (end of August to beginning of October). A parallel series in spring (April-May) was abandoned after 2004, following the other countries.

Chartered shrimping vessels are employed throughout, differing between locations and changing through time. Boats are different in size, typically between 12 and 18 m length.

Samples are mainly worked up on board by a team of 2–3 persons. The processing has developed through time towards more taxonomic accuracy and more biological detail.

2.1.3 Netherlands

The Dutch undertake two inshore beam trawl surveys: the Demersal Survey (DFS) and the Sole Net Survey (SNS).

2.1.4 DFS

The DFS was initiated by the Dutch fisheries research institute (formerly RIVO) in 1969. From 1969 to 1986 the DFS was carried out in both spring and autumn. Since 1987, the survey has been carried out once a year in September-October.

The early DFS surveys showed the importance of the Wadden Sea as nursery grounds for flatfish. It was thus decided to continue and expand the DFS in order to collect indices of young flatfish.

The coastal zone from the border between the Netherlands and Belgium up to Esbjerg (DK), the Dutch Wadden Sea, Ems-Dollard estuary, Schelde estuary (Wester-/Oosterschelde) are sampled. (NB: the Belgian coast is sampled by Belgium, the German Wadden Sea sampled by Germany).

2.1.5 SNS

The SNS was initiated by the Dutch fisheries research institute (formerly RIVO) in 1969. The survey was designed to continue a Dutch flatfish monitoring programme in the coastal zone ("raaienprogramma"), which had been started in the 1950s. From 1969–1995, the SNS was carried out with RV "Tridens". Since 1996, it has been continued with RV "Isis". The SNS was carried out in both spring and autumn from 1969 to 1989. Since 1990, the SNS has taken place once a year in September-October, with the exception of 2003 when, for only one year, the survey was carried out in spring instead of autumn. From 1974–1991 and in 1994, the area north of Esbjerg was also sampled during the SNS. Because of the difficult (rocky) bottom structure, this area was fished with a heavier beam trawl than the normal one.

2.1.6 United Kingdom

Studies in the early 1960s of coastal waters around England and Wales have shown their importance as inshore flatfish nursery grounds, in particular for plaice and sole. More extensive surveys were undertaken during the 1970s to evaluate the extent of these populations and from 1981 onwards the survey was conducted annually. The extent of the area covered by the survey has changed over this period and has been more extensive than the present study area. The survey once covered the English coastline from Flamborough Head on the northeast coast to Portland Bill on the south coast, as well as Morecambe Bay for a short while.

2.2 History of the survey gear

2.2.1 Belgium

A 6m beam trawl, rigged the same has been used through-out the duration of the survey that begun in 1970.

2.2.2 Germany

Gear rigging remained unchanged except for replacing wooden with rubber rollers. Presumably, the netting material available changed properties through time.

2.2.3 Netherlands

2.2.4 DFS

Not updated

2.2.5 SNS

Not updated

2.2.6 United Kingdom

The 2m wooden beam trawl has been rigged the same through-out the duration of the survey. In addition a 1.5m push-net, designed to have similar efficiency and selectivity, was operated at the low water mark in water depths less than 1m. The use of the push-net ceased in 1999.

2.3 Survey design

2.3.1 Belgium

A research and training vessel is used for the survey. There is no fixed order in which the stations are fished but a similar yearly pattern is executed as much as possible. During the span of the time-series, some stations have been moved slightly. The rationale for the new locations has been: within 5 nautical miles, similar grounds and depth. The survey commences during September and is conducted during daylight hours.

2.3.2 Germany

About 150 stations are covered per year. Fishing is mostly done during daytime (with the exception of Cuxhaven/Elbe), towing 15 minutes with the tide. This results in an average speed over ground of 3 knots.

2.3.3 Netherlands

2.3.4 DFS

Sampling is stratified by geographical area and by bottom depth (5m depth classes). The survey area can be subdivided into the Wadden Sea, the Schelde estuary, and the coastal zone. The trawl positions are more or less fixed over the various depth strata.

