

## Stock Annex: Grey gurnard (*Eutrigla gurnardus*) in Subarea 4 and divisions 7.d and 3.a (North Sea, eastern English Channel, Skagerrak and Kattegat)

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Stock specific documentation of standard assessment procedures used by ICES.

<b>Stock:</b>	Grey gurnard
<b>Working Group:</b>	Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK)
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### A. General

#### A.1. General biology

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

## **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 4 and 3.a (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 (4) and Skagerrak Kattegat (3.a) 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		$L_{\infty}$ (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 south-eastern 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 3.a, 4 and 7.d-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.

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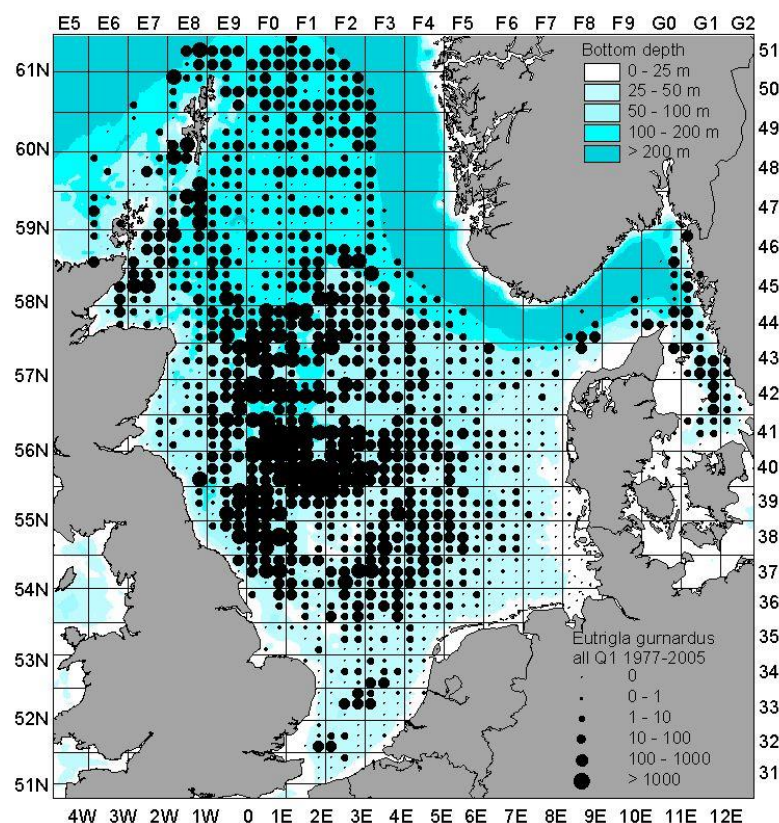


Figure 1. Average annual catch (number per fishing hour for all length classes combined) for grey gurnard in the quarter 1 IBTS survey, 1977–2005 (ICES-FishMap).

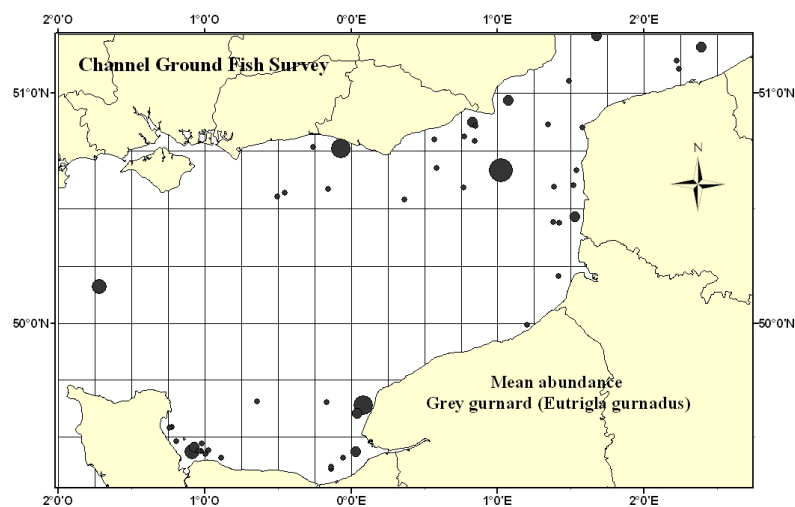


Figure 2. Distribution of grey gurnard in the eastern Channel. CGFS survey 1988–2004.

