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Results for the Atlantic cod, roughhead grenadier, redfish, thorny skate and black dogfish of the Spanish Survey in the NAFO Div. 3L for the period 2003-2010

by

Esther Román, Ángeles Armesto and Diana González-Troncoso

Instituto Español de Oceanografía
P.O. Box 1552. Vigo, Spain
e-mail: esther.roman@vi.ieo.es

Abstract

Since 2003, a stratified random spring bottom trawl survey was conducted by Spain in the NAFO Regulatory Area of Division 3L (Flemish Pass). The surveys were carried out by the R/V *"Vizconde de Eza"* using bottom trawl net type *Campelen*. Entire series of mean catches, biomass and length distribution for Atlantic cod, roughhead grenadier, redfish, thorny skate and black dogfish are presented for the period 2003-2010.

KEYWORDS: Survey, Flemish Pass, Atlantic Cod, Roughhead grenadier, Redfish, Thorny skate, Black dogfish.

Material and Methods

The surveys on NAFO Regulatory Area of Div. 3L (Flemish Pass) were initiated by Spain in 2003. The Research vessel *"Vizconde de Eza"* carried out the surveys following the same procedures and using the same bottom trawl gear *Campelen 1800*. In 2003, the survey was carried out in spring (June) and it did not cover all strata adequately (69% of the total area prospected in 2006-2010). In 2004, the survey was carried out in August, for a period of nine days, and it covered only the 96%. In 2005, it was not possible to perform the survey due to problems with the winch of the ship; and in 2006, for the first time, an adequate prospecting survey was conducted in Division 3L with over 100 valid hauls. Table 1 shows the number of valid tows, the depth and number of covered strata and the dates of the survey series. To know more details about the technical specifications of the surveys, see Román *et al*., 2011.

The catch from each haul was sorted out and weighted by species and a randomly selected sample of each species was taken in order to measure it and obtain the length distribution. In 2003 and 2004 the Atlantic cod samples were not sorted out by sex. There are two species of redfish in Division 3L (*Sebastes mentella* and *S. fasciatus*); the external characteristics of both species are very similar, which makes it difficult to distinction between them and, as a result, they are treated together.

For Atlantic cod, redfish, thorny skate and black dogfish each individual of the sample was measured to the total length to the nearest lower cm and data are given in 2 cm intervals. However, roughhead grenadier individuals were measured from tip of snout to base of first anal-fin ray to the lower ½ cm., in 0.5 cm intervals, as adopted by NAFO in June 1980 (Atkinson, 1991) as a standard measurement for roundnose and roughhead grenadiers; length is presented as pre-anal-fin length (AFL) and data are given in 1 cm intervals.

It is presented the mean catch per haul, the stratified mean catch per haul and the biomass with their variance per year in the period 2003-2010. Length distribution in number per haul stratified mean catches per length, sex and year for these species are presented too. To obtain the biomass from length distribution, the following formula was used: $Weight=a(Length+0.5)^b$.

Results

Atlantic Cod (*Gadus morhua* Linnaeus, 1758)

NAFO manages 3 cod stocks in 3L, 3M and 3NO. After a dramatic decline of cod during the eighties and nineties, fishing bans were imposed in the 1990s. In recent assessment all stocks remain at a very low level although spawning biomass has increased in recent years. In 2010 a fishery for cod on the Flemish Cap (Div. 3M) was re-opened after a decade long moratorium but moratoria (no directed fishery) continues for Div. 3NO and Div. 3L. (NAFO, 2010).

Mean catches and biomass

Table 2 shows the swept area, the tow number, the mean catches and their variance per haul by stratum for Atlantic cod. Table 3 and Figure 1 present the stratified mean catches by stratum and year with their total variance. Table 4 and Figure 2 present the biomass per swept area per stratum and their total variance per year. Table 5 presents the length-weight relationships.

Atlantic cod indices show no clear trend along the whole period. A great variation in the cod indices can be seen, but this is due to a few hauls in which the presence of cod was very high. Stratified mean catch and biomass decreased from 2003 to 2004; then, the values of these indices increased in 2006 and declined briefly again in 2007. A great increase is shown in 2008 but this was due to a single haul in which the presence of cod was very high (1298.5 kg). The great value of the variance in some years is due to the tows with a large catch. In 2009 and 2010 the biomass reaches the third and first highest values respectively in the time series, and in these cases there were no single hauls with very high catches. The highest values in the estimated biomass have been observed in the shallow strata, in a range of depth from 93 to 274 meters.

