ICES WGNEW REPORT 2014

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

24–28 March 2014

Copenhagen, Denmark

ICES International Council for the Exploration of the Sea

CIEM Conseil International pour l'Exploration de la Mer

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Executive Summary

The ICES Working Group on Assessment of New MoU Species met at ICES Headquarters in Copenhagen, Denmark, during 24–28 March 2014. There were five participants from four countries. The main task of WGNEW is to provide information on the new species and stocks of the MoU between ICES and the EC: Each year, different stocks are being dealt with, including but not limited to sea bass, striped red mullet, red gurnard, tub gurnard, grey gurnard, turbot, brill, dab, flounder, lemon sole, witch flounder, pollack and John dory. For most stocks, this information includes total international landings and research vessel survey data that are indicative of abundance trends.

Only five experts attended WGNEW 2014 and the working group recommends moving all stocks in WGNEW to regional expert groups. This ensures regional expertise being available in the evaluation of stock trends for all new MoU species.

This year, WGNEW collated information on the following stocks:

Striped red mullet (*Mullus surmuletus*) in Subareas and Divisions VI, VIIa–c, e–k, VIII, and IXa: The majority of the landings are by France. Time-series from market sampling are still short. The available surveys have a very high interannual variation and mainly catch juvenile fish.

For the gurnard species time-series of abundance and length compositions from surveys are available. The quality of landings data is poor since the species have usually not been well separated when landed.

Red gurnard (*Aspitrigla cuculus*): The species is mainly found in the Channel and on the shelf west of Brittany. The IBTS abundance index shows a strong upward trend, while the other surveys (in the main distribution area) are relatively stable.

Grey gurnard (*Eutrigla gurnardus*) in Subarea IV and Divisions VIId and IIIa: The species is widely distributed in the North Sea. Both in the North Sea and in Skagerrak-Kattegat abundance increases since the late 1980s as can be seen from the NS-IBTS survey index.

Grey Gurnard (*Eutrigla gurnardus*) in the Celtic Seas and West of Scotland (ICES Subareas VI and VII; excl. VIId): There is limited survey information for this widely distributed stock. The EVHOE survey in the western part of Subarea VII is stable to increasing, with high interannual variation.

Pollack (*Pollachius pollachius*): Pollack is mainly a bycatch in various fisheries. For several areas, these landing estimates are clearly incomplete and erratic. WGNEW uses 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). 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 and Terms of Reference of WGNEW

1.1 Terms of Reference

2013/2/ACOM21 The **Working Group on Assessment of New MoU Species** (WGNEW), chaired by Jan Jaap Poos, The Netherlands will meet in Copenhagen, Denmark 24–28 March 2014 to:

a) Address generic ToRs for Regional and Species Working Groups for the stocks in the table below. For stocks for which Advice should be drafted, the assessment and draft advice should be available to the respective ecoregion assessment expert group, for further improvements to the fisheries and ecosystem sections.

b) For stocks without an advice request, development on stock identity and data compilation should be undertaken as far as possible.

c) For gurnard stocks the overall distribution between catch and survey information on the species needs to be presented and indications on the way advice can be given for this conglomerate of species are welcomed.

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

WGNEW will report by 10 April 2014 to ACOM and SSGSUE, and relevant ecoregion assessment working groups.

Fish Stock	Stock name	Stock Coord.	Assess. Coord.	Advice needs	Advice
Sol-8c9a	Sole in Divisions VIIIc and IXa	PT		Data needed from all countries	Update
Pol-89a	Pollack in Subarea VIII and Division IXa	BEL/NL		Data needed	Update
Pol-celt	Pollack in Subareas VI and VII	BEL		Data needed	Update
Pol-nsea	Pollack in Subarea IV and Division IIIa	NL		Data needed	Update
gur-comb	Red gurnard in the Northeast Atlantic	FR		Data needed for combined gurnard to see what advice options are possible	Update
gug-347d	Grey gurnard in Subarea IV (North Sea) and Divisions VIId (Eastern Channel) and IIIa (Skagerrak - Kattegat)	DE			Update
gug-celt	Grey gurnard in Subarea VI and Divisions VIIa–c and e–k (Celtic Sea and West of Scotland)	BEL			Update
Guu-comb	Tub gurnard in the Northeast Atlantic	-			Not required
mur-west	Striped red mullet in Subarea VI, VIII and Divisions VIIa–c, e–k and IXa (Western area)	NL		Data needed	Update

The generic ToRs applying to assessment Expert Groups were the following:

The working group should focus on:

For the ecoregion

a) Consider ecosystem overviews where available, and propose and possibly implement incorporation of ecosystem drivers in the basis for advice

b) For the ecoregion or fisheries considered by the working group, produce a brief report summarizing for the stocks and fisheries where the item is relevant:

  i) Mixed fisheries overview and considerations;

  ii) Species interaction effects and ecosystem drivers;

  iii) Ecosystem effects of fisheries;

  iv) Effects of regulatory changes on the assessment or projections;

For all stocks

c) If no stock annex is available this should be prepared prior to the meeting, based on the previous year's assessment and forecast method used for the advice, including analytical and data-limited methods.

d) Audit the assessments and forecasts carried out for each stock under consideration by the Working Group and write a short report.

e) Propose specific actions to be taken to improve the quality and transmission of the data (including improvements in data collection).

f) Propose indicators of stock size (or of changes in stock size) that could be used to decide when an update assessment is required and suggest threshold % (or absolute) changes that the EG thinks should trigger an update assessment on a stock by stock basis.

g) Prepare planning for benchmarks next year, and put forward proposals for benchmarks of integrated ecosystem, multi or single species for 2016.

h) Check the existing static parts of the popular advice and update as required.

i) In autumn, where appropriate, check for the need to reopen the advice based on the summer survey information and the guidelines in AGCREFA (2008 report). The relevant groups will report on the AGCREFA 2008 procedure on reopening of the advice before 13 October and will report on reopened advice before 29 October.

j) Take into account new guidance on giving catch advice (ACOM, December 2013).

k) Update, quality check and report relevant data for the stock:

  i) Load fisheries data on effort and catches (landings, discards, bycatch, including estimates of misreporting when appropriate) in the InterCatch database by fisheries/fleets, either directly or, when relevant, through the regional database. Data should be provided to the data coordinators at deadlines specified in the ToRs of the individual groups. Data submitted after the deadlines can be incorporated in the assessments at the discretion of the Expert Group chair;

  ii) Abundance survey results;

iii) Environmental drivers.

l) Produce an overview of the sampling activities on a national basis based on the InterCatch database or, where relevant, the regional database.

For update advice stocks

m) Produce a first draft of the advice on the fish stocks and fisheries under considerations according to ACOM guidelines and implementing the generic introduction to the ICES advice (Section 1.2). If no change in the advice is needed, one page 'same advice as last year' should be drafted.

n) For each stock , when possible prior to the meeting:

i) Update the assessment using the method (analytical, forecast or trends indicators) as described in the stock annex.

ii) Produce a brief report of the work carried out regarding the stock, summarizing for the stocks and fisheries where the item is relevant:

1) Input data (including information from the fishing industry and NGO that is pertinent to the assessments and projections);

2) Where misreporting of catches is significant, provide qualitative and where possible quantitative information and describe the methods used to obtain the information;

3) Stock status and catch options for next year;

4) Historical performance of the assessment and brief description of quality issues with the assessment;

5) In cooperation with the Secretariat, update the description of major regulatory changes (technical measures, TACs, effort control and management plans) and comment on the potential effects of such changes including the effects of newly agreed management and recovery plans. Describe the fleets that are involved in the fishery.

o) Review the outcomes of WKMSRREF2 for the specific stocks of the EG. Calculate reference points for stocks where the information exists but the calculations have not been done yet and resolve inconsistencies between MSY and precautionary reference points and if possible.

For stocks with multiyear advice or biennial (2nd year) advice

In principle, there is no reason to update this advice. The advice should be drafted as a one page version referring to earlier advice. If a change in the advice (basis) is considered to be needed, this should be agreed by the working group on the first meeting day and communicated to the ACOM leadership. Agreement by the ACOM leadership will revert the stock to an update procedure.

1.2 Background

ToR a) is discussed in the individual chapters on the stocks in the report. However, guu-comb (tub gurnard) was not dealt with because of time constraints. The other stocks are discussed in the subsequent chapters. Note that the pollack stocks are combined in a single chapter.

The working group reviewed 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. The resulting perception of the status of the stocks did not change substantially and WGNEW proposed to keep the same advice as last year for all stocks.

During the working group, the means of dealing with the stock advice for "WGNEW stocks" was discussed. Over the last few years, WGNEW has had problems with attendance. This year, no experts from the UK or France attended the meeting, while the main fisheries for several stocks are in these countries. Moving the wgnew stocks to regional working groups would ensure that regional expertise is available for evaluating the status of the stocks. We suggest moving all WGNEW stocks to regional working groups and to discontinue WGNEW. This is our recommendation to ACOM.

Finally, the working group has a few other recommendations: we recommend taking better care at the ICES secretariat of storing the official landings data. Currently, this information is stored in several files. The information in the files is inconsistent, and the structure and identifiers differs among files. A single file that is quality assured would improve the advice given by ICES.

The recommendation is summarized in Section 1.5 and filed on the ICES SharePoint.

1.3 Participants

The following persons attended the meeting:

Maria de Fátima Borges	Portugal
Kelle Moreau	Belgium
Holger Haslob	Germany
Aukje Coers	Netherlands
Jan Jaap Poos (chair)	Netherlands

1.4 Recommendations

WHAT	ON	FOR
Move all stocks from WGNEW to regional WGs	WGNEW struggles with attendance from experts. As a result information on stocks has to be interpreted by WG members who are unknown with important regional fisheries for several stocks. The same holds for survey information. In addition, the early timing of the working group has proven to make it difficult for countries to provide data as required by its data call. Hence, we recommend ceasing WGNEW, and moving all stocks to existing regional WGs. This will have the benefit of expertise being available at the WG, and of having a data call for the relevant information later in the year. We realize this puts pressure on the regional groups. Attendance for regional groups should be expanded to accommodate the increased workload.	ACOM
DCF funding for working group attendance	Given that WGNEW suggests moving all new stocks in the MoU with the EC to regional WGs, we expect an increasing number of experts per country to be needed. This needs to be accommodated for in the DCF. ACOM is requested to communicate the need for an increased number of experts per regional WG to its clients.	ACOM

What	On	For
Search function on the ICES website	WGNEW Members would like to be able to search for CM number documents on the website. So by inserting year and number the requested document would pop up.	ICES secretariat
Official catch statistics data files	There are three datasets with catch statistics available on the ICES website: http://www.ices.dk/marine-data/dataset-collections/Pages/Fish-catch-and-stock-assessment.aspx The different datasets cover different time periods, and differ in set up. a) It is unclear why there is a big difference in the overlapping datasets (compare solea solea/SOL/Common sole in area IX between the 1950–2010 and the 1985–2010 dataset. These differences should be checked and resolved where possible. b) It would be very helpful if one merged dataset could be set up to facilitate data mining. c) At least, the files should have consistent structure and consistent labeling of areas, countries, and species.	ICES Datacentre
Recreational catch data on pollack catches	Considering that catches of pollack by recreational fisheries may be substantial, data are required on the quantities of those catches. This relevant to Pollack in all areas.	WGRFS

1.5 Data issues

The table below lists the data issues that were encountered during the working group:

Stock	Data Problem	How to be addressed in	By who [1]
gug-nsea	Landing data	Officially reported landings are still a mix of species (gux, sra, guy). Grey gurnard should be reported as grey gurnard (gug).	DEN, NED, BEL , FRA, UK, GER
	Biological data	Area specific data on life-history parameters should be collected in surveys and through commercial sampling	DEN, NED, BEL , FRA, UK, GER
	Discards	Discard rates for this species substantial, but discard weights unavailable.	NED, BEL, FRA, UK, GER
Pol-nsea	Recreational catches	Recreational catches may be substantial but unknown	DEN, NO, SE, GER, UK
Pol-celt	Recreational catches	Recreational catches may be substantial but unknown	FR, IE, UK
	Biological data	Area specific data on life-history parameters should be collected in surveys and through commercial sampling	FR, UK, IE
gur-comb	Landing data	Officially reported landings are still a mix of species (gux, sra, guy). Red gurnard should be reported as grey gurnard (gur).	ALL

[1] Recommendations on surveys for be addressed by the SCICOM Steering Group on Ecosystem Surveys, Science and Technology (SSGESST).

Stock	Data Problem	How to be addressed in	By who [1]
Gug-celt	Landing data	Officially reported landings are still a mix of species (gux, sra, guy). Grey gurnard should be reported as grey gurnard (gug).	UK, FR, RU, BE
	Biological data	Area specific data on life-history parameters should be collected in surveys and through commercial sampling	UK, FR, RU, BE
	Discards	Discard rates substantial, but discard weights unavailable (also not requested in data call 2014).	UK, FR, RU, BE
sol-8c9a	All of the above	Virtually no data are available, only Portuguese landings were presented to WGNEW 2014.	ESP, POR

2 Red gurnard

2.1 General biology

The main biological features known for red gurnard (*Aspitrigla (Chelidonichthys) cuculus*) are described in the stock annex. This species is widely distributed in the 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 (Dorel, 1986).

2.2 Stock identity and possible assessments areas

A compilation of datasets from bottom-trawl 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 2.1). 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 continuous distribution of fish crossing the Channel and the area West of Brittany does not suggest a separation of the Divisions VIId from VIIe and VIIh. Therefore a split of the population between the Ecoregions does not seem appropriate. Further investigations are needed to progress on stocks boundaries such as morphometric studies, tagging and genetic population studies.

2.3 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.

2.4 Fisheries data

Red gurnard is mainly caught as bycatch by demersal trawlers in mixed fisheries, mainly in Divisions IVbc, VIIdj, and VIIIab.

2.4.1 Historical landings

Official landings reported at ICES are available in Table 2.1 and shown in Figures 2.2 and 2.3. Before 1977, red gurnard was not specifically reported. Still, gurnards are not always reported by species, but rather as mixed gurnards. This makes interpretations of the records of official landings difficult.

International landings have fluctuated between 4000 t and 6500 t since 2000. France is the main contributor of 'red gurnard' landings. Because of problems with recording gurnards as separate species and because of a lack of French landings data, total landings of red gurnard are not available for the years 1999 and 2001. The main area for the landings is ICES Subarea VII. In the North Sea red gurnard is mainly landed from Divisions IVb,c.

2.4.2 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 composi-

tions of the catch of red gurnard in Divisions VIId and VIIe have been estimated. The discards rate is estimated at 63% and 55% in VIId and VIIe respectively.

Estimates of the Dutch discards data for bottom-trawl fisheries in the North Sea and Eastern English indicate very low discards rates, even for the beam trawlers using a smaller mesh size.

2.5 Survey data

The time-series of the IBTS-Q1 survey in the North Sea and the French EVHOE-WIBTS-Q4 survey in the Celtic Sea and Bay of Biscay and CGFS-Q4 in Division VIId have been updated. Each of these surveys covers a specific area of red gurnard distribution (Figure 2.5). Length-based indices are transformed to abundance in weights using a length–weight relationship in Dorel (1986), with α = 0.00561 and β = 3.169. Mature abundance in weight is calculated assuming a knife-edged maturity curve, with individuals becoming mature at 25 cm Dorel (1986).

- IBTS-Q1 series

Before 1990, red gurnard was scarce in North Sea and the abundance index was close to 0 (Figure 2.6). 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). The length distribution of the IBTS-Q1 catches is bimodal and a substantial part of the catches is >25 cm (Figure 2.7).

- CGFS-Q4 series

Over the time-series 1988–2011, the abundance index has fluctuated, peaked in 1994 and has been declining since 2008 (Figure 2.8).

- EVHOE-WIBTS-Q4 series

Over the time-series 1997–2011, the abundance index in Nb or kg/hr is shown in Figure 2.9. The indices have increased over time. Length measurements show a similar bimodal pattern as is observed in the IBTS-Q1 survey (Figure 2.10). However, relatively fewer large individuals are observed in the EVHOE-WIBTS-Q4 survey. Age reading of red gurnards caught during EVHOE survey has been carried out in 2006 and routinely since 2008 (Figure 2.10). They indicate that the individuals caught are mainly of age 1 and 2.

2.6 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.

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

2.8 Analyses of stock trends

In the North Sea, the appearance of red gurnard in the index of the IBTS Survey since 1990 is in line with an increase of the abundance in IVa. In Eastern Channel, the abundance index of the CGFS-Q4 survey has widely fluctuated, with a weak decline. The EVHOE-WIBTS-Q4 survey has slightly increased since its beginning in the 1990s.

2.9 Data requirements

Still, gurnards are not always reported by species, but rather as mixed gurnards. This makes interpretations of the records of official landings difficult. 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.

References

Dorel, D. 1986. Poissons de l'Atlantique nord-est relations taille-poids. Institut Francais de Recherche pour l'Exploitation de la Mer. Nantes, France. 165 p.

Table 2.1. Red gurnard. Official landings (tonnes) of red gurnard reported to ICES by main areas.

	Area					
year	IV	VI	VII	VIII	IX	Other
1985	85	166	3182	211	0	1
1986	40	124	4150	241	0	0
1987	151	89	3893	334	1	0
1988	129	94	3836	274	0	0
1989	225	137	3456	238	0	0
1990	219	139	3300	206	0	0
1991	109	107	4014	189	0	0
1992	99	54	4058	191	0	0
1993	129	68	3822	155	0	0
1994	126	30	3847	225	0	0
1995	127	49	4001	167	0	0
1996	115	29	4308	177	0	13
1997	64	22	4407	178	0	0
1998	82	32	4027	192	0	0
1999	11	2426	149	1	0	0
2000	119	10	4132	144	0	0
2001	1930	25	4705	145	0	0
2002	353	53	4975	153	0	1
2003	375	31	4731	167	0	3
2004	380	25	4650	179	0	5
2005	199	18	5115	208	46	2
2006	161	33	4623	219	124	1
2007	188	21	4631	203	125	4
2008	152	31	4378	94	109	3
2009	208	97	3512	142	148	1
2010	228	146	3766	136	114	1
2011	147	123	3597	163	133	2
2012	98	1	3126	143	140	2

Table 2.2. Red gurnard. 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

Table 2.3. Red gurnard. Estimates of discards of red gurnard in different métiers in The Netherlands.

	MÉTIER	TBB_DEF	TBB_DEF*	TBB_DEF	OTB_MCD	OTB_DEF	OTB_DEF
Year	Mesh size	70–99	70–99	100–119	70–99	70–99	100–119
2006		2.2				0	
2007		0.4					
2008		<0.1					
2009		0	0	0	0	<0.5	0
2010		2	0	0	0	0	0
2011		0	0	0	0	0	0
2012		5	0		<1	0	0

*** ≤ 300 hp segment.**

Table 2.4. Red gurnard. EVHOE Q4, CGFS Q4, and IBTS Q1 indices.

	IBTS Q1			CGFS Q4			EVHOE		
	Numbers	Biomass	Mature biomass	Numbers	Biomass	Mature biomass	Numbers	Biomass	Mature biomass
Year	(n/hr)	(kg/hr)	kg/hr	(n/hr)	(kg/hr)	(kg/hr)	(n/hr)	(kg/hr)	(kg/hr)
1974	0.00	0.000	0.000						
1975	0.02	0.005	0.005						
1976	0.00	0.000	0.000						
1977	0.00	0.000	0.000						
1978	0.08	0.008	0.006						
1979	0.01	0.002	0.002						
1980	0.13	0.035	0.032						
1981	0.01	0.002	0.002						
1982	0.00	0.000	0.000						
1983	0.00	0.000	0.000						
1984	0.01	0.001	0.000						
1985	0.01	0.001	0.001						
1986	0.05	0.005	0.004						
1987	0.14	0.009	0.002						
1988	0.00	0.000	0.000	17.0	3.94	3.48			
1989	0.10	0.017	0.015	16.4	3.25	2.67			
1990	0.82	0.099	0.050	9.6	1.94	1.55			
1991	1.24	0.130	0.067	8.8	1.79	1.46			
1992	0.23	0.031	0.019	15.1	3.33	2.69			
1993	1.03	0.160	0.098	7.4	1.75	1.54			
1994	0.38	0.047	0.029	18.1	3.22	2.30			
1995	0.19	0.027	0.022	9.6	2.23	2.03			
1996	0.58	0.065	0.022	7.3	1.61	1.32			
1997	1.50	0.161	0.097	13.1	2.56	2.10	33.0	3.02	0.81
1998	0.69	0.062	0.019	5.0	1.01	0.83	33.3	3.15	0.92
1999	2.03	0.152	0.023	5.8	1.23	1.06	33.0	2.99	0.83
2000	1.44	0.198	0.129	7.3	1.46	1.20	26.8	2.20	0.43
2001	1.11	0.142	0.074	5.1	1.00	0.81	47.5	3.72	1.01
2002	1.24	0.117	0.048	8.9	2.09	1.91	41.9	3.42	0.79
2003	1.57	0.267	0.212	9.8	1.96	1.55	43.9	3.16	0.66
2004	0.95	0.139	0.094	5.9	1.43	1.31	53.4	4.32	1.27
2005	0.92	0.122	0.077	8.0	1.79	1.59	46.2	3.83	1.06
2006	1.16	0.131	0.066	9.5	1.79	1.38	36.3	3.42	0.94
2007	4.77	0.472	0.216	7.2	1.86	1.71	52.1	4.22	0.75
2008	2.82	0.384	0.222	12.9	2.65	2.22	43.6	4.07	1.03
2009	3.22	0.433	0.288	11.7	2.56	2.15	65.3	5.89	1.12
2010	2.46	0.413	0.335	6.9	1.53	1.35	51.5	4.65	1.17
2011	4.88	0.724	0.533	3.8	0.96	0.88	44.2	3.88	1.10
2012	3.86	0.603	0.445	8.2	1.75	1.45	37.0	3.61	1.00
2013	5.51	1.027	0.852	8.4	1.62	1.29	NA	NA	NA

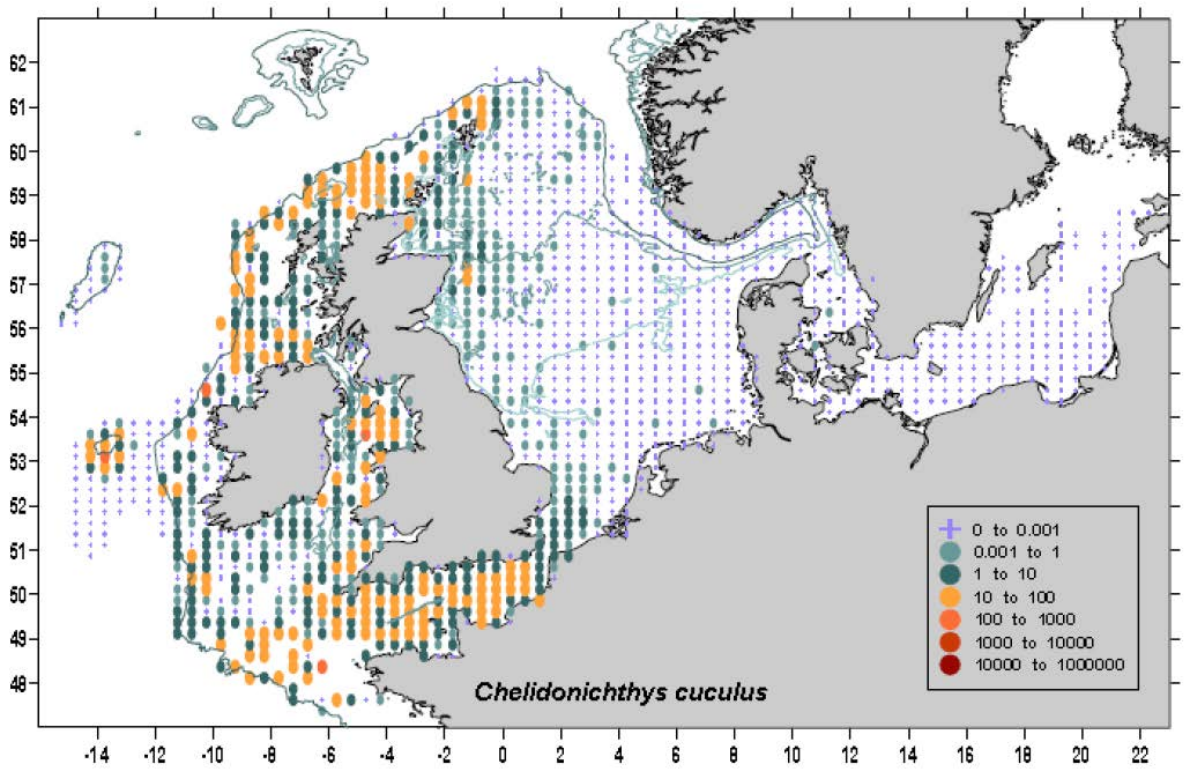

Figure 2.1. Red gurnard. Distribution map of red gurnard in the northern European shelf (From Heessen *et al.*)

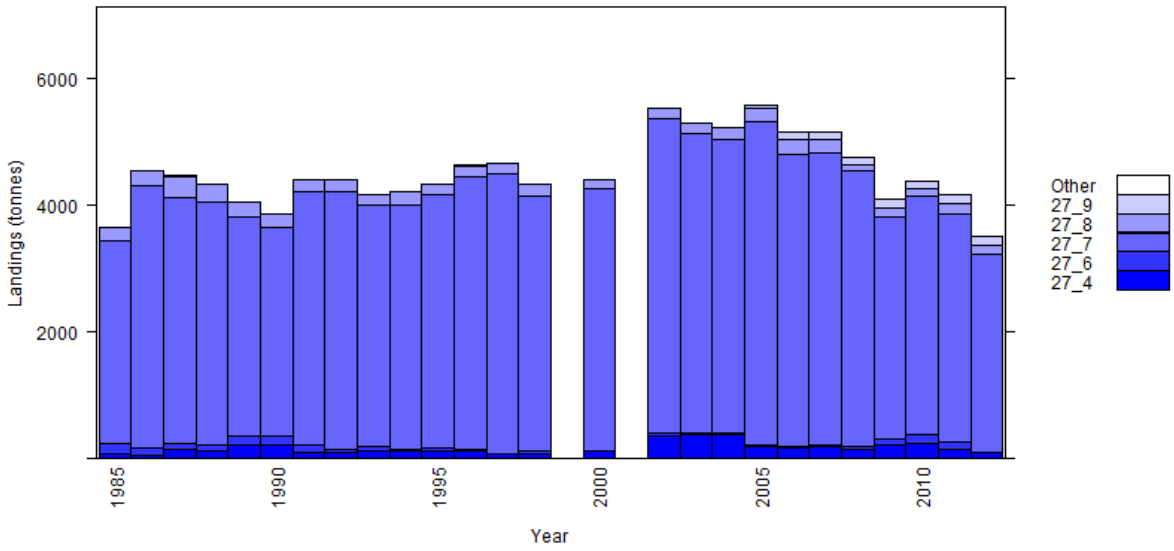

Figure 2.2. Red gurnard. Official landings reported to ICES in the different areas. 1999 and 2001 are removed because of partially missing or misreported data.

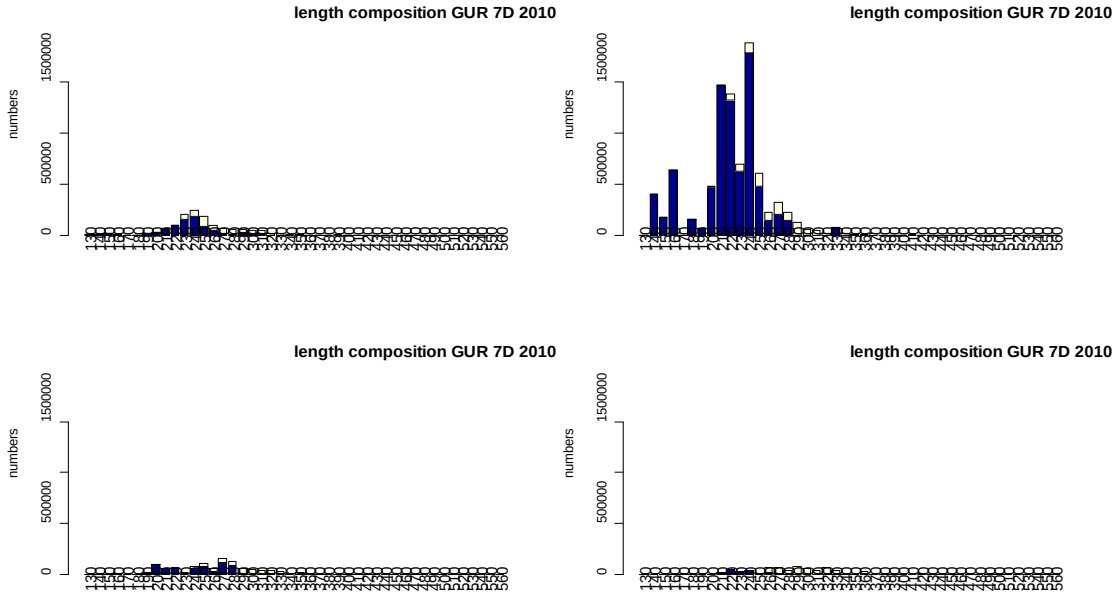

Figure 2.3. Red gurnard. Quarterly length compositions of the 2010 French catch of red gurnard in VIId of OT._DEF strata composed of 711 t of landings and 1215 t estimated of discards. Histogram of discards in dark blue.

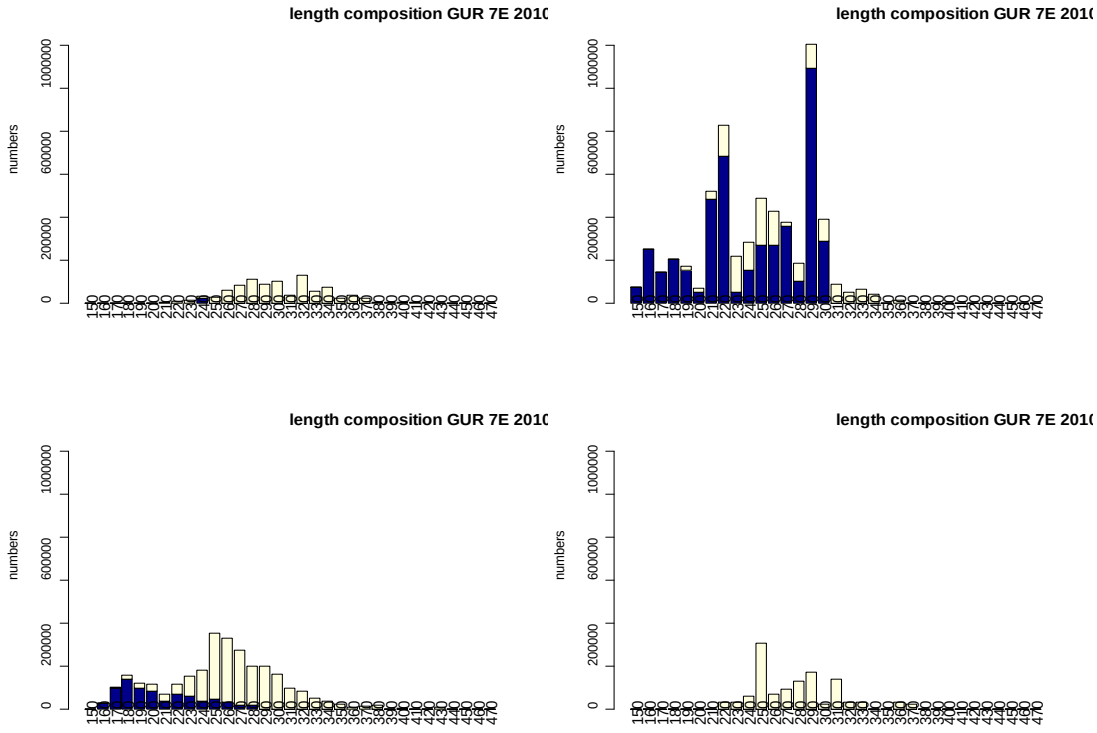

Figure 2.4. Red gurnard. Quarterly length compositions of the 2010 French catch of red gurnard in VIIe of OT._DEF strata composed of 1340 t of landings and 1632 t estimated of discards. Histogram of discards in dark blue.

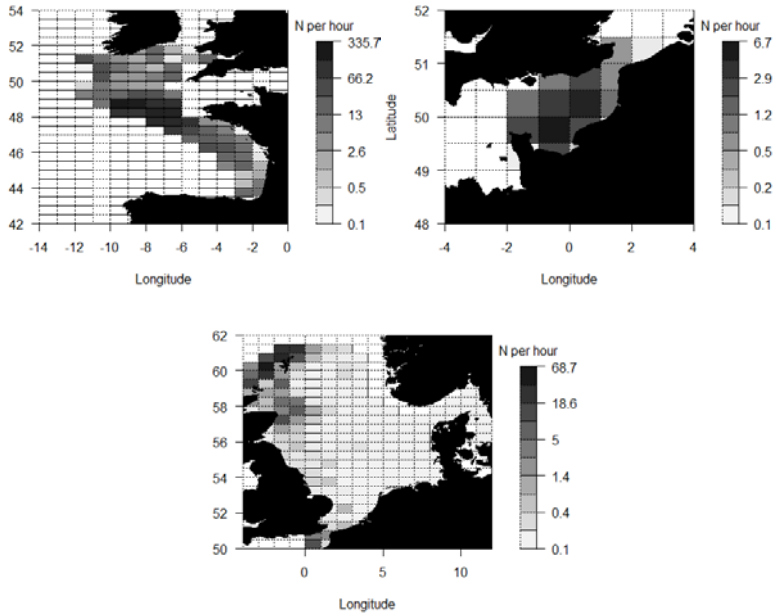

Figure 2.5. Red gurnard. Spatial extent of three trawl surveys used for abundance estimates of red gurnard. Grey scaling indicates mean catch rate of the surveys in the different ICES squares covered by the surveys.

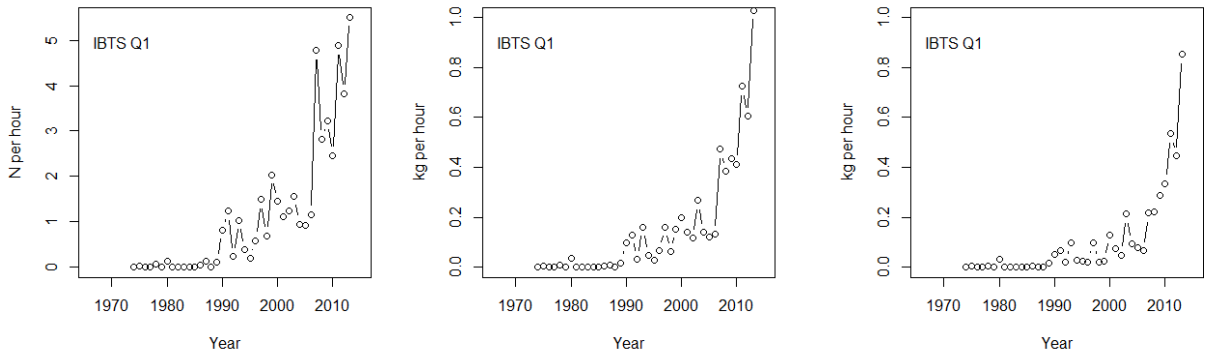

Figure 2.6. Red gurnard. Time-series of abundance index of red gurnard from IBTS-Q1 in the North Sea. Numbers per hour (left panel), proxy for biomass (middle panel), and proxy for adult biomass (right panel).

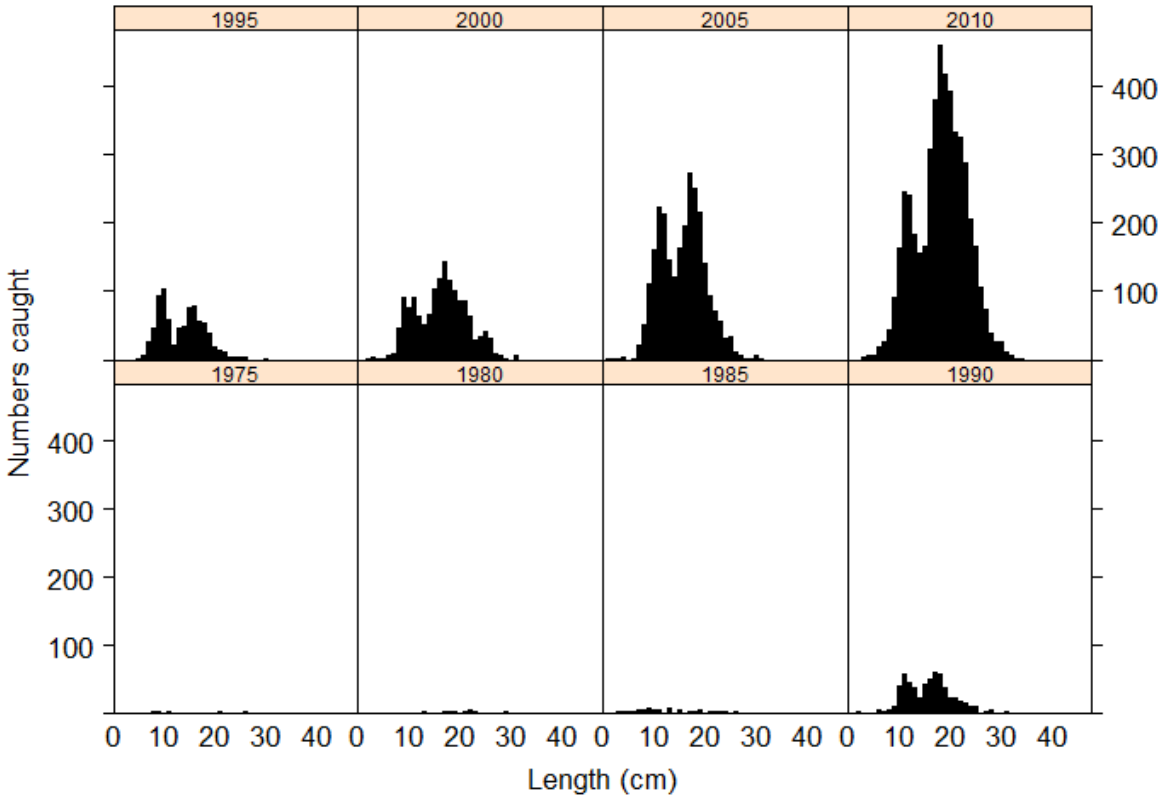

Figure 2.7. Red gurnard. Length distribution of IBTS-Q4 catches in five year periods.

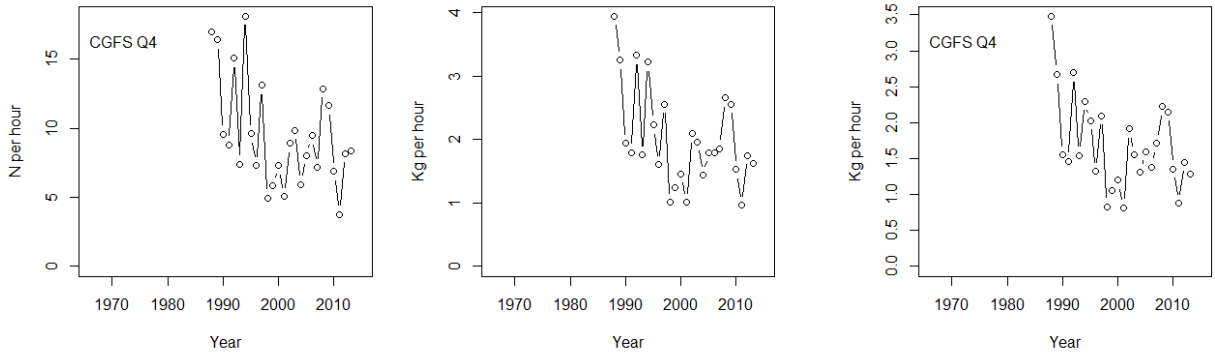

Figure 2.8. Red gurnard. Time-series of abundance index of red gurnard from CGFS-Q4 series in VIId. Numbers per hour (left panel), proxy for biomass (middle panel), and proxy for adult biomass (right panel).

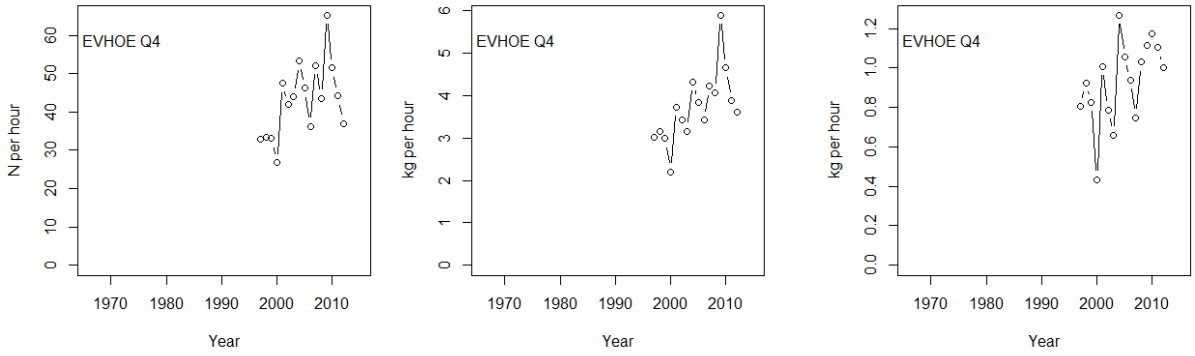

Figure 2.9. Red gurnard. Time-series of abundance index of red gurnard from EVHOE-Q4 series in Bay of Biscay and Channel. Numbers per hour (left panel), proxy for biomass (middle panel), and proxy for adult biomass (right panel).

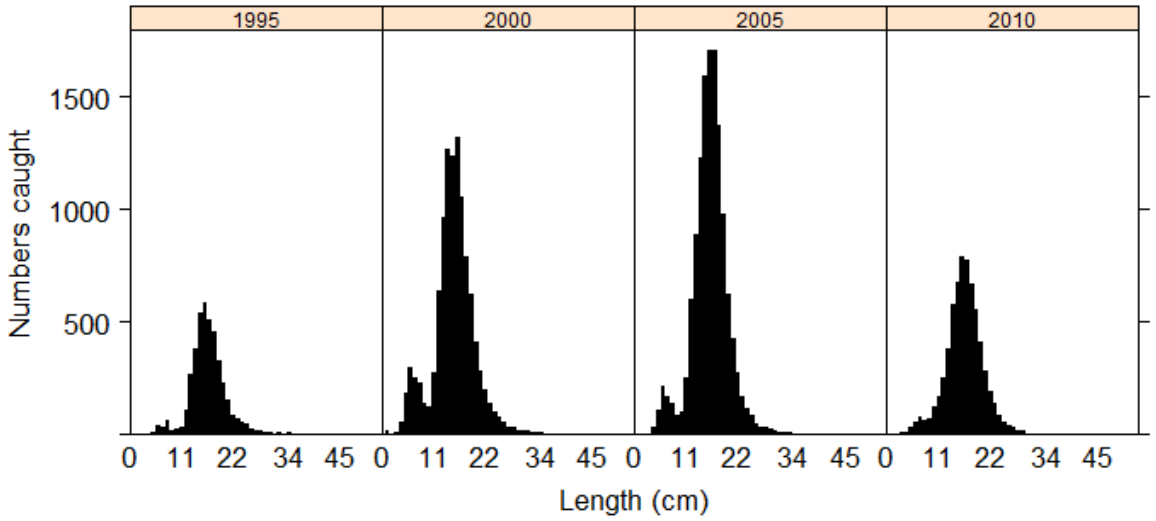

Figure 2.10. Red gurnard. Length distribution of EVHOE-WIBTS-Q4 catches in five year periods.