Three research vessels are used. Fishing takes place during daylight hours during, September and October. The 6m beam trawl is currently deployed in the Dutch coastal zone by RV Isis, and 3m beam trawl in the Wadden Sea by RV Stern and in the Scheldt estuary by RV “Schollevaar”.

2.3.5 SNS

Since 1996, Dutch RV “Isis” surveys the coastal waters from Scheveningen up to Esbjerg (Denmark). The survey station grid consists of 10 standard transects, which run along or perpendicular to the coast.

The SNS is a transect survey using fixed stations originally designed to sample the 1 and 2 year old flatfish. The survey takes place during September and fishing occurs during the hours of daylight.

2.3.6 United Kingdom

Small inshore fishing vessels are chartered for the survey. The survey is carried out by two teams of scientific staff, one surveying the area between the River Humber to the north Norfolk coast and the other, the Greater Thames Estuary. For the survey the coast is divided into sectors, referred to as mini-areas, which are based on geographic features, and within these fixed prime stations are fished annually between late August and early September. This is the period when the majority of newly metamorphosed fish occupy shallow nursery grounds in large numbers. Furthermore each fixed station is permanently assigned to a stratum based on the chart depth.

2.4 Beam trawl construction and rigging

2.4.1 Belgium

The 6m beam trawl is rigged without tickler chains and an 18mm mesh liner. The warp length is, on average, 7 times the station depth as the warp is used double. The skipper assures that the gear fishes well and is in good contact with the bottom. The chief scientist decides, in accordance with the skipper, when the circumstances are no longer appropriate to deliver valid hauls.

2.4.2 Germany

The gear is a 3m beam trawl rigged as a shrimp trawl with a roller chain and no tickler chain. The steel construction can be taken apart for transportation. Codend mesh opening is 20mm.

2.4.3 Netherlands

2.4.4 DFS

Both 3 and 6m beam trawls are used that are rigged the same. The beams are rigged with one tickler chain and the mesh sizes of the net and codend are 35 and 20mm, respectively.

2.4.5 SNS

A 6m beam with four tickler chains is used for the survey. The size of the mesh of the net is 80mm and the codend 40mm.

2.4.6 United Kingdom

The 2m wooden beam trawl is rigged with three tickler chains and a 4mm mesh liner.

2.5 Fishing positions

2.5.1 Belgium

33 fixed positions are distributed over the survey area, all of which are identified as priority stations for the calculation of the indices.

2.5.2 Germany

Survey design has changed through time from fixed-number, fixed stations to variable stations with attempted optimum coverage of tidal channels, creeks and depths.

2.5.3 Netherlands

2.5.4 DFS

A total of 55 fixed stations are surveyed each year, all of which are completed for the calculation of any indices. Fixed

2.5.5 SNS

In total 300 fixed stations are surveyed each year (200 3m beam trawl stations (120 deployed from the RV "Stern" and 80 from the RV "Schollevaar") and 100 6m beam trawl stations by RV "Isis")).

2.5.6 United Kingdom

161 fixed stations are fished, 81 for the River Humber to the north Norfolk coast (northern survey area) and 80 for the Thames Estuary (Thames survey area). It is intended for all stations to be fished although no core stations have been identified that require to be completed each for the calculation of any indices.

2.6 Standard fishing method

2.6.1 Belgium

A haul consist of 30 minutes trawling during daytime, starting when the gear settles on the bottom and ending when hauling commences. Depending on the circumstances a shorter period is allowed not dropping below 15 minutes. Trawl speed should be 3 knots over the ground against the tide. Warp length is, on average, 7 times the fishing depth (double wire).

2.6.2 Germany

Trawling is 15 minutes with the tide. The warp length paid out, and the speed through the water is left to the expertise of the skipper.