Length distribution

Table 6 presents the length distribution of stratified mean catches per haul for this species, by sex and year, with the number of samples in which there were length measurements, the total number of individuals measured in these samples, the sampled catch and the range of lengths achieved, as well as the total catch of this species and the total hauls made in the survey. In Figures 3 and 4 the evolution along the years can be followed.

In this period, individuals between 12 and 25 cm can be seen although in 2004 there was no presence of individuals below 24 cm. In general all lengths presence is very low, even it is very difficult to follow the modal values. In 2008 we have a good presence of individuals between 26 and 33 cm, probably due to the haul with great catch of that year, 29 cm is the mode in the length distribution. In 2009 the dominant lengths were between 36 and 41 cm (mode = 37 cm). In 2010 the mode was 44 cm with the dominant length between 40 and 47 cm.

Roughhead grenadier (*Macrourus berglax* Lacépède, 1802)

Roughhead grenadier is not a regulated species. There is no directed fishery for this species and most catches are taken as by-catch in Greenland halibut fishery in Subareas 2 and 3. Roughhead grenadier is taken mainly in Div. 3LMN Regulatory Area. The highest level of observed catches was reached in 1998. The biomass of this species presents a decreasing trend in the last years (NAFO, 2010).

Mean catches and biomass

Roughhead grenadier haul mean catches by stratum are presented in Table 7; swept area, number of hauls and SD are also shown in this table. Stratified mean catches per tow by stratum and year and their variance are presented in Table 8. The entire time series (2003-2010) of biomass and their SD estimates of this species are shown in Table 9 and length-weight relationships are shown in Table 5.

The indices of Roughhead grenadier show no clear trend along the whole period, with an increasing in 2004 with respect to 2003 and then remain stable (2006-2007). In 2008 the biomass increased, being in this case the highest value of the series, with a slight decrease in 2009 and 2010 (Fig. 5 and 6).

Length distribution

Table 10 shows the stratified mean catches per haul length distribution, for roughhead grenadier, by sex and year, with the number of samples in which there was length measurements, the total number of individuals measured in these samples, the sampled catch and the range of lengths met. The total catch of this species and the total hauls made in the survey are shown too. In Figures 4 and 7 the evolution along the years can be followed.

A slight recruitment can be seen in all period. Females attain larger lengths than males in all years.

Redfish (*Sebastes spp*. Cuvier, 1829)

There are three redfish species in the Northwest Atlantic, *Sebastes fasciatus* (Acadian redfish), *S.mentella* (deepwater redfish), and *S.marinus* (golden redfish). The redfish species are very similar in appearance and are reported collectively. In its regulations, NAFO does not differentiate between species and the catches are reported by genus only (*Sebastes spp*). The redfish stocks in 3LN, 3M, 3O, as well as Subarea 2 and Div. 1F+3K are managed by NAFO. There is a moratorium on 3LN stocks (no directed fishery) since 1998. The stock biomass, female spawning biomass and abundance is higher in 2006 than in the early 1990s (NAFO, 2010).

Mean catches and biomass

Table 11 shows the swept area, the tow number, the mean catches per haul and year and their variance for redfish. Table 12 and Figure 8 present the stratified mean catches per stratum with the total variance per year.

Table 13 and Figure 9 show the biomass estimate per swept area per stratum and their total variance by year and also estimated abundance. Redfish shows a great annual variability probably due to its pelagic habitat. The redfish biomass indices decreased in 2004 and 2007 and increased in 2006, 2008 and 2009 with a sharply increased in 2010, being this last year the highest value of the series. The length-weight relationships are presented in Table 5.

Length distribution

Table 14 presents the length distribution of the stratified mean catches per haul for redfish, by sex and year, with the number of samples in which there was length measurements, the total number of individuals measured in these samples, the sampled catch and the range of lengths met. The total catch of this species and the total hauls made in the survey are also shown. In Figures 4 and 10 the evolution along the years can be followed.

The highest proportions of small redfish in the catches (less than 20 cm) were in 2007 and 2008.

