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Report of the Working Group on Assessment of New MoU Species (WGNEW)

5 – 9 March 2012



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Executive Summary

The ICES Working Group on Assessment of New MoU Species met at ICES Headquarters in Copenhagen, Denmark, during 5–9 March 2012. There were 14 participants from 7 countries. The main task of WGNEW is to provide information on the new species of the MoU between ICES and the EC: sea bass, striped red mullet, red gurnard, grey gurnard, turbot, brill, dab, flounder, lemon sole, witch flounder, Pollack, and Blue jack mackerel. For most stocks, this information includes total international landings and research vessel survey data that are indicative of abundance trends. The International Bottom Trawl Survey (IBTS) was used often along other internationally coordinated surveys. The IBTS is held annually in the first and the third quarter of the year.

In addition, the Working Group was asked to prepare the benchmark assessment for turbot and sea bass that is planned in October 2012 and to evaluate the stock structure for the stocks listed above. Below, the main conclusions are summarised per species.

Witch flounder (*Glyptocephalus cynoglossus*): This species is particularly important in the Skagerrak-Kattegat area where it is a valuable bycatch in fisheries by Denmark and Sweden. Two different assessment models were run in an attempt to assess witch flounder in IV and IIIa. The results of these methods were considered as an exploratory analysis. However, the estimated landings in the last years (2007–2011) are considered accurate, although discard were not included in the analysis.

Flounder (*Platichthys flesus*): In the North Sea flounder is a bycatch in fisheries for flatfish. The information on flounder was updated. A considerable part of the catch is being discarded; landings are 3000 to 4000 t. Mainly data for surveys are available. Recently a market sampling programme started in The Netherlands, the main country landing flounder. The abundance of North Sea flounder in the IBTS quarter 1 survey increased between 1980 and 1990, and decreased again. In the last four years, 2008 to 2011, abundance was high.

Sea bass (*Dicentrarchus labrax*): The main countries landing sea bass are France (2/3 of the European landings) and the UK. The WG collated a large amount of data in preparation of the benchmark, including landings data, tagging data, genetics data, and survey data.

Striped red mullet (*Mullus surmuletus*): Landings were around 1500 t in 1985 and have increased to around 5000 t in recent years. The majority of the landings are by France and most fish is caught in the Eastern Channel. For management purposes, two areas could be considered for this species: the north area (III, IV and VIId), and the south area (VI, VIIa,e,g,h,j-VIIIa,b and IXa)

Red gurnard (*Aspitrigla cuculus*): The species is mainly found in the Channel and on the shelf around the British Isles. Between 2001 and 2010 landings fluctuated around 4000 t.

Grey gurnard (*Eutrigla gurnardus*): Only survey data are available. The species is widely distributed in Western Europe. In a pragmatic approach, the population could be split between 3 Ecoregions: North Sea including VIId, Celtic Seas and South European Atlantic. Both in the North Sea and in Skagerrak-Kattegat the IBTS survey indicates an abundance increase since the late 1980's.

Common dab (*Limanda limanda*): Common dab is a very common flatfish in the North Sea, where it is probably also the species with the highest discarding rate. Landings from the North Sea are around 10 000 t. Survey indices, e.g. the IBTS quarter 1 survey, indicate an increase in abundance in the 1980s.

Brill (*Scophthalmus rhombus*): brill is mainly a bycatch in the fishery for flatfish and demersal species. Many data on surveys and landings are available, but age data only exist for several short periods. Most of landings come from the North Sea, where between 1000 and 1600 t are caught annually in the last 10 years. Due to time constraints no assessment could be made.

Turbot (*Psetta maxima*): Turbot is mainly a bycatch in the fishery for flatfish and demersal species. For turbot many data from surveys and landings are available, but age data only exist for several short periods. The North Sea accounts for the major part of the landings. In the North Sea, landings have been decreasing in the last 10 years from about 4000 t to about 3000 t annually. Like for sea bass, the WG collated data in preparation of the benchmark, including landings data, tagging data, genetics data, and survey data.

Lemon sole (*Microstomus kitt*): Lemon sole is a bycatch in several demersal fisheries. In the North Sea recent landings were 2500 to 4000 t. The IBTS index in the first quarter has increased between 1980–2000, and is now fluctuating at a high level.

Pollack (*Pollachius pollachius*): Pollack is mainly a bycatch in various fisheries. For several areas, these landing estimates are clearly incomplete and erratic. WGNEW proposes to distinguish three different stock units: the southern European Atlantic shelf (Bay of Biscay and Iberian Peninsula), the Celtic Seas, and the North Sea (including VIIId and IIIa). For most of the areas, very little information is available that can be used to infer stock trends. For Division IIIa (Skagerrak and Kattegat), the stock biomass of pollack is suggested to have increased from 1940 and to have reached a peak in the late 1950s. Since then the biomass has shown a decrease to reach a very low value around 2000.

1 Introduction

1.1 Terms of Reference

WGNEW has not met since October 2010. The WG TOR's for its 2012 meeting were:

- a) Re-evaluate the stock identity, based on the best available science for the list of species* below:

| BSS-COMB | EUROPEAN SEABASS IN THE NORTHEAST ATLANTIC |
|----------|--|
| czs-comb | Red gurnard in the Northeast Atlantic |
| gug-comb | Grey gurnard in the Northeast Atlantic |
| mut-comb | Striped red mullet in the Northeast Atlantic |
| ple-89a | Plaice in Subarea VIII and Division IXa |
| pol-89a | Pollack in Subarea VIII and Division IXa |
| pol-celt | Pollack in Subareas VI and VII (Celtic Sea and West of Scotland) |
| pol-nsea | Pollack in Subarea IV and Division IIIa |
| sol-8c9a | Sole in Divisions VIIIc and IXa |
| spr-celt | Sprat in the Celtic Sea and West of Scotland |
| jaa-10 | Blue jack mackerel (<i>Trachurus picturatus</i>) in Subdivision Xa2 (Azores) |
| whg-89a | Whiting in Subarea VIII and Division IXa |

* geographic definition for the stocks listed above is based on the 2011 advice, and should be revised based on conclusions from this ToR a).

- b) Address generic ToRs for Fish Stock Assessment Working Groups for the stocks in the table below. For stocks for which a specific ecoregion was identified in ToR a) the assessment and draft advice should be available to the respective ecoregion assessment expert group, for further improvements. For stocks with unclear stock identity, the draft advice should be available for ADGWIDE if the current stock definition is for whole ICES area, otherwise should go to the specific Ecoregion ADG.

- c) Prepare the benchmark for Turbot and European seabass in October 2012.

Material and data relevant for the meeting must be available to the group no later than 14 days prior to the starting date.

WGNEW will report by 30 March 2012 to ACOM and SSGSUE, WGNSSK, WGCSE, WGHMM, WGHANSA.

| FISH STOCK | STOCK NAME | STOCK COORD. | ASSESS. COORD. | ADVICE |
|------------|--|-----------------|----------------|--------------------------|
| tur-nsea | Turbot in Subarea IV and Division IIIa | Jan Jaap (NL) | N | Biennial 2nd year* |
| bll-nsea | Brill in Subarea IV and Divisions IIIa and VIId,e | Kelle (NL) | N | Biennial 2nd year* |
| dab-nsea | Dab in Subarea IV and Division IIIa | Kay (DE) | N | Biennial 2nd year* |
| fle-nsea | Flounder in Division IIIa and Subarea IV | Henk (NL) | N | Biennial 2nd year* |
| lem-nsea | Lemon sole in Subarea IV and Divisions IIIa and VIId | Sarah (UK) | N | Biennial 2nd year* |
| wit-nsea | Witch in Subarea IV, Division IIIa and VIId | France sca (SE) | N | Biennial 2nd year* |
| pol-89a | Pollack in Subarea VIII and Division IXa | ? | Y | Prepare advice for WGHMM |

| | | | | |
|----------|--|-------------------------|---|---|
| pol-celt | Pollack in Subareas VI and VII (Celtic Sea and West of Scotland) | ? | Y | Prepare advice for WGCSE |
| pol-nsea | Pollack in Subarea IV and Division IIIa | ? | Y | Prepare advice for WGNSS K |
| jaa-10 | Blue jack mackerel (<i>Trachurus picturatus</i>) in Subdivision Xa2 (Azores) | POR | Y | Prepare advice for WGHAN SA |
| bss-comb | European seabass in the Northeast Atlantic | Mickael, Sarah (FR, UK) | Y | Prepare advice for WGWIDE |
| czs-comb | Red gurnard in the Northeast Atlantic | Robert Bellail (FR) | Y | Prepare advice for WGNSS K, WGCSE, WGHM M |
| gug-comb | Grey gurnard in the Northeast Atlantic | ? | Y | Prepare advice for WGNSS K, WGCSE, WGHM M |
| mut-comb | Striped red mullet in the Northeast Atlantic | Kelig (FR) | Y | Prepare advice for WGNSS K, WGCSE, WGHM M |
| | Tub gurnard in all areas | ? | N | No advice |
| | John dory in all areas | ? | N | No advice |

* 2011 advice is valid for 2012 and 2013, time for further development for advice next year, unless sudden changes are found: then updated advice can be put forward.

1.2 Background

Tor a) is discussed in the individual chapters on the stocks in the report. This means that the stock identity of ple-89a, sol-8c9a, spr-celt, jaa-10, and whg-89a was not re-evaluated. For some stocks, scientific information was available to suggest management regions that are linked to stock identity. Generally, this information was based on otolith shape or population genetic markers. For other species, there was no direct scientific evidence to support stock structure delineation within the “current” subdivision of regions. However, in the case of stocks such as the gurnards now covering the entire Northeast Atlantic, it seemed unlikely that population dynamic processes span such a vast region. Therefore, these stocks were split in ecoregions. More information on the decisions taken on individual stocks can be found in the chapters of the individual stocks.

Tor b) The working group added the available information that could be used for advice in the advice drafting sheets. Generally, this information included landings

from different sources (estimates by national labs or official landings as reported to ICES) and survey CPUE series. The survey information was generally taken from DATRAS, and calculated from the exchange files. Additional information from scientific literature was added if available.

Given that for some species this was the first time that advice was given, a decision had to be taken on the frequency of advice. For all stocks, it was decided to propose biennial advice. This is in line with the advice for other “new” species given last year, and results in a two year cycle in which different stocks have to be dealt with each year. This will reduce the workload of the expert groups. For stocks that do not require advice in a certain year, the report only needs to be updated with the latest information on which the advice is based to evaluate if no sudden changes have occurred that warrant the reopening of advice.

During the working group, the means of managing WGNEW stocks was discussed. Currently the advice is generally phrased in terms of “reducing catches”. Many of the WGNEW stocks are bycatches in directed or mixed fisheries on other species. By translating “reducing catches” into setting or reducing TACs in the European fisheries context, the risk is that incentives are created for discarding these species without actually reducing catches. In that context, the effort reductions in management plans for target species in which these species are bycatches should be taken into account.

Tor c). Much data and information was collated in WGNEW that can be used in the benchmark for Turbot and European seabass in October 2012. WGNEW could thus be considered a data collection workshop for the benchmark. In the European Seabass and turbot sections, the data is presented, or at least its existence described. In the period between WGNEW 2012 and the benchmark, requests will be sent out to national labs to look into the contribution of additional data to the benchmark.

The working group decided that the best approach for this report would be to create or update stock annexes for the stocks, like is done in other assessment expert groups. These annexes are meant to gather all the knowledge for each species and include material previously included in the former reports. These stock annexes allow reducing the size of the report, and make general information about the stocks more easily retrievable.

2 Witch flounder in Subarea IV, Division IIIa and VIId

2.1 Stock definition

Witch flounder (*Glyptocephalus cynoglossus*) is a rather stationary species and the knowledge about stock identity is limited and based on old investigations (Molander 1935). As mentioned above Molander (1935) distinguished 2 stocks in IIIa and IV, one in the Kattegat and one in the North Sea and Skagerrak. However, as already reported by Molander in 1935, catches in the Kattegat are small and irregular and only at scattered places at depth between 30 and 100 meters. From IBTS survey, the analysis of the distribution of the catches showed a continuum from IIIa into the Norwegian trench and the Northern part of Subarea IV (Figure 2.1). Considering the results from IBTS, that catches in the Kattegat are sporadic and there are no firm indications of spawning grounds in this area, witch flounder is assessed as a single stock in Subarea IV, Division IIIa and VIId.

2.2 The Fishery

2.2.1 ICES advice and management applicable to 2011 and 2012

The advice 2012 for witch flounder is unchanged compared to 2011. The TAC for 2011 and 2012 was set for area II and IV and for lemon sole (*Microstomus kitt*) and witch flounder together and amounted to 6391 t.

2.2.2 Catches in 2011

Total landings and estimated catches are given in Figure 2.2 and Figure 2.3 for IV and IIIa, respectively. The total WG catch of all witch flounder in IV and IIIa in 2011 amounted to 1517 t. Landings in VII d are negligible.

In area IV, the total landings declined from about 2500 t in the middle of the 1980s to less than 1000 t in 2011. In the IIIa, the total landings also declined from about 2500 t in the beginning of the 2000s to less than 700 t in 2011.

2.2.3 Regulations and their effects

As a typical by-catch species, witch flounder has not been subject to any TAC limitations. There is no Minimum Landing Size (MLS) specified in EU waters. In some coastal areas of England and Wales MLSs are enforced and the landing of witch below 28 cm is prohibited. Also in Germany, Denmark, Scotland and Sweden the minimum landing size is 28 cm.

2.2.4 Fishing patterns

North Sea witch flounder is nowadays mainly landed by Denmark, Norway, Sweden and Germany in both areas (IIIa and IV) and UK mainly in Subarea IV. The Netherlands only show a small fraction of the total landings in subarea IV.

The Danish landings are taken in Skagerrak (IIIa) and in the Norwegian Deep (IVa East). At present, the majority of the landings are by-catches in mixed demersal trawl fisheries.

In Sweden, the fisheries where witch flounder are caught, apart from the witch flounder directed fishery, are mainly the *Pandalus*, and demersal fish fisheries.

In the UK fishery, witch flounder is mainly caught in IVa and IVb. Beam trawlers took a big proportion of landings between mid-1980's and mid 2000's. Recently, the majority of landings are by unspecified otter trawls, though some catches are from *Nephrops* trawls.

In Germany where flounder is mainly caught by otter bottom trawl, approximately 90% of the catches are taken with > 120 mm mesh opening. There are some minor catches with beam trawl and seine.

2.3 Biological composition of the catch

In 2009 witch flounder has been included as a mandatory species in the EU Data Collection Framework (DCF). Accordingly Denmark and Sweden started the regular sampling of biological data, i.e. length, weight, maturity status and age, in IIIa. Some additional length measurements have been collected during 2007–2008 by the Swedish Institute of Marine Research. Length data and length-weight relationship parameters were also available for UK samples since 2007.

German and Norwegian landings from IV and IIIa have been splitted into length classes using the Danish individual length information from the respective areas. Also Dutch landings in subarea IV have been splitted into length classes using Danish biological sampling in the same area.

The numbers at age in the landings as obtained by sampling of commercial catches is given in Table 2.1. Data are given for the whole year.

The numbers at length from the total landings in 2007–2011 (Figure 2.4) were converted into numbers at age using a statistical slicing method (described in Scott *et al.*, 2011) and an age length key (ALK; Figure 2.5) derived from otolith reading of the Swedish commercial samples collected during 2009–2011. For all countries, ALK for 2009 were used to split 2007 and 2008 landings into number at length.

The statistical slicing assumes that the distribution of the numbers at length is composed of a mixture of distributions representing the different cohorts (or age classes) in the population. The statistical method estimates the parameters of each distribution.

A range of fitting options are available including different statistical distributions (i.e. normal, lognormal and gamma) and the possibility of fixing some of the parameters according to the Von Bertalanffy growth function. Thus, each age class can be separated into a single distribution. Each distribution has three parameters π , μ and σ , where: π is the proportion of the total numbers assigned to a single age class, μ and σ are the mean and standard deviation of the mean length of each age class and the spread (assumed constant at 0.07) of the lengths within each age class. Three different distributions were fitted to the data: normal, lognormal and a gamma distribution. The fit of the different distributions can be compared by a reduced X^2 test ($X^2_{red} = X^2 / \text{degrees of freedom}$). The rule of thumb is that the larger the X^2_{red} the worse is the fit. The results of the X^2_{red} for the different distributions are reported in Table 2.2.

For witch flounder in IV and IIIa, the statistical age slicing was performed as follows: Age classes 2–9 were statistically sliced, while the age 1, 10 and 11+ plus group were estimated using the Von Bertalanffy growth function. As detailed information on when the catches were taken was missing, we assumed that all the landings were taken in the middle of the year (expressed as timing 0.5 in the slicing function). The

timing mimics the period in which most of the landings occurred during the year. The results for the lognormal distribution only are presented in Figure 2.6.

2.3.1 Data revisions

No data revisions were applied in this year's assessment.

2.3.2 Quality of catch and biological data, discards

As mentioned above, the regular sampling of biological data has only recently started accordingly to the DCF and it is conducted by some of the countries landing this species. However, age reading and maturity staging of this species are not straightforward. Concerning the otoliths, several techniques were tried by Swedish technicians in order to find the optimal one and obtained results are described in the previous WGNEW report (ICES, 2010).

The maturity assessment is also problematic. The reproductive period is uncertain (ICES, 2010) and histological investigation of gonads is planned at the Swedish Institute of Marine Research for the near future in order to delineate the spawning season and be able to calculate accurate maturity ogives and spawning stock biomass. Thus the knowledge about the biology of this species is currently under improvement.

Information on discards is scarce and was not used in the assessment.

2.4 Fishery independent information

2.4.1 International Bottom Trawl Survey (IBTS-Q1)

The International Bottom Trawl Survey (IBTS) provides indices for the North Sea and IIIa performed every year during the first and third quarter of the year. IBTS data are available since 1975. Furthermore a time series of Dutch Beam Trawl Survey (BTS) data (1985–2008) in IV was also available.

Time series of abundance (CPUE, number per hours) for Q1 only, were standardized by haul position, depth and year through general linear models. The abundance of witch flounder observed during the first quarter of the IBTS has been fluctuating. A “maximum” was reached around 1995, and the abundance seems to have decreased since (Figure 2.7). However, results show a decline during the last decade matching the trend observed in landings. The spatial distribution of haul-specific CPUE averaged over 5-year time intervals, also show a reduction of both the abundance and spatial distribution of witch flounder in IV and IIIa (Figure 2.8).

Thus the IBTS catches seem to be the most valuable and promising data source to be used as tuning fleet, particularly during Q1 when more stations are usually fished and the time series is longer.

For what it concerns the length composition, IBTS-Q1 catch the whole size range of witch flounder from just below 10 cm to around 50 cm (Figure 2.9).

Regarding the distribution, witch flounder is a species that occurs in the deeper waters of the northern North Sea. There does not seem to be a significant difference in the distribution in winter and in summer (ICES 2010).

A yearly ALK was constructed using otolith collected during Swedish IBTS in Q1 (Figure 2.10). These were used to derive a number at age index from the IBTS survey for the period 2007–2011. The index was estimated summing the catches per hour for each length class per year and then dividing it by the number of hauls to standardize

for different numbers of hauls per year carried out during the IBTS survey. The index was multiplied per 1000 to facilitate readiness. The length at age was then transformed in number at age using an annual ALK derived from the Swedish IBTS. The age disaggregated index is presented in Table 2.3.

2.5 Mean weight-at-age and maturity-at-age

2.5.1 Mean weight-at-age

Table 2.4 shows the mean weights-at-age in the catch from 2007 to 2011. The weights-at-age were obtained from Swedish market samples collected in IIIa from 2009 to 2011 and averaged over the time period. Weight at age in 2007 and 2008 were assumed equal to the mean weight at age estimated between 2009 and 2011.

2.5.2 Maturity ogive

The percentages at age of witch flounder in IV and IIIa that were deemed mature were estimated from the Swedish market samples collected from 2009 to 2011 and averaged over the time period (Table 2.5). Maturity at age in 2007 and 2008 were assumed equal to the mean maturity at age estimated between 2009 and 2011.

2.6 Recruitment index

There are no information on recruitment index of witch flounder in IV and IIIa.

2.7 Assessment of Witch flounder in IV and IIIa

2.7.1 Exploratory Assessment for Witch flounder in IV and IIIa

The VIT program was designed to analyze exploited marine populations based on catch data only structured by ages or sizes. This method is especially suited for data poor situations in which long time series of age data on catches are lacking to perform a VPA kind of analysis. Using catch data with auxiliary parameters (i.e. natural mortality and growth parameters) and a cohort analysis, the program estimates the population numbers at age and fishing mortality at age. The main assumption is that of a steady state (i.e. constant recruitment) as the program uses the annual catch at age data and interprets the age structure of the catches as "pseudo cohorts".

The numbers at age in the landings of witch flounder derived from the statistical slicing and from the ALK (Table 2.1) for the period 2007–2011 were used as input to the VIT program. Biological input data were natural mortality ($M=0.2$ and constant for all age classes and years), maturity at age (Table 2.5), together with the Von Bertalanffy growth parameters ($L_{inf}=50$ cm; $k=0.120$ year⁻¹; $t_0=-0.125$) and length-weight parameters ($a=0.0000001$; $b=3.5456$). Terminal F was set at 0.41 in the VIT analysis, which is the average F of the last three years for the 11+ group estimated from a catch at age analysis using the number at age matrix derived from the ALK.

The VIT estimated stock numbers at age (Table 2.6) and fishing mortality at age by year 2007–2010 (Table 2.7) using the statistical slicing and age length key are shown. The reference fishing mortality was estimated for the age classes fully recruited to the fisheries, $F_{bar} = F_{4-8}$.

The exploration indicates that the catch at age matrix derived from the statistical slicing is rather different from the same matrix estimated using ALK information de-

rived from otolith reading. This obviously affects both the estimate of the number of fish in the stock and the associated fishing mortality at age as shown by the estimates of the VIT pseudo-cohort analysis

In particular, the estimates of F are rather low (generally less than 0.1 for all ages) when using the statistical slicing method. This was already highlighted by simulation done at STECF-SGMED, i.e. catch at age matrix derived from slicing is generally more flat than from otolith reading (Finlay *et al.*, 2011) and thus the F estimates are also generally lower for statistical slicing derived age matrix.

For these reasons, we also explored the possibility of fitting an XSA using the catch at age matrix derived from the ALK (Table 2.1) and tuned by IBTS Q1 index (Table 2.3). The same biological input data (weight at age, maturity at age and natural mortality) as used in the VIT were used to run an XSA. The results are presented in Figure 2.11. Due to time constraints, we only explored the effect of different q at age (q constant from age 6, 7 or 8, defined as CAA6, CAA7 and CAA8, respectively) in the XSA settings while we kept shrinkage constant at 0.5 and q independent by stock size from age 3 and onwards in all runs. The estimates of F_{curr} in 2011 from the different XSA vary from 0.37 to 0.59 for CAA6, CAA7 and CAA8, respectively (Table 2.8).

This is the first attempt to assess witch flounder in IV and IIIa and results should be considered as an exploratory analysis. However, the estimated landings in the last years (2007–2011) are considered accurate, although discard were not included in the analysis. Nevertheless, several sensitive analyses should be performed to verify the XSA (or any other model) settings, the natural mortality assumptions, the ageing accuracy as well as the extent and age structure of the discards in a future benchmark.

2.8 Precautionary and Limit Reference Points and FMSY targets

FMSY target

A yield per recruit analysis was run using the same input data as for the XSA but exploring the effect of the different F at age on the estimates of the reference points, F_{01} and F_{max} . The Yield per recruit analysis based on the results of the CAA6 run is shown in Figure 2.12. The F_{01} ranges from 0.17 to 0.18, while F_{max} varies from 0.63 to 0.65, when using XSA results from CAA6, CAA7 and CAA8, respectively. Nevertheless, estimates of current F , although uncertain, are above the estimates of a possible proxy of F_{msy} , F_{01} .

2.9 Quality of the assessment

The assessment is considered exploratory and only indicative of trends. From this preliminary analysis, it is evident that the shortness of the time series and the uncertainty linked to several aspects of the data collection, as for example the derivation of the ALK used to split the landings, are reflected in the estimation of SSB and F , and thus it precludes that the assessment is used for catch forecast at that stage. Therefore, a full exploratory analysis should be carried out in a future benchmark meeting, exploring different models and models settings but also the way the number at age and other input data are derived. The addition of more years, if trustworthy catch at age data can be estimated, would also likely improve the assessment of witch flounder in IV and IIIa. A full benchmark assessment would be necessary to identify an appropriate assessment model to be used into short term forecast in the future.

2.10 Management Considerations

No specific management considerations were provided.

2.11 Ecosystem considerations

No specific ecosystem considerations were provided.

2.12 Changes in the environment

No information on changes in the environment that can affect witch flounder in IV and IIIa were provided.

References

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Table 2.1. Witch flounder in IV and IIIa: Number at age from statistical slicing and from ALK, respectively.

| Ages | 2007 | 2008 | 2009 | 2010 | 2011 |
|------|---------|---------|---------|---------|---------|
| 1 | 51 | 64 | 65 | 36 | 38 |
| 2 | 65 | 125 | 54 | 30 | 57 |
| 3 | 27 | 39 | 738 | 579 | 539 |
| 4 | 468 | 1331 | 1037 | 2446 | 2523 |
| 5 | 105210 | 130640 | 19363 | 54779 | 71079 |
| 6 | 1355600 | 1158600 | 475090 | 340660 | 624650 |
| 7 | 2213700 | 1897500 | 1547800 | 921180 | 1097300 |
| 8 | 1126300 | 1069700 | 1143000 | 796200 | 677540 |
| 9 | 840470 | 825230 | 906930 | 753950 | 591490 |
| 10 | 789220 | 721940 | 748240 | 671110 | 585910 |
| 11 | 2185300 | 1853800 | 1819700 | 1534400 | 1585000 |

| Ages | 2007 | 2008 | 2009 | 2010 | 2011 |
|------|---------|---------|---------|---------|---------|
| 1 | 10 | 10 | 10 | 10 | 10 |
| 2 | 11 | 156 | 1563 | 11 | 2003 |
| 3 | 29804 | 56815 | 9105 | 226736 | 214319 |
| 4 | 2474625 | 2097767 | 1130806 | 299229 | 1305970 |
| 5 | 2276281 | 2011010 | 1900699 | 1967334 | 374008 |
| 6 | 1445372 | 1278398 | 1312730 | 1309785 | 1734566 |
| 7 | 1340041 | 1193516 | 1269104 | 699333 | 707424 |
| 8 | 813164 | 707875 | 735521 | 664821 | 618890 |
| 9 | 265430 | 214551 | 228447 | 410856 | 410590 |
| 10 | 335849 | 290568 | 286248 | 96291 | 248582 |
| 11+ | 117594 | 100870 | 80215 | 69337 | 104286 |

Table 2.2. Witch flounder in IV and IIIa: Summary of the X^2_{red} for the different distributions and years. In bold are the best fit according to the X^2_{red} statistics.

| Year | norm | lnorm | gamma |
|------|-------|--------------|--------------|
| 2007 | 17959 | 15000 | 17274 |
| 2008 | 15781 | 16305 | 14782 |
| 2009 | 8012 | 5047 | 6063 |
| 2010 | 5252 | 3623 | 3963 |
| 2011 | 6438 | 3821 | 4510 |

Table 2.3. Witch flounder in IV and IIIa. Tuning indices derived from the IBTS Q1 survey. The index was estimated summing the catches per hour for each length class per year and then dividing it by the number of hauls to standardize for different numbers of hauls per year carried out in the IBTS survey. The index was multiplied per 1000. The length at age was then transformed in number at age using an annual ALK derived from the Swedish IBTS.

| Ages | 2007 | 2008 | 2009 | 2010 | 2011 |
|------|-------|-------|-------|------|-------|
| 4 | 234.3 | 262.7 | 107.5 | 47.9 | 285.6 |
| 5 | 84.1 | 161.6 | 98.3 | 40.7 | 45.1 |
| 6 | 118.6 | 156.6 | 95.3 | 41.2 | 50.3 |
| 7 | 98 | 121.7 | 64.6 | 23.4 | 24.7 |
| 8 | 35.8 | 56.2 | 31.1 | 28.8 | 35.4 |
| 9 | 14.3 | 16.7 | 17.3 | 28.4 | 42.7 |
| 10 | 22.3 | 18.7 | 15.8 | 3.4 | 8.8 |
| 11+ | 0 | 18.7 | 7.9 | 10.3 | 21.2 |

Table 2.4. Witch flounder in IV and IIIa: weight at age derived from the Swedish catches collected from 2009 to 2011 averaged over the time period.

| Ages | 2007 | 2008 | 2009 | 2010 | 2011 |
|------|-------|-------|-------|-------|-------|
| 1 | 0.010 | 0.010 | 0.010 | 0.010 | 0.010 |
| 2 | 0.035 | 0.035 | 0.035 | 0.035 | 0.035 |
| 3 | 0.094 | 0.094 | 0.094 | 0.094 | 0.094 |
| 4 | 0.150 | 0.150 | 0.150 | 0.150 | 0.150 |
| 5 | 0.197 | 0.197 | 0.197 | 0.197 | 0.197 |
| 6 | 0.257 | 0.257 | 0.257 | 0.257 | 0.257 |
| 7 | 0.314 | 0.314 | 0.314 | 0.314 | 0.314 |
| 8 | 0.347 | 0.347 | 0.347 | 0.347 | 0.347 |
| 9 | 0.396 | 0.396 | 0.396 | 0.396 | 0.396 |
| 10 | 0.515 | 0.515 | 0.515 | 0.515 | 0.515 |
| 11+ | 0.520 | 0.520 | 0.520 | 0.520 | 0.520 |

Table 2.5. Witch flounder in IV and IIIa: maturity ogives derived from the Swedish catches collected from 2009 to 2011 averaged over the time period.

| Ages | 2007 | 2008 | 2009 | 2010 | 2011 |
|------|------|------|------|------|------|
| 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 |
| 4 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 |
| 5 | 0.19 | 0.19 | 0.19 | 0.19 | 0.19 |
| 6 | 0.28 | 0.28 | 0.28 | 0.28 | 0.28 |
| 7 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 |
| 8 | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 |
| 9 | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 |
| 10 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 |
| 11+ | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

Table 2.6. Witch flounder in IV and IIIa: number at age in the stock from statistical slicing and from ALK, respectively and estimated using VIT pseudocohort analysis.

| Ages | 2007 | 2008 | 2009 | 2010 | 2011 |
|------|-------|-------|-------|-------|-------|
| 1 | 79990 | 69534 | 66055 | 53666 | 54433 |
| 2 | 65490 | 56930 | 54081 | 43938 | 44566 |
| 3 | 53618 | 46610 | 44278 | 35973 | 36488 |
| 4 | 43899 | 38161 | 36251 | 29452 | 29873 |
| 5 | 35941 | 31242 | 29679 | 24111 | 24456 |
| 6 | 29331 | 25461 | 24282 | 19691 | 19958 |
| 7 | 22788 | 19797 | 19450 | 15813 | 15775 |
| 8 | 16654 | 14492 | 14524 | 12113 | 11923 |
| 9 | 12616 | 10897 | 10857 | 9197 | 9148 |
| 10 | 9568 | 8175 | 8068 | 6848 | 6955 |
| 11+ | 7120 | 6040 | 5929 | 4999 | 5164 |

| Ages | 2007 | 2008 | 2009 | 2010 | 2011 |
|------|-------|-------|-------|-------|-------|
| 1 | 30064 | 26202 | 23961 | 19858 | 20906 |
| 2 | 24614 | 21453 | 19618 | 16258 | 17117 |
| 3 | 20153 | 17564 | 16060 | 13311 | 14012 |
| 4 | 16473 | 14329 | 13141 | 10693 | 11278 |
| 5 | 11247 | 9833 | 9736 | 8484 | 8052 |
| 6 | 7149 | 6231 | 6251 | 5166 | 6254 |
| 7 | 4545 | 3945 | 3930 | 3044 | 3551 |
| 8 | 2509 | 2150 | 2069 | 1860 | 2267 |
| 9 | 1318 | 1120 | 1029 | 921 | 1296 |
| 10 | 839 | 723 | 636 | 382 | 690 |
| 11 | 383 | 329 | 261 | 226 | 340 |

Table 2.7. Witch flounder in IV and IIIa: F at age in the stock from statistical slicing and from ALK, respectively and estimated using VIT pseudocohort analysis.

| Ages | 2007 | 2008 | 2009 | 2010 | 2011 |
|------|-------|-------|-------|-------|-------|
| 1 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 2 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 3 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 4 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 5 | 0.003 | 0.005 | 0.001 | 0.003 | 0.003 |
| 6 | 0.052 | 0.052 | 0.022 | 0.019 | 0.035 |
| 7 | 0.114 | 0.112 | 0.092 | 0.067 | 0.080 |
| 8 | 0.078 | 0.085 | 0.091 | 0.075 | 0.065 |
| 9 | 0.076 | 0.087 | 0.097 | 0.095 | 0.074 |
| 10 | 0.096 | 0.103 | 0.108 | 0.115 | 0.098 |
| 11 | 0.410 | 0.410 | 0.410 | 0.410 | 0.410 |

| Ages | 2007 | 2008 | 2009 | 2010 | 2011 |
|------|-------|-------|-------|-------|-------|
| 1 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 2 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 3 | 0.002 | 0.004 | 0.001 | 0.019 | 0.017 |
| 4 | 0.182 | 0.176 | 0.100 | 0.031 | 0.137 |
| 5 | 0.253 | 0.256 | 0.243 | 0.296 | 0.053 |
| 6 | 0.253 | 0.257 | 0.264 | 0.329 | 0.366 |
| 7 | 0.394 | 0.407 | 0.441 | 0.293 | 0.249 |
| 8 | 0.443 | 0.452 | 0.499 | 0.503 | 0.359 |
| 9 | 0.252 | 0.238 | 0.282 | 0.679 | 0.431 |
| 10 | 0.584 | 0.588 | 0.689 | 0.326 | 0.508 |
| 11 | 0.410 | 0.410 | 0.410 | 0.410 | 0.410 |

Table 2.8. Witch flounder in IV and IIIa. XSA results in terms of F at age estimated using the different settings (i.e. CAA6, CAA7 and CAA8) as described in the text above.

| Ages | 2007 | 2008 | 2009 | 2010 | 2011 |
|------|-------|-------|-------|-------|-------|
| 3 | 0.002 | 0.005 | 0.003 | 0.016 | 0.011 |
| 4 | 0.228 | 0.235 | 0.130 | 0.135 | 0.119 |
| 5 | 0.244 | 0.294 | 0.347 | 0.350 | 0.250 |
| 6 | 0.263 | 0.210 | 0.318 | 0.430 | 0.601 |
| 7 | 0.573 | 0.361 | 0.333 | 0.278 | 0.438 |
| 8 | 0.419 | 0.691 | 0.397 | 0.292 | 0.427 |
| 9 | 0.208 | 0.184 | 0.497 | 0.404 | 0.295 |
| 10 | 0.332 | 0.372 | 0.398 | 0.402 | 0.460 |
| 11+ | 0.332 | 0.372 | 0.398 | 0.402 | 0.460 |

| Ages | 2007 | 2008 | 2009 | 2010 | 2011 |
|------|-------|-------|-------|-------|-------|
| 3 | 0.003 | 0.006 | 0.003 | 0.013 | 0.016 |
| 4 | 0.231 | 0.256 | 0.157 | 0.123 | 0.099 |
| 5 | 0.256 | 0.298 | 0.390 | 0.450 | 0.223 |
| 6 | 0.275 | 0.224 | 0.324 | 0.514 | 0.946 |
| 7 | 0.599 | 0.385 | 0.362 | 0.286 | 0.585 |
| 8 | 0.452 | 0.754 | 0.436 | 0.328 | 0.444 |
| 9 | 0.222 | 0.204 | 0.585 | 0.467 | 0.347 |
| 10 | 0.333 | 0.406 | 0.459 | 0.526 | 0.580 |
| 11+ | 0.333 | 0.406 | 0.459 | 0.526 | 0.580 |

| Ages | 2007 | 2008 | 2009 | 2010 | 2011 |
|------|-------|-------|-------|-------|-------|
| 3 | 0.003 | 0.007 | 0.003 | 0.014 | 0.021 |
| 4 | 0.246 | 0.276 | 0.172 | 0.121 | 0.101 |
| 5 | 0.268 | 0.324 | 0.434 | 0.510 | 0.220 |
| 6 | 0.287 | 0.237 | 0.364 | 0.611 | 1.262 |
| 7 | 0.619 | 0.408 | 0.391 | 0.337 | 0.810 |
| 8 | 0.490 | 0.805 | 0.478 | 0.366 | 0.568 |
| 9 | 0.245 | 0.228 | 0.667 | 0.541 | 0.405 |
| 10 | 0.389 | 0.467 | 0.539 | 0.668 | 0.757 |
| 11+ | 0.389 | 0.467 | 0.539 | 0.668 | 0.757 |

Glyptocephalus cynoglossus, witch, Pleuronectiformes

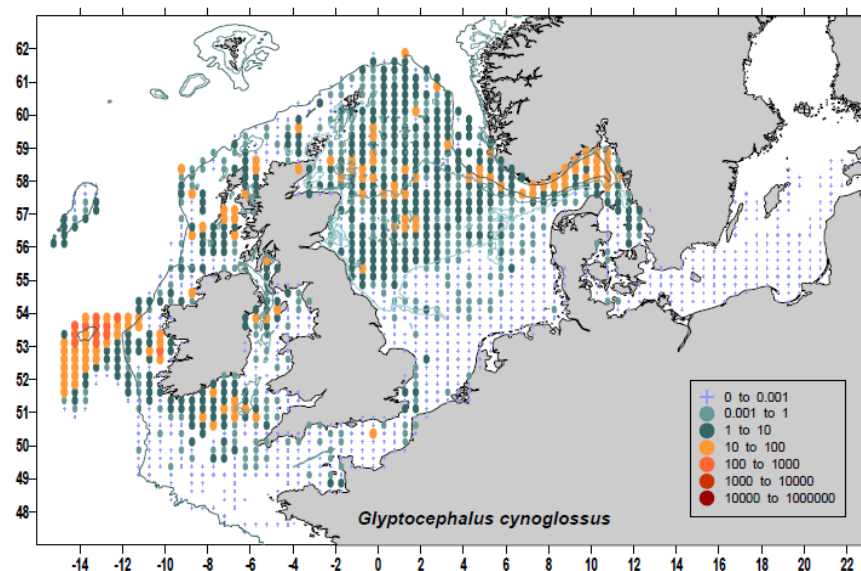


Figure 2.1. Witch flounder in IV and IIIa. Spatial distribution of the catches from IBTS Q1 and Q3 from 1975 to 2010 (From WD 1; Annex 2).

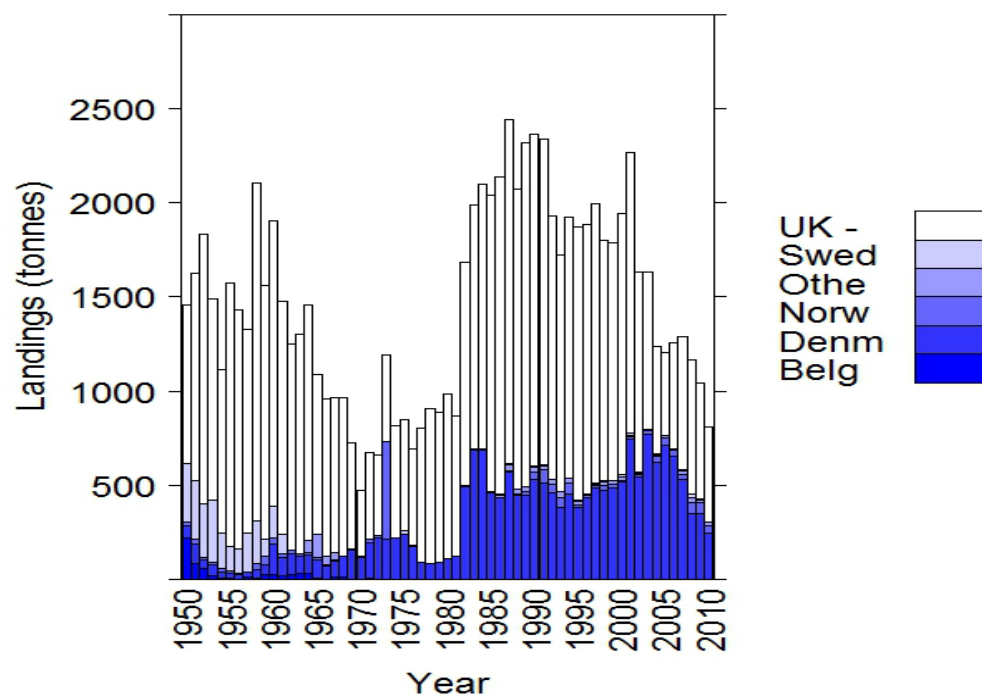


Figure 2.2. Witch flounder in IV: total landings of Witch flounder by country in IV from 1950 to 2011.

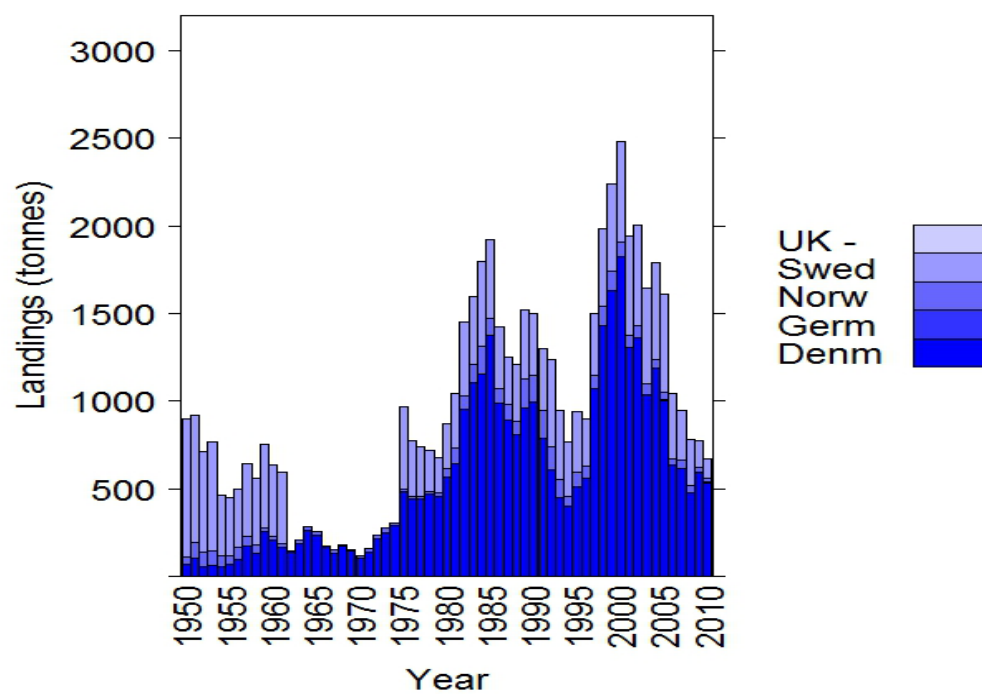


Figure 2.3. Witch flounder in IIIa: total landings of Witch flounder by country in IIIa from 1950 to 2011.

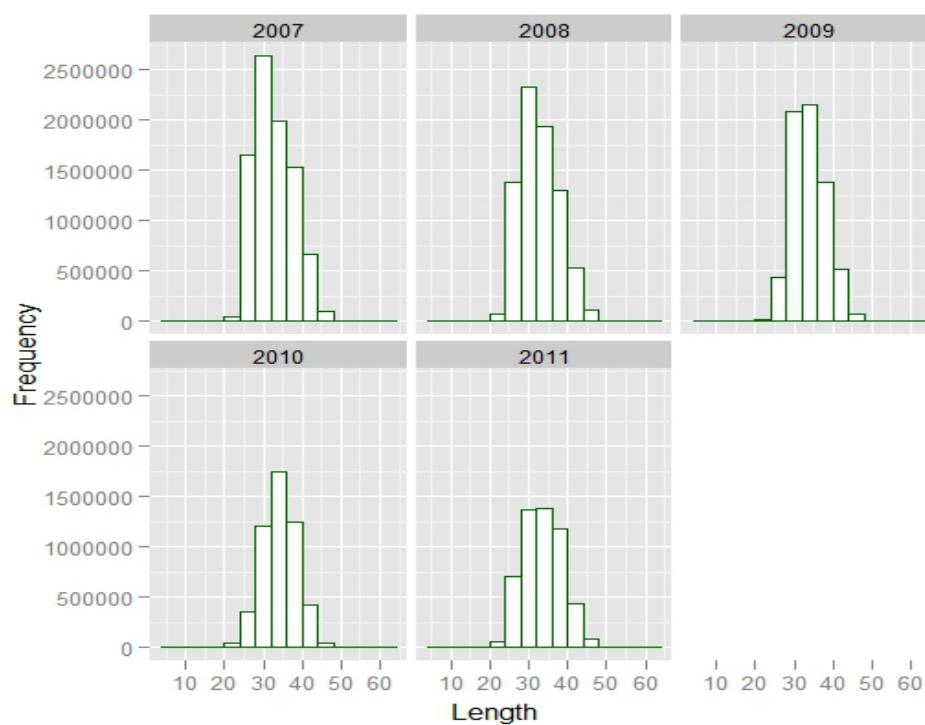


Figure 2.4. Witch flounder in IV and IIIa: length frequency distribution from 2007 to 2011.

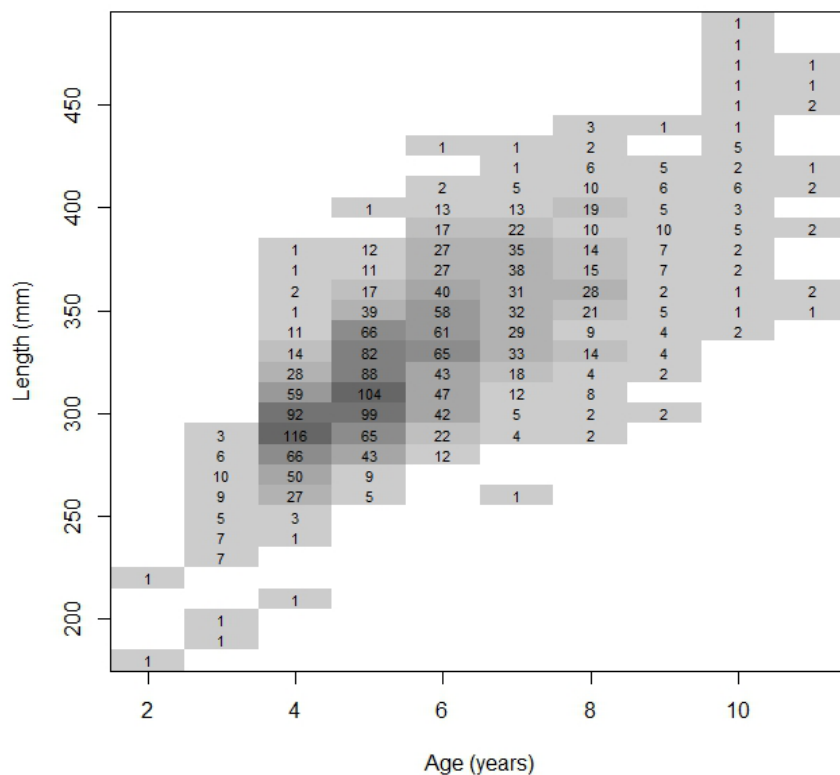


Figure 2.5. Witch flounder in IV and IIIa: age length keys (ALK) derived from otolith collected in 2009-2011 from market samples.

Figure 2.6. Witch flounder in IV and IIIa: Results of fitting the length frequency distribution from 2007 to 2011 using a lognormal distribution. The red triangles on the x-axis indicate the position of the mean of each cohort. The green vertical lines indicate the mean length for each cohort estimated by the von Bertalanffy growth curve. The blue line indicates the accumulated distribution by length for all age classes.

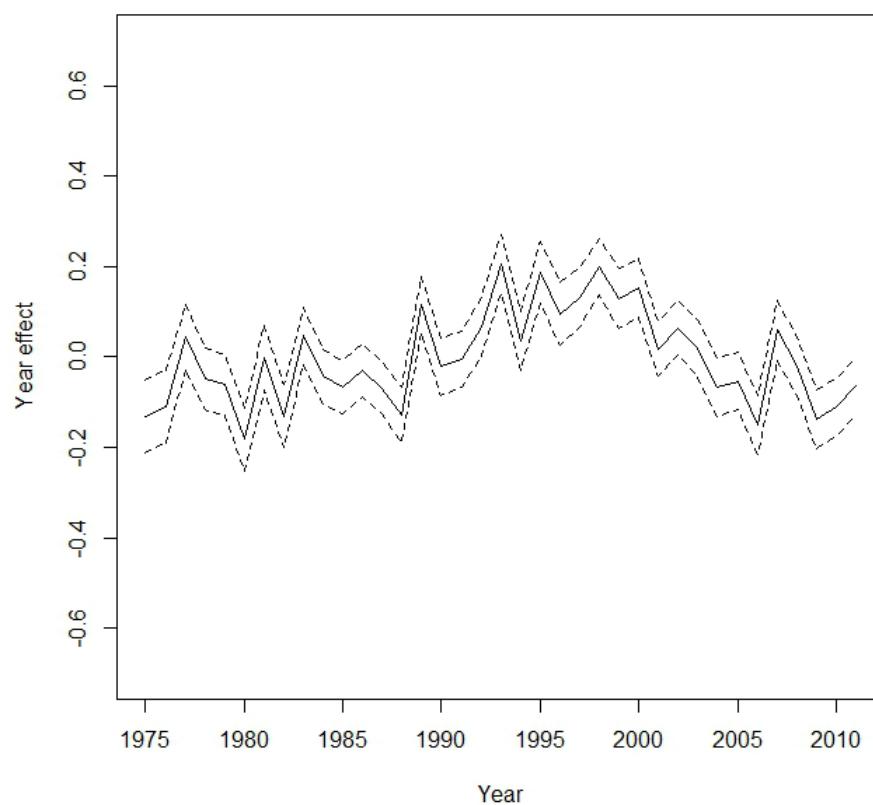


Figure 2.7. Witch flounder in IV and IIIa: year effect of a GLM model of the IBTS Q1 haul-specific CPUE (n/h) standardized by haul position and depth.

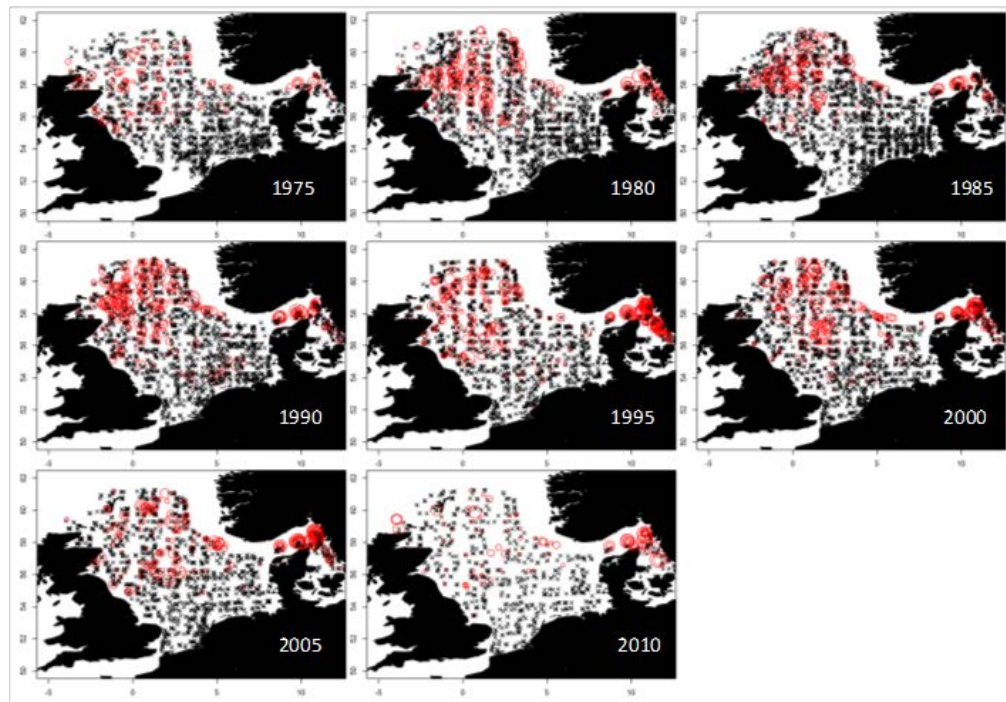


Figure 2.8. Witch flounder in IV and IIIa: haul-specific CPUE (n/h) standardized for depth and averaged over 5 years' time intervals during the first quarter, except for the last Figure which only includes 2010 and 2011.

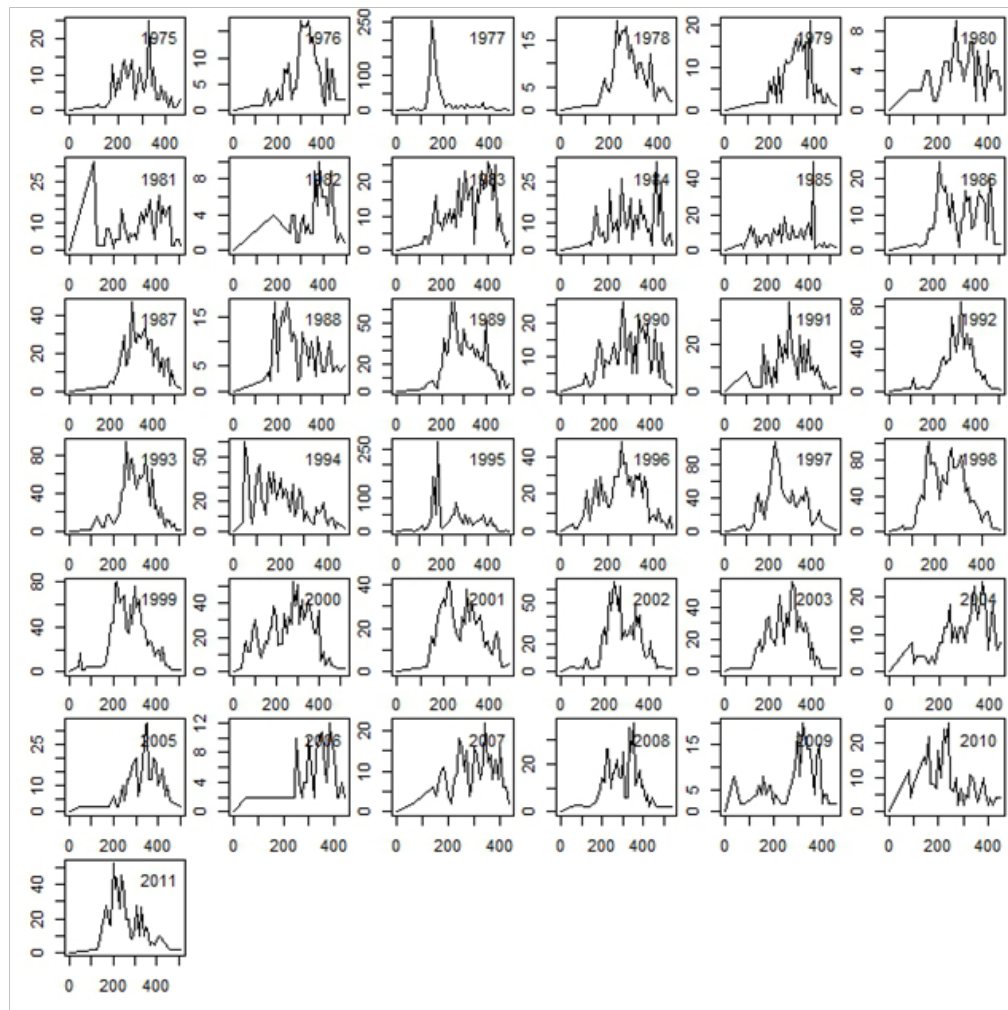


Figure 2.9. Witch flounder in IV and IIIa: length frequency distribution of the IBTS Q1 from 1975 to 2011.

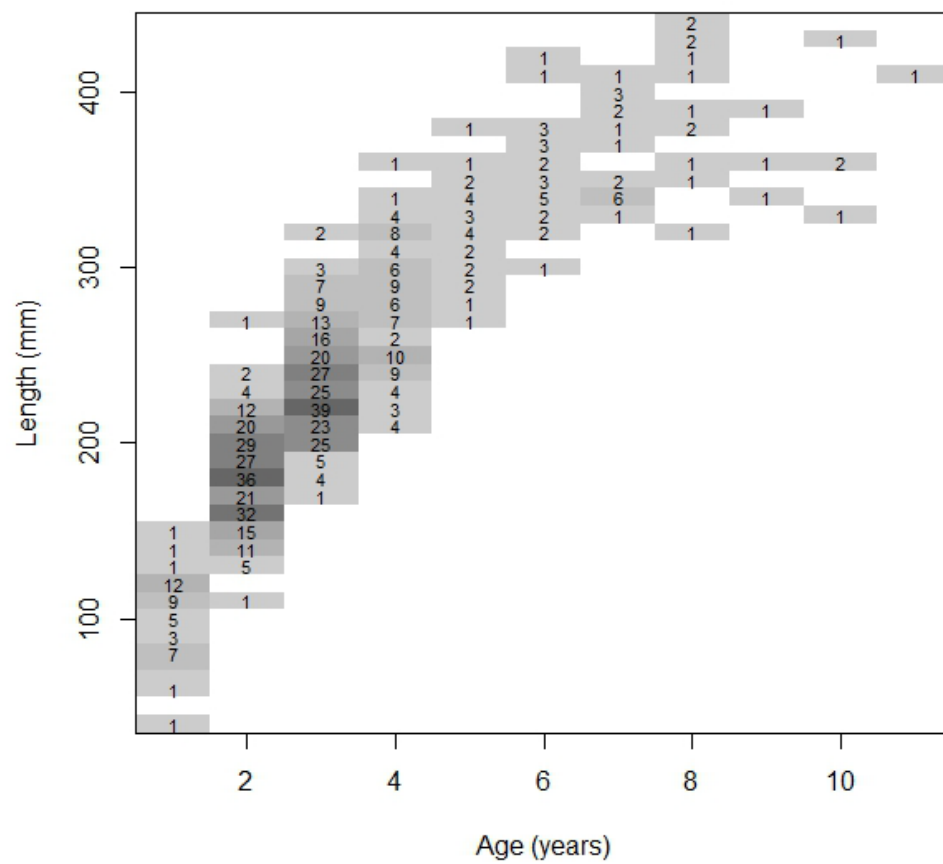


Figure 2.10. Witch flounder in IV and IIIa: age length keys (ALK) derived from otolith collected in 2009–2011 from IBTS survey.

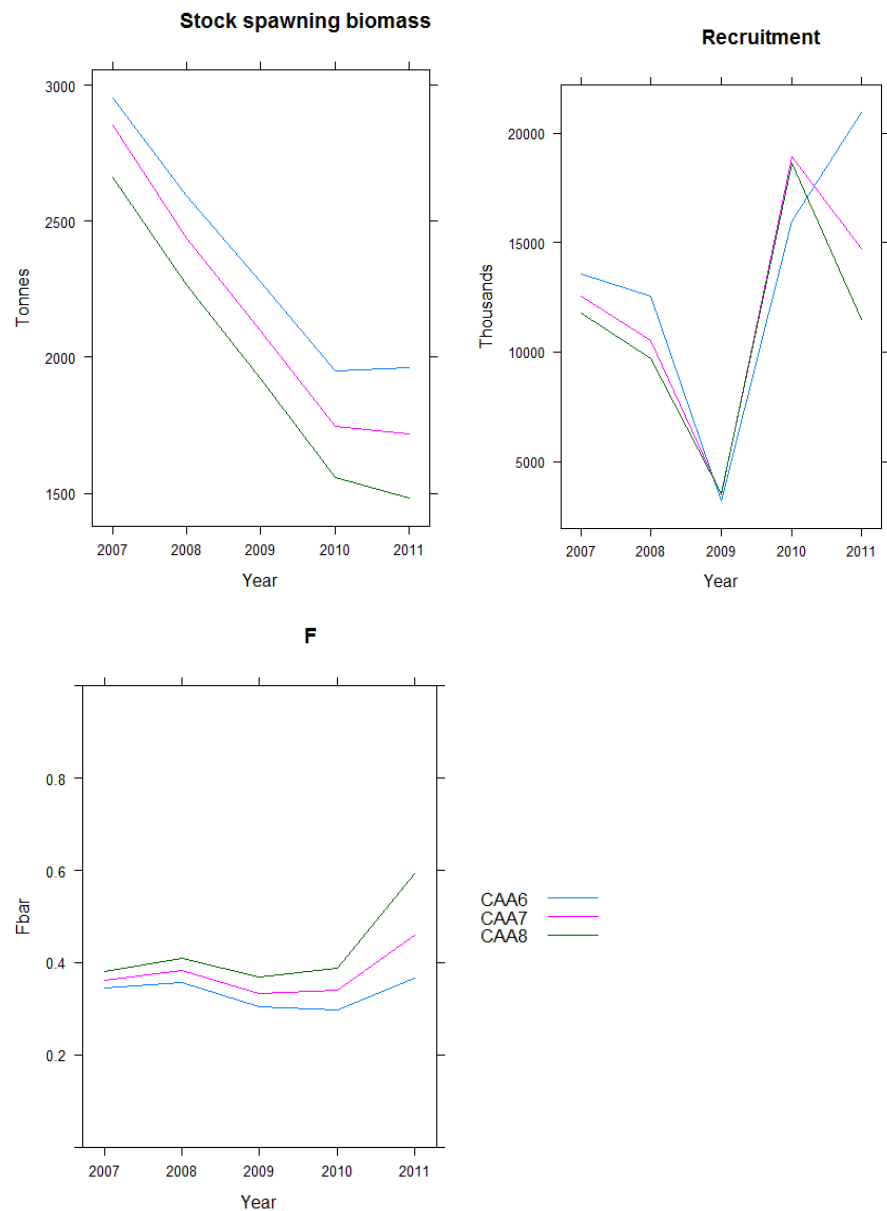


Figure 2.11. Witch flounder in IV and IIIa: Comparison of three different XSA run with different assumptions of q at age (q constant from age 6, 7 or 8, defined as CAA6, CAA7 and CAA8, respectively).

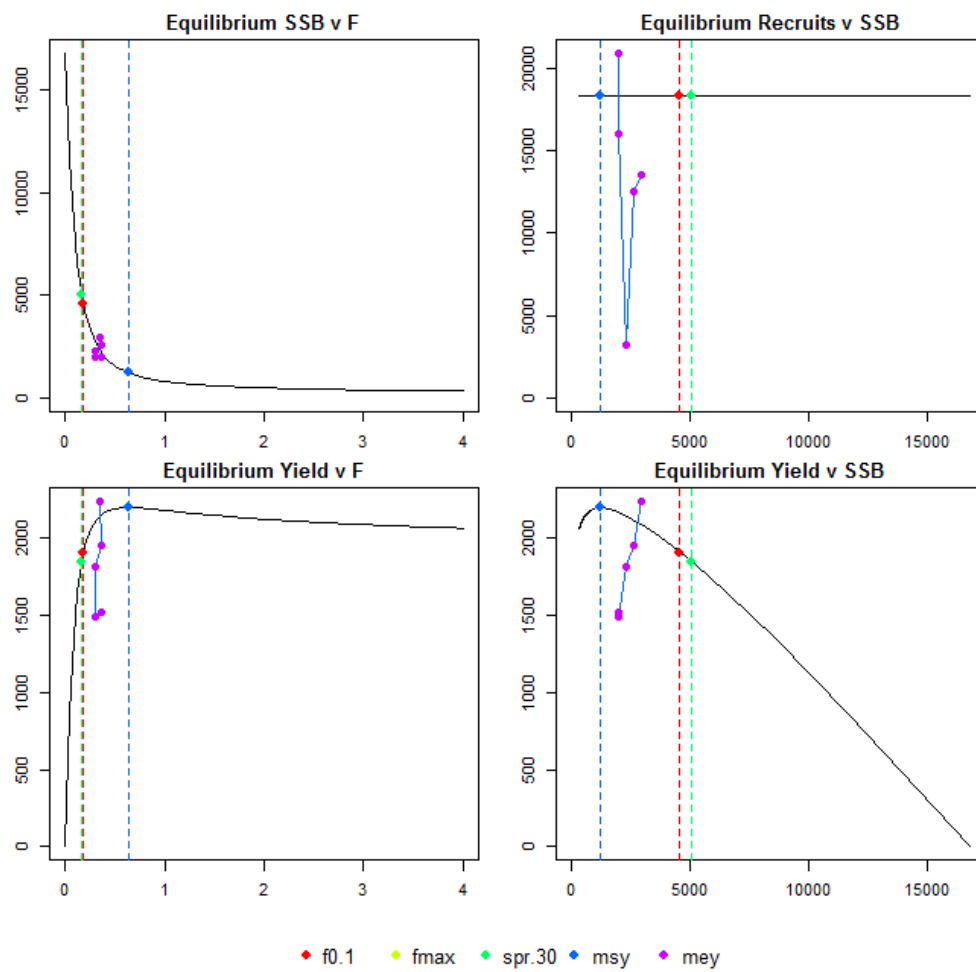


Figure 2.12. Witch flounder in IV and IIIa: Yield per recruit analysis based on the results of the CAA6 run.

3 Flounder in IV and IIIa

3.1 General

During the 2012 meeting of WGNEW only the landings data by country (Table 3.1 and 3.2, Figure 3.1) and the survey time series (Figure 3.2) data have been updated.

Table 3.1. Flounder. Landings by country in Division IIIa, as officially reported to ICES.

| ICES DIVISION IIIa | | | | | | |
|--------------------|---------|---------|----------|--------|--------|-------|
| | Denmark | Germany | Netherl. | Norway | Sweden | Total |
| 1975 | 1377 | 1 | | | 89 | 1467 |
| 1976 | 949 | 2 | 4 | | 144 | 1099 |
| 1977 | 1036 | <0.5 | 19 | | 64 | 1119 |
| 1978 | 1560 | 10 | 14 | | 64 | 1648 |
| 1979 | 1219 | <0.5 | | | 100 | 1319 |
| 1980 | 426 | | | | 135 | 561 |
| 1981 | 1831 | | <0.5 | | 74 | 1905 |
| 1982 | 1236 | | <0.5 | | 75 | 1311 |
| 1983 | 2352 | | | | 160 | 2512 |
| 1984 | 2463 | | | | 283 | 2746 |
| 1985 | 1203 | <0.5 | | | 102 | 1305 |
| 1986 | 1585 | | | | 166 | 1751 |
| 1987 | 1050 | | | | 119 | 1169 |
| 1988 | 1164 | | | | 149 | 1313 |
| 1989 | 996 | | | | 133 | 1129 |
| 1990 | 650 | 1 | | | 57 | 708 |
| 1991 | 574 | | | | 50 | 624 |
| 1992 | 455 | | | | 52 | 507 |
| 1993 | 673 | 3 | | | 67 | 743 |
| 1994 | 865 | 1 | | | 77 | 943 |
| 1995 | 403 | 19 | | | 76 | 498 |
| 1996 | 429 | 9 | | | 104 | 542 |
| 1997 | 367 | 2 | | | 68 | 437 |
| 1998 | 637 | 5 | | | 83 | 725 |
| 1999 | 558 | 6 | | | 24 | 588 |
| 2000 | 609 | 17 | | | 30 | 656 |
| 2001 | 672 | 2 | | 1 | 30 | 705 |
| 2002 | 493 | | | 1 | 30 | 524 |
| 2003 | 452 | 3 | | <0.5 | 18 | 473 |
| 2004 | 462 | 2 | | <0.5 | 14 | 478 |
| 2005 | 467 | | | | 15 | 482 |
| 2006 | 380 | | | <0.5 | 13 | 393 |
| 2007 | 419 | 3 | 1 | <0.5 | 22 | 445 |
| 2008 | 326 | 4 | | | 16 | 346 |
| 2009 | 238 | 2 | | <0.5 | 33 | 273 |
| 2010 | 188 | | | | 17 | 205 |

Table 3.1 Flounder. Landings by country in Subarea IV, as officially reported to ICES.

| ICES Subarea IV | | | | | | | | | | | |
|-----------------|--------|---------|--------|--------|--------|---------|-------|-----|-----|----|-------|
| | Belgiu | Denmark | France | German | Irelan | Netherl | Norwa | Swe | UK | Ru | Total |
| 1975 | 68 | 437 | | 155 | | 2191 | | 1 | 87 | | 2939 |
| 1976 | 94 | 575 | | 209 | | 2077 | | 3 | 70 | 51 | 3079 |
| 1977 | 107 | 320 | | 208 | 2 | 1732 | | | 127 | 9 | 2505 |
| 1978 | 122 | 203 | | 198 | | 1519 | | | 169 | | 2211 |
| 1979 | 129 | 181 | 31 | 275 | | 1260 | | | 201 | | 2077 |
| 1980 | 190 | 300 | 33 | 229 | | 806 | | | 140 | | 1698 |
| 1981 | 164 | 669 | 14 | 200 | | 1068 | | | 133 | | 2248 |
| 1982 | 110 | 630 | 31 | 200 | | 1597 | | | 121 | | 2689 |
| 1983 | 88 | 564 | 36 | 197 | | 2059 | | | 125 | | 3069 |
| 1984 | 272 | 518 | 15 | 103 | | | | | 122 | | 1030 |
| 1985 | 163 | 379 | 14 | 128 | | | | | 109 | | 793 |
| 1986 | 155 | 456 | 1 | 91 | | | | | 111 | | 814 |
| 1987 | 132 | 394 | 32 | 106 | | | | | 90 | | 754 |
| 1988 | 160 | 509 | 44 | 105 | | 682 | | | 98 | | 1598 |
| 1989 | 200 | 632 | 28 | 95 | | 916 | | | 80 | | 1951 |
| 1990 | 153 | 467 | 69 | 147 | | | | | 45 | | 881 |
| 1991 | 260 | 377 | 51 | 902 | | | | | 69 | | 1659 |
| 1992 | 152 | 492 | 35 | 521 | | | | | 76 | | 1276 |
| 1993 | 194 | 1812 | 47 | 356 | | | | | 136 | | 2545 |
| 1994 | 196 | 642 | 57 | 921 | | | | | 247 | | 2063 |
| 1995 | 301 | 628 | 103 | 843 | | | | | 250 | | 2125 |
| 1996 | 262 | 1439 | 68 | 43 | | | | | 193 | | 2005 |
| 1997 | 110 | 988 | 10 | 25 | | | | | 157 | | 1290 |
| 1998 | 283 | 154 | 40 | 13 | | 4938 | | | 132 | | 5560 |
| 1999 | 326 | 123 | | 11 | | 3158 | | | 54 | | 3672 |
| 2000 | 289 | 100 | 46 | 17 | | 2656 | 5 | | 52 | | 3165 |
| 2001 | 241 | 92 | 42 | 4 | | 2608 | 3 | | 32 | | 3022 |
| 2002 | 165 | 83 | 51 | 2 | | 3531 | 3 | | 55 | | 3890 |
| 2003 | 206 | 94 | 33 | 3 | | 3172 | 9 | | 120 | | 3637 |
| 2004 | 335 | 96 | 46 | 5 | | 3720 | 18 | | 74 | | 4294 |
| 2005 | 241 | 171 | 17 | 5 | | 3363 | 38 | | 111 | | 3946 |
| 2006 | 167 | 152 | 19 | 1 | | 4020 | 39 | | 216 | | 4614 |
| 2007 | 298 | 166 | 56 | 46 | | 2925 | 11 | | 120 | | 3622 |
| 2008 | 306 | 228 | 30 | 40 | | 2231 | 3 | | 57 | | 2895 |
| 2009 | 272 | 274 | 38 | 46 | | 2124 | 3 | | 59 | | 2816 |
| 2010 | 250 | 126 | 20 | 58 | | 2612 | 6 | | 87 | | 3159 |

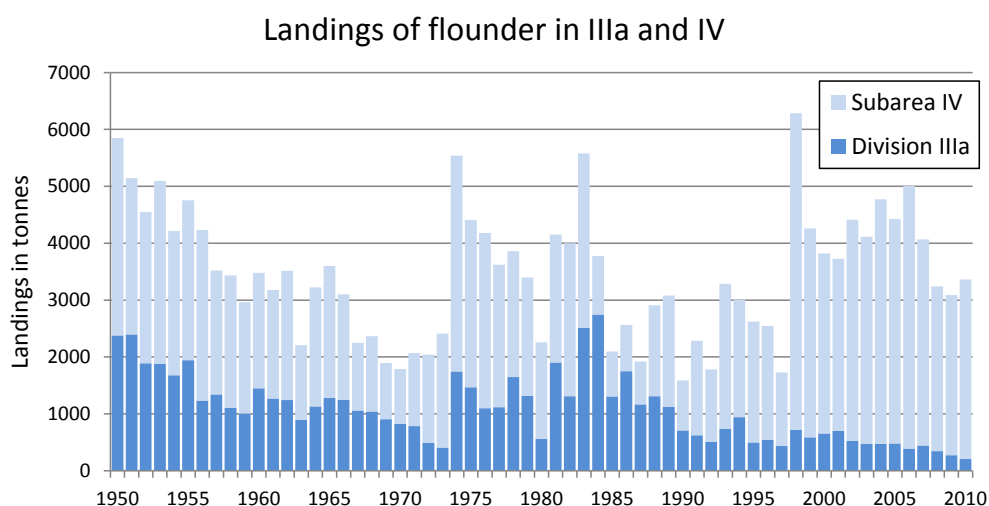


Figure 3.1. Landings (in t) of Flounder in Subarea IV and Division IIIa. Official landings statistics.

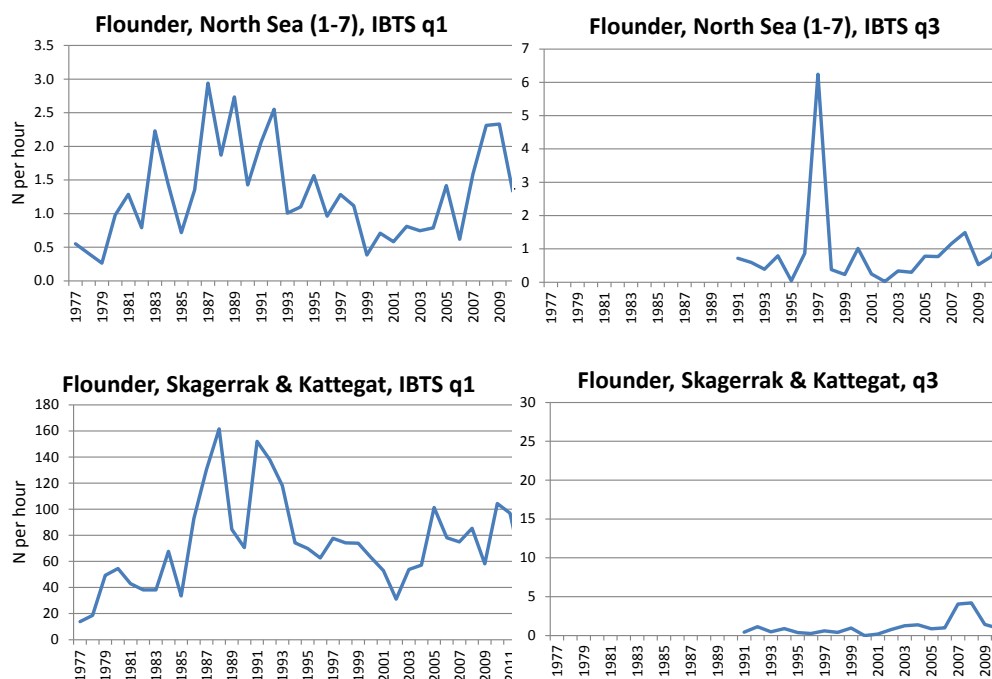


Figure 3.2. Flounder in IV and IIIa. Time series of abundance (N per hour with the GOV trawl) of flounder in the IBTS surveys in quarter 1 and quarter 3 in the North Sea (average for roundfish areas 1–7) and in Skagerrak/Kattegat (average for roundfish areas 8 and 9). Data from Datras.

4 Sea Bass in the Northeast Atlantic

4.1 General Biology

Sea bass *Dicentrarchus labrax* is widely distributed in shallow coastal and estuarine habitats of the northeast Atlantic, extending from southern Scandinavia down to the Mediterranean, Black Sea and North-west Africa. It is a predatory species highly prized by anglers and is also a high-value species for commercial fisheries using trawls, nets and lines. WGNEW deals only with the Northeast Atlantic component.

Mature sea bass aggregate on offshore spawning grounds during January to March in the Bay of Biscay and during February to May in the English Channel and eastern Celtic Sea. Sea bass have become more common towards the northern limit of their range since the 1990s, coinciding with the recent period of ocean warming, and spawning now extends more northerly in the North Sea (Pawson *et al.*, 2007). Larvae drift inshore and the first two years of life are spent in nursery areas in the brackish waters of estuaries. The fish range more widely within the estuaries as they grow and by their third year begin to migrate to over-wintering areas in deeper water, returning to larger estuaries in summer. When they reach 4 or 5 years they become more widely distributed in coastal waters and eventually adopt the adult feeding/spawning migration patterns on attainment of maturity (Pawson *et al.*, 1987).

Tagging studies show that individual sea bass have very strong site fidelity and are often recaptured very close to where they were tagged even after completion of a spawning migration (Pawson *et al.*, 2007). Site fidelity appears less well developed towards the edge of the range for example in the Irish Sea and North Sea.

Growth is relatively slow and the species is long-lived (up to 30 years of age). Maturity is attained at 4 - 7 years, which is around 35 cm for males and 42 cm for females (Pawson and Pickett 1996).

The life history characteristics of sea bass (slow growth, late maturity, spawning aggregation and strong site fidelity) increase their vulnerability to over-exploitation and localised depletion.

4.2 Stock ID and possible management areas

Stock identity of European sea bass was reviewed by WGNEW 2012 to address its ToR(a) (re-evaluate the stock identity, based on the best available science).

4.2.1 Evidence from genetics studies

Although Child (1992) suggested that there may be genetic differences between immature sea bass from the Irish Sea and elsewhere, other work (Tobin, Galway University, unpublished manuscript), using samples of 0-group sea bass from the Camel and Tamar Estuaries (SW England), the Scheldt Estuary in Belgium and two Irish samples, suggests that there is little, if any, sign of population structuring. In addition, work by Durand, Bonhomme and Morizur (2001) on adult sea bass captured at the main spawning grounds in VIIe, VIIf, VIIIfa and VIIIfb suggested that the genetic differentiation between spawning grounds is very limited, suggesting that mixing between generations is sufficient to homogenise the genetic make up of each sub-population. Fritsch *et al.* (2007) investigated 8 microsatellite loci of juvenile and adult sea bass caught in the Bay of Biscay and the English Channel and of 5 loci of sea bass caught in Ireland and Scotland. Genetic data showed no significant population differentiation, indicating substantial gene flow. However, results suggested that Irish and

Scottish populations could be separated from the Bay of Biscay and Channel, but the sample size in this case was limited.

4.2.2 Evidence from tagging studies

Since 2001, various proposals have been made to structure the sea bass population and its migrations and to establish stock boundaries based largely on conventional tagging studies. The history of proposals by SGBASS (ICES, 2001, 2002 and 2004; Fritsh *et al*, 2007, Pawson *et al*, 2007) is shown in Figures 4.1 – 4.3.

The 2001 ICES Study Group on Sea Bass (SGBASS) proposed four stocks (North Sea and eastern-Channel; Biscay-western Channel; west coast of England and Wales, and Ireland (ICES, 2001). The SGBASS 2004 extended this to propose additional stock structuring in the eastern Channel and southern part of the western Channel (ICES 2004). They considered the eastern and western Channel have a mixture of resident and seasonal visiting sea bass and, although there is little evidence of a "biological" boundary between these stocks, the SGBASS suggested that the boundary between ICES Divisions VIId and VIIe be retained for assessment purposes because the respective fisheries are different in character. Very few sea bass appear to move north or south across the Hurd Deep within VIIe, which suggested to SGBASS (ICES 2004) that fish around North Brittany and the Channel Islands could be separated from UK stocks and possibly included with those in subarea VIII. The Study Group considered that for management purposes the sea bass population around Ireland could be regarded as a discrete stock. Finally, the sea bass population in the Bay of Biscay appeared to be relatively self-contained, and the Study Group proposed that this should be treated as a separate stock area.

Recent genetic and tagging studies led both Fritsch *et al*. (2007) and Pawson *et al*. (2007), to question the need for six stock areas. While these authors proposed separate stock units in the North Sea and Bay of Biscay, they suggested that the English Channel and Bristol Channel could be treated as a single stock unit, as could bass in Irish waters.

In a recent study conducted by CEFAS using electronic data-storage tags (Quayle *et al* 2009), sea bass tagged near the Channel Islands in VIIe (south of Hurd Deep) moved as far as the southern North Sea, and sea bass tagged on the NE coast of England and the Thames Estuary moved into VIId in the eastern Channel (Figure 4.4).

A recent electronic tagging study conducted in France in 2010–2011 (Figure 4.5) showed seasonal movements of sea bass between tagging sites off NW Brittany and the Bay of Biscay, which supports the idea of a stock in the Bay of Biscay. The study also showed the high degree of homing for sea bass on summer feeding areas (five sea bass were recaptured on the same rock one year after tagging, and at least two of them could have migrated to different offshore winter spawning areas).

4.2.3 Distribution of commercial fishing catches

The most intensive fishing areas for sea bass by the UK, France and Netherlands in Subareas IV and VII are spread across the North Sea – eastern Channel boundary (Figures 4.6 – 4.8), which together with tagging results suggests that this is not an appropriate boundary for delimiting separate stocks for management purposes. This does not in itself preclude the existence of separate stocks. However the lack of any clear spatial structuring, together with the known movements of tagged sea bass between ICES Divisions, would make the use of ICES Divisions in IV and VII to define stock boundaries rather subjective.

4.2.4 Similarities in stock trends between ICES areas

Previous WGNEW meetings have attempted to analyse the UK landings-at-age data separately for ICES Divisions IVb and c, VIId, VIIe and h, and VIIa,f and g, using simple approaches such as SURBA, as well as a complex statistical, fleet-disaggregated model (ICES 2008). The age compositions for these areas are derived from independent sampling for length and age. Historical recruitment trends were very similar for the four assessment areas, except for the most recent year classes which were estimated from only partial cohort data and without the use of recruit indices. This could reflect large-scale environmental variables affecting recruitment in all areas, but could also be an effect of stock mixing on the separate catch-at-age matrices.

4.2.5 Recommendations for stock identity to be used at benchmark assessments

It is clear that further studies are needed on sea bass stock identity, using conventional and electronic tagging, genetics and other individual and population markers (e.g. otolith microchemistry and shape), together with data on spawning distribution, larval transport and VMS data for vessels tracking migrating sea bass shoals, to confirm and quantify the exchange rate of sea bass between sea areas that could form management units for this stock.

The pragmatic view of WGNEW is to continue to assume the presence of discrete sea bass stocks off southern Ireland and in the Bay of Biscay / IXa. The October 2012 benchmark assessment of sea bass should evaluate the effect on model diagnostics of different degrees of disaggregation of the assessment data across IVb/c, VIId, VIIe,h and VIIa, f and g.

4.3 Management regulations

Sea bass are not subject to EU TACs and quotas. Commercial vessels catching sea bass within cod recovery zones are subject to days-at-sea limits according to gear, mesh and species composition.

Under EU regulation, the MLS of sea bass in the Northeast Atlantic is 36 cm total length, and there is effectively a banned range for enmeshing nets of 70 - 89 mm stretched mesh in Regions 1 and 2 of Community waters.

A variety of national restrictions on commercial sea bass fishing are also in place. These include:

- a landings limit of 5 t/boat/week for all French and UK trawlers landing sea bass;
- closure of 37 sea bass nursery areas in England and Wales to specified fishing methods;
- UK regional byelaws in Cornwall and South Wales stipulating a 37.5 cm MLS;
- a minimum gillnet mesh size of 100 mm in South Wales;
- a variety of control measures in Ireland that effectively ban commercial fishing for sea bass in Irish waters.
- a licensing system from 2012 in France for commercial gears targeting sea bass.
- voluntary closed season from February to mid-March for long-line and hand-line sea bass fisheries in Brittany;

Depending on country, measures affecting recreational fisheries include minimum landing sizes, restrictions on sale of catch, bag limits (Ireland), and gear restrictions (France; Netherlands).

4.4 Fisheries Data

The commercial sea bass fisheries in Areas IV and VII have two distinct components: an offshore fishery on pre-spawning and spawning sea bass during November to April, predominantly by pelagic trawlers from France and the UK, and small-scale inshore fisheries catching immature sea bass and mature fish returning to coastal areas following spawning.

The inshore fisheries include many small (10 m and under) vessels using a variety of fishing methods (e.g. trawl, handline, longline, nets, rod and line) and often taking sea bass as a by-catch with other species. Historical landings data for the small-scale fisheries have often been poorly recorded. The introduction of legislation requiring registration of Buyers and Sellers since 2006 has improved the accuracy of the reported landings in the UK.

The fisheries in Area VIII are prosecuted mainly by France and Spain and in Division IXa by Spain and Portugal. The Portuguese fleet is predominantly polyvalent with small catches also recorded for purse seines, trawls and gillnets.

Sea bass are a popular target for recreational fishing in Europe. Relatively little historical data are available on recreational fisheries although several European countries are now carrying out surveys to meet the requirements of the EU Data Collection Framework and for other purposes (ICES, 2009, 2010, 2011; Herfault *et al.*, 2010, Rocklin *et al.*, 2012 in prep).

4.4.1 Commercial landings series

4.4.1.1 Data available

Landings series for use in the assessment are available from two sources:

- i) Official statistics recorded in the Fishstat database since around the mid 1970s.
- ii) French landings for 1999–2010 from a separate analysis by Ifremer of logbook and auction data.

Total international landings from the two sources combined increased from around 2000t in the late 1970s to over 8000 t by 2006, the bulk coming from areas IVb,c, VIIe and XIII (Table 4.1; Figure 4.9). An important driver of the increase in landings since the 1990s was the increased landings in Divisions IVb,c, VIId and VIIe,h, coinciding with the large 1989 year class and a northward expansion of the sea bass population in the North Sea during a period of increasing sea temperatures. Landings by country from each ICES area are given in Tables 4.2 – 4.8.

WGNEW has previously given separate (unofficial) estimates of 29 – 65 t for Spanish Basque countries for area VIII, but only for 1995 – 2005. These have not been updated but can be viewed in the ICES 2010 and 2011 advice sheets (ICES, 2011)

UK and French landings by gear type and area are shown in Figures. 4.10 and 4.11. A large fraction of the landings from VIIe,h are from the pelagic trawl fisheries on off-shore sea bass

4.4.1.2 Quality of landings data

From 1999 onwards, French landings data from FishStat are replaced by more accurate Figures from a separate analysis of logbook and auction data carried out by Ifremer.

The accuracy of total landings statistics for subareas IV, VII and Div. VIIIa are expected to have improved further since 2006 since the introduction of the registration of Buyers and Sellers in the UK, particularly for small vessels that do not have to supply EU logbooks. Landings data for Div. IXa are more accurate since 2006 when sea bass *Dicentrarchus labrax* landed into Portugal started to be recorded as the correct species rather than mainly as part of a mixed sea bass category with the spotted sea bass *Dicentrarchus punctatu*. This resulted in a sharp increase in reported landings of *D. Labrax* in 2006 (Figure 4.12).

The UK has previously attempted to estimate the sea bass landings of inshore commercial and recreational fishing boats between 1984 and 2006 using a voluntary log book scheme in conjunction with a biennial census of vessels catching sea bass that covers different segments of coast in different years (Pickett 1990). The landings tables in previous WGNEW and ACOM advice included “unallocated” landings which are the difference between the voluntary logbook estimates and the official UK statistics in each ICES area. The coverage of the logbook scheme has declined substantially and the scheme is under review. Pending the outcome of the review, the “unallocated” landings series are withdrawn from the WGNEW report and are not included in any data series shown. Time-series of LPUE of individual logbook holders are reproduced in the Stock Annex.

Due to the species’ high commercial value and demand in local restaurants, there might be some unreported catches of sea bass at specific areas, although its level is unknown.

Further information on availability and quality of landings data by country is provided by SGBASS (ICES, 2004).

4.4.2 Commercial discards

4.4.2.1 Data available

Estimates of sea bass discards by area and fleet were available to WGNEW for UK fleets from 2002 onwards and for French fleets from 2009. The UK and French sampling schemes involve vessel-list sampling frames and random selection of vessels within strata defined by area and fleet sector.

As sampling is targeted at all species, annual coverage of the sea bass fisheries is relatively limited. UK discard rates for samples aggregated over 2002 – 2008 are given in Table 4.9. The highest discard rates were for trawlers using 80–89mm mesh in the eastern Channel (VIIId) and southern North Sea. Discard rates of gillnetters were very low. No trips were undertaken on vessels using lines, which are a significant component of the sea bass fishery. It is assumed that discards of line-caught sea bass in shallow inshore waters will have a high survival rate. Although beam trawlers using 80–89 mm mesh had a high discard rate in VIIId, this fleet has very low catches of sea bass. No discards sampling has taken place on offshore pair trawlers, however as this fishery targets mature sea bass, discarding is expected to be low, as observed in the French offshore fishery.

French discard rates of sea bass in 2009 and 2010 were low in general (Tables 4.10 and 4.11). As with UK fleets, bottom trawlers had the highest discard rate mainly in the eastern English Channel (VIId) and southern North Sea (IVb,c). The total amount of discards estimated in 2009 and 2010 was 183 t and 157 t, mainly assigned to Division VIId. Data for some fleets and areas are indicative because of the low rates of sampling.

4.4.2.2 Quality of discards data

Discards estimates for UK and France are from vessel selections that for some areas and gears include relatively limited numbers of observed trips where sea bass is caught and discarded. A compilation of all available discards estimates by year, area and gear type, in terms of weight, length and age composition, with indicators of annual precision and bias, should be provided by all countries catching sea bass for the October 2012 benchmark assessment.

4.4.3 Recreational catches

4.4.3.1 Data available

Recreational marine fishery surveys in Europe are still at an early stage in development (ICES, 2010, 2011). Recent estimates will be compiled and evaluated for the benchmark assessment of sea bass in October 2012. The following information was available to WGNEW 2012.

4.4.3.1.1 France

The first national survey of recreational fishing in France (2006 to 2008) revealed that sea bass was the main target species for recreational fishermen, and that 378,500 people had fished recreationally for sea bass.

A new study targeting sea bass was conducted between 2009 and 2011. In 2009, 15 000 households were phoned in the targeted districts using random digit dialling (RDD). The main goal was to estimate the population of sea bass recreational fishers and their socio-demographic profiles in the Bay of Biscay and in the Channel. In 2010–2011 a panel of 121 recreational fishermen was recruited during the RDD screening survey and kept diaries of their catches for one year. The main goal was to obtain a detailed description of fishing trips (travel, area of fishing, gears, ...) and the description of their catches (species, weight, length, ...) to be used for assessment.

The estimated recreational catch of sea bass in the Bay of Biscay and in the Channel was 3170 t of which 2350 t was kept and 830 t released. The main gears used, in order of total catch, were fishing rod with artificial lure, fishing rod with bait, hand line, long line, net and spear fishing. Approximately 80% of the recreational catch was taken by sea angling (rod and line or handline) - 2610 t total catch and 1840t kept (29% release rate).

The precision of the estimate is relatively low (CV =51%). Increasing the panel from 121 to 500 fishermen would be expected to improve precision to 25% and increasing this panel to 1000 would improve precision to 18%.

4.4.3.1.2 UK (Eand W)

Several attempts have been made in the past to estimate recreational sea angling catches of sea bass in England and Wales or more restricted areas of the UK (Dunn *et al*, 1989; Dunn and Potten, 1994). A new survey programme based on a statistically-

sound survey design commenced in 2012 to estimate fishing effort, catches (kept and released) and fish sizes for shore based and boat angling in England. The survey does not cover other forms of recreational fishing.

4.4.3.1.3 Netherlands

Sea bass are taken by recreational sea anglers in the Netherlands, and a recent survey is described in ICES (2011). The estimates from this survey were under review at the time of the ICES PGRFS report in 2011.

4.4.3.1.4 Other countries

Sea bass are a popular angling species in Ireland and are also caught in Belgium. WGNEW did not have any information on estimated recreational catches.

4.4.3.2 Quality of recreational catch estimates

Recreational catch estimates are not yet available as time series. The estimates for France are characterised by relatively poor precision. Sources and potential magnitude of bias were not provided to WGNEW. The 2012 ICES Working Group on Recreational Fisheries (WGRFS) will consider the development of data quality indicators for recreational fishery survey estimates.

4.4.4 Commercial catch-effort data

4.4.4.1 Data available

4.4.4.1.1 France

Fishing effort data are available for French fleets but will be biased by trends in the availability of logbook data. During 2000 - 2001 around 50% of the vessels that had auction sales slips on the Atlantic coast had no logbook data (Figure 4.13). This reduced to around 20% by 2007 due to increasing declaration of log books to the French administration, both for vessels >10 meters and for vessels of 10 m and under. The subsequent increase in percentage of vessels with no logbook data during 2009–2011 is due to logbook data not having been captured yet in the database (Figure 4.13). This tendency is apparent across areas and gears, and it means that effort and LPUE trends cannot at present be provided for sea bass based on logbook data. LPUE data could be obtained using the auction data: this will be explored for the benchmark assessment especially for coastal bottom trawl.

Data on LPUE of sea bass is available from the personal fishing records of six coastal vessels fishing with lines in Division VIIe (Figure 4.14). It shows a mean decline of 33% of their LPUE from 2007 to 2009. More recent data were not available to WGNEW, although the fishermen reported a continued downward trend with a more recent levelling off. Reports from fishermen indicate that this trend isn't apparent in VIId and IVbc.

4.4.4.1.2 UK (Eand W)

The exploratory assessment of sea bass conducted by WGNEW in 2010 used effort data to tune a statistical, fleet disaggregated catch-at-age model applied only using UK data updated to 2008. The assessment has not been updated this year, as the stock will be subject to a benchmark stock assessment in October 2012. Intersessional work is proposed to re-evaluate the effort and LPUE data for sea bass as potential input to assessment and no trends are presented here. The LPUE trends from individual fish-

ermen can be derived from the Cefas logbook scheme, and can be obtained for the three weight categories recorded (examples are given in the Stock Annex). This will be explored further for the benchmark assessment.

4.4.4.1.3 Spain

LPUE data for Spanish fleets operating in ICES areas VI-VIII and landing into Basque Country ports were provided to WGNEW in 2005, and the best indicator of sea bass abundance trends (LPUE) in the period 1994 - 2004 was considered to be from vessels of the 'baka' otter trawl fleet working in Div. VIIIa,b,d and landing into the Basque port of Ondarroa. Data for later years were not available to WGNEW, but will be requested for the benchmark assessment.

4.4.4.1.4 Quality of data

None of the fishing effort or LPUE data available to WGNEW are suitable for inclusion in the benchmark assessment without further evaluation. Development of LPUE series providing relative abundance data for adult sea bass is desirable because of the lack of survey data. LPUE for the offshore pelagic fishery may be biased due to targeting of aggregations. Sea bass are a by-catch in several other fisheries and catchability may drift due to changes in species targeting, areas fished and vessel fishing power. Subsetting of trips to exclude those where there is no expectation of sea bass catches (e.g. Stephens and MacCall, 2004), may be appropriate and will be investigated. French effort and LPUE will have to be based on auction data due to variable availability of logbooks.

4.5 Biological sampling: length and age compositions

4.5.1 Data available from commercial fishery landings

Length and age compositions of sea bass landings were available to WGNEW from sampling in the UK and France.

4.5.1.1 France

Quarterly landings age compositions are available for all métiers in Divs. VII e h from 2000 (annual age compositions are given in Tables 4.20 to 4.24). For VII d quarterly length distributions are available from 2003 for bottom trawl and pelagic trawl (Table 4.25 and 4.26). For IV b c length distributions are available from 2009 for various gears (Table 4.28). For VIII a b length distributions per métier are available from 2000 (Tables 4.29 to 4.32).

4.5.1.2 UK

Length and age compositions are supplied by the UK since 1985 for IV b and c, VII d, VIIe,h and VII a,fand g, disaggregated by five gear types: otter trawl, pelagic pair trawl, driftand gill nets, lines, and other gears. Although separate ALKs are derived for the five areas, the same ALK is applied to all gear groups meaning that the age composition estimates for the different gears are not independent.

Landings age compositions by gear and area are given in Tables 4.33 to 4.44. Age data are currently provided with a plus group (12+). If possible the data should be provided to the oldest true age to allow more flexibility to investigate the most appropriate plus group.

4.5.1.3 Other countries

Fishery sampling data from other countries catching sea bass will be sourced for the benchmark assessment but were not available to WGNEW 2012.

4.5.1.4 Comparison of age and length compositions for UK and French fisheries by area and gear

Age compositions of sea bass landings in the UK and French fisheries in VIIe-h for the years 2000 – 2010 are compared in Figures. 4.17 to 4.19. The compositions of bottom trawl landings are quite similar in most years (Figure 4.17) with some exceptions such as 2008 and 2010. Age compositions in the net fisheries differ substantially in some years (Figure 4.18). The French longline fishery appears to take younger sea bass than the handline fishery which has a very high component in the 12+ group in some years (Figure 4.19). The UK line fishery age compositions (combined line gears) are more similar to the French handline fishery than the longline fishery.

Length compositions of UK and French fleets are compared for 2010 in Figures 4.20 and 4.21. The length compositions for IV b c nets and lines and VII d bottom trawl were very similar (Figure 4.20), as were bottom trawls and pair trawls in VIIe,h (Figure 4.21). Samples from the UK and French line fisheries in VII e and h had very different length compositions.

4.5.2 Quality of commercial fishery length and age composition data

UK Sampling rates for length compositions have been very variable between area, gear and year strata. Most strata have some sampling coverage with the exception of pair trawls which have had zero or very low coverage in many years despite large catches, although sampling has improved recently (Tables 4.12 to 4.15; Figure 4.15). The sampling rate (trips sampled per tonne landed) has declined for all gears since the mid 2000s (Figure 4.15).

Sampling of sea bass in France has also been very variable between areas and gears, with greatest consistency between years in VIIIa,b. There has been a general increase in numbers of trips sampled for length since 2009 (Tables 4.16 to 4.19 and Figure 4.16).

The sampling of fishery landings is sufficient to clearly demonstrate strong and weak year classes that can be tracked over many years (Figure 4.22b; Table 4.45), for example the 1989 year class which was a major contributor to the growth in fishery landings in Subareas IV and VII in the 1990s. This indicates plenty of contrast in the catch-at-age data to help in fitting an age-based assessment model. The overall age compositions of UK fisheries has changed little between 1985–97 and 1998–2010 (Figure 4.22a).

WGNEW was not in a position to compute effective sample sizes for annual length or age compositions to be input to stock assessment models such as Stock Synthesis. The numbers of trips sampled for age compositions was not available. Metadata on numbers of sampled trips and numbers of fish measured and aged will be required for the benchmark assessment.

The statistical design of fishery sampling schemes has undergone change in recent years in the UK and France, following recommendations from ICES workshops on sampling survey design, with a move towards more representative sampling across trips within fleet segments. This can result in sampling more trips that have small catches of sea bass, and is one reason for the increase in numbers of sampled trips

with sea bass since 2009 in France which does not imply an increase of the proportion in numbers of fish measured per trip

4.5.3 Data available from commercial fishery discards

Although discards data are provided to WGNEW for UK and French vessels (Table 4.9 to 4.11), information on sampling for length or age compositions was not available. A compilation of all available discards estimates by year, area and gear type, in terms of weight, length and age composition, with indicators of annual precision and bias, should be provided by all countries catching sea bass for the October 2012 benchmark assessment.

4.5.4 Data available from recreational fisheries

Length compositions of sea bass reported for the recent recreational fishery survey in France was available to WGNEW. These will be evaluated at the benchmark assessment.

4.6 Biological parameters and other research

A review of sea bass population biology and fisheries is given by Pickett and Pawson (1994), and some updates are provided by ICES SGBASS (2004) and previous WGNEW. However there is an absence of parameters that can be directly incorporated in the assessment process and work is needed to compile and analyse data to provide this information prior to the benchmark assessment.

4.6.1 Accuracy and validation of age estimates

4.6.1.1 Age-reading consistency

The first small-scale otolith and scale exchange for sea bass (*Dicentrarchus labrax*) took place in 2011. A total of 155 fish from Eastern English Channel (ICES Div.VIIId) was sampled. The length range of the fish was between 17 and 74 cm, with a mean length at 47 cm. For each fish, the *Sagittae* otoliths and few scales were used to compare the age estimation between both calcified pieces. Four readers participated from the UK and France. Only images were used during this exchange.

There was a low mean precision of age estimate for individual fish with Coefficient of Variation (CV) of 13.1% and percent agreement to modal age of 54.1%. Only two of the 155 fish were read with 100% agreement (1.3%). The results showed the same precision of age estimation from the otolith (60% agreement; CV = 12%) or the scale (62% agreement; CV = 12%). However, this exchange showed that the age estimation from the otoliths was different than this from the scales. A large-scale exchange is planned for 2012 to further investigate the consistency of sea bass ageing.

4.6.1.2 Age validation

WGNEW was not aware of specific studies to validate absolute ages of sea bass derived from otolith or scale readings. Strong and weak year classes can be followed clearly to over 20 years of age (Table 4.45) although it is not known to what extent the elevated numbers of sampled fish in immediately adjacent year classes is a true reflection of year class strength or a “bleeding” of data due to the types of age errors discussed in the previous section. There is also some confusion in year class tracking in the younger ages 3 – 5 (see Figure 4.22b), although this will be affected by gear selectivity and changes in fish behaviour.

4.6.2 Growth parameters

Pickett and Pawson, 1994, provide plots of growth curves for female and male sea bass based on samples collected in the 1980s, and give some estimates of Von Bertalanffy growth parameter from other studies ($L_{\text{inf}} \sim 72$ cm and $k \sim 0.14$ for combined-sex data). There is some sexual dimorphism of growth, with females attaining mean lengths 5–10 cm greater than males from around eight years of age onwards. Growth will vary regionally, and Pickett and Pawson (1994) also highlight influence of in-shore and estuarine temperature variation on growth of immature sea bass.

4.6.3 Maturity

Collection of maturity data are difficult as few adult sea bass are caught in surveys and sea bass are typically landed whole and are extremely expensive to purchase. The most commonly cited information is from Pickett and Pawson (1994). These and other data need to be retrieved for statistical analysis.