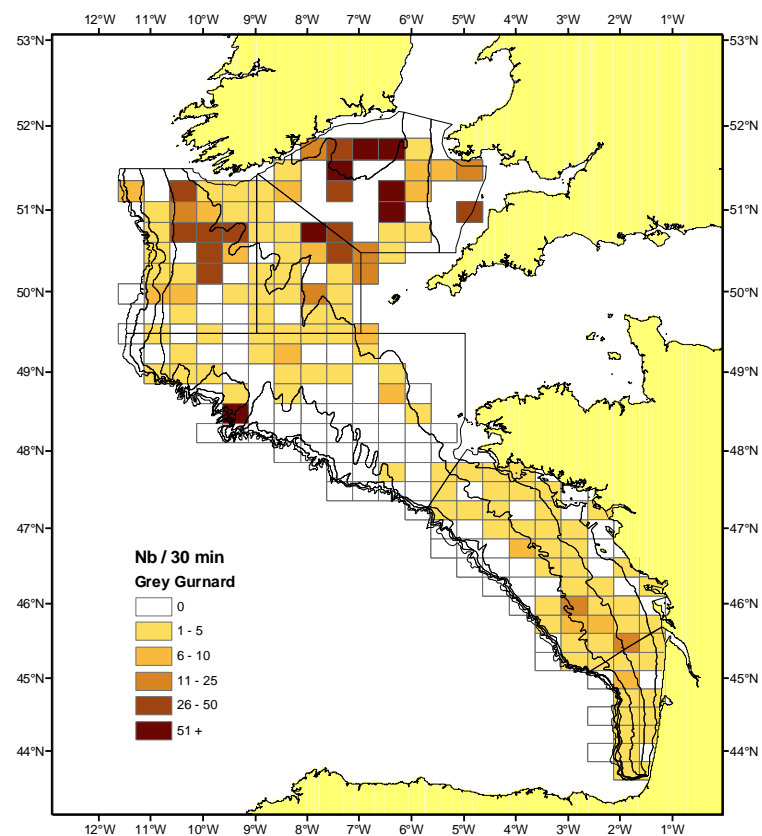


Figure 3. Distribution of grey gurnard in the Celtic Sea and the Bay of Biscay. EVHOE survey, 1997–2004.

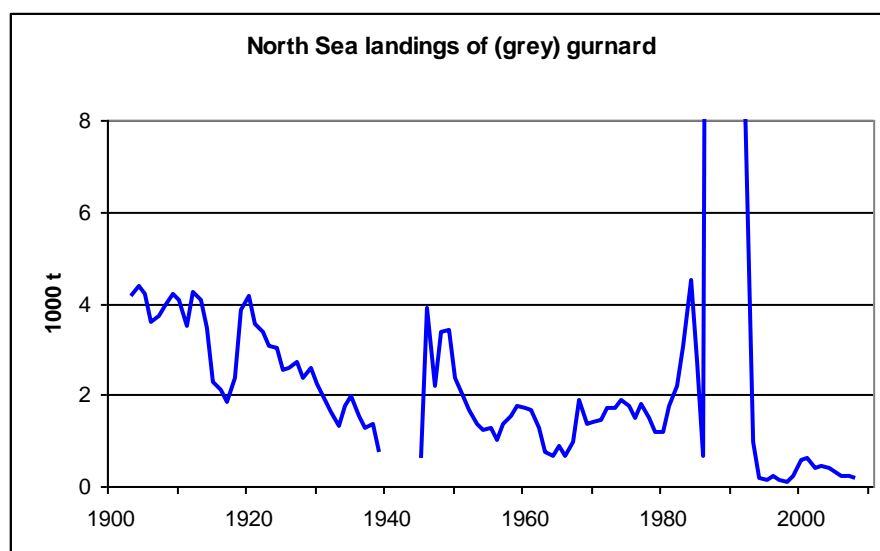


Figure 4. Total international landings of gurnards from the North Sea, probably most of the landings consisted of grey gurnard. See text for further explanation.