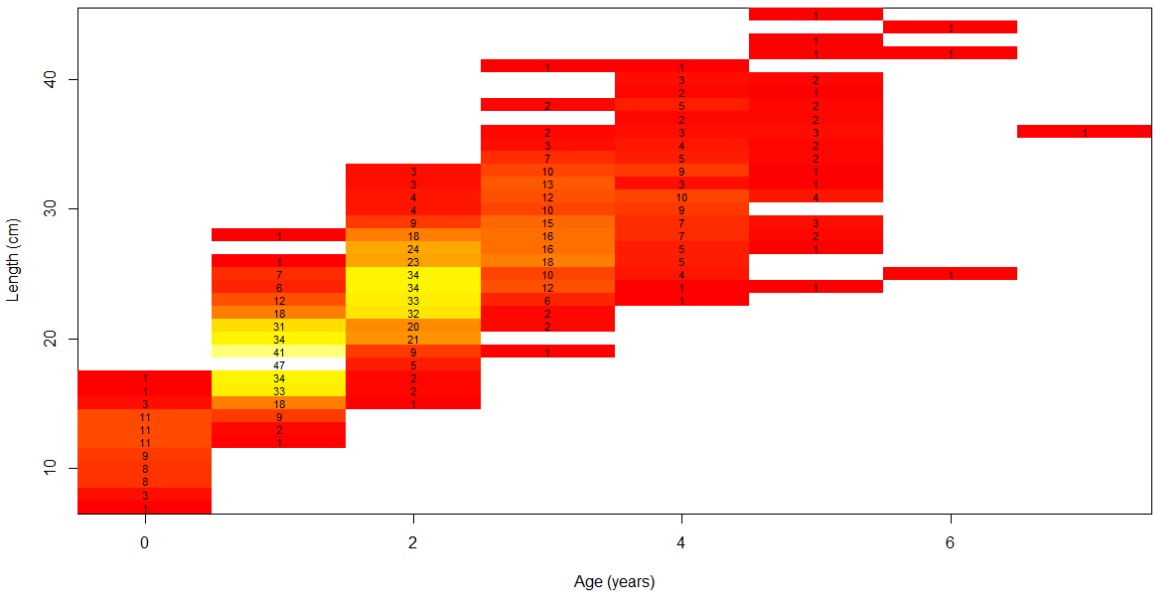

Figure 2.11. Red gurnard. Age–length key for EVHOE-WIBTS-Q4 catches.

3 Grey gurnard in Subarea IV (North Sea) and Divisions VIId (Eastern Channel) and IIIa (Skagerrak – Kattegat)

3.1 General biology

The existing knowledge of grey gurnard general biology is available in the stock annex.

Grey gurnard *Eutrigla gurnardus* occurs in the eastern Atlantic from Iceland, Norway, southern Baltic, and North Sea to southern Morocco and 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, whereas in summer it is more widely distributed. 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.

3.2 Stock ID and possible assessment areas

No studies are known of the stock ID of grey gurnard. In a pragmatic approach for advisory purposes and in order to facilitate addressing ecosystem considerations, the population is currently split among three ecoregions: North Sea including VIId, 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 (ICES, 2011; WGNEW).

3.3 Management regulations

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

3.4 Fisheries data

3.4.1 Historical landings

Historically, grey gurnard is taken as a bycatch species in mixed demersal fisheries for flatfish and roundfish. Grey gurnard from the North Sea is mainly landed for human consumption purposes. However, the market is limited and the largest part of the catch is discarded (see also stock annex). Owing to the low commercial value of this species, landings data do not reflect the actual catches.

In the past, gurnards were often not sorted by species when landed and were reported as one generic category of "gurnards". Further, catch statistics are incomplete for some years, e.g. the Netherlands did not report gurnards during the years 1984–1999. In recent years, the official statistics seem to improve gradually. However, species misidentification continues to be a major problem in estimating the landings of all gurnards and hence grey gurnard. In addition, some countries continue to report "gurnards" landings and do not provide information on grey gurnard separately. Figure 3.1a displays the official landings for Area IV, IIIa and VIId for all species categories in which grey gurnard may be included, e.g. a considerably proportion was reported as "Gurnards, sea robins nei" in recent years.

Since the early 1980s specific landings data for grey gurnard are available from the catch statistics. Before that, these data occurred only sporadically in the statistics

(Figure 3.1b; Table 3.1). Most of gurnard catches are taken in Area IV and to a much lesser extent in Areas VIId and IIIa (Figure 3.1b; Table 3.1). Exceptionally high annual landings were reported during the late 1980s to early 1990s with a maximum of 46 598 t in 1987 (Figure 3.1c; Table 3.2) because of Danish landings for reduction purposes. After this peak, the Danish landings dropped again to a low level. Recent international landings for the last five years have been low ranging between 285 to 558 t per year. The average 2000–2013 was at 445 t. Data from 1950 to 2010 were taken from the "ICES catch statistics 1950 to 2010". Data from 2011 to 2012 were taken from the "ICES catch statistics 1985 to 2012". Data for 2013 were taken from the preliminary catch statistics and estimated from InterCatch upload files provided to WGNEW 2014.

3.4.2 InterCatch data

In 2014 grey gurnard in area IV, IIIa and VIId was included into the InterCatch data call for the first time. Not all countries were able to provide their data in time, thus this dataset remains incomplete. However, the data provided were analysed to estimate total landings and also discards were available.

3.4.3 Discards

In Table 3.4 the numbers per hour of discarded grey gurnard in Dutch bottom-trawl fisheries in North Sea and Eastern Channel are shown for 2006–2012. The rates are highly variable depending on the specific métiers, with highest values observed for the SSC_DEF métiers. German discard data indicate that the proportion of discarded gurnard in German demersal trawl fisheries ranges between 76.6% and 93.0% (Ulleweit *et al*., 2010).

3.5 Survey data/ recruit series

For the North Sea and Skagerrak/Kattegat, data are available from the International Bottom-trawl survey. The IBTS-Q1 and IBTS-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 (Figures 3.2 and 3.3). The distribution pattern changes substantially in 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 (Daan *et al.*, 1990). The densities of grey gurnard observed in the Eastern Channel (Area VIId) were much lower compared to the North Sea area (Figure 3.5).

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 seabed (or even in midwater, especially at night-time) which may result in extremely large catches. Within one survey, these large hauls may account for 70% or more of the total catch of the species. Bottom temperatures in high-density areas usually range from 8 to 13°C (Sahrhage, 1964).

3.6 Biological sampling

Individual biological data for this species are still scarce (see also the stock annex). In the North Sea, individual data have been collected sporadically during some years of the IBTS-Q1 and IBTS-Q3 survey.

Length distributions presented in the WGNEW2010 Report have been updated and are presented in Figure 3.10 and in the stock annex. They showed that a bimodal structure occurred in Skagerrak and Kattegat (IIIa) which was not observed in North Sea where smaller fish were only found in relatively small numbers.

An ALK from collected otoliths has shown that the age span of grey gurnard collected in Q1 is large (age 2 to age 14), but not many individuals were aged (Figure 3.8).

Available data on gurnard individual weights and maturity were analysed in order to estimate a mature biomass index (Figures 3.9, 3.10.; Tables 3.5, 3.6).

Not all available maturity data were obtained during the main spawning season which takes place in spring and summer, some were obtained in the first and fourth quarter of the year (Table 3.5). However, a maturity ogive based on all the available grey gurnard maturity data was used to calculate the mature biomass index. The obtained maturity ogive shows that above 24.5 cm more than 90% of all the individuals can be considered mature (Figure 3.9). The corresponding Lmat50% value was 18.5 cm.

The available age and maturity data suggest that grey gurnard is early maturing in North Sea and a certain proportion of fish at age 1 are mature.

3.7 Population biological parameters and other research

The information delivered at the WGNEW 2014 is now in the stock annex.

3.8 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.

To analyse stock trends a mature biomass index was calculated applying a length–weight relationship and a maturity ogive which were obtained from all data available to WGNEW2014 (see Section 3.6).

According to van Heessen and Daan (1996), outliers were excluded from the IBTS-Q1 time-series since grey gurnards tend to form dense concentrations during winter. Outliers were defined as hauls which accounted for more than 90% of the total gurnard weight caught in the respective year. The time-series of mature biomass index of grey gurnard in the IBTS-Q1 and IBTS-Q3 survey has shown a strong increase pattern from the beginning of 1990s (Figure 3.4; Table 3.3). Since then it is fluctuating on a high level. The third highest IBTS-Q1 time-series record was observed in 2010, followed by a decrease up to 2013. A similar trend since beginning of the 1990s was observed for the IBTS-Q3 mature biomass time-series. Overall, for the IBTS-Q3 survey lower biomass values were observed. Compared to the North Sea/Skagerrak (Area IV/IIIa) the mature biomass values recorded by the CGFS in the Eastern Channel

(Area VIId) were extremely low (Figure 3.6). No trend could be detected in the CGFS index. Therefore, the advice for grey gurnard in Area IV, IIIa and VIId should be based on the IBTS survey, which covers by far the largest part of the stock.

3.9 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 which is still the case for some countries today. Further, this species is highly discarded and for the past years discard data are not available covering all fleets.

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.

For a better understanding of this species an increase in our knowledge of biological parameters is required. In the context of ecosystem considerations, it would be useful to obtain more information on age composition of the stock and its diet composition.

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

3.10 Ecosystem considerations

Grey gurnard is considered a predator on a number of commercially important demersal stocks (cod, whiting, haddock, sandeel, Norway pout) in the North Sea (de Gee and Kikkert, 1993. The steep increase in abundance of the grey gurnard has led to an increase in mortality especially of North Sea cod (age-0) and whiting (age-0 and age-1) in recent years (ICES, 2011). The multi species model SMS estimates that grey gurnard is currently responsible for over 50% of the predation mortality on 0-group cod and whiting. Therefore, the abundance and distribution pattern of grey gurnard and its prey size preferences are highly relevant from an ecological point of view (Floeter and Temming, 2005; Kempf *et al*., 2013).

3.11 References

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Table 3.1. Grey gurnard. Official landings (tonnes) of grey gurnard by areas.

Year	IV	IIIa	VIId
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	54	0
1958	0	76	0
1959	0	0	0
1960	0	0	0
1961	0	0	0
1962	0	0	0
1963	202	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	62	0
1977	0	37	0
1978	13	54	2
1979	105	49	839
1980	43	36	950
1981	0	46	0
1982	100	129	380
1983	64	36	489
1984	71	68	126
1985	173	12	116
1986	93	16	217
1987	44324	20	78
1988	37024	61	360
1989	26348	23	99
1990	22168	37	98
1991	14612	30	99
1992	8242	32	91
1993	979	27	54
1994	193	24	37
1995	153	15	43
1996	232	21	48
1997	151	18	84
1998	75	35	35
1999	225	28	1
2000	548	37	76
2001	611	33	46
2002	393	19	87
2003	420	33	72
2004	376	28	48
2005	316	26	36
2006	200	21	46
2007	205	25	49
2008	158	29	86
2009	201	18	66
2010	264	13	111
2011	334	6	102
2012	525	6	27
2013	467	6	53

Table 3.2. Grey gurnard. Official landings (tonnes) of grey gurnard in Areas IIIa, IV, and VIId by country as reported to ICES.

Year	BEL	DNK	FRA	NDL	NOR	SWE	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	254	0
1958	0	0	0	0	0	311	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	0	0
1973	0	0	0	0	0	0	0
1974	0	0	0	0	0	0	0
1975	0	0	0	0	0	14	0
1976	0	0	0	0	0	69	0
1977	0	0	0	0	0	37	0
1978	0	0	15	0	0	54	0
1979	0	0	944	0	0	49	0
1980	0	0	993	0	0	38	0
1981	0	0	0	0	0	46	0
1982	0	360	480	0	0	43	0
1983	0	1067	553	0	0	8	0
1984	0	4041	197	0	0	7	0
1985	102	2358	187	0	0	9	0
1986	0	314	283	0	0	10	0
1987	76	46598	122	0	0	6	0
1988	86	38237	389	0	0	3	22
1989	82	26739	135	0	0	5	0
1990	91	22075	134	0	0	3	0
1991	75	14539	122	0	0	5	0
1992	104	8135	106	0	0	10	10
1993	113	840	74	0	0	9	24
1994	67	99	54	0	0	12	22
1995	50	73	62	0	0	5	21
1996	112	70	62	0	0	3	54
1997	52	36	103	0	0	5	57
1998	34	56	47	0	0	8	0
1999	36	86	0	0	0	132	0
2000	37	95	72	452	0	5	0
2001	28	288	60	277	0	4	33
2002	55	63	64	286	0	2	29
2003	34	92	47	319	0	7	26
2004	35	83	9	297	0	5	23
2005	29	73	7	238	0	9	22
2006	18	65	4	155	2	2	21
2007	14	37	5	165	5	3	50
2008	9	48	5	120	5	8	78
2009	16	21	3	157	1	4	83
2010	20	18	12	258	1	2	77
2011	37	11	9	316	16	1	64
2012	60	8	9	478	2	1	0
2013 [1)]	54	10	6	278	33	2	144

[1)] Preliminary data; FRA data from InterCatch.

Table 3.3. Grey gurnard mature biomass indices (kg/hour) from IBTS Q1, IBTS Q3 and CGFS Q4 survey.

Year	IBTSQ1	IBTSQ3	CGFSQ4
1966	0.00		
1967	2.49		
1968	9.35		
1969	17.56		
1970	2.08		
1971	0.64		
1972	0.12		
1973	0.72		
1974	4.74		
1975	3.30		
1976	7.89		
1977	0.92		
1978	2.50		
1979	0.21		
1980	0.91		
1981	0.84		
1982	6.39		
1983	4.34		
1984	12.50		
1985	3.35		
1986	8.38		
1987	4.05		
1988	2.35		0.20
1989	5.96		0.31
1990	7.71		0.08
1991	7.39	5.48	0.28
1992	8.08	9.21	0.06
1993	9.59	6.59	0.07
1994	9.20	9.19	0.06
1995	11.06	8.07	0.02
1996	16.06	13.45	0.04
1997	22.59	10.84	0.12
1998	18.99	18.09	0.05
1999	40.48	19.56	0.57
2000	22.32	14.17	0.05
2001	17.85	19.40	0.03
2002	21.73	13.95	0.16
2003	17.50	13.95	0.06
2004	19.12	5.14	0.20
2005	17.08	4.20	0.02
2006	16.62	4.77	0.00
2007	18.02	5.72	0.05
2008	19.60	8.75	0.03
2009	17.15	12.51	0.03
2010	32.04	7.98	0.02
2011	25.70	18.13	0.05
2012	27.51	6.83	0.08
2013	21.33	6.66	0.07

Table 3.4. Grey gurnard. Discards per hour of grey gurnard by different métiers in the Netherlands 2006–2012.

Métier	TBB_DEF	TBB_DEF*	TBB_DEF	SSC_DEF	SSC_DEF	OTB_MCD	OTB_DEF	OTB_DEF
Mesh	70-99	70-99	100-119	100-119	>120	70-99	70-99	100-119
2006	68.3							
2007	60.2							
2008	34.3							
2009	55	17	37			111	77	15
2010	81	10	109			47	52	110
2011	61	27	10	NA	119	27	55	70
2012	41	24	30	317	307	110	75	12

***≤300 hp segment**

Table 3.5. Grey gurnard maturity ogives available to WGNEW 2014. Sigmoid model fitted to the data: prop_mat = a / (1+exp(-1*(Length-Lmat50%)/b)).

Source	Institute	Year	Quarter	a	b	Lmat (50%)	r^2	p	n
IBTS Q1	IMARES	2010	1	0.996	0.047	18.447	0.995	< 0.001	240
IBTS Q1	TI-SF	2014	1	0.989	1.989	18.072	0.905	< 0.001	347
IBTS Q3	CEFAS	1991	3	0.990	1.762	18.991	0.938	< 0.001	594
IBTS Q3	CEFAS	1992	3	0.983	0.395	17.055	0.981	<0.001	356
WGNEW 2012	CEFAS	1991	4	0.995	2.983	21.617	0.975	< 0.001	254
	all combined			0.992	2.063	18.478	0.997	< 0.001	1791

Table 3.6. Grey gurnard length–weight relationship available to WGNEW 2014.

Source	Institute	Year	Quarter	a	b	r^2	p	n
IBTS Q1	IMARES	2010	1	0.005	3.141	0.959	< 0.001	240
IBTS Q1	TI-SF	2014	1	0.009	2.947	0.975	< 0.001	347
	combined			0.006	3.094	0.968	< 0.001	587

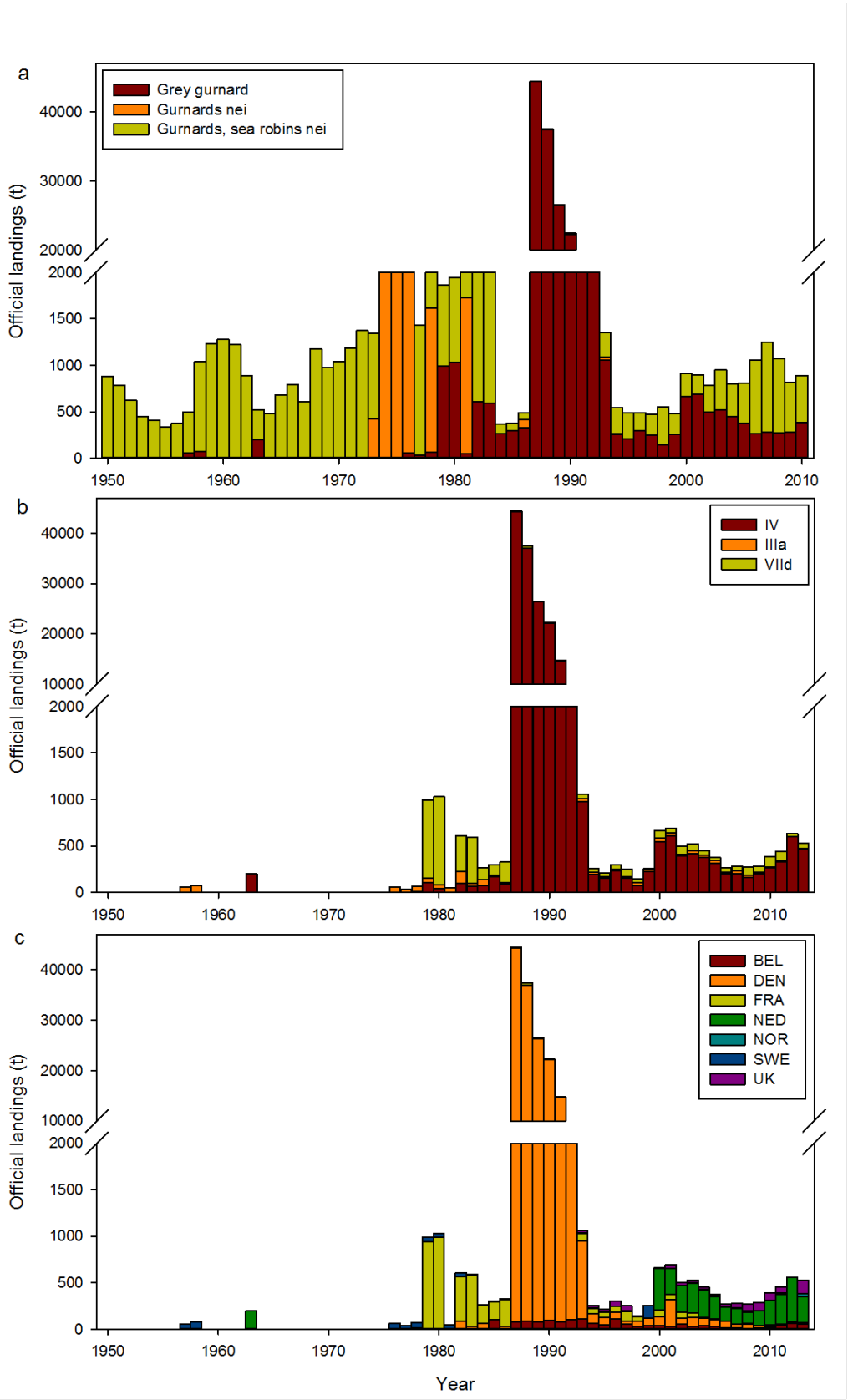

Figure 3.1. Gurnards. Official landings of gurnard categories for all areas (a), grey gurnards by area (b), and grey gurnards by country (c) reported to ICES.

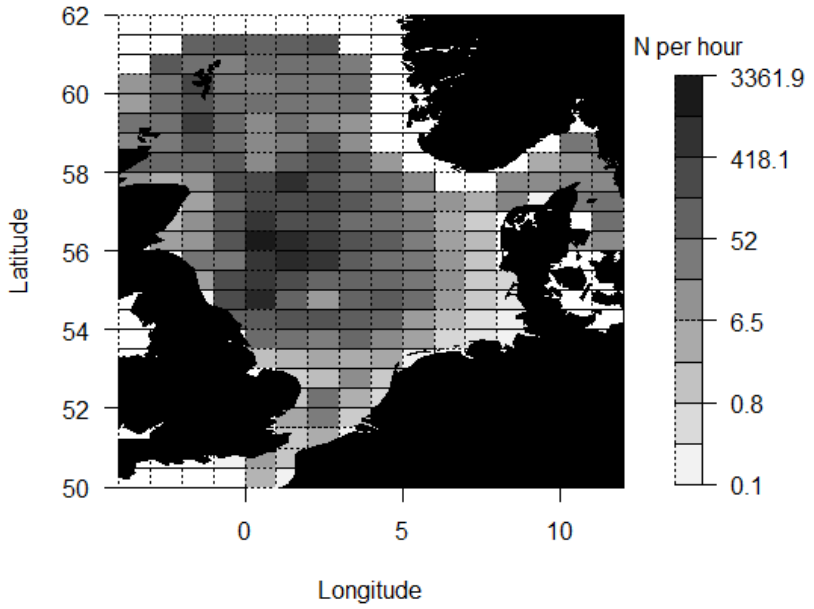

Figure 3.2. Grey gurnard. Spatial distribution of grey gurnard from IBTS-Q1 survey in Area IV and IIIa.

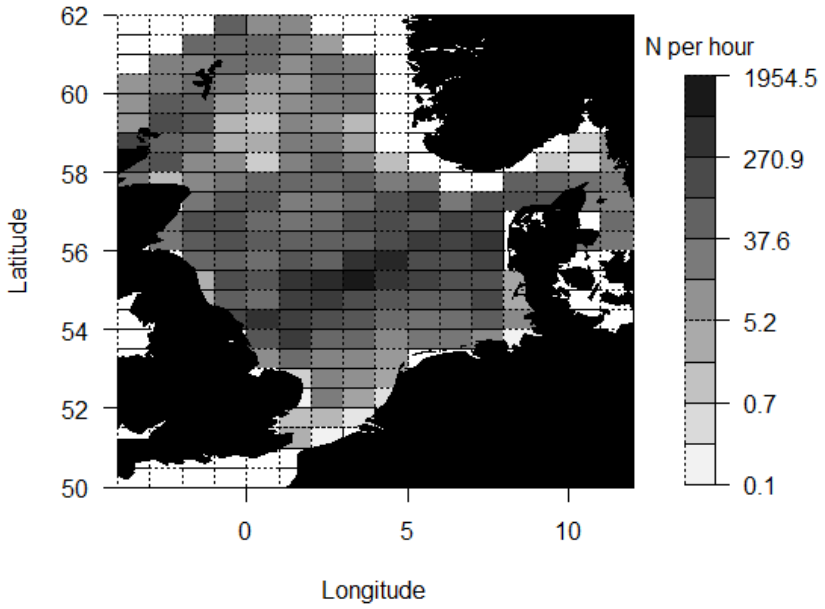

Figure 3.3. Grey gurnard. Spatial distribution of grey gurnard from IBTS-Q3 survey in Area IV and IIIa.

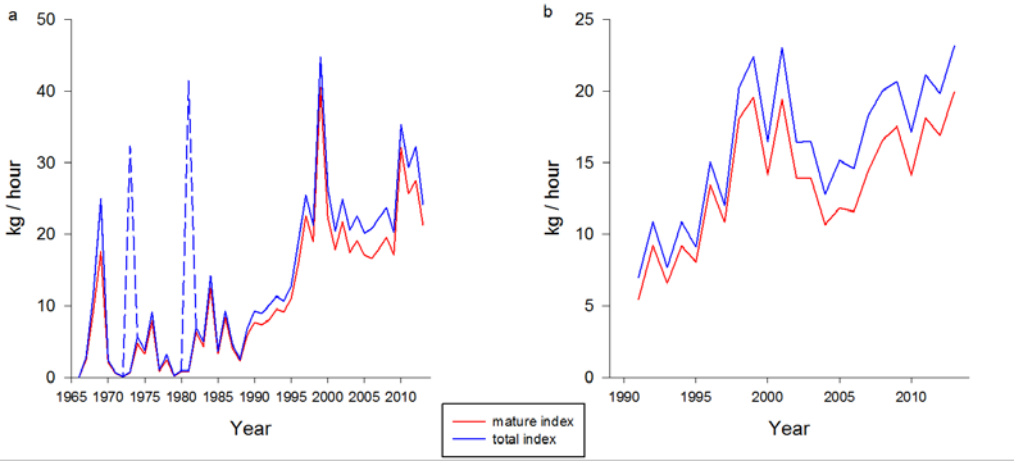

Figure 3.4. Grey gurnard. Total biomass index (blue line) and mature biomass index (red line) of grey gurnard from IBTS-Q1 (panel a) and IBTS-Q3 (panel b) survey time-series. Exceptionally high abundances observed occasionally by shoal behaviour in quarter 1 (blue dashed line) were excluded from analyses as proposed in Heessen and Daan (1996).

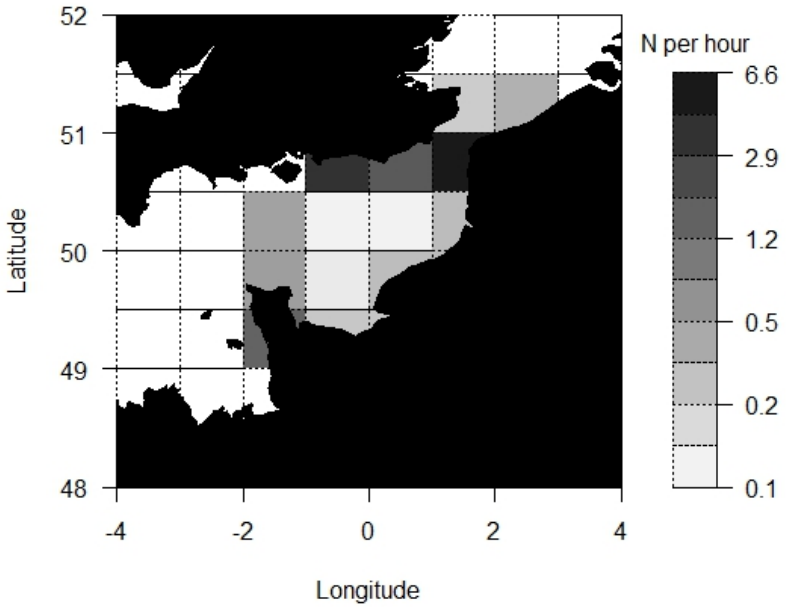

Figure 3.5. Grey gurnard. Spatial distribution of grey gurnard from CGFS-Q4 survey in Area VIId.

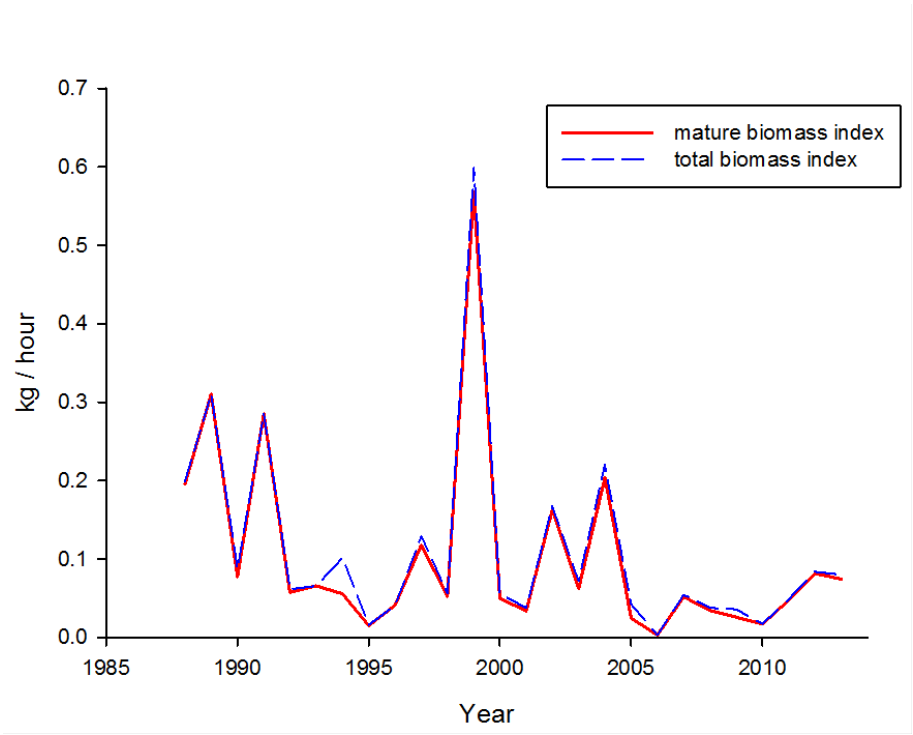

Figure 3.6. Grey gurnard. Abundance index of grey gurnard from CGFS-Q4 survey time-series.

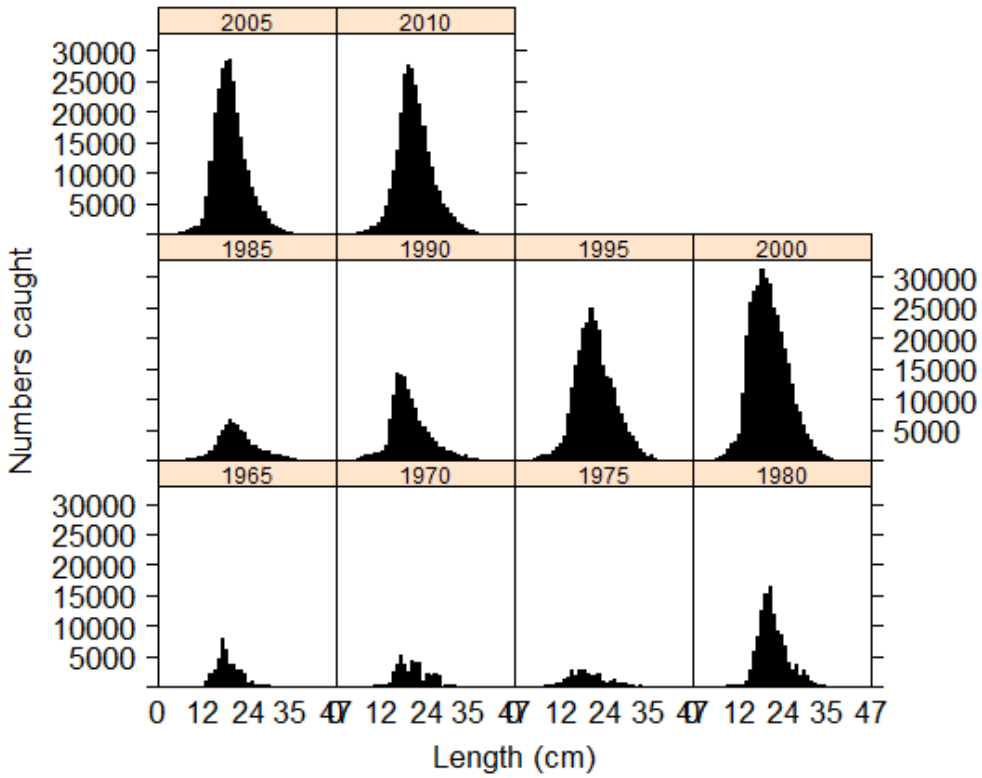

Figure 3.7. Grey gurnard. Length–frequency distributions for five year intervals form the IBTS-Q1 database.

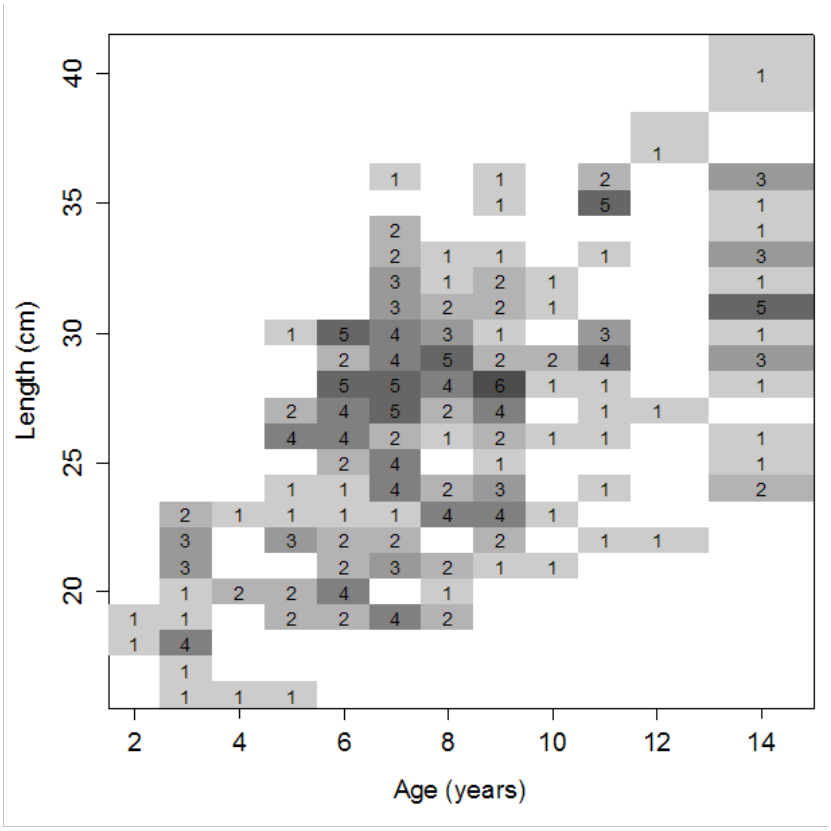

Figure 3.8. Grey gurnard. ALK from otoliths of Grey gurnard collected during 2010 IBTS-Q1 survey.

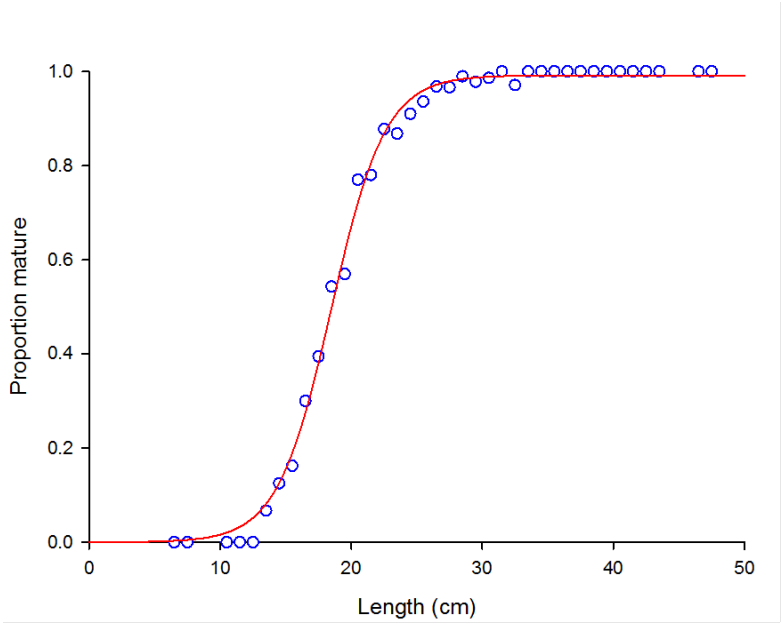

Figure 3.9. Maturity ogive of Grey gurnard sampled during IBTS surveys.

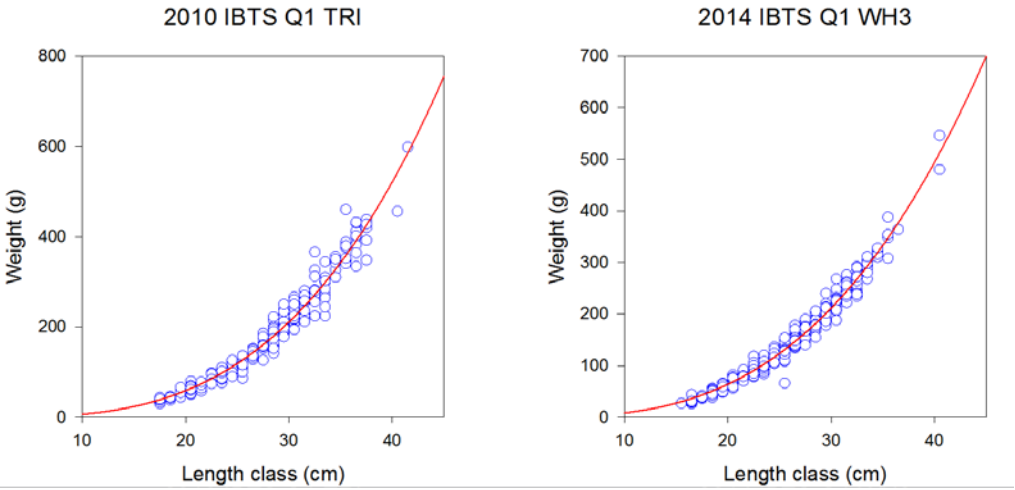

Figure 3.10. Length–weight relationship of Grey gurnard sampled during IBTS surveys.

4 Pollack

4.1 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 in Faroese and Icelandic waters and in the Baltic and was never registered in Spanish landings from IXa South (Gulf of Cádiz).

According to FAO FishBase pollack is bentho-pelagic, 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.

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, a maximum published weight of 18.1 kg, and a maximum reported age of eight years based on Cohen *et al*. (1990). Studies aimed at determining length-at-maturity for pollack suggest that 50% of the individuals are mature at a length between 35–42 cm (Cardinale *et al*., 2012; Heino *et al*., 2012; Alonso *et al*., 2013), when they are around three years old. 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 fairly rapid, approaching 10 cm per year. Pollack moves gradually away from the coast into deeper waters as it grows.

French observations also show that pollack is most available to commercial fisheries 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.

4.2 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 to: i) the existence of gene flow between spawning units due to the larval dispersal or ii) a recent origin of populations which prevents significant genetic drift. However, authors remark that these results should be carefully interpreted 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 allow separation of stocks for this species.

Data from the fishery indicate three main areas of exploitation:

1) the northern North Sea/Skagerrak extending north along the Norwegian coast;

2) 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);

3) 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 IIIa).

4.3 Management

A TAC has been adopted for 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 at 1482 t for VIIIabde, 231 t for VIIIc and 282 t for IX and X (precautionary TAC) (Council Regulation EU No 43/2014 and previous editions).

Also for Subareas 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 and international waters of Vb and the international waters of XII and XIV). For Subarea VII, the TAC has decreased from 17 000 t in 2000–2005 to 13 495 t in 2012–2013.

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 the management of this species, no precautionary reference points have been proposed, and no management plans are in place. No analytical assessments leading to fisheries advice have been carried out for pollack in European waters.

4.4 Pollack in Subarea VIII and Division IXa

2014 information at WGNEW

The official landing statistics have been updated in Table 4.4.1. The 2012 advice for 2013 and 2014 was for a 20% reduction compared to the last three years average official landings but this was not quantified due to uncertainties in landing data. No additional data were provided in 2014 and landing statistics do not show any remarkable changes so the group considered there is no basis to change the advice basis.

However, since the landing data are now available, the working group considered that it is now appropriate to quantify the advice (for a 20% reduction compared to the last three years average official landings; 2010–2012).

There is a difference between the total landing statistics in the official data in this table and Table 4.4.2 with national landings (by country and gear type), for which not all data were available in 2013.

Information from WGHMM 2013

Landings have been reported by the three countries with quota: France, Spain and Portugal. The respective time-series, from 2001 to 2012, of national landings desegregated by gear are shown in Table 4.4.2.

This stock from is currently ranked as a Data Limited Stock in category 5.2; however, all the stocks covered by the current DCF sampling programme have been proposed to be upgrade to category 4, because of the availability of biological information. Therefore, survey abundance indices, length–frequency distributions, and other biological information is required from the respective National laboratories.

French and Portuguese surveys show very low catches of these species (pers. com.). Even similar low indices have been obtained by the Spanish survey developed in VIIIc–IXaN (SP_GFS), the occurrence of Pollock is only observed in the last part of the time-series (Figure 4.4.1).

Length–frequency distributions (LFD) were provided by IEO (Spain) for years 2011 and 2012 by métier. However, as Pollack is scarce in landings, most of samples (83%) come from the gillnet fleet, due to it has a higher number of métiers than others fleets, as longline. Different mean sizes are obtained depending on the mesh size used (Figure 4.4.2): 46.0 cm (GNS_DEF_60-79_0_0), 46.9 cm (GNS_DEF_80-99_0_0), and 48.8 cm (GNS_DEF_>=100_0_0).

Discards estimates of Pollack in Spanish trawlers were also provided by IEO (Spain) for year 1994, 1997, 1999, 2000, and the period 2003–2012. The low numbers of discards recorded makes it reasonable to assume that landings can be a proxy of catches.

Therefore, from the biological information compiled (scarce due to the low catches of this species in the area), just the LFD could be useful in order to improve the assessment of this stock in future. However, the time-series should be longer and more representative of the different métiers catching Pollack.

4.5 Pollack in the Celtic Seas and West of Scotland (ICES Subareas VI and VII)

4.5.1 Fisheries data

The nominal landings as reported to ICES are given in Tables 4.5.1–2 and Figures 4.5.1–2 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 4.5.1 and Figure 4.5.1). 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 2013, 95% of the landings originated from Subarea VII, and Ireland, UK and France together comprised 99% of the official landings. Subarea VI has lost almost all of its past landings. The evolution of the relative contribution of Subareas VI and VII to the total international landings is depicted in Figure 4.5.3.

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 the report of WGCSE 2013 (ICES, 2013) for an overview of catches per gear for all countries combined in 2012, and the report of WGCSE 2012 (ICES, 2012a) for an overview of catches per gear for Ireland and France over the period 2003–2010).

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 +/-2500 t (ICES, 2010), no other information on recreational pollack catches in this stock area is known to us. WGRFS 2012 (ICES, 2012b) listed pollack in the Northeast Atlantic as a species for which recreational fishery sampling should be included in the new DC-MAP because of the potential impact of recreational fisheries on its population dynamics and because it is of strong socio-economic importance.

4.5.2 Survey data

Pollack has a preference for wrecks and rocky bottom, making it difficult to catch with trawls. Therefore the species is 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 substratum), the occurrence of years with zero survey catches doesn't necessarily mean that there were 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 in WGCSE 2012 (ICES, 2012a),WGNEW 2012 (ICES, 2012c) and WGCSE 2013 (ICES, 2013). All conclusions were the same: 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. Therefore these surveys were not analysed again during WGNEW 2014.

4.5.3 Biological sampling

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

4.5.4 Analysis of stock trends/ assessment

As long as the stock units are not well defined, it will not be possible to estimate MSY reference points. This stock has been categorized by WKLIFE (ICES, 2012d) as category 4 data-limited and in this situation it was suggested to run a DCAC (Depletion-Corrected Average Catch) model to estimate a yield likely to be sustainable (McCall, 2009). WKLIFE II (ICES, 2012e) recommended that "the DCAC method should be re-examined in 2013 due to the *slow up–fast down* nature of the method". The DCAC-method was also applied during WGNEW 2014 with the same model settings as applied by WGCSE 2013 (ICES, 2013).

The inputs to the DCAC method are further detailed:

Sum of catch: The period over which the catches are summed is 1986–2013, i.e. 28 years, as 1986 is the year where Ireland recomposed a time-series of landings after 13 years of missing declaration. In Subarea VI, the landings by Spain were removed as they appear only over the period 1981–1988. In Subarea VII, the French landings in

1999 are missing and are replaced by the mean of the previous and following year. For 2012, official UK landings are absent in ICES FishStat. This gap was filled by the preliminary estimate that was available to WGCSE 2013 (ICES, 2013). At the time of WGNEW 2014, no official landing statistics had been uploaded to ICES FishStat for France, Netherlands, Norway, Russia and Spain. In the case of pollack in VI and VII this is especially problematic with respect to the French landings. Therefore these have been estimated as the averages of the French landings in the three previous years (2010–2012).

The values used thus become 159 576 tons for Subarea VII and 6715 tons for Subarea VI.

Natural mortality: set to 0.2 arbitrarily. The standard deviation and distribution are set at 0.4 and lognormal, after a series of trial settings (see Figure 9.2.8 in ICES, 2013).

