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

5–8 June 2012

IJmuiden, the Netherlands

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CIEM Conseil International pour l'Exploration de la Mer

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Executive summary

The Working Group on Beam Trawl Surveys (WGBEAM), chaired by Brian Harley, UK, met in IJmuiden, Netherlands, 5–8 June 2012. Nine participants from seven countries joined the meeting.

a) Prepare a progress report summarizing the results of the 2011 offshore and inshore beam trawl surveys;

All of the standard outputs were prepared before WGBEAM. All data was available, although some countries are still unable to load their offshore data to DATRAS. This is being dealt with throughout the year with the ICES Data Centre and the affected institutes. Having met criteria for being coordinated by WGBEAM, the Adriatic SoleMon survey has been recommended as being coordinated by WGBEAM.

An issue that is starting to affect some surveys is that some stations have to be abandoned due to an increase in the number of static gears being found around the surveys sites. For the UK, this meant the loss of six stations from the VIId survey (7% of the stations). Along with this the increase in the number of off-shore developments is also having the affect of stations having to be moved from their historic positions. These issues will be monitored.

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;

North Sea sole: The good 2005 year class, that was still clearly visible in 2008 and 2009, was already becoming less abundant in the population in 2010 and continued that trend in 2011. The 2010 year class, seen as one year olds in 2011, is slightly above the long term mean.

Area VII sole: for Divisions VIId, VIIe, and VIIf, the relative abundance of the 2010 year class is above the long term mean. However for VIIa, the 2010 year class is half that of the long term mean.

Northern Adriatic sole: the 0 and 1 group relative abundance is around the mean for the survey series.

North Sea plaice: The Isis survey has shown a large 2010 year class in 2011 as did the Tridens survey, with the highest 2011 one year olds of its time series. The UK survey also picked this up but to a lesser extent.

Area VII plaice: for all areas the most recent years are showing either the highest one year olds of the survey series or very close to it.

The inshore indices have been revised to take into account the loss of the UK inshore surveys. These changes were evaluated and it is recommended that inter-session work is carried out to improve it.

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

In 2012, the German offshore survey will be slightly reduced in length due to maintenance on the vessel but this should not impact the primary aims of the survey.

d) Continue work on standardizing the offshore and inshore surveys such as, the reviewing the manuals, updating database and staff exchanges;

Both the inshore and offshore survey manuals are now ready to be released as full versions and they are to be sent to the ICES secretariat to be published.

Two staff exchanges were carried out in 2011, one on board the Tridens and one on board the Cefas Endeavour.

e) 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. Focus in 2012 will be on selection of species, water depth and distance from shore;

The suggested focus of this ToR, was changed during the meeting and it was decided to investigate the changes in length at age over time of sole in the North Sea. Data from the Isis survey was used and it was noted that there were changes in length at age, particularly for male sole, during the time-series. A further investigation using DATRAS data from the offshore surveys of WGBEAM will be carried out for WGBEAM in 2013.

Additional requests

There were seven additional requests sent to WGBEAM. The main two that needed additional resource outside the main TORs are;

- The recommendation from WGMG is that estimates of survey sampling variance always be calculated. Where appropriate, the inverse of survey estimates of sampling variance should be incorporated as a maximum weighting for corresponding survey data points.

WGBEAM investigated this and have suggested (in collaboration with WGISDAA) that WGISDAA carry out analysis of data from WGBEAM surveys to calculate estimates of survey sampling variance at their working group in 2013.

- WGISUR 2012 recommended that a survey expert group fully carries out the exercise to take the current survey through to an ecosystem survey without losing the current objectives, as an example for other groups. The expert group is requested to provide feedback to WGISUR on the result as well as on the flow diagram (Section 4.2 in ICES, 2012a) and the content of the mind-map (Section 4.1 in ICES, 2012a).

This was done for a number of WGBEAM offshore surveys and WGBEAM will be playing an active part in the workshop later in the year to continue to develop this area.

1 Opening of the meeting

The Chair opened the meeting at 09:30 on 6 June 2012.

There were nine participants from seven countries, including one member of the ICES Data Centre. A complete list of participants at the WGBEAM meeting is given in Annex 1 of the report.

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 Brian Harley, UK, will meet in IJmuiden, the Netherlands, 5–8 June 2012 to:

a) Prepare a progress report summarizing the results of the 2011 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 work on standardizing the offshore and inshore surveys such as, the reviewing the manuals, updating database and staff exchanges;

e) 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. Focus in 2012 will be on selection of species, water depth and distance from shore (look at text in report);

The information should be provided for all major fish stocks covered by the survey.

WGBEAM will report by 10 July 2012 (via SSGESST) for the attention of SCICOM, WGISUR and ACOM.

4 Review of WGBEAM 2011 recommendations and other requests to WGBEAM

4.1 WGBEAM 2011 recommendations

1. WGBEAM recommends that within the DATRAS database, 'quarter' is considered as a fixed value for a specific survey, and not create an error message when the month is outside the quarter.

Agreed. DATRAS will allow data which are out of the quarter range by to be accepted by the data-submitter as within range. A non-critical error will display after screening the file and submitter will need to accept it. In the calculation and downloading, these data are part of same quarter. This functionality is tested and applicable from 2012 3rd quarter BTS submission and those submitting such data should use the comment field to warn ICES that their data crosses two quarters. DATRAS needs a list of surveys by country that have surveys that cover two adjacent quarters. The UK and Netherlands beam trawl surveys responsible persons will provide the ICES Data Centre the surveys this applies to, in order to ensure that the calculation of data products is consistent with the import of the data and the new use of the quarter field.

2. WGBEAM recommends that ICES Data Centre, as soon as possible, provides a list of species that are currently in DATRAS, containing the scientific name, the TSN code and the WoRMS code, to all data submitters.

Available as a download from DATRAS (via http://datras.ices.dk/Data_products/AphiaID_TSN_lookup_table.csv) and a list sent to all WGBEAM data-submitters.

3. WGBEAM recommends that ICES Data Centre allows "-9" to be used in 'nomeas' and 'totalno' when "5" is reported in the 'SpecVal' field

Implemented during the WGBEAM 2012 meeting.

4. WGBEAM recommends that marine litter data are collected in all surveys following the excel spreadsheet submitted by WKMAL, and data are made available to national representatives of Descriptor 10.

The litter collection template is available on the WGBEAM 2012 SharePoint. Only to be carried out on surveys when sufficient resources are available.

5. WGBEAM recommends that ICES Data Centre resolve the issue of combining the BTS and BTS-7a dataset within DATRAS as soon as possible by and certainly before WGBEAM 2012.

The decision was made to keep these two surveys separate in DATRAS to avoid issues when data is extracted and when used with other data products.

6. WGBEAM recommends that the Belgian institute allows resources to upload at least the most recent years data (2011 once complete), by January 2012.

ILVO have an advertised job out at this time and hope to start work on this by late summer 2012.

7. WGBEAM recommend that ILVO evaluate the number of biological samples collected by area, paying particular attention to the sampling regime used by Cefas, in order to rationalise its numbers of biological samples and bring it's sampling protocol in line with the rest of WGBEAM.

Complete. From 2011 onwards, the new approach was expanded to the entire survey area (14 rectangles) and all species for which Belgium collects biological samples (see also section 5.1.3.1).

8. WGBEAM recommends that calculation of indices, by using ICES Data Centre products, be available ready for WGBEAM 2012.

Ongoing, but getting closer to completion (Chapter 9).

9. 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.

Once recommendation 8 is complete, this will be possible.

10. WGBEAM recommends that the UK (England) provide an extended time series for IVc plaice for WGBEAM 2012.

Available for WGNSSK and provided in this report, section 6.1. However, this index was not used (see also section xxx –presentation David Miller)

11. WGBEAM recommends that if time and weather allows, overlapping hauls are to be carried out by countries operating in the same areas.

No additional overlapping tows were carried out in 2011.

12. WGBEAM recommends that WGNSSK and WGBEAM collaborate on the best way forward to calculate the proportion of fish larger than the mean size of first sexual maturity.

The main dilemma is to find the best data source. Macroscopic maturity data collection is not possible during most beam trawl surveys due to the timing of these surveys (ICES 2012b). If maturity data can be obtained from the appropriate time of year, then these need to be corrected for growth until the survey period. Market sampling data on maturity are considered to be unsuitable (at least for plaice) due to inherent size selection of market samples. Discard data may provide suitable maturity data that can be 'projected' to the survey period (see also section 4.2, point 7).

13. WGBEAM recommends that ICES Data Centre provides the metric for calculating the mean maximum length of fish found on offshore beam trawl surveys.

Not started. Other priorities have taken precedent.

14. WGBEAM recommends that a further campaign should be carried out preferably in August 2011 to obtain a sufficient level of data for a robust estimate of the biomass correction factor for 3m/6m-beamtrawls.

This refers to comparison of gear efficiencies of the Dutch (6m) and the German (3m) D(Y)FS beam trawls. See below.

15. WGBEAM recommends that vTI and IMARES put up a list of requirements, including a power analysis to identify the number of hauls needed to carry out a sound statistical analysis and costs, and decide between the two institutes if, how and when the comparison in recommendation 14, can be carried out. If it is not possible to finance the comparative study in 2011 but it might be possible in 2012, WGBEAM recommends that the study is postponed to 2012.

Financing for a comparative survey was not available in 2011 or in 2012. The recommendation to carry out a power analysis based on the data collected in 2010, should include *Crangon crangon*, plaice and sole. Although the robustness of a power analyses may be debatable, given the limited data collected in 2010, without examination of the variance of the data it is impossible to estimate how many comparative hauls

will be required. This power analysis will be carried out inter-sessionally in collaboration with WGCRAN and presented at WGBEAM in 2013.

4.2 Actions

1. As the DYFS indices are weighted by DYFS area codes, WGBEAM should supply a table to ICES Data Centre containing the total m² per stratum.

This is in all WGBEAM reports as a standard table (Annex 11 of WGBEAM 2011 report).

2 and 3. WGBEAM recommends that WGBEAM incorporates the description of the DATRAS database 'LngtCode', from the IBTS manual, into the DYFS and BTS manual.

No such definition is to be found in the IBTS manual and for any definitions of DATRAS fields, the ICES DataCentre web portal should be consulted (http://datras.ices.dk/Data_products/ReportingFormat.aspx).

4. It is recommended that WGBEAM provide ICES Data Centre with a closed benthos list for the DYFS, in order to use 'BycSpecRecCode 6' from the DATRAS database, for fully sampled hauls.

Inshore data uploaded to DATRAS is in the progress of being investigated (section 9.1.1.2) and once ready this can be progressed further.

5. All WGBEAM participating countries upload their offshore data to DATRAS by 1 February 2012.

Most countries met this deadline, however, France and Belgium could not meet this deadline this year (section 9.1.1.1).

6. All WGBEAM participating countries send their inshore data to IMARES by 1 April 2012.

All countries met this deadline.

7. All WGBEAM participating institutes should investigate whether their countries discard sampling program provides data on mean size of first maturity.

From our investigations it appears that at this time no countries are providing estimates of mean size at first maturity from their discard programs. WGBEAM cannot provide data on mean size of first maturity, given the fact we are unable to collect maturity data during the majority of our surveys (section 9.4) and therefore we recommend that the maturity sub-group of PGCCDBS, investigate other sources of data for this request.

4.3 Additional requests

There were seven additional requests sent to WGBEAM:

- *The recommendation from WGMG is that estimates of survey sampling variance always be calculated. Where appropriate, the inverse of survey estimates of sampling variance should be incorporated as a maximum weighting for corresponding survey data points.*

During the working group, contact was made with the Chair of WGMG and WGISDAA. It was suggested that WGBEAM request that WGISDAA have a ToR to deal with this issue. It is therefore recommended that WGISDAA carry out analysis of data from WGBEAM surveys to calculate estimates of survey sampling variance at their working group in 2013. In addition there is an action on WGBEAM to ensure

that WGISDAA have the necessary data made available to them through the DATRAS portal, to carry out this ToR.

- *WGISUR 2012 recommended that a survey expert group fully carries out the exercise to take the current survey through to an ecosystem survey without losing the current objectives, as an example for other groups. The expert group is requested to provide feedback to WGISUR on the result as well as on the flow diagram (section 4.2 in ICES 2012a) and the content of the mind-map (section 4.1 in ICES 2012a)".*

See section 9.3.

- *In 2010, the WGNSSK recommended that the UK beam trawl and Belgian survey indices for sole and plaice should be published by WGBEAM, whose members should discuss them in the context of patterns and differences observed in the Dutch BTS (ISIS and Tridens) and SNS data. Large spatial changes in the distribution of plaice in the North Sea have occurred, viz. the migration of juvenile plaice out of the Plaice Box. WGBEAM should investigate spatial changes in the distribution of sole. These observations are still entirely valid in 2011, and therefore the WGNSSK reiterates its recommendation and hope to get more consistent Beam Trawl Surveys indices in the future.*

This request is dealt with under TORb in the main report.

- *WGCRAN recommends that an international DFS manual should be written.*

This request is dealt with under TORd in the main report

- *Additional hauls for gear comparisons between 3 and 6m beam trawls with and without tickler chain are needed.*

This request is dealt with under recommendation 14 above.

- *WGEF recommends that WGBEAM provide North Sea beam trawl data for analysis, particularly information that is not available from DATRAS. These data should include the numbers-at-length of the main elasmobranchs, by species, by haul, and by sex, along with haul positions, including zero-catch hauls.*

This request is dealt with under TORa in the main report.

- *It is recommended that estimates of survey sampling variance always be calculated. Where appropriate, the inverse of survey estimates of sampling variance should be incorporated as a maximum weighting for corresponding survey data points.*

This request is dealt with under recommendation 9 above.

5 Results of 2011 surveys (ToR a)

5.1 Offshore surveys

5.1.1 Participation and coverage of the area

Nine surveys were carried out, covering the North Sea, VIId, VIIe, VIIfg, VIIa, VIIIa, VIIIb and the Northern Adriatic Sea. The participating vessels and time of the cruises are 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 2011 is shown in Annex 6.

WGBEAM recommends that once the offshore surveys are uploaded to the DATRAS Database, ICES Data Centre provides precision estimates based on the outcome of the work to be carried out by WGISDAA in 2013.

Table 5.1.1.1. Overview of surveys during 2011.

Country	Vessel	Area	Dates	Gear
Belgium	Belgica	Southern North Sea	22 Aug – 2 Sep	4m beam
England	Endeavour	VIId, IVc	20 Jul – 2 Aug	4m beam
England	Endeavour	VIIa, VIIf	12 Sept – 4 Oct	4m beam
England	Carhelmar	VIIe	9 Oct – 16 Oct	4m beam
France	Gwen Drez	VIIIa, VIIIb	3 Nov – 10 Dec	4m beam
Germany	Solea	German Bight	16 Aug – 26 Aug	7m beam
Italy/Slovenia	G. Dallaporta	Northern Adriatic Sea	14 Nov – 28 Nov	3.5m beam
Netherlands	Tridens	central North Sea	22 Aug – 16 Sep	8m beam + flip-up rope
Netherlands	Isis	southern North Sea	8 Aug – 6 Sep	8m beam

5.1.2 Survey results

A summary of each of the surveys is to be found in Section 5.1.3.

The Belgian offshore survey successfully carried out 58 of the 62 planned. Four stations were missed for technical constraints (e.g. presence of operating fishing vessels).

The survey in IVc and VIId was carried out by Endeavour. It was not possible to collect a valid sample from 6 of the 91 stations, almost exclusively due to the volume of static gear on the ground. The survey in IVc and VIId was successfully carried out by Endeavour, without any particular issues, as well as the survey in VIIe, carried out by FV Carhelmar.

The French, German and Italian offshore surveys were completed without any criticisms.

The Dutch offshore survey, usually carried out by two vessels the "Isis" and the "Tridens", was not fully completed. During the last week of the Isis survey it was decided to quit the survey earlier than planned due to bad weather. Two priority stations were taken over by RV Tridens.

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 are in Annex 9.

5.1.3 Survey summary sheets offshore surveys per country

5.1.3.1 Surveys summary Belgium

Nation:	**Belgium**	**Vessel:**	**RV "Belgica"**
Survey:	Offshore North Sea Beam Trawl Survey	Dates:	22 August to 2 September 2011

Survey description:	An annual North Sea Beam Trawl Survey is carried out in the south-western part of the North Sea (IVb and IVc West) to sample the adult flatfish stocks, primarily targeting plaice *Pleuronectes platessa* and sole *Solea solea*. 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.):	58 of the 62 planned survey stations were succesfully fished. Two stations in the north-eastern part (20 and 114) were missed as there were active crab fisheries going on. Another station 2 (40a) will have to be moved to a new location as the catch was so big here (predominantly starfish) that it could not be transferred to deck. The fourth station (98b) was missed because of time constraints that resulted from technical (hydraulics and winches) problems with the vessel. Number of otoliths: at least 3 ind. per cm size class per ICES Statistical Rectangle for cod, brill, turbot, plaice and sole. This was the first time that the collection of biological samples was geographically organised based on the rectangles instead of the formerly used ALK-areas. To be able to compare the consequences of both sampling strategies for the resulting ALKs we still collected 25 ind. per cm size class for each ALK-area, meaning that more than 3 ind. per cm class were sampled in some rectangles (especially where an ALK-area consists of a small number of rectangles). Indices for plaice and sole are the numbers per hour, averaged by ICES rectangle and averaged over all sampled ICES rectangles.
Target species catch rates:	

	TIME SERIES MEAN NR. PER HR	2011 MEAN NR. PER HR
Plaice	58.4	97.5
Sole	89.7	84.5

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). 49 different species of fish were caught.

The top 10 by number are:

SPECIES	TOTAL NUMBER
Dab (*Limanda limanda*)	4035
Sole (*Solea solea*)	2906
Lesser Weever (*Echiichthys vipera*)	2888
Plaice (*Pleuronectes platessa*)	2810
Common Dragonet (*Callionymus lyra*)	2005
Pogge (*Agonus cataphractus*)	1448
Whiting (*Merlangius merlangus*)	1174

	Lemon Sole (*Microstomus kitt*)	897
	Solenette (*Buglossidium luteum*)	761
	Scaldfish (*Arnoglossus laterna*)	640
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:	None	

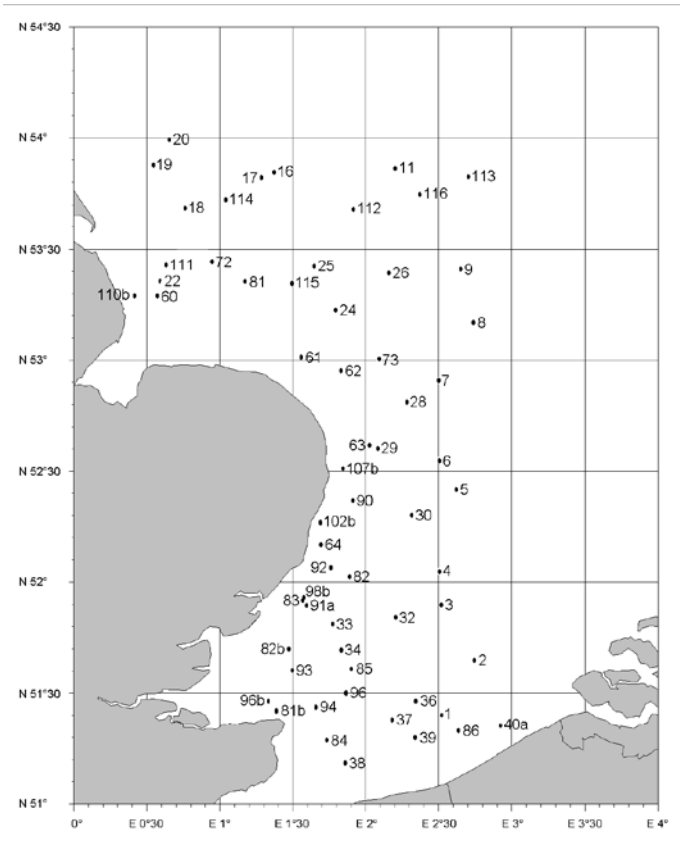
Stations fished:

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):

3 otoliths per cm size class are collected per ICES Statistical Rectangle 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.



5.1.3.2 Survey summary England: VIId & IVc

Nation:	**UK (England and Wales)**	**Vessel:**	**RV Cefas Endeavour**
Survey:	13/11	Dates:	20 July – 2 August 2011

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.):

A total of 79 valid tows were successfully completed out of a total of 91 stations. It was not possible to collect a valid sample from six stations, exclusively due to the volume of static gear on the ground. No suitable close alternatives were able to be found and it is likely that these stations will have to be removed from the survey from 2012. This year only 21 of the deployments were less than the standard 30 minute duration either because large catches of benthos and dead shell were expected of there were similar associated, or other, problems encountered during the deployment of the gear. A number of additional survey aims were succesfully completed, which included the collection of data on litter, isotope samples and this year an experiment into carrying out additional work on MCZ was also carried out at night. This included drop camera, multi-beam and Hamon grab work, which was very successful. Over 20 deployments of these gears were successfully carried out in the evening between the 27 July and 1 August.

At Target species catch rates:

	Time series mean no. per hr	2011 mean no. per hr	Time series mean catch weight per hr (kg)	2011 mean catch weight per hr (kg)
Sole	37.77	48.44	4.29	4.66
Plaice	44.07	124.48	11.11	23.43

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

66 separate species / genera of finfish were caught. The top 10 by number are:

Pleuronectes platessa	4614
Callionymus lyra	3155
Buglossidium luteum	2810
Limanda limanda	1925
Solea solea	1764
Agonus cataphractus	884
Pomatoschistus spp.	875
Arnoglossus laterna	713
Merlangius merlangus	587
Trisopterus luscus	447

Number of epifauna species recorded:

112 separate infauna species / genera were observed during the 2011 survey across both ICES divisions.

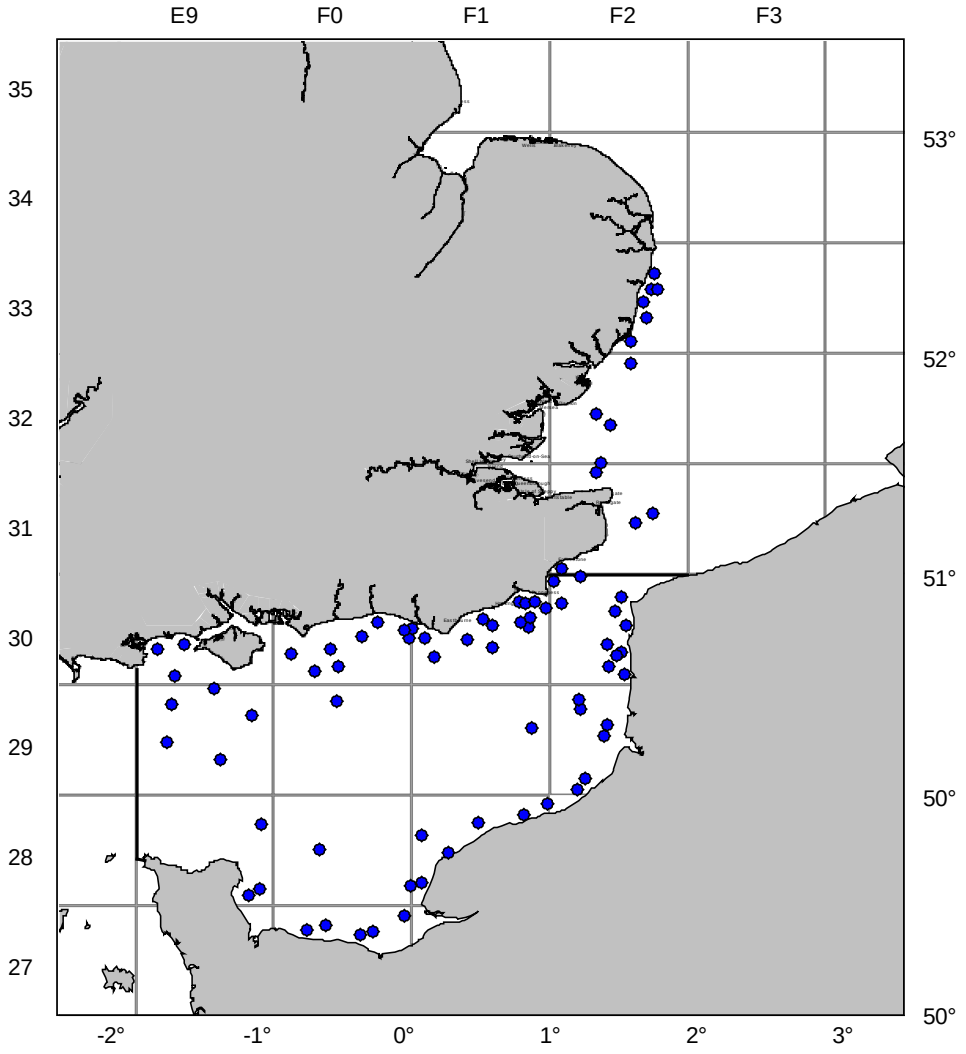
Index revisions:

Stations fished:

ICES Divisions	Strata	Gear	Total no. of stns fished	Total no. of additional stns	No. of invalid stns	No. of stns not attempted	Total Valid	Comments
VIId & IVc	None	4m beam trawl	86	1	6	6	79	

Number of biological samples (maturity and age material, *maturity only):			
Species	Number	Species	Number
Pleuronectes platessa	1231	*Merlangius merlangus*	157
Solea solea	883	*Scophthalmus rhombus*	38
Limanda limanda	588	*Scophthalmus maximus*	40
Microstomus kitt	298	*Dicentrarchus labrax*	9
Platichthys flesus	119	*Gadus morhua*	9

Positions of stations sampled in 2011 on 7d BTS



5.1.3.3 Survey summary England: VIIa and VIIf

Nation:	UK (England and Wales)	Vessel:	RV Cefas Endeavour
Survey:	15/11	Dates:	12 Sept – 4 Oct 2011

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.):	The survey was completed, although the trawl received major net damage at one station after hitting a suspected sandbank and had to be replaced. For a total of 12 stations the tow duration was reduced from the standard 30-minute to 15-minute tows because of expected large catches of weed, broken shell or small flatfish. In addition, four stations were hauled a few minutes early due to either cables or static gear at the end of the tow. At two stations, a 5 minute 'test' tow was conducted prior to fishing a valid tow duration to determine the likely by-catch. A few other stations were moved short distances to avoid snagging under-sea cables (an increasing problem in this busy sea area) or to avoid static gear. At 25 selected fishing stations, samples of the epi-benthic by-catches were sorted and 32 'core species' identified and quantified, and at all fishing stations on the survey, catches of nine sentinel taxa of benthic invertebrates were recorded. Additional survey aims included the collection of surface sea-water samples for the analysis of caesium and tritium, the collection of alkalinity, nutrient & dis-solved inorganic carbon (DIC) samples, as well as the collection of thornback ray (*Raja clavata*) tissue samples to assess fish health.
Target species catch rates:	
Number of fish species recorded and notes on any rare species or unusual catches:	79 separate species / genera of finfish were caught. The top 10 by number are:
Number of infauna species recorded	106 separate infauna species / genera were observed during the 2011 survey across both ICES divisions. At 25 selected stations 32 "core species" were quantified.
Index revisions:	

	Time series mean no. per hr	2011 mean no. per hr	Time series mean catch weight per hr (kg)	2011 mean catch weight per hr (kg)
Sole VIIa	30.24	12.63	4.00	1.95
Sole VIIf	73.98	53.22	8.06	6.72
Plaice VIIa	215.86	261.38	18.81	19.97
Plaice VIIf	30.70	52.94	8.66	6.72

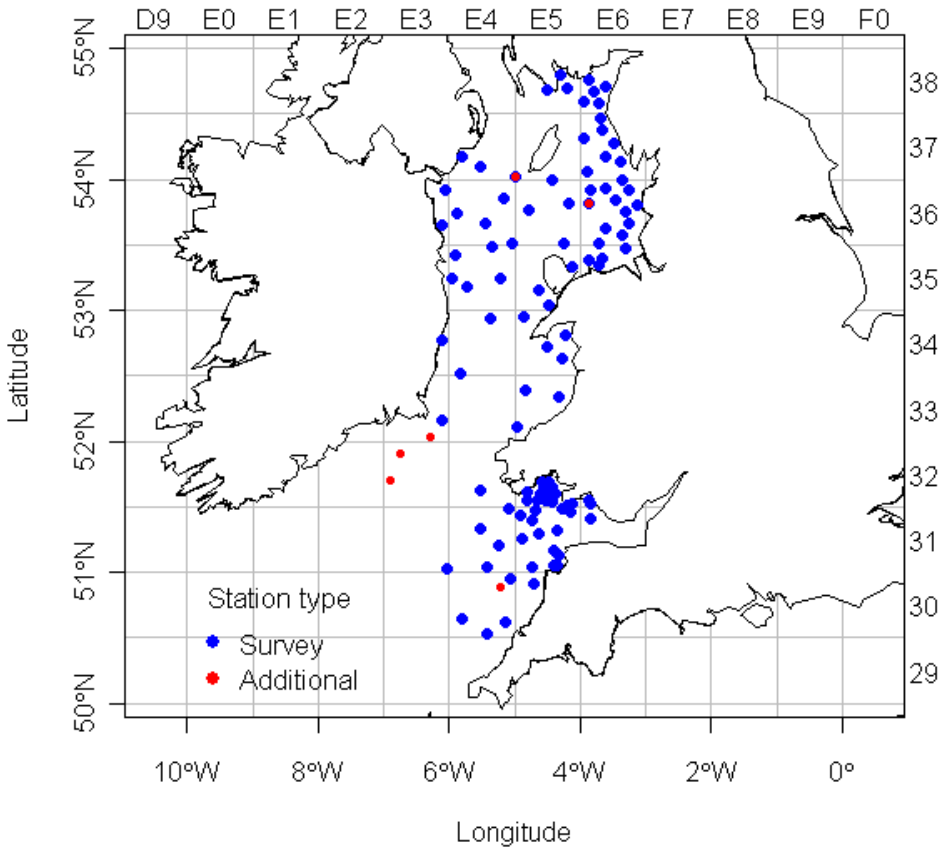
Limanda limanda	11502
Pleuronectes platessa	8759
Buglossidium luteum	5184
Trisopterus minutus	4180
Callionymus lyra	2552
Merlangius merlangus	2522
Scyliorhinus canicula	2353
Arnoglossus laterna	1636
Solea solea	1425
Microchirus variegatus	1006

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	45	3	4	117	

Number of biological samples (maturity and age material, *maturity only):			
Species	Number	Species	Number
Pleuronectes platessa	1821	*Lophius piscatorious*	66
Solea solea	662	*Scophthalmus maximus*	32
Limanda limanda	467	*Scophthalmus rhombus*	19
Merlangius merlangus	186	*Zeus faber*	37
Microstomus kitt	170	*Dicentrarchus labrax*	14
Melanogrammus aeglefinus	96	*Merluccius merluccius*	10
Gadus morhua	46	*Mullus barbatus*	3
Lepidorhombus whiffiagonis	85	*Lophius budegassa*	0

Station positions for Cefas Endeavour 15/11 Beam Trawl survey



5.1.3.4 Survey summary England: VIIe

Nation:	**UK (England and Wales)**	**Vessel:**	**FV Carhelmar**
Survey:	2/11	Dates:	9 – 16 October 2011

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 trawls 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.):	In 2011, all 58 stations were successfully fished although there were some problems associated with large catches of gravel/shell, particularly for the port side beam, which required some adjustments to be made to its rigging after the first day's fishing. It was necessary to repeat two stations; at prime E2 the catch was too big to bring aboard and the cod-ends had to be cut, and at prime I6 the port side trawl dug in early and was brought aboard after only 12 minutes, which was not long enough to be classed as a valid tow. At Primes B1 and F1 the port side trawls became full, and were too large to be brought aboard, and the decision was made to work-up the starboard side only. For 2011 a number of changes to the survey were implemented. The principal ones were to stop collecting length measurements for non-commercial fish species at a randomly selected station each day, which was considered to be of limited scientific value to collect length frequency data for all commercial cephalopods (*Sepia* and *Loligo* spp.), and to restrict the collection of biological samples to *Pleuronectes platessa*, *Solea solea* and *Microstomus kitt* as well as reducing slightly some of the length group targets.Weights are only recorded for individual biological samples.
Target species catch rates:	

	Time series mean no. per hr	2011 mean no. per hr
Sole	15.33	22.27
Plaice	20.35	56.14

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

51 separate species / genera of finfish were caught in 2011. The top 10 by number are:

Pleuronectes platessa	1595
Aspitrigla cuculus	983
Limanda limanda	898
Scyliorhinus canicula	666
Solea solea	627
Eutrigla gurnardus	191
Merlangius merlangus	184
Trisopterus luscus	155
Lophius piscatorius	135
Microstomus kitt	64

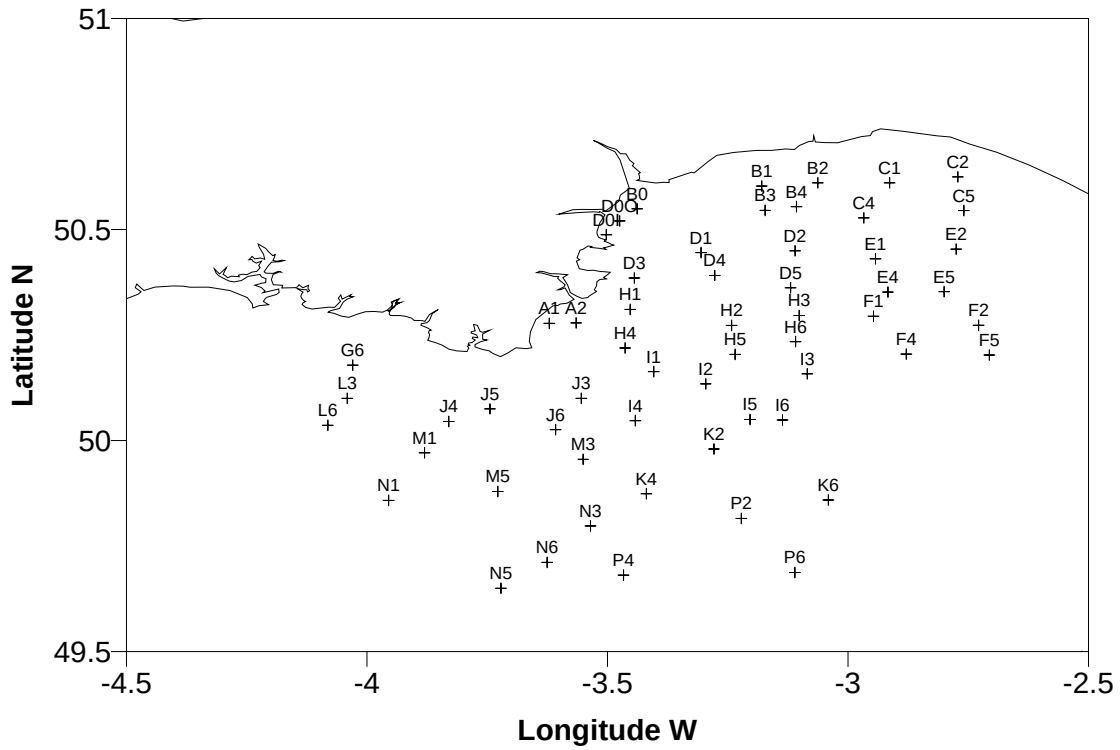
Number of infauna species recorded	Five species of commercial shell-fish (mollusca and crustacea) and cephalopod species were measued at each station, of which *Sepia officinalis* was the most abundant. *Asterias rubens* occurred at 95% of the stations and were the most commonly encountered of the 59 other epibenthic species / genera that were observed during the survey.

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	9	0	58	

Number of biological samples (maturity and age material, *maturity only):			
Species	Number	Species	Number
Pleuronectes platessa	451	*Solea solea*	258
Microstomus kitt	50		

Station positions for Carhelmar 2/11 Beam Trawl survey



5.1.3.5 Survey summary France

Nation :	**FRANCE**	**Vessel :**	**NO "Gwen Drez"**
Survey :	ORHAGO 11	Dates :	3 Nov – 10 Dec 2011

Survey description :

The Q4 Bay of Biscay ORHAGO survey aims to collect data on composition, distribution and change in relative abundance of fish fauna on yearly basis. Information is collected on length frequency for all the fish, with biological information (age, maturity) on some species. The main target species is sole, other additional abundant species include *Nephrops norvegicus*, cuttlefish, wedge sole, red mullet, meagre, monks. The exploited benthic species is sampled and in 2011, for the first time, the benthos has been exhaustively identified for two hauls by day.

Gear details :

4m-beam trawl with chain mat, 50 mm mesh in the net et 40 mm mesh in the cod-end.

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

114 hauls were carried out (approx. 52 hours fishing time). 54 replicate tows were made for day-night studies. Bottom temperatures were recorded during each haul.

Target species catch rates :

	Time series mean no. per hr	2011 mean no. per hr	Time series mean catch weight per hr	2011 mean catch weight per hr (kg)
Sole (day)	45.0	41.3	5.5	5.2
Sole (night)	50.5	53.2	6.6	7.3

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

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

Day		Night	
Arnoglossus laterna	53.9	*Arnoglossus laterna*	56.7
Callionymus lyra	45.2	*Callionymus lyra*	56.7
Solea solea	41.3	*Solea solea*	53.2
Merluccius merluccius	29.1	*Trisopterus luscus*	27.8
Trisopterus luscus	24.4	*Microchirus variegatus*	26.9
Trachurus trachurus	17.2	*Merluccius merluccius*	20.0
Trisopterus minutus	15.4	*Buglossidium luteum*	16.9
Microchirus variegatus	14.4	*Trisopterus minutus*	16.8
Buglossidium luteum	13.5	*Dicologlossa cuneata*	14.2
Dicologlossa cuneata	9.9	*Mullus surmuletus*	10.3

Number of epifauna species recorded

35 separates epifauna species at day and 29 separates epifauna species at night were sampled (number, total weight, length distribution of some of them).

Stations fished:

ICES Divisions	Strata	Gear	Indices stations	Priority stations	Additional	Invalid	Total valid	comments
VIIIab	N/A	4m beam trawl	56		10	0	112	46 replicate tows for day-night studies.

Number of biological samples (*age materiel only)			
Species	Number	Species	Number
Solea vulgaris maturity and age	851	Bass*	7
Solea vulgaris maturity only	1635	*Lophius piscatorius**	74
Red mullet	140	Lophius budegasa*	4
Argyrosomus regius	108		

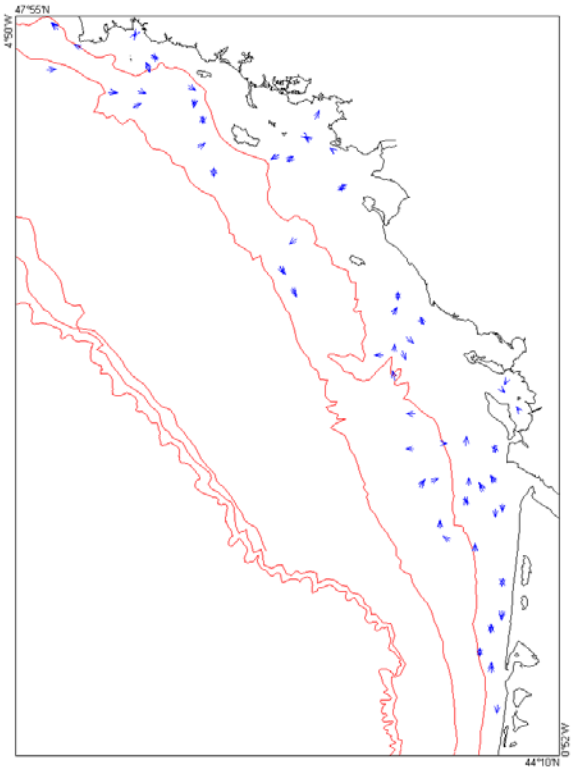


Figure 5.1.3.5.1. ORHAGO 2011 tow positions.

5.1.3.6 Survey summary Germany

Nation:	**Germany**	**Vessel:**	**RV "Solea"**
Survey:	BTS	Dates:	16 – 26 Aug 2011

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 cod-end, 80 mm mesh in the net.
Notes from survey (e.g. problems, additional work etc.):	55 hauls were carried out (approx. 27.5 hours fishing time).
Target species catch rates:	Time series mean no. per hr / 2011 mean no. per hr Sole 4.01 / 11.29 Plaice 265.29 / 199.73
Number of fish species recorded and notes on any rare species or unusual catches:	42 separate species of finfish were caught. The top 10 by number are: *Limanda limanda* 15981 *Pleuronectes platessa* 5559 *Buglossidium luteum* 1840 *Hippolossoides platessoides* 1041 *Eutrigla gurnardus* 846 *Pomatoschistus minutus* 634 *Agonus cataphractus* 628 *Arnoglossus laterna* 487 *Callionymus lyra* 469 *Microstomus kitt* 314
Number of epifauna species recorded:	67 epifauna (attached and free-living) species were observed during the 2011 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	55	55	**	0	55	

Number of biological samples (maturity and age material, *maturity only):			
Species	Number	Species	Number
Pleuronectes platessa	1666	*Limanda limanda*	2011

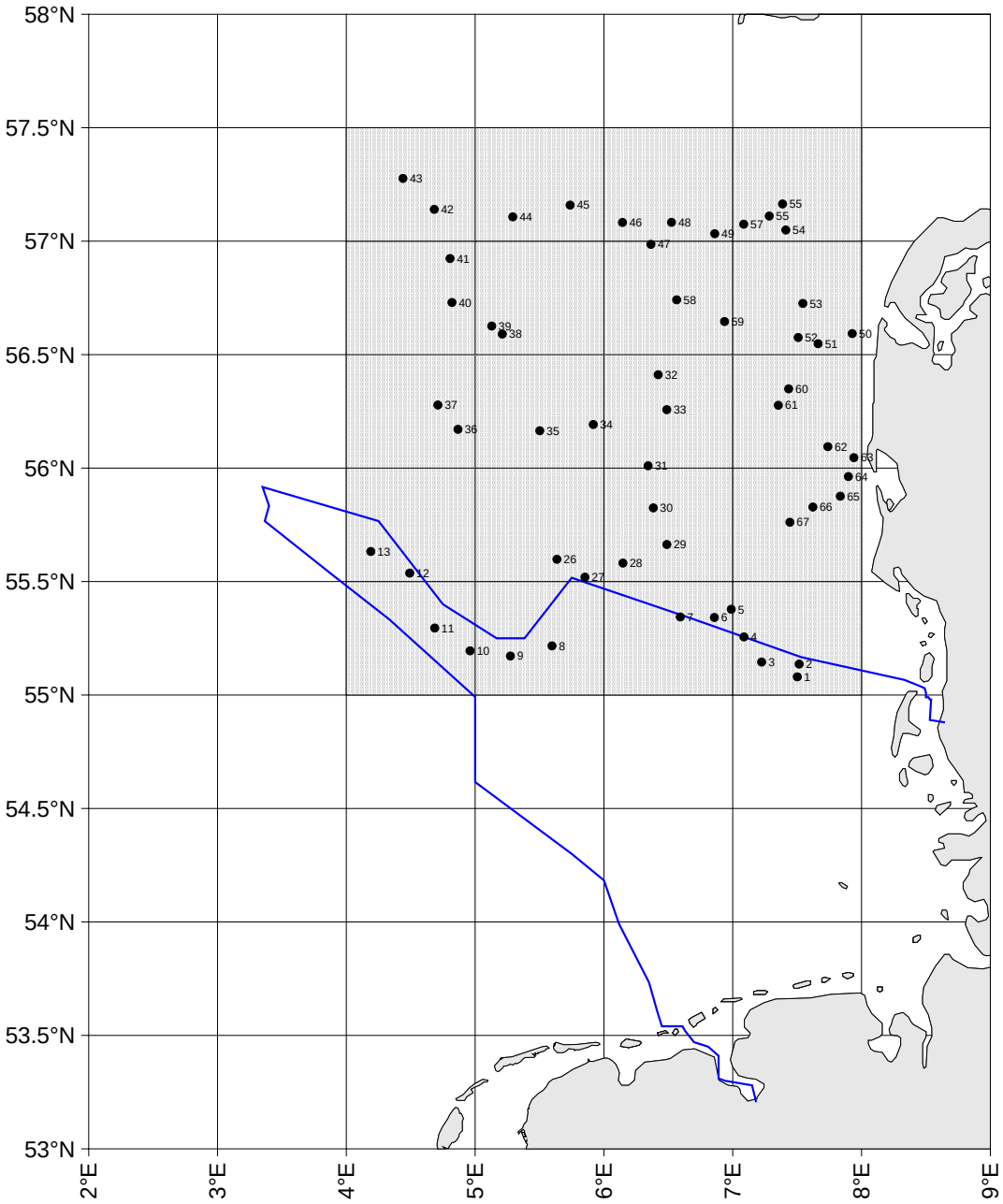


Figure 5.1.3.6.1. Towing positions Germany "Solea" Beam Trawl Survey.

5.1.3.7 Survey summary Adriatic Sea: GSA17

Nation:	**Italy and Slovenia**	**Vessel:**	**N/O G. Dallaporta**
Survey:	SoleMon	Dates:	14 Nov – 28 Nov 2011

Survey description	SoleMon survey aims to collect data on distribution and relative abundance, with biological information on commercial fish species in FAO-GFCM Geographical Sub-Area 17 (Fig. 5.1.3.7.1). The primary target species is sole, with additional species including cuttlefish, scallop, queen scallops, turbot, brill, skates, purple dye murex and caramote prawn.
Gear details:	Modified beam trawl with a rigid mouth. The frame is rigged with 46 iron teeth along the lower leading edge. Joined to the iron frame there are 4 skids and a reinforced rubber diamond-mesh net in the lower part to protect the polyamide net bag tied to the iron frame (Width: 3.5 m; Weight: 225 kg; Four 120-mm wide skids; 40-mm codend mesh size). The beam trawl is provided with DST Logic Temperature and Depth Recorders.
Notes from survey (e.g. problems, additional work etc.):	67 hauls were carried out (approx. 31 hours fishing time). The survey was completed without incident. A total of 21 stations had to be fished for less than 30 minutes. This was mainly due to large by catches of benthos and/or as a precaution against gear damage. A significant amount of additional aims were carried out. These incldued *Solea solea*, *Scophthalmus rhombus* and *Scophthalmus maximus* otolith and finclips for ageing and comparative population genetics structure, collection of samples for Lindane and TBT contaminants analises, maturity stages of *Sepia officinalis*, epibenthos analises. Vertical CTD measurements were carried out after each haul.

Target species catch rates:

	Time series mean no. per hr	2011 mean no. per hr	Time series mean catch weight per hr (kg)	2011 mean catch weight per hr (kg)
Sole GSA17	29.9	31.9	2.58	2.39

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

61 separate species of finfish were caught. The top 10 by number per square km are:

Arnoglossus laterna	488.69
Gobius niger	175.28
Serranus hepatus	121.98
Merluccius merluccius	100.1
Buglossidium luteum	97.64
Chelidonichthys lucernus	92.27
Eutrigla gurnargus	73.94
Lepidotrigla cavillone	37.83
Uranoscopus scaber	52.2
Scorpaena notata	32.49

Number of epifauna species recorded	256 separate macro- and megabenthos species were observed during the 2011 survey.
Index revisions:	

Stations fished:

GSA	Strata	Gear	Indices stations	Priority stations	Additional	Invalid	Total Valid	comments
17	3 depth strata	2 x 3.5m modified beam trawls		67	0	0		

Number of biological samples (maturity and age material):		
Species	Number	Biological material
Solea solea	1681	(maturity)
Solea solea	345	(otolith)
Scophthalmus rhombus	56	(maturity and otolith)
Scophthalmus maximus	9	(maturity and otolith)
Platichthys flesus	51	(maturity and otolith)

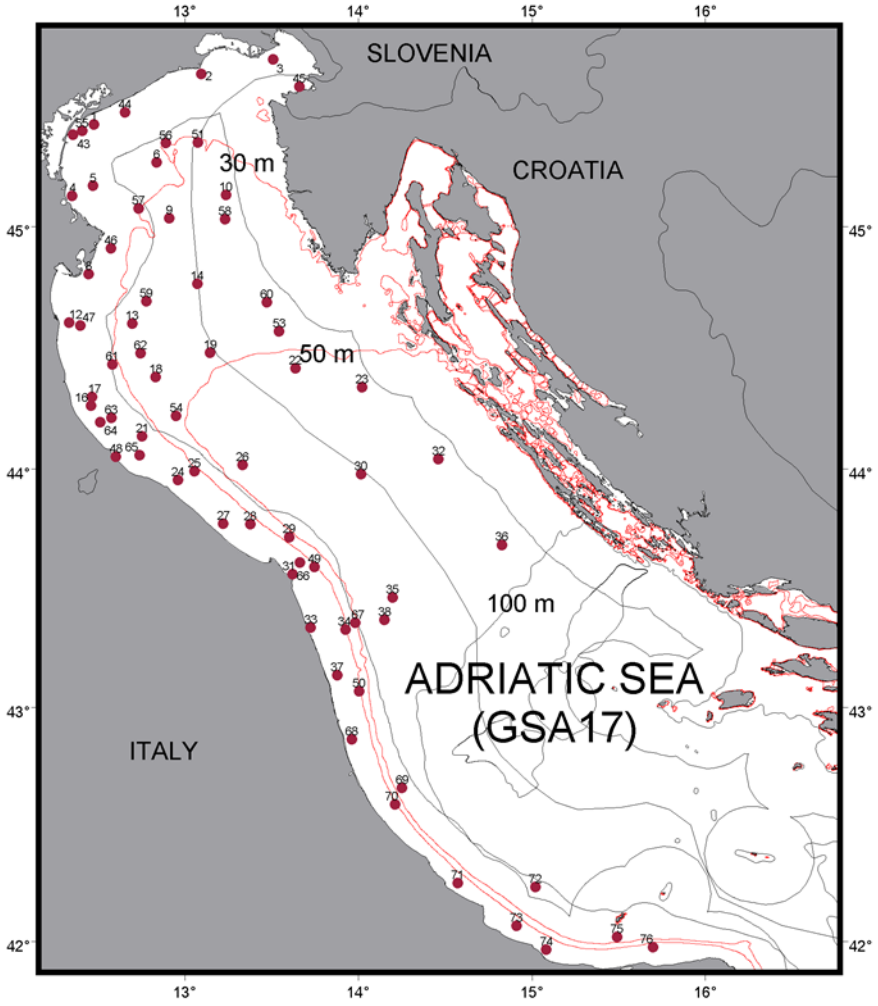


Figure 5.1.3.7.1. Towing positions of SoleMon survey.