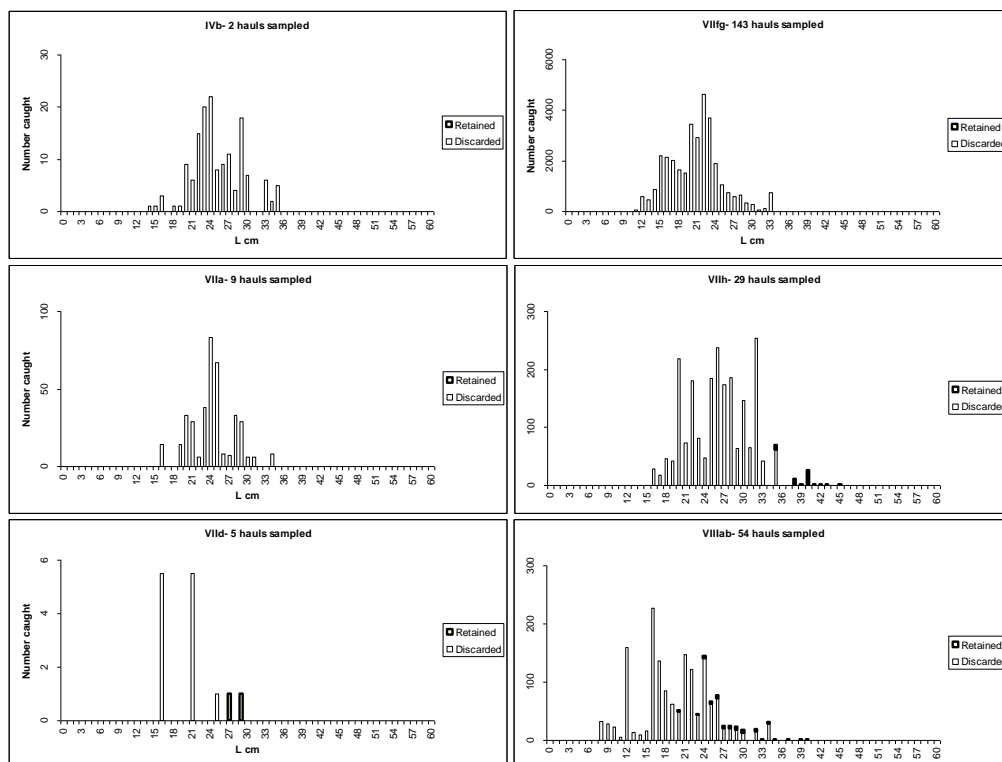


Figure 5. Length composition of French catches of grey gurnard in 2005.