F_{MSY} to M: MacCall (2009) proposes a value of 0.6 for vulnerable stocks. Values of 0.6, 0.8 and 1.0 are used in order to test the sensitivity of the outputs.

B_{MSY} to B_0: 0.5 will be used in line with a value proposed by McCall (2009).

Depletion delta: is the fractional reduction in biomass from the beginning to the end of the time-series, relative to unfished biomass. A value of 0.5 is commonly used, whereas a value of 0 means that the biomass is unchanged and a value of 1 means that the stock is totally depleted. For Subarea VI, values of 0.8 and 0.9, for Subarea VII, values of 0.5, 0.6 and 0.7 will be used.

Given the fact that three F_{MSY}/M-values and two Depletion Deltas are tested for Subarea VI, a total of six DCAC-runs was carried out for this Subarea. In the case of Subarea VII, nine DCAC-runs were completed (three F_{MSY}/M-values * three Depletion Deltas). Tables 4.5.3 and 4.5.4 give an overview of all the input parameters of the 15 runs.

The results are as below:

Subarea VI		F_{MSY} to M		
		0.6	0.8	1.0
Depl. Δ	0.8	154	169	179
	0.9	148	163	174
Average		164		

Subarea VII		F_{MSY} to M		
		0.6	0.8	1.0
Depl. Δ	0.5	4218	4498	4688
	0.6	4016	4321	4532
	0.7	3834	4160	4387
Average		4295		

The DCAC (Depletion-Corrected Average Catch) outputs (table above) suggest that yield in Subarea VI could be increased up to 164 tons (comparable result as in the 2012 and 2013 computations, when DCAC was 162 tons). The possibility to increase the catch is supported by evidence of very low effort on targeting this species due to restrictive regulations for inshore fisheries in the area. In 2012, the fisheries advice for this Subarea was calculated as a 10% increase of the average landings of the three preceding years (2010–2012), as the three year average landings were only around $^{1}/_{3rd}$ of the DCAC. The 2013 re-examination gave almost identical results, so the advice was not changed. Although the three year average landings (2011–2013) doubled in the 2014 analysis (due to the much higher UK landings in 2013), it was still only around $^{2}/_{3rds}$ of the new DCAC-value (see Table 4.5.5). Therefore, the perception of the stock has not changed, and WGNEW 2014 feels that the same advice as last year is still valid for Subarea VI.

In Subarea VII, the range of sustainable yield estimated by DCAC averaged 4295 tons (3928 tons in 2013 and 4008 tons in 2012). This is supported by the observation that landings for the last 20 years have been around that level without any signs of decline (the lower 1999 yield being the consequence of a problem in the French database). Given the fact that the differences between the three year average landings and the calculated mean DCAC-values were very similar in 2013 and 2014, and that these differences were smaller than 10% in both years (average landings 7.46% higher than DCAC in 2013, and 9.66% higher in 2014), WGNEW 2014 also sticks to the same advice as last year for Subarea VII (no decrease in landings advised).

Therefore also the combined advice for Subareas VI and VII doesn't change compared with the 2013 advice.

Uncertainties in assessment: the weakness of the DCAC analysis resides in the non-inclusion of the significant removals from the recreational fisheries. If managers want to actively manage pollack fisheries in VI and VII then better data on recreational fisheries will be needed. From preliminary data it seems likely that catches in recreational fisheries are of a similar order of magnitude to, or larger than, commercial landings. Also no discard information has been included, but these are considered to be negligible.

4.5.5 Data requirements

Stock identity: This section is not dedicated to a 'stock', it relates to a species in a wider region where data are available. ICES does not necessarily advocate that VI–VII constitutes a management unit for pollack. Further work on the stock identity of this species needs to be carried out, not only to investigate possible differentiation within the advisory unit VI–VII but also with respect to the differentiation between pollack in the advisory units VI–VII and IV–IIIa. More information can be found in WGNEW (ICES, 2012c).

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.

Progress in the qualification of the status of pollack in the Celtic Seas can be made by processing all the data available through the EU fisheries monitoring programmes in place in all EU Member States since 2002 (EU, 2010). This can only be achieved if experts are formally designated as stock coordinator and stock assessor in order to take

the leadership on the needed analysis. As already pointed out by the ICES RGCS in 2011 (see Section 9.2.1 of WGCSE 2013) and in the text above, more information is also needed on details of the fisheries (more spatial detail in landings data; especially for the earlier years in the time-series, landings by gear, length compositions, discards); life-history/biological parameters and recreational fisheries (catch and effort statistics).

4.6 Pollack in Subarea IV and Division IIIa

4.6.1 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 dataseries appears to be reasonably consistent and adequate for allocating catches to ICES subareas. Considering that pollack in the North Sea is not subject to TAC regulations, there is no incentive for underreporting or misreporting into other areas. Landings figures thus probably reflect the main trends in landings in the different areas correctly.

Landings by country for the years 1977–2013 in Subdivision IIIa (Skagerrak/Kattegat) and Subarea IV (North Sea) are shown in Tables 4.6.1 and 4.6.2. Figure 4.6.1 shows total landings in Subarea IV and Division IIIa 1977–2013 by area and by country. Two periods with high landings can be seen in the 1970s and 1990s, while catches have been at a rather stable low level over the last decade.

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, possibly in fisheries targeting spawning aggregations. In Norway the most important gears used are gillnets and otter trawls, which are responsible for 70% and 14% of the landings respectively. A comparison between Norwegian landings from in- and outside the 12 mile zone shows that, for instance in 2011, in Division IIIa 97% was taken within the 12 mile zone (by gillnet and *Pandalus* trawl). In Subarea IV 66% of the landings were taken within the 12 mile zone (again by gillnets), whereas in the area beyond the 12 mile zone the main landings came from otter trawls.

Pollack is also often caught in recreational fisheries, but no data on these catches are known to the working group. Pollack is one of the three species for which the ICES Working Group on Recreational Fisheries Surveys (WGRFS; ICES 2012b) recommended in 2012 that data collection on recreational fisheries under the new DCF or in the future, the DCMAP, should take place because the recreational fishery has a potential important impact on the population and because of socio-economic importance.

4.6.2 Survey data/ recruit series

Pollack is caught in the IBTS Q1 and Q3 surveys in small numbers only, albeit slightly higher in the Q1 survey. They are distributed mainly over the Northwestern North Sea (along the Norwegian Deeps) and into the Skagerrak (Figure 4.6.2). Length–frequency plots (Figures 4.6.3a and 4.6.3b) show that most individuals caught are between 40–60 cm. Catches of smaller pollack are rare, probably because the younger fish reside nearer to shore in shallow waters, where they are not available to the survey. Time-series of catches (standardized rates in kg/hour of mature fish) in the IBTS surveys are shown for Subarea IV and Division IIIa separately, for quarter 1 (from

1977 onwards) and quarter 3 (from 1996 onwards) (Figure 4.6.4). To select mature fish from the total population, individuals of 40 cm or larger were included, based on the assumption that Lm (length at 50% maturity) is around 40 cm, i.e. around the age of 3 (Heino *et al*., 2012). Catches are irregular, and no clear patterns emerge. The time-series for quarter 1 in IIIa suggests a decrease in abundance of pollack in this area, which is also reported in Cardinale *et al*. (2012).

4.6.3 Biological sampling

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

4.6.4 Population biological parameters and other research

No information.

4.6.5 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 data and commercial landings data. The stock biomass of pollack is suggested to have increased from the 1940s to reach a peak in the late 1950s. Since then, the biomass has shown a decrease to reach a low value around 2000 where it has remained stable. IBTS Q3 survey data, although highly variable between years, shows some of that decline as well.

4.6.6 Data requirements

Apart from reporting landings 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. Figure 4.6.2, showing the distribution of IBTS catches, suggests that the distribution area of this stock may extend further North into Norwegian waters. It may be worthwhile therefore to investigate data from a Norwegian survey in the area. Considering that catches of pollack by recreational fisheries may be substantial, it would be useful to require data on the quantities of those catches.

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Table 4.4.1. Pollack in Subarea VIII and Division IXa: Official landings (tonnes) by country.

Area	Bay of Biscay (Subarea VIII)				Iberian (division IXa)		Total
Country	BE	ES	FR	UK	ES	PT	
1985	0	2304	2769	23	636	0	5732
1986	0	437	2127	5	237	0	2806
1987	0	584	2022	1	308	3	2918
1988	3	476	1761	6	329	7	2582
1989	13	214	1682	4	57	3	1973
1990	14	194	1662	2	27	1	1900
1991	1	221	1867	1	76	2	2168
1992	2	154	1735	0	65	2	1958
1993	3	135	1327	0	47	1	1513
1994	3	157	1764	0	28	3	1955
1995	6	153	1457	2	59	2	1679
1996	8	137	1164	0	43	2	1354
1997	2	152	1167	1	54	2	1378
1998	1	152	956	0	55	1	1165
1999	0	120	0	0	36	1	157
2000	0	121	1315	0	49	15	1500
2001	0	346	1142	0	81	41	1610
2002	0	170	1467	0	35	45	1717
2003	0	142	1245	1	39	31	1458
2004	0	211	1145	0	90	12	1458
2005	0	306	1311	0	132	6	1755
2006	0	251	1419	171	102	7	1950
2007	0	198	1238	62	103	5	1606
2008	0	265	814	64	128	31	1302
2009	0	218	1507	41	68	3	1837
2010	0	265	1269	44	91	2	1671
2011	0	321	1454	26	104	2	1907
2012	0	158	1095	0	139	2	1394
2013*	0.2		1337	8		3	1348

***Preliminary data.**

Table 4.4.2. Pollack in Subarea VIII and Division IXa: Annual landings (tonnes) from France, Spain and Portugal by country and gear.

YEAR	FRANCE				SPAIN			PORTUGAL		OTHERS	TOTAL
	Nets	Trawl	Lines	Others	Longlines	Gillnets	Others	Polyvalent	Trawl	---	
2001	325	136	75	8	31	53	169	-	-	0	766
2002	358	173	36	5	26	28	134	-	-	0	760
2003	570	202	65	3	31	35	146	-	-	1	1053
2004	542	151	57	4	47	36	222	16.5	0.1	-	1092
2005	378	205	95	6	90	36	161	7.8	0.6	0	988
2006	498	294	92	11	48	29	243	6.7	0.3	171	1400
2007	565	311	133	19	72	51	210	4.5	0.4	62	1433
2008	557	263	138	12	147	95	163	33.3	0	64	1506
2009	679	224	217	5	101	76	97	2.4	0.5	41	1446
2010	-	-	-	-	167	162	93	1.7	0.1	44	470
2011	-	-	-	-	207	199	20	1.2	0.3	26	455
2012	608	170	267	49	123	122	53	-	-	-	1392

Table 4.5.1. Pollack in Subareas VI and VII. Official landings by country in Subarea VI.

	BEL	DNK	FRA	GER	IRL	NLD	NOR	PRT	ESP	SWE	UK**	TOTAL
1950	1	-	-	-	-	-	-	-	-	-	295	296
1951	-	-	-	-	-	-	-	-	-	-	484	484
1952	-	-	-	-	-	1	-	-	-	-	503	504
1953	-	-	-	-	-	-	-	-	-	-	422	422
1954	-	-	-	-	-	-	-	-	-	-	452	452
1955	-	-	-	-	-	-	-	-	-	-	566	566
1956	-	-	-	-	-	-	-	-	-	-	528	528
1957	-	-	-	-	-	-	-	-	-	-	547	547
1958	-	-	-	23	-	-	-	-	-	-	710	733
1959	1	-	-	6	-	-	-	-	-	-	607	614
1960	15	-	-	-	-	-	-	-	-	-	441	456
1961	1	-	-	1	125	-	-	-	-	-	259	386
1962	2	-	-	8	197	-	-	-	-	-	235	442
1963	6	-	-	2	204	-	-	-	-	-	320	532
1964	1	-	-	1	130	-	-	-	-	-	368	500
1965	1	-	-	1	402	-	-	-	-	-	496	900
1966	2	-	-	-	200	-	-	-	-	-	428	630
1967	1	-	-	1	263	-	-	-	-	1106	413	1784
1968	5	-	-	2	214	-	148	-	-	1012	500	1881
1969	1	-	-	4	282	-	-	-	-	1224	667	2178
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

Table 4.5.1 (cont.). Pollack in Subareas VI and VII. Official landings by country in Subarea VI.

	BEL	DNK	FRA	GER	IRL	NLD	NOR	PRT	ESP	SWE	UK**	TOTAL
1990	-	-	76	-	150	-	1	-	-	-	192	419
1991	-	-	31	-	145	-	-	-	4	-	189	369
1992	-	< 0.5	21	-	23	-	-	-	-	-	203	247
1993	-	-	39	-	12	-	-	-	-	-	273	324
1994	-	-	34	-	26	-	-	-	-	-	276	336
1995	-	-	64	3	83	-	-	-	-	-	354	504
1996	-	< 0.5	29	-	97	-	1	-	-	-	210	337
1997	-	-	14	1	69	-	2	-	-	-	162	248
1998	-	-	21	-	60	-	-	< 0.5	-	-	147	228
1999	-	-	16[1]	-	73	-	3	-	-	-	136	228
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	-	-	-	4	-	5	37
2007	-	-	10	-	21	-	6	-	-	-	21	58
2008	-	-	8	-	21	-	1	-	-	-	23	53
2009	-	-	7	-	5	-	-	-	-	-	25	37
2010	-	-	6	-	34	-	< 0.5	-	-	-	39	79
2011	2	-	2	-	8	-	-	-	-	-	34	46
2012	-	-	2	-	10	-	-	-	2	-	33[2]	47
2013*	-	-	3[3,4]	-	34	[3]	[3]	-	[3]	-	218	252

*** Preliminary.**

**** including Channel Islands and Isle of Man.**

[1] mean of 1998 and 2000.

[2] value from WGCSE 2013 (lacking in ICES FishStat).

[3] not yet provided at WGNEW 2014.

[4] average of 2010–2012.

Table 4.5.2. Pollack in Subareas VI and VII. Official landings by country in Subarea VII.

	BEL	DNK	FRA	GER	IRL	NLD	NOR	ESP	UK**	TOTAL
1950	93	-	-	-	-	-	-	-	375	468
1951	74	-	-	2	-	-	-	-	380	456
1952	80	-	-	10	-	-	-	-	336	426
1953	34	-	-	-	-	-	-	-	252	286
1954	17	-	-	4	-	-	-	-	365	386
1955	38	-	-	-	-	-	-	-	247	285
1956	67	-	-	1	-	-	-	-	155	223
1957	219	-	-	6	-	-	-	-	367	592
1958	342	-	-	17	-	-	-	-	233	592
1959	158	-	-	32	-	-	-	-	251	441
1960	317	-	-	-	-	-	-	-	267	584
1961	268	-	-	-	360	-	-	-	210	838
1962	367	-	-	1	369	-	-	-	170	907
1963	95	-	-	-	411	-	-	-	176	682
1964	299	-	-	-	342	-	-	-	194	835
1965	362	-	-	-	335	-	-	-	231	928
1966	456	-	-	-	438	-	-	-	175	1069
1967	417	-	-	-	474	-	-	-	202	1093
1968	214	-	-	-	508	-	-	-	167	889
1969	142	-	-	-	794	-	-	-	161	1097
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

Table 4.5.2 (cont.). Pollack in Subareas VI and VII. Official landings by country in Subarea VII.

	BEL	DNK	FRA	GER	IRL	NLD	NOR	ESP	UK**	TOTAL
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	-	7	2540	6077
1998	92	-	2375	-	886	1	-	11	2347	5712
1999	86	-	2399(1)	-	976	-	3	19	1703	5186
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	1531	4661
2007	91	-	1970	-	782	3	-	1	1764	4611
2008	76	-	1578	-	738	1	-	14	1453	3860
2009	42	-	1699	-	828	4	-	3	1545	4121
2010	35	-	1846	-	942	2	-	3	1384	4212
2011	37	-	1784	-	967	2	-	4	1814	4608
2012	43	-	1421	-	1165	1	-	3	1836(2)	4469
2013*	27	-	1684(3,4)	-	1223	(3)	(3)	(3)	2101	5053

*** Preliminary.**

**** including Channel Islands and Isle of Man.**

(1) mean of 1998 and 2000.

(2) value from WGCSE 2013 (lacking in ICES FishStat).

(3) not yet provided at WGNEW 2014.

(4) average of 2010–2012.

Table 4.5.3. Input parameters for the six DCAC runs carried out for pollack in Subarea VI.

	POL-CELT 2014 - VI - RUN 1	POL-CELT 2014 - VI - RUN 2	POL-CELT 2014 - VI - RUN 3	POL-CELT 2014 - VI - RUN 4	POL-CELT 2014 - VI - RUN 5	POL-CELT 2014 - VI - RUN 6
sumC	6715	6715	6715	6715	6715	6715
CV sumC	0	0	0	0	0	0
n° of yrs	28	28	28	28	28	28
iterations	10.000	10.000	10.000	10.000	10.000	10.000
M	0,2	0,2	0,2	0,2	0,2	0,2
stdev M	0,4	0,4	0,4	0,4	0,4	0,4
F_{MSY}/M	0,6	0,8	1	0,6	0,8	1
stdev F_{MSY} to M	0,2	0,2	0,2	0,2	0,2	0,2
distr F_{MSY} to M	normal	normal	normal	normal	normal	normal
B_{MSY}/B0	0,5	0,5	0,5	0,5	0,5	0,5
stdev B_{MSY}/B0	0,1	0,1	0,1	0,1	0,1	0,1
up lim B_{MSY}/B0	1	1	1	1	1	1
low lim B_{MSY}/B0	0	0	0	0	0	0
depletion delta Δ	0,8	0,8	0,8	0,9	0,9	0,9
stdev Δ	0,1	0,1	0,1	0,1	0,1	0,1
distr Δ	normal	normal	normal	normal	normal	normal

Table 4.5.4. Input parameters for the 9 DCAC runs carried out for pollack in Subarea VII.

	POL–CELT 2014 – VII – RUN 1	POL–CELT 2014 – VII – RUN 2	POL–CELT 2014 – VII – RUN 3	POL–CELT 2014 – VII – RUN 4	POL–CELT 2014 – VII – RUN 5	POL–CELT 2014 – VII – RUN 6	POL–CELT 2014 – VII – RUN 7	POL–CELT 2014 – VII – RUN 8	POL–CELT 2014 – VII – RUN 9
sumC	159 576	159 576	159 576	159 576	159 576	159 576	159 576	159 576	159 576
CV sumC	0	0	0	0	0	0	0	0	0
n° of yrs	28	28	28	28	28	28	28	28	28
iterations	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000	10.000
M	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2
stdev M	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4
F_{MSY}/M	0,6	0,8	1	0,6	0,8	1	0,6	0,8	1
stdev F_{MSY} to M	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2
distr F_{MSY} to M	normal								
B_{MSY}/B0	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5
stdev B_{MSY}/B0	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
up lim B_{MSY}/B0	1	1	1	1	1	1	1	1	1
low lim B_{MSY}/B0	0	0	0	0	0	0	0	0	0
depletion delta Δ	0,5	0,5	0,5	0,6	0,6	0,6	0,7	0,7	0,7
stdev Δ	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
distr Δ	normal								

Table 4.5.5. Comparison of the 2014 and 2013 DCAC results.

DCAC	VI	% CHANGE	VII	% CHANGE
2014	164	1,23%	4295	9,43%
2013	162	0%	3928	0%
2012	162		4008	
Average landings	VI	% diff. to DCAC	VII	% diff. to DCAC
2011–2013	115	70,12%		109,66%
2010–2012	57	35,19%		7,46%

Table 4.6.1. Pollack. Landings by country in Division IIIa as officially reported to ICES.

	ICES Division IIIa							
	Belgium	Germany	Denmark	Netherl.	Norway	Sweden	UK	Total
1977	10	4	1764	3	449	706	0	2936
1978	1	4	2077	0	556	794	0	3432
1979	13	0	1898	0	824	1066	0	3801
1980	13	0	1860	0	987	1584	0	4444
1981	5	0	1661	0	839	1187	1	3693
1982	1	0	1272	0	575	417	0	2265
1983	2	0	972	0	438	288	0	1700
1984	2	0	930	0	371	276	0	1579
1985	0	0	824	0	350	356	0	1530
1986	4	0	759	0	374	271	0	1408
1987	6	0	665	0	342	246	0	1259
1988	4	0	494	0	350	136	0	984
1989	3	0	554	0	313	152	0	1022
1990	8	0	1842	0	246	253	0	2349
1991	2	0	1824	0	324	281	0	2431
1992	8	0	1228	0	391	320	0	1947
1993	6	1	1130	0	364	442	0	1943
1994	5	0	645	0	276	238	0	1164
1995	10	0	497	0	322	271	0	1100
1996	0	0	680	0	309	273	0	1262
1997	0	0	364	0	302	178	0	844
1998	0	0	299	0	330	105	0	734
1999	0	0	192	0	342	88	0	622
2000	0	0	199	0	268	33	0	500
2001	0	1	201	0	253	46	0	501
2002	0	3	228	0	202	44	0	477
2003	0	3	168	1	236	17	0	425
2004	0	2	140	4	179	34	0	359
2005	0	5	160	7	173	153	0	498
2006	0	10	103	3	178	36	0	330
2007	0	9	172	0	245	38	0	464
2008	0	5	161	0	247	33	0	446
2009	0	7	206	0	220	38	0	471
2010	0	8	313	1	195	35	0	552
2011	0	7	193	0	168	28	0	396
2012	0	7	200	0	171	37	0	415
2013	0	3	209	0	172	35	0	420

Table 4.6.2. Pollack landings by country in Subarea IV as officially reported to ICES.

	ICES Subarea IV										
	Belgium	Germany	Denmark	Faroe	France	NL	Norway	Poland	Sweden	UK	Total
1977	121	142	0	0	75	38	419	9	0	442	1246
1978	102	154	0	0	98	21	492	2	0	471	1340
1979	62	64	0	0	72	8	563	11	31	429	1240
1980	82	58	0	0	66	2	1095	0	0	355	1658
1981	59	21	0	0	173	2	1261	0	0	362	1878
1982	46	40	0	0	59	1	1169	33	0	270	1618
1983	58	44	0	0	79	1	1081	0	0	300	1563
1984	52	37	0	0	108	0	880	2	0	315	1394
1985	14	23	0	0	69	0	686	0	0	363	1155
1986	44	21	485	0	45	0	602	0	0	362	1559
1987	21	21	424	0	988	0	471	0	0	290	2215
1988	32	30	421	0	367	10	560	0	0	296	1716
1989	31	21	273	0	0	4	568	0	0	269	1166
1990	44	34	917	0	0	3	651	0	0	366	2015
1991	31	48	1464	0	0	4	887	0	0	684	3118
1992	49	59	794	0	18	7	1051	0	0	1310	3288
1993	46	161	1161	0	8	19	1429	0	0	1561	4385
1994	42	55	635	0	12	14	845	0	113	872	2588
1995	56	84	532	1	7	18	1203	0	175	1525	3601
1996	13	99	366	0	4	13	909	0	82	945	2431
1997	20	115	272	1	1	11	733	0	82	1185	2420
1998	21	44	265	0	7	5	567	0	75	780	1764
1999	21	62	288	0	0	5	768	0	72	636	1852
2000	45	38	291	0	24	5	880	0	91	877	2251
2001	36	40	156	0	6	1	860	0	63	809	1971
2002	27	112	234	0	6	0	879	0	68	711	2037
2003	13	82	191	0	9	1	971	0	36	837	2140
2004	28	57	162	0	5	0	517	0	16	612	1397
2005	26	128	173	0	3	3	511	0	46	477	1367
2006	18	80	152	0	4	1	545	0	12	587	1399
2007	18	137	192	0	130	2	754	0	43	905	2181
2008	15	114	150	0	129	1	840	0	46	999	2294
2009	13	50	121	3	6	1	668	0	32	658	1552
2010	12	129	163	0	10	0	599	0	32	540	1485
2011	12	67	106	0	10	0	580	0	35	489	1299
2012	17	102	123	0	3	1	433	0	42	400[1]	1100[1]
2013	16	66	127	0	0	0	371	0	28	458	1067

[1] **From preliminary catch statistics in 2012 (rounded).**

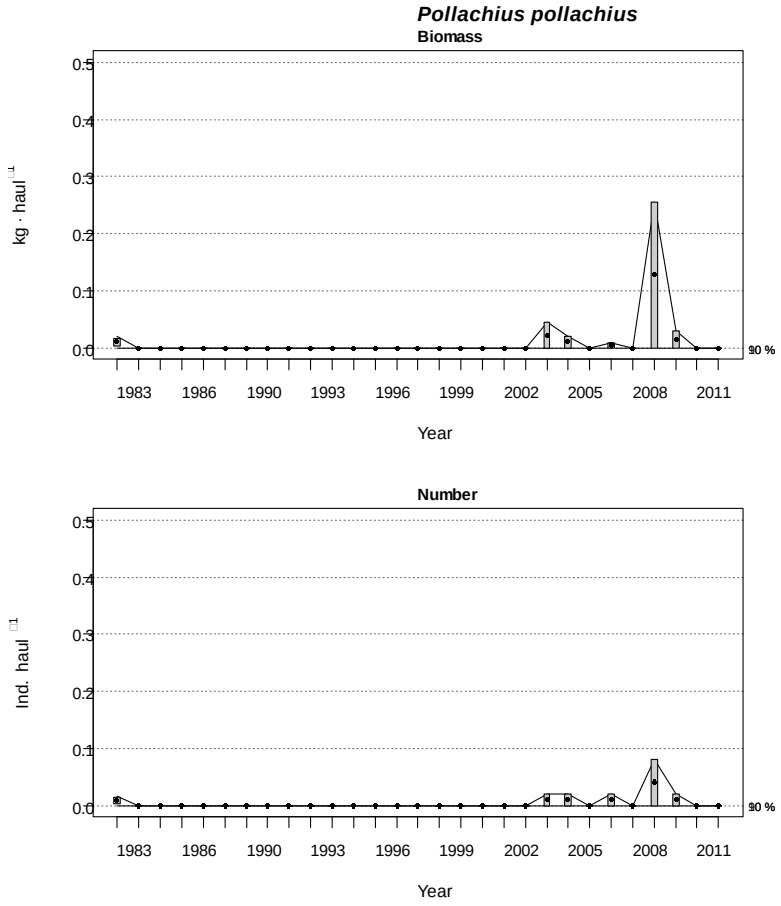

Figure 4.4.1. Pollack in ICES Subarea VIII and Division IXa: Abundance indices from the Spanish survey in Cantabrian Sea and off Galicia (SP-GFS).

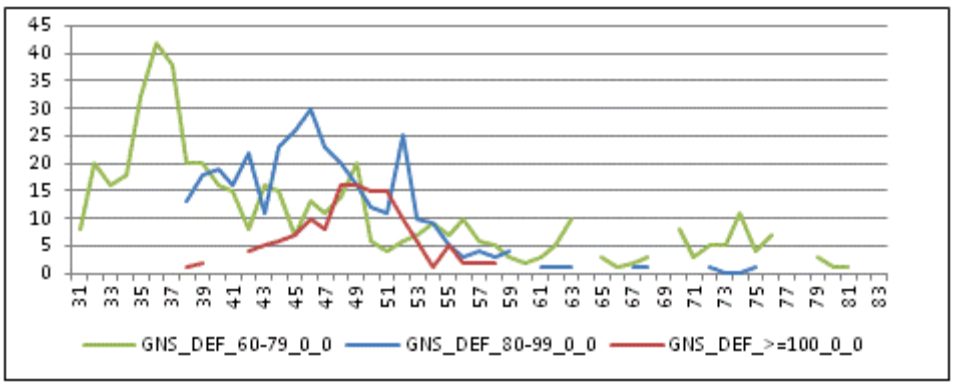

Figure 4.4.2. Pollack in ICES Subarea VIII and Division IXa: length–frequency distribution (LFD) of the three main Spanish métiers of gillnet in VIIIc-IXaN.

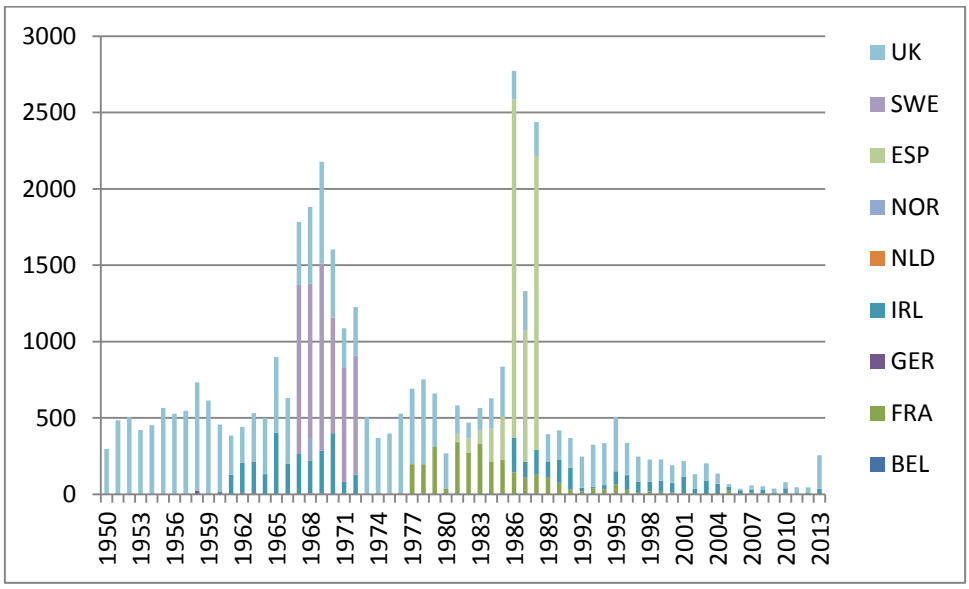

Figure 4.5.1. Official international landings of pollack *Pollachius pollachius* by country in Subarea VI (source: ICES FishStat).

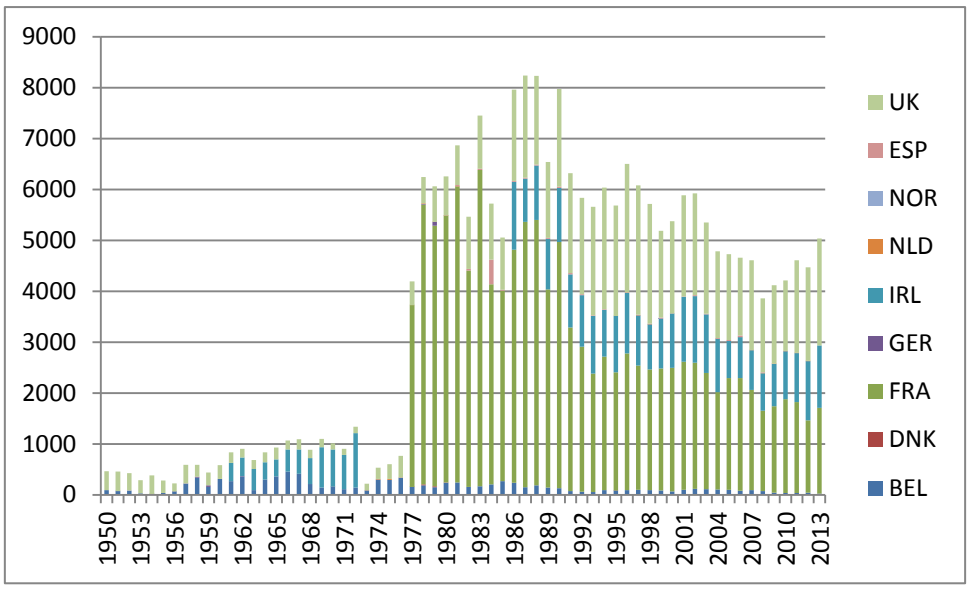

Figure 4.5.2. Official international landings of pollack *Pollachius pollachius* by country in Subarea VII (source: ICES FishStat).

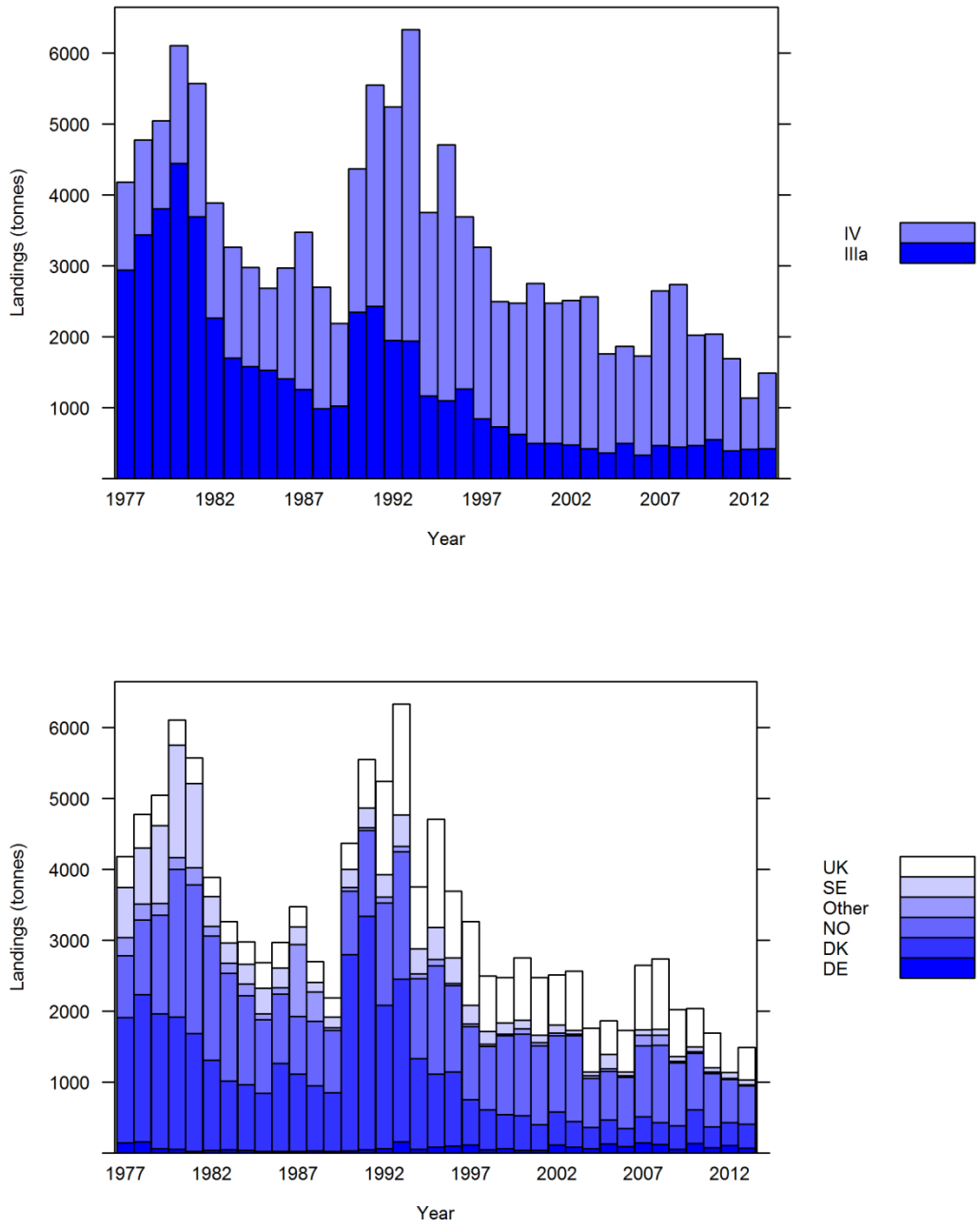

Figure 4.6.1. Total landings of pollack in Division IIIa and Subarea IV by area (top) and by country (bottom) as officially reported to ICES.

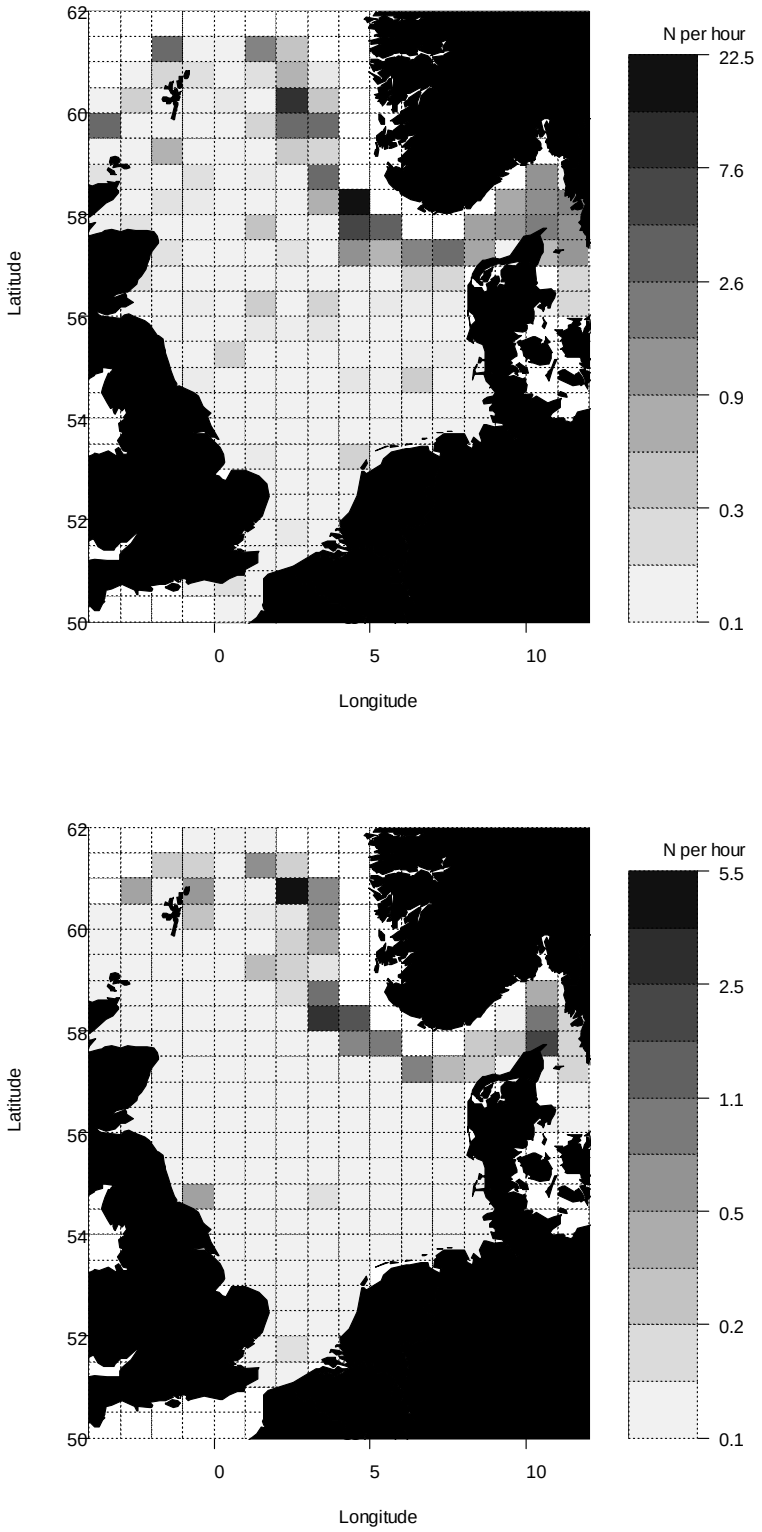

Figure 4.6.2. Distribution of catches of pollack in the IBTS Q1 (top) and Q3 (bottom) surveys in the North Sea and Skagerrak. Abundance is shown as N per hour caught in the GOV-trawl, based on all data available in Datras.

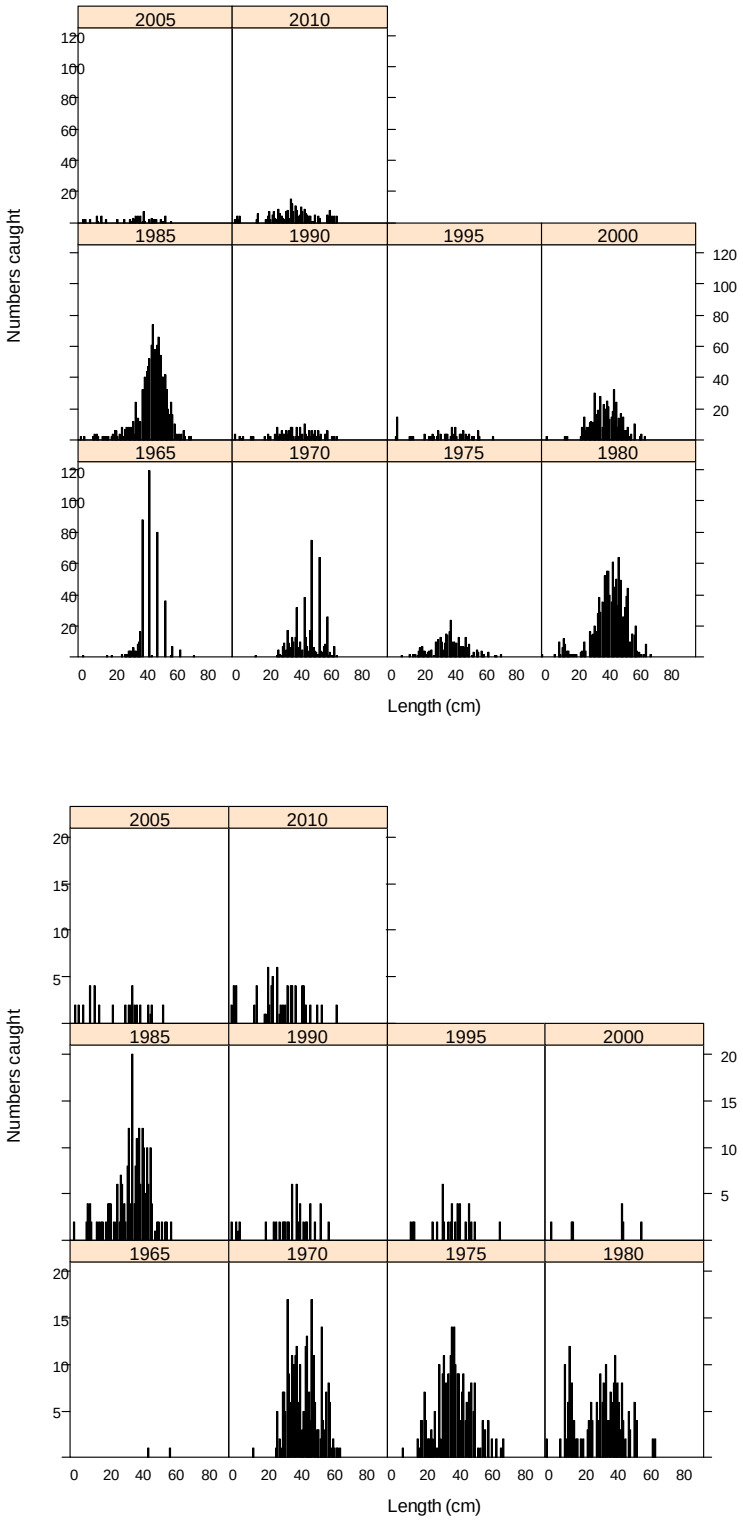

Figure 4.6.3a. Length distribution of pollack catches in the North Sea IBTS Q1 survey for Areas IV and IIIa combined (top) and for Area IIIa only (bottom) by 5-year periods.