5.1.3.8 Survey summary Netherlands: Tridens

Nation:	**Netherlands**	**Vessel:**	**RV "Tridens"**
Survey:	BTS (Beam Trawl Survey)	Dates:	22 Aug – 16 Sep 2011

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 cod-end, 120 mm mesh in the net and a flip-up rope.
Notes from survey:	72 hauls were carried out (approx. 36 hours fishing time). The survey was finished without major incidents. During two days, fishing was not possible dus to weather conditions, but did not lead to serious delay. Three stations were not fished as they could not be reached within the survey period. For the Isis stations sampled by Tridens the 8 meter beam trawl with flip-up rope was used. 2 stations were used for the index calculation in the Isis area. A correction was done for the use of the flip-up rope. Net damage was repaired within a few hours. Vertical CTD measurements were carried out after each haul.
Target species catch rates:	Time series mean no. per hr / 2011 mean no. per hr Sole: no index Plaice: 95.58 / 260.99
Number of fish species recorded and notes on any rare species or unusual catches:	53 separate species of finfish were caught. The top 10 by number are: *Limanda limanda* 31574 *Pleuronectes platessa* 9093 *Hippoglossoides platessoides* 5144 *Eutrigla gurnardus* 2728 *Microstomus kitt* 2428 *Arnoglossus laterna* 1978 *Merlangius merlangus* 1779 *Buglossidium luteum* 1439 *Agonus cataphractus* 1040 *Melanogrammus aeglefinus* 676
Number of epifauna species recorded:	137 epifauna (attached and free-living) species were observed during the 2011 survey.
Index revisions:	None

Stations fished:

ICES Divisions	Strata	Gear	Indices stations	Priority stations	Additional	Invalid	Total Valid	Comments
North Sea	N/A	8m beam trawl	46	26	0	0	72	

Number of biological samples (age material), including hauls with Isis gear:			
Species	Number	Species	Number
Pleuronectes platessa	1262	*Merluccius merluccius*	53
Limanda limanda	622	*Microchirus variegatus*	37
Microstomus kitt	424	*Psetta maxima*	31
Hippoglossoides platessoides	241	*Buglossidium luteum*	26
Solea solea	198	*Scophthalmus rhombus*	17
Gadus morhua	184	*Zeugopterus norvegicus*	8
Arnoglossus laterna	42		

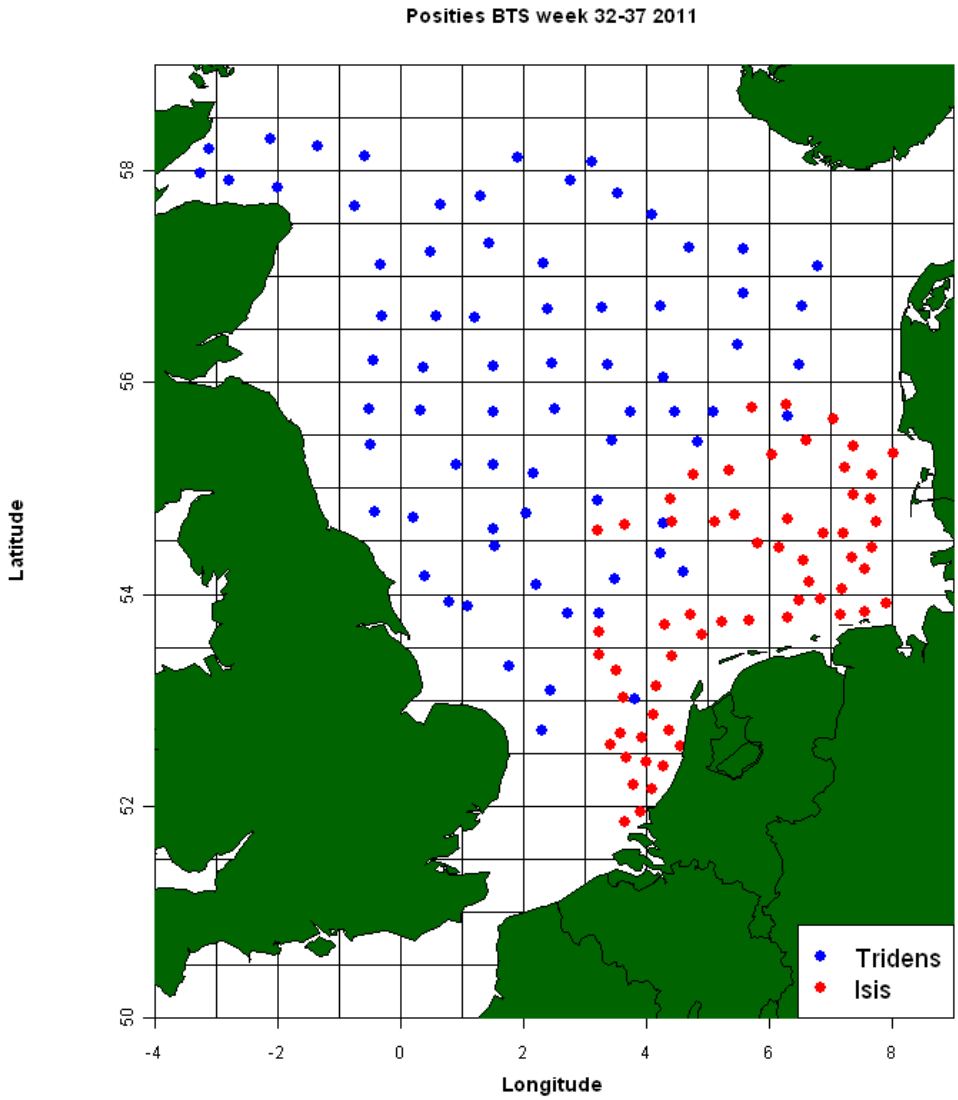


Figure 5.1.3.8.1. Towing positions Dutch Beam Trawl survey: blue=Tridens, red=Isis (in Isis summary sheet).

5.1.3.9 Survey summary Netherlands: Isis

Nation:	**Netherlands**	**Vessel:**	**RV "Isis"**
Survey:	BTS (Beam Trawl Survey)	Dates:	8 Aug - 6 Sep 2011

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 cod-end, 120 mm mesh in the net.
Notes from survey:	61 hauls were carried out (approx. 30 hours fishing time) by Isis. During the last week of the survey it was decided to quit the survey earlier than planned due to bad weather. Two priority stations were taken over by RV Tridens (see survey summary sheet RV Tridens). CTD measurements were carried out using a CTD fixed on the net.
Target species catch rates:	Time series mean no. per hr / 2011 mean no. per hr Sole 50.46 / 52.66 Plaice 803.12 / 1055.67
Number of fish species recorded and notes on any rare species or unusual catches:	42 separate species of finfish were caught. The top 10 by number are: *Limanda limanda* 46980 *Pleuronectes platessa* 32540 *Arnoglossus laterna* 6369 *Pomatoschistus sp.* 5251 *Buglossidium luteum* 4676 *Callionymus lyra* 3079 *Agonus cataphractus* 2267 *Merlangius merlangus* 1685 *Solea solea* 1596 *Eutrigla gurnardus* 1407
Number of epifauna species recorded:	47 epifauna (attached and free-living) species were observed during the 2011 survey, including the invasive gastropod species *Rapana venosa*
Index revisions:	None

Stations fished:

ICES Divisions	Strata	Gear	Indices stations	Priority stations	Additional	Invalid	Total Valid	Comments
North Sea	N/A	8m beam trawl	60	1	0	0	61	2 overlapping Tridens/Isis stations taken into account for index

Number of biological samples (age material):			
Species	Number	Species	Number
Pleuronectes platessa	701	*Scophthalmus rhombus*	128
Limanda limanda	487	*Microstomus kitt*	127
Solea solea	460	*Platichthys flesus*	72
Psetta maxima	143		

Map of sampling stations: see Figure 5.1.3.8.1

5.1.4 Staff exchange

During WGBEAM 2011, the following staff exchanges were arranged:

- Participation of vTI-SF in the Cefas BTS VIIfg-VIIa (Kay Panten (vTI-SF), September 2011) (section 5.1.4.1)
- Participation of Cefas in the IMARES BTS on board Tridens (section 5.1.4.2)
- Participation of IMARES in the vTI BTS on board Solea. This exchange could not be carried out due to personal circumstances.

The observations on differences and similarities by the staff involved in this exchange should help the involved parties and WGBEAM to better understand and coordinate the surveys from an international perspective.

5.1.4.1 Germany/ UK

A German 'observer' (Kay Panten, vTI-SF) joined the Cefas survey in the third quarter of 2011. The survey was carried out on board of the RV Cefas Endeavour, that sailed from Lowestoft on 12 Sep 2011, to return there on 4 Oct 2011. The German participant stayed on board from 15 Sep (when he came on board in Swansea, Wales) until 26 Sep (when he disembarked in Douglas, Isle of Man), and had the chance to contribute to the processing of the catches of 72 hauls in the period 16-25 Sep, that were divided over the survey sectors in the following way: 25 stations in Inner Bristol Channel, six stations in Outer Bristol Channel, six stations in Saint George's Channel, 18 stations in Irish Sea South, 16 stations in Irish Sea North and one station in Irish Sea West. This experience gave him the opportunity to make a detailed comparison between vessels and practices on the English and German offshore surveys, both focussing on scientifically relevant issues and non-scientific ('human') aspects.

Vessel properties and logistics

In terms of vessel dimensions, the most important finding was that the extra available space on the larger Cefas Endeavour creates possibilities for 1) including more tasks to focus on (getting more out of the time at sea, which is to be considered a scarce resource), and 2) a more efficient processing of the catches.

Objectives and survey design

Although the English and German offshore beam trawl surveys were originally not set-up as one survey, they nowadays follow the same manual and focus primarily on the same objectives (collecting fisheries independent data for plaice, sole and some additional commercially important species) under the coordination of WGBEAM.

Both surveys annually (quarter 3) attempt to fish a fixed number (119 on Endeavour, 55 on Solea) of stations, with tows lasting 30 min (shorter if large numbers of small fish or high by-catch of benthic species and/or non-biological materials, but not less than 15 min) while fishing at 4 knots over the ground during daytime.

Survey gear and gear deployment

Due to the different origins of the two compared surveys, no standardisation in gears has taken place over time. The gears used are different: Cefas Endeavour use a 4 m steel beam trawl equipped with a chain mat and a 40 mm codend liner, and trawl from the aft. The English beam trawl is additionally equipped with flip-up ropes. Solea use a 7 m steel beam trawl with 5 tickler chains and a 40 mm codend liner and trawl with a derrick from the side.

The practice on Cefas Endeavour is similar to Solea, where the permanent vessel crew prepares, inspects, deploys and hauls the gear. Aboard the Solea the catch is transported to the scientists by a conveyor belt, whereas on the Cefas Endeavour the catch is taken to the scientists in fish baskets.

Catch sorting and collection of fish data

Both England and Germany weigh and sort the entire catch for all fish species and the main commercial invertebrates, identifying these organisms to the lowest taxonomic level possible and document numbers and weights by species. On the English offshore survey, a selection of species/size categories of species may be identified for sub-sampling in case of larger catches. Germany sorts a 'mixed' sub-sample that is representative for the entire catch of benthos/epibenthos to the lowest taxonomic level possible and records numbers and weights per taxon, whereas England only documents presence/absence of these taxa.

England records lengths to 1 cm below for all fish (with the exception of herring and sprat that are measured to 0.5 cm below) and implements a resolution of 0.1 cm for shellfish. Germany measures fish with the same precision. Crabs were measured to 0.1 cm carapace length (*Nephrops norvegicus*) or carapace width (*Cancer pagurus*). For elasmobranches, fish are weighed and measured by sex. Sub-sampling may occur on both the English and German surveys when numbers of a certain species are extremely high.

Sampling for age and sex is carried out by Germany only for sole, plaice and dab. For plaice and dab, a maximum of 3 otoliths was collected by sex, cm class and rectangle. England documents biological parameters (age, sex and maturity) for a higher number of species, adding rays, monkfish, cod, turbot, brill, haddock, whiting, sea bass, halibut, dab and lemon sole.

Deck/fish lab layout

On RV Solea, the sorting of the catches take place on the conveyor belt that is positioned at the side in the fish lab. It is possible for all scientists to participate in this task. On RV Cefas Endeavour, the sorting takes place outside the fish lab (under a shelter) where there is enough place to install a high number of sorting trays so the sorting can be carried out with the same efficiency.

On RV Solea, two electronic scales are installed without connection to a computer. One for heavy weights up to 50 kg and one for weights up to 10 kg. After sorting the catch all weights of different fish and invertebrates are recorded by hand in a log.

Afterwards two teams with two persons measure the fish. The first person measures the fish, the second makes a tally. Otoliths of plaice and dab are collected during the measurements. During the measurements one person is sorting the benthos subsample to the lowest taxonomic level. Afterwards the weights and numbers were recorded in a log. This way can be finished before the next catch arrives on deck. One person of the team is working with the data input into the computer parallel to fishery and catch sorting. On the other hand, aboard RV Cefas Endeavour, seven separate working stations were installed in the fish lab. All of these are connected to a central computer, on which the deck master can follow everybodys activities and keep track of the progress. Each of these working stations consists of an electronic measuring board and a scale, and is equipped with the materials needed to collect otoliths (or other calcified structures), determine sexes and maturities. After defining the species, area, depth band, and recording the individual length, the computer tells the user exactly what data need to be collected for that individual. Obviously, the simultaneous processing of catch fractions by seven persons, and the centralised storage of the data of all working stations on one computer, makes the entire process very efficient and leaves only limited space for errors.

Team Structure

Some differences were observed when comparing the German and English team structures and the whereabouts of some team members.

First of all, on board of RV Solea the Scientist In Charge (SIC) spends a portion of their time in the fish lab, from where they keep in touch with the vessel's captain. The coordinating task of the deck master is taken care of by a technician. After each haul the SIC carried out the CTD. On RV Cefas Endeavour, the SIC spends a large proportion of the time in the bridge, while the deck master coordinates the sampling activities in the fish lab.

Scientific team sizes on both surveys were comparable in 2011 (RV Solea: seven persons without mid-cruise break; RV Cefas Endeavour: 10 persons before the mid-cruise break – including the Belgian and also an Irish 'observer', seven persons after the break), but the distribution of tasks during the data collection was somewhat different.

Where the length measuring, otolith cutting, otolith collecting, sexing and recording of the data all are separate responsibilities of two or three teams on RV Solea, all these tasks are being taken care of by the same individual on RV Cefas Endeavour, with several individuals working in parallel.

Environmental data

The English trawling gear are nowadays equipped with a CTD unit collecting continuous data (temperature, salinity, turbidity, etc.) during the tows. On RV Solea abiotic data are documented at the hauling positions with a vertical profile by the onboard CTD-system. On RV Cefas Endeavour, a vertical profile is also carried out at the start and end of each fishing day, with a Niskin bottle attached to take a water sample from the bottom to calibrate the data collected.

Conclusion

Although some differences between the two compared surveys are listed above, they obviously have a lot in common due to their similar objectives, their joint manual and the common coordination by WGBEAM. Differences in approach (mostly caused by different logistics on the two vessels) are not considered to lead to differences in data quality and applicability, but the possibilities on board of RV Cefas Endeavour create opportunities for a more efficient catch processing.

5.1.4.2 UK/Netherlands

Rob Bush asked to participate in a one week survey, with colleagues from IMARES on the Dutch RV Tridens during their summer North sea beam trawl survey (BTS) using two 8m beam trawls.

He arrived on the evening of 28 August at Aberdeen train station, after a days travelling up from Lowestoft. Luckily the docks and the Tridens were moored a short walk away and he was soon on board reacquainted with Ingeborg and introduced to the other scientists and crew. The ship was due to sail after breakfast on the Monday (29), but a large low depression was still in the area making lively sea conditions, so the decision was made to postpone sailing till the afternoon. That gave him ample time to familiarise himself with the Tridens.

The ship managed to sail later in the afternoon, the wind had moderated considerably and the sea wasn't as bad as expected, with only a lazy swell showing of the storm that had been raging 36 hours before. Unfortunately due to our late sailing we were unable to complete any tows before day light disappeared.

Tuesday dawned bright and clear with a keen wind but nothing that would stop a full days sampling. A CTD profile was completed at around 07:00, with the first tow being shot away and fishing for 07:30. A quick breakfast before the net came up for 08:00 and sorting commenced.

The first thing that became very clear was that everyone had got their particular role in sorting and processing the catch. Rob was teamed up with Tobias to collect the benthic portion of the catch coming off the conveyor, sorting into species and weigh and count before Ralf relayed the information to Ingeborg who fed the information directly into the computer. It took Rob half a day to get accustomed to this way sorting and processing the catch after having worked for years using the Cefas systems.

The last haul was set around 19:00-20:00 and processed an hour half later. The target was to complete five hauls per day, which would go to some way to gather back the lost day. This target was achieved with ease thanks improving weather and calming seas and the relatively high transit speed between stations that the Tridens could achieve.

The sorting and processing was not the only thing that was different from working on the Endeavour, all sorting takes place below decks, with the catch being delivered through hatches in the aft deck and held in pounds. Each pound can be independently processed and is taken by conveyor to the sorters, fish are taken of the conveyor and retrained in baskets or bins located along the conveyor, the benthic component is left on the conveyor and then removed at the end. The conveyor can be stopped to allow fish to be removed if the catch is large. The system is very much like a commercial vessel.

After four days fishing and completing 21 successful towsthe beams were hauled on board and a heading set for the port of Scheveningen. After an overnight steam the RV Tridens, crew and scientists arrived in her home port of Scheveningen by mid-morning on Friday 2 September. Scientists made their way back to IJmuiden and Rob returned to the UK.

5.1.5 Other issues

In last year's report, the Netherlands described the use of a survey blog during their Tridens survey and made a suggestion that other countries attempted to do this in the future. During the Cefas Irish Sea survey in 2011, a blog was carried out and can be viewed via this link http://www.Cefas.defra.gov.uk/news/survey-blogs.aspx. It is planned that a blog will be carried out on future Cefas surveys.

5.1.6 Observations on daylight effect on sole CPUE in the Bay of Biscay

The beam trawl ORHAGO survey was launched in 2007 to fulfil the need of a fishery independent abundance index for the Bay of Biscay sole stock. The sampling strategy was consequently defined to fish all over the sole habitat in the Bay of Biscay and in a period (November-December) during which the fish behaviour and distribution should be in favour of obtaining an unbiased abundance index (young fish moving offshore when coastal waters become colder and before the concentrations of the spawning season).

5.1.6.1 Background

The boat which could be used for this survey is a 24.5 m long research vessel on which the working rules do not allow to fish all the night long. However, the sole catches are generally higher at night and consequently CPUE during that period should provide a higher abundance index than during daylight. This was often underlined by the fishermen who were interviewed when preparing the survey. In the context of an EU multiannual plan for restoring the state of the Bay of Biscay sole stock, that objection must be considered to get the agreement of the industry on the survey protocol and then the future acceptance of assessments in which the survey will take part.

Consequently, the survey was designed to investigate the daylight effect in sole CPUE by towing systematically the beam trawl at night and during daytime on the same haul position and the same day.

5.1.6.2 Results

A first analysis was presented after three surveys at WGBEAM 2010. It confirmed that the CPUE are higher at night by about 10%. A depth effect was suspected but because large changes in the night/day ratio of CPUE from one year to another one, the need to continue the night/day comparison over more than three years was underlined.

After five years, the mean 10% increase of CPUE at night is confirmed and also the night/day CPUE ratio may substantially vary from 1.0 to 1.4 between years (Figure 5.1.6.2.1). Consequently the investigation on the effect of depth on CPUE was carried out on the stations on which paired day and night hauls were performed each year from 2007 to 2011 to avoid the combination of year and depth effects, about half (25) of the 48 reference stations of the survey. Depths range from 10 m to 90 m and the

hauls are distributed all over the surveyed area, with lower representation of the northern part of the Bay of Biscay because bad weather in 2007.

The analysis on this set of stations does not confirm any depth effect on the night/daylight CPUE ratio (Figure 5.1.6.2.2) for the whole catch, nor when it is split into juvenile (fish length <23 cm) and mature fish (length > 26 cm). Consequently, there is no reason to give more priority to daylight or at night hauls according to the depth.

The analysis also shows that there is only a small proportion of hauls (about 10%) for which the night/daylight CPUE ratios have limited variations between years. Considering the important range of these variations, it seems better to work at night to avoid the risk of successive years of low or high ratio that could biased the index. However, because it is difficult to assess that risk with only five years, it may be worth keeping the opportunity to skip to daylight working hours in the future by continuing the double hauls (by daylight and at night) for some years before to decide to work only at night (unless working rules on board could allow larger number of daily hauls at night during the ORHAGO survey).

The ORHAGO survey provides two separate tuning series, one by daylight and one by night which it should be not wise to combine together (except for some hauls when a night or daylight value is missing and with great precaution). Each series can be used for stocks assessments and then can be compared by their assessment outputs, which is at the end the best way to compare the two series. This comparison should include investigations on the effect of missing values for some stations in some years (0 to 20%, depending on the year and the day fishing period).

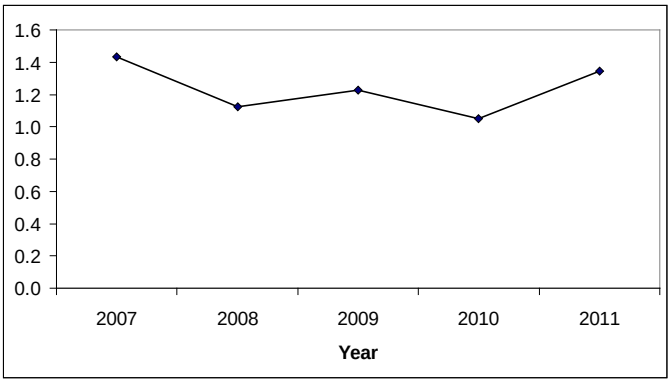


Figure 5.1.6.2.1. Trend in Night/Day CPUE ratio from 2007 to 2011 (same set of stations carried out by daylight and at night every year, CPUE in number/km).

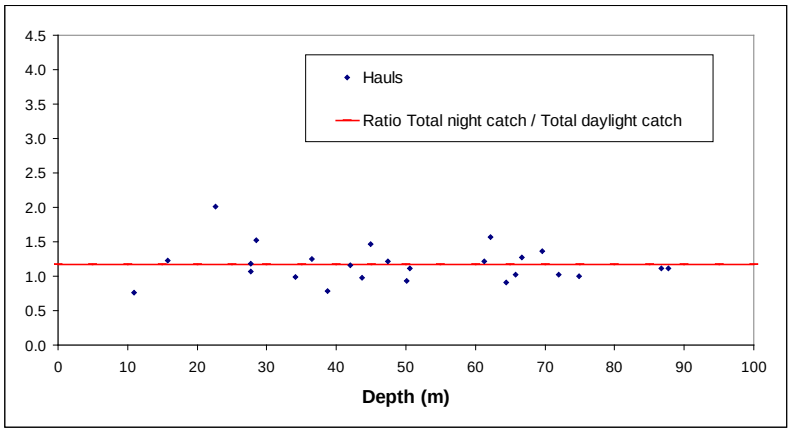


Figure 5.1.6.2.2. Night-Day total CPUE ratios against depth from 2007 to 2011 (same set of stations carried out by daylight and at night every year, CPUE in number/km)

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) and the Netherlands (Demersal Fish Survey-DFS). UK (Young Fish Survey-YFS) ceased the survey due financial constraints. Altough STECF were critical of Cefas in cancelling this survey, Cefas's response to STECF was deemed to be satisfactory and no sanctions were imposed.

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 2011.

Country	Vessel	Area	Dates	Gear
Belgium	Broodwinner	Belgian coastal zone	15 Sep – 23 Sep	6 m shrimp trawl
Germany	BK3	German Bight and German Wadden Sea	05 Sep – 06 Oct	3 m shrimp trawl
Netherlands (SNS)	Isis	Dutch coastal zone	12 Sep – 23 Sep	6 m beam trawl
Netherlands	Schollevaar	Scheldt estuary	5 Sep – 23 Sep	3 m shrimp trawl
Netherlands	Stern	Dutch Wadden Sea	29 Aug – 30 Sep	3 m shrimp trawl
Netherlands	Isis	Dutch coastal zone and German Bight	26 Sep – 2 Nov	6 m shrimp trawl

5.2.2 Survey results

A summary of each of the surveys is to be found in Section 5.2.3.

During the Belgium inshore survey carried out 31 stations. All stations were valid.

The German inshore survey did not face any difficulties.

Netherlands Sole Net Survey and Isis demersal fish survey lost 7 and 4 stations due to weather conditions respectively.

5.2.3 Catch results

The species composition per country per area for the continental surveys (Coastal, Wadden Sea, and Scheldt Estuary) is listed in Annex 14. From this year, Annex 14 only shows the data from the most recent years. Also, from this year, the catch for the UK inshore surveys is no longer given in the reports as the surveys ceased in 2010 and no new data is available. For historic data on these surveys please refer to the reports of meetings in 2011.

5.2.4 Survey summary sheets inshore surveys per country

5.2.4.1 Survey summary Belgium

Nation:	**Belgium**	Vessel:	O.29 'Broodwinner'
Survey:	Inshore Demersal Young Fish & Brown shrimp Survey	Dates:	15-23 September 2011

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. Until 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 11 mm, no tickler chains), at 3 knots against tide.
Notes from survey (e.g. problems, additional work etc.):	31 of the 33 sampling stations were fished succesfully in 2011. Two stations have become dredging points for which alternative locations need to be identified. None of the fished stations were declared invalid.
Target species catch rates: 2011 data	

	TIME SERIES MEAN NR. PER 1000 M²	2011 MEAN NR. PER 1000 M²
Plaice	10.18	24.36
Sole	8.60	1.58

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

The DYFS focusses 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 was 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 2011. Ordered by number, these are:

SPECIES	TOTAL NUMBER
Dab (*Limanda limanda*)	4854
Whiting (*Merlangius merlangus*)	4193
Plaice (*Pleuronectes platessa*)	3713
Sole (*Solea solea*)	901
Flounder (*Platichthys flesus*)	232
Horse Mackerel (*Trachurus trachurus*)	54
Cod (*Gadus morhua*)	47
Lemon Sole (*Microstomus kitt*)	23
Tub Gurnard (*Chelidonichthys lucernus*	14
Turbot (*Psetta maxima*)	4
Seabass (*Dicentrarchus labrax*)	1
Lesser Spotted Dogfish (*Scyliorhinus canicula*)	1

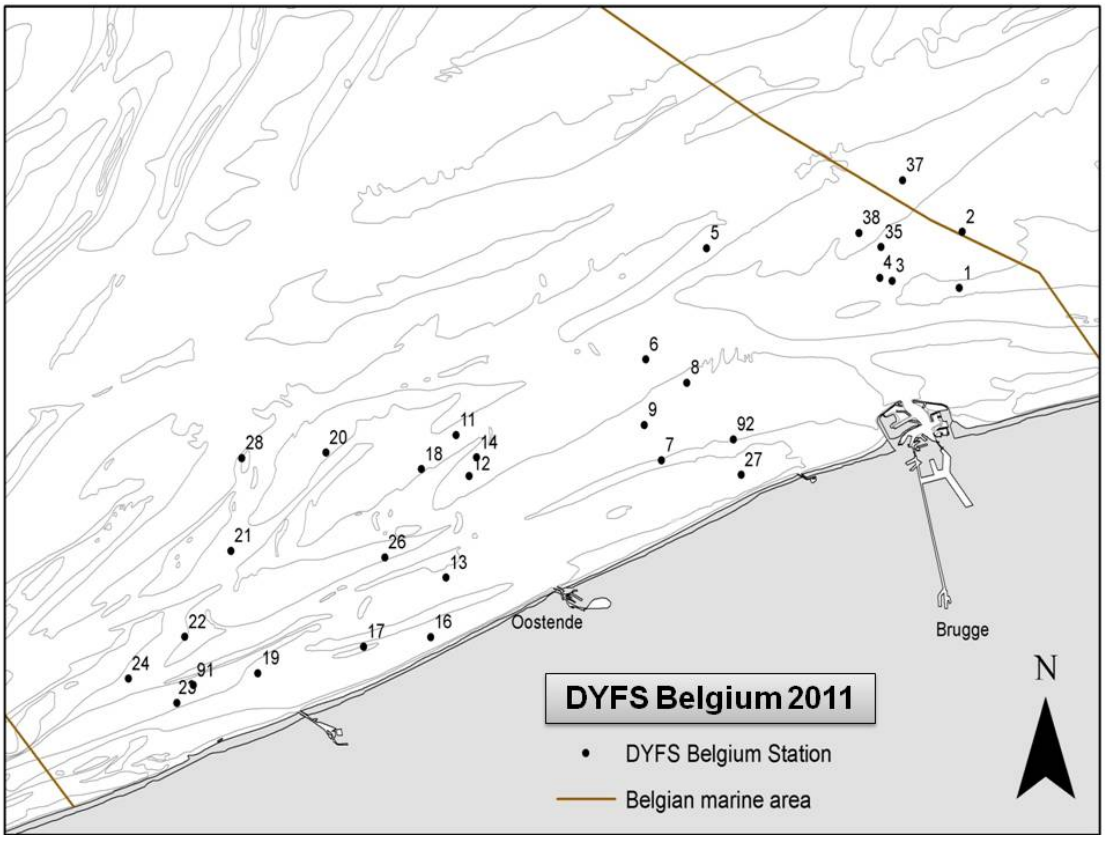
Number of epifauna species recorded:	Appr. 500 brown shrimp per station are measured in 5 mm size classes. No other epifauna species are recorded.
Index revisions:	No

Stations fished:

ICES Divisions	Strata	Gear	Indices stations	Priority stations	Additional	Invalid	Total Valid	Comments
IVc	N/A	6m beam trawl	33	33	0	0	31	2 stations not fished (see above)

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

DYFS sampling stations in the Belgian coastal waters



5.2.4.2 Survey summary Germany

Nation:	**Germany**	Vessel:	Chartered Cutters
Survey:	DYFS	Dates:	05 Sep – 06 Oct 2011

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 cod-end. An electronic mini sensor for time, temperature and pressure (light optional) is attached.
Notes from survey (e.g. problems, additional work etc.):	vTI-SF 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 data base. (Species list has changed also over years) In total 141 valid hauls of 144 total hauls were carried out.

Target species catch rates:

	Time series mean (Schleswig-Holstein only) n/1000m²	2011 mean (Schleswig-Holstein only) n/1000m²	Time series mean	2011 mean (coastal Zone all along Germany) n/1000m²
Plaice	14.40	6.40		12.08
Sole	0.97	0.34		036
Cod	0.98	0.83		0.57
Whiting	2.23	0.47		0.67
Brown shrimp	1899	1980.33		1499.90

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 2011. The top 10 by number in 2011 out of 40 taxa:

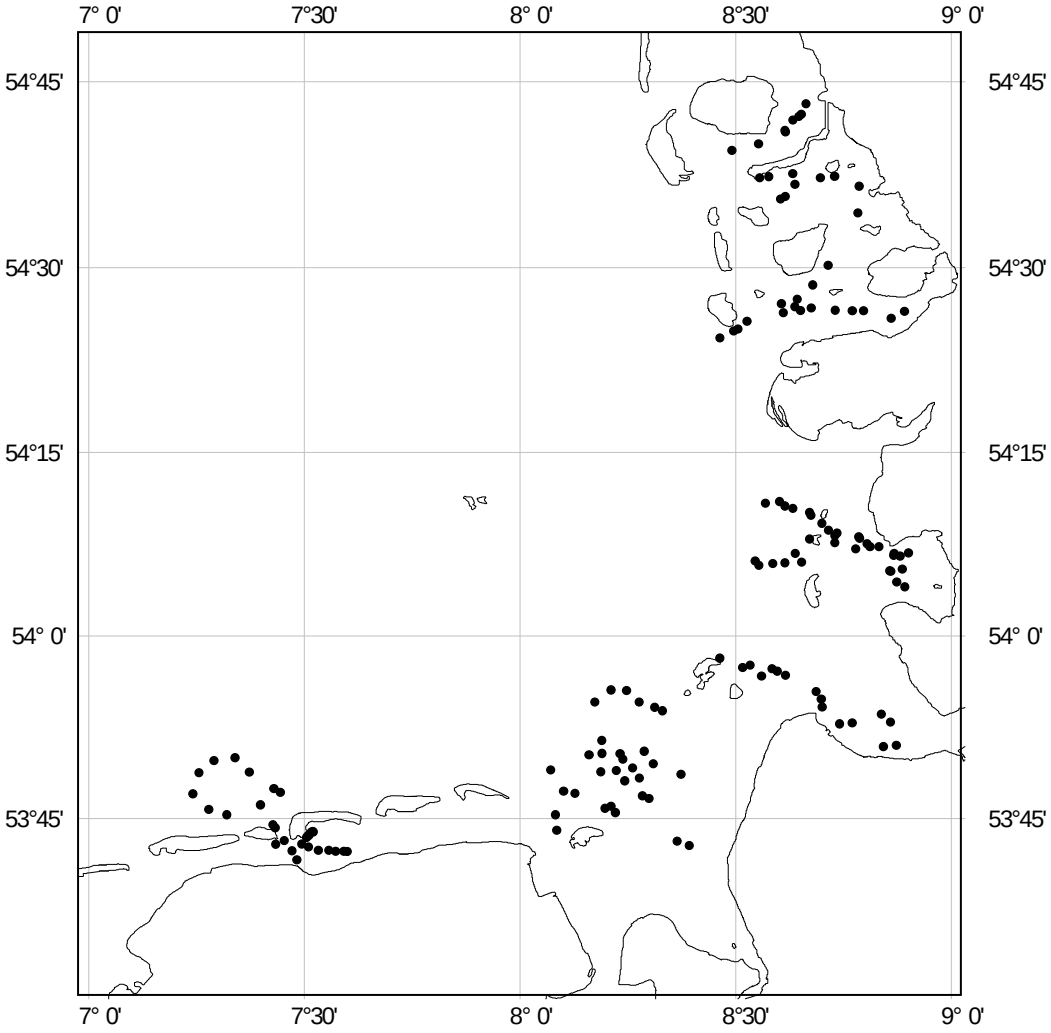
Pomatoschistus minutus	7403
Pleuronectes platessa	6714
Syngnathus rostellus	4239
Osmerus eperlanus	3471
Platichthys flesus	858
Agonus cataphractus	588
Ciliata mustela	579
Myoxocephalus scorpius	375
Zoarces viviparus	306
Clupea harengus	264

Number of epifauna species recorded:

All epifauna found are recorded on protocols, however, only selected species are available in the SF database. For 2011 they were

Crangon crangon	896291
Macropipus holsatus	5274
Carcinus maenas	3759
Mytilus edulis	2291
Asterias rubens	1763
Ophiurida	1233
Pandalus montagui	1070
Paguridae	129
Loligo	88
Actinaria	42

Index revisions:	



Stations sampled in the German DYFS 2011.

5.2.4.3 Survey summary Netherlands: Schollevaar

Nation:	**Netherlands**	Vessel:	RV "Schollevaar"
Survey:	DYFS (Demersal Young Fish Survey)	Dates:	5-23 Sep 2011

Survey description	The DYFS 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 m beam trawl with 1 tickler chain and a bobbin rope ("shrimp net").
Notes from survey (e.g. problems, additional work etc.):	74 hauls were carried out. A CTD was attached to the net.
Target species catch rates:	**Time series mean no./1000m^2** / **2011 mean no. per 1000m^2** Sole 3.52 1.90 Plaice 10.17 7.32 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:	31 separate species of finfish were caught. The top 10 by number are: *Pomatoschistus sp.* 4257 *Pleuronectes platessa* 2212 *Solea solea* 480 *Platichthys flesus* 351 *Myoxocephalus scorpius* 327 *Gobius niger* 227 *Osmerus eperlanus* 223 *Clupea harengus* 172 *Merlangius merlangus* 123 *Syngnathus rostellatus* 109
Number of epifauna species recorded:	31 epifauna (attached and free-living) species were observed during the 2011 survey.
Index revisions:	No

Stations fished:

ICES Divisions	Strata	Gear	Indices stations	Priority stations	Additional	Invalid	Total Valid	Comments
IVc: Scheldt estuary	area & depth class	3m beam trawl	74		0	0	74	

Number of biological samples (maturity and age material):			
Species	Number	Species	Number
Pleuronectes platessa	112	*Limanda limanda*	27
Solea solea	120	*Scophthalumus rhombus*	6
Platichthys flesus	63		

5.2.4.4 Survey summary Netherlands:Stern (DFS)

Nation:	**Netherlands**	Vessel:	RV "Stern"
Survey:	DYFS (Demersal Young Fish Survey)	Dates:	29 Aug- 30 Sep 2011

Survey description	The DYFS 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 m beam trawl with 1 tickler chain and a bobbin rope ("shrimp net").
Notes from survey (e.g. problems, additional work etc.):	118 hauls were carried out. A CTD was attached to the net.
Target species catch rates:	**Time series mean no/1000m²** / **2011 mean no/1000m²** Sole 5.33 2.32 Plaice 32.73 10.17 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:	37 separate species of finfish were caught. The top 10 by number are: *Pomatoschistus sp.* 7094 *Pleuronectes platessa* 1425 *Osmerus eperlanus* 1167 *Solea solea* 1002 *Ciliata mustela* 743 *Myoxocephalus scorpius* 743 *Liparis liparis* 539 *Zoarces viviparus* 507 *Syngnathus rostellatus* 448 *Platichthys flesus* 282
Number of epifauna species recorded:	19 epifauna (attached and free-living) species were observed during the 2011 survey.
Index revisions:	No

Stations fished:

ICES Divisions	Strata	Gear	Indices stations	Priority stations	Additional	Invalid	Total Valid	Comments
IVc: Wadden Sea	area & depth class	3m beam trawl	118		0	0	118	

Number of biological samples (maturity and age material):			
Species	Number	Species	Number
Platichthys flesus	211	*Scophthalmus rhombus*	7
Pleuronectes platessa	207	*Limanda limanda*	13
Solea solea	152	*Psetta maxima*	3

5.2.4.5 Survey summary Netherlands: Isis (DFS)

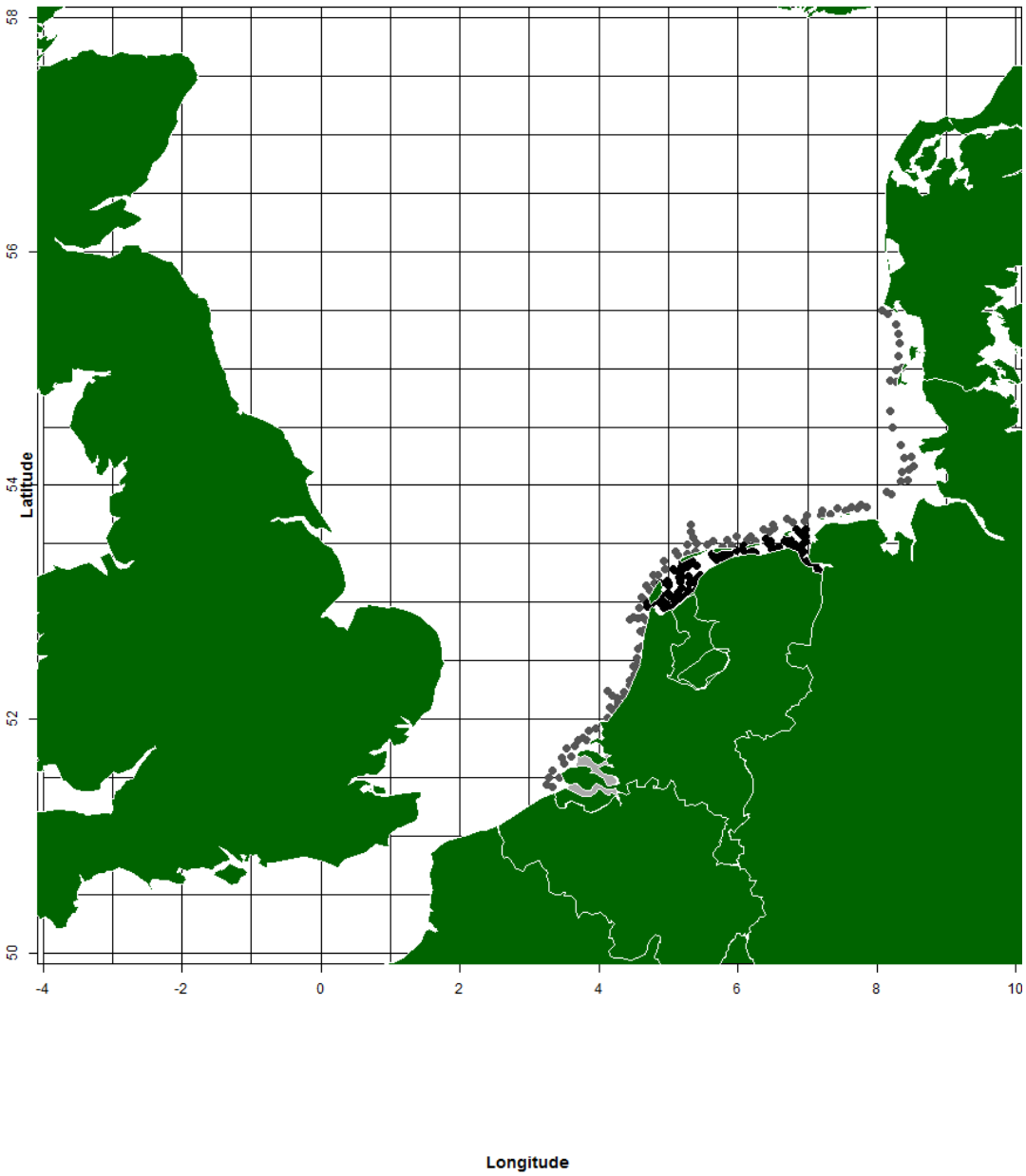
Nation:	**Netherlands**	Vessel:	RV "Isis"
Survey:	DYFS (Demersal Young Fish Survey)	Dates:	26 Sep –02 Nov 2011

Survey description	The DYFS 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 mr beam trawl with 1 tickler chain and a bobbin rope ("shrimp net").
Notes from survey (e.g. problems, additional work etc.):	109 hauls were carried out. A CTD was attached to the net. Due to the weather, about 4 stations could not be fished.
Target species catch rates:	**Time series mean no/1000m²** / **2011 mean no/1000m²** Sole 6.21 / 0.89 Plaice 22.27 / 10.17 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:	42 separate species of finfish were caught. The top 10 by number are: *Pomatoschistus sp.* 115544 *Limanda limanda* 7896 *Pleuronectes platessa* 6463 *Buglossidium luteum* 3581 *Syngnathus rostellatus* 3419 *Merlangius merlangus* 2127 *Osmerus eperlanus* 1836 *Aginus cataphractus* 1544 *Callionymus lyra* 1136 *Clupea harengus* 972
Number of epifauna species recorded:	32 epifauna (attached and free-living) species were observed during the 2009 survey.
Index revisions:	No

Stations fished:

ICES Divisions	Strata	Gear	Indices stations	Priority stations	Additional	Invalid	Total Valid	Comments
IVc: Dutch coast	area & depth class	6m beam trawl	109	0	0	0	109	

Number of biological samples (maturity and age material):			
Species	Number	Species	Number
Limanda limanda	589	*Platichthys flesus*	94
Pleuronectes platessa	346	*Psetta maxima*	14
Solea solea	184	*Scophthalmus rhomus*	11



Station positions for Isis (dark grey), Schollevaar (light grey) and Stern (black) (DYFS).

5.2.4.6 Survey summary Netherlands: Isis (SNS)

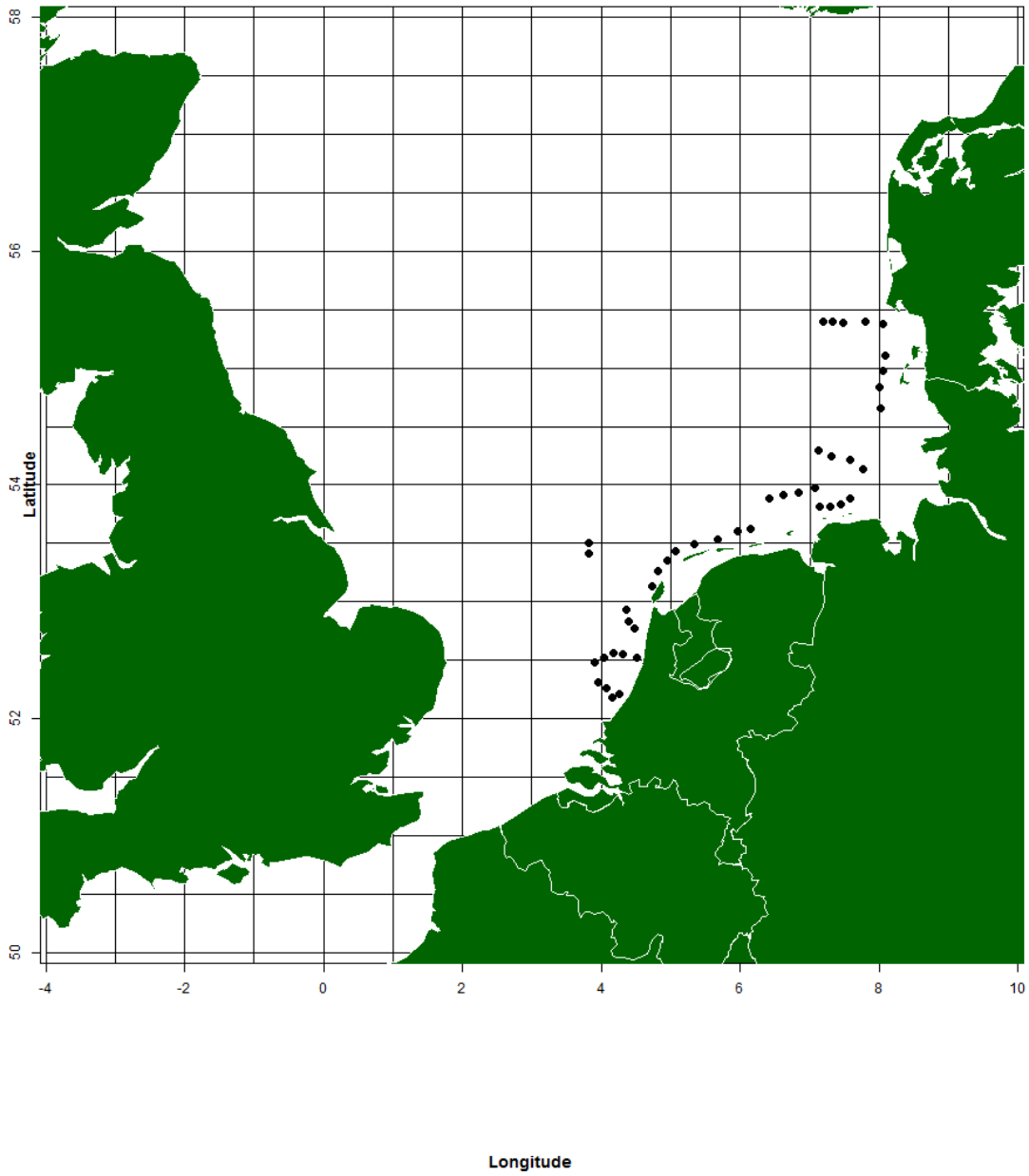
Nation:	**Netherlands**	Vessel:	RV "Isis"
Survey:	SNS (Sole Net Survey)	Dates:	12-23 Sep 2011

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 cod-end.
Notes from survey (e.g. problems, additional work etc.):	43 hauls were carried out (approx. 13 hours fishing time). A CTD was attached to the net. Due to weather coonditions, 7 stations could not be fished. All transects were covered.
Target species catch rates:	**Time series mean no/100 hr** / **2011 mean no/100 hr** Sole 6534 2629 Plaice 66859 72605
Number of fish species recorded and notes on any rare species or unusual catches:	34 separate species of finfish were caught. The top 10 by number are: *Limanda limanda* 8631 *Pleuronectes platessa* 7575 *Pomatoschistus* spp. 7226 *Buglossidium luteum* 2631 *Arnoglossus laterna* 2360 *Agonus cataphractus* 1247 *Callionymus lyra* 1229 *Merlangius merlangus* 963 *Myoxocephalus scorpius* 299 *Solea solea* 255
Number of epifauna species recorded:	35 epifauna (attached and free-living) species were observed during the 2011 survey.
Index revisions:	

Stations fished:

ICES Divisions	Strata	Gear	Indices stations	Priority stations	Additional	Invalid	Total Valid	Comments
IVc: North Sea	area & depth class	6m beam trawl	43	0	0	0	43	

Number of biological samples (maturity and age material):			
Species	Number	Species	Number
Limanda limanda	633	*Platichthys flesus*	55
Pleuronectes platessa	542	*Psetta maxima*	28
Solea solea	254	*Scophthalmus rhombus*	32



Station positions for Isis (black) (SNS).