Thorny skate (*Amblyraja radiata* Donovan, 1808)

NAFO started to regulate skates, under a 3-year plan, in 2004. The state of the stock is unclear; the biomass has been stable from 1996 to 2005 but at lower level than in the mid-1980s. Since then the catches have declined (NAFO, 2010).

Mean catches and biomass

Table 15 shows the swept area, the tow number, the mean catches per haul and year and their variance for thorny skate. Table 16 presents the length-weight relationships. Table 17 and Figure 11 present the stratified mean catches per stratum with the total variance per year. Table 18 and Figure 12 present the biomass per swept area per stratum and year, their total variance per year and the abundance index. The indices of the thorny skate decreased since 2003 until 2004, increased for 2006-2007 and decreased again in 2008 and 2009, with a slight decrease in 2010.

Length distribution

Table 19 presents the stratified mean catches per haul length distribution for this species, by sex and year, with the number of samples in which there was length measurements, the total number of individuals measured in these samples, the sampled catch and the range of lengths achieved, as well as the total catch of this species and the total hauls made in the survey. In Figures 13 and 14, the evolution along the years can be followed. The highest proportion of small thorny skate in the catches was in 2007.

Black dogfish (*Centroscyllium fabricii* Reinhardt, 1825)

Black dogfish is present in all Divisions, but is more abundant in Div. 3NO and in depths of more than 900 m. Black dogfish is not a regulated species and commercial catches of this species are mainly a by-catch of the Greenland halibut fishery in Div. 3LMNO (González-Costas *et al*., 2006).

Mean catches and biomass

Black dogfish haul mean catches by stratum are presented in Table 20, including swept area, number of hauls and SD. Stratified mean catches per tow by stratum and year and their variance are presented in Table 21. The entire time series (2003-2010) of biomass and their SD estimates of black dogfish are shown in Table 22. Length-weight relationships are presented in Table 16.

The abundance and biomass present the same trend as mean catches. Biomass estimated from the 3L survey displays an increasing trend since 2004 until 2007 and decreased in 2008 and 2009, increasing again in 2010 being the second value of the time series (Fig. 15 and 16). In 2003, the catches occurred only in two strata (745 and 749), in which the catches were much different, that is why the variance in this year is so large.

Length distribution

Table 23 presents the length distribution of the stratified mean catches per haul for black dogfish, by sex and year, with the number of samples in which there was length measurements, the total number of individuals measured in these samples, the sampled catch and the range of lengths met. The total catch of this species and the total hauls made in the survey are shown too. In Figures 14 and 17 the evolution along the years can be followed.

There is no presence of small individual (less than 40 cm). Size compositions are mainly between 50 and 80 cm of length.

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TABLE 1.- Spanish bottom trawl surveys in NAFO Division 3L for the period 2003-2010.

Year	Vessel	Valid tows	Depth strata covered (m)	Surveyed strata (no.)	Dates
2003	R/V *"Vizconde de Eza"*	39	118-1100	17	June 2 - June 6, June 29
2004	R/V *"Vizconde de Eza"*	50	141-1452	23	August 7 - August 15
2005	-	-	-	-	-
2006	R/V *"Vizconde de Eza"*	100	116-1449	24	July 31 - August 18
2007	R/V *"Vizconde de Eza"*	94	119-1449	24	July 23 - August 11
2008	R/V *"Vizconde de Eza"*	100	105-1455	24	July 24 - August 11
2009	R/V *"Vizconde de Eza"*	98	111-1458	24	July 25 - August 12
2010	R/V *"Vizconde de Eza"*	97	119-1462	24	July 25 - August 14

TABLE 2.- Swept area, number of hauls and **Atlantic cod** mean catch (Kg) and SD (**) by stratum. Spanish Survey on NAFO Div. 3L in the period 2003-2010, on board R/V "*Vizconde de Eza"*. (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