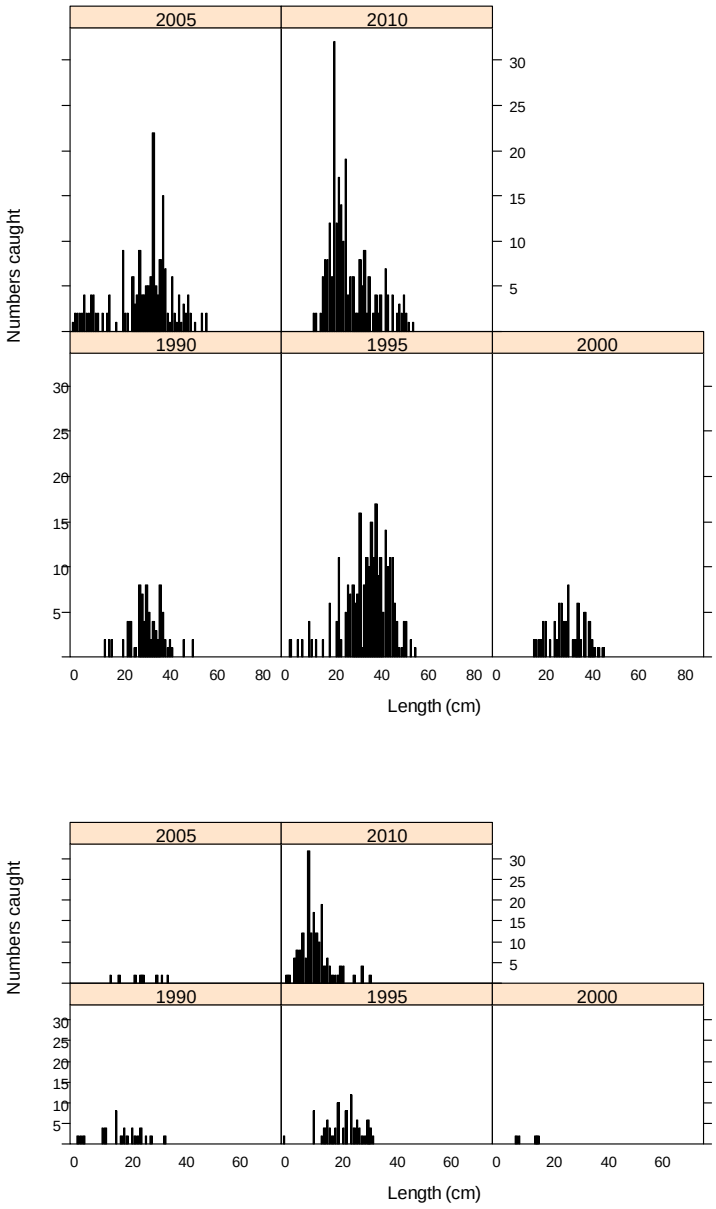

Figure 4.6.3b. Length distribution of pollack catches in the North Sea IBTS Q3 survey for Areas IV and IIIa combined (top) and for Area IIIa only (bottom) by 5-year periods.

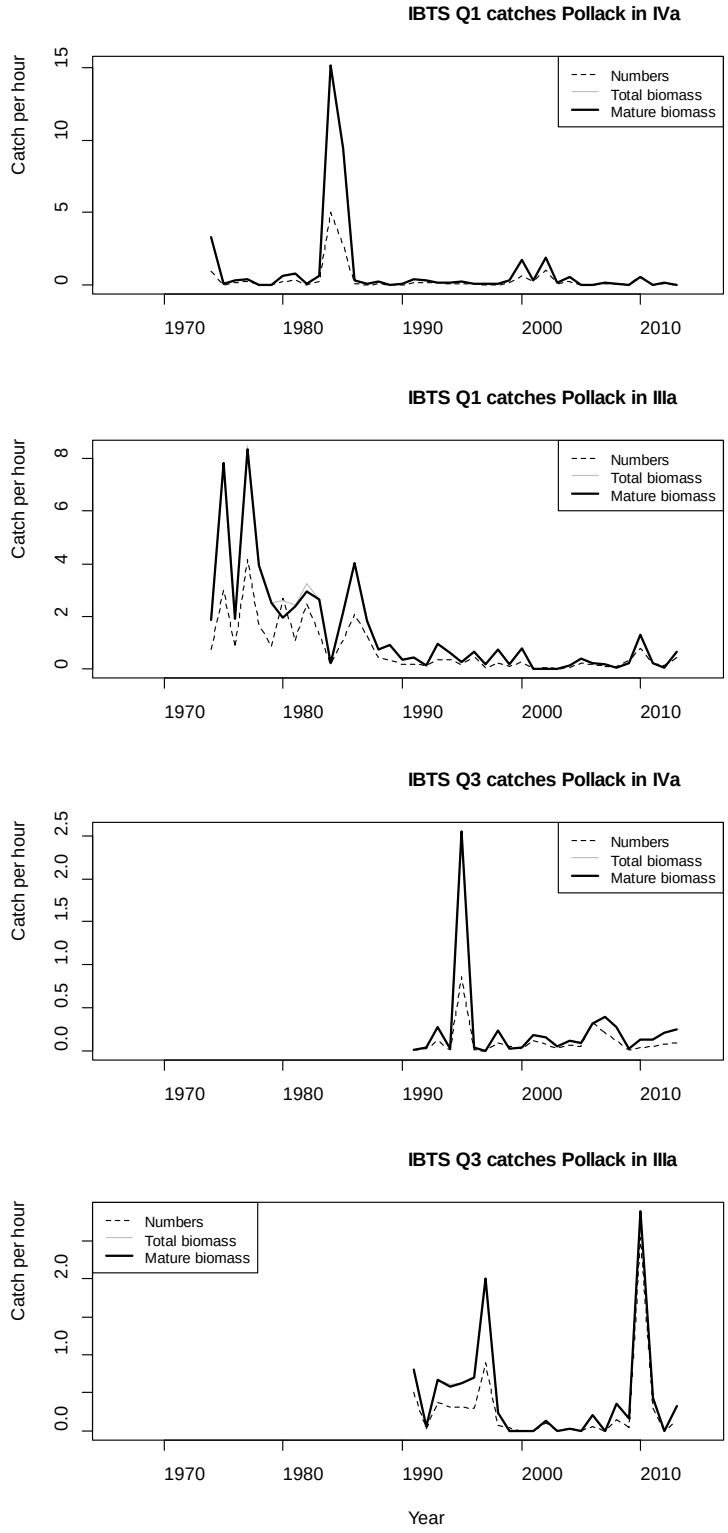

Figure 4.6.4. Time-series of catches of pollack in the IBTS Q1 and Q3 surveys in the North Sea and in the Skagerrak, shown as numbers and weight (kg) caught per hour with the GOV-trawl. Data from Datras.

5 Striped red mullet in Subareas and Divisions VI, VIIa–c, e–k, VIII, and IXa

5.1 General biology

Striped red mullet (*Mullus surmuletus*) is a benthic fish found along the European coasts from southern Norway and the Faroe Islands in the North, to the Strait of Gibraltar in the South (Davis and Edward, 1988; Gibson and Robb, 1997). The species is also found in the northern part of western Africa and in the Mediterranean and Black Seas (Quéro and Vayne, 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 CGFS (Channel Ground Fish Survey) in the eastern English Channel showed that young individuals are distributed in coastal areas, while adults exhibit preferentially an offshore distribution in the eastern part (Carpentier *et al*., 2009).

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 found mostly on sandy substrata (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, it resulted in catch of immature individuals (<14 cm), which has recently been targeted and landed. There is no TAC for this stock.

5.3 Stock ID and possible management areas

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.

Benzinou *et al*. (2013) suggest that the population of striped red mullet can be geographically divided in three zones:

- The Bay of Biscay (NBB + SBB);
- A mixing zone composed of the Celtic Sea and the Western English Channel (CS + WEC);
- A northern zone composed of the Eastern English Channel and the North Sea (EEC + NS).

Here, we deal with the first areas.

5.4 Fisheries data

Since 1975, officially recorded landings have strongly increased. Landings are mainly taken from Subarea VII and VIII, and especially by France (Figure 5.1). 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 5.1). In the Western English Channel striped red mullet is also caught by gillnets. The north of the Bay of Biscay (VIIIa,b) is exploited by France and Spain. The south (VIIIc) is only exploited by Spain.

The trawlers in the striped red mullet fishery have a length and a power respectively of about 20 meters and 400 kilowatts.

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 available for the Bay of Biscay and the Celtic sea (EVHOE survey). 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 and 17 cm (TL). In consequently, the abundance of this survey gives 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 500 m. The PCTS (Portuguese Crustacean Trawl Survey) covers the Southwestern and the South regions of the Portuguese continental coast, with depths ranging from 200 to 750 m. 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

In the Bay of Biscay sexual maturity and length measures were taken in 2009 by AZTI.

An inventory of the French data collected from the Bay of Biscay to the North Sea is given in Table 5.2 for the different striped red mullet stocks combined. No such overview is available for the subset of samples taken for this stock. French samplings started in 2004 in the Eastern Channel and in south North Sea, and since 2008 in the Bay of Biscay.

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 VIIIa,b at the end of 2007. In 2007–2008, the striped red mullet otolith exchange had for goal to optimize age estimation between countries (ICES, 2009).

In 2011, an Otolith Exchange Scheme has been realized, 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 oto-

liths, 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.

5.9 Data requirements

Regular sampling of biological parameters of striped red mullet catches must be continued under DCF. Sampling in the Celtic Sea and in the Bay of Biscay started in 2008. In 2010 and 2011, sampling for age and maturity data was reduced compared to 2009, due to the end of the Nespman project.

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

5.10 References

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Quéro, J.C. and Vayne, J.J. 1997. Les poissons de mer des pêches françaises. Ifremer, Ed. Delachaux and Niestlé, 304pp.

Table 5.1. Striped red mullet. Landings as officially reported to ICES.

Year	VIIbc	VIIe	VIIf	VIIg	VIIh	VIIj	VIII	IXa	Other
1977	0	283	2	0	0	0	338	0	0
1978	0	358	1	1	25	0	202	0	0
1979	0	190	3	3	15	0	307	0	4
1980	0	210	2	1	26	0	489	0	0
1981	0	119	7	0	0	0	277	0	0
1982	0	118	4	0	0	0	399	0	0
1983	0	280	3	0	0	0	648	0	0
1984	0	180	3	0	0	0	796	0	0
1985	0	181	3	1	29	0	843	0	0
1986	0	141	3	1	29	0	829	0	0
1987	0	205	5	2	24	1	950	0	0
1988	0	214	7	1	29	0	880	0	0
1989	0	163	6	0	23	0	851	87	0
1990	0	346	2	1	40	0	863	92	0
1991	0	350	12	3	56	1	891	118	4
1992	0	306	15	5	36	3	867	0	3
1993	2	389	15	3	32	15	613	0	3
1994	9	265	14	4	49	21	645	0	5
1995	0	354	13	6	79	6	578	0	4
1996	1	674	14	7	73	45	625	192	1
1997	0	628	18	8	73	0	646	192	0
1998	0	638	13	21	79	27	554	7	0
1999	NA	NA	NA	NA	NA	NA	NA	NA	NA
2000	1	759	16	11	64	5	1015	14	5
2001	2	879	26	11	72	2	1037	34	15
2002	0	659	21	6	77	2	879	5	9
2003	8	677	17	9	79	5	1209	9	0
2004	4	1073	31	19	108	12	1571	55	0
2005	11	1041	46	33	108	3	1431	38	1
2006	1	868	50	24	103	6	1582	39	0
2007	1	1046	53	22	104	12	1441	267	1
2008	1	879	46	15	72	12	990	296	0
2009	3	592	26	8	73	16	1540	243	0
2010	4	638	25	11	59	15	1665	331	2
2011	0	665	19	10	56	5	1713	309	2
2012	0	383	18	6	29	4	1308	280	0
2013	1	226	22	7	36	2	788	195	0

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

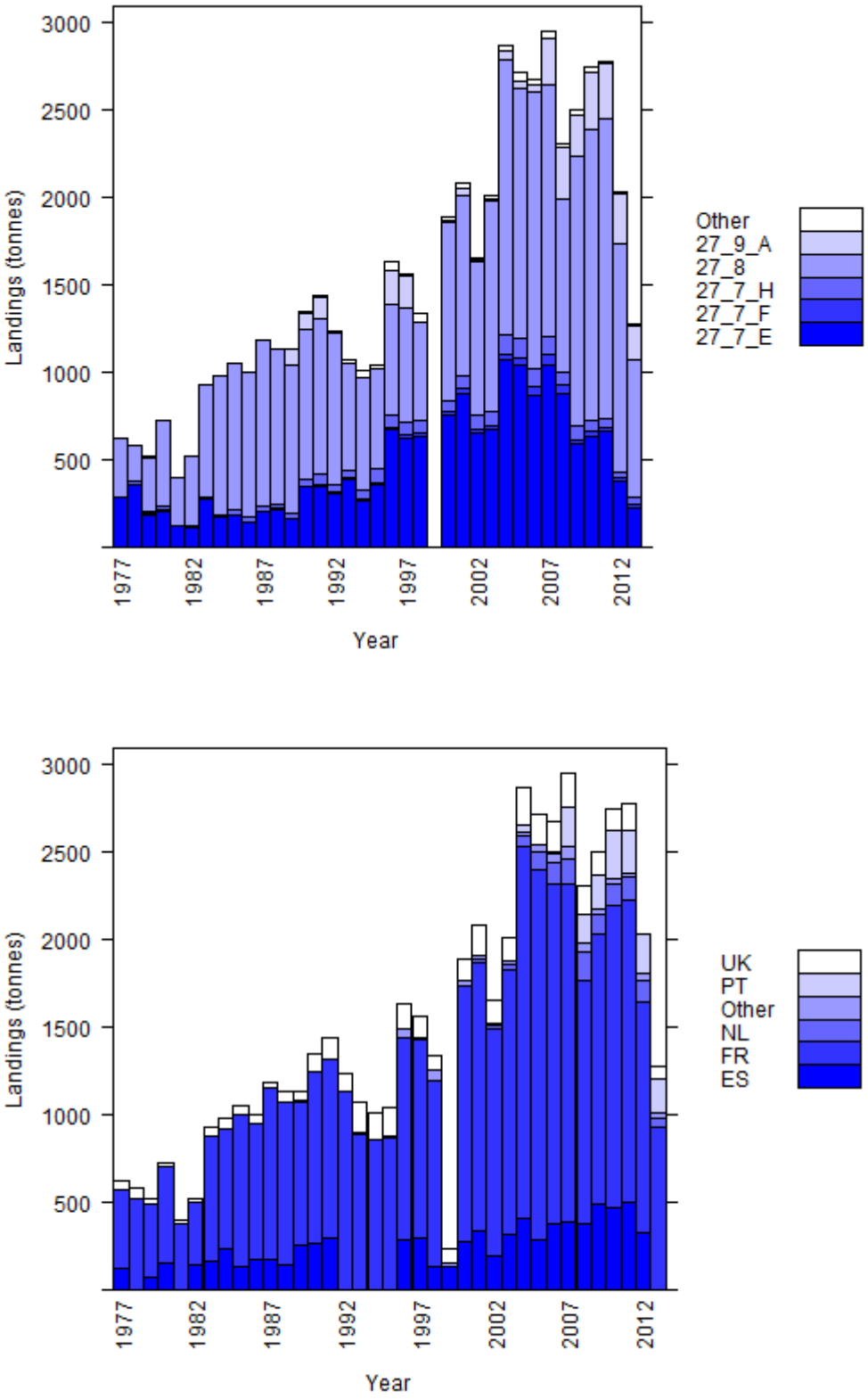

Figure 5.1. Striped red mullet. Landings per country (top panel) and per ICES area (bottom panel). As officially reported to ICES.

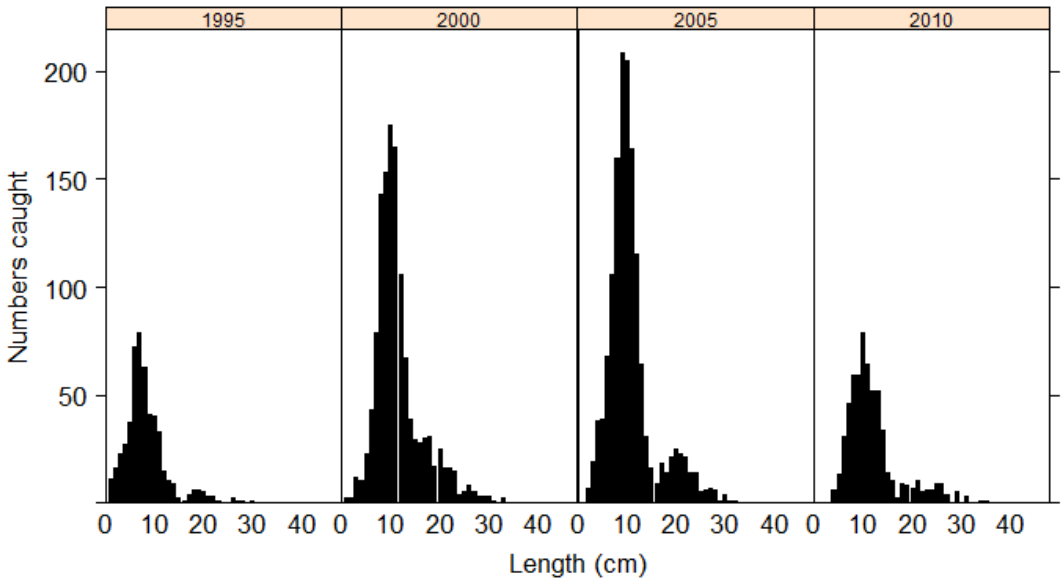

Figure 5.6. Striped red mullet. Length distribution of EVHOE Q4 survey catches in four consecutive 5-year periods.

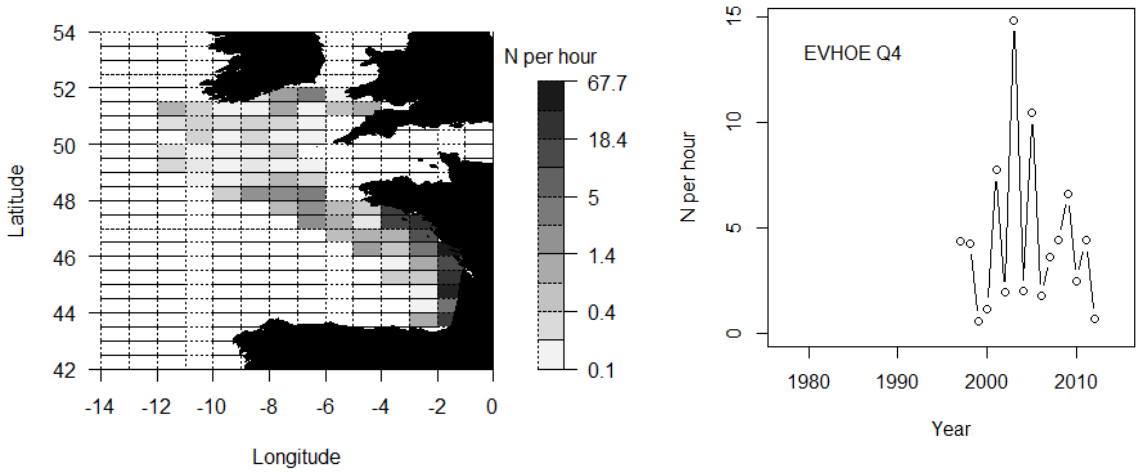

Figure 5.6. Striped red mullet. Spatial distribution of EVHOE Q4 survey abundance estimates and time-series of abundance (Nb/hour) of EVHOE Q4 survey.

6 Sole in Subdivision VIIIc and IXa

6.1 General biology

Common sole (*Solea solea*) spawning takes place in winter/early spring and varies with latitude starting earlier in the south (Vinagre, 2007). Larvae migrate to estuaries where juveniles concentrate until they reach approximately two years of age and move to deeper waters. In Portuguese waters, sole length of first maturity is estimated as 25 cm for males and 27 cm for females (Jardim *et al*., 2011). Sole is a nocturnal predator and therefore more susceptible to be captured by fisheries at night than in daytime. It feeds on polychaetes, molluscs and amphipods. *S. solea* is abundant in the Tagus estuary and uses this habitat as nursery ground. (Cabral and Costa, 1999).

Recent growth studies based on *S. solea* otolith readings in the Portuguese coast indicate L_{inf} 52.1 cm (females) and 45.7 cm (males) while the growth coefficient (k) estimate of females (K=0.23) was slightly higher than for males (k=0.21) and to -0.11 and 1.57 for females and males respectively, (Teixeira and Cabral, 2010). Maximum length observed between 2004 and 2011 from the landings sampling program (PNAB-DCF) attained 60 cm. According to Vinagre (2007) *S. solea* off the Portuguese coast presents higher growth rates compared with the northern European coasts.

6.2 Stock identity and possible assessment areas

There is no clear information to support the definition of the common sole stock for ICES Subdivision VIIIc and IXa.

6.3 Management regulations (TACs, minimum landing size)

The minimum landing size of sole is 24 cm. There are other regulations regarding the mesh size for trammel and trawlnets, fishing grounds and vessel's size. A precautionary TAC was set for *Solea spp*. in ICES Divisions VIIIc–e, Subareas IX and X.

6.4 Fisheries data

Table 6.1 presents all soles species official landings by country, for Division VIIIc and IXa. Table 6.2 indicates only common sole (*Solea solea*) official landings by Division and country. Figure 6.1 illustrates *Solea* species *(Solea solea, Solea senegalensis* and *Pegusa lascaris*) landings for Divisions VIIIc and IXa.

There is evidence of market *solea* species misclassification which means *solea solea* Portuguese official landings might not correspond only to this species but mixed with *Solea senegalensis* and *Pegusa lascaris.* Based on harbour length sampling data it is possible to separate the soles complex using scientifically identified proportions of each species: *Solea solea*, *S. senegalensis* and *Pegusa lascaris*, and this was estimated for the landings in Portugal (Division IXa) (Borges *et al.,* 2014).

Landings length compositions for *Solea solea* are presented for the Portuguese area (Figure 6.2) (Borges *et al.,* 2014).

Based on the DCF discard sampling in Portugal discards for Sole (*Solea solea*) only occur in negligible small amounts due to the minimum landing size or damaged specimens.

6.5 Survey data, recruit series

Solea solea is rarely caught in the existing Portuguese bottom-trawl research surveys (Jardim *et al.*, 2011). This species may be found along the Portuguese coast mainly from very shallow waters and estuaries up to 100 m depth. To monitor sole species a dedicated independent research survey is necessary.

6.6 Biological sampling

In Division IXa, existing biological sampling is based on fishery data from commercial vessels landings.

6.7 Population biology parameters and a summary of other research

Solea solea maturity ogives by sex, length–weight relationship, sex-ratio by length based on harbour DCF sampling were presented in 2012 for Division IXa (Jardim *et al.*, 2011).

6.8 General problems

In Portugal *Solea solea* (SOL) is caught together with and other similar species *Solea senegalensis* (OAL) and *Pegusa lascaris* (SOS) and there are evidences of misreporting sole (*Solea solea*) with the other two species. Figure 6.3 indicates the proportion of landings attributed to each species based on harbour DCF-IPMA sampling. It is apparent that the most abundant species in the area is *Solea senegalensis* (OAL) as reflected by the estimated higher catches, than *Solea solea* and *Pegusa lascaris*, based on the scientifically separated species sampling.

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Table 6.1. Sole in Divisions VIIIc and IXa. Official landings of *solea* spp: *Solea solea*, *Pegusa Lascaris* and *solea senegalensis*, by country and division (in tonnes.

SOLEA SPP	DIV VIIIC				DIVISION IX		TOTAL	
year	Spain	Portugal	France	Total	Spain	Portugal	Total	*solea* spp
1977						976	976	976
1978					310	606	916	916
1979					152	581	733	733
1980					166	628	794	794
1981					155	800	955	955
1982					275	789	1064	1064
1983					140	635	775	775
1984					242	626	868	868
1985			1	1	370	600	972	973
1986				0	444	1081	1525	1525
1987		3	1	1	609	1173	1787	1788
1988		7	1	8	479	1277	1772	1780
1989	22	8		30	194	1435	1689	1719
1990	22	5		27	192	1223	1469	1496
1991	10	3		13	290	1076	1392	1405
1992	19	1	1	21	171	1115	1328	1349
1993	15	3	1	19	75	1327	1440	1459
1994	15	2		17	35	1212	1281	1298
1995	6	3		9	33	1232	1283	1292
1996	13	4		17	61	938	1033	1050
1997	23	4		27	155	800	1009	1036
1998	40	4		44	188	726	1002	1046
1999	40	2		42	206	639	929	971
2000	89	2	7	98	184	735	1115	1213
2001	224	1		225		759	1209	1434
2002	25	1	1	27	115	579	748	775
2003	8	3	4	15	234	635	899	914
2004	45	12		57	120	783	1017	1074
2005	80	10		90	194	821	1195	1285
2006	81	10	1	92	73	594	851	943
2007	31	11	1	43	80	381	547	590
2008	36	11	1	48	97	467	660	708
2009	48	6	2	56	91	552	755	811
2010	49	7	2	58	152	616	884	942
2011		6				698	704	704
2012		7				(516)	523	523
2013						(618)	618	618

In brackets data provided to WGNEW members by Member States.

Table 6.2. Official landings for Sole (*Solea solea*) in Subdivision VIIIc and IXa.

year	Spain	France	Portugal	totals
2004	-	0	164	164
2005	240	0	27	267
2006	154	1	22	177
2007	-	0	269	269
2008	-	0	321	321
2009	-	3	360	363
2010	-	2	380	382
2011	-	1	293	294
2012	-	4	397	401
2013	-	-	432*	

*** provisional.**

- not available.

Table 6.3. Landings (ton) of *S. solea* (SOL), *P. lascaris* (SOS) and mixed soles species (SOX) by fleet/métier since 2003 (Division IXa. Source DGRM (official landings).

	SOS				SOL				SOX				ALL SPP
Year	Dtrawl	Polyvalent	Pseine	Total	Dtrawl	Polyvalent	Pseine	Total	Dtrawl	Polyvalent	Pseine	Total	total
2003	3.5	94.2	0.0	97.7	1.4	109.9	0.0	111.3	26.5	385.0	2.2	413.7	622.7
2004	3.6	112.8	0.2	116.7	1.8	141.9	0.1	143.9	19.4	442.0	2.2	463.6	724.2
2005	5.4	143.2	0.1	148.7	5.5	269.9	0.7	276.2	11.3	387.9	3.0	402.2	827.1
2006	1.1	84.7	0.5	86.3	8.8	272.5	5.0	286.3	3.9	156.1	2.6	162.6	535.3
2007	1.7	52.4	0.1	54.1	16.7	247.1	2.8	266.5	1.6	56.5	0.1	58.2	378.8
2008	1.0	74.9	0.0	76.0	18.4	277.1	1.2	296.7	0.7	67.6	0.0	68.4	441.1
2009	1.2	132.3	0.1	133.6	16.9	315.3	1.8	334.1	0.2	55.2	0.0	55.4	523.1
2010	1.0	153.8	0.5	155.3	17.2	361.9	3.6	382.7	0.1	76.5	0.0	76.5	614.5
2011	1.7	171.2	0.1	173.0	27.9	402.2	2.3	432.4	0.1	86.3	0.0	86.4	691.8
2012	0.8	102.7	0.1	103.6	20.2	351.1	2.0	373.3	0.0	39.0	0.0	39.0	515.6
2013	0.9	150.0	0.7	151.6	19.0	411.6	1.1	431.7	0.0	34.3	0.0	34.3	617.6

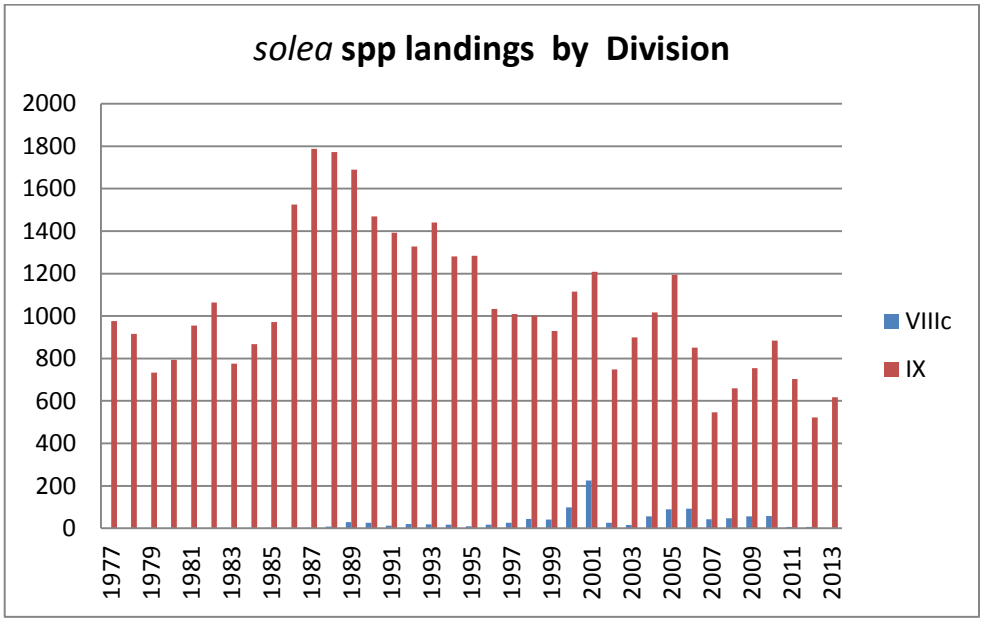

Figure 6.1. Sole in Divisions VIIIc and IXa. Official landings of *solea* spp: *Solea solea, Pegusa Lascaris* and *solea senegalensis*, by country and division (in tonnes).

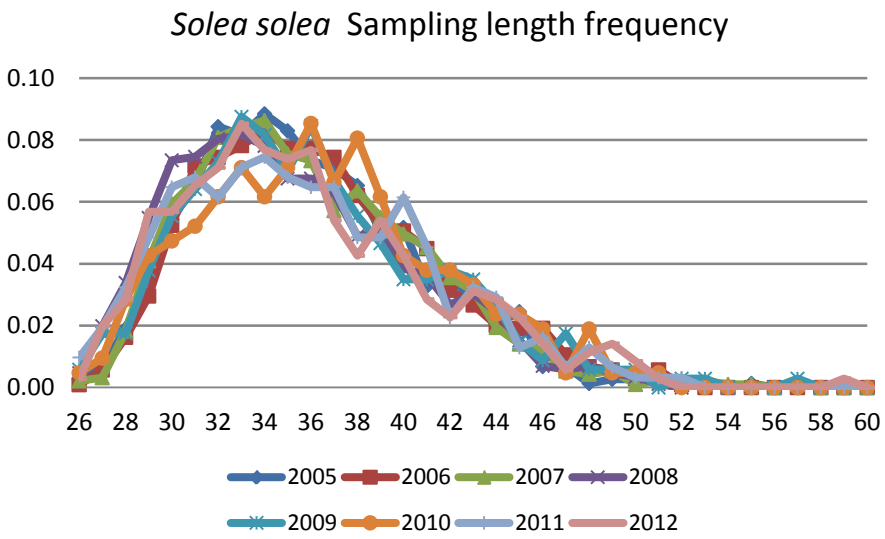

Figure 6.2. Division IXa (Portugal. *Solea solea* sampling length frequency from all métiers harbour sampling DCF-IPMA.

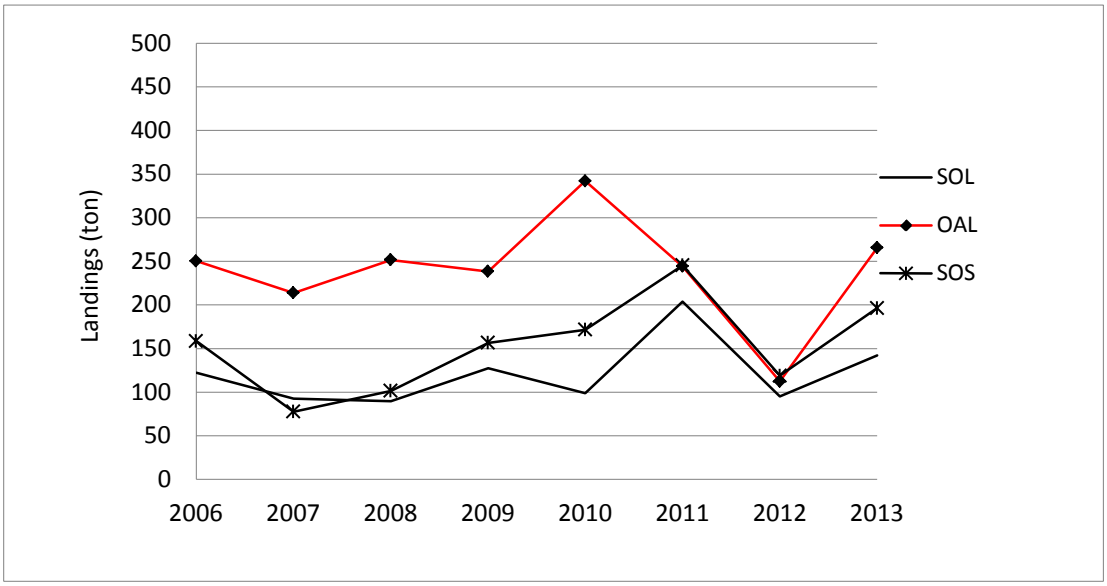

Figure 6.3. Estimated landings of *Solea solea* (SOL), *Solea senegalensis* (OAL) and *Pegusa lascaris* (SOS) for Division IXa (Portugal).

7 Grey Gurnard in the Celtic Seas and West of Scotland (ICES Subareas VI and VII; excl. VIId)

7.1 General Biology

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

The grey gurnard is an abundant demersal species that is especially common on sandy grounds, but also occurs on rocky and muddy bottoms. It can be found from the coastline up to depths of 140 m. The species is less abundant in the English Channel, the Celtic Sea and the Bay of Biscay than in the North Sea and the Skagerrak/Kattegat.

The species mainly feeds on crustaceans (mostly shrimps and shore crabs) and small fish (mostly gobies, sandeels, young herring and flatfish).

Spawning takes place in spring and summer. There do not seem to be clear nursery areas. Grey gurnard can reach a maximum published length of 60 cm.

7.2 Stock identity and possible assessment areas

No studies on the stock ID of grey gurnard are known. In a pragmatic approach (in the absence of specific information on stock structure), the ICES Ecoregions are currently used as a minimum level of disaggregation for the definition of stock units. This way, three grey gurnard stocks are currently recognized: 1) the North Sea (including IIIa and VIId), 2) the Celtic Seas and West of Scotland, and 3) the South European Atlantic (Bay of Biscay and Atlantic Iberian waters). This is an interim solution until more information becomes available on the stock structure of this species. ICES does not necessarily advocate that the Areas VI and VII constitute a management unit for grey gurnard, and further work is required. More information can be found in the reports of WGNEW 2010 and 2012 (ICES, 2010, 2012) and in the Stock Annex.

7.3 Management

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

7.4 Fisheries data

Fisheries: Grey gurnard is mainly taken as a bycatch 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. More information on the UK (England and Wales) and Russian fisheries in 2012 can be found in working documents 8 and 25 of the report of WGCSE 2013 (ICES, 2013).

Landings: In the past, gurnards were often not sorted by species when landed and reported into one generic category of "gurnards". In the EU, this approach was legal until 2010. After that the legislation changed, now requiring all gurnards to be landed under their exact species names. As a consequence, the official statistics seem to improve gradually over the years, but it remains problematic to disentangle the past gurnard landings into the different species parts. Another problem is that the catch statistics are incomplete for several years: some countries reporting no landings at all,

other countries reporting exceptionally high landings in certain years. A third aspect relates to the spatial entities in which landings are reported. Sometimes landings from certain ICES Divisions are reported separately, sometimes they are pooled in larger geographical units (e.g. VIId and VIIe vs. VIIde).

The landings of grey gurnard in the Celtic Seas and West of Scotland are presented in Table 7.1 and Figure 7.1 for ICES Subareas VI and VII combined (source: ICES FishStat). These show large intra-annual fluctuations, probably mainly due to the above mentioned problems. In the period 2007–2011 the international landings appear to be among the lowest in the time-series, but in 2012 and 2013 values of 275 tonnes and 723 tonnes were reached respectively, mainly due to an increase of the UK landings in those years. In the most recent decade, Subarea VI was only responsible for less than 5% of the total landings.

Discards: Due to the low commercial value, catches of grey gurnard are largely discarded. Therefore, landing data will not reflect the actual catches and are thus only considered to be marginally informative. Only DCF observer programmes and/or self-sampling programmes could provide more accurate estimates of the true catches. Some data on discards of grey gurnard have been analysed in previous WGNEW meetings, but no comprehensive international overview of discard practices could be compiled for this stock area. In general, the observed discard rates were highly variable.

7.5 Survey data

Several surveys that catch grey gurnard could be identified in the Celtic Seas and West of Scotland. Four of these have data available through DATRAS (EVHOE-WIBTS-Q4, FR-CGFS-Q4, IE-CGFS-Q4 and BTS-VIIa-Q3), but also some Scottish, Spanish, Russian and Northern Irish surveys could prove to be informative with respect to the trends of grey gurnard in the northern and central parts of the stock area (VI, VIIa, VIIbc).

So far, only the data from EVHOE-WIBTS-Q4 (VIIfghj) have been analysed by WGNEW (updated in WGNEW 2014), but obviously this survey can only be used as an indicator of abundance of grey gurnard in this area. Figures 7.2–4 illustrate that grey gurnard is caught in sufficient numbers by this survey to deliver a meaningful abundance index. The highest abundances are observed in the northern part of the Celtic Sea and south of Ireland (Figure 7.2). The abundance index (numbers per hour) shows a much higher mean abundance over the last six years compared to the years before, but the signal is very noisy (Figure 7.3). From Figure 7.4 it becomes clear that EVHOE catches mainly immature grey gurnards (FishBase: Lm = 19.3 cm).

7.6 Biological sampling

No new analyses of biological data could be carried out by WGNEW 2014. Information on the scarce biological data that are available for this species can be consulted in the Stock Annex.

7.7 Analysis of stock trends

Information from landings is very poor, due to poor reporting (gurnard landings are not always identified at the species level or delivered in sufficient spatial detail, and there are additional concerns regarding misreporting) and also because the low value of the species leads to massive discarding. The EVHOE trend cannot be assumed to

be relevant to the entire stock area. Therefore, the status of grey gurnard in the Celtic Seas and West of Scotland is not exactly known, and no certain statements can be made with regards to the trends in this stock.

7.8 Data requirements

Further progress can be made with respect to:

- the stock identity of grey gurnard in the Northeast Atlantic;
- the reported landings (species-specific and by ICES Division);
- discards;
- analysis of other surveys;
- biological data from commercial sampling programmes.

Progress on processing all this information can only be achieved if experts are formally designated as stock coordinator and stock assessor in order to take the leadership on the needed analysis.

7.9 References

ICES. 2010. Report of the Working Group on Assessment of New MoU Species (WGNEW), 11–15 October 2010, Copenhagen, Denmark. ICES CM 2010/ACOM: 21. 544 pp.

ICES. 2012. Report of the Working Group on Assessment of New MoU Species (WGNEW), 5–9 March 2012, Copenhagen, Denmark. ICES CM 2012/ACOM:20. 269 pp.

ICES. 2013. Report of the Working Group for the Celtic Seas Ecoregion (WGCSE), 8–17 May 2013, Copenhagen, Denmark. ICES CM 2013/ACOM:12. 1974 pp.

Additional references are to be found in the Stock Annex.

Table 7.1. Grey Gurnard in Subarea VI and Divisions VIIa–c, e–j. Official landings by country (source: ICES FishStat).

	BEL	FRA	IRL	NLD	RUS	UK	TOTAL
1978	0	206	0	0	0	0	206
1979	0	165	0	0	0	0	165
1980	0	155	0	0	0	0	155
1981	0	0	0	0	0	0	0
1982	0	407	0	0	0	0	407
1983	0	271	0	0	0	0	271
1984	0	157	0	0	0	2	159
1985	35	130	0	0	0	2	167
1986	0	280	0	0	0	0	280
1987	37	216	0	0	0	0	253
1988	30	211	0	0	0	21	262
1989	34	646	0	0	0	0	680
1990	18	538	16	0	0	0	572
1991	17	298	15	0	0	4	334
1992	13	123	17	0	0	0	153
1993	11	113	10	0	0	1	135
1994	11	107	0	0	0	2	120
1995	7	101	0	0	0	0	108
1996	6	117	0	0	0	2	125
1997	8	61	0	0	0	2	71
1998	13	59	38	0	0	0	110
1999	11	0	0	0	0	0	11
2000	13	109	0	7	26081	0	26210
2001	3	116	0	0	3155	13	3287
2002	7	81	0	0	60	11	159
2003	3	66	0	1	263	0	333
2004	5	61	0	7	1401	0	1474
2005	9	59	0	8	2456	0	2532
2006	4	28	0	10	138	6	186
2007	4	24	0	1	0	4	33
2008	7	1	0	3	0	1	12
2009	11	33	0	1	0	8	53
2010	14	45	0	5	0	12	76
2011	18	49	0	3	1	19	82
2012	24	57	0	2	92	101(1)	275
2013*	14	(2)	0	(2)	(2)	709	723

*** Preliminary.**

(1) value from WGCSE 2013 (lacking in ICES FishStat).

(2) not yet provided at WGNEW 2014.

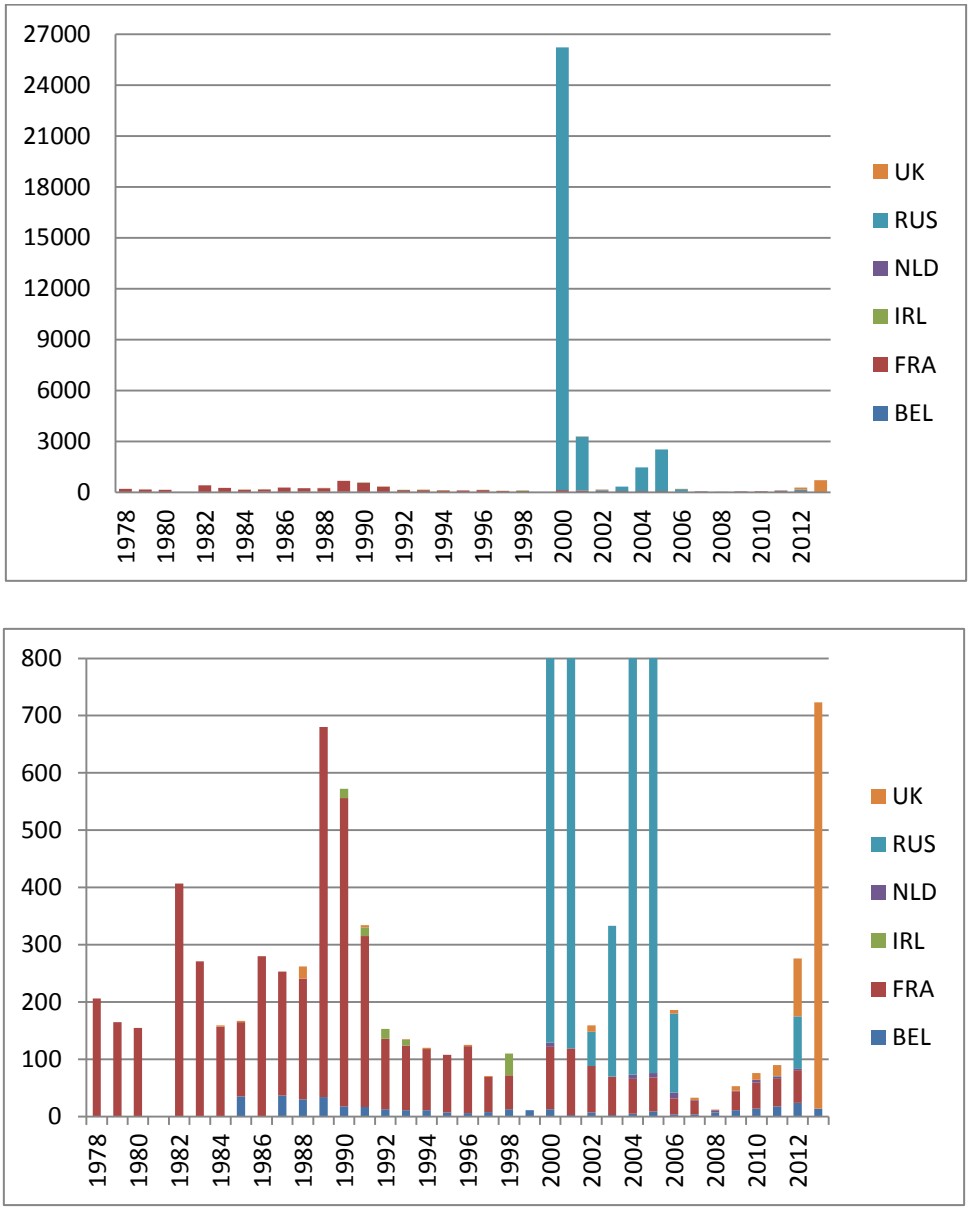

Figure 7.1. Grey Gurnard in Subarea VI and Divisions VIIa–c, e–j. Official landings by country (source: ICES FishStat). The lower panel presents a detailed view of the lower range of values from the top panel.