6 Population abundance indices (ToR b and f)

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 2011.

The revision history until 2011 can be found in the WGBEAM 2011 report (ICES, 2011) and preceding WGBEAM reports.

6.1.1 Sole

North Sea sole

Time-series trends in sole for the North Sea, based on the Netherlands Isis offshore survey, are shown in Figure 6.1.1.1a. This survey indicates that recent year classes have been mainly poor with seven of the year classes in the latest decade (2001-2010) below the long term arithmetic mean at all ages (with the 2003 and 2004 year classes substantially below these means). The good 2005 year class, that was still clearly visible in 2008 and 2009, was already becoming less abundant in the population in 2010 and continued that trend in 2011. In 2010, the observed number of one year olds (2009 year class) was higher than the mean for the first time since 1997, also leading to an above average number of two year olds in 2011. The one year olds numbered slightly above the average in 2011 (2010 year class), representing the sixth highest value of the time-series. The spatial coverage of the Netherlands Tridens survey makes it unsuitable for monitoring sole abundance.

Time-series trends for sole in the Southern North Sea, based on the UK offshore survey, are depicted in Figure 6.1.1.1b. Also here, the number of one-year olds was around the average in 2011. The numbers of two and three year olds were slightly lower than the long term mean for this part of the North Sea, following the trend from 2010. The disappearing of the good year class 2005, as observed by the Netherlands Isis offshore survey, is confirmed by this UK survey.

Area VII sole

The indices for sole from area VII stocks are summarised in Figure 6.1.1.1c-f.

Division VIId

The relative abundance of sole in 2011 across all age groups is either at or above the time-series averages, and for the 2 and 3 groups it is noticeably above. Since 1999 the relative abundance of the 4+ group has remained relatively constant, after declining between 1993 and 1998, there has been a slight decline in relative abundance of the 4+ group over the last three years. In contrast relative abundances for the 1 – 3 groups are quite variable, and are often attributable to a strong 1 group recruitment that can be followed through from one year to the next.

Division VIIe

Similarly to VIId, relative abundances for 2011 are above time-series averages for most year groups, although the abundance of the 1 group was about half that recorded for 2010. As for VIId in the more recent years, the most consistent relative

abundance calculated for a year group, is that for the 4+ group. Again, compared to VIId, the relative abundance for the 1 – 3 groups are more variable, and, in contrast to VIId, strong year classes recorded for the 1 groups do not follow through, so well, from one year to the next. For the four 1 group peaks recorded fro 1990, 1996, 2003 and 2010 only the 1990 1 group cohort can be followed through into 1991 and 1992,

Division VIIf

The relative abundance for most of the year groups, for 2011, are at or above time-series mean averages. However, the abundance of the 2 group is very low, which is a reflection of the low 1 group abundance recorded for the proceeding year, which is one of the lowest recorded for the time-series. The highest recorded time-series 1 group peak for 1999 corresponds to very strong 2, 3 and 4+ group abundances recorded for the following years, which are also time-series peaks for these respective year groups. Similarly the second highest 1 group peak recorded in 2008 can also be followed through to the following years.

Division VIIa

Of all VII sole stocks, the abundance of year groups for the VIIa stock has been below mean time-series peaks since 2005. For 2011 there was an increase in the 1 group, compared to the proceeding year, which is still less than half of the time-series mean average. Again, as for the other stocks, the peaks in the abundance of 1 groups (1996, 1997 and 2004) can generally be tracked through to following years.

Northern Adriatic Sea sole

Figure 6.1.1.1g shows the time-series trends in sole for the Northern Adriatic Sea, based on the SoleMon offshore beam trawl surveys. Although sole otoliths were collected since 2007, for financial constraints it was not possible to analyse these for the age. So age slicing, based on Von Bertalanffy parameters (L_{inf}: 39.6; k: 0.44, t_0: -0.46), was carried out using LFDA 5.0.

This survey indicates that the 2011 age 0 group has been at the same level of the long-term arithmetic mean. Similarly, also age 1 group showed index values higher than the long-term arithmetic mean. Adults (age-groups 2–5+) showed substantially lower values than the long-term arithmetic mean.

6.1.2 Plaice

North Sea plaice

Figures 6.1.1.2a and 6.1.1.2b show trends in the indices for North Sea plaice from the Netherlands Isis and Tridens surveys. 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 in most years since the strong 2001 year class became apparent as one year olds in 2002. Only in 2009 and 2011, the observed number of one year olds was higher than the long term mean; with the 2011 recruitment at age one being the fith highest of the time series. The Tridens survey confirmed the strong 2001 year class, and documented above average incoming year classes from 2007 onwards, with the observed number of one year olds in 2011 being the highest of the time series. This pattern is visible at all ages in this survey. The combined Isis-Tridens index (Figure 6.1.1.2c) shows above average numbers at all ages, with an increasing trend since the beginning of the 21st century,

building up to the biggest 4+ group in the time series. It is not clear where the higher numbers of four year olds in 2007-2009 come from in the Tridens and combined indices.

Figure 6.1.1.2d, depicting the population abundance series for plaice in the Southern North Sea from the UK offshore survey, gives a different picture. Here, especially high incoming year classes 2006 and 2007 are apparent, and the above average incoming year class 2010 (one year olds in 2011) was also picked up to a lesser extent.

Area VII plaice

The indices for plaice from area VII stocks are summarised in Figure 6.1.1.2e-h

Division VIId

The relative abundances for all year groups have steadily increased over the last five years or so. For 2011 the abundances for the 1 and 2 groups are time-series peaks, and those recorded for the 3 and 4+ groups are both the second highest recorded values in these respective age groups. Over the time-series the recruitment of 1 group fish has been relatively stable but when more pronounced 1 groups appear (e.g. 1997, 2007 and 2009) the cohort can be followed into all or some of the following years.

Division VIIe

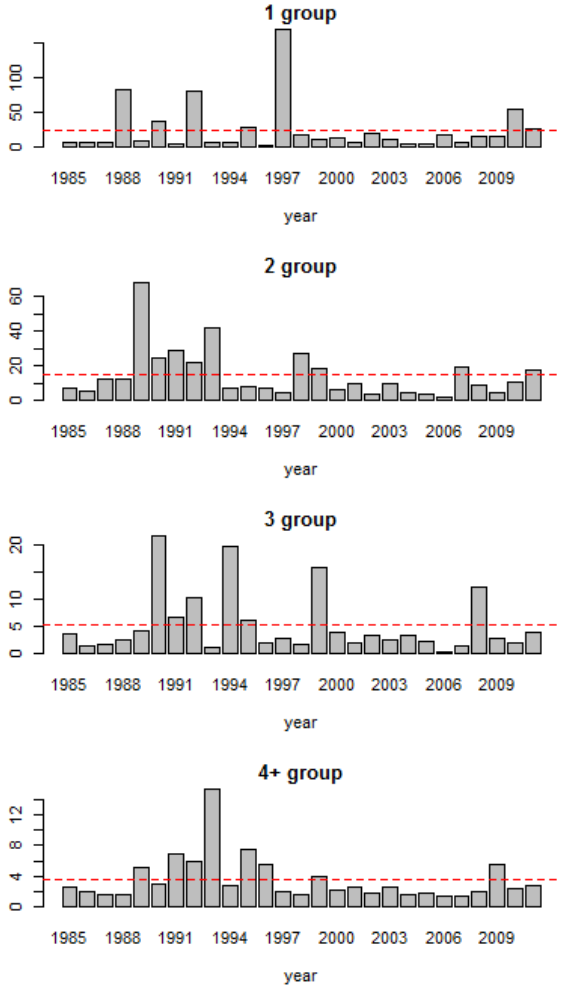
Again, as for the VIId plaice stock, the relative abundance of plaice in VIIe for all year groups has increased in the last few years. There has a been a particularly high recruitment of 1 group fish in the last two years, which the 2011 figure was the highest recorded for the time-series. Consequently the high 2 group abundance for 2011 corresponds with the high abundance recorded for the 1 group in 2010. Aside from this, the correlation of strong year groups from one year to the next is poor.

Division VIIf

For 2011, the calculated relative abundance of plaice in VIIf remained stable across all year groups, and their abundances are comfortably above the time series mean averages. Strong 1 group figures were recorded for both 2010 and 2011. Since 2003 the mean average abundance of 4+ group fish is at or above that calculated for the proceeding ten years. Only a few 1 group abundance peaks have been recorded. Although not consistent it is possible to track some cohorts from one year to the next. The high abundance of 2 group fish in 2011corresponds to high numbers of 1 group fish caught in 2010.

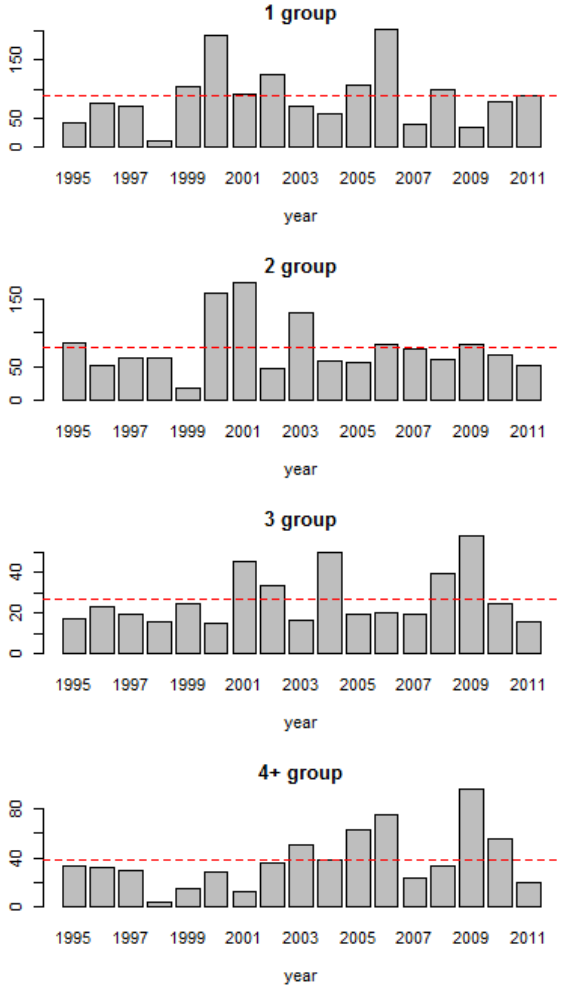
Division VIIa

Since 2002 the abundance figures recorded for plaice by the UK survey in VIIa, across all year groups has remained relatively constant, and in particular for the 4+ group, and to a lesser extent the 3 and 2 groups, relative abundances are noticeably above those recorded for the years prior to this date. Again, as for VIIf, There have only been a few, relatively small, time-series peaks in the abundance of 1 group fish. For the largest peak, recorded in 2007, the cohort can be tracked through to the following years.



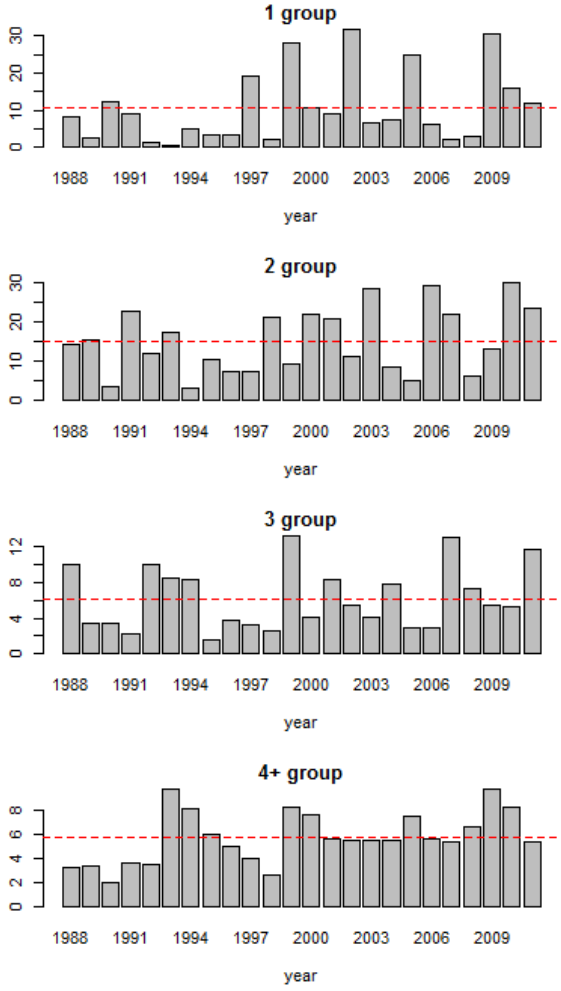
a) Netherlands: sole (N.hr^-1/8m trawl) North Sea (IV) RV "Isis".

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



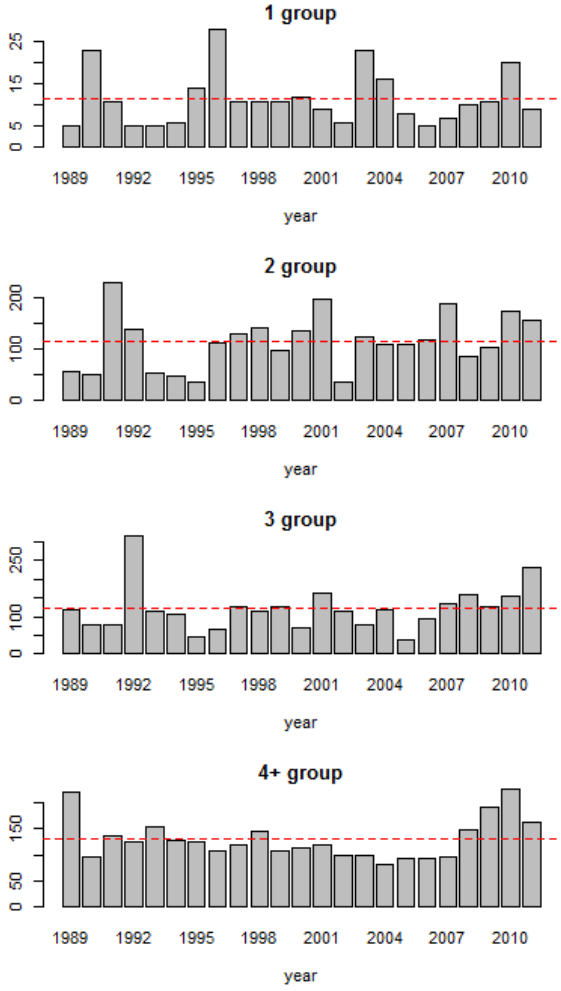
b) UK: sole (mean numbers per km towed for 4m beam trawl) Southern North Sea (IVc).

Figure 6.1.1.1. Continued.



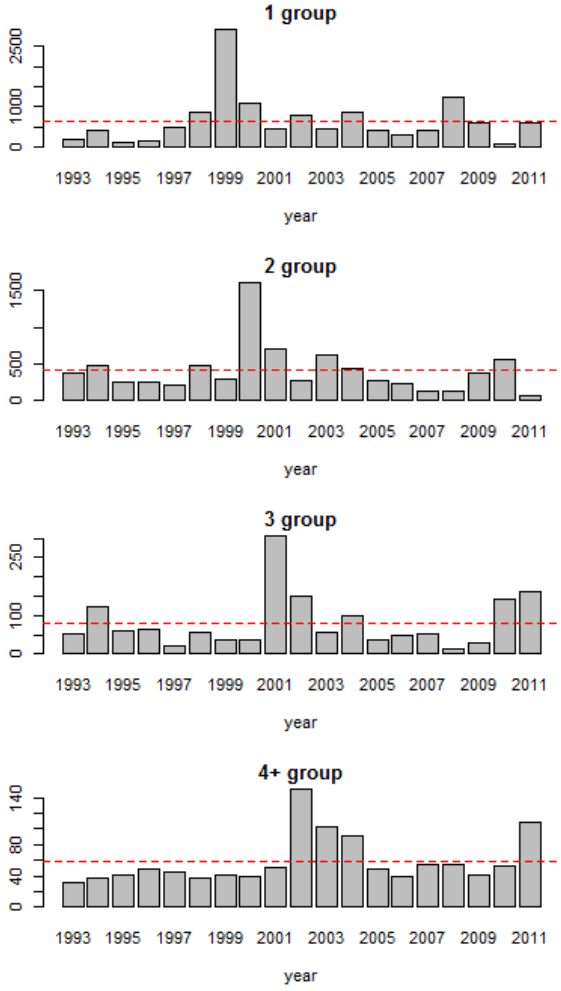
c) UK: sole (N.hr^-1/8m beam) Eastern English Channel (VIId).

Figure 6.1.1.1. Continued.



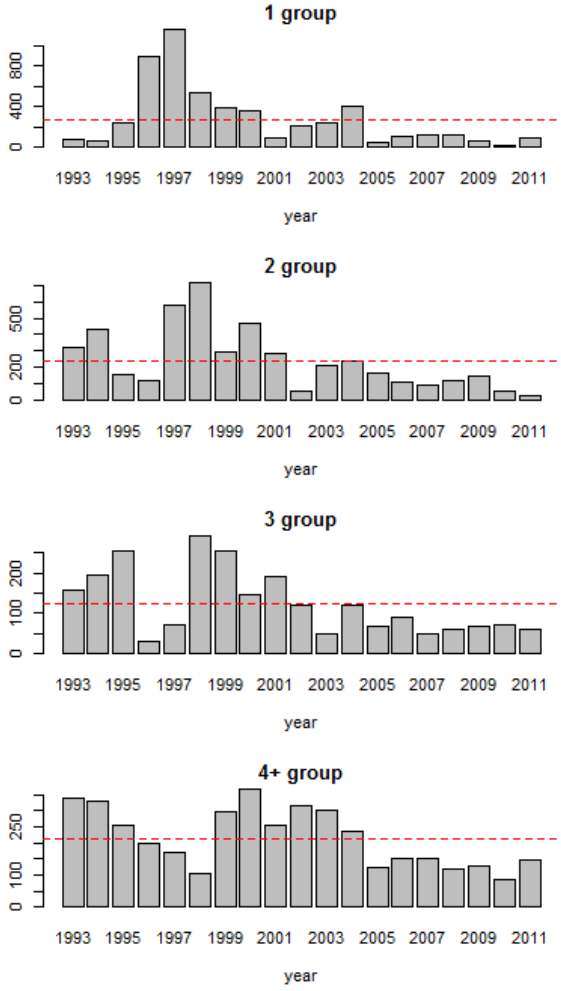
d) UK: sole (mean numbers per km towed for 2*4m beam trawl) Western English Channel (VIIe).

Figure 6.1.1.1. Continued



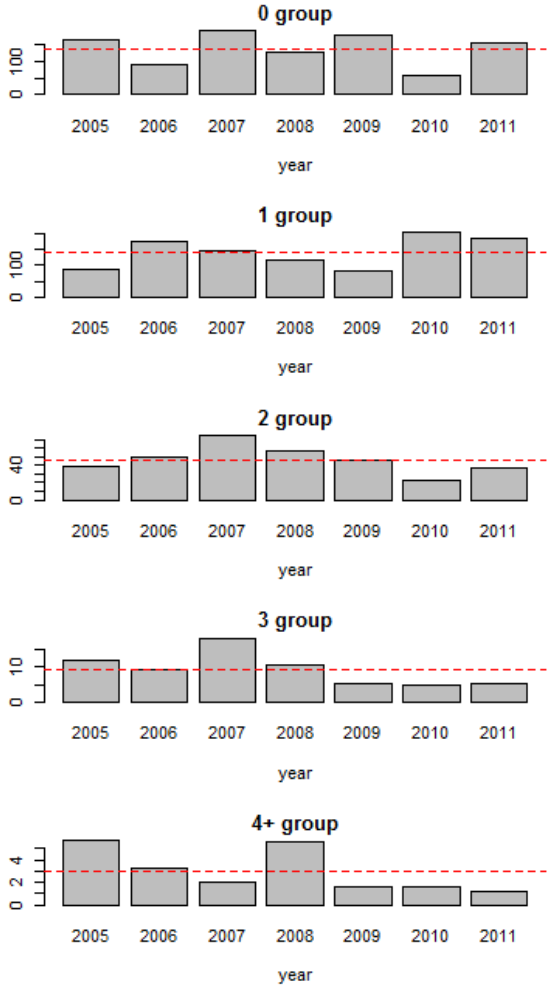
e) UK: sole (mean numbers per km towed for 4m beam trawl) Bristol Channel (VIIf).

Figure 6.1.1.1. Continued



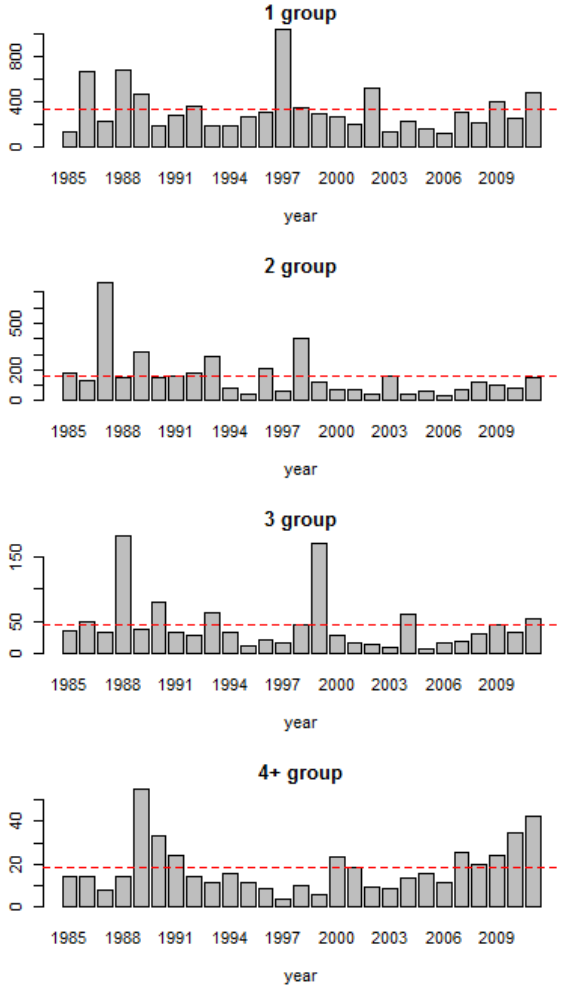
f) UK: sole (mean numbers per km towed for 4m beam trawl) Eastern Irish Sea (VIIa).

Figure 6.1.1.1. Continued.



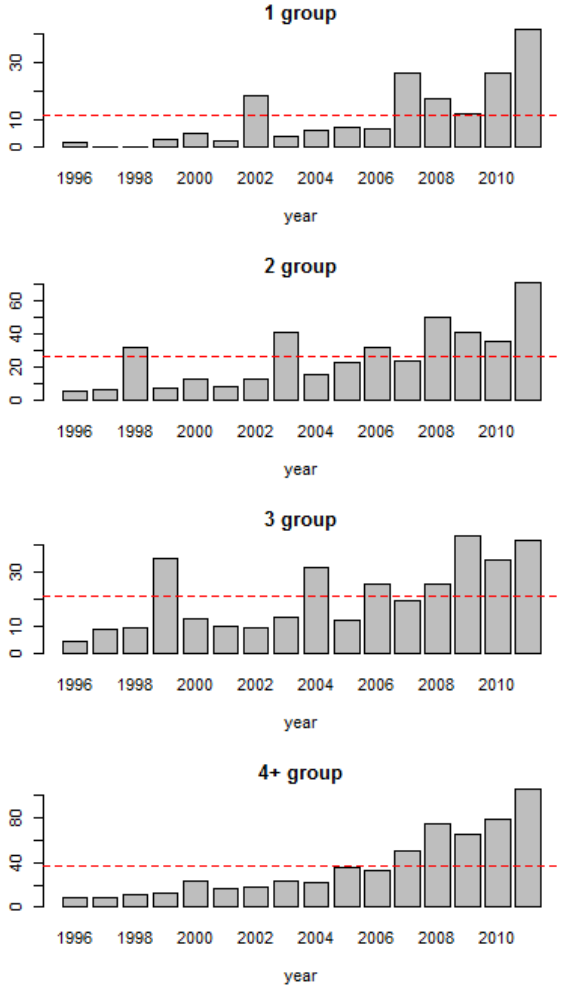
g) Italy: Catch rate of sole from the Adriatic beam trawl survey. (horizontal line = long-term mean for the period presented).

Figure 6.1.1.1. Continued.



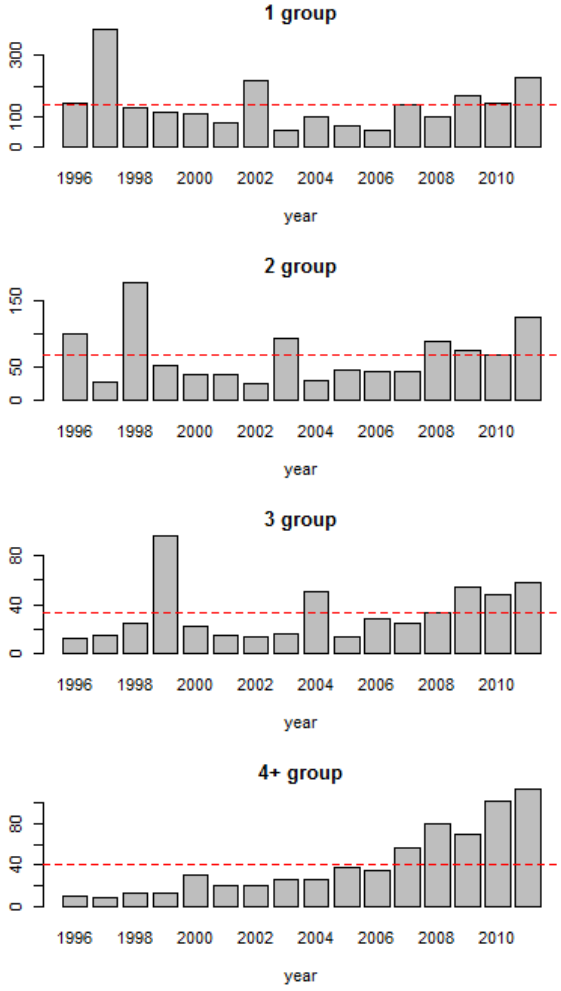
(a) Netherlands: plaice (N.hr^-1/8m trawl) North Sea (IV) RV "Isis".

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



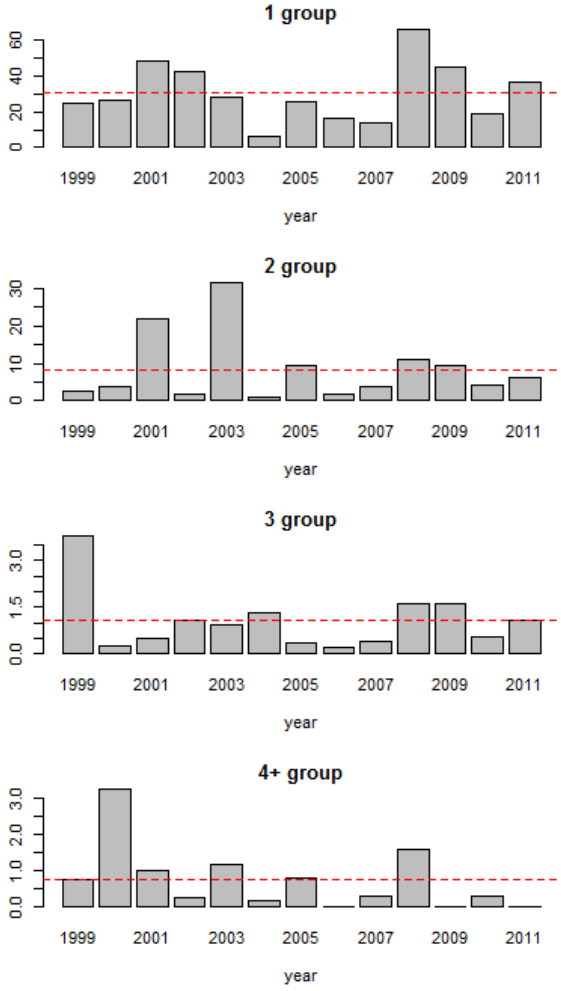
(b) Netherlands: plaice (N.hr^-1/8m trawl) North Sea (IV) RV "Tridens".

Figure 6.1.1.2. Continued.



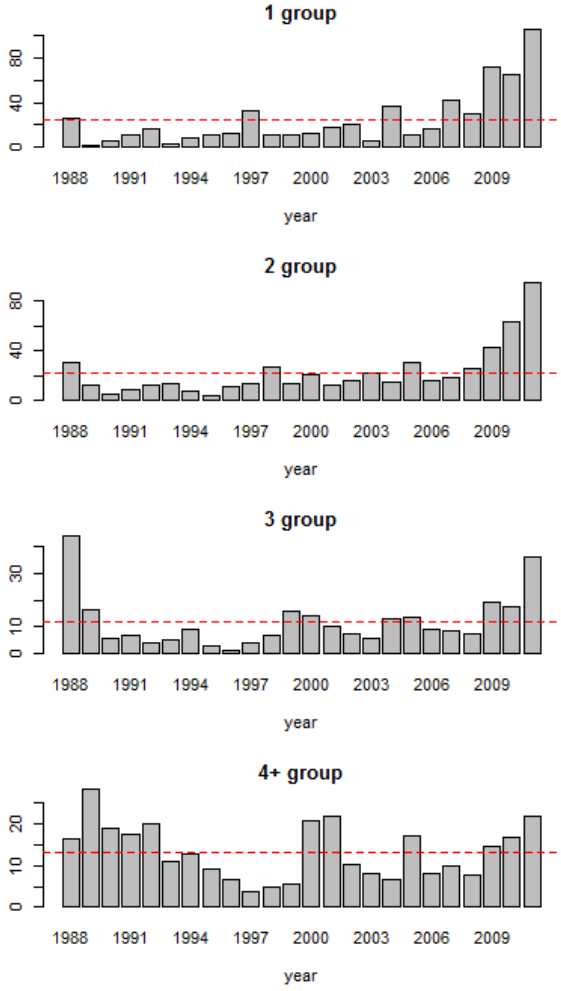
(c) Netherlands: plaice (N.hr^-1/8m trawl) North Sea (IV) RV "Isis" and RV "Tridens".

Figure 6.1.1.2. Continued.



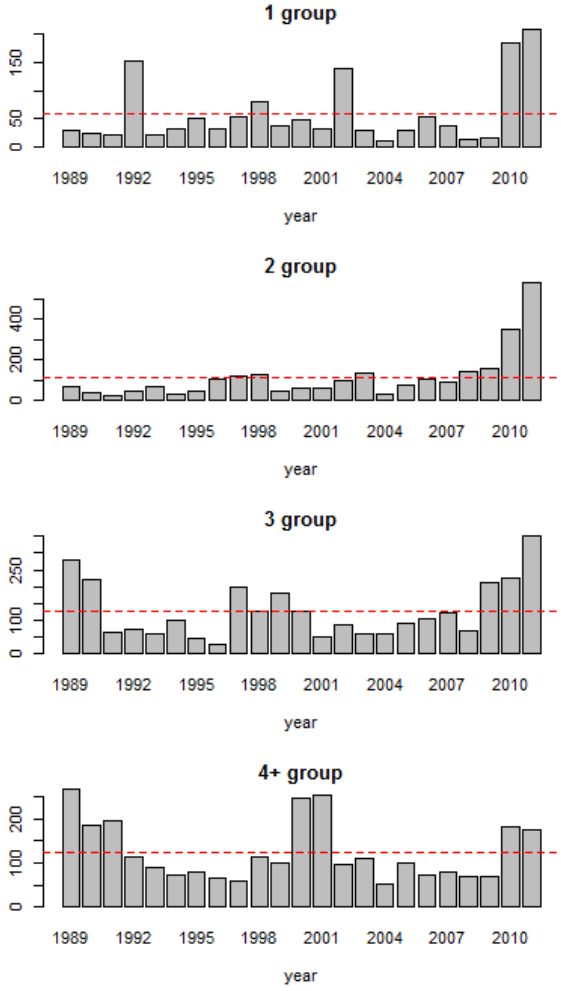
(d) UK: plaice (mean numbers per km towed for 4m beam trawl) Southern North Sea (IVc).

Figure 6.1.1.2. Continued.



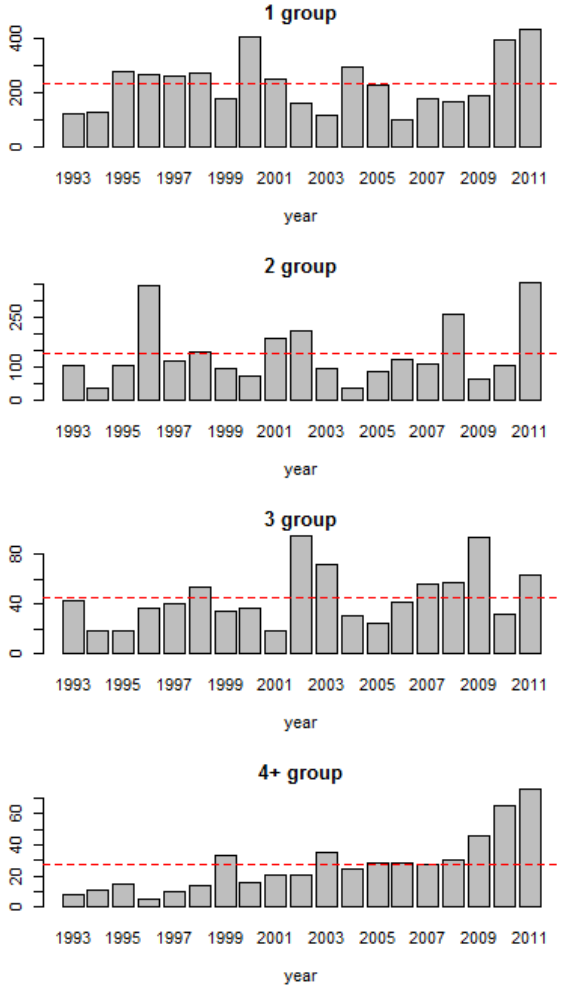
(e) UK: plaice (N.hr^-1/8m beam trawl) Eastern English Channel (VIId).

Figure 6.1.1.2. Continued.



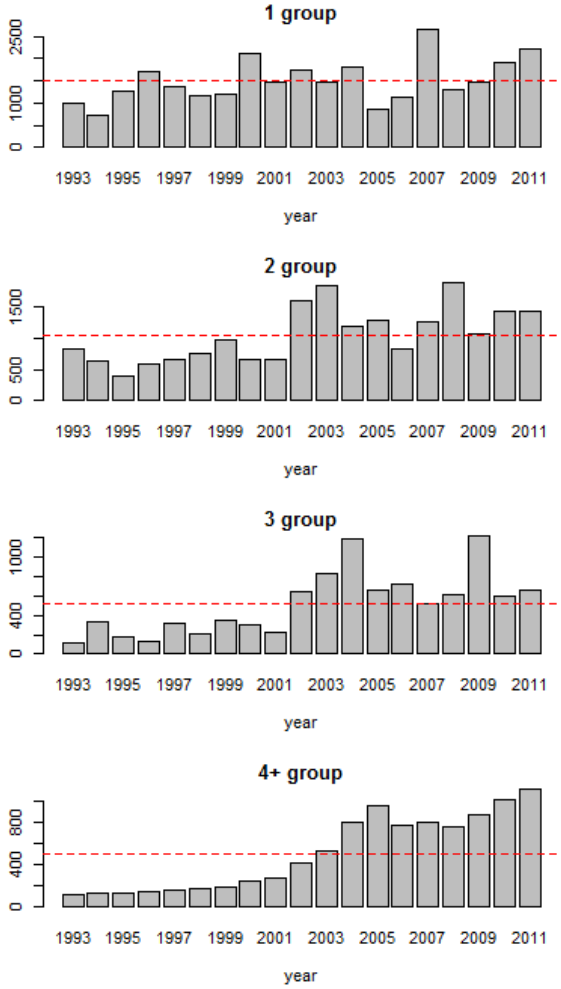
(f) UK: plaice (mean numbers per km towed for 2*4m beam trawl) Western English Channel (VIIe).

Figure 6.1.1.2 Continued.



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

Figure 6.1.1.2. Continued.



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

Figure 6.1.1.2. Continued.

6.1.3 Further offshore index calculations

Although Germany uploads their offshore data to DATRAS, at this time no indices are calculated for assessment use. With the development of the DATRAS data products to produce indices from the Dutch data (see Section 9.1.2), it will be possible to analyse the German data and hopefully produce an index from the offshore survey. Inter-sessionally Germany shall produce indices from their offshore data and present to WGBEAM in 2013. This can be done in conjunction with ICES Data Centre, Cefas and IMARES.

There is also no Belgian offshore index, due to lack of age data availability, however, as shown in the report of WGBEAM in 2007 (ICES, 2007), it may be possible to use the age data collected on the UK survey to produce a Belgian offshore index. Inter-sessionally Cefas will produce an index from the Belgium offshore data, provided by from the WGBEAM dataset, using age data derived from the southern North Sea part of the UK quarter 3 North Sea Beam Trawl survey. This will be carried out for plaice and sole and will be presented at WGBEAM 2013.

As there is now enough data for the creation of a time series for the ORHAGO survey in the Bay of Biscay, it is recommended that from 2013, IMFREMER provides an index to WGBEAM for this survey.

D. Miller (IMARES) presented the WGNSSK 2012 products for plaice and sole to WGBEAM. WGNSSK requests data on plaice for the Skagerrak area. Germany will investigate if it is possible to modify the survey so the information can be derived from the German offshore beam trawl survey. During this presentation, it was also discussed that England delivered an extended time-series for the IVc offshore beam trawl survey which was not used by WGNSSK in 2012. This was due to unawareness of the stock coordinator at WGNSSK.

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

6.2.1 Population abundance indices

Eastern English Channel (VIId)

The UK Young Fish Survey (YFS) covered UK coastal waters in VIId from 1981 to 2006. The survey was initiated in the 1970s but the spatial coverage is considered to be consistent for the period 1981-2006. The UK no longer carries out the YFS due to financial reasons. The population abundance indices are presented in the WGBEAM report of 2011 (ICES 2011)

The indices used by WGNSSK for the VIId stocks are the YFS for plaice, the UK offshore survey and the French CGFS survey for sole. WGBEAM does not coordinate the French survey (CGFS) as it is not a beam trawl survey and therefore the data were not available for the meeting. There are no inshore surveys in other parts of area VII which are used by the relevant Working Groups or coordinated by WGBEAM.

North Sea (IVbc)

Previously, the 3 continental surveys and the YFS were combined into international inshore indices for 0 and 1 group plaice and sole. The combined indices were revised this year, due to termination of the UK YFS and the spring survey of the German DYFS. The combined 0 group indices are now calculated using Belgian, Dutch and German data, the combined 1 group indices using Belgian and Dutch data only. The combined indices are calculated from 1990 onwards. See section 6.2.2. for further explanation.

WGNSSK uses the SNS indices and the combined inshore indices for recruitment estimates of the North Sea plaice and sole stocks. The SNS indices are also used as tuning fleet in the XSA models. The combined inshore indices are considered to be suitable for 0 group plaice and sole, but less suitable for 1 group sole and especially for 1 group plaice, because of the spatial coverage of the survey in relation to the spatial distribution of these age groups. The SNS is considered to be suitable for age groups 1 to 4. However, conflicting signals are observed for plaice between the BTS and the SNS for theses age groups, which may be related to changes in distribution.

The abundance indices are presented in Annex 15 for each survey separately and for the full period of each survey. The SNS indices and the combined indices are plotted for 1990 to 2011 in Figures 6.2.1.1 and 6.2.1.2.

The UK YFS covered UK coastal waters in IVc from 1981 to 2010. The survey was initiated in the 1970s but the spatial coverage is considered to be consistent for the period 1981-2010. The UK no longer carries out the YFS due to financial reasons. The population abundance indices are presented in the WGBEAM report of 2011 (ICES 2011).

The Belgian Demersal Young Fish Survey (DYFS), the German DYFS and the Dutch Demersal Fish Survey (DFS) together cover most of the coastal and estuarine waters along the continental coast from the French-Belgian border to Esbjerg in Denmark. All of these surveys were initiated in the 1970s. The Dutch DFS indices are calculated for all years from 1970 onwards, but the survey design changed in 1990 and sampling is considered to be consistent from 1990 onwards.

The Dutch Sole Net Survey (SNS) was initiated in 1970 and samples transects further offshore than the other inshore surveys. The SNS survey area overlaps with those of the Dutch DFS and BTS-Isis.

The 0 group combined indices for both plaice and sole in 2011 were below average and lower than in 2010. The 1 group combined index for plaice in 2011 was higher than in 2010, but still below average. This increase in 1 group plaice was mainly observed in the Belgian survey. A slight increase in 1 group plaice was also observed in the SNS. 1 group sole in 2011 has declined compared to 2010 according to both the combined inshore indices and the SNS. The 1 group index for sole is above average in the combined inshore series and below average in the SNS.

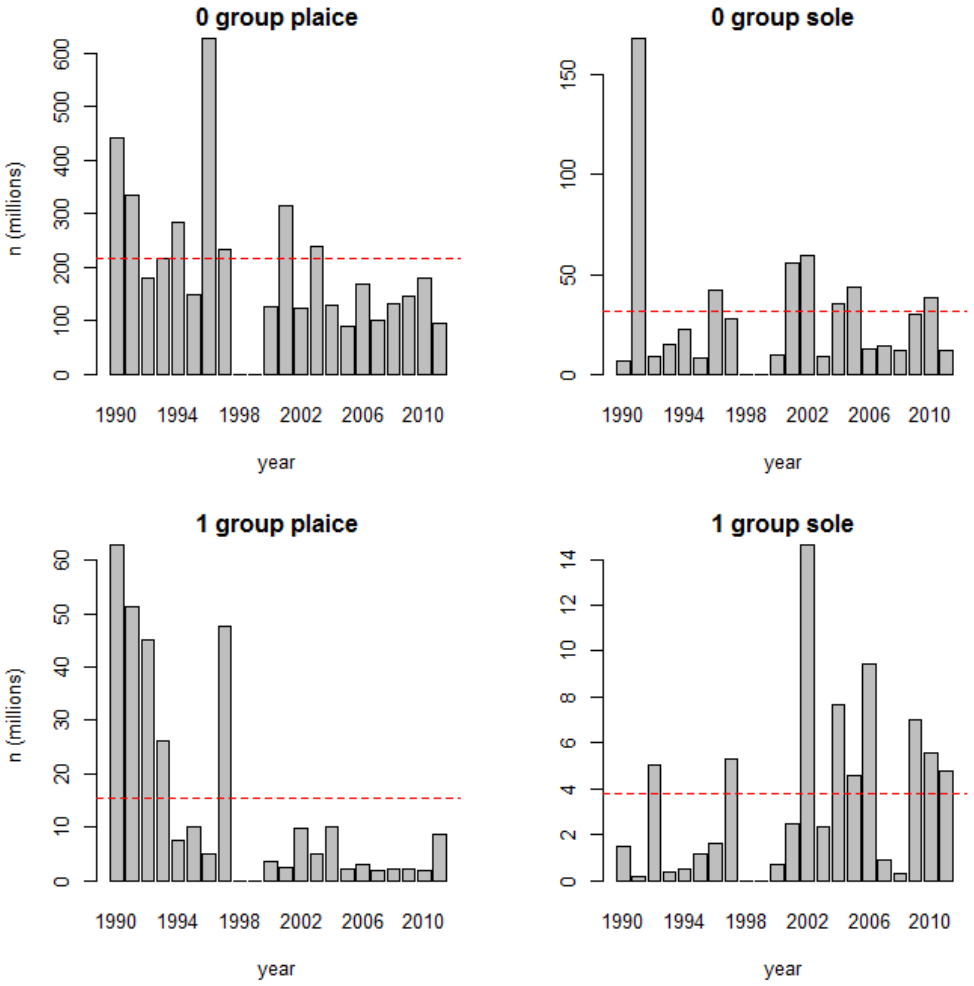


Figure 6.2.1.1. Combined inshore indices for 0 and 1 group plaice and sole. The horizontal line is the long term mean for the period presented. The indices were declared to be in invalid in 1997 and 1998, due to insufficient coverage of the Dutch survey.

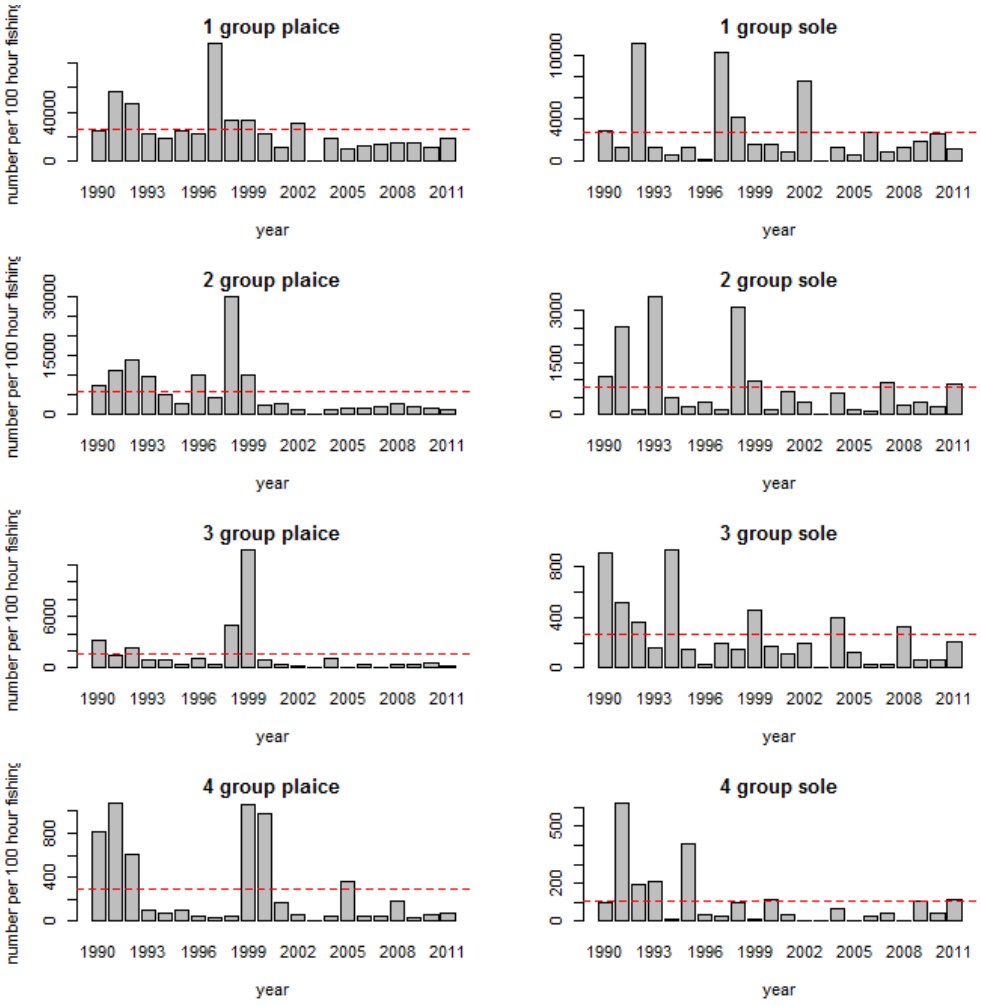


Figure 6.2.1.1. SNS indices for 1 - 4 group plaice and sole. The horizontal line is the long term mean for the period presented.

6.2.2 Revision of the inshore indices

The termination of the UK YFS necessitated revision of the combined inshore indices. Furthermore, the combined 1 group indices had not been calculated since 2005 because of the termination of the German DYFS spring survey.

The following issues were addressed during this revision:

1) Dutch DFS indices: Correction of age data, specifically for plaice in survey years 1996 and 1997 (i.e. year class 1996).

2) Dutch DFS indices: Revision of the area-based weighting factors using new surface area estimates. This included reconsideration of setting the weighting factor to zero for depth strata which were sampled insufficiently or inconsistently, and reconsideration of the areas included in the indices.

3) Combined inshore indices: Reduce the surveys included in the combined indices, due to termination of surveys. Revision of the area-based raising factors using new surface area estimates.

A detailed description of the national and combined index calculation procedures was given in the 2007 report of WGBEAM (ICES 2007). Any changes due to revision are described here.

Correction of Dutch age data

The Dutch DFS age data are now included in the oracle database held at IMARES, whereas before they were stored in text files. This data transfer caused minor differences in the age-length keys in years prior to 1984. Most changes were related to corrections (e.g. elimination of double entries), but some were related to loss of data.

The age data for the 1996 year class plaice that were collected in 1996 (0 group) and 1997 (1 group) were under discussion for quite a while. All otoliths from these two survey years were recently re-read. The new age determinations, although not validated, are considered to be better due to gained experience of the age reader and discussions during the Workshop on Age Reading of North Sea (IV) and Skagerrak-Kattegat (IIIa) Plaice (WKARP, ICES 2010). This change in the age-length keys caused an increase of the 0 group indices and a decrease of the 1 group indices in 1996 and 1997 (Figure 6.2.2.1).