2.6.3 Netherlands

For both surveys the standard tow duration was 15 minutes, although less than this is acceptable provided it is greater than 7.5 minutes. For the DFS both the gears are towed at a speed of 2–3 knots, whereas the trawl used for the SNS is towed at 3.5–4 knots.

For the DFS, RV "Isis" surveys the coastal zone and uses a 6m beam trawl, rigged with shrimp netting. RV "Stern" and RV "Schollevaar" survey the other areas with a 3m beam trawl.

2.6.4 United Kingdom

Fishing is conducted during daylight hours and the 2m beam trawl is towed with the tide for a duration of 10 minutes covering a distance of around 450m. It is towed at a speed of 1 knot using a rope warp. In difficult fishing conditions tows of less than ten minute are valid provided that they are more than five minutes in duration.

2.7 Current objectives

2.7.1 Belgium

To produce commercially independent indices of abundance of commercially important species, primarily sole and plaice, in the Southern North Sea. To collect abundance and length distributions for shrimp.

2.7.2 Germany

To provide prerecruit abundance indices for plaice and sole for assessment purposes, abundance and biological data for brown shrimp dynamics, species composition for faunistic and conservation considerations.

2.7.3 Netherlands

2.7.4 DFS

The main objective of the DFS is to provide recruitment indices of plaice (*Pleuronectes platessa*) and sole (*Solea solea*), focussing on age 0- and 1- groups. Recruitment indices of the previous survey year are used by the ICES Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK) to make short-term projections of stock development. The DFS indices of the current survey year only become available after the meeting of the demersal Working Group and is therefore used in the following year. Additionally, the DFS aims at monitoring the demersal fish fauna and epibenthos in shallow waters of the North Sea. Next to plaice and sole, also brown shrimps (*Crangon crangon*) and non-commercial fish are caught. The DFS is unique in delivering such data for the Wadden Sea region and for the Schelde estuary.

2.7.5 SNS

The primary objective of the SNS is to provide abundance indices for juvenile North Sea plaice (*Pleuronectes platessa*) and sole (*Solea solea*) up to ages 3–4. These indices are used by the ICES Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK) for "tuning" the VPAs and for short-term stock and catch projections. The data are hence important for management advice. Additionally, the SNS monitors non-commercial demersal fish species and benthic fauna. The SNS was initiated in 1969, and has been carried out annually since.

Both surveys provide long time-series of data on changes in abundance and distribution of fish species and benthic fauna in the Dutch coastal zone and estuaries and can thus be used to detect ecosystem changes

2.7.6 United Kingdom

The principal objective is to provide indices of abundance of small dermersal fish, in particular juvenile 0- and 1-group plaice and sole, prior to their recruitment to the fishery.

3 Sampling of beam trawl catches

3.1 Catch sorting

3.1.1 Belgium

Catch sorting

On completion of the tow, the commercial finfish catch is sorted into species and measurements taken for each species unless there are excessive numbers, in which case subsampling and categorization is acceptable. No data are collected for benthic species, and the processing of the shrimp catch is discussed below.

Length composition (fish)

Length distributions are recorded for all fish species caught measured to nearest 1 cm below. Length is defined as total length (measured from tip of snout to tip of caudal fin).

Sampling for Age, Sex and Maturity

No biological data are collected.

Shrimp

Aboard the vessel the shrimp catch is mechanically sorted into three size categories and the volumes recorded for each station. The whole of the shrimp catch is preserved in formaldehyde and returned to the laboratory to be measured. For each size category a maximum subsample of about 500 shrimp, which are sorted into species is measured in 5mm length groups and the raising factors noted.

Benthos

No biological data are collected.

3.1.2 Germany

Catch sorting

Ideally the whole catch is sorted by species, but often this is not feasible because of the amount of the catch, such that subsamples are taken by splitting the total catch, or more commonly, by splitting after having sorted out the easier components.