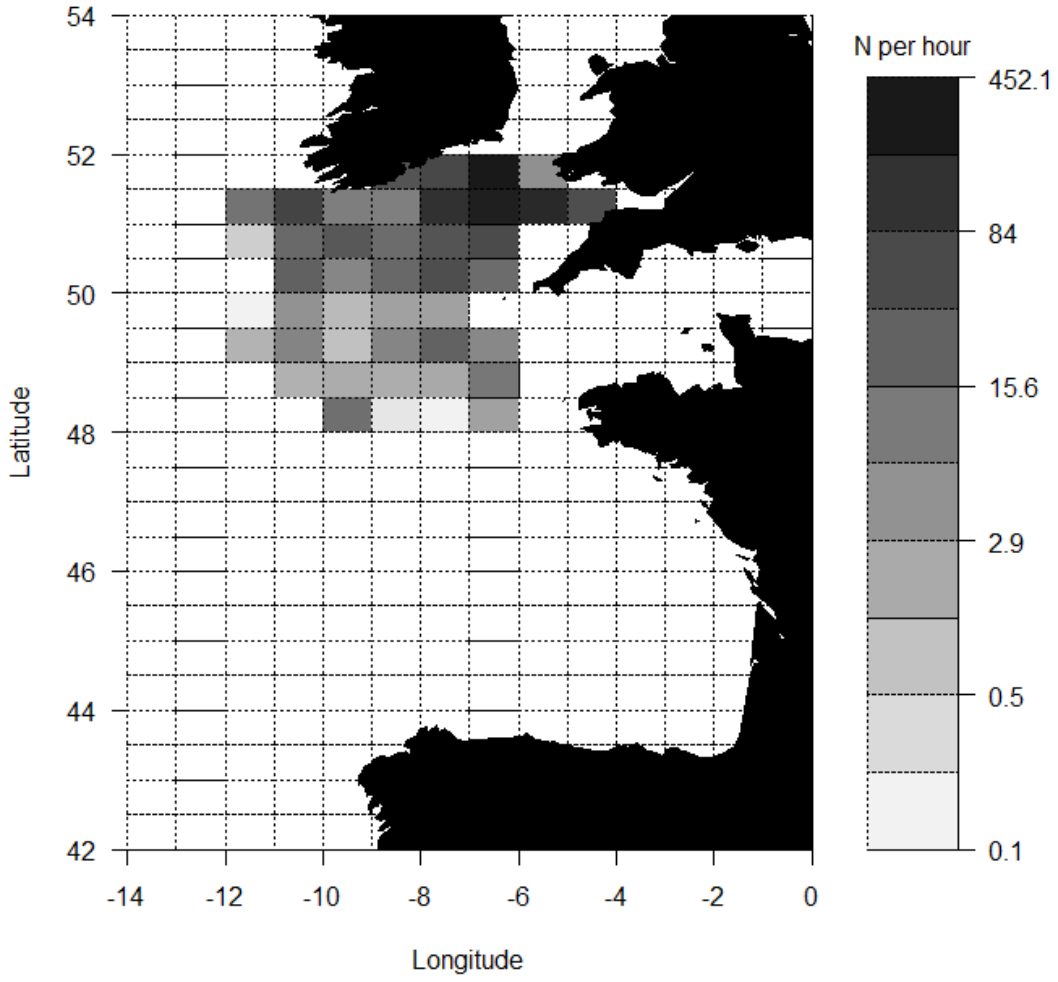

Figure 7.2. Grey Gurnard in Subarea VI and Divisions VIIa–c, e–j. Distribution of catches of grey gurnard in the EVHOE-WIBTS-Q4. Abundance is shown as N per hour caught, based on all data available in Datras.

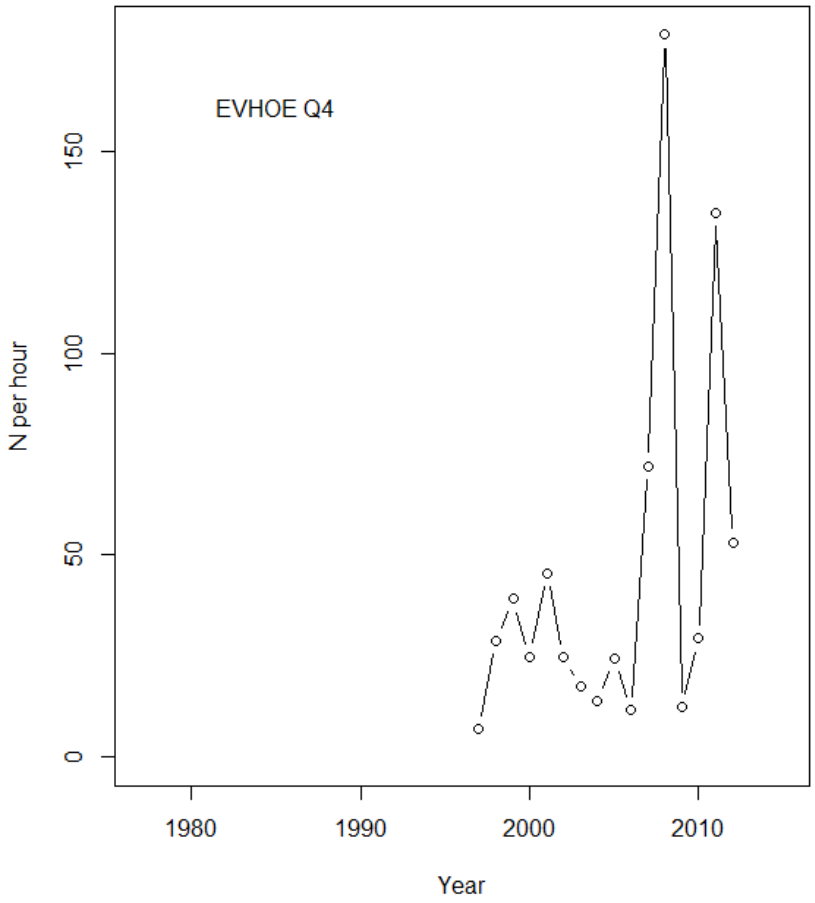

Figure 7.3. Grey Gurnard in Subarea VI and Divisions VIIa–c, e–j. Time-series of catches of grey gurnard in the EVHOE-WIBTS-Q4, shown as numbers caught per hour. Data from Datras.

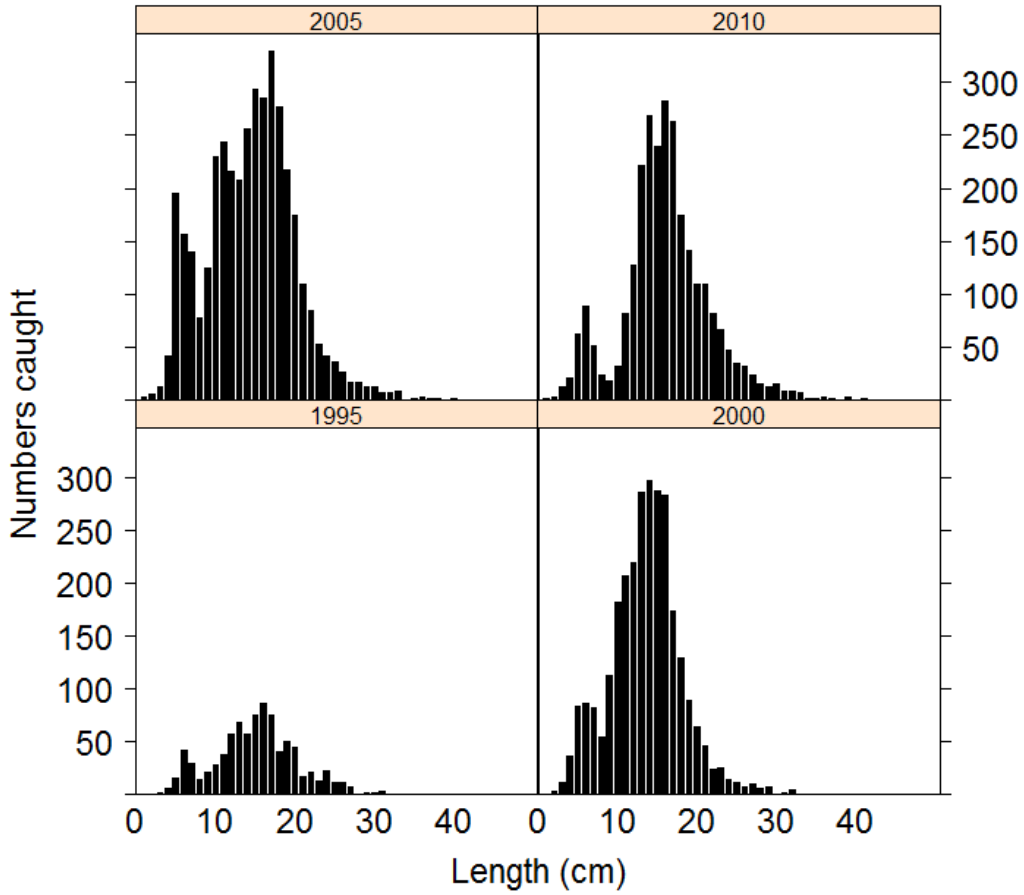

Figure 7.4. Grey Gurnard in Subarea VI and Divisions VIIa–c, e–j. Length distribution of grey gurnard catches in the EVHOE-WIBTS-Q4 by 5-year periods.

Annex 1: Participants list

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Annex 2: Terms of Reference for meeting

2013/2/ACOM21 The **Working Group on Assessment of New MoU Species** (WGNEW), chaired by Jan Jaap Poos, The Netherlands will meet in Copenhagen, Denmark 24–28 March 2013 to:

a) Address generic ToRs for Regional and Species Working Groups for the stocks in the table below. For stocks for which Advice should be drafted, the assessment and draft advice should be available to the respective ecoregion assessment expert group, for further improvements to the fisheries and ecosystem sections.

b) For stocks without an advice request, development on stock identity and data compilation should be undertaken as far as possible.

c) For gurnard stocks the overall distribution between catch and survey information on the species needs to be presented and indications on the way advice can be given for this conglomerate of species are welcomed.

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

WGNEW will report by 10 April 2014 to ACOM and SSGSUE, and relevant ecoregion assessment working groups.

Fish Stock	Stock name	Stock Coord.	Assess. Coord.	Advice needs	Advice
Sol-8c9a	Sole in Divisions VIIIc and IXa	PT		Data needed from all countries	Update
Pol-89a	Pollack in Subarea VIII and Division IXa	BEL/NL		Data needed	Update
Pol-celt	Pollack in Subareas VI and VII	BEL		Data needed	Update
Pol-nsea	Pollack in Subarea IV and Division IIIa	NL		Data needed	Update
gur-comb	Red gurnard in the Northeast Atlantic	FR		Data needed for combined gurnard to see what advice options are possible	Update
gug-347d	Grey gurnard in Subarea IV (North Sea) and Divisions VIId (Eastern Channel) and IIIa (Skagerrak - Kattegat)	DE			Update
gug-celt	Grey gurnard in Subarea VI and Divisions VIIa–c and e–k (Celtic Sea and West of Scotland)	BEL			Update
Guu-comb	Tub gurnard in the Northeast Atlantic	-			Not required
mur-west	Striped red mullet in Subarea VI, VIII and Divisions VIIa–c, e–k and IXa (Western area)	NL		Data needed	Update

Annex 3: Stock Annexes

Stock Annex for Red Gurnard

Stock specific documentation of standard assessment procedures used by ICES.

Stock	Red Gurnard
Working Group	WGNEW
Date	March 2012
Revised by	Robert Bellail.

A. General

Red gurnard (*Aspitrigla cuculus* or *Chelidonichthys cuculus*) is widely distributed in Northeast Atlantic from South Norway and north of the British Isles to Mauritania (Quéro, 1984). Hureau (1986) indicates that this species is scarce in the North Sea. This species is also present in the Mediterranean Sea and off Western Africa to the latitude of the Canaries Islands.

This benthic species occurs on grounds between 20 m and 250 m. As with other species of gurnards, red gurnards are able to make audible sounds to help schooling during the spawning period (Wheeler, 1969). In the western Channel (VIIe), concentrations occur close to the Central Deep, limited to 90 m depth (Theret, 1983).

Surveys results and commercial fisheries data have shown that the species occurs from the southern North Sea to the Celtic Sea (Anon, 1993). October CGFS French surveys carried out since 1988 have confirmed that in Division VIId, red gurnards mainly occur in the central area (Carpentier and Coppin, 2000). This species is considered common in autumn as it was present in around 50% of the hauls. It is not found in bays and estuaries (Dauvin, 1988) and also when salinity is below 34°/00. Adults are found mainly in the south of Division VIId, off Normandy (Delcour, 1996; Carpentier *et al*., 1997; 2000). This species is usually fished on gravel or coarse sand.

On the other hand, results of French IBTS surveys in North Sea have shown that this species is scarce; with a few fish caught on rocky grounds offshore Scotland (Verin and Dufour, 1999).

Théret (1983) has suggested a spawning area in Division VIIe, between Ouessant Island and the Isle of Wight.

Observations on maturity stages showed that maturity started in December and spawning season could start at the end of February and end in June. Quéro (1984) and Hureau (1986) indicated that summer should be the spawning season. Studying all species of gurnards in the Bay of Douarnenez (west of Britany), Baron (1985) indicated that the spawning season is long (six months) and set a mean birthday at the 1st of March for red gurnard by analogy with grey gurnard but with a poor sample of red gurnards. The same author has provided some data on the size at first maturity (L50 = 27 cm for males and 28,4 cm for females). The mean size at first maturity could be set at 25 cm in a range of 26–29 cm at three years old (Forest, 2001).

A.1. Stock definition

In the English Channel, a stock structure within Divisions VIId and VIIe has not been established and Dunn (1996) recommended not to aggregate biological parameters from the two divisions.

Data available are not sufficient to state about stock identity for red gurnard from the southern North Sea and fish from English Channel and Celtic Sea, though data from IVc and VIId,e were aggregated because fish are present all through the year in these divisions (Forest, 2001).

B. Data

B.1. Commercial catch

Available EuroStat/ICES statistics have shown that species of gurnards are not always discriminated and data for Triglidae also occurred.

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

Figure B.1 and Table B.1 show the landings by country and area specific to red gurnard. There is a lack of French data in 1999. In Division VIIa, landings have fluctuated at less than 100 t. France seemed the main contributor to international landings except in area VIII, but Spanish data were not available. The bulk of landings seemed to come from Divisions VIId,e at around 4000 t. Landings in VIIf–k levelled at around 500 t. In VIII, landings fluctuated at around 200 t since the beginning of 1990s. France is the main contributor to international landings in all areas described except in VIIa. In recent years, the official landings from the main areas where red gurnard is harvested (VIId to k) have shown a continuous decreasing trend from 2003–2004 to levels recorded in years before; that means a decrease of around 50%.

Based on the French database available from the fish markets network, the main species of gurnards landed in France are red gurnard and tub gurnard. The series 1999–2008 shown in Figure B.6. Seasonal landings of gurnards in France from fish markets network has been revised and updated. The drop observed previously in 2003 in the dataset used at WGNEW 2007 was due to data recorded in duplicate in the database during the period 1999–2002. The seasonal pattern is quite regular from year to year either for red gurnard and for tub gurnard. The average landings of red gurnard over the series is around 4900 t. Two higher values are observed in 2002 and 2005 and then the landings of red gurnard tend to decrease to less than 4000 t in 2008. The French landings for different métiers in VIId and VIIe are sampled as a DCR requirement (Tables B.2 and B.3).

A series 1988–2008 based on logbooks is also available for France in Divisions IVc, VIId, VIIe and VIIf–k and Subarea VIII using a dataseries published in Forest (2001) and recent data from 1999 (Table B.4, Figures B.3 and B.4). The series 1999–2008 has been updated in 2010. The main area where red gurnard is caught is VIId+VIIe+VIIf–k. Datasets are rather consistent to those given by EuroStat/ICES database except a larger discrepancy in VIIe in 2008. Detailed data from the Celtic Sea have shown that landings are mainly provided by Division VIIh. The contribution of Division IVc has been generally marginal. In Division VIId, landings have fluctuated around 1200 t in the period 1989–1996, declined to 665 t in 2000, and remained below 1000 t since then. Over the time-series, There is in VIIe a general trend of increase with fluctuations except the odd drop in 2008. In VIIf–k, the landings have also increased since 2000

and have generally fluctuated around 700 t since then. In Subarea VIII the production has become marginal between the period 1999–2004 and then increased to levels observed in the years before.

Discards

In France, several métiers contribute to discarding in the western Channel (Morizur *et al.*, 1996).

- Gillnet with small meshes set in inshore waters and targeting crayfish, monkfish, sole and hake;
- Gillnet with large meshes targeting crabs have shown discarding of small amounts of red gurnard in winter;
- Red gurnard from coastal otter trawlers is more discarded in the western part of the area than in the eastern part where gurnards are used for baiting crabpots;
- Offshore otter trawlers have been discarding around 50% of red gurnard catches when they fished in the north of VIIe, on the Smalls grounds and Bristol Channel (VIIf,g).

Figures B.1 and B.2 show the estimates of landings and discards of red gurnard by French trawlers in 2010 in Divisions VIId and VIIe respectively. Tables B.2 and B.3 summarized the observations of catches at sea from French trawlers carried out under DCF in that year by concurrent sampling. The rate of discarding is estimated at 63% and 55% in VIId and VII e respectively.

The DCF program has provided by concurrent sampling new datasets of the discarding practice by métier for several countries.

B.2. Biological

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

Since 2003, under DCF sampling program 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 concurrent sampling was planned. The French sampling program by observation at sea under DCF should provide with length compositions of catches by métiers of the fishery when the tools to extract and exploit them will be developed (COST tools to adapt).

In surveys series, length data were available and age compositions are now available since 2008 at least for the FR-EVHOE survey which is partly funded by DCF but this survey is carried out outside the area where the bulk of landings is harvested. The abundance index per age from this survey where obtained by sampling 223 and 222 otoliths sampled during EVHOE 2008 and 2009 respectively.

Available growth parameters from several authors are summarized in Table B.11. They vary considerably. Maximum length is lower for males. Available length–weight relationships are shown in Table B.12.

A maturity ogive is not available except an assumed knife-edge at age 3. Biological parameters collected during EVHOE survey since 2008 could provide a first estimate in Celtic Sea.

Natural mortality has not been estimated in the areas studied.

A total of 696 otoliths from EVHOE (the Bay of Biscay and the Celtic Sea) and IBTS (the North Sea) surveys were interpreted. A summary of aged otoliths is shown below:

Surveys	2006	2007	2008	2009
EVHOE	236		222	222
IBTS		16		

Average sizes (cm) at the ages by sex (F: female; I: unspecified and M: male) from EVHOE 2006, 2008 and 2009 (the Bay of Biscay and the Celtic Sea):

Age	F	I	M
0	15,50	11,44	
1	19,05	16,70	18,86
2	24,24	18,75	22,98
3	29,46		25,69
4	31,86		28,36
5	34,08		33,20

The cumulated age–length key from 4th quarter FR-EVHOE survey 2006, 2008 and 2009 (the Bay of Biscay and the Celtic Sea) is shown in Table B.13. Cumulated age–length key of red gurnard from the FR-EVHOE survey 2006, 2008 and 2009.

B.3. Surveys

Multiannual surveys have been carried out by several countries and could provide some series of abundance index. The UK Western Channel Groundfish Surveys (UK-WCGFS) are operated in VIIe–h and in the north of VIIIa during 1st quarter. International Bottom-trawl Surveys (IBTS) cover the North Sea also in 1st quarter. French Channel Groundfish Surveys (FR-CGFS) cover Division VIId and French "Evaluation Halieutique à l'Ouest de l'Europe" (FR-EVHOE) survey cover the Bay of Biscay and the Celtic Sea out to 11°W respectively during the 4th quarter. None of them is especially designed to target gurnards, but data available could provide long series of abundance indices and at least total or stratified by area length distributions. Series from the UK-WGCFS discontinued in 2005 are not available yet.

Tables B.9 and B.10 shows the series of abundance index of red gurnard from IBTS database and results of the CGFS survey. Figure B.11 shows their trends and their 95% confidence interval.

The IBTS index produces very small values of index and the small trend to increase in the last decade as some higher values in 1986 and 1991 are rather uncertain.

The CGFS index in VIId has fluctuated in the range of the confidence interval indicating no significant trend. However some higher values have been observed in 2006 and 2008.

The distribution of red gurnard in the Eastern Channel during the FR-CGFS survey in October between 1988 to 2006 is shown in Figure B.12 and indicates that higher

abundance occurred in the central area along a Southwest- Northeast axis between Cotentin (FR) and Kent (UK).

The FR-EVHOE index in number or in weight by 30 mn as well show a higher abundance in Celtic Sea than in Bay of Biscay. In Celtic Sea, the index has increased sharply (x2) in 2001 and has fluctuated at this high level since then. In the Bay of Biscay, the index has fluctuated in a wider range but at low levels. The peak observed in 2008 is uncertain.

The distribution of red gurnard in the Celtic Sea and the Bay of Biscay during FR-EVHOE from 1997 to 2009 is shown in Figure B.13. Clearly the greater abundance is located offshore Brittany in the South of Division VIIh and in the North of Division VIIIa quite in a geographical continuity with Division VIIe where the bulk of landings are harvested by the fishery.

The abundance index at length of red gurnard from the CGFS and EVHOE surveys are shown in Figure B.14 and Figure B.15 respectively. In CGFS dataset, there is no variability of mean lengths in the length distributions in which we can notice the quasi absence of 0 group (under 15 cm) in the catches, 1989 and 2002 excepted. For some years, bimodal distributions from the EVHOE survey series show clearly the abundance 0 group. Relatively abundant in the period 2001–2005, they are poorly represented in recent years.

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, 2008 and 2009. They are shown in Figure B.16 and indicate that the populations caught are mainly composed of individuals of age 1 and 2.

B.4. Commercial cpue

In some countries species of gurnards are not always distinguished by species and their contribution to international landings is much smaller than those of France. Therefore only French datasets are presented.

The dataseries proposed in WGNEW 2007 have been completely revised since the new French database Harmonie has come into service. Series 1999–2009 of lpues and total effort dedicated to gurnards by otter trawlers (OTB+OTT) are shown in Table B.4 and Figure B.3. Odd values are observed in 1999 and 2009 reflecting problems of quality in the datasets of these years. Therefore the observed window is reduced to the period 2000–2008.

A decreasing trend of effort is shown in the period 2003–2008 in VIIde. A similar trend has begun before, in 2002 in area VIIfgh in line with several decommissioning plans carried out in order to reduce the effort of Gadoids trawlers to manage the reduced quotas of cod. At the same time, effort in VIIIab has generally increased in that period. Over the period 2000–2008, the lpues have fluctuated without trend in each of the areas selected (Figure B.4).

Other series of French effort and lpue data using landings and effort by ICES rectangle over the period 1999–2008 have been constructed by métier in the Western Approaches (VIIe–k) and Bay of Biscay (Area VIII). Effort considered is the fishing effort by métier and area. Trends of lpue and effort are shown in Table B.4 to B.8. The main métiers contributing to red gurnard landings are the Gadoid trawlers in Western Approaches which target mainly haddock, whiting and cod and the Benthic trawlers in the same area which target mainly monkfish, megrim and rays. The fluctuations without trend of lpue of Gadoids trawlers in Western Approaches are rather

similar to those observed in the series mentioned above. Lpue of Benthic trawlers in the same area increased to 2004 and since then levelled with fluctuations. Lpue of the other métiers described are very small. In the Western Approaches, effort of Gadoids and *Nephrops* trawlers have shown an almost continuous decline over the period in line with the adjustment to the effort regulation and restrictive quotas of cod set in this area. In the same area, effort of benthic trawlers has fluctuated without trend. In Bay of Biscay, the effort of gadoid trawlers has increased since 2003, probably indicating a shift of effort from Western Approach to Bay of Biscay. Effort of *Nephrops* and benthic trawlers has fluctuated at lower levels.

A series 1999–2008 of *LPUE* and effort of French otter trawler (OTB) in VIId is shown in Table B.6. Lpue have fluctuated between 1.2 and 2.0 kg/hour and levelled at higher values since 2005 as the fishing effort has decreased.

Over all the short series presented, only lpue in VIId could indicate a trend of abundance increasing in recent years in that area. The other series have only shown small fluctuations without obvious trends.

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Table B.1. Official landings of Red gurnard reported to ICES by Division and country in recent years.

COUNTRY	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
IVa											
Belg	0	0	0	0	0	0	0	0	0	0	0
Fran	0	0	0	0	0	0	0	0	0	0	0
UK	4	36	62	49	50	24	13	12	34	58	79
Total	4	36	62	49	50	24	13	12	34	58	79
	IVb										
Belg	1	2	16	23	68	19	16	23	11	11	0
Fran	0	0	0	0	0	0	1	4	3	0	10
Neth	12	590	1	2	1	5	5	1	1	1	5
UK	0	114	155	205	171	71	61	93	48	46	48
Total	13	706	172	230	240	95	83	121	63	58	63
	IVc										
Belg	15	25	26	18	15	14	15	10	15	17	7
Fran	54	111	43	39	27	26	11	14	12	35	28
Neth	33	1052	50	39	47	39	36	28	26	40	47
UK	0	0	0	0	1	1	2	3	2	0	4
Total	102	1188	119	96	90	80	64	55	55	92	86
	VIa										
Belg	0	0	0	0	0	0	0	0	0	0	0
Fran	10	6	7	2	2	8	16	7	6	5	1
Irel	0	0	0	0	0	0	0	0	0	0	0
UK	0	19	45	29	23	10	16	14	22	90	100
Total	10	25	52	31	25	18	32	21	28	95	101
	VIb										
Fran	0	0	0	0	0	0	1	0	0	0	0
Russ	0	0	0	0	0	0	0	0	0	0	0
UK	0	0	1	0	0	0	0	0	3	2	46
Total	0	0	1	0	0	0	1	0	3	2	46
	VIIa										
Belg	33	26	22	24	8	11	10	7	5	3	13
Fran	6	15	12	2	0	2	0	0	0	0	0
Irel	0	0	0	0	0	0	0	0	0	0	0
Othe	1	0	0	0	0	0	0	0	0	0	0
UK	0	3	5	12	11	0	0	0	0	0	1
Isle of Man	0	0	0	0	0	0	0	0	0	1	0
Total	40	44	39	38	19	13	10	7	5	4	14
	VIIb										
Fran	18	15	9	3	9	7	9	7	6	7	8
Irel	0	0	0	0	0	0	0	0	0	0	0
UK	0	3	0	0	0	0	0	0	1	0	0
Total	18	18	9	3	9	7	9	7	7	7	8

Table B.1. Continued. Official landings of Red gurnard reported to ICES by Division and country in recent years.

COUNTRY	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
VIIc											
Fran	20	9	3	1	21	8	12	15	16	6	10
UK	0	11	6	2	2	0	0	0	0	0	0
Total	20	20	9	3	23	8	12	15	16	6	10
	VIId										
Belg	94	107	98	162	133	143	171	191	223	153	159
Fran	800	1119	1183	1043	1005	1039	898	971	894	971	1116
Neth	0	63	2	4	14	16	16	35	64	105	177
UK	0	0	0	0	0	0	17	32	55	63	79
Total	894	1289	1283	1209	1152	1198	1102	1229	1236	1292	1531
	VIIe										
Belg	2	6	6	24	45	45	73	62	60	21	34
Chan	0	0	15	15	15	0	10	3	10	0	2
Fran	2499	2575	2968	2728	2436	2951	2714	2603	2382	1513	1546
Neth	0	2	0	0	0	0	0	2	1	14	22
UK	0	0	0	0	0	0	6	3	0	2	4
Total	2501	2583	2989	2767	2496	2996	2803	2673	2453	1550	1608
	VIIf										
Belg	6	9	7	17	31	37	21	24	33	14	14
Fran	187	305	196	199	231	299	209	223	216	98	118
UK	0	0	1	0	0	0	0	0	0	0	0
Total	193	314	204	216	262	336	230	247	249	112	132
	VIIg										
Belg	2	3	4	8	16	10	6	9	4	6	8
Fran	31	33	23	13	9	14	10	6	5	17	15
Irel	0	0	0	0	0	0	0	0	0	0	0
UK	0	0	0	0	0	0	0	0	0	0	0
Total	33	36	27	21	25	24	16	15	9	23	23
	VIIh										
Belg	0	0	3	1	0	1	0	0	0	0	0
Fran	415	364	412	467	668	522	446	437	408	510	433
Total	415	364	415	468	668	523	446	437	408	510	433
	VIIj										
Fran	15	10	8	6	8	5	5	4	4	6	8
Irel	0	0	0	0	0	0	0	0	0	0	0
UK	0	20	6	15	2	0	0	0	1	1	1
Total	15	30	14	21	10	5	5	4	5	7	9
VIIk											
Fran	3	7	1	0	0	0	0	0	0	0	0
UK	0	0	0	0	0	0	0	0	0	0	0
Total	3	7	1	0	0	0	0	0	0	0	0

Table B.1. Continued. Official landings of Red gurnard reported to ICES by Division and country in recent years.

COUNTRY	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
VIIIa											
Belg	0	0	0	0	1	0	0	0	0	0	0
Fran	87	86	90	118	113	133	153	139	66	98	100
Neth	0	1	0	0	0	0	0	0	0	0	0
UK	0	0	0	0	0	3	0	0	0	0	0
Total	87	87	90	118	114	136	153	139	66	98	100
	VIIIb										
Belg	1	1	1	0	1	2	1	1	2	2	3
Fran	30	30	32	44	56	64	59	58	23	38	31
Neth	0	2	0	0	0	0	0	0	0	0	0
Total	31	33	33	44	57	66	60	59	25	40	34
	VIIIc										
Fran	1	0	2	0	0	1	1	3	3	0	0
Port	0	0	0	0	0	0	0	0	0	1	0
Total	1	0	2	0	0	1	1	3	3	1	0
	VIIId										
Fran	1	1	1	3	0	5	5	2	1	2	Fran
Total	1	1	1	3	0	5	5	2	1	2	Total
	IX										
Port	0	0	0	0	0	46	124	125	109	148	114
Spai	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	46	124	125	109	148	114

Table B.2. Summary of French sampling at sea of red gurnard under DCF Regulation in Division VIId.

QUARTER	DRB_MOL	GNS_DEF	GTR_CRU	GTR_DEF	GTR_MOL	OTB_DEF	OTB_MOL	OTB_SPF	OTM_DEF
1	NA	1	NA	8	NA	155	329	30	6
2	NA	NA	NA	1	NA	248	NA	NA	NA
3	NA	NA	NA	37	NA	186	17	NA	7
4	NA	7	NA	15	NA	159	NA	NA	NA
	OTM_MOL	OTM_SPF	OTT_CRU	PTM_DEF	PTM_SPF	TBB_DEF			
1	7	NA	NA	NA	NA	2			
2	NA	1	NA	NA	51	NA			
3	NA	1	NA	NA	163	NA			
4	NA	NA	NA	64	NA	NA			

Table B.3. Summary of French sampling at sea of red gurnard under DCF Regulation in Division VIIe. In yellow cells, data aggregated in OT._DEF for further analysis to obtain a sample of measured fish both in LAN and DIS strata by quarter.

Quarter	DRB_ MOL	FPO_ CRU	FPO_ MOL	GNS_ CRU	GNS_ DEF	GTR_ CRU	GTR_ DEF	LTL_ DEF	OTB_ CRU
1	NA	NA	NA	2	NA	NA	NA	NA	NA
2	NA	NA	NA	19	NA	NA	18	NA	NA
3	NA	NA	NA	1	NA	NA	3	NA	NA
4	NA	NA	NA	NA	NA	NA	3	NA	NA
	OTB_ DEF	OTB_ MOL	OTM_ DEF	OTT_ CRU	OTT_ DEF	OTT_ MOL	PS_ DEF	PS_ SPF	PTM_ DEF
1	20	NA	NA	NA	NA	NA	NA	NA	87
2	155	NA	NA	NA	6	NA	NA	NA	NA
3	683	220	211	NA	NA	NA	1	NA	34
4	38	NA	NA	NA	NA	NA	1	NA	NA

Table B.4 Series of landings of red gurnard, effort and LPUE of French otter trawlers (OTB+OTT) from logbooks datasets.

	Landings kg Red gurnard			effort 000'h fished			1000 LPUE	kg/h fished	
year	7de	7fgh	8ab	7de	7fgh	8ab	7de	7fgh	8ab
1999	3143378	315217	35275	810.553	230.328	48.834	3.9	1.4	0.7
2000	3026836	607484	54645	1130.318	941.991	356.194	2.7	0.6	0.2
2001	3356616	684815	49543	1067.780	994.438	302.113	3.1	0.7	0.2
2002	3813616	595813	39719	1219.589	846.449	321.536	3.1	0.7	0.1
2003	3507286	661274	49012	1391.980	893.467	426.490	2.5	0.7	0.1
2004	3248722	900132	63445	1297.526	865.703	497.762	2.5	1.0	0.1
2005	3624801	681381	112036	1085.057	778.914	768.129	3.3	0.9	0.1
2006	3452166	633692	117881	1069.908	672.443	680.123	3.2	0.9	0.2
2007	3352089	657775	100654	1002.862	623.124	716.833	3.3	1.1	0.1
2008	2254264	583834	103017	778.306	603.849	677.288	2.9	1.0	0.2
2009	1314597	336279	26941	213.796	106.379	59.186	6.1	3.2	0.5
	1999 and 2009: datasets unreliable								

Table B.5. Series of landings of red gurnard, effort and lpue by métier of French otter trawlers (OTB+OTT) from CPR datasets.

Red Gurnard France Captures (t) Metier	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Benthic Western Approaches	55	145	252	247	463	810	595	614	751	469
Gadoids Western Approaches	2685	2874	2930	3222	2851	2536	2850	2667	2421	1642
Nephrops Western Approaches	3	2	1	1	1	1	1	0	0	0
Benthic Bay of Biscay	7	29	21	22	29	28	57	62	39	51
"Gadoids" Bay of Biscay	25	24	22	16	18	30	52	49	59	51
Nephrops Bay of Biscay	3	3	2	3	4	6	6	5	5	6
	2778	3077	3228	3511	3366	3411	3561	3397	3275	2219

Red Gurnard France Fishing Effort Metier	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Benthic Western Approaches	260758	295235	289227	265173	311690	319664	277571	303860	327413	266640
Gadoids Western Approaches	603846	561385	549464	549402	532461	488775	455446	436125	394148	314761
Nephrops Western Approaches	198129	219402	195229	182732	199108	164514	168537	159230	118692	99788
Benthic Bay of Biscay	143053	137186	128085	132199	148483	166266	203183	173227	178323	170854
"Gadoids" Bay of Biscay	276271	211502	208556	184709	194668	215719	260360	291848	356308	305030
Nephrops Bay of Biscay	199384	171203	181568	182496	218913	238337	277343	277908	249244	230292
Total	1681441	1595913	1552129	1496711	1605323	1593275	1642440	1642198	1624128	1387365

Red Gurnard France LPUE (Kg/10h) Metier	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Benthic Western Approaches	2.1	4.9	8.7	9.3	14.9	25.3	21.4	20.2	22.9	17.6
Gadoids Western Approaches	44.5	51.2	53.3	58.6	53.5	51.9	62.6	61.2	61.4	52.2
Nephrops Western Approaches	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0
Benthic Bay of Biscay	0.5	2.1	1.6	1.7	2.0	1.7	2.8	3.6	2.2	3.0
"Gadoids" Bay of Biscay	0.9	1.1	1.1	0.9	0.9	1.4	2.0	1.7	1.7	1.7
Nephrops Bay of Biscay	0.2	0.2	0.1	0.2	0.2	0.3	0.2	0.2	0.2	0.3

Table B.6. Series of landings of red gurnard, effort and lpue of French otter trawlers (OTB) in VIId from logbooks datasets.

year	Landings kg	Effort hours	LPUE Kg/hour
1999	731485	449924	1.6
2000	653244	551088	1.2
2001	869054	485479	1.8
2002	929381	560053	1.7
2003	813963	629978	1.3
2004	800899	573711	1.4
2005	827994	441078	1.9
2006	791125	440473	1.8
2007	811937	438125	1.9
2008	698455	342351	2.0

Table B.7. Series of landings of red gurnard, effort and lpue of French otter trawlers (OTB+OTT) from logbooks datasets.

	Landings kg Red gurnard			effort 000'h fished			1000 LPUE kg/h fished		
year	7de	7fgh	8ab	7de	7fgh	8ab	7de	7fgh	8ab
1999	3143378	315217	35275	810.553	230.328	48.834	3.9	1.4	0.7
2000	3026836	607484	54645	1130.318	941.991	356.194	2.7	0.6	0.2
2001	3356616	684815	49543	1067.780	994.438	302.113	3.1	0.7	0.2
2002	3813616	595813	39719	1219.589	846.449	321.536	3.1	0.7	0.1
2003	3507286	661274	49012	1391.980	893.467	426.490	2.5	0.7	0.1
2004	3248722	900132	63445	1297.526	865.703	497.762	2.5	1.0	0.1
2005	3624801	681381	112036	1085.057	778.914	768.129	3.3	0.9	0.1
2006	3452166	633692	117881	1069.908	672.443	680.123	3.2	0.9	0.2
2007	3352089	657775	100654	1002.862	623.124	716.833	3.3	1.1	0.1
2008	2254264	583834	103017	778.306	603.849	677.288	2.9	1.0	0.2
2009	1314597	336279	26941	213.796	106.379	59.186	6.1	3.2	0.5
	1999 and 2009: datasets unreliable								

Table B.8. Series of landings of red gurnard, effort and lpue of French otter trawlers (OTB) in VIId from logbooks datasets.

year	Landings kg	Effort hours	LPUE Kg/hour
1999	731485	449924	1.6
2000	653244	551088	1.2
2001	869054	485479	1.8
2002	929381	560053	1.7
2003	813963	629978	1.3
2004	800899	573711	1.4
2005	827994	441078	1.9
2006	791125	440473	1.8
2007	811937	438125	1.9
2008	698455	342351	2.0

Table B.9. The abundance index (N/h) of red gurnard from the IBTS database in North Sea and CGFS survey in Eastern Channel.

Year	IBTS Quarter 1	CGFS
1986	11.87	20.77
1987	1.17	19.24
1988	0.00	12.33
1989	0.37	11.87
1990	4.91	16.35
1993	0.00	10.12
1994	0.00	23.71
1995	0.00	12.89
1996	0.00	9.56
1997	0.06	18.01
1998	0.00	6
1999	0.00	7.09
2000	0.11	9.83
2001	0.12	7.17
2002	0.05	11.18
2003	0.24	12.92
2004	0.22	7.34
2005	0.10	10.9
2006	0.00	13.56
2007	0.23	10.26
2008	0.00	18.64
2009	0.24	17.24

Table B.10. The average abundance (number and weight (kg) per 30 mn) of red gurnard annually from FR-EVHOE survey in the Celtic Sea (VII,g,h,j) and in the Bay of Biscay (VIIIa,b).

Year	Celtic Sea (VIIg, h, j)		Bay of Biscay (VIIIa, b)	
	Number/30minutes	W(kg)/30minutes	Number/30minutes	W(kg)/30minutes
1997	23.29	2.24	5.34	0.43
1998	22.32	2.35	2.79	0.25
1999	25.22	2.35	0.9	0.09
2000	19.12	1.65	1.2	0.11
2001	39.11	3.03	8.02	0.7
2002	35.75	2.97	9.79	0.69
2003	37.62	2.8	2.61	0.21
2004	43.76	3.66	7.19	0.58
2005	38.84	3.39	6.7	0.57
2006	27.89	2.56	6.82	0.53
2007	36.41	3.18	10.59	0.81
2008	33.97	3.39	14.71	1.42
2009	38.7	3.82	6.04	0.53

Table B.11. Growth parameters of red gurnard in the English Channel.

Authors	Area	Sex	Nb	L_∞	K (y^{-1})	t_0 (years)
Baron (1983)	Manche + mer du Nord	M	118	37,1	0,51	-0,08
		F	232	41,7	0,46	-0,05
Dunn *et al*. (1996)	VIId	M	213	35.75	0,232	-3,37
	VIId	F	531	41,05	0,248	-2,57
	VIIe	F	147	NS	0,137	-2,09
Carpentier 1995	VIId	M+F	187	36,75	0,597	0,180
Id 1996			94	37,97	0,622	0,149
Id 1997			90	36,67	0,645	0,185
Id 1998			107	36,18	0,613	0,048
Id 1999			122	36,02	0,511	-0,277
Mean 1995–2000			704	36,34	0,543	-0,17

Table B.12. Length–weight relationships available for red gurnard in English (W = aLb, W live weight in g and L in cm).

Author	Area	Month	Sex	Number	a	b
Théret, 1983	English Channel	September	M	31	$1{,}13.10^{-3}$	3,3854
			F	80	$4{,}50.10^{-3}$	3,14027
		November	M	33	$3{,}65.10^{-3}$	3,16261
			F	33	$2{,}94.10^{-3}$	3,20117
		December	M	55	$1{,}51.10^{-3}$	3,32967
			F	144	$1{,}05.10^{-3}$	3,38984
		January	M	112	$0{.}98.10^{-3}$	3,39763
			F	120	$2{,}19.10^{-3}$	3,25648
		February	M	31	$0{.}73.10^{-3}$	3,44558
			F	82	$0{,}88.10^{-3}$	3,41197
Dorel, 1986	idem		M + F	593	$5{,}61.10^{-3}$	3,16882

Table B.13. Cumulated age–length key of red gurnard from the FR-EVHOE survey 2006, 2008 and 2009.

Length	0	1	2	3	4	5	6
8	5						
9	12						
10	8						
11	10						
12	10						
13	14	1					
14	10	5					
15	2	15					
16	1	22	2				
17	1	28	2				
18		37	3				
19		32	6				
20		30	10				
21		22	18	2			
22		9	25	1			
23		5	25	5			
24		1	25	6	1	1	
25		3	16	5	4		
26			9	14	5		
27			13	8	6	1	
28		1	6	10	8	2	
29			5	8	2	3	
30			1	5	6	1	
31			2	6	7	4	
32			2	5	1	1	
33			2	6	4		
34				5	3	2	
35				3	2	2	
36				2	1	3	
37					1	2	
38					3	2	
39						1	
40					2	2	
41				1	1	1	
42						1	1
44							1
45						1	

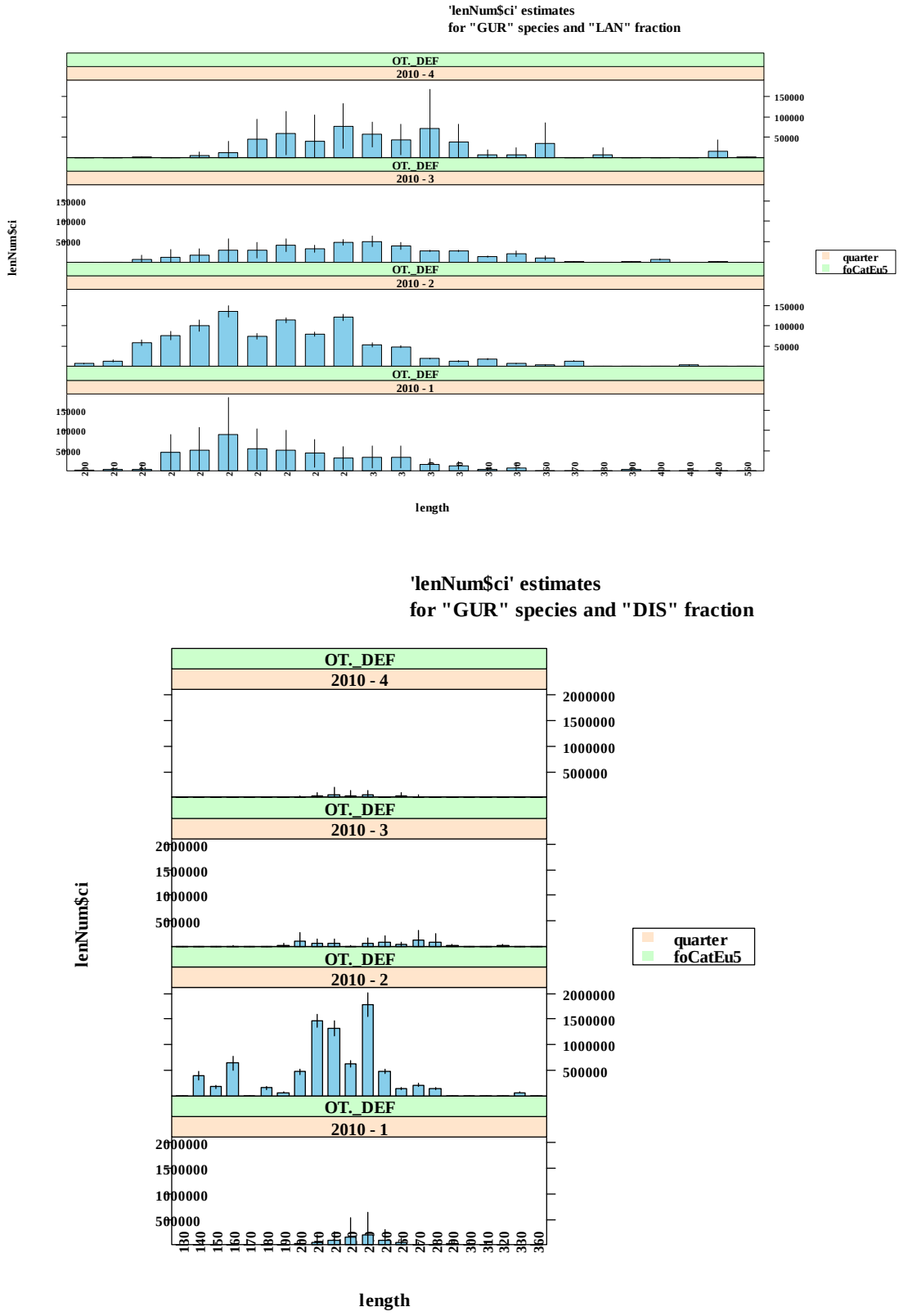


Figure B.1. Quarterly length compositions of the 2010 French landings (top) and discards (bottom) of Red gurnard of trawlers in Divisions VIId and their confidence intervals.