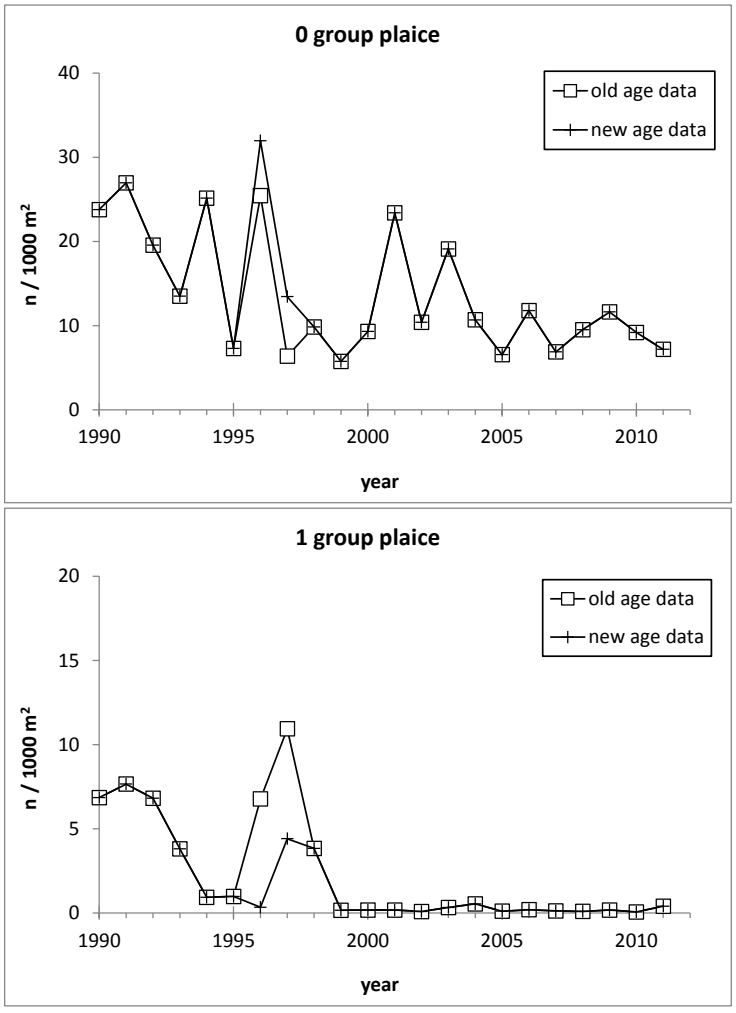


Figure 6.2.2.1. Dutch DFS indices for 0 and 1 group plaice, before and after correction of age data.

Revision of weighting procedure for Dutch DFS indices

The Dutch DFS indices are calculated using area-based weighting factors. Previously, this weighting was done using the surface area estimates presented in ICES 1985. The surface areas were re-estimated for the German and Dutch surveys using GIS techniques (ICES 2007). The new estimates are presented by area and 5m depth class in

Annex 11, and aggregated by region and index depth class in Table 6.2.2.1. A map showing the areas is included in Annex 11.

Only the areas which are included in the index calculation are included in Table 6.2.2.1. Area 631 was included in the Dutch DFS, but has not been sampled since 1987 (Annex 12), due to the closure of this estuary. It has therefore been removed from the revised indices.

The new surface areas (Table 6.2.2.1.) were used in the revision of the Dutch DFS indices. However, for some of the region-depth strata, sampling was insufficient or inconsistent (Annex 13) and the weighting factor was set to zero (Table 6.2.2.2).

The Dutch DFS was initiated in 1970, but the survey design changed in 1990. Although the indices are calculated for all survey years (Annex 15), they spatial coverage is considered to be consistent since 1990.

Table 6.2.2.1. Surface areas (km²) by region and depth class for the Dutch DFS and German DYFS.

Region	Area codes	Country	0-5m	5-10m	10-20m	>20 m	**Total**
Scheldt estuary *	634, 638	NL	167	104	147	60	478
Dutch Coast	401-404	NL	708	961	1801	195	3664
German Bight	405-407w	NL	843	1132	1653	136	3764
Dutch Wadden Sea	610-620	NL	2565	274	232	32	3102
German Wadden Sea **	408-411	DE	1646	163	103	7	1919

* excluding area 631 (sampled until 1986)
** excluding areas 407o, 412-414 (no, insufficient or inconsitent sampling)

Table 6.2.2.2. Weighting factors for each region and depth class stratum in the Dutch DFS.

Region	Area codes	Country	0-5m	5-10m	10-20m	>20 m	**Total**
Scheldt estuary	634, 638	NL	0.018	0.011	0.016	0.007	0.053
Dutch Coast	401-404	NL	0*	0.106	0.198	0*	0.304
German Bight	405-407w	NL	0*	0.124	0.182	0*	0.306
Dutch Wadden Sea	610-620	NL	0.282	0.030	0.025	0*	0.338
Total							**1.000**

* surface area > 0 km², but no weight (due to insufficient sampling)

Revision of the combined indices

The UK YFS was removed from both the 0 group and the 1 group combined inshore indices, due to the termination of the survey. The German DYFS was removed 1 group indices due termination of the spring survey. For the German DYFS, the 0 group indices were based on the autumn surveys, whereas the 1 group indices were based on the spring surveys, which actually gives to two abundance estimates of the same year-class. All other countries based both their 0 and 1 group indices on the autumn surveys.

The national indices are raised from numbers per 1000m² to total numbers (millions) by multiplying with the total surface area covered by each country. The total numbers are corrected for differences in gear efficiency and the then summed up to produce the international combined indices (Annex 15). Previously, the national indices were raised by the surface areas estimated in 1985 (ICES 1985, Riley et al. 1986). New surface area estimates are available for the German and Dutch surveys (Annex 11, Table 6.2.2.1). The old and new estimates of the total surface area by country are listed in Table 6.2.2.3.

For the revision of the combined inshore indices, the new estimates were used if available. The Belgian surface area (total and by depth class stratum) will be re-estimated. Until then, the old estimate will be used. The UK YFS is no longer included in the combined inshore indices, so the raising factor is no longer relevant.

The combined indices for 0 group plaice and sole now consist of German DYFS, Belgian DYFS and Dutch DFS data. The 1group indices only consist of Belgian DYFS and Dutch DFS data. The combined series is calculated for the period 1990-2011. Main reason for not extending the series further back is the change in the survey design of the Dutch DFS in 1990 (see above). An additional reason is that surface areas by depth class, specifically the shallowest depth class in the estuaries, change over time.

Table 6.2.2.3. Total surface area estimates (km²) by survey.

Survey	ICES 1985	ICES 2007
Belgian DYFS	1661	-
German DYFS	1559	1919
Dutch DFS	16484	11007
UK YFS	6.994	-

The revised indices are lower than the old indices for both species and both age groups, with the exception of 0 group in 1996 (Figure 6.2.2.2). This can be explained by the fact that the total raising is lower in the revised indices, due to the elimination of surveys and consequently of total area covered. The exception for 0 group plaice in 1996 is related to the correction of the Dutch age data (see above and Figure 6.2.2.1).

Despite the difference in abundance level, the relative patterns of year class strength are largely the same. This was expected because the combined inshore index is mainly driven by the Dutch DFS, which covers a large area and therefore has a high raising factor.

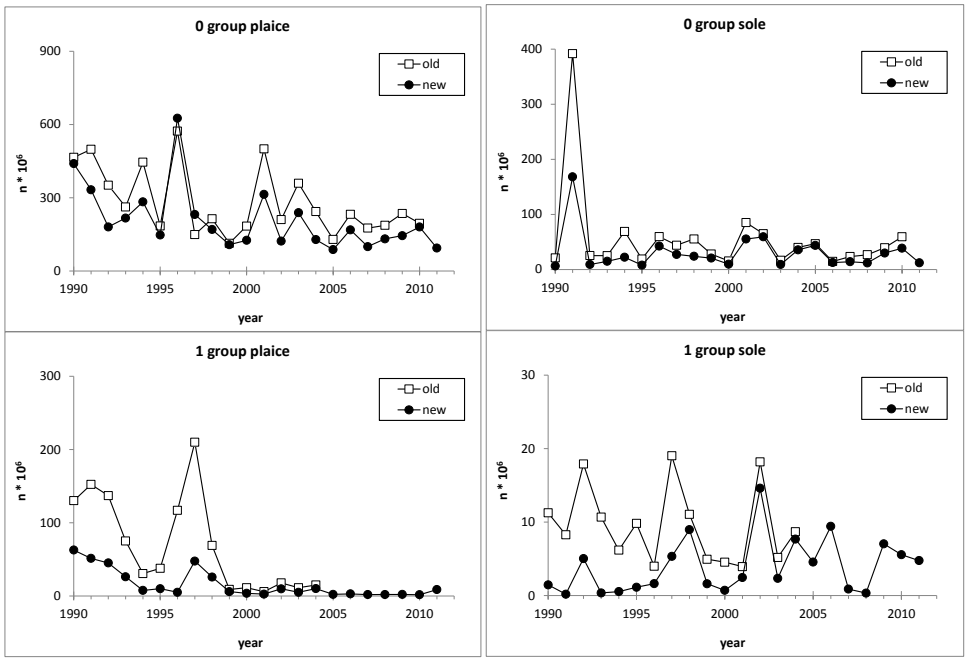


Figure 6.2.2.2. Combined inshore indices for 0 and 1 group plaice and sole, before and after revision.

6.2.3 Evaluation of the (combined) inshore indices

The Dutch DFS, Belgian DYFS and UK YFS survey indices are (were) calculated using area-based weighting factors. No weighting is applied for the calculation of the German DYFS indices. Previously, area weighting was carried using the surface area estimates presented in ICES 1985 and Riley et al. 1986. The surface areas were re-estimated for the German and Dutch surveys using GIS techniques (Annex 11, ICES 2007). For a consistent approach in the calculation of the national and combined indices WGBEAM recommends that:

1) Inter-sessionally an estimate of surface areas by depth class and total surface area for the Belgian DYFS using GIS. Revise the area-based weighting for the Belgian indices accordingly. Include the 0-5m depth class in the index as it has been sampled adequately since 1983 (Annex 13), by 1 July 2012.

2) Inter-sessionally Germany should reconsider not applying area-based weighting for the German DYFS indices. Also, consideration should be given to which areas are included in the German DYFS indices, before 1 October 2012. Areas 412-414 are not included, while these areas appear to have a good coverage since 1979 (Annex 12).

3) Revise the combined inshore indices using the revised Belgian and German data and the new raising factor for the Belgian survey.

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

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.

The Adriatic Sea Beam Trawl survey using a 2 x 3.5 m modified beam (Table 7.1.1.1), was once again presented at WGBEAM. As this survey has met the full set of criteria to be coordinated by our group, WGBEAM recommends that it be included in the list of coordinated surveys. The chair of WGBEAM shall contact the chairs of RCM MED&BS and the chair of the PGMED about the Adriatic survey coordination.

As in previous years, WGBEAM recommends that if time and weather allows, overlapping hauls should be carried out by countries operating in the same area. In 2011, no overlapping hauls were carried out due to time constraints, other priorities and budgetary constraints.

The German survey is slightly reduced in length due to maintenance on the vessel, although this should not impact the primary aims of the survey. The Adriatic survey, although sailing 10 days later than in 2011, is within the normal window of the time-series.

Table 7.1.1.1. Timing of the surveys in 2012.

Country	Vessel	Area	Dates	Gear
Belgium	Belgica	southern North Sea	27 Aug – 7 Sep	4m beam
UK	Cefas Endeavour	VIId, IVc	18 Jul – 31 Jul	4m beam
UK	Cefas Endeavour	VIIfg, VIIa	10 Sep – 2 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	17 Aug – 28 Aug	7m beam
Adriatic (Italy-Slovenia)	G. Dallaporta	North Adriatic Sea (GSA 17)	20 Nov – 10 Dec	2 x 3.5 m modified beam
Netherlands	Tridens	central North Sea	20 Aug – 14 Sep	8m beam + flip-up rope
Netherlands	Isis	southern North Sea	6 Aug – 7 Sep	8m beam

7.1.2 Staff exchange

During 2012, the Adriatic survey can host a member of staff from one of the WGBEAM participating institutes, however, no definite exchange has been organised at this time. Cefas and the Netherlands have also offer a place on either of their Research Vessel offshore surveys.

7.1.3 Other issues

All of the offshore surveys that have the staff and resources to collect information on litter in the catch are now doing so. Cefas have offered to database the litter data and

either send the sheets, scanned or input into a spreadsheet to brian.harley@cefas.co.uk.

The closed benthic list was discussed again this year to remind countries about its existence and to ensure that the data is being collected. Annex 9, gives the abundance results including benthos, from the offshore beam trawl surveys, using data from the UK for Divisions VIIa and VIId and from all countries for the North Sea.

7.2 Inshore beam trawl surveys

7.2.1 Timing and area coverage

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

Table 7.2.1.1. Timing of the surveys in 2012.

Country	Vessel	Area	Dates	Gear
Belgium	Broodwinner	Belgian coastal zone	10 Sep – 17 Sep*	6 m shrimp trawl
Germany	Chartered vessels	German Bight and German Wadden Sea	3 Sep – 11 Oct*	3 m shrimp trawl
Netherlands (SNS)	Isis	Dutch coastal zone	10 - 21 Sep	6 m beam trawl
Netherlands	Schollevaar	Scheldt estuary	3 – 21 Sep	3 m shrimp trawl
Netherlands	Stern	Dutch Wadden Sea	27 Aug – 28 Sep	3 m shrimp trawl
Netherlands	Isis	Dutch coastal zone and German Bight	24 Sep - 2 Nov	6 m shrimp trawl

*** : planned**

7.2.2 Staff exchange

The organisation of staff exchange on inshore surveys is more complicated than for the offshore surveys since 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 their own survey.

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

Table 7.2.1.2. Information on inshore trips.

Country	Ship	Sleep ashore	Extra sleeping facilities on board	Trip length
Belgium	Broodwinner*	yes	-	day
Germany	Commerical	yes	-	day
Netherlands	Stern, Schollevaar	no	no	day
	Isis	no	no	week

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

The Netherlands have once again offered a place on one of their inshore day trip surveys however, at this time no definite exchange has been organised.

7.2.3 Vessel comparison for the Belgian inshore survey in 2012

In May 2012, the newly built Belgian Research Vessel 'Simon Stevin' arrived in its homeport Ostend for the first time, and it was announced that the vessel will be at the service of the marine scientific world from September 2012 onwards. From the viewpoint of the Belgian fish stock surveys, this creates the possibility to transfer the Belgian inshore survey from the currently used training vessel 'Broodwinner' (an old commercial beam trawl cutter that is nearing the end of its life) to the new RV. The intention is to stop using the 'Broodwinner' in 2013, making the 2012 edition of the Belgian Demersal Young Fish Survey its last campaign as a RV.

Because both vessels can be available to ILVO in September 2012 (shipping time on the 'Simon Stevin' has already been applied for, and will most probably be granted for the week of 17-21 September 2012), opportunities arise for comparative analysis of the catches of the two vessels and the calculation of correction factors to recalculate the time series of the old vessel. For this, the two vessels should ideally be fishing close to each other at the exact same time, so effects of different weather circumstances, sea states, tidal cycles, etc. are eliminated. But, ILVO doesn't have enough staff to populate both vessels at the same time (but this problem can be overcome by including staff from other WGBEAM member countries, as was offered by several of them) and this way it is also impossible to use the exact same gear on both vessels as there is currently only one set (6m beam trawl) available, that obviously can only be rigged on one vessel at a time. Having a second set of this unusual gear (not commercially used, they use 4 or 8m beams) reproduced would be both too expensive and time consuming to make this feasible within the current financial limits and remaining time. Additionally, differences in gear were found to be the main cause for differences in catch in many studies (although these studies often failed to find statistically significant differences, and concluded that higher numbers of comparative tows were needed). Therefore, ILVO decided to use the two vessels in two consecutive weeks, with the first week (Broodwinner) generating the Belgian 2012 inshore survey data, and the second week (Simon Stevin) generating data that will be compared with these in a joint analysis.

8 Development of manual (ToR d)

8.1 Offshore beam trawl survey manual

No updates to the offshore manual were required.

ICES has now implemented a referencing protocol for survey manuals. The chair of WGBEAM will send the most up-to-date offshore manual to ICES to enable them to give it a suitable reference, along with the completed WGBEAM 2012 report.

8.2 Inshore beam trawl survey manual

Between WGBEAM 2011 and WGBEAM 2012 the manual received a general review by the Netherlands and by the UK to account for the termination of the UK survey in 2010. No further amendments were required from Germany. During WGBEAM 2012 minor updates were made by Belgium, to document the capture of length data for additional commercial species. The inshore manual is currently considered to be complete, and again, this manual will be sent to ICES, along with the offshore manual, in order to be referenced appropriately.

9 Other subjects

9.1 Database developments (DATRAS)

9.1.1 Upload data to DATRAS

9.1.1.1 Offshore data

Offshore data from England, Germany and Netherlands were uploaded to DATRAS. Data from Belgium and France were not uploaded to DATRAS due to problems with the data. The Belgium data were available for analysis by WGBEAM.

It is recommended that Belgium and France upload the 2011 offshore survey data to DATRAS before 1 August 2012. Especially for Belgium, it is crucial to upload the data as there is a recommendation by WGNSSK to provide combined indices for sole.

Since spring 2012, the facility http://ecosystemdata.ices.dk incorporates DATRAS raw data and so, species distribution maps and station maps are available to everyone.

9.1.1.2 Inshore data

ICES Data Centre works on the adaptation of DATRAS to include inshore beam trawl survey data. This process is however not yet finalised. It is recommended that when DATRAS is ready for the inshore data, ICES Data Centre requests members of WGBEAM to test the import facility and the checks. When WGBEAM agrees on the input format and the checks, the inshore data will be uploaded starting with the most recent year and working back in time.

9.1.2 Offshore index calculation by ICES Data Centre

ICES Data Centre worked on the reproduction of the Dutch offshore indices for plaice and sole. It was highly valuable that a representative from ICES Data Centre attended WGBEAM as the expertise of a survey group is needed to explain the choices being made in the calculation of standard output by ICES Data Centre. Good progress was made, although it is not possible yet to create the indices directly from DATRAS. It is

recommended that ICES Data Centre and IMARES agree on the way forward, to ensure that indices for plaice and sole in the North Sea can be calculated from DATRAS before 1 December 2012.

9.1.3 Check Data Type in DATRAS

ICES Data Centre requested to check the values in Data Type for the BTS. The result is in Table 9.1.3. The data from England in VIIa have not been taken into account.

Table 9.1.3. Data types for the beam trawl survey in DATRAS (North Sea).

	ENG		GFR	NED
	R	S	R	R
1987				69
1988				81
1989				87
1990	89			100
1991	103			105
1992	102			106
1993	94			106
1994	82			95
1995	108			91
1996	113			157
1997	92			148
1998	99			137
1999	90			185
2000	105			191
2001	108			171
2002	101			161
2003	106		51	163
2004	93	28	53	158
2005	90	14	45	162
2006	86	22		153
2007	88	18	47	151
2008	75	16	44	139
2009	90	10	56	151
2010	194	9	54	111
2011	80		55	133

Most data types are R, which is correct. The Data type S for the English survey might not be correct. The issue is known at Cefas and currently being worked on. It is recommended that the corrected English beam trawl survey data are re-uploaded as soon as possible by Cefas.

9.1.4 Upload of CTD data

During all surveys CTD information is collected. Only Netherlands stores the vertical profiles at ICES (http://ocean.ices.dk/), and works on the addition of the continuous

profiles. It is recommended that England, Germany and Belgium check if their CTD data is publically available elsewhere, and if not, upload the CTD data to ICES.

9.2 Multi-annual ToRs for WGBEAM

From 2014 onwards, WGBEAM will shift to multi-annual ToRs, meaning that every third year an extensive report where the results of the ToRs are published. As a result, in the other years only the minimum requirements (eg. indices, coordination information, input for other WG's) will be supplied.

Potential multi-annual ToRs as well as minimum requirements are listed below. It is recommended that WGBEAM in 2013 reviews the list and makes amendments when required.

Minimum requirements WGBEAM (yearly from 2014-2016)

1) Review recommendations and action items
2) Survey summary sheet per survey per country
3) Reports from staff exchanges
4) Index plaice and sole offshore (WGNSSK):
    a) Compare Dutch series created by ICES Data Centre with Dutch series created by NED
    b) Create international offshore North Sea index based on DATRAS data, in collaboration with ICES Data Centre
    c) Evaluate international index
5) Index plaice and sole inshore (WGNSSK)
6) Index plaice and sole (WGCSE), depending on developments in 2013
7) Distribution of Elasmobranch species in the offshore surveys (WGEF)
8) Planning upcoming surveys
9) Appointments for staff exchange, comparative tows, etc. for the upcoming surveys
10) Recommendations from other groups, especially benchmark groups
11) Review manuals (2014: offshore, 2015: inshore)

Proposed ToRs 2014-2016

1) Meet MSFD requirements:
    a) Develop methods for calculation of MSFD indices (in collaboration with WGINOSE)
    b) Provide information to ICES Data Centre for the calculation of MSFD indices
    c) Develop the surveys to meet MSFD requirements (in collaboration with WGISUR)
2) Provide information on WGNEW species frequently caught in the beam trawl surveys (currently turbot, brill, dab, lemon sole, flounder, witch flounder, grey gurnard, red gurnard) (in collaboration with WGNEW)
    a) Length and age data in DATRAS if available
    b) Index calculation
3) Meet DCF requirements

a) Develop methods for calculation of new DCF output
b) Provide information to ICES Data Centre for the calculation of new DCF output

4) Develop inshore beam trawl survey database
a) Test database
b) Upload inshore data
c) Provide information to ICES Data Centre for the calculation of indices
d) Check indices calculated by ICES Data Centre

In order to facilitate the work of the multi-annual TORs, WGBEAM recommends that the ICES secretariat sets up multi-annul SharePoint sites.

9.3 Recommendation from WGISUR

An additional recommendation was received from WGISUR 2012 "that a survey expert group fully carries out the exercise to take the current survey through to an ecosystem survey without losing the current objectives, as an example for other groups. The expert group is requested to provide feedback to WGISUR on the result as well as on the flow diagram (Section 4.2 in ICES, 2012a) and the content of the mind-map (Section 4.1 in ICES, 2012a)".

9.3.1 Feedback on roadmap

The roadmap (ICES, 2012a, Figure 4.2.1) was evaluated by the group, keeping in mind the Adriatic beam trawl survey, as its survey setup might be modified in due time as a result of changed requirements. As the roadmap was originally developed for new surveys, a few topics arose when dealing with an existing survey.

Phase 1 (exploration), add some text in specific lines:

- Define resources (e.g. money, ship time, **sample and data** storage facilities available)
- Define constraints (e.g. regulations, international agreements, **current time-series, protocols**)

Phase 3, add bullet:

- Take into account quality assurance on board

Phase 6, add bullet:

- Keep track of the stored data/samples as different data sources might be needed to get a full overview

Phase 6, 'to take into account', change text and add bullet:

- The result of the analysis might lead to a change in ~~survey~~ **sampling** design. (…)
- The result of this phase might lead to change in phase 1 when some objectives are not achievable at all in a survey.

In 2011, Cefas had to finish their otter trawl survey in the Celtic Sea due to changes in resource priorities. In doing so it has enabled Cefas to look into redistributing some ship time in order to provide a survey in the Celtic Sea that meets DCF, Ecosystem and other priorities. In order to do this in the most appropriate manner, Cefas have decided to use the WGISUR roadmap for new ecosystem surveys. Although it is pos-

sible that the survey may not ultimately be a full ecosystem survey the steps described in the roadmap, are deemed to be the best way to plan a new survey. At this time Cefas are still in the "Exploration" phase, defining and prioritising objectives, looking at the ecosystem that the areas covers and attempting to define the resources. The objectives for the survey are almost finalised, with the target species being identified and the short list of gears that will be used. Over the next few months the "survey design" and "sampling design" phases will be started. It is hoped that in February 2013, the first test of the survey will be carried out, and once evaluated, the survey will commence with any amendments, in 2014.

9.3.2 Feedback on content mindmap

WGBEAM has not looked into detail at the contents of the mindmap.

9.3.3 From beam trawl surveys to an ecosystem survey?

WGBEAM identified the opportunities to change the offshore beam trawl surveys in the North Sea into surveys matching MSFD requirements. Even when the surveys stick to the current design, there is a number of opportunities to do additional sampling. The only conditions set by WGBEAM in this exercise were that additional personnel could be taken on board, and 24 hour operation of the ship is possible.

9.3.3.1 What is being done

There are five surveys in the North Sea, listed in Table 9.3.3.1

Table 9.3.3.1 North Sea offshore beam trawl surveys.

Country	Ship	Days@sea	Gear	Additional tasks	MSFD descriptor
Belgium	Belgica	10	4 m beam trawl CTD on trawl CTD vertical multibeam	Genetics, contaminants in fish, rays vertebra, live fish collection, parasites dab/whiting, litter	1,2,3,(4),6,7,9,10
England	Cefas Endeavour	3	4 m beam trawl CTD vertical CPR Continuous logger Ferry box	Dissolved organic carbon, tritium analysis, litter	1,2,3,(4),7,10
Germany	Solea	17	7 m beam trawl CTD vertical	Live fish, litter	1,2,3,(4),7,10
Netherlands	Isis	25	8 m beam trawl CTD on trawl	Sepiolidae	1,2,3,(4),7
Netherlands	Tridens	20	8 m beam trawl 2 m beam trawl CTD vertical	Live fish, genetics, litter, contaminants in fish, stomachs, Sepiolidae	1,2,3,(4),7,10

All countries fully sort the catch and record all fish species and benthos species following the offshore beam trawl manual. All countries take on ad hoc additional requests, from their own institutes or third parties.

9.3.3.2 What could be done

As the beam trawl surveys are daytime surveys, the nights are available for additional data collection. Three constraints apply:

1) It should logistically be possible to take extra people on board
2) It should logistically be possible to take additional tasks on board
3) There should be a possibility for the crew to work at night

On board Isis and Solea at least two of the three constraints apply, so it will not be possible to use the night for additional tasks.

Potential additional night sampling is listed in table 9.3.3.2. The column 'Possible on board' refers to the ships where it is currently possible to carry out the sampling. In theory, all sampling could be done on the vessels where the constraints do not apply. Some institutes however do not have the proper gears or do not have any experience with the gear deployment.

Table 9.3.3.2. Potential additional sampling at offshore beam trawl surveys at night.

Data	Activity	MSFD descriptor	Possible on board
Parasites, contaminants in fish	Additional sampling with beam trawl	9 (food safety)	Cefas Endeavour, Belgica, Tridens
Ichthyo-, zoo-, phytoplankton composition	Sampling with plankton gears	4 (food-web); 5 (eutrophication)	Cefas Endeavour, Tridens
Sediment composition	Sampling with grab/corer	6 (sea floor)	Cefas Endeavour*, Belgica, Tridens
Contaminants in the sediment	Sampling with grab/corer	8 (contaminants)	Cefas Endeavour*, Belgica, Tridens
Infauna quantity and distribution	Sampling with grab/corer	4 (food-web)	Cefas Endeavour*, Belgica, Tridens
Information on the seabed	Multibeam	6 (sea floor)	Cefas Endeavour, Belgica
Information on water quality	Water samples	5 (eutrophication)	Cefas Endeavour, Tridens
Information on noise	Hydrophone	11 (noise)	Tridens
Cephalopod distribution and quantity	Jigging	1 (biodiversity) 4 (food-web)	

***when Cefas Endeavour conducts grab/corer sampling, DP might be switched on, creating noise in the ship and so grab/corer sampling at night time on board Endeavour is possible but not recommended.**

It should be clear that not all additional sampling can be carried out during one cruise, and an institute should choose which information is most relevant with respect to the national MSFD indicators. As the Belgian and the English sampling area as well as the German and Dutch area largely overlap, WGBEAM members will inform each other when additional sampling will take place in the area, such to prevent unintended duplicate sampling.

9.4 Output from maturity staging workshops

In January 2012, the workshop on sexual maturity staging of sole, plaice, dab and flounder took place (WKMSSPDF, ICES 2012b), and in March 2012, a similar workshop on turbot an brill was carried out (WKMSTB, ICES 2012c).

Both groups provided reference documents for macroscopic maturity staging WKMSSPDF:

- http://www.ices.dk/reports/ACOM/2012/WKMSSPDF2/WD2_Reference%20Documents_part1.pdf
- http://www.ices.dk/reports/ACOM/2012/WKMSSPDF2/WD2_Reference%20Documents_part2.pdf

WKMSTB:

- http://www.ices.dk/reports/ACOM/2012/WKMSTB/wkmstb_WDs.pdf

Both groups mention that reliable macroscopic maturity staging of fish can only be done in the period from two months before the spawning season until the end of spawning. Outside that period, histological samples should be taken to identify the maturity stage.

Based on the advice of the maturity staging workshops, WGBEAM decided not to collect sexual maturity information for spring spawning fish, except during the French offshore survey and the coastal Dutch inshore survey.

9.5 Changes in length at age over time in North Sea Sole

Plaice and sole are both commercially important flatfish species and both are target species of the beam trawl surveys. Plaice has received much attention in the past, therefore sole was now selected to examine in more detail.

Many aspects of the biology of sole can be examined using survey data. The group decided to first examine (changes in) length at age.

9.5.1 Methods

The analyses carried out during the 2012 meeting were limited to the Dutch BTS-Isis survey. The analyses will be extended to other surveys in the future. Examination by geographical area (within surveys) may also be considered in the future.

In a sexual dimorphic species like sole it is essential to examine length at age for males and females separately. The length distributions by haul were converted into age distributions by haul and sex using sexes differentiated age-length-keys. At the same time the mean length by sex and age group was calculated for each haul. These mean lengths were first averaged by ICES rectangle and then for all ICES rectangles within the index area. Only hauls within the index area were included, following the approach taken for the index calculations, to ensure that observed changes over time were not related to geographical shifts in the survey. A weighted average was applied in which the mean length by sex, age group and haul was weighted by the number of fish for that sex and age group in that haul.

9.5.2 Results

Mean length at age appears to be smaller in 2011 (the most recent survey) than in 1985 (the first year of the BTS Isis survey) (Figure 9.5.1). Mean length by year is plotted for each age group separately in Figure 9.5.2. A decrease in mean length over time

is observed in the 3+ age groups. This decrease appears to be stronger in males than in females and stronger in the period 1985-1995 then in the period after 1995.

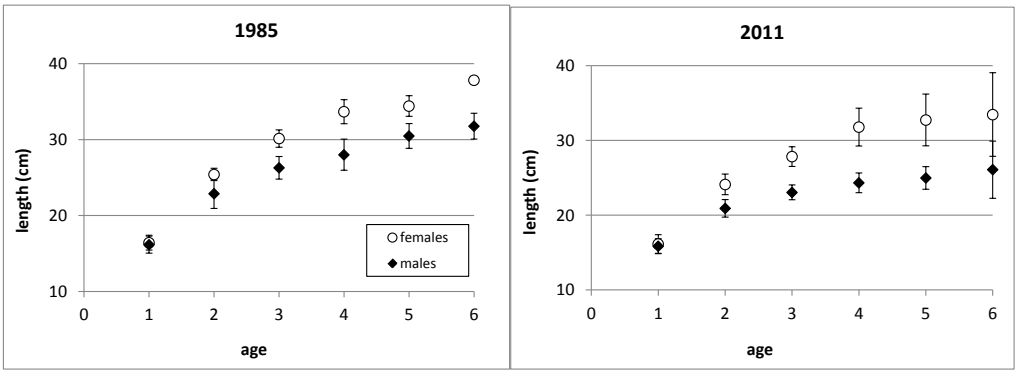


Figure 9.5.1. Mean length at age (± standard deviation) for sole in the Dutch BTS Isis surveys of 1985 and 2011.

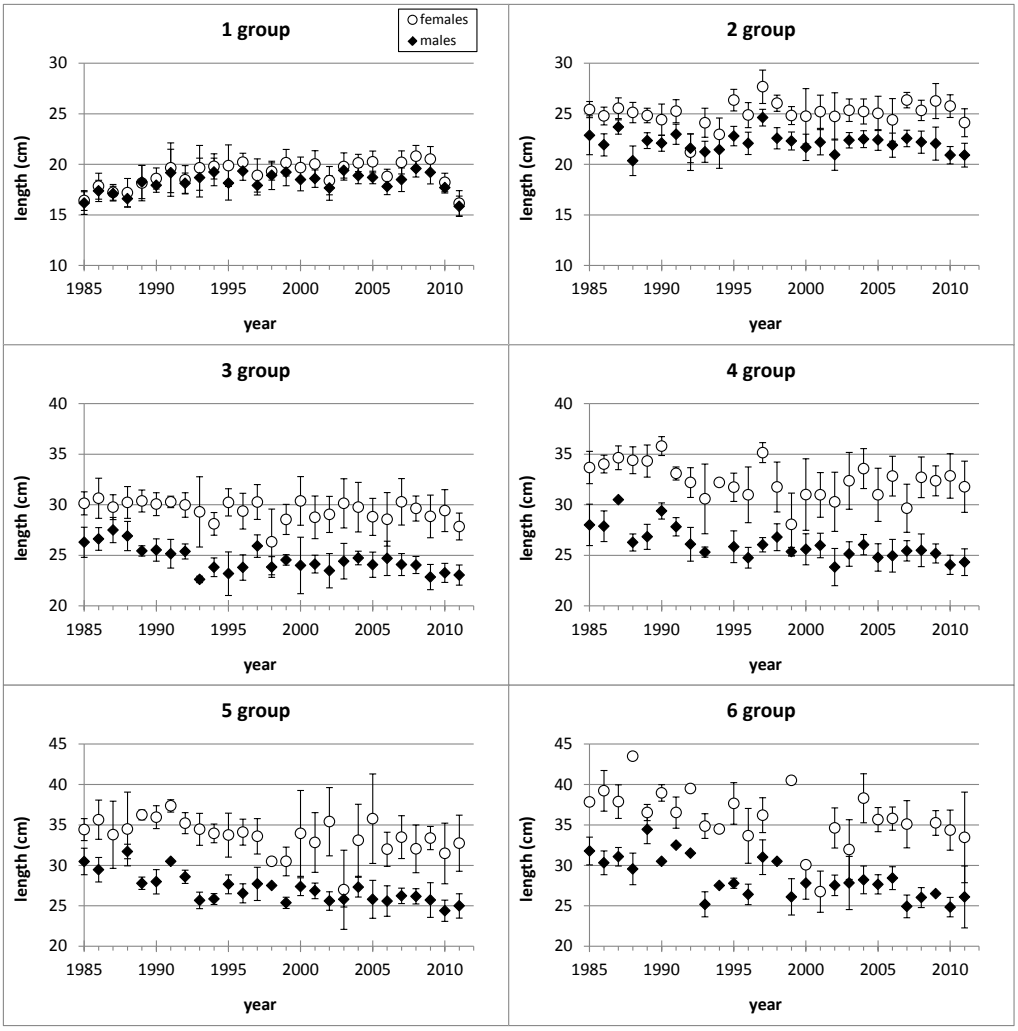


Figure 9.5.2. Mean length (± standard deviation) by year for sole age groups 1 to 6 in the Dutch BTS Isis surveys.

9.5.3 Discussion

Examination of age at length in other surveys and areas is needed to corroborate the patterns observed in the BTS Isis. Furthermore, examination of spatial distribution patterns by age groups and size classes over time is recommended to ensure that the patterns in age at length are not a result of changes in spatial distributions. Finally, these and future results will need to be embedded in the available literature on growth changes in sole. The WG is aware that some research has been done addressing this topic in sole, but has not yet been able to collate and review the relevant literature.

9.6 Contribution of the SoleMon survey to the estimate indicators according to the MSFD

The Commission Decision 2010/93/UE and the Marine Strategy Framework Directive (MSFD; Directive 2008/56/EU) are pieces of European Legislation relevant for the SoleMon trawl-survey since these laws requires each Member State to assess some indicators on the basis of fishery independent (i.e. trawl-survey) data. In particular the Northern Adriatic sea, where the survey is historically focusing, constitutes a major portion of the Adriatic Eco-region as defined in MFSD.

According to the MFSD, each Member State a first process to agree on the Criteria to evaluate the GES in 2010 and by 2012 they will need to define precise targets, objectives and indicators to evaluate GES. A monitoring programme (2014) and a programme of measures (2015) will be established and implemented, with the aim of reaching a GES by 2020.

For the purpose of determining GES, 11 different qualitative descriptors for determining good environmental status have been identified in the MSFD.

SoleMon trawl-survey, can already contribute to the estimate of several indicators related to descriptors 1, 2, 3, 4, 6, 9 and 10. Such indicators have been assessed and presented according to already available data to show the full potential of this beam trawl-survey. In the next future, possible modification of sampling scheme will be evaluate in order to allow the estimate of "new" indicators (see WKCATDAT ICES table for further insights on data that could be collected according to trawl-survey features), revising the SoleMon protocol, based on the new version of the instruction manual available during the meeting.

10 References

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Riley, J. D., Symonds, D. J., Woolner, L. E. 1986. Determination of the distribution of the planktonic and small demersal stages of fish in the coastal waters of England, Wales and adjacent areas between 1970 and 1984. Fisheries Research Technical Report No. 84.

Annex 1: WGBEAM List of Participants, Ijmuiden, The Netherlands 5–8 June 2012

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Annex 2: Agenda

Agenda WGBEAM 2012, 5-8 June 2012

Tuesday 5 June, start 9.30

Welcome & Logistics

am

General issues:

1. Terms of Reference and main aims
2. Working documents
3. Chapter responsibilities:

Then ICES Datacentre issues

- ICES Datacenter – Vaishav
- Issues arising

4. Review of recommendations
5. Reports from:
    - IBTS WG – Brian
    - Maturity workshops - Ingeborg
    - WGDIM – Ingeborg
    - WGNSSK – (hopefully a volunteer from IMARES)
    - WGISUR – Ingeborg
6. Presentations:
    - Giuseppe Scarcella on Adriatic Sea beam trawl survey data use
    - Gerard Biais on day-night comparison of CPUE – an update after 5 years.
    - Staff exchanges
7. Additional requests:

The consequences of multi-annual TORs to WGBEAM

ToR a) prepare a progress report summarising the results of the 2011 offshore and inshore beam trawl surveys;

Short feedback on the 2011 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
- finalise survey summary sheets if not ready

ToR 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;

- as last year: similar plots and text as in 2011 report
- changes in population distribution
- discuss the index calculation methods

Additional:

- Southern North Sea combined Plaice indices – where are we and what can we do?

pm

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

- check the offshore manual for updates
- continue the creation of the coastal beam trawl manual

Inshore surveys:

- update database inshore surveys
- Commission acceptance of loss of UK YFS and recalculation of index

Discussion and arrangement of staff exchanges on 2012 beam trawl surveys

if time remains then work on chapters that you are responsible for

Wednesday 6th

am

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

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

- survey timing and gear
- staff exchange – any for 2012
- overlapping of survey days for gear inter-calibration to be discussed
- QA issues, List of fish species in offshore and inshore beam trawl surveys
- Benthic species list for DATRAS

pm

e) 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. Focus in 2012 will be on selection of species, water depth and distance from shore;

- Any ideas on which species issues to look at?
- The Elasmobranch plots were very useful to WGEF and they would like them again.

Thursday 7th

am

- Chapter work

pm

- Recommendations
- Analysis and text writing

Friday 8th

am

Date and time of next meeting

ToRs for 2013 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 Ancona, Italy, 9–12 April 2013.

Prepare a progress report summarizing the results of the 2012 offshore and inshore beam trawl surveys;

a) 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;

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

c) Continue work on standardizing the offshore and inshore surveys such as, the reviewing the manuals, updating database and staff exchanges;

d) Using the work carried out in 2012, continue to analyse the changes in mean length at age for sole in the North Sea, English Channel, Bristol Channel and Irish Sea;

e) Review and finalise the multi-annual TOR for 2014-2016;

The information should be provided for all major fish stocks covered by the survey.

WGBEAM will report by 10 July 2013 (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 6-10 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 SSGESST. 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	Adressed to
1. WGBEAM recommends that a power analysis to identify the number of hauls needed to carry out a sound statistical analysis and costs for the differences between the German and Dutch inshore surveys should be carried out .This power analysis will be carried out intersessionally in collaboration with WGCRAN and presented at WGBEAM in 2013.	WGCRAN, WGBEAM
2. WGBEAM recommends that the maturity subgroup of PGCCDBS, investigate other sources of of data for the calculation of mean size at first maturity..	PGCCDBS
3. WGBEAM recommends that WGISDAA carry out analysis of data from WGBEAM surveys to calculate estimates of survey sampling variance at their working group in 2013	WGISDAA
4. WGBEAM recommends that once the offshore surveys are uploaded to the DATRAS Database, ICES Data Centre provides precision estimates based on the outcome of the work to be carried out by WGISDAA in 2013	ICES Data Centre
5. WGBEAM recommends that as the Adriatic survey has met the full set of criteria to be coordinated by our group, it be included in the list of coordinated surveys.	RCM MED&BS, PGMED
6. WGBEAM recommends that if time and weather allows, overlapping hauls should be carried out by countries operating in the same area	All WGBEAM institutes
7. WGBEAM recommends that Belgium and France upload the 2011 offshore survey data to DATRAS before 1 August 2012.	ILVO and IFREMER
8.WGBEAM recommends that when DATRAS is ready for the inshore data, ICES Data Centre requests members of WGBEAM to test the import facility and the checks. When	ICES Data Centre
9. WGBEAM recommends that ICES Data Centre and IMARES agree on the way forward, to ensure that indices for plaice and sole in the North Sea can be calculated from DATRAS before 1 December 2012.	ICES Data Centre and IMARES
10. WGBEAM recommends that the ICES secretariat sets up multiannul SharePoint sites, in order to facilitate the work of the multiannual TORs.	ICES secretariat

Actions	Adressed to
1.The UK and Netherlands beam trawl surveys responsible persons will provide the ICES Data Centre with information regarding those surveys affected by this, in order to ensure that the calculation of data products is not affected by the change in the use of the quarter field.	Cefas, IMARES
2.WGBEAM needs to ensure that WGISDAA have the necessary data made available to them through the DATRAS portal, to carry out the calculation of estimates of survey sampling variance at their working group in 2013	WGBEAM members
3.Inter-sessionally Germany shall produce indices from their offshore data and present to WGBEAM in 2013. This can be done in conjunction with ICES Data Centre and Cefas and IMARES.	Germany, Cefas, IMARES and ICES Data Centre
4.Inter-sessionally Cefas will produce an index from the Belgium offshore data , provided by from the WGBEAM dataset, using age data derived from the southern North Sea part of the UK quarter 3 North Sea Beam Trawl survey. This will be carried out for plaice and sole and will be presented at WGBEAM 2013.	Cefas, IMARES
5.Comparisons of the day and night indecies from the ORHAGO survey, by their assessment outputs, needs to be carries out. This comparison should include investigations on the effect of missing values for some stations in some years (0 to 20 %, depending on the year and the day fishing period).	IFREMER
6.Inter-sessionally an estimate of surface areas by depth class and total surface area for the Belgian DYFS using GIS. Revise the area-based weighting for the Belgian indices accordingly. Include the 0-5m depth class in the index as it has been sam-pled adequately since 1983 (Annex 13), by 1 July 2012.	ILVO
7.Inter-sessionally Germany should reconsider not applying area-based weighting for the German DYFS indices. Also, consideration should be given to which areas are included in the German DYFS indices, before 1 October 2012.	vTI
8.IMARES will revise the combined inshore indices using the revised Belgian and German data and the new raising factor for the Belgian survey for WGBEAM 2013	IMARES
9.The chair of WGBEAM shall contact the chairs of RCM MED&BS and the chair of the PGMED about the Adriatic survey coordination.	Cefas
10.The chair of WGBEAM will send the most up-to-date offshore manual to ICES to enable them to give it a suitable reference, along with the completed WGBEAM 2012 report.	Cefas
11.It is recommended that the corrected English beam trawl survey data are re-uploaded as soon as possible by Cefas.	Cefas
12.It is recommended that England, Germany and Belgium check if their CTD data is publically available elsewhere, and if not, upload the CTD data to ICES.	Cefas, IVLO, vTI
13.It is recommended that WGBEAM in 2013 reviews the list of multi-annual TORs suggested during WGBEAM 2012 and makes amendments when required.	WGBEAM
14.As there is now enough data for the creation of a time series for the ORHAGO survey in the Bay of Biscay, it is recommended that from 2013, IMFREMER provides an indices to WGBEAM for this survey.	IFREMER

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	Adriatic	Netherlands	Netherlands	UK	UK	UK
Survey area:	IVb and c west	VIIIab	IVb east	North Adriatic Sea (GSA 17)	IVb and c east	Central N Sea	VIId	VIIe	VIIa, f and g
Year survey started:	1992	2007	1991	2005	1985	1996	1988	1988	1988
Dates:	August	November	mid August	November	August-early September	mid August-mid September	late July	late September/ early October	September
Usual start date	week 33	Week 44	week 32	Week 45	week 32/33	week 34	week 30	week 39/40	Week 36/37
Number of survey days	10	35	11	18	20	16–20	15	8	21–24
Ship:	RV Belgica	RV Gwen Drez	RV Solea #	RV G. Dallaporta	RV Isis	RV Tridens	RV Cefas Endeavour ##	MFV Carhelmar	RV Cefas Endeavour
Ship length:	50 m	24.5 m	42 m	35.7 m	28 m	73.5	73 m	22 m	73 m
Beam trawl length:	4 m	4 m	7 m	3.5 m	8 m	8 m	4 m	4 m	4 m
Number of beams fished:	1	1	2	2	2	2	1	2	1
Number of beams sorted:	1	1	1	2	1	1	1	2	1
Trawl duration (min):	30	30	30	30	30	30	30	30	30
Tow speed (knots):	4	5	4	5.5	4	4	4	4	4
Codend stretched mesh (mm):	40	20	80 Liner: 40 mm	40	40	40	75 Liner: 40 mm	75 Liner: 40 mm	75 Liner: 40 mm
Number of ticklers:	0	10	5	0	8	8	0	0	0
Gear code:	BT4M		BT7	Rapido	BT8	BT8F	BT4FM	BT4FM	BT4FM
Attachment:	*	(none)	(none)	(none)	(none)	**	*	*	*
Station positions:	fixed	Fixed	pseudo-random	Fixed	pseudo-random	pseudo-random	Fixed	fixed	Fixed
Av No stns/yr	53	120	63	67	88	63-73	100	57	94
Benthos sampling since:	1992	2007	1992	2005	1985	1996	1991	1992	1992

 # new vessel since 2004; previously 35m, ## Corystes (53 m) in 2009 replaiced by CEFAS Endeavour, * chain mat and flip-up rope, ** flip-up rope only.

Annex 5.2: Inventory of the inshore beam trawl surveys.

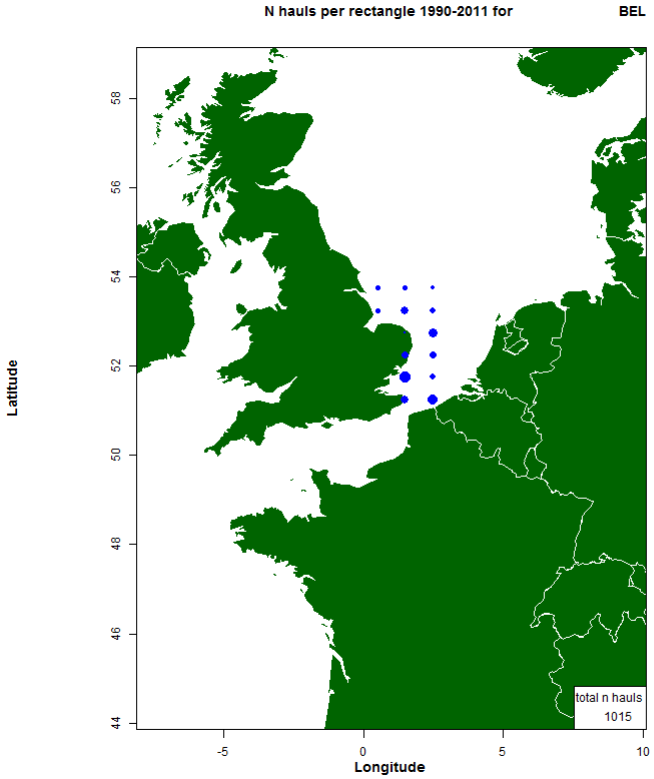
Country	Netherlands (SNS)	Netherlands (DYFS)			UK (YFS)	Belgium (DYFS)	Germany (DYFS)	
Geographical Area	Scheveningen (NL) to Esbjerg (DK)	Wadden Sea	Scheldt Estuary	Dutch coast to Danish coast	Eastern/South-Eastern English Coast	Belgian Coast	NiedersachsenWadden Sea +Elbe Estuary	Schlesweig-Holstein Waddensea
Ship	Tridens / Isis	Stern / Wadden-zee	Schollevaar	Isis / Beukels / WR17 / GO29	Chartered vessels	Broodwinner	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 Ceased 2011	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

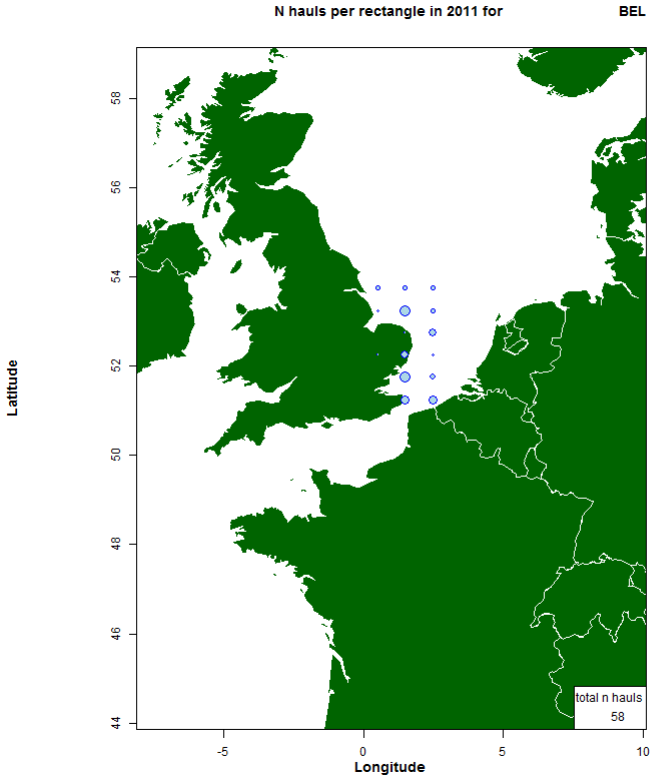
Annex 6: Spatial distribution of sampling and fish species for the offshore surveys

Annex 6.1: Spatial sampling coverage per country

Annex 6.1.1: Total number of offshore beam trawl hauls per rectangle for Belgium.