Length composition (fish)

All fish species are measured as total length to the cm below, herring and sprat to the 0.5cm. Measuring may be restricted to a subsample.

Sampling for Age, Sex and Maturity

A subsample of the shrimp taken to the lab is sexed and for the females presence or absence of eggs is recorded. No biological data are taken from fish.

Shrimp

A 200-g sample of shrimp per haul is stored frozen and measured home in the lab to the mm. This replaces the 3-class- measurement (≤54, 55–67, > 67mm) performed formerly on board.

Benthos

Some selected taxa of benthos are recorded by number:

[List to be provided]

Other taxa are ignored.

3.1.3 Netherlands

Catch sorting

Catch is sorted differently on "Isis" and "Tridens" as a result of different size of the vessels and space for sorting.

On-board "Tridens", all fish is sorted. Larger or rare epifauna species are sorted, too. The epifauna are collected in baskets. If the quantities of epifauna are more than one fishing basket, a mixed sample (from different baskets) of one basket is created. This sample is sorted and, if necessary, subsampled. Sub sampling of fish species is generally done by fraction. If the length distribution is homogeneous, the catch per species is sub samples. If there are for example a few larger fish of a species and many small fish of the same species, the smaller fish will be sub sampled and the larger will not be sub sampled. The measured (sub) sample is weighed after measuring.

On-board "Isis", larger fish and larger or rare epifauna species are sorted. Small fish and other epifauna, is collected in baskets of which a mixed sample of one basket is created. This sample is sorted and, if necessary, subsampled.

All species are identified to the lowest taxonomic level. Only if this proves impossible can some be grouped by genus or larger taxonomic group (e.g. *Pomatoschistus* species, Ammodytidae).

Length composition (fish)

Length distributions are recorded for all finfish species caught, measured to the cm below. Herring and sprat are measured to the 0.5 cm since 2007. Length is defined as total length (measured from tip of snout to tip of caudal fin). *Nephrops norvegicus* as well as *Cancer pagurus* are measured to the mm below, by sex. Elasmobranch species are measured by sex, to the cm below.

Minimum number of individuals to be measured is 50 per species. Sub sampling is allowed as long as minimum 50 fish will be measured.

For epifauna species, on-board RV "Tridens" for most free-living species minimum and maximum length (to mm below) are measured for the sample, per species.

Sampling for Age, Sex and Maturity

Depending on the species, a fixed number of fish per cm class per ICES rectangle, flatfish area ("Isis") or roundfish area ("Tridens") is collected. All fish is measured to the mm below, weighted to the gram and sex is identified. Only for lemon sole maturity is staged.

Shrimp

No shrimps are sampled for the SNS. For the DFS a subsample of 100 *Crangon* are measured (total length to mm below) per station.

Benthos

All of the benthic species are counted.

3.1.4 United Kingdom

Catch sorting

On completion of the tow the finfish catch is sorted into species and measurements taken for each species unless there is excessive numbers, in which case subsampling and categorization is acceptable. All elasmobranchs are sexed. No catch weights are collected. Fish are identified to the species level. Only if this proves impossible can some be grouped by genus or larger taxonomic group (e.g. *Pomatoschistus* species, Ammodytidae). Selected benthic species / taxa are counted (for which subsampling is acceptable), abundances estimated for others and the shrimp quantified/measured (see below).

Length composition (fish)

Length distributions are recorded for all fish species caught to nearest 0.5 cm below. Length is defined as total length (measured from tip of snout to tip of caudal fin).

Sampling for Age, Sex and Maturity (fish)

In accordance with targets per length group otoliths are collected for age determination purposes from sole and plaice and their sex and maturity recorded.

Shrimp

Length distributions for approximately 50 individuals for each shrimp species per station are collected, which is raised to the to the total catch

Benthos

At each station preselected species are counted. The list of species to be counted includes both those on the WGBEAM list of species as well as shell-fish species. Subsampling is acceptable where appropriate. Colonial taxa are observed and an abundance estimate, in according to a predefined scale is obtained for selected other species considered to be important.