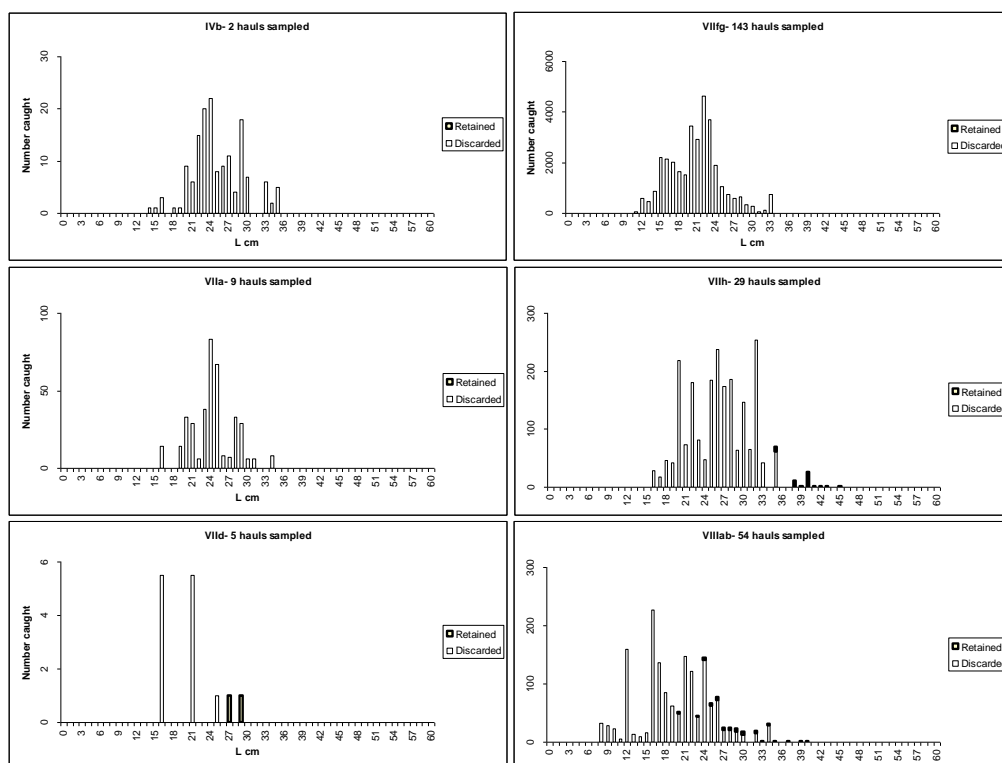
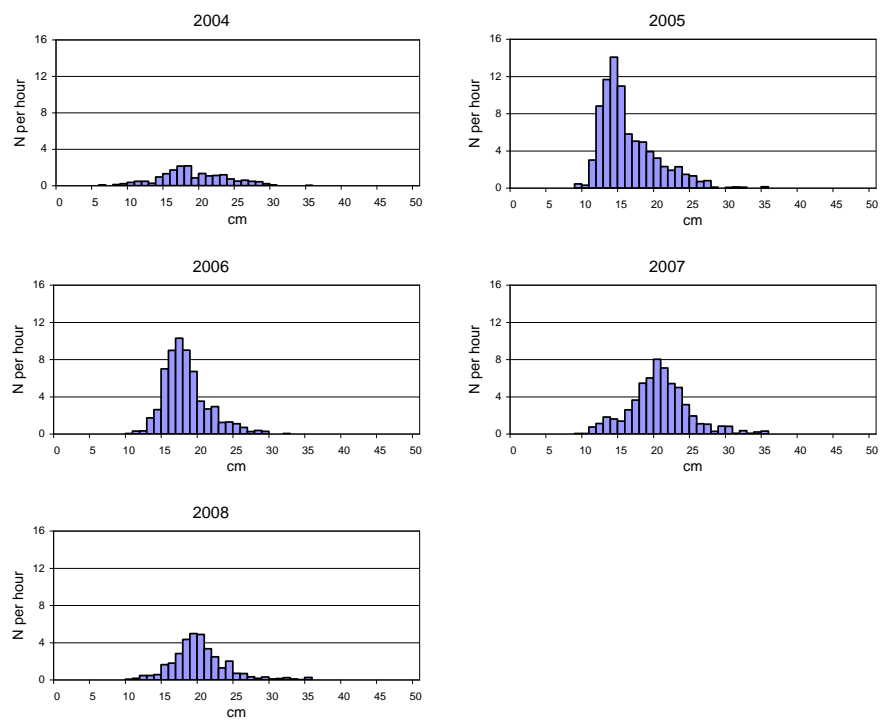


Figure 6. Length composition of French catches of grey gurnard in 2006.