SGBASS (ICES, 2004) reported that around Britain and Ireland, male sea bass mature at a length of 31–35 cm, aged 4–7 years, and females at 40–45 cm, aged 5–8 years, (Kennedy and Fitzmaurice, 1972; Pawson and Pickett, 1996), and data from the southern part of the Bay of Biscay (Lam Hoai, 1970 [ref not provided by SGBASS], Steuert, 1972) indicate that male sea bass mature at a length of 35 cm (age 4) and females at 42 cm (age 6). Data provided by Masski (1998) from samples taken from VIIe bottom trawlers (41 females) indicate that 40 % and 82 % of females were mature at age 6 and 7 respectively, with a very small percentage mature at age 5.

In 2009 the maturity of sea bass caught by the UK fishery was investigated using samples of 981 fish (male = 339, female = 642) caught by commercial trawl and nets in the northeast, the southeast and the southwest UK during April– June (ICES, 2010). Maturity ogives fitted to the combined data for females indicated L_{50} at approximately 40 cm TL and first maturity around 35 cm (Figure 4.23). This contrasts with the data of Pawson and Pickett, (1996) who reported that females were not becoming ripe to spawn at lengths of < 42 cm TL, and may suggest that females may be maturing at a smaller size than was previously reported. In addition, separate model fits to the four area/gear sample sets suggest that the onset of maturity may differ by geographic location, with females in the North Sea maturing at a larger size than those in the southeast. For males, the data indicated that L_{50} was approximately 34 cm TL, but that there were uncertainties due to the small sample size and outliers in the data. However, it appeared that gravid and running individuals were larger than previously reported.

4.6.4 Natural mortality M

There are no direct estimates of natural mortality available for Northeast Atlantic sea bass. Predation up to around age 4 will be in and near estuaries and bays. As with other fish species it is expected that M will be relatively high at the youngest ages, particularly given the slow growth rate in sea bass. For the benchmark assessment WGNEW proposes the compilation of life-history based inferences in the general value of M , based on maximum observed age, VB growth parameters, age at maturity and age of cohort biomass peak in relation to maturity. Age composition data from France since 2000 (Tables 4.20 to 4.24) and the UK since 1985 (Table 4–45) indicate maximum recorded ages from 22 (French data) to 28 (UK data). The probability of encountering very old sea bass is partly a function of the interaction of year class

strength and sampling rates, as well as mortality, however the occurrence of sea bass to almost 30 years of age suggests low rates of mortality.

4.6.5 Data sourcing and evaluation for benchmark assessment

The distribution of sampling in relation to distribution of mature and immature fish at different times of year needs to be evaluated for a species such as sea bass which undertakes spawning migrations. All existing data on maturity at size / age from surveys and fisheries, and individual length-at-age data, needs to be sourced and analysed for the October 2012 benchmark assessment in order to estimate growth parameters and maturity ogives for use in possible assessment models. WGNEW has compiled age data out to the truest age for UK sampling (1985 onwards) and French sampling (2000 onwards) but should source earlier data if available, for periods or areas of much lower fishing activity on sea bass.

4.7 Survey data

4.7.1 UK

4.7.1.1 Solent and Thames pre-recruit surveys

The UK has conducted pre-recruit trawl surveys in the Solent and the Thames Estuary since 1981 and 1997 respectively. These surveys all ended in 2009 although the Solent survey was repeated as a one-off survey in autumn 2011 to help provide recruitment indices for the sea bass benchmark assessment. The location of the surveys and the tow positions are shown in Figure 4.24. Both surveys use a high headline sea bass trawl, although in the Thames it is deployed as a twin rig and in the Solent as a single rig.

The Solent survey has previously been presented as a combined index across ages in each year class. The index was derived by firstly rescaling the annual mean catch rate per age class to the mean for that age in the survey series, then taking the average of the rescaled values for ages 2 – 4 in each year class from surveys in May-July and September (i.e. up to six values per year class represented in the combined index). The Thames survey data are worked up in the same way, although using a different age range for the combined index (ages 0 – 3). WGNEW has this year provided the survey data in the more conventional tuning-file format, giving the standardised catch rates (numbers per 10 minute tow) by year and age, separately for the two surveys (Tables 4.46 and 4.47).

The mean-standardised indices from the Solent survey show very large variations from year to year as may be expected given the large variation in year class strength evident in the commercial catch data (Figure 4.25). Strong year classes are apparent in 1989, 1995 and 1997, but in the last decade, year class strength has been less variable, a pattern also seen in the commercial fishery (Figure 4.22 b). The survey indicates a general trend of increasing recruitment since the early 1990s. The most recent survey in 2011 indicates very weak 2008 and 2009 year classes.

Some year-effects (where all or most age classes show a reduced or elevated index in a year) are evident in 2007 in the September survey and in 1996 and 2003–07 in the May-July survey (Figure 4.25). Year-class effects are not consistent across the survey and age range, and this is also shown by low correlation coefficients in the internal consistency plots (index for age i , year y plotted against age $i-1$, $y-1$; Figure 4.26)

The Thames survey shows fewer year effects and better internal consistency than the Solent survey (Figures 4.27 and 4.28). The overall trend is closer to the Solent September survey than to the Solent May-July survey, showing a trend of increasing recruitment in the 1990s although with a dip in the mid 1990s.

4.7.1.2 Other 0-gp and 1-gp surveys

The UK has undertaken a seine net survey in the Tamar Estuary, since 1985. Additional data are available from power stations in the Thames and Severn Estuary. Abundance indices for these surveys are given in Tables 4.48.

4.7.2 Netherlands

The Netherlands has data from a 3m beam trawl survey in the Westerscheldt. From 1972 to 1990, sea bass catches were rare, but since 1990 catch rates increased with large peaks in 1994 and 2004.

4.7.3 France

Sea bass are caught in small numbers in the French Evhoe trawl survey, which extends to the shelf edge in Subareas VII and VIII but also extends into coastal areas of the Bay of Biscay and the Celtic Sea where sea bass may be caught. Less than 10% of the stations have sea bass catches in most years. The percentage of stations with sea bass catches, and the catch rate at positive stations, have both shown a slight increasing trend since 1997 (Figure 4.29; Table 4.49). The data should be reworked for the benchmark assessment to separate out the catch rates for Subareas VIII and VII.

4.8 Analyses of stock trends

No formal analyses of stock trends are presented pending the benchmark assessment in October 2012.

4.9 Data recommendations: benchmark assessment preparation

4.9.1 Summary of data available for benchmark assessment

A summary of the data available for the October 2012 benchmark assessment of sea bass is provided in tables 4.50 to 4.56, together with an indication of the quality of the data. A traffic-lights indicator is shown, in the spirit of the ICES WKACCU scorecard although not derived formally using the detailed WKACCU criteria.

4.9.2 Tasks for further data compilation and evaluation for the benchmark assessment

A workplan to prepare for the October benchmark assessment is given below, using the headings and guidelines for data compilation and evaluation provided by the 2011 meeting of the ICES Planning Group on Commercial Catches, Discards and Biological Sampling. The objective is to produce a detailed Working Document for the benchmark assessment describing and evaluating the data sets and parameters on which an assessment can be carried out. This will be based on the sea bass Section 4 from WGNEW 2012 with additional data and evaluation recommended by WGNEW and should be made available by end of June 2012 to allow sufficient time for inter-session work on developing suitable assessment models.

The following intersessional work is recommended, covering data compilation and evaluation not already included in WGNEW 2012.

4.9.2.1 Review stock structure and unit stock definitions and consider if changes to existing definitions are required.

This is covered by WGNEW 2012

4.9.2.2 Review and recommend life history parameters (e.g. growth parameters, maturity ogives, fecundity, natural mortality), for use in assessments.

- Compile historical length-at-age data sets for each area; estimate Von Bertalanffy growth parameters and investigate if changes in growth are apparent (year class effects).
- Compile historical length – age- maturity data; explore appropriate models for maturity ogives.
- Develop and recommend values for natural mortality based on life history information and comparison with other stocks.
- Provide ranges of uncertainty for life history parameters to allow sensitivity testing.

4.9.2.3 Develop time-series of commercial and recreational fishery catch estimates, including both retained and discarded catch, with associated measures or indicators of bias and precision.

- Complete review of UK sea bass logbook scheme, and recommend exclusion or inclusion in assessment.
- Review the recreational fishery catch estimates for France in the light of the findings of the 2012 meeting of the ICES Working Group on Recreational Fishery Surveys.
- Obtain sea bass commercial discards estimates from all countries / areas / fleets and information on sampling design, coverage and numbers of trips sampled.

4.9.2.4 Estimate the length and age distributions of fishery landings and discards if feasible, with associated measures or indicators of bias and precision.

- Compile and evaluate any length and age composition data for landings / discards for countries other than UK and France.
- Tabulate nos. trips sampled on shore and at sea for length and age, and numbers of fish sampled for length and age, by country, year, area and gear.
- Develop annual estimates or proxies for effective sample size for length/age composition input series.
- Compile raised length and age compositions for landings and discards by area and fleet in the format necessary for input to Stock Synthesis 3 (age compositions to oldest true age)
- Evaluate internal consistency of catch-at-age data series.
- Describe any methods of imputation of missing values and their impact on estimates.

4.9.2.5 Develop recommendations for addressing fishery selectivity (pattern of catchability at length or age) in the assessment model.

- Review existing information on selectivity characteristics of the main types of fishing gears used for sea bass, including inferences on relative selectivity from available length and age composition information.

4.9.2.6 Recommend values for discard mortality rates, where appropriate, and indicate the range of uncertainty in values.

- Review available research and published literature on discard mortality rates that might be appropriate to sea bass.

4.9.2.7 Review all available and relevant fishery dependent and independent data sources on fish abundance, and recommend which series are considered adequate and reliable for use in stock assessments. Provide measures or indicators of bias and precision over the time series.

- Compile existing survey data into the necessary input data files.
- Investigate the use of the Stephens and MacCall (2004) or similar method of sub-setting commercial LPUE data to exclude trips where catch compositions indicate the trips are in areas where sea bass do not occur.
- Investigate use of individual LPUE from fishermen participating in Cefas logbook scheme.
- Document important technological developments in vessels and gears that could result in trends in catchability.
- Describe methods of analysis of fishery LPUE /CPUE data including any statistical modelling carried out.

4.9.2.8 Review progress on existing recommendations for research to develop and improve the input data and parameters for assessments, and develop and prioritise new proposals.

- Compile any previous research recommendations relating to sea bass, review progress, and develop and prioritise new proposals for discussion at the benchmark assessment meeting.

4.9.2.9 Develop a spreadsheet of assessment model input data that reflects the decisions and recommendations of the Data Workshop. Review and approve the contents of the input spreadsheet by end June 2012.

- Develop spreadsheet.

4.9.2.10 No later than end June 2012, prepare the benchmark data Working Document and all input files in the required format.

- Produce data compilation and evaluation report, and data files.

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Table 4.1. Nominal landings (t) of bass by stock area. Source: FishStat except landings for France in 1999--2010 supplied to WGNEW 2012 by Ifremer.

| ARE A | IVBC VIID | VIIIE H | VIIIAF G | IVA XII | VIA XII | VIIIBCJ | VIIIA D | VIIIC C | IX A | TOTAL ICES |
|----------|--------------|------------|-------------|------------|------------|---------|------------|------------|---------|---------------|
| 1975 | 92 | 190 | 7 | 20 | | | 0 | 0 | 0 | 309 |
| 1976 | 67 | 44 | 3 | 0 | | | 0 | 0 | 0 | 114 |
| 1977 | 68 | 45 | 9 | 0 | | | 0 | 0 | 0 | 122 |
| 1978 | 172 | 372 | 11 | 0 | | | 1146 | 0 | 576 | 2277 |
| 1979 | 316 | 458 | 7 | 0 | | | 1132 | 0 | 550 | 2463 |
| 1980 | 210 | 616 | 30 | 0 | | | 1086 | 0 | 460 | 2402 |
| 1981 | 158 | 738 | 44 | 0 | | | 0 | 0 | 370 | 1310 |
| 1982 | 172 | 565 | 50 | 0 | | | 0 | 0 | 691 | 1478 |
| 1983 | 261 | 569 | 40 | 2 | | | 1363 | 0 | 522 | 2757 |
| 1984 | 400 | 508 | 27 | 1 | | | 2886 | 0 | 681 | 4503 |
| 1985 | 219 | 469 | 55 | 1 | | | 2477 | 0 | 475 | 3696 |
| 1986 | 387 | 579 | 14 | 0 | | | 2607 | 0 | 401 | 3988 |
| 1987 | 264 | 1049 | 53 | 1 | | | 2479 | 0 | 410 | 4256 |
| 1988 | 308 | 569 | 48 | 3 | | | 2292 | 14 | 208 | 3442 |
| 1989 | 366 | 478 | 74 | 5 | | | 2215 | 326 | 196 | 3660 |
| 1990 | 281 | 505 | 37 | 1 | | | 1679 | 396 | 236 | 3135 |
| 1991 | 390 | 494 | 97 | 0 | | | 1796 | 303 | 187 | 3267 |
| 1992 | 287 | 551 | 67 | 0 | | | 1776 | 254 | 147 | 3082 |
| 1993 | 429 | 518 | 47 | 0 | | | 1613 | 247 | 161 | 3015 |
| 1994 | 636 | 423 | 118 | 0 | | | 1728 | 308 | 189 | 3402 |
| 1995 | 815 | 594 | 169 | 8 | | | 1549 | 334 | 154 | 3623 |
| 1996 | 850 | 1357 | 123 | 3 | | | 1473 | 376 | 206 | 4388 |
| 1997 | 811 | 1131 | 123 | 0 | | | 1428 | 290 | 223 | 4006 |
| 1998 | 688 | 1042 | 249 | 50 | | | 1294 | 258 | 153 | 3734 |
| 1999 | 980 | 1176 | 32 | 1 | | | 1130 | 221 | 171 | 3711 |
| 2000 | 894 | 1406 | 106 | 4 | | | 2362 | 241 | 139 | 5152 |
| 2001 | 962 | 1402 | 137 | 5 | | | 2309 | 166 | 111 | 5092 |
| 2002 | 1214 | 1220 | 188 | 14 | | | 2398 | 83 | 89 | 5206 |
| 2003 | 1761 | 1582 | 116 | 2 | | | 2626 | 75 | 86 | 6248 |
| 2004 | 1934 | 1634 | 163 | 4 | | | 2386 | 221 | 141 | 6483 |
| 2005 | 2123 | 2143 | 161 | 2 | | | 2800 | 197 | 256 | 7683 |
| 2006 | 1852 | 2483 | 212 | 2 | | | 2877 | 155 | 576 | 8157 |
| 2007 | 2207 | 1754 | 241 | 6 | | | 2758 | 116 | 772 | 7853 |
| 2008 | 2176 | 1774 | 302 | 5 | | | 2746 | 142 | 513 | 7658 |
| 2009 | 2370 | 1437 | 211 | 5 | | | 2354 | 138 | 501 | 7016 |
| 2010 | 2352 | 2205 | 179 | 9 | | | 2258 | 200 | 577 | 7779 |

Table 4.2: Sea bass in Divisions IVb,c, and VIId. Official landings by country and ICES estimates of catches (t),

| | Belgium | Denmark | France | France ¹ (ICES) | Netherlands | UK(Scotland) | UK(England and NI) | Total (ICES) |
|------|---------|---------|--------|-------------------------------|-------------|--------------|--------------------|-----------------|
| 1984 | 0 | 0 | 324 | 324 | 0 | 0 | 76 | 400 |
| 1985 | 0 | 0 | 144 | 144 | 0 | 0 | 75 | 219 |
| 1986 | 0 | 0 | 295 | 295 | 0 | 0 | 92 | 387 |
| 1987 | 0 | 0 | 180 | 180 | 0 | 0 | 84 | 264 |
| 1988 | 0 | 0 | 199 | 199 | 8 | 0 | 101 | 308 |
| 1989 | 0 | 1 | 272 | 272 | 2 | 0 | 91 | 366 |
| 1990 | 0 | <0.5 | 210 | 210 | 0 | 0 | 71 | 281 |
| 1991 | 0 | <0.5 | 222 | 222 | 0 | 0 | 168 | 390 |
| 1992 | 0 | <0.5 | 204 | 204 | 0 | 0 | 83 | 287 |
| 1993 | 0 | 1 | 282 | 282 | 0 | 0 | 146 | 429 |
| 1994 | 0 | <0.5 | 279 | 279 | 0 | 0 | 357 | 636 |
| 1995 | 0 | 1 | 339 | 339 | 0 | <0.5 | 475 | 815 |
| 1996 | 0 | 1 | 527 | 527 | 4 | <0.5 | 318 | 850 |
| 1997 | 0 | 1 | 487 | 487 | 1 | <0.5 | 322 | 811 |
| 1998 | 0 | 2 | 372 | 372 | 32 | <0.5 | 282 | 688 |
| 1999 | 0 | 1 | 0 | 611 | 32 | 3 | 333 | 980 |
| 2000 | 0 | 5 | 701 | 612 | 60 | <0.5 | 217 | 894 |
| 2001 | 0 | 2 | 701 | 681 | 74 | 0 | 205 | 962 |
| 2002 | 0 | 1 | 858 | 868 | 94 | 6 | 245 | 1214 |
| 2003 | 133 | 1 | 1206 | 1197 | 158 | 3 | 269 | 1761 |
| 2004 | 119 | 1 | 1159 | 1318 | 188 | 0 | 308 | 1934 |
| 2005 | 149 | 1 | 1126 | 1377 | 319 | 1 | 276 | 2123 |
| 2006 | 150 | 2 | 1086 | 1145 | 299 | 6 | 250 | 1852 |
| 2007 | 128 | 1 | 1340 | 1429 | 373 | 24 | 252 | 2207 |
| 2008 | 118 | <0.5 | 1020 | 1290 | 375 | 41 | 352 | 2176 |
| 2009 | 125 | <0.5 | 1623 | 1483 | 389 | 20 | 353 | 2370 |
| 2010 | 175 | 4 | 1452 | 1363 | 391 | 26 | 393 | 2352 |

Source: ICES Bulletin Statistique.

¹Landings for 1999 – 2010 supplied to WGNEW by Ifremer.

Table 4.3. Sea bass in Divisions VIIe,h. Official landings by country and ICES estimates of catches (t)

| | Belgium | Denmark | France ¹ | Channel Is.- | Netherlands | Spain | UK(Scotland) | UK(E, Wales and NI) | Total (ICES) |
|------|---------|---------|---------------------|--------------|-------------|-------|--------------|---------------------|--------------|
| 1984 | 0 | 0 | 444 | 25 | 0 | 0 | 0 | 39 | 508 |
| 1985 | 0 | 0 | 432 | 18 | 0 | 0 | 0 | 19 | 469 |
| 1986 | 0 | 0 | 543 | 15 | 0 | 0 | 0 | 21 | 579 |
| 1987 | 0 | 0 | 1019 | 14 | 0 | 0 | 0 | 16 | 1049 |
| 1988 | 0 | 18 | 509 | 12 | 0 | 0 | 0 | 30 | 569 |
| 1989 | 0 | 1 | 390 | 48 | 0 | 0 | 0 | 39 | 478 |
| 1990 | 0 | 0 | 389 | 25 | 0 | 0 | 0 | 91 | 505 |
| 1991 | 0 | 0 | 434 | 16 | 0 | 0 | 0 | 44 | 494 |
| 1992 | 0 | 0 | 475 | 36 | 0 | 0 | 0 | 40 | 551 |
| 1993 | 0 | 0 | 422 | 45 | 0 | 0 | 0 | 51 | 518 |
| 1994 | 0 | 0 | 306 | 49 | 0 | 0 | 0 | 68 | 423 |
| 1995 | 0 | 0 | 424 | 69 | 0 | 0 | 0 | 101 | 594 |
| 1996 | 0 | 0 | 1135 | 56 | 4 | 0 | 0 | 162 | 1357 |
| 1997 | 0 | 0 | 907 | 74 | 0 | 0 | 0 | 150 | 1131 |
| 1998 | 0 | 0 | 784 | 79 | 16 | 0 | 0 | 163 | 1042 |
| 1999 | 0 | 0 | 752 | 108 | 0 | 0 | 4 | 312 | 1176 |
| 2000 | 0 | 0 | 1137 | 130 | 0 | 0 | 0 | 139 | 1406 |
| 2001 | 0 | 0 | 1149 | 80 | 3 | 0 | 0 | 170 | 1402 |
| 2002 | 0 | 0 | 902 | 73 | 2 | 0 | 0 | 243 | 1220 |
| 2003 | 2 | 0 | 1258 | 84 | 5 | 0 | 0 | 233 | 1582 |
| 2004 | 4 | 0 | 1237 | 159 | 3 | 0 | 0 | 231 | 1634 |
| 2005 | 3 | 0 | 1750 | 220 | 8 | 0 | 0 | 162 | 2143 |
| 2006 | 6 | 0 | 2075 | 193 | 9 | 0 | 1 | 199 | 2483 |
| 2007 | 6 | 0 | 1314 | 160 | 3 | 0 | 28 | 243 | 1754 |
| 2008 | 7 | 0 | 1402 | 143 | 5 | <0.5 | <0.5 | 217 | 1774 |
| 2009 | 2 | 0 | 1140 | 103 | 6 | 0 | 3 | 183 | 1437 |
| 2010 | 2 | 0 | 1825 | 144 | 8 | 0 | 35 | 191 | 2205 |

Source: ICES Bulletin Statistique.

¹Landings for 1999 – 2010 supplied to WGNEW by Ifremer.

Table 4.4. Sea bass in Divisions VIIa,fand g. Official landings by country and ICES estimates of catches (t).

| | BELGIUM | FRANCE ¹ | IRELAND | UK(Sco) | UK(E,WAND NI) | TOTAL | TOTAL(ICES) |
|------|---------|---------------------|---------|---------|---------------|-------|-------------|
| 1984 | 0 | 0 | 0 | 0 | 27 | 27 | 27 |
| 1985 | 0 | 44 | 0 | 0 | 11 | 55 | 55 |
| 1986 | 0 | 3 | 0 | 0 | 11 | 14 | 14 |
| 1987 | 0 | 27 | 3 | 0 | 23 | 53 | 53 |
| 1988 | 0 | 6 | 0 | 0 | 42 | 48 | 48 |
| 1989 | 0 | 13 | 0 | 0 | 61 | 74 | 74 |
| 1990 | 0 | 10 | 0 | 0 | 27 | 37 | 37 |
| 1991 | 0 | 70 | 0 | 0 | 27 | 97 | 97 |
| 1992 | 0 | 42 | 0 | 0 | 25 | 67 | 67 |
| 1993 | 0 | 14 | 0 | 0 | 33 | 47 | 47 |
| 1994 | 0 | 8 | 0 | 0 | 110 | 118 | 118 |
| 1995 | 0 | 38 | 0 | <0.5 | 131 | 169 | 169 |
| 1996 | 0 | 41 | 0 | <0.5 | 82 | 123 | 123 |
| 1997 | 0 | 35 | 0 | <0.5 | 88 | 123 | 123 |
| 1998 | 0 | 207 | 0 | <0.5 | 42 | 249 | 249 |
| 1999 | 0 | 0 | 0 | <0.5 | 32 | 32 | 32 |
| 2000 | 0 | 56 | 0 | <0.5 | 50 | 228 | 106 |
| 2001 | 0 | 54 | 0 | 0 | 83 | 301 | 137 |
| 2002 | 0 | 55 | 0 | 0 | 133 | 261 | 188 |
| 2003 | 19 | 16 | <0.5 | 0 | 81 | 162 | 116 |
| 2004 | 36 | 49 | 0 | 3 | 75 | 217 | 163 |
| 2005 | 54 | 34 | 0 | 1 | 72 | 260 | 161 |
| 2006 | 55 | 39 | <0.5 | 0 | 118 | 257 | 212 |
| 2007 | 44 | 28 | 0 | 1 | 168 | 284 | 241 |
| 2008 | 63 | 58 | 0 | 1 | 180 | 334 | 302 |
| 2009 | 46 | 26 | 0 | 1 | 138 | 237 | 211 |
| 2010 | 38 | 49 | 0 | 1 | 91 | 228 | 179 |

Source: ICES Bulletin Statistique.

¹Landings for 1999 – 2010 supplied to WGNEW by Ifremer.

Table 4.5 Seabass in Divisions IVa, VIa, and VIIb,c,jand k, and Subarea XII. Official landings by country (t).

| | BELG IUM | DENM ARK | FRA NCE | IREL AND | NETHER LANDS | NOR WAY | SPA IN | UK(Sc o) | UK(E,W AND NI) | TOT AL |
|------|-------------|-------------|------------|-------------|-----------------|------------|-----------|-------------|-------------------|-----------|
| 1984 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 1985 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | <0.5 | 1 |
| 1986 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | <0.5 | 0 |
| 1987 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 1988 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 3 |
| 1989 | 0 | 0 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 5 |
| 1990 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 1991 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | <0.5 | 0 |
| 1992 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | <0.5 | 0 |
| 1993 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | <0.5 | 0 |
| 1994 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | <0.5 | 0 |
| 1995 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | <0.5 | 8 | 8 |
| 1996 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | <0.5 | 3 | 3 |
| 1997 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | <0.5 | 0 |
| 1998 | 0 | <0.5 | 0 | 0 | 0 | 0 | 40 | <0.5 | 10 | 50 |
| 1999 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | <0.5 | 1 | 1 |
| 2000 | 0 | 0 | 1 | 0 | 0 | 0 | 3 | <0.5 | <0.5 | 4 |
| 2001 | 0 | 0 | 2 | 0 | 0 | 0 | 3 | 0 | 0 | 5 |
| 2002 | 0 | 0 | 2 | 0 | 0 | 0 | <0.5 | 0 | 12 | 14 |
| 2003 | 0 | 0 | 1 | 0 | 1 | <0.5 | 0 | 0 | <0.5 | 2 |
| 2004 | <0.5 | 0 | 3 | 0 | 0 | <0.5 | 1 | 0 | <0.5 | 4 |
| 2005 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 2006 | 0 | 0 | 2 | 0 | 0 | <0.5 | 0 | <0.5 | <0.5 | 2 |
| 2007 | 0 | <0.5 | 6 | 0 | 0 | <0.5 | 0 | <0.5 | <0.5 | 6 |
| 2008 | 0 | 0 | 5 | 0 | 0 | <0.5 | <0.5 | 0 | <0.5 | 5 |
| 2009 | 0 | 0 | 4 | 1 | 0 | <0.5 | 0 | 0 | 0 | 5 |
| 2010 | 0 | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 9 |

Source: ICES Bulletin Statistique

Table 4.6. Seabass in Division VIIIa, band d. Official landings by country and ICES estimates (t).

| | Belgium | France ¹ | Netherlands | Spain | UK(Sco) | UK(E,Wand NI) | Total (ICES) |
|------|---------|---------------------|-------------|-------|---------|---------------|--------------|
| 1984 | 0 | 2886 | 0 | 0 | 0 | 0 | 2886 |
| 1985 | 0 | 2477 | 0 | 0 | 0 | 0 | 2477 |
| 1986 | 0 | 2607 | 0 | 0 | 0 | 0 | 2607 |
| 1987 | 0 | 2474 | 0 | 0 | 0 | 5 | 2479 |
| 1988 | 0 | 2277 | 0 | 0 | 0 | 15 | 2292 |
| 1989 | 0 | 2215 | 0 | 0 | 0 | 0 | 2215 |
| 1990 | 0 | 1679 | 0 | 0 | 0 | 0 | 1679 |
| 1991 | 0 | 1779 | 0 | 17 | 0 | 0 | 1796 |
| 1992 | 0 | 1762 | 0 | 14 | 0 | 0 | 1776 |
| 1993 | 0 | 1599 | 0 | 14 | 0 | 0 | 1613 |
| 1994 | 0 | 1711 | 0 | 17 | 0 | 0 | 1728 |
| 1995 | 0 | 1549 | 0 | 0 | 0 | 0 | 1549 |
| 1996 | 0 | 1459 | 0 | 0 | 0 | 14 | 1473 |
| 1997 | 0 | 1416 | 0 | 0 | 0 | 12 | 1428 |
| 1998 | 0 | 1263 | 0 | 27 | 0 | 4 | 1294 |
| 1999 | 0 | 1117 | 0 | 11 | 0 | 2 | 1130 |
| 2000 | 0 | 2295 | 0 | 67 | 0 | <0.5 | 2362 |
| 2001 | 0 | 2238 | 3 | 68 | 0 | 0 | 2309 |
| 2002 | 0 | 2216 | 0 | 182 | 0 | 0 | 2398 |
| 2003 | <0.5 | 2497 | 0 | 127 | 0 | 2 | 2626 |
| 2004 | <0.5 | 2284 | 0 | 96 | 0 | 6 | 2386 |
| 2005 | 0 | 2722 | 0 | 74 | 0 | 4 | 2800 |
| 2006 | 0 | 2707 | 0 | 168 | 0 | 2 | 2877 |
| 2007 | 1 | 2677 | 0 | 79 | 0 | 1 | 2758 |
| 2008 | 0 | 2600 | 0 | 146 | <0.5 | <0.5 | 2746 |
| 2009 | 1 | 2152 | 0 | 201 | 0 | 0 | 2354 |
| 2010 | 0 | 2089 | 0 | 167 | 2 | 0 | 2258 |

Source: ICES Bulletin Statistique.

¹Landings for 1999 – 2010 supplied to WGNEW by Ifremer.

Table 4.7. Sea bass in Division VIIIc. Official landings by country (t).

| | FRANCE | PORTUGAL ¹ | SPAIN | TOTAL |
|------|--------|-----------------------|-------|-------|
| 1984 | 0 | 0 | 0 | 0 |
| 1985 | 0 | 0 | 0 | 0 |
| 1986 | 0 | 0 | 0 | 0 |
| 1987 | 0 | <0.5 | 0 | 0 |
| 1988 | 14 | <0.5 | 0 | 14 |
| 1989 | 0 | 1 | 325 | 326 |
| 1990 | 1 | <0.5 | 395 | 396 |
| 1991 | 2 | 1 | 300 | 303 |
| 1992 | 0 | <0.5 | 254 | 254 |
| 1993 | 0 | <0.5 | 247 | 247 |
| 1994 | 0 | 2 | 306 | 308 |
| 1995 | 0 | <0.5 | 334 | 334 |
| 1996 | 0 | <0.5 | 376 | 376 |
| 1997 | 0 | <0.5 | 290 | 290 |
| 1998 | 0 | <0.5 | 258 | 258 |
| 1999 | 0 | <0.5 | 221 | 221 |
| 2000 | 2 | <0.5 | 239 | 241 |
| 2001 | <0.5 | <0.5 | 166 | 166 |
| 2002 | 8 | <0.5 | 75 | 83 |
| 2003 | 1 | 1 | 73 | 75 |
| 2004 | 39 | 1 | 181 | 221 |
| 2005 | 57 | 1 | 139 | 197 |
| 2006 | 2 | 2 | 151 | 155 |
| 2007 | 1 | 1 | 114 | 116 |
| 2008 | 0 | 1 | 141 | 142 |
| 2009 | 6 | 6 | 126 | 138 |
| 2010 | 2 | 2 | 196 | 200 |

Source: ICES Bulletin Statistique.

¹Contains mixed landings of two seabass species particularly before 2006

Table 4.8. Seabass in Division IXa. Official landings by country (t).

| | DENMARK | FRANCE | PORTUGAL ¹ | SPAIN ¹ | TOTAL |
|------|---------|--------|-----------------------|--------------------|-------|
| 1984 | 0 | 0 | 431 | 250 | 681 |
| 1985 | 0 | 0 | 311 | 164 | 475 |
| 1986 | 0 | 0 | 219 | 182 | 401 |
| 1987 | 0 | 0 | 216 | 194 | 410 |
| 1988 | 0 | 0 | 115 | 93 | 208 |
| 1989 | 0 | 0 | 104 | 92 | 196 |
| 1990 | 0 | 0 | 90 | 146 | 236 |
| 1991 | 0 | 0 | 76 | 111 | 187 |
| 1992 | 0 | 0 | 53 | 94 | 147 |
| 1993 | 0 | 0 | 57 | 104 | 161 |
| 1994 | 0 | 0 | 55 | 134 | 189 |
| 1995 | 0 | 0 | 42 | 112 | 154 |
| 1996 | 0 | 0 | 48 | 158 | 206 |
| 1997 | 0 | 0 | 39 | 184 | 223 |
| 1998 | 0 | 0 | 38 | 115 | 153 |
| 1999 | 0 | 0 | 37 | 134 | 171 |
| 2000 | 0 | 0 | 49 | 90 | 139 |
| 2001 | 0 | 0 | 42 | 69 | 111 |
| 2002 | 0 | 0 | 43 | 46 | 89 |
| 2003 | <0.5 | 0 | 46 | 40 | 86 |
| 2004 | 0 | 0 | 66 | 75 | 141 |
| 2005 | 0 | 0 | 176 | 80 | 256 |
| 2006 | 0 | 0 | 459 | 117 | 576 |
| 2007 | 0 | 0 | 544 | 228 | 772 |
| 2008 | 0 | 0 | 402 | 111 | 513 |
| 2009 | 0 | 2 | 413 | 86 | 501 |
| 2010 | 0 | 0 | 487 | 90 | 577 |

Source: ICES Bulletin Statistique.

¹Contains mixed landings of two sea bass species Particularly before 2006

Table 4.9. Sea bass in the Northeast Atlantic. Percentage of bass catch discarded (by number and by weight) on UK (England and Wales) observed trips for all years combined (2002 - 2008), by gear, mesh and ICES Division.

| Gear | Mesh | ICES Div. | % Discarded by number | % Discarded by weight | Number of observed trips |
|-------------|---------|-----------|--------------------------|-----------------------------|-----------------------------|
| Beam trawl | 80–99 | VIIId | 30 | 13 | 9 |
| | | VIIe | 8 | 8 | 46 |
| | | VIIIf | 0 | 0 | 2 |
| | | VIIg | 0 | 0 | 4 |
| Otter trawl | 80–89 | IVb,c | 34 | 15 | 15 |
| | | VIIId | 63 | 49 | 9 |
| | | VIIe | 9 | 5 | 127 |
| | | VIIIf | 9 | 4 | 35 |
| | | VIIg | 4 | 2 | 8 |
| | 90–99 | VIIe | 3 | 1 | 24 |
| | | VIIIf | 20 | 14 | 3 |
| | 100–119 | IVc | 10 | 2 | 1 |
| | | VIIId | 2 | 1 | 1 |
| Gill net | 90–99 | IVc | 3 | 2 | 5 |
| | 100–119 | IVc | 0 | 0 | 4 |
| | | VIIe | 2 | 2 | 1 |
| | 120–149 | VIIe,f,g | 3 | 2 | 9 |

Table 4.10. Sea bass in the Northeast Atlantic. Retained and discarded weight of seabass taken by French vessels using different gear types in 2010.

| 2010 | ICES area | number of samples | Weight of discards (t) estimated | total weight landings (t) | % discarded |
|---------------|-----------|----------------------|--|------------------------------|----------------|
| bottom trawl | IVbc | 8 | 2 | 81 | 2 |
| bottom trawl | VIIId | 29 | 140 | 507 | 28 |
| bottom trawl | VIIeh | 8 | 1 | 209 | 0 |
| bottom trawl | VIIIab | 42 | <1 | 414 | 0 |
| long line | VIIIab | 2 | <1 | 543 | 0 |
| net | IVbc | 6 | <1 | 33 | 0 |
| net | VIIId | 13 | <1 | 68 | 0 |
| net | VIIeh | 6 | <1 | 58 | 0 |
| net | VIIIab | 22 | <1 | 419 | 0 |
| pelagic trawl | VIIId | 14 | 11 | 505 | 2 |
| pelagic trawl | VIIeh | 6 | 1 | 1319 | 0 |
| pelagic trawl | VIIIab | 10 | <1 | 365 | 0 |

Table 4.11. Sea bass in the Northeast Atlantic. Retained and discarded weight of seabass taken by French vessels using different gear types in 2009.

| 2009 | ICES area | number of samples | Weight of discards (t) estimated | total weight landings (t) | % discarded |
|---------------|-----------|-------------------|----------------------------------|---------------------------|-------------|
| bottom trawl | IVbc | 16 | 34 | 155 | 22 |
| bottom trawl | VIIId | 29 | 78 | 683 | 11 |
| bottom trawl | VIIeh | 9 | 9 | 189 | 5 |
| bottom trawl | VIIIab | 72 | 29 | 391 | 7 |
| long line | VIIeh | 17 | 1 | 71 | 1 |
| long line | VIIIab | 34 | 5 | 538 | 1 |
| net | IVbc | 3 | <1 | 5 | 0 |
| net | VIIId | 26 | 1 | 56 | 2 |
| net | VIIeh | 12 | <1 | 33 | 0 |
| net | VIIIab | 159 | 5 | 523 | 1 |
| pelagic trawl | IVbc | 1 | <1 | 1 | 0 |
| pelagic trawl | VIIId | 15 | 12 | 404 | 3 |
| pelagic trawl | VIIeh | 7 | 4 | 693 | 1 |
| pelagic trawl | VIIIab | 89 | 6 | 401 | 1 |

Table 4.12. Sea bass in the Northeast Atlantic. UK(Eand W) sampling of bass landings for length composition in Divisions IVb, c.

| Year | Otter trawls | | | Pair trawl | | | Drift and gill nets | | | Lines | | | Other gears | | |
|------|--------------|-------------------|-------------------|--------------|-------------------|-------------------|---------------------|-------------------|-------------------|--------------|-------------------|-------------------|--------------|-------------------|-------------------|
| | Landings (t) | No. trips sampled | No. fish measured | Landings (t) | No. trips sampled | No. fish measured | Landings (t) | No. trips sampled | No. fish measured | Landings (t) | No. trips sampled | No. fish measured | Landings (t) | No. trips sampled | No. fish measured |
| 1985 | 2.2 | 4 | 20 | 0.0 | 1 | 42 | 9.6 | 6 | 52 | 2.5 | 4 | 47 | 0.1 | 0 | 0 |
| 1986 | 2.8 | 2 | 7 | 0.0 | 0 | 0 | 16.6 | 3 | 13 | 6.8 | 3 | 31 | 0.2 | 0 | 0 |
| 1987 | 7.6 | 9 | 11 | 0.0 | 0 | 0 | 20.0 | 19 | 116 | 1.6 | 17 | 100 | 0.0 | 0 | 0 |
| 1988 | 8.8 | 3 | 4 | 0.0 | 0 | 0 | 21.5 | 14 | 347 | 4.1 | 20 | 118 | 0.0 | 0 | 0 |
| 1989 | 2.9 | 6 | 25 | 0.0 | 0 | 0 | 19.4 | 16 | 395 | 3.9 | 14 | 46 | 0.0 | 0 | 0 |
| 1990 | 2.7 | 3 | 13 | 0.0 | 0 | 0 | 13.3 | 3 | 98 | 6.0 | 13 | 27 | 0.1 | 0 | 0 |
| 1991 | 2.7 | 3 | 3 | 0.0 | 0 | 0 | 9.6 | 3 | 38 | 7.9 | 13 | 98 | 1.1 | 0 | 0 |
| 1992 | 4.5 | 2 | 2 | 0.0 | 0 | 0 | 12.1 | 8 | 140 | 4.8 | 34 | 171 | 0.0 | 6 | 23 |
| 1993 | 6.4 | 2 | 2 | 0.0 | 0 | 0 | 24.9 | 14 | 177 | 1.8 | 37 | 130 | 0.5 | 0 | 0 |
| 1994 | 26.7 | 18 | 154 | 0.0 | 0 | 0 | 87.1 | 26 | 1207 | 3.2 | 27 | 200 | 1.8 | 0 | 0 |
| 1995 | 29.7 | 6 | 11 | 0.0 | 0 | 0 | 103.2 | 19 | 501 | 2.2 | 35 | 124 | 0.9 | 0 | 0 |
| 1996 | 33.1 | 2 | 11 | 0.0 | 0 | 0 | 52.8 | 7 | 133 | 2.9 | 13 | 35 | 0.6 | 0 | 0 |
| 1997 | 18.1 | 6 | 37 | 0.0 | 0 | 0 | 47.6 | 12 | 44 | 2.7 | 72 | 140 | 0.0 | 0 | 0 |
| 1998 | 17.5 | 0 | 0 | 0.0 | 0 | 0 | 28.8 | 18 | 521 | 2.5 | 33 | 147 | 0.1 | 0 | 0 |
| 1999 | 16.2 | 6 | 90 | 0.0 | 0 | 0 | 48.1 | 18 | 725 | 12.9 | 51 | 266 | 0.4 | 0 | 0 |
| 2000 | 22.3 | 3 | 43 | 0.0 | 0 | 0 | 25.9 | 19 | 569 | 3.9 | 11 | 51 | 0.5 | 0 | 0 |
| 2001 | 15.2 | 4 | 25 | 0.0 | 0 | 0 | 19.6 | 18 | 808 | 9.5 | 17 | 285 | 0.5 | 0 | 0 |
| 2002 | 19.9 | 4 | 35 | 0.4 | 0 | 0 | 38.3 | 144 | 2847 | 18.0 | 33 | 137 | 1.0 | 0 | 0 |
| 2003 | 24.1 | 6 | 48 | 0.0 | 0 | 0 | 52.1 | 160 | 3052 | 8.2 | 0 | 0 | 0.5 | 1 | 22 |
| 2004 | 27.2 | 2 | 4 | 0.0 | 0 | 0 | 50.9 | 6 | 123 | 4.7 | 5 | 57 | 0.8 | 0 | 0 |
| 2005 | 23.0 | 5 | 146 | 0.0 | 0 | 0 | 42.9 | 12 | 318 | 3.4 | 1 | 12 | 0.7 | 0 | 0 |
| 2006 | 24.6 | 6 | 154 | 0.1 | 0 | 0 | 46.0 | 35 | 642 | 1.6 | 5 | 35 | 0.6 | 0 | 0 |
| 2007 | 18.1 | 7 | 168 | 0.0 | 0 | 0 | 39.6 | 7 | 438 | 3.8 | 6 | 124 | 0.6 | 0 | 0 |
| 2008 | 25.5 | 6 | 21 | 0.0 | 0 | 0 | 71.1 | 12 | 948 | 10.7 | 1 | 1 | 0.5 | 0 | 0 |
| 2009 | 40.5 | 0 | 0 | 0.0 | 0 | 0 | 62.1 | 8 | 1105 | 4.3 | 0 | 0 | 1.3 | 0 | 0 |
| 2010 | 43.8 | 1 | 3 | 0.0 | 0 | 0 | 95.9 | 8 | 492 | 9.4 | 22 | 291 | 1.2 | 0 | 0 |

Table 4.13. Sea bass in the Northeast Atlantic. UK(Eand W) sampling of bass landings for length composition in Divisions VIIId.

| Year | Otter trawls | | | Pair trawl | | | Drift and gill nets | | | Lines | | | Other gears | | |
|------|--------------|-------------------|-------------------|--------------|-------------------|-------------------|---------------------|-------------------|-------------------|--------------|-------------------|-------------------|--------------|-------------------|-------------------|
| | Landings (t) | No. trips sampled | No. fish measured | Landings (t) | No. trips sampled | No. fish measured | Landings (t) | No. trips sampled | No. fish measured | Landings (t) | No. trips sampled | No. fish measured | Landings (t) | No. trips sampled | No. fish measured |
| 1985 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 13.0 | 1 | 68 | 3.3 | 3 | 164 | 0.0 | 0 | 0 |
| 1986 | 5.4 | 6 | 57 | 0.0 | 0 | 0 | 35.9 | 8 | 282 | 19.5 | 14 | 216 | 0.0 | 0 | 0 |
| 1987 | 23.1 | 6 | 199 | 0.0 | 0 | 0 | 24.6 | 5 | 101 | 9.1 | 7 | 29 | 0.1 | 1 | 7 |
| 1988 | 37.4 | 7 | 163 | 0.0 | 0 | 0 | 15.2 | 5 | 160 | 13.5 | 6 | 606 | 0.0 | 0 | 0 |
| 1989 | 36.1 | 3 | 14 | 4.9 | 0 | 0 | 20.9 | 6 | 242 | 2.6 | 1 | 8 | 0.0 | 1 | 42 |
| 1990 | 9.8 | 4 | 100 | 0.0 | 0 | 0 | 6.1 | 3 | 27 | 3.1 | 4 | 123 | 0.0 | 0 | 0 |
| 1991 | 22.9 | 9 | 59 | 0.0 | 0 | 0 | 74.1 | 17 | 129 | 49.6 | 18 | 378 | 0.0 | 0 | 0 |
| 1992 | 22.5 | 4 | 54 | 0.0 | 0 | 0 | 30.4 | 11 | 944 | 9.3 | 27 | 1273 | 0.2 | 2 | 9 |
| 1993 | 49.0 | 17 | 355 | 0.0 | 0 | 0 | 19.0 | 54 | 881 | 41.3 | 34 | 651 | 0.4 | 17 | 48 |
| 1994 | 72.0 | 46 | 2274 | 0.1 | 0 | 0 | 96.1 | 103 | 2711 | 68.0 | 54 | 1082 | 3.3 | 16 | 177 |
| 1995 | 66.3 | 37 | 545 | 0.0 | 0 | 0 | 78.6 | 76 | 3227 | 97.2 | 18 | 331 | 31.6 | 18 | 273 |
| 1996 | 47.2 | 23 | 396 | 0.1 | 0 | 0 | 76.8 | 52 | 1312 | 94.3 | 32 | 569 | 10.9 | 18 | 177 |
| 1997 | 56.6 | 37 | 1907 | 0.0 | 0 | 0 | 96.6 | 31 | 396 | 88.4 | 21 | 766 | 11.2 | 7 | 49 |
| 1998 | 75.6 | 20 | 868 | 0.0 | 0 | 0 | 52.6 | 19 | 450 | 92.6 | 20 | 1114 | 11.6 | 5 | 23 |
| 1999 | 91.6 | 18 | 333 | 1.9 | 4 | 114 | 64.0 | 31 | 1380 | 80.6 | 27 | 1247 | 19.2 | 8 | 24 |
| 2000 | 54.9 | 16 | 267 | 0.0 | 0 | 0 | 43.6 | 52 | 3533 | 31.4 | 16 | 665 | 27.5 | 1 | 2 |
| 2001 | 69.3 | 25 | 960 | 0.0 | 0 | 0 | 48.8 | 36 | 1120 | 27.8 | 12 | 435 | 0.0 | 0 | 0 |
| 2002 | 51.3 | 25 | 257 | 0.0 | 0 | 0 | 90.3 | 52 | 3016 | 36.1 | 23 | 512 | 6.2 | 1 | 3 |
| 2003 | 73.3 | 33 | 771 | 7.6 | 1 | 102 | 60.4 | 31 | 1284 | 36.6 | 15 | 668 | 0.0 | 0 | 0 |
| 2004 | 70.6 | 9 | 230 | 0.0 | 0 | 0 | 106.6 | 11 | 939 | 46.1 | 15 | 374 | 0.2 | 2 | 2 |
| 2005 | 30.9 | 3 | 251 | 0.0 | 0 | 0 | 101.7 | 4 | 214 | 37.1 | 7 | 192 | 0.0 | 0 | 0 |
| 2006 | 55.0 | 3 | 173 | 0.0 | 0 | 0 | 86.1 | 5 | 237 | 24.4 | 7 | 136 | 0.0 | 0 | 0 |
| 2007 | 44.3 | 4 | 46 | 3.9 | 0 | 0 | 93.4 | 8 | 188 | 49.7 | 6 | 157 | 2.4 | 0 | 0 |
| 2008 | 70.1 | 8 | 570 | 0.0 | 0 | 0 | 137.4 | 33 | 1378 | 34.8 | 11 | 382 | 4.9 | 0 | 0 |
| 2009 | 48.0 | 6 | 478 | 0.9 | 0 | 0 | 141.9 | 72 | 1182 | 42.1 | 5 | 125 | 10.3 | 1 | 4 |
| 2010 | 46.3 | 11 | 350 | 0.0 | 0 | 0 | 128.9 | 39 | 1228 | 47.0 | 0 | 0 | 17.5 | 0 | 0 |

Table 4.14. UK(Eand W) sampling of bass landings for length composition in Divisions VIIe,h.

| Year | Otter trawls | | | Pair trawl | | | Drift and gill nets | | | Lines | | | Other gears | | |
|------|--------------|-------------------|-------------------|--------------|-------------------|-------------------|---------------------|-------------------|-------------------|--------------|-------------------|-------------------|--------------|-------------------|-------------------|
| | Landings (t) | No. trips sampled | No. fish measured | Landings (t) | No. trips sampled | No. fish measured | Landings (t) | No. trips sampled | No. fish measured | Landings (t) | No. trips sampled | No. fish measured | Landings (t) | No. trips sampled | No. fish measured |
| 1985 | 7.0 | 9 | 175 | 0.6 | 1 | 1 | 3.4 | 4 | 35 | 8.0 | 6 | 23 | 0.5 | 0 | 0 |
| 1986 | 9.8 | 16 | 2465 | 2.2 | 0 | 0 | 4.3 | 2 | 749 | 4.4 | 7 | 551 | 1.0 | 4 | 119 |
| 1987 | 7.4 | 50 | 1064 | 0.0 | 1 | 589 | 5.7 | 18 | 1020 | 3.0 | 30 | 250 | 0.1 | 0 | 0 |
| 1988 | 11.4 | 17 | 310 | 7.7 | 0 | 0 | 6.0 | 7 | 1838 | 4.5 | 6 | 266 | 0.2 | 0 | 0 |
| 1989 | 22.8 | 5 | 356 | 4.2 | 1 | 832 | 9.5 | 3 | 566 | 2.6 | 10 | 254 | 0.4 | 0 | 0 |
| 1990 | 50.7 | 7 | 266 | 22.8 | 0 | 0 | 16.9 | 3 | 243 | 0.5 | 1 | 15 | 0.1 | 0 | 0 |
| 1991 | 16.5 | 6 | 289 | 14.5 | 0 | 0 | 13.1 | 6 | 1689 | 0.3 | 0 | 0 | 0.2 | 2 | 41 |
| 1992 | 18.6 | 7 | 336 | 7.9 | 0 | 0 | 7.1 | 6 | 343 | 6.2 | 29 | 133 | 0.1 | 0 | 0 |
| 1993 | 21.7 | 42 | 834 | 1.0 | 0 | 0 | 11.2 | 10 | 261 | 16.5 | 14 | 334 | 0.1 | 1 | 26 |
| 1994 | 28.5 | 52 | 1788 | 0.0 | 0 | 0 | 19.1 | 20 | 703 | 19.0 | 35 | 658 | 0.3 | 0 | 0 |
| 1995 | 43.3 | 25 | 916 | 1.1 | 1 | 19 | 28.9 | 21 | 584 | 26.9 | 30 | 619 | 0.6 | 0 | 0 |
| 1996 | 36.9 | 32 | 1210 | 87.2 | 1 | 214 | 19.1 | 14 | 618 | 13.4 | 25 | 466 | 5.6 | 0 | 0 |
| 1997 | 45.9 | 14 | 400 | 71.4 | 0 | 0 | 18.9 | 10 | 477 | 9.9 | 22 | 474 | 4.0 | 0 | 0 |
| 1998 | 40.3 | 14 | 375 | 84.7 | 0 | 0 | 19.1 | 19 | 373 | 17.9 | 28 | 672 | 0.4 | 0 | 0 |
| 1999 | 24.7 | 13 | 599 | 216.2 | 0 | 0 | 18.7 | 16 | 952 | 49.7 | 39 | 1161 | 0.4 | 0 | 0 |
| 2000 | 55.9 | 21 | 1455 | 52.1 | 0 | 0 | 14.2 | 19 | 2862 | 12.7 | 9 | 528 | 1.8 | 0 | 0 |
| 2001 | 46.4 | 23 | 1240 | 95.5 | 0 | 0 | 18.2 | 19 | 1475 | 6.6 | 27 | 783 | 0.7 | 0 | 0 |
| 2002 | 74.9 | 19 | 1016 | 108.6 | 0 | 0 | 40.9 | 22 | 1175 | 1.8 | 45 | 1269 | 8.3 | 0 | 0 |
| 2003 | 87.2 | 9 | 403 | 119.2 | 0 | 0 | 15.5 | 22 | 1411 | 10.7 | 45 | 1447 | 0.8 | 0 | 0 |
| 2004 | 58.7 | 8 | 334 | 130.8 | 0 | 0 | 38.1 | 8 | 568 | 3.6 | 12 | 293 | 0.2 | 0 | 0 |
| 2005 | 63.9 | 17 | 1284 | 78.3 | 2 | 299 | 12.4 | 5 | 387 | 7.4 | 13 | 475 | 0.1 | 0 | 0 |
| 2006 | 72.0 | 5 | 429 | 27.8 | 0 | 0 | 41.5 | 4 | 272 | 44.1 | 44 | 479 | 0.2 | 0 | 0 |
| 2007 | 82.1 | 7 | 507 | 60.0 | 4 | 489 | 41.8 | 13 | 606 | 67.8 | 7 | 232 | 0.6 | 0 | 0 |
| 2008 | 68.2 | 19 | 1158 | 19.7 | 9 | 1302 | 56.3 | 8 | 535 | 61.6 | 3 | 94 | 1.5 | 0 | 0 |
| 2009 | 46.2 | 7 | 329 | 10.2 | 6 | 625 | 52.5 | 12 | 663 | 67.9 | 10 | 560 | 1.6 | 0 | 0 |
| 2010 | 35.5 | 23 | 1118 | 41.9 | 3 | 376 | 50.9 | 17 | 612 | 90.3 | 9 | 408 | 1.8 | 1 | 3 |

| Year | Otter trawls | | | Pair trawl | | | Drift and gill nets | | | Lines | | | Other gears | | |
|------|--------------|-------------------|-------------------|--------------|-------------------|-------------------|---------------------|-------------------|-------------------|--------------|-------------------|-------------------|--------------|-------------------|-------------------|
| | Landings (t) | No. trips sampled | No. fish measured | Landings (t) | No. trips sampled | No. fish measured | Landings (t) | No. trips sampled | No. fish measured | Landings (t) | No. trips sampled | No. fish measured | Landings (t) | No. trips sampled | No. fish measured |
| 1985 | 5.9 | 4 | 37 | 0.0 | 0 | 0 | 4.1 | 4 | 26 | 0.8 | 6 | 51 | 0.1 | 6 | 16 |
| 1986 | 3.4 | 6 | 91 | 0.0 | 0 | 0 | 3.9 | 5 | 88 | 2.8 | 7 | 96 | 1.1 | 0 | 0 |
| 1987 | 7.4 | 4 | 86 | 0.0 | 0 | 0 | 4.7 | 2 | 84 | 4.4 | 15 | 178 | 6.7 | 0 | 0 |
| 1988 | 12.1 | 6 | 883 | 0.0 | 0 | 0 | 21.5 | 16 | 736 | 8.1 | 21 | 375 | 0.4 | 0 | 0 |
| 1989 | 29.3 | 34 | 377 | 0.0 | 0 | 0 | 11.7 | 23 | 664 | 19.7 | 1 | 2 | 0.8 | 0 | 0 |
| 1990 | 11.6 | 38 | 588 | 0.0 | 0 | 0 | 10.9 | 2 | 88 | 4.8 | 4 | 95 | 0.0 | 0 | 0 |
| 1991 | 6.5 | 17 | 466 | 0.0 | 0 | 0 | 16.2 | 5 | 217 | 2.8 | 22 | 487 | 0.0 | 0 | 0 |
| 1992 | 5.2 | 6 | 68 | 0.0 | 0 | 0 | 14.8 | 5 | 41 | 3.4 | 21 | 500 | 0.7 | 0 | 0 |
| 1993 | 17.8 | 7 | 203 | 0.0 | 0 | 0 | 10.2 | 16 | 367 | 2.8 | 38 | 311 | 1.2 | 0 | 0 |
| 1994 | 12.8 | 20 | 505 | 0.3 | 0 | 0 | 26.6 | 10 | 643 | 64.8 | 39 | 1843 | 5.4 | 1 | 51 |
| 1995 | 39.3 | 16 | 843 | 0.2 | 0 | 0 | 51.5 | 35 | 2012 | 42.5 | 24 | 419 | 6.5 | 3 | 338 |
| 1996 | 26.4 | 2 | 240 | 0.0 | 0 | 0 | 37.6 | 42 | 1463 | 18.0 | 36 | 720 | 0.2 | 0 | 0 |
| 1997 | 37.9 | 13 | 435 | 0.0 | 0 | 0 | 31.8 | 52 | 1830 | 18.5 | 22 | 692 | 0.2 | 1 | 78 |
| 1998 | 23.8 | 13 | 349 | 0.0 | 0 | 0 | 7.8 | 30 | 924 | 8.2 | 30 | 887 | 2.3 | 0 | 0 |
| 1999 | 17.4 | 16 | 366 | 1.4 | 0 | 0 | 5.6 | 14 | 565 | 4.5 | 32 | 1119 | 3.3 | 1 | 70 |
| 2000 | 23.0 | 9 | 313 | 0.0 | 0 | 0 | 19.3 | 28 | 981 | 4.8 | 29 | 723 | 2.6 | 0 | 0 |
| 2001 | 30.1 | 17 | 293 | 0.0 | 0 | 0 | 34.6 | 24 | 597 | 14.2 | 58 | 1432 | 2.2 | 1 | 57 |
| 2002 | 41.3 | 14 | 1007 | 0.0 | 0 | 0 | 63.6 | 35 | 989 | 19.3 | 45 | 1113 | 7.3 | 0 | 0 |
| 2003 | 45.2 | 8 | 458 | 0.0 | 0 | 0 | 18.0 | 17 | 882 | 9.2 | 31 | 1051 | 0.5 | 1 | 7 |
| 2004 | 45.4 | 4 | 350 | 0.0 | 0 | 0 | 10.4 | 3 | 42 | 18.0 | 8 | 262 | 0.4 | 2 | 14 |
| 2005 | 46.2 | 12 | 904 | 0.0 | 0 | 0 | 14.9 | 13 | 260 | 11.0 | 4 | 242 | 0.3 | 0 | 0 |
| 2006 | 49.3 | 6 | 211 | 4.9 | 1 | 100 | 24.3 | 4 | 154 | 37.2 | 15 | 404 | 2.6 | 0 | 0 |
| 2007 | 57.3 | 7 | 242 | 0.0 | 0 | 0 | 63.9 | 15 | 655 | 45.7 | 12 | 575 | 0.2 | 0 | 0 |
| 2008 | 67.0 | 7 | 1284 | 0.0 | 0 | 0 | 57.0 | 11 | 597 | 54.5 | 18 | 1050 | 0.5 | 1 | 3 |
| 2009 | 59.4 | 0 | 0 | 0.0 | 0 | 0 | 55.7 | 8 | 297 | 31.5 | 4 | 272 | 1.1 | 0 | 0 |
| 2010 | 29.5 | 0 | 0 | 0.0 | 0 | 0 | 23.4 | 7 | 234 | 33.4 | 11 | 342 | 0.7 | 0 | 0 |

[illegible][illegible]

Table 4.17. Sampling of bass landings in France for length composition in Division VIId (from 2009, because of non-specific seabass sampling at sea, high level of sampling can appear although fish samples is very low).

No. OF TRIPS SAMPLED FOR LENGTH

| Gear | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---------------|------|------|------|------|------|------|------|------|------|------|------|
| Handlines | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Longlines | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nets | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 | 20 |
| Bottom trawl | 0 | 0 | 4 | 6 | 10 | 7 | 4 | 3 | 7 | 52 | 37 |
| Pelagic trawl | 0 | 0 | 0 | 1 | 1 | 7 | 4 | 2 | 3 | 43 | 16 |
| Purse seine | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Danish seine | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other gears | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

LANDING (TONNES)

| Gear | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---------------|------|------|------|------|------|------|------|------|------|------|------|
| Handlines | 9 | 70 | 70 | 108 | 79 | 89 | 105 | 142 | 82 | 89 | 93 |
| Longlines | 5 | 6 | 7 | 11 | 11 | 13 | 16 | 26 | 11 | 8 | 8 |
| Nets | 52 | 63 | 80 | 101 | 98 | 85 | 81 | 89 | 53 | 56 | 68 |
| Bottom trawl | 397 | 375 | 443 | 688 | 710 | 645 | 594 | 807 | 749 | 683 | 507 |
| Pelagic trawl | 89 | 76 | 104 | 131 | 272 | 391 | 242 | 246 | 254 | 404 | 505 |
| Purse seine | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Danish seine | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 23 | 27 |
| Other gears | 9 | 11 | 6 | 12 | 6 | 4 | 9 | 15 | 13 | 58 | 28 |

Table 4.18. Sea bass in the Northeast Atlantic. Sampling of sea bass landings in France for length composition in Division VIIe,h (from 2009, because of none specific seabass sampling at sea, high level of sampling can appear although fish samples is very low).

No. OF TRIPS SAMPLED FOR LENGTH

| Gear | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---------------|------|------|------|------|------|------|------|------|------|------|------|
| Handlines | 39 | 99 | 76 | 72 | 71 | 23 | 63 | 35 | 23 | 11 | 5 |
| Longlines | 14 | 2 | 3 | 6 | 7 | 11 | 10 | 34 | 18 | 22 | 5 |
| Nets | 2 | 1 | 0 | 1 | 6 | 4 | 11 | 28 | 25 | 9 | 14 |
| Bottom trawl | 2 | 0 | 0 | 2 | 2 | 7 | 7 | 8 | 11 | 22 | 17 |
| Pelagic trawl | 2 | 0 | 3 | 3 | 5 | 4 | 12 | 6 | 5 | 11 | 11 |
| Purse seine | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| Danish seine | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other gears | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

LANDING (TONNES)

| Gear | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---------------|------|------|------|------|------|------|------|------|------|------|------|
| Handlines | 192 | 141 | 133 | 169 | 128 | 149 | 189 | 173 | 168 | 83 | 84 |
| Longlines | 97 | 154 | 137 | 144 | 158 | 182 | 239 | 211 | 151 | 71 | 84 |
| Nets | 45 | 35 | 33 | 40 | 35 | 48 | 41 | 53 | 61 | 33 | 58 |
| Bottom trawl | 204 | 226 | 280 | 262 | 358 | 433 | 403 | 273 | 246 | 189 | 209 |
| Pelagic trawl | 588 | 577 | 303 | 632 | 548 | 925 | 1177 | 596 | 749 | 693 | 1319 |
| Purse seine | 1 | 8 | 6 | 3 | 4 | 5 | 21 | 4 | 22 | 20 | 13 |
| Danish seine | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 11 |
| Other gears | 10 | 8 | 9 | 7 | 7 | 8 | 5 | 4 | 6 | 49 | 48 |

Table 4.19. Sea bass in the Northeast Atlantic. Sampling of sea bass landings in France for length composition in Division VIIa,b (from 2009, because of non-specific seabass sampling at sea, high level of sampling can appear although fish samples is very low).

No. OF TRIPS SAMPLED FOR LENGTH

| Gear | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---------------|------|------|------|------|------|------|------|------|------|------|------|
| Handlines | 0 | 0 | 31 | 14 | 19 | 16 | 23 | 20 | 14 | 0 | 0 |
| Longlines | 47 | 40 | 57 | 52 | 30 | 30 | 12 | 9 | 14 | 49 | 28 |
| Nets | 31 | 47 | 50 | 50 | 32 | 42 | 31 | 18 | 37 | 208 | 220 |
| Bottom trawl | 32 | 28 | 47 | 44 | 57 | 63 | 55 | 58 | 50 | 144 | 182 |
| Pelagic trawl | 0 | 0 | 2 | 3 | 3 | 3 | 0 | 1 | 1 | 135 | 53 |
| Purse seine | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 |
| Danish seine | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other gears | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

LANDING (TONNES)

| Gear | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---------------|------|------|------|------|------|------|------|------|------|------|------|
| Handlines | 104 | 101 | 103 | 127 | 132 | 88 | 111 | 139 | 105 | 175 | 168 |
| Longlines | 530 | 549 | 540 | 686 | 749 | 721 | 764 | 781 | 684 | 538 | 543 |
| Nets | 731 | 569 | 553 | 539 | 524 | 535 | 581 | 688 | 556 | 523 | 419 |
| Bottom trawl | 433 | 332 | 334 | 286 | 408 | 492 | 456 | 524 | 546 | 391 | 414 |
| Pelagic trawl | 464 | 635 | 612 | 814 | 410 | 803 | 752 | 507 | 658 | 401 | 365 |
| Purse seine | 10 | 35 | 57 | 21 | 36 | 55 | 16 | 19 | 42 | 5 | 14 |
| Danish seine | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 37 |
| Other gears | 22 | 17 | 18 | 24 | 26 | 28 | 27 | 19 | 9 | 119 | 128 |

Table 4.20. Sea bass in the Northeast Atlantic. Estimated age compositions of sea bass landings in France in Division VIIe,h: PELAGIC TRAWLS (nos. fish). Oldest true age shown.

| age structure VIIe,h, France, pelagic trawl <i>Dicentrarchus labrax</i> | | | | | | | | | | | |
|--|--------|--------|-------|--------|--------|--------|--------|--------|--------|-------|--------|
| age/year | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
| 3 | | 620 | 79 | 4473 | | 873 | 78 | 138 | | | |
| 4 | 108040 | 7988 | 4636 | 26634 | 8483 | 3126 | 1173 | 2669 | 1161 | 1401 | |
| 5 | 148225 | 9118 | 36523 | 97630 | 96952 | 27211 | 65020 | 15828 | 52379 | 18818 | 39208 |
| 6 | 92367 | 118961 | 27945 | 57335 | 109808 | 170081 | 95570 | 114736 | 85183 | 44291 | 110542 |
| 7 | 63498 | 115731 | 85134 | 123192 | 92182 | 97148 | 366472 | 33786 | 320095 | 47525 | 255097 |
| 8 | 22817 | 46506 | 26156 | 77230 | 20735 | 174180 | 56697 | 90070 | 64429 | 76455 | 249813 |
| 9 | 29767 | 20408 | 10268 | 28258 | 55237 | 12600 | 191486 | 39421 | 52990 | 14771 | 184333 |
| 10 | 23931 | 12967 | 3840 | 10952 | 36376 | 65355 | 6974 | 35003 | 29458 | 62887 | 45410 |
| 11 | 6123 | 17769 | 3596 | 10833 | 4993 | 31896 | 71267 | 11391 | 22727 | 24746 | 18823 |
| 12 | 3443 | 20477 | 4139 | 2850 | 4778 | 12384 | 19364 | 30888 | 13456 | 28922 | 43252 |
| 13 | 1176 | 11125 | 9728 | 5542 | 1613 | 12026 | 9488 | 24153 | 8579 | 696 | 13680 |
| 14 | 387 | 3193 | 9563 | 5258 | 2314 | 9847 | 1356 | 10347 | 967 | 63392 | 13543 |
| 15 | 68 | 2509 | 1172 | 392 | 2891 | 12729 | 5447 | 4531 | 1150 | 4284 | 2521 |
| 16 | 161 | 755 | 710 | 318 | 697 | 14390 | 3535 | 583 | 509 | 3066 | 2558 |
| 17 | 33 | 1250 | 21 | 47 | 39 | 2722 | 4128 | 587 | 725 | 11782 | 2402 |
| 18 | 36 | 772 | | 26 | 14 | 1906 | 85 | 538 | 279 | | 1649 |
| 19 | | 300 | | | 73 | | 37 | 58 | 260 | | |
| 20 | | 639 | | | 0 | | 72 | | 56 | | |
| 21 | | 765 | | | 361 | 71 | 14 | | 2 | | 1199 |
| 22 | | | | | | 535 | 37 | 41 | 126 | | |

Table 4.22. Sea bass in the Northeast Atlantic. Estimated age compositions of sea bass landings in France in Division VIIe,h: HAND LINES (nos. fish). Oldest true age shown.

| age structure VIIe,h, France, hand line <i>Dicentrarchus labrax</i> | | | | | | | | | | | |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
| age/year | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
| 3 | | 31 | 93 | | | 18 | 51 | 113 | | | |
| 4 | 79 | 3034 | 1881 | 2141 | 524 | 2086 | 51 | 2973 | 325 | 213 | |
| 5 | 9997 | 1933 | 9189 | 6066 | 9261 | 2896 | 9088 | 6059 | 3978 | 1814 | 101 |
| 6 | 24418 | 19924 | 8999 | 17048 | 11671 | 18723 | 10252 | 25720 | 4136 | 5210 | 1234 |
| 7 | 13725 | 22221 | 33236 | 6279 | 10785 | 13396 | 40487 | 5527 | 17326 | 4687 | 1709 |
| 8 | 7570 | 10522 | 13046 | 25627 | 4715 | 23317 | 6841 | 11152 | 12654 | 13324 | 1357 |
| 9 | 8826 | 5967 | 4716 | 15541 | 11789 | 3441 | 15982 | 8922 | 13898 | 7166 | 2914 |
| 10 | 8729 | 3341 | 4129 | 8698 | 10062 | 16192 | 717 | 9350 | 6140 | 8957 | 2421 |
| 11 | 11801 | 5761 | 3744 | 4745 | 5154 | 8241 | 13098 | 4236 | 6656 | 4472 | 4579 |
| 12 | 8562 | 5983 | 3068 | 3602 | 3211 | 3562 | 11906 | 11289 | 6040 | 2569 | 2979 |
| 13 | 3971 | 3560 | 4151 | 4069 | 3633 | 2701 | 2988 | 11246 | 7366 | 3596 | 3438 |
| 14 | 2218 | 984 | 2389 | 4156 | 2978 | 2133 | 1834 | 2748 | 6969 | 4723 | 3488 |
| 15 | 2274 | 1430 | 1394 | 1705 | 1992 | 2601 | 1222 | 1835 | 1193 | 3364 | 319 |
| 16 | 1673 | 626 | 59 | 738 | 859 | 1262 | 2025 | 621 | 1489 | 2723 | 186 |
| 17 | 868 | 669 | 77 | 133 | 201 | 338 | 1096 | 554 | 1763 | 747 | 135 |
| 18 | 1422 | 422 | 215 | 119 | 89 | 298 | 254 | 267 | 100 | 689 | |
| 19 | 192 | 164 | 135 | 131 | 22 | | 196 | 174 | | 480 | |
| 20 | 121 | 155 | 84 | 121 | 118 | | | | 55 | | |
| 21 | 217 | 80 | 33 | | | 33 | | 169 | | | |
| 22 | | 41 | | | | | | 97 | | | |

Table 4.23. Sea bass in the Northeast Atlantic. Estimated age compositions of sea bass landings in France in Division VIIe,h: LONG LINES (nos. fish). Oldest true age shown.

[illegible]

Table 4.24. Sea bass in the Northeast Atlantic. Estimated age compositions of sea bass landings in France in Division VIIe,h: FIXED/DRIFT NETS (nos. fish). Oldest true age shown.

[illegible]

Table 4.25. Sea bass in the Northeast Atlantic. Estimated length compositions of sea bass landings in France in Division VIIId: PELAGIC TRAWL (nos. fish)

| length structure VIIId, France, pelagic trawl <i>dicentrarchus labrax</i> | | | | | | | | | |
|---|------|------|-------|-------|------|-------|-------|-------|------|
| | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
| 35 | 0 | 0 | 539 | 1672 | 0 | 0 | | 15 | |
| 36 | 0 | 0 | 0 | 1672 | 0 | 534 | | 8353 | |
| 37 | 0 | 0 | 1561 | 0 | 215 | 2135 | 263 | 11451 | |
| 38 | 0 | 0 | 4440 | 3530 | 130 | 3141 | 1155 | 13574 | |
| 39 | 358 | 364 | 8870 | 5015 | 559 | 6442 | 2893 | 13318 | |
| 40 | 596 | 1819 | 17452 | 6966 | 429 | 6193 | 7975 | 24005 | |
| 41 | 715 | 728 | 11657 | 10136 | 1202 | 12294 | 7446 | 19450 | |
| 42 | 953 | 2547 | 12207 | 11059 | 2132 | 12101 | 16200 | 13476 | |
| 43 | 358 | 2547 | 22370 | 15337 | 2681 | 12140 | 15209 | 14299 | |
| 44 | 477 | 4367 | 24614 | 19749 | 4501 | 8593 | 13119 | 17551 | |
| 45 | 948 | 3395 | 25620 | 15698 | 5233 | 12774 | 29272 | 15778 | |
| 46 | 1033 | 2788 | 23959 | 13808 | 5815 | 17404 | 22228 | 14695 | |
| 47 | 1033 | 4118 | 17441 | 8244 | 4534 | 16074 | 17678 | 24109 | |
| 48 | 885 | 2301 | 24719 | 11795 | 4535 | 7455 | 11801 | 28355 | |
| 49 | 1475 | 4359 | 15006 | 11650 | 5774 | 14579 | 19908 | 6834 | |
| 50 | 590 | 4359 | 13782 | 7350 | 7182 | 13531 | 38594 | 19189 | |
| 51 | 1033 | 5812 | 12408 | 13515 | 3542 | 6360 | 20099 | 10595 | |
| 52 | 1033 | 2422 | 12301 | 6863 | 4947 | 6029 | 10955 | 11649 | |
| 53 | 738 | 1937 | 10858 | 6963 | 2482 | 3171 | 17700 | 2268 | |
| 54 | 814 | 3391 | 4783 | 3022 | 3077 | 4757 | 7385 | 8910 | |
| 55 | 527 | 1333 | 3572 | 1138 | 3187 | 2523 | 14335 | 6911 | |
| 56 | 970 | 484 | 7418 | 2273 | 2087 | 5227 | 4979 | 6551 | |
| 57 | 675 | 2667 | 4677 | 1170 | 1907 | 2807 | 13009 | 3395 | |
| 58 | 304 | 1943 | 3894 | 1043 | 962 | 3407 | 6621 | 2697 | |
| 59 | 152 | 1219 | 2355 | 888 | 2041 | 4410 | 2175 | 15473 | |
| 60 | 532 | 490 | 4664 | 1267 | 544 | 1500 | 736 | 1020 | |
| 61 | 532 | 245 | 2492 | 904 | 612 | 1037 | 5866 | 1597 | |
| 62 | 228 | 1958 | 1665 | 522 | 622 | 2070 | 1726 | 420 | |
| 63 | 275 | 1713 | 2050 | 468 | 1089 | 865 | 5919 | 347 | |
| 64 | 503 | 979 | 2757 | 812 | 885 | 1360 | 1748 | 6327 | |
| 65 | 143 | 598 | 1145 | 260 | 457 | 467 | 475 | 1657 | |
| 66 | 294 | 353 | 1089 | 568 | 269 | 355 | 1225 | 520 | |
| 67 | 456 | 706 | 691 | 304 | 156 | 128 | 690 | 161 | |
| 68 | 238 | 1004 | 842 | 507 | 97 | 10 | 113 | 578 | |
| 69 | 190 | 325 | 828 | 368 | 198 | 102 | 561 | 313 | |
| 70 | 95 | 434 | 1115 | 32 | 140 | 105 | 525 | 1944 | |
| 71 | 48 | 108 | 867 | 32 | 244 | 87 | | 1388 | |
| 72 | 95 | 108 | 464 | 32 | 46 | 249 | | 1549 | |
| 73 | 143 | 108 | 636 | 235 | 92 | 53 | | 7599 | |
| 74 | 48 | 0 | 287 | 133 | 16 | 109 | | 161 | |
| 75 | 143 | 0 | 223 | 0 | 92 | 40 | | | |
| 76 | 0 | 434 | 272 | 197 | 26 | 79 | 55 | 1990 | |
| 77 | 48 | 0 | 171 | 267 | 13 | 36 | | 117 | |
| 78 | 0 | 108 | 0 | 235 | 13 | 33 | | | |
| 79 | 0 | 0 | 117 | 0 | 26 | 11 | | | |
| 80 | 0 | 0 | 105 | 32 | 0 | 0 | | | |
| 81 | 0 | 0 | 235 | 0 | 0 | 10 | | 117 | |
| 82 | 0 | 0 | 53 | 0 | 0 | 0 | | 6094 | |
| 83 | 0 | 0 | 53 | 0 | 13 | 0 | | | |
| 84 | 0 | 0 | 0 | 0 | 0 | 0 | | 322 | |
| 85 | 0 | 0 | 0 | 0 | 26 | 0 | | 117 | |

Table 4.26. Sea bass in the Northeast Atlantic. Estimated length compositions of bass landings in France in Division VIIId: BOTTOM OTTER TRAWL (nos. fish).

| length structure Vlld, France, bottom trawl dicentrarchus labrax | | | | | | | | | |
|--|-------|-------|-------|--------|-------|--------|-------|-------|------|
| | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
| 21 | | | | | | | | 717 | |
| 22 | | | | | | | | | |
| 23 | | | | | | | | | |
| 24 | | | | | | | | | |
| 25 | | | | | | | | | |
| 26 | | | | | | | | | |
| 27 | | | | | | | | | |
| 28 | | | | | | | | | |
| 29 | 3455 | 0 | 0 | 0 | 0 | 0 | | | |
| 30 | 2688 | 0 | 0 | 0 | 0 | 0 | 473 | | |
| 31 | 10366 | 0 | 0 | 15689 | 0 | 0 | | | |
| 32 | 13239 | 1621 | | 0 | 0 | 0 | | 4739 | |
| 33 | 45478 | 11350 | 9149 | 32459 | 0 | 579 | 947 | 5072 | |
| 34 | 40303 | 24780 | 3739 | 100708 | 0 | 6008 | 473 | 8153 | |
| 35 | 62396 | 50220 | 24623 | 76691 | 2017 | 19632 | 686 | 20029 | |
| 36 | 36704 | 60042 | 53145 | 124862 | 8319 | 88046 | 11162 | 60805 | |
| 37 | 57782 | 40956 | 37401 | 150253 | 16639 | 115212 | 49466 | 73130 | |
| 38 | 49669 | 36951 | 29670 | 121311 | 28404 | 87502 | 55836 | 49336 | |
| 39 | 16671 | 33525 | 31452 | 59622 | 21597 | 75570 | 50159 | 46810 | |
| 40 | 13955 | 65438 | 44036 | 41734 | 18978 | 68261 | 66055 | 35956 | |
| 41 | 10787 | 41529 | 24949 | 35648 | 24930 | 50780 | 34705 | 46015 | |
| 42 | 12022 | 53065 | 58402 | 27410 | 20742 | 47585 | 25401 | 40282 | |
| 43 | 7758 | 46153 | 24128 | 8976 | 17848 | 24227 | 26414 | 46441 | |
| 44 | 7776 | 33087 | 43618 | 16771 | 16106 | 35347 | 23792 | 29891 | |
| 45 | 9202 | 35180 | 61769 | 14417 | 7946 | 18845 | 51953 | 23473 | |
| 46 | 10134 | 27261 | 29068 | 11818 | 3469 | 21081 | 36321 | 12667 | |
| 47 | 7501 | 23374 | 15405 | 9022 | 2040 | 13959 | 54566 | 16665 | |
| 48 | 5193 | 16126 | 20902 | 7848 | 0 | 8652 | 31645 | 12288 | |
| 49 | 9966 | 10906 | 15340 | 7796 | 1008 | 12068 | 28921 | 6409 | |
| 50 | 6334 | 9890 | 10751 | 5144 | 0 | 6245 | 27897 | 25979 | |
| 51 | 3160 | 5131 | 10051 | 8429 | 0 | 7318 | 11845 | 6111 | |
| 52 | 4122 | 6197 | 8640 | 6807 | 0 | 3841 | 14422 | 4416 | |
| 53 | 5963 | 1594 | 14090 | 2348 | 0 | 2648 | 5487 | 9631 | |
| 54 | 4956 | 3271 | 4254 | 1174 | 0 | 4429 | 14639 | 8422 | |
| 55 | 1782 | 2433 | 1418 | 2935 | 0 | 2768 | 3265 | 2827 | |
| 56 | 6369 | 1591 | 2312 | 5046 | 0 | 1695 | 18084 | 3175 | |
| 57 | 3973 | 1102 | 1418 | 4109 | 0 | 715 | 10331 | 86 | |
| 58 | 3728 | 1308 | 2438 | 2348 | 0 | 1609 | 7456 | 2501 | |
| 59 | 1466 | 627 | 92 | 1174 | 0 | 1280 | 9888 | 171 | |
| 60 | 3154 | 682 | 0 | 1174 | 0 | 4141 | 9474 | 3551 | |
| 61 | 2686 | 2638 | 3982 | 587 | 0 | 1073 | 6104 | | |
| 62 | 2247 | 682 | 3515 | 0 | 0 | 1073 | 10953 | 1580 | |
| 63 | 1432 | 910 | 709 | 0 | 0 | 1788 | 686 | | |
| 64 | 1042 | 1536 | 709 | 1174 | 0 | 207 | 3116 | 2520 | |
| 65 | 3419 | 3146 | 0 | 0 | 0 | 358 | 2318 | | |
| 66 | 911 | 1591 | 709 | 0 | 0 | 358 | 941 | 214 | |
| 67 | 0 | 0 | 709 | 0 | 0 | 358 | 2348 | | |
| 68 | 521 | 648 | 1636 | 1174 | | 207 | 1159 | | |
| 69 | 391 | 2446 | 0 | 0 | 0 | 0 | 947 | | |
| 70 | 911 | 682 | 0 | 0 | 0 | 0 | | | |
| 71 | 0 | 0 | 0 | 0 | 0 | 0 | | | |
| 72 | 1432 | 682 | 0 | 0 | 0 | 0 | | 4560 | |
| 73 | 0 | 0 | 0 | 0 | 0 | 0 | 473 | | |
| 74 | 0 | 682 | 0 | 0 | 0 | 0 | 473 | | |
| 75 | 1432 | 682 | 0 | 0 | 0 | 0 | | 917 | |
| 76 | 391 | 1102 | 0 | 0 | 0 | 0 | 473 | | |
| 77 | 0 | 0 | 0 | 0 | 0 | 0 | | | |
| 78 | 0 | 0 | 0 | 0 | 0 | 0 | | | |
| 79 | 0 | 0 | 0 | 0 | 0 | 0 | 292 | | |
| 80 | 391 | 0 | 0 | 0 | 0 | 0 | | | |
| 81 | | | | | | | | | |
| 82 | | | | | | | 947 | | |
| 83 | | | | | | | | | |
| 84 | | | | | | | | | |
| 85 | | | | | | | | | |

Table 4.27. Sea bass in the Northeast Atlantic. Estimated length compositions of sea bass landings in France in Division IVb,c VARIOUS GEARS (nos. fish). No data prior to 2009.

| | Bottom otter trawl | | Pelagic trawl | Nets | Long line | Handline |
|--------|--------------------|------|---------------|------|-----------|----------|
| Length | 2009 | 2010 | 2010 | 2010 | 2010 | 2010 |
| 28 | | | | | | No data |
| 29 | | | | | | |
| 30 | | | | | | |
| 31 | | | | | | |
| 32 | | | | | | |
| 33 | 1001 | | | | | |
| 34 | | | | | | |
| 35 | 4280 | | | 13 | | |
| 36 | 14281 | 575 | | 1398 | 8 | |
| 37 | 24651 | | | 1124 | 8 | |
| 38 | 14892 | 162 | 8 | 1243 | 67 | |
| 39 | 19816 | | 20 | 2483 | 100 | |
| 40 | 13149 | 845 | 47 | 4797 | 59 | |
| 41 | 14746 | 2760 | 33 | 2454 | 119 | |
| 42 | 6757 | 1554 | 99 | 4322 | 202 | |
| 43 | 15229 | 5715 | 61 | 4685 | 303 | |
| 44 | 14866 | 3822 | 97 | 2275 | 185 | |
| 45 | 9392 | 575 | 32 | 2474 | 194 | |
| 46 | 6918 | 3660 | 39 | 1133 | 176 | |
| 47 | 6993 | 5135 | 28 | 2959 | 318 | |
| 48 | 1672 | 1935 | 25 | 277 | 139 | |
| 49 | 2189 | 1610 | 31 | 605 | 147 | |
| 50 | 1407 | 710 | 31 | 674 | 173 | |
| 51 | 1141 | 3825 | 22 | 224 | 132 | |
| 52 | 41 | 1522 | 20 | 598 | 85 | |
| 53 | 874 | 487 | 16 | 37 | 101 | |
| 54 | 1448 | 812 | 16 | 288 | 100 | |
| 55 | 105 | 812 | 30 | 196 | 185 | |
| 56 | 35 | 1369 | 7 | 761 | 135 | |
| 57 | 35 | 871 | 5 | 104 | 84 | |
| 58 | 3031 | 719 | 9 | 92 | 121 | |
| 59 | 1508 | 789 | 5 | 15 | 163 | |
| 60 | | 1132 | 2 | | 95 | |
| 61 | 35 | 1086 | 2 | | 136 | |
| 62 | | 162 | 4 | | 99 | |
| 63 | 35 | 1346 | 4 | | 141 | |
| 64 | 35 | 2004 | 3 | 461 | 138 | |
| 65 | | 1103 | 2 | | 119 | |
| 66 | | 1183 | 7 | 5 | 101 | |
| 67 | 35 | 394 | 1 | | 155 | |
| 68 | | 2405 | 1 | | 57 | |
| 69 | | 893 | 2 | 92 | 27 | |
| 70 | | | 1 | | 96 | |
| 71 | | 394 | 0 | | 74 | |
| 72 | 35 | | 1 | 5 | 34 | |
| 73 | | | 6 | | 27 | |
| 74 | | | 1 | | 36 | |
| 75 | | | 0 | | 10 | |
| 76 | | | 0 | | | |
| 77 | | | 0 | | | |
| 78 | | | 0 | | | |
| 79 | | | 0 | | 10 | |
| 80 | | | 0 | | | |
| 81 | | | | | 8 | |
| 82 | | | | | | |
| 83 | | | 0 | | | |
| 84 | | | | | | |
| 85 | | | | | | |
| 86 | | | | | | |
| 87 | | | | | | |
| 88 | | 394 | 0 | | | |

Table 4.28. Sea bass in the Northeast Atlantic. Estimated length compositions of sea bass landings in France in Division VIIIa,b: PELAGIC TRAWL (nos. fish).

| length structure VIIIa,b, France, pelagic trawl <i>dicentrarchus labrax</i> | | | | | | | | | | |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| length/yea | 2000 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
| 20 | | | | | | | | | 6 | |
| 21 | | | | | | | | | 25 | |
| 22 | | | | | | | | | | |
| 23 | | | | | | | | | 6 | |
| 24 | | | | | | | | 121 | | |
| 25 | | 3938 | | | | | | 0 | | |
| 26 | | 5907 | | | | | | 0 | 24 | |
| 27 | | 3938 | | | | | | 121 | 105 | |
| 28 | | 5907 | | | | | | 492 | 270 | |
| 29 | | 19691 | | | | | | 861 | 179 | |
| 30 | | 7876 | | | | | | 1704 | 106 | |
| 31 | | 11814 | | | | | | 242 | 293 | |
| 32 | | 7876 | | 1270 | 8725 | 5234 | | 1833 | 202 | |
| 33 | | 25598 | | 0 | 0 | 0 | | 856 | 197 | |
| 34 | | 30590 | 1419 | 1371 | 0 | 0 | 7845 | 960 | 295 | 22 |
| 35 | | 8930 | 13428 | 6970 | 39264 | 25687 | 10157 | 5158 | 732 | 391 |
| 36 | | 28900 | 22598 | 11433 | 34902 | 21900 | 4101 | 9428 | 2092 | 4198 |
| 37 | 9937 | 13923 | 21944 | 8463 | 43627 | 28723 | 10424 | 29665 | 936 | 5845 |
| 38 | 13467 | 15117 | 25436 | 13422 | 39375 | 24892 | 13050 | 39671 | 2855 | 6793 |
| 39 | 13303 | 18419 | 41703 | 13037 | 13199 | 12862 | 5262 | 26059 | 6419 | 7408 |
| 40 | 16670 | 6326 | 29694 | 28886 | 30870 | 30124 | 13712 | 29701 | 7269 | 12104 |
| 41 | 3367 | 14620 | 14551 | 18483 | 22493 | 24931 | 14270 | 14611 | 7289 | 11885 |
| 42 | 6733 | 10264 | 17686 | 14889 | 26221 | 23987 | 9201 | 46926 | 9939 | 12311 |
| 43 | 10376 | 11179 | 9319 | 13785 | 25316 | 29359 | 30242 | 27746 | 7518 | 15051 |
| 44 | 17273 | 23726 | 30793 | 13115 | 28386 | 29913 | 36333 | 33469 | 7621 | 19701 |
| 45 | 10376 | 40539 | 20397 | 20204 | 20440 | 29406 | 35614 | 46356 | 21411 | 16304 |
| 46 | 7173 | 30186 | 34931 | 8149 | 7580 | 17873 | 25747 | 32972 | 12955 | 17751 |
| 47 | 10816 | 43559 | 35672 | 19466 | 14887 | 25127 | 30092 | 15052 | 11674 | 15159 |
| 48 | 11243 | 40486 | 66746 | 15910 | 28273 | 27842 | 19829 | 24940 | 12509 | 14107 |
| 49 | 0 | 22580 | 69462 | 41889 | 25477 | 17057 | 3683 | 8031 | 11923 | 11125 |
| 50 | 7613 | 19875 | 28677 | 8563 | 33155 | 33896 | 23680 | 24096 | 19470 | 12646 |
| 51 | 3630 | 16256 | 46513 | 9988 | 21084 | 21395 | 19179 | 13860 | 13809 | 10017 |
| 52 | 3905 | 16256 | 16506 | 7763 | 23575 | 19737 | 8258 | 15732 | 8797 | 7770 |
| 53 | 3630 | 6502 | 6243 | 8428 | 18593 | 15502 | 5502 | 13275 | 15227 | 7263 |
| 54 | 3905 | 6502 | 16111 | 4272 | 7474 | 10957 | 7333 | 12557 | 8821 | 10095 |
| 55 | 3806 | 920 | 12858 | 5823 | 10845 | 12705 | 6876 | 14151 | 9708 | 3652 |
| 56 | 0 | 0 | 8681 | 7376 | 23994 | 14799 | 1981 | 7849 | 13016 | 4984 |
| 57 | 3905 | 2698 | 5191 | 4458 | 18314 | 11925 | 1663 | 14865 | 11379 | 5554 |
| 58 | 3905 | 0 | 8918 | 4434 | 7097 | 10077 | 7487 | 5865 | 3173 | 5174 |
| 59 | 11715 | 1778 | 672 | 1793 | 6931 | 7372 | 4379 | 2386 | 4294 | 3078 |
| 60 | 7810 | 920 | 672 | 3758 | 8478 | 5096 | 7540 | 5800 | 4600 | 1490 |
| 61 | 0 | 0 | 4518 | 2793 | 11393 | 10782 | 6527 | 1031 | 2668 | 4958 |
| 62 | 3905 | 4476 | 8364 | 238 | 1771 | 3070 | 3034 | 16655 | 11623 | 1626 |
| 63 | 3905 | 5396 | 3940 | 1506 | 4860 | 4904 | 2881 | 8687 | 2712 | 1846 |
| 64 | 11715 | 3618 | 0 | 856 | 937 | 1591 | 8652 | 208 | 2449 | 3583 |
| 65 | 7810 | 3618 | 0 | 2904 | 1822 | 1360 | 7341 | 8668 | 3345 | 2446 |
| 66 | 0 | 1778 | 3940 | 538 | 2276 | 2127 | 2636 | 329 | 1095 | 1023 |
| 67 | 3905 | 1778 | 0 | 3600 | 885 | 1502 | 2577 | 329 | 4729 | 1775 |
| 68 | 0 | 3556 | 0 | 0 | 885 | 581 | 439 | 3502 | 3614 | 680 |
| 69 | 4235 | 3556 | 5577 | 889 | 937 | 582 | 381 | 104 | 1323 | 479 |
| 70 | 0 | 0 | 1345 | 1427 | 2656 | 1676 | 240 | 3015 | 4172 | 755 |
| 71 | 0 | 0 | 0 | 0 | 5466 | 3287 | 181 | 0 | 270 | 199 |
| 72 | 8469 | 1840 | 9809 | 0 | 2759 | 1655 | 152 | 104 | 1730 | 1414 |
| 73 | 0 | 1778 | 0 | 0 | 885 | 537 | 0 | 0 | 1868 | 996 |
| 74 | 4235 | 0 | 0 | 538 | 4529 | 2729 | 152 | 1454 | 921 | 301 |
| 75 | 4235 | 920 | 0 | 0 | 0 | 143 | 342 | 0 | 165 | 194 |
| 76 | 8469 | 0 | 0 | 889 | 885 | 537 | 0 | 121 | 223 | 318 |
| 77 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 104 | 90 | 145 |
| 78 | 0 | 0 | 0 | 0 | 1873 | 1118 | 381 | 0 | 0 | 0 |
| 79 | 0 | 0 | 0 | 0 | 1087 | 537 | 152 | 0 | 0 | 22 |
| 80 | 0 | 0 | 0 | 889 | 885 | 537 | 0 | 208 | 0 | 443 |
| 81 | 8469 | 0 | 0 | 158 | 0 | 143 | 189 | 0 | 0 | 50 |
| 82 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 23 |
| 83 | 0 | 0 | 0 | 0 | 0 | 0 | 146 | 0 | 0 | 0 |
| 84 | 0 | 0 | 0 | 0 | 0 | 110 | 0 | 0 | 65 | 178 |
| 85 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 97 | 103 |
| 86 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 87 | 0 | 0 | 0 | 0 | 0 | 110 | 146 | 0 | 0 | 0 |

Table 4.29. Estimated length compositions of bass landings in France in Division VIIIa,b: BOT-TOM OTTER TRAWL (nos. fish).

| length structure VIIIab, France, bottom trawl <i>dicentrarchus labrax</i> | | | | | | | | | | | | |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|
| length/year | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | |
| 20 | | | | | | | | | | | | 168 |
| 21 | | | | | | | | | | | | 168 |
| 22 | | | | | | | | | | | | 168 |
| 23 | | | | | | | | | | | | |
| 24 | | | | | 2316 | | | | | | | 336 |
| 25 | | | | | 9058 | | | | | | | 336 |
| 26 | | | | | 16523 | | | | | | | 1177 |
| 27 | | | | | 22034 | | | | | 205 | | 753 |
| 28 | | | | | 12047 | | | | | 205 | | 376 |
| 29 | | | | 489 | 1339 | | | | 612 | 308 | | 1257 |
| 30 | | | 72 | 1467 | 0 | | | | 0 | 809 | | 753 |
| 31 | | | 0 | 489 | 0 | | | | 0 | 263 | | 941 |
| 32 | | 359 | 72 | 489 | 450 | 695 | | 224 | 0 | | | 2152 |
| 33 | 1555 | 82 | 365 | 1646 | 2416 | 406 | 490 | 0 | 0 | 630 | | 3544 |
| 34 | 2853 | 6009 | 1632 | 6812 | 11105 | 9542 | 8650 | 7379 | 5481 | 176 | | 5925 |
| 35 | 16288 | 12763 | 12834 | 20519 | 21537 | 27565 | 30002 | 20341 | 20235 | 2724 | | 12757 |
| 36 | 43685 | 31205 | 22986 | 15675 | 29578 | 49860 | 48764 | 39865 | 78684 | 9865 | | 18876 |
| 37 | 39346 | 28780 | 37674 | 40694 | 42508 | 54911 | 51108 | 53252 | 80904 | 43350 | | 27913 |
| 38 | 55891 | 37517 | 29380 | 54049 | 43546 | 39797 | 56214 | 45737 | 77069 | 41248 | | 19345 |
| 39 | 29613 | 40616 | 28455 | 22667 | 46606 | 27628 | 52632 | 52125 | 71205 | 43261 | | 23333 |
| 40 | 30863 | 42038 | 23755 | 29910 | 41636 | 20989 | 60532 | 39432 | 91407 | 43516 | | 20896 |
| 41 | 31249 | 34881 | 24345 | 29757 | 30468 | 23076 | 39274 | 44148 | 62794 | 28394 | | 26666 |
| 42 | 34480 | 32892 | 20811 | 29307 | 26774 | 26015 | 42862 | 42004 | 45757 | 16219 | | 24440 |
| 43 | 30184 | 30397 | 15742 | 16142 | 24795 | 22472 | 35745 | 30449 | 46076 | 22322 | | 28157 |
| 44 | 20848 | 10525 | 11433 | 14729 | 22401 | 30323 | 37729 | 36413 | 19581 | 23170 | | 24266 |
| 45 | 20762 | 17267 | 20270 | 10176 | 16561 | 32427 | 23882 | 27955 | 17877 | 36254 | | 20977 |
| 46 | 19643 | 15521 | 8161 | 11225 | 12828 | 15262 | 22852 | 20208 | 15243 | 28927 | | 17724 |
| 47 | 15205 | 11858 | 5986 | 8536 | 8978 | 29198 | 16902 | 16879 | 8716 | 26778 | | 18267 |
| 48 | 12805 | 10022 | 7545 | 6133 | 10939 | 5191 | 20425 | 11820 | 9015 | 16168 | | 6710 |
| 49 | 14632 | 2305 | 4431 | 5065 | 4807 | 11833 | 8613 | 12426 | 6563 | 15993 | | 11115 |
| 50 | 11940 | 3510 | 5825 | 3012 | 5022 | 7444 | 7682 | 7690 | 5630 | 8842 | | 18246 |
| 51 | 5436 | 1456 | 5356 | 3194 | 6038 | 5266 | 6330 | 4963 | 4007 | 4125 | | 4458 |
| 52 | 7501 | 3215 | 5400 | 2471 | 6507 | 3591 | 3078 | 3922 | 3432 | 4997 | | 9260 |
| 53 | 2531 | 3076 | 4402 | 2976 | 5111 | 8905 | 3318 | 3254 | 3057 | 3100 | | 7967 |
| 54 | 2531 | 882 | 3939 | 2493 | 2762 | 4677 | 3611 | 4295 | 4056 | 9744 | | 9797 |
| 55 | 1093 | 2440 | 2563 | 2936 | 2428 | 3277 | 1778 | 2922 | 1687 | 1577 | | 5716 |
| 56 | 3229 | 2313 | 2225 | 1799 | 2344 | 6488 | 2523 | 3023 | 1863 | 11049 | | 4676 |
| 57 | 1664 | 865 | 4524 | 2680 | 5800 | 1928 | 2861 | 3568 | 3263 | 2159 | | 3979 |
| 58 | 1516 | 3333 | 3103 | 1887 | 2468 | 3665 | 1127 | 3285 | 2139 | 4374 | | 3527 |
| 59 | 3876 | 328 | 3471 | 1306 | 1087 | 2469 | 2110 | 1482 | 3010 | 3403 | | 2817 |
| 60 | 3185 | 3550 | 2978 | 3328 | 3604 | 2282 | 1722 | 17090 | 1816 | 879 | | 2385 |
| 61 | 1988 | 185 | 1415 | 1150 | 1788 | 2141 | 1488 | 2221 | 1510 | 1104 | | 753 |
| 62 | 2043 | 369 | 385 | 1372 | 1724 | 2205 | 2932 | 2171 | 1351 | 1431 | | 3231 |
| 63 | 379 | 0 | 1454 | 682 | 2367 | 3260 | 2391 | 2274 | 523 | 284 | | 1011 |
| 64 | 1812 | 3756 | 743 | 432 | 1859 | 2031 | 1956 | 16240 | 2281 | 1102 | | 3439 |
| 65 | 491 | 1656 | 2733 | 654 | 1198 | 2334 | 2452 | 3020 | 834 | 795 | | 2606 |
| 66 | 2746 | 369 | 1627 | 117 | 1908 | 3336 | 1634 | 707 | 773 | 588 | | 706 |
| 67 | 331 | 554 | 438 | 342 | 1879 | 1535 | 1913 | 1984 | 1019 | 1938 | | 1377 |
| 68 | 703 | 82 | 652 | 225 | 838 | 2024 | 2459 | 3047 | 621 | 40 | | 1347 |
| 69 | 1549 | 349 | 1355 | 117 | 1273 | 1350 | 1109 | 2845 | 1133 | 176 | | 3358 |
| 70 | 331 | 369 | 216 | 234 | 240 | 945 | 325 | 889 | 1029 | 86 | | 335 |
| 71 | 578 | 1656 | 1658 | 342 | 0 | 2197 | 742 | 1093 | 733 | 496 | | 574 |
| 72 | 331 | 0 | 1214 | 223 | 305 | 2429 | 1360 | 771 | 1137 | 270 | | 4429 |
| 73 | 181 | 0 | 837 | 457 | 1087 | 0 | 403 | 217 | 213 | 181 | | 455 |
| 74 | 185 | 0 | 329 | 1269 | 240 | 551 | 325 | 492 | 2283 | | | 448 |
| 75 | 595 | 1574 | 710 | 225 | 305 | 1067 | 215 | 1577 | 0 | 272 | | 377 |
| 76 | 219 | 0 | 0 | 117 | | 270 | 215 | 1185 | 0 | 181 | | 376 |
| 77 | 0 | | 214 | 225 | | 945 | 448 | 0 | 1704 | 91 | | 188 |
| 78 | 219 | | 385 | 0 | | 0 | 448 | 435 | 1469 | | | 565 |
| 79 | 0 | | 0 | 0 | | 257 | 523 | 0 | 0 | 209 | | |
| 80 | 219 | | 154 | 351 | | 0 | 558 | 442 | 0 | 91 | | 188 |
| 81 | 219 | | 0 | 0 | | 1266 | 0 | 0 | 302 | | | |
| 82 | 219 | | 0 | 0 | | 0 | 0 | 217 | | | | |
| 83 | 0 | | 0 | 0 | | 0 | 0 | 0 | | | | |
| 84 | 219 | | 0 | 80 | | 0 | 0 | 243 | | | | |
| 85 | 0 | | 72 | | | 0 | 0 | | | | | |
| 86 | 0 | | | | | 0 | 0 | | | | | |
| 87 | 219 | | | | | 984 | 0 | | | | | |
| 88 | | | | | | | 110 | | | | | 231 |

| length structure Villab, France, net dicentrarchus labrax | | | | | | | | | | | |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| length/yea | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
| 20 | | | 3701 | | | | | | | | |
| 21 | | | 0 | | | | | | | | |
| 22 | | | 0 | | | | | | | | |
| 23 | | | 0 | | | | | | | 59 | |
| 24 | 2234 | | 0 | | 2115 | | | | | 211 | |
| 25 | 372 | | 0 | | 2115 | | | | | | 86 |
| 26 | 745 | | 0 | | 1410 | | 890 | | | | |
| 27 | 745 | | 0 | | 1410 | | 3561 | | | 164 | |
| 28 | 372 | | 2623 | | 705 | | 6232 | 3685 | | 35 | |
| 29 | 745 | | 3950 | | 0 | | 6232 | 0 | | | |
| 30 | 1328 | | 2765 | | 0 | | 4451 | 0 | | | 86 |
| 31 | 0 | | 1185 | | 0 | | 6232 | 0 | | 164 | 36 |
| 32 | 0 | | 0 | | 0 | | 0 | 0 | | 152 | 3478 |
| 33 | 372 | 303 | 920 | 732 | 0 | | 1068 | 1672 | | 328 | 7909 |
| 34 | 0 | 532 | 3680 | 2238 | 0 | 95 | 0 | 7029 | 142 | 569 | 4962 |
| 35 | 7070 | 1376 | 7815 | 7567 | 0 | 1065 | 1313 | 45209 | 755 | 1477 | 3295 |
| 36 | 5169 | 4017 | 5232 | 8346 | 2044 | 3089 | 5258 | 37229 | 1009 | 6723 | 5918 |
| 37 | 11594 | 3488 | 13940 | 9338 | 5667 | 3346 | 4650 | 30079 | 2799 | 8937 | 9769 |
| 38 | 1849 | 8579 | 11868 | 9410 | 2643 | 3792 | 7710 | 20507 | 9295 | 16871 | 13920 |
| 39 | 25531 | 7474 | 14547 | 15541 | 16311 | 10367 | 8316 | 22842 | 24063 | 27551 | 8702 |
| 40 | 24147 | 14569 | 41409 | 14274 | 27432 | 9470 | 13087 | 38090 | 24940 | 28389 | 13445 |
| 41 | 41817 | 32082 | 29208 | 17870 | 27847 | 11906 | 27569 | 65245 | 59387 | 37385 | 26110 |
| 42 | 68757 | 32508 | 18729 | 33197 | 49376 | 18006 | 31702 | 66664 | 50278 | 37469 | 33961 |
| 43 | 67135 | 45018 | 30768 | 30123 | 45628 | 27008 | 32665 | 42713 | 49263 | 43313 | 47773 |
| 44 | 56978 | 39461 | 31686 | 41215 | 50467 | 41566 | 35071 | 33709 | 93497 | 40561 | 30194 |
| 45 | 92286 | 51614 | 19004 | 29172 | 25114 | 32418 | 36353 | 21024 | 33360 | 38296 | 25459 |
| 46 | 52539 | 53088 | 36814 | 36887 | 37789 | 35617 | 35123 | 76214 | 20115 | 24537 | 27823 |
| 47 | 53165 | 20838 | 36676 | 26092 | 19690 | 38339 | 22629 | 54961 | 19991 | 27792 | 21063 |
| 48 | 20845 | 32704 | 58090 | 21813 | 33646 | 39695 | 36956 | 21925 | 15706 | 19953 | 20891 |
| 49 | 32135 | 27768 | 18107 | 16607 | 28084 | 28050 | 20681 | 65526 | 20375 | 15771 | 14548 |
| 50 | 18563 | 18584 | 19584 | 22044 | 15067 | 25130 | 18498 | 33357 | 15237 | 18484 | 9100 |
| 51 | 16471 | 9840 | 6725 | 17364 | 10465 | 20542 | 15768 | 8486 | 17273 | 9893 | 9438 |
| 52 | 10539 | 11123 | 11254 | 14544 | 10247 | 6032 | 23289 | 22636 | 9956 | 11255 | 15667 |
| 53 | 17139 | 10888 | 10261 | 13766 | 8919 | 10243 | 5848 | 18340 | 8809 | 10404 | 11156 |
| 54 | 8241 | 3743 | 3019 | 15877 | 7545 | 8817 | 5428 | 14999 | 11870 | 6387 | 6265 |
| 55 | 6919 | 4823 | 445 | 7202 | 7624 | 5620 | 4054 | 15177 | 7692 | 4430 | 4769 |
| 56 | 2387 | 10807 | 5217 | 8365 | 6977 | 9230 | 8957 | 3218 | 5512 | 6208 | 3893 |
| 57 | 6285 | 5960 | 637 | 3548 | 4929 | 4861 | 1581 | 13157 | 9622 | 3284 | 3465 |
| 58 | 2690 | 4780 | 8938 | 2606 | 5337 | 2536 | 13868 | 15077 | 4544 | 4187 | 2030 |
| 59 | 2364 | 3332 | 2811 | 3211 | 1543 | 4771 | | | | | |