Table 3.1.1 shows from which species biological data will be collected. For this report, a Y is noted when age material is collected. Additionally, weight, sex and maturity might be collected.

Table 3.1.1. Species for which biological data are collected.

	UK	Netherlands		Germany
Species		DFS	SNS	
Limanda limanda		Y	Y	
Phrynorhombus norvegicus			Y	
Platichthys flesus		Y	Y	
Pleuronectes platessa	Y	Y	Y	
Scophthalmus maximus		Y	Y	
Scophthalmus rhombus		Y	Y	
Solea solea	Y	Y	Y	
Crangoncrangon				Y

4 Quality assurance

Gear: In the UK and Netherlands, standard gear descriptions are used to maintain the gear. A check is done before or after each survey. If the gear does not match the description, the gear technicians overhaul the gear. If the gear is damaged during the survey, a check will be performed immediately after the survey.

Germany: The gear technician checks conformity with the standard description after repairs and replacements.

In Belgium, the fishing skipper and the gear technicians check the gear prior to the yearly survey to meet the standard. Every haul, the gear is checked and repaired before deployment.

Identification: WGBEAM will use the outcome of the Workshop on Taxonomic Quality (ICES, 2007b) concerning problem taxa. Generally, literature is used on board to identify species. All countries' sampling procedures allow for continuous feedback on species identification on board. Species that cannot be identified at sea are conserved and taken home for expert identification.

Germany: Quality of taxonomic distinction has improved in the recent years. Remaining species complexes which cannot yet be resolved at sea are *Pomatoschistus* sp. and *Syngnathus* sp.. In future, the gobies will be taken to the lab for identification, whereas for the pipefish the further procedure has not been decided yet.

In the Netherlands, quality assurance of difficult species is done by internal identification workshops after the survey. For near future, a yearly identification workshop will be planned for all seagoing personnel in the institute.

Sub sampling: for the Dutch survey quality assurance for the fraction and numbers subsampled is defined. At least three times during a survey is checked if the last two fractions in the sub sample are equal and the numbers of fish in the sub sample is recorded continuously.

Survey teams: A common inherent problem with inshore surveys is that the sampling is undertaken by small teams (often by two individuals), that does not necessarily offer the skills-base that is available for the offshore surveys. It is therefore important the that the lead scientist is experienced enough to deal with any issues that arise.

General: for the Dutch offshore survey a quality assurance is available in Dutch (2008) but will be available in English within due time.

5 Environmental data

Environmental data collected by countries includes temperature, salinity and turbidity.

5.1 Belgium

A CTD is attached to the trawl at each station to collected temperature and salinity data.

5.2 Germany

Weather parameters, SST and Secchi depth are recorded about two times per day. Respective water samples are taken to the lab for salinity measurement.

5.3 Netherlands

Since 2002 in the estuarine waters and since 2004 in the coastal waters, hydrographic data (temperature, salinity and visibility profiles) are collected with a data-logging CTD. In earlier years only basic hydrographic measurements (surface water temperature and visibility estimates using a secchi disc) were collected on all DFS cruises.

5.4 United Kingdom

At each station surface and temperature data are collected. At the River Humber stations dissolved oxygen is measured for the Environment Agency.

6 Protocol for starting a new beam trawl survey

This manual should be the starting point for any institute or body that wishes to start a beam trawl survey that will be used for indices purposes. Although there are 5 different gears and up to 11 different vessels (RV and charter) participating in the current coordinated surveys, all countries are using similar methods to carry out their surveys. All countries use protocols to ensure that the sampling on their survey is carried out in a standard way, year on year, and many of the processes used are the same across the coordinated surveys. Gear is maintained and deployed to specified standards and this is fundamental to the process of maintaining high quality data suitable for scientific use. Whenever a new survey is commissioned the suitability of the gear is paramount and liaison with the industry and the WGBEAM would be first steps along the correct path to an inaugural survey. Fundamentally the following steps should be carried out before any survey is started.