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

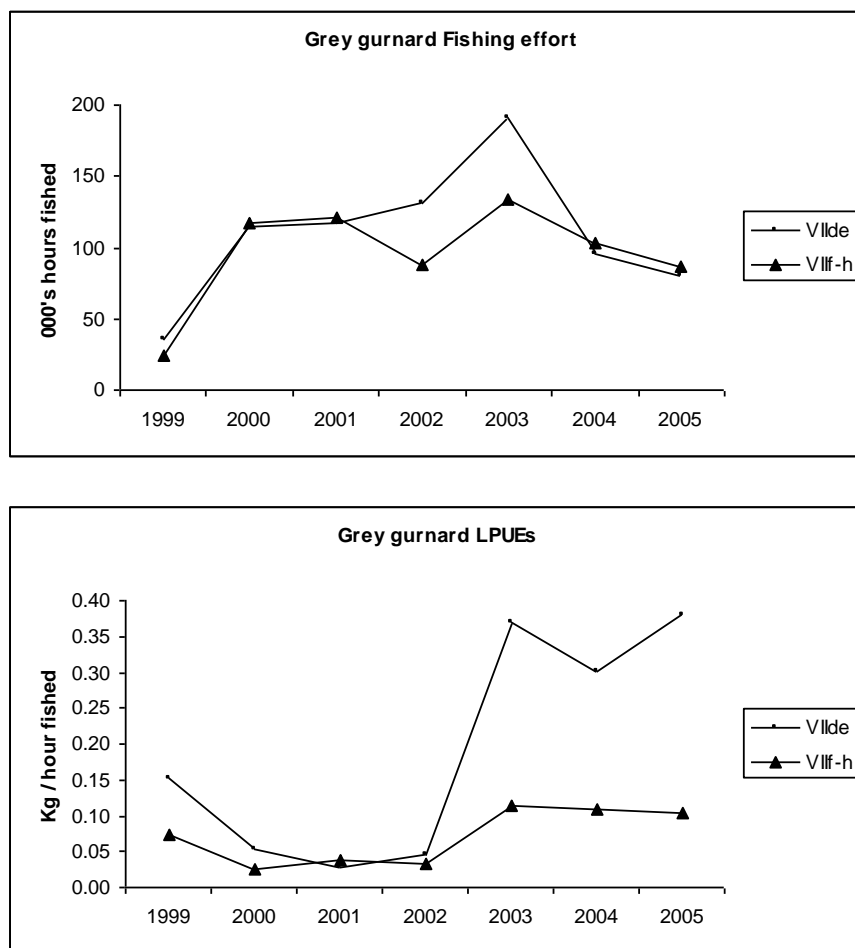


Figure 8. Effort and landings per unit of effort for French single otter trawlers for areas VIIde and VIIf-h for the years 1999 to 2005.

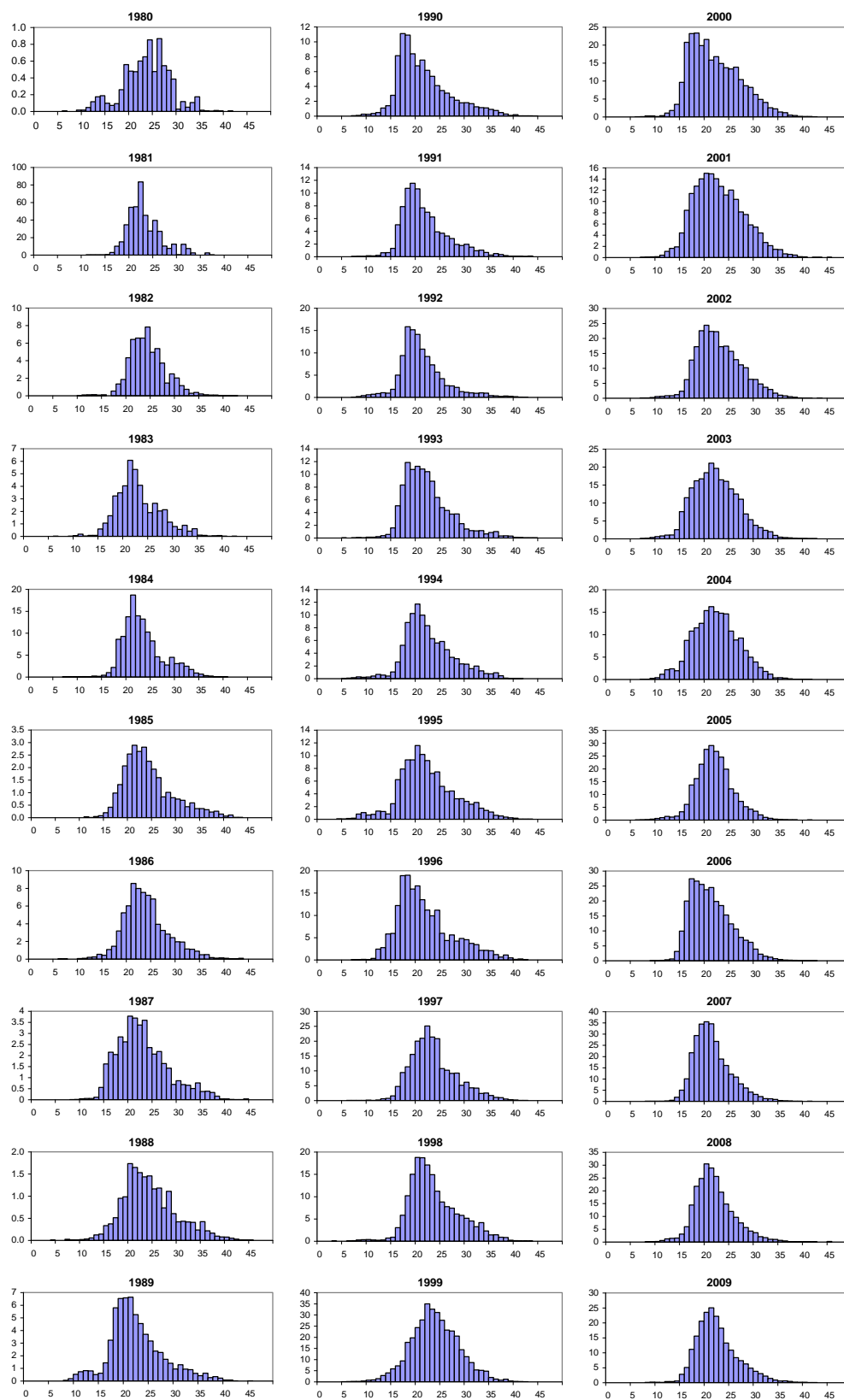
***Eutrigla gurnardus*, IBTS1, average for roundfish areas 1-7**