Table 4.31. Sea bass in the Northeast Atlantic. Estimated length compositions of sea bass landings in France in Division VIIIa,b: HAND LINES (nos. fish)

| length structure VIIIab, France, hand line <i>dicentrarchus labrax</i> | | | | | | | | | | | |
|--|------|------|------|-------|------|------|------|------|------|------|------|
| length/yea | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
| 33 | NA | NA | | 677 | | | 142 | | | NA | NA |
| 34 | NA | NA | 223 | 1454 | | 205 | 369 | 931 | 263 | NA | NA |
| 35 | NA | NA | 1039 | 5354 | 1004 | 1065 | 2933 | 1523 | 200 | NA | NA |
| 36 | NA | NA | 2511 | 6470 | 2790 | 692 | 3057 | 5268 | 910 | NA | NA |
| 37 | NA | NA | 3972 | 10521 | 4164 | 757 | 2186 | 3800 | 1831 | NA | NA |
| 38 | NA | NA | 6309 | 10207 | 4164 | 631 | 3421 | 5119 | 1592 | NA | NA |
| 39 | NA | NA | 4222 | 11888 | 7281 | 964 | 4000 | 6595 | 2788 | NA | NA |
| 40 | NA | NA | 7107 | 14519 | 7286 | 2324 | 4582 | 7116 | 979 | NA | NA |
| 41 | NA | NA | 4021 | 9844 | 7025 | 1721 | 7409 | 4455 | 2850 | NA | NA |
| 42 | NA | NA | 5335 | 7624 | 1109 | 2603 | 3884 | 2698 | 4323 | NA | NA |
| 43 | NA | NA | 3832 | 6709 | 8276 | 2024 | 5268 | 2446 | 2804 | NA | NA |
| 44 | NA | NA | 3707 | 6158 | 5784 | 4197 | 2098 | 4301 | 3020 | NA | NA |
| 45 | NA | NA | 3407 | 3223 | 3578 | 1187 | 3295 | 3134 | 3292 | NA | NA |
| 46 | NA | NA | 2980 | 7058 | 2914 | 897 | 3528 | 2117 | 3223 | NA | NA |
| 47 | NA | NA | 3287 | 3849 | 2562 | 1756 | 4013 | 3187 | 1996 | NA | NA |
| 48 | NA | NA | 3005 | 5176 | 2512 | 2396 | 2611 | 2804 | 2171 | NA | NA |
| 49 | NA | NA | 3702 | 4349 | 1308 | 1284 | 3699 | 3507 | 9929 | NA | NA |
| 50 | NA | NA | 2421 | 2696 | 4280 | 631 | 3947 | 4079 | 2094 | NA | NA |
| 51 | NA | NA | 3504 | 3901 | 3077 | 1946 | 1875 | 2636 | 5159 | NA | NA |
| 52 | NA | NA | 1868 | 1780 | 3783 | 861 | 844 | 3045 | 2086 | NA | NA |
| 53 | NA | NA | 2033 | 2495 | 2776 | 784 | 2552 | 3562 | 9910 | NA | NA |
| 54 | NA | NA | 1671 | 1164 | 2622 | 784 | 1571 | 3135 | 5089 | NA | NA |
| 55 | NA | NA | 1395 | 1345 | 4200 | 1907 | 652 | 4102 | 5200 | NA | NA |
| 56 | NA | NA | 1644 | 392 | 606 | 2559 | 1714 | 2754 | 1877 | NA | NA |
| 57 | NA | NA | 862 | 1536 | 1135 | 1307 | 1468 | 4387 | 1185 | NA | NA |
| 58 | NA | NA | 725 | 957 | 1949 | 451 | 2156 | 2289 | 783 | NA | NA |
| 59 | NA | NA | 1897 | 2198 | 562 | 1348 | 401 | 1197 | 2192 | NA | NA |
| 60 | NA | NA | 919 | 916 | 2488 | 958 | 1408 | 552 | 9385 | NA | NA |
| 61 | NA | NA | 671 | 238 | 1201 | 120 | 2031 | 3082 | 836 | NA | NA |
| 62 | NA | NA | 694 | 719 | 401 | 1573 | 2458 | 1292 | 6813 | NA | NA |
| 63 | NA | NA | 863 | 715 | 482 | 656 | 913 | 1870 | 9151 | NA | NA |
| 64 | NA | NA | 642 | 477 | 2438 | 386 | 1621 | 2465 | 5122 | NA | NA |
| 65 | NA | NA | 307 | 242 | 237 | 265 | 865 | 3817 | 383 | NA | NA |
| 66 | NA | NA | 529 | 477 | 2177 | 571 | 17 | 1686 | 1295 | NA | NA |
| 67 | NA | NA | 826 | 238 | 646 | 346 | 702 | 255 | 741 | NA | NA |
| 68 | NA | NA | 307 | 242 | 0 | 20 | 75 | 1000 | 1073 | NA | NA |
| 69 | NA | NA | 789 | 677 | 0 | 1244 | 209 | 1513 | 305 | NA | NA |
| 70 | NA | NA | 783 | 0 | 1949 | 797 | 822 | 526 | 455 | NA | NA |
| 71 | NA | NA | 0 | 0 | 0 | 386 | 351 | 570 | 870 | NA | NA |
| 72 | NA | NA | 112 | 0 | 1622 | 0 | 200 | 144 | 236 | NA | NA |
| 73 | NA | NA | 306 | 0 | 562 | 732 | 200 | 272 | 698 | NA | NA |
| 74 | NA | NA | 0 | 238 | 237 | 962 | 27 | 963 | 1337 | NA | NA |
| 75 | NA | NA | 112 | | 164 | 205 | 373 | 251 | 895 | NA | NA |
| 76 | NA | NA | 307 | | 318 | 20 | 0 | 126 | 0 | NA | NA |
| 77 | NA | NA | 224 | | | 40 | 157 | 0 | 104 | NA | NA |
| 78 | NA | NA | 0 | | | 20 | 0 | 310 | 104 | NA | NA |
| 79 | NA | NA | 0 | | | 0 | 0 | | 0 | NA | NA |
| 80 | NA | NA | 0 | | | 20 | 0 | | 0 | NA | NA |
| 81 | NA | NA | 111 | | | | 0 | | 0 | NA | NA |
| 82 | NA | NA | 0 | | | | 157 | | 104 | NA | NA |
| 83 | NA | NA | 0 | | | | | | 0 | NA | NA |
| 84 | NA | NA | 83 | | | | | | 0 | NA | NA |
| 85 | NA | NA | 0 | | | | | | 36 | NA | NA |
| 86 | NA | NA | 0 | | | | | | | NA | NA |
| 87 | NA | NA | 0 | | | | | | | NA | NA |
| 88 | NA | NA | 0 | | | | | | | NA | NA |
| 89 | NA | NA | 112 | | | | | | | NA | NA |

| length structure Villab, France, long line dicentrarchus labrax | | | | | | | | | | | |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| length/yea | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
| 29 | | 701 | | | | | | | | | |
| 30 | | 0 | | 598 | | | | | | | |
| 31 | | 409 | | 598 | | | | | | | |
| 32 | | 901 | | 598 | | | 2069 | | | | |
| 33 | | 1737 | 734 | 2291 | 815 | | 6208 | | 1011 | | |
| 34 | 2069 | 2142 | 1872 | 2479 | 1275 | | 4139 | | 0 | | |
| 35 | 8691 | 4429 | 7995 | 2107 | 4481 | 2778 | 63240 | | 2023 | 176 | |
| 36 | 8608 | 6362 | 12370 | 8012 | 9669 | 12745 | 50783 | | 10136 | 5274 | |
| 37 | 13878 | 14684 | 12812 | 8617 | 16900 | 5912 | 42625 | | 16893 | 7917 | 4436 |
| 38 | 13033 | 12538 | 21554 | 9493 | 19090 | 32915 | 14706 | 3561 | 20939 | 11800 | 5897 |
| 39 | 23028 | 13075 | 20387 | 14182 | 27027 | 9980 | 20189 | 7735 | 33787 | 14663 | 14387 |
| 40 | 23219 | 19690 | 24255 | 19138 | 31848 | 9962 | 96953 | 2531 | 27880 | 18399 | 13999 |
| 41 | 21038 | 24950 | 19465 | 17999 | 32422 | 37186 | 47051 | 750 | 43052 | 27134 | 5904 |
| 42 | 15506 | 22385 | 20571 | 26777 | 33688 | 23169 | 40515 | 7124 | 42567 | 23768 | 18633 |
| 43 | 26017 | 18054 | 23199 | 25863 | 36487 | 39521 | 16745 | 5247 | 42750 | 27649 | 13561 |
| 44 | 20951 | 26588 | 16773 | 29056 | 38857 | 32576 | 40545 | 16049 | 34455 | 21206 | 31613 |
| 45 | 20949 | 27507 | 14273 | 27759 | 33318 | 18319 | 43320 | 4498 | 41718 | 25657 | 17839 |
| 46 | 20470 | 14989 | 14224 | 30451 | 20580 | 20618 | 36667 | 10218 | 12826 | 15606 | 20124 |
| 47 | 16114 | 26410 | 14775 | 20859 | 22242 | 11940 | 15095 | 27692 | 10115 | 19950 | 18082 |
| 48 | 14879 | 16486 | 15769 | 24506 | 21089 | 15763 | 11998 | 10126 | 19562 | 22099 | 21755 |
| 49 | 14436 | 17262 | 11998 | 20138 | 20151 | 23063 | 41961 | 19785 | 12321 | 18293 | 9365 |
| 50 | 14754 | 11380 | 14819 | 18238 | 17006 | 12518 | 8486 | 21567 | 9103 | 15910 | 22319 |
| 51 | 16457 | 17453 | 10670 | 14003 | 12571 | 14012 | 15540 | 14439 | 11148 | 14021 | 18663 |
| 52 | 10775 | 13198 | 7447 | 15182 | 15115 | 11585 | 18488 | 12657 | 10459 | 13081 | 14508 |
| 53 | 6275 | 7366 | 8082 | 20572 | 9647 | 9384 | 13115 | 17254 | 5057 | 14257 | 23447 |
| 54 | 9829 | 7583 | 12906 | 11814 | 10157 | 14835 | 7234 | 2998 | 13494 | 13122 | 18856 |
| 55 | 6372 | 4835 | 11394 | 9765 | 8985 | 11940 | 4421 | 4031 | 9286 | 8602 | 17668 |
| 56 | 8309 | 6921 | 10807 | 11376 | 11963 | 6490 | 4556 | 7594 | 5402 | 9426 | 13069 |
| 57 | 5038 | 6986 | 8231 | 12324 | 8206 | 6023 | 4522 | 2531 | 1011 | 8830 | 9919 |
| 58 | 4630 | 6583 | 7028 | 8780 | 10458 | 5912 | 9720 | 6845 | 1011 | 7403 | 6075 |
| 59 | 5248 | 6632 | 5768 | 7576 | 6565 | 16101 | 0 | 15435 | 5240 | 9184 | 3391 |
| 60 | 5239 | 3294 | 2694 | 5936 | 7378 | 1045 | 2278 | 8061 | 5240 | 5665 | 3388 |
| 61 | 4839 | 2813 | 2950 | 7373 | 11043 | 10896 | 7008 | 3281 | 1011 | 5946 | 3342 |
| 62 | 5363 | 3308 | 4550 | 7846 | 4485 | 4867 | 2886 | 3748 | 4046 | 4397 | 5621 |
| 63 | 5083 | 3923 | 4185 | 5674 | 5776 | 4401 | 5164 | 1782 | 4229 | 5650 | 2571 |
| 64 | 2654 | 2374 | 4059 | 4610 | 6661 | 8340 | 0 | 2531 | 0 | 7800 | 5122 |
| 65 | 4362 | 1650 | 5118 | 2733 | 1749 | 9273 | 2069 | 5063 | 5 | | |

Table 4.33. Sea bass in the Northeast Atlantic. Estimated numbers at age for bass landed into the UK from Division IVb,c: TRAWLS (nos. fish)

| | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12+ |
|------|------|-------|-------|-------|-------|------|------|------|------|------|
| 1985 | 61 | 19 | 47 | 134 | 11 | 22 | 422 | 166 | 78 | 132 |
| 1986 | 41 | 742 | 0 | 0 | 73 | 0 | 0 | 997 | 0 | 286 |
| 1987 | 0 | 738 | 2560 | 235 | 40 | 0 | 28 | 0 | 302 | 1020 |
| 1988 | 0 | 0 | 0 | 213 | 240 | 0 | 107 | 0 | 0 | 1041 |
| 1989 | 0 | 0 | 20 | 324 | 365 | 82 | 7 | 31 | 11 | 676 |
| 1990 | 0 | 0 | 3 | 5 | 150 | 126 | 37 | 62 | 26 | 421 |
| 1991 | 218 | 1747 | 0 | 0 | 0 | 981 | 273 | 0 | 0 | 654 |
| 1992 | 531 | 1142 | 1115 | 186 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1993 | 212 | 14052 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1994 | 115 | 4823 | 27763 | 1459 | 1190 | 74 | 0 | 93 | 575 | 562 |
| 1995 | 1051 | 3932 | 4648 | 13630 | 3001 | 922 | 0 | 0 | 0 | 0 |
| 1996 | 909 | 4278 | 758 | 2628 | 11680 | 1915 | 1006 | 0 | 0 | 0 |
| 1997 | 519 | 739 | 2243 | 1634 | 1824 | 5486 | 748 | 567 | 0 | 536 |
| 1998 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 |
| 1999 | 0 | 1979 | 6159 | 2956 | 828 | 904 | 528 | 2038 | 215 | 168 |
| 2000 | 2728 | 291 | 4271 | 5909 | 931 | 724 | 1109 | 546 | 1010 | 0 |
| 2001 | 3606 | 8944 | 315 | 990 | 1272 | 218 | 715 | 281 | 21 | 478 |
| 2002 | 1064 | 3877 | 10646 | 419 | 1550 | 1728 | 507 | 276 | 128 | 526 |
| 2003 | 3939 | 19137 | 4340 | 2812 | 187 | 464 | 767 | 60 | 118 | 474 |
| 2004 | 125 | 2081 | 10962 | 5834 | 4535 | 0 | 0 | 0 | 691 | 0 |
| 2005 | 1669 | 11627 | 10743 | 9306 | 781 | 43 | 0 | 18 | 58 | 0 |
| 2006 | 4370 | 11069 | 7288 | 2285 | 1680 | 669 | 91 | 0 | 0 | 1630 |
| 2007 | 356 | 1271 | 11835 | 4909 | 1061 | 502 | 448 | 125 | 0 | 119 |
| 2008 | 145 | 2372 | 9563 | 7092 | 3169 | 372 | 1211 | 572 | 191 | 0 |
| 2009 | 61 | 2558 | 12767 | 21177 | 6004 | 1256 | 166 | 100 | 0 | 0 |
| 2010 | 0 | 566 | 13317 | 19346 | 15618 | 3753 | 0 | 0 | 0 | 0 |

Table 4.34. Sea bass in the Northeast Atlantic. Estimated numbers at age for bass landed into the UK from Division IVb,c: GILL / DRIFT NETS (nos. fish)

| | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12+ |
|------|-------|-------|--------|-------|-------|-------|------|------|------|------|
| 1985 | 300 | 202 | 153 | 277 | 57 | 180 | 1813 | 552 | 706 | 1424 |
| 1986 | 13 | 181 | 1406 | 0 | 0 | 0 | 0 | 1670 | 800 | 3364 |
| 1987 | 0 | 1679 | 5824 | 2212 | 534 | 588 | 174 | 90 | 2514 | 1683 |
| 1988 | 0 | 636 | 6072 | 12355 | 2349 | 423 | 489 | 74 | 31 | 977 |
| 1989 | 666 | 152 | 472 | 7779 | 6476 | 1296 | 23 | 163 | 143 | 1415 |
| 1990 | 298 | 72 | 263 | 689 | 3581 | 2469 | 357 | 299 | 280 | 731 |
| 1991 | 12476 | 4870 | 326 | 0 | 0 | 439 | 192 | 0 | 0 | 982 |
| 1992 | 4523 | 10135 | 5617 | 229 | 0 | 605 | 286 | 443 | 56 | 200 |
| 1993 | 163 | 16958 | 5030 | 2811 | 506 | 64 | 24 | 402 | 363 | 1233 |
| 1994 | 383 | 19675 | 100954 | 5301 | 2238 | 24 | 0 | 46 | 315 | 343 |
| 1995 | 3883 | 19269 | 32920 | 57259 | 2834 | 1165 | 0 | 92 | 92 | 917 |
| 1996 | 10223 | 26970 | 4300 | 8033 | 11141 | 27 | 27 | 0 | 0 | 1808 |
| 1997 | 3205 | 2154 | 3656 | 3862 | 4969 | 15073 | 702 | 866 | 0 | 1654 |
| 1998 | 578 | 9555 | 2922 | 4053 | 2772 | 2197 | 3891 | 173 | 49 | 164 |
| 1999 | 0 | 7530 | 21487 | 11714 | 2110 | 2481 | 1195 | 3598 | 157 | 314 |
| 2000 | 2863 | 429 | 8226 | 9025 | 1023 | 809 | 757 | 346 | 1209 | 218 |
| 2001 | 4993 | 13685 | 362 | 1243 | 1811 | 275 | 717 | 226 | 171 | 238 |
| 2002 | 5258 | 13749 | 24085 | 805 | 1626 | 1588 | 233 | 284 | 78 | 262 |
| 2003 | 6004 | 38686 | 13797 | 8451 | 294 | 556 | 545 | 202 | 28 | 241 |
| 2004 | 1523 | 12939 | 31116 | 5813 | 3104 | 16 | 195 | 125 | 119 | 441 |
| 2005 | 2633 | 16183 | 14813 | 13842 | 4020 | 909 | 0 | 235 | 312 | 129 |
| 2006 | 5726 | 17561 | 15153 | 3929 | 3930 | 665 | 1713 | 16 | 65 | 1076 |
| 2007 | 648 | 3282 | 28985 | 13597 | 2414 | 1503 | 668 | 66 | 0 | 255 |
| 2008 | 821 | 8873 | 56065 | 22637 | 6194 | 995 | 839 | 581 | 58 | 0 |
| 2009 | 94 | 3928 | 19602 | 32514 | 9218 | 1928 | 256 | 153 | 0 | 0 |
| 2010 | 0 | 10019 | 29343 | 29683 | 13619 | 4890 | 3574 | 1256 | 1873 | 1664 |

Table 4.35. Sea bass in the Northeast Atlantic. Estimated numbers at age for sea bass landed into the UK from Division IVb,c: LINES (nos. fish)

| | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12+ |
|------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|------------|
| 1985 | 700 | 445 | 249 | 101 | 223 | 12 | 406 | 209 | 134 | 234 |
| 1986 | 196 | 3483 | 825 | 255 | 726 | 0 | 0 | 1978 | 246 | 0 |
| 1987 | 0 | 36 | 110 | 37 | 18 | 21 | 6 | 10 | 129 | 296 |
| 1988 | 0 | 5 | 40 | 279 | 136 | 14 | 87 | 10 | 11 | 976 |
| 1989 | 0 | 0 | 0 | 88 | 76 | 107 | 21 | 48 | 61 | 1196 |
| 1990 | 150 | 13 | 6 | 79 | 252 | 316 | 145 | 122 | 94 | 1082 |
| 1991 | 30 | 54 | 48 | 40 | 40 | 644 | 436 | 137 | 0 | 2731 |
| 1992 | 82 | 191 | 322 | 86 | 0 | 78 | 106 | 267 | 160 | 693 |
| 1993 | 28 | 318 | 103 | 87 | 22 | 10 | 6 | 70 | 74 | 268 |
| 1994 | 2 | 78 | 843 | 182 | 115 | 7 | 0 | 25 | 66 | 566 |
| 1995 | 8 | 70 | 108 | 297 | 71 | 92 | 0 | 20 | 20 | 336 |
| 1996 | 28 | 59 | 85 | 270 | 1109 | 26 | 9 | 0 | 33 | 297 |
| 1997 | 32 | 26 | 71 | 93 | 113 | 487 | 57 | 76 | 17 | 285 |
| 1998 | 33 | 629 | 173 | 181 | 111 | 130 | 367 | 52 | 6 | 97 |
| 1999 | 0 | 263 | 1518 | 750 | 567 | 811 | 603 | 2270 | 246 | 749 |
| 2000 | 4 | 4 | 102 | 254 | 65 | 88 | 165 | 144 | 819 | 112 |
| 2001 | 575 | 1551 | 41 | 491 | 810 | 204 | 1184 | 160 | 222 | 535 |
| 2002 | 493 | 1119 | 1395 | 187 | 714 | 1484 | 432 | 984 | 406 | 1782 |
| 2003 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 |
| 2004 | 56 | 216 | 714 | 771 | 294 | 19 | 66 | 6 | 79 | 671 |
| 2005 | 22 | 104 | 107 | 178 | 43 | 85 | 0 | 67 | 67 | 135 |
| 2006 | 1 | 46 | 116 | 70 | 85 | 28 | 37 | 17 | 0 | 255 |
| 2007 | 17 | 59 | 1172 | 949 | 219 | 203 | 155 | 53 | 0 | 138 |
| 2008 | 0 | 0 | 0 | 1325 | 3533 | 883 | 883 | 0 | 0 | 0 |
| 2009 | 7 | 273 | 1362 | 2259 | 641 | 134 | 18 | 11 | 0 | 0 |
| 2010 | 0 | 21 | 336 | 784 | 870 | 655 | 1070 | 340 | 660 | 456 |

Table 4.36. Sea bass in the Northeast Atlantic. Estimated numbers at age for sea bass landed into the UK from Division VIIId: TRAWLS (nos. fish)

| | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12+ |
|------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|------------|
| 1985 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 |
| 1986 | 0 | 107 | 346 | 245 | 101 | 357 | 106 | 173 | 853 | 200 | 641 |
| 1987 | 0 | 166 | 13311 | 17414 | 4492 | 270 | 530 | 0 | 179 | 917 | 2218 |
| 1988 | 0 | 166 | 10555 | 32067 | 7671 | 2321 | 74 | 258 | 346 | 0 | 1936 |
| 1989 | 31571 | 4227 | 253 | 2500 | 8142 | 2525 | 943 | 472 | 483 | 144 | 4660 |
| 1990 | 0 | 86 | 147 | 207 | 400 | 3182 | 1993 | 595 | 182 | 110 | 788 |
| 1991 | 0 | 22 | 4995 | 211 | 37 | 160 | 1021 | 1673 | 786 | 0 | 3268 |
| 1992 | 0 | 3045 | 15040 | 7230 | 230 | 0 | 350 | 1160 | 178 | 0 | 1042 |
| 1993 | 0 | 128 | 26660 | 35848 | 10173 | 177 | 114 | 229 | 1159 | 565 | 755 |
| 1994 | 0 | 681 | 3174 | 104074 | 7011 | 1845 | 113 | 15 | 59 | 444 | 1134 |
| 1995 | 0 | 60 | 1738 | 7273 | 68607 | 2552 | 1417 | 131 | 68 | 0 | 1362 |
| 1996 | 0 | 160 | 2703 | 7322 | 9832 | 33535 | 1495 | 737 | 46 | 59 | 817 |
| 1997 | 0 | 95 | 1867 | 14380 | 11902 | 5322 | 30344 | 927 | 339 | 55 | 567 |
| 1998 | 0 | 190 | 10361 | 14699 | 26963 | 11289 | 3941 | 12082 | 469 | 140 | 139 |
| 1999 | 87 | 0 | 39939 | 64483 | 12941 | 9821 | 2388 | 905 | 3868 | 99 | 0 |
| 2000 | 0 | 2062 | 1147 | 55484 | 19123 | 1659 | 1046 | 298 | 74 | 157 | 385 |
| 2001 | 223 | 1325 | 42460 | 8778 | 41547 | 6513 | 995 | 1532 | 300 | 382 | 1186 |
| 2002 | 0 | 920 | 9805 | 62835 | 1399 | 5793 | 1665 | 410 | 413 | 239 | 284 |
| 2003 | 0 | 207 | 18864 | 14624 | 27649 | 2213 | 9497 | 4095 | 2118 | 798 | 1831 |
| 2004 | 0 | 991 | 6722 | 61321 | 15618 | 12795 | 409 | 1458 | 953 | 470 | 1133 |
| 2005 | 0 | 3297 | 35226 | 11504 | 2309 | 994 | 21 | 0 | 0 | 0 | 0 |
| 2006 | 0 | 9795 | 46538 | 32078 | 8515 | 1306 | 153 | 0 | 0 | 0 | 0 |
| 2007 | 0 | 0 | 14186 | 33363 | 11666 | 2060 | 1062 | 0 | 0 | 0 | 0 |
| 2008 | 0 | 1385 | 34169 | 51369 | 10347 | 3680 | 1877 | 728 | 80 | 0 | 0 |
| 2009 | 0 | 535 | 14815 | 28034 | 20782 | 2812 | 613 | 58 | 72 | 66 | 966 |
| 2010 | 0 | 0 | 12496 | 28558 | 16700 | 8602 | 775 | 39 | 51 | 48 | 0 |

Table 4.37. Sea bass in the Northeast Atlantic. Estimated numbers at age for bass landed into the UK from Division VIIId: GILL / DRIFT NETS (nos. fish)

| | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12+ |
|------|-----|-------|-------|--------|-------|-------|-------|------|------|------|------|
| 1985 | 0 | 5217 | 13315 | 1470 | 109 | 39 | 163 | 342 | 0 | 466 | 0 |
| 1986 | 0 | 11401 | 12160 | 14107 | 2561 | 4473 | 53 | 828 | 2210 | 121 | 3042 |
| 1987 | 0 | 80 | 4886 | 19009 | 2131 | 478 | 228 | 228 | 98 | 293 | 3024 |
| 1988 | 0 | 0 | 23 | 3417 | 610 | 771 | 387 | 490 | 370 | 26 | 3695 |
| 1989 | 776 | 265 | 316 | 3307 | 20552 | 3013 | 1035 | 164 | 35 | 0 | 0 |
| 1990 | 0 | 188 | 244 | 273 | 231 | 1806 | 1195 | 201 | 230 | 73 | 182 |
| 1991 | 0 | 98 | 17852 | 1016 | 0 | 1968 | 8469 | 7801 | 3768 | 211 | 9893 |
| 1992 | 0 | 6759 | 25548 | 19772 | 286 | 44 | 69 | 71 | 47 | 18 | 94 |
| 1993 | 0 | 67 | 10957 | 10592 | 2956 | 79 | 17 | 102 | 383 | 262 | 482 |
| 1994 | 2 | 91 | 3244 | 91351 | 8857 | 3467 | 280 | 31 | 264 | 1126 | 4610 |
| 1995 | 0 | 484 | 7270 | 19948 | 88207 | 1213 | 550 | 18 | 4 | 66 | 651 |
| 1996 | 0 | 94 | 7162 | 16793 | 14011 | 44994 | 2297 | 1144 | 70 | 51 | 858 |
| 1997 | 0 | 195 | 1838 | 14645 | 12847 | 4994 | 50786 | 2856 | 876 | 592 | 1126 |
| 1998 | 0 | 221 | 15078 | 20693 | 13217 | 5352 | 2089 | 7317 | 610 | 181 | 256 |
| 1999 | 22 | 0 | 18930 | 41202 | 10205 | 6696 | 1328 | 529 | 1957 | 88 | 457 |
| 2000 | 0 | 885 | 440 | 42392 | 14705 | 1293 | 888 | 236 | 67 | 488 | 282 |
| 2001 | 119 | 693 | 24311 | 2737 | 24775 | 7317 | 1243 | 1194 | 884 | 286 | 948 |
| 2002 | 0 | 1572 | 8507 | 125382 | 3612 | 9601 | 1456 | 221 | 118 | 18 | 140 |
| 2003 | 0 | 148 | 14163 | 12787 | 23309 | 886 | 1937 | 580 | 315 | 157 | 293 |
| 2004 | 0 | 1014 | 5899 | 71297 | 23602 | 26500 | 1733 | 4191 | 1218 | 407 | 1182 |
| 2005 | 0 | 3808 | 21767 | 27456 | 57048 | 9627 | 4276 | 0 | 699 | 0 | 0 |
| 2006 | 0 | 5210 | 42273 | 41874 | 16074 | 7852 | 1356 | 1377 | 128 | 384 | 386 |
| 2007 | 0 | 0 | 3344 | 19759 | 9992 | 13623 | 6455 | 1316 | 3286 | 8887 | 733 |
| 2008 | 0 | 1386 | 45971 | 99042 | 21883 | 6294 | 3797 | 2714 | 819 | 988 | 1290 |
| 2009 | 0 | 1306 | 27408 | 50180 | 46195 | 17362 | 5502 | 2374 | 1590 | 487 | 851 |
| 2010 | 0 | 0 | 46483 | 50000 | 17977 | 14920 | 7804 | 2102 | 919 | 2168 | 1638 |

Table 4.38. Sea bass in the Northeast Atlantic. Estimated numbers at age for bass landed into the UK from Division VIIId: LINES (nos.. fish)

[illegible]

Table 4.39. Sea bass in the Northeast Atlantic. Estimated numbers at age for bass landed into the UK from Division VIIe,h: TRAWLS (nos. fish)

| | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12+ |
|------|------|-------|-------|-------|-------|-------|------|------|------|------|
| 1985 | 0 | 178 | 385 | 1698 | 255 | 483 | 1610 | 229 | 197 | 609 |
| 1986 | 0 | 1654 | 586 | 275 | 842 | 72 | 677 | 1955 | 257 | 970 |
| 1987 | 0 | 1050 | 1634 | 1226 | 134 | 709 | 54 | 111 | 703 | 603 |
| 1988 | 0 | 18 | 4989 | 4900 | 1005 | 446 | 413 | 30 | 186 | 680 |
| 1989 | 0 | 0 | 286 | 3574 | 5492 | 1606 | 537 | 1063 | 258 | 2219 |
| 1990 | 0 | 128 | 280 | 3335 | 10928 | 9213 | 2257 | 657 | 380 | 3498 |
| 1991 | 155 | 1609 | 533 | 473 | 1227 | 3090 | 3475 | 1410 | 153 | 3235 |
| 1992 | 847 | 5935 | 3865 | 411 | 635 | 420 | 1075 | 1139 | 323 | 1535 |
| 1993 | 0 | 5374 | 7346 | 1761 | 276 | 225 | 292 | 728 | 901 | 1742 |
| 1994 | 74 | 316 | 20952 | 8100 | 1993 | 183 | 68 | 283 | 546 | 782 |
| 1995 | 61 | 567 | 2512 | 33932 | 5068 | 1216 | 232 | 80 | 126 | 2040 |
| 1996 | 0 | 1354 | 877 | 3309 | 21137 | 1745 | 560 | 77 | 151 | 2042 |
| 1997 | 14 | 496 | 7570 | 4344 | 6559 | 16023 | 1949 | 464 | 138 | 1299 |
| 1998 | 45 | 2816 | 6159 | 12908 | 4093 | 3175 | 8062 | 581 | 285 | 706 |
| 1999 | 7 | 5472 | 4921 | 1703 | 2487 | 981 | 1411 | 3371 | 347 | 727 |
| 2000 | 1124 | 336 | 27566 | 17334 | 3241 | 3061 | 1002 | 1781 | 2906 | 882 |
| 2001 | 0 | 855 | 740 | 16305 | 8408 | 2803 | 2039 | 1170 | 2195 | 4636 |
| 2002 | 380 | 1434 | 11582 | 4471 | 24560 | 5182 | 2885 | 3048 | 861 | 7578 |
| 2003 | 194 | 6623 | 12256 | 25172 | 2319 | 16937 | 5424 | 1203 | 1357 | 4274 |
| 2004 | 90 | 4601 | 18781 | 13468 | 18780 | 675 | 3636 | 1603 | 91 | 866 |
| 2005 | 321 | 1298 | 4503 | 14205 | 11261 | 11025 | 1140 | 5161 | 820 | 2928 |
| 2006 | 56 | 15004 | 23471 | 13720 | 13689 | 5517 | 6954 | 526 | 1204 | 302 |
| 2007 | 0 | 4451 | 39390 | 24241 | 11809 | 10880 | 3760 | 1921 | 704 | 864 |
| 2008 | 2225 | 11674 | 23181 | 24117 | 9227 | 4203 | 2729 | 705 | 728 | 868 |
| 2009 | 0 | 1921 | 10817 | 13717 | 9917 | 3029 | 4088 | 1049 | 771 | 1222 |
| 2010 | 125 | 1020 | 6659 | 7679 | 7116 | 4578 | 2405 | 1068 | 1107 | 1025 |

Table 4.40. Sea bass in the Northeast Atlantic. Estimated numbers at age for sea bass landed into the UK from Division VIIe,h: GILL / DRIFT NETS (nos. fish)

| | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12+ |
|------|------|-------|-------|-------|-------|------|------|------|------|------|
| 1985 | 84 | 263 | 132 | 391 | 94 | 144 | 1106 | 162 | 155 | 175 |
| 1986 | 0 | 3847 | 887 | 230 | 992 | 0 | 566 | 1149 | 36 | 620 |
| 1987 | 0 | 6130 | 2894 | 358 | 63 | 215 | 9 | 34 | 261 | 155 |
| 1988 | 0 | 51 | 902 | 707 | 220 | 67 | 67 | 5 | 26 | 1048 |
| 1989 | 0 | 189 | 690 | 1121 | 293 | 40 | 12 | 58 | 114 | 1322 |
| 1990 | 1067 | 34 | 2014 | 10295 | 4416 | 2284 | 192 | 55 | 4 | 9 |
| 1991 | 880 | 2659 | 285 | 280 | 947 | 1607 | 1931 | 609 | 64 | 356 |
| 1992 | 208 | 2685 | 2231 | 8 | 132 | 200 | 311 | 694 | 223 | 460 |
| 1993 | 0 | 1718 | 1693 | 376 | 101 | 111 | 225 | 749 | 1042 | 1234 |
| 1994 | 62 | 395 | 10496 | 1865 | 628 | 145 | 85 | 790 | 1187 | 2093 |
| 1995 | 47 | 468 | 1628 | 14079 | 1367 | 908 | 312 | 181 | 597 | 4017 |
| 1996 | 0 | 774 | 509 | 2072 | 9450 | 896 | 407 | 51 | 90 | 1225 |
| 1997 | 13 | 263 | 3679 | 1766 | 2466 | 4633 | 727 | 149 | 45 | 1251 |
| 1998 | 11 | 642 | 1216 | 2376 | 764 | 1147 | 5057 | 712 | 192 | 420 |
| 1999 | 0 | 3887 | 4663 | 1254 | 1563 | 577 | 1057 | 2564 | 260 | 330 |
| 2000 | 362 | 60 | 12507 | 6132 | 604 | 188 | 2 | 2 | 2 | 10 |
| 2001 | 41 | 1076 | 435 | 5102 | 993 | 537 | 414 | 388 | 1342 | 2576 |
| 2002 | 1013 | 2160 | 15641 | 1996 | 9377 | 2117 | 1169 | 1212 | 200 | 3157 |
| 2003 | 45 | 1176 | 2159 | 4119 | 352 | 2904 | 1177 | 371 | 426 | 860 |
| 2004 | 101 | 2695 | 10421 | 9031 | 13148 | 475 | 2524 | 724 | 40 | 485 |
| 2005 | 103 | 886 | 3193 | 4339 | 2265 | 1580 | 211 | 455 | 188 | 71 |
| 2006 | 0 | 16389 | 17281 | 6625 | 5283 | 1682 | 1789 | 353 | 1156 | 378 |
| 2007 | 0 | 2362 | 16221 | 9360 | 4734 | 5196 | 1676 | 1342 | 578 | 927 |
| 2008 | 4264 | 14007 | 19389 | 18011 | 5280 | 2268 | 1693 | 769 | 911 | 994 |
| 2009 | 102 | 8722 | 27469 | 28221 | 9023 | 779 | 378 | 191 | 319 | 279 |
| 2010 | 190 | 2115 | 13061 | 11591 | 6784 | 3432 | 1710 | 2528 | 441 | 4651 |

Table 4.41. Sea bass in the Northeast Atlantic. Estimated numbers at age for sea bass landed into the UK from Division VIIe,h: LINES (nos. fish)

| | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12+ |
|------|------|-------|-------|-------|-------|------|------|------|------|------|
| 1985 | 7591 | 7968 | 1985 | 3378 | 354 | 145 | 392 | 0 | 0 | 78 |
| 1986 | 4 | 1883 | 308 | 124 | 271 | 14 | 155 | 488 | 60 | 344 |
| 1987 | 0 | 253 | 467 | 229 | 48 | 181 | 15 | 54 | 317 | 480 |
| 1988 | 0 | 0 | 622 | 1033 | 586 | 177 | 319 | 19 | 141 | 488 |
| 1989 | 0 | 594 | 2756 | 1538 | 299 | 23 | 2 | 4 | 0 | 9 |
| 1990 | 4 | 0 | 8 | 55 | 22 | 6 | 0 | 0 | 0 | 0 |
| 1991 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 |
| 1992 | 49 | 611 | 885 | 109 | 142 | 128 | 189 | 492 | 161 | 771 |
| 1993 | 76 | 4285 | 4450 | 1173 | 292 | 229 | 327 | 946 | 959 | 1318 |
| 1994 | 38 | 191 | 8164 | 2592 | 866 | 193 | 82 | 724 | 1049 | 1989 |
| 1995 | 106 | 741 | 1575 | 15625 | 2742 | 1128 | 204 | 99 | 226 | 2145 |
| 1996 | 0 | 793 | 647 | 2237 | 5998 | 602 | 290 | 45 | 45 | 697 |
| 1997 | 169 | 200 | 1252 | 522 | 891 | 3047 | 571 | 168 | 49 | 550 |
| 1998 | 6 | 982 | 876 | 1373 | 638 | 778 | 3634 | 782 | 205 | 1935 |
| 1999 | 274 | 16433 | 13482 | 3969 | 4741 | 1108 | 1976 | 4574 | 448 | 2172 |
| 2000 | 66 | 36 | 3924 | 3387 | 767 | 864 | 327 | 475 | 1021 | 233 |
| 2001 | 0 | 194 | 113 | 1784 | 678 | 348 | 227 | 188 | 516 | 1075 |
| 2002 | 15 | 47 | 439 | 138 | 1182 | 330 | 171 | 162 | 39 | 345 |
| 2003 | 2 | 350 | 901 | 3366 | 283 | 2461 | 885 | 201 | 231 | 735 |
| 2004 | 6 | 191 | 700 | 543 | 943 | 98 | 663 | 203 | 42 | 267 |
| 2005 | 23 | 105 | 343 | 839 | 660 | 800 | 100 | 1203 | 226 | 649 |
| 2006 | 1 | 14310 | 30011 | 6887 | 5934 | 694 | 1389 | 162 | 839 | 839 |
| 2007 | 0 | 964 | 7563 | 8295 | 5078 | 6558 | 3971 | 4574 | 1467 | 7333 |
| 2008 | 95 | 1675 | 5065 | 11186 | 5458 | 5047 | 5783 | 2577 | 3392 | 3747 |
| 2009 | 0 | 1555 | 6350 | 11660 | 10624 | 5158 | 5089 | 1886 | 2413 | 5282 |
| 2010 | 592 | 4138 | 27976 | 30082 | 18316 | 7800 | 1134 | 210 | 1040 | 705 |

Table 4.42. Sea bass in the Northeast Atlantic. Estimated numbers at age for sea bass landed into the UK from Division VIIa, f and g; TRAWLS (nos. fish)

[illegible]

Table 4.43. Sea bass in the Northeast Atlantic. Estimated numbers at age for sea bass landed into the UK from Division VIIa, f and g: GILL / DRIFT NETS (nos. fish)

| | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12+ |
|------|------|------|-------|-------|-------|-------|------|------|------|------|
| 1985 | 4210 | 480 | 483 | 1609 | 76 | 752 | 608 | 270 | 92 | 26 |
| 1986 | 0 | 1548 | 1301 | 264 | 423 | 172 | 326 | 430 | 16 | 154 |
| 1987 | 0 | 1315 | 3573 | 1070 | 134 | 149 | 53 | 85 | 330 | 5 |
| 1988 | 0 | 304 | 2720 | 13786 | 5452 | 482 | 423 | 42 | 188 | 625 |
| 1989 | 0 | 0 | 31 | 859 | 4298 | 2283 | 982 | 660 | 387 | 1684 |
| 1990 | 0 | 0 | 0 | 42 | 155 | 404 | 275 | 85 | 156 | 1341 |
| 1991 | 0 | 2089 | 150 | 500 | 1695 | 4002 | 3022 | 1220 | 142 | 1336 |
| 1992 | 390 | 719 | 466 | 34 | 117 | 449 | 1654 | 2297 | 595 | 1799 |
| 1993 | 19 | 3923 | 5950 | 2428 | 99 | 43 | 170 | 150 | 244 | 427 |
| 1994 | 0 | 60 | 15881 | 5560 | 3255 | 200 | 70 | 619 | 1482 | 1652 |
| 1995 | 0 | 212 | 2216 | 38747 | 1499 | 498 | 0 | 3 | 6 | 4743 |
| 1996 | 24 | 721 | 1369 | 11187 | 29376 | 361 | 59 | 0 | 27 | 316 |
| 1997 | 0 | 400 | 4343 | 3759 | 5850 | 18946 | 305 | 731 | 0 | 263 |
| 1998 | 2 | 825 | 882 | 2958 | 480 | 822 | 1647 | 118 | 18 | 105 |
| 1999 | 0 | 1874 | 1619 | 1187 | 1575 | 231 | 165 | 360 | 8 | 4 |
| 2000 | 201 | 127 | 11148 | 4424 | 2178 | 2536 | 711 | 681 | 763 | 103 |
| 2001 | 90 | 2680 | 1514 | 14187 | 3199 | 1225 | 1686 | 1203 | 1536 | 2986 |
| 2002 | 389 | 1826 | 19746 | 3169 | 15616 | 3451 | 2583 | 3523 | 1415 | 6832 |
| 2003 | 0 | 773 | 2667 | 16132 | 519 | 1288 | 149 | 91 | 52 | 466 |
| 2004 | 0 | 200 | 1746 | 1611 | 6707 | 254 | 631 | 185 | 102 | 153 |
| 2005 | 0 | 69 | 321 | 4361 | 2035 | 6071 | 495 | 841 | 130 | 238 |
| 2006 | 0 | 296 | 1093 | 561 | 1844 | 471 | 765 | 46 | 167 | 155 |
| 2007 | 0 | 1527 | 13844 | 13236 | 6183 | 7833 | 4109 | 6229 | 1070 | 3149 |
| 2008 | 0 | 1407 | 14130 | 19924 | 7896 | 5037 | 4922 | 3773 | 1414 | 687 |
| 2009 | 0 | 244 | 2822 | 9223 | 8335 | 5038 | 3949 | 4810 | 4913 | 2245 |
| 2010 | 0 | 580 | 2929 | 4734 | 4187 | 1746 | 1434 | 919 | 220 | 271 |

Table 4.44. Sea bass in the Northeast Atlantic. Estimated numbers at age for bass landed into the UK from Division VIIa, f and g: LINES (nos. fish)

| | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12+ |
|------|------|------|-------|-------|-------|-------|------|------|------|------|
| 1985 | 9 | 9 | 1 | 17 | 3 | 31 | 112 | 34 | 15 | 92 |
| 1986 | 29 | 856 | 529 | 123 | 251 | 97 | 155 | 502 | 124 | 158 |
| 1987 | 106 | 274 | 1510 | 778 | 189 | 107 | 89 | 231 | 663 | 343 |
| 1988 | 23 | 434 | 1653 | 1449 | 387 | 114 | 202 | 33 | 189 | 1977 |
| 1989 | 0 | 0 | 503 | 3065 | 123 | 0 | 0 | 0 | 0 | 0 |
| 1990 | 0 | 0 | 0 | 288 | 766 | 557 | 220 | 38 | 83 | 550 |
| 1991 | 43 | 780 | 57 | 227 | 490 | 1177 | 965 | 287 | 21 | 275 |
| 1992 | 438 | 481 | 435 | 12 | 41 | 160 | 497 | 634 | 195 | 367 |
| 1993 | 4 | 555 | 426 | 208 | 11 | 17 | 75 | 234 | 248 | 422 |
| 1994 | 0 | 1330 | 70318 | 8437 | 2597 | 195 | 72 | 755 | 1972 | 1901 |
| 1995 | 0 | 2154 | 10912 | 39045 | 1065 | 572 | 0 | 20 | 72 | 745 |
| 1996 | 9 | 327 | 502 | 5197 | 14836 | 157 | 77 | 0 | 0 | 86 |
| 1997 | 0 | 218 | 1259 | 1370 | 3070 | 10435 | 265 | 44 | 0 | 870 |
| 1998 | 2006 | 1848 | 899 | 2440 | 400 | 870 | 1949 | 85 | 4 | 34 |
| 1999 | 0 | 1024 | 608 | 420 | 761 | 150 | 227 | 923 | 90 | 159 |
| 2000 | 44 | 33 | 2422 | 769 | 323 | 423 | 149 | 223 | 478 | 86 |
| 2001 | 21 | 685 | 391 | 6145 | 2058 | 680 | 1056 | 565 | 536 | 893 |
| 2002 | 64 | 307 | 3593 | 887 | 5571 | 1856 | 916 | 1528 | 401 | 1918 |
| 2003 | 0 | 213 | 734 | 5691 | 352 | 1661 | 231 | 201 | 76 | 677 |
| 2004 | 0 | 195 | 2609 | 2647 | 6475 | 417 | 946 | 1169 | 324 | 1352 |
| 2005 | 0 | 113 | 1116 | 4613 | 1626 | 3577 | 447 | 450 | 114 | 208 |
| 2006 | 0 | 1813 | 7136 | 4280 | 13325 | 4030 | 6744 | 410 | 921 | 730 |
| 2007 | 0 | 1473 | 15056 | 14110 | 5424 | 5269 | 2675 | 3673 | 961 | 851 |
| 2008 | 0 | 1490 | 15905 | 22076 | 8209 | 4220 | 3637 | 2039 | 1013 | 1218 |
| 2009 | 0 | 332 | 2075 | 10706 | 9133 | 3741 | 1872 | 1706 | 1282 | 394 |
| 2010 | 0 | 938 | 4696 | 8795 | 9506 | 3032 | 1568 | 1191 | 458 | 276 |

| | Age class | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------|-----------|------|------|------|------|------|------|------|------|------|------|------|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------|------|
| year | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | No. fish | |
| 1985 | | | 3.5 | 19.3 | 16.6 | 6.9 | 12.2 | 1.8 | 5.9 | 17.5 | 4.8 | 3.3 | 3.0 | 1.8 | 0.8 | 1.8 | 0.6 | 0.1 | 0.3 | 0.8 | 0.5 | 0.1 | 0.1 | 0.1 | | | | | | | 1014 |
| 1986 | | | 0.1 | 2.6 | 25.2 | 17.4 | 3.7 | 10.2 | 2.2 | 4.9 | 17.3 | 3.3 | 2.4 | 3.3 | 1.7 | 1.9 | 1.0 | 0.8 | 0.4 | 0.6 | 0.5 | 0.2 | | 0.1 | | 0.1 | | | | | 1015 |
| 1987 | | 0.1 | | 4.2 | 17.4 | 33.4 | 10.2 | 1.8 | 3.2 | 4.9 | 19.1 | 11.7 | 3.1 | 3.0 | 1.4 | 2.0 | 1.0 | 0.7 | 1.4 | 0.4 | 0.7 | 0.7 | 0.4 | | | | | | | | 1354 |
| 1988 | | | | 0.4 | 4.6 | 27.0 | 24.8 | 11.1 | 2.6 | 3.9 | 0.8 | 1.8 | 8.7 | 3.2 | 3.0 | 2.0 | 1.8 | 1.5 | 0.6 | 0.8 | 0.7 | 0.3 | | | | | 0.1 | 0.1 | 0.1 | | 1427 |
| 1989 | 1.2 | 7.4 | 10.3 | 0.5 | 1.7 | 5.9 | 17.8 | 15.7 | 6.3 | 2.3 | 3.2 | 1.6 | 2.8 | 12.1 | 1.9 | 1.9 | 3.2 | 1.1 | 1.1 | 0.5 | 0.5 | 0.6 | 0.2 | 0.1 | | | 0.1 | | 0.1 | | 1870 |
| 1990 | | 17.7 | 17.9 | 12.4 | 1.1 | 1.7 | 6.1 | 14.2 | 10.7 | 3.5 | 1.4 | 1.1 | 0.8 | 1.1 | 6.1 | 0.4 | 1.0 | 0.9 | 0.7 | 0.3 | 0.1 | 0.7 | | 0.0 | | | | | | | 2097 |
| 1991 | | 6.5 | 36.6 | 10.3 | 10.7 | 1.0 | 0.8 | 2.8 | 9.4 | 8.1 | 3.5 | 0.5 | 1.1 | 1.1 | 0.6 | 4.5 | 0.6 | 0.7 | 0.5 | 0.1 | 0.4 | 0.1 | 0.2 | | | | | | | | 3367 |
| 1992 | 0.7 | 2.6 | 1.9 | 28.8 | 24.3 | 17.9 | 0.8 | 2.7 | 1.8 | 5.3 | 6.9 | 2.2 | 0.5 | 0.7 | 0.4 | 0.6 | 2.9 | 0.2 | 0.3 | 0.1 | 0.2 | 0.0 | 0.1 | 0.1 | | | | | | | 3982 |
| 1993 | 0.0 | 3.1 | 4.0 | 2.7 | 32.2 | 20.0 | 12.0 | 0.9 | 0.7 | 2.0 | 6.3 | 5.9 | 2.1 | 1.0 | 1.2 | 1.1 | 0.8 | 2.8 | 0.3 | 0.3 | 0.3 | 0.2 | 0.0 | 0.0 | | | | | | | 4609 |
| 1994 | 0.4 | 0.7 | 2.7 | 2.8 | 5.2 | 64.3 | 9.2 | 4.6 | 0.5 | 0.1 | 1.1 | 3.1 | 2.4 | 1.7 | 0.7 | 0.4 | 0.3 | 0.3 | 0.2 | 0.8 | 0.1 | 0.1 | 0.1 | | | | | | | | 6620 |
| 1995 | 0.2 | 0.1 | 0.7 | 2.7 | 7.8 | 72.8 | 72.4 | 4.8 | 3.1 | 0.2 | 0.3 | 0.5 | 2.2 | 1.8 | 1.0 | 0.5 | 0.2 | 0.2 | 0.4 | 0.4 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.0 | | 3704 |
| 1996 | 0.1 | 0.3 | 0.2 | 6.9 | 9.4 | 15.6 | 53.1 | 3.9 | 2.2 | 0.2 | 0.4 | 0.6 | 2.3 | 1.7 | 0.7 | 0.4 | 0.3 | 0.4 | 0.3 | 0.4 | 0.3 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | | | 0.0 | | 4896 |
| 1997 | | 0.2 | 1.2 | 3.1 | 21.5 | 12.9 | 10.8 | 41.1 | 2.8 | 1.4 | 0.3 | 0.2 | 1.6 | 0.9 | 0.4 | 0.2 | 0.6 | 0.1 | 0.0 | 0.3 | 0.0 | 0.0 | | | | | | | | | 4423 |
| 1998 | 0.1 | 0.1 | 0.8 | 13.1 | 13.1 | 22.4 | 8.5 | 8.2 | 26.0 | 2.4 | 0.8 | 0.1 | 0.2 | 0.7 | 1.1 | 0.7 | 0.4 | 0.0 | 0.0 | | 0.1 | 0.1 | | | | 0.0 | | | | | 3388 |
| 1999 | | 0.4 | 0.5 | 13.5 | 24.1 | 10.5 | 11.2 | 5.4 | 6.1 | 20.0 | 2.1 | 1.8 | 0.3 | 0.7 | 0.6 | 1.6 | 0.4 | 0.2 | 0.1 | 0.1 | 0.1 | 0.0 | 0.2 | 0.0 | 0.2 | 0.0 | | | | | 3359 |
| 2000 | 0.1 | 0.1 | 0.1 | 1.9 | 0.6 | 32.8 | 26.1 | 7.4 | 8.6 | 3.1 | 4.0 | 12.4 | 1.0 | 0.4 | 0.1 | 0.3 | 0.2 | 0.4 | 0.2 | 0.1 | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | | | | | 4759 |
| 2001 | | 0.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Table 4.46. Sea bass in the Northeast Atlantic. Abundance indices from the UK(England) trawl surveys of juvenile bass in the Solent (VIId) in May-July and September (nos. per 10-minute tow).

| Year | MAY-JULY | | | SEPTEMBER | | |
|------|----------|-------|-------|-----------|-------|-------|
| | age 2 | age 3 | age 4 | age 2 | age 3 | age 4 |
| 1981 | 0.00 | 0.30 | 0.25 | | | |
| 1982 | 0.51 | 2.17 | 0.16 | 3.25 | 10.10 | 0.38 |
| 1983 | | | | 9.87 | 0.91 | 1.88 |
| 1984 | 0.95 | 2.66 | 0.43 | 1.38 | 0.65 | 0.09 |
| 1985 | 0.00 | 10.33 | 2.56 | | | |
| 1986 | | | | 0.27 | 4.26 | 1.31 |
| 1987 | 0.00 | 0.42 | 3.18 | 0.05 | 0.28 | 2.27 |
| 1988 | 0.00 | 0.02 | 0.47 | | | |
| 1989 | | | | 6.68 | 0.37 | 0.00 |
| 1990 | 2.84 | 2.48 | 0.00 | 2.81 | 1.15 | 0.02 |
| 1991 | 5.78 | 0.62 | 0.09 | 3.08 | 0.21 | 0.03 |
| 1992 | 0.11 | 7.04 | 0.35 | 0.95 | 18.59 | 0.16 |
| 1993 | 0.05 | 7.33 | 14.02 | 6.65 | 3.59 | 4.39 |
| 1994 | 0.04 | 1.63 | 1.14 | 3.33 | 1.84 | 0.29 |
| 1995 | 0.05 | 1.57 | 0.97 | 4.83 | 4.69 | 0.72 |
| 1996 | 1.43 | 4.09 | 3.36 | 5.52 | 0.43 | 0.11 |
| 1997 | 0.27 | 1.94 | 0.11 | 33.62 | 4.52 | 0.06 |
| 1998 | 0.00 | 6.75 | 5.79 | 1.22 | 5.50 | 0.61 |
| 1999 | 0.61 | 0.95 | 12.30 | 19.37 | 0.67 | 0.87 |
| 2000 | 0.49 | 37.03 | 1.06 | 9.06 | 16.94 | 0.16 |
| 2001 | 1.71 | 6.33 | 3.43 | 34.42 | 3.92 | 1.57 |
| 2002 | 0.63 | 1.62 | 0.29 | 7.42 | 3.87 | 0.40 |
| 2003 | 0.06 | 0.32 | 0.38 | 8.37 | 4.60 | 0.59 |
| 2004 | 0.17 | 0.28 | 0.16 | | | |
| 2005 | 0.05 | 0.42 | 0.35 | 13.12 | 7.98 | 0.84 |
| 2006 | 0.44 | 2.47 | 1.03 | 9.51 | 9.21 | 1.02 |
| 2007 | 0.33 | 0.50 | 0.50 | 3.42 | 1.78 | 0.30 |
| 2008 | | | | 18.52 | 6.66 | 0.34 |
| 2009 | 0.72 | 1.03 | 0.13 | 13.25 | 6.25 | 0.33 |
| 2010 | | | | | | |
| 2011 | | | | 2.25 | 1.39 | 0.42 |

Table 4.47. Sea bass in the Northeast Atlantic. Abundance indices from the UK(England) trawl surveys of juvenile sea bass in the Thames Estuary (IVc) in November (nos. per 10-minute tow).

| YEAR | AGE 0 | AGE 1 | AGE 2 | AGE 3 |
|-------------|--------------|--------------|--------------|--------------|
| 1997 | 7.737 | 0 | 0.048 | 0.41 |
| 1998 | | | | |
| 1999 | 19.54 | 6.033 | 0.764 | 0 |
| 2000 | 4.015 | 14.74 | 0.832 | 0.089 |
| 2001 | 121.5 | 11.47 | 5.108 | 0.171 |
| 2002 | 469 | 20.71 | 2.716 | 1.093 |
| 2003 | 225.6 | 35.76 | 4.429 | 0.159 |
| 2004 | 238.92 | 44.99 | 7.32 | 1.03 |
| 2005 | 37.04 | 14.49 | 6.86 | 0.75 |
| 2006 | 245.54 | 11.26 | 3.46 | 0.94 |
| 2007 | | | | |
| 2008 | 107.55 | 50.69 | 1.86 | 0.2 |
| 2009 | 95.43 | 7.79 | 13.59 | 0.91 |

Table 4.48. Sea bass in the Northeast Atlantic. Abundance indices for 0-gp and 1-gp sea bass. († discontinued)

| COUNTRY | UK (ENGLAND AND WALES) | | | | IRELAND |
|----------|------------------------|---------|---------|---------------|----------|
| Area | (Tamar) | (Tamar) | (Camel) | (Severn) | |
| Division | VIIe | VIIe | VIIIf | VIIIf | VII |
| | 0-group | 1-group | 0-group | 0 group | 0 group |
| Year | Seine | Seine | Seine | Power station | Seine/ |
| Class | survey | survey | survey | screens | Stop-net |
| 1972 | | | | 3 | |
| 1973 | | | | 4 | |
| 1974 | | | | 1 | |
| 1975 | | | | 15 | |
| 1976 | | | | 127 | |
| 1977 | | | | - | |
| 1978 | | | | - | |
| 1979 | | | | - | |
| 1980 | | | | 9 | |
| 1981 | | | 2 | 216 | |
| 1982 | | | 123 | 83 | |
| 1983 | | | 30 | 226 | |
| 1984 | | 0.13 | 134 | 8 | |
| 1985 | 0.66 | 0.38 | 22 | 11 | |
| 1986 | 0.00 | 0.01 | 1 | 3 | |
| 1987 | 0.03 | 0.06 | 31 | 96 | |
| 1988 | 1.48 | 1.28 | 48 | 98 | |
| 1989 | 2.35 | 2.39 | 112 | 446 | |
| 1990 | 1.04 | 1.52 | 89 | 25 | |
| 1991 | 0.08 | 0.06 | 50 | 300 | |
| 1992 | 2.22 | 2.43 | 25 | 280 | |
| 1993 | 1.01 | 0.91 | 22 | 202 | |
| 1994 | 1.13 | 0.35 | 134 | - | |
| 1995 | 2.36 | 1.29 | - | - | |
| 1996 | 0.10 | 0.05 | 119 | 242 | 15 |
| 1997 | 1.12 | 1.30 | 102 | † | 1 |
| 1998 | 2.08 | 3.17 | 264 | | 5 |
| 1999 | 1.22 | 0.94 | 56 | | 2 |
| 2000 | 0.34 | 1.18 | 133 | | 0 |
| 2001 | 0.35 | 0.13 | † | | 3 |
| 2002 | 2.10 | 3.18 | | | 93 |
| 2003 | 0.97 | 1.07 | | | 1 |
| 2004 | 1.45 | 0.26 | | | † |
| 2005 | 0.52 | 0.17 | | | |
| 2006 | 0.19 | 0.20 | | | |
| 2007 | 0.47 | 1.31 | | | |
| 2008 | 1.28 | 1.23 | | | |
| 2009 | 0.46 | | | | |

Table 4.49. Sea bass in the Northeast Atlantic. Seabass indices from Evohe French survey from 1997 to 2010. Bay of Biscay and Celtic sea area mixed.

| Year | ALL STATIONS | | | POSITIVE STATIONS | | |
|------|---------------------|---------------------|----------------------|----------------------------|----------------------------|--------------------------------|
| | Total nos. stations | Nos. seabass caught | Mean Nos.per station | Nos. stations with seabass | % of stations with seabass | Mean Nos. per positive station |
| 1997 | 129 | 42 | 0.3 | 11 | 9 | 3.8 |
| 1998 | 125 | 32 | 0.3 | 13 | 10 | 2.5 |
| 1999 | 119 | 46 | 0.4 | 17 | 14 | 2.7 |
| 2000 | 121 | 12 | 0.1 | 7 | 6 | 1.7 |
| 2001 | 151 | 55 | 0.4 | 6 | 4 | 9.2 |
| 2002 | 153 | 28 | 0.2 | 11 | 7 | 2.5 |
| 2003 | 148 | 45 | 0.3 | 10 | 7 | 4.5 |
| 2004 | 138 | 29 | 0.2 | 13 | 9 | 2.2 |
| 2005 | 143 | 65 | 0.5 | 12 | 8 | 5.4 |
| 2006 | 129 | 47 | 0.4 | 14 | 11 | 3.4 |
| 2007 | 145 | 99 | 0.7 | 14 | 10 | 7.1 |
| 2008 | 147 | 115 | 0.8 | 24 | 16 | 4.8 |
| 2009 | 136 | 42 | 0.3 | 10 | 7 | 4.2 |
| 2010 | 139 | 398 | 2.9 | 15 | 11 | 26.5 |

Table 4.50. Sea bass in the Northeast Atlantic. Sea bass data availability up to 2010 for benchmark assessment: North Sea (Divisions IVband c)

| Area: IVb,c : main countries 2010 : Netherlands, UK, France | | | | | | | | | | | | | | | | | | | | | | | | |
|---|----------------|---------------------------------|---------------|--------------------------------|-------|-------|-------|-------|------------------------------|-------|-----------------------|-------|-------|-------|------------------------------|-------|-------|---------------------------|-------|-------|-------------------------------------|--|--|--|
| | | | | Netherlands (334 tons in 2010) | | | | | | | UK (151 tons in 2010) | | | | | | | France (126 tons in 2010) | | | | | | |
| | | | Gear | 85-89 | 90-94 | 95-99 | 00-04 | 2005+ | comments | 85-89 | 90-94 | 95-99 | 00-04 | 2005+ | comments | 85-89 | 90-94 | 95-99 | 00-04 | 2005+ | comments | | | |
| Catch weights | Commercial | Landings weight | OTB | | | | | | ask tabs (P18 Imares report) | | | | | | <10m data poor pre 2006 | | | | | | | | | |
| | | | Pelagic trawl | | | | | | ask tabs (P18 Imares report) | | | | | | no landings | | | | | | low using of this gear in this area | | | |
| | | | Nets | | | | | | ask tabs (P18 Imares report) | | | | | | <10m data poor pre 2006 | | | | | | | | | |
| | | | Lines | | | | | | ask tabs (P18 Imares report) | | | | | | <10m data poor pre 2006 | | | | | | low using of this gear in this area | | | |
| | Commercial | Discards weight | OTB | | | | | | Data ? | | | | | | period available (2002-2008) | | | | | | period available (2009-2010) | | | |
| | | | Pelagic trawl | | | | | | Data ? | | | | | | period available (2002-2008) | | | | | | period available (2009-2010) | | | |
| | | | Nets | | | | | | Data ? | | | | | | period available (2002-2008) | | | | | | period available (2009-2010) | | | |
| | | | Lines | | | | | | Data ? | | | | | | no sampling | | | | | | period available (2009-2010) | | | |
| | Recreational | Retained catches | | | | | | | only 2010 | | | | | | | | | | | | only 2010 | | | |
| | | Ruterned catches | | | | | | | | | | | | | | | | | | | only 2010 | | | |
| Effort | Commercial | Fishing effort | OTB | | | | | | no distinction per gear ASK | | | | | | Effort series to be revised | | | | | | methodology has to be discussed | | | |
| | | | Pelagic trawl | | | | | | no distinction per gear ASK | | | | | | no landings | | | | | | low using of this gear in this area | | | |
| | | | Nets | | | | | | no distinction per gear ASK | | | | | | Effort series to be revised | | | | | | | | | |
| | | | Lines | | | | | | no distinction per gear ASK | | | | | | Effort series to be revised | | | | | | low using of this gear in this area | | | |
| Recreational | Fishing effort | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | |
| Catch composition | Commercial | Landings Length compositions | OTB | | | | | | Data ? | | | | | | very low landings pre 1995 | | | | | | period 2009-2010 | | | |
| | | | Pelagic trawl | | | | | | Data ? | | | | | | no landings | | | | | | low using of this gear in this area | | | |
| | | | Nets | | | | | | Data ? | | | | | | | | | | | | period 2009-2010 | | | |
| | | | Lines | | | | | | Data ? | | | | | | Low sample nos. some yrs | | | | | | period 2009-2010 | | | |
| | | Landings Age compositions & wts | OTB | | | | | | Data ? | | | | | | Sampled trips to be provided | | | | | | no data | | | |
| | | | Pelagic trawl | | | | | | Data ? | | | | | | no landings | | | | | | no data | | | |
| | | | Nets | | | | | | Data ? | | | | | | Sampled trips to be provided | | | | | | no data | | | |
| | | | Lines | | | | | | Data ? | | | | | | Sampled trips to be provided | | | | | | no data | | | |
| | | Discards Length compositions | OTB | | | | | | Data ? | | | | | | From 2002 on to be provided | | | | | | period available (2009-2010) | | | |
| | | | Pelagic trawl | | | | | | Data ? | | | | | | no landings | | | | | | low using of this gear in this area | | | |
| | | | Nets | | | | | | Data ? | | | | | | From 2002 on to be provided | | | | | | period available (2009-2010) | | | |
| | | | Lines | | | | | | Data ? | | | | | | no sampling | | | | | | period available (2009-2010) | | | |
| | | Discards Age compositions & wts | OTB | | | | | | Data ? | | | | | | From 2002 on to be provided | | | | | | no data | | | |
| | | | Pelagic trawl | | | | | | Data ? | | | | | | no landings | | | | | | low using of this gear in this area | | | |
| | | | Nets | | | | | | Data ? | | | | | | From 2002 on to be provided | | | | | | no data | | | |
| | | | Lines | | | | | | Data ? | | | | | | no sampling | | | | | | no data | | | |
| | Recreational | Length compositions | | | | | | | Data ? | | | | | | | | | | | | 2010 only | | | |
| | | Age composition | | | | | | | Data ? | | | | | | | | | | | | | | | |
| Abundance indices | Commercial | LPUE | OTB | | | | | | Data ? | | | | | | LPUESeries to be revised | | | | | | methodology has to be discussed | | | |
| | | | Pelagic trawl | | | | | | Data ? | | | | | | | | | | | | low using of this gear in this area | | | |
| | | | Nets | | | | | | Data ? | | | | | | LPUESeries to be revised | | | | | | | | | |
| | | | Lines | | | | | | Data ? | | | | | | LPUESeries to be revised | | | | | | low using of this gear in this area | | | |
| | Surveys | pre-recruit | | | | | | | | | | | | | from 1997 | | | | | | | | | |
| Surveys | post recruit | | | | | | | | | | | | | | | | | | | | | | | |
| Biological parameters | All | Growth | | | | | | | from UK | | | | | | from UK | | | | | | from UK | | | |
| | All | Maturity Ogives | | | | | | | from UK | | | | | | | | | | | | from UK | | | |
| | All | Fecundity | | | | | | | | | | | | | | | | | | | | | | |
| | All | Natural mortality | | | | | | | to be determined | | | | | | to be determined | | | | | | to be determined | | | |
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| | good data quality |
| | data quality has to be discussed |
| | poor quality of data |
| | question to ask |
| | no data |

Table 4.51. Sea bass in the Northeast Atlantic. Sea bass data availability for benchmark assessment: Eastern Channel (Division VIIId)

| Area: VIId : main countries 2010 : France, UK | | | | | | | | | | | | | | | | |
|---|--|---------------------------------|---------------|----------------------------|-------|-------|-------|-----------|---------------------------------|------------------------------|-------|-------|-------|-------|------------------------------|-----------------------------|
| | | | | France (1237 tons in 2010) | | | | | | UK (268 tons in 2010) | | | | | | |
| | | | Gear | 85-89 | 90-94 | 95-99 | 00-04 | 2005+ | comments | 85-89 | 90-94 | 95-99 | 00-04 | 2005+ | comments | |
| Catch weights | Commercial | Landings weight | OTB | | | | | | <10m data poor pre 2006 | | | | | | <10m data poor pre 2006 | |
| | | | Pelagic trawl | | | | | | <10m data poor pre 2006 | | | | | | zero / low landings most yrs | |
| | | | Nets | | | | | | <10m data poor pre 2006 | | | | | | <10m data poor pre 2006 | |
| | | | Lines | | | | | | <10m data poor pre 2006 | | | | | | <10m data poor pre 2006 | |
| | Commercial | Discards weight | OTB | | | | | | period available (2009-2010) | | | | | | period available (2002-2008) | |
| | | | Pelagic trawl | | | | | | period available (2009-2010) | | | | | | no sampling | |
| | | | Nets | | | | | | period available (2009-2010) | | | | | | | |
| | | | Lines | | | | | | period available (2009-2010) | | | | | | | |
| Recreational | Retained catches Ruterned catches | | | | | | | only 2010 | | | | | | | | |
| | | | | | | | | only 2010 | | | | | | | | |
| Effort | Commercial | Fishing effort | OTB | | | | | | methodology has to be discussed | | | | | | Effort series to be revised | |
| | | | Pelagic trawl | | | | | | methodology has to be discussed | | | | | | zero / low landings most yrs | |
| | | | Nets | | | | | | methodology has to be discussed | | | | | | Effort series to be revised | |
| | | | Lines | | | | | | methodology has to be discussed | | | | | | Effort series to be revised | |
| Recreational | Fishing effort | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Catch composition | Commercial | Landings Length compositions | OTB | | | | | | | | | | | | Low sample nos. in some yrs | |
| | | | Pelagic trawl | | | | | | | | | | | | zero / low landings most yrs | |
| | | | Nets | | | | | | | | | | | | | |
| | | | Lines | | | | | | | | | | | | Low sample nos. in some yrs | |
| | | Landings Age compositions & wts | OTB | | | | | | | | | | | | Sampled trips to be provided | |
| | | | Pelagic trawl | | | | | | | | | | | | zero / low landings most yrs | |
| | | | Nets | | | | | | | | | | | | Sampled trips to be provided | |
| | | | Lines | | | | | | | | | | | | Sampled trips to be provided | |
| | | Discards Length compositions | OTB | | | | | | | period available (2009-2010) | | | | | | From 2002 on to be provided |
| | | | Pelagic trawl | | | | | | | period available (2009-2010) | | | | | | |
| | | | Nets | | | | | | | period available (2009-2010) | | | | | | From 2002 on to be provided |
| | | | Lines | | | | | | | period available (2009-2010) | | | | | | no sampling |
| | Discards Age compositions & wts | OTB | | | | | | | | | | | | | From 2002 on to be provided | |
| | | Pelagic trawl | | | | | | | | | | | | | From 2002 on to be provided | |
| | | Nets | | | | | | | | | | | | | no sampling | |
| | | Lines | | | | | | | | | | | | | | |
| Recreational | Length compositions Age composition | | | | | | | 2010 only | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Abundance indices | Commercial | LPUE | OTB | | | | | | methodology has to be discussed | | | | | | LPUEseries to be revised | |
| | | | Pelagic trawl | | | | | | methodology has to be discussed | | | | | | zero / low landings most yrs | |
| | | | Nets | | | | | | methodology has to be discussed | | | | | | LPUEseries to be revised | |
| | | | Lines | | | | | | methodology has to be discussed | | | | | | LPUEseries to be revised | |
| | Surveys | pre-recruit | | | | | | | | | | | | | | |
| Surveys | post recruit | | | | | | | | | | | | | | | |
| Biological parameters | All | Growth | | | | | | | from UK | | | | | | | |
| | All | Maturity Ogives | | | | | | | from UK | | | | | | | |
| | All | Fecundity | | | | | | | | | | | | | | |
| | All | Natural mortality | | | | | | | to be determined | | | | | | to be determined | |
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| | good data quality |
| | data quality has to be discussed |
| | poor quality of data |
| | question to ask |
| | no data |

Table 4.52. Sea bass in the Northeast Atlantic. Sea bass data availability for benchmark assessment: Western Channel and approaches (Division VIIe,h)

| Area: .Vileh : main countries 2010 : France, UK | | | | | | | | | | | | | | | | |
|---|---------------------|---------------------------------|---------------|----------------------------|-------|-------|-------|---------------------------------|---------------------------------|---------------------------------|-------|-------|-------|-------|------------------------------|-----------------------------|
| | | | | France (1940 tons in 2010) | | | | | UK (335 tons in 2010) | | | | | | | |
| | | | Gear | 85-89 | 90-94 | 95-99 | 00-04 | 2005+ | comments | 85-89 | 90-94 | 95-99 | 00-04 | 2005+ | comments | |
| Catch weights | Commercial | Landings weight | OTB | | | | | | <10m data poor pre 2006 | | | | | | <10m data poor pre 2006 | |
| | | | Pelagic trawl | | | | | | <10m data poor pre 2006 | | | | | | <10m data poor pre 2006 | |
| | | | Nets | | | | | | <10m data poor pre 2006 | | | | | | <10m data poor pre 2006 | |
| | | | Lines | | | | | | <10m data poor pre 2006 | | | | | | <10m data poor pre 2006 | |
| | | | OTB | | | | | | period available (2009-2010) | | | | | | period available (2002-2008) | |
| | Commercial | Discards weight | Pelagic trawl | | | | | | period available (2009-2010) | | | | | | period available (2002-2008) | |
| | | | Nets | | | | | | period available (2009-2010) | | | | | | period available (2002-2008) | |
| | | | Lines | | | | | | period available (2009-2010) | | | | | | no sampling | |
| | Recreational | Retained catches | | | | | | | only 2010 | | | | | | | |
| | | Returned catches | | | | | | | only 2010 | | | | | | | |
| Effort | Commercial | Fishing effort | OTB | | | | | | methodology has to be discussed | | | | | | Effort series to be revised | |
| | | | Pelagic trawl | | | | | | methodology has to be discussed | | | | | | Effort series to be revised | |
| | | | Nets | | | | | | methodology has to be discussed | | | | | | Effort series to be revised | |
| | | | Lines | | | | | | methodology has to be discussed | | | | | | Effort series to be revised | |
| Recreational | Fishing effort | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| Catch composition | Commercial | Landings Length compositions | OTB | | | | | | | | | | | | low sampling in some yrs | |
| | | | Pelagic trawl | | | | | | | | | | | | almost no sampling pre 2007 | |
| | | | Nets | | | | | | | | | | | | low sampling in some yrs | |
| | | | Lines | | | | | | | | | | | | low sampling in some yrs | |
| | | Landings Age compositions & wts | OTB | | | | | | | | | | | | Sampled trips to be provided | |
| | | | Pelagic trawl | | | | | | | | | | | | Sampled trips to be provided | |
| | | | Nets | | | | | | | | | | | | Sampled trips to be provided | |
| | | | Lines | | | | | | | | | | | | Sampled trips to be provided | |
| | | Discards Length compositions | OTB | | | | | | | period available (2009-2010) | | | | | | From 2002 on to be provided |
| | | | Pelagic trawl | | | | | | | period available (2009-2010) | | | | | | no sampling |
| | | | Nets | | | | | | | period available (2009-2010) | | | | | | From 2002 on to be provided |
| | | | Lines | | | | | | | period available (2009-2010) | | | | | | no sampling |
| | | Discards Age compositions & wts | OTB | | | | | | | period available (2009-2010) | | | | | | From 2002 on to be provided |
| | | | Pelagic trawl | | | | | | | period available (2009-2010) | | | | | | no sampling |
| | | | Nets | | | | | | | period available (2009-2010) | | | | | | From 2002 on to be provided |
| | | | Lines | | | | | | | period available (2009-2010) | | | | | | no sampling |
| Recreational | Length compositions | | | | | | | 2010 only | | | | | | | | |
| | Age composition | | | | | | | 2011 only | | | | | | | | |
| Abundance indices | Commercial | LPUE | OTB | | | | | | methodology has to be discussed | | | | | | LPUEseries to be revised | |
| | | | Pelagic trawl | | | | | | methodology has to be discussed | | | | | | LPUEseries to be revised | |
| | | | Nets | | | | | | methodology has to be discussed | | | | | | LPUEseries to be revised | |
| | | | Lines | | | | | | methodology has to be discussed | | | | | | LPUEseries to be revised | |
| | | Surveys | pre-recruit | | | | | | | Evhoe (very low sampling rate)? | | | | | | |
| Surveys | post recruit | | | | | | | Evhoe (very low sampling rate)? | | | | | | | | |
| Biological parameters | All | Growth | | | | | | | from UK | | | | | | | |
| | All | Maturity Ogives | | | | | | | from UK | | | | | | | |
| | All | Fecundity | | | | | | | | | | | | | | |
| | All | Natural mortality | | | | | | | to be determined | | | | | | to be determined | |
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| | good data quality |
| | data quality has to be discussed |
| | poor quality of data |
| | question to ask |
| | no data |

Table 4.53. Sea bass in the Northeast Atlantic. Data availability for benchmark assessment: Celtic Sea and Irish Sea (Division VIIa,fand g)

| Area: VIIafg : main countries 2010 : UK, France, Belgium | | | | | | | | | | | | | | | | | | | | | | |
|--|--------------|---------------------------------|---------------|----------------------|-------|-------|-------|-------|------------------------------|--------------------------|-------|-------|-------|-------|-------------------------------------|--------------------------|-------|-------|-------|-------|------------------|--|
| | | | | UK (92 tons in 2010) | | | | | | France (49 tons in 2010) | | | | | | BELGIUM 38 tons in 2010) | | | | | | |
| | | | Gear | 85-89 | 90-94 | 95-99 | 00-04 | 2005+ | comments | 85-89 | 90-94 | 95-99 | 00-04 | 2005+ | comments | 85-89 | 90-94 | 95-99 | 00-04 | 2005+ | comments | |
| Catch weights | Commercial | Landings weight | OTB | | | | | | <10m data poor pre 2006 | | | | | | | | | | | | | |
| | | | Pelagic trawl | | | | | | almost zero landings | | | | | | low using of this gear in this area | | | | | | | |
| | | | Nets | | | | | | <10m data poor pre 2006 | | | | | | low using of this gear in this area | | | | | | | |
| | | | Lines | | | | | | <10m data poor pre 2006 | | | | | | low using of this gear in this area | | | | | | | |
| | Commercial | Discards weight | OTB | | | | | | | | | | | | | | | | | | | |
| | | | Pelagic trawl | | | | | | | | | | | | | | | | | | | |
| | | | Nets | | | | | | | | | | | | | | | | | | | |
| | Recreational | Retained catches | Lines | | | | | | | | | | | | | | | | | | | |
| | | Ruterned catches | | | | | | | | | | | | | | | | | | | | |
| Effort | Commercial | Fishing effort | OTB | | | | | | Effort series to be revised | | | | | | methodology has to be discussed | | | | | | | |
| | | | Pelagic trawl | | | | | | almost zero landings | | | | | | | | | | | | | |
| | | | Nets | | | | | | Effort series to be revised | | | | | | | | | | | | | |
| | | | Lines | | | | | | Effort series to be revised | | | | | | | | | | | | | |
| | Recreational | Fishing effort | | | | | | | | | | | | | | | | | | | | |
| Catch composition | Commercial | Landings Length compositions | OTB | | | | | | low sampling in some yrs | | | | | | | | | | | | | |
| | | | Pelagic trawl | | | | | | almost zero landings | | | | | | | | | | | | | |
| | | | Nets | | | | | | low sampling in some yrs | | | | | | | | | | | | | |
| | | | Lines | | | | | | low sampling in some yrs | | | | | | | | | | | | | |
| | | Landings Age compositions & wts | OTB | | | | | | Sampled trips to be provided | | | | | | | | | | | | | |
| | | | Pelagic trawl | | | | | | almost zero landings | | | | | | | | | | | | | |
| | | | Nets | | | | | | Sampled trips to be provided | | | | | | | | | | | | | |
| | | | Lines | | | | | | Sampled trips to be provided | | | | | | | | | | | | | |
| | | Discards Length compositions | OTB | | | | | | From 2002 on to be provided | | | | | | | | | | | | | |
| | | | Pelagic trawl | | | | | | almost zero landings | | | | | | | | | | | | | |
| | | | Nets | | | | | | From 2002 on to be provided | | | | | | | | | | | | | |
| | | | Lines | | | | | | no sampling | | | | | | | | | | | | | |
| | | Discards Age compositions & wts | OTB | | | | | | From 2002 on to be provided | | | | | | | | | | | | | |
| | | | Pelagic trawl | | | | | | almost zero landings | | | | | | | | | | | | | |
| | | | Nets | | | | | | From 2002 on to be provided | | | | | | | | | | | | | |
| | | | Lines | | | | | | no sampling | | | | | | | | | | | | | |
| | Recreational | Length compositions | | | | | | | | | | | | | | | | | | | | |
| | | Age composition | | | | | | | | | | | | | | | | | | | | |
| Abundance indices | Commercial | LPUE | OTB | | | | | | LPUEseries to be revised | | | | | | methodology has to be discussed | | | | | | | |
| | | | Pelagic trawl | | | | | | almost zero landings | | | | | | | | | | | | | |
| | | | Nets | | | | | | LPUEseries to be revised | | | | | | | | | | | | | |
| | | | Lines | | | | | | LPUEseries to be revised | | | | | | | | | | | | | |
| | Surveys | pre-recruit | | | | | | | | | | | | | | | | | | | | |
| Surveys | post recruit | | | | | | | | | | | | | | | | | | | | | |
| Biological parameters | All | Growth | | | | | | | | | | | | | from UK | | | | | | from UK | |
| | All | Maturity Ogives | | | | | | | | | | | | | from UK | | | | | | from UK | |
| | All | Fecundity | | | | | | | | | | | | | | | | | | | | |
| | All | Natural mortality | | | | | | | to be determined | | | | | | to be determined | | | | | | to be determined | |

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| | good data quality |
| | data quality has to be discussed |
| | poor quality of data |
| | question to ask |
| | no data |

Table 4.54. Sea bass in the Northeast Atlantic. Data availability for benchmark assessment: Bay of Biscay (Division VIIIa and b)

| Area: VIIIab : main countries 2010 : France, Spain | | | | | | | | | | | | | | | |
|--|--------------|---------------------------------|----------------------------|-------|-------|-------|-------|-------|------------------------------------|-------|-------|-------|-------|-------|-------------------------------|
| | | | France (2333 tons in 2010) | | | | | | SPAIN (167 tons in 2010) | | | | | | |
| | | | Gear | 85-89 | 90-94 | 95-99 | 00-04 | 2005+ | comments | 85-89 | 90-94 | 95-99 | 00-04 | 2005+ | comments |
| Catch weights | Commercial | Landings weight | OTB | | | | | | ask tabs (P18 Imares report) | | | | | | Landings aggregate (all gear) |
| | | | Pelagic trawl | | | | | | ask tabs (P18 Imares report) | | | | | | Landings aggregate (all gear) |
| | | | Nets | | | | | | ask tabs (P18 Imares report) | | | | | | Landings aggregate (all gear) |
| | | | Lines | | | | | | ask tabs (P18 Imares report) | | | | | | Landings aggregate (all gear) |
| | Commercial | Discards weight | OTB | | | | | | period available (2009-2010) | | | | | | |
| | | | Pelagic trawl | | | | | | period available (2009-2010) | | | | | | |
| | | | Nets | | | | | | period available (2009-2010) | | | | | | |
| | | | Lines | | | | | | period available (2009-2010) | | | | | | |
| Effort | Commercial | Fishing effort | OTB | | | | | | methodology has to be discussed | | | | | | |
| | | | Pelagic trawl | | | | | | methodology has to be discussed | | | | | | |
| | | | Nets | | | | | | methodology has to be discussed | | | | | | |
| | | | Lines | | | | | | methodology has to be discussed | | | | | | |
| | Recreational | Retained catches | OTB | | | | | | only 2010 | | | | | | |
| | | | Pelagic trawl | | | | | | only 2010 | | | | | | |
| | | | Nets | | | | | | | | | | | | |
| | | | Lines | | | | | | | | | | | | |
| Catch composition | Commercial | Landings Length compositions | OTB | | | | | | | | | | | | |
| | | | Pelagic trawl | | | | | | | | | | | | |
| | | | Nets | | | | | | | | | | | | |
| | | | Lines | | | | | | | | | | | | |
| | | Landings Age compositions & wts | OTB | | | | | | | | | | | | |
| | | | Pelagic trawl | | | | | | | | | | | | |
| | | | Nets | | | | | | | | | | | | |
| | | | Lines | | | | | | | | | | | | |
| | | Discards Length compositions | OTB | | | | | | period available (2009-2010) | | | | | | |
| | | | Pelagic trawl | | | | | | period available (2009-2010) | | | | | | |
| | | | Nets | | | | | | period available (2009-2010) | | | | | | |
| | | | Lines | | | | | | period available (2009-2010) | | | | | | |
| | | Discards Age compositions & wts | OTB | | | | | | | | | | | | |
| | | | Pelagic trawl | | | | | | | | | | | | |
| | | | Nets | | | | | | | | | | | | |
| | | | Lines | | | | | | | | | | | | |
| Abundance indices | Commercial | LPUE | OTB | | | | | | methodology has to be discussed | | | | | | |
| | | | Pelagic trawl | | | | | | methodology has to be discussed | | | | | | |
| | | | Nets | | | | | | methodology has to be discussed | | | | | | |
| | | | Lines | | | | | | methodology has to be discussed | | | | | | |
| | Surveys | pre-recruit | | | | | | | | | | | | | |
| | Surveys | post recruit | | | | | | | validity (very low sampling rate)? | | | | | | |
| | All | Growth | | | | | | | from UK | | | | | | from UK |
| | All | Maturity Ogives | | | | | | | from UK | | | | | | from UK |
| | All | Fecundity | | | | | | | | | | | | | |
| | All | Natural mortality | | | | | | | to be determined | | | | | | to be determined |

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| | good data quality |
| | data quality has to be discussed |
| | poor quality of data |
| | question to ask |
| | no data |

Table 4.55. Sea bass in the Northeast Atlantic. Data availability for benchmark assessment: Division VIIIc

| Area: VIIIc : main countries 2010 : SPAIN | | | | | | | | | |
|---|--------------|---------------------------------|--------------------------|-------|-------|-------|-------|-------|-------------------------------|
| | | | SPAIN (196 tons in 2010) | | | | | | |
| | | | Gear | 85-89 | 90-94 | 95-99 | 00-04 | 2005+ | comments |
| Catch weights | Commercial | Landings weight | OTB | | | | | | Landings aggregate (all gear) |
| | | | Pelagic trawl | | | | | | Landings aggregate (all gear) |
| | | | Nets | | | | | | Landings aggregate (all gear) |
| | | | Lines | | | | | | Landings aggregate (all gear) |
| | Commercial | Discards weight | OTB | | | | | | |
| | | | Pelagic trawl | | | | | | |
| | | | Nets | | | | | | |
| | | | Lines | | | | | | |
| | Recreational | Retained catches | | | | | | | |
| | | Returned catches | | | | | | | |
| Effort | Commercial | Fishing effort | OTB | | | | | | |
| | | | Pelagic trawl | | | | | | |
| | | | Nets | | | | | | |
| | | | Lines | | | | | | |
| | Recreational | Fishing effort | | | | | | | |
| | | | | | | | | | |
| Catch composition | Commercial | Landings Length compositions | OTB | | | | | | |
| | | | Pelagic trawl | | | | | | |
| | | | Nets | | | | | | |
| | | | Lines | | | | | | |
| | | Landings Age compositions & wts | OTB | | | | | | |
| | | | Pelagic trawl | | | | | | |
| | | | Nets | | | | | | |
| | | | Lines | | | | | | |
| | | Discards Length compositions | OTB | | | | | | |
| | | | Pelagic trawl | | | | | | |
| | | | Nets | | | | | | |
| | | | Lines | | | | | | |
| | | Discards Age compositions & wts | OTB | | | | | | |
| | | | Pelagic trawl | | | | | | |
| | | | Nets | | | | | | |
| | | | Lines | | | | | | |
| | Recreational | Length compositions | | | | | | | |
| | | Age composition | | | | | | | |
| Abundance indices | Commercial | LPUE | OTB | | | | | | |
| | | | Pelagic trawl | | | | | | |
| | | | Nets | | | | | | |
| | | | Lines | | | | | | |
| | Surveys | pre-recruit | | | | | | | |
| | Surveys | post recruit | | | | | | | |
| Biological parameters | All | Growth | | | | | | | |
| | All | Maturity Ogives | | | | | | | |
| | All | Fecundity | | | | | | | |
| | All | Natural mortality | | | | | | | to be determined |

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| | good data quality |
| | data quality has to be discussed |
| | poor quality of data |
| | question to ask |
| | no data |

Table 4.56. Sea bass in the Northeast Atlantic. Data availability for benchmark assessment: Division IXa

| Area: IXA : main countries 2010 : Portugal and Spain | | | | | | | | | | | | | | | |
|--|---------------------------------|---------------------------------|----------------|-----------------------------|-------|-------|-------|-------|------------------|-------------------------|-------|-------|-------|-------|-------------------------------|
| | | | | Portugal (487 tons in 2010) | | | | | | SPAIN (90 tons in 2010) | | | | | |
| | | | Gear | 85-89 | 90-94 | 95-99 | 00-04 | 2005+ | comments | 85-89 | 90-94 | 95-99 | 00-04 | 2005+ | comments |
| Catch weights | Commercial | Landings weight | OTB | | | | | | | | | | | | Landings aggregate (all gear) |
| | | | Pelagic trawl | | | | | | | | | | | | Landings aggregate (all gear) |
| | | | Nets | | | | | | | | | | | | Landings aggregate (all gear) |
| | | | Lines | | | | | | | | | | | | Landings aggregate (all gear) |
| | Commercial | Discards weight | OTB | | | | | | | | | | | | |
| | | | Pelagic trawl | | | | | | | | | | | | |
| | | | Nets | | | | | | | | | | | | |
| | Recreational | Retained catches | | | | | | | | | | | | | |
| | | Ruterned catches | | | | | | | | | | | | | |
| | Effort | Commercial | Fishing effort | OTB | | | | | | | | | | | |
| Pelagic trawl | | | | | | | | | | | | | | | |
| Nets | | | | | | | | | | | | | | | |
| Lines | | | | | | | | | | | | | | | |
| Recreational | Fishing effort | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| Catch composition | Commercial | Landings Length compositions | OTB | | | | | | | | | | | | |
| | | | Pelagic trawl | | | | | | | | | | | | |
| | | | Nets | | | | | | | | | | | | |
| | | | Lines | | | | | | | | | | | | |
| | | Landings Age compositions & wts | OTB | | | | | | | | | | | | |
| | | | Pelagic trawl | | | | | | | | | | | | |
| | | | Nets | | | | | | | | | | | | |
| | | | Lines | | | | | | | | | | | | |
| | | Discards Length compositions | OTB | | | | | | | | | | | | |
| | | | Pelagic trawl | | | | | | | | | | | | |
| | | | Nets | | | | | | | | | | | | |
| | | | Lines | | | | | | | | | | | | |
| | Discards Age compositions & wts | OTB | | | | | | | | | | | | | |
| | | Pelagic trawl | | | | | | | | | | | | | |
| | | Nets | | | | | | | | | | | | | |
| | | Lines | | | | | | | | | | | | | |
| Recreational | Length compositions | | | | | | | | | | | | | | |
| | Age composition | | | | | | | | | | | | | | |
| Abundance indices | Commercial | LPUE | OTB | | | | | | | | | | | | |
| | | | Pelagic trawl | | | | | | | | | | | | |
| | | | Nets | | | | | | | | | | | | |
| | | | Lines | | | | | | | | | | | | |
| Surveys | pre-recruit | | | | | | | | | | | | | | |
| | post recruit | | | | | | | | | | | | | | |
| Biological parameters | All | Growth | | | | | | | | | | | | | |
| | All | Maturity Ogives | | | | | | | | | | | | | |
| | All | Fecundity | | | | | | | | | | | | | |
| | All | Natural mortality | | | | | | | to be determined | | | | | | to be determined |
| | | | | | | | | | | | | | | | |

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| | good data quality |
| | data quality has to be discussed |
| | poor quality of data |
| | question to ask |
| | no data |

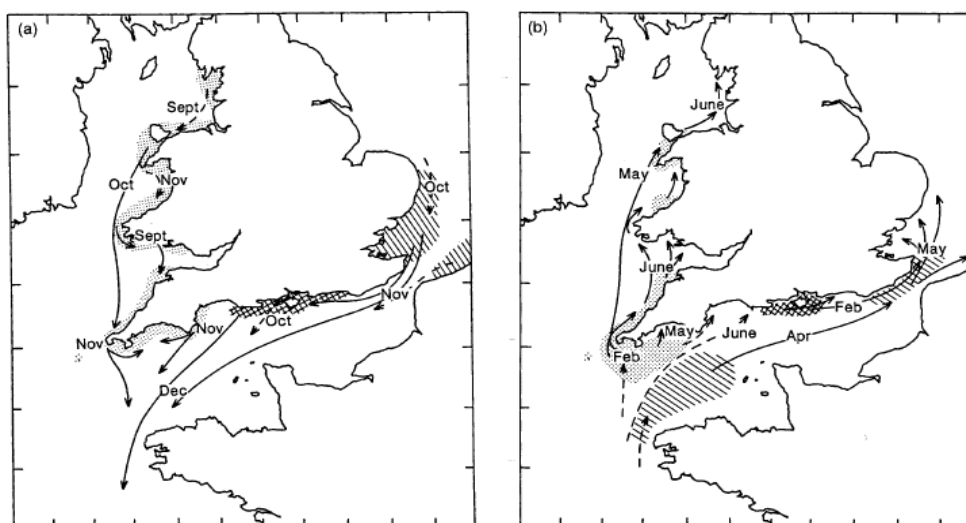


Figure 4.1 Sea bass in the Northeast Atlantic: seasonal movements and migrations of adult bass in three populations around England and Wales (shaded areas) as proposed by SGBASS 2001 (ICES 2001): (a) autumn movements from summer feeding areas; (b) spring movements from spawning areas.

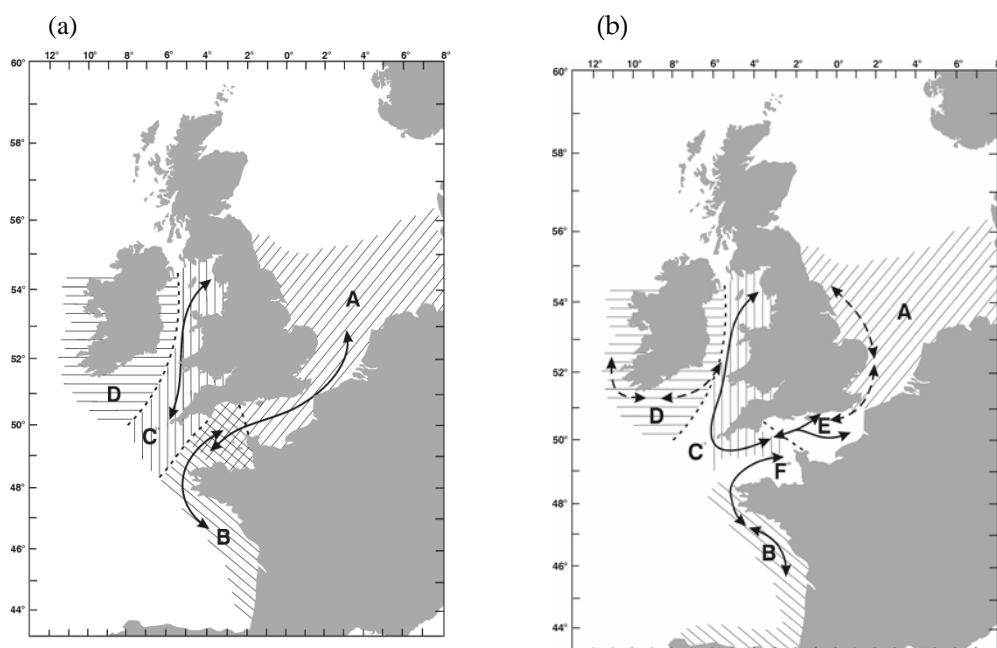


Figure 4.2. Sea bass in the Northeast Atlantic. (a) SGBASS 2001 tentative proposal for four stocks of seabass in A) North Sea-Channel; B) Biscay-Western Channel; C) west coast of England and Wales and D) Ireland (ICES 2001); (b) further structuring proposed by SGBASS 2004 (ICES 2004) to include additional stock components in E) eastern Channel, and F) western Channel, south part. Arrows indicate the main range of movement of adult bass in each "stock".

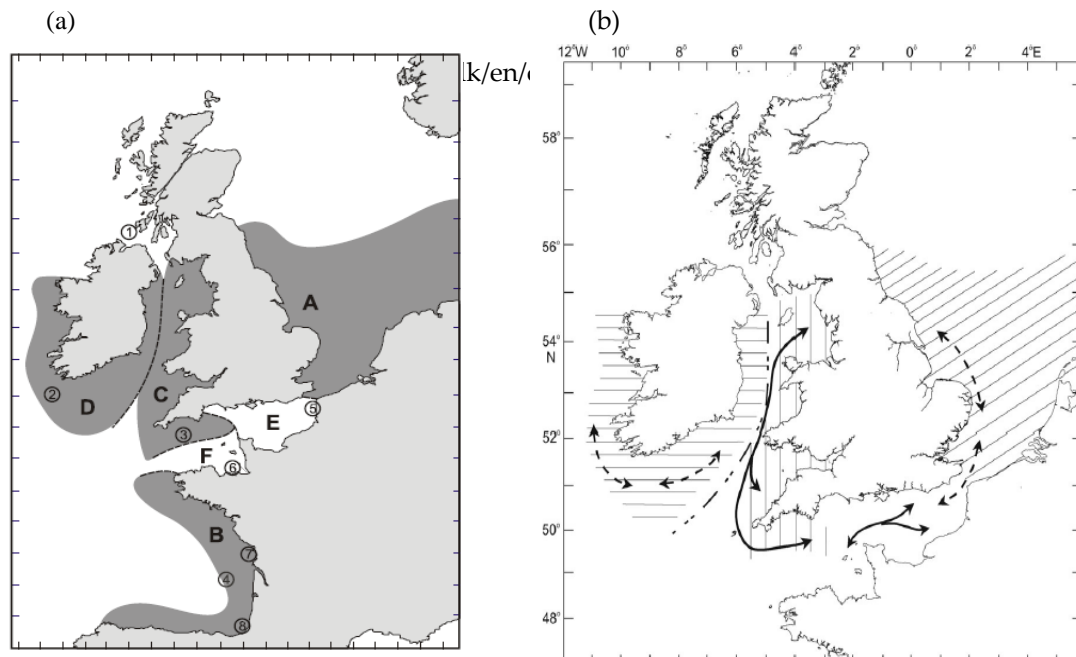


Figure 4.3. Sea bass in the Northeast Atlantic. (a) Distribution of seabass stocks given by Fritsch *et al.* (2007); (b) putative stock structure and movements of seabass in ICES Subareas IV and VII proposed by Pawson (2007).