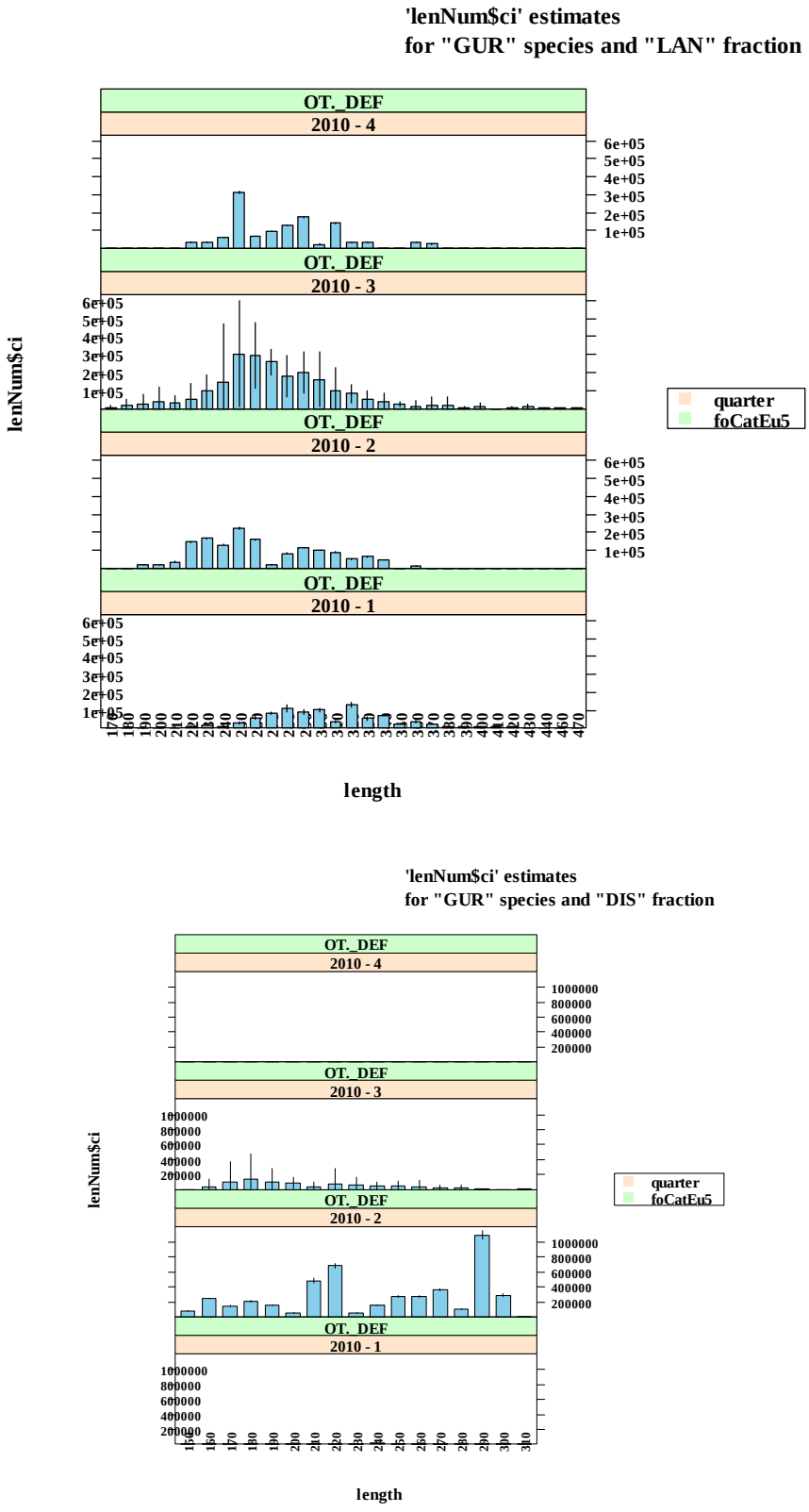
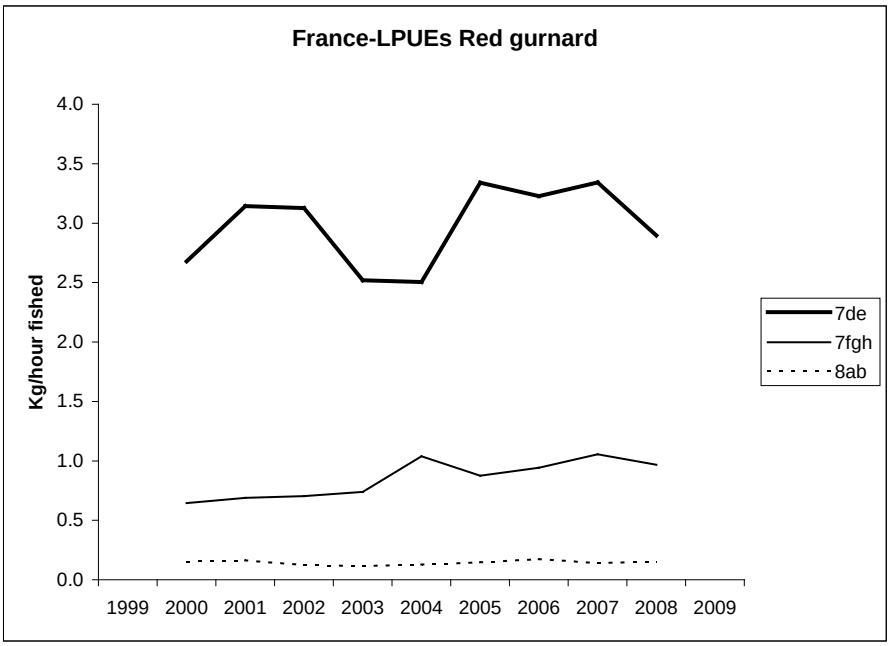


Figure B.2. Quarterly length compositions of the 2010 French landings (top) and discards (bottom) of Red gurnard of trawlers in Divisions VIIe and their confidence intervals.



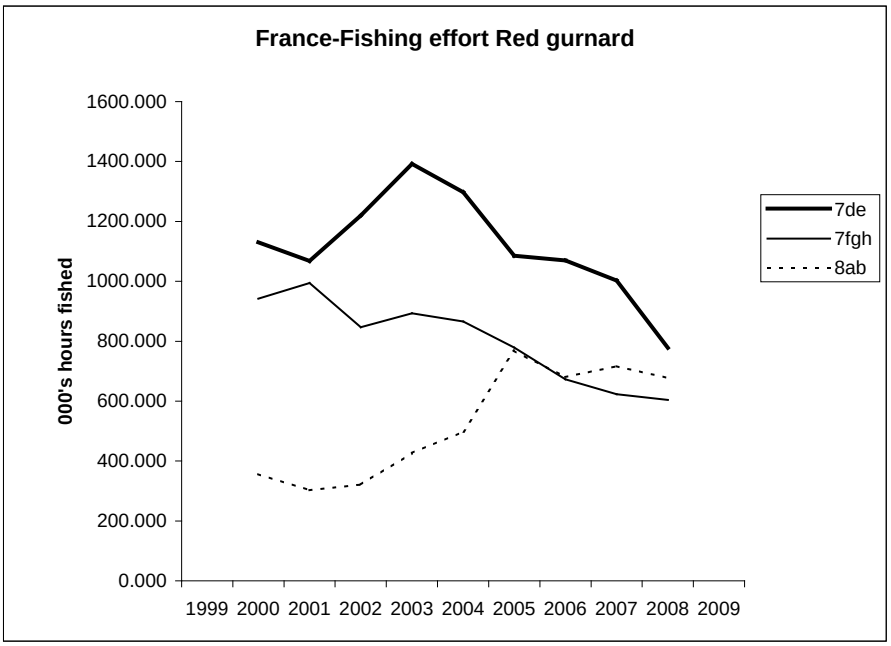


Figure B.3. Trends of lpues and French effort OTB+OTT and in VIIde, VIIfgh and VIIIab.

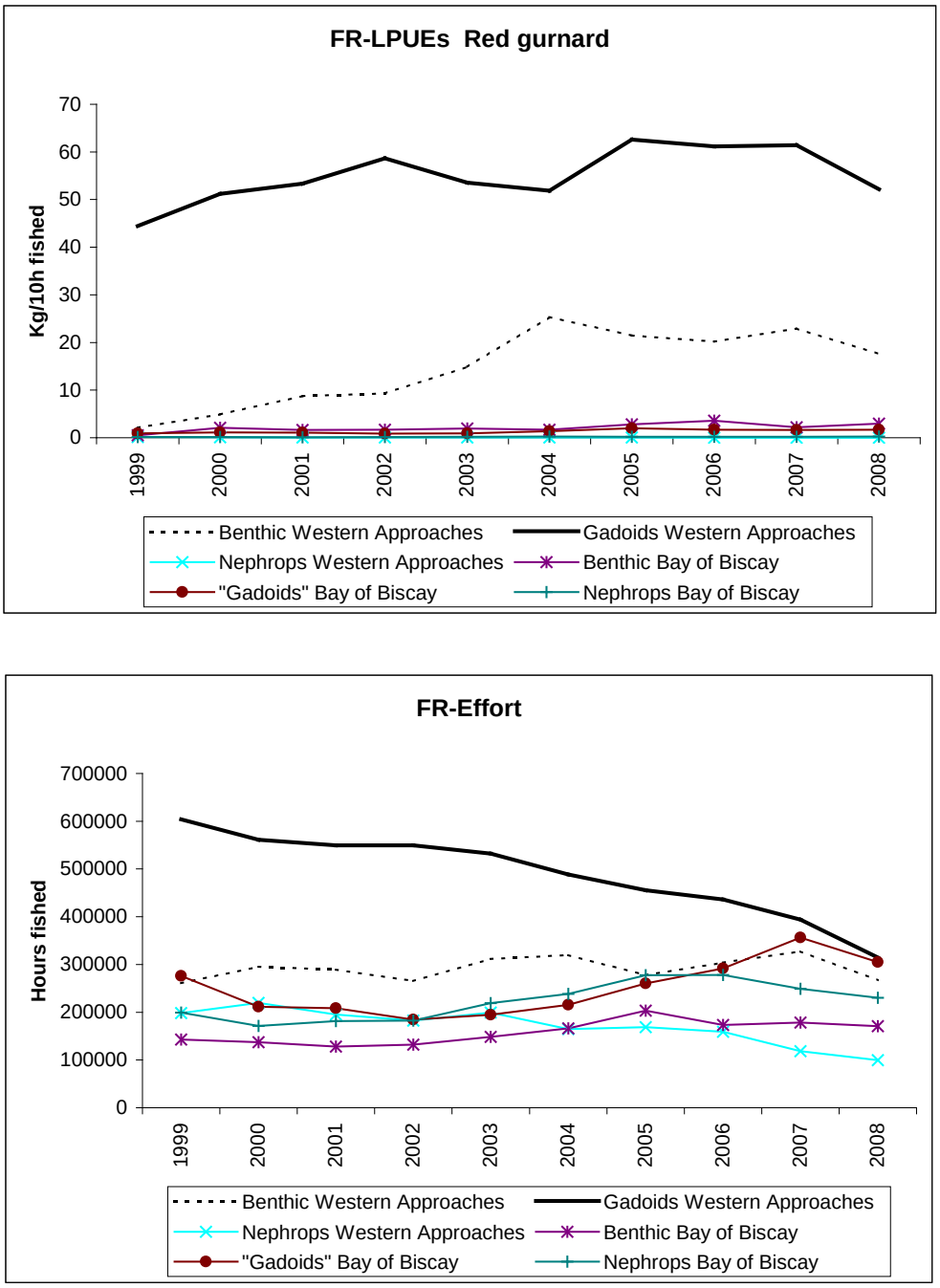


Figure B.4. Red Gurnard. Trends of lpue (kg/10h) and fishing effort (hours fished) of French otter trawlers (OTB+OTT) in Areas VIIe–k (Western Approaches) and VIII (Bay of Biscay).

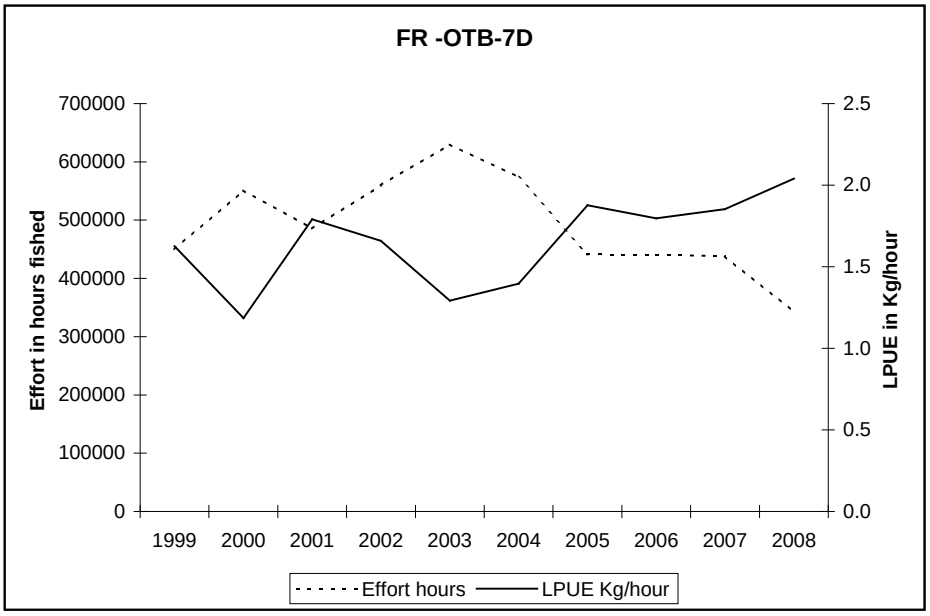


Figure B.5. France. Trends of lpue and effort in VIId of otter trawlers (OTB) for years 1999–2008.

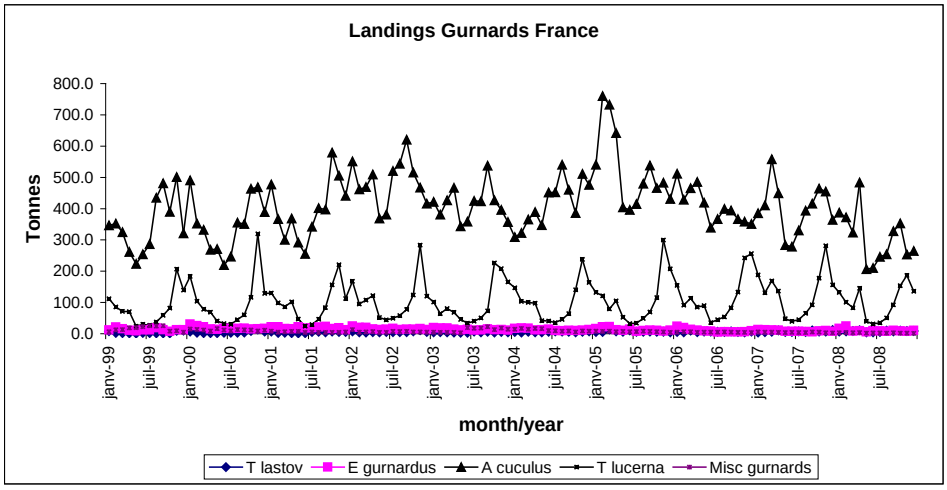


Figure B.6. Seasonal landings of gurnards in France from fishmarkets network.

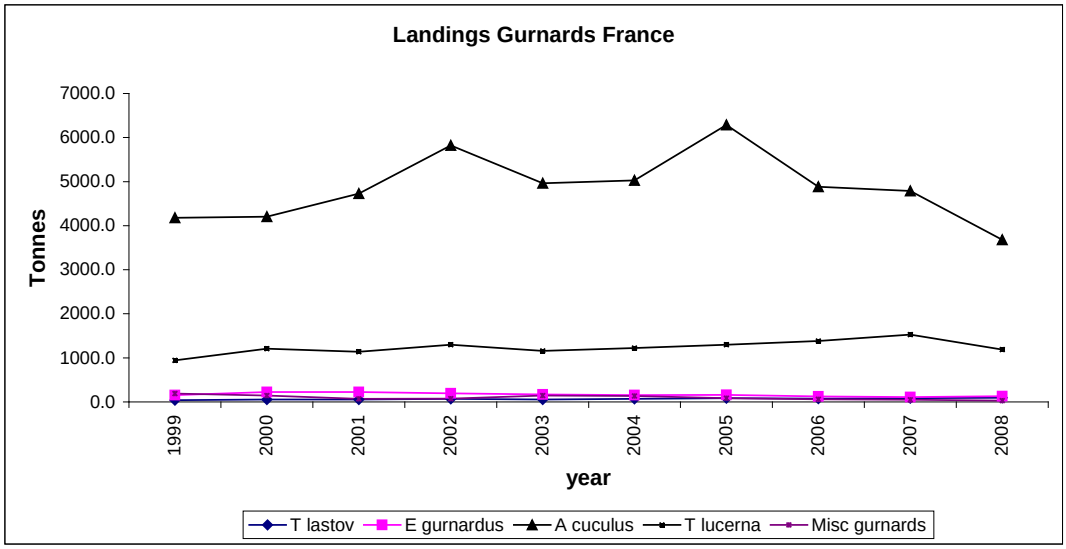


Figure B.7. Annual landings of gurnards in France from fishmarkets network.

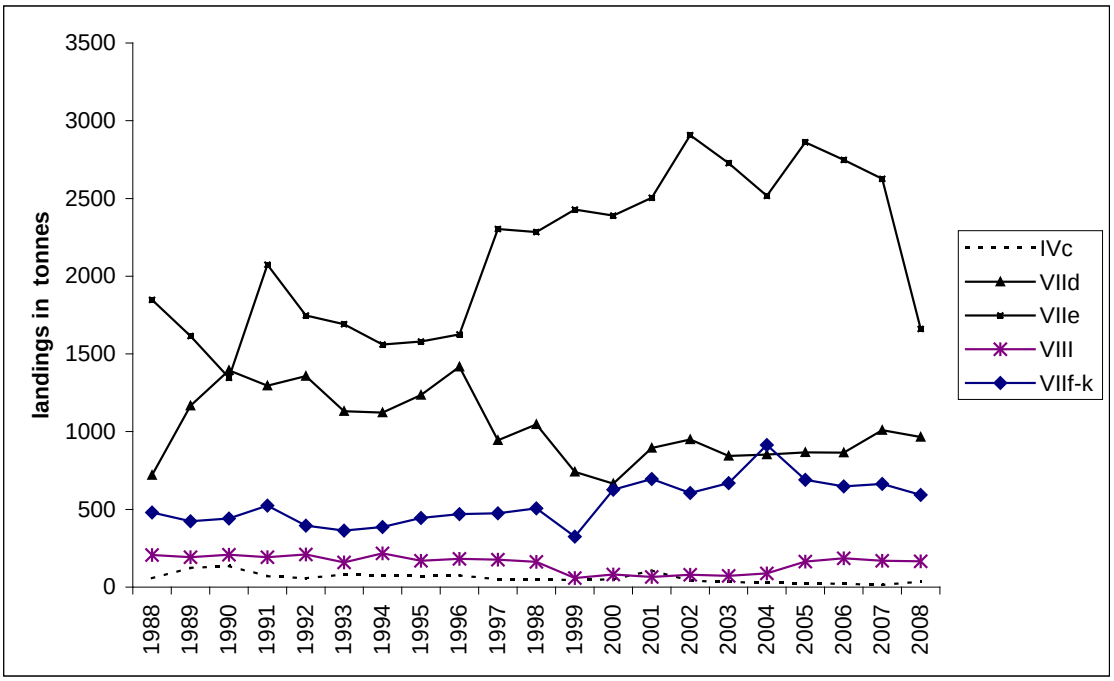


Figure B.8. France: Trends of French landings of red gurnard. Only from logbooks since 1999. In 2008 landings from VIIe have dropped by 35%, not observed in official landings from Euro-Stat/ICES dataset.

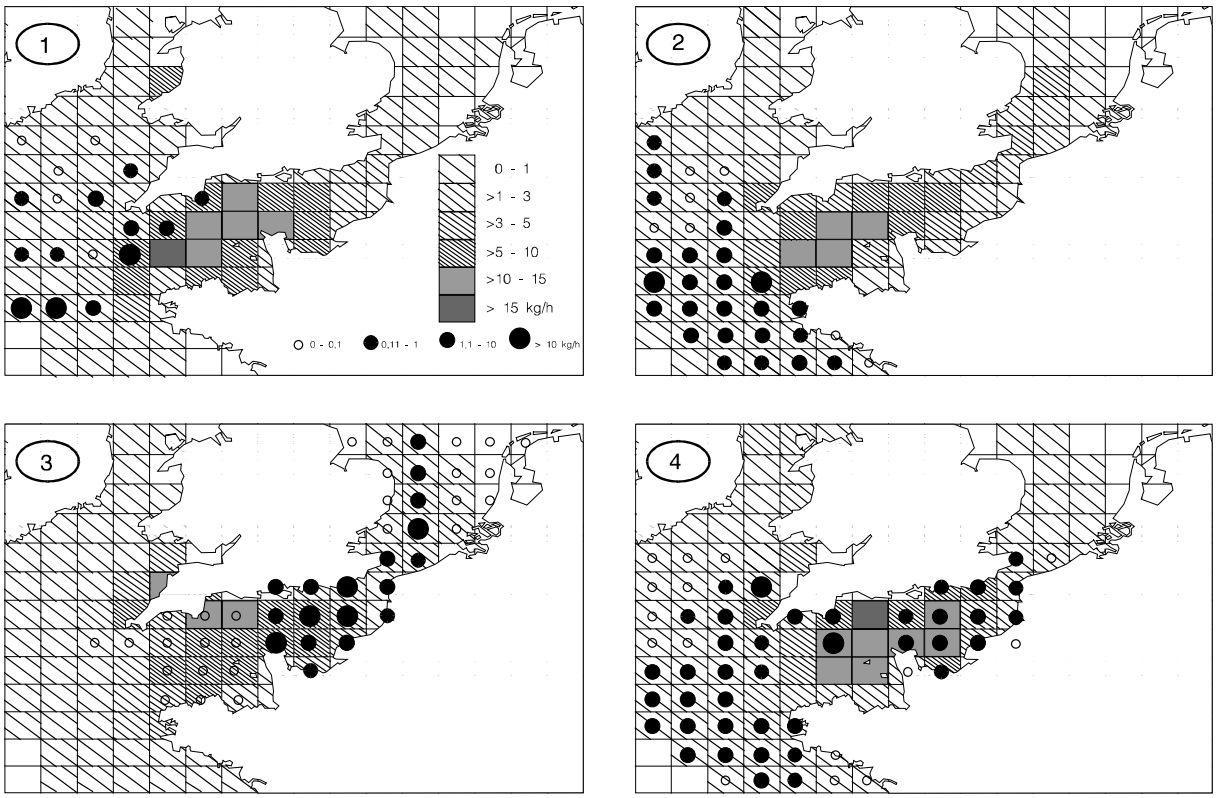


Figure B.9. Quarterly landings of red gurnard in English Channel and neighbouring areas in the period 1988–1992. Cpue in Kg/h from surveys are given as superimposed circles.

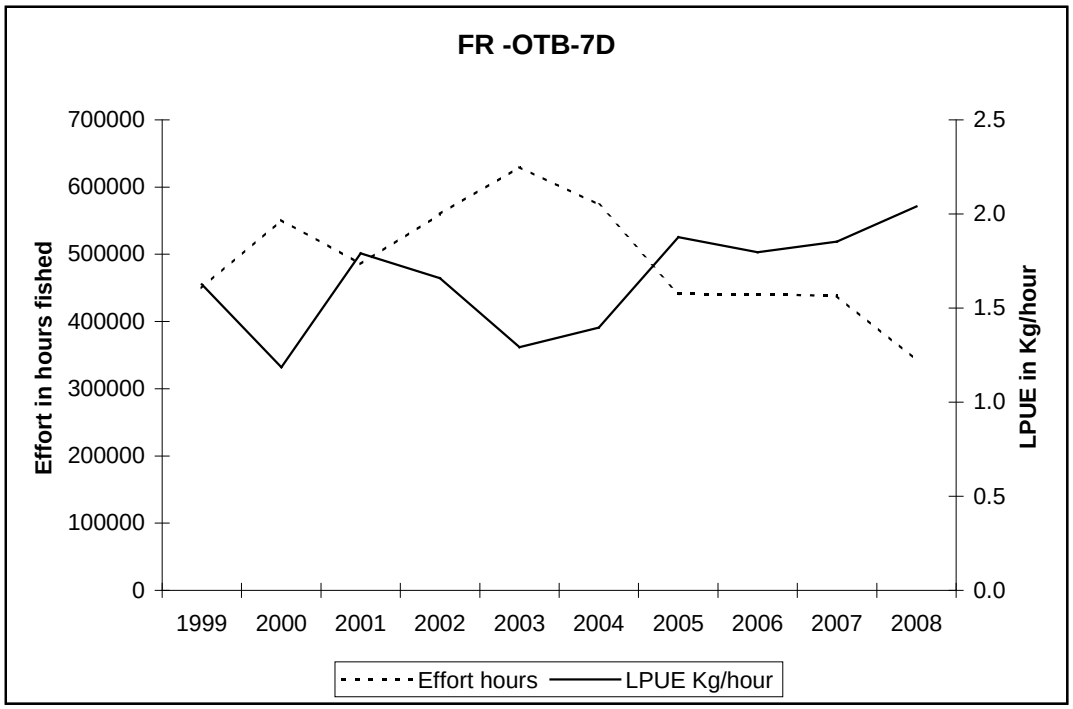


Figure B.10. France. Trends of lpue and effort in VIId of otter trawlers (OTB) for years 1999–2008.

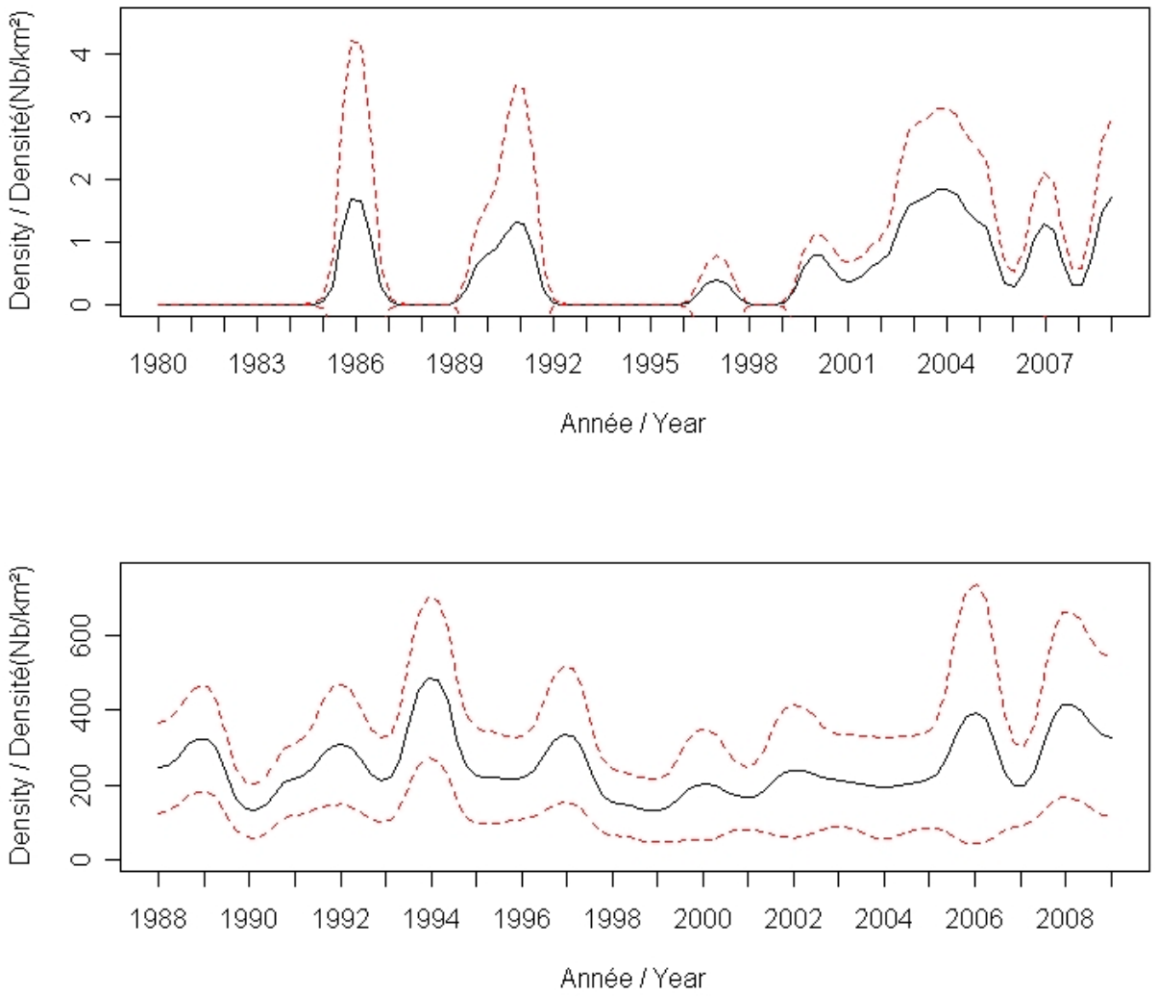


Figure B.11. Time-series of abundance of red gurnard in the North Sea base on IBTS data (Nb/km²) from 1980 to 2009 in upper panel and in the eastern Channel base on FR-CGFS data (Nb/km²) from 1988 to 2009 in the lower panel.

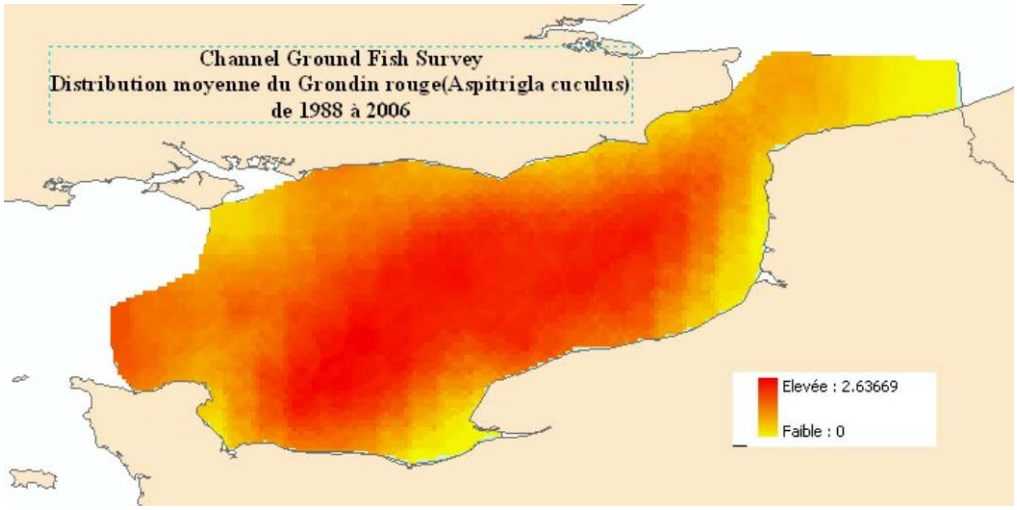


Figure B.12. FR-CGFS surveys series. Geographical distribution of red gurnard in Eastern Channel in October from 1988 to 2006.

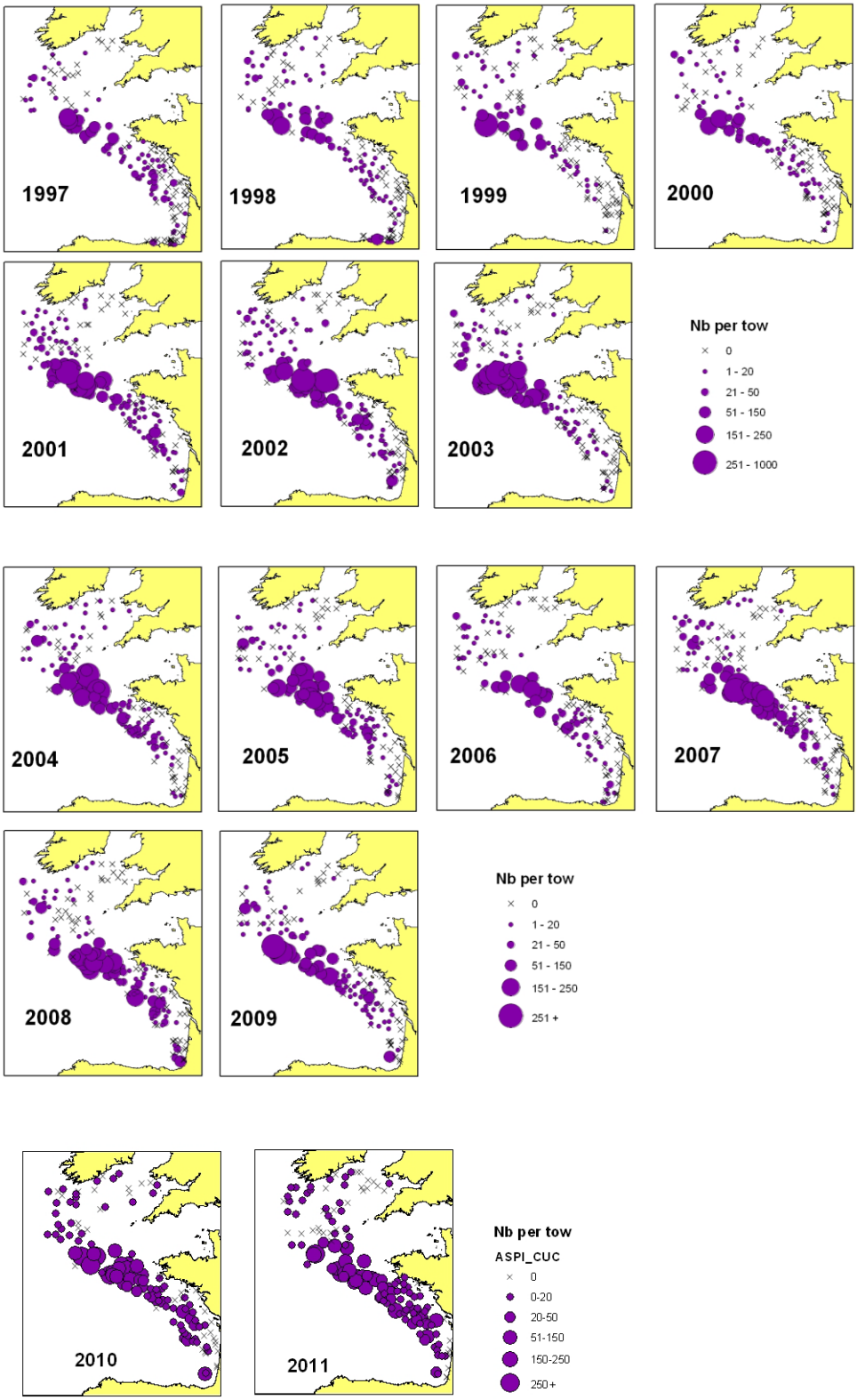


Figure B.13. Distribution of red gurnard in the Celtic Sea and in the Bay of Biscay during FR-EVHOE from 1997 to 2011.

Figure B.14. Abundance index at length of red gurnard in Eastern Channel from CGFS survey time-series 1988 (top left)–2011(bottom right).

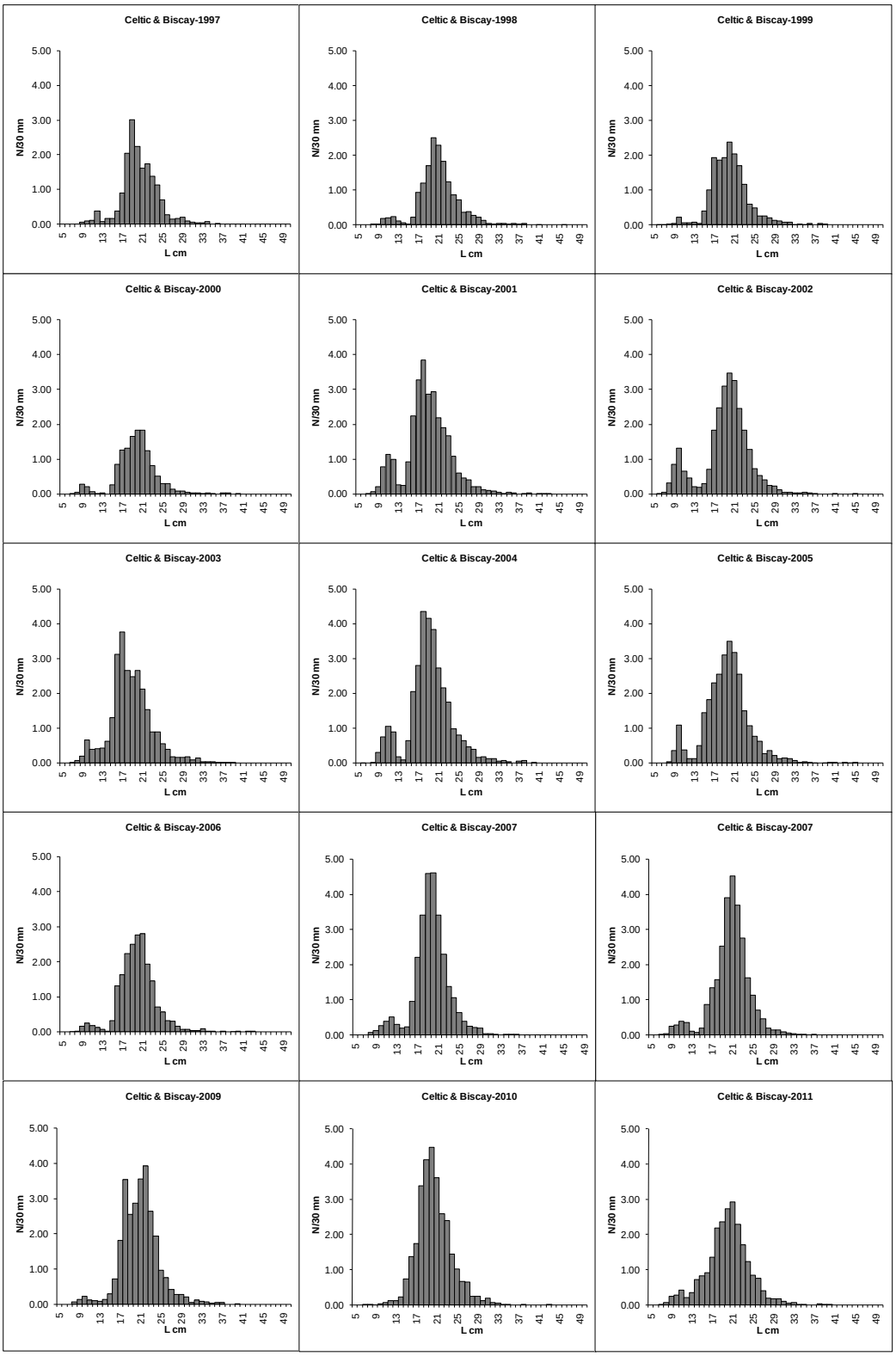


Figure B.15. Length abundance index of red gurnard in the combined areas of Celtic Sea and Bay of Biscay from EVHOE-WIBTS-Q4 survey time-series.

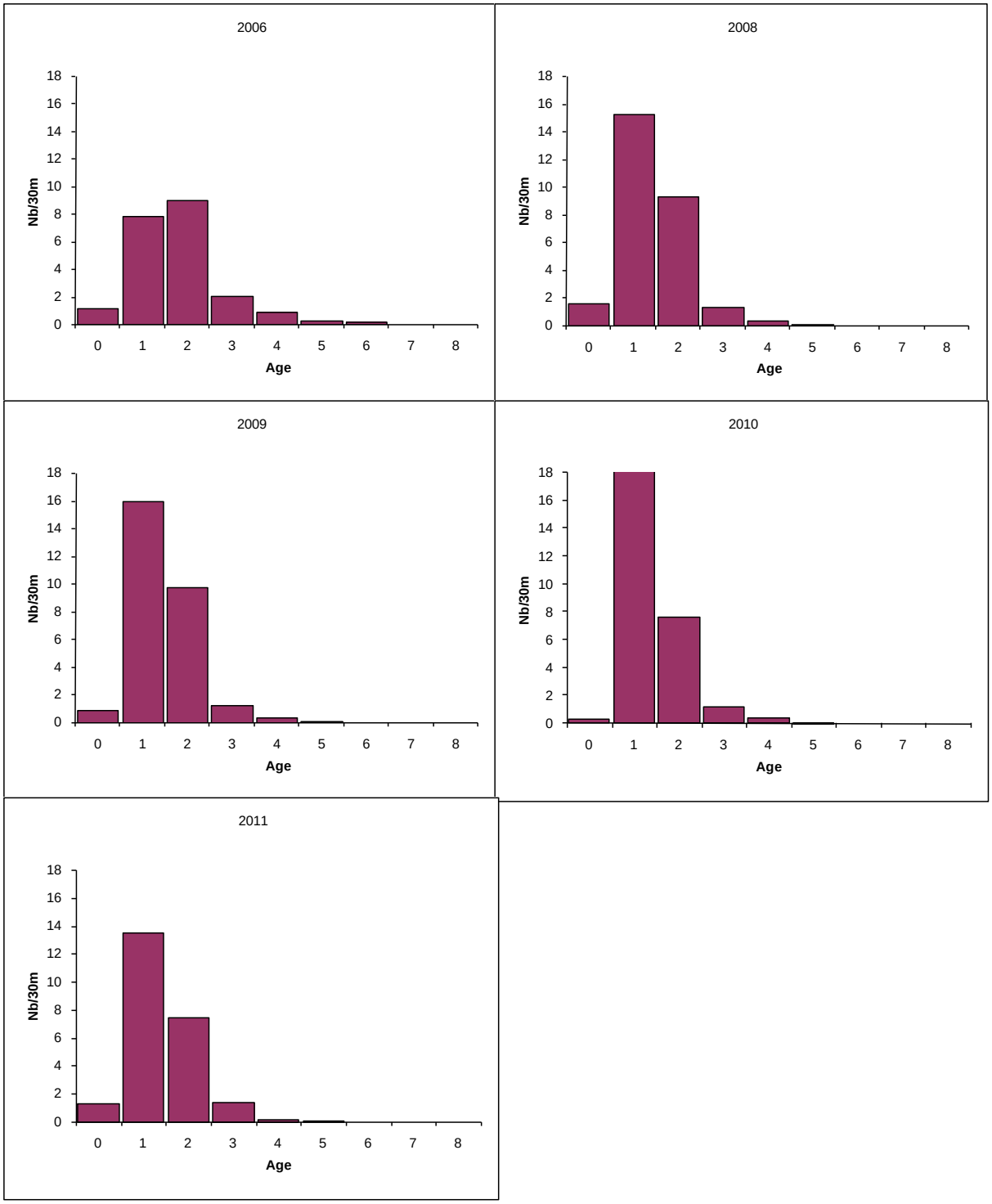


Figure B.16. Abundance index at age of red gurnard in the combined areas of Celtic Sea and Bay of Biscay from FR-EVHOE surveys series for 2006 and 2008 to 2011.