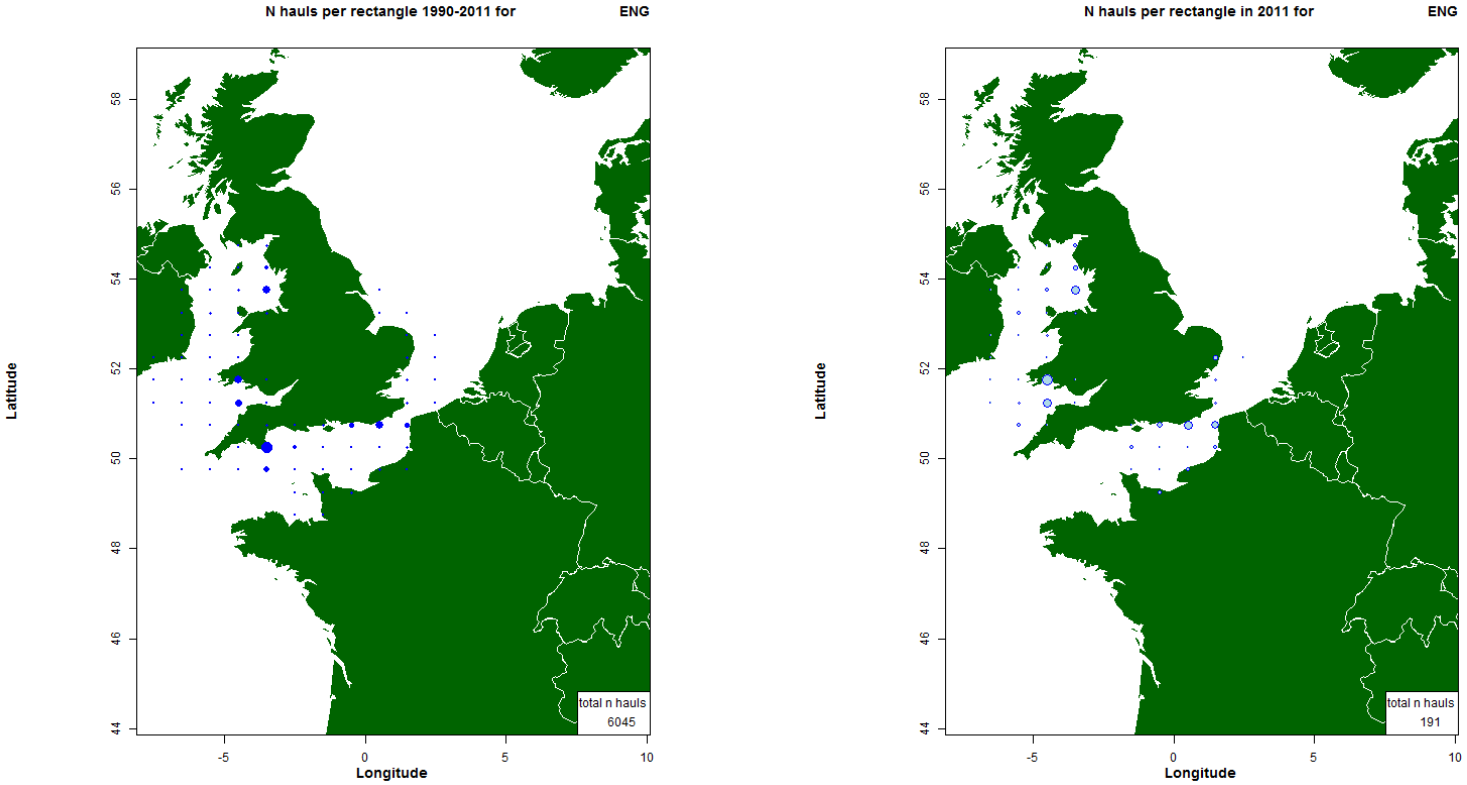
Left plot time-series, right plot current year





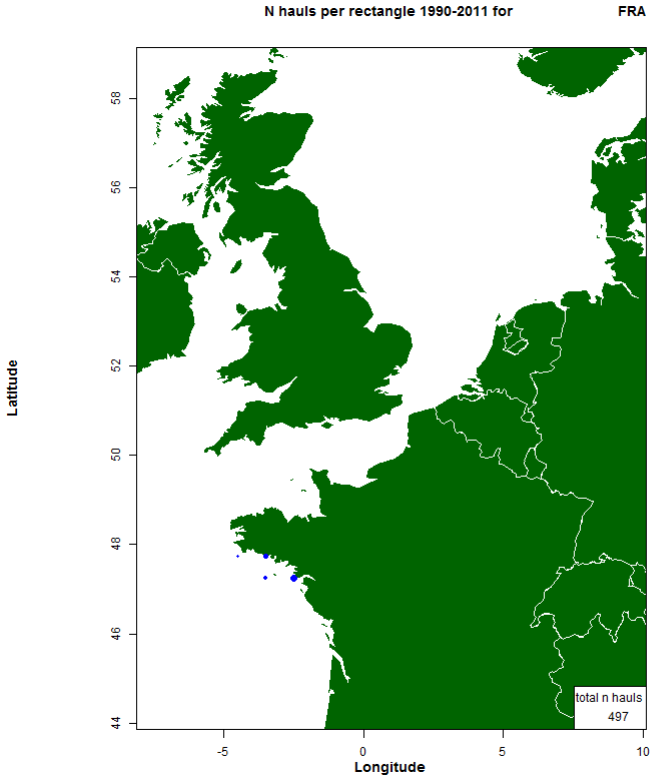
Annex 6.1.2: Total number of offshore beam trawl hauls per rectangle for England

Left plot time-series, right plot current year



Annex 6.1.3: Total number of offshore beam trawl hauls per rectangle for France

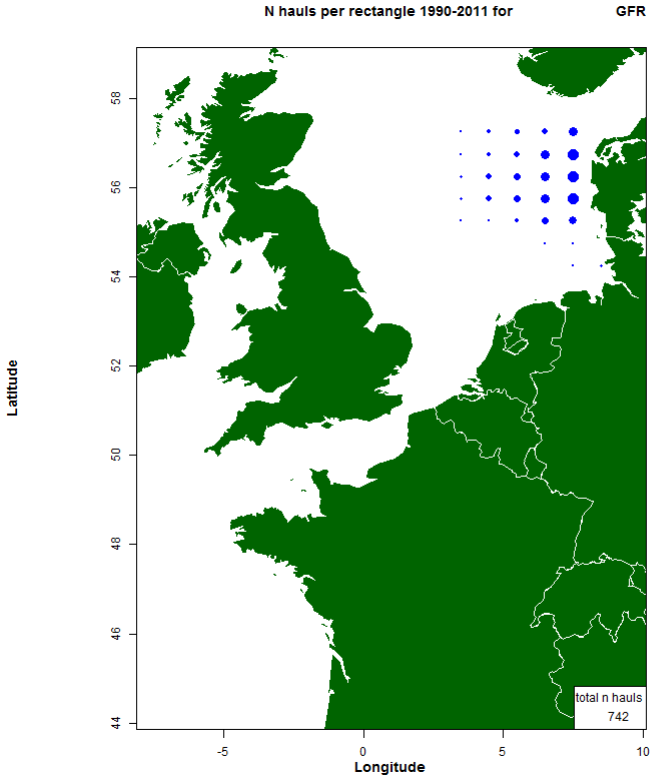
Left plot time-series, right plot current year

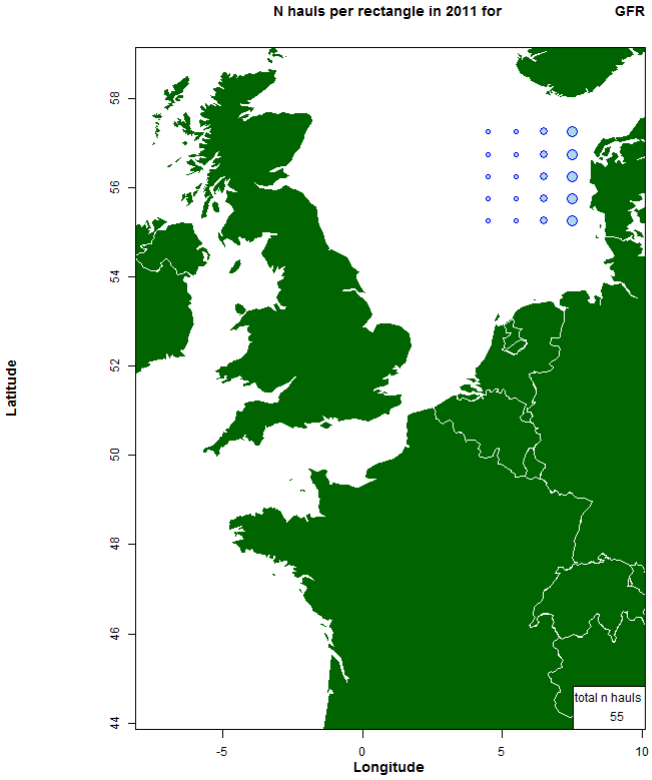


Station plot for 2011 survey not avialabe at time of Working Group

Annex 6.1.4: Total number of offshore beam trawl hauls per rectangle for Germany

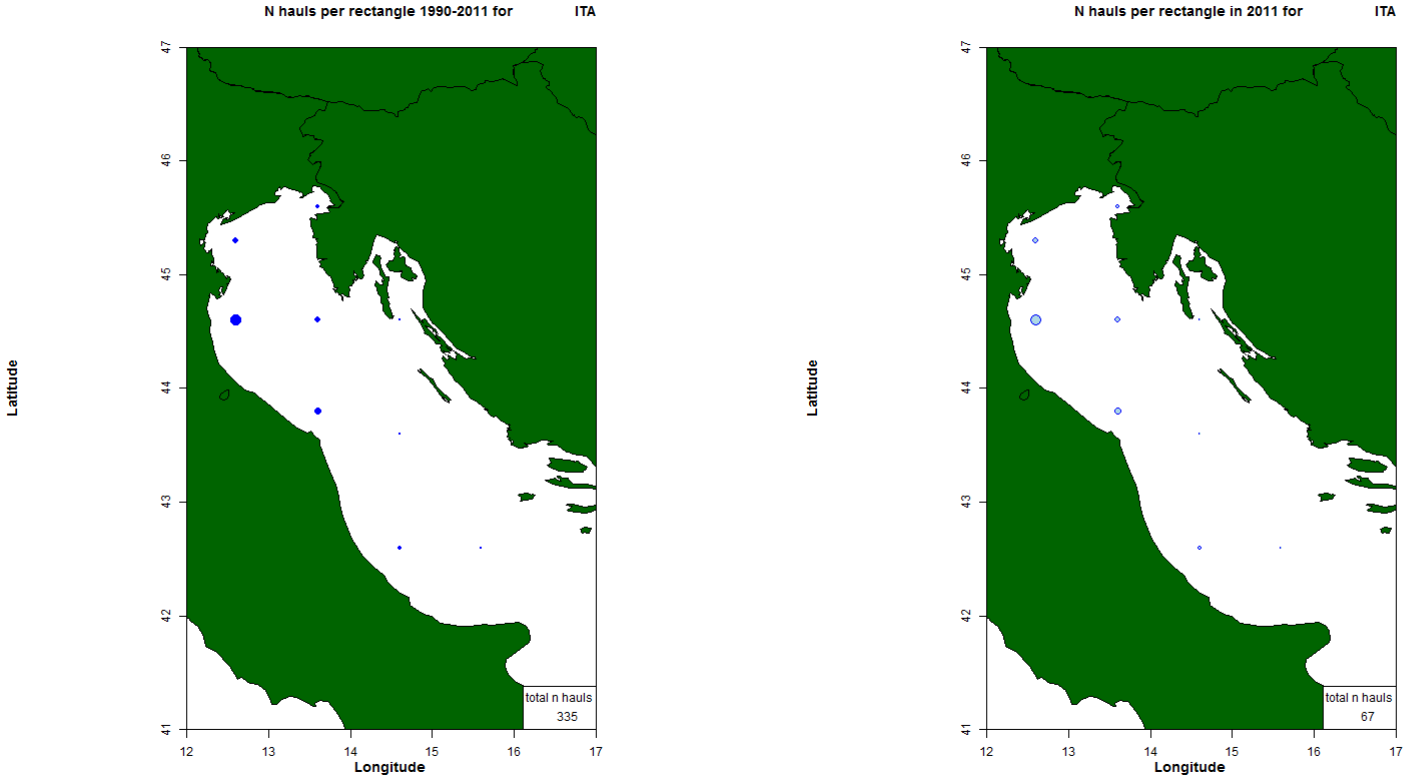
Left plot time-series, right plot current year





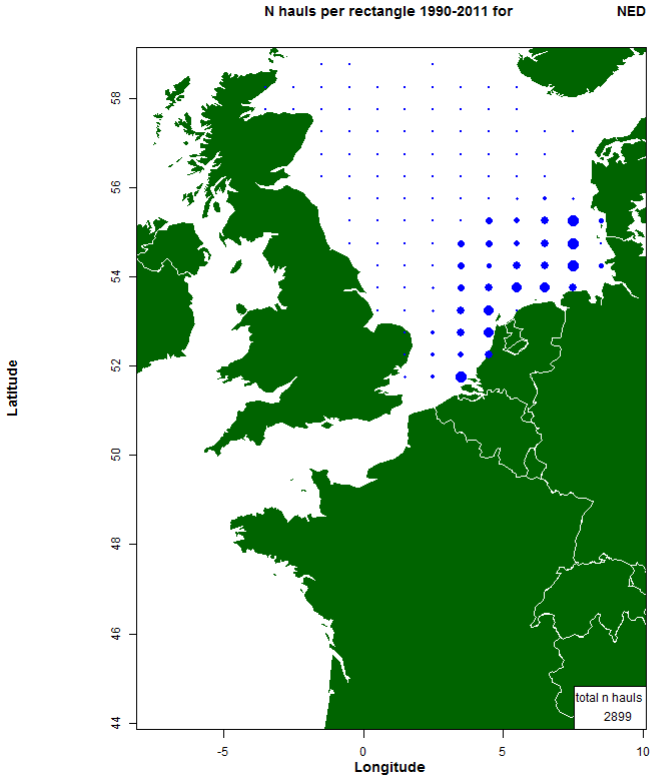
Annex 6.1.5: Total number of offshore beam trawl hauls per rectangle for Italy-Slovenia-Croatia

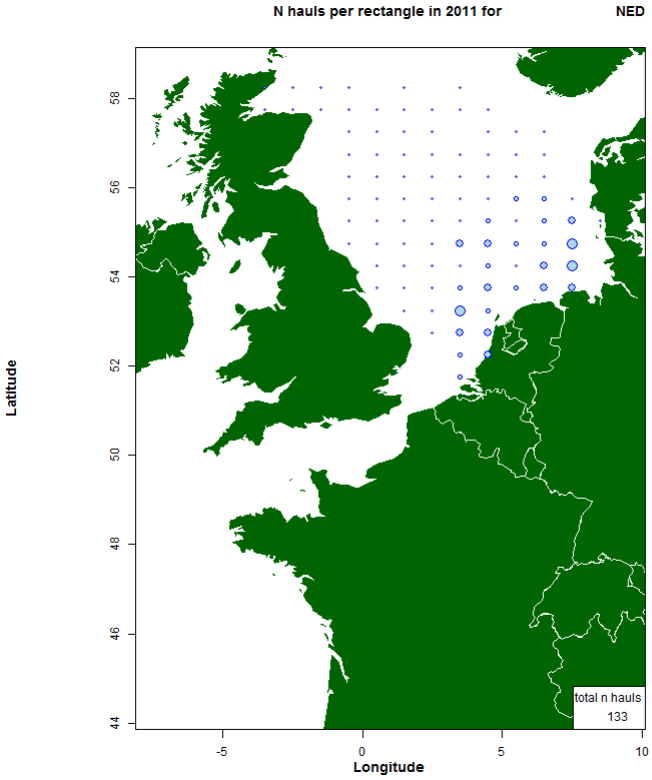
Left plot time-series, right plot current year



Annex 6.1.6: Total number of offshore beam trawl hauls per rectangle for Netherlands

Left plot time-series, right plot current year





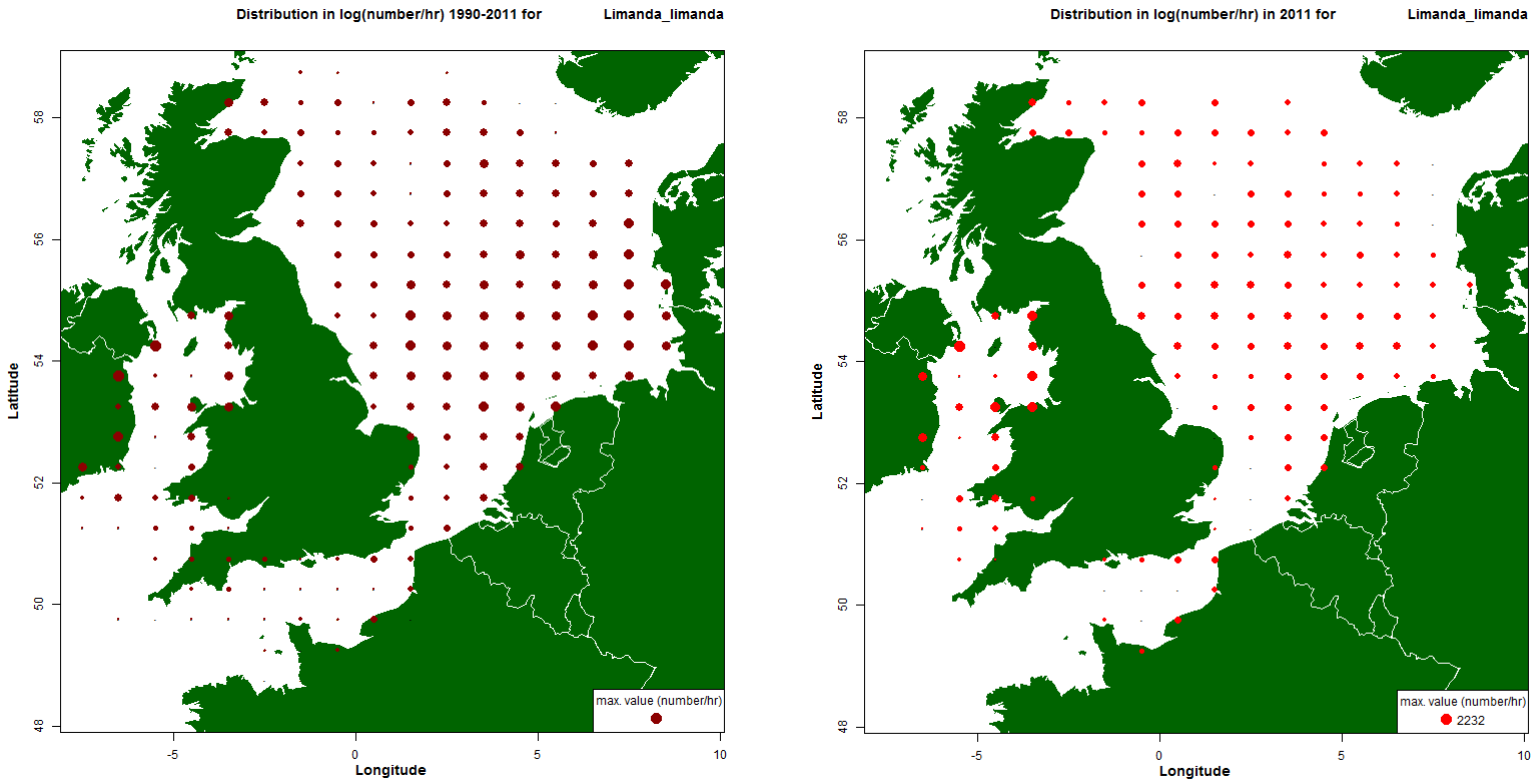
Annex 6.2: Spatial distribution per species

This annex shows distribution bubble plots of the main species caught throughout the beam trawl surveys by rectangle for all surveys combined. The left hand plot shows the mean catch in numbers per hour, raised to 8m-beam trawl, for the time-series. The right hand plot shows the data for the current year.

Annex 6.2.1: International offshore beam trawl survey 1990–2011

Catches are number/hr/8m beam; left plot mean of time-series, right plot current year

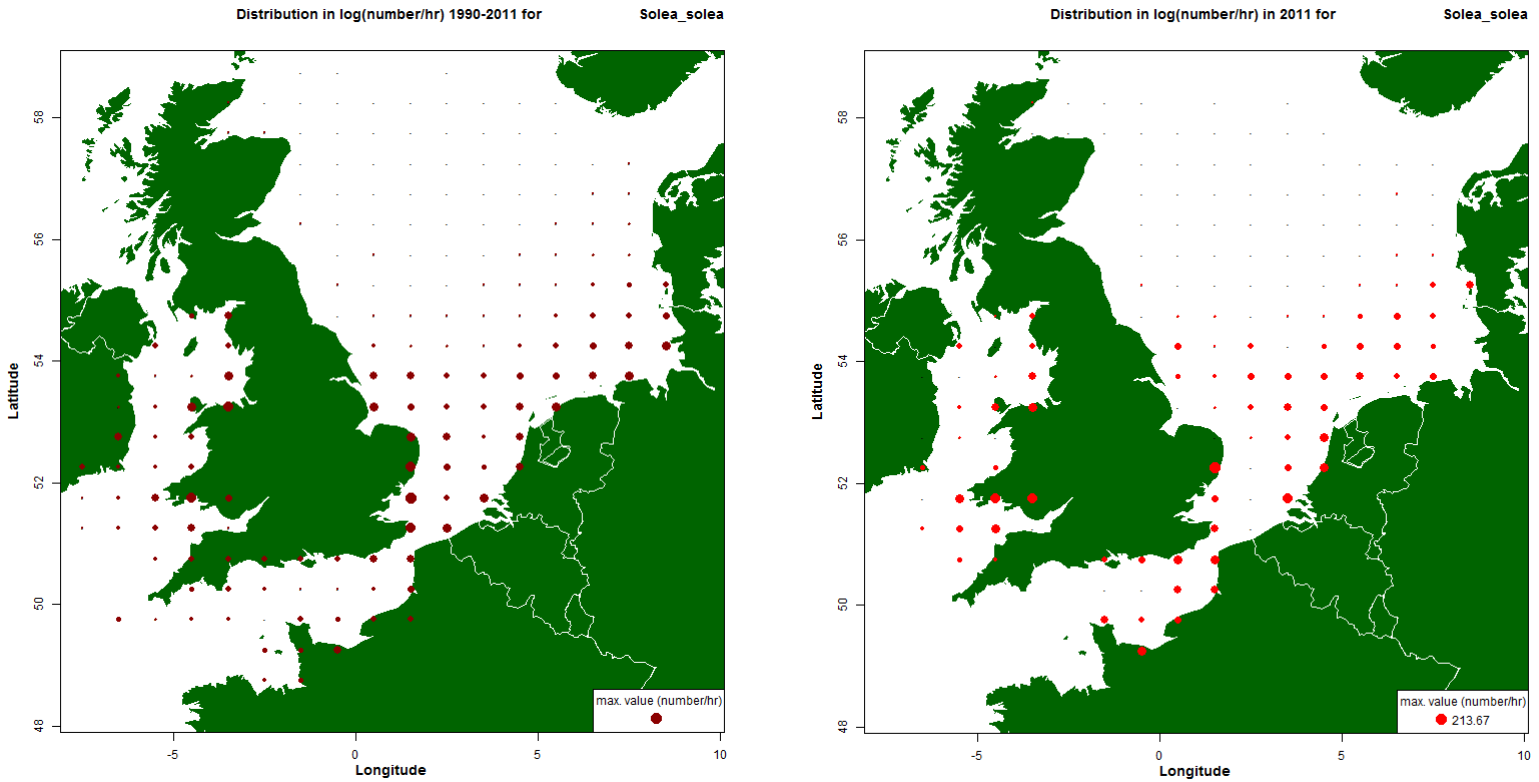
Dab



Annex 6.2.2: International offshore beam trawl survey 1990–2011

Catches are number/hr/8m beam; left plot mean of time-series, right plot current year

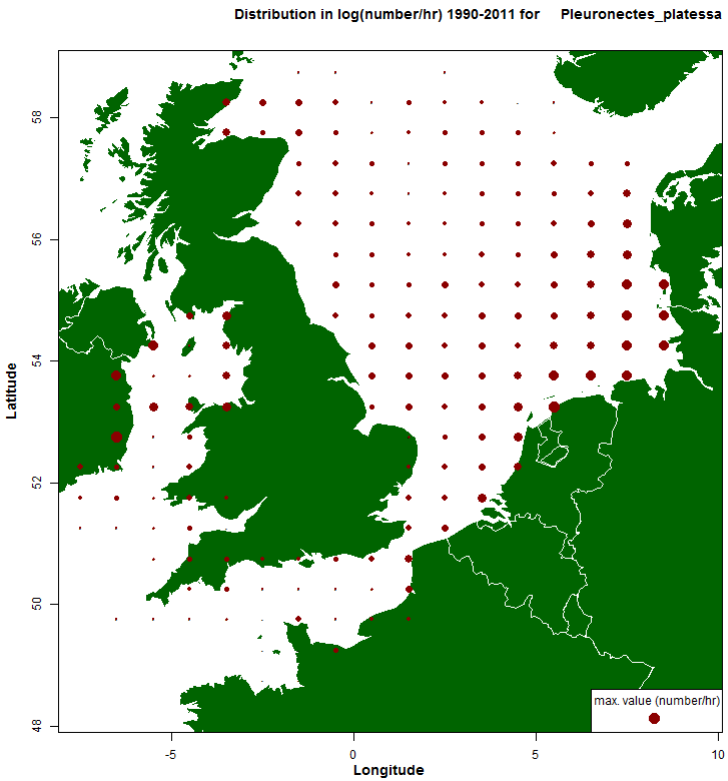
Sole

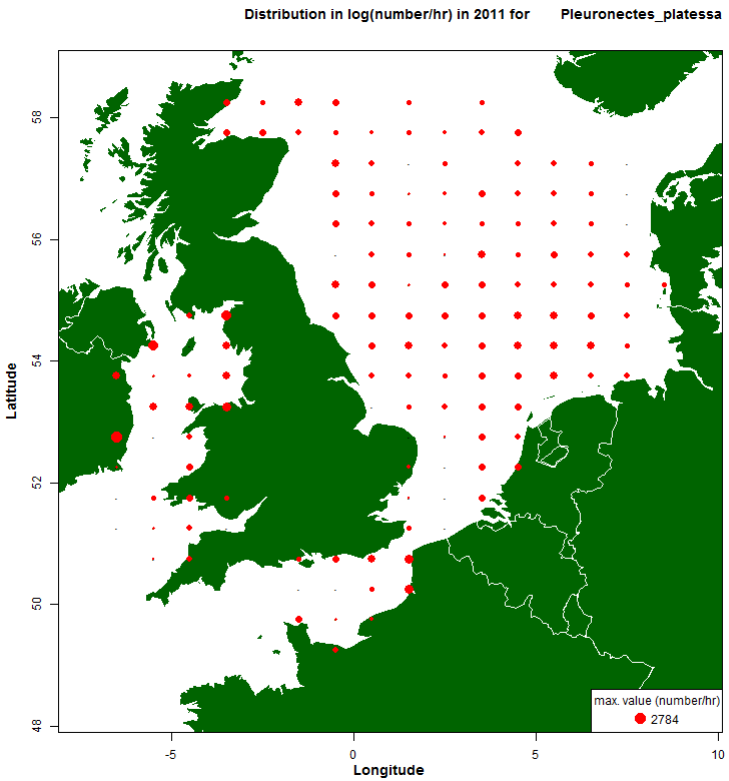


Annex 6.2.3: International offshore beam trawl survey 1990–2011

Catches are number/hr/8m beam; left plot mean of time-series, right plot current year

Plaice

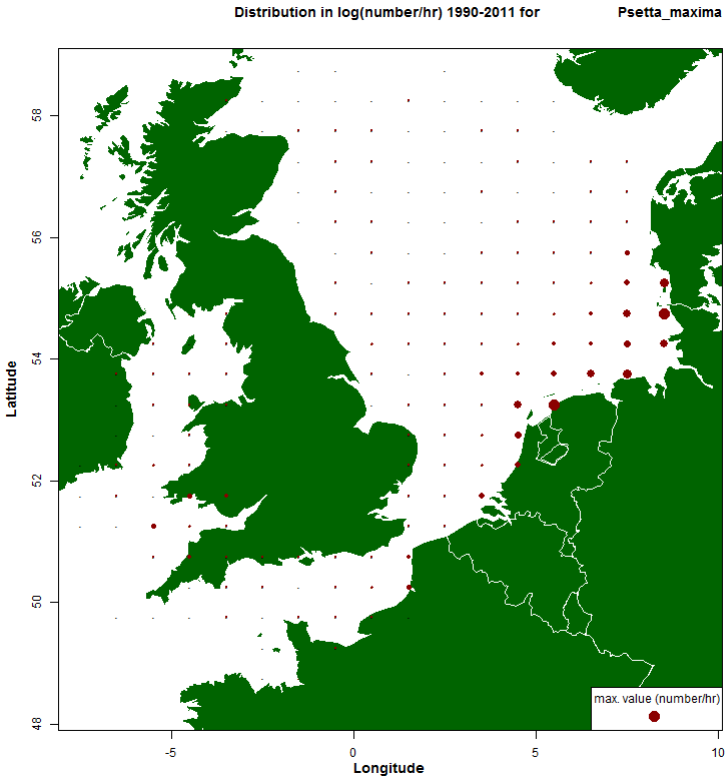


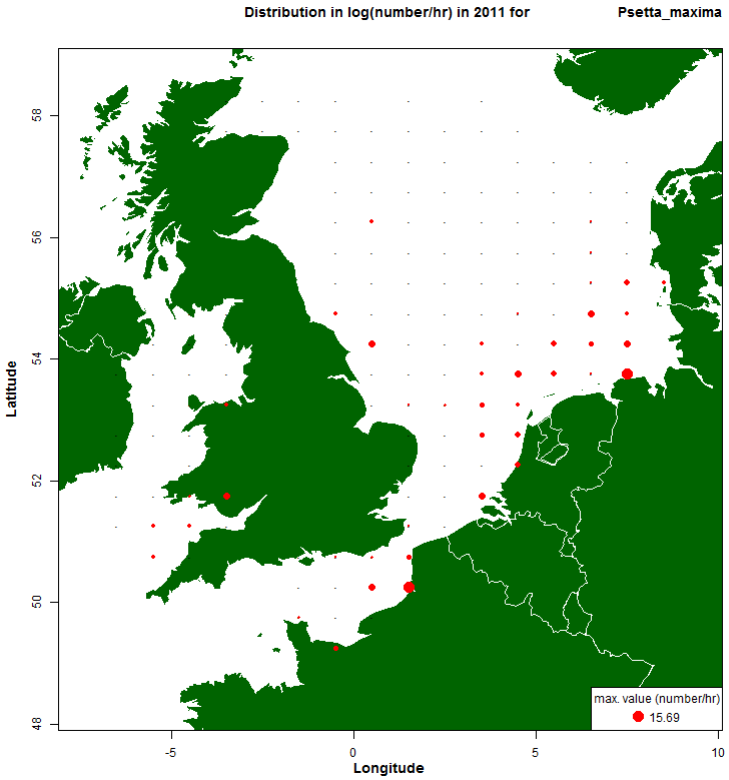


Annex 6.2.4: International offshore beam trawl survey 1990–2011

Catches are number/hr/8m beam; left plot mean of time-series, right plot current year

Turbot

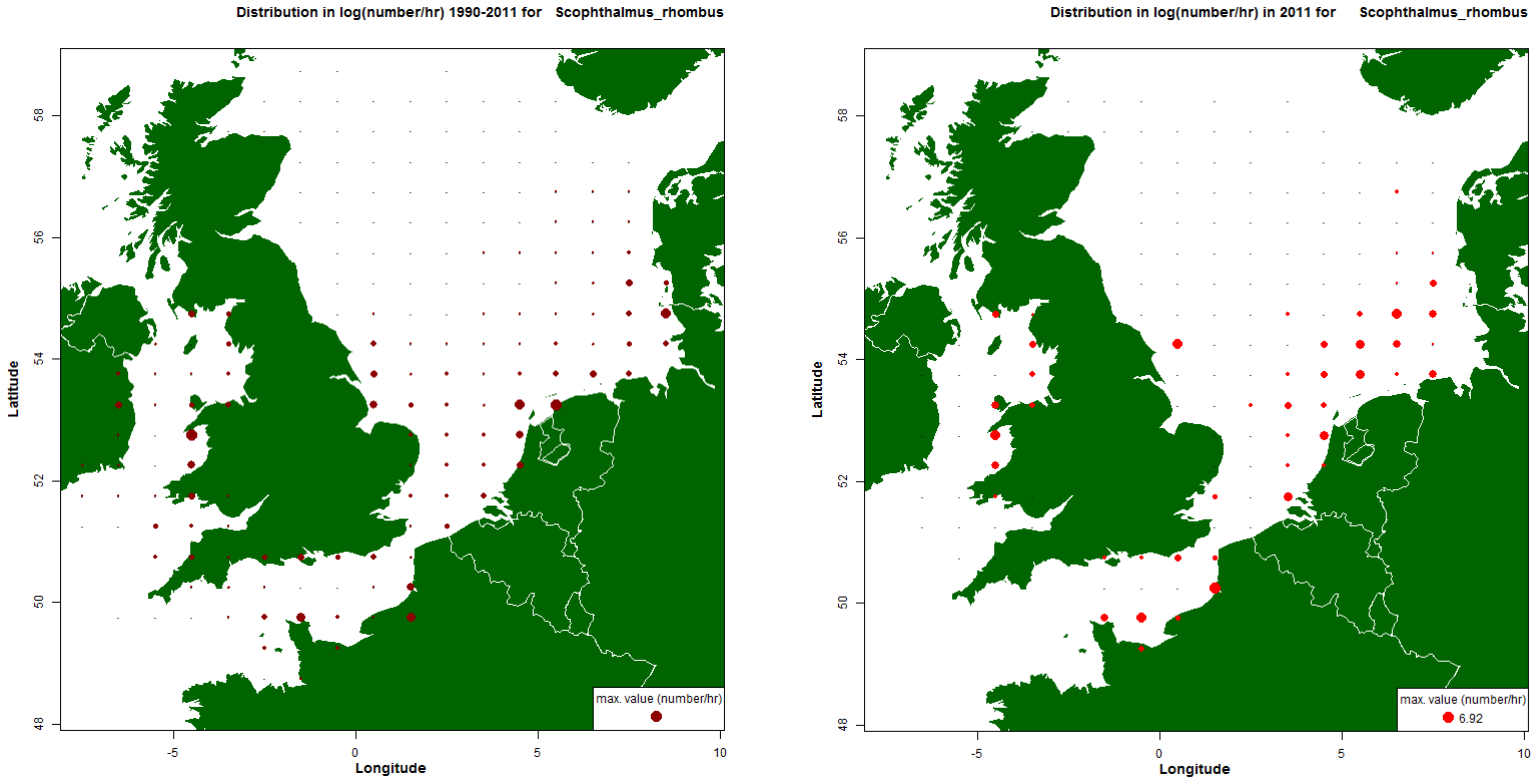




Annex 6.2.5: International offshore beam trawl survey 1990–2011

Catches are number/hr/8m beam; left plot mean of time-series, right plot current year

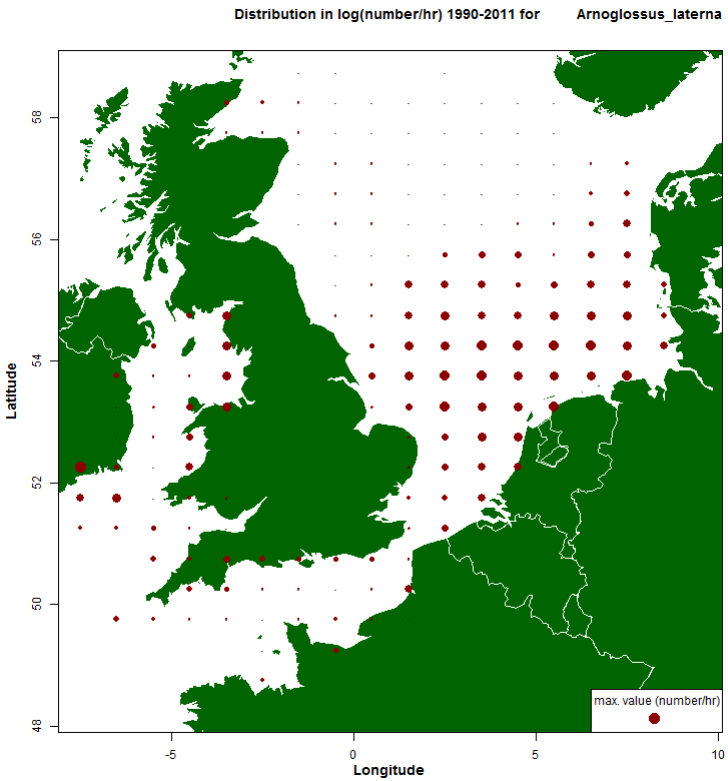
Brill

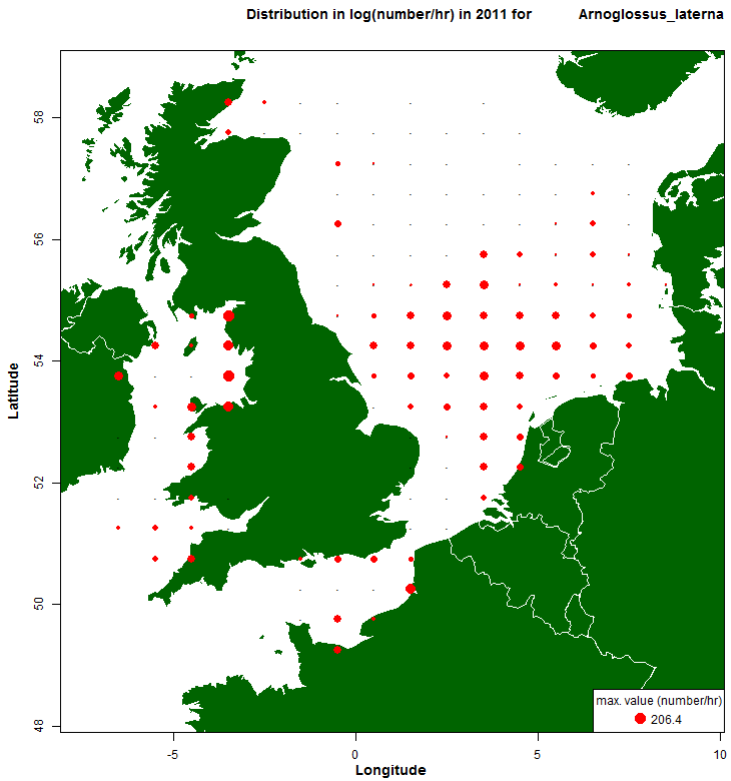


Annex 6.2.6: International offshore beam trawl survey 1990–2011

Catches are number/hr/8m beam; left plot mean of time-series, right plot current year

Scaldfish

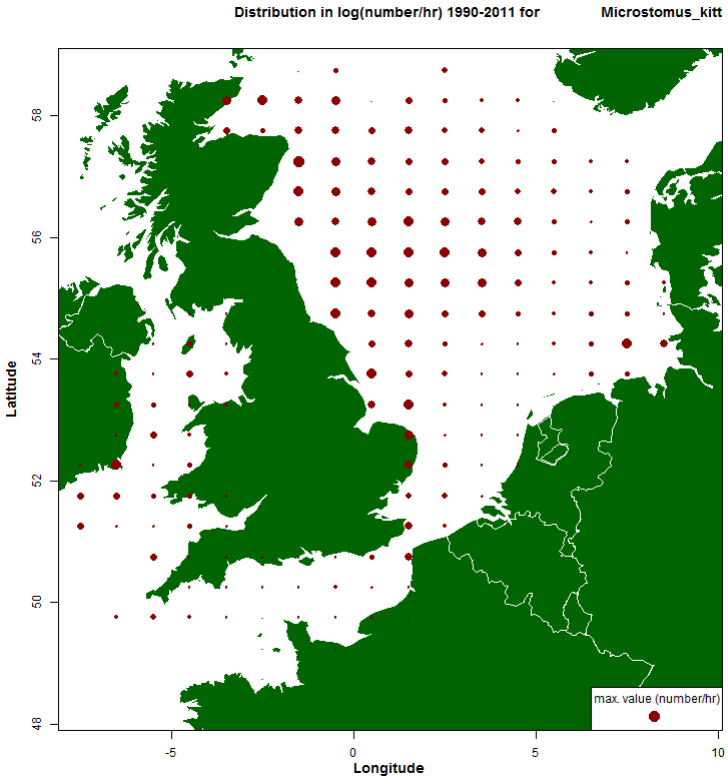


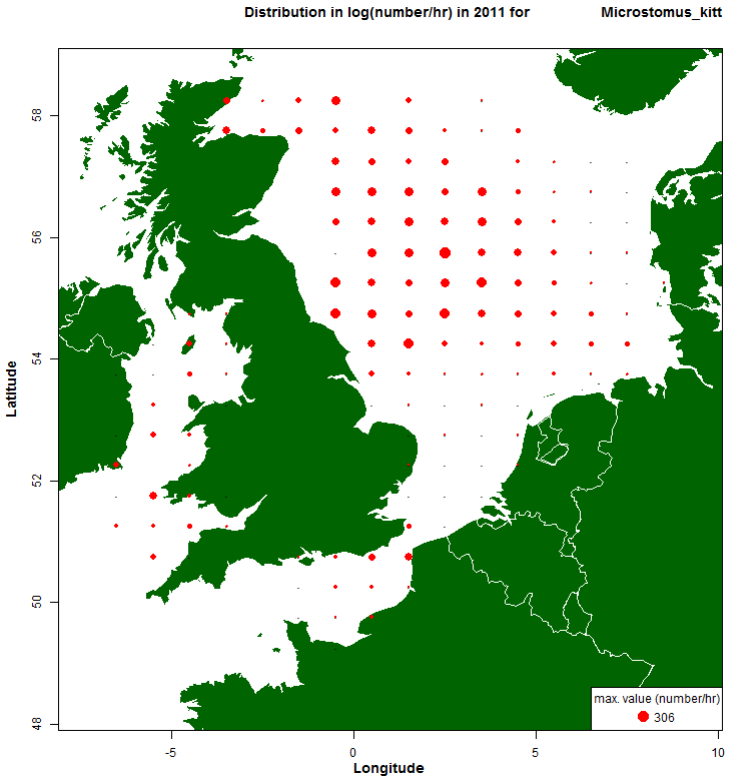


Annex 6.2.7: International offshore beam trawl survey 1990–2011

Catches are number/hr/8m beam; left plot mean of time-series, right plot current year

Lemon sole

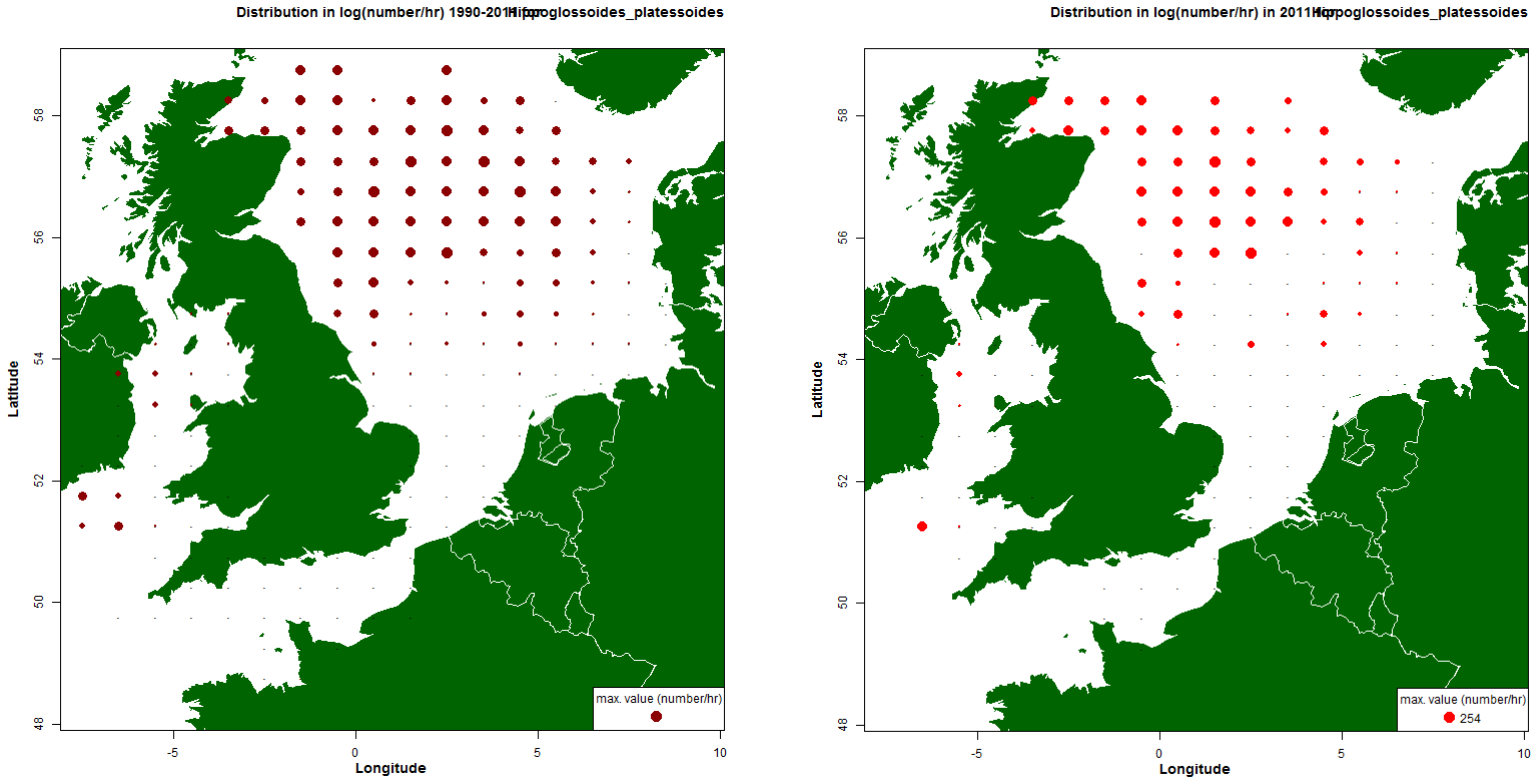




Annex 6.2.8: International offshore beam trawl survey 1990–2011

Catches are number/hr/8m beam; left plot mean of time-series, right plot current year

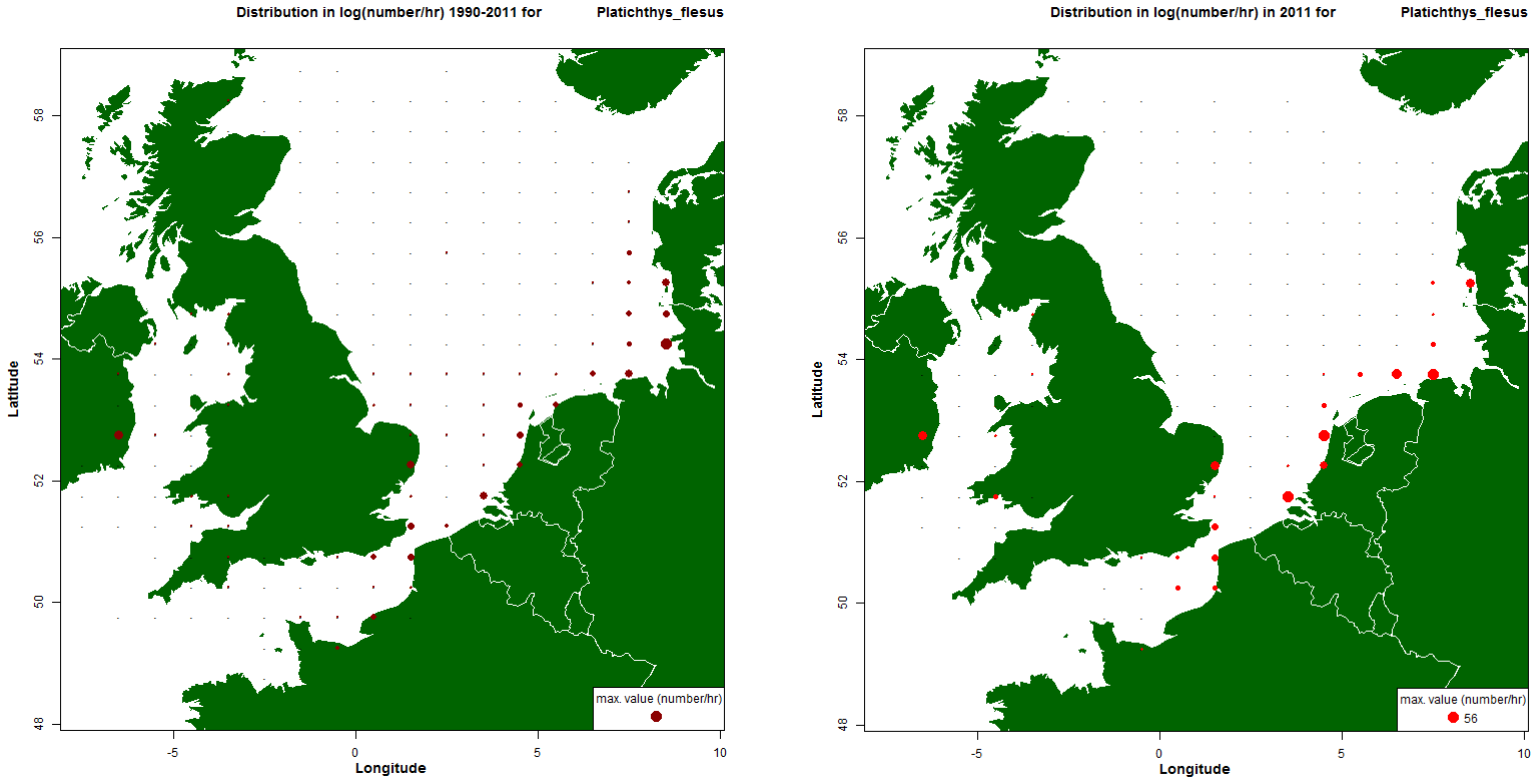
American plaice (long rough dab)