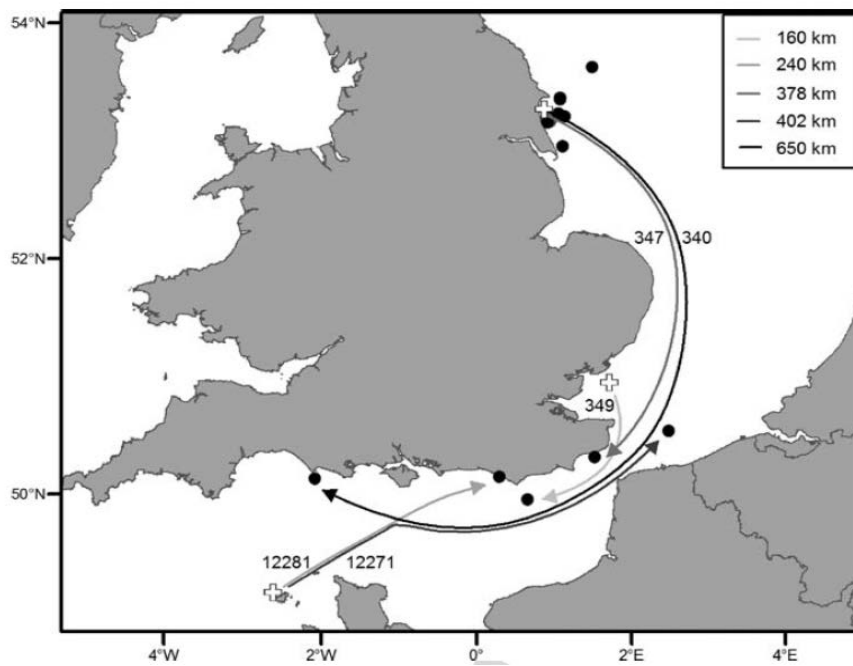


Figure 4.4. Sea bass in the Northeast Atlantic. (a) Release and recapture positions of seabass tagged with data-storage tags (Quayle *et al.* 2009). Release positions shown by white crosses and recapture positions shown by black circles.

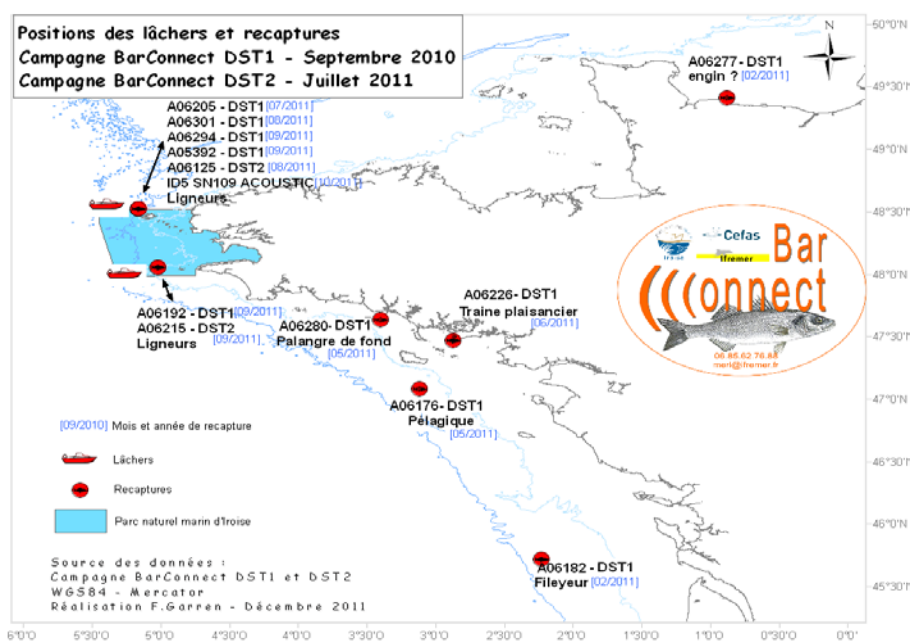


Figure 4.5. Sea bass in the Northeast Atlantic. Ifremer “Bar Connect” electronic tagging study. Catch and release () area : DST1 at Ushant (98 seabass tagged) and DST2 at Sein Island (74 seabass tagged). Dates and total number of recaptures () are listed above (10 recaptures for DST1 and 2 recaptures for DST2 at present).

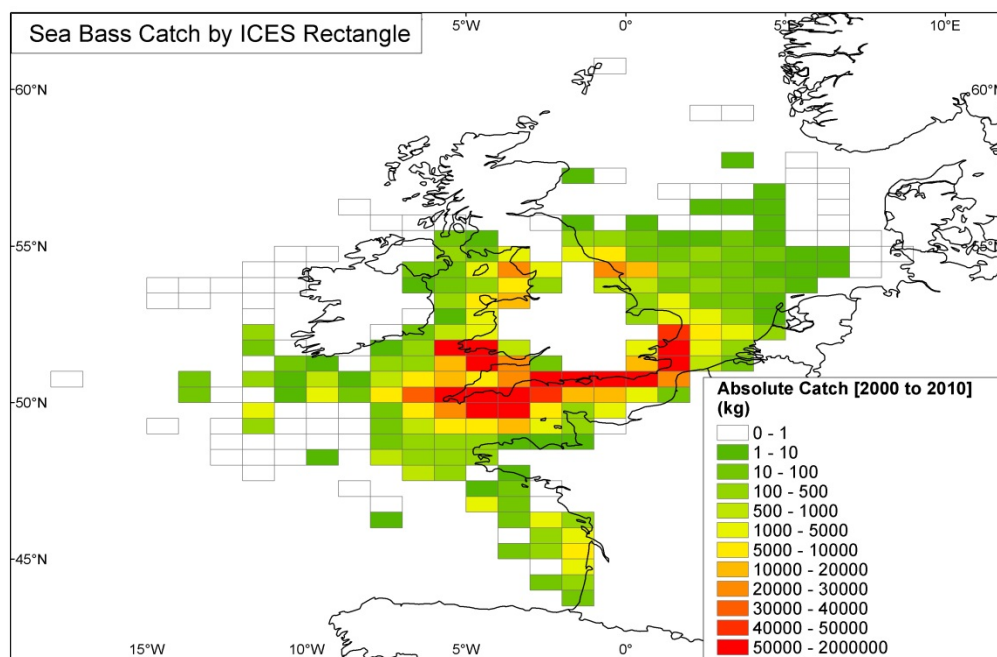


Figure 4.6. Sea bass in the Northeast Atlantic. Distribution of UK landings of sea bass by ICES rectangle, aggregated over 2000 – 2010 for all gear types.

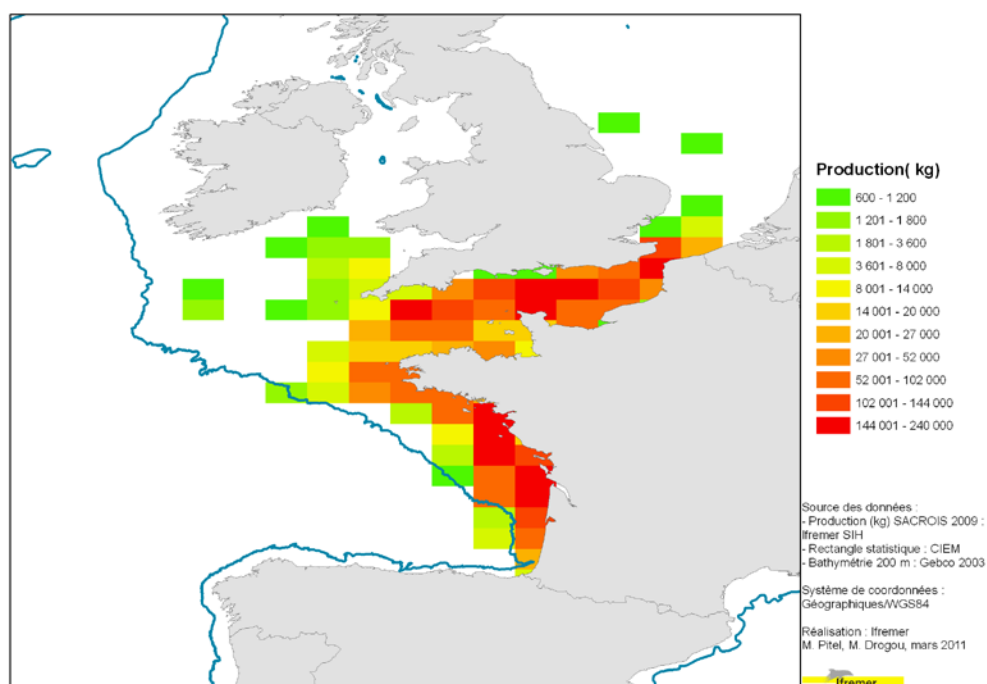


Figure 4.7. Sea bass in the Northeast Atlantic. Distribution of French landings of sea bass by ICES rectangle for all gear types in the year 2009.

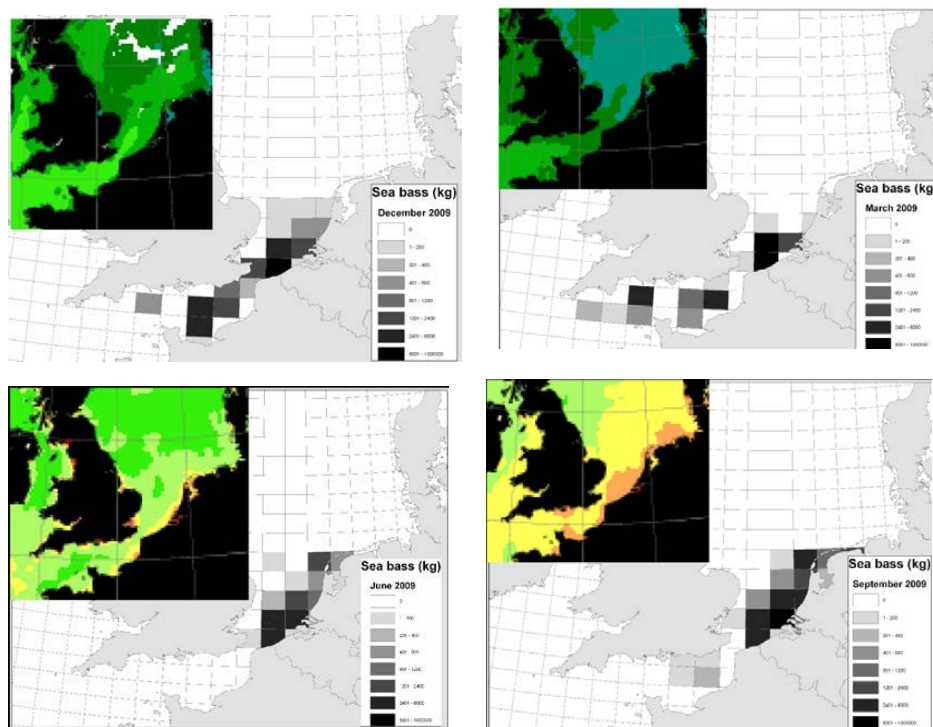


Figure 4.8. Sea bass in the Northeast Atlantic. Total landings of sea bass in kg. By the Dutch fleet in the year 2009 for the months December (a), March (b), June (c) and September (d) per ICES quadrant (Reproduced from Nijboer, 2011 -Data from VIRIS database).

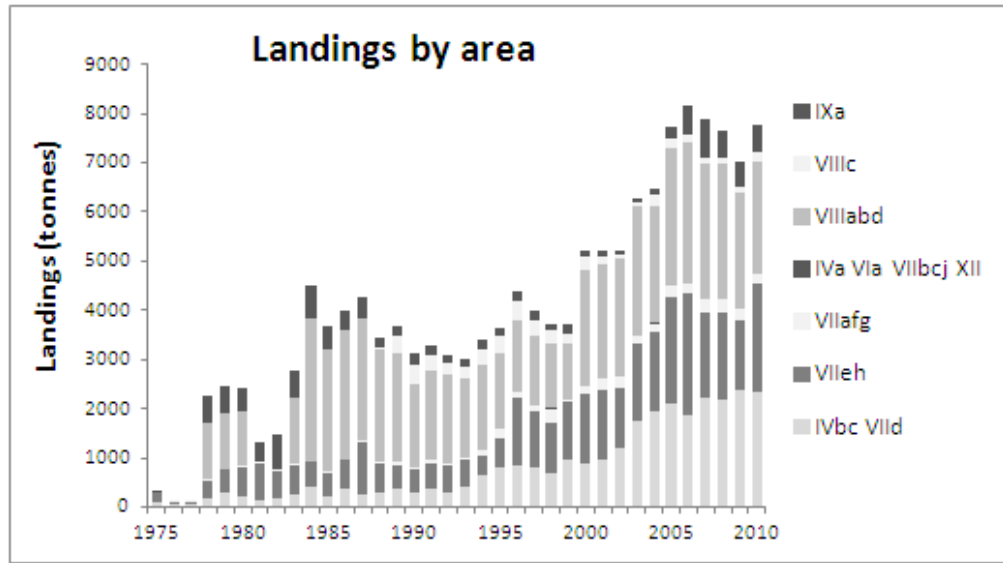


Figure 4.9. Sea bass in the Northeast Atlantic. ICES landings (tonnes).

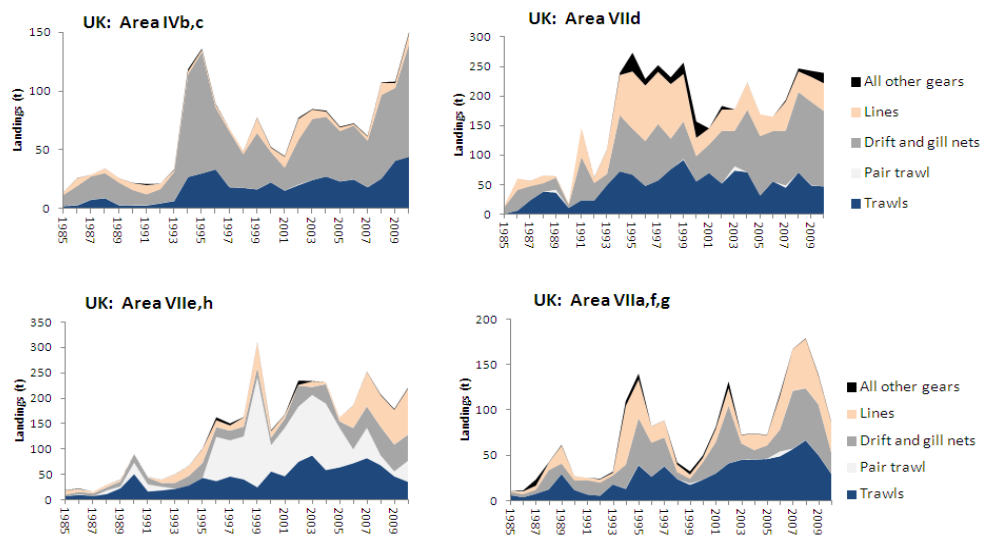


Figure 4.10. Sea bass in the Northeast Atlantic. Landings by area and gear type for UK commercial fishing fleets (pair trawl = offshore pelagic trawl fishery).

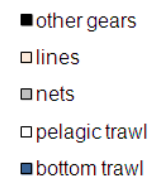
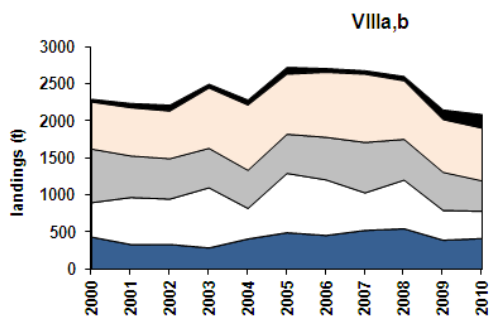
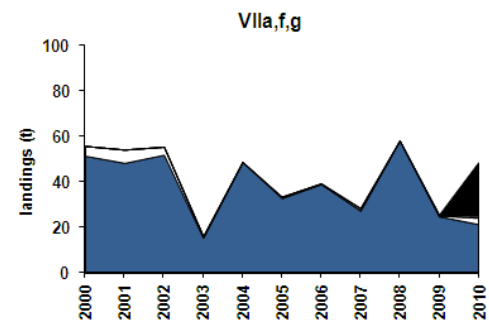
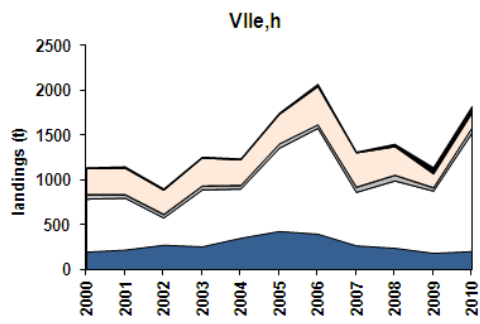
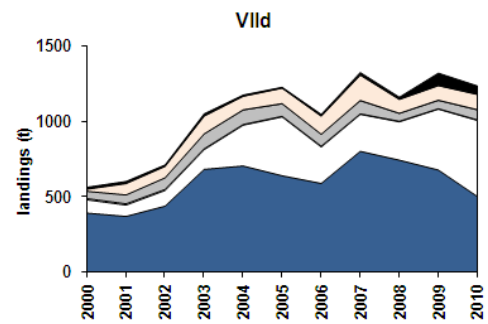
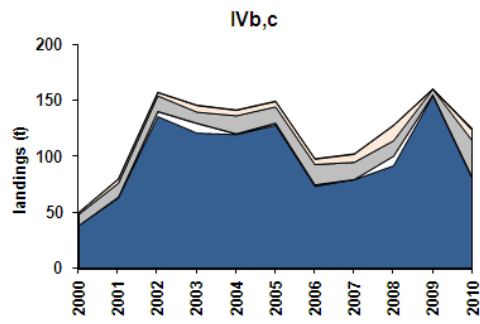
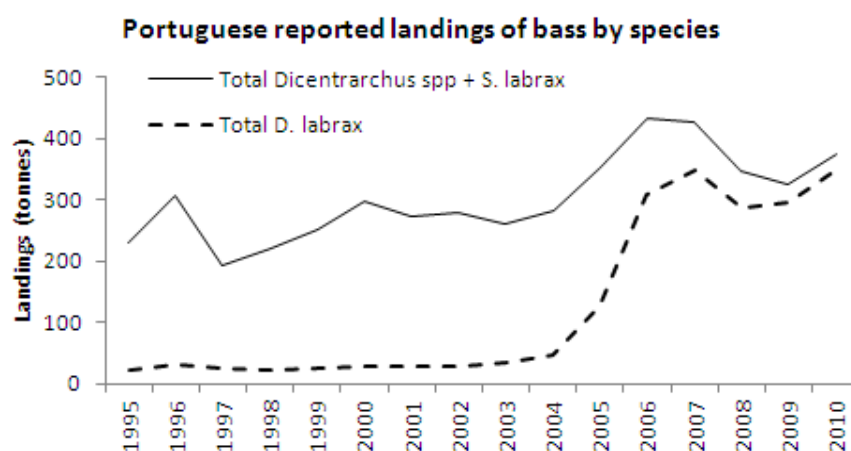


Figure 4.11. Sea bass in the Northeast Atlantic. Landings by area and gear type for French commercial fishing fleets.



Figure

4.12. Sea bass in the Northeast Atlantic. Landings by area and gear type for Portuguese commercial fishing fleets.

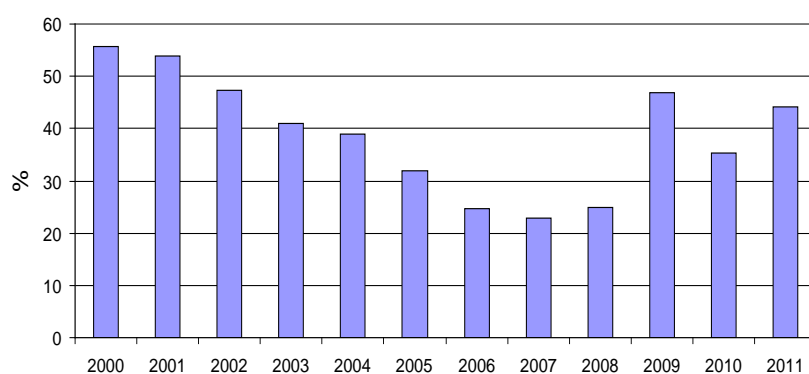


Figure 4.13. Sea bass in the Northeast Atlantic. Percentage of vessel/month for fishing vessels in France (NE Atlantic area), where there are no logbook data when there are sales market records. 2011 data are provisional.

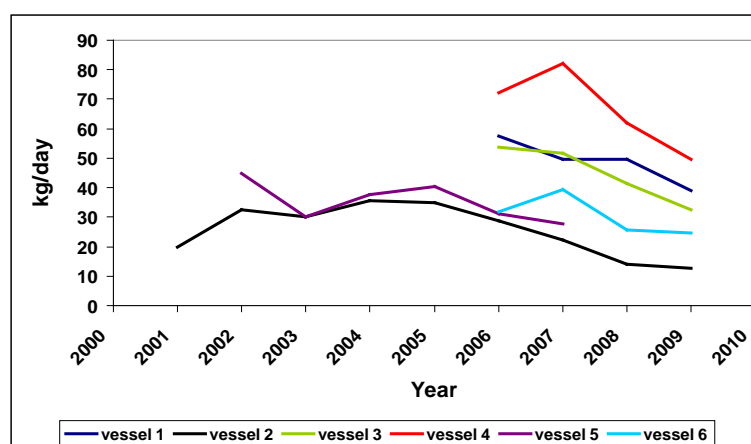


Figure 4.14. Sea bass in the Northeast Atlantic. LPUE (Kg/day) from personal fishing notebooks of six French coastal vessels fishing with lines in Division VIIe.

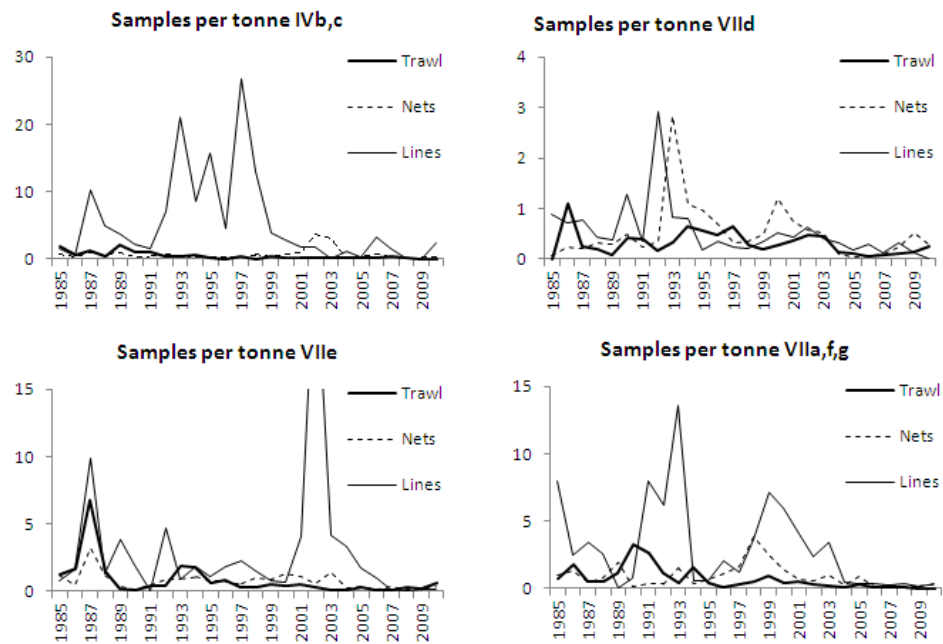


Figure 4.15. Sea bass in the Northeast Atlantic. Annual sampling of UK(Eand W) sea bass landings for length compositions: nos. trips sampled per tonne of bass landed, by area and gear.

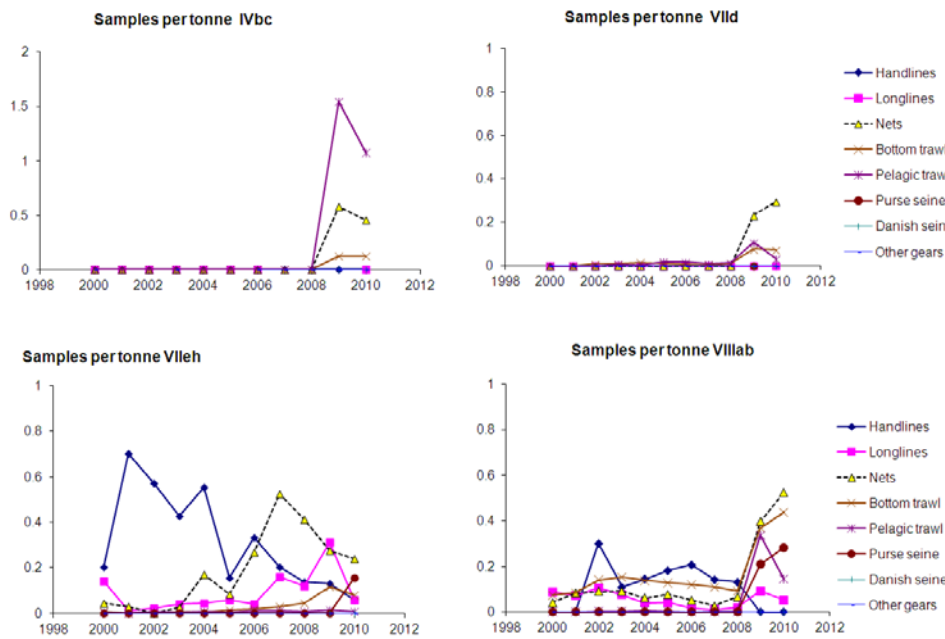


Figure 4.16. Sea bass in the Northeast Atlantic. Annual sampling of bass landings in France for length compositions: nos. trips sampled per tonne of bass landed, by area and gear.

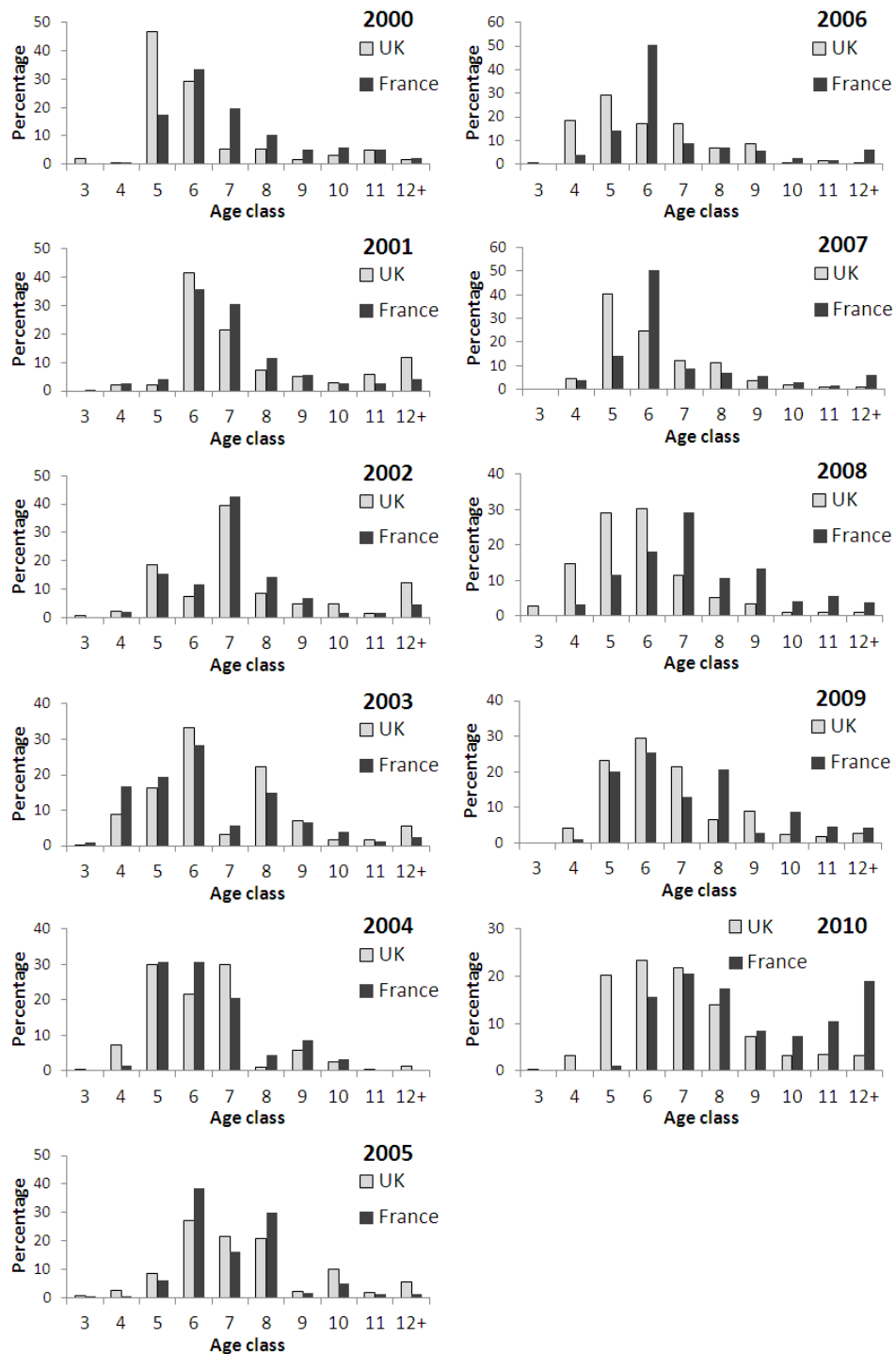


Figure 4.17. Sea bass in the Northeast Atlantic. Seabass in Divisions VIIe,h: Comparison between percentage age composition of annual landings of UK and French bottom trawlers.

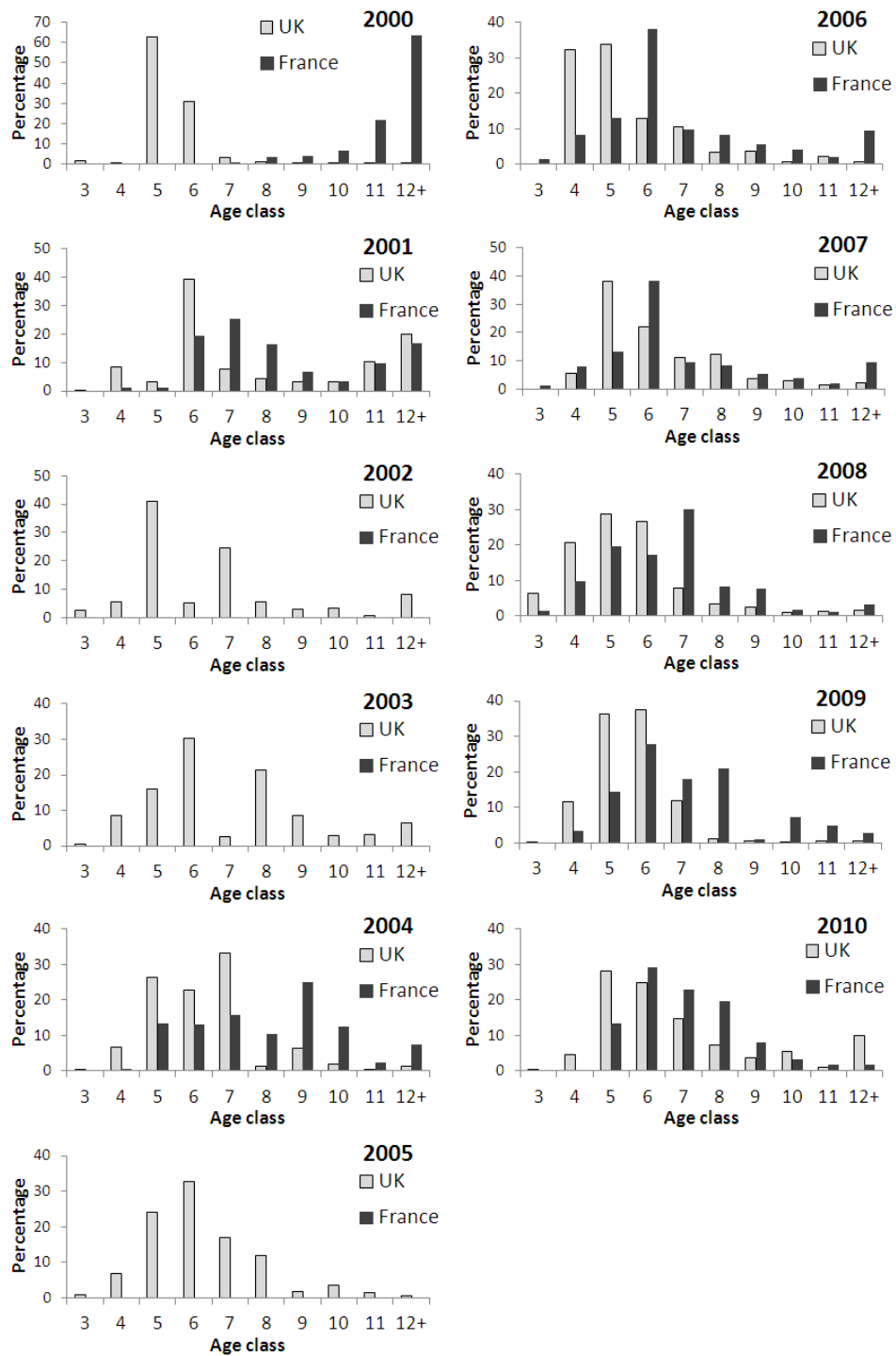


Figure 4.18. Sea bass in the Northeast Atlantic. Seabass in Divisions VIIe,h: Comparison between percentage age composition of annual landings of UK and French vessels using fixed/drift nets

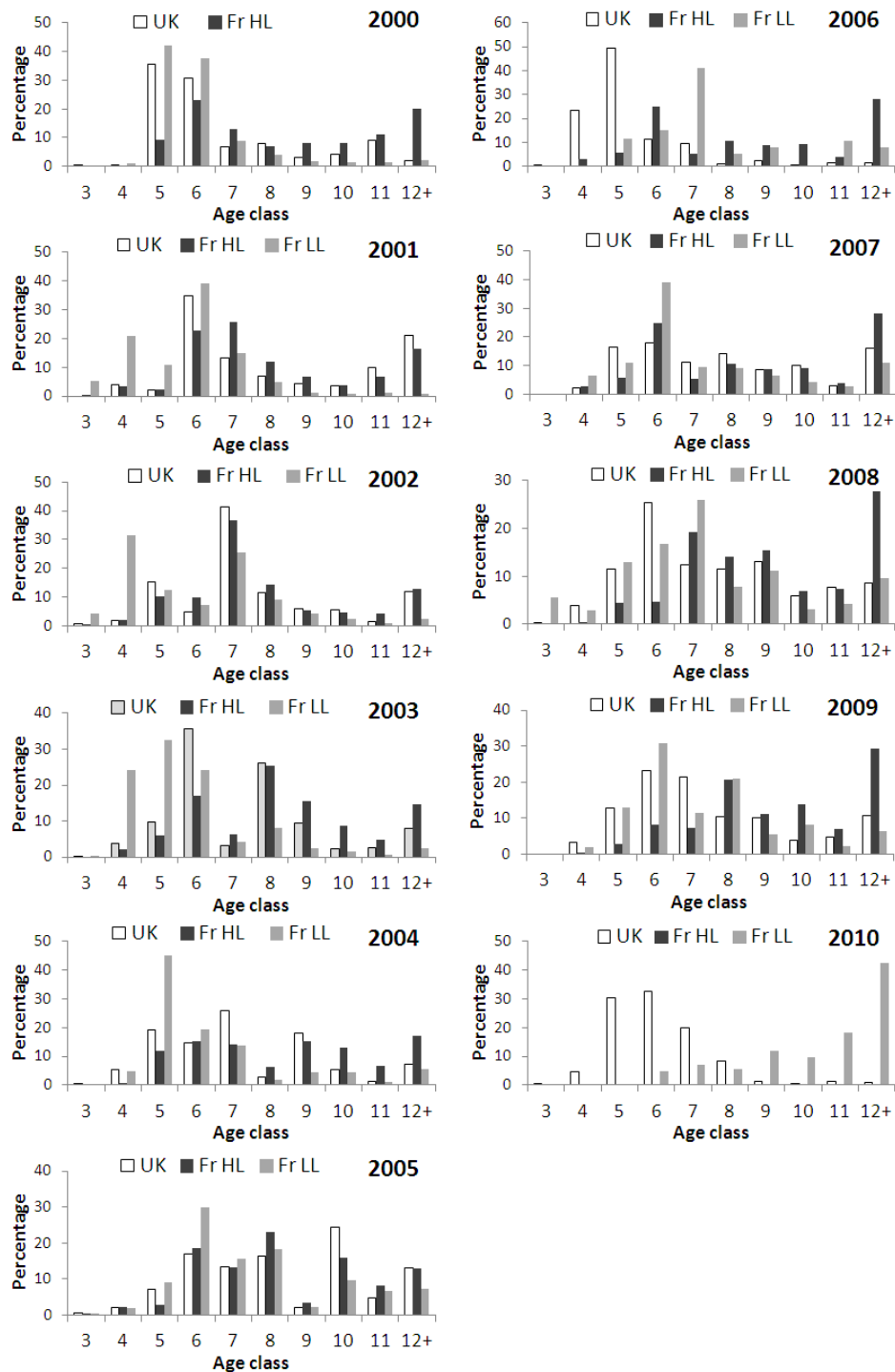


Figure 4.19. Sea bass in the Northeast Atlantic. Sea bass in Divisions VIIe,h: Comparison between percentage age composition of annual landings of UK and French vessels using lines. French data are given separately for handlines (Fr HL) and longlines (Fr LL).

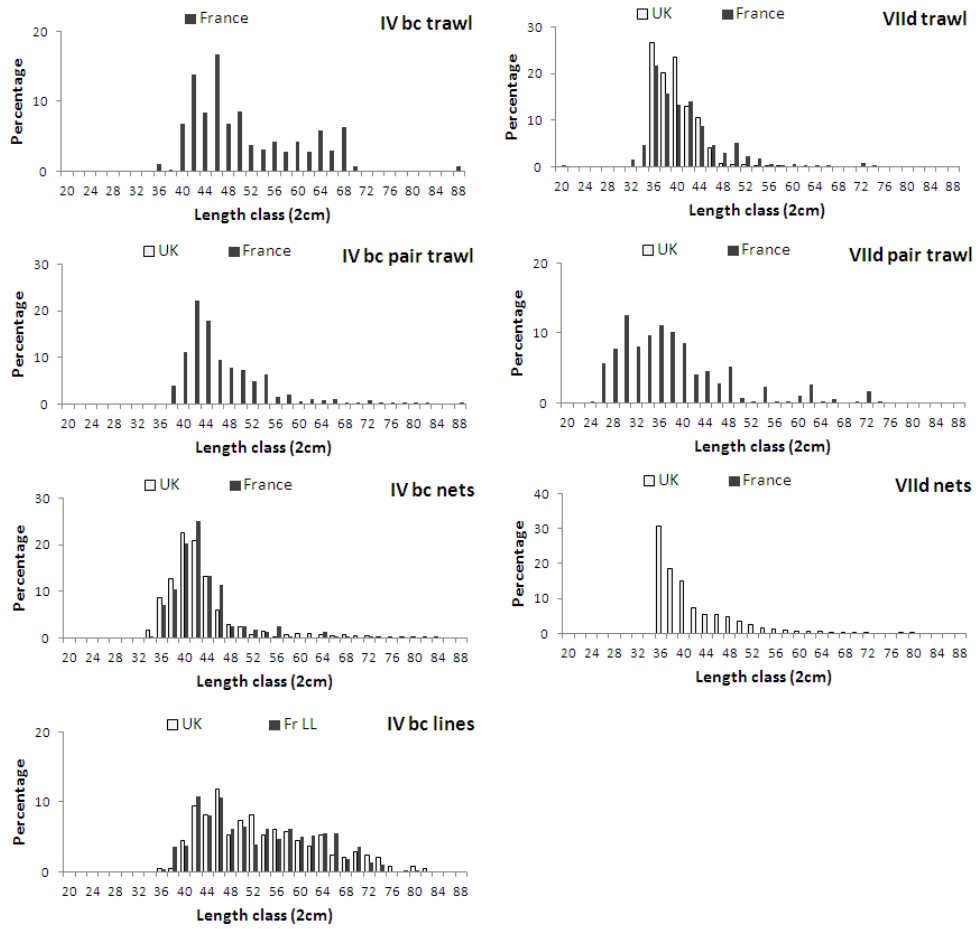


Figure 4.20. Sea bass in the Northeast Atlantic. Sea bass in Divisions IVb,c and VIIId: Comparison between percentage length composition of annual landings of UK and French vessels using different gear types (Fr LL = French longlines).

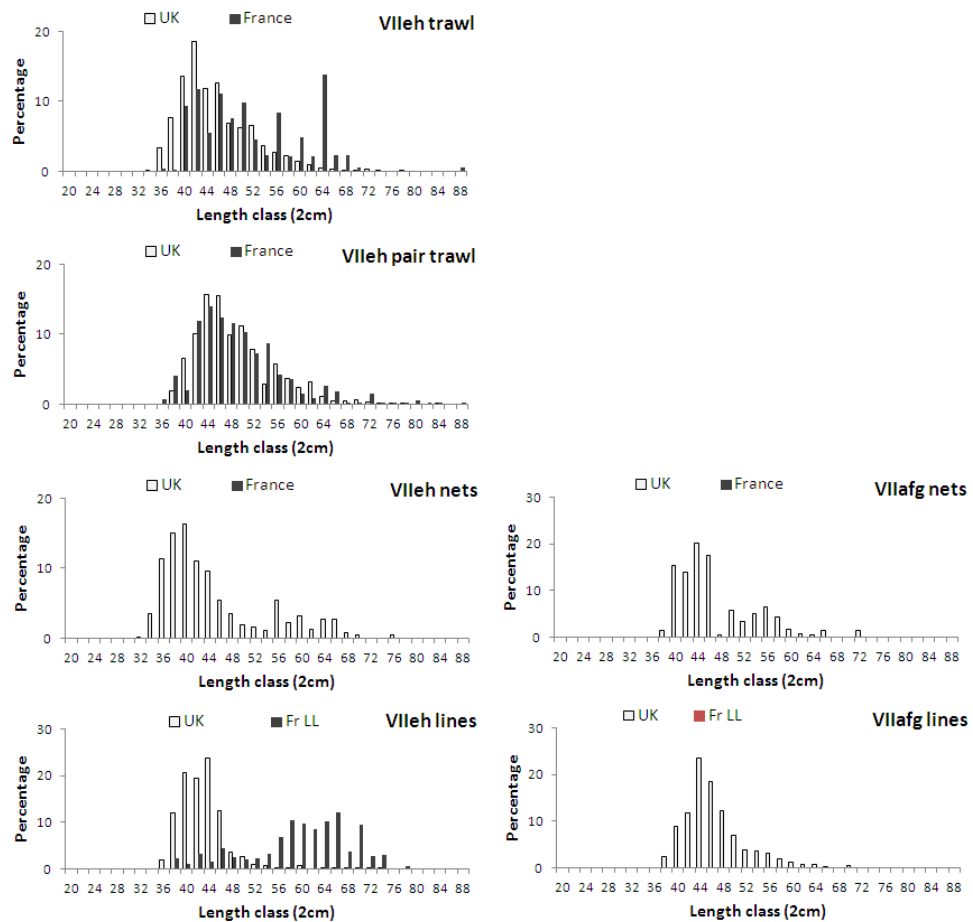
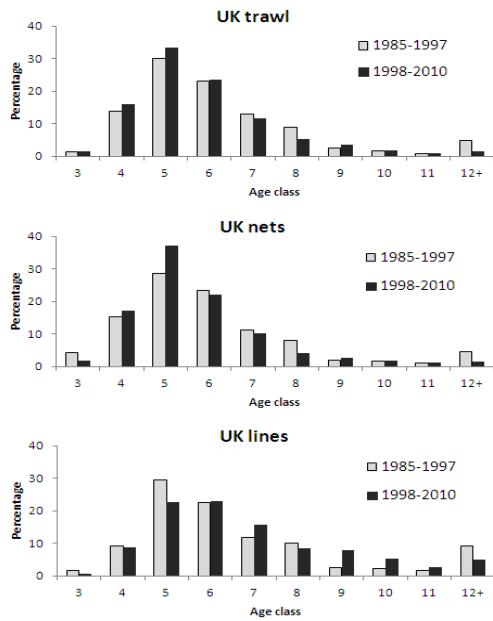


Figure 4.21. Sea bass in the Northeast Atlantic. Sea bass in Divisions VIIe,h and VIIa,f,g: Comparison between percentage length composition of annual landings of UK and French vessels using different gear types (Fr LL = French longlines).

(a)



(b)

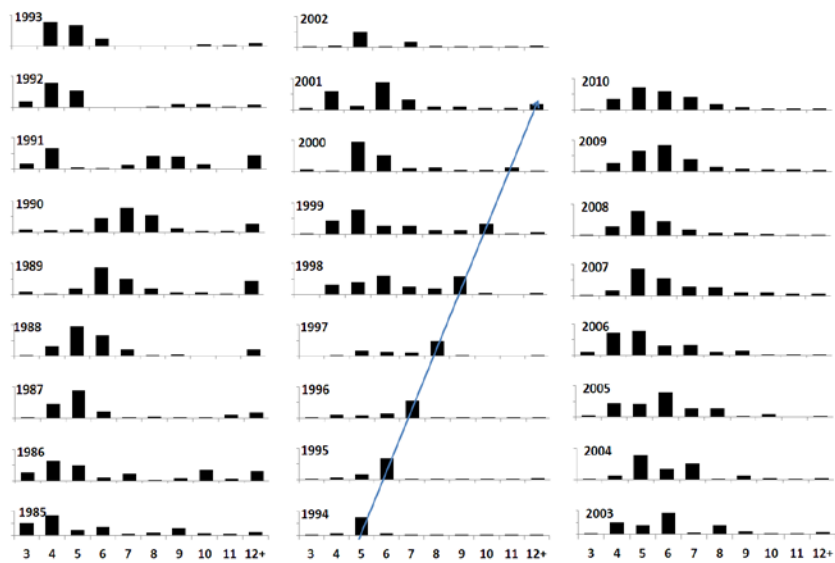
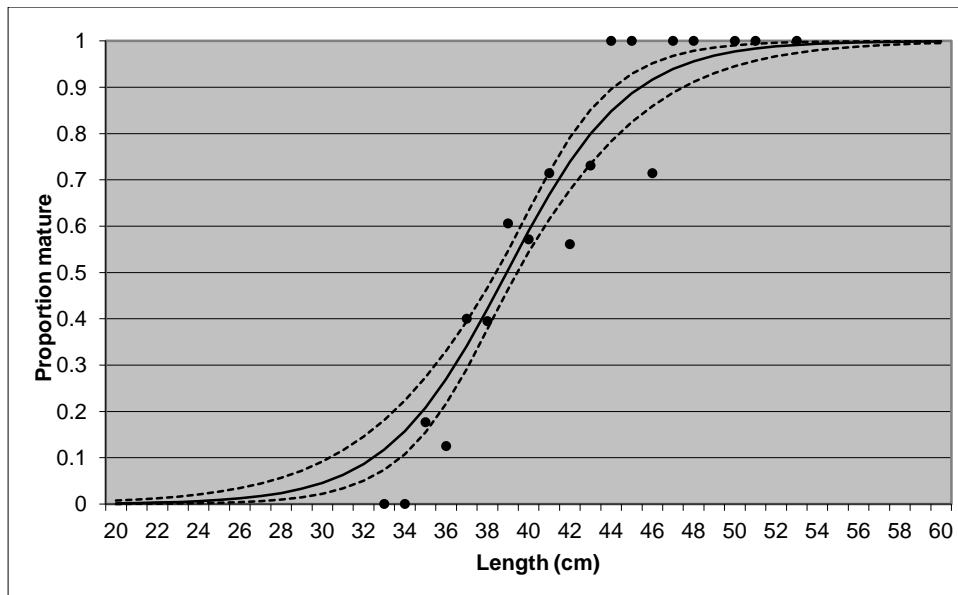


Figure 4.22. Sea bass in the Northeast Atlantic. (a) Average age compositions of UK landings during 1985–1997 and 1998–2010 for trawls, nets and lines in Areas IV and VII; (b) Age composition (percentage) of UK landings of sea bass from all areas, 1985 – 2010. Arroe indicates progression of 1989 year class.

Female bass: all areas and gears sampled in April – June 2009



Maturity ogives for female bass fitted to samples from four area/gear combinations

Top: Northeast trawls (April)

Top: Southeast trawls (April)

Bottom: Southwest trawls (April)

Bottom: Southwest nets (June)

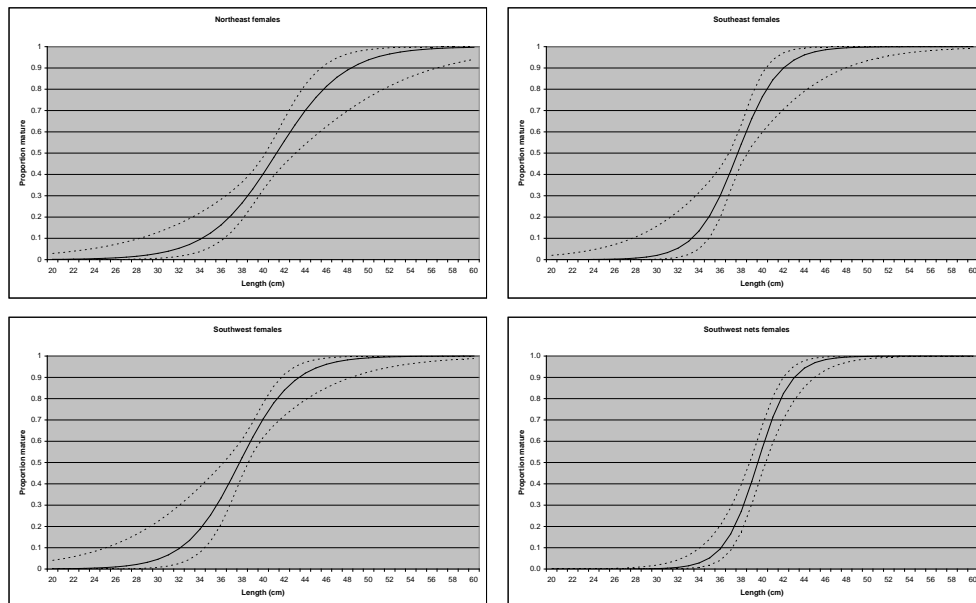


Figure 4.23. Sea bass in the Northeast Atlantic. UK(England). Maturity ogives for female sea bass fitted to proportions mature in 1-cm length classes: (a) from combined sample of three trawl and one gillnet landing from NE, SE and SW England in April – June 2009 (total of 642 fish); (b) separate ogives fitted to data for females from the four samples.

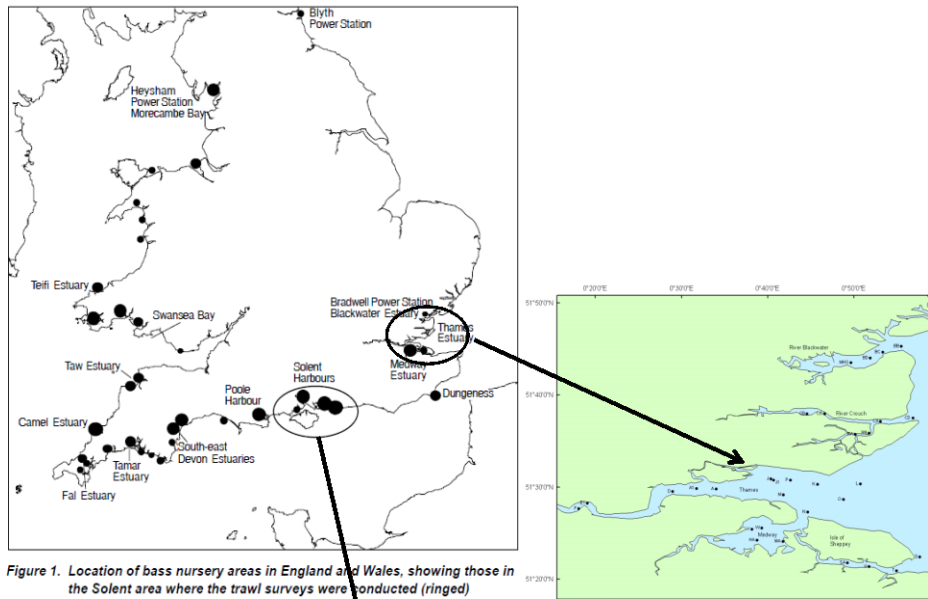


Figure 1. Location of bass nursery areas in England and Wales, showing those in the Solent area where the trawl surveys were conducted (ringed)

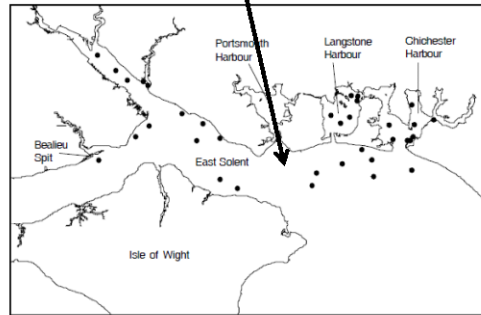


Figure 5. Solent bass - current core station positions

Figure 4.24. Sea bass in the Northeast Atlantic. Location and tow positions for UK(England) Solent and Thames sea bass surveys.

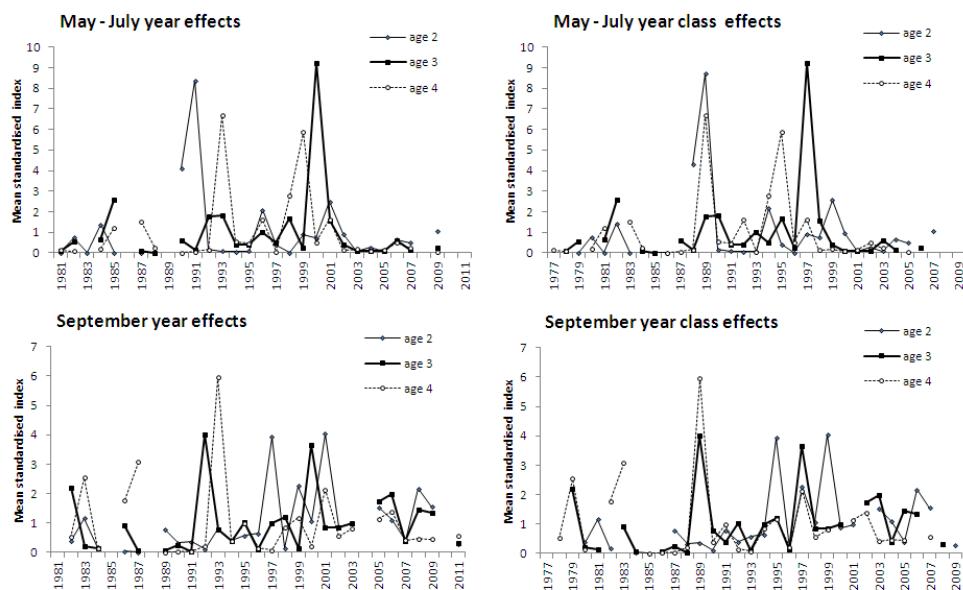


Figure 4.25. Sea bass in the Northeast Atlantic. UK(England) Solent sea bass survey: mean-standardised indices at ages 2, 3 and 4 plotted against year (left-hand plots) and year-class (right-hand plots) for surveys in May-July (top) and September (bottom).

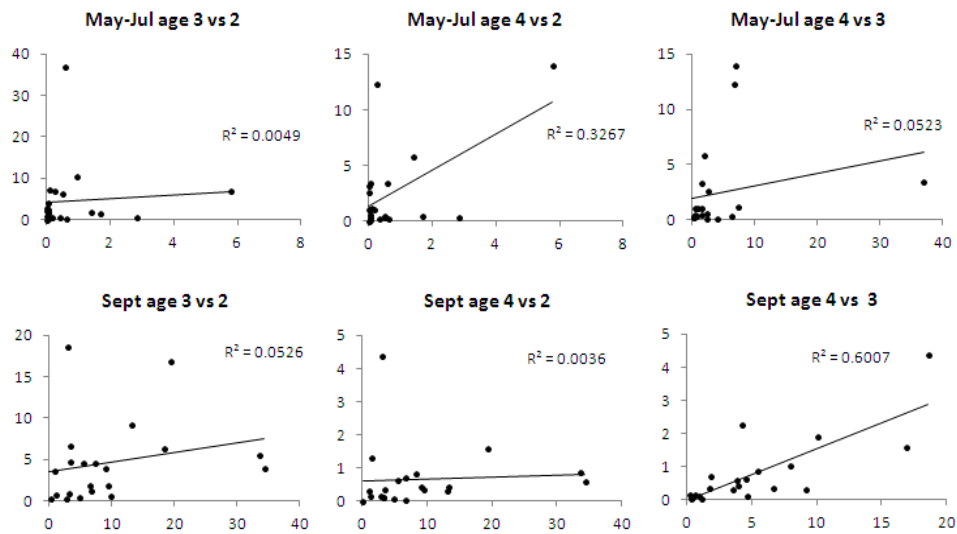


Figure 4.26. Sea bass in the Northeast Atlantic. UK(England) Solent sea bass survey: Internal consistency plots of abundance indices at successive ages in year classes: surveys in May-July (top) and September (bottom).

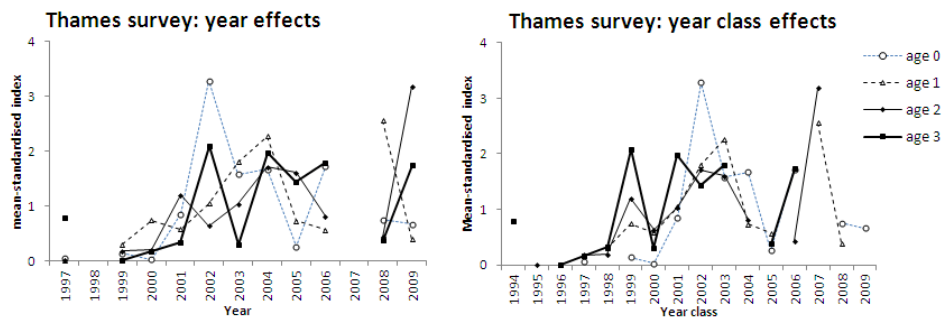


Figure 4.27. Sea bass in the Northeast Atlantic. UK(England) Thames sea bass survey in November: mean-standardised indices at ages 0 - 3 plotted against year (left-hand plots) and year-class (right-hand plots)

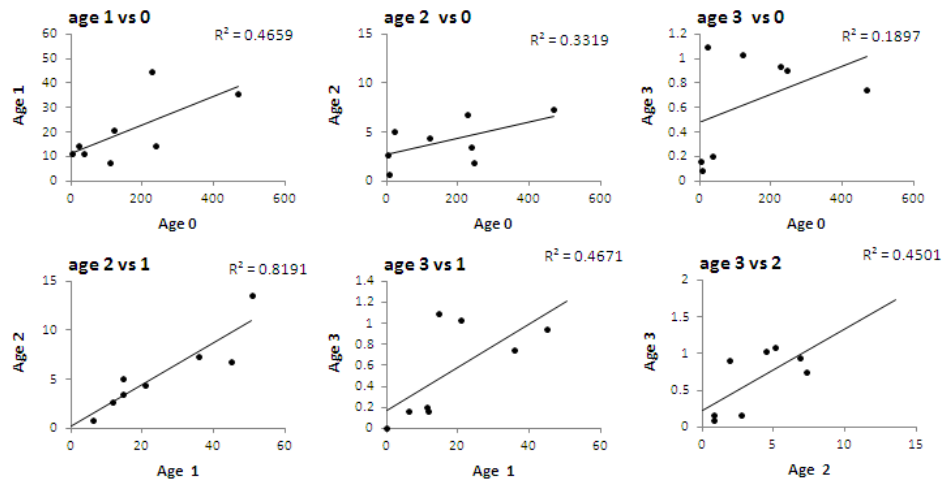


Figure 4.28. Sea bass in the Northeast Atlantic, UK(England) Thames sea bass survey in November: Internal consistency plots of abundance indices at successive ages in year classes.

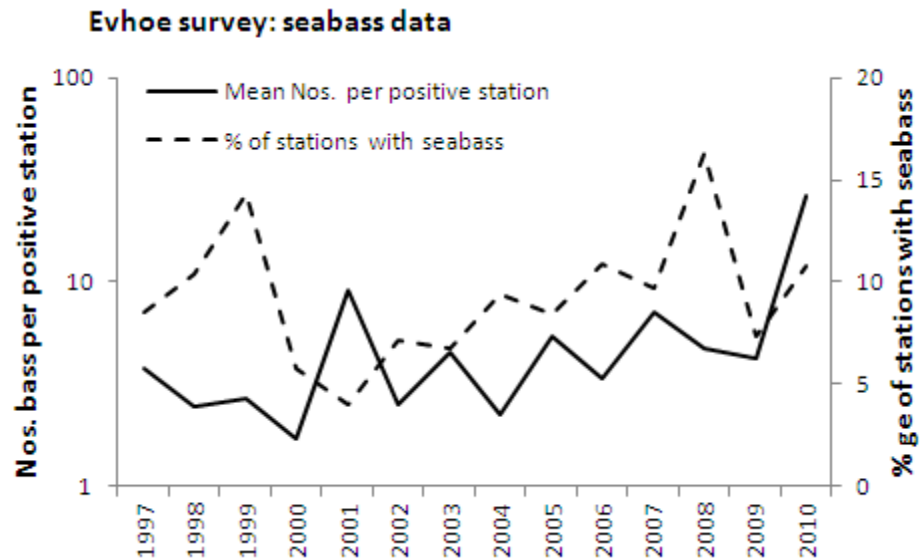


Figure 4.29. Sea bass in the Northeast Atlantic. Incidence and catch-rate of sea bass (all sizes) in the French Evhoie survey, 1997 – 2010. Data are for all areas in VII and VIII covered by the survey. Data are shown as percentage of stations with sea bass, and log of mean catch numbers per positive tow.

5 Striped red mullet

5.1 General biology

The striped red mullet (*Mullus surmuletus*) is a benthic fish, which is found along the European coasts from the South Norway and North Scotland including the Faroe Islands in the North, to the Strait of Gibraltar in the South. This species is also found in the northern part of western Africa and in the Mediterranean and Black Seas (Quéro and Vayne, 1997). Striped red mullet is considered occasional off Norway, around Ireland, at the north coasts of England and in the West of Scotland (Davis and Edward, 1988; Gibson and Robb, 1997).

Analysis of British commercial landings revealed a strong concentration of this species in the central pit of the western Channel during winter (Dunn, 1999). The scientific survey CGFS (Channel Ground Fish Survey), carried out every year by Ifremer in the eastern Channel since 1988, showed that young individuals are distributed in coastal areas, while adults exhibit preferentially an offshore distribution in the eastern part (Carpentier *et al.*, 2009).

Finally, nurseries are located in the Bay of Saint-Brieuc and at the Falklands coasts (Morizur *et al.*, 1996). Striped red mullet is accommodated to deep water and elevated temperatures (ICES, 2007b), and tolerates weak and high salinity (corresponding respectively to juvenile and adult habitats) and is rarely found in the transitions zones of intermediate salinity. This species is met mostly on sandy substratum (Carpentier *et al.*, 2009). Food of striped red mullet is primarily composed of crustaceans and molluscs.

In the English Channel, the first sexual maturity was identified on fish of 16.2 cm for the male and 16.7 cm for the female (Mahé *et al.*, 2005).

5.2 Management regulations

Before 2002, a minimum landing size was set at 16 cm in France. Since, this minimal size requirement has been removed and it resulted on catch of immature individuals (< 14 cm), which has recently been targeted and landed.

5.3 Stock ID and possible management areas

Due to the presence of the striped red mullet in catches all year-round, Dunn (1999) suggested that a single stock should exist within the English Channel, although he could not determine whether this stock was distinct from other western stocks. He also suggested that it might be a newly established stock in the North Sea.

In 2004 and 2005, a study using fish geometrical morphometry was carried out in the Eastern English Channel and the Bay of Biscay. It pointed out a morphological difference on striped red mullets between those from the Eastern English Channel and those from the Bay of Biscay.

In 2010, in the Nespman project, a study based on the shape of the otoliths has been conducted to differentiate stocks. The study area was divided into six geographic sectors: the NS (North Sea; ICES Division IVab), the EEC (Eastern English Channel; ICES Division VIIId), the WEC (Western English Channel ; ICES Division VIIe), the CS (Celtic Sea ; ICES Division VIIh), the NBB (North Bay of Biscay ; ICES Division VIIa) and the SBB (South Bay of Biscay ; ICES Division VIIb) (Figure 5.1).

In this work, three techniques have been applied: a Fourier, a PCA and a Geodesic approach (In Benzinou *et al.*, submitted). Among these 3, Geodesic approach reached the highest mean correct classification rate (30%). The confusion matrix of Geodesic approach on dataset with six geographic sectors, achieved by K-Nearest Neighbours classifier (In Benzinou *et al.*, submitted) showed that populations of striped red mullet of Western English Channel and Eastern English Channel could be separated (Table 5.1).

In the north, it appears a continuum between the North Sea and the Eastern English Channel. In the same way, a continuum has been identified between the north and the south of the Bay of Biscay. Currently, we do not have enough data to separate the Bay of Biscay from the Celtic sea or the Eastern English Channel.

Therefore, for management purposes, two areas could be considered for this species:

- the north area (III, IV and VIId)
- the south area (VI, VIIa,e,g,h,j-VIIIa,b and IXa)

5.4 Fisheries data

According to ICES statistics, in the Atlantic Ocean, fishery of this species was only conducted by Spain and Portugal from 1950 to 1975, then France also part of it. From 1950 to 1975, fishing of striped red mullet was carried out nearby the Spanish coasts and in the bay of Biscay. From 1990, catches strongly increased, essentially due to France, but also to England and Netherlands fisheries. It could be explained by the beginning of exploitation of the striped red mullet in the English Channel and in the North Sea (Figure 5.2).

Currently, the main country that catches striped red mullet is France. The striped red mullet is a target species for this country and is mainly caught (> 90%) by bottom trawlers with a mesh size of 70–99 mm in the Eastern Channel and south of the North Sea (Figure 5.2). In the Eastern English Channel and south of the North Sea, the complementary gears are essentially represented by various trawlers and in Western English Channel by various gears and gillnets. Striped red mullet catches, achieved by these complementary metiers, remain accessory.

The trawlers concerned by striped red mullet fishery have a length and a power respectively of about 20 meters and 400 kilowatts yearly average. This has remained stable since 1991. Among this fleet, 71% of the ships which fish in the south of the North Sea, show to fish also in the Eastern English Channel. Only 24% of ships fishing in the Western English Channel frequented the Eastern English Channel.

Main areas for the striped red mullet exploitation are areas IV, VIId,e and VIIIa,b. French catches are the most important in the entire zone. Other important countries are the Netherlands and the United Kingdom with regard to the English Channel (VIId,e) and the North Sea (IV), where catches are concentrated in the south (IVb,c). The north of the Bay of Biscay (VIIIa,b) is exploited by France and Spain. The south (VIIIc) is only exploited by Spain. Other countries concerned by this fishery for small catches are Germany, Scotland, Denmark and Ireland.

Since 2008, landings decrease in the north area (IV-VIId) (Figure 5.3, Figure 5.4 and Figure 5.5). One observed a reverse trend in the south.

This species is not discarded by French vessels. Striped red mullet was rare in the discard samples of Portuguese bottom otter trawl fleet (OTB) in ICES Division IXa

and, when present, were found in low strength (Fernandes and Prista, 2012). More investigations on potential discarding should be carried out in other countries areas.

5.5 Survey data, recruit series

Since 1988, striped red mullet abundance indices are currently available for the Bay of Biscay (EVHOE survey), the Celtic sea (EVHOE survey), the western English Channel (UK-WCBTS survey), the eastern English Channel (CGFS survey), and for the North Sea (IBTS survey Q1 and Q3) (Figure 5.6).

In the north area (III, IV and VIId), abundance indices (CGFS survey and IBTS surveys Q1 and Q3) of 3 surveys were used. During the last decade, variable abundance during CGFS survey has been observed with 3 large peaks in 2003, 2007 and 2009 (from 50 to 70 per hour, Figure 5.6). For the years 2003 and 2007, a peak of abundance has been observed too, during IBTS survey Q3 in the North sea. Abundance indices of IBTS-Surveys Q3 are more higher than these of IBTS-Survey Q1 (Figure 5.7). Abundance of striped red mullet during of IBTS-Surveys Q3 presented trend to increase from 1990 to 1995 and after this date, abundance trend to decrease. The maps of these surveys show the different spatial distributions with the fish close to the UK coasts during Quarter 1 and in the south-eastern of the North sea (coasts of Belgium and the Netherlands) during Quarter 3 (Figure 5.8). Abundance indices of striped red mullet per age class during FR-CGFS from 2006 to 2011 presented Age groups from 0 to 2 only (Figure 5.9). In consequently, the abundance of this survey give recruitment index. Correlation between Abundance indices of striped red mullet per age class during FR-CGFS and landings in ICES Subareras IV and VIId showed that the landings are strongly correlated to the recruitment (Figure 5.10). The Age Length Key of striped red mullet in the north Sea during the IBTS-Q1 survey did not show the recruitment only with mainly age groups between 1 and 3 (Figure 5.11).

In the south area (VI, VIIa,e,g,h,j-VIIIa,b and IXa), abundance indices (EVHOE survey and UK-WCBTS survey) of 2 surveys were used. These 2 surveys do not present trend (Figure 5.6). There are few peaks of abundance of striped red mullet in Celtic sea and the bay of Biscay (EVHOE-WIBTS Q4) and the Eastern English Channel (UK-WCBTS Survey). During EVHOE-WIBTS-Q4 Survey, 2001, 2003, 2005 and 2009 present peaks of abundance of striped red mullet (from 16 to 23 per hour, Figure 5.6). Abundance indices per size class during EVHOE-WIBTS-Q4 show mainly fish between 8 to 17 cm (TL). In consequently, the abundance of this survey give recruitment index. UK-WCBTS survey in the Eastern English Channel

Since 1979, the PGFS (Portuguese Autumn Groundfish Survey) covers the whole Portuguese continental coast, within depths ranging from 20 to 500m. The PCTS (Portuguese Crustacean Trawl Survey) covers the Southwestern and the South regions of the Portuguese continental coast, with depths ranging from 200 to 750m. Data from these surveys shows that striped red mullet distributes along the Portuguese coast, at depths ranging between 20 and 700 m deep. Some investigations on potential distribution of this species should be carried out in the Spanish coasts between the Portuguese coasts and the bay of Biscay.

5.6 Biological sampling

The Netherlands sampled 31 fishes in 2009 during Quarter 3 and 223 fishes in 2010 (month 5 : 60; month 6 : 60; month 7 : 60 ; month 10 : 45) for age estimation in the North sea. The Azti institute carried out sexual maturity and measures in length in 2009, in the bay of Biscay.

An inventory of the French data collected from the bay of Biscay to the North Sea is given in Table 5.2. French samplings started in 2004 in the Eastern Channel and in south North sea, and since 2008 in the bay of Biscay.

A French study on the sampling optimisation (IVc; VIId) was presented in the WGNEW 2010 (ICES, 2010). The results showed a strong yearly adequacy between sampling and catches (Mahé *et al.*, 2007).

5.7 Biological parameters and other research

Since 2004, data (age, length, sexual maturity) are usually collected by France for the Eastern English Channel and the southern North sea (Table 5.2). France started to collect data for VIIa,b at the end of 2007. In 2007–2008, the striped red mullet otolith exchange had for goal to optimise age estimation between countries (ICES, 2009).

In 2011, an Otolith Exchange Scheme has been realised, which was the second exercise for the Striped red mullet *Mullus surmuletus*. Four readers of this exchange interpreted an images collection coming from the Bay of Biscay, the Spanish coasts and the Mediterranean coasts (Spain and Italy). A set of *Mullus surmuletus* otoliths (N=75) from the Bay of Biscay presented highest percentage of agreement (82%). On 75 otoliths, 34 were read with 100% agreement (45%) and thus a CV of 0%. Modal age of these fishes was comprised between 0 and 3 years (Mahé *et al.*, 2012).

5.8 Analysis of stock trends / assessment

Currently, age structured analytical stock assessment is not possible due to a too short time series of available data.

By comparing landings from ICES Subareas IV and VIId with the abundance indices of CGFS-survey by age-group, one can noticed that abundance indices of Age-group 1 have the same trend as the landings (Figure 5.7). This analysis should be supplemented but these results showed that landings were essentially constituted by young fish (Age group 1). These results confirm the analysis of landings composition by age group from 2004 to 2008 from ICES Subareas IV and VIId.

5.9 Data requirements

Regular sampling of striped red mullet catches must be continued under DCF. Sampling in the Eastern Channel and in south North Sea started in 2004. The effort of sampling (700 otoliths) in these zones is sufficient (ICES, 2007) but must be continued. Effort of sampling in the North sea (IV b and c), the Western Channel, the Celtic Sea and in the bay of Biscay started in 2009. In 2010 and 2011, a sampling level for age and maturity data was diminished compared to 2009, due to the end of the Nespmann project.

Since 2009, a concurrent sampling design carried out, should provide more data (length compositions) than in recent years.

The FR-CGFS and FR-EVHOE surveys would continue to provide abundance indice series at age. However, The FR-CGFS survey is not funded by DCF. In the same way, there do not exist any surveys in the Western Channel (VIIe) which extend to French and English waters, whereas catches of the striped red mullet in this geographical area in particular, are as significant as catches in the Celtic sea.

5.10 References

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Table 5.1. Striped red mullet. Confusion matrix (in %) for Geodesic approach on dataset (1) achieved by K-Nearest Neighbours classifier (In Benzinou *et al.*, submitted). Mean correct classification rate was 30% (25% for PCA approach and 19% for Fourier approach).

| <i>Geodesic approach on Dataset (1)</i> | | | | | | |
|---|--------------|-------|-----|----|-----|-----|
| Estimated Class | Actual Class | | | | | |
| | NS | EEC08 | WEC | CS | NBB | SBB |
| NS | 15 | 20 | 11 | 8 | 5 | 11 |
| EEC08 | 28 | 44 | 17 | 23 | 5 | 5 |
| WEC | 9 | 9 | 22 | 11 | 7 | 9 |
| CS | 24 | 15 | 24 | 32 | 15 | 13 |
| NBB | 10 | 5 | 16 | 13 | 27 | 22 |
| SBB | 14 | 7 | 10 | 13 | 41 | 40 |

Table 5.2. Striped red mullet. Biological sampling in France.

| YEAR | LENGTH | | AGE | | MATURITY | | INDIVIDUAL WEIGHT | |
|------|-------------|---------------|-------------|---------------|-------------|---------------|-------------------|---------------|
| | Fish number | Sample number | Fish number | Sample number | Fish number | Sample number | Fish number | Sample number |
| 1994 | 181 | 23 | - | - | - | - | - | - |
| 1995 | 246 | 32 | - | - | - | - | - | - |
| 1996 | - | - | - | - | - | - | - | - |
| 1997 | - | - | - | - | - | - | - | - |
| 1998 | - | - | - | - | - | - | - | - |
| 1999 | - | - | - | - | - | - | - | - |
| 2000 | - | - | - | - | - | - | - | - |
| 2001 | - | - | - | - | - | - | - | - |
| 2002 | 65 | 9 | - | - | - | - | - | - |
| 2003 | 147 | 17 | - | - | - | - | - | - |
| 2004 | 142 | 17 | 372 | 12 | 620 | 12 | 1401 | 12 |
| 2005 | 536 | 10 | 301 | 3 | 196 | 3 | 301 | 3 |
| 2006 | 1941 | 10 | 646 | 4 | 646 | 4 | 646 | 4 |
| 2007 | 5053 | 129 | 740 | 4 | 740 | 4 | 740 | 4 |
| 2008 | 4396 | 124 | 447 | 5 | 447 | 5 | 190 | 2 |
| 2009 | 8648 | 334 | 1221 | 11 | 1221 | 11 | 1076 | 9 |
| 2010 | 7931 | 328 | 779 | 8 | 779 | 8 | 528 | 4 |
| 2011 | 8138 | 326 | 585 | 7 | 445 | 6 | 375 | 4 |

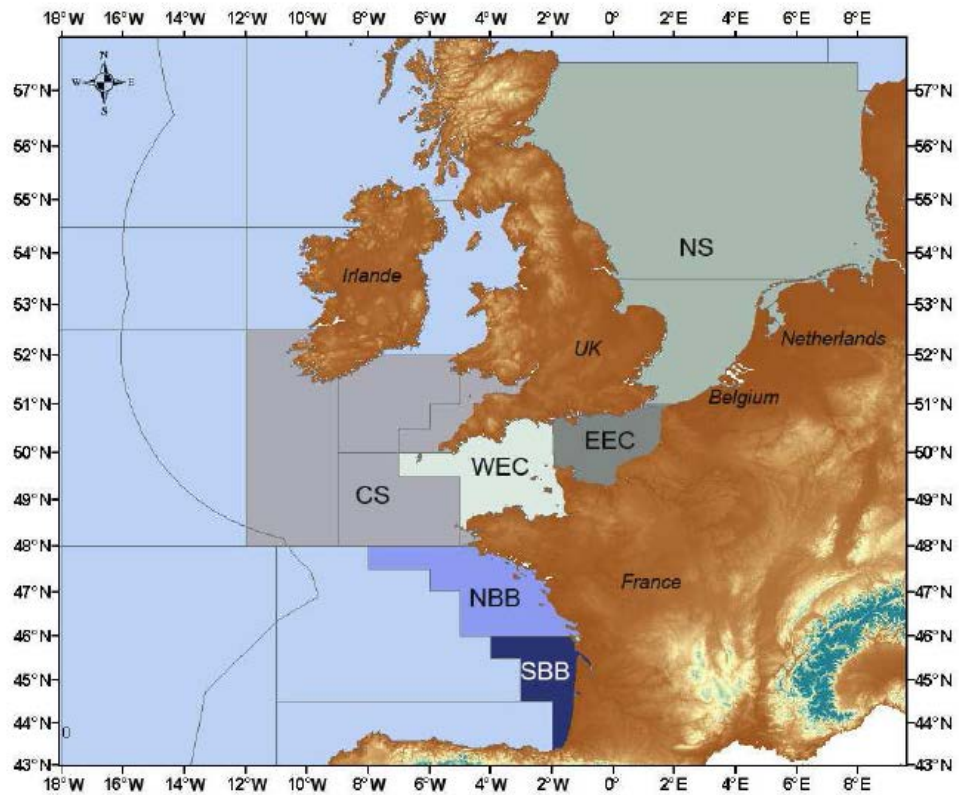


Figure 5.1. Striped red mullet. Map divided into 6 geographic sectors.

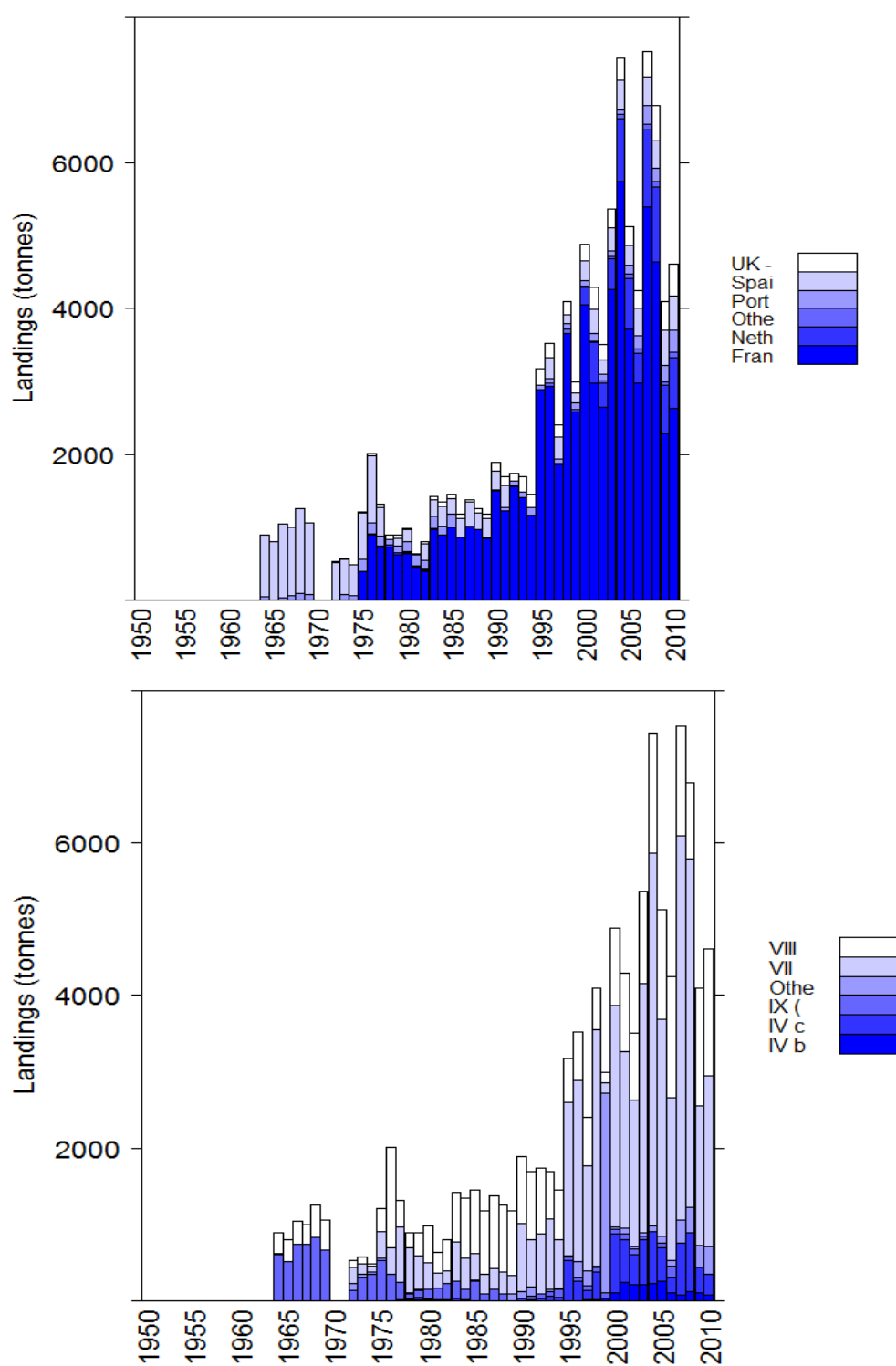


Figure 5.2. Striped red mullet. Landings per country (top panel) and per ICES area (bottom panel). As officially reported.

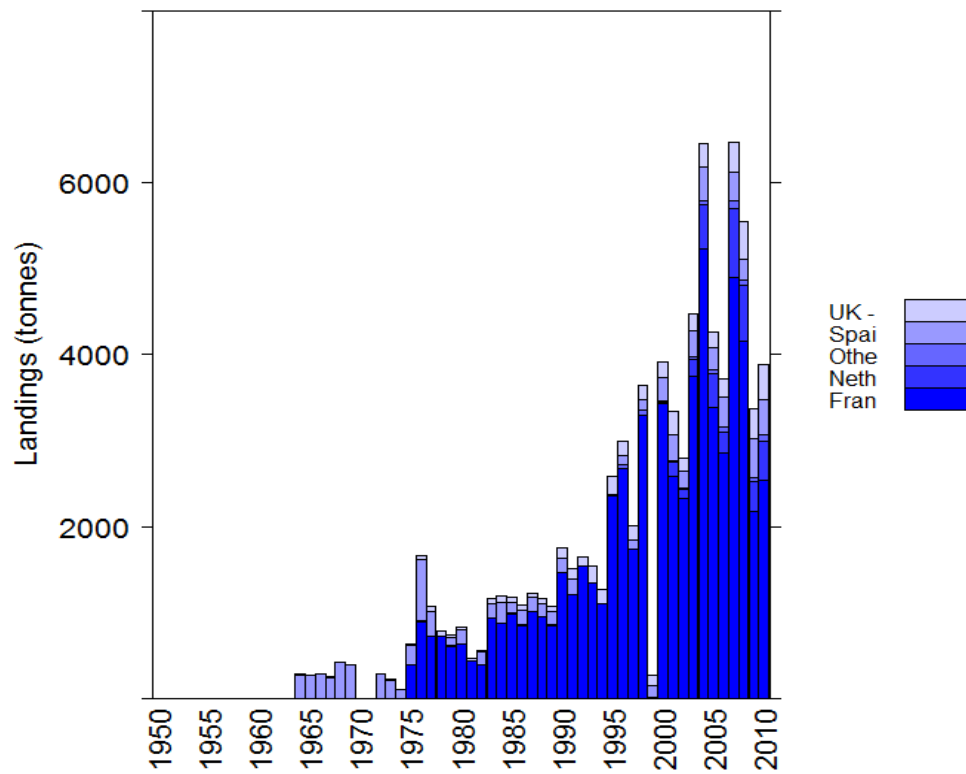


Figure 5.3. Striped red mullet. Landings in ICES area VIIId by country. As officially reported.

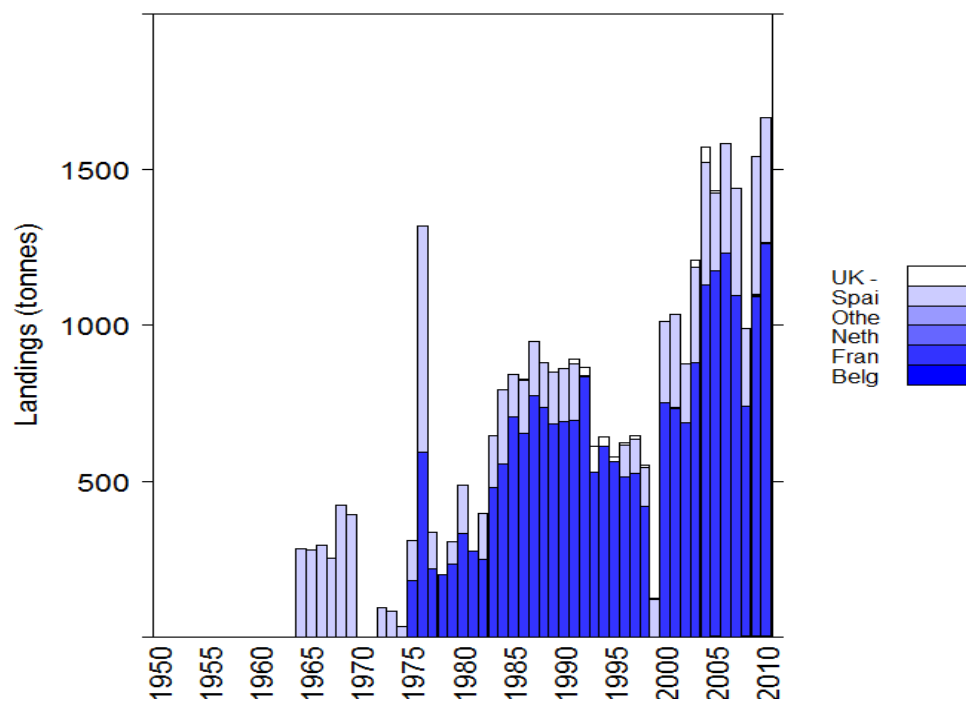


Figure 5.4. Striped red mullet. Landings in ICES area VIII by country. As officially reported.

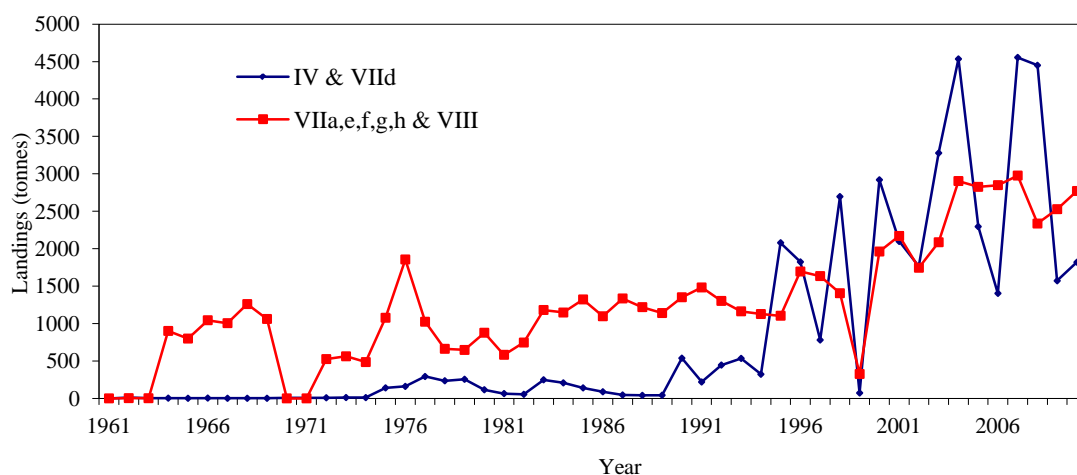


Figure 5.5. Striped red mullet. Landings from 1960 to 2010 in the north zone (ICES areas : VIIId and IV) and in the south zone (ICES areas : VIIa,d,g,h, j and VIII). As officially reported.

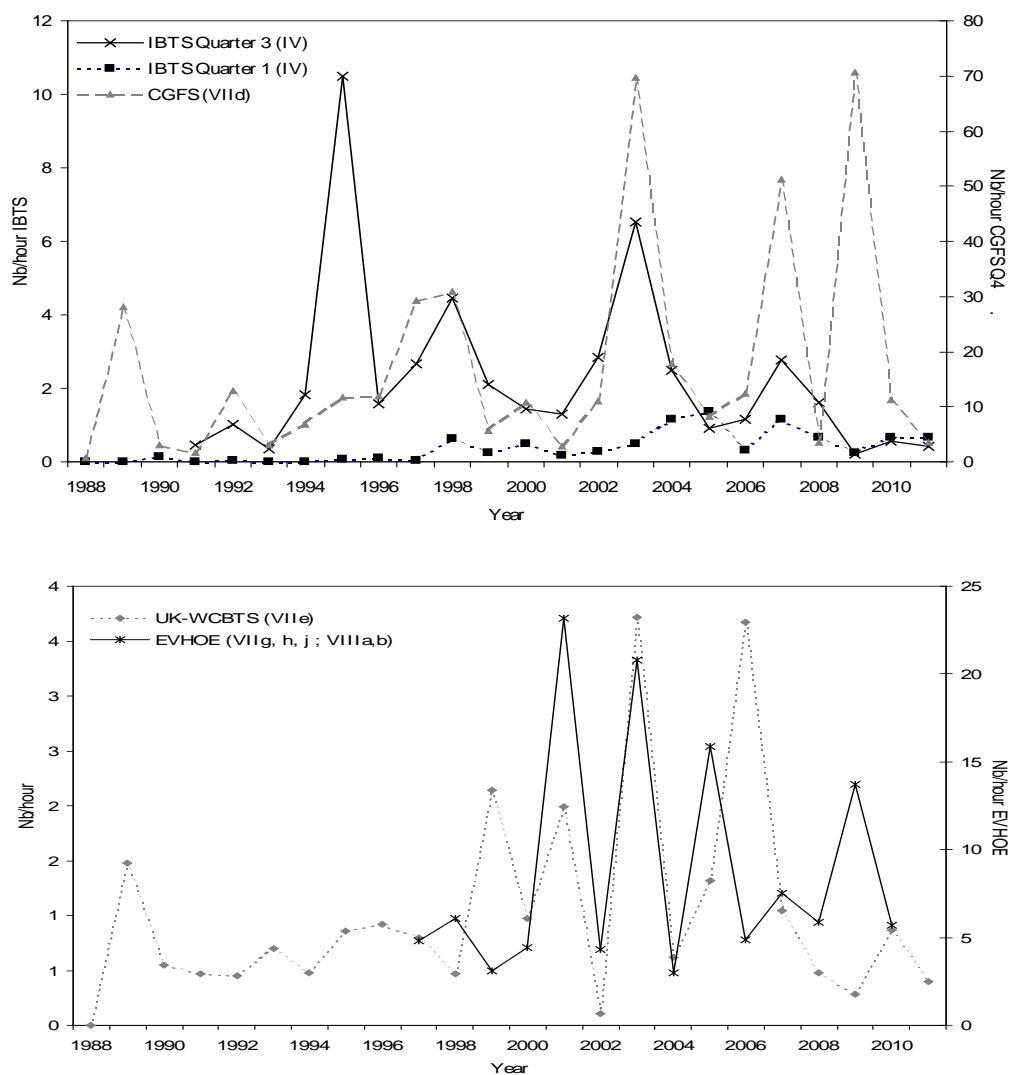


Figure 5.6. Striped red mullet. Time series of abundance (Nb/hour) of striped red mullet base on Surveys (International Bottom Trawl Survey (IBTS, IV), Channel Ground Fish Survey (FR-CGFS, VIIId), UK-WCBTS (VIIe), EVHOE-WIBTS survey (VIIg, h, j ; VIIla,b) from 1988 to 2011.

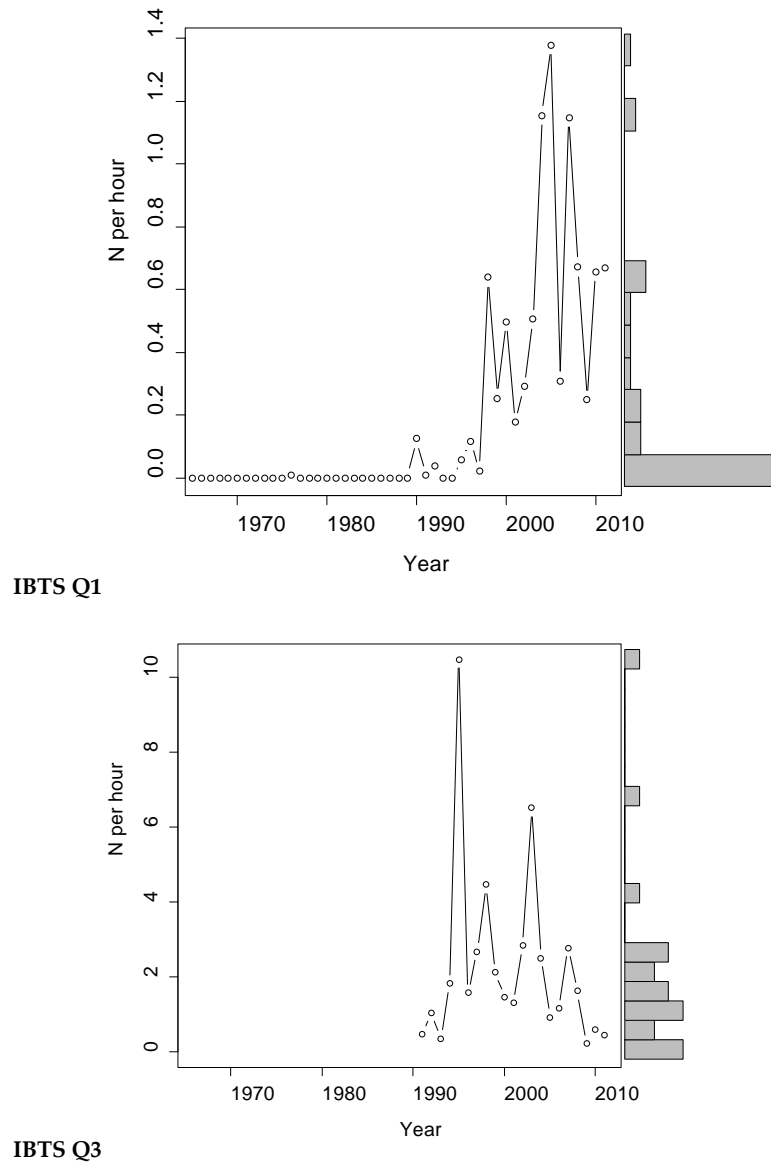
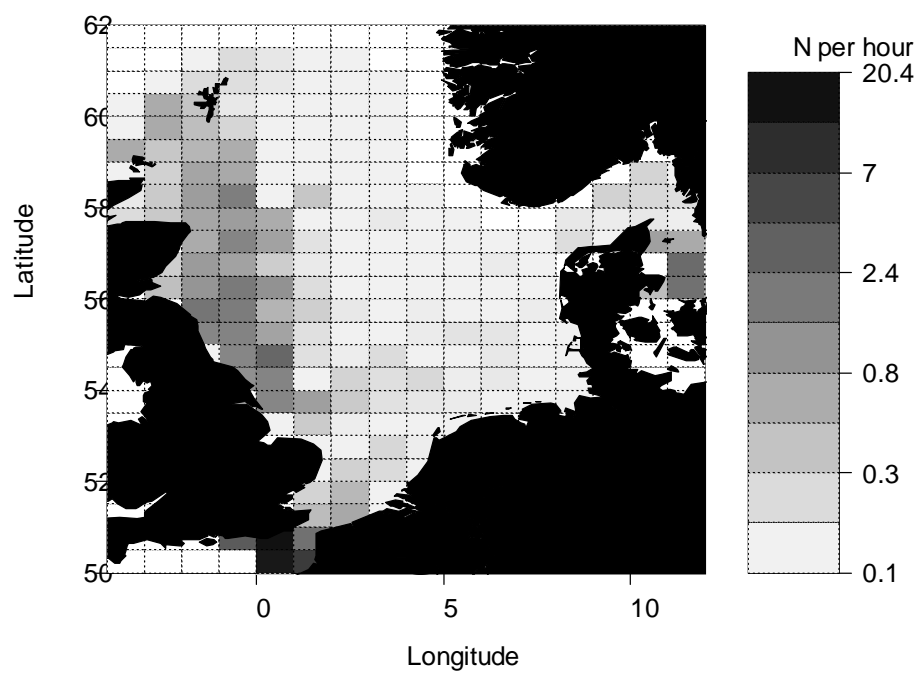
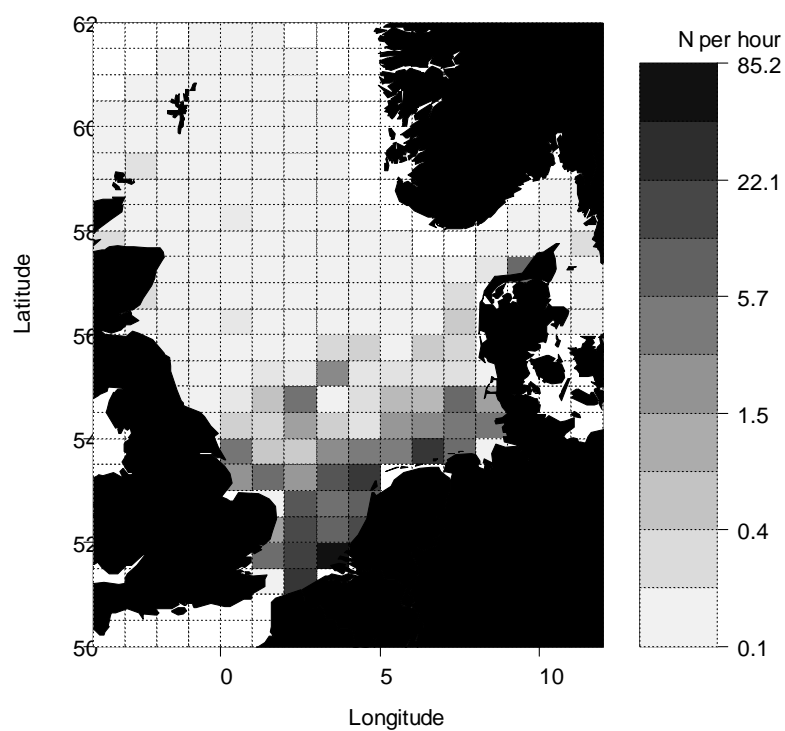


Figure 5-7. Striped red mullet. Time series of abundance (Nb/hour) of striped red mullet base on International Bottom Trawl Survey (IBTS, IV) during Q1 (top panel) and Q3 (bottom panel), Width of grey rectangle is proportional to the occurrence of striped red mullet.



IBTS Q1



IBTS Q3

Figure 5.8. Striped red mullet. Map of abundance index (Nb/hour) of striped red mullet during the IBTS survey Q1 (top panel) and Q3 (bottom panel).

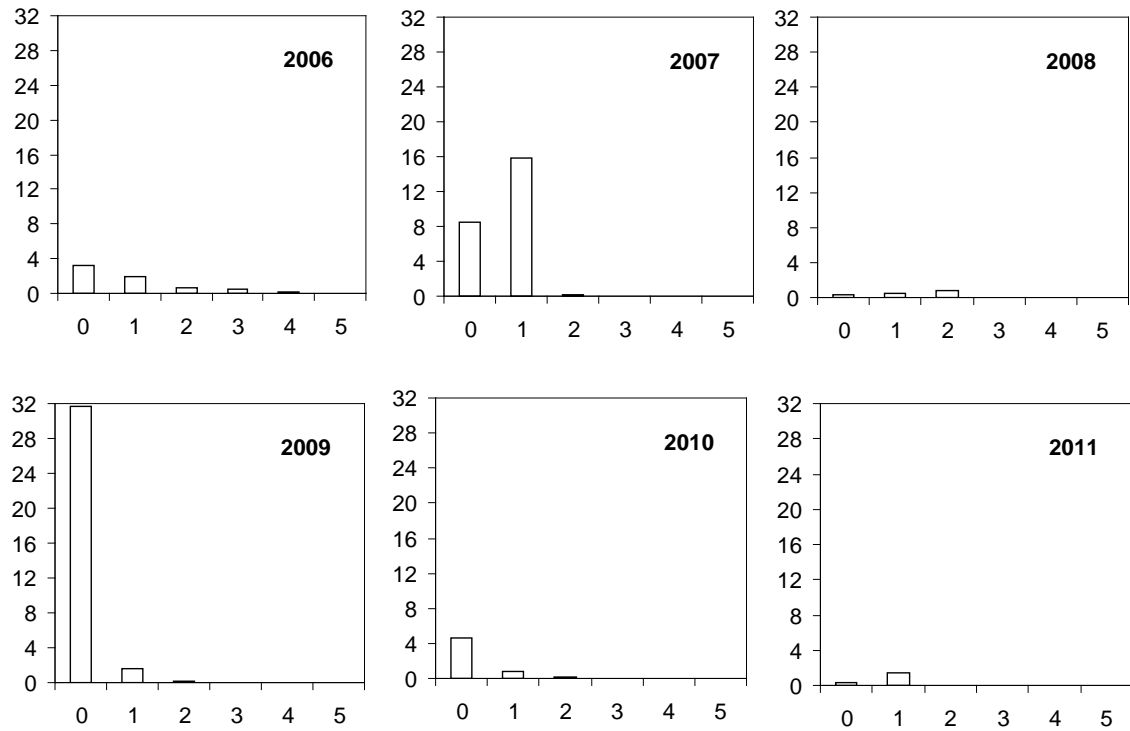


Figure 5.9. Striped red mullet. Abundance indices (Nb/30 min Trawl) of striped red mullet per age class (Length, cm.) during FR-CGFS from 2006 to 2011.