Stratum	2003 (*)				2004				2006				2007			
	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD
385	0.0225	2	0.062	0.040	0.0229	2	0.450	0.636	0.0229	2	1.783	2.521	0.0225	2	0.835	1.181
387	0.0229	2	4.390	1.004	0.0214	2	1.885	1.888	0.0225	2	0.395	0.559	0.0225	2	1.992	1.105
388	0.0334	3	7.870	6.987	0.0105	1	1.313	-	0.0566	5	7.028	5.142	0.0563	5	7.434	7.400
389	0.0454	4	0.844	1.573	0.0225	2	0.510	0.721	0.0795	7	10.582	14.986	0.0900	8	4.162	4.621
390	0.0563	5	0.000	0.000	0.0345	3	0.000	0.000	0.1249	11	0.081	0.249	0.1350	12	1.369	1.251
391	0.0338	3	0.167	0.289	0.0218	2	0.000	0.000	0.0450	4	14.338	13.278	0.0450	4	11.183	15.378
392	0.0116	1	0.400	-	0.0214	2	13.219	17.991	0.0229	2	2.045	1.506	0.0225	2	13.985	7.779
729	0.0210	2	1.260	1.782	0.0221	2	0.000	0.000	0.0338	3	0.000	0.000	0.0338	3	0.000	0.000
730	0.0221	2	0.000	0.000	0.0221	2	0.000	0.000	0.0326	3	0.000	0.000	0.0225	2	0.000	0.000
731	0.0229	2	22.405	13.329	0.0233	2	0.496	0.530	0.0341	3	0.000	0.000	0.0338	3	0.510	0.883
732	0.0113	1	0.000	-	0.0210	2	0.000	0.000	0.0334	3	0.000	0.000	0.0338	3	0.000	0.000
733	n.s.	n.s.	n.s.	n.s.	0.0330	3	0.000	0.000	0.0454	4	0.000	0.000	0.0338	3	0.427	0.739
734	n.s.	n.s.	n.s.	n.s.	0.0304	3	0.000	0.000	0.0225	2	0.000	0.000	0.0225	2	0.000	0.000
741	0.0113	1	0.000	-	0.0323	3	0.000	0.000	0.0218	2	0.000	0.000	0.0225	2	0.000	0.000
742	0.0116	1	0.000	-	0.0120	1	0.000	-	0.0229	2	0.000	0.000	0.0225	2	0.000	0.000
743	n.s.	n.s.	n.s.	n.s.	0.0188	2	0.000	0.000	0.0225	2	0.000	0.000	0.0225	2	0.000	0.000
744	n.s.	n.s.	n.s.	n.s.	0.0101	1	0.000	-	0.0229	2	0.000	0.000	0.0218	2	0.000	0.000
745	0.0341	3	0.000	0.000	0.0319	3	0.000	0.000	0.0686	6	0.000	0.000	0.0675	6	0.000	0.000
746	0.0446	4	0.000	0.000	0.0338	3	0.000	0.000	0.0675	6	0.000	0.000	0.0664	6	0.000	0.000
747	n.s.	n.s.	n.s.	n.s.	0.0308	3	0.000	0.000	0.1230	11	0.000	0.000	0.1238	11	0.000	0.000
748	0.0109	1	0.000	-	0.0199	2	0.000	0.000	0.0326	3	0.000	0.000	0.0338	3	0.000	0.000
749	0.0221	2	0.000	0.000	0.0221	2	0.000	0.000	0.0229	2	0.000	0.000	0.0113	1	0.000	-
750	n.s.	n.s.	n.s.	n.s.	0.0180	2	0.000	0.000	0.1005	9	0.000	0.000	0.0679	6	0.000	0.000
751	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s	n.s	0.0454	4	0.000	0.000	0.0225	2	0.000	0.000

$$(**)\ SD = \frac{\sum (x_i - \bar{x})}{n-1}$$

TABLE 2 (cont).- Swept area, number of hauls and **Atlantic cod** mean catch (Kg) and SD (**) by stratum. Spanish Survey on NAFO Div. 3L in the period 2003-2010, on board R/V "*Vizconde de Eza"*. (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