Stock Annex for Grey Gurnard in SD IV and IIIa&VIId

Stock specific documentation of standard assessment procedures used by ICES.

Stock	Grey gurnard in Subarea IV and Divisions IIIa and VIId
Working Group	WGNEW
Date	March 2014
Revised by	Holger Haslob

A.1 General biology [1])

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 Sea.

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.

Grey gurnard is most common on sandy bottoms, but also on mud, shell and rocky bottoms (Wheeler, 1978). Juveniles feed on a variety of small crustaceans. The diet of older specimens consists mainly of larger crustaceans and small fish. Spawning takes place in spring and summer. There do not seem to be clear nursery areas.

The maximum length is 50 cm.

It is a bycatch species in demersal fisheries. Catches are largely discarded.

A.2 Stock ID and possible assessment areas

No studies are known of the stock ID of grey gurnard. Based on IBTS survey data Heessen and Daan (1996) suggested that there may be three subpopulations in the North Sea and Skagerrak/Kattegat: one to northwest of the Dogger Bank, one around Shetland and one in the Skagerrak/Kattegat. A more recent distribution map (based on quarter 1 IBTS data for the period 1977–2005) suggests that there is indeed an area with low abundance between the North Sea and the Skagerrak, but that a more or less continuous distribution exists between the central and northwestern North Sea. Grey gurnard from the North Sea may well be separated from grey gurnard in the Channel. Figure 1 shows that the species is almost absent from the southernmost stations of the Southern Bight. In the eastern Channel abundance of grey gurnard seems to be low compared to the North Sea (Figure.2). The distribution in the western Channel is not known. A higher abundance is observed in the Celtic Sea, whereas the species is almost absent from the Bay of Biscay (Figure.3).

B. Management regulations

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

[1]) Most of the text is copied from the text on grey gurnard in ICES-FishMap (2005)

C. Fisheries data

Gurnards were often not sorted by species when landed. This is reflected in the catch statistics where different species of gurnards were often reported into one generic category of "gurnards". Only some countries sometimes report landings of "grey gurnard" (see Table 4.1 for landings data for 1975–2008). From this table it is also obvious that the catch statistics are incomplete for several years: some countries reporting no landings at all, other countries reporting exceptionally high landings.

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 4.4) because of Danish landings for reduction purposes. In the same period, however, there was some misreporting as well. 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.

Historically, grey gurnard is mainly taken as a bycatch in mixed demersal fisheries for flatfish and roundfish. However, the market is limited and the larger part of the catch is discarded. Data for French discard sampling in 2005 and 2006 in different ICES areas are shown in Figure 4.5 and Figure 4.6. Information on discarding in the Dutch beam trawl fleet is shown in Figure 4.7. Owing to the low commercial value of this species, landings data will usually not reflect the actual catches very well.

D. Survey data/ recruit series

For the North Sea and Skagerrak/Kattegat, data are available from the International Bottom-trawl survey. The IBTS 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 1). The distribution pattern changes substantially in 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. Many gurnards are also caught in the northernmost part of the area throughout the year.

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 seabed (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).

Patterns in distribution of the small and large fish are similar in space and time (Knijn *et al.*, 1993).

Spawning occurs in spring and summer and, perhaps, in autumn (Russel, 1976), and may also explain the observed seasonal movements (Van der Land, 1990). For instance, the German Bight is invaded from April onwards by fish that apparently

spawn there. Emigration to northern, deeper waters commences in September and by November only a few young specimens are left (Hertling, 1924).

Length–frequency distributions per year are shown for Areas IV and IIIa (Figures 9 and 10). Average length–frequency distributions for these two areas are given in Figure 11. In Skagerrak Kattegat two modes can be seen, whereas in the North Sea the smaller fish are only found in relatively small numbers.

Time-series of abundance of grey gurnard, based on catches of all length classes combined during the IBTS quarter 1 survey in the North Sea (IV) and Skagerrak Kattegat (IIIa) are presented in Figure 12. The time-series for the North Sea shows a clear upward trend, especially since the late 1980s. The peak in 1981 is presumably caused by a single very large catch in that year, caused by one of the enormous concentrations of fish that appear in that time of year. Also in Skagerrak Kattegat an increase can be seen since the same time as in the North Sea, but since a maximum was reached in 1993, catches decreased and have fluctuated widely around the same level since then.

E. Biological sampling

Biological data for this species are scarce. In the early 1990s some countries collected otoliths and information on maturity stages during the quarterly IBTS surveys; and Table 4-3 provide an age–length key for females and for males based on sampling by Cefas in the 4th quarter of 1992. For the same fish, Table 4-4 and Table 4-5 provide information on maturity-at-length.

F. Population biological parameters and other research

The maximum size reported by different authors ranges from 45 (Wheeler, 1978) to 50 cm (N. Daan, pers. comm.). In the North Sea, specimens >45 cm are rarely caught.

The winter catches in the North Sea are dominated by larger specimens, with a maximum abundance at 19–22 cm. In Skagerrak-Kattegat, the length–frequency distribution has two clear peaks at 11–12 cm and at 16–18 cm, while larger fish are clearly absent. There are no reliable data on the age composition.

The length distributions are remarkably similar from year to year and do not indicate a clear year-class signal: small individuals are never very abundant. The absence of small fish in the North Sea suggests that the IBTS survey does not adequately cover the nursery grounds. It is possible that juveniles concentrate on rough bottoms, which have usually to be avoided to minimize damage to the fishing gear, or that they remain pelagic (ICES-FishMap).

Average length of 1-year-olds was 13–14 cm and of 2-year-olds 19–20 cm in samples collected during the first quarter of 1977–1978. Highest age reported was nine years. The average length of 8-year-old fish has been estimated at 35 cm (Damm, 1987) and 32 cm (MacDonald *et al.*, 1994). Females grow faster and live longer than males (Damm, 1987). This is supported by a survey in May 1992, where all specimens larger than 32 cm were females (Knijn *et al.*, 1993).

Available von Bertalanffy growth parameters are given in the text table below:

Area	L_∞ (cm)	K (yr-1)	t_0 (yr)	Reference
Brittany males	34.4	0.85	0.14	Baron, 1985
Brittany females	38.0	0.77	0.16	Baron, 1985

Sexual maturity is said to be attained at between two and three years of age (Wheeler, 1978; Baron, 1985a, 1985b), but data from the North Sea from the first half of May 1992 show that specimens from about 15 cm onwards can be mature, males at a somewhat smaller length than females (Knijn *et al.*, 1993). The same can be seen in the data for the 4th quarter of 1992 presented in Table 4-4 and Table 4-5. This indicates that maturity may even be reached in 1-year old fish.

Studies in the Baie de Douarnenez (Brittany) have shown that the length at which 50% of males and females were mature were 29.4 and 31.2 cm, respectively (Baron, 1985a, 1985b). These values seem very high compared to the North Sea.

The spawning period is from April to August (Wheeler, 1978). Off the English north-east coast eggs are found from May to August (Harding and Nichols, 1987). The pelagic eggs are 1.3–1.5 mm in diameter, and the larvae hatch at a length of 3–4 mm (Russell, 1976).

Seasonal distribution maps indicate a marked seasonal northwest–southeast migration pattern that is rather unusual. The population is concentrated in the central western North Sea during winter and spreads into the southeastern part during spring to spawn. In the Kattegat and the northern North Sea, such shifts appear to be absent. The withdrawal from the colder coastal waters may reflect the southerly origin of the species (ICES-FishMap).

The lower three rays of the pectoral fins of gurnards are separate and well supplied with sense organs. They are used to 'walking' over the substratum and locating prey buried in the seabed (Wheeler, 1978). Small crustaceans, such as the brown shrimp *Crangon crangon* and small crabs are major food items in terms of weight for small (<25 cm) individuals, while stomach contents of larger specimens are dominated by a variety of fish species (De Gee and Kikkert, 1993). The fish component of the diet largely consists of juveniles (0- and 1-group) of commercially exploited species such as cod, whiting, sandeel and sole. Off Jutland, grey gurnard appeared to be a major predator on pelagic 0-group cod during June–July (De Gee and Kikkert, 1993). Specimens in Loch Etive (west coast of Scotland) were found to feed almost exclusively on mysids, euphausiids, and decapod crustaceans (Gordon, 1981). Due to their piscivorous behaviour, grey gurnard appears to play an important role in the ecosystem.

G. Analysis of stock trends/ assessment

The 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 stocks in Areas IIIa, IV and VIId,e is not known. Most informative are probably the time-series based on the catches from the IBTS survey in the North Sea and in Skagerrak-Kattegat. Especially in the North Sea these show a marked increase since the late 1980s).

H. Data requirements

For management purposes information should be available on catches and on landings. The quality of landings data has been poor for this species because in the past only landings of "gurnards" were reported.

Little is known of the biological parameters of grey gurnard.

From the information presented here, it can be concluded that grey gurnard is of very limited commercial interest. It should be considered to exclude this species from the list of species dealt with by WGNEW.

I. References (not necessarily all mentioned in the text)

Baron, J. 1985. Les Triglides (Téléostéens, Scorpaeniformes) de la Baie de Douarnenez. I La croissance de: *Eutrigla gurnardus*, *Trigla lucerna*, *Trigloprus lastoviza* et *Aspitrigla cuculus*. Cybium 9(2): 127–144.

Baron, J. 1985. Les Triglides (Téléostéens, Scorpaeniformes) de la Baie de Douarnenez. II La reproduction de : *Eutrigla gurnardus*, *Trigla lucerna*, *Trigloprus lastoviza* et *Aspitrigla cuculus*. Cybium 9(3): 255–281.

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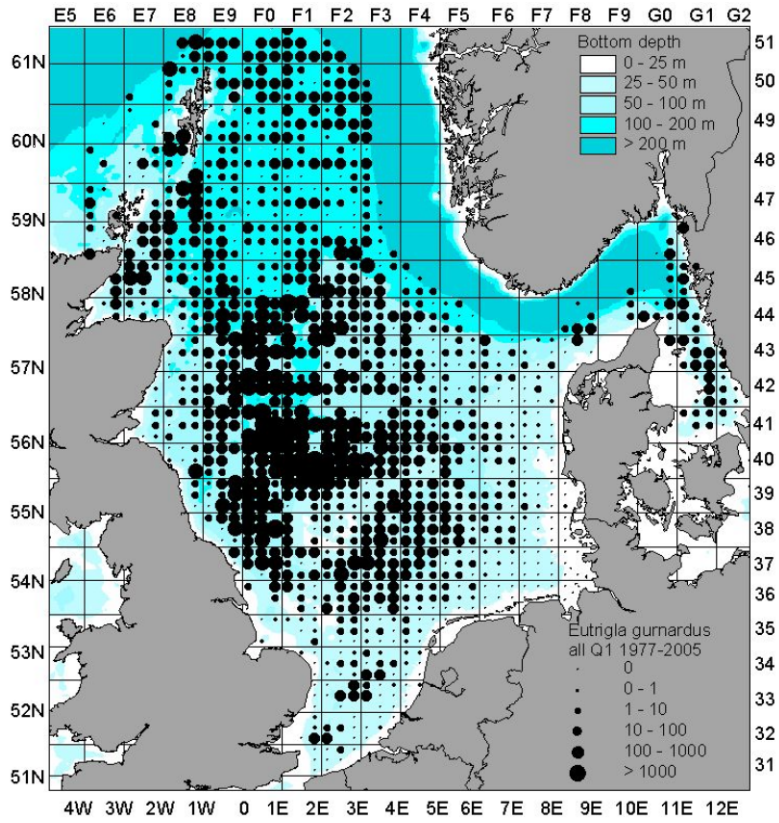

Figure 1. Average annual catch (number per fishing hour for all length classes combined) for grey gurnard in the quarter 1 IBTS survey, 1977–2005 (ICES-FishMap).

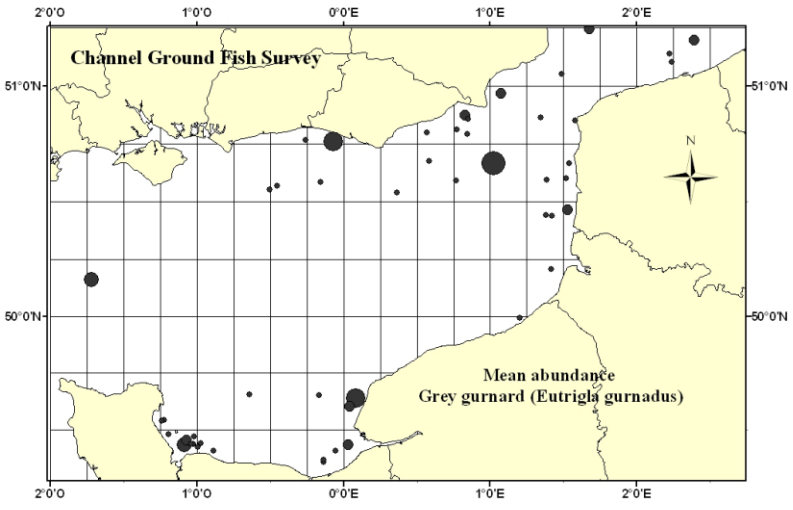

Figure.2. Distribution of grey gurnard in the eastern Channel. CGFS survey 1988–2004.

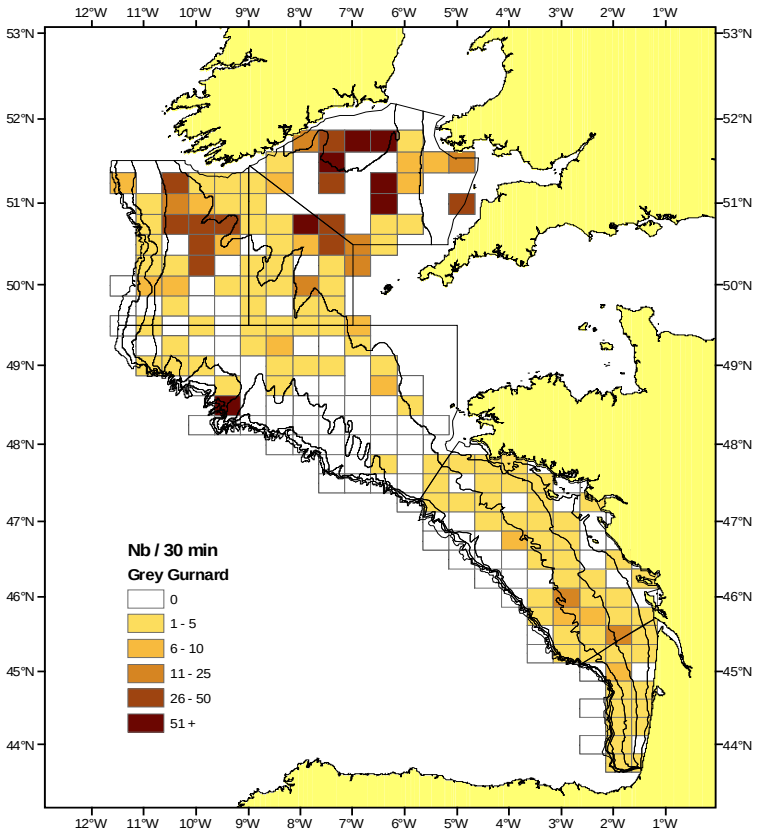

Figure.3. Distribution of grey gurnard in the Celtic Sea and the Bay of Biscay. EVHOE survey, 1997–2004.

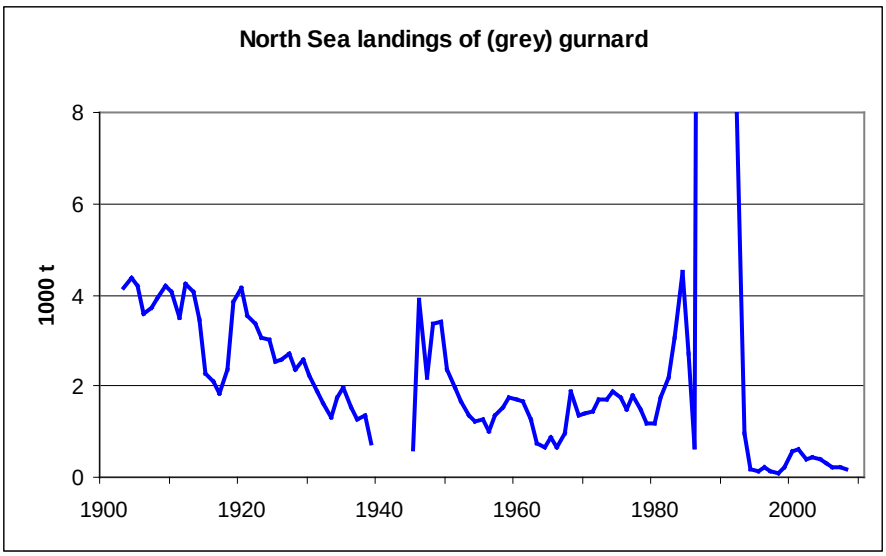

Figure.4. Total international landings of gurnards from the North Sea, probably most of the landings consisted of grey gurnard. See text for further explanation.

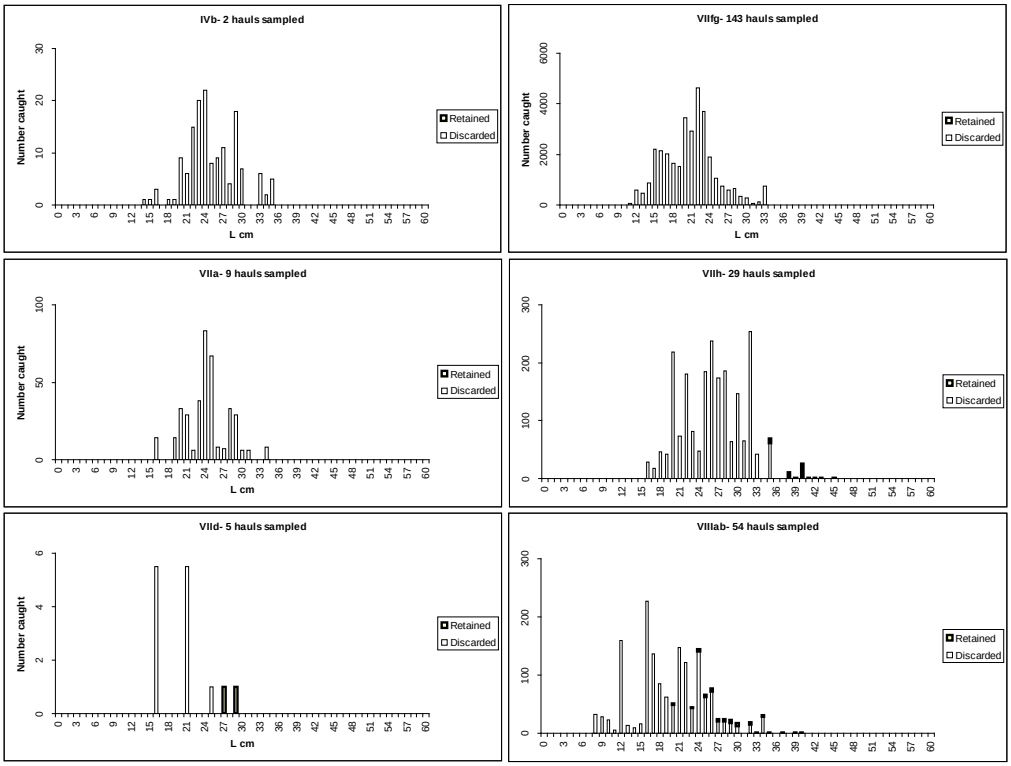

Figure 5. Length composition of French catches of grey gurnard in 2005.

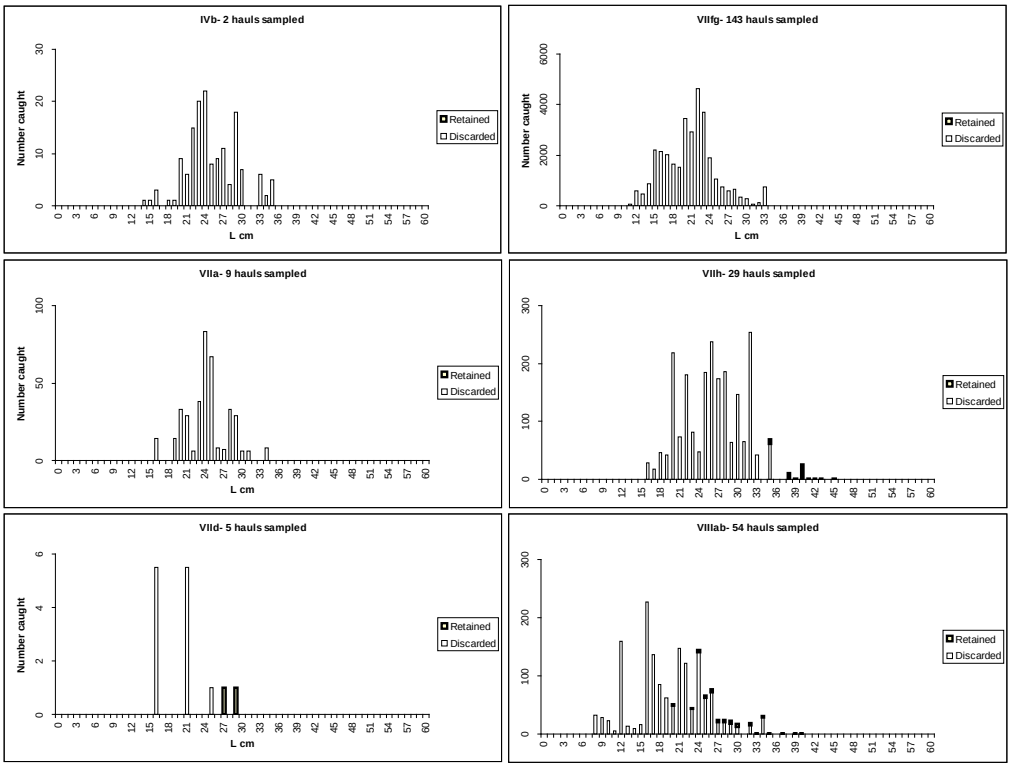

Figure.6. Length composition of French catches of grey gurnard in 2006.

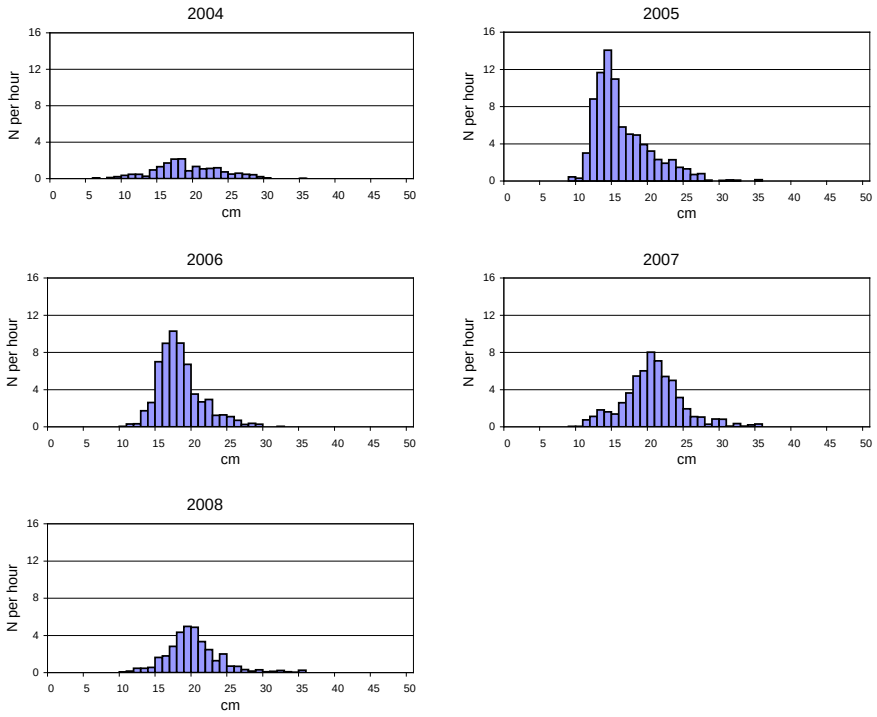

Figure 7. Grey gurnard: number at length discarded per fishing hour by the Dutch beam trawl fishery in the years 2004 to 2008.

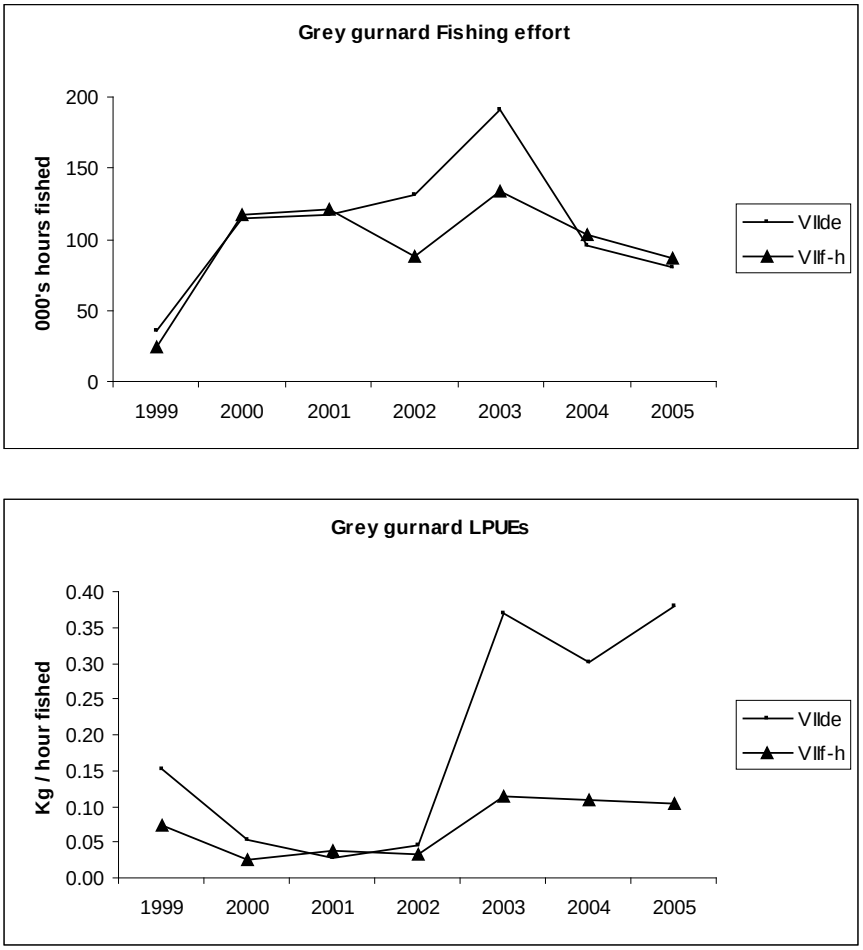

Figure 8. Effort and landings per unit of effort for French single otter trawlers for areas VIId,e and VIIf–h for the years 1999 to 2005.

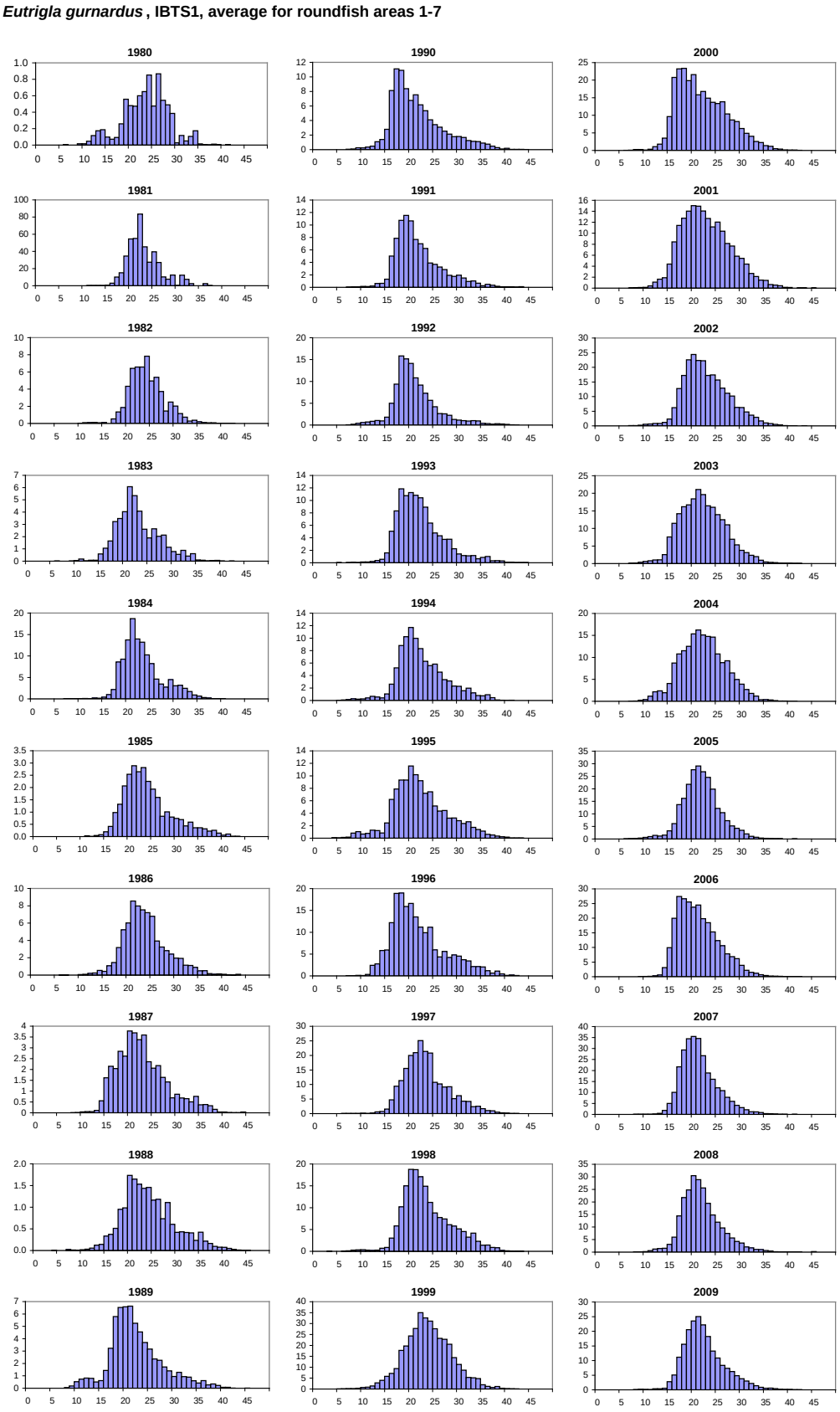

Figure 9. Grey gurnard in IV: number at length during the quarter 1 IBTS survey.

Eutrigla gurnardus **, IBTS1, average for roundfish areas 8 and 9**

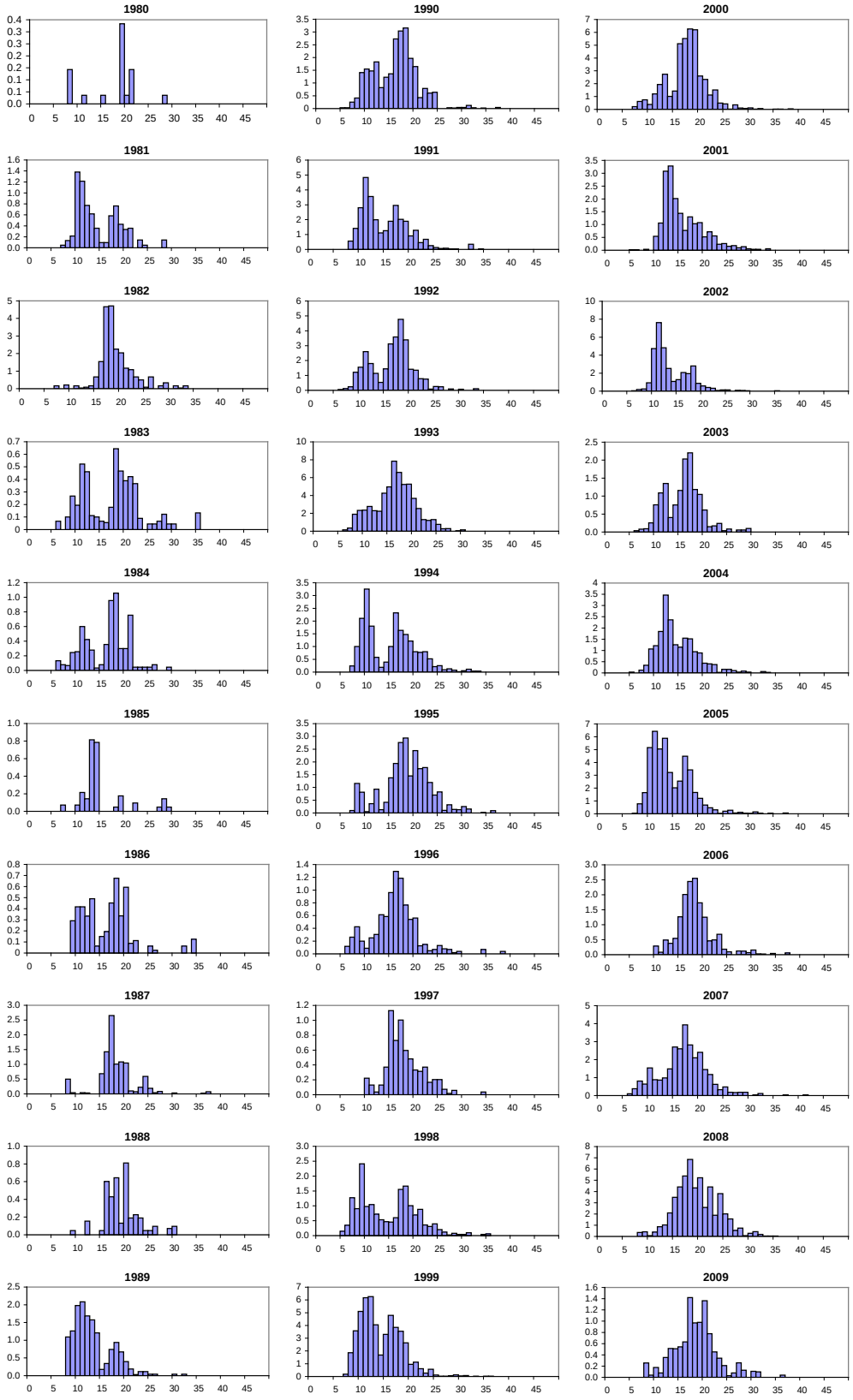

Figure 10. Grey gurnard in IIIa: number at length during the quarter 1 IBTS survey.

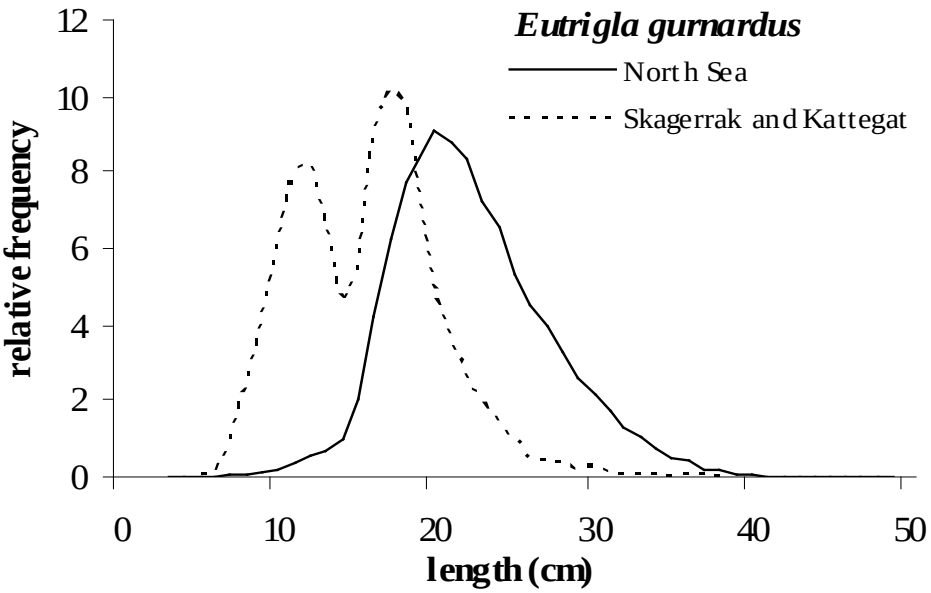

Figure 11. Length–frequency distribution of *E. gurnardus* based on the quarter 1 IBTS, 1985–2005 in the North Sea and in Skagerrak/Kattegat. (ICES-FishMap).

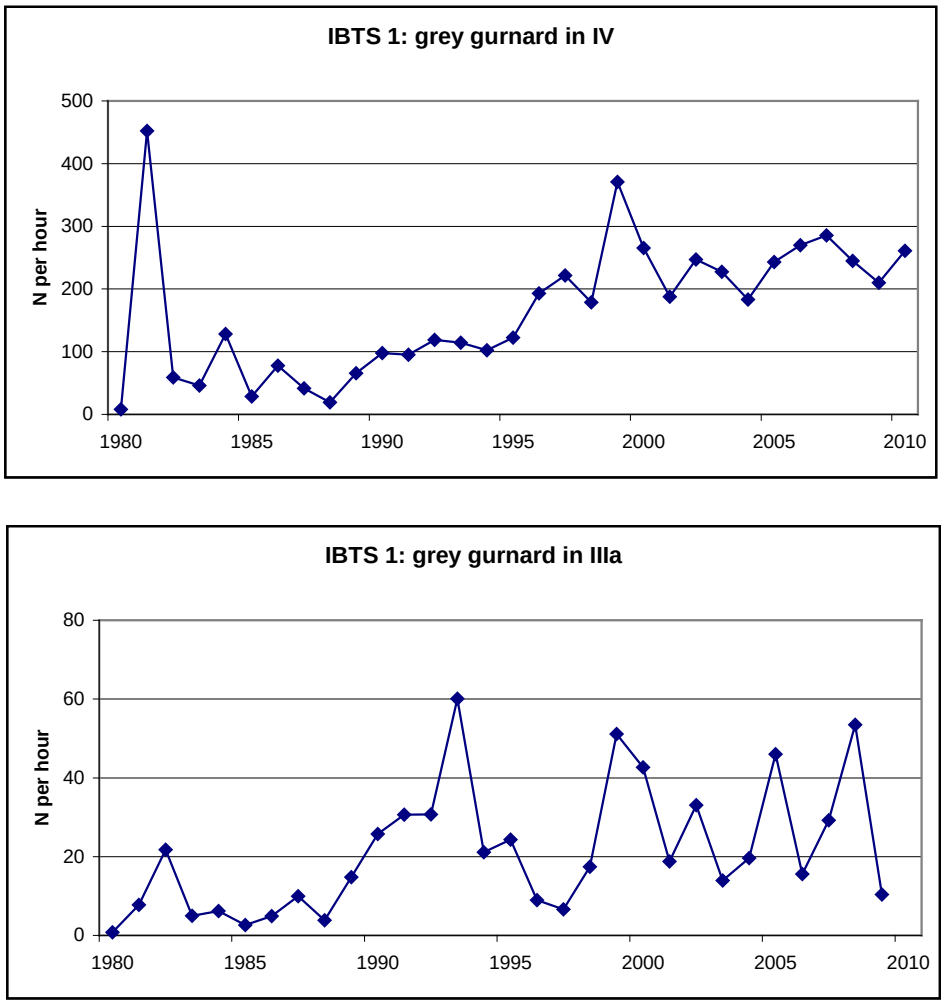

Figure 12. Average catch rate (number per hour for all length classes combined) of grey gurnard in the North Sea (upper panel) and in Skagerrak and Kattegat (lower panel), based on quarter 1 IBTS.

Table 1. Total international landings of grey gurnard from the whole ICES area as reported to FAO for the years 1975–2008.

Country	Bel	Den	Faer	Fra	Icl	Irl	Net	Nor	Por	Russ	Swe	UK E&W	UK Sc	TOTAL
1975	0	0	0	0	0	0	0	0	0	.	14	0	0	14
1976	0	0	0	0	0	0	0	0	0	.	69	0	0	69
1977	0	0	0	0	0	0	0	0	0	.	37	0	0	37
1978	0	0	0	222	0	0	0	0	0	.	54	0	0	276
1979	0	0	0	1,118	0	0	0	0	0	.	49	0	0	1,167
1980	0	0	0	1,172	0	0	0	0	0	.	38	0	0	1,210
1981	0	0	0	0	0	0	0	0	0	.	46	0	0	46
1982	0	360	0	895	0	0	0	0	0	.	43	0	0	1,298
1983	0	1,067	0	852	0	0	0	0	0	.	8	0	0	1,927
1984	0	4,041	0	400	0	0	0	0	0	.	7	0	0	4,450
1985	137	2,358	0	373	0	0	0	0	0	.	9	0	0	2,879
1986	0	314	0	638	0	0	0	0	0	.	10	0	0	962
1987	115	46,598	0	432	0	0	0	0	0	.	6	0	0	47,151
1988	116	38,237	0	655	0	0	0	0	0	.	3	43	0	39,054
1989	119	26,739	0	841	0	0	0	0	0	.	5	.	0	27,704
1990	110	22,076	0	704	0	16	0	0	0	.	3	.	0	22,909
1991	93	14,539	0	443	0	15	0	0	0	.	5	.	4	15,099
1992	118	8,136	0	259	0	17	0	0	0	0	10	.	10	8,550
1993	126	840	0	240	0	10	0	0	<0.5	0	9	.	25	1,250
1994	79	99	0	194	0	0	0	0	<0.5	0	12	.	24	408
1995	58	73	0	204	0	0	0	0	<0.5	0	6	.	21	362
1996	122	70	0	220	1	0	0	0	0	0	4	.	56	473

Country	Bel	Den	Faer	Fra	Icl	Irl	Net	Nor	Por	Russ	Swe	UK E&W	UK Sc	TOTAL
1997	64	36	0	217	<0.5	0	0	0	0	0	5	.	59	381
1998	50	56	0	159	<0.5	38	0	0	0	0	8	.	0	311
1999	48	86	0	.	0	0	0	0	0	0	132	.	0	266
2000	51	96	0	224	0	0	459	0	0	26,081	5	.	0	26,916
2001	32	289	0	216	0	0	295	<0.5	0	3,155	4	.	46	4,037
2002	64	64	1	179	0	0	286	0	0	60	2	.	41	697
2003	38	92	0	159	0	0	320	<0.5	0	263	7	.	26	905
2004	41	83	0	132	0	0	304	<0.5	<0.5	1,401	5	.	23	1,989
2005	39	73	0	124	0	0	246	0	0	2,456	9	.	22	2,969
2006	25	67	<0.5	103	0	0	165	2	0	138	2	.	27	529
2007	20	38	12	97	0	0	166	5	4	0	3	.	54	399
2008	19	48	15	11	1	0	123	5	8	0	8	.	79	317

Table 2. Age–length key for female grey gurnard from the North Sea (1992, quarter 4). Data provided by Cefas.