Figure 9. Grey gurnard in 4: number at length during the quarter 1 IBTS survey.

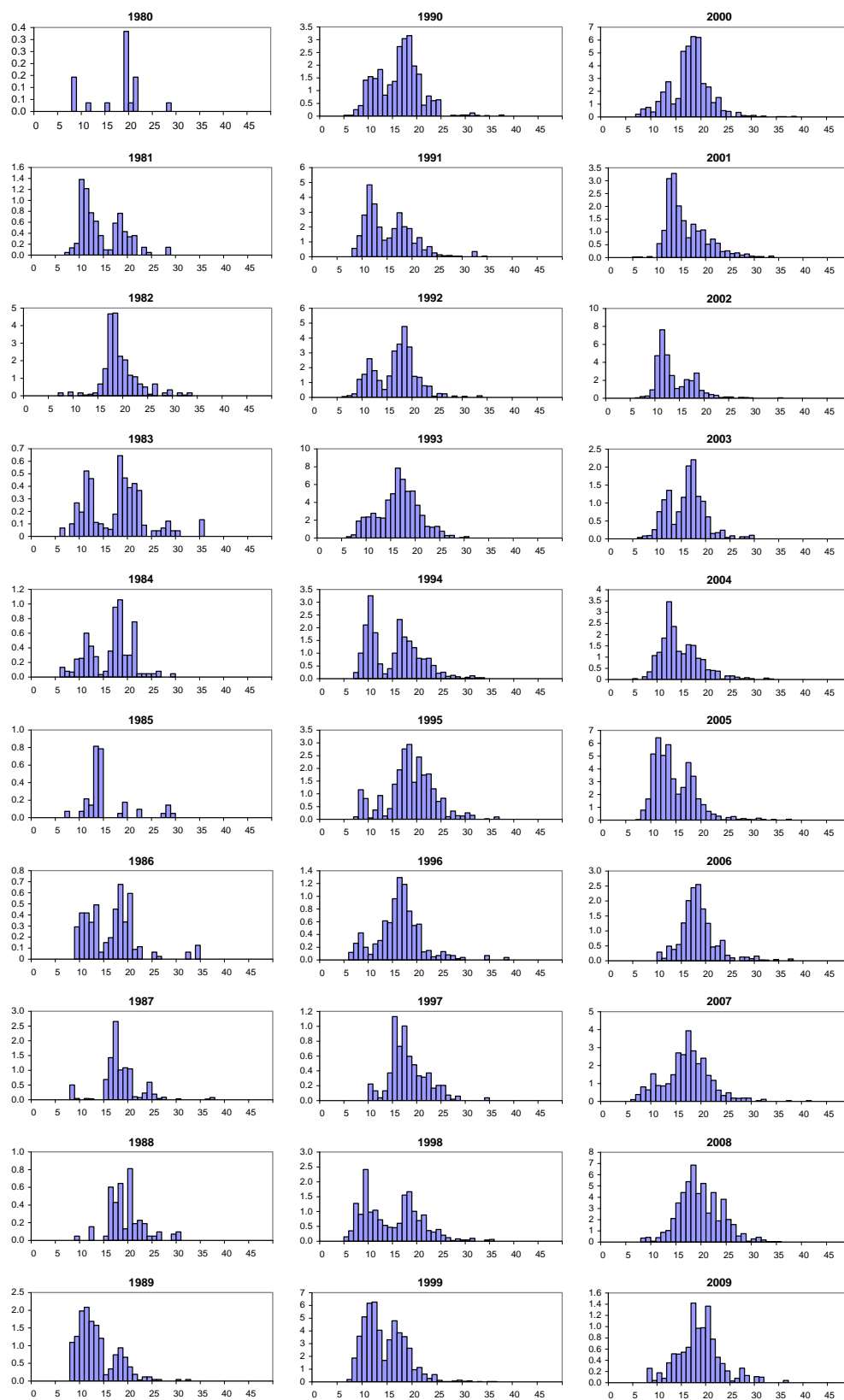
***Eutrigla gurnardus*, IBTS1, average for roundfish areas 8 and 9**