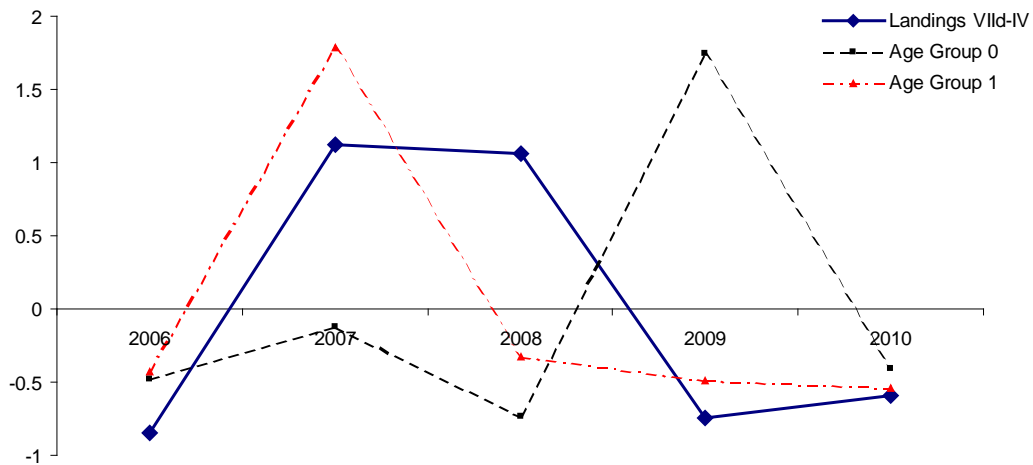


Figure 5.10. Striped red mullet. Mean standardised of Abundance indices base on CGFS survey (ICES Subarea VIIId) from 2006 to 2010 per age class and total landings (ICES Subareas VIIId-IV) of striped red mullet.

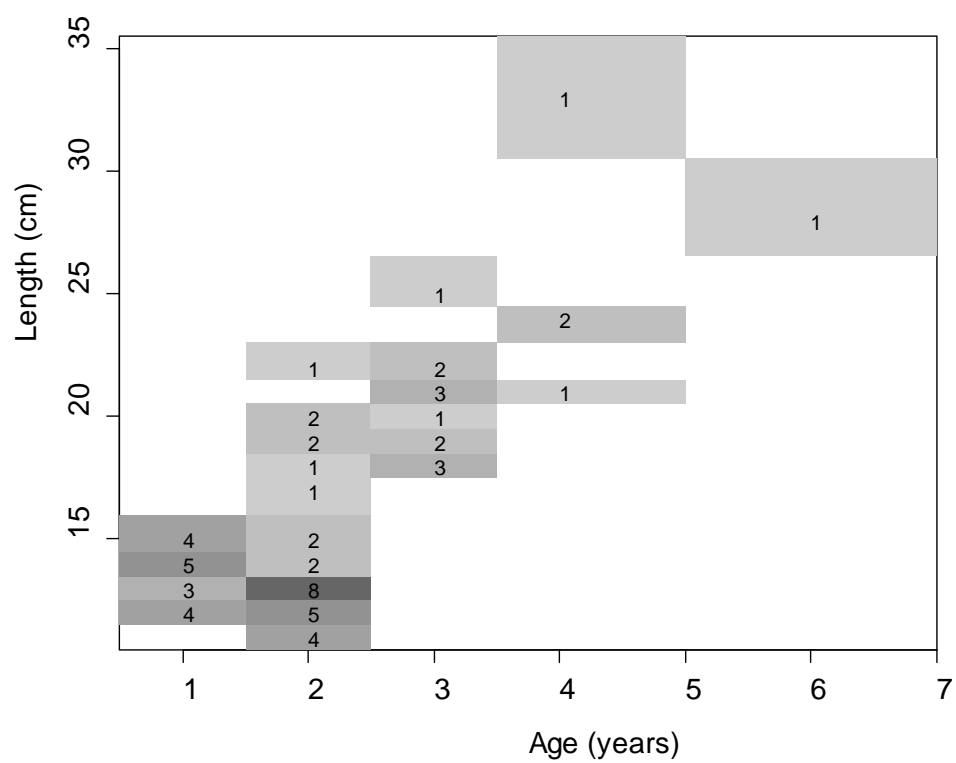


Figure 5.11. Striped red mullet. Age Length Key of striped red mullet in the north Sea during the IBTS-Q1 survey.

6 Red gurnard

6.1 General Biology

The main biological features known for red gurnard (*Aspitrigla (Chelidonichthys) cuculus*) are described in annex 3. This species is widely distributed in North-East Atlantic from South Norway and North of the British Isles to Mauritania on grounds between 20 and 250 m. This benthic species is abundant in the Channel (VIIde) and on the shelf West of Brittany (VII h, VIII a), living on gravel or coarse sand. In the Channel, the size at first maturity is ~25 cm at 3 years old.

6.2 Stock identity and possible assessments areas

A compilation of datasets from the IBTS and BTS surveys undertaken within the project 'Atlas of the marine fishes of the northern European shelf' (Heessen *et al.*, WD 1) has produced a distribution map of red gurnard (Figure 6.1). Higher occurrences of red gurnard with patchy distribution have been observed along the Western Approaches from the Shetlands Islands to the Celtic Seas and the Channel.

A distribution patch crossing the Channel and the West of Brittany does not militate for a separation of the Divisions VII d from VII e and VII h. Therefore a split of the population between the Ecoregions do not seem appropriate.

Further investigations are needed to progress on stocks boundaries such as morphometric studies, tagging and genetic population studies.

6.3 Management regulations

There is currently no technical measure specifically applied to red gurnard or other gurnard species. The exploitation of red gurnard is submitted to the general regulation in the areas where they are caught. There is no minimum landing size set.

6.4 Fisheries data

Red gurnard is mainly caught as by-catch by demersal trawlers in mixed fisheries, mainly in Divisions IV b c, VIId j and VIII a,b.

6.4.1 Historical landings

Official landings reported at ICES are available in table 6.1 and shown in Figures 6.2 and 6.3. Before 1977, red gurnard was not specifically reported. In the past the species of gurnards were not always reported by species and data for Triglidae also occurred.

French data are unavailable in 1981 and 1999. International landings have fluctuated between 4 000 t 6500 t since 2000. France is the main contributor of so-called 'red gurnard'.

The main area of production is the ICES area VII. In 1999 and 2001, higher productions from the Netherlands in IVbc are recorded.

A focus on the recent years 2000–2010 of the Official landings by Division and country is shown in the Stock Annex. In the North Sea red gurnard is mainly harvested in Divisions IVb,c. A continuous area which comprises The Channel, the shelf West of Brittany and the North of Bay of Biscay produces the bulk of International landings and the Divisions VIId,e are the main contributing areas.

For Spain, landings reported by ICES Divisions are mainly available for all species of gurnards combined and not usable specifically for red gurnard.

6.4.2 Discards

French discards data for gurnards have been recorded from at-sea observers within the EU Data Collection Framework. For the French trawlers, the 2010 length compositions of the catch of red gurnard in Divisions VIId and VIIe have been estimated using the COST R packages. In the Stock Annex are shown the intensity of sampling and the length compositions of landings and discards and their confidence intervals.

The erratic length structure in the 2nd quarter (Figures 6.4 and 6.5) shows that the sampling level is not yet at the optimum. The discards rate is estimated at 63% and 55% in VIId and VIIe respectively.

In the table below are shown the numbers per hour of discarded non-target fish species in Dutch bottom-trawl fisheries in North Sea and Eastern Channel for the series 2006–2010. The rates are generally very low even for the beam trawlers using a smaller mesh size.

| Métier Mesh size Species | TBB_DEF 70-99 | TBB_DEF* 70-99 | TBB_DEF 100-119 | OTB_MCD 70-99 | OTB_DEF 70-99 | OTB_DEF 100-119 |
|--------------------------------|------------------|-------------------|--------------------|------------------|------------------|--------------------|
| 2006 Red gurnard | 2.2 | | | | 0 | |
| 2007 Red gurnard | 0.4 | | | | | |
| 2008 Red gurnard | <0.1 | | | | | |
| 2009 Red gurnard | 0 | 0 | 0 | 0 | <0.5 | 0 |
| 2010 Red gurnard | 2 | 0 | 0 | 0 | 0 | 0 |

*≤300 hp segment

From the Portuguese programme of observers at sea under DCF, a time series 2004–2011 of length compositions of sampled red gurnards discarded in IXa is shown in table 1. The number of measured fish has decreased in last years.

6.4.3 Catch and effort data by sea area and country

The French Statistics database has been redesigned in 2009, occasioning strong disturbance in that particular year. Concurrently, an engineering system has been developed to merge all information from logbooks, sales notes and VMS for each fishing trips. This promising system will soon be mature enough to work the French statistics back in time, where the VMS could be included to better spatialize the catches back to 2005 (year of implementation of the VMS). In the mean time there is no updating of the series presented in previous reports and those previous values are shown in the stock annex.

6.5 Survey data, recruit series

The time series of the IBTS-Q1 survey in the North Sea and the French EVHOE-WIBTS survey in the Celtic Sea and Bay of Biscay and CGFS in Division VIId have been analysed during the NESPMAN project and presented in the previous report. These Figures have been updated. Results from the Portuguese PGFS in Division IXa are also presented.

- IBTS-Q1 series

Before 2006, red gurnard was scarce in North Sea and the abundance index (Nb/hour) was close to 0. The appearance of red gurnard in the index in recent years is in line

with an increase of the abundance in the northern border of the North Sea (Iva). Since then the index has widely fluctuated in a range of low values (Figure 6.6).

- CGFS-Q4 series

Over the time series 1988–2011, the abundance index (Nb/30 mn) has widely fluctuated, peaked in 1994 and has been declining since 2008 (Figure 6.7). The time series of abundance index at length is shown in the stock annex. We can notice the quasi absence of 0 group (under 15 cm) in the catches, 1989 and 2002 excluded.

- EVHOE-WIBTS-Q4 series

Over the time series 1997–2011, the abundance index in Nb or kg/30 mn and their confidence intervals are shown in Figure 6.8. Red gurnard is more abundant in Celtic sea than in Bay of Biscay. In Celtic Sea the index have increased in 2001 and then have fluctuated around this high value and declined in 2011. In Bay of Biscay, the index has shown a small trend to increase with wide fluctuations since 2000.

The distribution maps of red gurnard in the Celtic Sea and the bay of Biscay caught by EVHOE-WIBTS-Q4 survey from 1997 to 2011 are shown in stock annex. Clearly the greater abundance is located offshore of Brittany in the south of Division VIIIh and in the north of Division VIIIa quite in a geographical continuity with Division VIIe where the bulk of the landings comes from.

The time series of abundance index at length from the EVHOE-WIBTS-Q4 survey has been updated and is shown in stock annex. For some years, bimodal distributions from the EVHOE survey series show clearly an abundant 0 group in the period 2001–2005. They are poorly represented in recent years.

The presence in the southern Celtic Sea and northern Bay of Biscay area of younger individuals than seen in the eastern Channel may suggest an eastward migration of the species as it gets older. Data from the western Channel are lacking to improve the resolution of this pattern.

Age reading of red gurnards caught during EVHOE survey has been carried out in 2006 and routinely since 2008. Therefore abundance index at age are available in 2006 and continuously from 2008. They indicate that the individuals caught are mainly of age 1 and 2.

- PGFS series

The PGFS covers the whole Portuguese continental coast, within depths range from 20 to 500 m; Over the time series 2005–2011, the abundance index (NB/hour) has fluctuated at low value (Figure 6.9).

6.6 Biological sampling

There was a lack of regular sampling for red gurnard in commercial landings and discarding to provide series of length or age compositions usable for a preliminary analytical assessment.

Since 2003, under EU DCR sampling programme at sea, length data have been collected, in a sporadic way during the first years by observers at sea but more intensively since 2009 when the new DCF came into force. As mentioned in Section 6.4.2 a first use of the COST tools on the data set available in 2010 has been exploited to produce length compositions of landings and discards for the main metier in Divisions VIIId and e.

Sampling red gurnard at fish market is not carried out in France. The reason is that red gurnard is listed in group 2 (as specified in appendix VII of the Comm. Dec. 2010/93/EU) and the concurrent sampling in place since 2009 in France implies the sampling of all species of Group 1, and a few group 2 species of special interest, such as sea bass, meagre, red mullet, depending on the region.

For surveys, length data were available and age compositions are now available since 2008 at least for the EVHOE-WIBTS-Q4 survey, but this survey is carried out outside the area where the bulk of landings are harvested. The abundance index per age from this survey was obtained by sampling in average ~200 otoliths per annual survey.

6.7 Biological parameters and other research

There is no update of growth parameters presented at WGNEW and available parameters from several authors are summarized in the Stock Annex. They vary widely.

Available length-weight relationships are also shown in Stock Annex.

A maturity ogive is not available and a knife-edge at age 3 is proposed. Biological parameters collected during EVHOE survey since 2008 could provide a first estimate in the Celtic Sea but in a period which does not match with the spawning season.

Natural mortality has not been estimated in the areas studied at this Working Group.

6.8 Analyses of stock trends.

Stocks limits are not currently defined.

Overall, Official catch statistics reported to ICES have shown a decreasing trend over the period 2001–2010 from ~6 500 t to ~4 000 t. One can note that only two high values have been recorded at rather the same level, in 1977 and in 2001 (Figure 1.2).

A focus by Division in recent years 2000–2010 has shown that in VIId the annual catches have fluctuated in a narrow range, ~900 t in 2000 and ~1 500 t in 2010. In VIIe, catches have levelled above ~2 400 t and dropped to ~1 500 t in 2009 and 2010. In Division VIIh, the production has fluctuated around ~500 t. These three Divisions concentrate the major part of the production of red gurnard.

These datasets show a rather consistent signal from landings which show some indication of stability in recent years.

In North Sea, the appearance of red gurnard in the index of the IBTS Survey since 2006 is in line with an increase of the abundance in IVa. Since then the index has widely fluctuated in a range of low values.

In Eastern Channel, the abundance index of the CGFS-Q4 survey has widely fluctuated, peaked in 1994 and has been declining since 2008. Indices at length also show that 0 group (under 15 cm) are generally scarce since 2003.

In Celtic Sea the index of the EVHOE-WIBTS-Q4 survey has increased in 2001 and then have fluctuated around this high value and declined in 2011.

In Bay of Biscay, the index of the EVHOE-WIBTS-Q4 survey have shown since 2000 a small trend to increase with wide fluctuations.

In the combined area Celtic Sea and Bay of Biscay, length abundance indices from EVHOE-WIBTS-Q4 survey have remained at lower values up to 2000 and then they have peaked in 2004. Indices of recruitment (age 0 set under 15 cm) have been also lower from 2008. The stronger year classes shown in 2001, 2002 and 2004 are probably

now almost fished out. The available abundance indices at age from this survey since 2006 have shown rather the same structure from year to year and therefore without signal of any stronger year class.

Along the whole Portuguese continental coast, the abundance index of the PGFS survey has fluctuated at low value.

6.9 Data requirements

Regular sampling of red gurnard catches is continuing by observations at sea under DCF at least to estimate by metier and areas weight and length compositions of retained and discarded catches but the priority given to this species should be discussed taking into account its lower economical importance compared to those of valuable species harvested in the same areas which also need more data for their assessment .

Indices of red gurnard from UK (Scotland) and Irish surveys in the Celtic Seas Ecoregion should be made available.

Extending the studied area by a survey in VIIe and collecting length and age data of red gurnard in the main area of production should help in better understanding the biology and dynamics of this species in the area.

Table 6.1. Red gurnard. Official landings (tonnes) of red gurnard reported to ICES by main areas

| IV | | | | | VI | | | | | |
|------|------|------|------|-----|------|------|------|------|------|-----|
| year | Belg | Fran | Neth | UK | year | Belg | Fran | Irel | Russ | UK |
| 1977 | 0 | 184 | 0 | 0 | 1977 | 0 | 246 | 0 | 0 | 0 |
| 1978 | 0 | 29 | 0 | 0 | 1978 | 0 | 26 | 0 | 0 | 0 |
| 1979 | 0 | 53 | 0 | 0 | 1979 | 0 | 360 | 0 | 0 | 0 |
| 1980 | 0 | 24 | 0 | 0 | 1980 | 0 | 149 | 0 | 0 | 0 |
| 1981 | 0 | 0 | 0 | 0 | 1981 | 0 | 0 | 0 | 0 | 0 |
| 1982 | 0 | 78 | 0 | 0 | 1982 | 0 | 96 | 0 | 0 | 0 |
| 1983 | 0 | 135 | 0 | 0 | 1983 | 0 | 130 | 0 | 0 | 0 |
| 1984 | 0 | 74 | 0 | 0 | 1984 | 0 | 99 | 0 | 0 | 0 |
| 1985 | 35 | 50 | 0 | 0 | 1985 | 0 | 166 | 0 | 0 | 0 |
| 1986 | 0 | 40 | 0 | 0 | 1986 | 0 | 124 | 0 | 0 | 0 |
| 1987 | 74 | 77 | 0 | 0 | 1987 | 1 | 88 | 0 | 0 | 0 |
| 1988 | 61 | 68 | 0 | 0 | 1988 | 1 | 93 | 0 | 0 | 0 |
| 1989 | 107 | 111 | 0 | 7 | 1989 | 1 | 64 | 0 | 0 | 72 |
| 1990 | 59 | 136 | 0 | 24 | 1990 | 0 | 91 | 7 | 0 | 41 |
| 1991 | 19 | 65 | 0 | 25 | 1991 | 0 | 65 | 10 | 0 | 32 |
| 1992 | 11 | 58 | 0 | 30 | 1992 | 0 | 26 | 11 | 0 | 17 |
| 1993 | 20 | 81 | 0 | 28 | 1993 | 1 | 23 | 5 | 0 | 39 |
| 1994 | 19 | 75 | 0 | 32 | 1994 | 0 | 10 | 0 | 0 | 20 |
| 1995 | 14 | 71 | 0 | 42 | 1995 | 0 | 15 | 0 | 0 | 34 |
| 1996 | 17 | 75 | 0 | 23 | 1996 | 0 | 11 | 0 | 0 | 18 |
| 1997 | 10 | 48 | 0 | 6 | 1997 | 0 | 15 | 0 | 0 | 7 |
| 1998 | 12 | 70 | 0 | 0 | 1998 | 0 | 25 | 7 | 0 | 0 |
| 1999 | 11 | 0 | 0 | 0 | 1999 | 0 | 0 | 0 | 2426 | 0 |
| 2000 | 16 | 54 | 45 | 4 | 2000 | 0 | 10 | 0 | 0 | 0 |
| 2001 | 27 | 111 | 1642 | 150 | 2001 | 0 | 6 | 0 | 0 | 19 |
| 2002 | 42 | 43 | 51 | 217 | 2002 | 0 | 7 | 0 | 0 | 46 |
| 2003 | 41 | 39 | 41 | 254 | 2003 | 0 | 2 | 0 | 0 | 29 |
| 2004 | 83 | 27 | 48 | 222 | 2004 | 0 | 2 | 0 | 0 | 23 |
| 2005 | 33 | 26 | 44 | 96 | 2005 | 0 | 8 | 0 | 0 | 10 |
| 2006 | 31 | 12 | 41 | 76 | 2006 | 0 | 17 | 0 | 0 | 16 |
| 2007 | 33 | 18 | 29 | 108 | 2007 | 0 | 7 | 0 | 0 | 14 |
| 2008 | 26 | 15 | 27 | 84 | 2008 | 0 | 6 | 0 | 0 | 25 |
| 2009 | 28 | 35 | 41 | 104 | 2009 | 0 | 5 | 0 | 0 | 92 |
| 2010 | 7 | 38 | 52 | 131 | 2010 | 0 | 1 | 0 | 0 | 146 |

| VIIa | | | | | | | VIIb,c | | | |
|------|------|------|------|-------------|------|----|--------|------|------|----|
| year | Belg | Fran | Irel | Isle of Man | Othe | UK | year | Fran | Irel | UK |
| 1977 | 0 | 134 | 0 | 0 | 0 | 0 | 1977 | 35 | 0 | 0 |
| 1978 | 0 | 58 | 0 | 0 | 0 | 0 | 1978 | 22 | 0 | 0 |
| 1979 | 0 | 113 | 0 | 0 | 0 | 0 | 1979 | 61 | 0 | 0 |
| 1980 | 0 | 79 | 0 | 0 | 0 | 0 | 1980 | 21 | 0 | 0 |
| 1981 | 0 | 0 | 0 | 0 | 0 | 0 | 1981 | 0 | 0 | 0 |
| 1982 | 0 | 30 | 0 | 0 | 0 | 0 | 1982 | 47 | 0 | 0 |
| 1983 | 0 | 14 | 0 | 0 | 0 | 0 | 1983 | 53 | 0 | 0 |
| 1984 | 0 | 21 | 0 | 0 | 0 | 0 | 1984 | 49 | 0 | 0 |
| 1985 | 32 | 49 | 0 | 0 | 0 | 0 | 1985 | 77 | 0 | 0 |
| 1986 | 0 | 36 | 0 | 0 | 0 | 0 | 1986 | 92 | 0 | 0 |
| 1987 | 20 | 30 | 0 | 0 | 0 | 0 | 1987 | 69 | 0 | 0 |
| 1988 | 13 | 15 | 0 | 0 | 0 | 0 | 1988 | 36 | 0 | 0 |
| 1989 | 9 | 13 | 0 | 0 | 0 | 2 | 1989 | 32 | 0 | 0 |
| 1990 | 12 | 14 | 0 | 0 | 0 | 2 | 1990 | 23 | 7 | 1 |
| 1991 | 5 | 50 | 0 | 1 | 0 | 3 | 1991 | 25 | 9 | 0 |
| 1992 | 12 | 23 | 0 | 0 | 0 | 3 | 1992 | 12 | 0 | 0 |
| 1993 | 15 | 10 | 8 | 0 | 0 | 2 | 1993 | 5 | 1 | 0 |
| 1994 | 16 | 8 | 0 | 0 | 0 | 2 | 1994 | 5 | 0 | 0 |
| 1995 | 15 | 4 | 0 | 0 | 0 | 3 | 1995 | 3 | 0 | 2 |
| 1996 | 26 | 5 | 0 | 0 | 0 | 2 | 1996 | 4 | 0 | 3 |
| 1997 | 23 | 5 | 0 | 0 | 0 | 2 | 1997 | 9 | 0 | 1 |
| 1998 | 21 | 2 | 10 | 0 | 0 | 0 | 1998 | 11 | 0 | 0 |
| 1999 | 40 | 0 | 0 | 0 | 0 | 0 | 1999 | 0 | 0 | 0 |
| 2000 | 33 | 6 | 0 | 0 | 1 | 0 | 2000 | 38 | 0 | 0 |
| 2001 | 26 | 15 | 0 | 0 | 0 | 3 | 2001 | 24 | 0 | 14 |
| 2002 | 22 | 12 | 0 | 0 | 0 | 5 | 2002 | 12 | 0 | 6 |
| 2003 | 24 | 2 | 0 | 0 | 0 | 12 | 2003 | 4 | 0 | 2 |
| 2004 | 8 | 0 | 0 | 0 | 0 | 11 | 2004 | 30 | 0 | 2 |
| 2005 | 11 | 2 | 0 | 0 | 0 | 0 | 2005 | 15 | 0 | 0 |
| 2006 | 10 | 0 | 0 | 0 | 0 | 0 | 2006 | 21 | 0 | 0 |
| 2007 | 7 | 0 | 0 | 0 | 0 | 0 | 2007 | 22 | 0 | 0 |
| 2008 | 5 | 0 | 0 | 0 | 0 | 0 | 2008 | 22 | 0 | 1 |
| 2009 | 3 | 0 | 0 | 1 | 0 | 0 | 2009 | 13 | 0 | 0 |
| 2010 | 13 | 0 | 0 | 0 | 0 | 1 | 2010 | 18 | 0 | 0 |

Table 6.1 continued

| VIId | | | | | VIlle | | | | | |
|------|------|------|------|----|-------|------|------|------|------|----|
| year | Belg | Fran | Neth | UK | year | Belg | Chan | Fran | Neth | UK |
| 1977 | 0 | 2112 | 0 | 0 | 1977 | 0 | 0 | 2619 | 0 | 0 |
| 1978 | 0 | 802 | 0 | 0 | 1978 | 0 | 0 | 536 | 0 | 0 |
| 1979 | 0 | 1040 | 0 | 0 | 1979 | 0 | 0 | 2249 | 0 | 0 |
| 1980 | 0 | 1157 | 0 | 0 | 1980 | 0 | 0 | 724 | 0 | 0 |
| 1981 | 0 | 0 | 0 | 0 | 1981 | 0 | 0 | 0 | 0 | 0 |
| 1982 | 0 | 893 | 0 | 0 | 1982 | 0 | 0 | 1693 | 0 | 0 |
| 1983 | 0 | 1701 | 0 | 0 | 1983 | 0 | 10 | 2017 | 0 | 0 |
| 1984 | 0 | 1484 | 0 | 0 | 1984 | 0 | 5 | 631 | 0 | 0 |
| 1985 | 56 | 1384 | 0 | 0 | 1985 | 27 | 6 | 1122 | 0 | 0 |
| 1986 | 0 | 1226 | 0 | 0 | 1986 | 0 | 5 | 2290 | 0 | 0 |
| 1987 | 61 | 977 | 0 | 0 | 1987 | 14 | 3 | 2237 | 0 | 0 |
| 1988 | 75 | 1171 | 0 | 0 | 1988 | 27 | 0 | 1990 | 0 | 0 |
| 1989 | 88 | 1214 | 0 | 0 | 1989 | 22 | 3 | 1642 | 0 | 0 |
| 1990 | 70 | 1574 | 0 | 0 | 1990 | 8 | 3 | 1199 | 0 | 0 |
| 1991 | 71 | 1292 | 0 | 0 | 1991 | 3 | 0 | 2112 | 0 | 0 |
| 1992 | 93 | 1376 | 0 | 0 | 1992 | 11 | 7 | 2106 | 0 | 0 |
| 1993 | 64 | 1143 | 0 | 0 | 1993 | 4 | 0 | 2194 | 0 | 0 |
| 1994 | 68 | 1132 | 0 | 0 | 1994 | 5 | 0 | 2189 | 0 | 0 |
| 1995 | 65 | 1239 | 0 | 0 | 1995 | 7 | 6 | 2199 | 0 | 0 |
| 1996 | 80 | 1424 | 0 | 0 | 1996 | 5 | 10 | 2269 | 0 | 0 |
| 1997 | 67 | 1178 | 0 | 0 | 1997 | 7 | 8 | 2614 | 0 | 0 |
| 1998 | 90 | 1000 | 0 | 0 | 1998 | 10 | 6 | 2303 | 0 | 0 |
| 1999 | 97 | 0 | 0 | 0 | 1999 | 0 | 10 | 0 | 0 | 0 |
| 2000 | 94 | 800 | 0 | 0 | 2000 | 2 | 0 | 2499 | 0 | 0 |
| 2001 | 107 | 1119 | 63 | 0 | 2001 | 6 | 0 | 2575 | 2 | 0 |
| 2002 | 98 | 1183 | 2 | 0 | 2002 | 6 | 15 | 2968 | 0 | 0 |
| 2003 | 162 | 1043 | 4 | 0 | 2003 | 24 | 15 | 2728 | 0 | 0 |
| 2004 | 133 | 1005 | 14 | 0 | 2004 | 45 | 15 | 2436 | 0 | 0 |
| 2005 | 143 | 1039 | 16 | 0 | 2005 | 45 | 0 | 2951 | 0 | 0 |
| 2006 | 171 | 898 | 16 | 17 | 2006 | 73 | 10 | 2714 | 0 | 6 |
| 2007 | 191 | 971 | 35 | 32 | 2007 | 62 | 3 | 2603 | 2 | 3 |
| 2008 | 223 | 894 | 64 | 55 | 2008 | 60 | 10 | 2382 | 1 | 0 |
| 2009 | 153 | 971 | 105 | 63 | 2009 | 21 | 0 | 1513 | 14 | 2 |
| 2010 | 159 | 1116 | 177 | 79 | 2010 | 34 | 2 | 1546 | 22 | 4 |

| VIIf-k | | | | | VIIf | | | | | |
|--------|------|------|------|----|------|------|------|------|------|----|
| year | Belg | Fran | Irel | UK | year | Belg | Fran | Neth | Port | UK |
| 1977 | 0 | 1756 | 0 | 0 | 1977 | 0 | 237 | 0 | 0 | 0 |
| 1978 | 0 | 458 | 0 | 0 | 1978 | 0 | 39 | 0 | 0 | 0 |
| 1979 | 0 | 1455 | 0 | 0 | 1979 | 0 | 289 | 0 | 0 | 0 |
| 1980 | 0 | 1227 | 0 | 0 | 1980 | 0 | 106 | 0 | 0 | 0 |
| 1981 | 0 | 0 | 0 | 0 | 1981 | 0 | 0 | 0 | 0 | 0 |
| 1982 | 0 | 538 | 0 | 0 | 1982 | 0 | 80 | 0 | 0 | 0 |
| 1983 | 0 | 557 | 0 | 0 | 1983 | 0 | 183 | 0 | 0 | 0 |
| 1984 | 0 | 187 | 0 | 0 | 1984 | 0 | 413 | 0 | 0 | 0 |
| 1985 | 29 | 639 | 0 | 0 | 1985 | 0 | 211 | 0 | 0 | 0 |
| 1986 | 0 | 852 | 0 | 0 | 1986 | 0 | 241 | 0 | 0 | 0 |
| 1987 | 31 | 748 | 0 | 0 | 1987 | 2 | 332 | 0 | 0 | 0 |
| 1988 | 21 | 759 | 0 | 0 | 1988 | 0 | 274 | 0 | 0 | 0 |
| 1989 | 21 | 657 | 0 | 0 | 1989 | 2 | 236 | 0 | 0 | 0 |
| 1990 | 18 | 634 | 0 | 0 | 1990 | 0 | 206 | 0 | 0 | 0 |
| 1991 | 11 | 667 | 0 | 0 | 1991 | 0 | 189 | 0 | 0 | 0 |
| 1992 | 13 | 533 | 0 | 0 | 1992 | 1 | 190 | 0 | 0 | 0 |
| 1993 | 9 | 513 | 2 | 0 | 1993 | 2 | 153 | 0 | 0 | 0 |
| 1994 | 9 | 640 | 0 | 0 | 1994 | 1 | 224 | 0 | 0 | 0 |
| 1995 | 13 | 721 | 0 | 0 | 1995 | 2 | 165 | 0 | 0 | 0 |
| 1996 | 14 | 789 | 0 | 0 | 1996 | 3 | 174 | 0 | 0 | 0 |
| 1997 | 18 | 731 | 0 | 0 | 1997 | 2 | 176 | 0 | 0 | 0 |
| 1998 | 23 | 885 | 0 | 0 | 1998 | 1 | 191 | 0 | 0 | 0 |
| 1999 | 12 | 0 | 0 | 0 | 1999 | 1 | 0 | 0 | 0 | 0 |
| 2000 | 8 | 1051 | 0 | 0 | 2000 | 1 | 143 | 0 | 0 | 0 |
| 2001 | 12 | 1073 | 0 | 0 | 2001 | 1 | 141 | 3 | 0 | 0 |
| 2002 | 17 | 1044 | 0 | 1 | 2002 | 1 | 152 | 0 | 0 | 0 |
| 2003 | 27 | 1146 | 0 | 0 | 2003 | 1 | 166 | 0 | 0 | 0 |
| 2004 | 47 | 1576 | 0 | 0 | 2004 | 2 | 169 | 0 | 0 | 8 |
| 2005 | 49 | 1357 | 0 | 0 | 2005 | 2 | 203 | 0 | 0 | 3 |
| 2006 | 27 | 1111 | 0 | 0 | 2006 | 1 | 218 | 0 | 0 | 0 |
| 2007 | 33 | 1103 | 0 | 0 | 2007 | 1 | 202 | 0 | 0 | 0 |
| 2008 | 37 | 1037 | 0 | 0 | 2008 | 2 | 93 | 0 | 0 | 0 |
| 2009 | 20 | 1135 | 0 | 0 | 2009 | 2 | 139 | 0 | 1 | 0 |
| 2010 | 22 | 999 | 0 | 0 | 2010 | 3 | 133 | 0 | 0 | 0 |

Table 6.1 continued

| IX year | Port | Spai |
|------------|------|------|
| 1977 | 0 | 0 |
| 1978 | 0 | 0 |
| 1979 | 0 | 0 |
| 1980 | 0 | 0 |
| 1981 | 0 | 87 |
| 1982 | 0 | 0 |
| 1983 | 0 | 0 |
| 1984 | 0 | 0 |
| 1985 | 0 | 0 |
| 1986 | 0 | 0 |
| 1987 | 1 | 0 |
| 1988 | 0 | 0 |
| 1989 | 0 | 0 |
| 1990 | 0 | 0 |
| 1991 | 0 | 0 |
| 1992 | 0 | 0 |
| 1993 | 0 | 0 |
| 1994 | 0 | 0 |
| 1995 | 0 | 0 |
| 1996 | 0 | 0 |
| 1997 | 0 | 0 |
| 1998 | 0 | 0 |
| 1999 | 0 | 0 |
| 2000 | 0 | 0 |
| 2001 | 0 | 0 |
| 2002 | 0 | 0 |
| 2003 | 0 | 0 |
| 2004 | 0 | 0 |
| 2005 | 46 | 0 |
| 2006 | 124 | 0 |
| 2007 | 125 | 0 |
| 2008 | 109 | 0 |
| 2009 | 148 | 0 |
| 2010 | 114 | 0 |

Table 6.2. Red gurnard. Time series of Portuguese datasets collected under DCF. Length composition of samples of red gurnard discarded by OTB-DEF operating in Division IXa, from trips observed at sea.

| Length cm | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|-----------|------|------|------|------|------|------|------|------|
| 5 | 2 | | | | | | | |
| 6 | 3 | | | | 1 | | | |
| 7 | 17 | | | | | | | |
| 8 | 4 | | 1 | | | | | |
| 9 | 3 | | | | | | | |
| 10 | 3 | | | | | | | |
| 11 | 6 | 1 | | | | | | |
| 12 | 18 | 0 | | | 1 | | 1 | |
| 13 | 21 | 3 | | | | 2 | 1 | |
| 14 | 8 | 2 | | | 1 | 2 | 1 | |
| 15 | 6 | 8 | | | | 1 | 1 | |
| 16 | 8 | 11 | 2 | 1 | 10 | | 1 | |
| 17 | 8 | 2 | 1 | | 10 | 2 | 1 | |
| 18 | 1 | 6 | 1 | | | | 1 | 2 |
| 19 | 1 | 1 | 2 | | 3 | | 2 | 4 |
| 20 | 4 | | 4 | 3 | 1 | | 3 | 2 |
| 21 | 2 | 4 | 2 | 1 | 3 | | 5 | 3 |
| 22 | 3 | 5 | 2 | 1 | 1 | 1 | 4 | 5 |
| 23 | 2 | | 2 | | 2 | | 3 | 1 |
| 24 | 1 | | | | | | 2 | |
| 25 | | 1 | | | | | | 1 |
| Total | 121 | 44 | 17 | 6 | 33 | 8 | 26 | 18 |

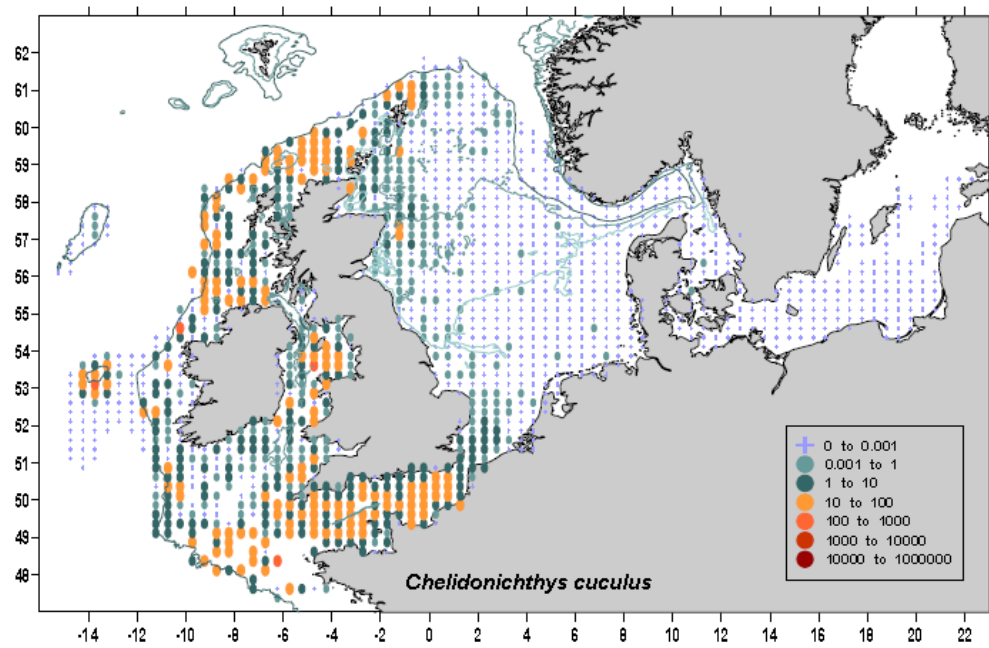


Figure 6.1. Red gurnard. Distribution map of red gurnard in the northern European shelf (From WD1; Annex 2)

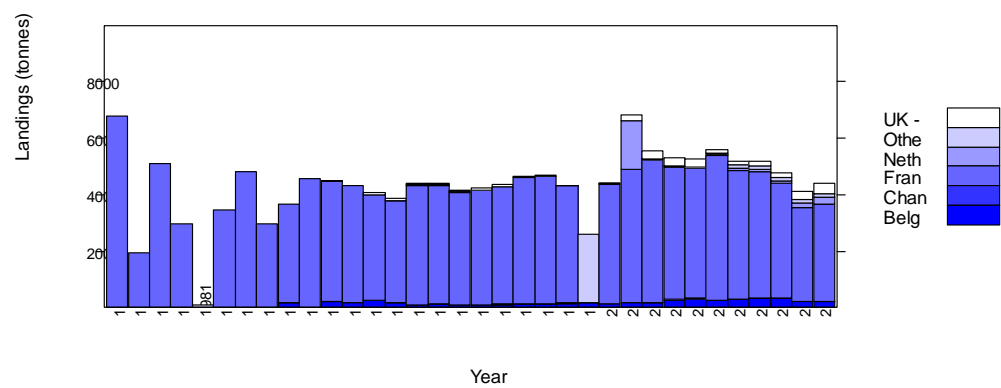


Figure 6.2. Red gurnard. Official landings reported to ICES of Red gurnard by country.

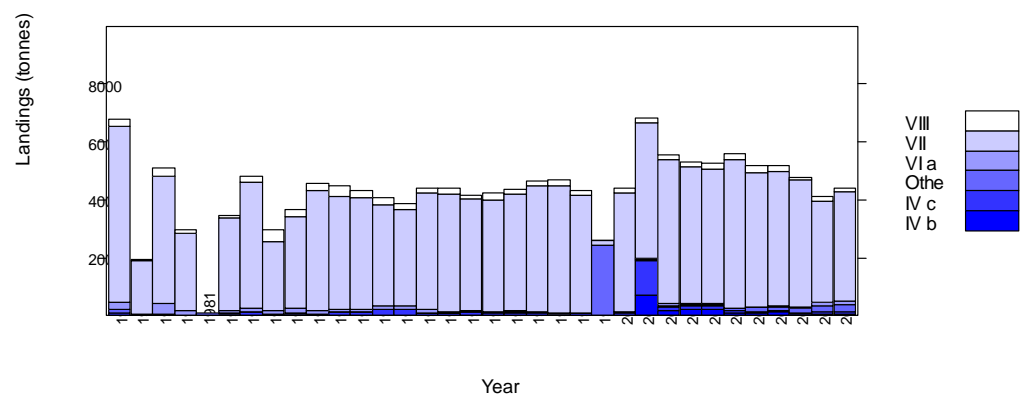


Figure 6.3. Red gurnard Official landings reported to ICES of Red gurnard by area.

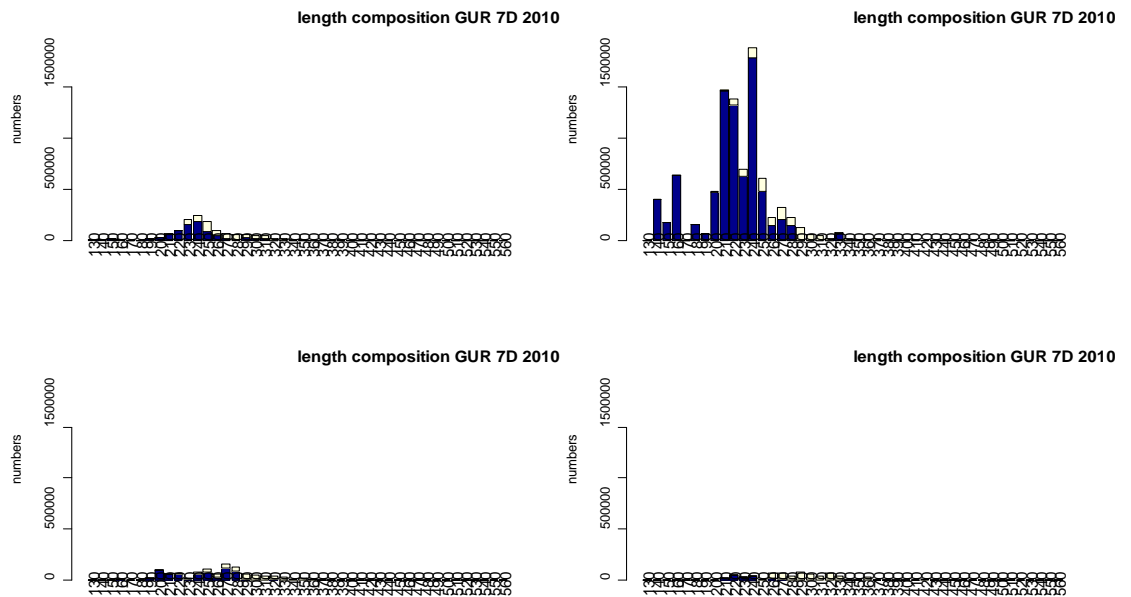


Figure 6.4. Red gurnard. Quarterly length compositions of the 2010 French catch of red gurnard in VIId of OT_DEF strata composed of 711 t of landings and 1215 t estimated of discards. Histogram of discards in dark blue.

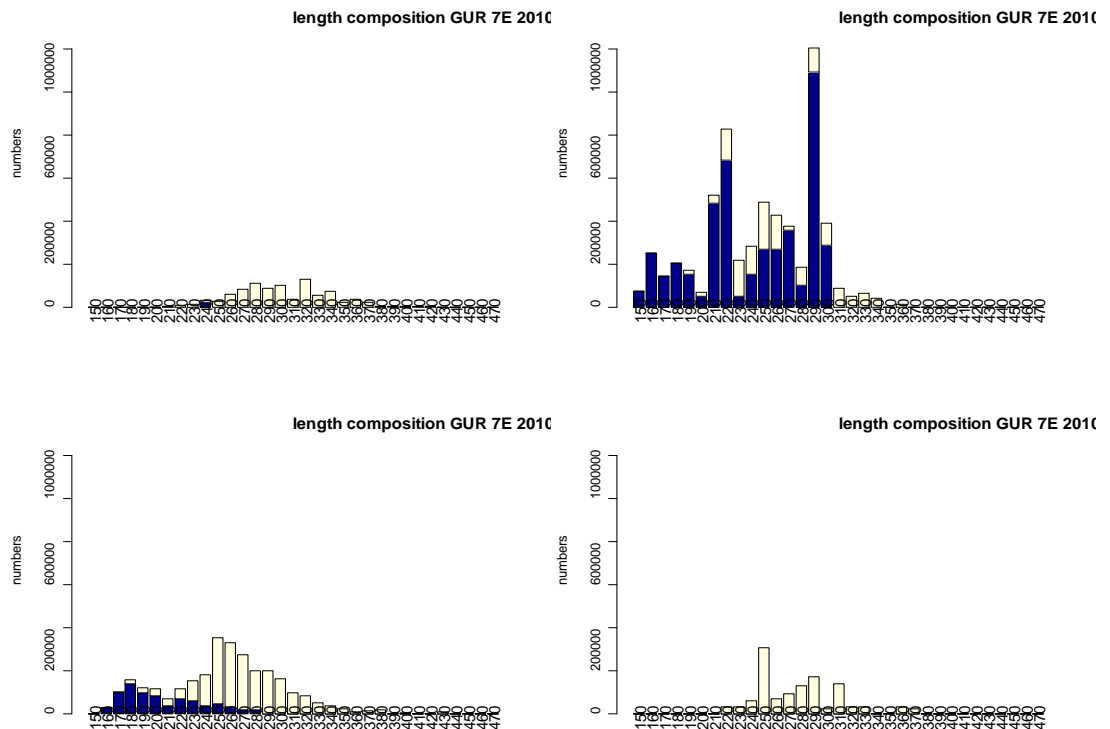


Figure 6.5. Red gurnard. Quarterly length compositions of the 2010 French catch of red gurnard in VIIe of OT_DEF strata composed of 1340 t of landings and 1632 t estimated of discards. Histogram of discards in dark blue.

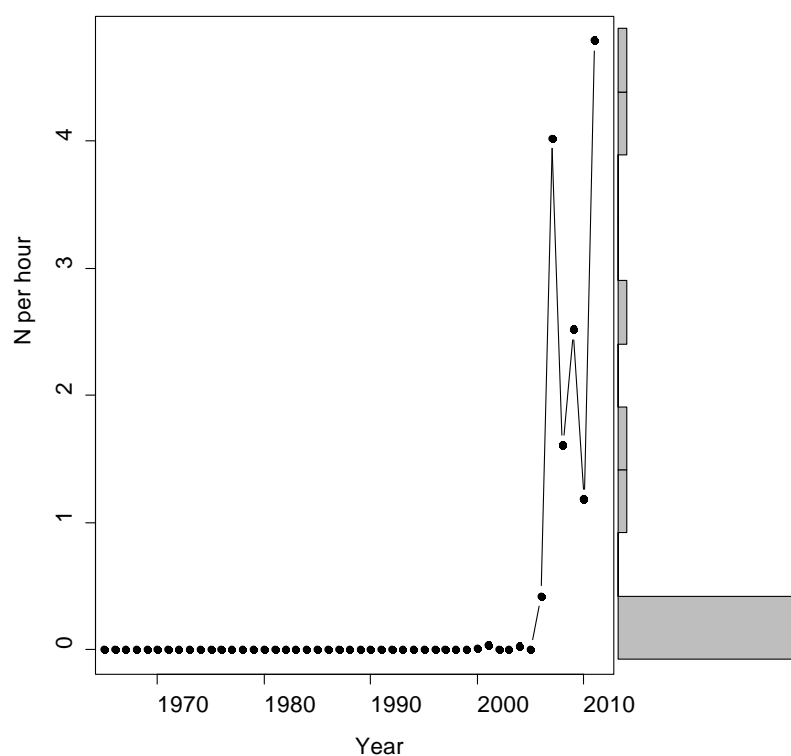


Figure 6.6. Red gurnard. Time series of abundance index of red gurnard from IBTS-Q1 in the North Sea.

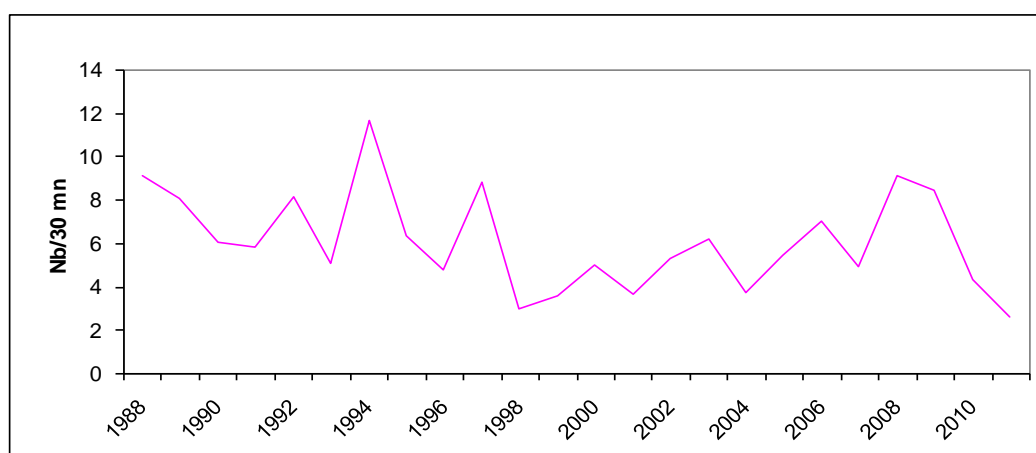


Figure 6.7. Red gurnard. Time series of abundance index of red gurnard from CGFS-Q4 series in VIIId.

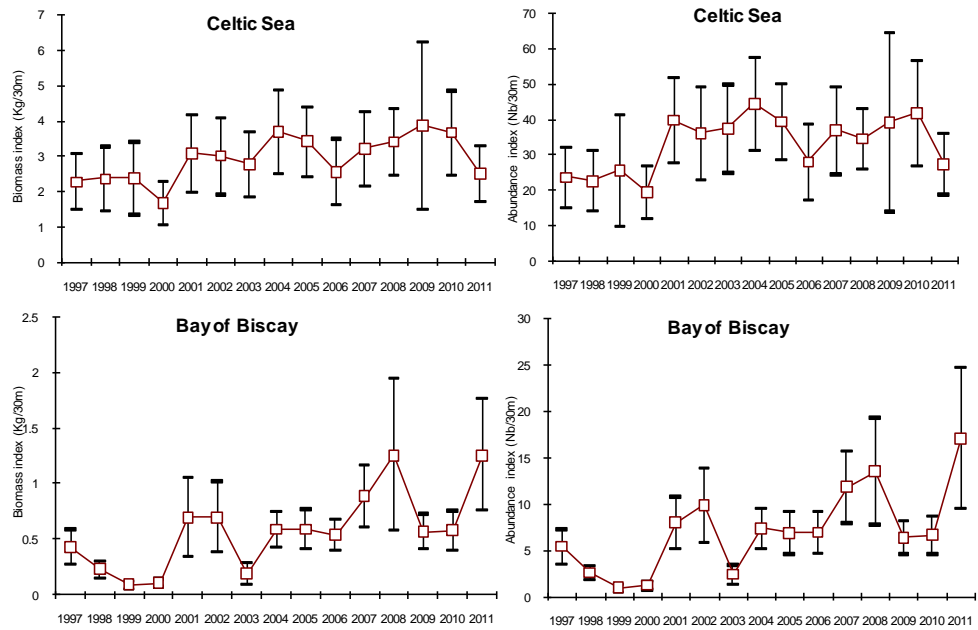


Figure 6.8. Red gurnard. Time series of abundance index (Nb and Weight(kg)/30 min) of red gurnard in the Celtic Sea and in the Bay of Biscay from EVHOE-WIBTS-Q4 survey.

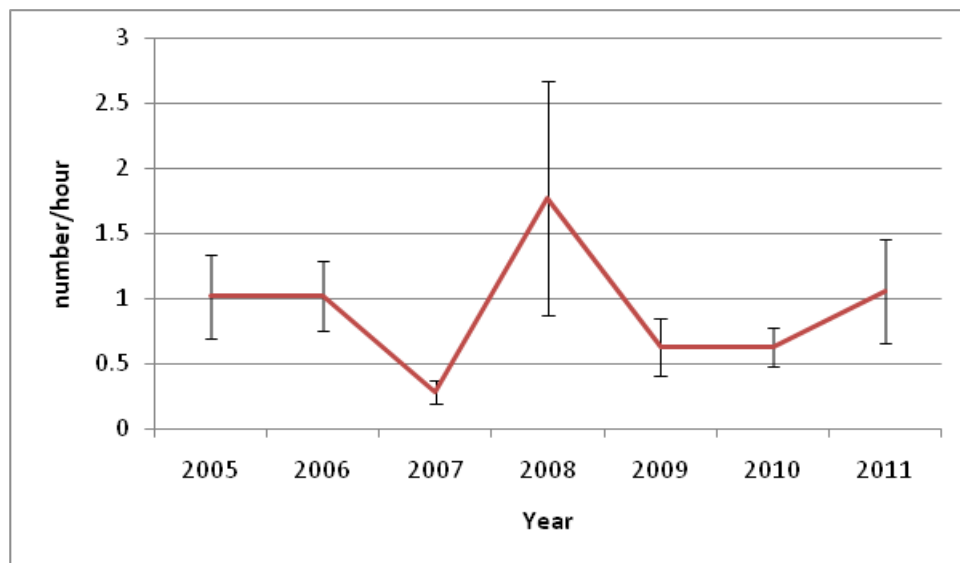


Figure 6.9. Red gurnard. Time series of abundance index of red gurnard from the PGFS survey in Division IXa.

7 Grey gurnard

7.1 General biology

Grey gurnard *Eutrigla gurnardus* occurs in the Eastern Atlantic from Iceland, Norway, southern Baltic, and North Sea to southern Morocco, Madeira. It is also found in the Mediterranean and Black Seas.

In the North Sea and in Skagerrak/Kattegat, grey gurnard is an abundant demersal species. In the North Sea, the species may form dense semi-pelagic aggregations in winter to the northwest of the Dogger Bank, in summer it is more widespread. The species is less abundant in the Channel, the Celtic Sea and in the Bay of Biscay.

Spawning takes place in spring and summer. There do not seem to be clear nursery areas. Grey gurnard can reach a maximum length of approximately 50 cm.

7.2 Stock ID and possible assessment areas

No studies are known of the stock ID of grey gurnard. The observations reported at the WGNEW2010 (ICES, 2010) which have not led to separate stocks are in the stock annex.

The individual behaviour of grey gurnard does not militate to maintain the population in a single stock. In a pragmatic approach, the population could be split between 3 Ecoregions: North Sea including VIIId, Celtic Seas and South European Atlantic. This proposal should be discussed considering the low levels of catches reported in recent years in Celtic Seas and South European Atlantic.

7.3 Management regulations

There is no minimum landing size for this species and there is no TAC.

7.4 Fisheries data

7.4.1 Historical landings

In the past, gurnards were often not sorted by species when landed and reported into one generic category of "gurnards". In recent years the official statistics seem to improve gradually, however, also obvious that the catch statistics are incomplete for several years: some countries reporting no landings at all, other countries reporting exceptionally high landings (Table 7.1–7.3; Figure 7.1, 7.2).

Official landings reported by Ecoregion are shown in Figure 7.3.

Grey gurnard from the North Sea is mainly landed for human consumption purposes. North Sea landings decreased gradually before World War II. After an initial post-war peak of 4000 t, annual landings stayed well below 2000 t until the early 1980s, when annual catches increased to around 40 000 t (Figure) because of Danish landings for reduction purposes. In the same period, however, there was some misreporting as well. After a few years the Danish landings dropped again to a low level. The Netherlands did not report gurnards during the years 1984–1999. Recent international landings have been very low at around 300 to 500 t per year only. The average 2000–2010 is at 361 t.

In Celtic Seas, influenced by high landings reported by Russia in VIb in the period 2000–2006, the production of grey gurnard peaked above 20 000 t. In average the total

catches in VIa were around 3 t since 2000. In area VII (without VIId), in average 65 t of grey gurnard have been reported since 2000.

In South European Atlantic (VIII and IX), official landings have fluctuated at low level and were in average 63 t since 2000.

Historically, grey gurnard is mainly taken as a by-catch in mixed demersal fisheries for flatfish and roundfish. However, the market is limited and the larger part of the catch appears to be discarded (see also stock Annex). Owing to the low commercial value of this species, landings data will usually not reflect the actual catches very well.

7.4.2 Discards

Some samples collected in France under DCF regulation by observations at sea in 2010 have been exploited with the COST tools.

Samples were aggregated for an area composed of IV c and VII d and VII e to obtain measured fish enough in the retained and in the discarded part of the catch and in the same way data from all trawlers were used. Only the quarter 1 and 3 of 2010 data sets have allowed estimates of catch and discards. Results are shown in Figure 7–4. Almost all the catches have been discarded.

In Table 7.4 the numbers per hour of discarded non-target fish species in Dutch bottom-trawl fisheries in North Sea and Eastern Channel are shown for 2006–2010. The rates are highly variable.

7.5 Survey data / recruit series

For the North Sea and Skagerrak/Kattegat, data are available from the International Bottom Trawl survey. The IBTS-Q1 and Q3 can provide information on distribution and the length composition of the catches. Grey gurnard occurs throughout the North Sea and Skagerrak/Kattegat. During winter, grey gurnards are concentrated to the northwest of the Dogger Bank at depths of 50–100 m, while densities are low off the Danish coast, in the German Bight and eastern part of the Southern Bight (Figure 7. and 7.6). The distribution pattern changes substantially in the spring, when the whole area south of 56°N becomes densely populated and the high concentrations in the central North Sea disappear until the next winter.

The near absence of grey gurnard in the southern North Sea during winter and the marked shift in the centre of distribution between winter and summer suggests a preference for higher water temperatures (Hertling, 1924; Daan *et al.* 1990).

During winter, grey gurnard occasionally form dense aggregations just above the sea bed (or even in midwater, especially during night time) which may result in extremely large catches. Within one survey, these large hauls may account for 70 percent or more of the total catch of the species. Bottom temperatures in high-density areas usually range from 8 to 13°C (Sahrhage, 1964).

Spawning occurs in spring and summer and, perhaps, in autumn (Russel, 1976), and may also explain the observed seasonal movements (Van der Land, 1990).

A time series of abundance index of grey gurnard in the IBTS-Q1 survey has shown a strong increase pattern from the beginning of 90's. The drawn line excludes the exceptional abundance observe occasionally as proposed in Heessen and Daan (1996) (Figure 7.7).

IBTS-Q3 series shows the same strong increase of the index during the 90's and stabilized at high level since then (Figure 7.8).

The length distributions index presented in the WGNEW2010 (ICES, 2010) Report have not been updated and are now in the stock annex. They showed that a bi modal structure occurred in Skagerrak and Kattegat (IIIa) which was not observed in North Sea where smaller fish were only found in relatively small numbers.

The CGFS survey series in VIId from 1988 have shown low level of abundance index except in 1999 where a shoal effect might occur (Figure 7–8). In recent years, abundance index at length have indicated some higher abundance of smaller fish in 2005 (Figure 7–9).

The time series of abundance index of EVHOE-WIBTS-Q4 survey in Celtic Sea and Bay of Biscay has clearly shown a higher abundance in Celtic Sea than in Bay of Biscay but in some years the signal is noisy (Figure 7.11). The trends in both areas are relatively similar. The time series of abundance at length by area have shown that the last higher but uncertain abundance of smaller fish was observed in 2007 in Celtic sea and in 2004 in Bay of Biscay (Figures 7.12 and 7.13). Spatial distribution of grey gurnard from this survey series is available in the stock annex. It shows that the higher abundances are observed in the northern part of Celtic Sea.

The index of the short time series from the autumn PGFS survey has fluctuated at low value and was at 0 in 2010 and 2011 (Figure 7.14).

7.6 Biological sampling

Biological data for this species are still scarce (see also the stock annex). In North Sea, individual data have been collected during the 2010 IBTS-Q1 survey.

An ALK from otoliths collected has shown that grey gurnard displays a significant number of individuals over a large span of ages (up to group 14). The ALK is shown in Figure 7.14.

A maturity length key of Grey gurnard sampled shows that above 19–20 cm almost all the individuals can be considered mature. The sampling was not carried out during the spawning which takes place in spring and summer.

Both these two datasets suggest that grey gurnard is early maturing in North Sea and a proportion of fish at age 1 are mature.

7.7 Population biological parameters and other research

The information delivered at the WGNEW 2010 (ICES 2010) are now in the stock annex.

7.8 Analysis of stock trends / assessment

Information from landings is very poor, due to poor reporting (gurnard species are not always identified in the data, and probably also misreporting has occurred) and also because the low value of the species leads to massive discarding.

The status of the populations in the Ecoregions which cover the Northern European Shelf is not known but some indications of trend are delivered by the survey series available.

The time series based on catches from the IBTS survey in the North Sea and in Skagerrak-Kattegat both show an increase since the late 1980s (Figure 7.15).

In Celtic Seas Ecoregion, the CGFS survey indicates that since 2006 the abundance has remained at lower level. In Celtic Sea, the index from the EVHOE-WIBTS-Q4 survey tend to slightly increase in 2010 and 2011 but remain at lower level.

In Bay of Biscay and Southern European shelf, both the EVHOE-WIBTS-Q4 and the PGFS surveys indicate very low levels of abundance.

7.9 Data requirements

For management purposes information should be available on catches and landings. The quality of landings data has been poor for this species because in the past only landings of “gurnards” were reported and also because there is some indication that this species is highly discarded.

Given the high level of discarding, observation at sea under DCF seems the main source of information to better estimate the catches. A way to obtain specific samples of grey gurnard could be a self-sampling program but it could be difficult to persuade fishermen of an extra work to sample a species they are used to discard.

Availability of the time series of UK(Scotland) and Irish surveys abundance index of grey gurnard should give more information on the population in areas covered by these surveys.

For a better understanding of this species an increase in our knowledge of biological parameters is required.

From the information presented here, it can be concluded that grey gurnard is currently of very limited commercial interest excepted in North Sea.

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Table 7.1. Grey gurnard. Official landings (tonnes) of grey gurnard in area VI and VII as reported to ICES.

| VI & VII | Official landings in tonnes | | | | | | |
|----------|-----------------------------|---------|--------|---------|-------------|--------------|----|
| | Belgium | Denmark | France | Ireland | Netherlands | Russian Fed. | UK |
| 1950 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1951 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1952 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1953 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1954 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1955 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1956 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1957 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1958 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1959 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1960 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1961 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1962 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1963 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1964 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1965 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1966 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1967 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1968 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1969 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1970 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1971 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1972 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1973 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1974 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1975 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1976 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1977 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1978 | 0 | 0 | 206 | 0 | 0 | 0 | 0 |
| 1979 | 0 | 0 | 165 | 0 | 0 | 0 | 0 |
| 1980 | 0 | 0 | 155 | 0 | 0 | 0 | 0 |
| 1981 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1982 | 0 | 0 | 407 | 0 | 0 | 0 | 0 |
| 1983 | 0 | 0 | 271 | 0 | 0 | 0 | 0 |
| 1984 | 0 | 0 | 157 | 0 | 0 | 0 | 2 |
| 1985 | 35 | 0 | 130 | 0 | 0 | 0 | 2 |
| 1986 | 0 | 0 | 280 | 0 | 0 | 0 | 0 |
| 1987 | 37 | 0 | 216 | 0 | 0 | 0 | 0 |
| 1988 | 30 | 0 | 211 | 0 | 0 | 0 | 21 |
| 1989 | 34 | 0 | 646 | 0 | 0 | 0 | 0 |
| 1990 | 18 | 0 | 538 | 16 | 0 | 0 | 0 |
| 1991 | 17 | 0 | 298 | 15 | 0 | 0 | 4 |
| 1992 | 13 | 0 | 123 | 17 | 0 | 0 | 0 |
| 1993 | 11 | 0 | 113 | 10 | 0 | 0 | 1 |
| 1994 | 11 | 0 | 107 | 0 | 0 | 0 | 2 |
| 1995 | 7 | 0 | 101 | 0 | 0 | 0 | 0 |
| 1996 | 6 | 0 | 117 | 0 | 0 | 0 | 2 |
| 1997 | 8 | 0 | 61 | 0 | 0 | 0 | 2 |
| 1998 | 13 | 0 | 59 | 38 | 0 | 0 | 0 |
| 1999 | 11 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2000 | 13 | 0 | 109 | 0 | 7 | 26081 | 0 |
| 2001 | 3 | 0 | 116 | 0 | 0 | 3155 | 13 |
| 2002 | 7 | 0 | 81 | 0 | 0 | 60 | 11 |
| 2003 | 3 | 0 | 66 | 0 | 1 | 263 | 0 |
| 2004 | 5 | 0 | 61 | 0 | 7 | 1401 | 0 |
| 2005 | 9 | 0 | 59 | 0 | 8 | 2456 | 0 |
| 2006 | 4 | 0 | 28 | 0 | 10 | 138 | 6 |
| 2007 | 4 | 0 | 24 | 0 | 1 | 0 | 4 |
| 2008 | 7 | 0 | 1 | 0 | 3 | 0 | 1 |
| 2009 | 11 | 0 | 33 | 0 | 1 | 0 | 8 |
| 2010 | 14 | 0 | 45 | 0 | 5 | 0 | 12 |

Table 7.2. Grey gurnard. Official landings (tonnes) of grey gurnard in area IIIa, IV, and VIId as reported to ICES.

| IIIa,IV,VIId | Official landings in tonnes | | | | | | |
|--------------|-----------------------------|---------|--------|-------------|--------|--------|----|
| | Belgium | Denmark | France | Netherlands | Norway | Sweden | UK |
| 1950 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1951 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1952 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1953 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1954 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1955 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1956 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1957 | 0 | 0 | 0 | 0 | 0 | 308 | 0 |
| 1958 | 0 | 0 | 0 | 0 | 0 | 387 | 0 |
| 1959 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1960 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1961 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1962 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1963 | 0 | 0 | 0 | 202 | 0 | 0 | 0 |
| 1964 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1965 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1966 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1967 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1968 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1969 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1970 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1971 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1972 | 0 | 0 | 0 | 0 | 0 | 51 | 0 |
| 1973 | 0 | 0 | 0 | 0 | 0 | 58 | 0 |
| 1974 | 0 | 0 | 0 | 0 | 0 | 64 | 0 |
| 1975 | 0 | 0 | 0 | 0 | 0 | 14 | 0 |
| 1976 | 0 | 0 | 0 | 0 | 0 | 131 | 0 |
| 1977 | 0 | 0 | 0 | 0 | 0 | 74 | 0 |
| 1978 | 0 | 0 | 15 | 0 | 0 | 108 | 0 |
| 1979 | 0 | 0 | 944 | 0 | 0 | 98 | 0 |
| 1980 | 0 | 0 | 993 | 0 | 0 | 74 | 0 |
| 1981 | 0 | 0 | 0 | 0 | 0 | 92 | 0 |
| 1982 | 0 | 446 | 480 | 0 | 0 | 86 | 0 |
| 1983 | 0 | 1096 | 553 | 0 | 0 | 15 | 0 |
| 1984 | 0 | 4103 | 197 | 0 | 0 | 13 | 0 |
| 1985 | 102 | 2361 | 187 | 0 | 0 | 18 | 0 |
| 1986 | 0 | 320 | 283 | 0 | 0 | 20 | 0 |
| 1987 | 77 | 46611 | 122 | 0 | 0 | 12 | 0 |
| 1988 | 86 | 38296 | 389 | 0 | 0 | 5 | 22 |
| 1989 | 82 | 26758 | 135 | 0 | 0 | 9 | 0 |
| 1990 | 91 | 22110 | 134 | 0 | 0 | 6 | 0 |
| 1991 | 75 | 14564 | 122 | 0 | 0 | 10 | 0 |
| 1992 | 104 | 8158 | 106 | 0 | 0 | 20 | 10 |
| 1993 | 113 | 858 | 74 | 0 | 0 | 18 | 24 |
| 1994 | 67 | 111 | 54 | 0 | 0 | 24 | 22 |
| 1995 | 50 | 83 | 62 | 0 | 0 | 11 | 21 |
| 1996 | 112 | 88 | 62 | 0 | 0 | 7 | 54 |
| 1997 | 52 | 49 | 103 | 0 | 0 | 10 | 57 |
| 1998 | 34 | 83 | 47 | 0 | 0 | 16 | 0 |
| 1999 | 36 | 109 | 0 | 0 | 0 | 137 | 0 |
| 2000 | 37 | 128 | 72 | 452 | 0 | 10 | 0 |
| 2001 | 28 | 319 | 60 | 277 | 0 | 7 | 33 |
| 2002 | 55 | 82 | 64 | 286 | 0 | 3 | 29 |
| 2003 | 34 | 124 | 47 | 319 | 0 | 8 | 26 |
| 2004 | 35 | 107 | 9 | 299 | 0 | 7 | 23 |
| 2005 | 29 | 94 | 7 | 242 | 0 | 10 | 22 |
| 2006 | 18 | 87 | 4 | 155 | 2 | 4 | 21 |
| 2007 | 14 | 59 | 5 | 166 | 5 | 6 | 50 |
| 2008 | 9 | 72 | 5 | 120 | 5 | 13 | 78 |
| 2009 | 16 | 36 | 3 | 157 | 1 | 7 | 83 |
| 2010 | 20 | 28 | 12 | 259 | 1 | 4 | 77 |

Table 7.3. Grey gurnard. Official landings (tonnes) of grey gurnard in area IIIa, IV, and VIId as reported to ICES.

| VIII, IXa | Official landings in tonnes | | |
|-----------|-----------------------------|--------|-------------|
| | Belgium | France | Netherlands |
| 1950 | 0 | 0 | 0 |
| 1951 | 0 | 0 | 0 |
| 1952 | 0 | 0 | 0 |
| 1953 | 0 | 0 | 0 |
| 1954 | 0 | 0 | 0 |
| 1955 | 0 | 0 | 0 |
| 1956 | 0 | 0 | 0 |
| 1957 | 0 | 0 | 0 |
| 1958 | 0 | 0 | 0 |
| 1959 | 0 | 0 | 0 |
| 1960 | 0 | 0 | 0 |
| 1961 | 0 | 0 | 0 |
| 1962 | 0 | 0 | 0 |
| 1963 | 0 | 0 | 0 |
| 1964 | 0 | 0 | 0 |
| 1965 | 0 | 0 | 0 |
| 1966 | 0 | 0 | 0 |
| 1967 | 0 | 0 | 0 |
| 1968 | 0 | 0 | 0 |
| 1969 | 0 | 0 | 0 |
| 1970 | 0 | 0 | 0 |
| 1971 | 0 | 0 | 0 |
| 1972 | 0 | 0 | 0 |
| 1973 | 0 | 0 | 0 |
| 1974 | 0 | 0 | 0 |
| 1975 | 0 | 0 | 0 |
| 1976 | 0 | 0 | 0 |
| 1977 | 0 | 0 | 0 |
| 1978 | 0 | 1 | 0 |
| 1979 | 0 | 9 | 0 |
| 1980 | 0 | 24 | 0 |
| 1981 | 0 | 0 | 0 |
| 1982 | 0 | 8 | 0 |
| 1983 | 0 | 28 | 0 |
| 1984 | 0 | 46 | 0 |
| 1985 | 0 | 54 | 0 |
| 1986 | 0 | 73 | 0 |
| 1987 | 2 | 94 | 0 |
| 1988 | 0 | 54 | 0 |
| 1989 | 3 | 60 | 0 |
| 1990 | 1 | 31 | 0 |
| 1991 | 1 | 22 | 0 |
| 1992 | 1 | 30 | 0 |
| 1993 | 2 | 53 | 0 |
| 1994 | 1 | 33 | 0 |
| 1995 | 1 | 41 | 0 |
| 1996 | 4 | 41 | 0 |
| 1997 | 4 | 53 | 0 |
| 1998 | 3 | 53 | 0 |
| 1999 | 1 | 0 | 0 |
| 2000 | 1 | 43 | 0 |
| 2001 | 1 | 40 | 4 |
| 2002 | 2 | 34 | 0 |
| 2003 | 1 | 46 | 0 |
| 2004 | 1 | 62 | 0 |
| 2005 | 1 | 58 | 0 |
| 2006 | 3 | 71 | 0 |
| 2007 | 2 | 68 | 0 |
| 2008 | 3 | 5 | 0 |
| 2009 | 3 | 96 | 0 |
| 2010 | 8 | 147 | 0 |

Table 7.4. Grey gurnard. Discards per hour of grey gurnard by different metiers in the Netherlands.

Numbers per hour of discarded non-target fish species in Dutch bottom-trawl fisheries

| Métier | TBB_DEF | TBB_DEF* | TBB_DEF | OTB_MCD | OTB_DEF | OTB_DEF |
|----------------------|---------|----------|---------|---------|---------|---------|
| Mesh size/hp power 7 | 0-99 | 70-99 | 100-119 | 70-99 | 70-99 | 100-119 |
| 2006 Grey gurnard | 68.3 | | | | 92 | |
| 2007 Grey gurnard | 60.2 | | | | | |
| 2008 Grey gurnard | 34.3 | | | | | |
| 2009 Grey gurnard | 55 | 17 | 37 | 111 | 77 | 15 |
| 2010 Grey gurnard | 81 | 10 | 109 | 47 | 52 | 110 |

*≤300 hp segment

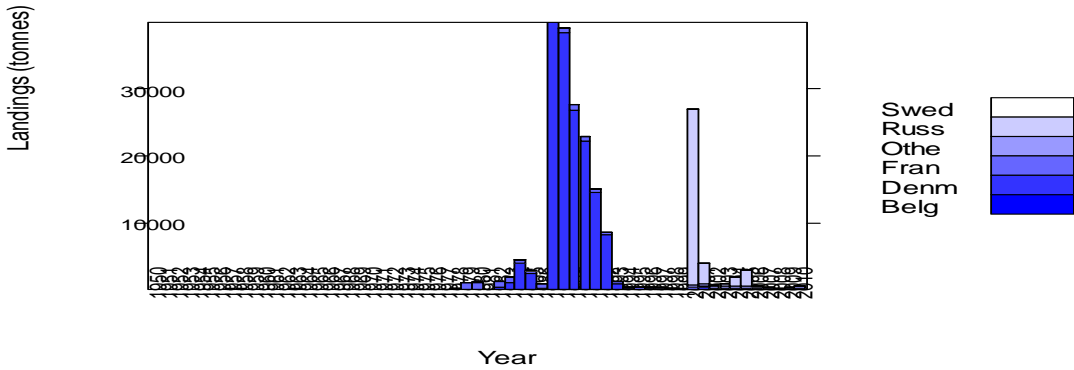


Figure 7.5. Grey gurnard. Official catches of grey gurnard reported at ICES from 1950 to 2010.

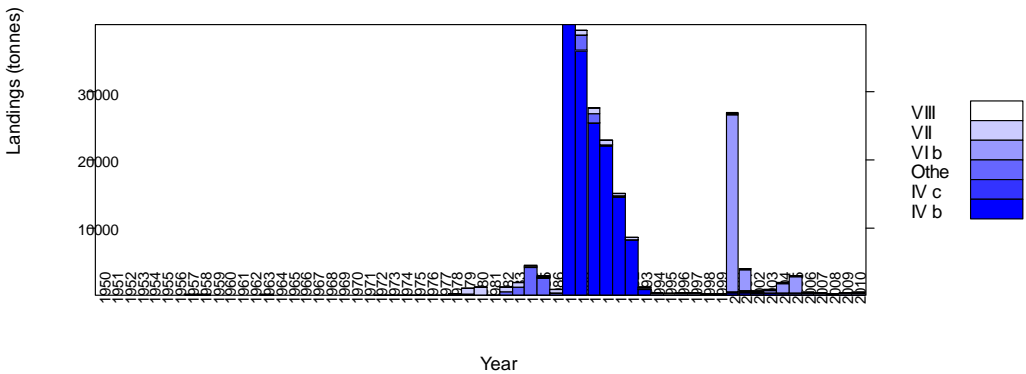


Figure 7.6. Grey gurnard. Official catches of grey gurnard reported at ICES from 1950 to 2010 in the main areas.

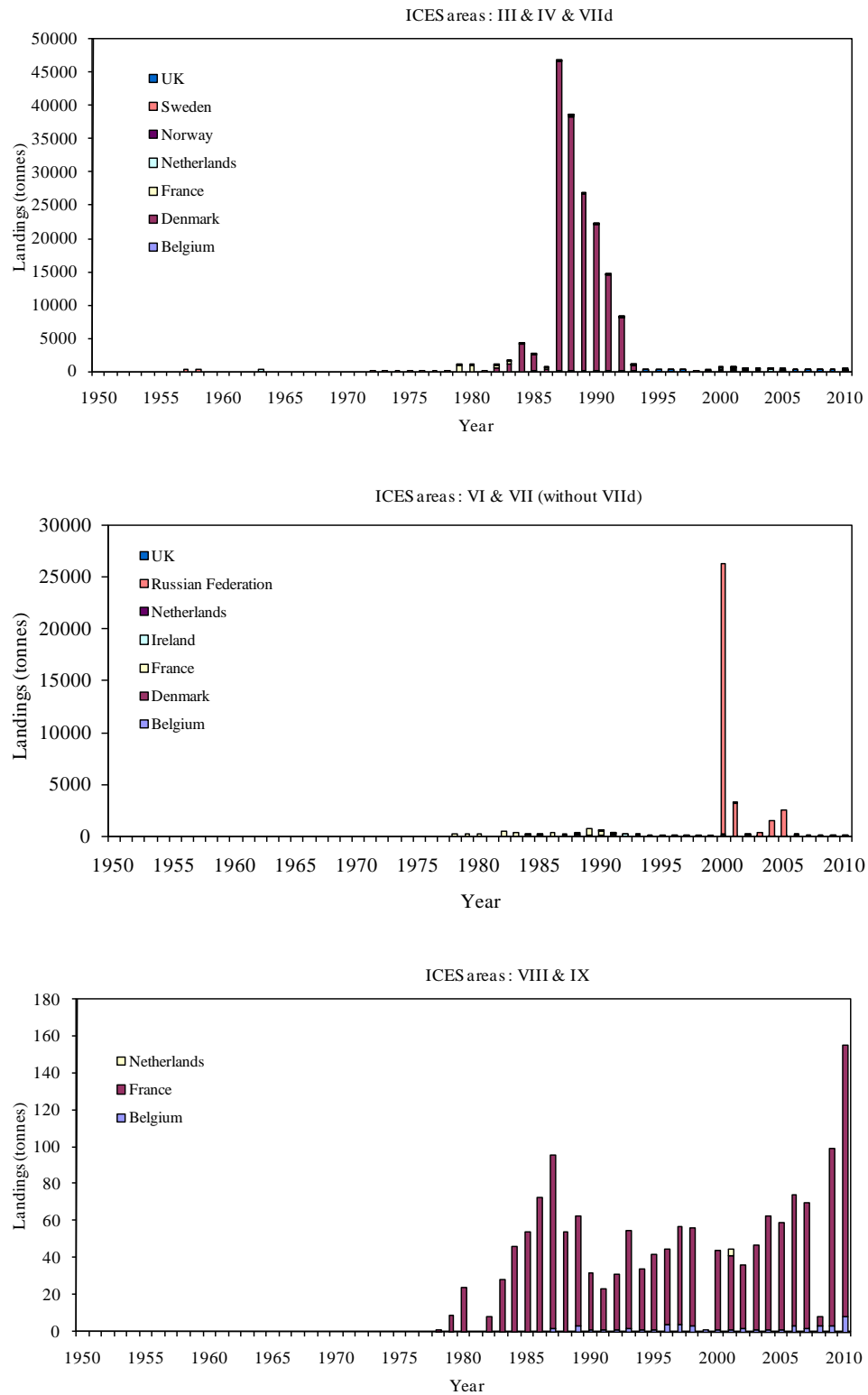


Figure 7.7. Grey gurnard. Official landings of grey gurnard reported at ICES from 1950 to 2010 by area covering the Ecoregions.

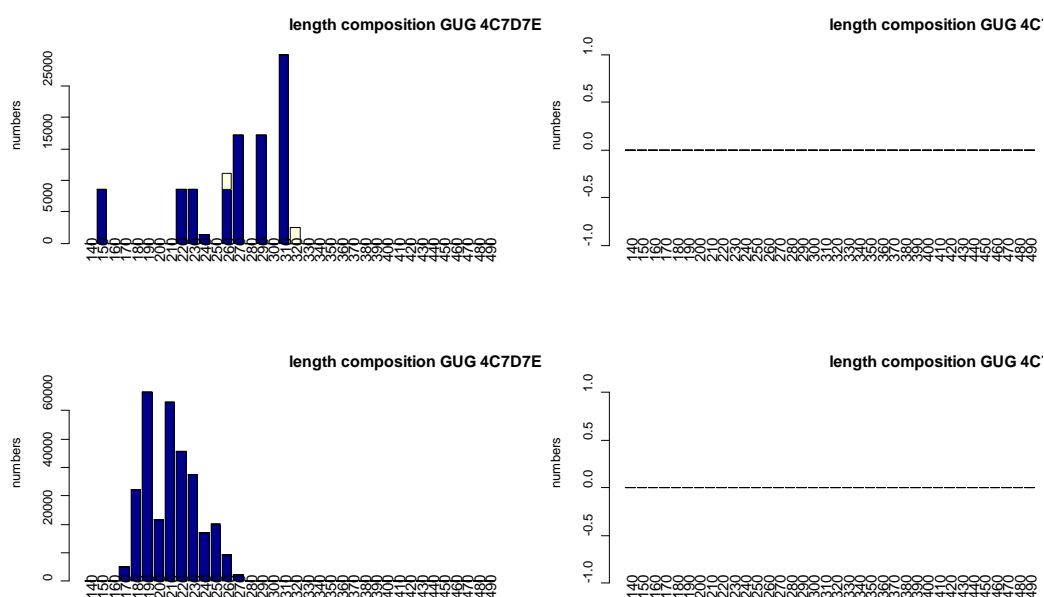


Figure 7.8. Grey gurnard. 2010 Length compositions of catch and discard of grey gurnard by French trawlers in Divisions IVc+VIIId+VIIe. Datasets available from DCF only support the estimation in quarter 1 and quarter 3. Almost all the catches have been discarded.

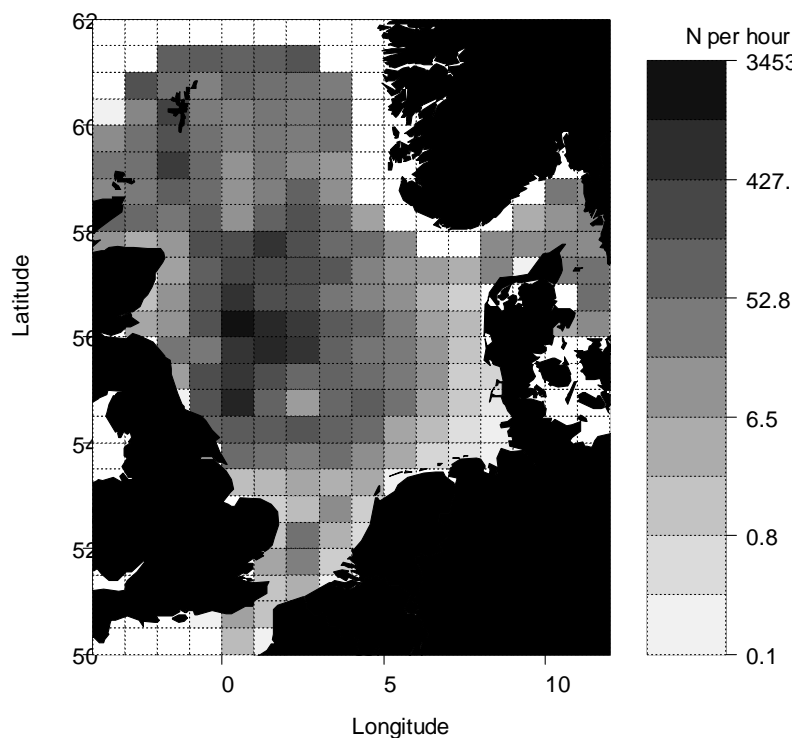


Figure 7.9. Grey gurnard. Spatial distribution of grey gurnard from IBTS-Q1 survey .

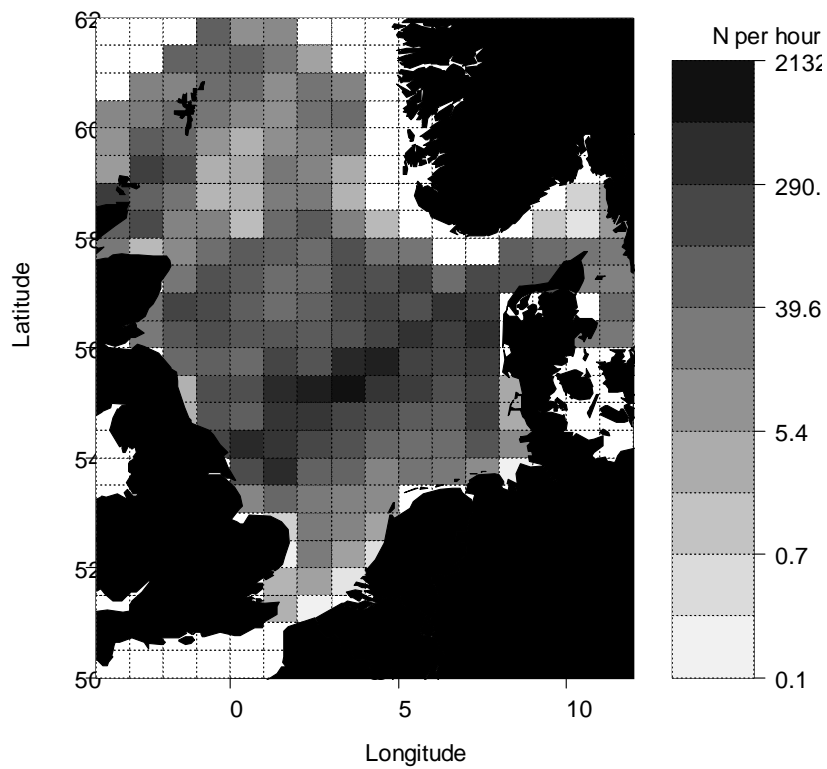


Figure 7.10. Grey gurnard. Spatial distribution of grey gurnard from IBTS-Q3 survey .

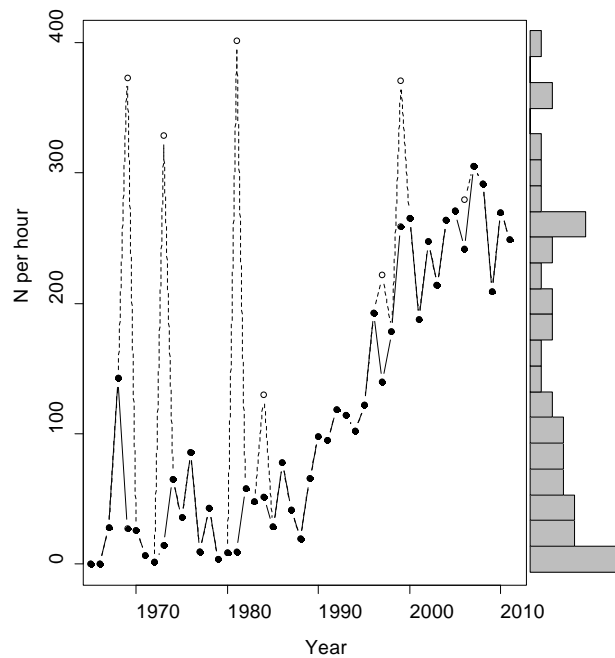


Figure 7.11. Grey gurnard. Abundance index of grey gurnard from IBTS-Q1 survey time series . The plain line excludes the exceptional abundance observed occasionally in a single rectangle by shoal behaviour.

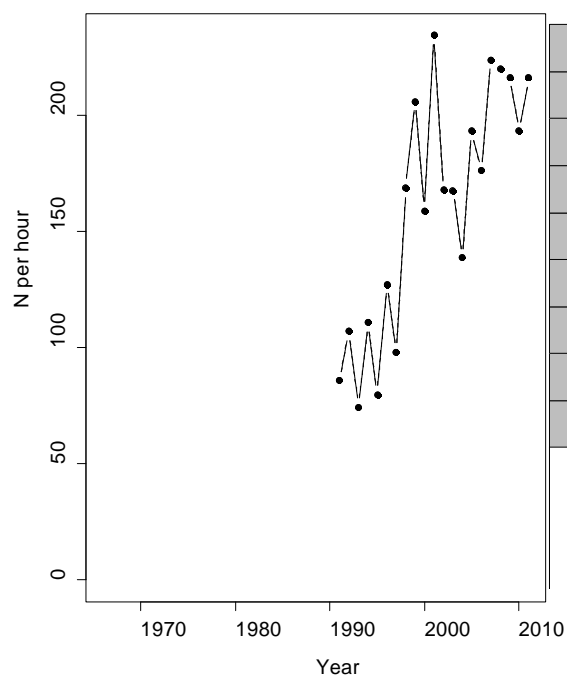


Figure 7.12. Grey gurnard. Abundance index of grey gurnard from IBTS-Q3 survey time series .

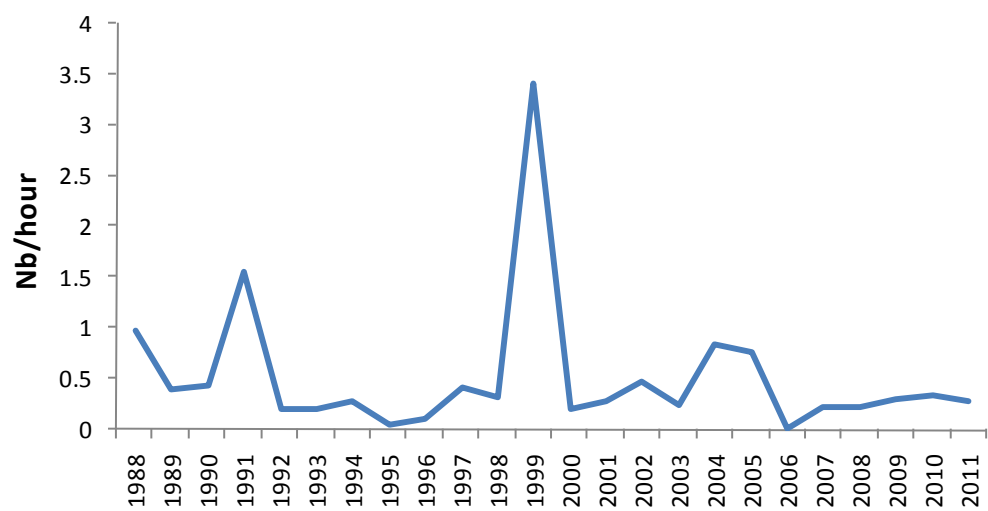


Figure 7.13. Grey gurnard. Abundance index of grey gurnard from CGFS-Q4 survey time series in Eastern Channel .

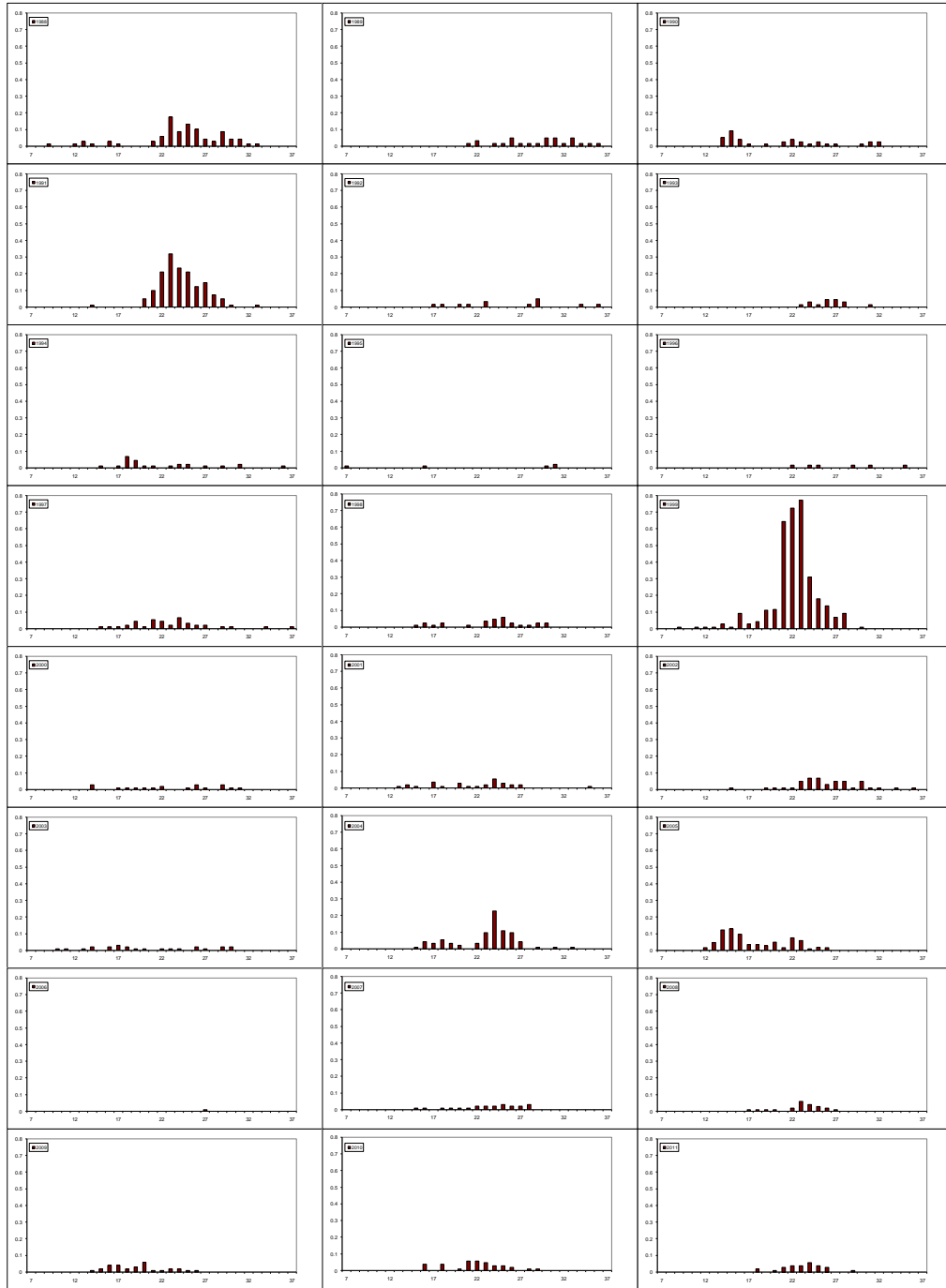


Figure 7.14. Grey gurnard. Abundance index at length of grey gurnard from CGFS-Q4 survey time series in Eastern Channel. 1999 indicates sporadic higher abundances.

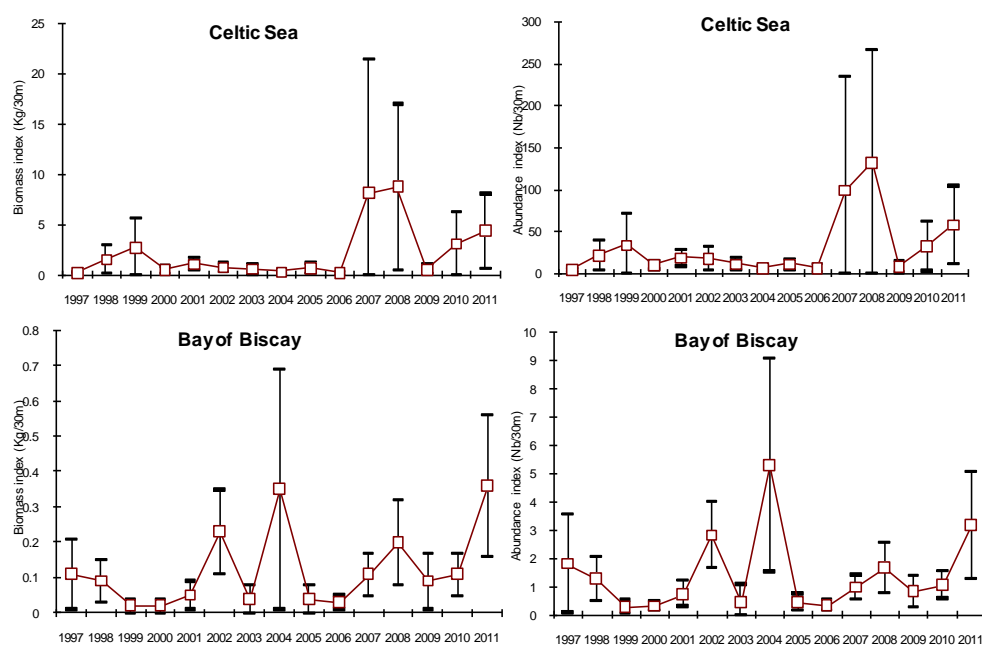


Figure 7.15. Grey gurnard. Abundance index (Nb/30mn and Weight/30 mn) of grey gurnard and their confidence interval from EVHOE-WIBTS-Q4 survey time series in Celtic sea and Bay of Biscay.

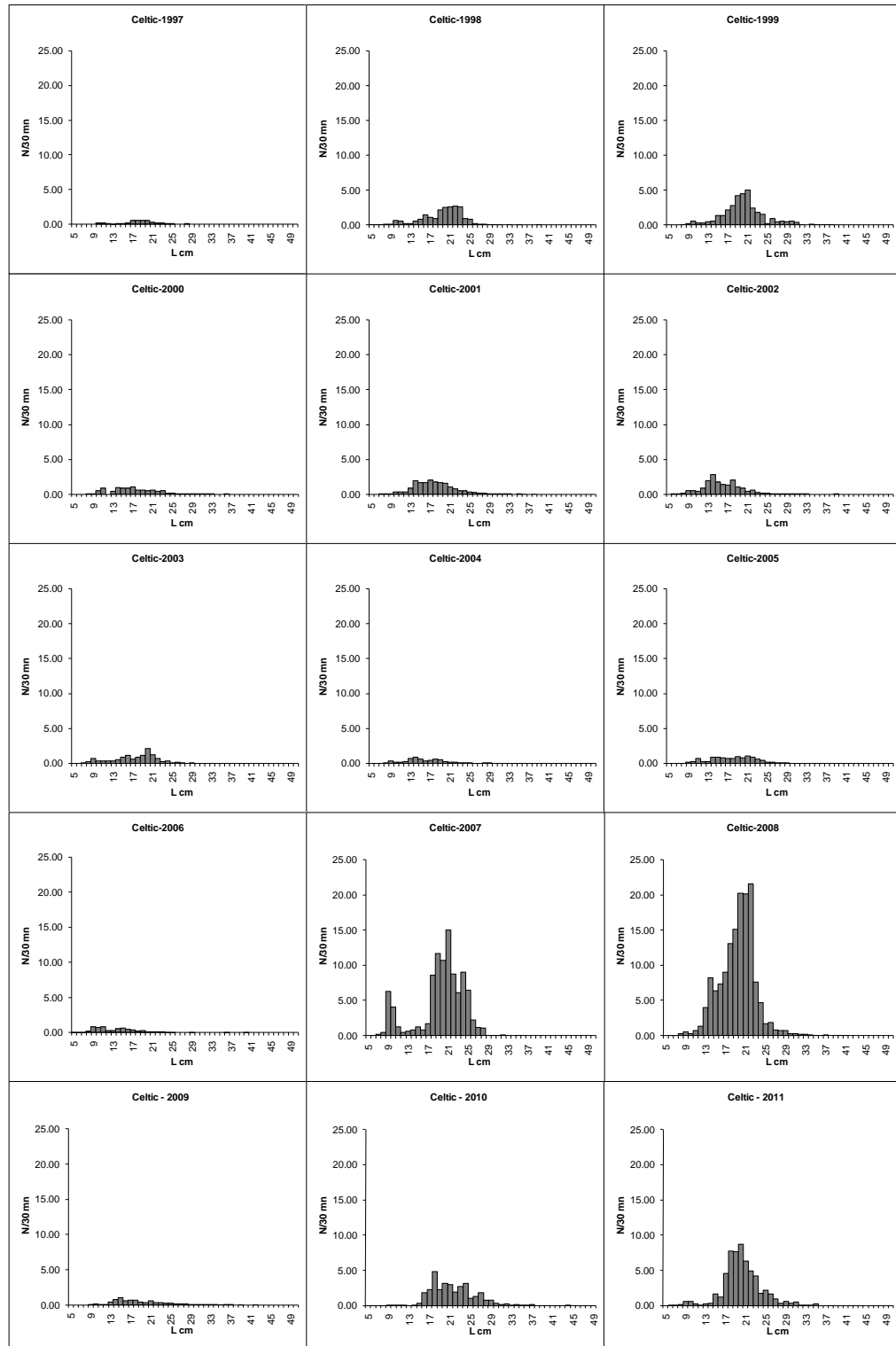


Figure 7.16. Grey gurnard. Abundance index at length of grey gurnard from EVHOE-WIBTS-Q4 survey time series in Celtic sea.

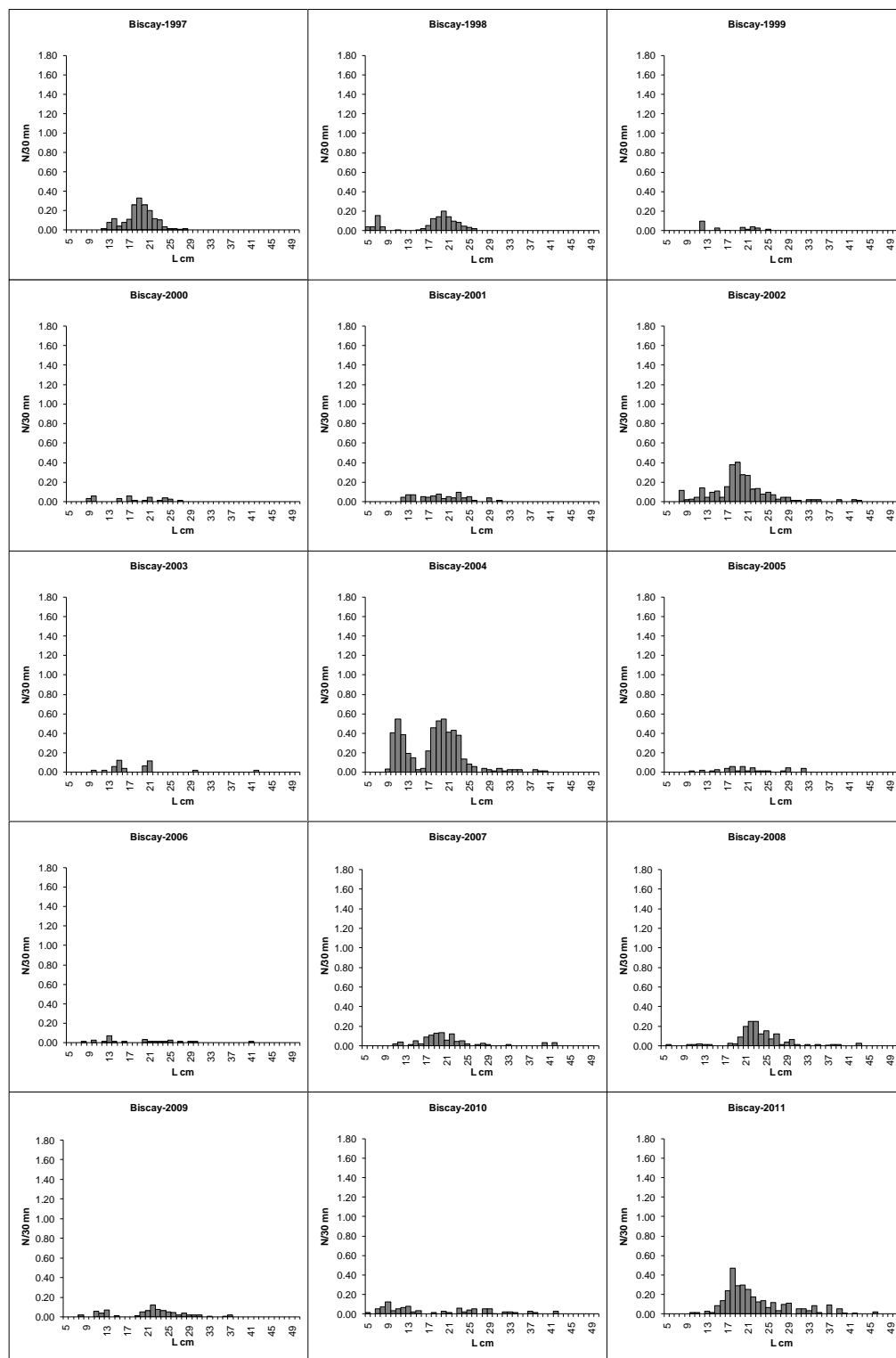


Figure 7.17. Grey gurnard. Abundance index at length of grey gurnard from EVHOE-WIBTS-Q4 survey time series in the Bay of Biscay.