Females	Age											
Length (mm)	0	1	2	3	4	5	6	7	8	9	10+	Grand Total
110	1											1
120	1											1
130	1											1
150		5										5
160		6	2									8
170		4	4									8
180		2	4		1							7
190		3	3	1	1							8
200		1	5									6
210			1	4								5
220			3	4	1							8
230			1	2	2	1						6
240				1	3							4
250				3	2	1	1					7
260				2	2	2		1				7
270				1	3	3	1					8
280					3	1	1	1			1	7
290					4	1	1	1				7
300					2	1			1			4
310					1		2	1				4
320					1			1	2		1	5
330					1			3	2			6
340					1	1		2		1		5
350						1				2		3
360					1				1		1	3
370							1		1			2
380						2		1		1		4
390							2	1		1	1	5
400												0
410												0
420											2	2
430											1	1
440												0
450												0
460											1	1
Grand Total	3	21	23	18	29	14	9	12	7	5	8	149

Table 2. Age–length key for male grey gurnard from the North Sea (1992, quarter 4). Data provided by Cefas.

Males

	Age											
Length (mm)	0	1	2	3	4	5	6	7	8	9	10+	Grand Total
140	1											1
150		3										3
160		1	1									2
170		4										4
180		2	5	1								8
190		1	3	1	1							6
200		1	5									6
210			4	3	1							8
220			1	4								5
230			1	3	3							7
240			1	2		1						4
250			1		1	1	1		1	1		6
260					2	2	1					5
270					1					1	1	3
280					2	2					2	6
290						1	1	1			2	5
300				1	1	1	1		1			5
310					1		1					2
320					1	1				1		3
330					1				2			3
340						1			1			2
350							1	1				2
360							1					1
370										1	1	2
380							1			1		2
390											1	1
400											2	2
410											1	1
Grand Total	1	12	22	15	15	10	8	2	5	5	10	105

Table 3. Maturity data for female grey gurnard from the North Sea (1992, quarter 4). Data provided by Cefas.

Females

Length	Immature	Maturing	Mature	Spent	Grand Total
110	1				1
120	1				1
130	1				1
150	5				5
160	5	2		1	8
170	8				8
180	5	1		1	7
190	6	1		1	8
200	4	1		1	6
210	2	3			5
220	3	4		1	8
230	2	1		3	6
240	1	1		2	4
250	2	3		2	7
260	1	3		3	7
270	2	3		3	8
280		3		4	7
290	1	4		2	7
300		2		2	4
310		2		2	4
320		3		2	5
330		5		1	6
340		2		3	5
350		3			3
360		1		2	3
370		2			2
380		3		1	4
390		2	1	2	5
420		1		1	2
430		1			1
460				1	1
Grand Total	50	57	1	41	149

Table 5. Maturity data for male grey gurnard from the North Sea (1992, quarter 4). Data provided by Cefas.

Males

Length	Immature	Maturing	Mature	Spent	Grand Total
140	1				1
150	3				3
160	2				2
170		4			4
180	6	1		1	8
190	4	1		1	6
200	3	3			6
210	6	2			8
220	3	1		1	5
230	1	2		4	7
240	1	1		2	4
250	1	2		3	6
260	1	1	1	2	5
270		3			3
280	1	3		2	6
290		1		4	5
300	1	2		2	5
310		1		1	2
320	1	2			3
330				3	3
340		2			2
350		2			2
360		1			1
370				2	2
380				2	2
390		1			1
400		2			2
410		1			1
Grand Total	35	39	1	30	105

Stock Annex for Pollack in Subarea VIII and Division IXa

Stock specific documentation of standard assessment procedures used by ICES.

Stock	Pollack in Subarea VIII and Division IXa
Working Group	Assessment of Southern Shelf Stocks of Hake, Monk and Megrim (WGHMM)
Date	May 2013
Revised by	José Castro

A. General

A.1. Stock definition

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.

Charrier *et al*. (2006) used genetic markers to assess the stock structure of pollack by comparing samples collected in the Atlantic French coast and off southern Norway; however, a limited genetic differentiation among samples was found. There are no morphological studies that allows to separate stocks for this species. Data from the fishery indicate three main areas of exploitation, so WGNEW proposed, based on a pragmatic approach, to distinguish three different stock units (ICES, 2012a): the southern European Atlantic shelf (ICES Subarea VIII and Division IXa), the Celtic Seas (ICES Subareas VI and VII), and the North Sea (ICES Subarea IV, including Divisions VIId and IIIa).

A.2. Fishery

Pollack is mainly a bycatch in various fisheries in both VIII and IXa including small-scale fisheries taking place in coastal waters. Catches are taken by the three countries with quota: France and Spain, followed distantly by Portugal. In France, pollack is mainly caught in nets, but also by lines, in Subarea VIII (the majority from Division VIIIa). 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. Spanish landings are taken mostly from Iberian waters (VIIIc and IXa), where they are basically caught by gillnet and longline (Rodriguez *et al*., 2011). The scarce Portuguese catches are made basically by the polyvalent fleet (Jardim *et al*., 2011).

However, there is a small-scale target gillnet fishery that started in 2006 by the UK (Readdy and Robinson, 2011) which operates mainly in ICES Subarea VIIIa. In 2012 recorded landings from the UK for VIII and IXa combined have dropped to below 2 tonnes.

A.3. Ecosystem aspects

Pollack is bentho-pelagic, found mostly close to the shore over hard bottom (Svetovidov, 1986). 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). Feeding is mainly on fish, and incidentally on crustaceans and cephalopods. According to FishBase spawning takes place from January to May, depending on the area, and mostly at 100 m depth. Cohen *et al*. (1990) report different spawning periods for Spain and Bay of Biscay, February and March, respectively.

B. Data

B.1. Commercial catch

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 Divisions VIIIabde, 231 t for VIIIc and 282 t for IX–X (precautionary TAC). The national quotas are allocated between France (62.8%) and Spain (36.7%), followed distantly by Portugal (0.5%).

A time-series of landings has been obtained from EuroStat, the statistical office of the European Union, since 1950; however, data show much more reliable from 1977 onwards. At the same time, the National laboratories of countries with pollack catches have provided more detailed data of landings, disaggregated by gear, since 2001. There is some mixing in Portuguese markets with whiting (*Merlangius merlangus*) due to use of common names; however, this problem should not have major impact in landing series due to the low level of Portuguese landings for both species (Jardim *et al*., 2011).

Portuguese discard data of pollack can be assumed null (Fernandes and Prista, 2012). Likewise, discard estimates from the coastal Spanish trawl fleets show negligible levels.

B.2. Biological

Female length-at-maturity was considered as 35 cm (Cardinale *et al*., 2012), at the age of three years. Cohen *et al.* (1990) give a maximum length of 130 cm, maximum published weight of 18.1 kg and maximum reported age of eight years. Life-history (growth) parameters for Pollack 89a were estimated to be L_{max}= 130 cm, L_{inf}= 85.6 cm, K= 0.19 $year^{-1}$, and M=0.55 (ICES, 2012).

Since 2011, IEO (Spain) starts to collect information for pollack under the multiannual Community programme (DCF). Most samplings provide from the gillnet fleet because is compounded by a higher number of DCF métiers than longline.

UK took length samples during scientific surveys up until 2001. Currently, UK under the DCF is undertaking sampling from fixed net fishery although this mostly covers VIIe–h as most of Area VIII landings are made into France.

B.3. Surveys

Pollack abundance indices result negligible in the groundfish surveys developed in the area (French, Spanish and Portuguese surveys). The bottoms preferred for this species (wrecks and rocky bottoms) makes that trawl surveys are probably not very well suited for monitoring this species.

However, despite the low abundance indices in the Spanish survey (SP_GFS), developed in Cantabrian Sea and off Galicia since 1983, it can be noted that pollack started to be detected since 2004 onwards. Biomass and abundance indices were greatest in

2009 and bathymetric distribution ranged between 0–150 m with maximum abundance between 100–150 m.

B.4. Commercial cpue

Cpue data are not available.

B.5. Other relevant data

No other relevant data were available.

C. Assessment: data and method

No reliable assessment was presented for this species in the southern European Atlantic shelf ecoregion due to the lack of sufficient data. However, the existence of a landings time-series makes it feasible to apply DLS assessment methods in future.

D. Short-term projection

No fishing possibilities can be projected.

E. Medium-term projections

No medium-Term projections can be projected.

F. Long-term projections

No long-term projections can be projected.

G. Biological reference points

No reference points have been defined. However, WGLIFE (ICES, 2012b) applied basic life-history parameters to generate a proposal of reference points, assuming knife-edge recruitment-at-age 1 and also at age 2.

H. Other issues

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).

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Stock Annex for Grey Gurnard in SD VI and VIIa–c,e–k

Stock specific documentation of standard assessment procedures used by ICES.

Stock	Grey gurnard in Subarea VI and Divisions VIIa–c and e–k (Celtic Sea and West of Scotland)
Working Group	WGNEW
Date	March 2014
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A.1 General biology

Grey gurnards *Eutrigla gurnardus* occur in the Eastern Atlantic from Iceland, Norway and the southern Baltic Sea in the North, to Morocco and Madeira in the South. 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.

Grey gurnard is most common on sandy bottoms, but also on mud, shell and rocky bottoms (Wheeler, 1978). It can be found from the coastline up to depths of 140 m. Juveniles feed on a variety of small crustaceans. The diet of older specimens consists mainly of larger crustaceans (mostly shrimps and shore crabs) and small fish (mostly gobies, sandeels, young herring and flatfish) (Wheeler, 1978; Gordon, 1981; De Gee and Kikkert, 1993). Due to its piscivorous behaviour, grey gurnard appears to play an important role in the ecosystem.

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

There do not seem to be clear nursery areas. Grey gurnard can reach a maximum published length of 60 cm.

A.2 Stock ID and possible assessment areas

No studies on the stock ID of grey gurnard are known, but it is assumed that Grey gurnard from the North Sea may well be separated from grey gurnard in the English Channel. In the Eastern Channel, the abundance of grey gurnard seems to be low compared to the North Sea (Figure 1.). The distribution in the western Channel is not known. A higher abundance is observed in the Celtic Sea, whereas the species is almost absent from the Bay of Biscay (Figure 1.).

In a pragmatic approach (in the absence of specific information on stock structure), the ICES Ecoregions are currently used as a minimum level of disaggregation for the definition of stock units. This way, three grey gurnard stocks are currently recognized: 1) the North Sea (including IIIa and VIId), 2) the Celtic Seas and West of Scotland (excluding VIId), and 3) the South European Atlantic (Bay of Biscay and Atlantic Iberian waters). This is an interim solution until more information becomes available on the stock structure of this species. ICES does not necessarily advocate that the Areas VI and VII constitute a management unit for grey gurnard, and further work is required.

A.3 Management regulations

There is no minimum landing size for this species, and no TACs have been set.

B. Data

B.3 Fisheries data

Fisheries: Historically, grey gurnard is mainly taken as a bycatch in mixed demersal fisheries for flatfish and roundfish. However, the market is limited due to the low commercial value of this species, and the larger part of the catch appears to be discarded. Therefore, landings data do not reflect the actual catches very well. More information on the UK (England and Wales) and Russian fisheries in 2012 can be found in working documents 8 and 25 of the report of WGCSE 2013 (ICES, 2013).

Landings: Gurnards were often not sorted by species when landed. This is reflected in the catch statistics where different species of gurnards were often reported into one generic category of "gurnards". In the EU, this approach was legal until 2010. After that the legislation changed, now requiring all gurnards to be landed under their exact species names. As a consequence, the official statistics seem to improve gradually over the years, but it remains problematic to disentangle the past gurnard landings into the different species parts. Another problem is that the catch statistics are incomplete for several years: some countries reporting no landings at all, other countries reporting exceptionally high landings in certain years (see Table 1). A third aspect relates to the spatial entities in which landings are reported. Sometimes landings from certain ICES Divisions are reported separately, sometimes they are pooled in larger geographical units (e.g. VIId and VIIe vs. VIIde).

The landings of grey gurnard in the Celtic Seas and West of Scotland are presented in Table 1 and Figure 3 for ICES Subareas VI and VII combined (source: ICES FishStat). These show large intra-annual fluctuations, probably mainly due to the above mentioned problems. In the period 2007–2011 the international landings appear to be among the lowest in the time-series, but in 2012 and 2013 values of 275 tonnes and 723 tonnes were reached respectively, mainly due to an increase of the UK landings in those years. In the most recent decade, Subarea VI was only responsible for less than 5% of the total landings.

Discards: Due to the low commercial value, catches of grey gurnard are largely discarded. Therefore, landing data will not reflect the actual catches and are thus only considered to be marginally informative. Only DCF observer programmes and/or self-sampling programmes could provide more accurate estimates of the true catches. Some data on discards of grey gurnard have been analysed in previous WGNEW-meetings, but no comprehensive international overview of discard practices could be compiled for this stock area. In general, the observed discard rates were highly variable. Data from the French discard sampling in 2005 and 2006 in different ICES areas are shown in Figure 1.44-5.

B.4 Survey data/ recruit series

Several surveys that catch grey gurnard could be identified in the Celtic Seas and West of Scotland. Four of these have data available through DATRAS (EVHOE-WIBTS-Q4, FR-CGFS-Q4, IE-CGFS-Q4 and BTS-VIIa-Q3), but also some Scottish, Spanish, Russian and Northern Irish surveys could prove to be informative with respect to the trends of grey gurnard in the northern and central parts of the stock area (VI, VIIa, VIIbc).

So far, only the data from EVHOE-WIBTS-Q4 (VIIfghj) have been analysed by WGNEW (updated in WGNEW 2014), but obviously this survey can only be used as an indicator of abundance of grey gurnard in this area. Figures 6–8 illustrate that grey gurnard is caught in sufficient numbers by this survey to deliver a meaningful abundance index. The highest abundances are observed in the northern part of the Celtic Sea and south of Ireland (Figure 6). The abundance index (numbers per hour) shows a much higher mean abundance over the last six years compared to the years before, but the signal is very noisy (Figure 7). From Figure 8 it becomes clear that EVHOE catches mainly immature grey gurnards (FishBase: Lm = 19.3 cm).

B.5 Biological sampling

Biological data for this species are scarce. In the early 1990s some countries collected otoliths and information on maturity stages during the quarterly IBTS surveys. Table 22-3 provide sex-separated age–length keys based on sampling by Cefas in the 4th quarter of 1992. For the same fish, Tables 4–5 provide information on maturity-at-length.

B.6 Population biological parameters and other research

The maximum size reported by different authors ranges from 45 (Wheeler, 1978) to 60 cm (FishBase). In the North Sea, specimens >45 cm are rarely caught.

The average length of 1-year-olds was 13–14 cm and of 2-year-olds 19–20 cm in samples collected during the first quarter of 1977–1978. The highest age reported was nine years. The average length of 8-year-old fish has been estimated at 35 cm (Damm, 1987) and 32 cm (MacDonald *et al.*, 1994). Females grow faster and live longer than males (Damm, 1987). This is supported by a survey in May 1992, where all specimens larger than 32 cm were females (Knijn *et al.*, 1993).

Available von Bertalanffy growth parameters are given in the text table below:

Area	L_∞ (cm)	K (yr-1)	t_0 (yr)	Reference
Brittany males	34.4	0.85	0.14	Baron, 1985
Brittany females	38.0	0.77	0.16	Baron, 1985

Sexual maturity is said to be attained at between two and three years of age (Wheeler, 1978; Baron, 1985a,b), but data from the North Sea from the first half of May 1992 show that specimens from about 15 cm onwards can be mature, males at a somewhat smaller length than females (Knijn *et al.*, 1993). The same can be seen in the data for the 4th quarter of 1992 presented in Table 3-5. This indicates that maturity may even be reached in 1-year old fish.

Studies in the Baie de Douarnenez (Brittany) have shown that the length at which 50% of males and females were mature were 29.4 and 31.2 cm, respectively (Baron, 1985a,b). These values seem very high compared to the North Sea.

The spawning period is from April to August (Wheeler, 1978). Off the English northeast coast eggs are found from May to August (Harding and Nichols, 1987). The pelagic eggs are 1.3–1.5 mm in diameter, and the larvae hatch at a length of 3–4 mm (Russell, 1976).

Seasonal distribution maps indicate a marked seasonal northwest–southeast migration pattern that is rather unusual. The population is concentrated in the central western North Sea during winter and spreads into the southeastern part during spring to spawn. In the Kattegat and the northern North Sea, such shifts appear to be

absent. The withdrawal from the colder coastal waters may reflect the southerly origin of the species (ICES-FishMap).

B.7 Analysis of stock trends/ assessment

Information from landings is very poor, due to poor reporting (gurnard landings are not always identified at the species level or delivered in sufficient spatial detail, and there are additional concerns regarding misreporting) and also because the low value of the species leads to massive discarding. The EVHOE trend cannot be assumed to be relevant to the entire stock area. Therefore, the status of grey gurnard in the Celtic Seas and West of Scotland is not exactly known, and no certain statements can be made with regards to the trends in this stock.

B.8 Data requirements

Further progress can be made with respect to:

- the stock identity of grey gurnard in the Northeast Atlantic;
- the reported landings (species-specific and by ICES Division);
- discards;
- analysis of other surveys;
- biological data from commercial sampling programmes.

Progress on processing all this information can only be achieved if experts are formally designated as stock coordinator and stock assessor in order to take the leadership on the needed analysis.

C. References

Baron, J. 1985a. Les Triglides (Téléostéens, Scorpaeniformes) de la Baie de Douarnenez. I La croissance de: *Eutrigla gurnardus*, *Trigla lucerna*, *Trigloprus lastoviza* et *Aspitrigla cuculus*. Cybium 9(2): 127–144.

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Table 1. Grey Gurnard in Subarea VI and Divisions VIIa-c,e–j. Official landings by country (source: ICES FishStat).

	BEL	FRA	IRL	NLD	RUS	UK	TOTAL
1978	0	206	0	0	0	0	206
1979	0	165	0	0	0	0	165
1980	0	155	0	0	0	0	155
1981	0	0	0	0	0	0	0
1982	0	407	0	0	0	0	407
1983	0	271	0	0	0	0	271
1984	0	157	0	0	0	2	159
1985	35	130	0	0	0	2	167
1986	0	280	0	0	0	0	280
1987	37	216	0	0	0	0	253
1988	30	211	0	0	0	21	262
1989	34	646	0	0	0	0	680
1990	18	538	16	0	0	0	572
1991	17	298	15	0	0	4	334
1992	13	123	17	0	0	0	153
1993	11	113	10	0	0	1	135
1994	11	107	0	0	0	2	120
1995	7	101	0	0	0	0	108
1996	6	117	0	0	0	2	125
1997	8	61	0	0	0	2	71
1998	13	59	38	0	0	0	110
1999	11	0	0	0	0	0	11
2000	13	109	0	7	26081	0	26 210
2001	3	116	0	0	3155	13	3287
2002	7	81	0	0	60	11	159
2003	3	66	0	1	263	0	333
2004	5	61	0	7	1401	0	1474
2005	9	59	0	8	2456	0	2532
2006	4	28	0	10	138	6	186
2007	4	24	0	1	0	4	33
2008	7	1	0	3	0	1	12
2009	11	33	0	1	0	8	53
2010	14	45	0	5	0	12	76
2011	18	49	0	3	1	19	82
2012	24	57	0	2	92	101(1)	275
2013*	14	(2)	0	(2)	(2)	709	723

*** preliminary.**

(1) value from WGCSE 2013 (lacking in ICES FishStat).

(2) not yet provided at WGNEW 2014.

Table 1. Age–length key for female grey gurnard from the North Sea (1992, quarter 4). Data provided by Cefas.

Females	Age											
Length (mm)	0	1	2	3	4	5	6	7	8	9	10+	Grand Total
110	1											1
120	1											1
130	1											1
150		5										5
160		6	2									8
170		4	4									8
180		2	4		1							7
190		3	3	1	1							8
200		1	5									6
210			1	4								5
220			3	4	1							8
230			1	2	2	1						6
240				1	3							4
250				3	2	1	1					7
260				2	2	2		1				7
270				1	3	3	1					8
280					3	1	1	1			1	7
290					4	1	1	1				7
300					2	1			1			4
310					1		2	1				4
320					1			1	2		1	5
330					1			3	2			6
340					1	1		2		1		5
350						1				2		3
360					1				1		1	3
370							1		1			2
380						2		1		1		4
390							2	1		1	1	5
400												0
410												0
420											2	2
430											1	1
440												0
450												0
460											1	1
Grand Total	3	21	23	18	29	14	9	12	7	5	8	149

Table 2. Age–length key for male grey gurnard from the North Sea (1992, quarter 4). Data provided by Cefas.

Males

	Age											
Length (mm)	0	1	2	3	4	5	6	7	8	9	10+	Grand Total
140	1											1
150		3										3
160		1	1									2
170		4										4
180		2	5	1								8
190		1	3	1	1							6
200		1	5									6
210			4	3	1							8
220			1	4								5
230			1	3	3							7
240			1	2		1						4
250			1		1	1	1		1	1		6
260					2	2	1					5
270					1					1	1	3
280					2	2					2	6
290						1	1	1			2	5
300				1	1	1	1		1			5
310					1		1					2
320					1	1				1		3
330					1				2			3
340						1			1			2
350							1	1				2
360							1					1
370										1	1	2
380							1			1		2
390											1	1
400											2	2
410											1	1
Grand Total	1	12	22	15	15	10	8	2	5	5	10	105

Table 3. Maturity data for female grey gurnard from the North Sea (1992, quarter 4). Data provided by Cefas.

Females

Length	Immature	Maturing	Mature	Spent	Grand Total
110	1				1
120	1				1
130	1				1
150	5				5
160	5	2		1	8
170	8				8
180	5	1		1	7
190	6	1		1	8
200	4	1		1	6
210	2	3			5
220	3	4		1	8
230	2	1		3	6
240	1	1		2	4
250	2	3		2	7
260	1	3		3	7
270	2	3		3	8
280		3		4	7
290	1	4		2	7
300		2		2	4
310		2		2	4
320		3		2	5
330		5		1	6
340		2		3	5
350		3			3
360		1		2	3
370		2			2
380		3		1	4
390		2	1	2	5
420		1		1	2
430		1			1
460				1	1
Grand Total	50	57	1	41	149

Table 4. Maturity data for male grey gurnard from the North Sea (1992, quarter 4). Data provided by Cefas.

Males

Length	Immature	Maturing	Mature	Spent	Grand Total
140	1				1
150	3				3
160	2				2
170		4			4
180	6	1		1	8
190	4	1		1	6
200	3	3			6
210	6	2			8
220	3	1		1	5
230	1	2		4	7
240	1	1		2	4
250	1	2		3	6
260	1	1	1	2	5
270		3			3
280	1	3		2	6
290		1		4	5
300	1	2		2	5
310		1		1	2
320	1	2			3
330				3	3
340		2			2
350		2			2
360		1			1
370				2	2
380				2	2
390		1			1
400		2			2
410		1			1
Grand Total	35	39	1	30	105

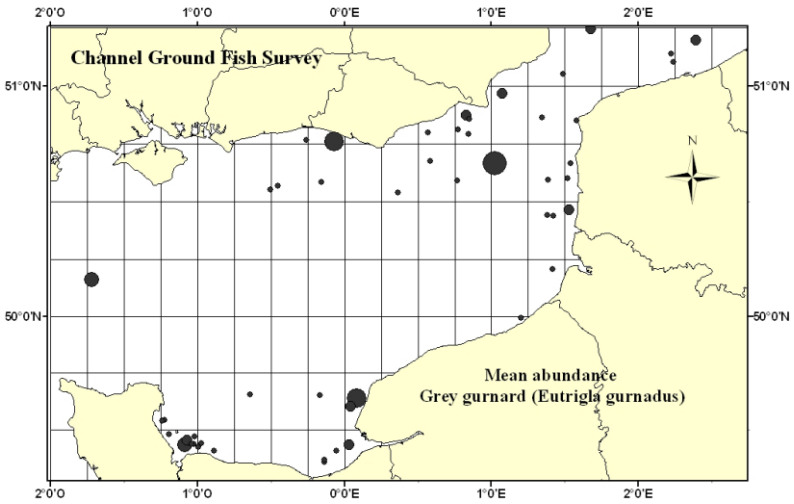

Figure 1.1. Distribution of grey gurnard in the eastern Channel. CGFS survey 1988–2004.

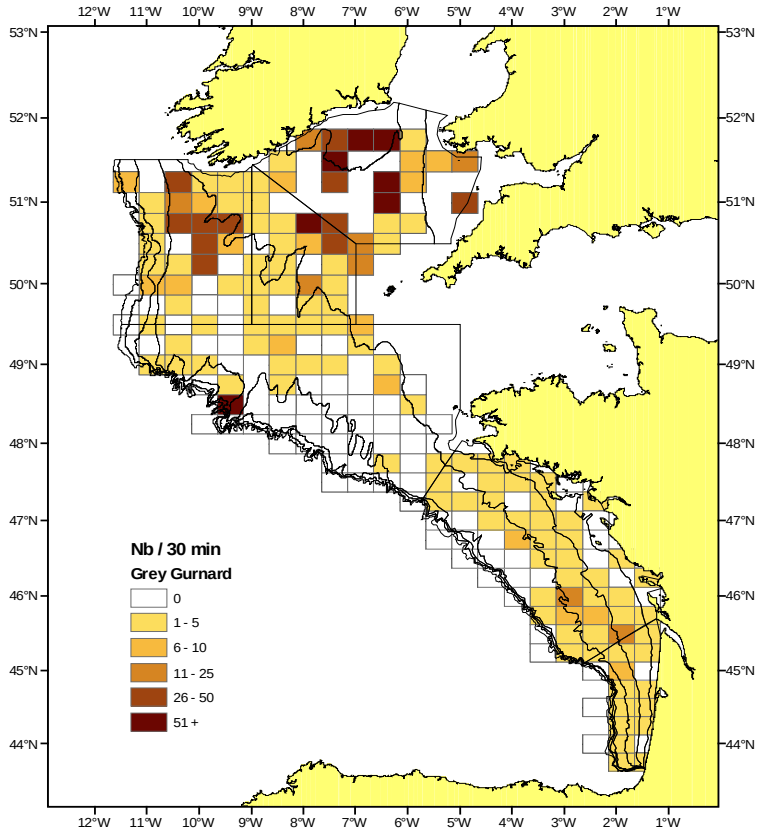

Figure 1.2. Distribution of grey gurnard in the Celtic Sea and the Bay of Biscay. EVHOE survey, 1997–2004.

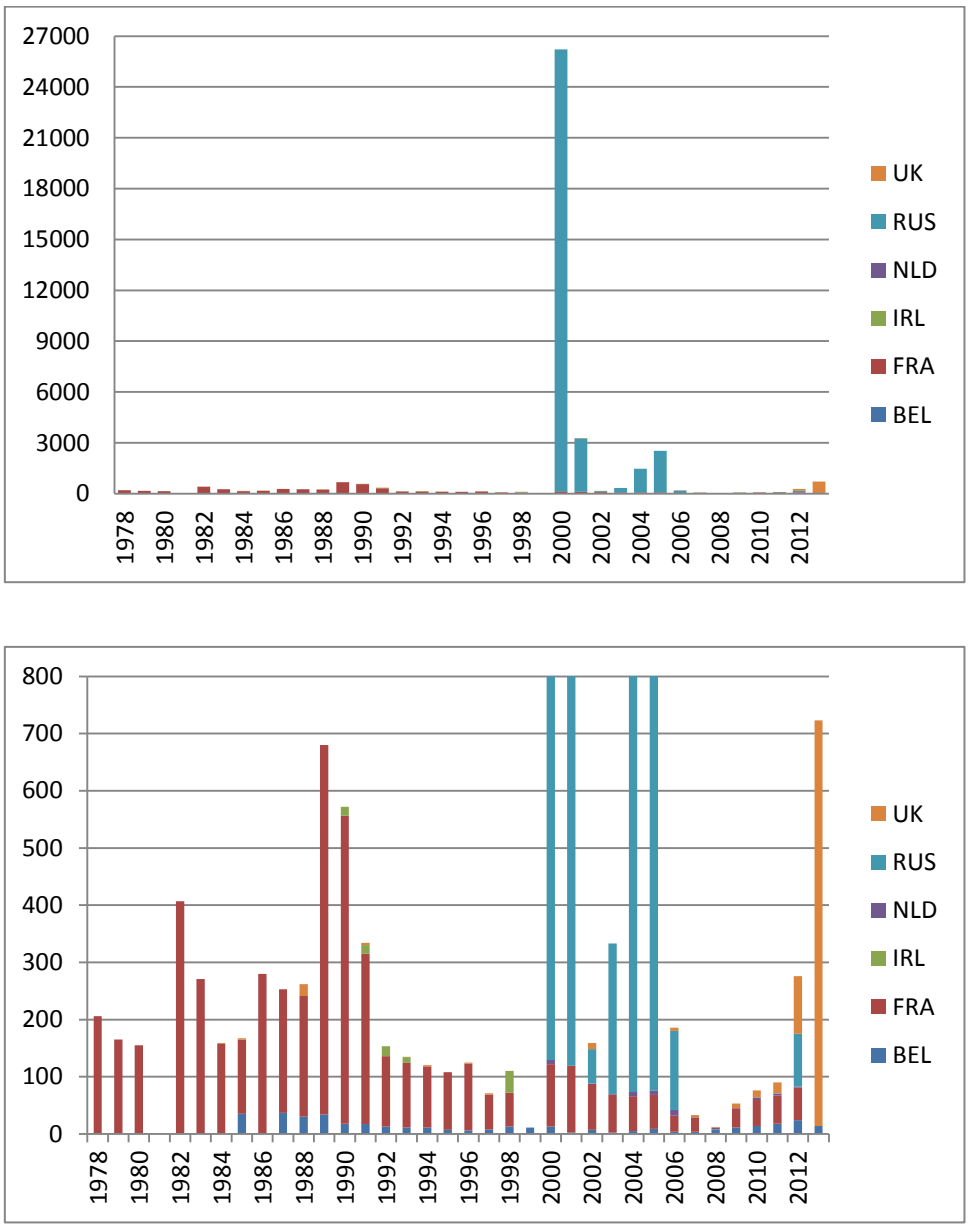

Figure 1.3. Grey Gurnard in Subarea VI and Divisions VIIa–c,e–j. Official landings by country (source: ICES FishStat). The lower panel presents a detailed view of the lower range of values from the top panel.

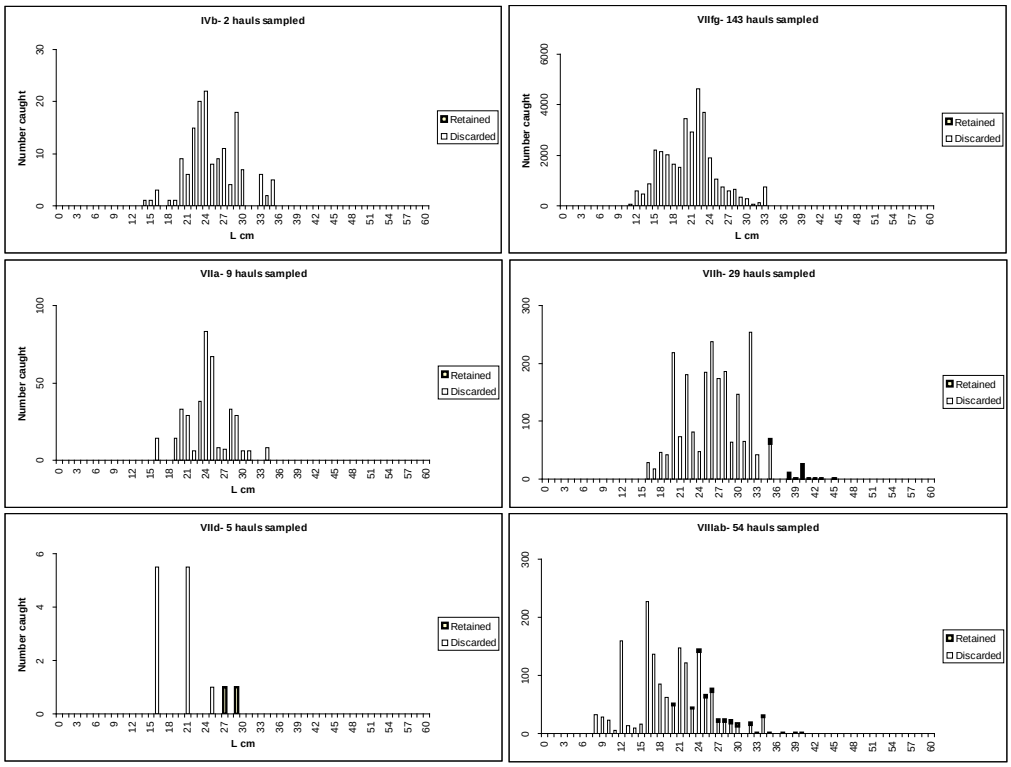

Figure 1.4. Length composition of French catches of grey gurnard in 2005.

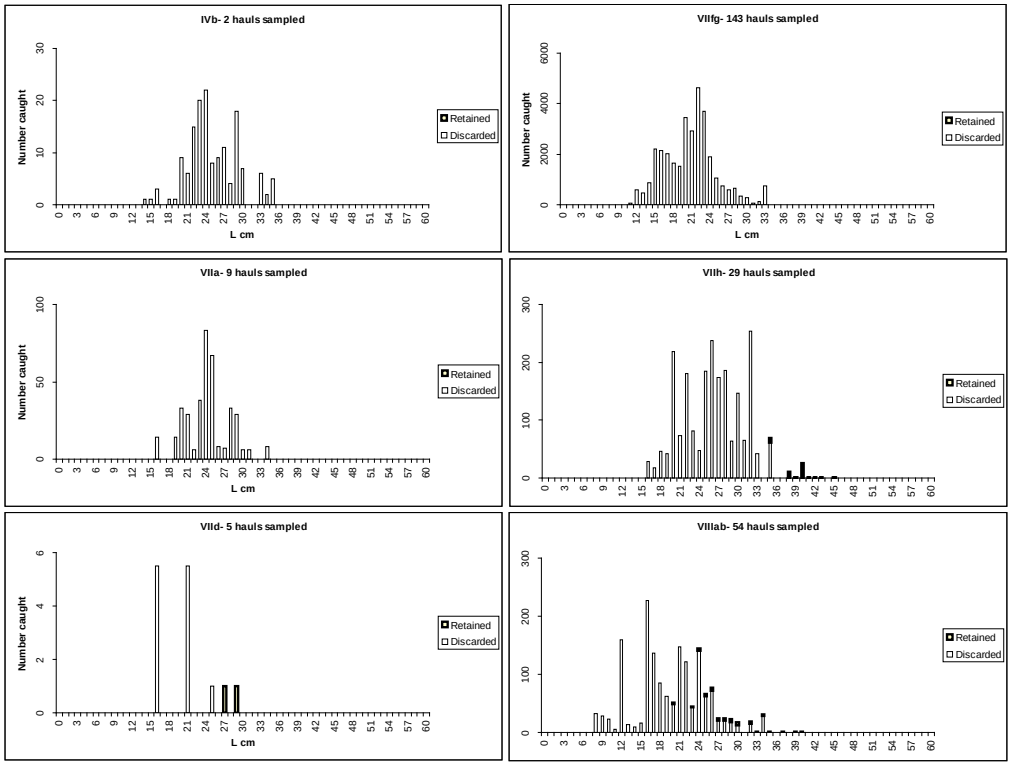

Figure 1.5. Length composition of French catches of grey gurnard in 2006.

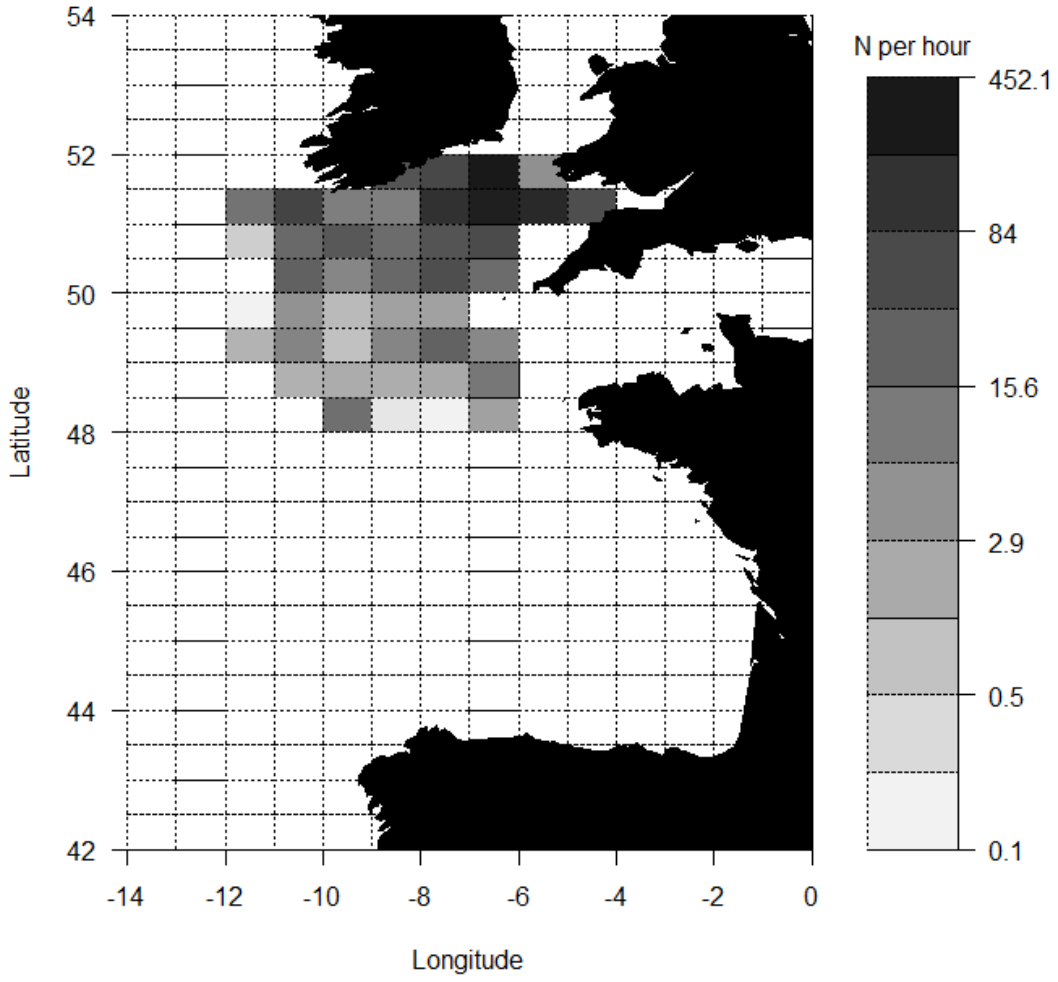

Figure 6. Grey Gurnard in Subarea VI and Divisions VIIa–c,e–j. Distribution of catches of grey gurnard in the EVHOE-WIBTS-Q4. Abundance is shown as N per hour caught, based on all data available in Datras.

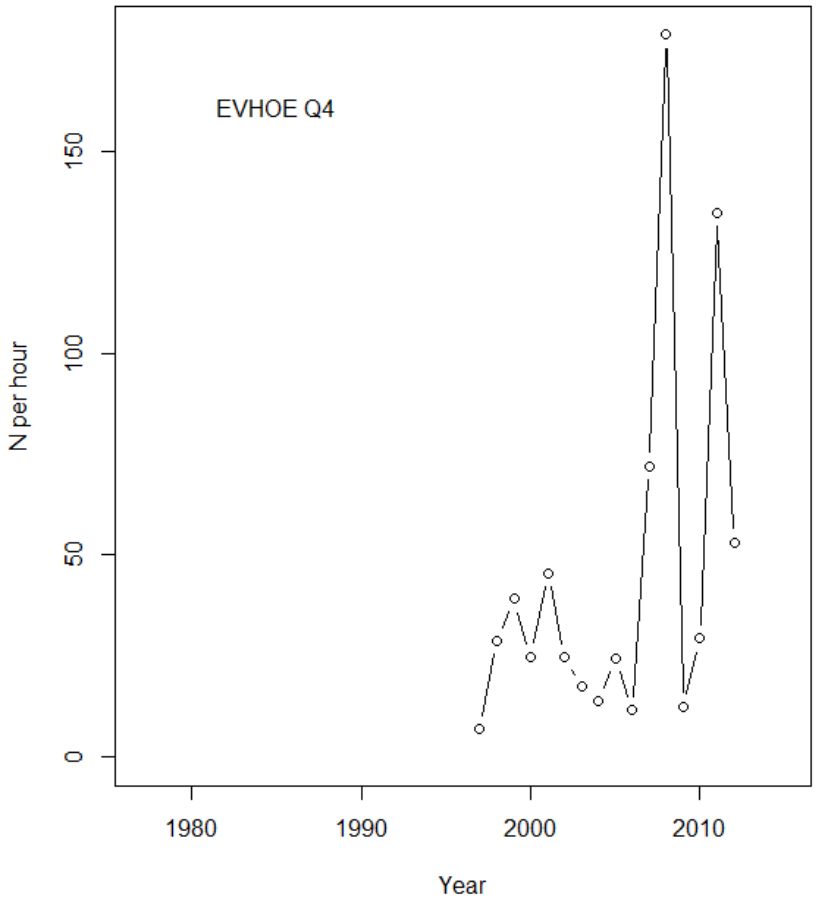

Figure 7. Grey Gurnard in Subarea VI and Divisions VIIa–c, e–j. Time-series of catches of grey gurnard in the EVHOE-WIBTS-Q4, shown as numbers caught per hour. Data from Datras.

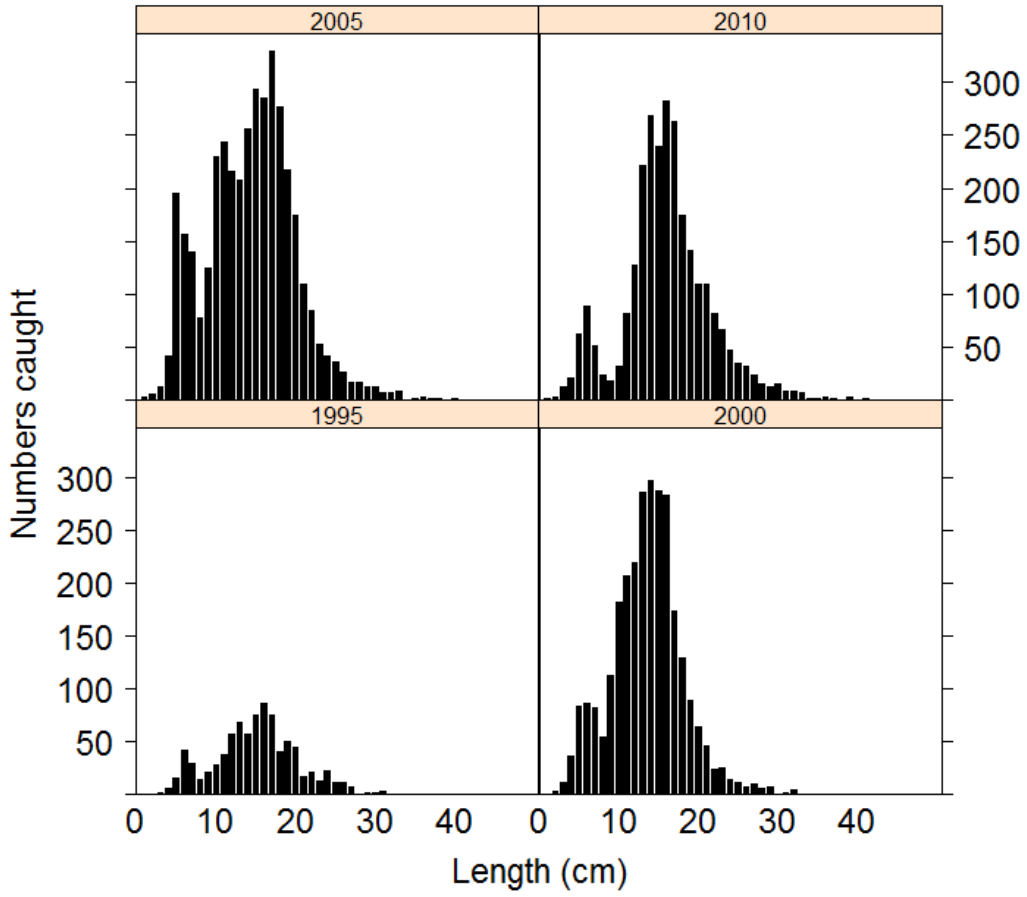

Figure 8. Grey Gurnard in Subarea VI and Divisions VIIa–c,e–j. Length distribution of grey gurnard catches in the EVHOE-WIBTS-Q4 by 5-year periods.