Figure 10. Grey gurnard in 3.a: number at length during the quarter 1 IBTS survey.

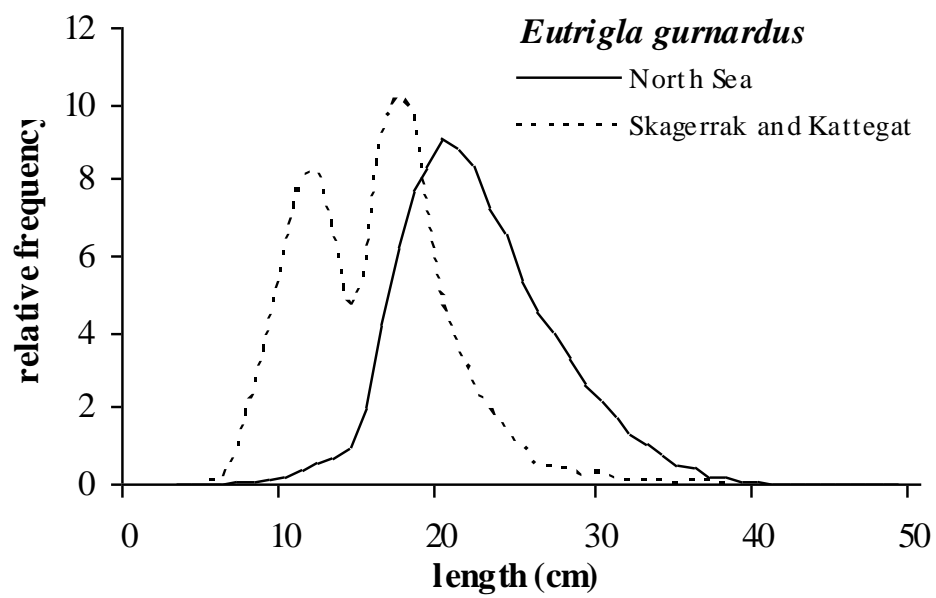


Figure 11. Length–frequency distribution of *E. gurnardus* based on the quarter 1 IBTS, 1985–2005 in the North Sea and in Skagerrak/Kattegat. (ICES-FishMap).