Annex 6.2.9: International offshore beam trawl survey 1990–2011

Catches are number/hr/8m beam; left plot mean of time-series, right plot current year

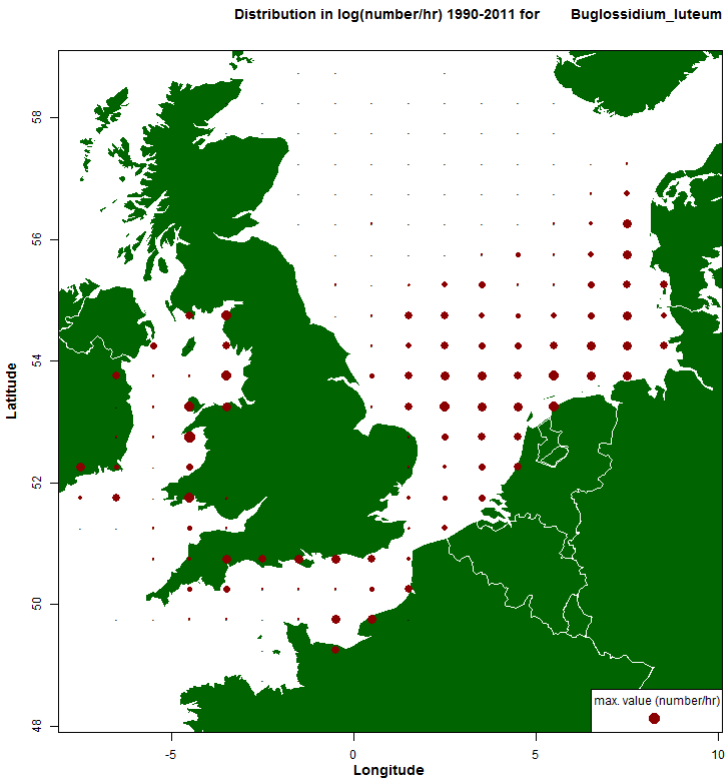
Flounder

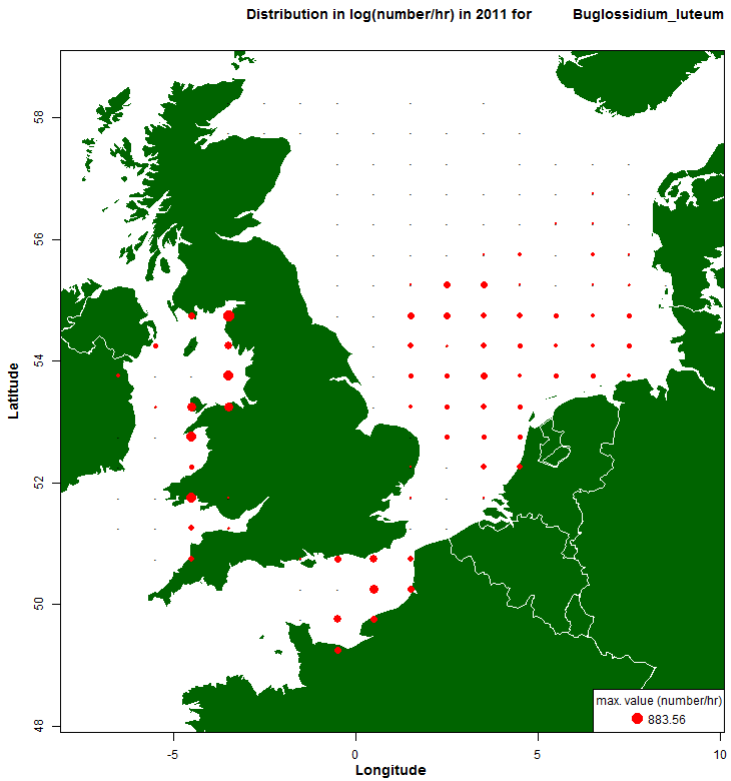


Annex 6.2.10: International offshore beam trawl survey 1990–2011

Catches are number/hr/8m beam; left plot mean of time-series, right plot current year

Solenette

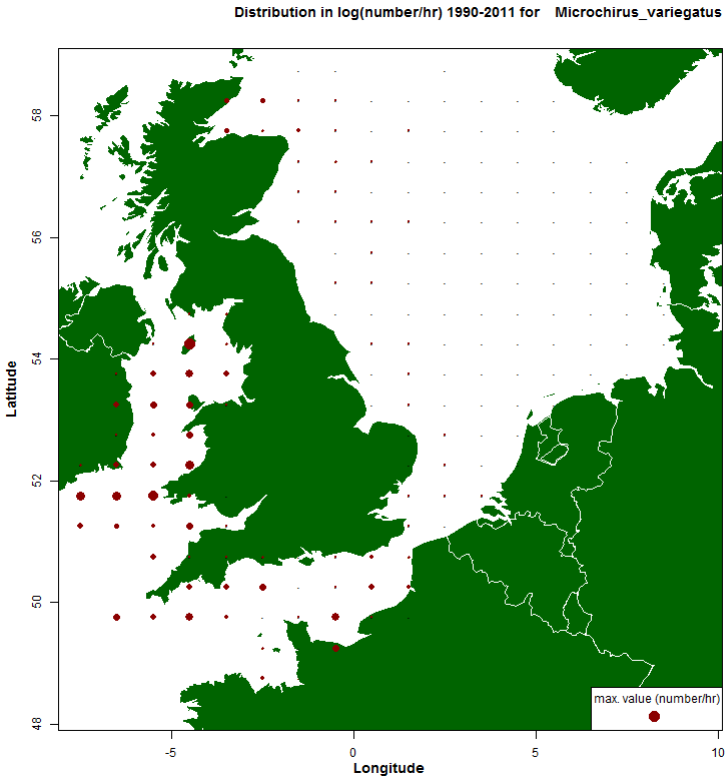


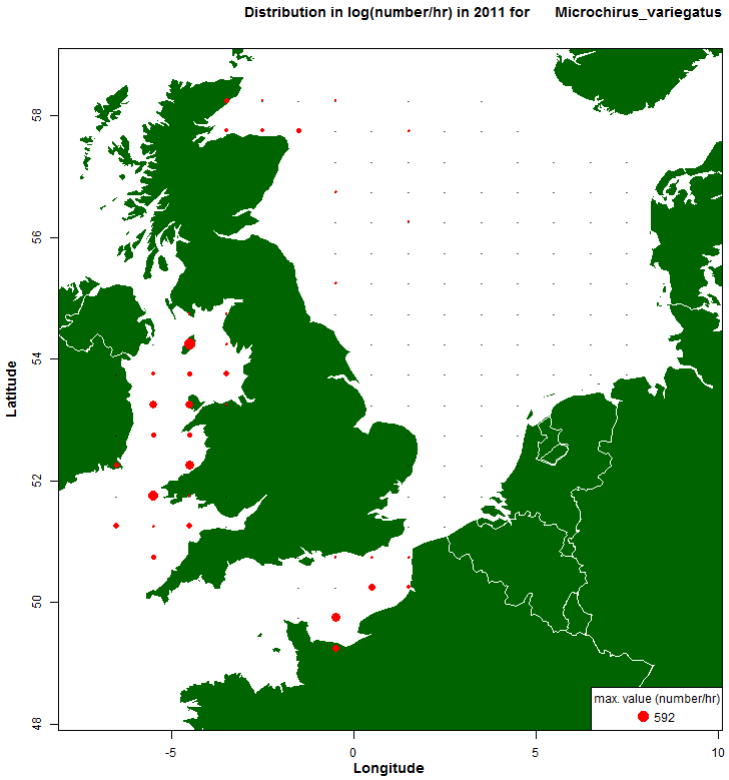


Annex 6.2.11: International offshore beam trawl survey 1990–2011

Catches are number/hr/8m beam; left plot mean of time-series, right plot current year

Thickback sole

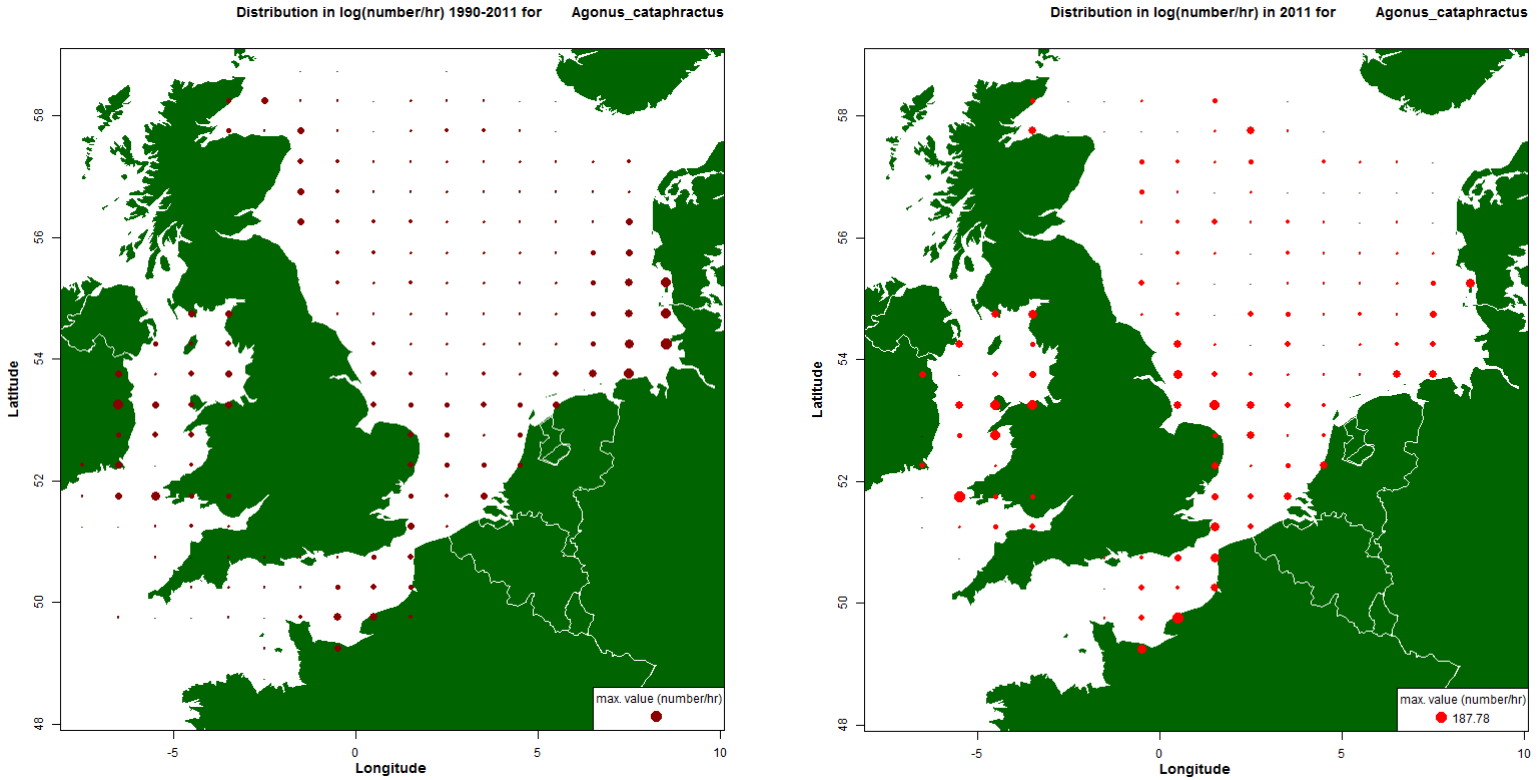




Annex 6.2.12: International offshore beam trawl survey 1990–2011

Catches are number/hr/8m beam; left plot mean of time-series, right plot current year

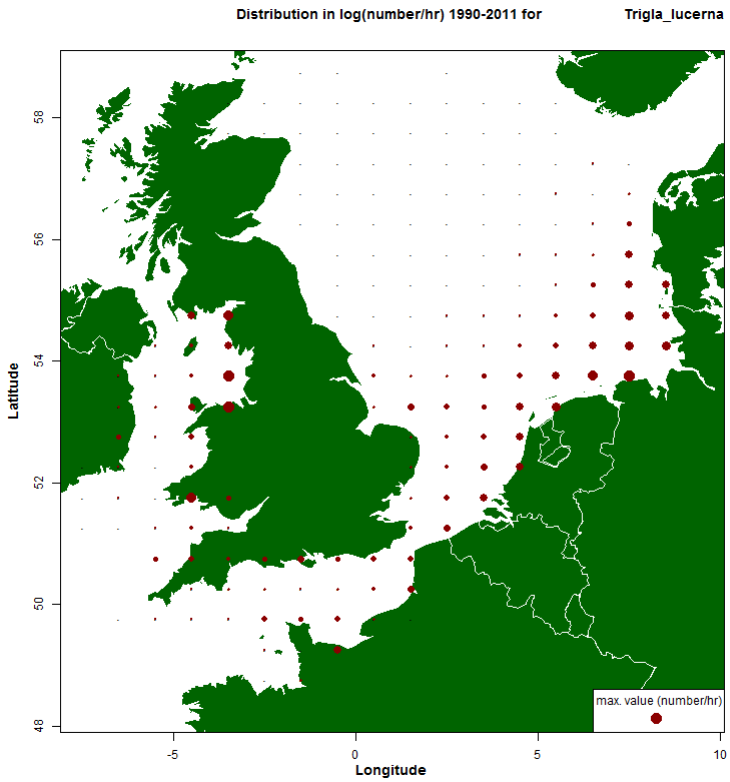
Pogge

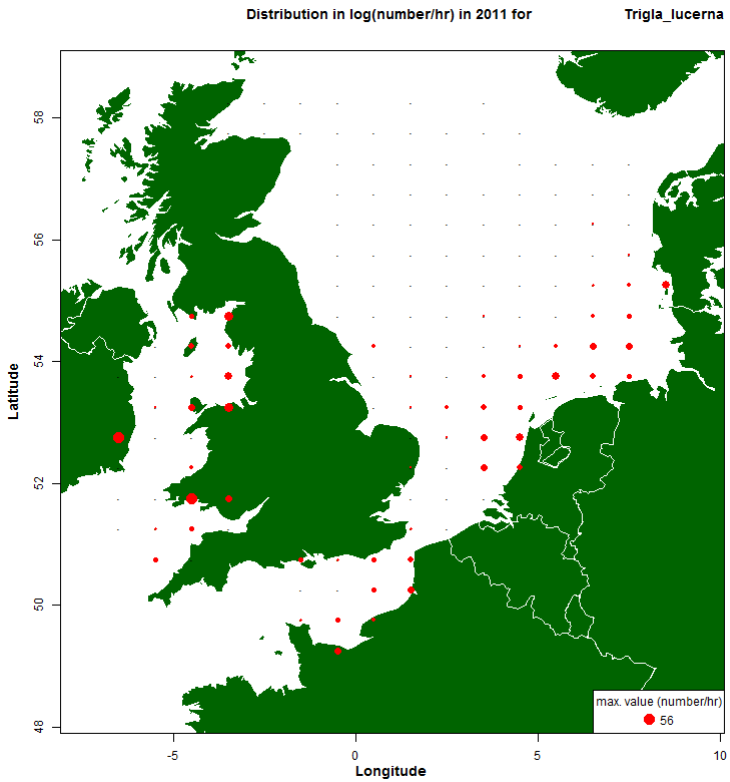


Annex 6.2.13: International offshore beam trawl survey 1990–2011

Catches are number/hr/8m beam; left plot mean of time-series, right plot current year

Tub gurnard

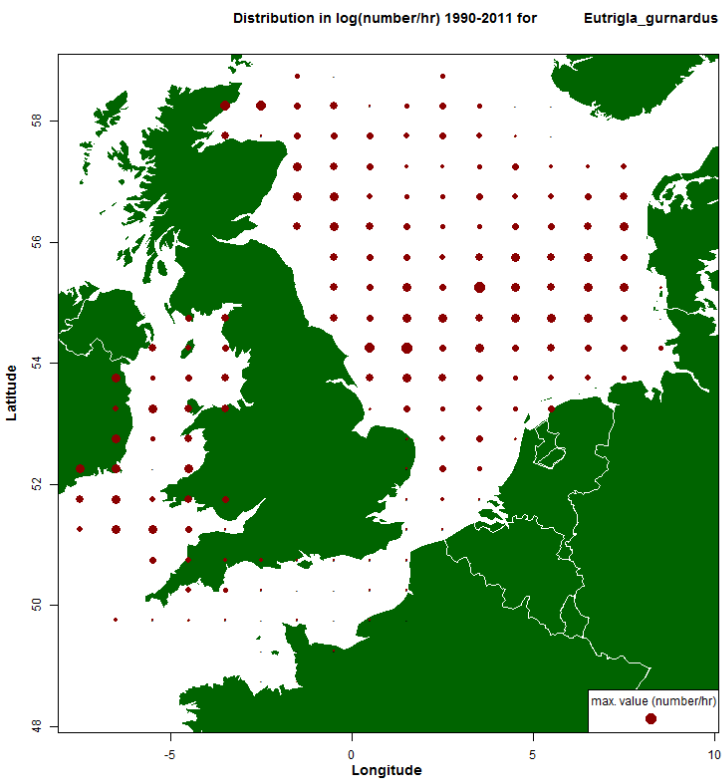


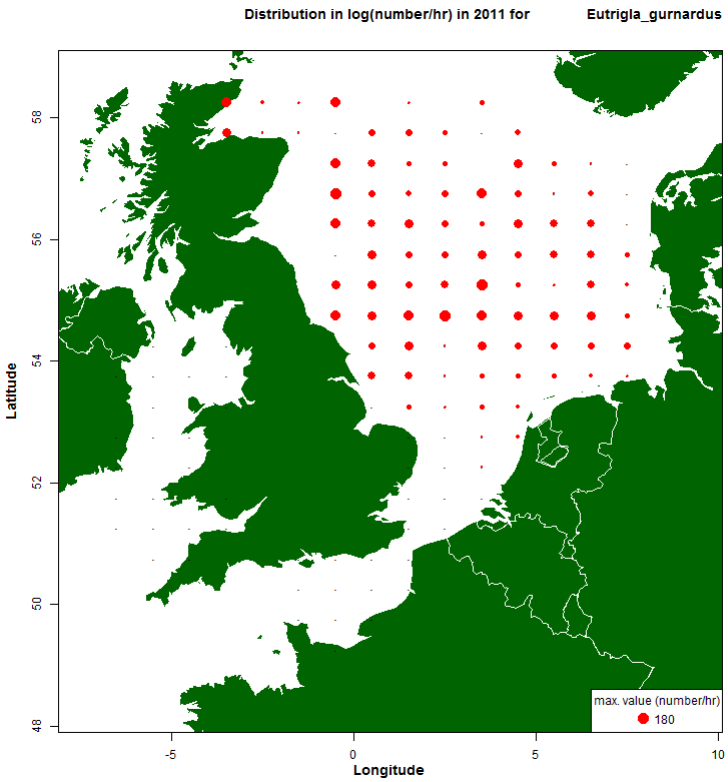


Annex 6.2.14: International offshore beam trawl survey 1990–2011

Catches are number/hr/8m beam; left plot mean of time-series, right plot current year

Grey gurnard

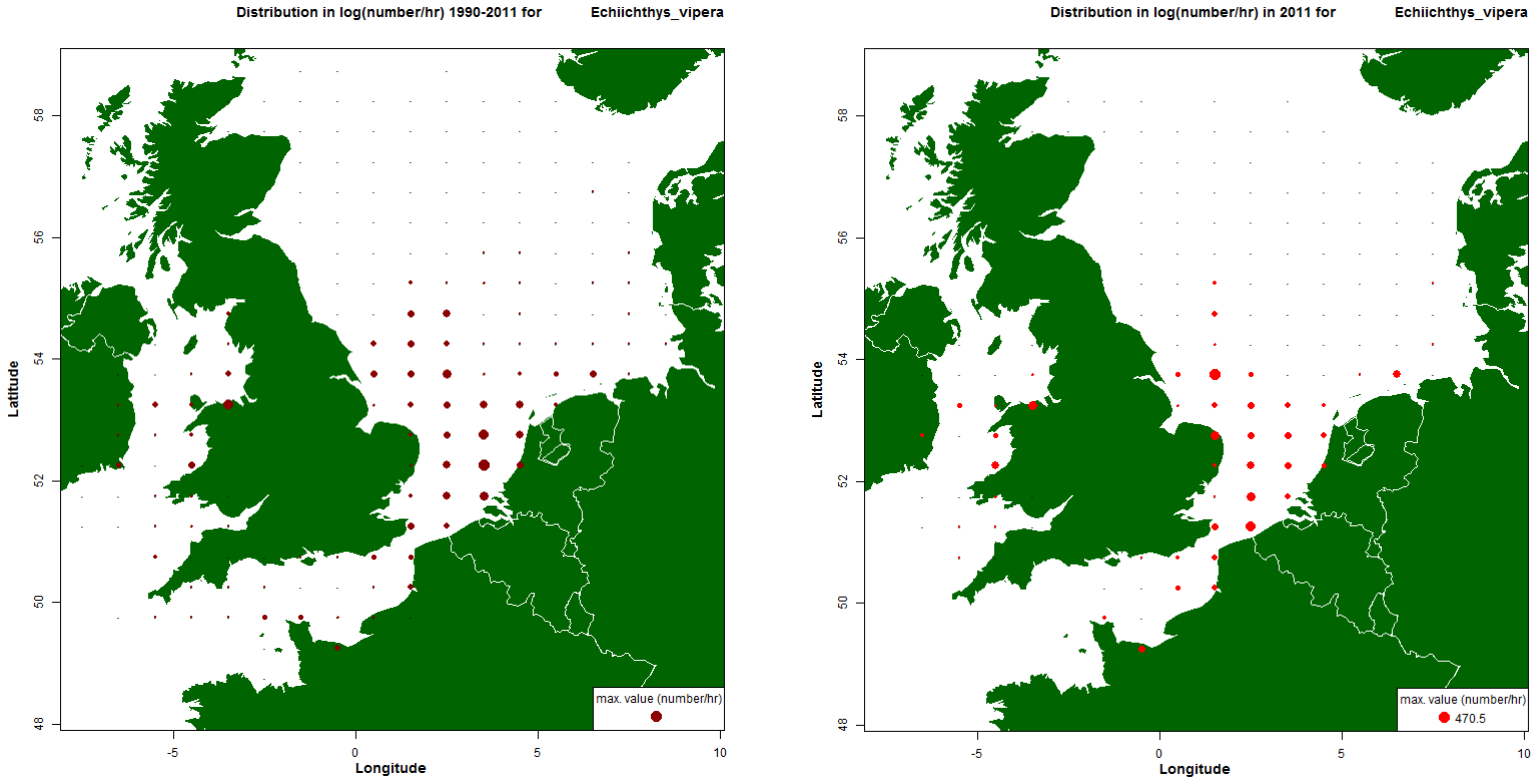




Annex 6.2.15: International offshore beam trawl survey 1990–2011

Catches are number/hr/8m beam; left plot mean of time-series, right plot current year

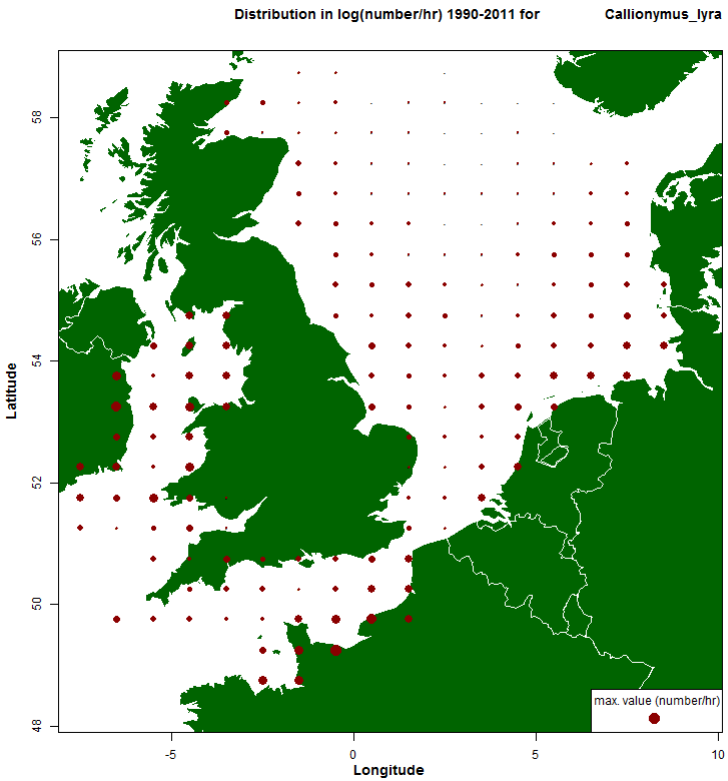
Lesser weever

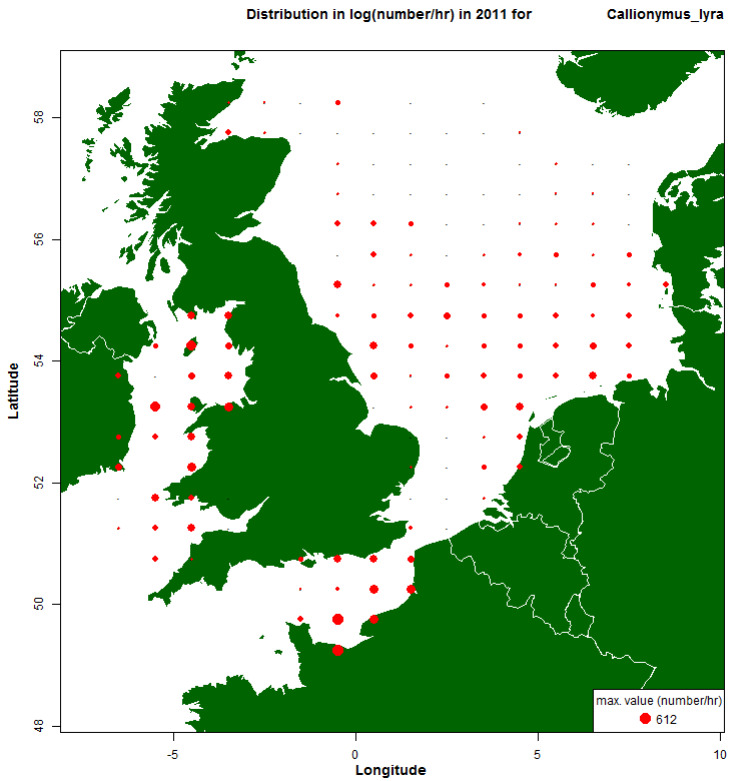


Annex 6.2.16: International offshore beam trawl survey 1990–2011

Catches are number/hr/8m beam; left plot mean of time-series, right plot current year

Common dragonet

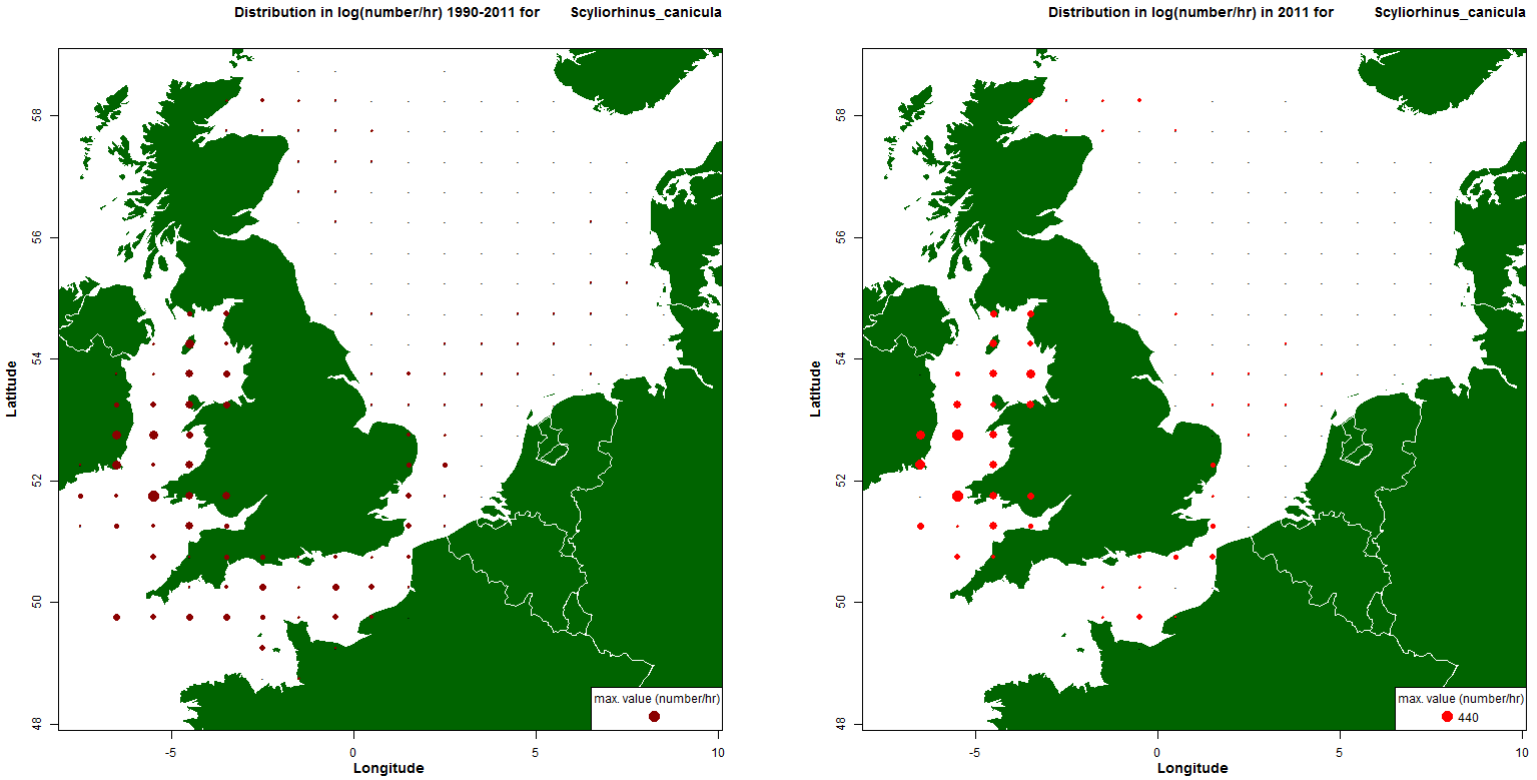




Annex 6.2.17: International offshore beam trawl survey 1990–2011

Catches are number/hr/8m beam; left plot mean of time-series, right plot current year

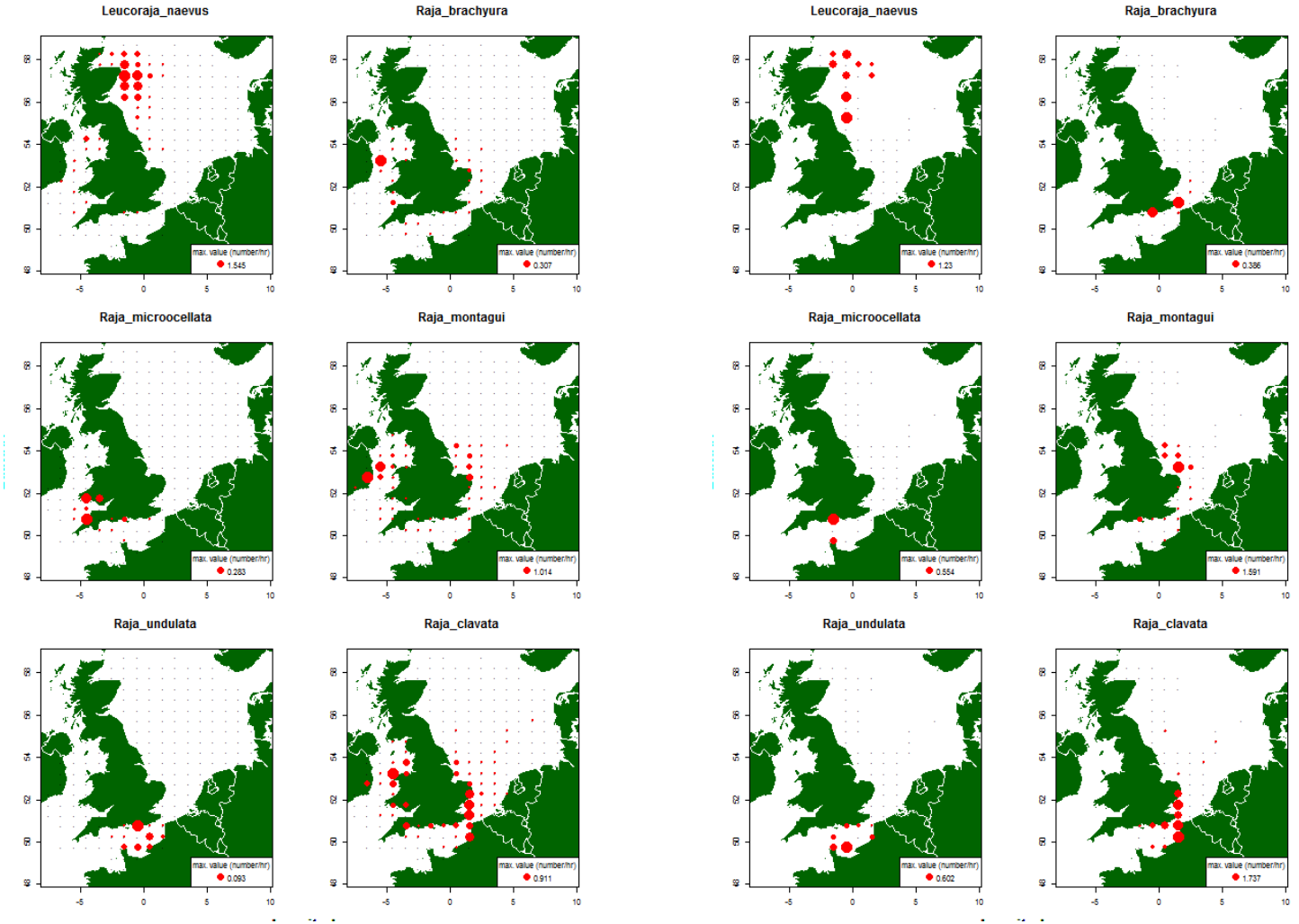
Lesser spotted dogfish



Annex 6.2.18: International offshore beam trawl survey 1990–2011

Catches are number/hr/8m beam; left plot mean of time-series, right plot current year

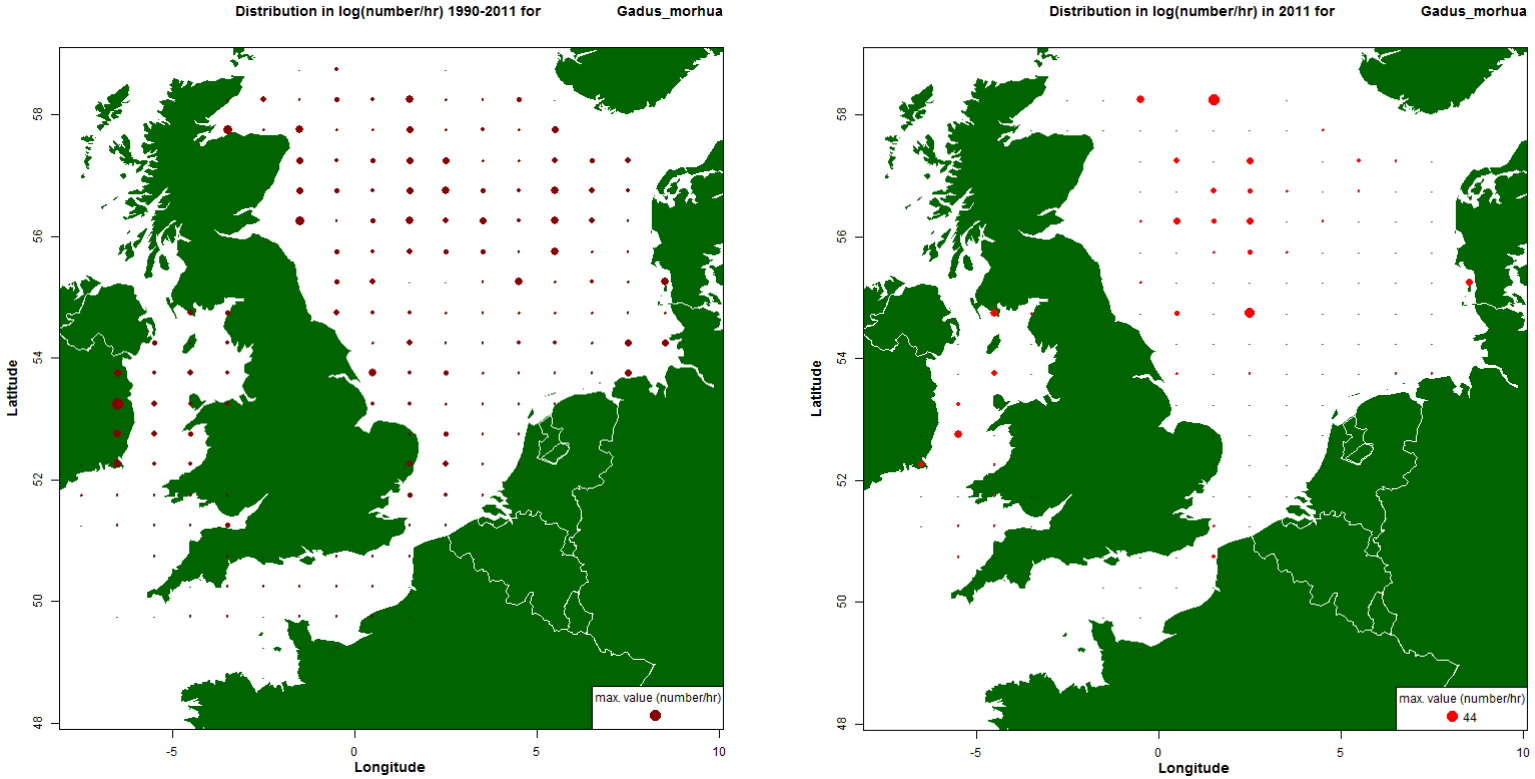
Rays



Annex 6.2.19: International offshore beam trawl survey 1990–2011

Catches are number/hr/8m beam; left plot mean of time-series, right plot current year

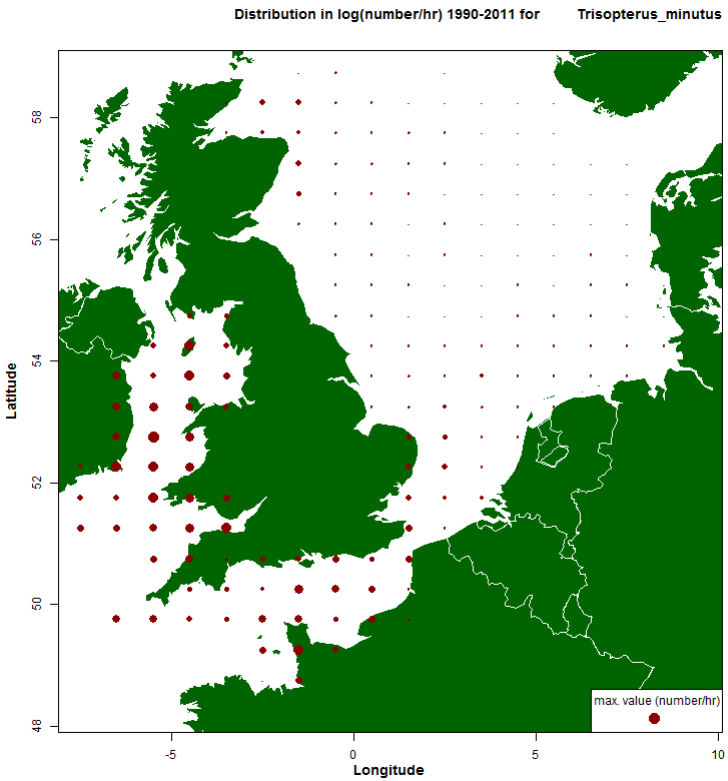
Cod

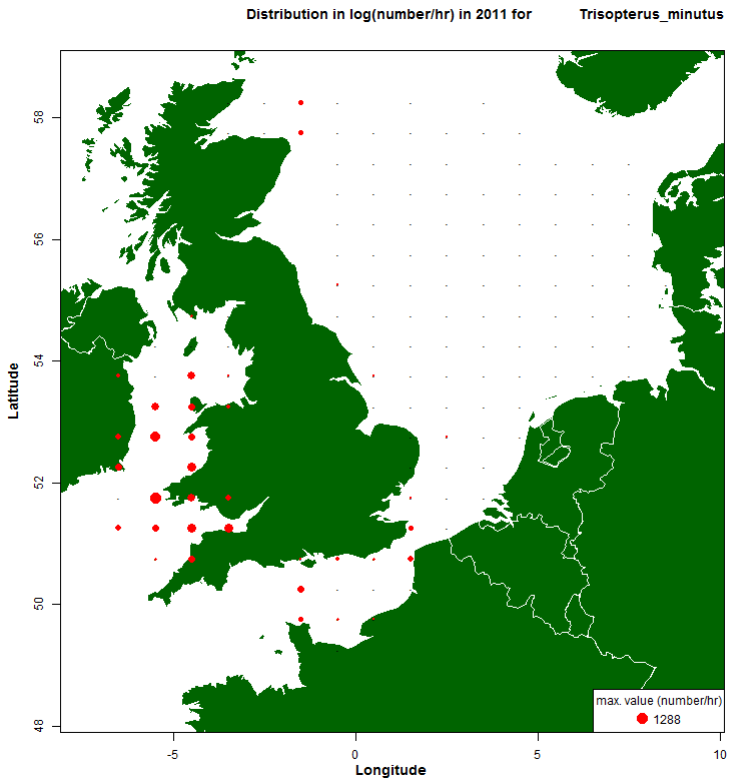


Annex 6.2.20: International offshore beam trawl survey 1990–2011

Catches are number/hr/8m beam; left plot mean of time-series, right plot current year

Poor cod

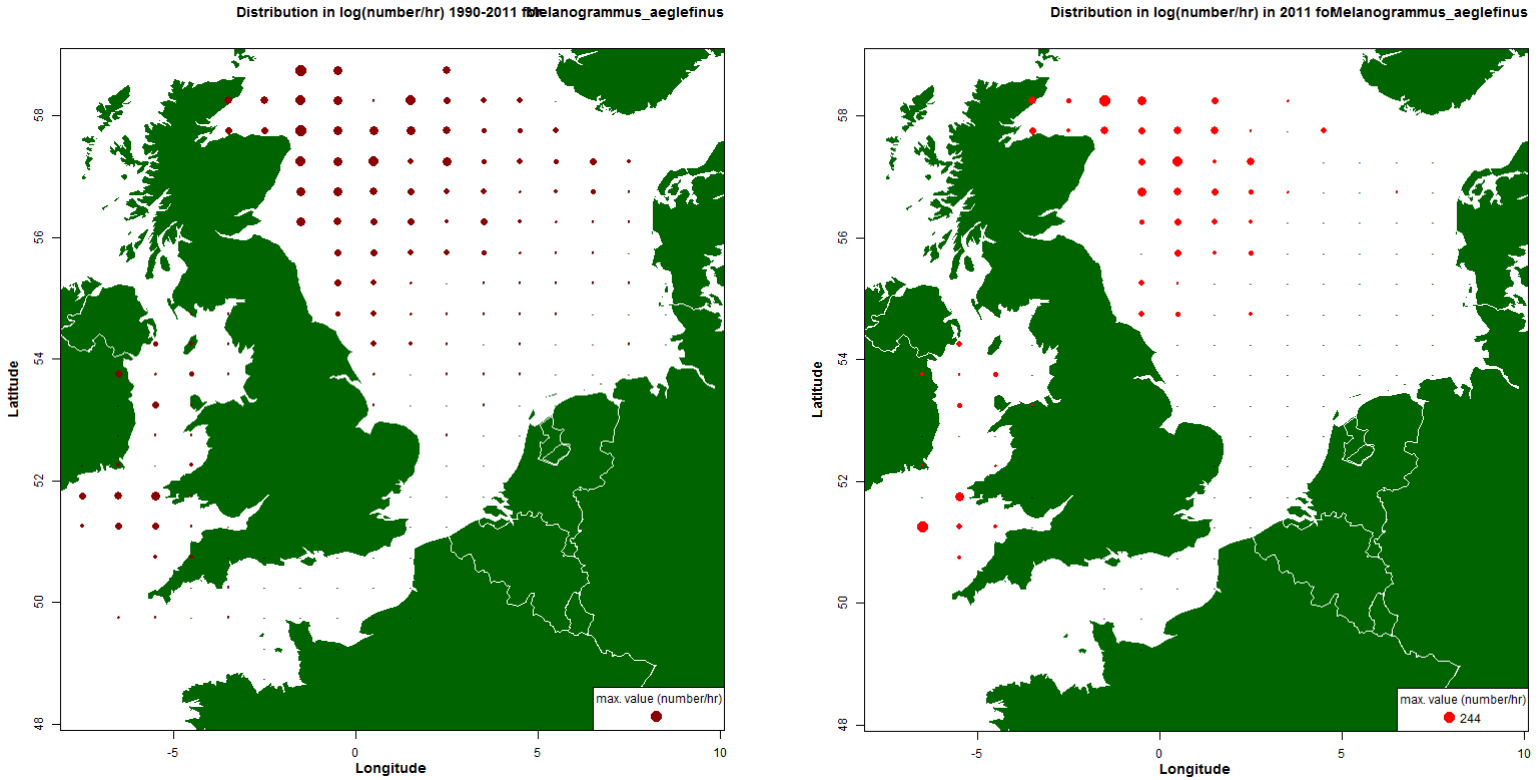




Annex 6.2.21: International offshore beam trawl survey 1990–2011

Catches are number/hr/8m beam; left plot mean of time-series, right plot current year

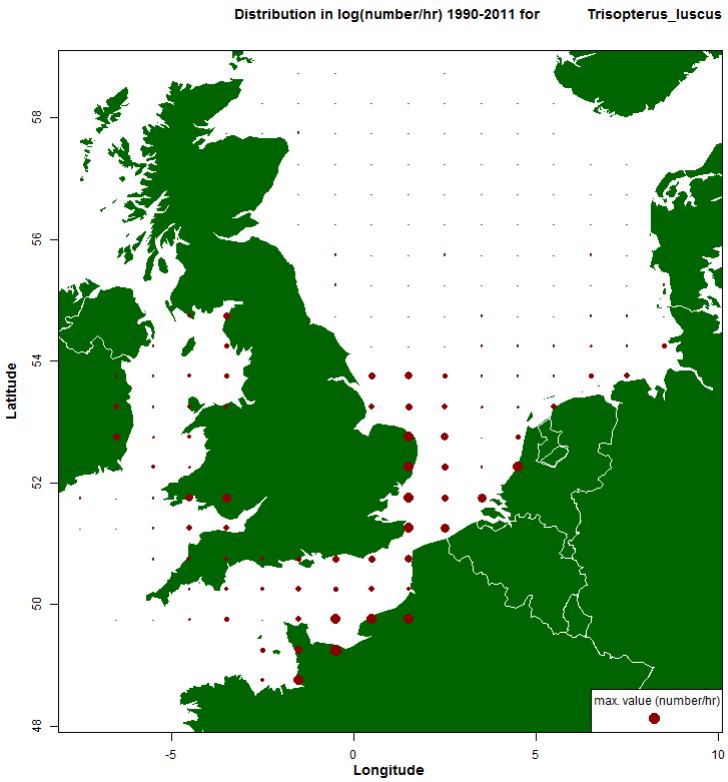
Haddock

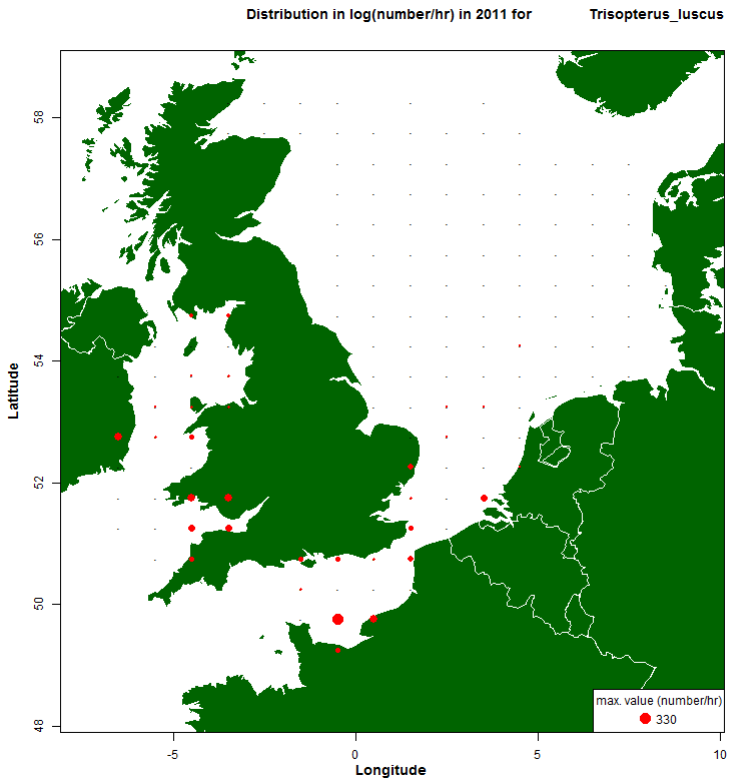


Annex 6.2.22: International offshore beam trawl survey 1990–2011

Catches are number/hr/8m beam; left plot mean of time-series, right plot current year