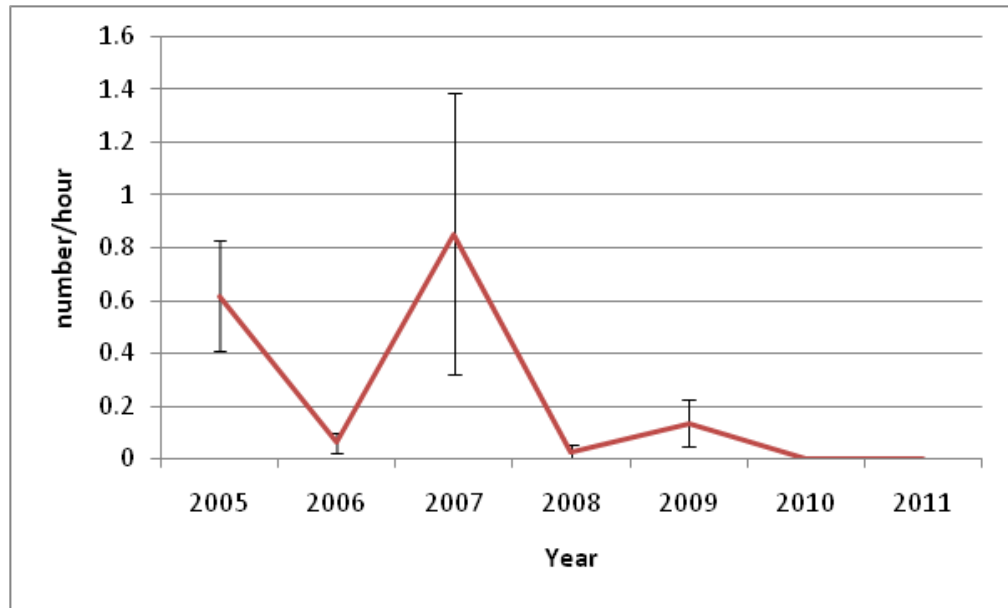


Figure 7.18. Grey gurnard. Abundance index of grey gurnard from PGFS-Q4 survey time series on the Western shelf of Portugal (the survey does not catch any grey gurnard in 2010 and 2011).

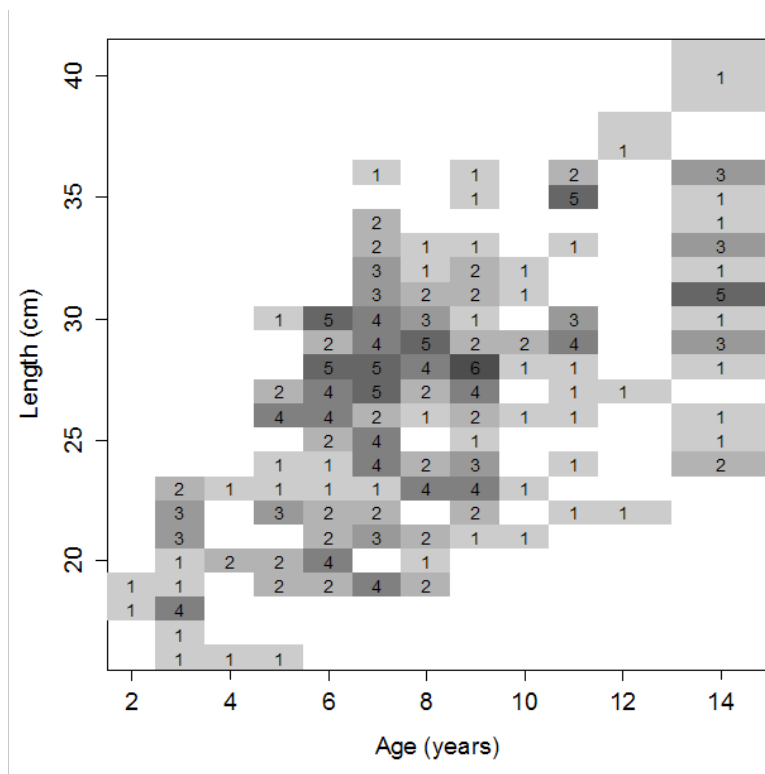


Figure 7.19. Grey gurnard. ALC from otoliths of Grey gurnard collected during 2010 IBTS-Q1 survey showing that grey gurnard displays a significant number of individuals over a large span of ages (up to 14).

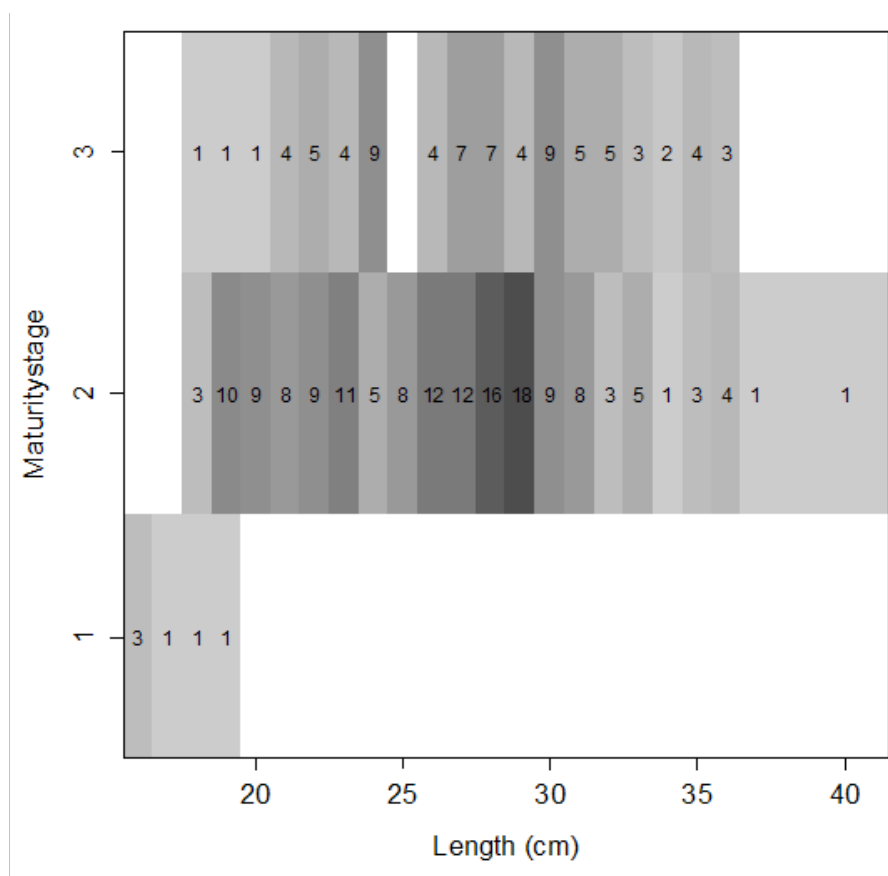


Figure 7.20. Maturity length key of Grey gurnard sampled during IBTS-Q1 surveys . which shows that above 19–20 cm almost all the individuals can be considered mature.

8 Dab

8.1 General biology

Dab (*Limanda limanda*) is a widespread demersal species on the Northeast Atlantic shelf and distributed from the Bay of Biscay to Iceland and Norway; including the Barents Sea and the Baltic. Its centre of distribution in the North Sea is located in the southern North Sea (Lozán 1988; Daan *et al.* 1990, ICES 2010 (Figure 8.1)). It is the secondmost abundant species in the North Sea (Daan *et al.* 1990).

8.2 Stock identity and possible assessment areas;

The several spawning grounds and the wide distribution of dab indicate the presence of more than one stock. Meristic data (Lozán, 1988) corroborate the hypothesis of several stocks for dab, distinguishing significantly between populations from western British waters and the North Sea and the Baltic. Further, tagging experiments and significant meristic differences within Baltic populations led Temming *et al.*, (1989b) to propose an individual stock around Bornholm, separated from IIIc22. However, currently no further scientific evidence is available to distinguish between different stocks for management purposes.

Based on the data of Lozan and a visual inspection of the spatial distribution of CPUE from different trawl surveys, the Working Group proposes three different assessment areas, corresponding to the ICES ecoregions. These are: The Celtic Seas ecoregion, the North Sea ecoregion, and the Bay of Biscay ecoregion

8.3 Management regulations (TAC's, minimum landing size)

According to EU-Regulations a precautionary TAC is given in EU waters of IIa and IV together with flounder (*Plathichthys flesus*). The TAC decreased from 2002 to 2012 from about 27 000 to 18 400 t. No minimum landing size is defined.

8.4 Fisheries data

Dab is a by-catch species in fisheries for plaice, sole and demersal roundfish. According to ICES catch statistics, annual landings of dab in ICES Divisions III, IV, and VII has been well above 10 000 t since 1973. The apparent decreases in official landings in the 1980's and 1990's are due to unreported catches by the Netherlands, Norway and Spain (Figure 8.2.2 and Figure 8.3.3). The main fishing gear in the North Sea is the beam trawl with mesh sizes between 80 and 100 mm. In the Baltic the otter trawl is used with mesh sizes >100 mm.

Dab is among the most discarded fish species in ICES Division IV. In the beam trawl fishery on sole and the otter trawl fishery on plaice about 95% of the catches on dab are discarded.

8.5 Survey data, recruit series

Surveys providing information on distribution, abundance and length frequency for dab are the International Bottom Trawl Survey IBTS and the Beam Trawl Survey in quarter 3. Abundance indices from IBTS and BTS are shown in Figures 8.4 and 8.5. The abundance in IBTS Q1 increases since 1980. Length frequencies for the German BTS in the North Sea are given in Figure 8.6. In some years a recruiting year class can clearly be seen, as e.g. in 1999, 2005, and 2008.

8.6 Biological sampling

Biological information is collected for dab for most UK surveys. In addition, data on length distributions, distributions and abundance is available in Cefas technical reports for the English Channel and southern North Sea (Parker-Humphreys 2004b). Length information from market sampling for this species is available for 2000 – 2003 only. Biological samples for otoliths, weight, sex and maturity are only available for 2000 – 2002.

During different flatfish surveys by the Netherlands biological samples for dab are being collected since many years. These data include information on length, weight, sex and maturity stage. Market sampling is carried out since 2002.

Germany routinely measured dab by sex during surveys. Age reading started in 1997 with BTS. Market samples for dab are not available.

8.7 Population biology parameters and a summary of other research

Several extended population studies provide regional age-length keys by sex, fecundity data and small scale distribution analyses for dab in the southern North Sea, the English Channel and the Bay of Biscay (Deniel, 1990; Rijnsdorp *et al.*, 1992; Jennings *et al.*, 1999). Maturity is reached at about 2 - 3 years. Maturity data are available in terms of combined age-at-maturity and length-at-maturity information (Deniel, 1990; Jennings *et al.*, 1999) (Deniel and Tassel, 1986).

Mortality rates for 0-group dab during winter time have been calculated for 11 time series (Iles and Beverton 1991). Temperature is considered as a mortality factor for eggs (van der Land, 1991).

8.8 Analyses of stock trends and potential status indicators

For the North Sea, the IBTS survey indicate that the population size has increased in the long term and had a considerably high level in recent years (Figure 8.4). The Dutch BTS survey in quarter 3 shows different trends in different areas. The “Isis” index series indicates a decrease in abundance since the start of the survey series, with a comparatively small increase in the last 5 years. The “Tridens” series shows an overall increase. High abundances can be found in the southeast along the German and Dutch coast and in the centre of the North Sea in the Doggerbank area. Biomass indices are linked to the abundance indices. Length composition has been stable over the years showing a slight increase of the range of sizes in recent years. Age 1 and age 2 dab are most abundant.

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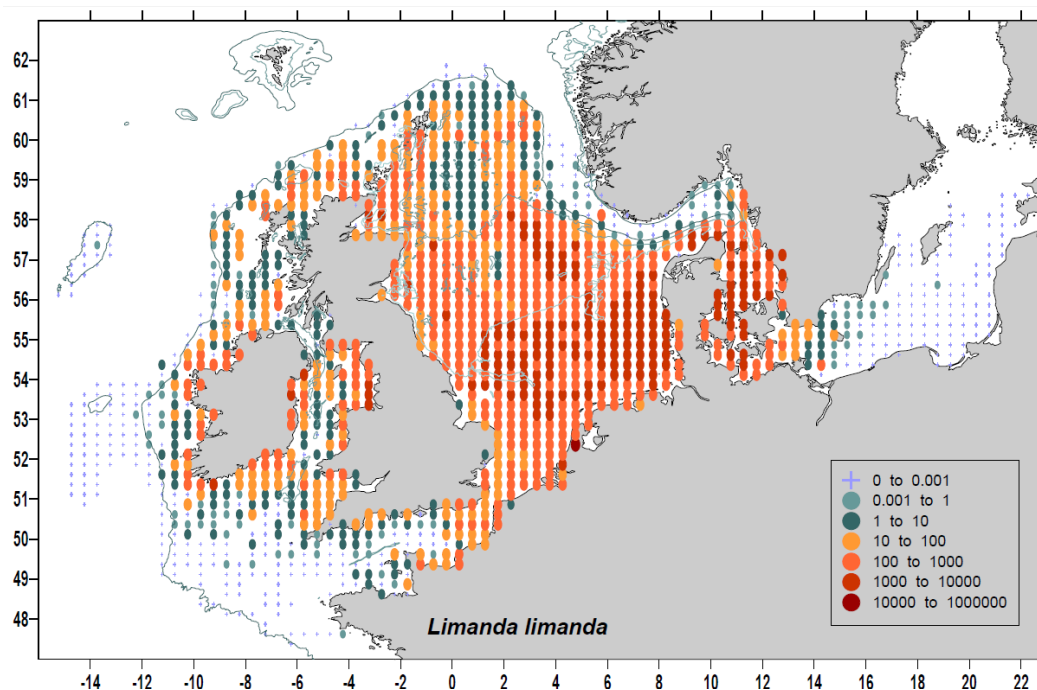


Figure 8.1. Spatial distribution of CPUE of dab in different trawl surveys. Taken from WD1 to WGNEW 2012 (Annex 2).

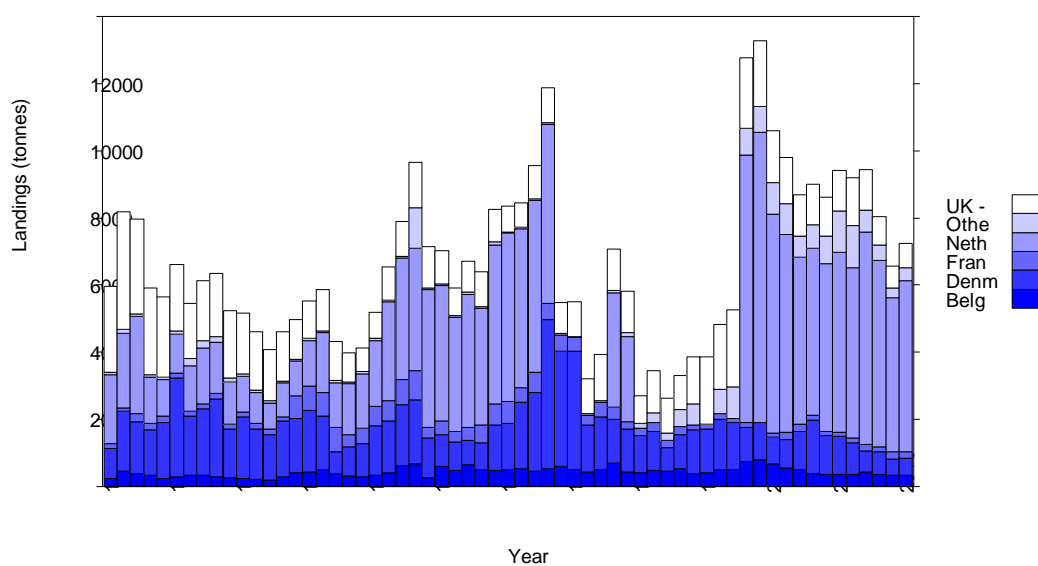


Figure 8.2. Dab landings in ICES IV by country. The period 1984- 1997 is characterized by lacking Dutch data.

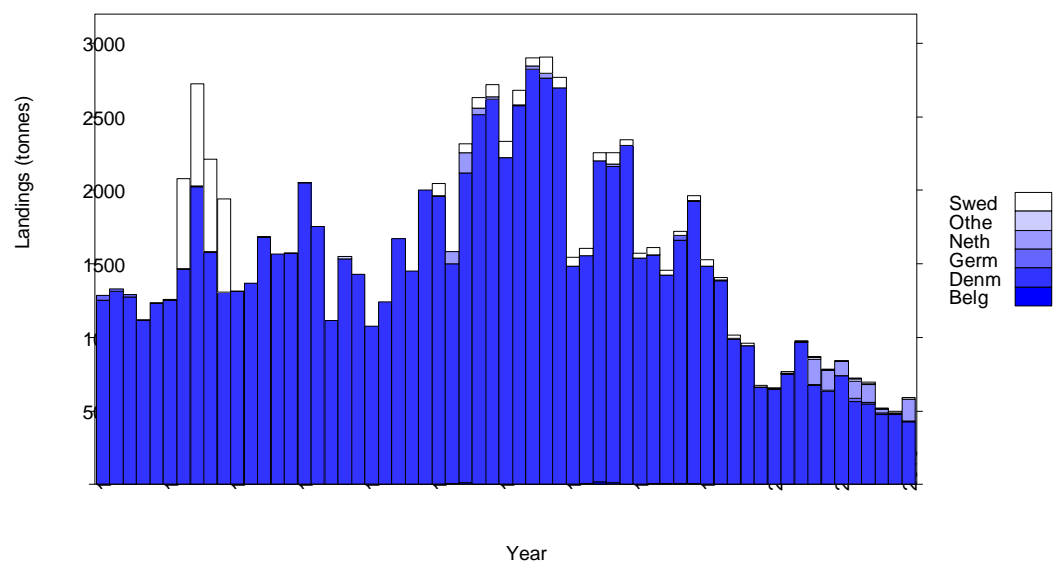


Figure 8.3. Dab landings in ICES IIIa by country. The period 1984- 1997 is characterized by lack- ing Dutch data.

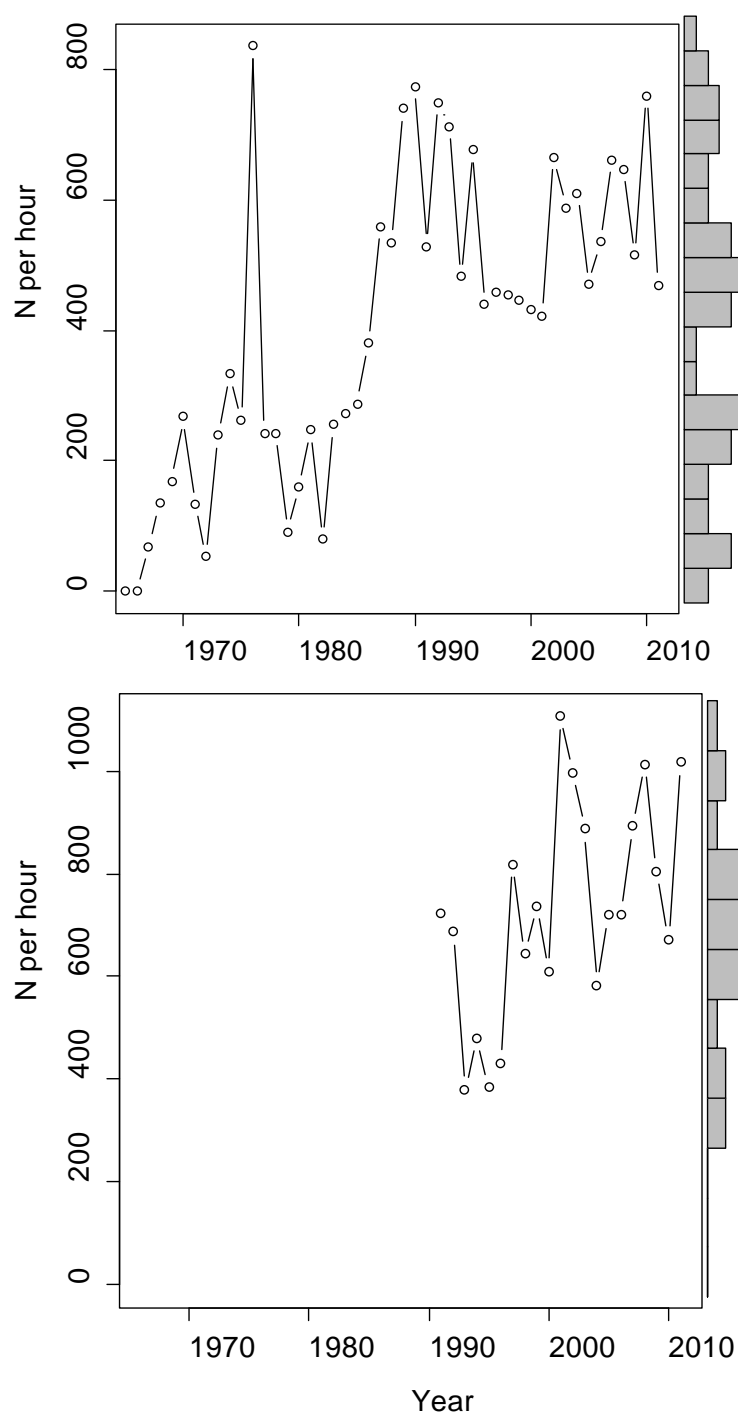


Figure 8.4. CPUE IBTS quarter 1 (left panel) and quarter 3 (right panel in ICES area IV for common dab.

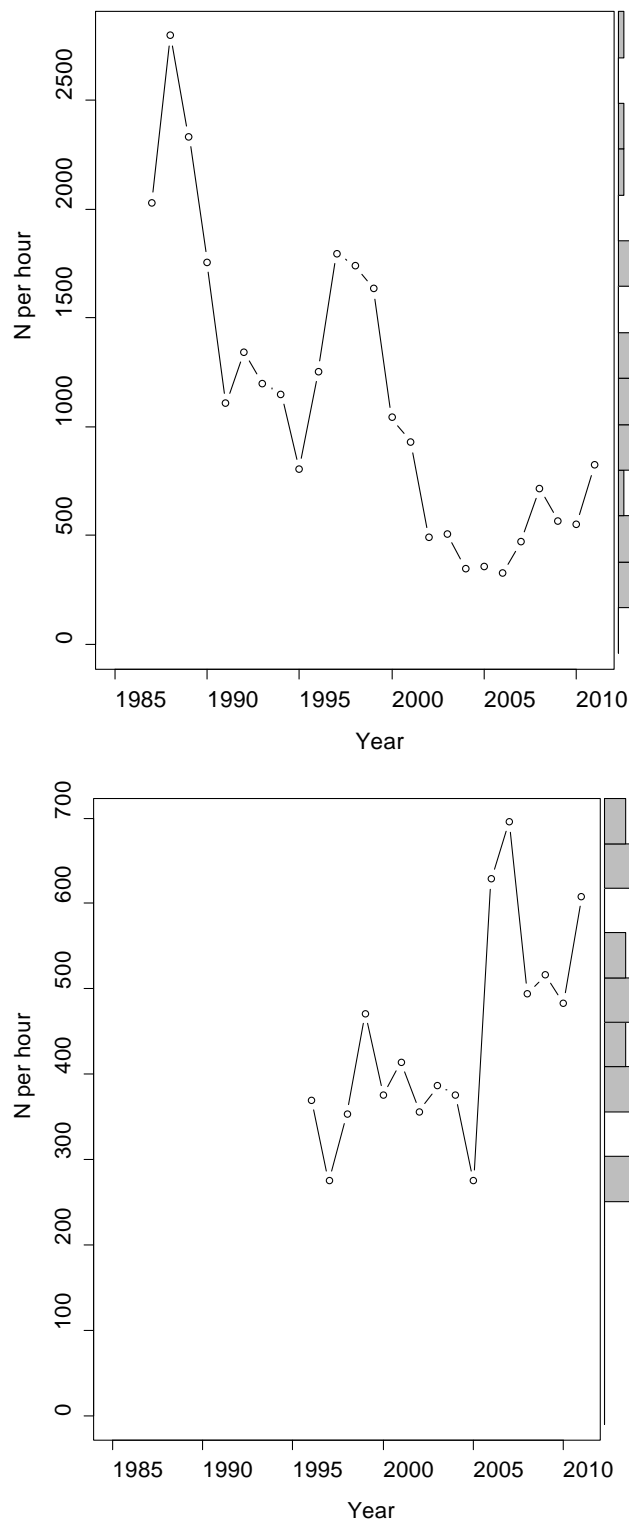


Figure 8.5. CPUE BTS quarter 3 for RV Isis (left panel) and RV Tridens (right panel) in ICES area IV for common dab.

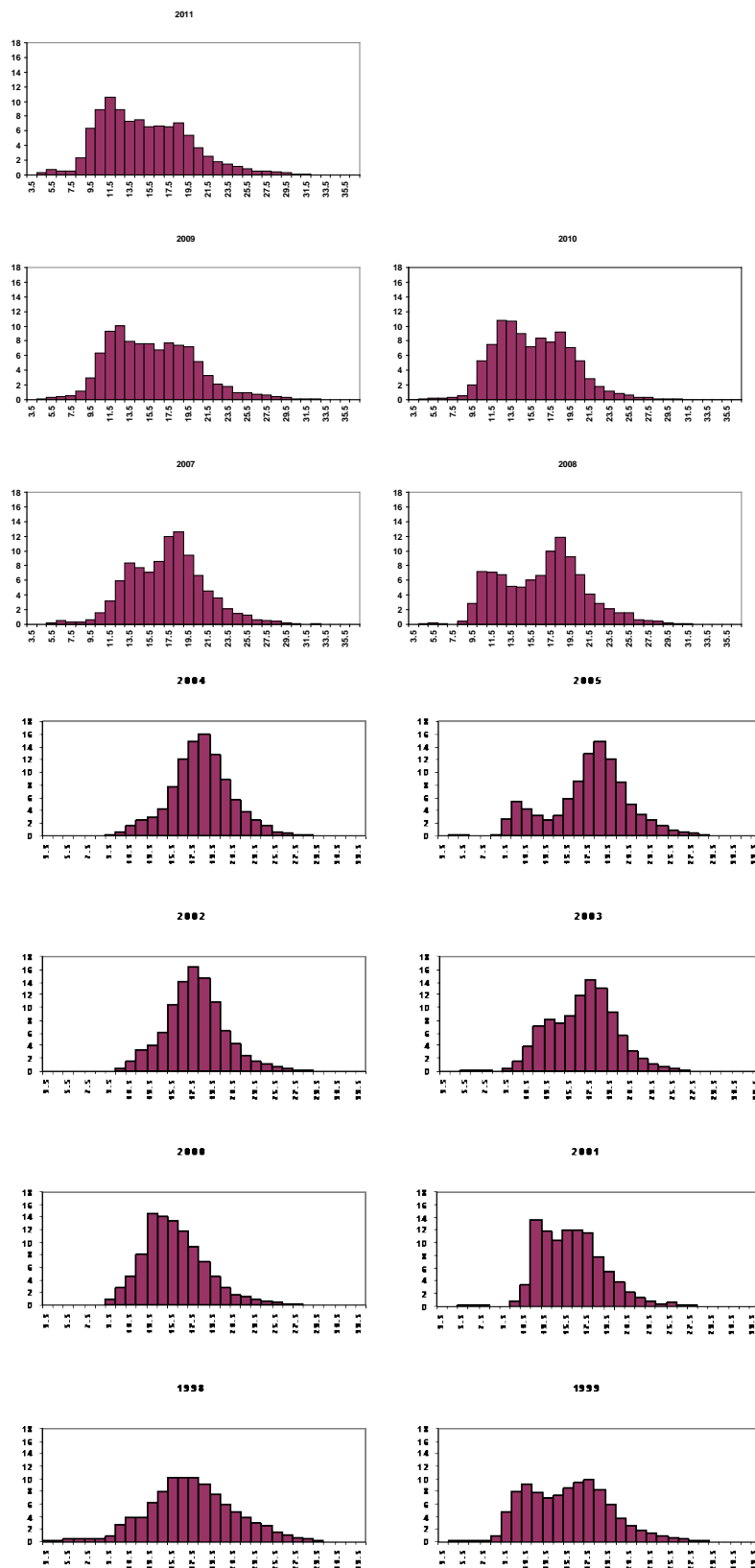


Figure 8.6. Length-frequency distribution (LFD) of common dab from the German BTS, ICES area IVb. Frequency in %.

9 Brill in Subarea IV, Subdivision IIIa and VIIde

9.1 General biology

Brill is a shallow-water flatfish mainly found in areas close inshore. It prefers sandy bottoms, but can sometimes also be found on gravel and muddy grounds. Its vertical distribution ranges from 4 m to 73 m, although small juvenile fish are often common in sand shore pools. Mature brill are rarely observed inshore, whereas immature specimens are often caught near the coast and even in estuaries.

The distribution of brill in the North Eastern Atlantic ranges along the European coastline from 64° N (the Lofotes) down to 30° N, extending into the Mediterranean and even into the Black Sea (Nielsen, 1986). Brill is also found in the Skagerrak, the Kattegat, and small quantities in the Baltic Sea. The western limit of its distribution area is reached in southern Iceland.

The feeding habits of this species closely resemble those of turbot and were extensively reviewed by de Groot (1971) and Wetsteijn (1981). The pelagic larvae feed primarily on copepod nauplii, decapod and mollusc larvae. With increasing size, this diet gradually changes from larger invertebrate prey and larvae of several fish species to small fish. Larger brill (> 40 cm) are primarily piscivorous.

More information on the biology of brill can be found in Annex 5 of WGNEW(2010).

9.2 Stock identity and possible management areas

The oldest study that could be found containing information on the genetic structure of brill was carried out by Blanquer *et al.* (1992), using allozyme electrophoresis. No genetic differentiation could be found between Atlantic and Mediterranean populations, suggesting that there are also very low levels of differentiation in brill from different areas.

In the EU funded study on 'Stock discrimination in relation to the assessment of the brill fishery' the following was concluded (Delbare and De Clerck, 1999): "As a final conclusion, biological parameters (composition of Belgian brill landings, growth rate and reproduction characteristics) and the sequencing of the D-loop resulted in insignificant differences between brill from the different areas. Therefore, arguments favour the hypothesis that brill from the NE Atlantic might be considered to be only one population: the North-eastern Atlantic brill population. Further research on spawning areas and migration through respectively egg surveys and tagging experiments, could generate valuable information about (sub-)population structures of brill throughout its entire distribution area. Therefore it is advisable to extend the sampling area to the Mediterranean Sea and the Black Sea."

Currently, the genetic structure of brill over its entire distribution area is being characterized by ILVO and the University of Leuven. Genetic variation was found to be of mean to high levels, but the results on differentiation between potential biological populations and/or management units, and on the levels of connectivity between these units, are not available yet. Also further research on brill spawning areas (egg surveys), and of migration of adult (tagging experiments) and especially immature brill (tagging experiments and genetic analysis of the immature population components) could still generate valuable information about (sub-) population structure of brill throughout its entire distribution area.

More information on the current research on the delineation of potential brill stocks can be found in Annex 5 of WGNEW(2010).

9.3 Management regulations

So far, no analytical assessments leading to fisheries advice have been carried out for brill by ICES. The available information is inadequate to evaluate stock trends. Therefore, the state of the stock(s) is unknown. No explicit objectives have been defined for potential stocks of this species, no precautionary reference points have been proposed, and no management plans are in place. However, for the EU-waters in Division IIa and Subarea IV, precautionary TACs have been defined for brill and turbot (combined) in the past. These TACs belong entirely to the EU-fisheries, and a historical overview is presented in the table below:

| YEAR | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|------|------|------|------|------|------|------|------|------|------|
| | 2009 | 2010 | 2011 | 2012 | | | | | |
| TAC | 9000 | 9000 | 6750 | 5738 | 4877 | 4550 | 4323 | 4323 | 5263 |
| | 5263 | 5263 | 4642 | 4642 | | | | | |

No restriction on the minimum length for landing brill is imposed by the EC. In several geographical areas however, Minimum Landing Sizes (MLS) have been installed for brill by different authorities. The most frequently applied MLS is 30 cm (e.g., in Belgium, the Baltic, the English Sea Fisheries District Cornwall, ...).

9.4 Fisheries data

Table 9.1 and Figure 9.1 summarise the official brill landings from the Greater North Sea (Subarea IV, Divisions IIIa and VIId,e) by country (Source: ICES Fishstat). Over the period 1950 – 1970, total landings ranged from 749 t to 1131 t per year, followed by a gradual increase to 2325 t in 1977. During 1978 – 2010, total landings varied between 1667 t (in 1980) and 3432 t (in 1993). Since 2000, annual total landings fluctuated around an average of 2236 t (range: 1985 t – 2591 t). The North Sea (IV) accounts for the major part of these landings, on average generating 71% of the totals over the time series (range: 51–88%). The English Channel and the Skagerrak are responsible for average contributions to the international brill landings of 17% and 12% respectively.

- Landings in the Skagerrak (IIIa)

International landing series from the Skagerrak were updated for brill (source: ICES Fishstat) and can be consulted in Table 9.2 and Figure 9.2. Over the period 1950–2010, these landings ranged from 59 t – 389 t per year. Denmark landed on average 81% of the Skagerrak brill (over the entire time series). Other countries contributing to the total landings were - in descending order of importance - Sweden, Norway, the Netherlands (mainly because of a peak in the second half of the seventies), Germany and Belgium. The Danish share has dropped to 75% of the landings in the last ten years, mainly due to an increase of Norwegian fisheries in the area.

- Landings in the North Sea (IV)

International landing series from the North Sea were composed for brill (source: ICES Fishstat) and can be consulted in Table 9.3 and Figure 9.3. During 1950–1970, total landings were about half of the values reached during 1970–1990, but as this is most likely attributable to incomplete statistics in the 50's and 60's (different reporting

regulations in this period compared to later in the time series) only the data from 1971 onwards were used to calculate the following Figures. Over the period 1971–2010, brill landings from the North Sea ranged from 1086 t – 2730 t per year. The Netherlands landed on average 62% of the North Sea brill. Other countries contributing to the total landings were – in descending order of importance – Belgium, UK, Denmark, Germany and France. Norway, Ireland and Sweden only land negligible quantities of North Sea brill.

- Landings in the English Channel (VIIId,e)

International landing series from the English Channel were updated for brill (source: ICES Fishstat) and can be consulted in Table 9.4 and Figure 9.4. Due to a change in reporting regulations in 1977, landings before and after this point in time cannot be quantitatively compared to each other. As a result, the dramatic increase in brill landings from 1977 onwards rather reflects an increase in reporting of the landings than an a real increase in these landings. Prior to 1977, only the UK systematically reported brill landings from the English Channel, whereas later in the time series also France and Belgium have major contributions to the total landings. Therefore, only data from 1977 onwards were used for the calculation of the following Figures. Over the period 1977–2010, brill landings from the English Channel ranged from 240 t to 759 t per year. France and the UK have always been the main contributors to the brill landings from the English Channel (44% and 34% respectively, over the entire timeline), with Belgium in third place (22%). The Netherlands, Ireland and Denmark landed negligible quantities.

More details on the Belgian, Dutch, French and UK fisheries catching brill, information on length- and age-distributions of Belgian brill landings, and numbers at length discarded per hour in the Dutch beam trawl fleet (North Sea) can be found in Annex 5 of WGNEW(2010). Numbers discarded are very low and only fish with a length of less than 25 cm are being discarded.

9.5 Survey data

Catches of brill are generally very low on surveys. These low catch numbers very often result in an underrepresentation of some year-classes (mainly the older ones), leading to a poor quality of the resulting survey abundance series and indices, and poor agreement among different surveys.

Four surveys were tested for their potential use in describing stock trends of brill in the greater North Sea. Three of these surveys take place in the North Sea (IBTS_TRI_Q1, BTS_TRI_Q3 and BTS_ISI_Q3) and one in the English Channel (CGFS_Q4). Time series of total numbers of brill caught by the three North Sea surveys are depicted in Figure 9.5. Only BTS_ISI_Q3 was found to catch a sufficient number of individuals to be useful in the context of evaluating stock trends of North Sea brill, and the corresponding abundance indices (numbers per hour) are illustrated in Figure 9.6. Figure 9.7 shows the time series of the abundance index of the CGFS_Q4 in the English Channel. Both index series are evaluated as stable at a low level (keep the low numbers in mind!).

Length frequency distributions for the Dutch Beam Trawl Survey are shown in Figure 9.8.

9.6 Biological Sampling

No new information was obtained compared to the report of WGNEW2010 (ICES, 2010) .

9.7 Biological parameters and other research

No new information was obtained compared to the report of WGNEW2010 (ICES, 2010) .

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9.8 Analysis of stock trends / assessment

No new information was obtained compared to the report of WGNEW2010 (ICES, 2010) .

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9.9 Data requirements

No new information was obtained compared to the report of WGNEW2010 (ICES, 2010) .

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Table 9.1. Total international landings (t) of brill *Scophthalmus rhombus* in the Greater North Sea (IIIa + IV + VIIde) by country over the period 1960–2010 (source: ICES Fishstat).

| | BEL | DNK | FRA | GER | IRL | NLD | NOR | SWE | UK | TOTAL |
|------|-----|-----|-----|-----|-----|------|-----|-----|-----|-------|
| 1960 | 61 | 364 | 0 | 51 | 0 | 150 | 1 | 54 | 281 | 962 |
| 1961 | 103 | 397 | 0 | 54 | 0 | 166 | 0 | 59 | 310 | 1089 |
| 1962 | 100 | 346 | 0 | 68 | 0 | 214 | 0 | 0 | 290 | 1018 |
| 1963 | 80 | 258 | 0 | 54 | 0 | 175 | 0 | 0 | 357 | 924 |
| 1964 | 79 | 231 | 0 | 45 | 0 | 279 | 0 | 0 | 221 | 855 |
| 1965 | 73 | 282 | 0 | 36 | 0 | 281 | 0 | 0 | 173 | 845 |
| 1966 | 100 | 350 | 0 | 27 | 0 | 264 | 0 | 0 | 172 | 913 |
| 1967 | 139 | 273 | 0 | 29 | 0 | 137 | 0 | 0 | 171 | 749 |
| 1968 | 155 | 295 | 0 | 41 | 0 | 274 | 0 | 0 | 164 | 929 |
| 1969 | 147 | 291 | 121 | 39 | 0 | 364 | 0 | 0 | 169 | 1131 |
| 1970 | 124 | 253 | 0 | 36 | 0 | 386 | 0 | 0 | 125 | 924 |
| 1971 | 205 | 363 | 0 | 46 | 0 | 730 | 0 | 0 | 142 | 1486 |
| 1972 | 233 | 398 | 0 | 16 | 0 | 668 | 0 | 0 | 103 | 1418 |
| 1973 | 205 | 371 | 0 | 16 | 0 | 710 | 0 | 0 | 109 | 1411 |
| 1974 | 160 | 403 | 0 | 17 | 0 | 905 | 0 | 0 | 100 | 1585 |
| 1975 | 188 | 407 | 68 | 22 | 0 | 926 | 0 | 19 | 102 | 1732 |
| 1976 | 190 | 398 | 180 | 18 | 0 | 966 | 0 | 12 | 119 | 1883 |
| 1977 | 212 | 530 | 214 | 38 | 0 | 1178 | 0 | 12 | 141 | 2325 |
| 1978 | 233 | 479 | 253 | 45 | 0 | 994 | 0 | 11 | 207 | 2222 |
| 1979 | 243 | 498 | 272 | 27 | 3 | 925 | 0 | 11 | 245 | 2224 |
| 1980 | 195 | 304 | 221 | 21 | 3 | 748 | 0 | 10 | 165 | 1667 |
| 1981 | 231 | 268 | 276 | 8 | 0 | 957 | 0 | 5 | 178 | 1923 |
| 1982 | 288 | 299 | 236 | 6 | 0 | 1009 | 0 | 8 | 197 | 2043 |
| 1983 | 289 | 317 | 257 | 7 | 0 | 1157 | 0 | 7 | 212 | 2246 |
| 1984 | 304 | 352 | 256 | 11 | 0 | 1200 | 0 | 8 | 220 | 2351 |
| 1985 | 281 | 358 | 248 | 4 | 0 | 1370 | 0 | 9 | 233 | 2503 |
| 1986 | 246 | 301 | 187 | 5 | 0 | 950 | 0 | 12 | 204 | 1905 |
| 1987 | 266 | 283 | 233 | 5 | 0 | 715 | 0 | 10 | 199 | 1711 |
| 1988 | 214 | 226 | 220 | 10 | 0 | 880 | 0 | 10 | 190 | 1750 |
| 1989 | 201 | 243 | 222 | 15 | 0 | 1080 | 0 | 9 | 181 | 1951 |
| 1990 | 268 | 423 | 273 | 30 | 0 | 480 | 0 | 10 | 277 | 1761 |
| 1991 | 287 | 431 | 277 | 38 | 0 | 1111 | 15 | 10 | 287 | 2456 |
| 1992 | 286 | 403 | 257 | 59 | 0 | 1196 | 29 | 16 | 376 | 2622 |
| 1993 | 371 | 593 | 294 | 63 | 0 | 1647 | 24 | 16 | 424 | 3432 |
| 1994 | 296 | 508 | 255 | 90 | 0 | 1235 | 23 | 17 | 410 | 2834 |
| 1995 | 285 | 373 | 272 | 68 | 1 | 943 | 19 | 13 | 363 | 2337 |
| 1996 | 311 | 364 | 255 | 47 | 0 | 732 | 20 | 5 | 438 | 2172 |
| 1997 | 236 | 250 | 186 | 49 | 1 | 590 | 27 | 11 | 343 | 1693 |
| 1998 | 230 | 326 | 207 | 59 | 0 | 810 | 26 | 13 | 355 | 2026 |
| 1999 | 258 | 378 | 0 | 52 | 0 | 808 | 29 | 17 | 296 | 1838 |
| 2000 | 331 | 372 | 276 | 79 | 1 | 1002 | 28 | 16 | 390 | 2495 |
| 2001 | 394 | 322 | 268 | 66 | 0 | 1077 | 26 | 12 | 426 | 2591 |
| 2002 | 349 | 263 | 278 | 58 | 0 | 908 | 22 | 11 | 363 | 2252 |
| 2003 | 362 | 301 | 296 | 71 | 1 | 936 | 24 | 16 | 372 | 2379 |
| 2004 | 305 | 336 | 266 | 67 | 1 | 779 | 34 | 17 | 406 | 2211 |
| 2005 | 258 | 310 | 274 | 62 | 0 | 721 | 44 | 13 | 342 | 2024 |
| 2006 | 285 | 285 | 290 | 56 | 0 | 771 | 28 | 14 | 339 | 2068 |
| 2007 | 315 | 281 | 337 | 48 | 0 | 858 | 24 | 22 | 367 | 2252 |
| 2008 | 271 | 341 | 230 | 44 | 0 | 653 | 23 | 28 | 305 | 1895 |
| 2009 | 240 | 304 | 286 | 54 | 0 | 788 | 18 | 32 | 285 | 2007 |
| 2010 | 249 | 296 | 352 | 76 | 0 | 1074 | 13 | 16 | 345 | 2421 |

Table 9.2. Total international landings (t) of brill *Scophthalmus rhombus* in the Skagerrak (Division IIIa) by country over the period 1960–2010 (source: ICES Fishstat).

| | BEL | DNK | GER | NLD | NOR | SWE | UK | TOTAL |
|------|-----|-----|-----|-----|-----|-----|----|-------|
| 1960 | 0 | 272 | 23 | 0 | 0 | 46 | 0 | 341 |
| 1961 | 0 | 255 | 20 | 0 | 0 | 50 | 0 | 325 |
| 1962 | 0 | 207 | 15 | 0 | 0 | 0 | 0 | 222 |
| 1963 | 0 | 120 | 2 | 0 | 0 | 0 | 0 | 122 |
| 1964 | 0 | 106 | 3 | 0 | 0 | 0 | 0 | 109 |
| 1965 | 0 | 155 | 5 | 0 | 0 | 0 | 0 | 160 |
| 1966 | 0 | 187 | 1 | 0 | 0 | 0 | 0 | 188 |
| 1967 | 0 | 106 | 2 | 0 | 0 | 0 | 0 | 108 |
| 1968 | 0 | 100 | 1 | 0 | 0 | 0 | 0 | 101 |
| 1969 | 0 | 99 | 1 | 0 | 0 | 0 | 0 | 100 |
| 1970 | 0 | 97 | 1 | 0 | 0 | 0 | 0 | 98 |
| 1971 | 0 | 104 | 1 | 0 | 0 | 0 | 0 | 105 |
| 1972 | 0 | 120 | 1 | 0 | 0 | 0 | 0 | 121 |
| 1973 | 0 | 131 | 3 | 0 | 0 | 0 | 0 | 134 |
| 1974 | 0 | 200 | 2 | 0 | 0 | 0 | 0 | 202 |
| 1975 | 0 | 167 | 2 | 1 | 0 | 19 | 0 | 189 |
| 1976 | 1 | 185 | 3 | 26 | 0 | 12 | 0 | 227 |
| 1977 | 1 | 276 | 1 | 99 | 0 | 12 | 0 | 389 |
| 1978 | 0 | 178 | 2 | 27 | 0 | 11 | 0 | 218 |
| 1979 | 0 | 156 | 0 | 17 | 0 | 11 | 0 | 184 |
| 1980 | 2 | 69 | 0 | 1 | 0 | 10 | 0 | 82 |
| 1981 | 0 | 54 | 0 | 0 | 0 | 5 | 0 | 59 |
| 1982 | 1 | 64 | 0 | 1 | 0 | 8 | 0 | 74 |
| 1983 | 0 | 73 | 0 | 3 | 0 | 7 | 0 | 83 |
| 1984 | 0 | 89 | 0 | 0 | 0 | 8 | 0 | 97 |
| 1985 | 0 | 100 | 0 | 0 | 0 | 9 | 0 | 109 |
| 1986 | 0 | 94 | 0 | 0 | 0 | 12 | 0 | 106 |
| 1987 | 0 | 93 | 0 | 0 | 0 | 10 | 0 | 103 |
| 1988 | 0 | 91 | 0 | 0 | 0 | 10 | 0 | 101 |
| 1989 | 0 | 88 | 0 | 0 | 0 | 9 | 0 | 97 |
| 1990 | 1 | 116 | 0 | 0 | 0 | 10 | 0 | 127 |
| 1991 | 1 | 81 | 0 | 0 | 7 | 10 | 0 | 99 |
| 1992 | 1 | 123 | 0 | 0 | 7 | 15 | 0 | 146 |
| 1993 | 2 | 184 | 0 | 0 | 10 | 16 | 0 | 212 |
| 1994 | 0 | 191 | 0 | 0 | 12 | 17 | 0 | 220 |
| 1995 | 0 | 124 | 1 | 0 | 13 | 13 | 0 | 151 |
| 1996 | 0 | 94 | 0 | 0 | 12 | 5 | 0 | 111 |
| 1997 | 0 | 83 | 1 | 0 | 11 | 11 | 0 | 106 |
| 1998 | 0 | 108 | 1 | 0 | 10 | 13 | 0 | 132 |
| 1999 | 0 | 126 | 1 | 0 | 13 | 17 | 0 | 157 |
| 2000 | 0 | 112 | 2 | 0 | 12 | 16 | 0 | 142 |
| 2001 | 0 | 73 | 0 | 0 | 13 | 12 | 0 | 98 |
| 2002 | 0 | 66 | 0 | 0 | 12 | 11 | 0 | 89 |
| 2003 | 0 | 99 | 1 | 1 | 12 | 16 | 0 | 129 |
| 2004 | 0 | 119 | 1 | 4 | 15 | 17 | 0 | 156 |
| 2005 | 0 | 101 | 0 | 3 | 16 | 13 | 0 | 133 |
| 2006 | 0 | 105 | 1 | 3 | 16 | 14 | 0 | 139 |
| 2007 | 0 | 119 | 1 | 3 | 15 | 22 | 0 | 160 |
| 2008 | 0 | 138 | 2 | 1 | 13 | 28 | 0 | 182 |
| 2009 | 0 | 98 | 1 | 1 | 14 | 32 | 0 | 146 |
| 2010 | 0 | 95 | 1 | 1 | 9 | 16 | 0 | 122 |

Table 9.3. Total international landings (t) of brill *Scophthalmus rhombus* in the North Sea (Subarea IV) by country over the period 1960–2010 (source: ICES Fishstat).

| | BEL TOTAL | DNK | FRA | GER | IRL | NLD | NOR | SWE | UK | |
|------|--------------|-----|-----|-----|-----|-------|-----|-----|-----|------|
| 1960 | 55 | 92 | 0 | 28 | 0 | 150 | 1 | 8 | 235 | 569 |
| 1961 | 102 | 142 | 0 | 34 | 0 | 166 | 0 | 9 | 264 | 717 |
| 1962 | 97 | 139 | 0 | 53 | 0 | 214 | 0 | 0 | 238 | 741 |
| 1963 | 79 | 138 | 0 | 52 | 0 | 175 | 0 | 0 | 307 | 751 |
| 1964 | 79 | 125 | 0 | 42 | 0 | 279 | 0 | 0 | 161 | 686 |
| 1965 | 71 | 127 | 0 | 31 | 0 | 281 | 0 | 0 | 127 | 637 |
| 1966 | 100 | 163 | 0 | 26 | 0 | 264 | 0 | 0 | 119 | 672 |
| 1967 | 138 | 167 | 0 | 27 | 0 | 137 | 0 | 0 | 105 | 574 |
| 1968 | 152 | 195 | 0 | 40 | 0 | 274 | 0 | 0 | 110 | 771 |
| 1969 | 145 | 192 | 0 | 38 | 0 | 364 | 0 | 0 | 102 | 841 |
| 1970 | 114 | 156 | 0 | 35 | 0 | 386 | 0 | 0 | 76 | 767 |
| 1971 | 187 | 259 | 0 | 45 | 0 | 730 | 0 | 0 | 94 | 1315 |
| 1972 | 213 | 278 | 0 | 15 | 0 | 665 | 0 | 0 | 51 | 1222 |
| 1973 | 185 | 240 | 0 | 13 | 0 | 710 | 0 | 0 | 39 | 1187 |
| 1974 | 135 | 203 | 0 | 15 | 0 | 905 | 0 | 0 | 44 | 1302 |
| 1975 | 164 | 240 | 13 | 20 | 0 | 925 | 0 | 0 | 44 | 1406 |
| 1976 | 148 | 213 | 10 | 15 | 0 | 940 | 0 | 0 | 45 | 1371 |
| 1977 | 166 | 254 | 17 | 37 | 0 | 1,079 | 0 | 0 | 60 | 1613 |
| 1978 | 175 | 298 | 26 | 43 | 0 | 967 | 0 | 0 | 84 | 1593 |
| 1979 | 188 | 342 | 10 | 27 | 3 | 908 | 0 | 0 | 103 | 1581 |
| 1980 | 129 | 233 | 8 | 21 | 0 | 747 | 0 | 0 | 45 | 1183 |
| 1981 | 148 | 214 | 5 | 8 | 0 | 957 | 0 | 0 | 42 | 1374 |
| 1982 | 182 | 235 | 11 | 6 | 0 | 1,007 | 0 | 0 | 41 | 1482 |
| 1983 | 182 | 244 | 23 | 7 | 0 | 1,153 | 0 | 0 | 28 | 1637 |
| 1984 | 190 | 263 | 30 | 11 | 0 | 1,200 | 0 | 0 | 29 | 1723 |
| 1985 | 187 | 258 | 35 | 4 | 0 | 1,370 | 0 | 0 | 46 | 1900 |
| 1986 | 131 | 207 | 4 | 5 | 0 | 950 | 0 | 0 | 46 | 1343 |
| 1987 | 140 | 190 | 17 | 5 | 0 | 715 | 0 | 0 | 48 | 1115 |
| 1988 | 102 | 135 | 18 | 10 | 0 | 880 | 0 | 0 | 52 | 1197 |
| 1989 | 112 | 155 | 9 | 15 | 0 | 1080 | 0 | 0 | 58 | 1429 |
| 1990 | 168 | 307 | 24 | 30 | 0 | 480 | 0 | 0 | 82 | 1091 |
| 1991 | 205 | 350 | 28 | 38 | 0 | 1,111 | 8 | 0 | 147 | 1887 |
| 1992 | 203 | 280 | 34 | 59 | 0 | 1,196 | 22 | 1 | 218 | 2013 |
| 1993 | 291 | 409 | 38 | 63 | 0 | 1,647 | 14 | 0 | 268 | 2730 |
| 1994 | 208 | 317 | 28 | 90 | 0 | 1,235 | 11 | 0 | 235 | 2124 |
| 1995 | 194 | 249 | 24 | 67 | 0 | 943 | 6 | 0 | 145 | 1628 |
| 1996 | 206 | 270 | 15 | 47 | 0 | 732 | 8 | 0 | 175 | 1453 |
| 1997 | 129 | 167 | 1 | 48 | 0 | 590 | 16 | 0 | 135 | 1086 |
| 1998 | 160 | 218 | 11 | 58 | 0 | 808 | 16 | 0 | 172 | 1443 |
| 1999 | 161 | 252 | 0 | 51 | 0 | 805 | 16 | 0 | 156 | 1441 |
| 2000 | 167 | 260 | 16 | 77 | 0 | 998 | 16 | 0 | 141 | 1675 |
| 2001 | 182 | 249 | 12 | 66 | 0 | 1,075 | 13 | 0 | 158 | 1755 |
| 2002 | 145 | 197 | 10 | 58 | 0 | 907 | 10 | 0 | 120 | 1447 |
| 2003 | 145 | 202 | 9 | 70 | 0 | 934 | 12 | 0 | 119 | 1491 |
| 2004 | 140 | 217 | 7 | 66 | 0 | 772 | 19 | 0 | 168 | 1389 |
| 2005 | 120 | 209 | 7 | 62 | 0 | 716 | 28 | 0 | 138 | 1280 |
| 2006 | 105 | 180 | 9 | 55 | 0 | 765 | 12 | 0 | 154 | 1280 |
| 2007 | 110 | 162 | 12 | 47 | 0 | 854 | 9 | 0 | 156 | 1350 |
| 2008 | 117 | 203 | 5 | 42 | 0 | 650 | 10 | 0 | 93 | 1120 |
| 2009 | 109 | 206 | 8 | 53 | 0 | 786 | 4 | 0 | 104 | 1270 |
| 2010 | 104 | 201 | 12 | 75 | 0 | 1072 | 4 | 0 | 136 | 1604 |

Table 9.4. Total international landings (t) of brill *Scophthalmus rhombus* in the English Channel (Divisions VIIId,e) by country over the period 1960–2010 (source: ICES Fishstat).

| | BEL | DNK | IRL | FRA | NLD | UK | TOTAL |
|------|-----|-----|-----|-----|-----|----|-------|
| 1960 | 6 | 0 | 0 | 0 | 0 | 46 | 52 |
| 1961 | 1 | 0 | 0 | 0 | 0 | 46 | 47 |
| 1962 | 3 | 0 | 0 | 0 | 0 | 52 | 55 |

| | | | | | | | |
|------|-----|---|---|-----|---|-----|-----|
| 1963 | 1 | 0 | 0 | 0 | 0 | 50 | 51 |
| 1964 | 0 | 0 | 0 | 0 | 0 | 60 | 60 |
| 1965 | 2 | 0 | 0 | 0 | 0 | 46 | 48 |
| 1966 | 0 | 0 | 0 | 0 | 0 | 53 | 53 |
| 1967 | 1 | 0 | 0 | 0 | 0 | 66 | 67 |
| 1968 | 3 | 0 | 0 | 0 | 0 | 54 | 57 |
| 1969 | 2 | 0 | 0 | 121 | 0 | 67 | 190 |
| 1970 | 10 | 0 | 0 | 0 | 0 | 49 | 59 |
| 1971 | 18 | 0 | 0 | 0 | 0 | 48 | 66 |
| 1972 | 20 | 0 | 0 | 0 | 3 | 52 | 75 |
| 1973 | 20 | 0 | 0 | 0 | 0 | 70 | 90 |
| 1974 | 25 | 0 | 0 | 0 | 0 | 56 | 81 |
| 1975 | 24 | 0 | 0 | 55 | 0 | 58 | 137 |
| 1976 | 41 | 0 | 0 | 170 | 0 | 74 | 285 |
| 1977 | 45 | 0 | 0 | 197 | 0 | 81 | 323 |
| 1978 | 58 | 3 | 0 | 227 | 0 | 123 | 411 |
| 1979 | 55 | 0 | 0 | 262 | 0 | 142 | 459 |
| 1980 | 64 | 2 | 3 | 213 | 0 | 120 | 402 |
| 1981 | 83 | 0 | 0 | 271 | 0 | 136 | 490 |
| 1982 | 105 | 0 | 0 | 225 | 1 | 156 | 487 |
| 1983 | 107 | 0 | 0 | 234 | 1 | 184 | 526 |
| 1984 | 114 | 0 | 0 | 226 | 0 | 191 | 531 |
| 1985 | 94 | 0 | 0 | 213 | 0 | 187 | 494 |
| 1986 | 115 | 0 | 0 | 183 | 0 | 158 | 456 |
| 1987 | 126 | 0 | 0 | 216 | 0 | 151 | 493 |
| 1988 | 112 | 0 | 0 | 202 | 0 | 138 | 452 |
| 1989 | 89 | 0 | 0 | 213 | 0 | 123 | 425 |
| 1990 | 99 | 0 | 0 | 249 | 0 | 195 | 543 |
| 1991 | 81 | 0 | 0 | 249 | 0 | 140 | 470 |
| 1992 | 82 | 0 | 0 | 223 | 0 | 158 | 463 |
| 1993 | 78 | 0 | 0 | 256 | 0 | 156 | 490 |
| 1994 | 88 | 0 | 0 | 227 | 0 | 175 | 490 |
| 1995 | 91 | 0 | 1 | 248 | 0 | 218 | 558 |
| 1996 | 105 | 0 | 0 | 240 | 0 | 263 | 608 |
| 1997 | 107 | 0 | 1 | 185 | 0 | 208 | 501 |
| 1998 | 70 | 0 | 0 | 196 | 2 | 183 | 451 |
| 1999 | 97 | 0 | 0 | 0 | 3 | 140 | 240 |
| 2000 | 164 | 0 | 1 | 260 | 4 | 249 | 678 |
| 2001 | 212 | 0 | 0 | 256 | 2 | 268 | 738 |
| 2002 | 204 | 0 | 0 | 268 | 1 | 243 | 716 |
| 2003 | 217 | 0 | 1 | 287 | 1 | 253 | 759 |
| 2004 | 165 | 0 | 1 | 259 | 3 | 238 | 666 |
| 2005 | 138 | 0 | 0 | 267 | 2 | 204 | 611 |
| 2006 | 180 | 0 | 0 | 281 | 3 | 185 | 649 |
| 2007 | 205 | 0 | 0 | 325 | 1 | 211 | 742 |
| 2008 | 154 | 0 | 0 | 225 | 2 | 212 | 593 |
| 2009 | 131 | 0 | 0 | 278 | 1 | 181 | 591 |
| 2010 | 145 | 0 | 0 | 340 | 1 | 209 | 695 |

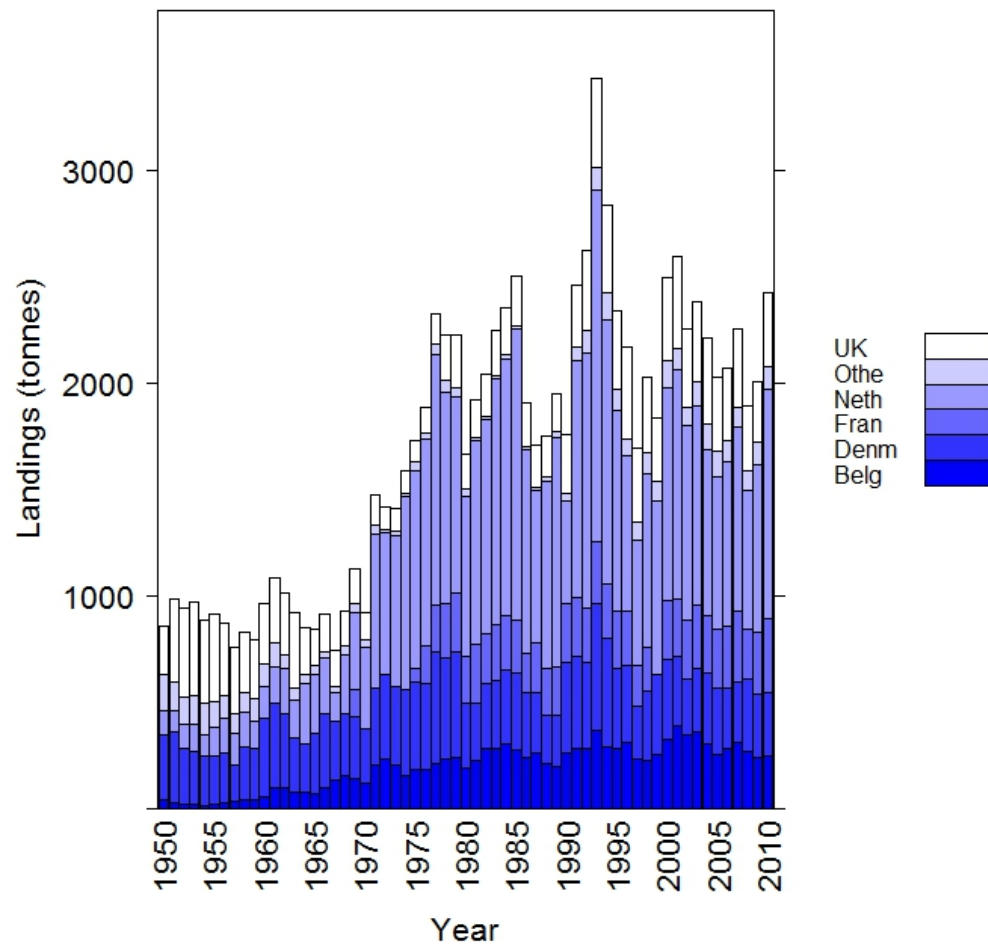


Figure 9.1. Total international landings (t) of brill *Scophthalmus rhombus* in the Greater North Sea (IIIa + IV + VIIde) by country over the period 1950–2010 (source: ICES Fishstat).

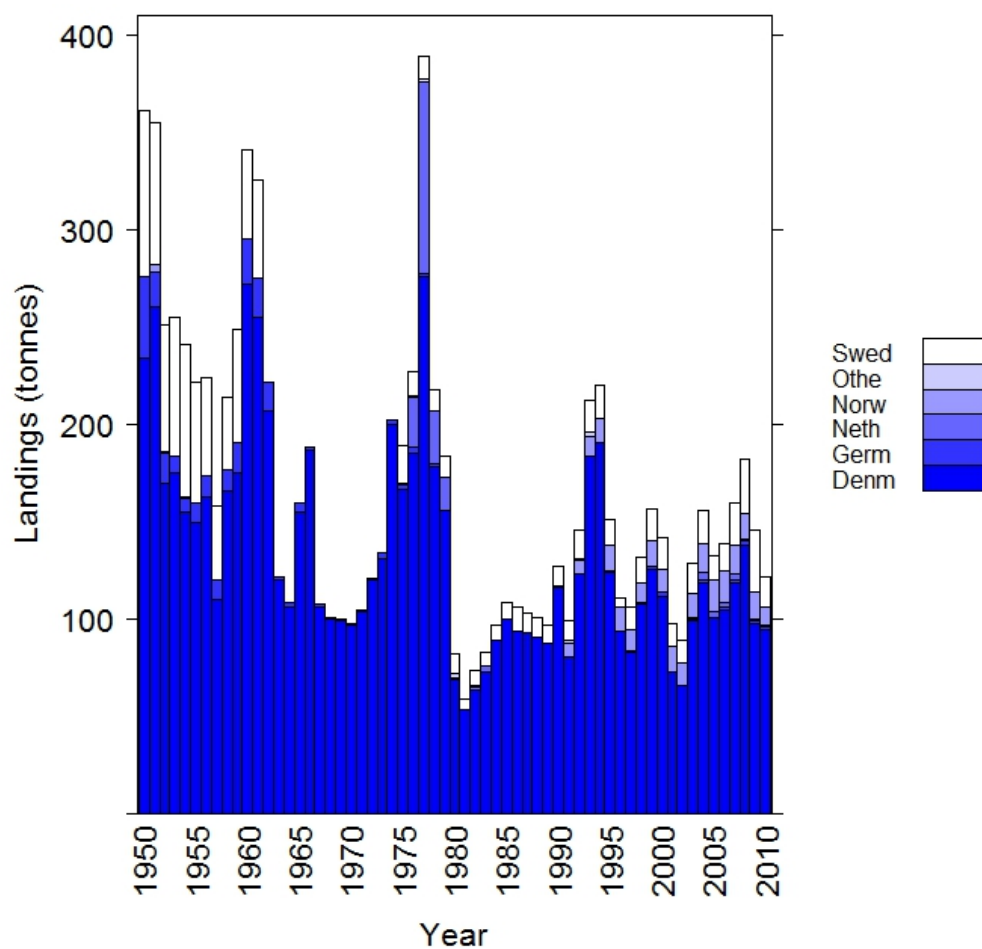


Figure 9.2. Total international landings (t) of brill *Scophthalmus rhombus* in the Skagerrak (Division IIIa) by country over the period 1950–2010 (source: ICES Fishstat).

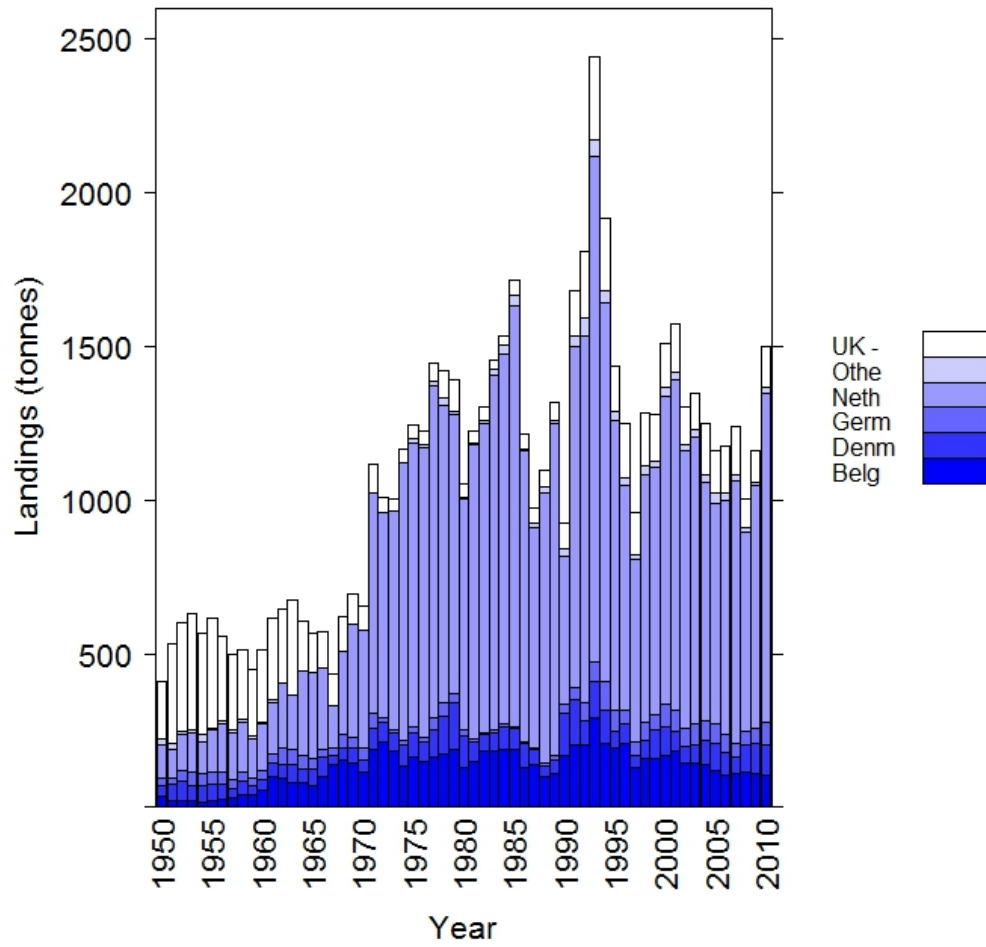


Figure 9.3. Total international landings (t) of brill *Scophthalmus rhombus* in the North Sea (Subarea IV) by country over the period 1950–2010 (source: ICES Fishstat).

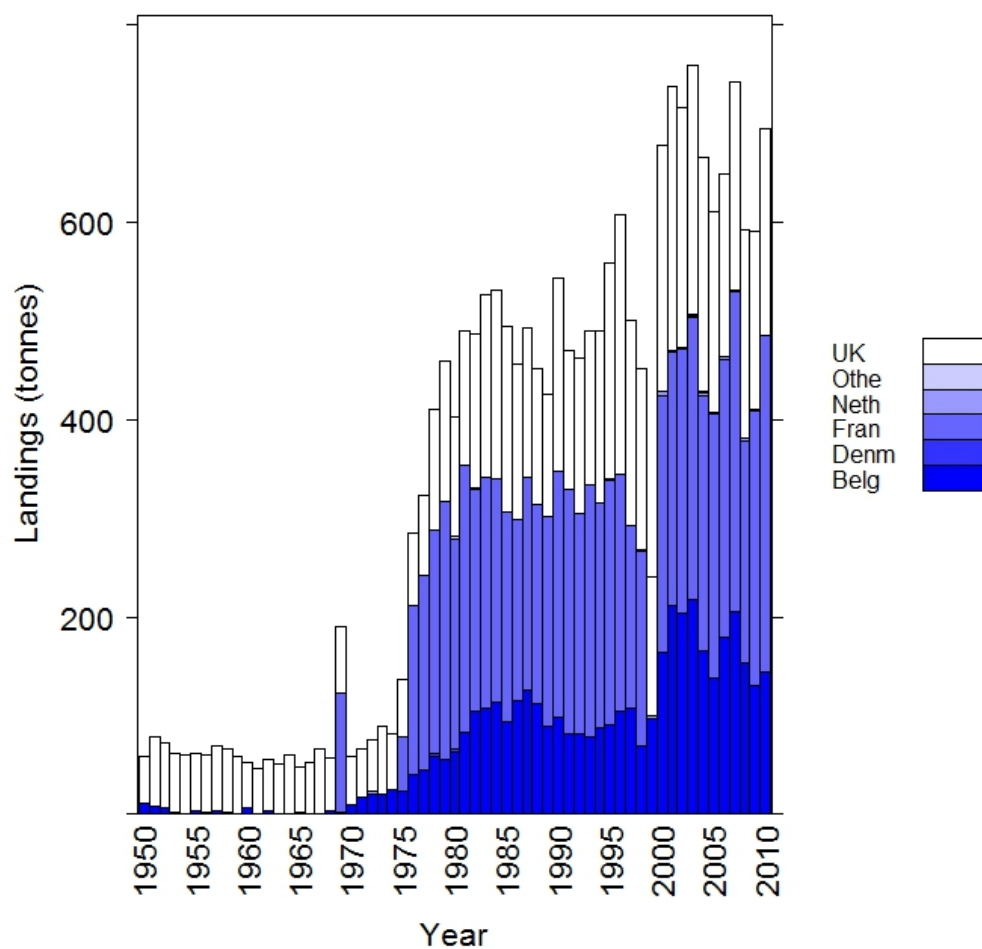


Figure 9.4. Total international landings (t) of brill *Scophthalmus rhombus* in the English Channel (Divisions VIIId,e) by country over the period 1950–2010 (source: ICES Fishstat).

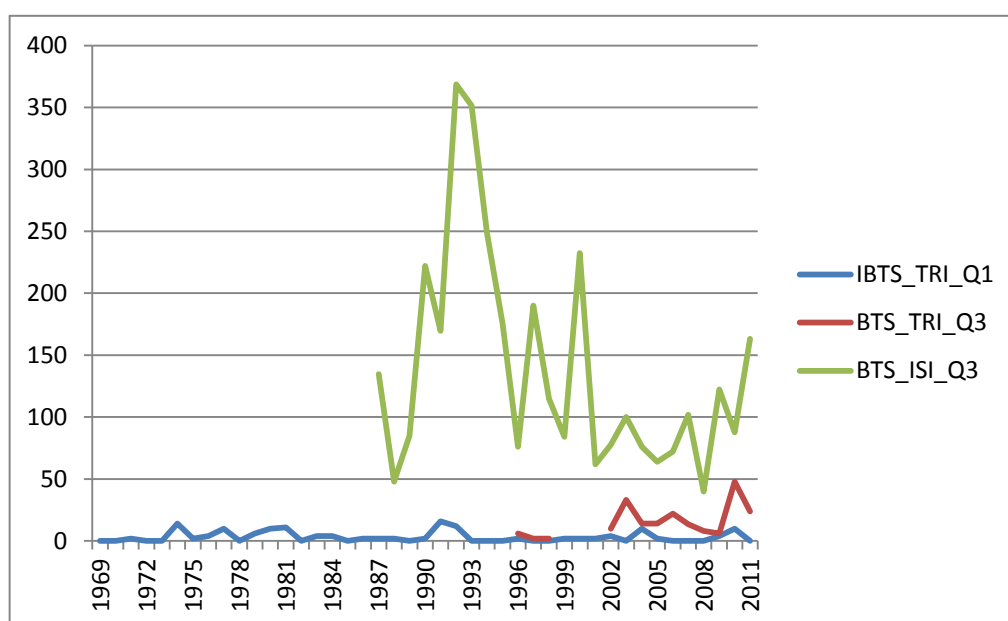


Figure 9.5. Total numbers of brill *Scophthalmus rhombus* caught by three surveys in the North Sea (Subarea IV).

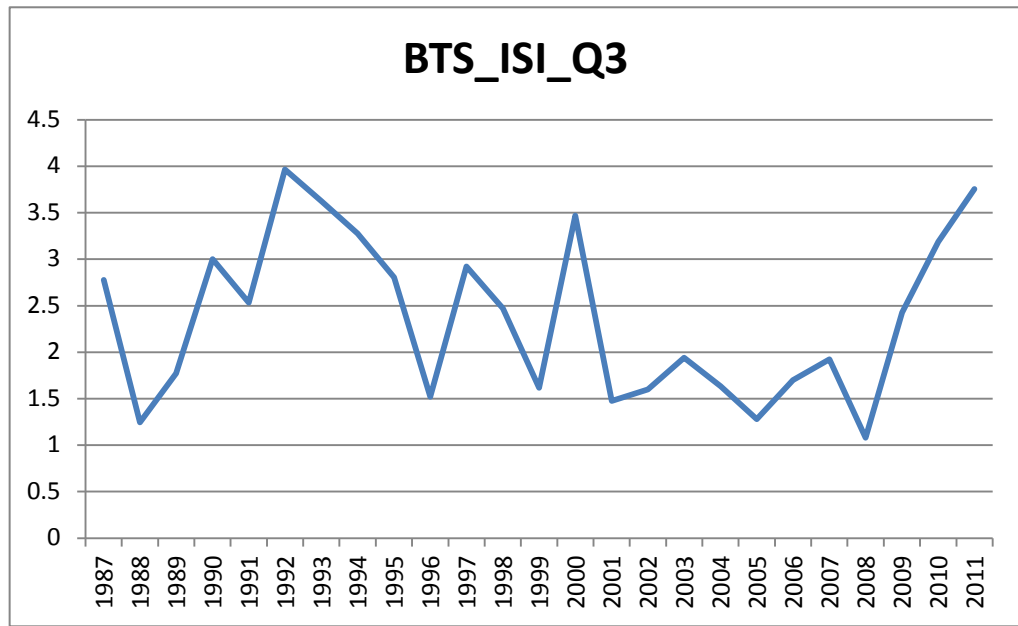


Figure 9.6. Abundance index (numbers per hour) of North Sea brill *Scophthalmus rhombus* in the BTS_ISI_Q3 survey (Subarea IV).

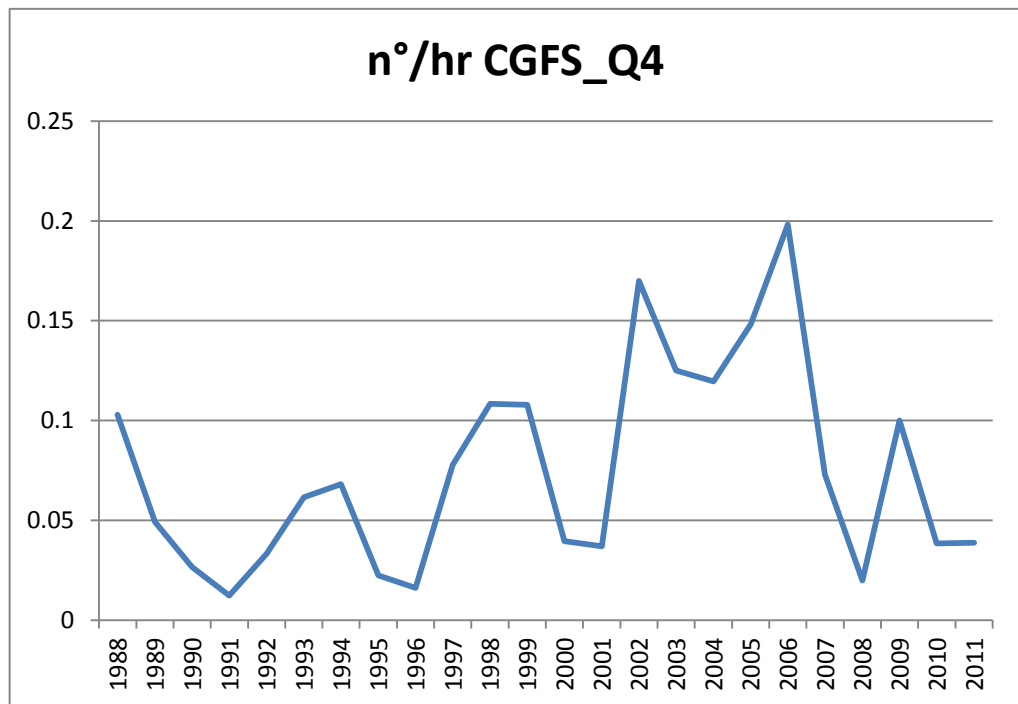


Figure 9.7. Abundance index (numbers per hour) of English Channel brill *Scophthalmus rhombus* in the CGFS_Q4 survey (Subdivision VIIId).

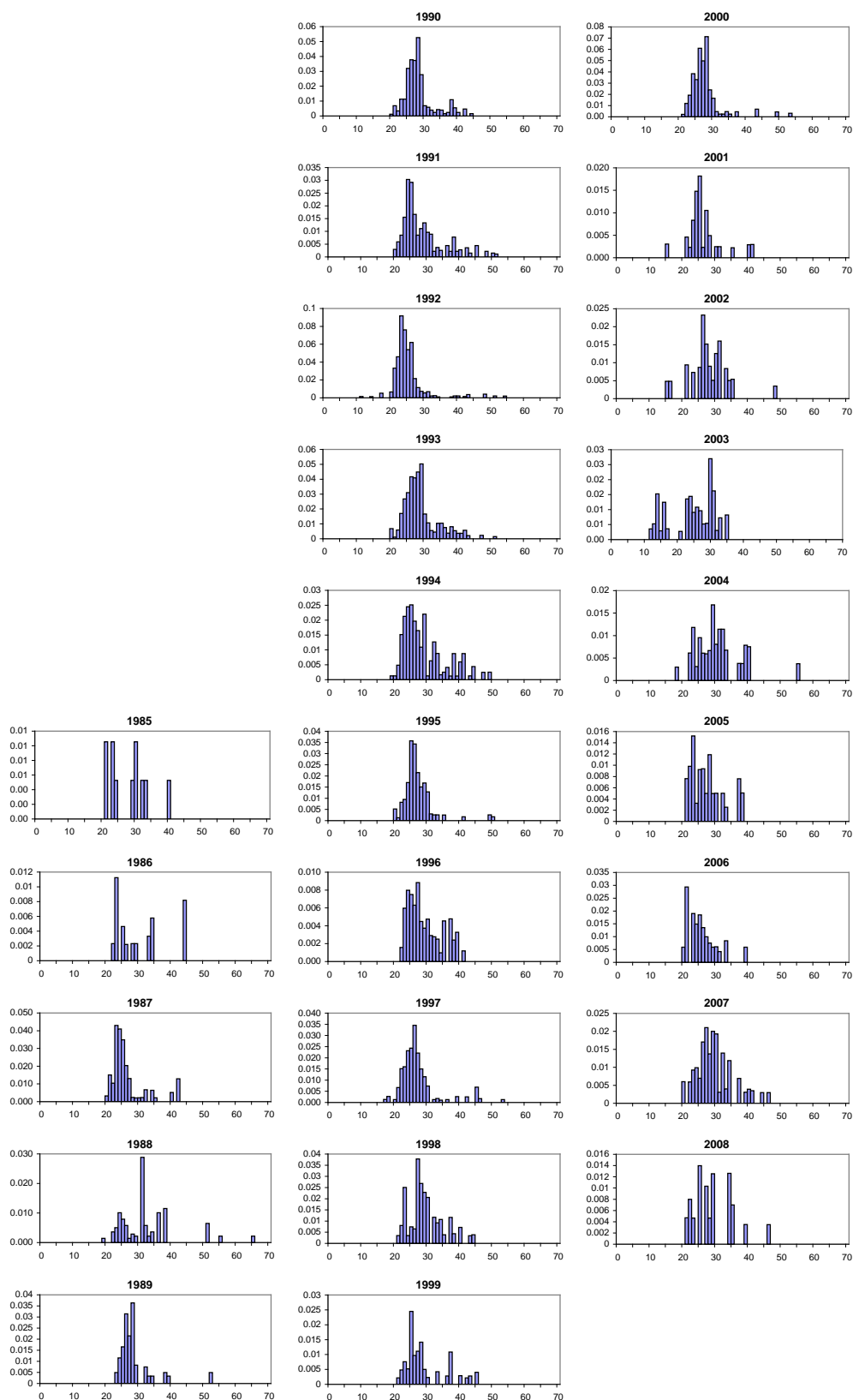
***Scophthalmus rhombus*, BTS (Isis)**

Figure 9.8. North Sea brill *Scophthalmus rhombus*: number at length for the Dutch contribution to the North Sea Beam Trawl Survey. Only data for RV Isis (Q3) are included.

10 Turbot

10.1 General biology

Turbot (*Psetta maxima*) is distributed along the European coastline, including the Faroe Islands, Iceland, Rockall Bank, the Skagerrak, the Kattegat, the Belt Sea and in the Baltic Sea. The distribution area extends into the Mediterranean and Adriatic Sea. It is typically found at a depth range of 10 to 70 m, on sandy, rocky or mixed bottoms. It is one of the few marine fish species that inhabits brackish waters.

Turbot is one of the fastest growing flatfish, it can reach 30 cm in the first three years of its life. Like other flatfish, females grow faster than males. Turbot is a typical visual feeder, feeding on bottom-living fishes, small pelagic fish and also on larger crustaceans and bivalves. Large turbot (40 to 70 cm) feed from March till May on herring and sprat (Rae and Devlin, 1972; Wetsteijn, 1981). During the other nine months 50 to 70 % of the animals were found to have empty stomachs. The diet of the juveniles has been shown to consist of copepods, shrimps, barnacle larvae and gastropod mollusc larvae (Jones, 1973).

Turbot is a rather sedentary species, but migratory patterns have been observed. In the North Sea, migrations from the nursery grounds in the south-eastern part to the more northern areas have been recorded. Adult turbot are more tolerant of the colder conditions in the northern areas of the North Sea where temperatures are too low for juveniles to survive. A study in the northern Baltic by Aneer and Weston (1990) also indicated that adult turbot is very stationary.

10.2 Stock identity and possible assessment areas

There are indications of distinct turbot populations in the Baltic Sea and in the Irish Sea. Also, there are indications that turbot from the North Sea, the southern coast of Iceland, the western coast of Scotland and Ireland, and the Celtic Sea (including the Western Approaches - 51°N, 10°W) forms another stock, the northern Atlantic stock, which is different from the stock originating from the Bay of Biscay and the Atlantic side of southern Europe, the southern stock. Transition zones between the northern stock and the southern stock are found in the English Channel and between the northern stock and the Baltic Sea in the Kattegat and the Belt Sea. The situation of turbot stocks in the Mediterranean is still unclear, although there are indications that samples from the Aegean Sea are genetically different from those originating from other areas (Figure 10.1).

A large population genetic study of turbot population structure is still ongoing. Results of this study can be used by the benchmark for turbot that will be held in October 2012.

10.3 Management regulations

TACs have been defined for turbot and brill combined for the EC-waters in Division IIa and Subarea IV. These TACs only apply to the EC-fisheries. A historical overview is presented in Table 10.1. No TACs are in place for area IIIa. So far, no analytical assessments leading to fisheries advice have been carried out for turbot by ICES. No explicit objectives have been defined for potential stocks of this species, no precautionary reference points have been proposed, and no management plans are in place.

There is no official EC minimum landing size. In several geographical areas however, Minimum Landing Sizes (MLS) have been installed by different authorities. The most

frequently applied MLS is 30 cm (e.g., in Belgium, the Baltic, the English Sea Fisheries District Cornwall, ...).

10.4 Fisheries data

Table 10.2 and Figure 10.3 summarize turbot landings in ICES area IIIa. Over the period 1973 – 2008, total landings (all areas) ranged from 3504 t to 9361 t per year, with the lowest landings halfway the eighties and the highest peak in the early nineties (Figure 10.2). In the last decade, the total landings of turbot were between 5000 and 6500 t. The North Sea (Figure 10–3 and 10–4) accounts for the major part of these landings generating around 60% of the totals in the past ten years (70–80% from the early sixties to the early seventies).

The English Channel (VIId,e) and the Celtic Sea (VIIIf and VIIg-k) are the second and third most important fishing grounds for turbot, but are already much less important than the North Sea (mean landings percentages of 8% and 7% respectively over the entire time-line). The importance of these fishing grounds increased slightly to almost 9% of the total landings (for each of these two areas) in the past ten years. Fishing grounds from where the landings represent on average between 2 and 5% of the total landings over the entire time-line are IIIa, IIIb-d, VIIa, VIII and IX. Landings from other areas are negligible.

10.5 Survey data, recruit series

The presence or absence of turbot in the catches of the BTS and IBTS survey is summarized in Figure 10.5. Turbot is mainly caught in the southern and eastern part of the North Sea. Also catches are made in the Kattegat and on the east coast of Scotland.

There are three Dutch trawl surveys for flatfish species that catch turbot in the North Sea: Sole Net Survey (SNS), BTS Isis survey, and BTS Tridens survey (Table 10–4 to 10–6). These surveys are held in autumn, but each covers a different area of the North Sea, and different gears are used. The SNS survey covers the coastal areas in the southern Bight and the German Bight. The BTS-Isis survey covers the south-eastern part of the North Sea. The BTS-Tridens covers the central and western part of the North Sea.

For the Dutch trawl surveys, data by length and age are available. Age structured survey indices are shown in Figure 10.6. However, the age composition in the age structured survey indices are derived from the length structure using an age-length key. This conversion from length- to age-structure of the survey indices for this series using the age length key has been done on a limited set of otoliths available from the survey, while almost all specimens caught in the survey are sampled for age. This means the age structure of the survey indices can be substantially improved by using all available age information. This improvement depends on the age data becoming available to ICES.

Cefas conducts several annual surveys in which turbot are routinely measured and biological information is retained. The most important surveys are the Irish Sea (VIIa, VIIIfg) beam trawl survey, the Channel (VIId) beam trawl survey, the Carhelmar (VIIe) commercial beam trawl survey and the English groundfish (IVb, c) GOV trawl survey.

10.6 Biological sampling

Appendix VII of Commission Decision 2010/93/EU lists biological variables with species sampling specifications for all ICES areas. Table 10.9 gives an overview of what this implies for turbot (sampling for fecundity is optional). Turbot is classified as a Group 2 species under the DCF. These are internationally regulated species and major non-internationally regulated by-catch species, that don't drive the international management process and are not under EU management plans, EU recovery plans, EU long term multi-annual plans or EU action plans for conservation and management based on Council Regulation 2002/2371/EC. Group 2 species only require data on weight, sex-ratio and maturity to be collected every three years.

In Table 10.10 the sampling intentions of all Member States that inscribed sampling of biological parameters for turbot in their national proposals, were compiled, and can directly be compared to the required numbers. For the North Sea and the Eastern English Channel, the joint effort of Belgium, Denmark, the Netherlands and the UK leads to sufficient sampling for age, weight, sex-ratio and maturity of turbot (green fields; for these parameters only 250 individuals are required under the DCF). All of the countries mentioned above plan to collect this biological information every year in the period 2011–2013 (and not on the minimum required three-year basis). No Member States included sampling of biological parameters for turbot in the Irish Sea and the Skagerrak in their proposals.

On surveys, catches of turbot are generally low. This is because of the low fish densities and the low trawling speeds on surveys compared to commercial vessels, making it easier for bigger fish like turbot to actively escape the nets. Turbot grows relatively fast and generally reaches a certain length faster (at younger ages) than other flatfish species in the same areas, leading to a higher proportion of bigger fish in the younger age-classes than in slower growing species such as sole *Solea solea* and plaice *Pleuronectes platessa*. This also means that it is much more difficult to obtain sufficient information on the bigger length classes for turbot. Additionally, the shorter trawl durations on surveys decrease the chance to encounter an individual turbot, that occur more scattered over a given area than other co-occurring flatfish species because of their predatory feeding behaviour (turbot is piscivorous and could be regarded as a top predator, except for the smaller larval stages).

10.7 Population biological parameters and other research

Length

Length weight relationships for males and females are given in Figure 10.9. An analysis of time series of landings and data from sampling on board of commercial vessels by Belgium (Moreau, 2010a) provided information on length-distributions, but not much on age-distributions, of landings and discards of turbot.

Age

Growth parameters (L_{∞} and K) for North Sea turbot are shown in Figure 10–10. ILVO extracted already existing age-information on turbot from its own database (Moreau, 2010b), and collected similar information from relevant project partners and some other countries that were not involved in the NESPMAN-project. This resulted in only very few data.

Sex-ratio, maturity and other reproductive characteristics

A couple of studies on the reproductive characters of turbot have been carried out in the past by various authors (e.g., Dunn *et al.*, 1996; Ongenae, and De Clerck, 1998, Boon *et al.*, 2000, and references therein). Findings on sex-ratio and maturity of turbot (mainly females) are summarized in Table 10–9 (after Moreau, 2010b). Due to sampling outside the main spawning months no certain assumptions could be made on the length range during first maturation for turbot in the English Channel, Celtic and Irish Seas.

In the past, biological samples of turbot from the Danish fisheries in IIIa have been taken both from landed catches and through the national at-sea-sampling programme.

UK length information from market sampling for turbot from the Irish Sea and the English Channel is available for 1994–1996, and from 2000 onwards. Biological sampling for age, weight, sex and maturity has only been carried out since 2000 (Annex 6). The otoliths collected have not been aged.

France did collect length and age data on turbot (demographic structures per metier) in the areas VIIId and VIIe during the years 1994–1996. These data were collected under an EU funded project carried out by France and the UK (Dunn *et al.*, 1996).

The Netherlands did sample North Sea turbot for age and length in 1982–1990, 1998 and from 2002 onwards. The number of length measurements varies between 3500 and 5500 per year, the number of aged fish between 400 and 2500 per year. The relative age distribution for the earliest sampling period is presented in Figure 10.7.

During the mid 1990s, Belgium took age and length samples of turbot caught in the Eastern English Channel, the Celtic Sea, the Irish Sea and the Bay of Biscay. The numbers measured vary between 200 and 600 individuals per year. The relative age distribution of turbot in the commercial landings of the Belgian beam trawl fleet for the period 1996–1997 is given in Annex 6. Since 2002, Belgium samples North Sea turbot as part of the DCR, although the sampling intensity has been rather low (<200 individuals per year).

Some biological sampling has been done in Germany for landings of turbot in the North Sea at the end of the 1970's. The age structured landings raised to the North Sea total are described by Weber (1979).

The different ageing programmes do not fully cover all years since the first observations presented in Weber (1979). The combined availability of age structured landings estimated is presented in Figure 10–8.

10.8 Analyses of stock trends

Dunn (1999) made an assessment of turbot in the Channel fisheries (UK and FR) by using a Pella-Tomlinson model to a cpue time series of the English beam trawlers (1984–1995). He concluded that fishing mortality has increased from 1984 to 1989 from 1 to 1.5 and decreased thereafter to 0.7 in 1995. The MSY was given by Dunn (1999) to be between 300 and 400 t, which was lower than the observed catches (550 t /year). Ulrich (2000) found a maximum sustainable production of 440 t/year.

For the North Sea, a stock assessment was developed based on the ideas presented in Aarts and Poos (2009). The available landings-at-age matrix spanning 1975–2008 is used (Table 10.7) The age range for the matrix is 1–9. The assessment incorporates the age structured survey indices for the SNS, BTS-Isis, and BTS-Tridens. In an initial

run, all surveys are included, each with an age range of ages 1–7. Figure 10.11 and 10.12 show the residuals of the survey indices and landings at age.

The assessment indicates that fishing mortality has increased between 1975 and 2000 (Figure 10.13). Since 2000, the increase has most likely stopped and fishing mortality has decreased. However, the 95% confidence limits for the estimates are very wide. The fishing mortality in 2008 is estimated to be between 0.40 and 0.77. The recent decrease in fishing mortality is most likely a response to the decrease in fishing effort by the beam trawl fleet in the North Sea. This decrease has also resulted in reductions in fishing mortality in the target species for this fishery, plaice and sole. The long term management plan for these two species will probably result in further reductions in fishing effort. Under the proviso that there is no increase in targeted fishing for turbot, the fishing mortality for turbot will likely further decrease in the future. The effects on the landings of this decrease in fishing effort is difficult to predict, given that there is no yield curve analysis available.

The recruitment in the North Sea is estimated to have been high at the beginning of the timeseries (Figure 10.14). No further trends are found. Recruitment appears slightly higher in the most recent period, but that may be an effect of the changes in the MLS discussed above. The Total Stock Biomass has likely decreased since the beginning of the time series, but the 95% confidence limits are very large (up to a factor 2 between lower and upper limit (Figure 10.15). The most recent estimate in TSB (at 1 January 2008) is estimated to be between 7.6 and 15.6 thousand tonnes.

10.9 Data recommendations

The collection of data needs to be continued in order to get a better understanding of the state of turbot stocks in the Northeast Atlantic, and to enable the evaluation of trends.

In order to meet the DCF-requirements (Table 10.9) for sampling of biological parameters for turbot in the Skagerrak, the English Channel, the Celtic Sea and the Irish Sea, the following countries could be valid candidates to fill in the gaps in Table 10–11, according to their importance in turbot fisheries;

- Denmark in the Skagerrak
- France and Belgium in the English Channel
- France, Belgium and Ireland in the Celtic Sea
- Ireland and Belgium in the Irish Sea

General recommendations

- EU to upgrade turbot from Group 2 to Group 1, forcing relevant Member States to collect biological information on a yearly basis
- Relevant Member States to include market sampling for turbot in their National Proposals, thus generating the required funds through the DCF.