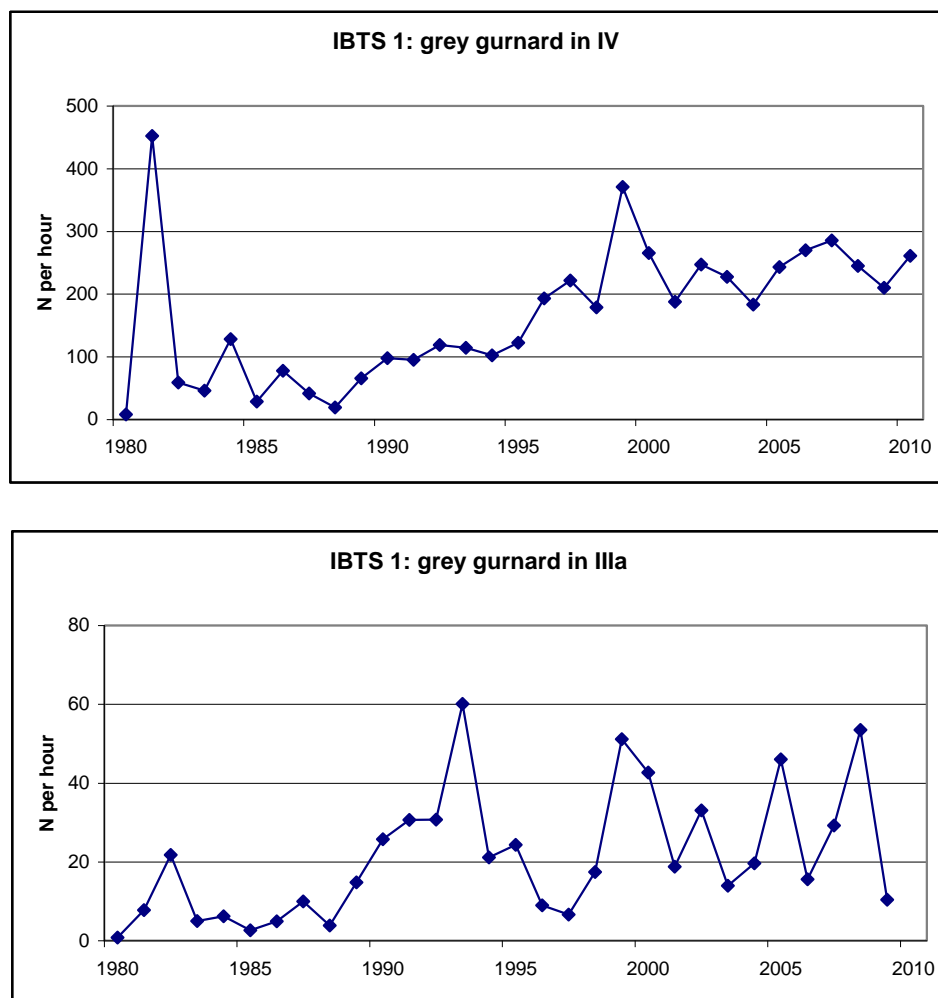


Figure 12. Average catch rate (number per hour for all length classes combined) of grey gurnard in the North Sea (upper panel) and in Skagerrak and Kattegat (lower panel), based on quarter 1 IBTS.

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

COUNTRY	BEL	DEN	FAER	FRA	ICL	IRL	NET	NOR	POR	RUSS	SWE	UK E&W	UK Sc	TOTAL
1996	122	70	0	220	1	0	0	0	0	0	4	.	56	473
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.**

<b>Females</b>	<b>Age</b>											
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.**

Length (mm)	Males											Grand Total
	0	1	2	3	4	5	6	7	8	9	10+	
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**

<b>Length</b>	<b>Immature</b>	<b>Maturing</b>	<b>Mature</b>	<b>Spent</b>	<b>Grand Total</b>
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
<b>Grand Total</b>	<b>50</b>	<b>57</b>	<b>1</b>	<b>41</b>	<b>149</b>

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

**Males**

<b>Length</b>	<b>Immature</b>	<b>Maturing</b>	<b>Mature</b>	<b>Spent</b>	<b>Grand Total</b>
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
<b>Grand Total</b>	<b>35</b>	<b>39</b>	<b>1</b>		<b>105</b>