Pout whiting

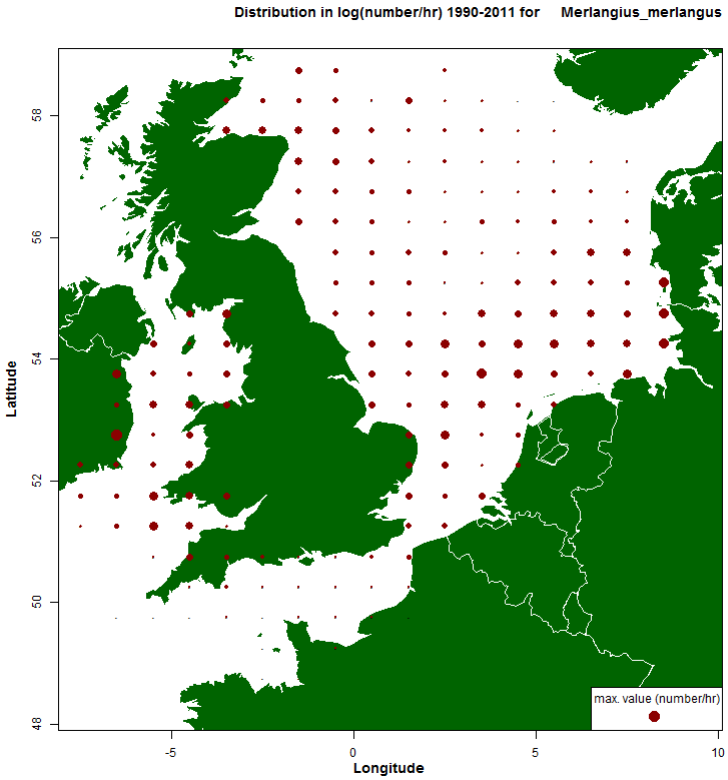


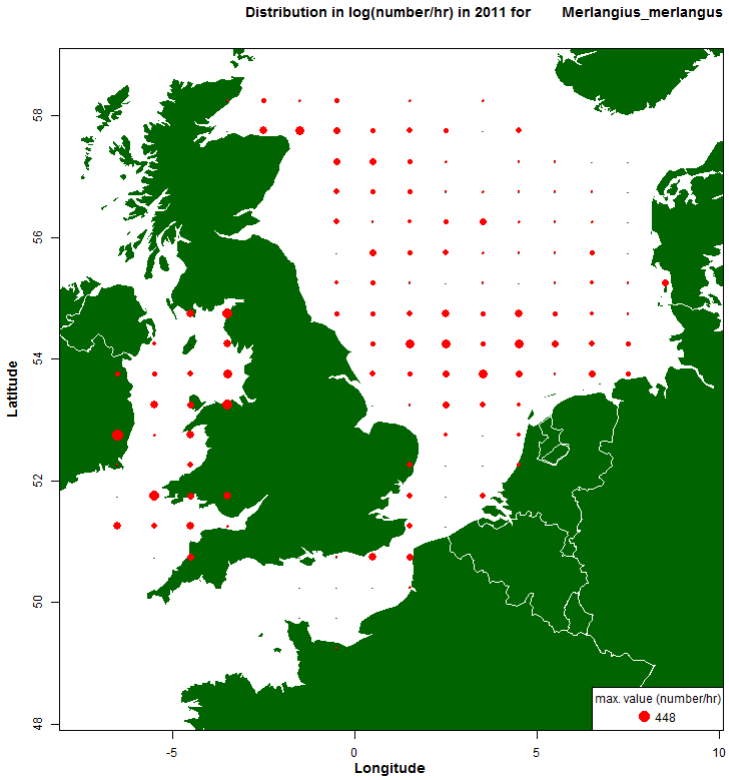


Annex 6.2.23: International offshore beam trawl survey 1990–2011

Catches are number/hr/8m beam; left plot mean of time-series, right plot current year

Whiting

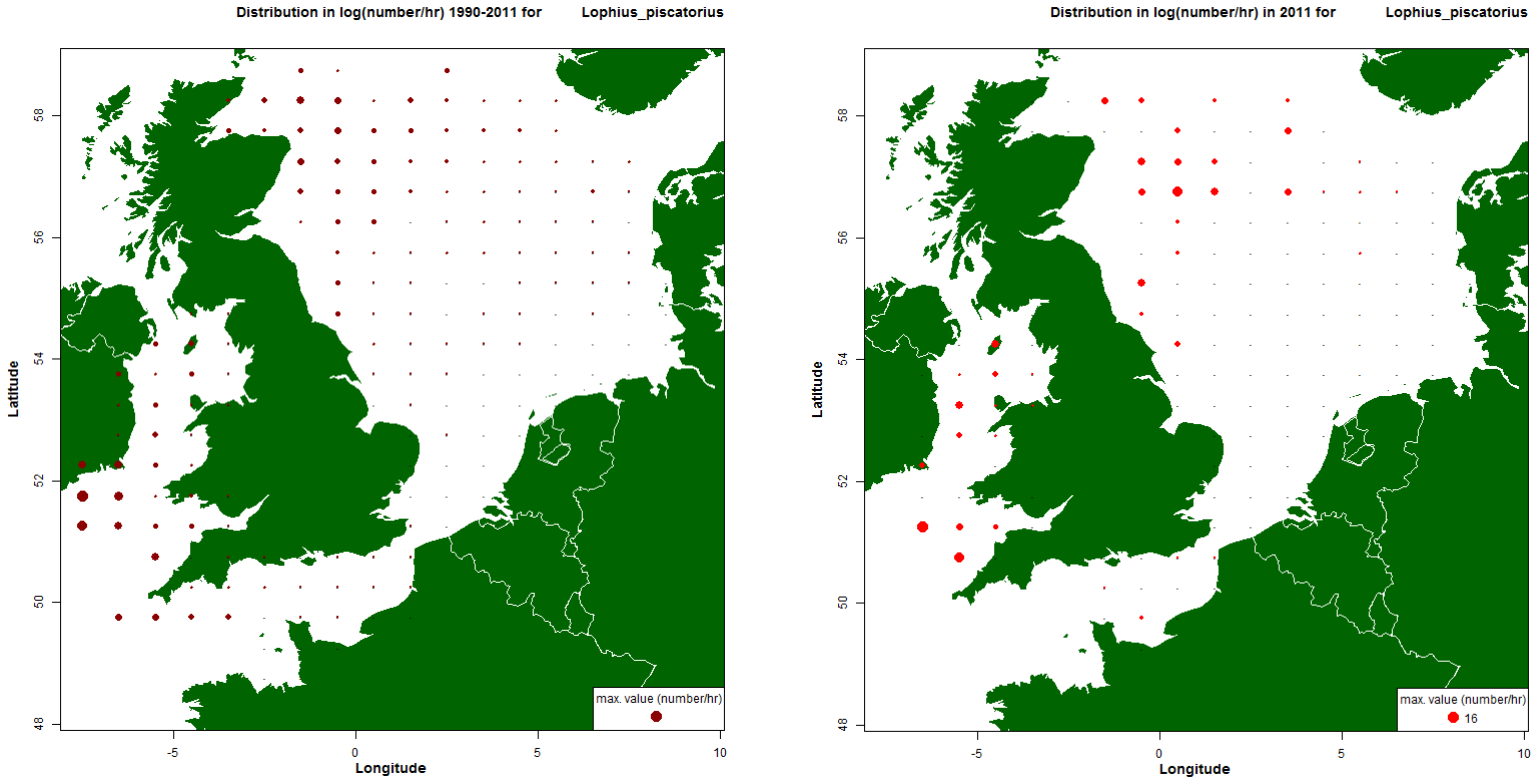




Annex 6.2.24: International offshore beam trawl survey 1990–2011

Catches are number/hr/8m beam; left plot mean of time-series, right plot current year

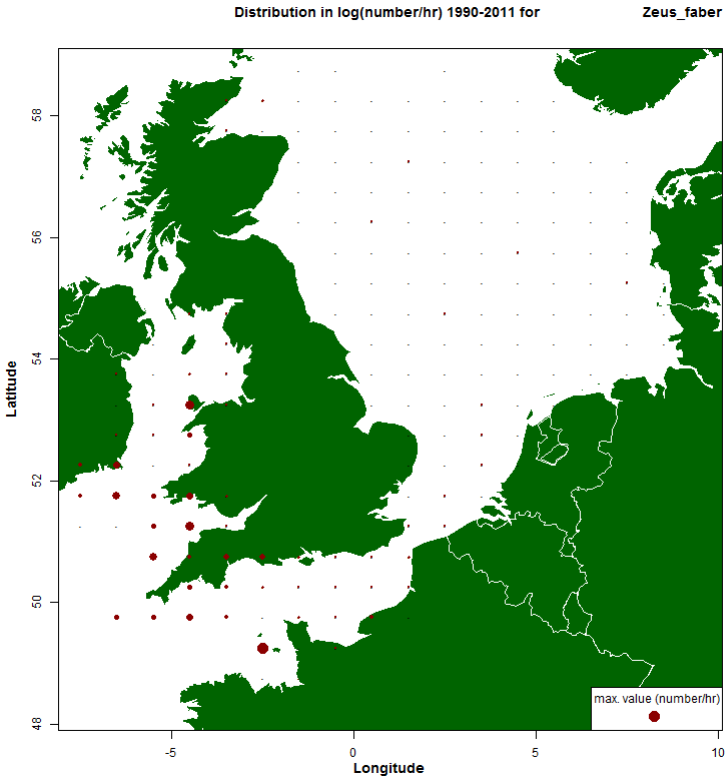
Monkfish

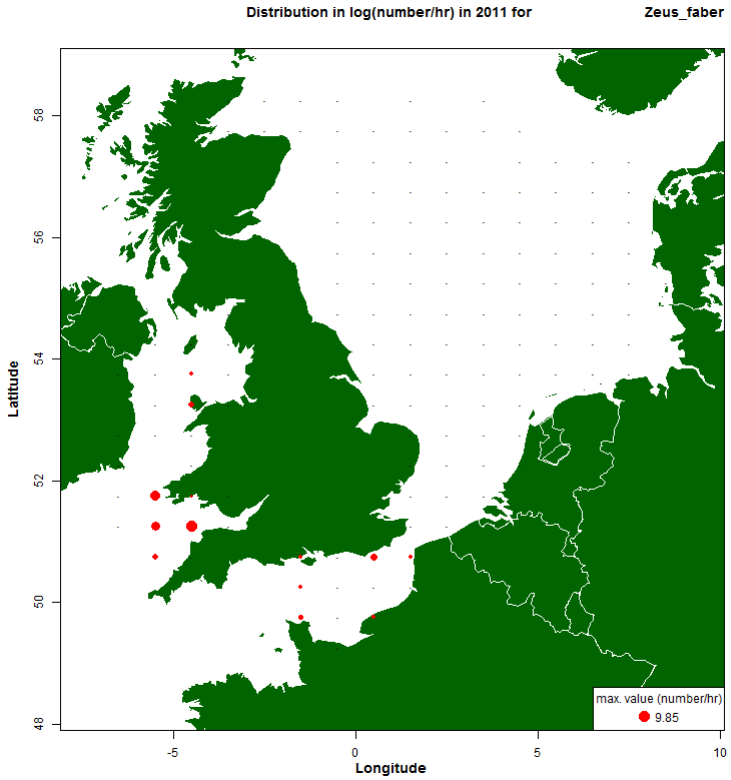


Annex 6.2.25: International offshore beam trawl survey 1990–2011

Catches are number/hr/8m beam; left plot mean of time-series, right plot current year

John Dory

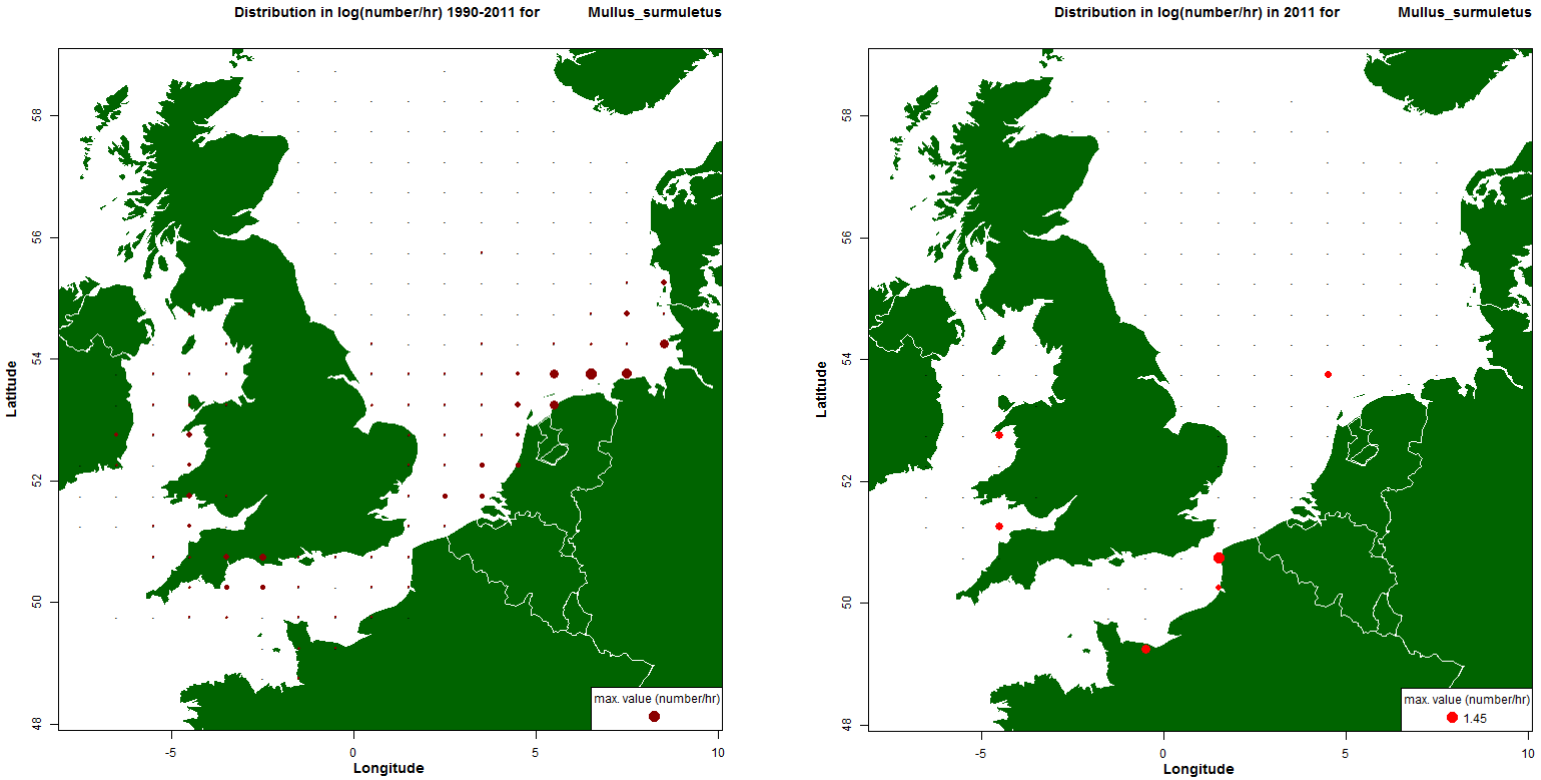




Annex 6.2.26: International offshore beam trawl survey 1990–2011

Catches are number/hr/8m beam; left plot mean of time-series, right plot current year

Red mullet



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.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Agonus cataphractus	42	30	35	32	55	30	23	28	21	27	34	50
Arnoglossus laterna	101	94	112	124	97	95	123	106	146	108	76	82
Aspitrigla cuculus	10	11	9	14	12	10	13	18	16	15	16	22
Buglossidium luteum	304	303	596	304	417	250	276	230	292	273	184	238
Callionymus lyra	188	103	124	164	155	97	111	128	138	99	118	121
Echiichthys vipera	57	17	33	20	25	18	23	19	28	21	12	18
Eutrigla gurnardus	50	48	33	48	50	45	64	64	60	34	24	40
Gadus morhua	11	5	2	1	8	7	5	2	2	3	5	2
Hippoglossoides platessoides	2	1	1	1	11	2	2	2	1	2	1	3
Limanda limanda	724	758	634	1271	1168	801	789	638	677	660	970	724
Lophius piscatorius	1	2	4	2	2	3	1	1	1	1	1	3
Melanogrammus aeglefinus	3	6	1	7	17	10	23	3	1	6	4	10
Merlangius merlangus	60	80	65	83	207	118	144	57	102	71	55	111
Microchirus variegatus	37	28	31	28	38	20	34	35	45	34	24	52
Microstomus kitt	8	10	11	14	12	7	5	5	4	5	6	8
Mullus surmuletus	1	1	1	1	1	1	2	1	1	1	0	
Platichthys flesus	1	4	1	2	1	2	1	1	1	2	1	1
Pleuronectes platessa	456	399	466	546	588	491	519	529	486	418	522	472
Psetta maxima	1	1	1	1	1	1	1	1	1	1	1	
Scophthalmus rhombus	1	2	1	1	1	1	1	2	2	2	1	1
Scyliorhinus canicula	27	38	35	32	62	38	49	40	44	60	55	95
Solea solea	93	62	51	56	66	31	32	32	34	29	19	26
Trigla lucerna	11	10	9	12	10	11	8	7	10	11	10	10
Trisopterus luscus	7	6	7	6	4	2	1	3	3	1	1	5
Trisopterus minutus	162	72	94	232	335	204	331	216	173	147	70	123
Zeus faber	1	1	1	1	1	1	1	1	1	1	1	1

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

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Agonus cataphractus	19	38	44	33	34	14	42	24	16	24	39	49
Arnoglossus laterna	8	7	9	12	22	10	18	29	32	29	30	34
Aspitrigla cuculus	12	13	9	14	12	8	8	8	15	12	7	8
Buglossidium luteum	84	90	89	119	155	94	195	185	140	148	202	79
Callionymus lyra	184	210	167	184	154	105	207	200	241	247	222	161
Echiichthys vipera	12	14	8	9	16	13	23	15	14	17	14	16
Eutrigla gurnardus	1	1	1	1	1	1	1	1	1	1	1	
Gadus morhua	1	1	1	1	1	1	1	1	2	1	1	1
Limanda limanda	35	62	64	92	69	28	99	41	40	146	68	98
Lophius piscatorius					1	1	1		1	1	1	1
Merlangius merlangus	3	2	9	1	6	4	1	1	13	14	22	25
Microchirus variegatus	9	17	12	19	14	10	14	11	19	16	20	13
Microstomus kitt	4	7	8	12	7	8	5	5	12	8	8	24
Mullus surmuletus	1	1	1	1	1	1	1	1	1	1	1	1
Platichthys flesus	5	4	8	9	8	7	8	4	6	15	4	3
Pleuronectes platessa	70	76	71	65	98	80	77	90	96	147	164	291
Psetta maxima	1	1	1	1	1	1	1	1	1	1	1	3
Scophthalmus rhombus	1	1	1	1	1	1	1	2	1	1	2	2
Scyliorhinus canicula	5	6	9	5	8	9	5	8	8	7	13	10
Solea solea	43	44	64	57	40	41	55	46	30	87	60	64
Trigla lucerna	2	3	3	5	3	2	5	6	5	8	7	6
Trisopterus luscus	20	67	15	139	60	46	50	57	54	30	11	27
Trisopterus minutus	40	54	45	79	105	60	18	52	55	29	17	18
Zeus faber	1	1	1	1	1	1	1	1	2	1	1	1

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

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Agonus cataphractus	1	1	18	1	19	2	1	1		1		
Arnoglossus laterna	1	6	82		85	4	2	6	5	6	1	
Aspitrigla cuculus	28	10	30	21	38	30	32	13	33	37	30	34
Buglossidium luteum	1	20	415	43	449	8	1	9	9	14	1	
Callionymus lyra	3	15	158	13	182	9	12	4	9	6	5	
Echiichthys vipera	1	1	6	1	6	1	1	1	1	1		
Eutrigla gurnardus	8	1	9	5	6	10	7	10	7	9	10	7
Gadus morhua	1	1	1				1	1	1	1	1	1
Limanda limanda	10	43	68	8	19	19	32	11	12	16	23	31
Lophius piscatorius	1	1	1	2	1	3	1	1	4	8	8	5
Melanogrammus aeglefinus							1		1	1	1	1
Merlangius merlangus	1	5	6	6	2	13	2	6	7	6	18	6
Microchirus variegatus	5	4	116	6	101	8	9	2	10	2	1	
Microstomus kitt	1	1	1	1	1	1	1	1	2	3	2	2
Mullus surmuletus	2	4	1	7	2	3	7	2	1	1	2	1
Platichthys flesus	1	1		1			1	1		1	1	1
Pleuronectes platessa	22	28	18	15	13	13	14	13	14	26	45	56
Psetta maxima	1	1	1	1	1	1	1	1	1	1	1	1
Scophthalmus rhombus	1	1	1	1	1	1	1	1	1	1	1	1
Scyliorhinus canicula	14	26	16	21	19	24	25	18	30	20	33	23
Solea solea	14	19	10	14	13	10	12	16	18	18	22	22
Trigla lucerna	1	1	1	2	1	1	2	2	3	2	3	2
Trisopterus luscus	1	1	6	10	4	3	6	3	11	7	13	5
Trisopterus minutus	5	6	56	16	75	27	9	5	13	6		
Zeus faber	1	2	1	1	1	1	1	1	2	1	1	1

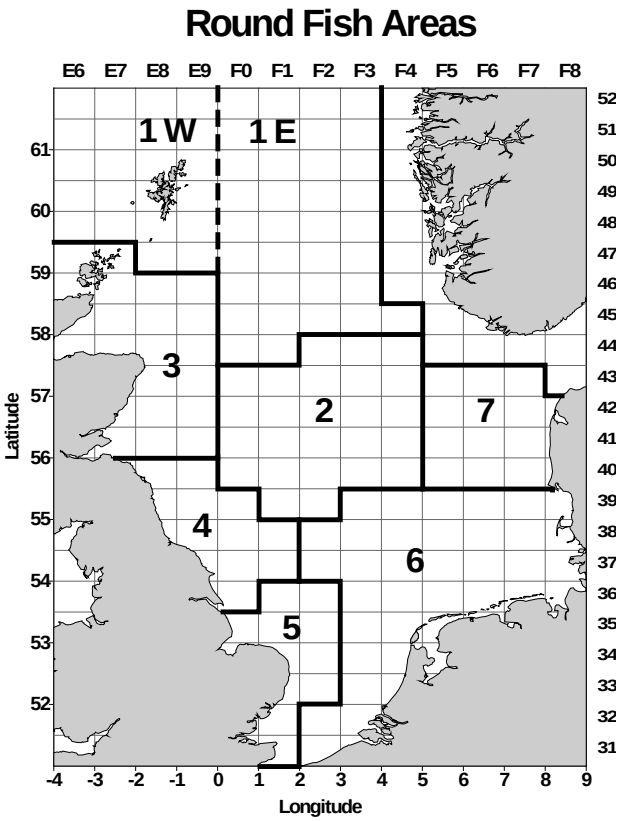
Annex 7 d): Abundance of fish species (per hour fishing) in subarea VIIf per year.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Agonus cataphractus	9	7	8	14	19	11	14	41	28	18	9	9
Arnoglossus laterna	3	4	4	9	10	13	8	23	11	13	17	7
Aspitrigla cuculus	5	11	11	12	19	8	6	12	1	11	6	5
Buglossidium luteum	184	153	125	197	460	486	196	438	248	188	222	143
Callionymus lyra	87	43	36	45	65	59	68	115	86	54	70	62
Echiichthys vipera	8	4	3	4	6	9	11	5	4	8	4	2
Eutrigla gurnardus	62	42	43	32	21	45	43	90	56	37	24	16
Gadus morhua	3	1	1		1	1	1	3	1	10	2	1
Limanda limanda	125	118	94	98	107	150	133	125	114	83	148	148
Lophius piscatorius	1	2	6	2	3	5	2	2	1	2	3	1
Melanogrammus aeglefinus	1		1	1	1	1	1	12		10	7	3
Merlangius merlangus	68	20	63	42	106	93	54	94	310	89	50	64
Microchirus variegatus	28	15	17	12	14	8	13	27	21	15	18	20
Microstomus kitt	7	9	17	21	19	11	16	26	11	10	12	9
Mullus surmuletus	2	3	1	9	2	15	6	2	1	1	1	1
Platichthys flesus	3	5	3	1	1	1	1	2	2	1	1	2
Pleuronectes platessa	69	58	49	38	58	48	41	48	56	63	85	111
Psetta maxima	3	1	2	1	1	2	1	2	2	2	3	2
Scophthalmus rhombus	4	1	1	1	1	2	1	2	1	1	1	1
Scyliorhinus canicula	47	37	47	24	98	33	67	74	78	60	61	76
Solea solea	313	165	128	120	156	97	104	86	155	105	91	111
Trigla lucerna	10	8	11	11	13	11	11	14	5	5	15	25
Trisopterus luscus	12	17	42	22	28	7	9	58	42	3	7	32
Trisopterus minutus	297	80	155	349	275	269	392	308	375	76	105	251
Zeus faber	2	6	3	3	3	3	2	2	2	1	2	5

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

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Agonus cataphractus		16	97	15	22	5	98	114	111	84	8	20
Arnoglossus laterna		1	12	11	17	16	33	16	22	5	19	24
Aspitrigla cuculus		3			2			2		2		11
Buglossidium luteum							37	2	9	4	14	4
Callionymus lyra	4	65	32	27	195	96	99	106	115	52	45	52
Echiichthys vipera						1		10		2		
Eutrigla gurnardus	8	87	46	61	23	47	63	130	142	64	65	41
Gadus morhua				1			1			1	1	1
Hippoglossoides platessoides			11	15	21	24			28	29	22	
Limanda limanda	4	92	40	39	15	76	66	100	162	107	87	33
Lophius piscatorius		3	6	9	6	5	6	4	5	8	9	9
Melanogrammus aeglefinus		21	29	3	8	100	54	301	19	76	73	25
Merlangius merlangus	308	167	47	53	145	118	21	238	482	22	5	46
Microchirus variegatus		80	133	57	153	49	44	34	59	24	9	54
Microstomus kitt		4	1	3	3	2	13	10	7	8	18	27
Mullus surmuletus								1			1	
Pleuronectes platessa	12	4	6	7	3	12	23	18	12	7	14	15
Psetta maxima	4	4	2	1	1	1	1	2	1	1	1	2
Scophthalmus rhombus						1	1	2		1		
Scyliorhinus canicula	8	139	207	20	47	46	48	100	110	112	57	63
Solea solea	28	81	16	33	37	33	33	40	16	29	39	26
Trigla lucerna				1		1	1			1		4
Trisopterus luscus			1	1		3			1			2
Trisopterus minutus	232	57	108	77	273	300	263	332	453	69	83	169
Zeus faber			3	1	3	3		2	2	1	3	5

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

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Agonus cataphractus	1	1		1	4	1		4	3	4	2	3
Callionymus lyra		1	1	1		1			2	1		
Eutrigla gurnardus	7	3	16	19	15	22	9	66	22	18	27	16
Gadus morhua	5	5	8	2	9	5	11	8	21	9	10	11
Hippoglossoides platessoides	150	101	116	142	218	180	189	212	187	223	122	99
Limanda limanda	73	68	54	98	111	83	29	37	103	140	68	121
Lophius piscatorius	4	1	7	12	4	3	3	3	6	5	7	2
Melanogrammus aeglefinus	132	56	58	24	48	39	91	82	85	82	83	42
Merlangius merlangus	66	11	34	11	35	4	8	11	6	11	15	12
Microchirus variegatus												2
Microstomus kitt	9	10	20	8	13	24	4	27	22	34	52	30
Pleuronectes platessa	8	7	5	11	4	17	3	6	21	29	22	34
Psetta maxima									1			
Scyliorhinus canicula				1		1		3	4	2	2	1
Trisopterus minutus			1	20	1	1	6	1	2	8		

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

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Agonus cataphractus	11	25	29	23	22	9	24	15	13	12	20	32
Arnoglossus laterna	3	3	20	34	37	8	9	21	21	18	20	26
Aspitrigla cuculus	20	12	20	24	32	19	21	11	10	45	40	6
Buglossidium luteum	36	30	111	149	172	60	91	74	54	63	78	36
Callionymus lyra	145	138	132	168	158	78	125	115	218	148	131	122
Echiichthys vipera	5	5	4	7	8	5	10	6	8	8	4	7
Eutrigla gurnardus	10	9	10	13	10	13	9	12	20	20	22	22
Gadus morhua	1	1	1	1	1	1	1	1	1	1	2	1
Hippoglossoides platessoides	49	46	67	64	38	33	50	35	97	50	40	48
Limanda limanda	62	114	152	146	117	69	142	114	230	228	153	82
Lophius piscatorius	1	1	2	1	1	2	1	1	1	8	9	1
Melanogrammus aeglefinus	21	14	6	5	3	2	9	2	5	1	6	7
Merlangius merlangus	4	5	6	5	3	5	3	2	4	6	15	6
Microchirus variegatus	7	12	59	85	73	11	13	7	17	12	14	12
Microstomus kitt	3	5	6	6	7	8	11	11	24	15	21	35
Mullus surmuletus	1	2	1	3	2	1	3	1		1	2	1
Platichthys flesus	3	1	1	1	1	1	1	1	2	1	1	1
Pleuronectes platessa	25	24	19	19	26	24	27	47	69	50	77	135
Psetta maxima	1	1	1	1	1	1	1	1	1	1	1	2
Scophthalmus rhombus	1	1	1	1	1	1	1	1	1	1	1	1
Scyliorhinus canicula	8	15	11	13	13	16	14	12	2	21	39	2
Solea solea	17	15	10	14	13	8	19	20	7	28	36	18
Trigla lucerna	2	1	1	2	1	1	3	3	2	4	4	3
Trisopterus luscus	13	35	8	79	30	28	35	34	22	22	14	22
Trisopterus minutus	30	20	49	125	73	43	12	21	30	15	8	9
Zeus faber	1	1	1	1	1	1	1	1	1	1	1	1

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

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Agonus cataphractus	24	18	25	22	33	17	21	26	24	23	16	29
Arnoglossus laterna	41	38	59	69	63	39	54	53	75	56	20	23
Aspitrigla cuculus	7	8	7	10	10	7	8	10	9	10	3	3
Buglossidium luteum	177	171	331	283	365	211	182	218	220	178	110	64
Callionymus lyra	98	72	91	119	117	60	77	96	107	68	42	68
Echiichthys vipera	26	11	15	12	16	12	16	12	15	13	8	13
Eutrigla gurnardus	34	32	27	34	31	31	42	52	47	31	14	15
Gadus morhua	5	2	2	2	5	6	4	2	2	4	1	1
Hippoglossoides platessoides	7	12	7	10	14	10	12	11	8	15	22	25
Limanda limanda	347	376	304	534	539	337	419	315	493	408	108	138
Lophius piscatorius	1	1	3	2	2	3	1	1	1	2	2	1
Melanogrammus aeglefinus	12	18	7	8	11	12	17	15	4	13	14	13
Merlangius merlangus	48	44	49	51	114	73	71	54	140	60	49	43
Microchirus variegatus	19	16	22	17	25	11	19	21	28	18	3	4
Microstomus kitt	9	11	14	23	16	12	12	13	14	10	14	41
Mullus surmuletus	1	1	1	3	1	4	3	1	1	1	2	1
Platichthys flesus	2	4	4	5	4	4	3	2	3	6	4	3
Pleuronectes platessa	212	195	215	242	283	209	248	247	258	256	190	303
Psetta maxima	1	1	1	1	1	1	1	1	1	1	1	1
Scophthalmus rhombus	2	1	1	1	1	1	1	2	1	1	2	2
Scyliorhinus canicula	20	24	32	20	50	25	40	36	43	44	15	11
Solea solea	106	73	71	69	75	52	56	45	62	65	48	64
Trigla lucerna	7	6	6	9	7	7	7	8	7	8	7	5
Trisopterus luscus	8	17	15	12	12	9	4	19	27	4	15	8
Trisopterus minutus	117	58	80	188	236	153	239	168	189	83	9	13
Zeus faber	1	2	1	1	1	1	1	1	1	1	1	1

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

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Agonus cataphractus	20	9	80	7	15	16	43	12	16	7	9	20
Arnoglossus laterna	15	19	11	31	23	92	37	38	57	48	56	24
Aspitrigla cuculus							1					
Buglossidium luteum	14	11	4	31	4	33	4	8	39	11	44	14
Callionymus lyra	39	21	20	22	19	74	52	61	57	27	73	58
Echiichthys vipera	9	6	16	55	53	5	13	7	11	258	42	10
Eutrigla gurnardus	44	81	29	32	48	110	99	68	80	35	106	84
Gadus morhua	5	3	13	4	9	13	4	6	2	10	1	2
Hippoglossoides platessoides	56	65	68	85	57	53	51	70	46	40	55	25
Limanda limanda	504	447	347	550	349	564	1467	774	866	634	166	184
Lophius piscatorius	1	1	2	1	1	1	3	3	1	3	1	2
Melanogrammus aeglefinus	32	34	16	11	6	7	10	4	2	2	6	6
Merlangius merlangus	73	38	72	63	17	22	37	13	33	14	44	43
Microchirus variegatus	1					1	1	1	1	1	1	1
Microstomus kitt	48	49	78	58	45	56	56	72	53	50	86	106
Mullus surmuletus	1		1					1				
Pleuronectes platessa	81	69	76	186	120	155	183	98	159	174	129	176
Psetta maxima	1	1		1		1	1	1	1	1		1
Scophthalmus rhombus	1		1	1	1	1	1	1	1	1		1
Scyliorhinus canicula					1		1		2			1
Solea solea	56	15	59	22	9	22	42	18	13	19	4	10
Trigla lucerna	1		1		1			1	1	1		1
Trisopterus luscus	19	5	49	4			8	7	1	1		
Trisopterus minutus	1	1	2		11	5		6	1	9		1

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

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Agonus cataphractus	26	37	16	24	27	17	32	20	24	6	30	49
Arnoglossus laterna	46	28	41	41	45	109	58	46	25	32	24	7
Aspitrigla cuculus	1	1	1	1	1	2	1	1	1		1	
Buglossidium luteum	98	48	64	59	27	73	62	53	18	31	25	9
Callionymus lyra	9	38	7	7	17	23	16	23	60	5	23	5
Echiichthys vipera	15	17	24	29	35	22	33	37	95	11	32	31
Eutrigla gurnardus	10	10	15	5	9	19	14	7	3	2	11	5
Gadus morhua	2	3	3	1	2	5	31	3	2	1	1	1
Hippoglossoides platessoides			1									
Limanda limanda	292	249	249	245	165	287	290	398	172	127	87	34
Lophius piscatorius	1			1		1		1		1		
Melanogrammus aeglefinus	1											
Merlangius merlangus	118	85	130	77	114	79	85	61	55	34	83	24
Microchirus variegatus		1	1	1	1	1	1	1	1	1		
Microstomus kitt	24	32	33	23	16	13	10	34	12	12	8	4
Mullus surmuletus	1	1	1	1	1	1	1	1	1	1	1	
Platichthys flesus	8	6	32	7	1	3	3	1	1	4	5	8
Pleuronectes platessa	68	65	117	78	51	86	63	65	72	46	100	30
Psetta maxima	1	1	1	1	1	1	1	1	1	1	1	1
Scophthalmus rhombus	1	1	1	1	1	1	1	1	1	1	1	1
Scyliorhinus canicula	8	5	20	7	26	4	19	14	29	21	29	8
Solea solea	192	146	163	245	127	249	288	190	117	121	122	67
Trigla lucerna	2	1	2	2	2	4	4	3	2	1	3	1
Trisopterus luscus	81	196	77	169	131	80	32	151	81	33	14	8
Trisopterus minutus	10	30	28	22	89	41	18	74	39	15	6	5
Zeus faber							1		1			

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

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Agonus cataphractus	44	60	86	59	44	23	26	37	71	31	25	21
Arnoglossus laterna	78	140	168	226	233	171	80	163	192	224	57	25
Aspitrigla cuculus	1	1	1	1	1	1	1	1	1	1	1	1
Buglossidium luteum	397	220	269	149	192	137	70	107	148	194	50	16
Callionymus lyra	64	68	124	95	65	37	64	83	106	61	45	22
Echiichthys vipera	37	74	41	61	55	37	45	39	55	22	14	54
Eutrigla gurnardus	44	25	37	36	36	49	27	26	23	19	33	23
Gadus morhua	3	2	1	1	1	3	3	6	2	1	3	1
Hippoglossoides platessoides	6	4	9	5	8	6	6	1	3	2	2	3
Limanda limanda	988	935	798	853	542	627	463	803	1156	907	424	98
Lophius piscatorius	1	1	1	1		1	1	1		1	1	
Melanogrammus aeglefinus	1	1	1	1	1	1	1		1	1	1	1
Merlangius merlangus	179	270	104	81	55	33	19	113	67	53	24	20
Microchirus variegatus		1			1	1	1					
Microstomus kitt	5	8	10	18	10	4	5	18	12	8	18	11
Mullus surmuletus	1	2	4	10	2	1	2	1	1	4	5	1
Platichthys flesus	3	4	4	5	6	6	3	5	6	4	9	7
Pleuronectes platessa	590	1209	759	501	451	463	379	575	616	895	278	114
Psetta maxima	5	3	3	4	3	3	3	3	3	2	2	2
Scophthalmus rhombus	2	1	1	1	1	1	1	1	1	1	2	2
Scyliorhinus canicula	1		1	1	1	1	1	1	1	1	1	1
Solea solea	40	42	75	34	16	17	44	34	33	31	41	19
Trigla lucerna	6	5	5	8	6	7	7	8	6	6	6	5
Trisopterus luscus	23	16	13	14	14	5	4	29	43	3	1	1
Trisopterus minutus	1	1	2	2	6	1	1	7	4	1		
Zeus faber					1	1	1	1	1	1		

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

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Agonus cataphractus	1	1		1	4	1		4	3	4	2	3
Callionymus lyra		1	1	1		1			2	1		
Eutrigla gurnardus	7	3	16	19	15	22	9	66	22	18	27	16
Gadus morhua	5	5	8	2	9	5	11	8	21	9	10	11
Hippoglossoides platessoides	150	101	116	142	218	180	189	212	187	223	122	99
Limanda limanda	73	68	54	98	111	83	29	37	103	140	68	121
Lophius piscatorius	4	1	7	12	4	3	3	3	6	5	7	2
Melanogrammus aeglefinus	132	56	58	24	48	39	91	82	85	82	83	42
Merlangius merlangus	66	11	34	11	35	4	8	11	6	11	15	12
Microchirus variegatus												2
Microstomus kitt	9	10	20	8	13	24	4	27	22	34	52	30
Pleuronectes platessa	8	7	5	11	4	17	3	6	21	29	22	34
Psetta maxima									1			
Scyliorhinus canicula				1		1		3	4	2	2	1
Trisopterus minutus			1	20	1	1	6	1	2	8		

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

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Aphrodita aculeata	242	52	79	154	82	46	52	93	40	66	32	66
Asterias rubens	83	127	213	1080	16	23	10	20	74	885	4	124
Astropecten irregularis	2846	1018	2853	9776	160	402	2292	948	447	308	12	74
Buccinum undatum	18	10	50	220	26	41	40	48	99	60	12	36
Cancer pagurus				16				8	6		4	4
Corystes cassivelaunus								4				
Echinocardium sp.	88	20	46	63	10			16				
Liocarcinus depurator	107	26	113	109	88	27	138	96	20	152	124	60
Liocarcinus sp.	56	11	67	42	20	48	23	96	33	125	20	31
Nephrops norvegicus	102	21	69	571	16	8	90	54				8
Ophiothrix fragilis			422	94		33			4			4
Ophiura sp.	142	57	98	154	14	36	32	318	373	229	100	94
Pagurus sp.	52	63	326	664	62	232	152	336	556	512	224	261

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

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Aphrodita aculeata	71	76	224	100	110	93	76	156	97	39	70	40
Asterias rubens	702	366	581	550	745	809	764	735	1031	904	156	99
Astropecten irregularis	2984	1874	1851	1757	3428	3456	5379	6785	13503	10634	1477	333
Buccinum undatum	101	104	164	121	241	373	335	364	458	544	128	88
Cancer pagurus	2		6	12	12	5	24	24	13	12	5	41
Corystes cassivelaunus	28	9	28	27	94	53	38	39	44	83	41	14
Echinocardium sp.	114	155	145	71	458	391	139	194	275	602	4	30
Liocarcinus depurator	11	222	493	103	268	341	286	144	397	517	360	61
Liocarcinus sp.	153	47	201	56	131	184	314	294	120	394	132	59
Nephrops norvegicus		59	50	12	19	4	4	5	12	4	11	4
Ophiothrix fragilis	438	104	1523	703	12	163	76	64	72	16	17	7
Ophiura sp.	95	43	121	49	60	32	41	53	38	80	20	33
Pagurus sp.	110	126	186	243	314	334	490	907	888	909	296	241

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

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Aphrodita aculeata	86	56	84	68	128	105	72	56	106	73	48	43
Asterias rubens	607	903	4998	2692	189	359	877	279	1119	591	158	144
Astropecten irregularis	294	384	460	720	191	653	876	184	195	208	131	105
Buccinum undatum	21	14	54	63	70	53	27	49	157	135	46	55
Cancer pagurus	4	3	48	52	13	10	32	16	12	10	8	7
Corystes cassivelaunus						16						8
Echinocardium sp.	31	58	368	16	10	16	418	331			4	16
Liocarcinus depurator	110	82	115	656	661	426	701	229	229	186	97	151
Liocarcinus sp.	62	35	235	273	606	370	168	138	228	229	89	95
Nephrops norvegicus	132	297	39	1170	131	1032	512	118		326	164	168
Ophiothrix fragilis	60	11	1808	2837	20	11	48	21	159	34	7	
Ophiura sp.	62	215	846	120	207	260	226	290	268	383	87	52
Pagurus sp.	147	69	195	571	429	277	213	584	953	681	520	491

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

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Aphrodita aculeata	115	65	136	38	80	81	82	86	158	115	104	130
Asterias rubens	590	186	885	583	168	1098	355	1219	1717	1689	231	473
Astropecten irregularis	1072	218	578	687	2445	1457	2281	1682	4242	1567	244	203
Buccinum undatum	763	24	169	62	22	86	94	178	66	106	59	73
Cancer pagurus	18	11	22	14	13	40	12	12	19	23	28	73
Corystes cassivelaunus	40	23	26	65	99	122	255	34	176	29	18	21
Echinocardium sp.	12	8	16		50	225	28	8			12	
Liocarcinus depurator			330	68	423	270	302	403	125	76	20	15
Liocarcinus sp.	529	108	542	220	1136	1143	601	1438	392	933	313	174
Nephrops norvegicus	6		16	32	4	4		4		4		
Ophiothrix fragilis	38507	11	373	61	276	133	94804	540	696	17	10	66
Ophiura sp.	101	35	259	58	121	46	70	306	360	148	94	111
Pagurus sp.	220	74	241	221	387	580	366	437	765	341	158	193

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

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Aphrodita aculeata	176	2	103	36	202	866	205	241	6		6	56
Asterias rubens	4697	4886	1405	1064	821	2069	1423	3743	408	5152	250	178
Astropecten irregularis	97		242	581	80	823	1956	4648	40	160	105	143
Buccinum undatum	60	6	67	44	158	588	780	164	11	96		2
Cancer pagurus	276	753	132	18	69	19	82	35	9	4	12	14
Corystes cassivelaunus	41	14	26	22	49	85	62	57	58	46	90	53
Echinocardium sp.	64	178	832	583	1761	1785	1141	5938		37		16
Liocarcinus depurator	2632	4510	211	421	202	496	771	1373	30	67	200	113
Liocarcinus sp.	2981	2234	3004	2706	3465	45443	7454	3256	512	3720	307	291
Nephrops norvegicus						431	490	2320		0		436
Ophiothrix fragilis	165	8	477	303109	8	117	228	187	2			
Ophiura sp.	431	53	13969	593	420	1482	47113	854	193	926	236	136
Pagurus sp.	320	43	199	138	147	373	630	634	228	243	72	172

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

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Aphrodita aculeata	375	329	281	453	280	331	495	51	121	156	48	55
Asterias rubens	10073	251	8981	7547	7211	5093	4012	5903	6441	4195	1484	134
Astropecten irregularis	4878	1508	13182	12222	10419	9274	8490	7222	9457	11438	551	192
Buccinum undatum	237	14	31	109	135	28	50	863	440	410	75	87
Cancer pagurus	14	3	73	26	18	23	36	28	23	14	33	31
Corystes cassivelaunus	254	94	214	600	436	496	348	160	378	265	60	18
Echinocardium sp.	526	186	1343	2810	1286	587	566	486	283	2069	34	26
Liocarcinus depurator	114	95	184	684	445	330	627	223	383	244	17	26
Liocarcinus sp.	3286	540	8604	14438	13200	32050	5762	9549	6389	7505	859	150
Nephrops norvegicus	1553	8	175	114	171	60	869	340	49	110	25	112
Ophiothrix fragilis	70	116	112	52	768	90	111	36	102	175	48	23
Ophiura sp.	5815	217	1870	1221	1232	1037	2679	1983	3037	3353	141	90
Pagurus sp.	440	58	317	382	227	269	210	457	542	522	45	91

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

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Aphrodita aculeata	174	281	407	166	369	58	380	147	75	80	171	90
Asterias rubens	425	195	475	2347	523	1073	466	459	612	3228	2089	161
Astropecten irregularis	2656	1323	2379	1916	2388	4142	11348	6853	8831	8162	4439	492
Buccinum undatum	209	89	357	261	166	223	240	222	109	139	270	75
Cancer pagurus	4	12	12	4	4	11	3	8	13	8	11	17
Corystes cassivelaunus	223	97	102	22	26	72	118	53	27	117	130	42
Echinocardium sp.	924	154	566	219	1774	656	501	333	134	10315	66	52
Liocarcinus depurator	106	69	207	300	509	166	68	325	452	396	41	62
Liocarcinus sp.	262	101	182	175	392	1268	366	823	813	1127	1279	121
Nephrops norvegicus	14	58	44	230	357	107	9	213	289	386	57	40
Ophiothrix fragilis	10	56	4	21	16	28					12	9
Ophiura sp.	239	112	238	274	278	66	27	98	104	49	121	63
Pagurus sp.	82	249	400	745	469	209	245	384	447	543	164	127

Annex 9 h): Abundance of epifauna species (per hour fishing) in Subarea 7a per year, using only core benthic stations (17 in all)

	2004	2005	2006	2007	2008	2009	2010	2011
Aphrodite aculeata	1136	420	672	644	364	648	264	804
Asterias rubens	15060	23980	22188	23268	17552	19728	19428	20428
Astropecten irregularis	1696	3968	1652	4844	2516	1824	1356	3312
Buccinum undatum	1148	1332	564	1396	2372	420	724	964
Cancer pagurus	180	124	156	104	68	244	88	204
Corystes cassivelaunus		16	4		64	12	4	16
Echinocardium sp.	108	236	236	364	408	764	760	1684
Liocarcinus depurator	948	592	1168	304	1492	880	832	764
Liocarcinus sp.	1888	1804	2804	3980	3096	6168	2144	3388
Nephrops norvegicus	628	428	1032	504	488	728	324	324
Ophiothrix fragilis	3492	16	224	224	80	1124	132	484
Ophiura sp.	1372	11256	2688	14392	25452	8028	5212	2916
Pagurus sp.	4176	1412	4664	4272	12368	2024	1240	1392

Annex 9 i): Abundance of epifauna species (per hour fishing) in Subarea 7d per year, using only core benthic stations (13 in all); No data collected in 2010

	2004	2005	2006	2007	2008	2009	2010	2011
Aphrodite aculeata	264	1492	148	668	452	620		620
Asterias rubens	15580	7452	4552	69460	63520	26284		26284
Buccinum undatum	1524	544	124	268	1236	1196		1196
Corystes cassivelaunus		4		8	4			
Echinocardium sp.	20	24	145600	508		692		692
Liocarcinus depurator	432	80	88	4240	10752	200		200
Liocarcinus sp.	10204	9404	11888	4684	12372	7804		7804
Ophiothrix fragilis	32396	133520	1073120	104204	1304	188756		188756
Ophiura sp.	2844	12	288	768	2176	1172		1172
Pagurus sp.	220	792	240	68	2536	416		416

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 a, d, e and f.

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
2010	2.462	54.811	10.707	2.027	0.774	1.252	0.143	0.122	0.005	0.027	0.089
2011	2.228	26.166	17.387	4.006	1.094	0.778	0.828	0.013	0.000	0.141	0.027

b) United Kingdom: sole (total numbers per km towed) Southern North Sea (IVc).