- Identify the species that are to be targeted.
- Identify the area to be fished.
- Identify the most appropriate gear to use.
- Ensure the gear can be deployed efficiently from your research platform.
- Ensure that you have competent and expert knowledge to deal with the gear and the sampling.
- Design the survey to deliver robust data that is representative of your needs.
- Document the process and ensure that there is repeatability to all of the processes that you carry out.
- Liaise with experts (such as those at WGBEAM) when designing and carrying out your survey.

One of the remits of WGBEAM to provide expert advice on such issues as listed above and one should take advantage of this, to help ensure the success of any new inshore beam trawl survey.

7. References

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Annex 1: Overview of WGBEAM inshore surveys

Country	Netherlands (SNS)		Netherlands (DFS)		UK (YFS)	Belgium (DYFS)	Germany (DYFS)
Ship	Tridens / Isis	Stern / Waddenzee	Schollevaar	Isis / Beukels / WR17 / GO29	Chartered vessels	Hinders / Broodwinner	Chartered vessels
ship size (m)	73m / 28m	21m / 21m	21m	± 28m	8–10m	27m	12–18m
Date started	1969	1970	1970	1970	1970	1970	1969*
Sampling Period	Apr/May ('69–'89) Sept/Oct	Apr/May ('70–'86) Sept/Oct	Apr/May ('70–'86) Sept/Oct	Apr/May ('70–'86) Sept/Oct	Sept/Oct	Sept/Oct	Apr/May ('74–'04) Sept/Oct
Usual Start date	12 Sept	29 Aug	5 Sept	26 Sept	Late Aug	1–14 Sept	5 Sept
Number of days per period	8–9 within 2 weeks	20 within 5 weeks	12 within 3 weeks	16 within 5 weeks	21	7 within 2 weeks	14
Beam trawl type	6m beam trawl	3m shrimp trawl	3m shrimp trawl	6m shrimp trawl	2m shrimp trawl	6m shrimp trawl	3m shrimp trawl
Number of beams fished	1	1	1	2	1	1	1
Number of beams sorted	1	1	1	1	1	1	1
Tickler Chains	4	1	1	1	3	0	0
Mesh size net	80mm	35mm	35mm	35mm	10mm	40mm	32mm
Mesh size codend	40mm	20mm	20mm	20mm	4mm	22mm	20mm
Speed fished	3.5–4 knots	3 knots	3 knots	3 knots	1 knot	3 knots	3 knots
Time Fished	15 min	15 min	15 min	15 min	10 min	15 min	15 min
Approx. number of stations per year	55	120	80	100	161	33	150
Station positions	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Pseudo - random
Target species	0– 4 group sole and plaice	0–1 group sole and plaice	0–1 group sole and plaice	0–1 group sole and plaice	0–1 group sole and plaice	0–2 group sole and plaice	0–1 group sole and plaice
Total fish catch quantification	Weighed	Weighed	Weighed	Weighed	LFDs only	LFDs only	Weighed
Fish LF distribution	All	All	All	All	All	Commercial	All
Age data for plaice and sole	All years	All years	All years	All years	Since 2001	None	None
Total Shrimp catch quatification	Weighed	Weighed	Weighed	Weighed	Volume	Volume	All

Total Shrimp catch quatification	Weighed	Weighed	Weighed	Weighed	Volume	Volume	All
Shrimp LF distribution	No	Crangon	Crangon	Crangon	Crangon	Crangon (1973–92, 2004–05)	Crangon
Epibenthos	All counted	All counted	All counted	All counted	Selected species Counted	Not quantified	Selected species Counted
Epibenthos since	??	??	??	??	2002	n/a	71–77

***Data available from 1971–1977 (depending on location)**