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Table 10.1. Turbot in the North Sea. Landings in IV as officially reported to ICES (Source: fishstat database) and combined TACs for turbot and brill (*Scophthalmus rhombus*) in Division IIa and Subarea IV.

| Year | Belgium | Denm | France | Germ | Netherl | Norway | UK | Other | total | TAC Tur+Brill |
|------|---------|------|--------|------|---------|--------|------|-------|-------|------------------|
| 1965 | 201 | 510 | 208 | 393 | 1199 | 0 | 1711 | 0 | 4222 | |
| 1966 | 267 | 670 | 54 | 467 | 1384 | 0 | 1497 | 0 | 4339 | |
| 1967 | 293 | 536 | 48 | 457 | 864 | 0 | 1185 | 0 | 3383 | |
| 1968 | 275 | 799 | 30 | 401 | 1826 | 0 | 917 | 0 | 4248 | |
| 1969 | 219 | 830 | 23 | 322 | 2259 | 0 | 1017 | 0 | 4670 | |
| 1970 | 151 | 538 | 96 | 267 | 1921 | 0 | 1070 | 0 | 4043 | |
| 1971 | 178 | 529 | 62 | 189 | 2472 | 0 | 880 | 0 | 4310 | |
| 1972 | 164 | 539 | 34 | 203 | 2523 | 0 | 951 | 0 | 4414 | |
| 1973 | 135 | 412 | 50 | 194 | 2638 | 0 | 824 | 0 | 4253 | |
| 1974 | 113 | 247 | 12 | 135 | 2885 | 0 | 717 | 0 | 4109 | |
| 1975 | 158 | 387 | 21 | 169 | 3349 | 0 | 503 | 1 | 4588 | |
| 1976 | 146 | 588 | 38 | 156 | 3253 | 0 | 631 | 2 | 4814 | |
| 1977 | 145 | 474 | 37 | 172 | 2973 | 0 | 683 | 0 | 4484 | |
| 1978 | 170 | 693 | 50 | 173 | 3196 | 0 | 752 | 0 | 5034 | |
| 1979 | 187 | 1164 | 22 | 151 | 3999 | 0 | 838 | 3 | 6364 | |
| 1980 | 162 | 1360 | 17 | 146 | 3241 | 0 | 559 | 0 | 5485 | |
| 1981 | 142 | 1044 | 6 | 86 | 3073 | 0 | 404 | 0 | 4755 | |
| 1982 | 153 | 880 | 14 | 42 | 3029 | 0 | 335 | 0 | 4453 | |
| 1983 | 174 | 893 | 24 | 44 | 3163 | 0 | 277 | 0 | 4575 | |
| 1984 | 242 | 886 | 40 | 46 | 3800 | 0 | 282 | 1 | 5297 | |
| 1985 | 222 | 983 | 37 | 34 | 4600 | 0 | 312 | 0 | 6188 | |
| 1986 | 133 | 997 | 5 | 31 | 3810 | 0 | 287 | 0 | 5263 | |
| 1987 | 130 | 988 | 21 | 27 | 2760 | 0 | 345 | 0 | 4271 | |
| 1988 | 129 | 858 | 24 | 41 | 2660 | 0 | 328 | 1 | 4041 | |
| 1989 | 176 | 637 | 30 | 85 | 3666 | 0 | 333 | 0 | 4927 | |
| 1990 | 292 | 1046 | 52 | 184 | 3732 | 0 | 437 | 7 | 5750 | |
| 1991 | 350 | 1233 | 64 | 186 | 3780 | 30 | 688 | 9 | 6340 | |
| 1992 | 317 | 907 | 81 | 163 | 3495 | 65 | 902 | 3 | 5933 | |
| 1993 | 355 | 817 | 123 | 252 | 2939 | 47 | 1013 | 0 | 5546 | |
| 1994 | 330 | 862 | 141 | 263 | 2724 | 42 | 882 | 0 | 5244 | |
| 1995 | 315 | 761 | 108 | 275 | 2476 | 33 | 703 | 0 | 4671 | |
| 1996 | 210 | 618 | 160 | 157 | 1776 | 36 | 687 | 0 | 3644 | |
| 1997 | 169 | 479 | 1 | 215 | 1854 | 45 | 619 | 0 | 3382 | |
| 1998 | 198 | 392 | 22 | 164 | 1695 | 33 | 582 | 0 | 3086 | |
| 1999 | 224 | 411 | 0 | 224 | 1808 | 32 | 488 | 0 | 3187 | |
| 2000 | 302 | 469 | 21 | 349 | 2280 | 55 | 549 | 0 | 4025 | 9000 |
| 2001 | 333 | 506 | 17 | 297 | 2226 | 79 | 642 | 0 | 4100 | 9000 |
| 2002 | 243 | 677 | 15 | 280 | 1898 | 85 | 551 | 0 | 3749 | 6750 |
| 2003 | 192 | 486 | 18 | 289 | 1893 | 65 | 431 | 0 | 3374 | 5738 |
| 2004 | 207 | 518 | 15 | 278 | 1762 | 74 | 463 | 0 | 3317 | 4877 |
| 2005 | 159 | 429 | 18 | 274 | 1903 | 65 | 347 | 0 | 3195 | 4550 |
| 2006 | 146 | 338 | 22 | 221 | 1828 | 40 | 381 | 0 | 2976 | 4323 |
| 2007 | 173 | 310 | 32 | 203 | 2263 | 43 | 485 | 0 | 3509 | 4323 |
| 2008 | 182 | 457 | 21 | 199 | 1744 | 32 | 370 | 0 | 3005 | 5263 |
| 2009 | 172 | 548 | 24 | 197 | 1698 | 29 | 421 | 0 | 3089 | 5263 |
| 2010 | 118 | 466 | 37 | 191 | 1469 | 26 | 385 | 0 | 2692 | 5263 |

Table 10.2. Turbot in the North Sea. Landings in IIIa as officially reported to ICES (Source: fish-stat database).

| Year | Belgium | Denm | Germ | Norway | Sweden | Other | Total |
|------|---------|------|------|--------|--------|-------|-------|
| 1960 | 0 | 115 | 11 | 2 | 46 | 0 | 174 |
| 1961 | 0 | 130 | 4 | 0 | 45 | 0 | 179 |
| 1962 | 0 | 157 | 5 | 0 | 0 | 0 | 162 |
| 1963 | 0 | 124 | 4 | 0 | 0 | 0 | 128 |
| 1964 | 0 | 89 | 5 | 0 | 0 | 0 | 94 |
| 1965 | 0 | 79 | 6 | 0 | 0 | 1 | 86 |
| 1966 | 0 | 104 | 2 | 0 | 0 | 0 | 106 |
| 1967 | 0 | 68 | 4 | 0 | 0 | 1 | 73 |
| 1968 | 0 | 64 | 0 | 0 | 0 | 0 | 64 |
| 1969 | 0 | 75 | 1 | 0 | 0 | 0 | 76 |
| 1970 | 0 | 76 | 1 | 0 | 0 | 0 | 77 |
| 1971 | 0 | 100 | 1 | 0 | 0 | 0 | 101 |
| 1972 | 0 | 130 | 2 | 0 | 0 | 0 | 132 |
| 1973 | 0 | 98 | 2 | 0 | 0 | 0 | 100 |
| 1974 | 0 | 116 | 1 | 0 | 0 | 0 | 117 |
| 1975 | 0 | 167 | 2 | 0 | 7 | 7 | 183 |
| 1976 | 7 | 178 | 2 | 0 | 6 | 190 | 383 |
| 1977 | 7 | 331 | 4 | 0 | 5 | 389 | 736 |
| 1978 | 2 | 327 | 4 | 0 | 6 | 186 | 525 |
| 1979 | 8 | 307 | 0 | 0 | 4 | 87 | 406 |
| 1980 | 7 | 205 | 0 | 0 | 6 | 15 | 233 |
| 1981 | 2 | 183 | 0 | 0 | 8 | 14 | 207 |
| 1982 | 1 | 164 | 0 | 0 | 7 | 10 | 182 |
| 1983 | 4 | 171 | 0 | 0 | 10 | 24 | 209 |
| 1984 | 0 | 176 | 0 | 0 | 12 | 0 | 188 |
| 1985 | 1 | 224 | 0 | 0 | 16 | 0 | 241 |
| 1986 | 2 | 180 | 0 | 0 | 11 | 0 | 193 |
| 1987 | 5 | 147 | 0 | 0 | 9 | 0 | 161 |
| 1988 | 2 | 115 | 0 | 0 | 10 | 11 | 138 |
| 1989 | 2 | 173 | 0 | 0 | 9 | 0 | 184 |
| 1990 | 5 | 363 | 0 | 0 | 18 | 0 | 386 |
| 1991 | 4 | 244 | 0 | 7 | 21 | 0 | 276 |
| 1992 | 4 | 278 | 0 | 8 | 19 | 0 | 309 |
| 1993 | 3 | 336 | 2 | 10 | 0 | 0 | 351 |
| 1994 | 2 | 313 | 1 | 15 | 22 | 0 | 353 |
| 1995 | 4 | 268 | 1 | 17 | 11 | 0 | 301 |
| 1996 | 0 | 185 | 1 | 13 | 11 | 0 | 210 |
| 1997 | 0 | 200 | 0 | 9 | 11 | 0 | 220 |
| 1998 | 0 | 148 | 1 | 7 | 8 | 0 | 164 |
| 1999 | 0 | 139 | 1 | 10 | 6 | 0 | 156 |
| 2000 | 0 | 180 | 1 | 6 | 6 | 0 | 193 |
| 2001 | 0 | 227 | 0 | 8 | 3 | 0 | 238 |
| 2002 | 0 | 205 | 1 | 11 | 5 | 0 | 222 |
| 2003 | 0 | 128 | 0 | 14 | 4 | 13 | 159 |
| 2004 | 0 | 119 | 0 | 7 | 7 | 14 | 147 |
| 2005 | 0 | 108 | 0 | 6 | 6 | 7 | 127 |
| 2006 | 0 | 95 | 1 | 8 | 9 | 8 | 121 |
| 2007 | 0 | 138 | 1 | 7 | 12 | 15 | 173 |
| 2008 | 0 | 121 | 1 | 6 | 11 | 4 | 143 |
| 2009 | 0 | 94 | 1 | 6 | 17 | 2 | 120 |
| 2010 | 0 | 72 | 0 | 4 | 13 | 6 | 95 |

Table 10-3. Turbot in the North Sea. Individual weight of landed fish in quarter 2 (spawning season). Note that for the period 1981–1990 the age 10 estimates represent a plus group.

| YEARS | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10(+) |
|-------|------|------|------|------|------|------|------|------|-------|-------|
| 1975 | NA | 0.73 | 1.30 | 2.02 | 2.63 | 3.35 | 3.99 | 4.41 | 4.71 | 5.19 |
| 1976 | NA | 0.73 | 1.30 | 1.96 | 2.73 | 3.29 | 4.04 | 4.58 | 4.91 | 4.97 |
| 1977 | NA | 0.73 | 1.30 | 1.95 | 2.65 | 3.45 | 3.71 | 4.53 | 5.03 | 5.28 |
| 1978 | NA | 0.73 | 1.30 | 1.93 | 2.57 | 3.35 | 4.06 | 3.85 | 5.20 | 5.25 |
| 1979 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1980 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1981 | NA | 0.90 | 0.80 | 1.48 | 2.59 | 3.23 | 5.66 | 5.17 | 6.39 | 8.40 |
| 1982 | NA | 0.59 | 1.01 | 1.80 | 2.53 | 3.33 | 4.88 | 6.20 | 6.42 | 5.95 |
| 1983 | NA | 0.61 | 1.13 | 1.99 | 2.77 | 3.38 | 3.97 | 4.72 | 3.70 | 6.65 |
| 1984 | NA | 0.66 | 1.04 | 2.07 | 2.87 | 4.25 | 4.93 | 6.02 | 5.46 | 7.77 |
| 1985 | NA | 0.59 | 1.02 | 1.83 | 2.95 | 4.46 | 5.99 | 4.83 | 6.36 | 7.19 |
| 1986 | NA | 0.91 | 1.12 | 1.98 | 3.08 | 3.48 | 7.02 | 4.12 | 7.45 | 7.40 |
| 1987 | 0.70 | 0.72 | 1.25 | 1.87 | 3.60 | 3.24 | 5.36 | 8.60 | 6.58 | 9.72 |
| 1988 | 0.70 | 1.16 | 1.65 | 2.65 | 3.31 | 5.78 | 7.24 | 4.58 | 7.00 | 12.56 |
| 1989 | NA | 0.81 | 1.48 | 2.96 | 5.30 | 5.77 | 8.26 | 8.00 | 8.31 | 8.62 |
| 1990 | 0.90 | 0.84 | 1.79 | 3.09 | 3.02 | 5.34 | 3.47 | 7.02 | 10.66 | 8.66 |
| 1991 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1992 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1993 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1994 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1995 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1996 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1997 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1998 | NA | 0.80 | 1.03 | 1.67 | 3.08 | 5.06 | 2.57 | 7.49 | NA | NA |
| 1999 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2000 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2001 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2002 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2003 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2004 | NA | 0.52 | 1.10 | 1.90 | 2.47 | 2.91 | 5.35 | 6.49 | 5.63 | 7.21 |
| 2005 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2006 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2007 | NA | 0.59 | 1.10 | 1.57 | 2.58 | 2.71 | 1.72 | 5.11 | NA | 4.65 |
| 2008 | NA | 0.65 | 1.14 | 1.44 | 2.10 | 5.16 | 6.01 | NA | 7.00 | 7.25 |
| 2009 | NA | 0.44 | 0.80 | 1.51 | 1.65 | 3.55 | 4.70 | 5.74 | 6.01 | 3.16 |
| 2010 | NA | 0.46 | 1.05 | 1.62 | 2.32 | 2.40 | 2.73 | 4.49 | 5.57 | 6.17 |
| 2011 | NA | 0.40 | 0.99 | 1.87 | 2.05 | 3.87 | 4.37 | 6.29 | 4.24 | 9.54 |

Table 10.4. Turbot in the North Sea. SNS survey index. Index numbers represent numbers of fish per 100 fishing hours.

| age | | | | | | | | | | |
|------|---------|---------|--------|--------|-------|-------|-------|-------|-------|-------|
| year | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1970 | 53.919 | 81.176 | 24.546 | 5.436 | 1.299 | 0.549 | 0.168 | 0.030 | 0.030 | 0.070 |
| 1971 | 19.614 | 61.060 | 20.153 | 3.881 | 0.957 | 0.454 | 0.118 | 0.023 | 0.023 | 0.068 |
| 1972 | 17.932 | 63.716 | 23.035 | 5.423 | 1.057 | 0.484 | 0.104 | 0.079 | 0.039 | 0.131 |
| 1973 | 49.008 | 56.723 | 14.637 | 3.710 | 0.538 | 0.229 | 0.061 | 0.027 | 0.012 | 0.055 |
| 1974 | 91.445 | 61.564 | 14.032 | 3.341 | 0.555 | 0.289 | 0.067 | 0.037 | 0.018 | 0.063 |
| 1975 | 100.961 | 82.587 | 17.554 | 3.665 | 0.601 | 0.312 | 0.091 | 0.005 | 0.005 | 0.015 |
| 1976 | 49.880 | 54.755 | 11.343 | 2.498 | 0.384 | 0.131 | 0.067 | 0.006 | 0.000 | 0.031 |
| 1977 | 415.318 | 208.182 | 41.937 | 10.813 | 4.713 | 2.731 | 1.721 | 0.640 | 0.214 | 0.285 |
| 1978 | 38.322 | 134.257 | 43.781 | 10.013 | 2.169 | 0.980 | 0.330 | 0.066 | 0.044 | 0.133 |
| 1979 | 20.480 | 122.187 | 43.675 | 9.129 | 1.832 | 0.848 | 0.274 | 0.076 | 0.035 | 0.131 |
| 1980 | 117.129 | 71.836 | 22.152 | 5.118 | 1.059 | 0.445 | 0.138 | 0.035 | 0.027 | 0.062 |
| 1981 | 29.442 | 72.032 | 20.261 | 6.071 | 3.683 | 2.621 | 1.764 | 0.811 | 0.312 | 0.336 |
| 1982 | 88.932 | 40.048 | 7.767 | 2.118 | 0.348 | 0.138 | 0.021 | 0.025 | 0.016 | 0.031 |
| 1983 | 168.301 | 142.722 | 23.738 | 5.728 | 0.809 | 0.246 | 0.090 | 0.017 | 0.006 | 0.057 |
| 1984 | 94.616 | 80.057 | 26.305 | 6.248 | 1.211 | 0.635 | 0.250 | 0.065 | 0.058 | 0.110 |
| 1985 | 51.362 | 94.481 | 21.287 | 4.174 | 0.718 | 0.391 | 0.137 | 0.000 | 0.000 | 0.005 |
| 1986 | 23.971 | 17.256 | 5.537 | 3.605 | 1.831 | 1.167 | 0.363 | 0.116 | 0.039 | 0.117 |
| 1987 | 64.116 | 17.379 | 2.495 | 0.555 | 0.059 | 0.046 | 0.015 | 0.000 | 0.000 | 0.000 |
| 1988 | 166.951 | 103.470 | 17.632 | 4.129 | 0.573 | 0.231 | 0.096 | 0.846 | 0.421 | 6.761 |
| 1989 | 65.994 | 46.137 | 14.352 | 3.880 | 0.743 | 0.291 | 0.132 | 0.048 | 0.052 | 0.088 |
| 1990 | 241.772 | 99.383 | 18.937 | 5.152 | 1.031 | 0.248 | 0.000 | 0.071 | 0.035 | 0.035 |
| 1991 | 43.580 | 77.483 | 19.348 | 3.968 | 0.761 | 0.384 | 0.102 | 0.012 | 0.012 | 0.018 |
| 1992 | 266.424 | 111.891 | 30.347 | 7.379 | 1.122 | 0.585 | 0.281 | 0.037 | 0.030 | 0.094 |
| 1993 | 162.396 | 150.387 | 29.937 | 7.406 | 1.101 | 0.443 | 0.145 | 0.046 | 0.023 | 0.115 |
| 1994 | 100.188 | 49.915 | 19.045 | 5.215 | 1.022 | 0.596 | 0.254 | 0.064 | 0.053 | 0.093 |
| 1995 | 194.538 | 57.004 | 4.909 | 1.670 | 0.102 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 1996 | 89.867 | 76.786 | 14.828 | 3.019 | 0.550 | 0.221 | 0.063 | 0.000 | 0.000 | 0.000 |
| 1997 | 35.459 | 27.614 | 10.743 | 4.459 | 0.966 | 0.393 | 0.117 | 0.097 | 0.058 | 0.093 |
| 1998 | 57.746 | 41.561 | 9.366 | 2.061 | 0.310 | 0.186 | 0.057 | 0.015 | 0.008 | 0.023 |
| 1999 | 165.059 | 98.285 | 29.282 | 6.207 | 1.477 | 0.647 | 0.202 | 0.038 | 0.019 | 0.117 |
| 2000 | 155.615 | 38.400 | 4.323 | 1.325 | 0.112 | 0.010 | 0.010 | 0.000 | 0.000 | 0.000 |
| 2001 | 48.891 | 36.151 | 17.505 | 4.458 | 0.859 | 0.424 | 0.060 | 0.084 | 0.047 | 0.092 |
| 2002 | 133.338 | 49.316 | 13.082 | 2.848 | 0.735 | 0.439 | 0.088 | 0.015 | 0.000 | 0.046 |
| 2003 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2004 | 150.213 | 42.384 | 13.395 | 7.336 | 2.473 | 1.048 | 0.237 | 0.055 | 0.082 | 0.110 |
| 2005 | 148.462 | 86.209 | 14.937 | 3.832 | 0.583 | 0.183 | 0.058 | 0.022 | 0.015 | 0.033 |
| 2006 | 180.330 | 105.290 | 20.901 | 4.853 | 0.862 | 0.337 | 0.073 | 0.037 | 0.019 | 0.048 |
| 2007 | 80.278 | 77.989 | 25.292 | 6.340 | 1.305 | 0.424 | 0.056 | 0.061 | 0.046 | 0.059 |
| 2008 | 78.786 | 91.298 | 33.181 | 10.682 | 4.674 | 3.204 | 2.094 | 0.897 | 0.416 | 0.436 |
| 2009 | 25.791 | 24.357 | 14.252 | 4.678 | 1.053 | 0.624 | 0.292 | 0.085 | 0.093 | 0.107 |

Table 10.5. Turbot in the North Sea. BTS-Isis survey index. Index numbers represent numbers of fish per fishing hour.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1985 | 0.547 | 1.104 | 0.344 | 0.105 | 0.025 | 0.011 | 0.003 | 0.001 | 0.001 | 0.002 |
| 1986 | 0.297 | 0.817 | 0.333 | 0.096 | 0.025 | 0.015 | 0.012 | 0.009 | 0.007 | 0.011 |
| 1987 | 0.362 | 0.956 | 0.350 | 0.114 | 0.029 | 0.016 | 0.006 | 0.008 | 0.004 | 0.013 |
| 1988 | 0.715 | 1.053 | 0.344 | 0.098 | 0.021 | 0.010 | 0.002 | 0.001 | 0.001 | 0.001 |
| 1989 | 0.461 | 1.240 | 0.460 | 0.118 | 0.036 | 0.023 | 0.016 | 0.010 | 0.007 | 0.011 |
| 1990 | 2.138 | 1.162 | 0.337 | 0.129 | 0.036 | 0.019 | 0.008 | 0.005 | 0.002 | 0.004 |
| 1991 | 1.387 | 1.140 | 0.439 | 0.116 | 0.035 | 0.021 | 0.012 | 0.007 | 0.004 | 0.006 |
| 1992 | 1.424 | 1.010 | 0.341 | 0.100 | 0.025 | 0.015 | 0.006 | 0.003 | 0.001 | 0.003 |
| 1993 | 1.632 | 1.248 | 0.327 | 0.092 | 0.034 | 0.022 | 0.013 | 0.006 | 0.002 | 0.003 |
| 1994 | 1.815 | 1.183 | 0.353 | 0.084 | 0.021 | 0.012 | 0.008 | 0.005 | 0.003 | 0.006 |
| 1995 | 1.667 | 0.615 | 0.195 | 0.051 | 0.015 | 0.010 | 0.005 | 0.003 | 0.001 | 0.002 |
| 1996 | 1.087 | 1.173 | 0.321 | 0.096 | 0.031 | 0.020 | 0.011 | 0.006 | 0.003 | 0.004 |
| 1997 | 0.936 | 1.006 | 0.348 | 0.101 | 0.029 | 0.016 | 0.007 | 0.002 | 0.001 | 0.002 |
| 1998 | 1.671 | 1.090 | 0.320 | 0.097 | 0.024 | 0.011 | 0.004 | 0.001 | 0.001 | 0.002 |
| 1999 | 1.430 | 0.900 | 0.279 | 0.087 | 0.021 | 0.010 | 0.003 | 0.001 | 0.001 | 0.001 |
| 2000 | 4.009 | 1.078 | 0.429 | 0.136 | 0.034 | 0.014 | 0.003 | 0.002 | 0.001 | 0.002 |
| 2001 | 1.246 | 1.017 | 0.340 | 0.105 | 0.031 | 0.017 | 0.007 | 0.002 | 0.001 | 0.002 |
| 2002 | 2.733 | 0.587 | 0.174 | 0.040 | 0.008 | 0.004 | 0.002 | 0.000 | 0.000 | 0.001 |
| 2003 | 1.387 | 0.861 | 0.260 | 0.074 | 0.015 | 0.007 | 0.002 | 0.001 | 0.001 | 0.001 |
| 2004 | 1.980 | 0.933 | 0.306 | 0.080 | 0.016 | 0.007 | 0.002 | 0.001 | 0.001 | 0.002 |
| 2005 | 1.647 | 1.179 | 0.404 | 0.101 | 0.021 | 0.010 | 0.003 | 0.001 | 0.001 | 0.001 |
| 2006 | 1.635 | 0.872 | 0.283 | 0.072 | 0.016 | 0.008 | 0.002 | 0.000 | 0.000 | 0.001 |
| 2007 | 1.263 | 1.234 | 0.494 | 0.175 | 0.041 | 0.018 | 0.005 | 0.002 | 0.002 | 0.003 |
| 2008 | 1.573 | 1.067 | 0.319 | 0.101 | 0.022 | 0.012 | 0.004 | 0.001 | 0.001 | 0.002 |
| 2009 | 0.980 | 0.686 | 0.364 | 0.132 | 0.033 | 0.016 | 0.006 | 0.002 | 0.002 | 0.003 |

Table 10.6. Turbot in the North Sea. BTS-Tridens survey index. Index numbers represent numbers of fish per fishing hour.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|
| 1996 | 0.0237 | 0.1128 | 0.0633 | 0.0156 | 0.0041 | 0.0017 | 0.0005 | 0.0001 | 0.0001 | 0.000 |
| 1997 | 0.0002 | 0.0227 | 0.0545 | 0.0394 | 0.0166 | 0.0097 | 0.0035 | 0.0013 | 0.0008 | 0.001 |
| 1998 | 0.0000 | 0.0005 | 0.0247 | 0.0371 | 0.0146 | 0.0077 | 0.0020 | 0.0006 | 0.0005 | 0.001 |
| 1999 | 0.0000 | 0.0015 | 0.0230 | 0.0120 | 0.0030 | 0.0013 | 0.0006 | 0.0004 | 0.0004 | 0.000 |
| 2000 | 0.0031 | 0.0840 | 0.0610 | 0.0153 | 0.0040 | 0.0017 | 0.0004 | 0.0003 | 0.0002 | 0.000 |
| 2001 | 0.0469 | 0.0816 | 0.0651 | 0.0196 | 0.0049 | 0.0026 | 0.0008 | 0.0002 | 0.0001 | 0.000 |
| 2002 | 0.0067 | 0.0599 | 0.0441 | 0.0118 | 0.0026 | 0.0017 | 0.0004 | 0.0001 | 0.0000 | 0.000 |
| 2003 | 0.0026 | 0.0481 | 0.0520 | 0.0165 | 0.0040 | 0.0021 | 0.0011 | 0.0003 | 0.0004 | 0.000 |
| 2004 | 0.0014 | 0.0589 | 0.0757 | 0.0306 | 0.0085 | 0.0037 | 0.0014 | 0.0005 | 0.0004 | 0.001 |
| 2005 | 0.0134 | 0.1106 | 0.1345 | 0.0466 | 0.0117 | 0.0056 | 0.0017 | 0.0007 | 0.0004 | 0.001 |
| 2006 | 0.0149 | 0.0870 | 0.0496 | 0.0135 | 0.0030 | 0.0012 | 0.0004 | 0.0002 | 0.0001 | 0.000 |
| 2007 | 0.0256 | 0.1993 | 0.1008 | 0.0398 | 0.0106 | 0.0044 | 0.0012 | 0.0004 | 0.0003 | 0.001 |
| 2008 | 0.0311 | 0.1104 | 0.0365 | 0.0310 | 0.0177 | 0.0134 | 0.0086 | 0.0062 | 0.0025 | 0.003 |
| 2009 | 0.0165 | 0.2210 | 0.1469 | 0.0382 | 0.0089 | 0.0048 | 0.0017 | 0.0005 | 0.0004 | 0.001 |

Table 10.7. Turbot in the North Sea. Landings at age matrix derived from the different data sources. Numbers are in thousands. Age 10 is a +group

| age | | | | | | | | | | |
|------|-------|------|------|-----|-----|-------|-------|------|------|-------|
| year | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10+ |
| 1975 | 0.8 | 427 | 1012 | 239 | 108 | 124.2 | 90.0 | 46.9 | 41.7 | 146.2 |
| 1976 | 0.0 | 350 | 1346 | 392 | 114 | 75.9 | 57.4 | 50.2 | 38.2 | 173.8 |
| 1977 | 18.2 | 895 | 644 | 531 | 166 | 43.8 | 30.5 | 42.0 | 36.6 | 142.0 |
| 1978 | 0.0 | 1324 | 1273 | 309 | 268 | 76.0 | 37.6 | 29.0 | 20.4 | 64.7 |
| 1979 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1980 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1981 | 0.0 | 299 | 755 | 532 | 458 | 175.0 | 67.0 | 35.0 | 40.0 | 32.0 |
| 1982 | 0.0 | 169 | 1046 | 267 | 167 | 292.0 | 98.0 | 49.0 | 41.0 | 65.0 |
| 1983 | 0.0 | 402 | 673 | 479 | 110 | 113.0 | 180.0 | 91.0 | 31.0 | 81.0 |
| 1984 | 0.0 | 1296 | 1223 | 311 | 157 | 60.0 | 57.0 | 74.0 | 51.0 | 70.0 |
| 1985 | 0.0 | 795 | 2415 | 654 | 179 | 109.0 | 26.0 | 38.0 | 48.0 | 74.0 |
| 1986 | 0.0 | 371 | 1470 | 697 | 183 | 67.0 | 29.0 | 16.0 | 18.0 | 90.0 |
| 1987 | 13.0 | 648 | 546 | 676 | 158 | 52.0 | 19.0 | 5.0 | 5.0 | 60.0 |
| 1988 | 36.0 | 1084 | 897 | 178 | 176 | 90.0 | 28.0 | 42.0 | 10.0 | 25.0 |
| 1989 | 0.0 | 594 | 1037 | 315 | 139 | 73.0 | 28.0 | 22.0 | 10.0 | 29.0 |
| 1990 | 43.0 | 957 | 1032 | 305 | 160 | 73.0 | 98.0 | 58.0 | 13.0 | 39.0 |
| 1991 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1992 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1993 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1994 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1995 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1996 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1997 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1998 | 0.0 | 540 | 1158 | 476 | 97 | 39.3 | 11.3 | 10.1 | 0.9 | 8.0 |
| 1999 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2000 | 4.5 | 255 | 938 | 270 | 315 | 144.7 | 116.1 | 51.3 | 58.8 | 72.4 |
| 2001 | 0.0 | 478 | 1642 | 357 | 64 | 75.5 | 55.1 | 64.7 | 21.6 | 61.1 |
| 2002 | 0.0 | 67 | 1565 | 463 | 148 | 24.3 | 43.8 | 29.2 | 11.4 | 34.1 |
| 2003 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 2004 | 453.6 | 2065 | 826 | 144 | 86 | 10 | 8 | 4 | 0.9 | 0.6 |
| 2005 | 269.9 | 1556 | 567 | 180 | 19 | 17 | 2 | 11 | 1.0 | 0.5 |
| 2006 | 657.3 | 1222 | 600 | 89 | 27 | 6 | 12 | 3 | 0.7 | 9.4 |
| 2007 | 76.5 | 2710 | 601 | 278 | 39 | 28 | 8 | 9 | 0.0 | 2.2 |
| 2008 | 182.1 | 1387 | 843 | 227 | 201 | 48 | 13 | 1 | 6.7 | 1.0 |
| 2009 | 115.9 | 1067 | 996 | 430 | 91 | 26 | 11 | 8 | 1.6 | 7.3 |
| 2010 | 246.4 | 1223 | 348 | 285 | 158 | 79 | 28 | 6 | 4.8 | 2.2 |

Table 10.8. Turbot in the North Sea. Summary of reproductive characteristics of female turbot *Psetta maxima* from different ICES areas (after Moreau, 2010b).

| | NORTH SEA/ SKAGERRAK | ENGLISH CHANNEL | CELTIC SEA | IRISH SEA |
|---------------------------------------|-------------------------|--------------------|------------|------------|
| Proportion females (age 2 - 5 years) | 50 - 80 % | 30 - 50 % | 40 - 60 % | 40 - 50 % |
| Proportion females (age > 5 years) | 60 - 80 % | 10 - 100 % | 35 - 100 % | 30 - 100 % |
| Spawning period | Apr-Aug | May-Sep | Apr-Jul? | May-Aug? |
| Length at 0% maturity | 30 cm | 35 cm | 35 cm | 35 cm |
| Length at full maturity | 47 cm | ND | ND | ND |
| Age at maturity males | 3 years | 3 years | 3 years | 3 years |
| Age at maturity females | 4-5 years | 4-5 years | 4-5 years | 4-5 years |
| Monthly variation in condition factor | NO | NO | NO | NO |
| ND* : not determined | | | | |

Table 10.9. Turbot in the North Sea. Overview of the requirements for biological sampling of turbot *Psetta maxima* under the DCF for the period 2011–2013 (EC/2010/93).

| AREA/STOCK | SPECIES GROUP | AGE N°/1000 T | WEIGHT | SEX | MATURITY |
|-------------------------------------|---------------|---------------|--------|-----|----------|
| IIIa | G2 | 250 | T | T | T |
| IV, VIIId | G2 | 250 | T | T | T |
| all areas (NE Atlantic + W Channel) | G2 | 250 | T | T | T |

Table 10.11. Turbot in the North Sea. Compilation of the scheduled sampling effort of Member States for biological parameters in turbot *Psetta maxima* for the period 2011–2013 (source: reports RCM's 2010).

| MS | 2011 | 2012 | 2013 | FISHING GROUND | AGE (N / YEAR) | WEIGHT (N / YEAR) | SEX- RATIO (N / YEAR) | MATURITY (N / YEAR) | DATA SOURCES |
|-------|------|------|------|----------------|----------------------|-------------------------|--------------------------------|---------------------------|------------------------------|
| TOTAL | | | | | 0 | 0 | 0 | 0 | |
| BEL | X | X | X | IV | 25 | 25 | 25 | / | Comm.+Surveys |
| DNK | X | X | X | IV, VIIId | 300 | 300 | 100 | 100 | Comm.+Surveys ^(a) |
| NLD | X | X | X | IV, VIIId | 720 | 720 | 720 | 720 | Comm.+surveys |
| UK | X | X | X | IV, VIIId | 25 | 25 | 25 | 25 | Market+surveys |
| TOTAL | | | | | 1070 | 1070 | 870 | 845 | |

(a) DNK: sex-ratio and maturity only on surveys.



Figure 10.1. Turbot in the North Sea. Preliminary map of the population structure of turbot (From Annex 4, ICES, 2005).

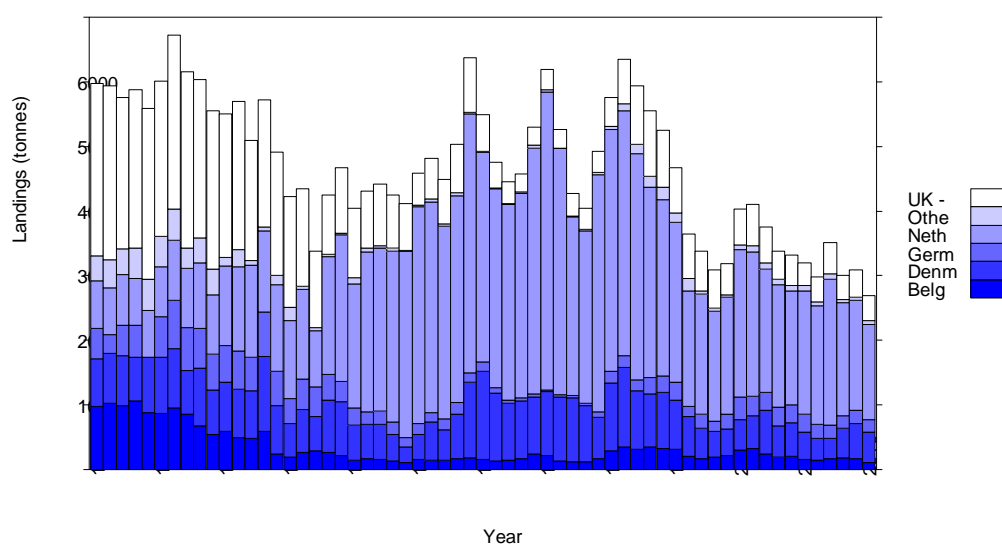


Figure 10.2. Turbot in the North Sea. Official international landings (t) of turbot *Psetta maxima* in the period 1950–2010 as reported to the EC and ICES (source: Eurostat database).

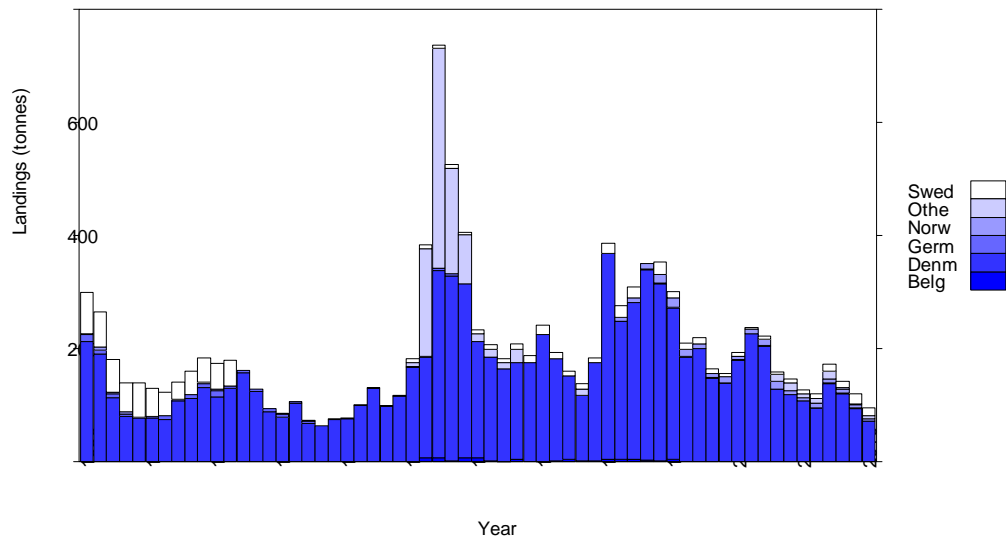


Figure 10.3. Turbot in the North Sea. Contribution of landings by country to North Sea total for the period 1950–2008.

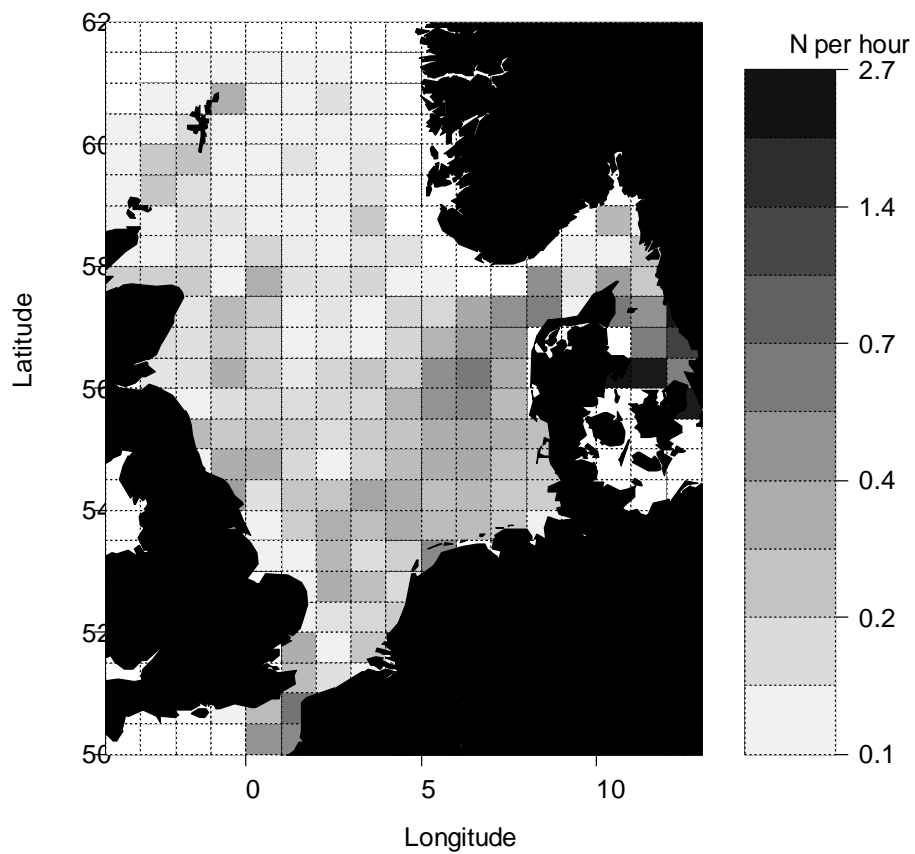


Figure 10.4. Turbot in the North Sea. Spatial distribution of IBTS quarter 1 CPUE index

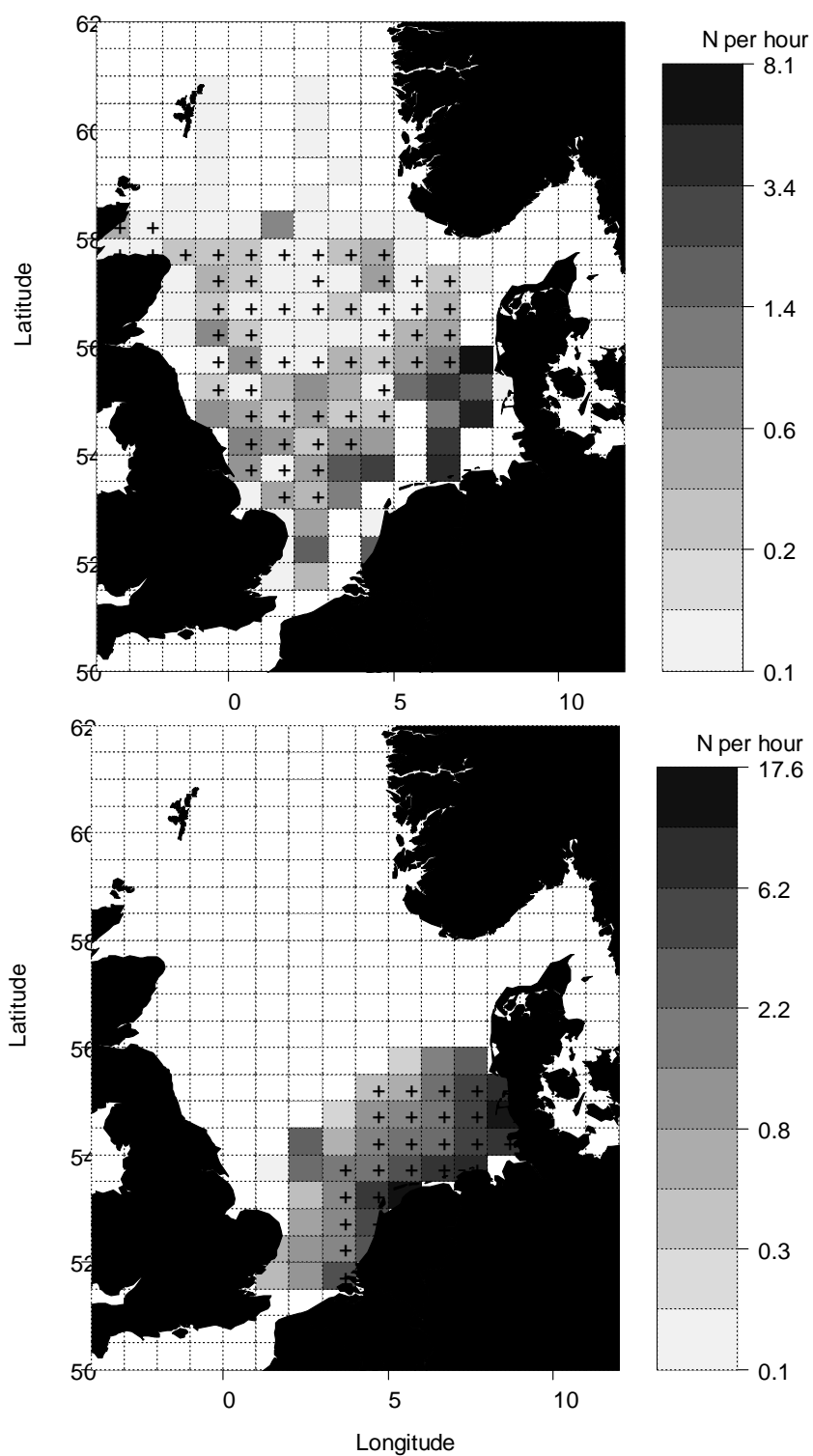


Figure 10.5. Turbot in the North Sea. Spatial distribution of Dutch BTS quarter 3 CPUE. Top panel represents BTS Tridens, bottom panel represents BTS ISIS. Rectangles used in the index calculation are indicated by a "+" sign.

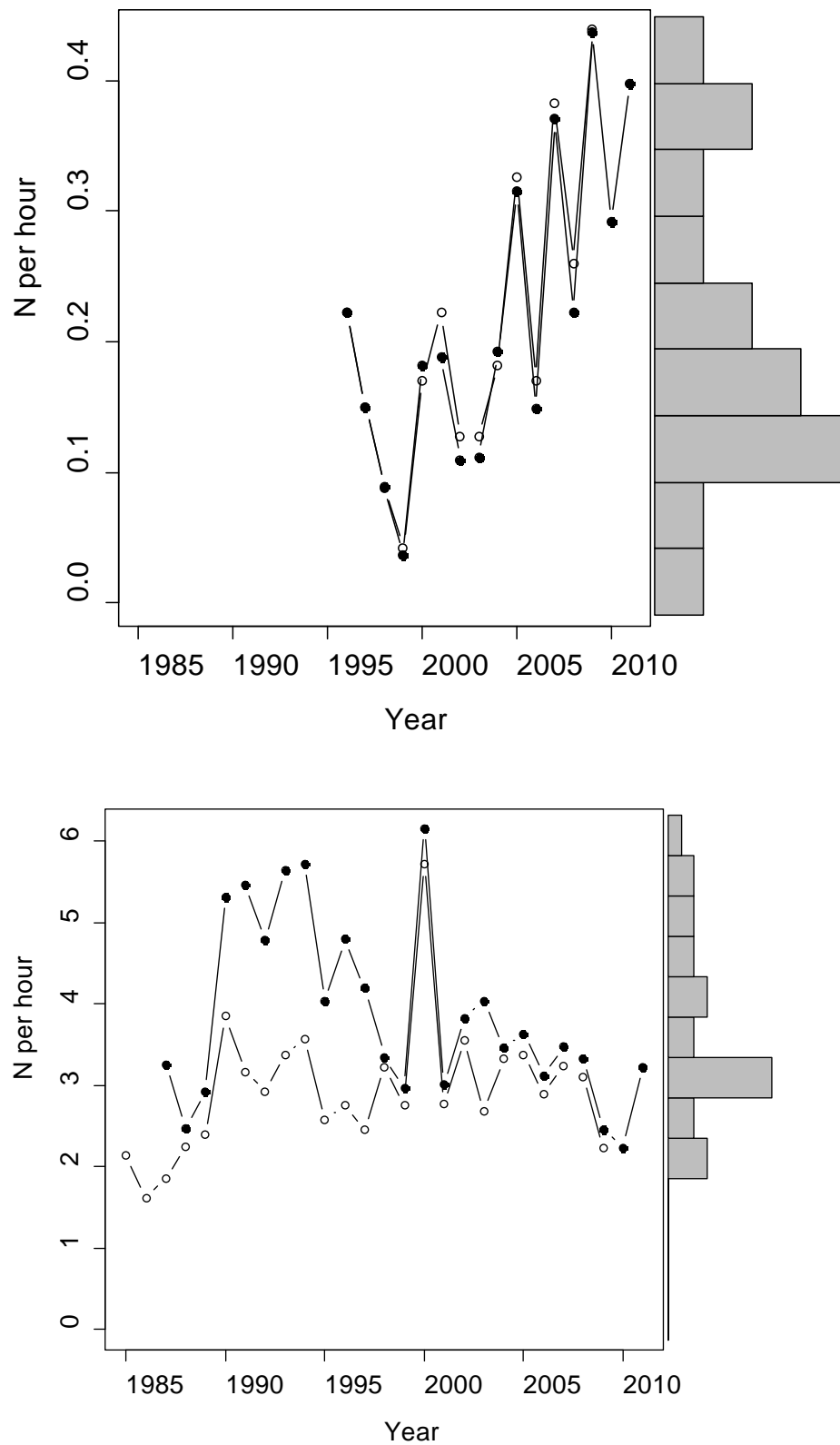


Figure 10.6. Turbot in the North Sea. Indices from Dutch BTS quarter 3 survey. Top panel represents BTS Tridens, bottom panel represents BTS ISIS.

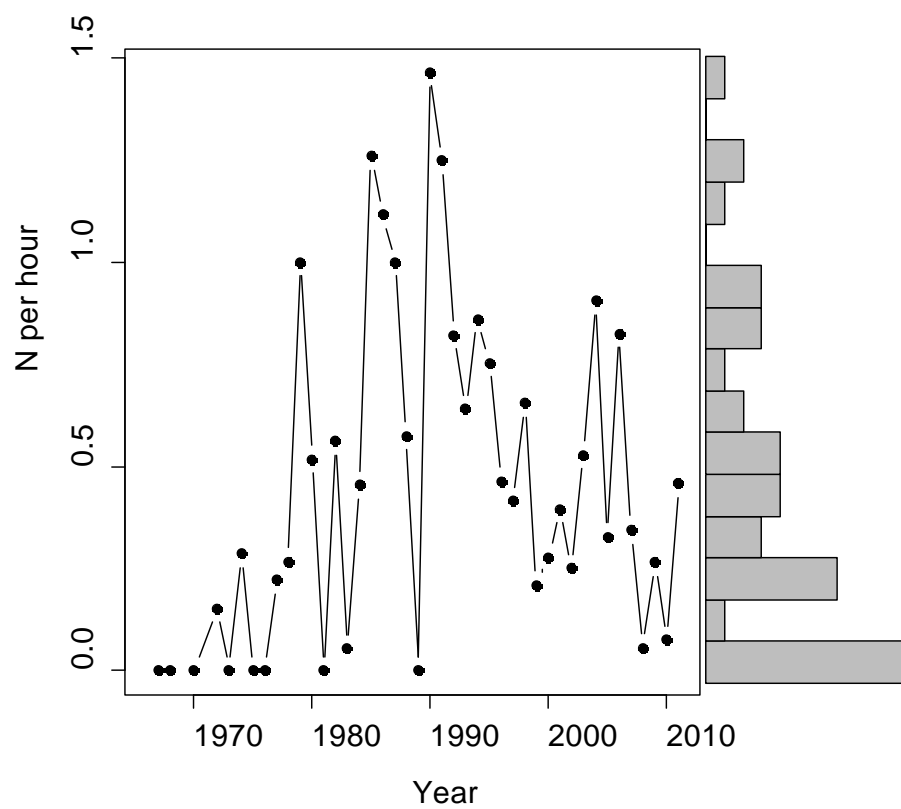


Figure 10.7. Turbot in the North Sea. CPUE index from IBTS in quarter 1 in ICES area IIIa.

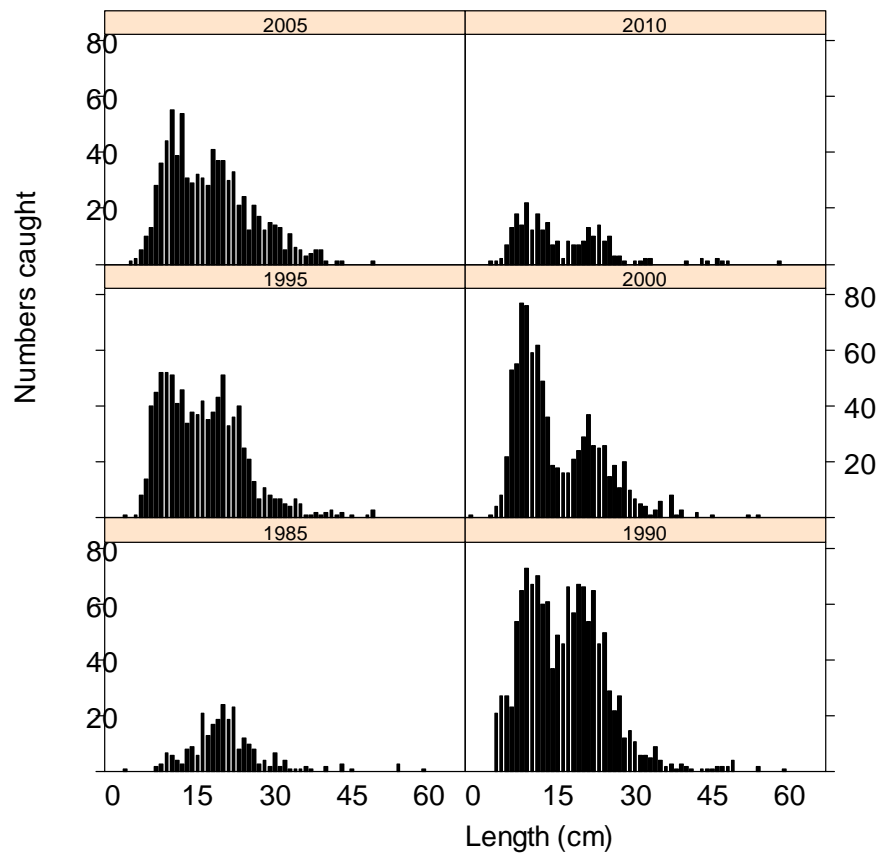


Figure 10.8. Turbot in the North Sea. Length frequency distribution in Dutch BTS quarter 3 survey.

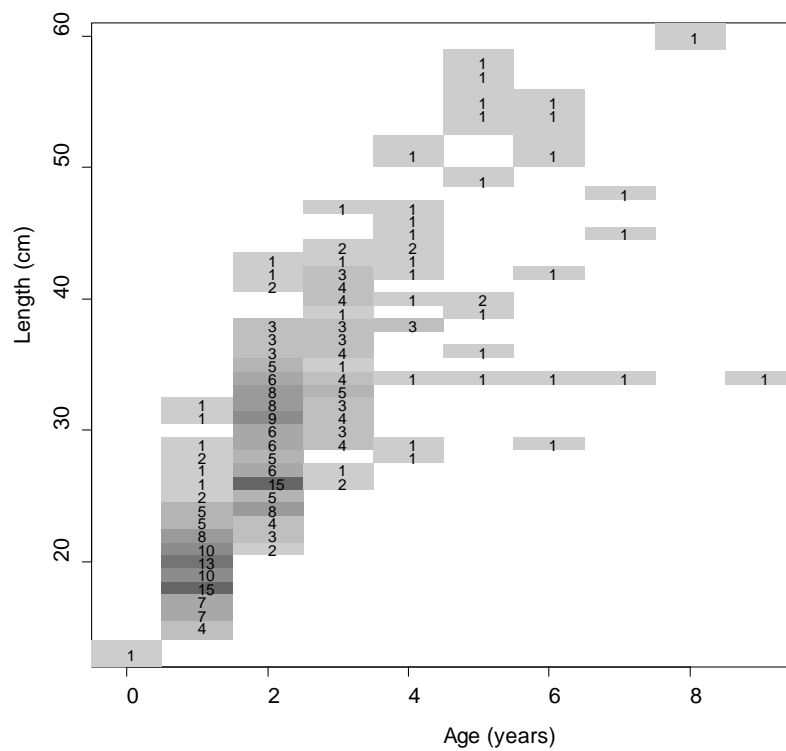


Figure 10.9. Turbot in the North Sea. Age Length Key from Dutch BTS survey data.

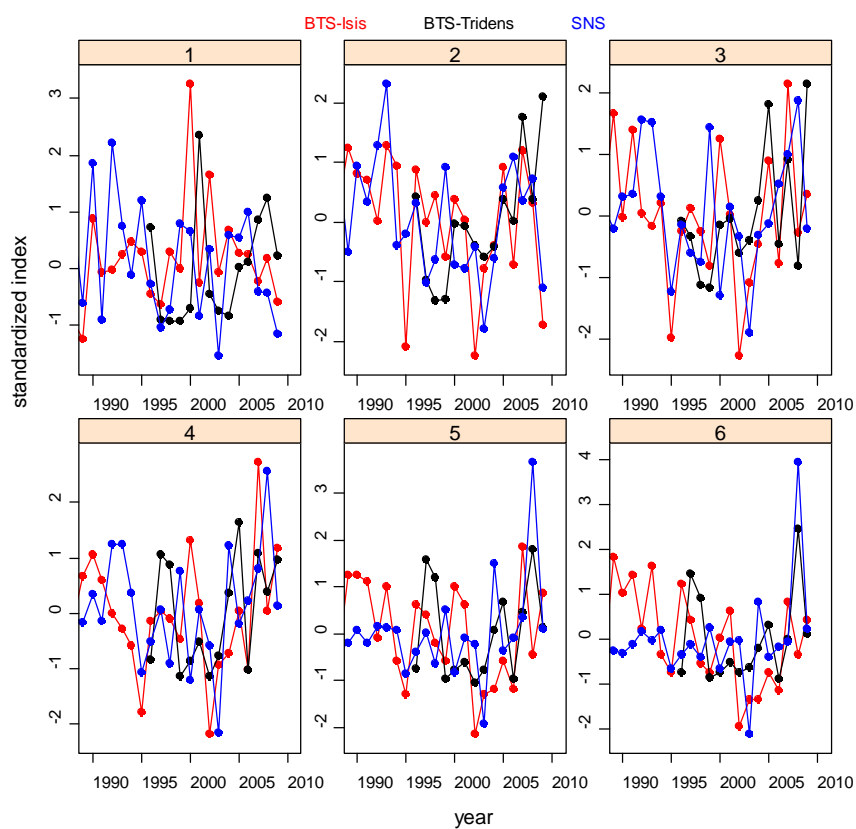


Figure 10.10. Turbot in the North Sea. Standardized time series for ages 1–6 of the three trawl surveys: BTS-Isis, BTS-Tridens, and SNS.

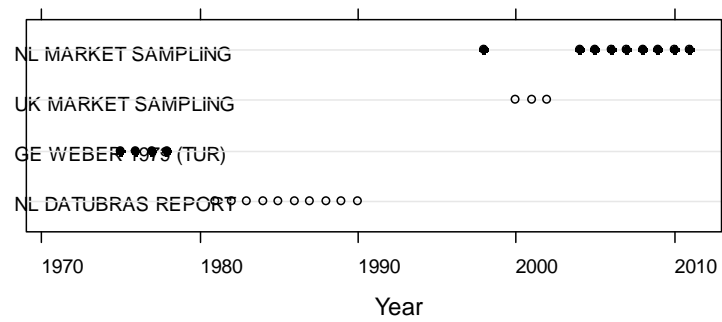


Figure 10.11. Turbot in the North Sea. Availability of market sampling data. Note that the Weber (1979) data is available for turbot only. Closed circles indicate availability of sex segregated data, open circles indicate sex separate data.

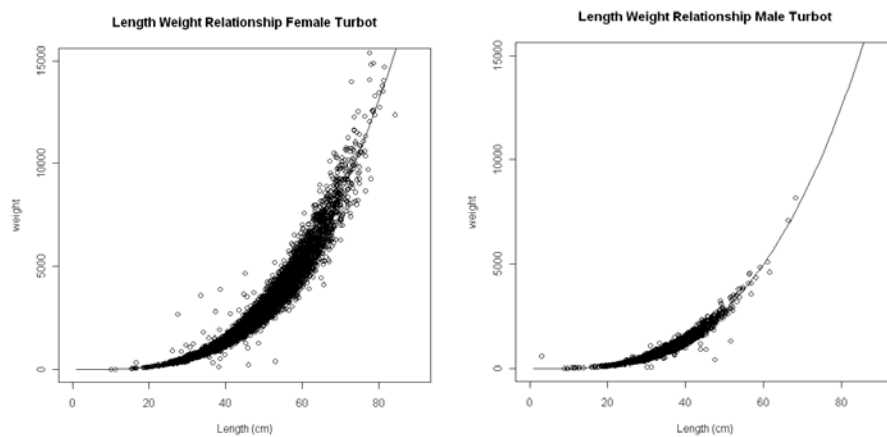


Figure 10.12. Turbot *Psetta maxima* in the North Sea. Length-weight relationship of female and male turbot for 1984–1990, 1998, 2004–2009 and corresponding fitted power functions. Based on survey and market data. Figure taken from NESPMAN report.

11 Lemon Sole in Subarea IV and Divisions IIIa and VIId

The ICES advice provided in 2011 was for 2012 and 2013, and remains unchanged. The basis for the advice can be found in WGNEW 2011 report (ICES, 2010).

This year's WGNEW report updates the time series of fishery landings data and research vessel indices.

11.1 Update of fisheries landings data

Annual landings of lemon sole in Divisions IIIa, IV and VIId are given in Tables 11.1 – 11.3 and Figures 11.1 – 11.3. Landings in Division IIIa were below 200 t between 1950 and 1974, after which a sharp increase to over 600 t was seen in 1976. Landings averaged between 500 and 600 t until 2000, since when they have declined. The majority of lemon sole from IIIa are caught by Denmark. Landings in Division IV have averaged between 3000–5000t, with successive peaks, followed by declines in landings. Landings in 2010 were at a series low of 2625 t. The majority of landings from Division IV are made by UK vessels. Total landings from Division VIId have fluctuated throughout the time series between a series low of 33 t in 1975 and a series high of 1151 t in 1996. . During the early part of the time series, the majority of landings were made by the UK fleet. However, since 1974, France has taken around 50% of the landings, with Belgium and the UK taking approximately 20% each. In all three Divisions, landings have declined during the past decade.

11.2 Survey data

11.2.1 International Bottom Trawl Survey

The Q1 IBTS index of abundance for lemon sole between 1970 and 1993 suggested that abundance was stable in the early years between 1974 and the early 1980's, but increased up to 1983. Between 1983 and 1990, abundance was considered to be stable (Heessen and Daan 1996). Since the early 1990s, abundance increased to a series high in 2002, before declining to early 1990 levels in 2006 (Figure 11.4), where it has since fluctuated.

- UK (Eand W)

Lemon sole abundance indices are currently available for 4 survey series - the Irish Sea/Bristol Channel (September) (VIIa, f and g) beam-trawl survey, the Channel (VIId) beam-trawl survey (July), the Carhelmar (VIIe) beam-trawl survey (October) and the English groundfish (IVb - c) GOV trawl survey (August) (Figure 11.5). In the eastern Channel, abundance has been variable with a large peak observed in 1995 and smaller peaks in 2002, 2004 and 2008. In the Carhelmar survey lemon sole abundance was initially relatively high but decreased in the early 1990's until the early 2000's. This was followed by an increase to 2004, but abundance then decreased again. However, abundance increased again in 2008 and 2009. In the Irish Sea/Bristol Channel, lemon sole abundance steadily increased from the beginning of the time series to 2003, since when it has declined. In the North Sea, lemon sole abundance has generally increased through the time series.

- Netherlands

The Netherlands has beam trawl surveys in the southeast North Sea between 1985 and 2009 (Isis) and in the central North Sea between 1998 and 2009 (Tridens). Abundance indices for these surveys are given in Figure 11.6. In both surveys, abundance

has generally increased through the series. However abundance in the central North Sea, has almost doubled since the survey began.

Table 11.1. Lemon Sole in Subarea IV and Divisions IIIa and VIId. Official landings of Lemon sole in ICES Division IIIa

| YEAR | BELGIUM | DENMARK | GERMANY | NETHERLANDS | SWEDEN | OTHER | TOTAL |
|------|---------|---------|---------|-------------|--------|-------|-------|
| 1960 | 0 | 95 | 1 | 0 | 57 | 0 | 153 |
| 1961 | 0 | 90 | 0 | 0 | 71 | 0 | 161 |
| 1962 | 0 | 92 | 1 | 0 | 0 | 0 | 93 |
| 1963 | 0 | 99 | 0 | 0 | 0 | 0 | 99 |
| 1964 | 0 | 133 | 1 | 0 | 0 | 0 | 134 |
| 1965 | 0 | 163 | 1 | 0 | 0 | 0 | 164 |
| 1966 | 0 | 159 | 0 | 0 | 0 | 0 | 159 |
| 1967 | 0 | 189 | 1 | 0 | 0 | 1 | 191 |
| 1968 | 0 | 184 | 0 | 0 | 0 | 1 | 185 |
| 1969 | 0 | 215 | 0 | 0 | 0 | 0 | 215 |
| 1970 | 0 | 169 | 0 | 0 | 0 | 0 | 169 |
| 1971 | 0 | 173 | 0 | 0 | 0 | 0 | 173 |
| 1972 | 0 | 168 | 0 | 0 | 0 | 0 | 168 |
| 1973 | 0 | 214 | 0 | 0 | 0 | 0 | 214 |
| 1974 | 0 | 183 | 0 | 0 | 0 | 0 | 183 |
| 1975 | 0 | 263 | 1 | 1 | 52 | 0 | 317 |
| 1976 | 10 | 294 | 1 | 19 | 37 | 0 | 361 |
| 1977 | 9 | 528 | 2 | 37 | 51 | 0 | 627 |
| 1978 | 4 | 628 | 2 | 12 | 59 | 0 | 705 |
| 1979 | 7 | 704 | 1 | 10 | 111 | 0 | 833 |
| 1980 | 12 | 622 | 0 | 0 | 87 | 1 | 722 |
| 1981 | 1 | 710 | 0 | 3 | 75 | 4 | 793 |
| 1982 | 2 | 647 | 0 | 9 | 77 | 0 | 735 |
| 1983 | 3 | 636 | 0 | 10 | 110 | 0 | 759 |
| 1984 | 6 | 525 | 0 | 0 | 64 | 0 | 595 |
| 1985 | 0 | 729 | 0 | 0 | 64 | 0 | 793 |
| 1986 | 7 | 576 | 0 | 0 | 56 | 0 | 639 |
| 1987 | 24 | 577 | 0 | 0 | 68 | 0 | 669 |
| 1988 | 11 | 569 | 0 | 6 | 56 | 0 | 642 |
| 1989 | 8 | 610 | 0 | 0 | 75 | 0 | 693 |
| 1990 | 16 | 782 | 0 | 0 | 74 | 0 | 872 |
| 1991 | 11 | 640 | 0 | 0 | 83 | 0 | 734 |
| 1992 | 22 | 793 | 0 | 0 | 120 | 17 | 952 |
| 1993 | 14 | 980 | 4 | 0 | 141 | 17 | 1156 |
| 1994 | 10 | 648 | 2 | 0 | 127 | 16 | 803 |
| 1995 | 27 | 576 | 2 | 0 | 91 | 18 | 714 |
| 1996 | 0 | 513 | 1 | 0 | 97 | 24 | 635 |
| 1997 | 0 | 628 | 2 | 0 | 115 | 23 | 768 |
| 1998 | 0 | 743 | 3 | 0 | 100 | 22 | 868 |
| 1999 | 0 | 731 | 3 | 0 | 88 | 22 | 844 |
| 2000 | 0 | 722 | 1 | 0 | 65 | 15 | 803 |
| 2001 | 0 | 511 | 1 | 0 | 53 | 19 | 584 |
| 2002 | 0 | 457 | 4 | 0 | 41 | 20 | 522 |
| 2003 | 0 | 451 | 6 | 30 | 35 | 21 | 543 |
| 2004 | 0 | 472 | 5 | 82 | 29 | 19 | 607 |
| 2005 | 0 | 468 | 5 | 147 | 38 | 16 | 674 |
| 2006 | 0 | 321 | 8 | 40 | 32 | 16 | 417 |
| 2007 | 0 | 374 | 5 | 16 | 18 | 19 | 432 |
| 2008 | 0 | 239 | 7 | 3 | 15 | 12 | 276 |
| 2009 | 0 | 233 | 4 | 1 | 15 | 9 | 262 |
| 2010 | 0 | 286 | 3 | 35 | 19 | 7 | 350 |

Table 11.2. Lemon Sole in Subarea IV and Divisions IIIa and VIId. Official landings of Lemon sole in ICES Division IV

| YEAR | BELGIUM | DENMARK | FRANCE | GERMANY | NETHERLANDS | NORWAY | UK | OTHER | TOTAL |
|------|---------|---------|--------|---------|-------------|--------|------|-------|-------|
| 1960 | 155 | 577 | 0 | 46 | 67 | 0 | 3178 | 12 | 4035 |
| 1961 | 286 | 488 | 0 | 79 | 102 | 0 | 3934 | 11 | 4900 |
| 1962 | 175 | 501 | 0 | 54 | 106 | 0 | 3794 | 0 | 4630 |
| 1963 | 365 | 222 | 0 | 36 | 71 | 0 | 3097 | 0 | 3791 |
| 1964 | 484 | 358 | 0 | 62 | 75 | 0 | 3142 | 0 | 4121 |
| 1965 | 562 | 385 | 0 | 91 | 93 | 0 | 3818 | 0 | 4949 |
| 1966 | 594 | 548 | 0 | 98 | 65 | 0 | 4110 | 0 | 5415 |
| 1967 | 601 | 791 | 0 | 136 | 61 | 0 | 4599 | 0 | 6188 |
| 1968 | 422 | 775 | 0 | 96 | 34 | 0 | 4943 | 0 | 6270 |
| 1969 | 292 | 639 | 0 | 80 | 36 | 0 | 3423 | 0 | 4470 |
| 1970 | 241 | 307 | 0 | 52 | 58 | 0 | 2776 | 0 | 3434 |
| 1971 | 348 | 514 | 0 | 54 | 122 | 0 | 2929 | 0 | 3967 |
| 1972 | 423 | 530 | 0 | 59 | 130 | 0 | 2530 | 0 | 3672 |
| 1973 | 566 | 478 | 0 | 73 | 217 | 16 | 3218 | 0 | 4568 |
| 1974 | 486 | 447 | 0 | 59 | 269 | 0 | 2966 | 0 | 4227 |
| 1975 | 748 | 521 | 0 | 83 | 299 | 0 | 3367 | 11 | 5029 |
| 1976 | 493 | 506 | 0 | 68 | 308 | 0 | 3443 | 12 | 4830 |
| 1977 | 618 | 321 | 0 | 71 | 262 | 0 | 4387 | 2 | 5661 |
| 1978 | 760 | 517 | 28 | 54 | 231 | 0 | 4518 | 0 | 6108 |
| 1979 | 674 | 876 | 136 | 41 | 390 | 0 | 4308 | 3 | 6428 |
| 1980 | 484 | 599 | 102 | 49 | 303 | 0 | 4885 | 2 | 6424 |
| 1981 | 555 | 605 | 237 | 39 | 412 | 0 | 4084 | 1 | 5933 |
| 1982 | 879 | 670 | 419 | 52 | 759 | 0 | 4386 | 3 | 7168 |
| 1983 | 1122 | 735 | 402 | 28 | 1009 | 0 | 4957 | 4 | 8257 |
| 1984 | 1144 | 567 | 344 | 22 | 0 | 0 | 4850 | 3 | 6930 |
| 1985 | 989 | 555 | 157 | 26 | 0 | 0 | 4703 | 5 | 6435 |
| 1986 | 511 | 577 | 103 | 16 | 0 | 0 | 3839 | 1 | 5047 |
| 1987 | 448 | 742 | 174 | 14 | 0 | 0 | 4137 | 1 | 5516 |
| 1988 | 539 | 639 | 184 | 14 | 301 | 0 | 4220 | 1 | 5898 |
| 1989 | 441 | 828 | 176 | 40 | 397 | 0 | 4083 | 2 | 5967 |
| 1990 | 491 | 1007 | 208 | 49 | 0 | 0 | 4431 | 4 | 6190 |
| 1991 | 544 | 1099 | 250 | 41 | 0 | 12 | 4666 | 6 | 6618 |
| 1992 | 577 | 1149 | 177 | 30 | 0 | 13 | 4175 | 5 | 6126 |
| 1993 | 525 | 966 | 240 | 37 | 0 | 9 | 4059 | 3 | 5839 |
| 1994 | 436 | 597 | 436 | 27 | 0 | 11 | 3754 | 1 | 5262 |
| 1995 | 588 | 585 | 412 | 70 | 0 | 9 | 3046 | 2 | 4712 |
| 1996 | 592 | 547 | 534 | 67 | 0 | 18 | 2976 | 3 | 4737 |
| 1997 | 504 | 499 | 224 | 76 | 0 | 29 | 3391 | 4 | 4727 |
| 1998 | 815 | 796 | 197 | 149 | 838 | 23 | 3643 | 5 | 6466 |
| 1999 | 662 | 1015 | 0 | 62 | 681 | 24 | 3866 | 6 | 6316 |
| 2000 | 711 | 1277 | 184 | 72 | 492 | 17 | 3222 | 5 | 5980 |
| 2001 | 694 | 1281 | 191 | 77 | 451 | 22 | 2666 | 7 | 5389 |
| 2002 | 604 | 971 | 190 | 116 | 402 | 17 | 1521 | 6 | 3827 |
| 2003 | 517 | 1008 | 239 | 136 | 369 | 16 | 1399 | 4 | 3688 |
| 2004 | 667 | 1113 | 120 | 81 | 355 | 12 | 1192 | 3 | 3543 |
| 2005 | 595 | 1057 | 102 | 85 | 402 | 13 | 1188 | 2 | 3444 |
| 2006 | 552 | 968 | 57 | 183 | 412 | 13 | 1440 | 2 | 3627 |
| 2007 | 542 | 1136 | 65 | 143 | 367 | 23 | 1610 | 6 | 3892 |
| 2008 | 527 | 925 | 47 | 120 | 434 | 26 | 1383 | 4 | 3466 |
| 2009 | 389 | 898 | 88 | 64 | 294 | 31 | 927 | 2 | 2693 |
| 2010 | 375 | 821 | 32 | 102 | 323 | 35 | 935 | 2 | 2625 |

Table 11.3. Lemon Sole in Subarea IV and Divisions IIIa and VIId. Official landings of Lemon sole in ICES Division VIId

| YEAR | BELGIUM | DENMARK | FRANCE | NETHERLANDS | UK | OTHER | TOTAL |
|------|---------|---------|--------|-------------|-----|-------|-------|
| 1960 | 4 | 0 | 0 | 0 | 62 | 0 | 66 |
| 1961 | 1 | 0 | 0 | 0 | 106 | 1 | 108 |
| 1962 | 2 | 0 | 0 | 0 | 99 | 0 | 101 |
| 1963 | 3 | 0 | 0 | 0 | 63 | 0 | 66 |
| 1964 | 5 | 0 | 0 | 0 | 72 | 0 | 77 |
| 1965 | 16 | 0 | 0 | 0 | 89 | 0 | 105 |
| 1966 | 7 | 0 | 0 | 0 | 194 | 0 | 201 |
| 1967 | 6 | 0 | 0 | 0 | 325 | 0 | 331 |
| 1968 | 8 | 0 | 0 | 0 | 329 | 0 | 337 |
| 1969 | 12 | 0 | 0 | 0 | 303 | 0 | 315 |
| 1970 | 16 | 0 | 0 | 0 | 240 | 0 | 256 |
| 1971 | 22 | 0 | 0 | 0 | 335 | 0 | 357 |
| 1972 | 18 | 0 | 0 | 0 | 457 | 0 | 475 |
| 1973 | 25 | 0 | 0 | 0 | 426 | 0 | 451 |
| 1974 | 16 | 0 | 0 | 1 | 334 | 0 | 351 |
| 1975 | 19 | 0 | 0 | 0 | 14 | 0 | 33 |
| 1976 | 24 | 0 | 0 | 0 | 18 | 0 | 42 |
| 1977 | 21 | 1 | 0 | 0 | 15 | 0 | 37 |
| 1978 | 45 | 2 | 63 | 0 | 31 | 0 | 141 |
| 1979 | 60 | 0 | 165 | 0 | 35 | 0 | 260 |
| 1980 | 33 | 0 | 109 | 0 | 10 | 0 | 152 |
| 1981 | 66 | 0 | 212 | 0 | 12 | 0 | 290 |
| 1982 | 96 | 0 | 406 | 1 | 81 | 0 | 584 |
| 1983 | 108 | 0 | 298 | 0 | 85 | 0 | 491 |
| 1984 | 110 | 0 | 367 | 0 | 109 | 0 | 586 |
| 1985 | 117 | 0 | 164 | 0 | 66 | 0 | 347 |
| 1986 | 77 | 0 | 133 | 0 | 41 | 0 | 251 |
| 1987 | 81 | 0 | 185 | 0 | 44 | 0 | 310 |
| 1988 | 74 | 0 | 155 | 0 | 29 | 0 | 258 |
| 1989 | 68 | 0 | 252 | 0 | 44 | 0 | 364 |
| 1990 | 68 | 0 | 272 | 0 | 83 | 0 | 423 |
| 1991 | 83 | 0 | 272 | 0 | 73 | 0 | 428 |
| 1992 | 66 | 0 | 176 | 0 | 122 | 0 | 364 |
| 1993 | 36 | 0 | 311 | 0 | 75 | 0 | 422 |
| 1994 | 97 | 0 | 505 | 0 | 93 | 0 | 695 |
| 1995 | 138 | 0 | 584 | 0 | 155 | 0 | 877 |
| 1996 | 213 | 0 | 720 | 0 | 218 | 0 | 1151 |
| 1997 | 143 | 0 | 305 | 0 | 115 | 0 | 563 |
| 1998 | 53 | 0 | 198 | 0 | 95 | 0 | 346 |
| 1999 | 50 | 0 | 0 | 0 | 90 | 0 | 140 |
| 2000 | 62 | 0 | 200 | 0 | 126 | 0 | 388 |
| 2001 | 104 | 0 | 191 | 0 | 188 | 0 | 483 |
| 2002 | 101 | 0 | 256 | 0 | 117 | 0 | 474 |
| 2003 | 128 | 0 | 251 | 0 | 112 | 0 | 491 |
| 2004 | 120 | 0 | 198 | 1 | 105 | 0 | 424 |
| 2005 | 90 | 0 | 187 | 2 | 71 | 0 | 350 |
| 2006 | 98 | 0 | 100 | 0 | 48 | 0 | 246 |
| 2007 | 70 | 0 | 72 | 1 | 21 | 0 | 164 |
| 2008 | 140 | 0 | 46 | 3 | 45 | 0 | 234 |
| 2009 | 149 | 0 | 176 | 9 | 108 | 0 | 442 |
| 2010 | 101 | 0 | 85 | 5 | 32 | 0 | 223 |

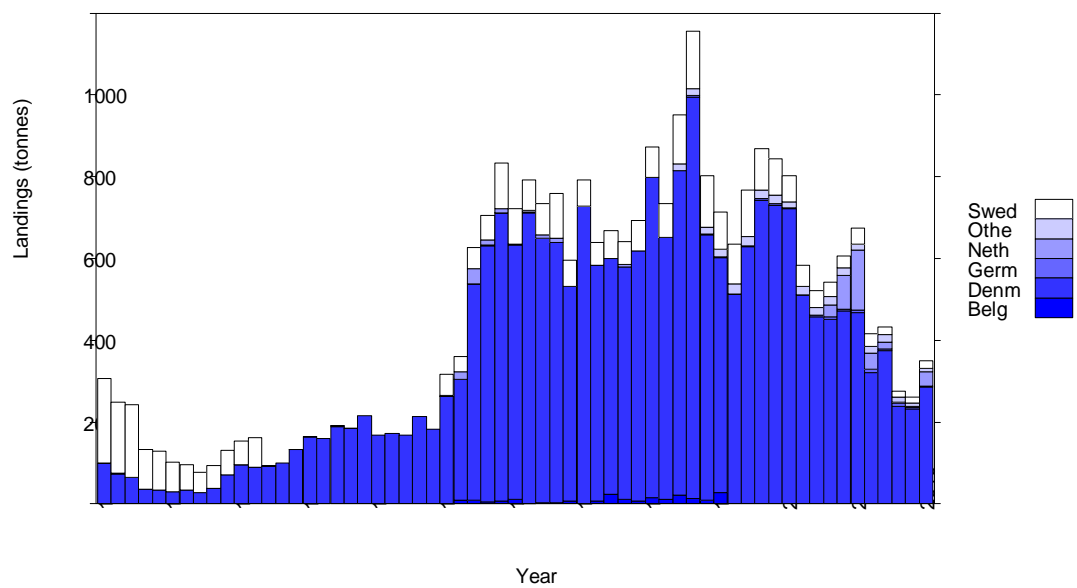


Figure 11.1. Lemon Sole in Subarea IV and Divisions IIIa and VIId. Official landings (t) of lemon sole for ICES Area IIIa 1950 – 2010. Source: FishStat

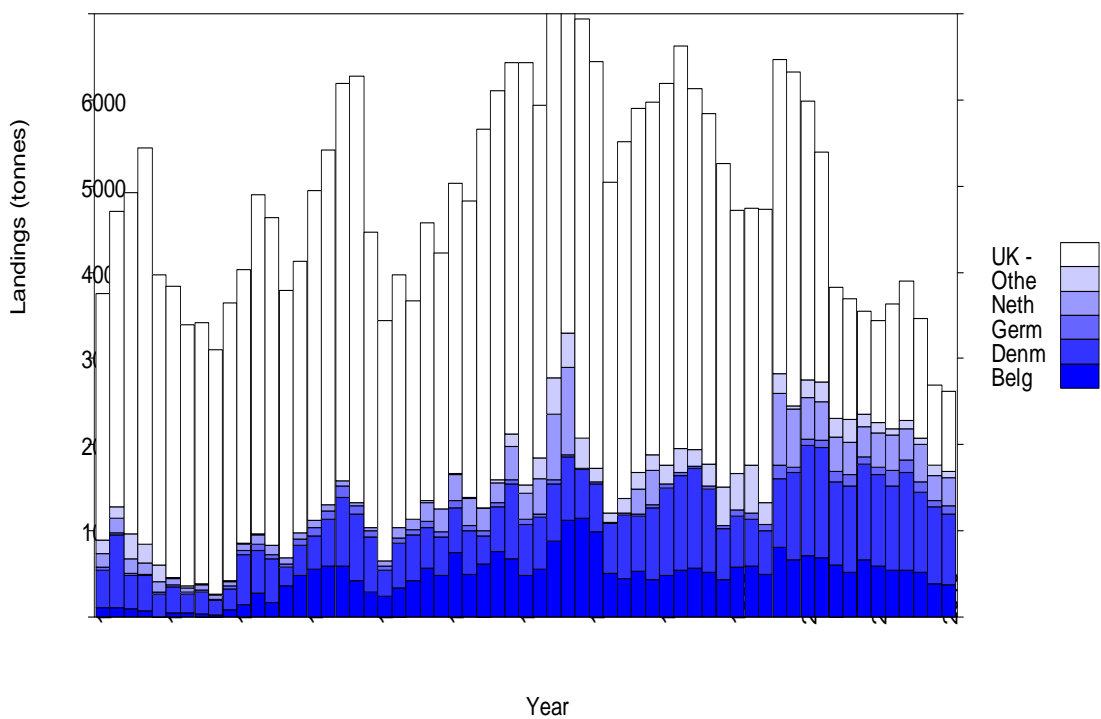


Figure 11.2. Lemon Sole in Subarea IV and Divisions IIIa and VIId. Official landings (t) of lemon sole for ICES Area IV 1950 – 2010. Source: FishStat

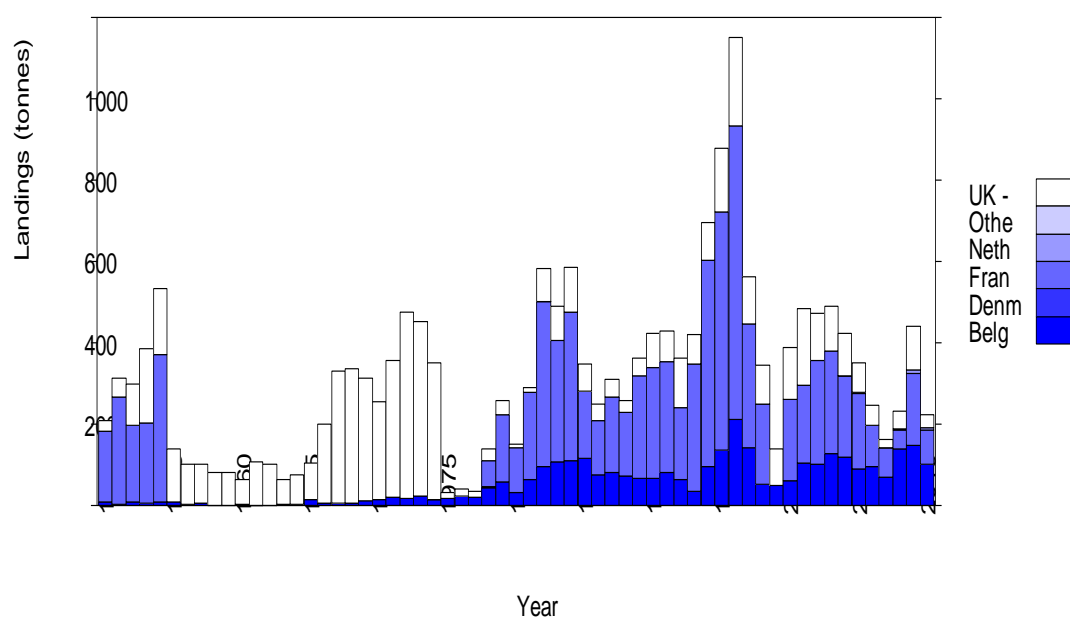


Figure 11.3. Lemon Sole in Subarea IV and Divisions IIIa and VIIId. Official landings (t) of lemon sole for ICES Area VIIId 1950 – 2010. Source: FishStat.

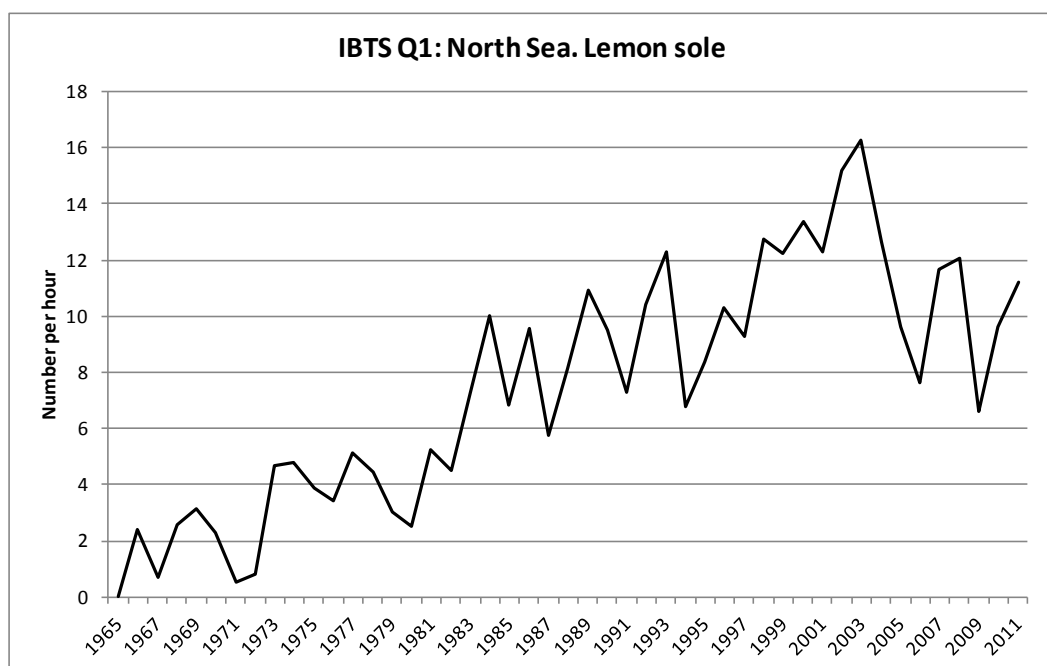


Figure 11.4. Index of abundance (number per hour) of lemon sole caught in the Q1 International Bottom Trawl survey between 1970 and 2011.

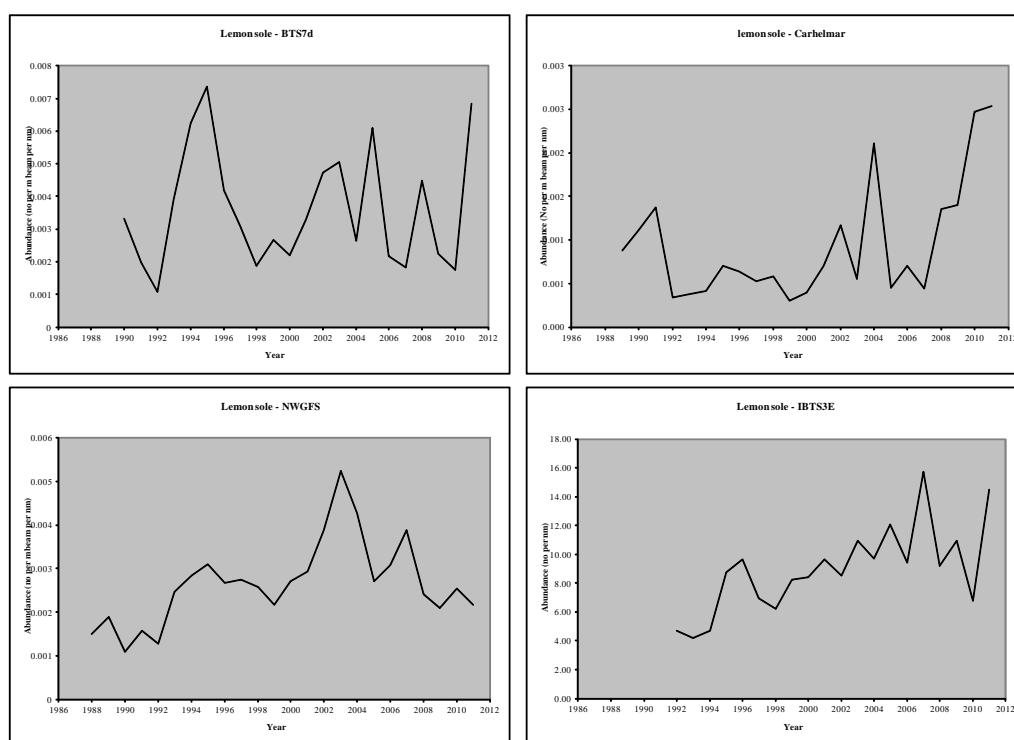


Figure 11.5. Lemon Sole in Subarea IV and Divisions IIIa and VIId. Indices of abundance of lemon sole caught in 4 Cefas surveys: the eastern Channel Beam Trawl survey (BTS7d)(July), the western Channel (VIIe) (Carhelmar) Beam Trawl survey (October), the Irish Sea/Bristol Channel (VIIa, f, g) Beam Trawl survey (NWGFS)(September) and the 3rd Quarter North Sea IBTS Ground-fish Survey (IBTS3E)(August). Abundances are given as number of fish per m beam per nm for the beam trawl surveys and as number of fish per nm for the groundfish survey.

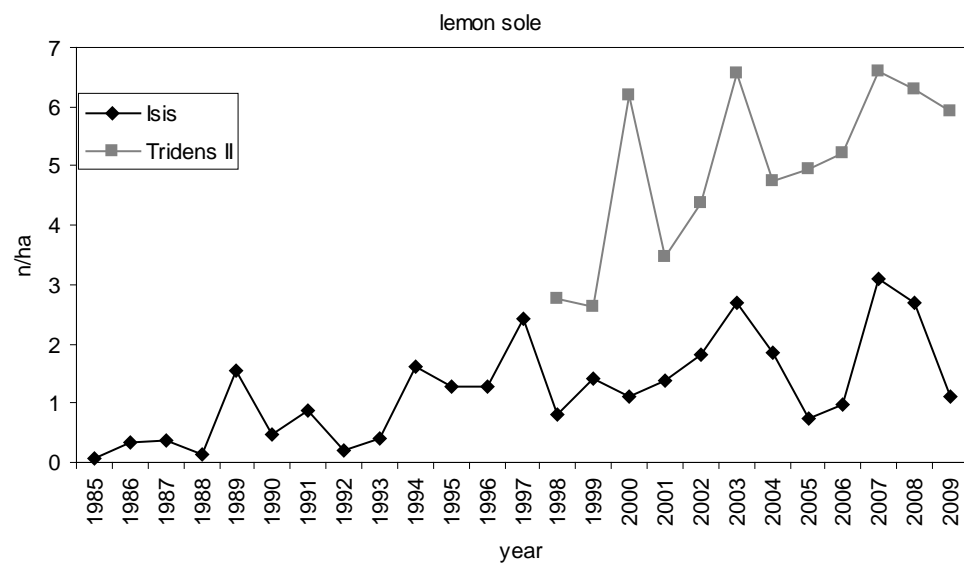


Figure 11.6. Lemon Sole in Subarea IV and Divisions IIIa and VIId. Lemon sole abundance (number per 30 minute tow) in Dutch Beam Trawl Surveys, Isis (SE north Sea) and Tridens (Central North Sea)

12 Pollack

12.1 General Biology

There is little published information on pollack (*Pollachius pollachius*, Linnaeus, 1758) biology. The species is restricted to the Northeast Atlantic with a main distribution from the Portuguese continental coast northwards around the British Isles, into the Skagerrak and along the Norwegian coast where it is fairly common up to the Lofoten Islands. It is rare at Faroe and Iceland and in the Baltic and was never registered in Spanish landings in IXa South (Gulf of Cádiz).

According to FAO Fishbase pollack is benthopelagic, found mostly close to the shore over hard bottom (Svetovidov, 1986) and wrecks and other obstacles (Quero and Vayne, 1997). It usually occurs at 40–100 m depth but is found down to 200 m. In the Cantabrian Sea and off Galicia it mainly occurs between 50 and 150 m deep (Rodriguez *et al.*, 2011). A long time series of hauls with a beach seine on the Skagerrak coast shows that 0-group pollack are regularly found in shallow areas close to the shore, but generally in more exposed areas than 0-group cod. 0-group Pollack are therefore protected from the fisheries in the early life stages.

According to Fishbase spawning takes place from January to May, depending on the area, and mostly at 100 m depth. FAO Fishbase gives a maximum length of 130 cm, and maximum published weight of 18.1 kg and maximum reported age of 8 years based on Cohen *et al.* (1990). Female length-at-maturity was considered as 35 cm (Cardinale *et al.*, 2012), at the age of 3 years. Feeding is mainly on fish, and incidentally on crustaceans and cephalopods.

French observations from the Western Channel/Celtic Sea region mainly support the information in Fishbase, although a higher maximum age (15 years) is found. Growth is thus fairly rapid, approaching 10 cm per year. Pollack moves gradually away from the coast into deeper waters as it grows. Maturity occurs at approximately 3 years, and spawning time is given as March-July, i.e. somewhat later than Fishbase states.

French observations also show that it is most available for fishing when it forms spawning aggregations. Otherwise its preference for wrecks and rocky bottom, makes it difficult to catch them with trawls. For this reason trawl surveys are probably not very well suited for monitoring this species.

12.2 Stock identity and possible assessment areas

Charrier *et al.* (2006) used six microsatellite markers to assess the stock structure of pollack in the NE Atlantic by comparing samples collected in four locations along the Atlantic French coast and from one location off southern Norway. Overall results showed the existence of limited genetic differentiation among samples which may be related: i) with the existence of gene flow between spawning units due to the larvae dispersal or ii) with a recent origin of populations which prevents significant genetic drift. However, authors remark that results should be carefully analysed due to the small sample sizes and the limited number of microsatellites used which might have hampered the detection of population differentiation for pollack. Nevertheless, a weak but significant genetic differentiation was detected between pollack from the Bay of Biscay and from the western English Channel. There are no morphological studies that allows to separate stocks for this species.

Data from the fishery indicate three main areas of exploitation : one in the northern North Sea/Skagerrak extending north along the Norwegian coast, one in the Western Channel extending into the Eastern Channel, the Celtic Sea, the Irish Sea, and the northern part of the French west coast (areas VIIe-j and VIII a,b - landings from the intermediate areas VIa and IVc are generally small), and one in the Iberian waters (areas VIIIc and IXa).

WGNEW proposes, based on a pragmatic approach, to distinguish three different stock units: the southern European Atlantic shelf (Bay of Biscay and Iberian Peninsula), the Celtic Seas, and the North Sea (including VIId and IIIa).

12.3 Management

A TAC has been adopted for the subarea VIII and division IXa in 2000. Since then, the TAC has been decreasing and according to the regulation for 2012 the fishing opportunities were fixed in 1482 t for the VIIId,b,d,e, 231 t for VIIIc and 282 t for IX and X (precautionary TAC).

Also for VI and VII, TACs have been defined since 2000. For subarea VI, this TAC dropped from 1100 t in 2000 to 397 t in 2011 (including the EC waters of Vb and the international waters of XII and XIV). For subarea VII, the TAC decreased from 17000 t in 2000–2005 to 15300 t in 2006–2009, 13770 t in 2010 and 13495 t in 2011.

For IV and IIa there are no formal TACs for pollack, but catches of pollack should be counted against the quota for some other species when caught in Norwegian waters south of 62° North.

So far, no further management regulations have been defined for pollack in the Atlantic region, apart from a Minimum Landing Size of 30 cm in European Member States (Council Regulation (EU) 850/1998). No explicit objectives have been defined for potential stocks of this species, no precautionary reference points have been proposed, and no management plans are in place. Analytical assessments leading to fisheries advice have never been carried out for pollack in European waters.

12.4 Pollack in Subarea VIII and Division IXa

12.4.1 Fisheries data

No updates were available for pollack in the VIII and IXa since the Working Group on the Assessment of Southern Shelf Stocks of Hake, Monk and Megrin (WGHMM) in May 2011. Pollack is mainly a bycatch in various fisheries in both VIII and IXa including small scale fisheries taking place in coastal waters. However, a target gillnet fishery started in 2006 mainly in VIIId, by the UK (Readdy and Robinson, 2011). In France, pollack is mainly caught in nets. The Portuguese and Spanish fleets operating in both areas comprise a combination of different gears and a small amount by trawl gears (Jardim *et al.*, 2011; Rodriguez *et al.*, 2011).

Landings Figures were available through the EUROSTAT database. Data presented starts in 1950 although reporting until 1977 can be unprecise. The introduction of the EEZs in 1977 represented a change in reporting and only from 1977 the data series appears to be reasonably consistent and adequate for allocating catches. For the IXa, landings are representative only from 1989 onwards. The TAC has decreased from 3850 t in 2000 to 1995 t in 2010, and landings have fluctuated between 1442 and 1302 t in the same time period. Thus landing Figures are likely to reflect at least the main trends in catches in the different areas.

The landings by country in are shown in Tables 12.1 and 12.2 and Figures 12.1–4. Landings assigned to division IX (unspecified) are also presented since are assumed to come from IXa. Total landings for both areas express mainly the French landings in subarea VIII (the majority from division VIIIa). Landings are apparently stable since 1989. Spanish landings on IXa represent almost the totality of the reported landings for this division. However it should be remarked that in Portuguese landings in the IXa pollack is commonly mididentified with whiting due to wrong use of the common names (Jardim *et al.*, 2011). Information available suggests that most Portuguese landings are pollack (Jardim *et al.*, 2011). However, this problem should not have major impact in landing series for both areas VIII and IXa combined (whiting and Pollock landings account approximately 200 t according to the Portuguese official landings). Portuguese landings of pollack and whiting presented at the meeting are shown in Figure 12.5. No evident trend is detectable.

Tables 12.3 to 12.5 present landing data by country by gear for all divisions combined (information from WGHMM 2011) (ICES, 2011a).

Portuguese discard data of pollock can be assumed null (WD2: Fernandes and Prista, 2012).

CPUE data is not available.

12.4.2 Survey data, recruit series

Spanish surveys record pollack in 1983 and then from 2004 onwards. Abundance and biomass indices of pollack in the Cantabrian Sea and off Galicia from these surveys are given in Figure 12.6. The time-series is short and pollack is not catch in sufficient quantity to evaluate trends in the abundance indices.

IPIMAR survey data for IXa shows that pollock was seldom observed (Jardim *et al.* 2011). There are no available time series of survey indices covering the division IXa.

12.4.3 Biological sampling

This information only started to be compiled in 2011 by Spain. Length samples were taken during UK scientific surveys until 2001.

12.4.4 Population biological parameters and other research

Cohen *et al.* (1990) report different spawning periods for Spain and Bay of Biscay, February and March, respectively.

12.4.5 Analyses of stock trends /assessment

There are no sufficient data to carry out any analytical assessment.

12.4.6 Data requirements

Presently only landings are available for the stock assessment. In southern areas, landings statistics might be uncertain because of pollack being misclassified as whiting. More spatial detail on fisheries are needed, including information on length frequency composition and discards.

Further work is required on stock identity. The collection of data under DCF needs to be continued by the countries that already collect these, and taken up by some others, in order to get a better understanding of the state of the potential pollack stocks in the

area, and to enable the evaluation of trends. Special effort should also be done in order to get age, maturity and other biological data (surveys or commercial sampling).

12.5 Pollack in the Celtic Seas (ICES Subareas VI and VII)

12.5.1 Fisheries data

The nominal landings as reported to ICES are given in Tables 12.6 and 12.7 for ICES Subareas VI and VII respectively. These landing figures are clearly incomplete and erratic (especially for the period prior to 1977, when a change in reporting requirements ensured more complete data) and further scrutiny is required. For example, Sweden is declaring substantial landings from subdivision VI in the period 1967–1972, while this is the case for Spain during the period 1981–1988, whereas both countries are largely absent from the rest of the landings time series (see Table 12.6 and Figure 12.7–8). France, a major contributor to the landings in both VI and VII, starts declaring in 1977 and has no declarations in 1999. For Ireland, another major contributor to pollack fisheries in the Celtic Seas Ecoregion, no landings were declared from 1973 until 1985. From 1977 onwards, the picture shows a long term downward trend, due mainly to the French threefold reduction of landings over the time period. In 2010, 98% of the landings originated from the Subarea VII, and Ireland, UK and France together comprised 99% of the official landings. Subarea VI has lost almost all of its past landings.

Landings are represented separately for VIIa, VIIbc, VIIde and VIIj-k (Figure 12.9). The Celtic Sea (VIIf-k) and the English Channel (VIIde) compose the majority of the landings (within the English Channel, an average of 83% of the landings consistently comes from VIIe over the period 1975–2010).

Most pollack in the Celtic Seas ecoregion is caught by trawls and gillnets, and other gears come to complement the landings, such as trolling lines, seine nets and beam trawls (see WGCSE/ICES, 2011b) for an overview of catches per gear for Ireland and France over the period 2003–2010). The overall gear contribution is unknown due to the lack of complete statistics.

It must be noted that pollack is also a target for recreational fisheries, especially by angling and spearfishing, both from shore and from boats. Apart from a survey conducted by France in 2006–2008, that estimated annual recreational catches of pollack to be 3500 t \pm 2500 t (ICES, 2010), no other information on recreational pollack catches is known to us.

12.5.2 Survey data

Pollock has a preference for wrecks and rocky bottom, making it difficult to catch with trawls and therefore poorly suited for monitoring by research surveys using trawling gear. This is in general illustrated by low numbers of individuals caught by bottom-trawl surveys. Given the fact that the occurrence of pollack in survey catches is highly influenced by coincidence (e.g., accidental fishing near a wreck or another hard substrate), the occurrence of years with zero survey catches doesn't necessarily mean that there was no pollack in those years.

Data generated by CGFS-Q3, EVHOE-WIBTS-Q4, IGFS-WIBTS-Q4 and BTS-VIIa-Q3 were tested for their information content on pollack from Subdivisions VI and VII. Pollack proves to be a very rare species in the catches of all these surveys, making them not suitable for the calculation of abundance indices of this species. Only for EVHOE-WIBTS-Q4 (Celtic Sea, VIIghj), biomass and abundance indices were calcu-

lated (available from DATRAS) for pollack (Figure 12.10). With the coincidence factor and low survey catches in mind, pollack seems to be rather stable at a low level over the time series.

12.5.3 Biological sampling

Some length frequency data are available for recent years, but area specific data on life history parameters are missing.

12.5.4 Analysis of stock trends / assessment

No reliable assessment can be presented for this species in the Celtic Sea ecoregion, and no reference points have been defined. The main cause of this is lack of reliable data. Therefore, fishing possibilities cannot be projected.

12.5.5 Data requirements

Further work on stock identity of pollack needs to be carried out, mainly to investigate the differentiation between pollack in the advisory units VI-VII and IV-IIIa.

Landing statistics for this area are assumed to be of good quality, but the data collection on surveys encountering pollack should be more intensive to enable a better understanding of the stock structure. Especially the collection of age and maturity information should be added to the routine reporting of catches at length.

12.6 Pollack in Subarea IV and Division IIIa

12.6.1 Fisheries data

Historical landings statistics for pollack are available from ICES, but they are clearly incomplete in earlier years. The introduction of the EEZs in 1977 represented a change in reporting and from 1977 the data series appears to be reasonably consistent and adequate for allocating catches at least to ICES subareas. Considering that pollack is not subject to TAC regulations, a major incentive for mis- or underreporting is not present and landings figures are thus probably reflecting at least the main trends in landings in the different areas.

Landings by country for the years 1977–2010 in Subdivision IIIa (Skagerrak/Kattegat) and Subarea IV (North Sea) are shown in Tables 12.8 and 12.9. Figure 12.11 shows total landings in Subarea IV and Division IIIa 1977–2010. Two periods with high catches can be seen, but catches are at a rather stable low level during the last 10 years.

Pollack is mainly a bycatch in various commercial fisheries. Monthly Norwegian catches, averaged over the years 1992–2011, show that catches peak in the months of March and April, coinciding with the spawning time, and this may be caused by fisheries targeting spawning aggregations. In Norway the most important gear is gillnets and otter trawl, responsible for 70 and 14 % of the catches respectively. When catches within and outside the 12 miles zone are compared it is seen that, for 2011, in Division IIIa 97% was from within the 12 miles zone (by gillnet and *Pandalus* trawl). In Subarea IV 66% of the catches was made within the 12 miles zone (again by gillnets), whereas in the area beyond the 12 miles zone the main catches were made by otter-trawl.

Pollack is also often caught in recreational fisheries, but no data about these catches are known to the working group.

12.6.2 Survey data / recruit series

Pollack is being caught in the IBTS survey in small numbers only. They are distributed mainly over the northwestern North Sea (along the Norwegian Deeps) and into the Skagerrak (Figure 12.12). Time series of abundance in the IBTS are shown for Subarea IV and Division IIIa separately, for quarter 1 (from 1977 onwards) and quarter 3 (from 1996 onwards) (Figure 12.13). The catches seem rather irregular, and no clear patterns emerge. A possible exception is the time series for quarter 1 in IIIa that may seem to mirror the decrease in abundance of pollack in this area, as also reported in Cardinale *et al.* (2012).

12.6.3 Biological sampling

There has been no recent collection of biological parameters in Subarea IV and Division IIIa.

12.6.4 Population biological parameters and other research

No information.

12.6.5 Analysis of stock trends / assessment

For Division IIIa (Skagerrak and Kattegat), Cardinale *et al.* (2012) analysed the spatial distribution and stock trends for the period 1906 – 2007, based on survey and commercial catches. The stock biomass of pollack is suggested to increase from 1940 to reach a peak in the late 1950ies. Since then the biomass has shown a decrease to reach a very low value around 2000.

12.6.6 Data requirements

Apart from reporting catches at length during routine surveys, such as the quarter 1 and quarter 3 IBTS in Subarea IV and Division IIIa, no biological data are collected for this species. In order to understand better their growth and maturity WGNEW recommends that otoliths and maturity information should be collected during these surveys for a few years.