Year/Age	0	1	2	3	4	5	6	7	8	9	10+
1995	0.53	41.6	86.43	17.13	16.1	9.81	5.19	0.86	0.78	0	0.43
1996	3.33	75.48	52.47	22.89	8.98	8.33	8.77	1.3	1.81	0.73	2.22
1997	4.49	70.49	63.17	19.81	9.34	5.56	3.52	7.1	1.77	1.77	0.97
1998	7.91	10.59	63.34	15.71	1.77	0.89	0.86	0	0.44	0	0.22
1999	8.96	103.75	18.49	24.53	9.36	0.86	0.3	1.09	0.59	1.56	0.99
2000	3.22	192.51	157.89	15.03	14.08	7	2.6	0.67	0.37	0.91	3.01
2001	5.87	91.45	174.9	45.7	2.99	4.57	1.83	0.82	0.63	0.24	1
2002	2.22	125.78	47.31	33.28	21.97	3.61	4.39	1.79	0.9	1.15	2.38
2003	0.91	69.91	129.31	16.26	23.56	14.71	0.77	6.43	1.52	0.86	2.5
2004	24.63	58.65	57.77	50.15	12.46	10.14	8.58	0.65	2.15	1.15	3
2005	37.64	107.01	55.54	19.82	37.68	3.29	10.42	5.63	0.56	1.2	4.64
2006	7.02	202.5	82.19	20.64	14.03	35.2	6.72	9.17	5.34	0.36	3.83
2007	9.41	40.71	77.34	19.25	4.4	2.78	11.41	0.94	2.19	1.08	0.96
2008	1	98.84	59.97	39.34	13.45	0.63	3.41	10.73	2.55	1.79	1.32
2009	1.01	35.21	82.39	58.21	56.85	12.23	1.99	3.39	10.18	6.27	5.23
2010	1.43	77.97	67.96	24.52	22.62	17.47	7.01	2.16	3.34	1.36	1.97
2011	5.43	89.66	51.75	15.66	4.40	7.94	4.01	1.13	0.77	0.43	1.60

c) 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	0.7
1990		12.1	3.7	3.4	0.7	0.8	0.2	0.1	0.2	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	10	0.7	1.1	0.3	0.5	0.1	0.2	0.6
1993		0.5	17.5	8.4	7	0.8	1	0.3	0.2	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	7.3	3.2	1.3	0.2	0.5	0.4	0.9	0	0.7
1998		2	21.2	2.5	1	0.9	0.1	0.3	0	0.1	0.3
1999		28.14	9.44	13.17	2.51	1.73	1.28	0.16	0.93	1.07	0.47
2000		10.49	22.03	4.15	4.24	1.03	0.58	0.28	0.03	0.24	1.2
2001		9.09	21.01	8.36	1.2	1.91	0.54	0.57	0.35	0.04	1.01
2002		31.76	11.42	5.42	3.45	0.27	0.71	0.44	0.09	0	0.56
2003		6.47	28.48	4.13	2.46	1.58	0.3	0.39	0.2	0.07	0.52
2004		7.35	8.49	7.71	1.57	1.45	0.99	0.2	0.44	0.21	0.57
2005		25	5.04	2.86	3.47	1.63	1.02	0.66	0.06	0.31	0.35
2006		6.3	29.18	2.83	1.99	1.95	0.34	0.44	0.57	0	0.34
2007		2.14	21.86	12.9	1.22	0.8	1.2	0.32	0.17	0.59	1.02
2008		2.86	6.46	7.24	4.82	0.25	0.49	0.38	0.27	0.24	0.2
2009		30.54	13.33	5.44	4.34	3.76	0.37	0.2	0.31	0.23	0.48
2010		15.9	30.12	5.32	1.66	2.82	2.38	0.35	0.16	0.55	0.31
2011		11.92	23.54	11.56	1.25	0.57	2.56	0.60	0.16	0.21	0.06

d) 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+
1989	0	5	56	120	107	34	40	17	5	7	12
1990	0	23	52	76	31	24	7	15	3	6	11
1991	0	11	231	79	51	23	21	5	17	4	15
1992	0	5	140	316	44	36	12	7	5	11	11
1993	0	5	54	115	105	14	10	9	3	3	10
1994	0	6	47	106	62	44	5	5	2	3	7
1995	0	14	37	44	42	26	31	4	5	5	13
1996	0	28	112	67	25	32	20	17	3	2	9
1997	0	11	130	126	43	14	16	13	14	5	15
1998	0	11	141	114	76	22	10	14	6	8	11
1999	0	11	97	128	47	23	8	4	4	4	17
2000	0	12	136	70	52	23	16	5	3	5	9
2001	0	9	197	162	52	31	12	12	4	1	7
2002	0	6	37	113	48	27	6	3	2	0	12
2003	0	23	124	78	56	28	6	1	1	2	4
2004	0	16	110	120	24	15	10	16	9	4	4
2005	0	8	110	39	53	12	12	6	2	4	4
2006	0	5	120	95	26	37	10	7	9	0	5
2007	0	7	188	135	50	11	23	3	3	1	4
2008	0	10	85	158	77	40	2	14	3	6	7
2009	0	11	104	126	96	49	13	13	12	1	8
2010	0	20	175	154	84	59	31	20	7	12	14
2011	0	9	156	231	62	39	25	24	8	2	4

e) 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+
1993	3	201	379	51	23	1	2	2	1	1	2
1994	1	407	473	121	17	9	8	0	0	2	2
1995	31	142	255	60	13	7	14	1	1	1	4
1996	3	178	251	64	27	7	3	4	1	3	3
1997	37	498	207	21	13	14	5	3	6	0	4
1998	104	885	472	57	11	9	5	2	1	5	5
1999	29	2922	297	38	16	7	4	5	1	0	9
2000	16	1086	1608	37	26	6	0	2	1	1	4
2001	26	449	711	307	23	9	6	2	0	2	8
2002	9	786	283	151	121	14	7	2	3	0	4
2003	14	465	628	55	30	56	9	3	3	0	1
2004	64	860	434	99	15	22	42	4	3	0	5
2005	44	407	267	38	16	7	5	17	1	2	0
2006	13	324	238	47	16	8	0	2	12	0	1
2007	108	424	128	51	16	8	7	3	4	13	3
2008	6	1232	124	15	18	7	9	4	3	5	8
2009	1	604	377	29	8	10	4	3	3	2	11
2010	19	101	558	144	20	2	7	9	4	2	8
2011	22	596	62	163	82	8	2	7	3	0	6

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

Year/Age	0	1	2	3	4	5	6	7	8	9	10+
1993	0	78	320	158	208	28	16	5	14	39	27
1994	0	62	431	193	95	128	43	10	11	6	36
1995	24	246	154	253	110	30	67	12	5	5	24
1996	4	886	126	32	76	46	23	31	8	2	11
1997	5	1158	577	72	24	55	27	16	30	7	10
1998	2	539	716	292	18	6	24	23	5	18	9
1999	3	385	293	255	203	29	8	26	5	6	21
2000	0	354	464	147	219	91	13	2	13	6	24
2001	1	91	284	192	65	96	64	6	3	12	11
2002	0	205	61	121	126	42	79	49	2	1	19
2003	0	242	210	51	97	81	40	43	26	1	13
2004	0	406	240	119	27	77	45	41	17	19	11
2005	0	53	165	69	25	13	35	25	4	6	17
2006	0	107	110	90	45	36	9	16	15	10	20
2007	0	125	93	49	57	41	11	4	6	12	22
2008	0	126	125	60	21	43	23	6	2	9	17
2009	0	57	150	68	39	23	30	12	7	1	16
2010	0	25	59	73	37	16	5	10	9	3	6
2011	0	89	35	62	68	35	12	4	13	6	11

Annex 10.2: Catch rate of plaice from Netherlands and UK surveys in the North Sea and VII

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

Year/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
2010	814.363	261.097	84.254	34.244	20.178	4.662	2.162	3.464	0.207	2.547	1.232
2011	323.428	486.157	148.217	55.305	20.065	12.903	3.945	2.243	2.263	0.232	0.906

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	-	1.643	6.021	4.451	2.903	2.039	1.566	0.721	0.415	0.190	0.468
1997	-	0.221	7.119	9.127	3.252	2.105	1.523	0.401	0.819	0.354	0.429
1998	-	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	-	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	-	26.571	23.735	19.551	23.175	4.900	10.147	1.974	3.786	0.323	5.471
2008	-	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
2010	0.644	26.180	35.716	34.561	30.093	13.412	5.695	12.234	2.744	6.362	7.706
2011	0.174	41.881	71.478	41.593	28.462	31.670	14.284	5.501	11.881	1.172	12.890

c) Netherlands: plaice (N.hr^-1/8m trawl) North Sea (IV) Combined with gear correction (RV "Isis" and RV "Tridens").

Year/Age	0	1	2	3	4	5	6	7	8	9	10+
1996	102.136	143.896	99.623	13.280	4.266	3.035	1.653	0.676	0.442	0.214	0.457
1997	24.190	386.840	28.679	14.886	4.010	2.042	1.538	0.428	0.797	0.327	0.407
1998	96.333	131.191	177.631	25.463	7.266	2.500	1.355	0.955	0.808	0.323	0.549
1999	100.264	116.989	53.597	96.348	6.493	3.005	1.926	0.659	0.756	0.314	0.355
2000	81.459	108.393	38.887	22.880	23.680	3.017	1.725	1.113	0.797	0.219	0.526
2001	297.375	80.296	39.788	15.695	8.754	9.300	1.079	0.624	0.420	0.511	0.602
2002	87.786	217.276	26.709	14.029	7.616	4.794	4.643	0.754	0.765	0.385	0.943
2003	87.985	53.579	94.429	15.858	10.305	5.361	3.081	4.007	0.732	0.760	1.534
2004	80.357	101.411	30.306	51.218	11.212	4.961	2.885	1.538	3.402	0.391	1.347
2005	106.916	70.845	45.646	13.806	20.392	3.035	6.942	1.568	0.571	3.570	2.435
2006	97.992	54.855	42.922	29.187	11.748	12.052	2.106	3.938	0.844	0.767	3.258
2007	115.922	139.391	44.429	24.594	26.579	5.681	11.685	2.091	3.947	0.364	5.558
2008	143.963	98.909	89.736	33.838	20.735	20.605	6.330	13.054	2.727	6.718	8.618
2009	219.268	170.840	76.528	54.059	21.482	12.834	12.192	3.139	10.254	1.585	7.941
2010	326.437	144.792	69.544	47.943	40.349	17.914	6.845	15.841	3.179	8.306	8.876
2011	120.520	226.465	125.987	58.138	32.752	33.174	15.090	5.808	11.940	1.124	12.808

d) United Kingdom: plaice (total numbers per km towed) Southern North Sea (IVc).

Year/Age	0	1	2	3	4	5	6	7	8	9	10+
1999	1.5	24.45	2.51	3.79	0.50	0	0	0	0	0.25	0
2000	13.25	26.33	3.68	0.25	2.92	0.33	0	0	0	0	0
2001	23.00	48.10	21.90	0.50	0.50	0.25	0	0	0.25	0	0
2002	1.07	42.40	1.87	1.07	0	0	0.27	0	0	0	0
2003	11.29	28.08	31.69	0.94	0.24	0.24	0	0.47	0	0.24	0
2004	0.95	6.29	0.95	1.33	0	0	0	0	0.19	0	0
2005	1.31	25.85	9.49	0.36	0.44	0	0	0	0	0.36	0
2006	2.49	16.02	1.72	0.22	0	0	0	0	0	0	0
2007	0.35	13.46	3.6	0.42	0.05	0	0.24	0	0	0	0
2008	0.80	66.24	11.07	1.60	0	0.80	0.80	0	0	0	0
2009	7.87	44.73	9.6	1.6	0	0	0	0	0	0	0
2010	4.86	18.72	4.27	0.57	0.29	0	0	0	0	0	0
2011	9.14	36.76	6.27	1.10	0	0	0	0	0	0	0

e) 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	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	0.8	0.4
1991		11.8	9.1	7	5.3	5.4	3.2	1.2	1	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	1.7	1.9	1.6	2	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	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	3.1	0.3	0.2	0.2	0.1	0	1
1999		11.3	14.1	15.9	2.9	1	0.2	0.1	0.3	0.1	0.9
2000		13.2	21	14.4	13.8	3.5	0.9	0.6	0.2	0.4	1.5
2001		17.9	13	10	7.1	10.9	1.9	0.5	0.3	0.2	1
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	2.9	1.6	0.8	1.8	0.6	0.1	0.3
2004		36.2	15	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	0.8	0.3	0.1	1.1
2008		30.3	26.5	7.2	3	2.3	1.1	0.5	0.4	0.1	0.3
2009		71.6	42.9	19.1	5.7	3.2	2.2	0.8	1.2	0.4	1.3
2010		65.25	63.83	17.27	8.9	3.04	1.9	1.38	0.3	0.36	0.89
2011		105.55	95.31	35.70	9.25	6.68	2.82	1.40	0.19	0.57	0.95

f) 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+
1989	0	31	70	281	188	23	11	14	8	6	18
1990	0	25	38	220	87	75	2	6	1	6	7
1991	2	22	27	63	79	62	41	9	0	1	3
1992	0	152	44	72	24	40	20	17	3	5	4
1993	0	21	70	60	24	13	25	13	11	2	2
1994	0	34	32	98	30	10	2	9	13	8	2
1995	0	50	46	45	48	12	4	5	6	1	4
1996	1	33	106	30	17	25	5	1	3	7	8
1997	0	53	122	197	24	6	12	7	1	1	7
1998	0	81	125	125	85	9	6	7	4	0	3
1999	1	38	44	182	53	30	3	2	6	4	2
2000	0	47.93	62.76	125.38	178.56	38.11	22.18	1.08	2.00	0	5.00
2001	20.50	31.88	63.69	50.99	111.35	97.44	24.54	12.61	0	3.00	5.00
2002	0	138.00	101.55	86.58	23.20	23.47	39.87	5.33	2.00	0	2.00
2003	0	28.83	137.32	59.84	50.14	4.50	18.06	27.08	7.22	0	2.00
2004	0	11.00	32.50	59.84	23.00	10.00	3.00	1.00	10.00	0	4.00
2005	1.50	30.43	75.41	90.88	69.82	12.88	3.20	2.67	5.25	2.20	2.75
2006	0.00	55.00	102.40	103.05	30.39	31.19	2.67	3.80	0.00	4.50	2.00
2007	0.00	37.00	91.15	120.53	33.79	27.03	6.00	5.50	0.50	2.50	4.00
2008	0.00	14.92	145.77	67.61	30.87	12.00	7.83	9.50	3.50	1.00	4.00
2009	3.00	16.17	156.37	213.65	29.13	14.63	10.94	8.00	4.61	1.00	2.50
2010	14.00	184.25	350.81	224.27	112.75	31.05	15.05	16.50	1.00	3.33	4.00
2011	0.00	207.99	578.76	351.47	94.41	54.86	8.75	8.27	3.00	1.00	6.50

g) 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+
1993	4	121	107	43	2	5	0	1	0	0	0
1994	150	131	39	19	10	1	0	0	0	0	0
1995	1	275	103	19	3	8	2	0	0	2	0
1996	10	265	342	37	1	3	1	0	0	0	0
1997	8	259	117	40	5	2	2	1	0	0	0
1998	6	273	145	54	10	2	1	0	0	0	1
1999	192	181	94	34	23	8	0	0	2	0	0
2000	100	403	75	37	8	7	0	1	0	0	0
2001	42	251	185	19	10	5	4	2	0	0	0
2002	1	162	208	95	7	7	2	4	1	0	0
2003	72	117	95	72	26	3	2	1	1	2	0
2004	188	297	38	31	15	3	1	1	3	0	2
2005	3	228	89	25	10	13	3	1	0	0	1
2006	96	102	121	41	11	2	11	0	3	1	0
2007	41	178	109	56	18	2	3	1	2	1	0
2008	7	167	257	57	19	6	1	3	0	0	1
2009	222	192	66	93	25	13	5	2	0	1	0
2010	170	393	105	31	47	8	5	1	0	1	2
2011	10	433	353	63	24	27	18	3	3	1	0

h) 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+
1993	7	1007	836	111	90	11	5	9	2	1	6
1994	100	736	642	339	63	29	12	16	9	2	9
1995	281	1283	387	179	84	16	18	0	1	3	8
1996	105	1701	601	124	74	49	9	11	1	2	8
1997	31	1363	668	322	65	50	23	8	7	0	7
1998	169	1167	767	212	95	34	23	14	3	1	7
1999	180	1189	965	344	113	38	17	7	7	4	0
2000	132	2112	659	298	141	73	22	7	3	3	5
2001	249	1468	663	218	130	89	28	10	7	6	4
2002	16	1734	1615	647	243	79	51	16	17	5	7
2003	258	1480	1842	827	296	122	62	39	10	4	4
2004	218	1816	1187	1184	404	261	57	57	14	4	3
2005	288	869	1295	666	499	297	111	17	17	9	11
2006	485	1120	840	722	411	178	83	59	16	15	6
2007	186	2667	1255	525	417	196	95	45	37	6	10
2008	439	1293	1900	619	339	244	76	55	33	5	0
2009	150	1460	1083	1225	310	189	251	65	31	20	13
2010	499	1912	1431	600	460	187	142	98	61	35	35
2011	232	2213	1432	663	315	347	122	101	87	71	74

Annex 11: Area definitions and surface area data for the German DYFS and Dutch DFS inshore surveys

The area definitions for the German DYFS and Dutch DFS are presented in the Figure 1. These definitions are an approximation of the old figure (see WGBEAM 2006 report) and were used to estimate surface areas using GIS techniques (see WGBEAM 2007 report). The surface area estimates, by area and depth class, are presented in Table 1. The selection and aggregation of data for raising and weighting procedures in the calculation of the indices is presented in Table 2.

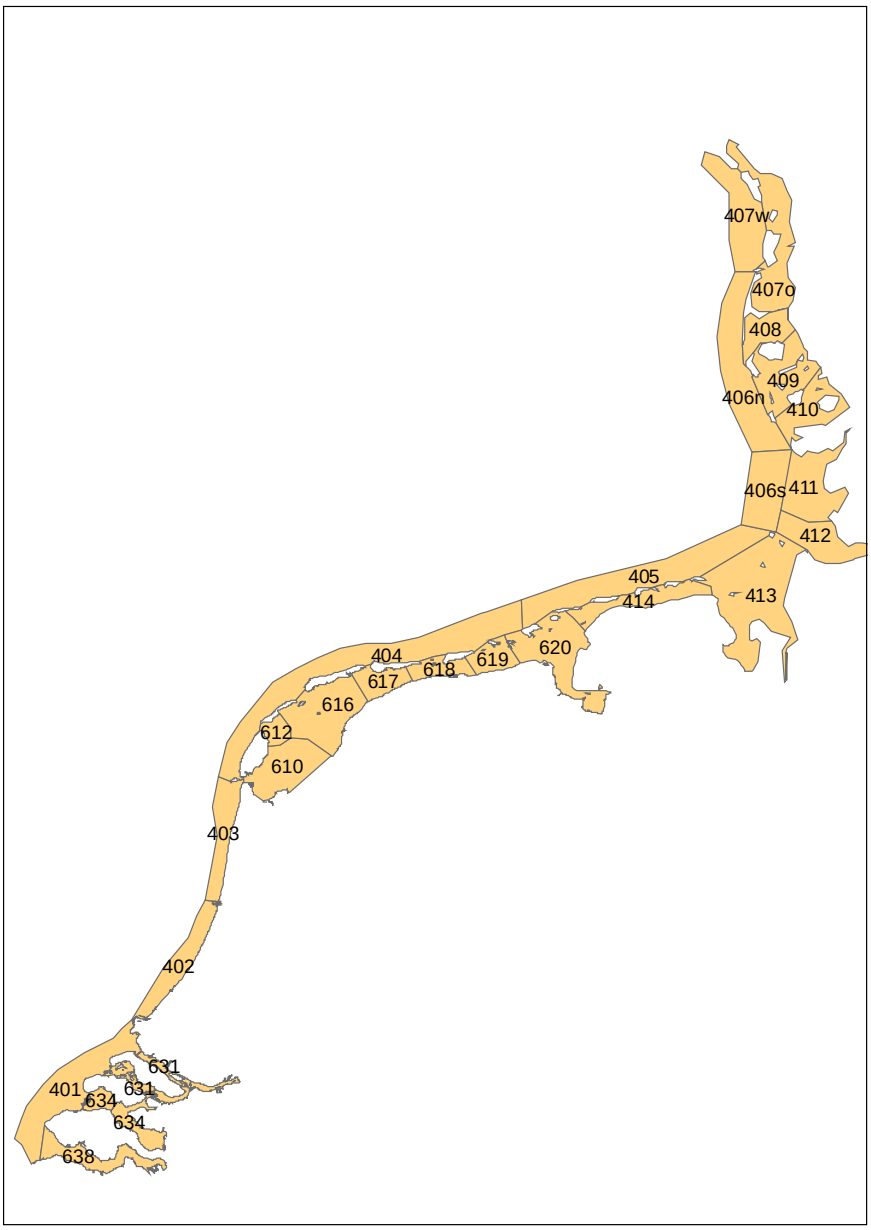


Figure 11.1. Area definitions for the Dutch DFS and German DYFS.

Table 11.1 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	10-15m	15-20m	20-25m	>25m	<LW	
401	0.3	329.7	370.2	192.1	58.1	28.0	7.1	985	986
402	0.0	44.0	78.3	174.2	199.4	3.1	0.3	499	499
403	0.9	50.8	92.5	176.3	121.7	18.9	4.6	465	466
404	6.4	275.6	420.1	393.8	484.9	132.4	0.4	1707	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	1275	1322
406n	4.3	246.4	322.4	489.0	14.3	1.0	0.0	1073	1077
406s	3.2	92.9	214.2	257.6	39.2	20.8	0.1	625	628
407w	0.0	193.1	323.5	214.3	5.5	0.2	0.1	737	737
German Bight	55	789	1132	1256	396	126	9	3709	3764
407o	0.0	767.4	26.9	15.4	3.7	2.2	0.8	816	816
408	158.5	118.3	19.5	7.6	1.8	0.3	0.1	148	306
409	323.0	184.8	47.2	18.2	10.8	4.6	0.2	266	589
410	233.2	83.3	39.4	32.6	8.9	2.0	0.2	166	400
411	324.3	220.3	56.8	21.3	1.3	0.0	0.0	300	624
412	198.3	126.2	93.9	46.0	24.5	5.1	0.6	296	495
413	740.1	325.8	161.2	106.6	50.7	12.0	1.6	658	1398
414	295.7	83.8	9.4	3.6	0.6	0.0	0.0	97	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	587	600
612	20.7	102.3	10.7	1.5	0.1	0.0	0.0	115	135
616	42.5	686.0	52.8	27.7	9.6	2.6	3.1	782	824
617	35.5	207.1	15.7	4.5	3.8	1.2	0.5	233	268
618	40.5	159.0	16.5	5.6	1.0	0.0	0.0	182	223
619	67.4	169.7	17.4	2.4	0.7	0.0	0.0	190	258
620	281.0	304.9	89.7	78.6	33.5	4.5	1.6	513	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	87	88
638	49.8	76.8	92.2	60.6	63.4	29.5	17.0	340	389
Scheldt estuary	51	116	104	73	74	36	24	426	478
Total	2888	5578	2925	2678	1507	392	60	13140	16028

Table 11.2 Surface area (km²) by region and depth class for the Dutch DFS and German DYFS.

Region	Area codes	Country	0-5m	5-10m	10-20m	>20 m	**Total**
Scheldt estuary *	634, 638	NL	167	104	147	60	478
Dutch Coast	401-404	NL	708	961	1801	195	3664
German Bight	405-407w	NL	843	1132	1653	136	3764
Dutch Wadden Sea	610-620	NL	2565	274	232	32	3102
German Wadden Sea **	408-411	DE	1646	163	103	7	1919

* excluding area 631 (sampled until 1986)

** excluding areas 407o, 412-414 (no, insufficient or inconsistent sampling)

Annex 12: Number of hauls by area and year for the Dutch DFS, German DYFS and Belgian DYFS

Annex 12.1. Dutch DFS

region	Belgian Coast	Dutch Coast				German Bight			Scheldt Est			Dutch Wadden Sea						
area_code	400	403	402	401	404	405	407	406	638	634	631	610	616	617	618	620	619	612
1970		11	11	6	22				26	31	13	23	24	16	10	20	12	
1971		13	9	9	19				30	29	4	25	28	14	8	22	12	
1972		11	15	8	20				28	29	5	18	25	11	10	20	10	
1973		8	9	8	19				31	30	5	18	24	11	9	22	9	2
1974		11	16	8	19				32	32	6	19	24	12	10	21	11	7
1975		10	11	8	19				26	31	4	21	25	14	9	21	10	7
1976									26	30	6	21	25	13	10	21	10	7
1977		9	16	10	23				27	28	8	21	26	13	10	21	11	7
1978		10	15	1	23	8	18	16	28	30	5	21	26	13	10	21	10	7
1979		8	15		13	7	19	18	28	28	6	21	26	13	10	21	10	
1980		10	7	9	26	7	23	16	29	27	6	21	26	13	10	21	10	7
1981		9	9	10	25	10		10	27	28	6	19	28	13	10	21	10	6
1982	3	9	8	18	28	14	6	21	27	28	6	21	26	13	10	21	10	7
1983		6	13	18	15	8	6	21	27	27	7	21	26	13	10	21	9	7
1984		8	13	23	31	15	4	22	27	27	6	22	25	12	10	21	10	7
1985		9	12	17	28	15	7	20	27	26	6	21	26	12	10	20	8	7
1986		9	13	17	28	15	5	21	27	26	6	21	26	13	10	21	9	7
1987		9	13	18	28	15	6	21	28	30		17	30	13	10	23	8	7
1988		8	14	18	29	14	5	22	27	24		21	26	13	9	22	8	
1989		9	13	26	28	10	6	23	30	40		21	26	13	10	23	8	
1990		9	13	25	28	15	6	21	29	39		21	25	13	11	23	8	
1991		9	13	16	28	15	6	21	31	31		23	25	13	10	24	10	5
1992		13	16	26	28	15	6	21	28	36		23	26	12	6	28		6
1993		9	20	22	28	15	5	21	27	31		23	27	14	11	29	8	
1994		13	16	21	28	15	6	19	33	35		24	26	12	10	25	7	
1995		9	13	17	25	14	6	22	33	41		31	23	15	10	26	9	
1996		10	12	17	29	14	6	21	33	43		28	28	15	10	27	9	6
1997		9	13	17	28	13			34	43		27	28	15	11	27	9	
1998		8	10	9					34	43		27	29	15	10	27	10	6
1999		8	14	17	14	1			35	43		28	31	14	13	22	10	
2000		2	7	15	17	10	6	19	43	45		42	26	15	11	26	10	
2001		5	13		28	15	3	19	49	45		28	27	14	11	26	10	
2002		8	13	21	26	14			41	44		27	26	13	11	26	9	
2003		9	14	16	28	15	6	18	36	42		29	27	13	9	26	9	
2004		4	13	17	19	15	6	17	31	41		28	27	14	10	27	8	6
2005		12	16	17	30	15	8	15	36	43		29	25	13	11	34	9	6
2006		10	14	15	28	15	6	17	36	41		28	28	16	8	29	9	7
2007		13	16	17	30	15	6	17	36	41		30	25	13	11	25	8	9
2008		8	11	16	19	11	6	4	37	41		30	24	12	9	30	9	7
2009		16	13	16	28	15	6	16	37	44		32	26	12	10	28	8	6
2010		15	13	17	26	15	6	16	36	41		31	24	13	10	28	6	6
2011		18	12	15	29	15	6	14	25	49		32	22	14	9	28	7	6

Annex 12.2: 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	
2010	13	21			22	7	52		20		13	
2011	10	1				16	17	31	16	31	19	

Annex 12.3: 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
2010	28
2011	31

Annex 13: Number of hauls by depth class, country and year for the Dutch DFS, German DYFS and Belgian DYFS

Annex 13.1: 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	5	16	11		1		9	32	26		7	1	18	26	13	12		
2004	4	17	8			4	1	21	28	3	8		18	17	14	21		
2005	4	18	9		1	1	2	35	29	9	7	2	17	16	8	20	1	
2006	8	10	13		2		3	27	31	6	2	1	14	18	5	19		
2007	4	16	11		1		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	
2010	2	11	13		2		3	31	29	8	9	1	17	15	7	21	1	
2011	6	14	10		1		1	29	34	10	1		3	18	5	17	2	

Annex 13.2: 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	
2010	41	56	19	2		84	27	3	
2011	53	49	15	1		82	43	4	1

Annex 13.3: 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
2010	15	19	32	11
2011	13	19	31	11

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 Coast (Dutch data)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Agonus cataphractus	16	19	5.7	15	4.6	6.3	13	77	110	26	67
Alosa fallax		0.05	0.39		1.2	0.25					0.52
Ammodytes sp.	5.8	11	7.2	3.5	23	27	58	32	23	38	32
Buglossidium luteum	55	32	166	160	134	144	170	126	192	43	116
Callionymus lyra	58	151	202	101	351	217	85	69	85	43	30
Clupea harengus	42	121	154	45	108	1237	122	45	14	45	41
Gadus morhua	10	2.8	1.7	6.4	2.5	13	5.9	2.1	2.4	1.2	1.8
Gobiidae	797	2436	7073	2511	3068	4303	2232	1389	4524	3072	2886
Hyperoplus lanceo-latus	1.1	3.2	9.6	4.8	4.3	1.5	3.6	5.5	3.5	2.5	3.3
Limanda limanda	274	223	1320	417	523	199	713	437	1697	188	188
Merlangius merlan-gus	164	241	75	130	36	40	273	97	133	105	87
Osmerus eperlanus		1.2	1.6	0.14	1.1	2.1	4.7		1.5	9.9	6.6
Platichthys flesus	1.2	16	3.1	2.5	1	1.5	4.6	5	4.2	4.2	3.4
Pleuronectes platessa	414	339	573	398	191	666	193	366	324	676	229
Solea solea	226	23	62	10	72	23	14	52	45	158	32
Syngnathus sp.	5.6	68	14	2.4	4.9	76	11	22	8.5	70	40
Crangon sp.	16636	28942	47496	21036	30097	46472	13105	35317	57722	48729	32310

German Bight

German Bight (Dutch data)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Agonus cataphractus	61	31	9.5	20	5.2	2	37	67	66	15	39
Alosa fallax			1.3		0.07	1.2					0.07
Ammodytes sp.	3.5	0.57	0.47	6.2	12	142	12	15	7	20	7.6
Buglossidium luteum	11	1.3	26	4	11	3	35	5.6	13	1.5	2.7
Callionymus lyra	55	4	36	59	16	37	53	36	15	11	13
Clupea harengus	9.4	0.43	4.4	13	0.39	35	6	42	8.7	46	14
Gadus morhua	57	0.21	1.8	12	4.8	5.2	21	3	11	3.4	1.4
Gobiidae	1130	581	1022	3007	1781	1476	552	390	1234	1012	5077
Hyperoplus lanceolatus	7.1	0.43	4.1	3.4	1.6	0.83	3	5	1.6	3.1	0.5
Limanda limanda	345	80	24	393	92	26	325	247	401	15	437
Merlangius merlangus	808	201	16	55	4.3	11	94	77	96	14	13
Osmerus eperlanus	6.3	0.93	7.6	42	39	43	24		28	176	144
Platichthys flesus	2.6	1.1	4.3	2.6	1.7	10	4.7	4	2.2	3.6	3.9
Pleuronectes platessa	559	78	284	163	103	127	130	176	456	121	267
Solea solea	4.5	11	4.7	2	11	4.1	1.8	14	4	3.3	0.77
Syngnathus sp.	4.5	163	47	12	28	18	2.2	13	14	11	244
Crangon sp.	19071	12105	27057	25414	40865	84103	14800	24763	28275	38611	60802

German Bight (German data)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Agonus cataphractus	4.5	7	1.4	2.4	0.25	0.06	118	1	3.3	9.7	9.7
Alosa fallax	0.02	0.1		0.04	0.09	0.06					
Ammodytes sp.	0.08	0.02	0.03		0.05			0.12	0.12	0.02	0.4
Buglossidium luteum	0.56	0.09	1	3		0.8			0.1		0.67
Callionymus lyra	2	1.3	0.79	2.4	0.11	3.8		0.88	1.1	0.02	5.2
Clupea harengus	1.5	0.75	0.05	0.38	0.07	0.26	1.6	39	0.54	0.57	29
Gadus morhua	1.2	0.01	0.02	0.02	0.03	0.2	5.2	0.07	0.53	0.08	0.8
Gobiidae	11	13	5.9	15	10	27	6	24	5.1	6.2	12
Hyperoplus lanceolatus	0.05	0.02	0.01		0.05	0.06		0.08	0.07	0.04	
Limanda limanda	21	5.4	1.7	17	2.3	2.1	4.5	3.7	2.9	0.54	6.5
Merlangius merlangus	12	1.2	0.4	0.08	0.04		13	1.7	3.8	1.1	11
Osmerus eperlanus	0.97	1.9	0.68	4.1	2.2	1.6	21	48	4.6	2.9	19
Platichthys flesus	0.12	0.37	0.15	0.18	0.06	0.13		0.59	0.2	1.6	8.9
Pleuronectes platessa	12	3.6	2.2	4.4	2.7	10	20	15	8.5	20	34
Solea solea	0.13	0.58	0.04	0.08	0.2	0.13		0.07	0.29		
Syngnathus sp.	1.8	3.9	7.4	9.9	5.6	3.6	4	27	1.5	4.1	8.3
Crangon sp.	683	1857	1126	2078	2092	6179	4756	3459			

Belgian Coast

Belgian Coast (Belgian data)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Agonus cataphractus											
Alosa fallax											
Ammodytes sp.											
Buglossidium luteum											
Callionymus lyra											
Clupea harengus											
Gadus morhua			0.12			4	10	0.58	0.43	0.39	1.5
Gobiidae											
Hyperoplus lanceo-latus											
Limanda limanda		29	83	93	30	11	343	404	167	143	157
Merlangius merlan-gus			74			53	1	223	133	203	135
Osmerus eperlanus											
Platichthys flesus									4.7	4.5	7.5
Pleuronectes platessa	48	165	74	115	82	33	85	76	121	43	120
Solea solea	190	320	43	234	142	38	39	9.2	111	155	29
Syngnathus sp.											
Crangon sp.											

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

Dutch Wadden Sea (Dutch data)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Agonus cataphractus	5.2	5.4	11	3.4	1.5	1.5	16	4.4	24	105	34
Alosa fallax	0.09		1.9	0.04	0.26	6		0.11			2.4
Ammodytes sp.	11	15	8.9	24	2.7	0.34	1.6	12	0.94	7	13
Buglossidium luteum			0.04								
Callionymus lyra	1.3	0.37		0.7	0.03	0.07	0.13	0.08	0.08		0.06
Clupea harengus	90	22	78	260	31	44	433	377	19	30	19
Gadus morhua	9.6	0.45	0.59	3.4	0.95	2.4	13	1.2	1.6	1.1	0.71
Gobiidae	574	272	252	1299	1236	111	346	256	415	481	478
Hyperoplus lanceo-latus	0.65	0.95	0.66	0.26	0.15	0.25	0.62	0.57	0.67	0.67	0.39
Limanda limanda	789	2.6	5.3	76	20	0.27	89	2.6	3	2.5	19
Merlangius merlan-gus	35	6.4	1.7	4.9	5.3	2	40	13	12	12	17
Osmerus eperlanus	49	55	16	14	132	82	82	103	21	205	62
Platichthys flesus	178	18	38	23	27	38	48	81	47	43	16
Pleuronectes platessa	552	131	546	237	176	396	214	333	124	363	76
Solea solea	74	105	21	34	183	60	56	48	72	71	80
Syngnathus sp.	83	306	295	114	260	19	11	81	24	151	16
Crangon sp.	80663	37291	55285	97350	72659	41510	42081	91125	70272	128306	59367

German/Danish Wadden Sea (German data)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Agonus cataphractus	2.5	5.3	5.5	2.5	1.9	6.3	71	9.6	8.8	13	33
Alosa fallax	0.03	0.07	0.07	1.1	0.17	5.2	0.05	0.05		0.01	1.7
Ammodytes sp.	0.28	0.15	0.33	0.19	0.15	1.2	0.72	0.62	0.47	0.04	0.27
Buglossidium luteum	0.1	0.04	0.22	0.06				0.28			0.16
Callionymus lyra	0.71	0.02	0.12	0.16	0.09	0.59	0.12	2.4	0.12	0.05	0.79
Clupea harengus	6.2	3.6	2.2	6.6	0.79	3.5	85	121	3.5	6.6	181
Gadus morhua	4	0.08	0.05	0.61	0.39	7.1	30	0.75	1	0.58	11
Gobiidae	30	50	61	69	93	151	57	40	83	42	33
Hyperoplus lanceo-latus	0.05	0.04	0.05	0.04	0.03	0.14	0.09	0.07	0.06		1.5
Limanda limanda	2.6	3.3	0.9	9.5	13	2.7	23	16	17	0.82	2.7
Merlangius merlan-gus	52	3	0.75	1.6	0.31	1.5	71	10	11	1.7	24
Osmerus eperlanus	17	14	22	29	21	64	91	221	45	24	115
Platichthys flesus	11	6.9	3.8	5.8	3.2	28	29	29	9.7	17	65
Pleuronectes platessa	92	20	39	35	25	248	138	132	94	69	60
Solea solea	0.49	1.1	0.34	0.51	4.2	5.8	5.1	2.4	2.7		
Syngnathus sp.	11	54	28	30	23	2477	28	53	42	17	35
Crangon sp.	3786	7253	7815	6768	12892	57778	13820	18089			

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

Scheldt estuary (Dutch data)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Agonus cataphractus	1.9	1.7	1.2	0.83	1.4	0.26	0.32	0.21	0.34	4	2.1
Alosa fallax										0.06	
Ammodytes sp.	0.55	0.47	0.38	2.5	1.2	1	0.39	0.7	0.33	3.1	0.2
Buglossidium luteum					0.51						
Callionymus lyra	7.3	12	3.7	3.9	4.5	6	1.5	0.29	0.35	0.28	0.1
Clupea harengus	147	80	116	26	10	40	39	77	40	26	3.8
Gadus morhua	0.25	0.51	0.06	0.05	2.1	0.58	0.71	0.34	0.14	0.1	0.14
Gobiidae	209	212	78	251	167	200	188	71	86	107	138
Hyperoplus lanceo-latus	0.21	0.05	0.15	0.17	0.29	0.37	0.35	0.35	0.47	0.46	0.26
Limanda limanda	37	19	2.4	10	13	0.07	28	5.2	18	1.4	1.7
Merlangius merlan-gus	3.8	0.14	1.5	1.8	4.4	0.77	5.6	3.8	1.7	2.7	4
Osmerus eperlanus	0.29	0.05	0.17	0.2	0.06	0.14	0.17	0.3	1.3	4.1	7
Platichthys flesus	8.4	5.7	3.1	3.7	1.1	1.4	15	33	24	20	9.6
Pleuronectes platessa	90	45	122	79	92	64	95	104	62	80	65
Solea solea	49	27	16	12	48	12	47	38	28	16	14
Syngnathus sp.	0.97	0.64	1.7	0.79	2.9	2.5	0.39	0.3	0.6	5.6	2.9
Crangon sp.	4825	2003	1796	1203	3957	2086	1485	1562	3574	6762	4398

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

Annex 15.1: Indices from the D(Y)FS inshore beam trawl surveys.

a) Plaice abundance indices in numbers per 1000m² (national) or numbers*10⁶ (combined)

	Plaice, age 0				Plaice, age 1		
	nl	be	de	combined	nl	be	combined
Raising	11.007	1.661	1.919		11.007	1.661	
Gear correction	1	1.22	1.22		1	1	
1970	8.843				5.809		
1971	20.313				1.558		
1972	7.089				4.004		
1973	6.764	1.209			7.668	0.015	
1974	6.121	0.010	14.380		2.215	0.295	
1975	9.701	1.005	9.020		2.866	0.126	
1976	15.046	0.193	37.090		3.919	0.070	
1977	7.652	0.126	39.120		4.156	0.148	
1978	21.015	1.471	26.370		3.608	0.132	
1979	21.784	1.485	22.210		5.651	0.630	
1980	13.076	0.109	21.480		12.346	0.533	
1981	46.391	1.688	34.300		9.633	0.115	
1982	25.790	0.487	6.370		15.210	0.474	
1983	35.123	0.662	26.410		21.881	0.559	
1984	30.685	0.450	6.010		5.672	0.187	
1985	53.906	3.764	5.510		4.354	0.149	
1986	17.824	1.598	3.380		14.316	0.814	
1987	35.897	3.157	13.460		11.427	1.802	
1988	33.658	0.718	14.930		6.339	1.768	
1989	26.621	0.380	19.090		4.269	0.126	
1990	34.515	2.387	23.590	439.974	5.518	1.208	62.746
1991	25.489	1.188	21.240	332.691	4.633	0.186	51.309
1992	15.326	0.314	4.720	180.380	4.066	0.201	45.087
1993	18.860	0.143	3.860	216.924	2.362	0.134	26.222
1994	23.898	1.025	7.710	283.170	0.636	0.326	7.544
1995	10.623	2.830	10.440	147.100	0.789	0.789	9.995
1996	45.345	14.348	41.770	625.977	0.426	0.220	5.058
1997	16.584	4.790	16.670	231.275	3.729	3.953	47.610
1998	*	3.009	8.110	*	*	1.745	*
1999	*	1.196	2.940	*	*	1.786	*
2000	8.953	1.478	10.280	125.605	0.162	1.100	3.615
2001	22.353	1.627	27.470	313.649	0.136	0.630	2.541
2002	10.013	4.734	1.120	122.427	0.088	5.284	9.741
2003	19.197	2.948	9.200	238.809	0.257	1.348	5.065
2004	9.787	4.843	4.700	128.537	0.592	2.158	10.097
2005	6.589	4.349	2.680	87.614	0.155	0.296	2.203
2006	14.230	1.240	3.997	168.497	0.143	0.792	2.885
2007	7.074	4.628	5.410	99.912	0.129	0.264	1.860
2008	10.691	4.243	2.230	131.490	0.067	0.763	2.009
2009	9.757	7.980	9.050	144.748	0.138	0.350	2.105
2010	12.807	1.276	15.600	180.077	0.073	0.580	1.762
2011	6.897	2.382	5.610	93.873	0.329	3.100	8.773

b) Sole abundance indices in numbers per 1000m² (national) or numbers*10⁶ (combined)

	Sole, age 0				Sole, age 1		
	nl	**be**	**de**	**combined**	**nl**	**be**	**combined**
Raising	11.007	1.661	1.919		11.007	1.661	
Gear correction	1	1.59	1.59		1	1.9	
1970	21.555				1.708		
1971	20.348				1.077		
1972	0.762				0.169		
1973	6.516	3.824			0.197	0.009	
1974	1.061	0.186	0.210		0.417	0.058	
1975	9.647	6.436	3.790		0.363	0.009	
1976	4.228	1.227	0.550		0.171	0.077	
1977	1.122	0.767	2.800		0.130	0.100	
1978	5.803	8.268	3.100		0.018	0.006	
1979	12.763	63.904	1.330		0.034	0.026	
1980	26.172	12.966	3.560		0.974	6.642	
1981	15.606	0.915	2.100		1.442	0.497	
1982	12.752	10.567	1.110		4.912	3.724	
1983	4.312	2.857	2.140		0.744	1.486	
1984	7.272	5.491	1.140		0.186	0.804	
1985	12.026	16.267	0.030		0.059	0.163	
1986	4.415	2.467	0.310		0.279	0.972	
1987	30.820	2.357	1.270		0.160	0.052	
1988	1.674	0.671	3.170		0.546	0.490	
1989	3.023	1.061	0.430		0.132	0.131	
1990	0.440	0.355	0.230	6.484	0.119	0.046	1.454
1991	14.521	2.165	0.870	168.207	0.015	0.005	0.186
1992	0.755	0.076	0.190	9.093	0.344	0.394	5.035
1993	1.263	0.249	0.120	14.929	0.024	0.025	0.348
1994	1.817	0.654	0.150	22.185	0.015	0.116	0.528
1995	0.284	1.714	0.090	7.921	0.075	0.094	1.128
1996	2.454	5.200	0.550	42.420	0.013	0.467	1.611
1997	2.141	1.403	0.030	27.369	0.248	0.821	5.325
1998	*	3.626	0.180	*	*	2.698	*
1999	*	2.135	0.100	*	*	0.435	*
2000	0.716	0.564	0.120	9.743	0.036	0.098	0.705
2001	2.648	9.867	0.050	55.360	0.032	0.666	2.450
2002	2.426	12.185	0.180	59.434	0.087	4.327	14.610
2003	0.618	0.754	0.100	9.094	0.087	0.439	2.343
2004	0.589	10.979	0.050	35.634	0.030	2.328	7.680
2005	2.245	6.100	0.990	43.839	0.032	1.329	4.546
2006	1.037	0.351	0.115	12.694	0.126	2.543	9.414
2007	0.863	1.698	0.050	14.140	0.013	0.231	0.875
2008	0.970	0.475	0.024	12.006	0.011	0.064	0.329
2009	1.224	5.866	0.310	29.906	0.035	2.109	7.037
2010	2.245	5.240	0.024	38.622	0.059	1.556	5.559
2011	0.981	0.444	0.070	12.185	0.143	1.009	4.755

*** No valid survey.**

Annex 15.2: Indices from SNS inshore beam trawl survey.

a) Plaice abundance indices in numbers per 100 hours fished

	Plaice			
	age group			
	1	2	3	4
1970	9311.368	9731.527	3272.977	769.727
1971	13538.483	28163.543	1414.688	100.825
1972	13206.903	10779.712	4477.829	89.111
1973	65642.504	5133.332	1578.221	461.359
1974	15366.398	16508.939	1128.838	160.004
1975	11628.230	8168.365	9556.302	65.238
1976	8536.534	2402.627	868.236	236.317
1977	18536.699	3423.843	1737.311	589.947
1978	14011.969	12678.032	345.465	134.778
1979	21495.430	9828.822	1574.911	161.222
1980	59174.156	12882.339	490.655	180.434
1981	24756.155	18785.306	834.420	38.321
1982	69993.328	8642.029	1261.036	87.857
1983	33974.181	13908.624	249.374	70.965
1984	44964.544	10412.798	2466.902	41.667
1985	28100.547	13847.837	1597.696	328.037
1986	93551.910	7580.403	1152.144	144.873
1987	33402.438	32991.107	1226.651	199.582
1988	36608.576	14421.140	13153.247	1350.132
1989	34276.253	17810.152	4372.837	7126.431
1990	25036.611	7496.000	3160.028	816.139
1991	57221.278	11247.222	1517.833	1076.833
1992	46798.224	13841.786	2267.598	612.976
1993	22098.315	9685.589	1006.278	97.778
1994	19188.431	4976.550	855.907	75.944
1995	24766.964	2796.381	381.327	96.994
1996	23015.391	10268.227	1185.155	44.714
1997	95900.889	4472.700	496.633	31.667
1998	33665.689	30242.247	5013.857	49.667
1999	32951.262	10272.083	13783.060	1058.214
2000	22855.018	2493.389	891.444	982.556
2001	11510.524	2898.476	370.167	175.833
2002	30809.227	1102.715	264.641	65.242
2003	*	*	*	*
2004	18201.602	1349.703	1080.686	50.778
2005	10118.405	1818.912	141.881	365.524
2006	12164.222	1570.978	384.722	52.444
2007	14174.543	2133.911	139.537	51.852
2008	14705.767	2700.438	464.129	178.500
2009	14860.033	2018.683	492.452	38.333
2010	11946.907	1811.517	529.338	55.476
2011	18348.596	1142.515	308.193	74.696

*** No survey.**

b) Sole abundance indices in numbers per 100 hour fishing

	Sole			
	age group			
	1	**2**	**3**	**4**
1970	5410.280	734.377	237.695	35.444
1971	902.697	1831.076	113.370	2.857
1972	1454.685	272.270	148.553	0.000
1973	5587.152	935.259	83.810	37.303
1974	2347.930	361.429	65.159	0.000
1975	525.425	864.480	176.960	17.500
1976	1399.429	73.556	229.111	26.667
1977	3742.944	776.101	103.838	43.091
1978	1547.714	1354.661	294.069	28.000
1979	93.778	408.273	300.838	76.889
1980	4312.889	88.889	109.333	61.333
1981	3737.200	1413.052	49.970	20.000
1982	5856.463	1146.204	227.778	6.667
1983	2621.143	1123.325	120.579	39.857
1984	2493.111	1099.911	318.322	74.433
1985	3619.435	715.602	167.074	49.333
1986	3705.063	457.607	69.235	31.429
1987	1947.852	943.704	64.815	21.333
1988	11226.667	593.833	281.611	81.533
1989	2830.744	5004.997	207.558	53.131
1990	2856.167	1119.500	914.250	100.444
1991	1253.620	2529.104	513.839	623.854
1992	11114.014	144.405	360.410	194.857
1993	1290.778	3419.571	153.778	212.778
1994	651.778	498.251	934.097	10.222
1995	1362.100	223.672	142.848	411.134
1996	218.359	349.085	29.600	35.533
1997	10279.333	153.630	189.819	26.470
1998	4094.611	3126.374	141.713	98.730
1999	1648.854	971.782	455.612	10.000
2000	1639.173	125.883	166.278	118.000
2001	970.310	655.357	106.667	35.476
2002	7547.460	379.044	195.300	0.000
2003	*	*	*	*
2004	1369.505	624.376	393.032	68.889
2005	568.083	162.917	124.000	0.000
2006	2726.417	117.083	25.000	30.000
2007	848.642	910.988	33.333	39.506
2008	1259.119	258.548	325.333	0.000
2009	1931.598	344.354	61.667	102.667
2010	2636.933	237.131	67.114	42.202
2011	1247.967	883.867	211.333	111.833

*** No survey.**