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Table 12.1. Pollack. Landings by country in subarea VIII. As officially reported to ICES.

| YEA R | BELGIU M | DENMAR K | FRANC E | NETHERLAND S | PORTUGA L | SPAI N | U K | TOTA L |
|----------|-------------|-------------|------------|-----------------|--------------|-----------|--------|-----------|
| 1965 | 0 | 0 | 0 | 0 | 0 | 1808 | 0 | 1808 |
| 1966 | 0 | 0 | 0 | 0 | 0 | 1951 | 0 | 1951 |
| 1967 | 0 | 0 | 0 | 0 | 0 | 2230 | 0 | 2230 |
| 1968 | 0 | 0 | 0 | 0 | 0 | 1960 | 0 | 1960 |
| 1969 | 0 | 0 | 0 | 0 | 0 | 1484 | 0 | 1484 |
| 1970 | 0 | 0 | 0 | 0 | 0 | 1953 | 0 | 1953 |
| 1971 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1972 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1973 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1974 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1975 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1976 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1977 | 0 | 0 | 1459 | 0 | 0 | 0 | 0 | 1459 |
| 1978 | 1 | 0 | 1661 | 0 | 0 | 0 | 0 | 1662 |
| 1979 | 0 | 1 | 2221 | 0 | 0 | 1021 | 0 | 3243 |
| 1980 | 1 | 0 | 2158 | 0 | 0 | 1576 | 0 | 3735 |
| 1981 | 1 | 0 | 2326 | 0 | 0 | 902 | 0 | 3229 |
| 1982 | 2 | 0 | 2185 | 0 | 0 | 85 | 2 | 2274 |
| 1983 | 0 | 0 | 2652 | 1 | 0 | 581 | 0 | 3234 |
| 1984 | 0 | 0 | 2351 | 0 | 0 | 1606 | 1 | 3958 |
| 1985 | 0 | 0 | 2769 | 0 | 0 | 2304 | 23 | 5096 |
| 1986 | 0 | 0 | 2127 | 0 | 0 | 437 | 5 | 2569 |
| 1987 | 0 | 0 | 2022 | 0 | 0 | 584 | 1 | 2607 |
| 1988 | 3 | 0 | 1761 | 0 | 0 | 476 | 6 | 2246 |
| 1989 | 13 | 0 | 1682 | 0 | 0 | 214 | 4 | 1913 |
| 1990 | 14 | 0 | 1662 | 0 | 0 | 194 | 2 | 1872 |
| 1991 | 1 | 0 | 1867 | 0 | 0 | 221 | 1 | 2090 |
| 1992 | 2 | 0 | 1735 | 0 | <0.5 | 154 | 0 | 1891 |
| 1993 | 3 | 0 | 1327 | 0 | 0 | 135 | 0 | 1465 |
| 1994 | 3 | 0 | 1764 | 0 | <0.5 | 157 | 0 | 1924 |
| 1995 | 6 | 0 | 1457 | 0 | 0 | 153 | 2 | 1618 |
| 1996 | 8 | 0 | 1164 | 0 | 0 | 137 | 0 | 1309 |
| 1997 | 2 | 0 | 1167 | 0 | 0 | 152 | 1 | 1322 |
| 1998 | 1 | 0 | 956 | 0 | 0 | 152 | 0 | 1109 |
| 1999 | 0 | 0 | 0 | 0 | 0 | 120 | 0 | 120 |
| 2000 | 0 | 0 | 1315 | 0 | <0.5 | 121 | 0 | 1436 |
| 2001 | 0 | 0 | 1142 | 0 | 0 | 346 | 0 | 1488 |
| 2002 | 0 | 0 | 1467 | 0 | 0 | 170 | 0 | 1637 |
| 2003 | 0 | 0 | 1245 | 0 | 0 | 142 | 1 | 1388 |
| 2004 | 0 | 0 | 1145 | 0 | <0.5 | 211 | 0 | 1356 |
| 2005 | 0 | 0 | 1311 | 0 | 0 | 306 | 0 | 1617 |
| 2006 | 0 | 0 | 1418 | 0 | 0 | 251 | 171 | 1840 |
| 2007 | 0 | 0 | 1238 | 0 | 0 | 198 | 62 | 1498 |
| 2008 | 0 | 0 | 814 | 0 | 0 | 265 | 64 | 1143 |
| 2009 | 0 | 0 | 1508 | 0 | 0 | 218 | 41 | 1767 |
| 2010 | 0 | 0 | 1269 | 0 | 0 | 265 | 44 | 1578 |

Table 12.2. Pollack. Landings by country in division IXa and subarea IX. Subarea IX includes landings assigned to the IXa and unspecified landings in IX, assumed to be from IXa. As officially reported to ICES.

| Year | IXa | | IX | | Total |
|------|----------|-------|----------|-------|-------|
| | Portugal | Spain | Portugal | Spain | |
| 1965 | 0 | 0 | 0 | 0 | 0 |
| 1966 | 0 | 0 | 0 | 0 | 0 |
| 1967 | 0 | 0 | 0 | 0 | 0 |
| 1968 | 0 | 0 | 0 | 0 | 0 |
| 1969 | 0 | 0 | 0 | 0 | 0 |
| 1970 | 0 | 0 | 0 | 2 | 2 |
| 1971 | 0 | 0 | 0 | 0 | 0 |
| 1972 | 0 | 0 | 0 | 0 | 0 |
| 1973 | 0 | 0 | 0 | 0 | 0 |
| 1974 | 0 | 0 | 242 | 0 | 242 |
| 1975 | 0 | 0 | 0 | 0 | 0 |
| 1976 | 0 | 0 | 0 | 0 | 0 |
| 1977 | 0 | 0 | 0 | 0 | 0 |
| 1978 | 0 | 0 | 0 | 0 | 0 |
| 1979 | 0 | 0 | 0 | 0 | 0 |
| 1980 | 0 | 0 | 0 | 0 | 0 |
| 1981 | 0 | 0 | 0 | 0 | 0 |
| 1982 | 0 | 0 | 0 | 32 | 32 |
| 1983 | 0 | 0 | 0 | 203 | 203 |
| 1984 | 0 | 0 | 0 | 642 | 642 |
| 1985 | 0 | 0 | 0 | 636 | 636 |
| 1986 | 0 | 0 | 0 | 237 | 237 |
| 1987 | 0 | 0 | 3 | 308 | 311 |
| 1988 | 0 | 0 | 7 | 329 | 336 |
| 1989 | 0 | 57 | 3 | 57 | 60 |
| 1990 | 0 | 27 | 1 | 27 | 28 |
| 1991 | 0 | 76 | 2 | 76 | 78 |
| 1992 | 0 | 65 | 2 | 65 | 67 |
| 1993 | 0 | 47 | 1 | 47 | 48 |
| 1994 | 0 | 28 | 3 | 28 | 31 |
| 1995 | 0 | 59 | 2 | 59 | 61 |
| 1996 | 0 | 43 | 2 | 43 | 45 |
| 1997 | 0 | 54 | 2 | 54 | 56 |
| 1998 | 0 | 55 | 1 | 55 | 56 |
| 1999 | 0 | 36 | 1 | 36 | 37 |
| 2000 | 0 | 49 | 15 | 49 | 64 |
| 2001 | 0 | 81 | 41 | 81 | 122 |
| 2002 | 0 | 35 | 45 | 35 | 80 |
| 2003 | 0 | 39 | 31 | 39 | 70 |
| 2004 | 12 | 90 | 12 | 90 | 102 |
| 2005 | 0 | 132 | 6 | 132 | 138 |
| 2006 | 0 | 102 | 7 | 102 | 109 |
| 2007 | 5 | 103 | 5 | 103 | 108 |
| 2008 | 31 | 128 | 31 | 128 | 159 |
| 2009 | 3 | 68 | 3 | 68 | 71 |
| 2010 | 2 | 91 | 2 | 91 | 93 |

Table 12.3. Pollack. Official landings for the UK fleet (England and Wales component) in the VIIIc and IX (from Readdy and Robinson, 2011)

| | Fixed nets | Longlines | Beam trawl | Bottom trawl |
|------|-------------------|------------------|-------------------|---------------------|
| 1985 | | 19504 | | 3759 |
| 1986 | | | | 4589 |
| 1987 | | | | 1004 |
| 1988 | | | | 5903 |
| 1989 | | | | |
| 1990 | 1802 | | | |
| 1991 | | 341 | | 307 |
| 1992 | | | | |
| 1993 | | | 1 | 262 |
| 1994 | | | | |
| 1995 | | | 8 | 1614 |
| 1996 | | 9 | | |
| 1997 | 934 | 3 | | |
| 1998 | | 5 | | |
| 1999 | | 1 | | |
| 2000 | | 33 | | 6 |
| 2001 | | 9 | | |
| 2002 | | 6 | | |
| 2003 | | 481 | 10 | 11 |
| 2004 | | | | |
| 2005 | | 5 | | 57 |
| 2006 | 170918 | | | |
| 2007 | 6184 | | | 1 |
| 2008 | 64054 | | | |
| 2009 | 40942 | | | |
| 2010 | 43787 | | | |

Table 12.4. Pollack. Landings Figures based on logbook data only for the French fleet for the VIIIa,b,d (from Mahé, 2011). The usual procedure used to produce best estimates could not be applied).

| | Trawl | Other | Nets | Lines |
|------|--------------|--------------|-------------|--------------|
| 1999 | 203 | 5 | 260 | 73 |
| 2000 | 255 | 5 | 264 | 20 |
| 2001 | 173 | 5 | 358 | 36 |
| 2002 | 202 | 3 | 570 | 65 |
| 2003 | 151 | 4 | 542 | 57 |
| 2004 | 205 | 6 | 378 | 95 |
| 2005 | 294 | 11 | 498 | 92 |
| 2006 | 311 | 19 | 565 | 133 |
| 2007 | 263 | 12 | 557 | 138 |
| 2008 | 224 | 5 | 679 | 217 |

Table 12.5. Pollack. Official Portuguese landings for the Portuguese fleet in the IXa of pollack and whiting (from Jardim *et al.*, 2011)

| | <i>Pollachius pollachius</i> | | | <i>Merlangius merlangus</i> | | |
|-------------|-------------------------------------|-------------------|-----------------|------------------------------------|-------------------|-----------------|
| Year | Dtrawl | Polyvalent | Pseiners | Dtrawl | Polyvalent | Pseiners |
| 2003 | 0.1 | 60.0 | 0.0 | 17.1 | 70.0 | 0.7 |
| 2004 | 0.3 | 33.0 | 0.1 | 24.3 | 125.3 | 0.1 |
| 2005 | 1.2 | 15.5 | 0.0 | 14.0 | 139.3 | 0.0 |
| 2006 | 0.7 | 13.4 | 0.0 | 8.1 | 205.8 | 0.1 |
| 2007 | 0.3 | 9.0 | 0.5 | 21.4 | 190.6 | 1.2 |
| 2008 | 0.1 | 66.5 | NA | 10.5 | 183.4 | 0.2 |
| 2009 | 1.0 | 4.8 | NA | 14.3 | 207.1 | 0.0 |
| 2010 | 0.2 | 3.4 | NA | 10.2 | 212.9 | 0.0 |

Table 12.6. Pollack in the Subareas VI and VII. Official landings by country in Subarea VI.

| | Belg. | Denm. | Fran. | Germ. | Irel. | Neth. | Norw. | Port. | Spain | Swed. | UK | Total IV |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----|-------------|
| 1970 | 2 | - | - | 1 | 398 | - | - | - | - | 756 | 447 | 1604 |
| 1971 | 1 | - | - | 5 | 75 | - | - | - | - | 750 | 256 | 1087 |
| 1972 | 1 | - | - | 1 | 127 | - | - | - | - | 779 | 317 | 1225 |
| 1973 | 2 | - | - | - | - | - | - | - | - | - | 503 | 505 |
| 1974 | 6 | - | - | - | - | 3 | - | - | - | - | 359 | 368 |
| 1975 | <0.5 | - | - | 1 | - | 1 | 4 | - | - | - | 393 | 399 |
| 1976 | 7 | - | - | - | - | 1 | - | - | - | - | 519 | 527 |
| 1977 | - | - | 196 | - | - | 1 | 2 | - | - | - | 493 | 692 |
| 1978 | - | - | 196 | - | - | - | 4 | - | - | - | 553 | 753 |
| 1979 | - | - | 310 | - | - | - | - | - | - | - | 350 | 660 |
| 1980 | - | - | 36 | - | - | - | - | - | - | - | 233 | 269 |
| 1981 | - | - | 342 | - | - | - | - | - | 55 | - | 185 | 582 |
| 1982 | - | <0.5 | 272 | - | - | - | - | - | 95 | - | 103 | 470 |
| 1983 | - | - | 331 | - | - | - | - | - | 86 | - | 148 | 565 |
| 1984 | - | - | 212 | - | - | - | - | - | 222 | - | 194 | 628 |
| 1985 | <0.5 | - | 224 | 1 | - | - | - | - | 283 | - | 328 | 836 |
| 1986 | - | - | 145 | - | 223 | - | - | - | 2217 | - | 187 | 2772 |
| 1987 | - | <0.5 | 108 | - | 103 | - | - | - | 860 | - | 259 | 1330 |
| 1988 | - | <0.5 | 128 | - | 163 | - | - | - | 1925 | - | 221 | 2437 |
| 1989 | - | <0.5 | 111 | 1 | 103 | - | - | - | - | - | 179 | 394 |
| 1990 | - | - | 76 | - | 150 | - | 1 | - | - | - | 192 | 419 |
| 1991 | - | - | 31 | - | 145 | - | - | - | 4 | - | 189 | 369 |
| 1992 | - | <0.5 | 21 | - | 23 | - | - | - | <0.5 | - | 203 | 247 |
| 1993 | - | - | 39 | - | 12 | - | - | - | - | - | 273 | 324 |
| 1994 | - | - | 34 | <0.5 | 26 | - | <0.5 | - | - | - | 276 | 336 |
| 1995 | - | - | 64 | 3 | 83 | - | - | - | - | - | 354 | 504 |
| 1996 | - | <0.5 | 29 | <0.5 | 97 | - | 1 | - | - | - | 210 | 337 |
| 1997 | - | - | 14 | 1 | 69 | - | 2 | - | - | - | 162 | 248 |
| 1998 | - | - | 21 | - | 60 | - | - | <0.5 | <0.5 | - | 147 | 228 |
| 1999 | - | - | - | - | 73 | - | 3 | - | <0.5 | - | 136 | 212 |
| 2000 | - | - | 11 | 2 | 62 | - | - | - | - | - | 116 | 191 |
| 2001 | - | - | 8 | - | 108 | - | - | - | - | - | 101 | 217 |
| 2002 | - | - | 9 | - | 26 | - | - | - | - | - | 96 | 131 |
| 2003 | <0.5 | - | 3 | - | 88 | - | 1 | - | - | - | 111 | 203 |
| 2004 | <0.5 | - | 2 | - | 68 | - | 1 | - | - | - | 65 | 136 |
| 2005 | - | - | 23 | - | 28 | - | - | - | - | - | 16 | 67 |
| 2006 | - | - | 3 | - | 25 | - | <0.5 | - | 4 | - | 5 | 37 |
| 2007 | - | - | 10 | - | 21 | - | 6 | - | - | - | 21 | 58 |
| 2008 | - | - | 8 | - | 21 | - | 1 | - | - | - | 23 | 53 |
| 2009 | - | - | 7 | - | 5 | - | <0.5 | - | - | - | 25 | 37 |
| 2010 | - | - | 6 | - | 34 | - | <0.5 | - | - | - | 38 | 78 |

Table 12.7. Pollack in the Subareas VI and VII. Official landings by country in Subarea VII.

| | Belg. | Denm. | Fran. | Germ. | Irel. | Neth. | Norw. | Spain | UK | Total VII |
|------|-------|-------|-------|-------|-------|-------|-------|-------|------|-----------|
| 1970 | 165 | - | - | 1 | 724 | - | - | - | 120 | 1010 |
| 1971 | 114 | - | - | - | 673 | - | - | - | 116 | 903 |
| 1972 | 142 | - | - | - | 1073 | - | - | - | 123 | 1338 |
| 1973 | 89 | - | - | - | - | 3 | - | - | 127 | 219 |
| 1974 | 299 | - | - | - | - | 13 | - | - | 223 | 535 |
| 1975 | 295 | - | - | - | - | 17 | - | - | 290 | 602 |
| 1976 | 339 | - | - | - | - | 4 | - | - | 421 | 764 |
| 1977 | 157 | 1 | 3569 | - | - | 1 | - | - | 465 | 4193 |
| 1978 | 186 | 21 | 5496 | 14 | - | 8 | - | - | 515 | 6240 |
| 1979 | 151 | 18 | 5119 | 76 | - | 1 | - | - | 696 | 6061 |
| 1980 | 237 | 7 | 5242 | - | - | 1 | - | 1 | 769 | 6257 |
| 1981 | 244 | - | 5814 | - | - | 3 | - | 23 | 780 | 6864 |
| 1982 | 154 | - | 4253 | - | - | - | - | 32 | 1022 | 5461 |
| 1983 | 167 | - | 6214 | - | - | - | - | 26 | 1045 | 7452 |
| 1984 | 207 | - | 3927 | - | - | - | - | 486 | 1100 | 5720 |
| 1985 | 269 | - | 3741 | - | - | - | - | 20 | 1022 | 5052 |
| 1986 | 241 | - | 4574 | - | 1335 | - | - | 17 | 1795 | 7962 |
| 1987 | 149 | - | 5213 | - | 848 | - | - | 19 | 2010 | 8239 |
| 1988 | 191 | - | 5211 | - | 1066 | - | - | 22 | 1740 | 8230 |
| 1989 | 145 | - | 3893 | - | 994 | - | - | 18 | 1487 | 6537 |
| 1990 | 133 | - | 4831 | - | 1066 | - | - | 26 | 1914 | 7970 |
| 1991 | 76 | - | 3211 | - | 1045 | - | - | 22 | 1962 | 6316 |
| 1992 | 62 | - | 2849 | - | 1014 | - | - | 19 | 1889 | 5833 |
| 1993 | 55 | - | 2325 | - | 1137 | - | - | 7 | 2135 | 5659 |
| 1994 | 94 | - | 2621 | - | 921 | - | - | 8 | 2391 | 6035 |
| 1995 | 88 | 2 | 2315 | - | 1107 | - | - | 4 | 2168 | 5684 |
| 1996 | 94 | - | 2684 | - | 1190 | 6 | - | 5 | 2519 | 6498 |
| 1997 | 99 | - | 2443 | - | 984 | 4 | <0.5 | 7 | 2540 | 6077 |
| 1998 | 92 | - | 2375 | - | 886 | 1 | - | 11 | 2347 | 5712 |
| 1999 | 86 | - | - | - | 976 | - | 3 | 19 | 1703 | 2787 |
| 2000 | 71 | - | 2422 | - | 1069 | - | - | 5 | 1810 | 5377 |
| 2001 | 100 | - | 2515 | - | 1274 | - | - | 9 | 1987 | 5885 |
| 2002 | 117 | - | 2481 | - | 1308 | - | - | 17 | 1999 | 5922 |
| 2003 | 113 | - | 2284 | - | 1151 | - | - | 12 | 1788 | 5348 |
| 2004 | 104 | - | 1914 | - | 1049 | 1 | - | 13 | 1705 | 4786 |
| 2005 | 98 | - | 2198 | - | 728 | 1 | - | 16 | 1684 | 4725 |
| 2006 | 79 | - | 2213 | - | 809 | 1 | - | 28 | 1513 | 4643 |
| 2007 | 91 | - | 1970 | - | 782 | 3 | - | 1 | 1764 | 4611 |
| 2008 | 76 | - | 1579 | - | 738 | 1 | - | 14 | 1453 | 3861 |
| 2009 | 42 | - | 1670 | - | 828 | 4 | - | 3 | 1545 | 4092 |
| 2010 | 35 | - | 1846 | - | 942 | 2 | - | 3 | 1459 | 4284 |

Table 12.8. Pollack. Landings by country in Division IIIa as officially reported to ICES.

| ICES Division IIIa | | | | | | | | |
|--------------------|---------|---------|---------|----------|--------|--------|------|-------|
| | Belgium | Denmark | Germany | Netherl. | Norway | Sweden | UK | Total |
| 1977 | 10 | 1764 | 4 | 3 | 449 | 706 | | 2936 |
| 1978 | 1 | 2077 | 4 | | 556 | 794 | | 3432 |
| 1979 | 13 | 1898 | <0.5 | | 824 | 1066 | | 3801 |
| 1980 | 13 | 1860 | | | 987 | 1584 | <0.5 | 4444 |
| 1981 | 5 | 1661 | | | 839 | 1187 | 1 | 3693 |
| 1982 | 1 | 1272 | | | 575 | 417 | <0.5 | 2265 |
| 1983 | 2 | 972 | | | 438 | 288 | | 1700 |
| 1984 | 2 | 930 | <0.5 | | 371 | 276 | | 1579 |
| 1985 | - | 824 | <0.5 | | 350 | 356 | | 1530 |
| 1986 | 4 | 759 | <0.5 | | 374 | 271 | | 1408 |
| 1987 | 6 | 665 | | | 342 | 246 | | 1259 |
| 1988 | 4 | 494 | | | 350 | 136 | | 984 |
| 1989 | 3 | 554 | | | 313 | 152 | | 1022 |
| 1990 | 8 | 1842 | <0.5 | | 246 | 253 | | 2349 |
| 1991 | 2 | 1824 | | | 324 | 281 | | 2431 |
| 1992 | 8 | 1228 | | | 391 | 320 | | 1947 |
| 1993 | 6 | 1130 | 1 | | 364 | 442 | | 1943 |
| 1994 | 5 | 645 | <0.5 | | 276 | 238 | | 1164 |
| 1995 | 10 | 497 | | | 322 | 271 | | 1100 |
| 1996 | | 680 | | | 309 | 273 | | 1262 |
| 1997 | | 364 | <0.5 | | 302 | 178 | | 844 |
| 1998 | | 299 | | | 330 | 105 | | 734 |
| 1999 | | 192 | | | 342 | 88 | | 622 |
| 2000 | | 199 | | | 268 | 33 | | 500 |
| 2001 | | 201 | 1 | | 253 | 46 | | 501 |
| 2002 | | 228 | 3 | | 202 | 44 | | 477 |
| 2003 | | 168 | 3 | 1 | 236 | 17 | | 425 |
| 2004 | | 140 | 2 | 4 | 179 | 34 | | 359 |
| 2005 | | 160 | 5 | 7 | 173 | 153 | | 498 |
| 2006 | | 103 | 10 | 3 | 178 | 36 | | 330 |
| 2007 | | 172 | 9 | | 245 | 38 | | 464 |
| 2008 | | 161 | 5 | | 247 | 33 | | 446 |
| 2009 | | 206 | 7 | | 220 | 38 | <0.5 | 471 |
| 2010 | | 313 | 8 | 1 | 195 | 35 | | 552 |

Table 12.9. Pollack. Landings by country in Subarea IV as officially reported to ICES.

| ICES Subarea IV | | | | | | | | | | | |
|-----------------|---------|---------|---------|--------|---------|----------|--------|--------|--------|------|-------|
| | Belgium | Denmark | Faeroes | France | Germany | Netherl. | Norway | Poland | Sweden | UK | Total |
| 1977 | 121 | 275 | | 75 | 142 | 38 | 419 | 9 | 0 | 442 | 1521 |
| 1978 | 102 | 249 | | 98 | 154 | 21 | 492 | 2 | 0 | 471 | 1589 |
| 1979 | 62 | 333 | | 72 | 64 | 8 | 563 | 11 | 31 | 429 | 1573 |
| 1980 | 82 | 407 | | 66 | 58 | 2 | 1095 | | 38 | 355 | 2103 |
| 1981 | 59 | 500 | | 173 | 21 | 2 | 1261 | | 12 | 362 | 2390 |
| 1982 | 46 | 431 | | 59 | 40 | 1 | 1169 | 33 | 23 | 270 | 2072 |
| 1983 | 58 | 481 | | 79 | 44 | 1 | 1081 | | 57 | 300 | 2101 |
| 1984 | 52 | 402 | | 108 | 37 | 0 | 880 | 2 | 106 | 315 | 1902 |
| 1985 | 14 | 308 | | 69 | 23 | 0 | 686 | | 51 | 363 | 1514 |
| 1986 | 44 | 550 | | 45 | 21 | 0 | 602 | | 67 | 362 | 1691 |
| 1987 | 21 | 427 | | 988 | 21 | 0 | 471 | | 40 | 290 | 2258 |
| 1988 | 32 | 432 | | 367 | 30 | 10 | 560 | | 20 | 296 | 1747 |
| 1989 | 31 | 273 | | 0 | 21 | 4 | 568 | | 37 | 269 | 1203 |
| 1990 | 44 | 924 | | 0 | 34 | 3 | 651 | | 126 | 366 | 2148 |
| 1991 | 31 | 1464 | | 0 | 48 | 4 | 887 | | 153 | 684 | 3271 |
| 1992 | 49 | 794 | | 18 | 59 | 7 | 1051 | | 141 | 1310 | 3429 |
| 1993 | 46 | 1161 | | 8 | 161 | 19 | 1429 | | 217 | 1561 | 4602 |
| 1994 | 42 | 635 | | 12 | 55 | 14 | 845 | | 113 | 872 | 2588 |
| 1995 | 56 | 532 | 1 | 7 | 84 | 18 | 1203 | | 175 | 1525 | 3601 |
| 1996 | 13 | 366 | | 4 | 99 | 13 | 909 | | 82 | 945 | 2431 |
| 1997 | 20 | 272 | 1 | 1 | 115 | 11 | 733 | | 82 | 1185 | 2420 |
| 1998 | 21 | 265 | | 7 | 44 | 5 | 567 | | 75 | 780 | 1764 |
| 1999 | 21 | 288 | | 0 | 62 | 5 | 768 | | 72 | 636 | 1852 |
| 2000 | 45 | 291 | | 24 | 38 | 5 | 880 | | 91 | 877 | 2251 |
| 2001 | 36 | 156 | | 6 | 40 | 1 | 860 | | 63 | 809 | 1971 |
| 2002 | 27 | 234 | | 6 | 112 | 0 | 879 | | 68 | 711 | 2037 |
| 2003 | 13 | 191 | | 9 | 82 | 1 | 971 | | 36 | 837 | 2140 |
| 2004 | 28 | 162 | | 5 | 57 | 0 | 517 | | 16 | 612 | 1397 |
| 2005 | 26 | 173 | | 3 | 128 | 3 | 511 | | 46 | 477 | 1367 |
| 2006 | 18 | 152 | | 4 | 80 | 1 | 545 | | 12 | 587 | 1399 |
| 2007 | 18 | 192 | | 130 | 137 | 2 | 754 | | 43 | 905 | 2181 |
| 2008 | 15 | 150 | | 129 | 114 | 1 | 840 | | 46 | 999 | 2294 |
| 2009 | 13 | 121 | 2 | 6 | 50 | 1 | 668 | | 32 | 658 | 1551 |
| 2010 | 12 | 163 | | 10 | 129 | 0 | 599 | | 32 | 540 | 1485 |

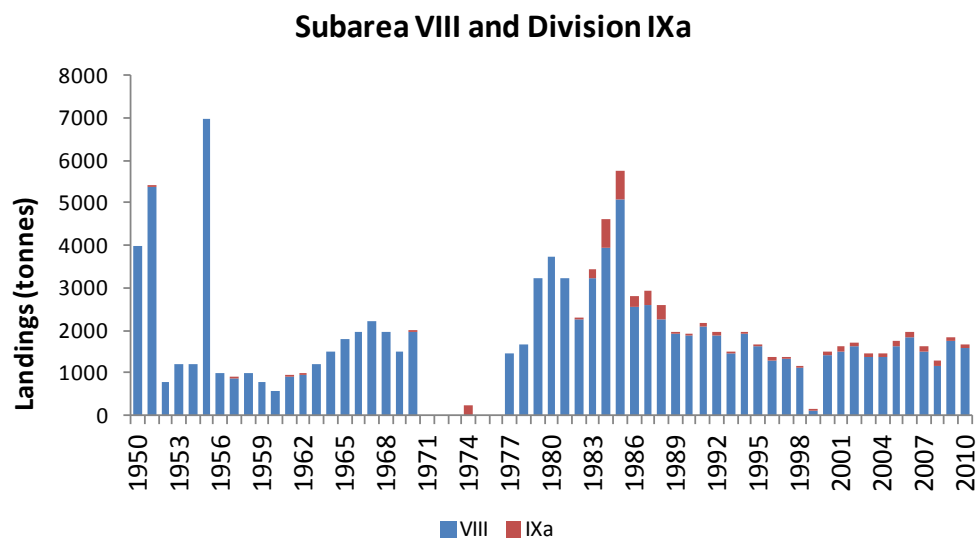


Figure 12.1. Pollack. Landings in subarea VIII and division IXa. As officially reported to ICES. IXa includes landings assigned to the IXa and unspecified landings in IX, assumed to be from IXa.

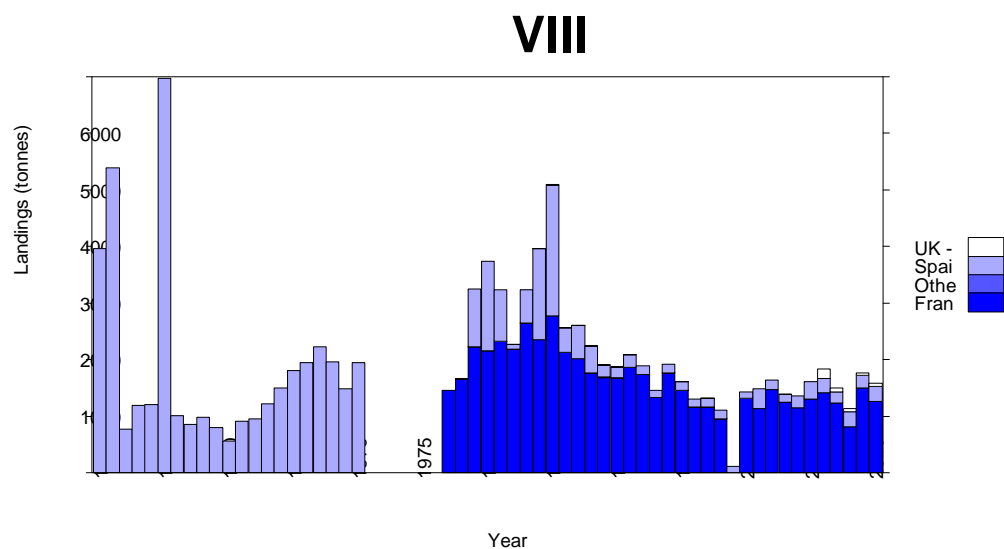


Figure 12.2. Pollack. Landings by country in subarea VIII. As officially reported to ICES. Previously to 1977 landings were never assigned to a division.

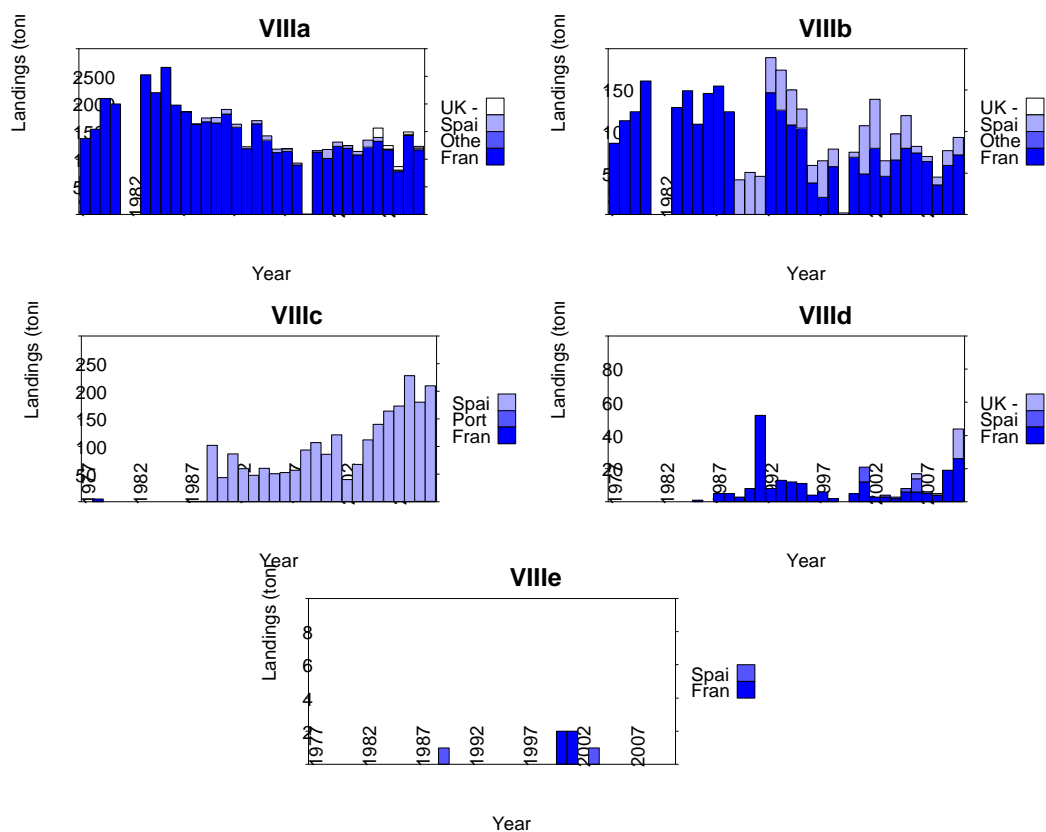


Figure 12.3. Pollack. Landings by country in subdivision VIIIa-e. As officially reported to ICES.

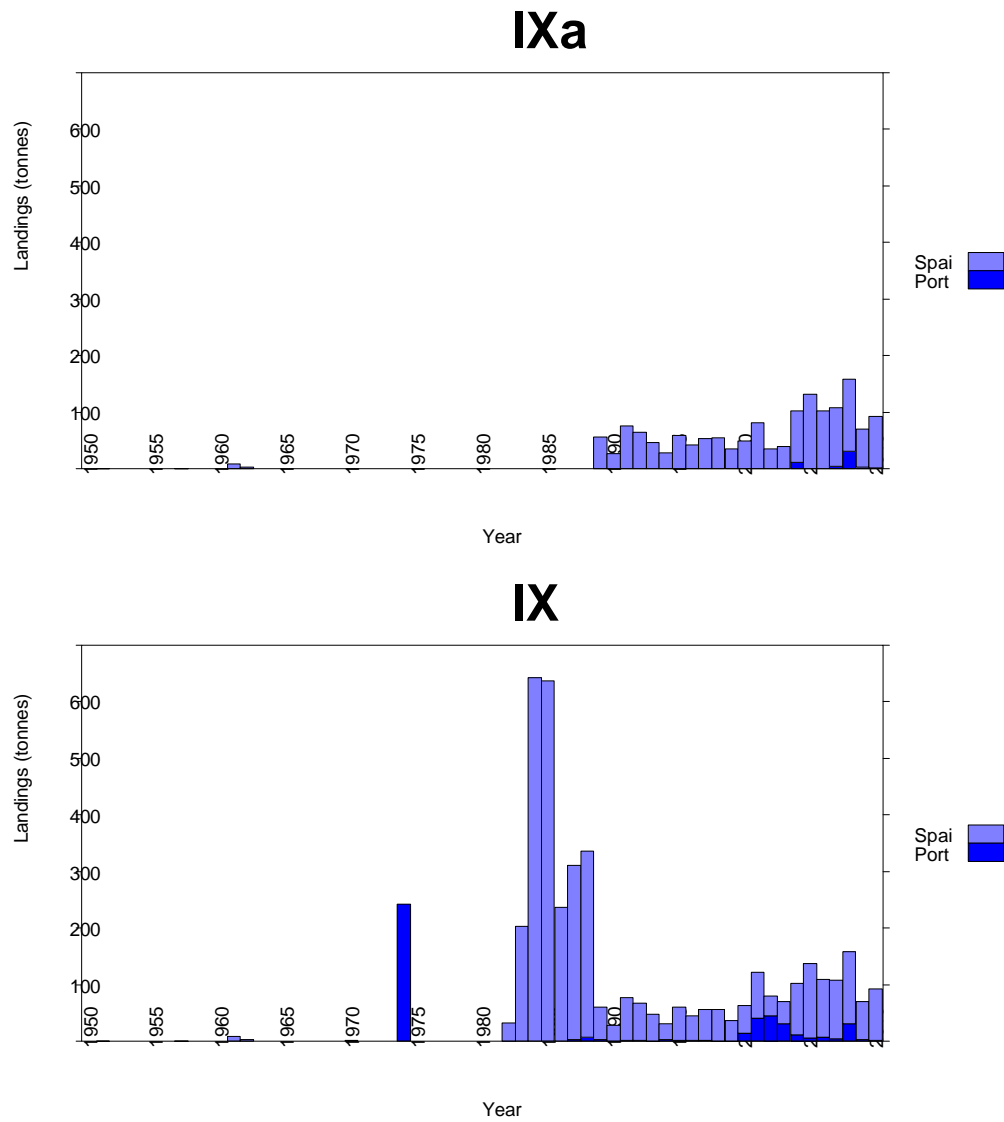


Figure 12.4. Pollack. Landings by country in division IXa and subarea IX. Subarea IX includes landings assigned to the IXa and unspecified landings in IX, assumed to be from IXa. As officially reported to ICES.

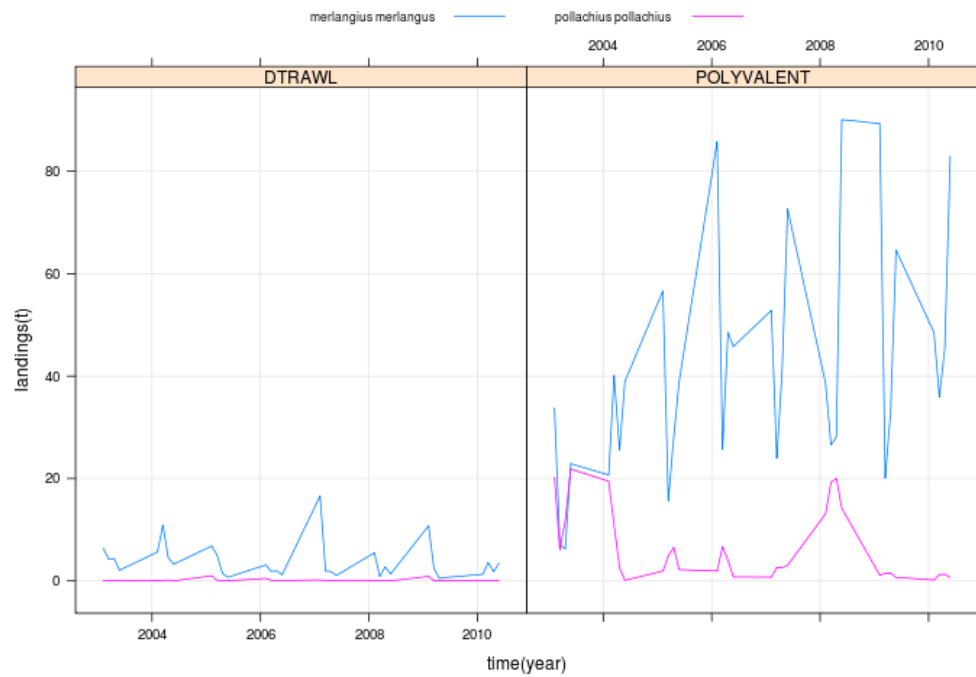


Figure. 12.5. Pollack. Portuguese official landings for pollack and whiting by gear (from Jardim *et al.*, 2011).

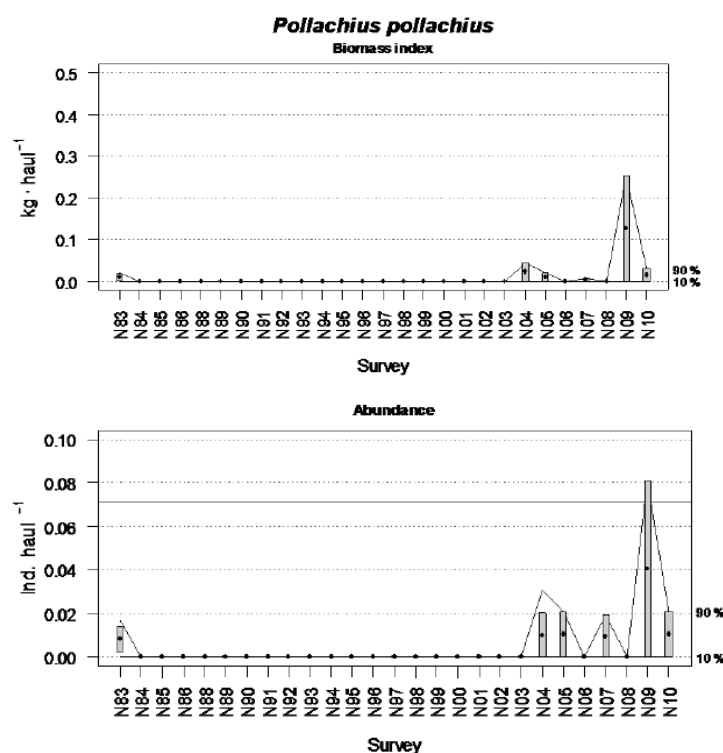


Figure 12.6. Pollack. Biomass and abundance indices of pollack from the time series of SP-GFS, 1983–2010 (no survey in 1987) (from Rodriguez *et al.*, 2011)

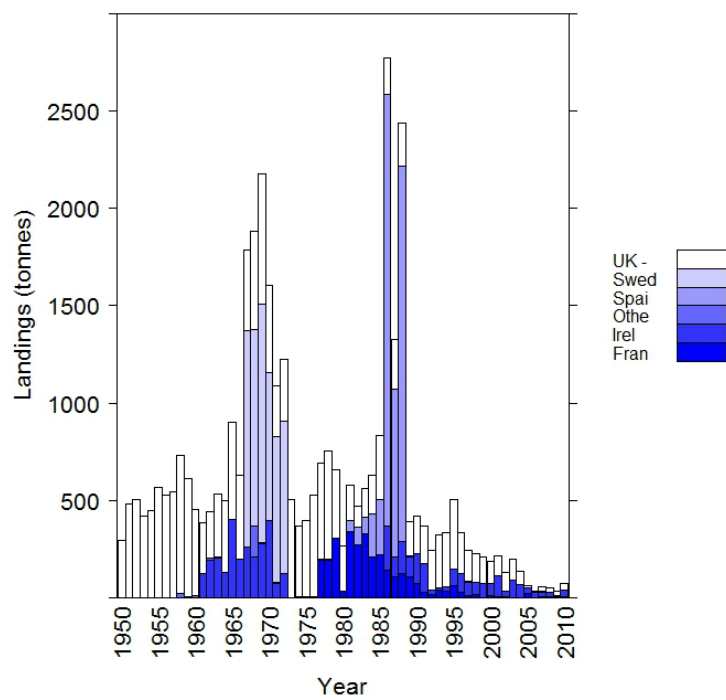


Figure 12.7. Pollack. Official international landings of pollack *Pollachius pollachius* by country in Subarea VI (source: ICES Fishstat).

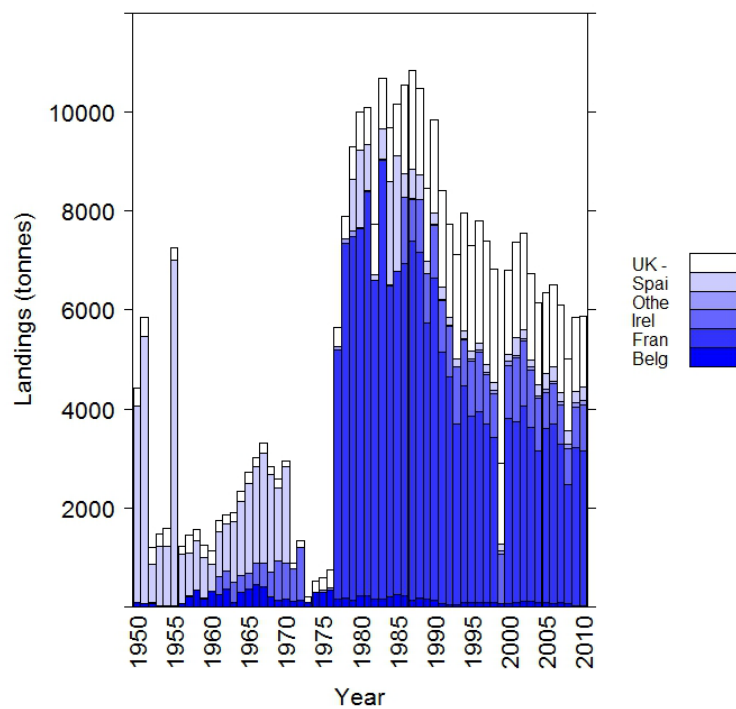


Figure 12.8. Official international landings of pollack *Pollachius pollachius* by country in Subarea VII (source: ICES Fishstat).

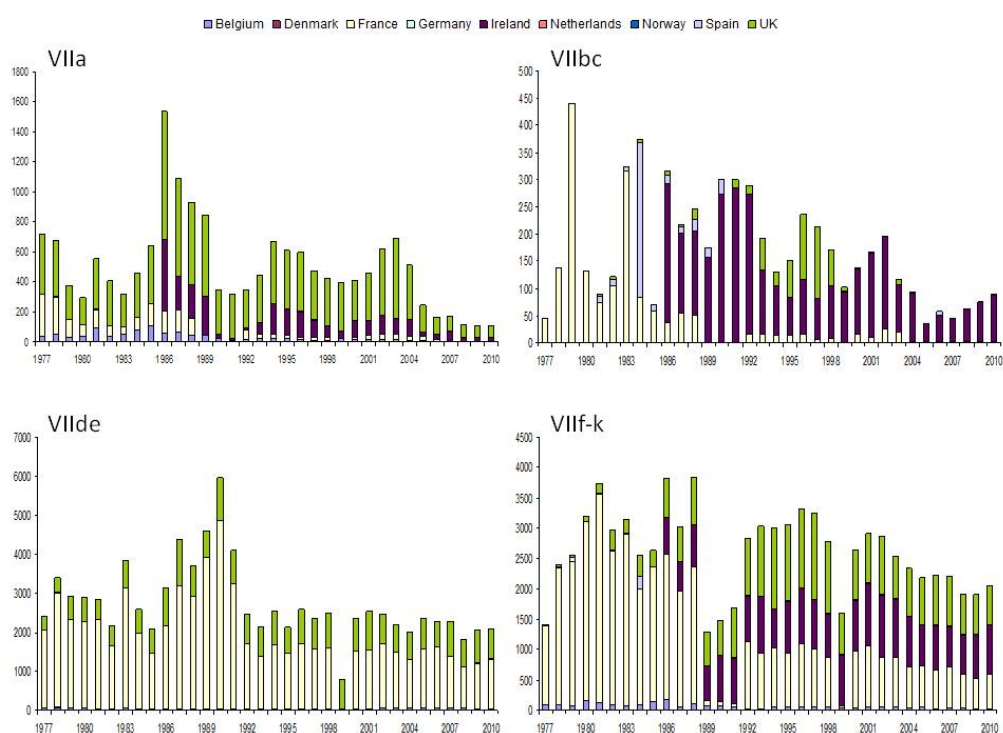


Figure 12.9. Official landings of pollack *Pollachius pollachius* by country in Divisions VIIa, VIIde, VIIbc and VIIf-k (source: ICES Fishstat).

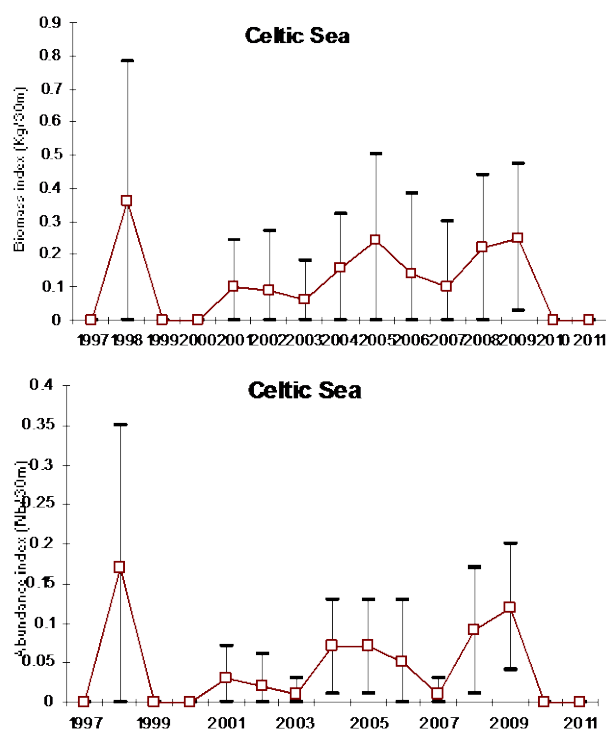


Figure 12.10. Biomass (kg/30 min) and abundance (number/30 min) indices of pollack in the Celtic Sea (EVHOE-WIBTS-Q4).

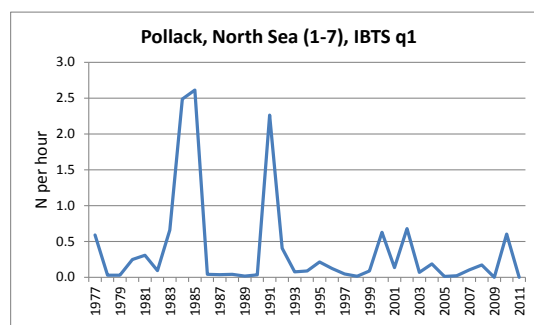
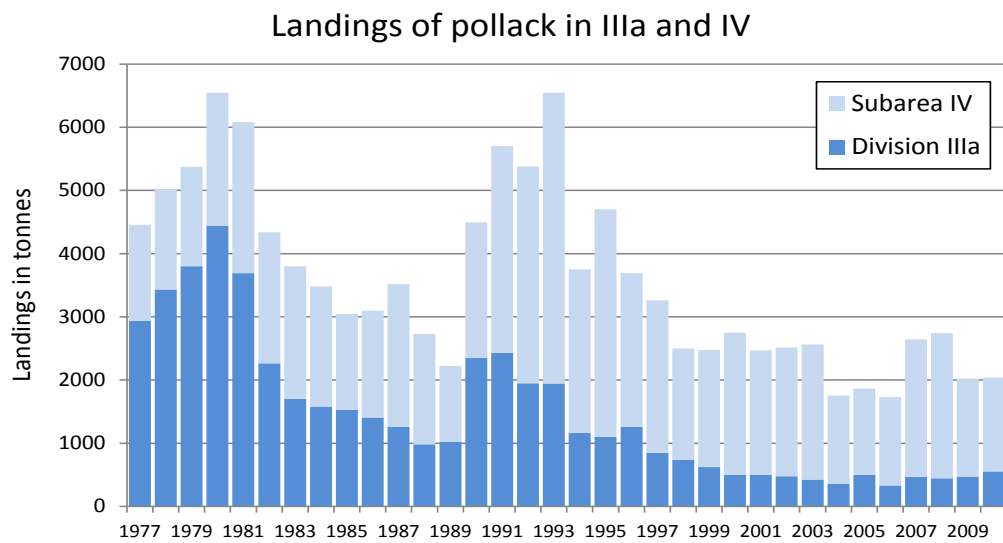


Figure 12.11. Pollack. Total landings of pollack in Division IIIa and Subarea IV as officially reported to ICES.

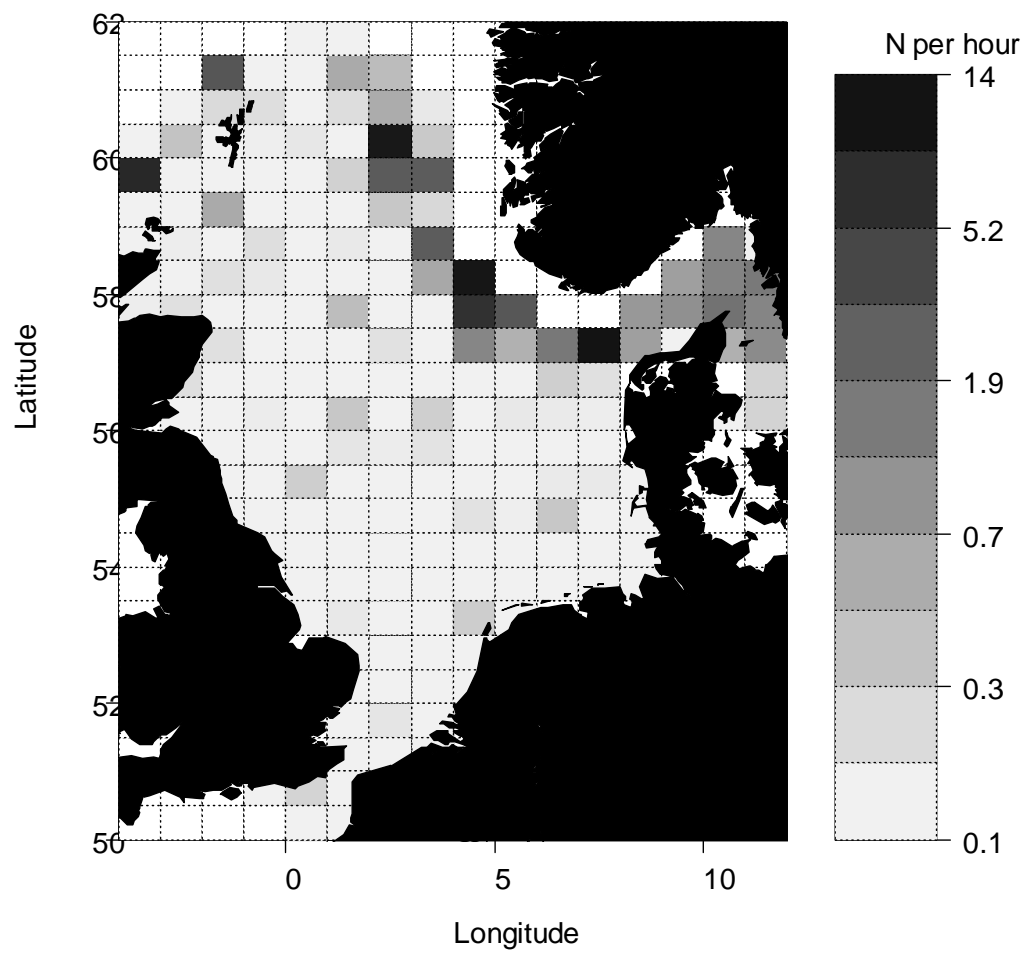


Figure 12.12. Pollack. Distribution of pollack in the North Sea. Abundance shown as N per hour caught in the GOV-trawl, based on all data available in Datras for quarter 1.

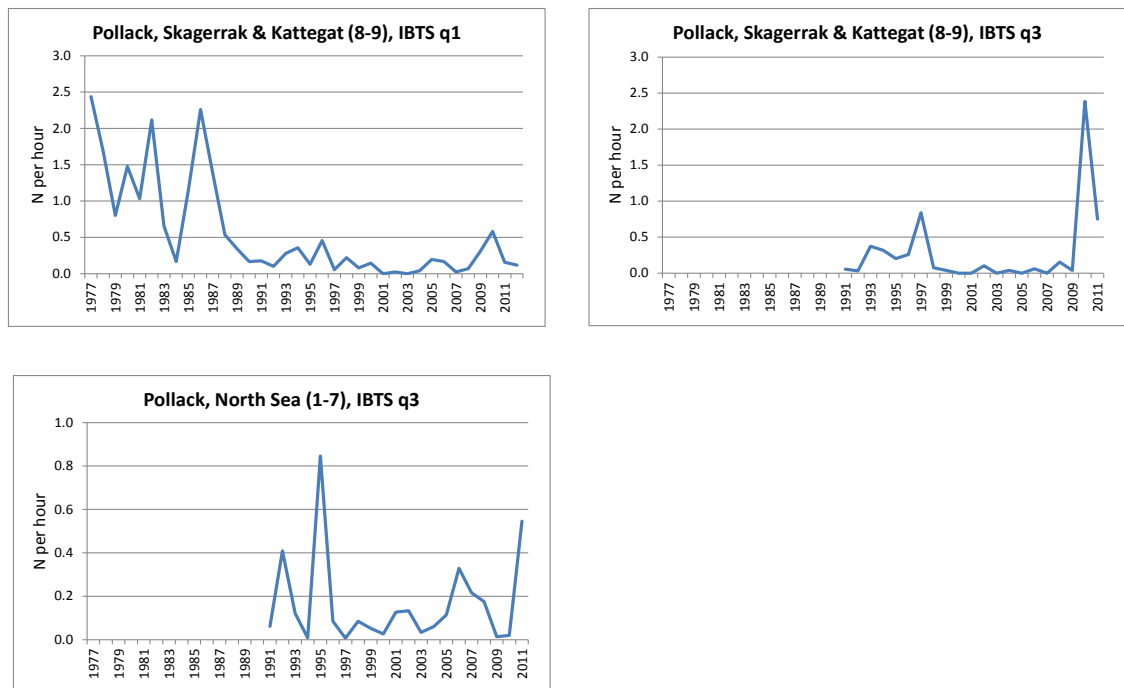


Figure 12.13. Pollack. Time series of abundance of pollack in the IBTS survey in the North Sea (roundfish areas 1–7) and in Skagerrak/Kattegat (roundfish areas 8 and 9), shown as N caught per hour with the GOV-trawl

1. Data from Datras.

Annex 1 – List of participants

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Annex 2 –Working documents

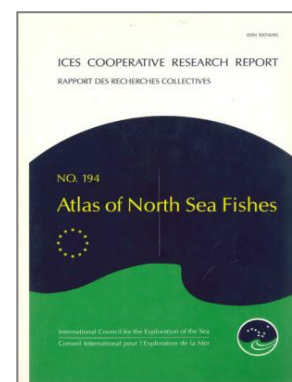
WD 1 Atlas of the marine fishes of the northern European shelf

based on 60 000 hauls made during research vessel surveys

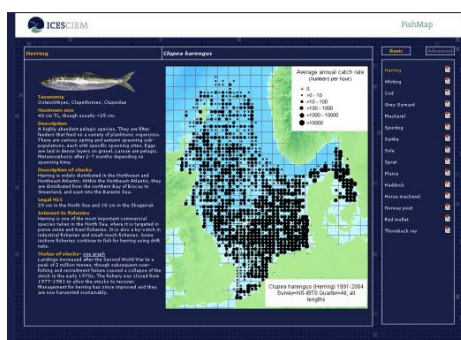
Henk Heessen (IMARES, IJmuiden, NL), Jim Ellis (CEFAS, Lowestoft, UK) and Niels Daan (Dreumel, NL)

History

In 1993, an Atlas of North Sea Fishes was published in a co-operative effort by IMARES (IJmuiden), CEFAS (Lowestoft) and the Marine Laboratory (Aberdeen), based on IBTS data for 1985–1987. Distribution maps were presented for 97 species for summer and winter, and where feasible, for juveniles and adults separately.



Atlas 1: ICES CRR 194



Atlas 2: ICES FishMap website

In 2005 an interactive atlas was launched on the ICES webpage resulting from a co-operative effort between IMARES, CEFAS and the ICES secretariat, funded by the EU (Specific Support Action, contract nr. 513661). Based on North Sea IBTS (GOV-trawl) and BTS (8m beam trawl), the user could make their own distribution maps for 15 species, by selecting years, quarters, age- and size-groups. In addition, the website provided general information on surveys, the North Sea ecosystem and the fish fauna. For each species a pdf could be downloaded with detailed biological information. Unfortunately, the mapping facility is no longer supported, but the detailed information is still available at <http://www.ices.dk/marineworld/ices-fishmap.asp>

Work in Progress

Atlas 3: Atlas of the northern European shelf

Although ICES-FishMap was meant to be the first phase of a much bigger project (covering a broader area and a larger number of species), no further funding was received, and the current authors decided to proceed nevertheless with limited resources by our institutes, and partly in our own time.

Since 1993, lots of data have become available and electronic exchange has become much easier, particularly through the ICES survey database DATRAS. Thanks to DATRAS and the cooperation of many colleagues, we have been able to assemble data over a large area of the northern European shelf running from the Porcupine Bank to the Baltic, and from Brittany to Shetland. The data span a period from 1977 to 2010/2011 and include close to 60,000 hauls.

Surveys included are: IBTS, BITS, BTS, the Norwegian Pandalus Surveys, the French Groundfish Survey, the Spanish Porcupine Bank survey, the Scottish Rockall Survey, etc .

We have analysed data for all species found on the shelf, down to a depth of 200 m, but in order to cover more of their distribution we have included information for hauls in deeper water.

For some 200 species, the distribution maps (cpue for commonly encountered species; presence- absence for rarer species) reveal fascinating patterns (see examples below). Apart from the geographical distribution of these species we will provide graphs for the distribution by depth-zone, length-frequency distributions and time series of abundance. If relevant this information will also be provided by either eco-region (Celtic Sea, North Sea, Baltic Sea) and/or winter and summer. Examples of the outputs of our analyses are given for four species of interest to WGNEW in the second part of this WD.

Each species account will provide details on:

Family name; Scientific name; English name

Lmax; Depth range

Names in: French, German, Dutch, Norwegian, Spanish

Photo (life, dead, or drawing)

Distribution map

General

Taxonomy and identification (incl. recent synonyms) Biogeographical distribution

Trawl survey data

Spatial distribution in the Atlas area

Bathymetric distribution

Size distribution

Time series of relative abundance

Biology

Habitat

Larval distribution Nursery areas Spawning areas

Movements and migration (incl. typical behaviour)

Reproduction

Age and growth (incl. growth curves, longevity) Age/length at maturity (ogives)

Fecundity (and egg stages)
Spawning behaviour, season
Other biological characteristics
Diet
Diseases/parasites
Stock structure
Exploitation

References (per family).

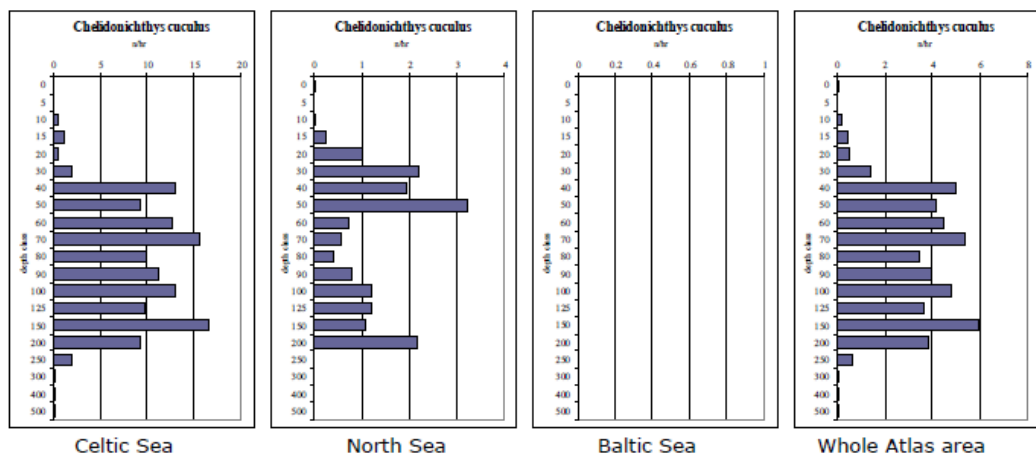
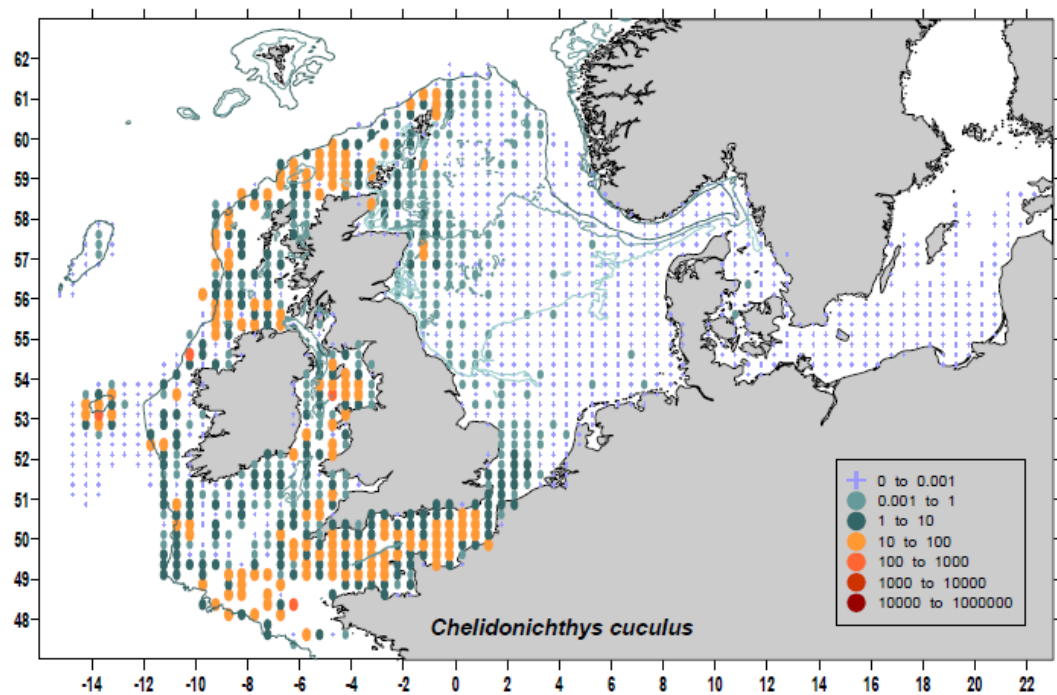
In a number of introductory chapters, background information will be provided on the marine environment, factors influencing the distribution of fishes, fish communities and assemblages, the different research vessel surveys and their methods.

The Atlas will be written for “intelligent laymen”: policy makers, sea-anglers, fishermen, fishery scientists, marine managers, environmental consultants, NGO’s. Our aim is to create a natural history book as well as an atlas. The Atlas will be published in The Netherlands by a combination of 2 publishers (full colour, A4 format, hard-back, ± 500 pages, and also as an e-book). Publication is scheduled for the end of 2013/early 2014. We will soon approach several colleagues with a request to contribute text for a number of accounts. All authors will be clearly named in the Atlas.

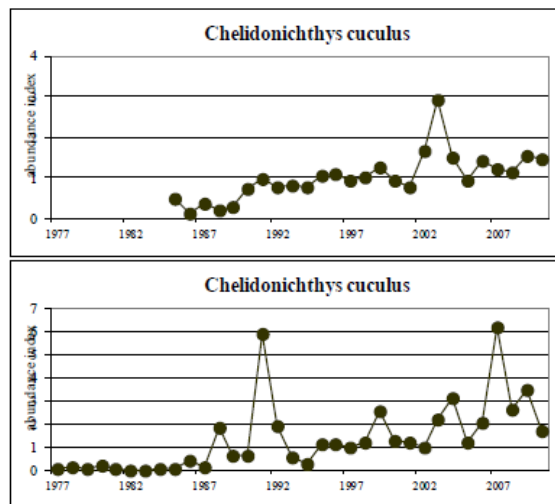
References

Knijn, R.J., T.W. Boon, H.J.L. Heessen and J.R.G. Hislop, 1993. Atlas of North Sea Fishes. ICES Cooperative Research Report. No. 194.

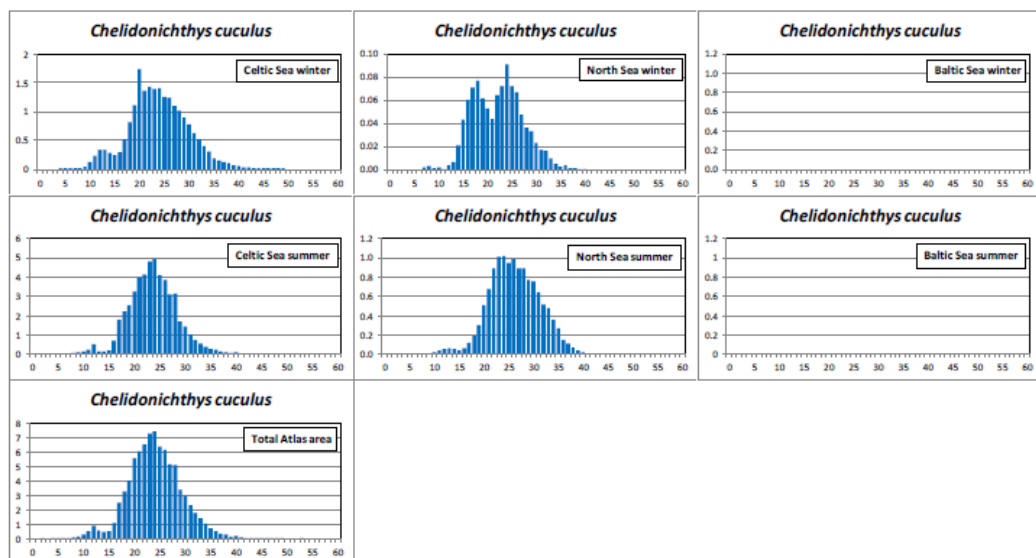
Aspitrigla (*Chelidonichthys*) cuculus, red gurnard, Scorpaeniformes



Bathymetric distribution

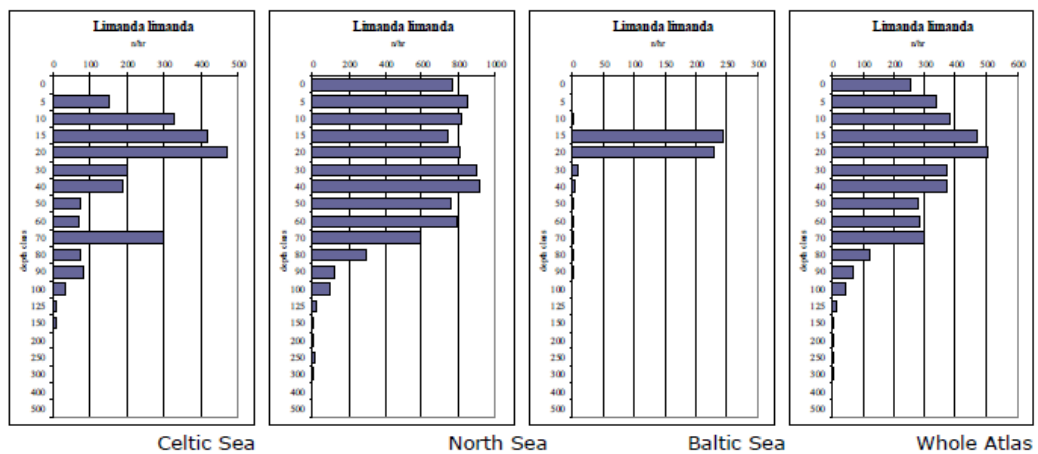
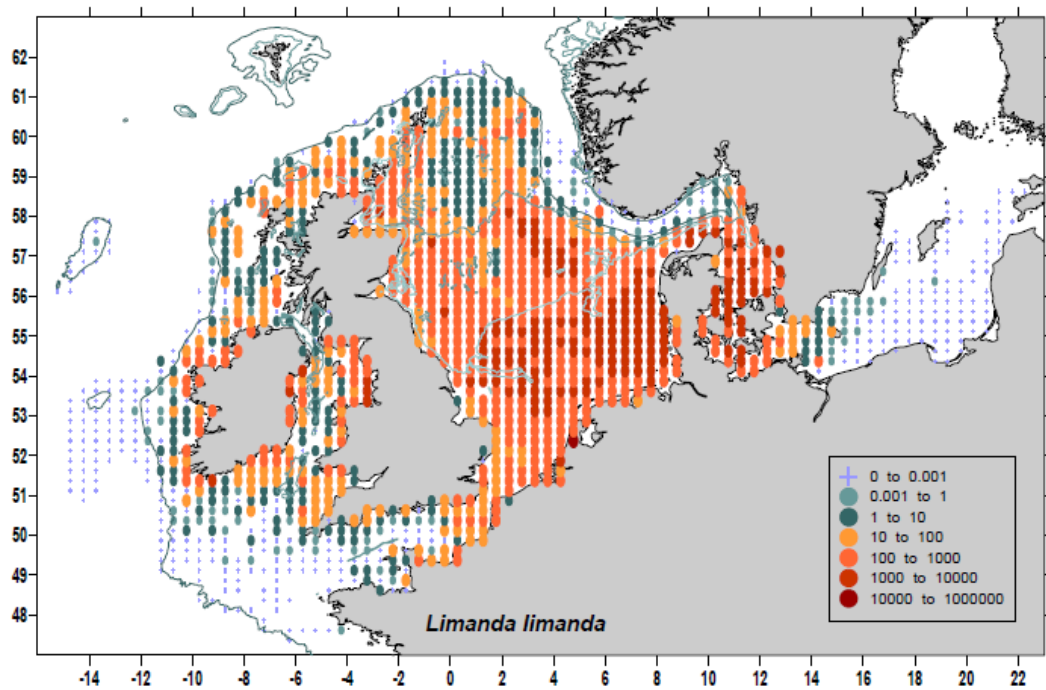


Time series of index of abundance for Celtic Sea (top) and North Sea

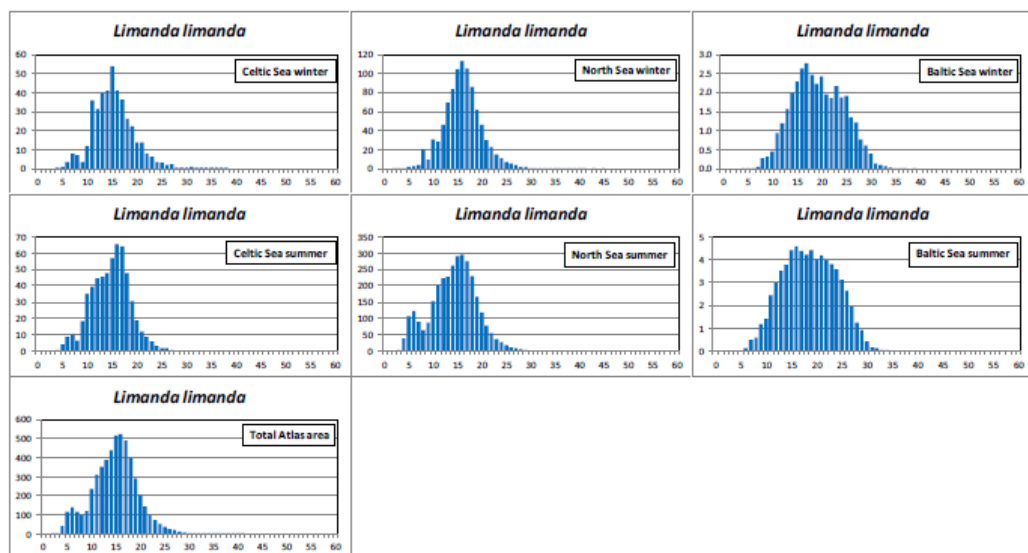
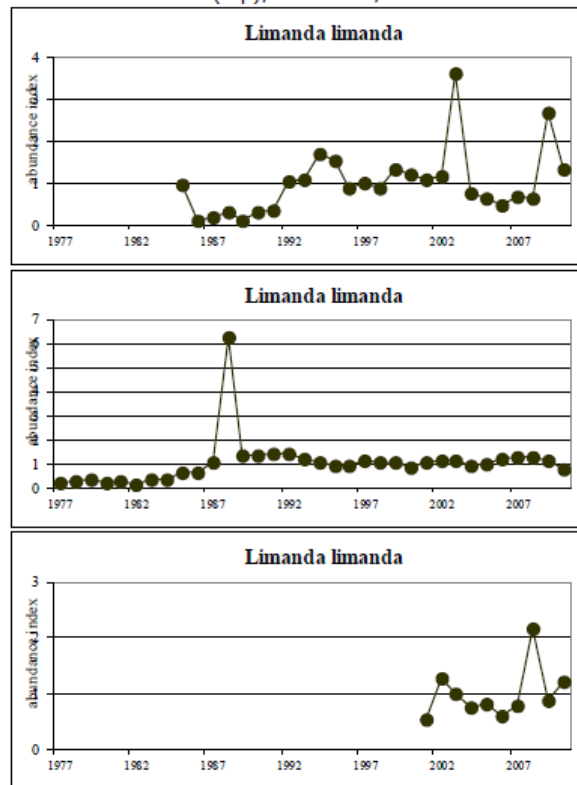


Length frequency distributions

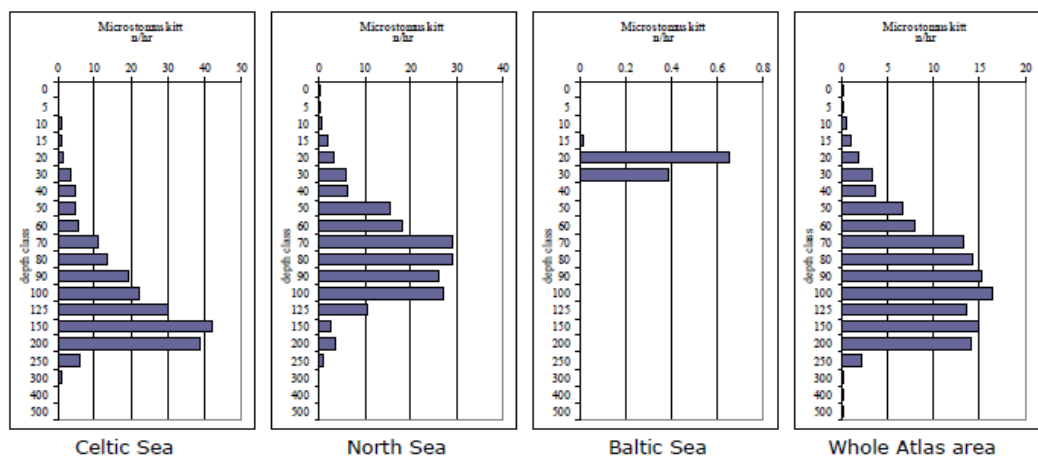
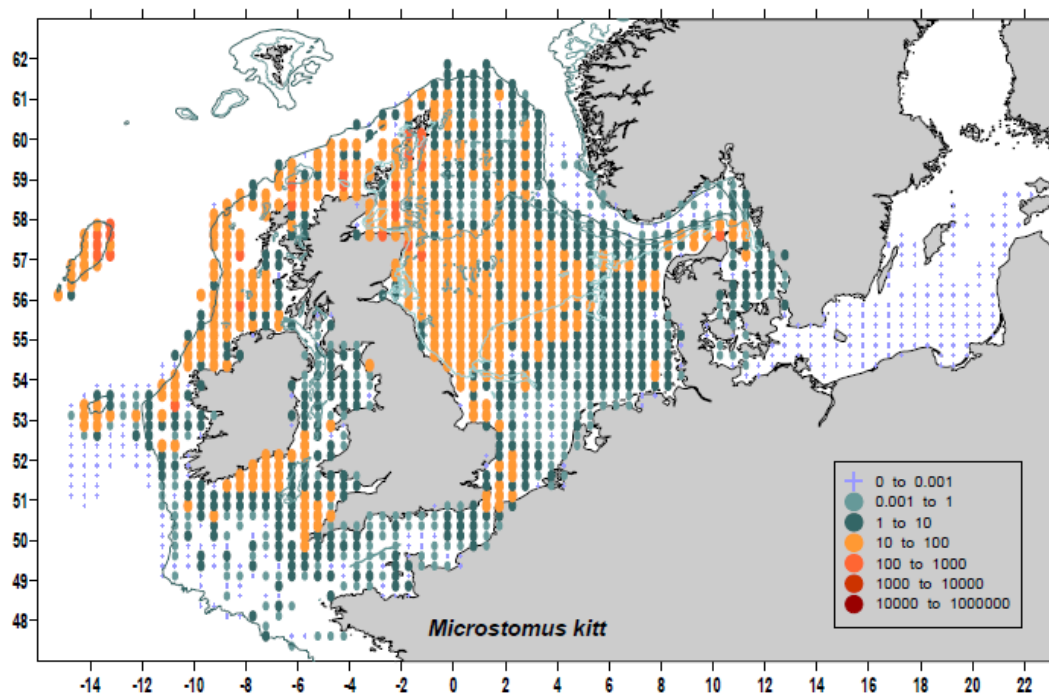
Limanda limanda, dab, Pleuronectiformes



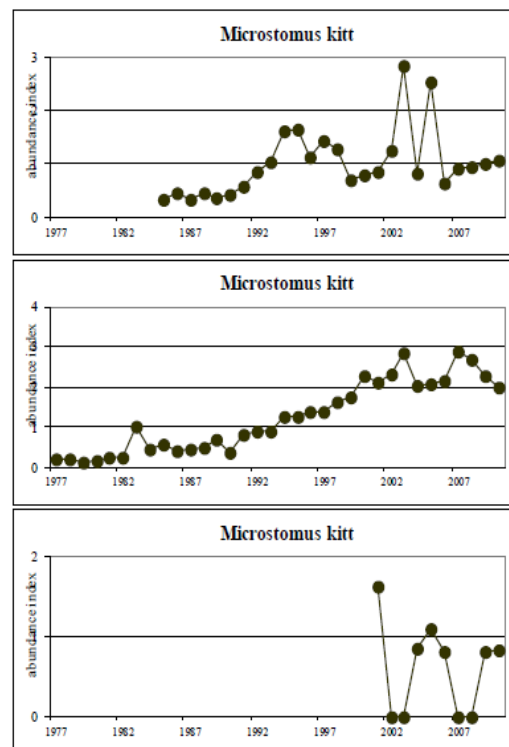
Celtic Sea (top), North Sea, Baltic Sea:



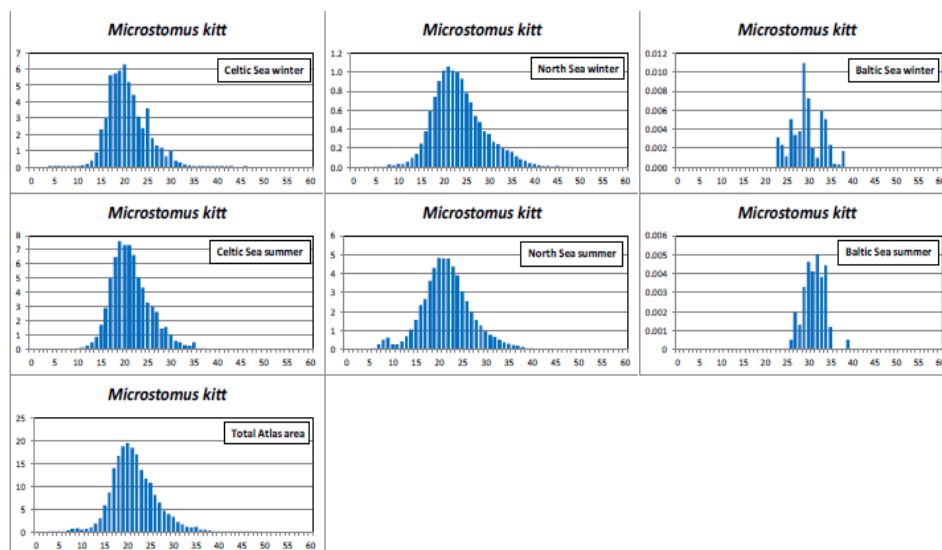
Microstomus kitt, lemon sole, Pleuronectiformes



Bathymetric distribution

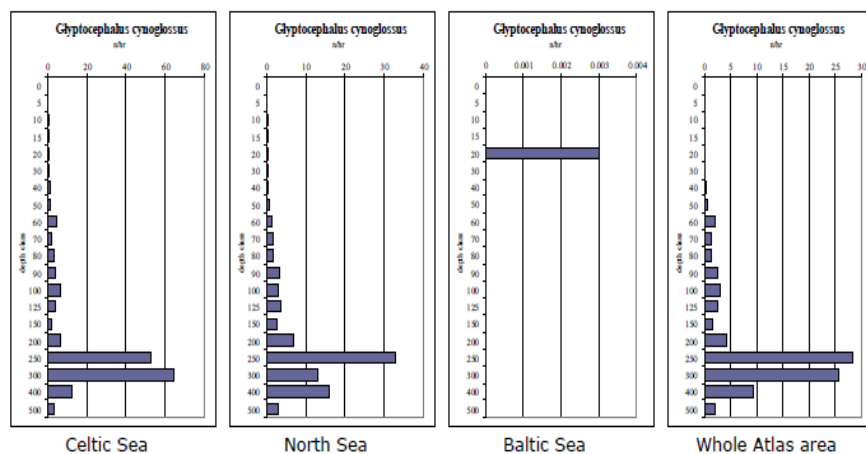
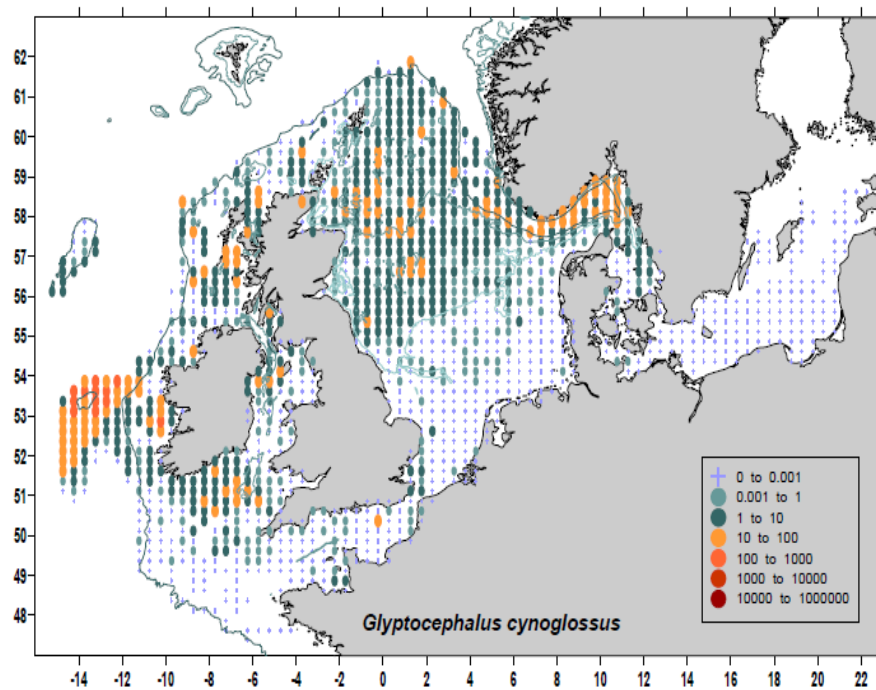


Time series of index of abundance for Celtic Sea (top), North Sea and Baltic Sea

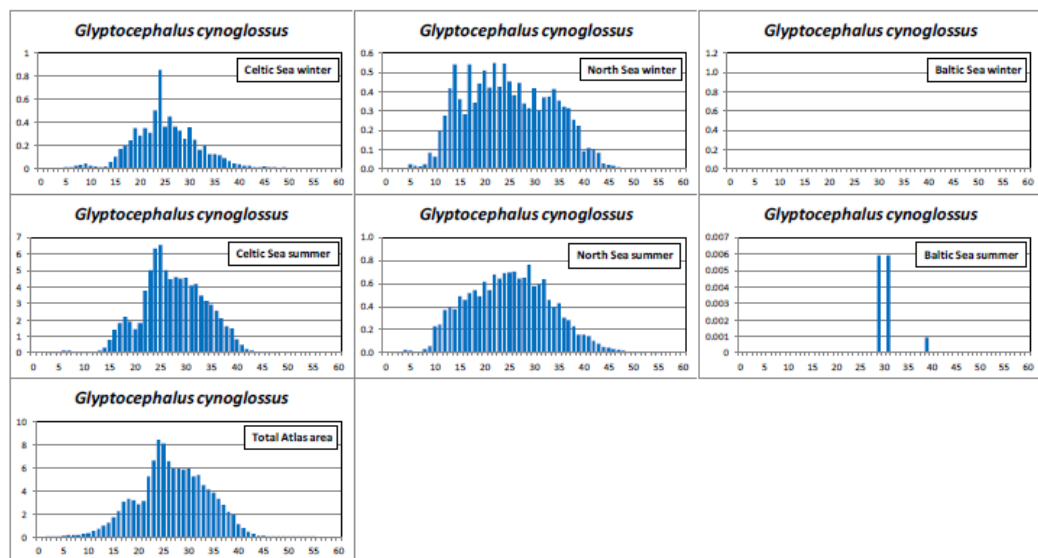
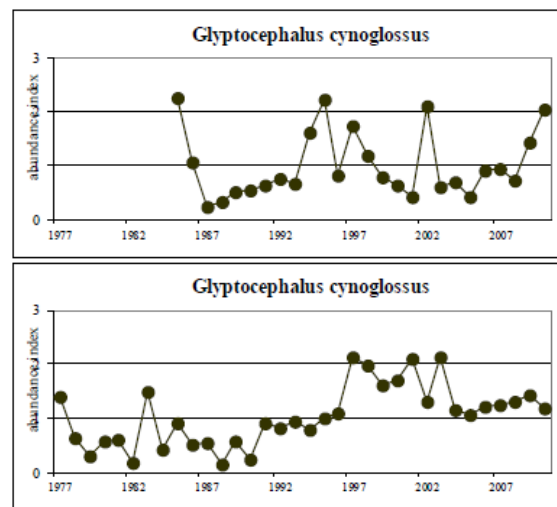


Length frequency distributions

Glyptocephalus cynoglossus, witch, Pleuronectiformes



Bathymetric distribution



WD2 Portuguese discard data on WGNEW 2012 species

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Abstract

We compile the information available on the discards of a set of species (European seabass, *Dicentrarchus labrax*; grey gurnard, *Eutrigla gurnardus*; red gurnard, *Chelidonichthys cuculus*; tub gurnard, *Chelidonichthys lucerna*; John dory, *Zeus faber*; striped red mullet, *Mullus surmuletus*; plaice, *Pleuronectes platessa*; pollack, *Pollachius pollachius*; sole, *Solea solea*; whiting, *Merlangius merlangus*) produced by Portuguese vessels operating with bottom otter trawl fleet (OTB) in the Portuguese reaches of ICES Division IXa. The data was collected by the Portuguese on-board sampling programme (EU DCR/NP) between 2004 and 2011. A description of the on-board sampling programme and details on the estimation algorithms and data quality assurance procedures are presented. Results on species' annual frequency of occurrence, total discard estimates and length composition are provided for two fisheries: the crustacean fishery (OTB_CRU) and the demersal fish fishery (OTB_DEF). Discards of European seabass, plaice, pollack, sole and whiting are null or negligible. The low frequency of occurrence of striped red mullet, grey gurnard, red gurnard, tub gurnard and John dory in discard samples ruled out estimates at fleet level. Preliminary information on discards of other Portuguese fleets operating in this geographical area is also provided.

Introduction

This working document compiles the information available on the discards of European seabass (*Dicentrarchus labrax*), grey gurnard (*Eutrigla gurnardus*), red gurnard (*Chelidonichthys cuculus*), tub gurnard (*Chelidonichthys lucerna*), John dory (*Zeus faber*), striped red mullet (*Mullus surmuletus*), plaice (*Pleuronectes platessa*), Pollack (*Pollachius pollachius*), sole (*Solea solea*), whiting (*Merlangius merlangus*) produced by the Portuguese bottom otter trawl fleet (OTB) operating in the Portuguese reaches of ICES Division IXa. The data was collected by the Portuguese onboard sampling programme (EU DCR/NP) between 2004 and 2011. The document starts with a description of the on-board sampling programme and details of the estimation algorithms and data quality assurance procedures (Section 2). Then, results on species' annual frequency of occurrence in discards, total discard estimates and length composition of discards are presented (Section 3). Finally, preliminary information on discards produced by other Portuguese fleets that operate in this geographical area is provided (Section 4).

On-board sampling and data analysis

The Portuguese on-board sampling program, included in the EU DCR/NP, is based on a quasi-random sampling of cooperative commercial vessels between 12 and 40 meters. The programme started in late 2003 and involves on-board sampling of several fishing métiers. These include, amongst other, bottom otter trawl, deep-water set longlines, gill and trammel nets (of various mesh sizes) and purse seines. From these, the bottom otter trawl fleet (OTB) constitutes the most comprehensively sampled fleet

(but see Section 4). For sampling purposes, the bottom otter trawl fleet is split into two different components: a crustacean fishery (OTB_CRU) that operates cod-end mesh sizes 55–59mm and >70mm and a demersal fish fishery (OTB_DEF) that operates cod-end mesh size 65–69mm. A detailed account of vessel characteristics in these components is found in Castro *et al.* (2007).

Trip selection

The EU DCR/NP (CR (EC) 199/2008; CD 2010/93/EU) establishes fishing trip as the sampling unit to be used by at-sea discard sampling programmes. The Portuguese onboard sampling programme targeting the bottom otter trawl fleet is based on a quasi-random sampling of trips from a set of cooperative vessels known to operate in each fishery. Annual sampling targets are fixed for each fishery, namely 12 trips in the OTB_CRU fishery and 27 trips in the OTB_DEF fishery. Sampling levels attained in the 2004–2011 period are presented in Table 1. In most years sampling attained or surpassed the annual sampling targets in both fisheries. The procedures used to collect data onboard and raise discard data from samples to annual fleet discards produced by each fishery have been previously described in Fernandes *et al.* (2010) and Prista *et al.* (2011), amongst other. A brief account follows.

Table 1: Discard sampling levels of the Portuguese on-board sampling programme per fishery (2004–2011).

| Year | Trips | | Sampling levels | | Hours fished | |
|------|---------|---------|-----------------|---------|--------------|---------|
| | OTB_CRU | OTB_DEF | Hauls | | OTB_CRU | OTB_DEF |
| | | | OTB_CRU | OTB_DEF | | |
| 2004 | 17 | 24 | 111 | 125 | 479 | 315 |
| 2005 | 15 | 39 | 74 | 159 | 372 | 349 |
| 2006 | 7 | 42 | 30 | 194 | 133 | 376 |
| 2007 | 12 | 38 | 73 | 162 | 260 | 287 |
| 2008 | 12 | 34 | 66 | 128 | 267 | 250 |
| 2009 | 16 | 38 | 84 | 135 | 299 | 264 |
| 2010 | 16 | 31 | 103 | 116 | 372 | 192 |
| 2011 | 13 | 30 | 56 | 83 | 217 | 161 |

Catch sampling

The sampling protocols used in Portuguese onboard sampling of the OTB fisheries are detailed in Prista *et al.* (2011). Briefly, two observers are deployed in each trip and on each selected haul they take a sample from catch, sort the specimens into retained and discarded fraction and register the weight and length composition of each species fraction. Concurrently, observers also collect fishing effort information (hours fished) and register environmental information (GPS coordinates, depth, bottom type, etc.). The sampling protocol suffered only minor changes and adaptations between 2004 and 2010. In 2011 the size of samples was increased from 1 to 2 boxes (of catch) and the number of hauls sampled in each trip was standardized to “at least, every other haul”.

Estimates of discards (haul level)

Total volume discarded (in kg) in each haul is estimated by multiplying the ratio of discard and retained sample weights (all species combined) by the total retained weight in the haul (all species combined). The volume of discards for each species in the sample (e.g., sole) is calculated a posteriori based on the proportion of discarded species in the sample and the total catch estimate calculated for each haul.

Estimates of discards (fleet level)

The procedure generally used to raise discards from haul to fleet level in the Portuguese trawl fisheries is adapted from Fernandes *et al.* (2010) (Jardim and Fernandes, in prep.). Using this procedure, species with low frequency of occurrence or abundance in discards (i.e., a large number of 0s in the dataset) cannot be reliably estimated at fleet level (Jardim *et al.*, 2011). The frequency of occurrence and abundance of WGNEW 2012 species in the discards of the Portuguese bottom trawl fleet was below the 30% (see Section 3.1., 3.2). Consequently, annual discard volumes and length frequencies at fleet level were not estimated.

Quality assurance procedures

The Portuguese onboard database is programmed in Oracle and contains internal routines for the detection of basic errors (e.g., errors in dates). The database contains general trip information (vessel information, date, location, haul number, retained weight by species), along with sample information by fraction (retained, discarded) and species, namely weight, number of specimens and length composition. Quality checks involving the manual checking of (at least) 10% of annual trawl records have been routinely carried out since the beginning of the onboard sampling programme. In 2010–2011 a semi-automated R quality assurance procedure was designed and the entire trawl database was checked for additional undetected errors. Minor updates and data reviews have been performed since then. The data used in the current estimates was extracted from the database in 29/02/2012.

Species discards

Frequency of occurrence

The annual frequency of occurrence of WGNEW 2012 species discards in the sampled hauls was low ranging between 0% and 4% in OTB_CRU and between 0% and 23% in OTB_DEF. European seabass, plaice and pollack were never recorded. Whiting, sole and striped red mullet were also very rare in samples. Complete data on the frequency of occurrence of these species in discards are displayed in Table 2 and Table 3.

Table 2: Frequency of occurrence (%) of species in the discards of hauls sampled in the OTB_CRU fishery (2004–2011). BSS = European seabass; GUG = grey gurnard; GUR = red gurnard; GUU = tub gurnard; JOD = John dory; MUR = striped red mullet; PLE = plaice; POL = pollack; SOL = sole; WHG = whiting; “–” = no occurrence

| Year | BSS | GUG | GUR | GUU | JOD | MUR | PLE | POL | SOL | WHG |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 2004 | – | – | – | – | – | – | – | – | – | – |
| 2005 | – | – | – | – | – | – | – | – | – | – |
| 2006 | – | – | – | 3 | – | – | – | – | – | – |
| 2007 | – | – | – | – | – | – | – | – | – | – |
| 2008 | – | – | – | – | – | – | – | – | – | – |
| 2009 | – | – | – | – | – | – | – | – | – | – |
| 2010 | – | – | – | – | – | 4 | – | – | – | – |
| 2011 | – | – | – | – | 2 | 4 | – | – | – | – |

Table 3: Frequency of occurrence (%) of species in the discards of hauls sampled in the OTB_DEF fishery (2004–2011). BSS = European seabass; GUG = grey gurnard; GUR = red gurnard; GUU = tub gurnard; JOD = John dory; MUR = striped red mullet; PLE = plaice; POL = pollack; SOL = sole; WHG = whiting; “–” = no occurrence

| Year | BSS | GUG | GUR | GUU | JOD | MUR | PLE | POL | SOL | WHG |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 2004 | – | – | 23 | 2 | 10 | – | – | – | – | – |
| 2005 | – | 1 | 12 | 1 | 8 | – | – | – | 1 | – |
| 2006 | – | – | 5 | 6 | 2 | – | – | – | – | – |
| 2007 | – | 1 | 2 | 2 | – | 1 | – | – | – | 1 |
| 2008 | – | 2 | 8 | 7 | 6 | – | – | – | – | – |
| 2009 | – | 3 | 5 | 2 | 8 | – | – | – | – | – |
| 2010 | – | 1 | 5 | 3 | 5 | 1 | – | – | – | – |
| 2011 | – | – | 8 | 7 | 8 | 1 | – | – | – | – |

Total volume of discards

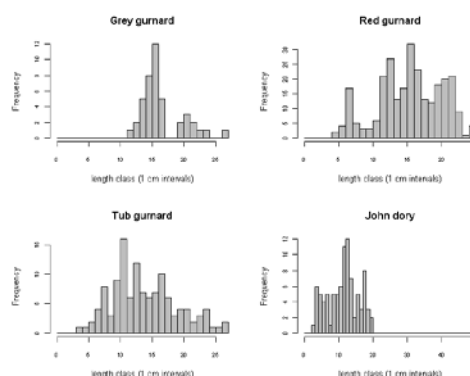
To accurately estimate the discard volume of rare species (i.e., species with low abundance and low frequency of occurrence in the sampled hauls) a large number of observations are generally required. European seabass, plaice, pollack were never recorded in discard samples (Table 2 and 3) so their discard volume may be assumed negligible. Whiting, sole and striped red mullet were also rare in the discard samples and when present were found in low numbers and weight. In fact, in the more than 1500 hauls sampled in 2004–2011 period (> 20 tonnes total sample weight; > 10 tonnes total discard sample weight), only $n=1$ whittings (total weight: 0.04 kg), $n=3$ soles (total weight: 0.12 kg) and $n=11$ red mullets (total weight: 1.6 kg) were sampled in trawl discards. In what concerns grey gurnard, red gurnard, tub gurnard and John dory these species were present in slightly larger numbers (2004–2011 total: 43–271 specimens) but were also below 30% occurrence in the sampled hauls. Because the current estimation algorithm is thought sensitive to the large number of 0s in the dataset (Jardim *et al.*, 2011), discard estimates obtained in these species were considered unreliable and are not presented (trial runs of the algorithm provided fishery level CVs ranging 46–90% in striped red mullet, 50–119% in grey gurnard, 18–60% in red gurnard, 35–92% in tub gurnard, and 48–73% in John dory).

Length composition of discards

European seabass, plaice, pollack were never recorded in discard samples. Length data on whiting, sole and striped red mullet discards is given in Annex. In what concerns striped red mullet (the most abundant of the latter species), average length of discarded fish was 17.0 cm (SD = 3.9 cm, $n=4$) in OTB_DEF and 23.1 cm (SD = 3.0 cm, $n=7$) in OTB_CRU. The length frequencies of grey gurnard, red gurnard, tub gurnard and John dory in the discards sampled from the OTB_DEF fishery are given in Figure 1). In the OTB_DEF fishery, the average length of grey gurnard was 16.9 cm (SD = 3.3 cm, $n=43$), the average length of red gurnard was 15.8 cm (SD = 4.7 cm, $n=271$), the average length of tub gurnard was 14.4 cm (SD = 5.2 cm, $n=124$) and the average

length of John dory was 12.2 (SD = 6.0 cm, n=92). In the OTB_CRU _shery, no grey gurnards or red gurnards were ever recorded and only one tub gurnard and three John dory were measured (average total length: 22 cm and 14 cm, respectively; complete data in annex). Given the low sample size and the uncertainty in total discard estimates at annual level (section 3.2) estimates of length composition of discards at fleet level were not computed.

Figure 1: Length frequencies (in number) of grey gurnard, red gurnard, tub gurnard and John dory specimens sampled in the discards of the OTB_DEF fishery (2004-2011).



Discards from other fleets

The Portuguese on-board sampling program also includes the regular sampling of other fisheries that may target (or may potentially by-catch) the set o WGNEW 2012 species. These include vessels operating deepwater longlines targeting black scabbardfish (acronym: LLS_DWS; sampled from late 2005 onwards, sampling goals set at 12 trips per year) and multi-gear vessels using, amongst other, gill nets and trammel nets of various mesh sizes to target a variety of demersal species (acronym: GNS_DEF and GTR_DEF; sampled from late 2009 onwards, sampling goals set at 24 trips per year). The sampling methodologies used in these _sheries were only standardized (Prista and Jardim, 2011). To date no fleet level estimates have been performed. However, sample data indicates that in the 2005–2010 period, none of these species was registered in LLS_DWS trips. In what concerns the GNS_DEF and GTR_DEF _sheries, discards of WGNEW species are likely higher since some vessels have already been observed to target sole and John dory that present signi_cant by-catch of gurnards. Due to uncertainties in the accuracy of the spatio-temporal distribution of the sampling effort and difulties in raising data from multi-metier fishing trips to fleet level, estimates of discards on these fisheries have not been computed and will be provided in future Working Documents.

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Annex

Lengths of whiting (WHG), sole (SOL) and striped red mullet (MUR) sampled in the discards of the OTB_CRU and OTB_DEF fisheries (2004-2011)

| Species | Fishery | Year | Quarter | Size Class (cm) | No. |
|---------|---------|------|---------|-----------------|-----|
| WHG | OTB_DEF | 2007 | Q2 | 19 | 1 |
| SOL | OTB_DEF | 2005 | Q3 | 17 | 1 |
| SOL | OTB_DEF | 2005 | Q4 | 10 | 1 |
| SOL | OTB_DEF | 2005 | Q4 | 12 | 1 |
| MUR | OTB_CRU | 2010 | Q1 | 25 | 1 |
| MUR | OTB_CRU | 2010 | Q1 | 28 | 1 |
| MUR | OTB_CRU | 2010 | Q2 | 21 | 1 |
| MUR | OTB_CRU | 2010 | Q4 | 24 | 1 |
| MUR | OTB_CRU | 2011 | Q3 | 24 | 1 |
| MUR | OTB_CRU | 2011 | Q4 | 20 | 2 |
| MUR | OTB_DEF | 2007 | Q2 | 19 | 1 |
| MUR | OTB_DEF | 2007 | Q2 | 21 | 1 |
| MUR | OTB_DEF | 2010 | Q1 | 16 | 1 |
| MUR | OTB_DEF | 2011 | Q4 | 12 | 1 |

Lengths of tub gurnard (GUU) and John dory (JOD) sampled in the discards of the OTB_CRU fisheries (2004-2011)

| Species | Fishery | Year | Quarter | Size Class (cm) | No. |
|---------|---------|------|---------|-----------------|-----|
| GUU | OTB_CRU | 2006 | Q4 | 22 | 1 |
| JOD | OTB_CRU | 2011 | Q2 | 13 | 1 |
| JOD | OTB_CRU | 2011 | Q2 | 14 | 1 |
| JOD | OTB_CRU | 2011 | Q2 | 15 | 1 |