Stratum	2008				2009				2010							
	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD
385	0.0229	2	6.051	6.537	0.0225	2	5.285	3.514	0.0225	2	0.775	1.096				
387	0.0435	4	5.386	5.633	0.0439	4	23.204	40.440	0.0458	4	3.433	2.594				
388	0.0559	5	18.665	19.454	0.0555	5	7.413	3.853	0.0570	5	61.988	121.458				
389	0.0780	7	30.523	18.566	0.0803	7	40.874	54.955	0.0795	7	150.908	266.990				
390	0.1395	12	8.682	15.848	0.1373	12	22.441	43.094	0.1249	11	37.143	51.671				
391	0.0454	4	342.268	637.574	0.0458	4	65.264	62.051	0.0454	4	144.075	119.143				
392	0.0221	2	0.000	0.000	0.0229	2	0.063	0.089	0.0225	2	70.680	89.265				
729	0.0338	3	0.000	0.000	0.0341	3	0.000	0.000	0.0338	3	0.000	0.000				
730	0.0323	3	0.000	0.000	0.0338	3	0.000	0.000	0.0334	3	0.000	0.000				
731	0.0330	3	0.130	0.225	0.0341	3	0.000	0.000	0.0338	3	0.247	0.225				
732	0.0446	4	0.000	0.000	0.0450	4	0.000	0.000	0.0450	4	0.000	0.000				
733	0.0431	4	0.000	0.000	0.0450	4	0.000	0.000	0.0450	4	0.000	0.000				
734	0.0221	2	0.000	0.000	0.0218	2	0.000	0.000	0.0225	2	0.000	0.000				
741	0.0210	2	0.000	0.000	0.0221	2	0.000	0.000	0.0225	2	0.000	0.000				
742	0.0210	2	0.000	0.000	0.0214	2	0.000	0.000	0.0225	2	0.000	0.000				
743	0.0203	2	0.000	0.000	0.0203	2	0.000	0.000	0.0225	2	0.000	0.000				
744	0.0221	2	0.000	0.000	0.0210	2	0.000	0.000	0.0229	2	0.000	0.000				
745	0.0555	5	0.000	0.000	0.0559	5	0.000	0.000	0.0563	5	0.000	0.000				
746	0.0638	6	0.000	0.000	0.0668	6	0.000	0.000	0.0679	6	0.000	0.000				
747	0.1069	10	0.000	0.000	0.1118	10	0.000	0.000	0.1125	10	0.000	0.000				
748	0.0218	2	0.000	0.000	0.0229	2	0.000	0.000	0.0225	2	0.000	0.000				
749	0.0214	2	0.000	0.000	0.0225	2	0.000	0.000	0.0229	2	0.000	0.000				
750	0.0844	8	0.000	0.000	0.0791	7	0.000	0.000	0.0900	8	0.000	0.000				
751	0.0413	4	0.000	0.000	0.0338	3	0.000	0.000	0.0225	2	0.000	0.000				

$$(**)\ SD = \frac{\sum (x_i - \bar{x})}{n-1}$$

TABLE 3.- Stratified mean catches (Kg) of **Atlantic cod** by stratum and year (2003-2010) and SD. Research Vessel *Vizconde de Eza*. n.s. means stratum not surveyed. In 2003: the data correspond to 69% of the total area prospected in 2006-2010.

	Survey							
Stratum	2003	2004	2005	2006	2007	2008	2009	2010
385	7.26	53.10	-	210.34	98.53	713.96	623.63	91.45
387	1123.84	482.56	-	101.12	509.82	1378.75	5940.16	878.72
388	2809.59	468.74	-	2509.00	2653.87	6663.55	2646.51	22129.72
389	429.34	259.59	-	5386.31	2118.59	15536.35	20804.94	76812.24
390	0.00	0.00	-	65.94	1115.80	7076.10	18289.28	30271.32
391	47.00	0.00	-	4043.18	3153.47	96519.44	18404.45	40629.15
392	58.00	1916.68	-	296.53	2027.75	0.00	9.14	10248.60
729	234.36	0.00	-	0.00	0.00	0.00	0.00	0.00
730	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00
731	4839.48	107.03	-	0.00	110.16	28.08	0.00	53.28
732	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00
733	n.s	0.00	-	0.00	99.84	0.00	0.00	0.00
734	n.s	0.00	-	0.00	0.00	0.00	0.00	0.00
741	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00
742	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00
743	n.s	0.00	-	0.00	0.00	0.00	0.00	0.00
744	n.s	0.00	-	0.00	0.00	0.00	0.00	0.00
745	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00
746	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00
747	n.s	0.00	-	0.00	0.00	0.00	0.00	0.00
748	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00
749	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00
750	n.s	0.00	-	0.00	0.00	0.00	0.00	0.00
751	n.s	n.s	-	0.00	0.00	0.00	0.00	0.00
TOTAL	9548.87	3287.70	-	12612.40	11887.83	127916.23	66718.10	181114.48
	2.13	0.53	-	1.94	1.83	19.72	10.28	27.92
SD	0.57	0.30	-	0.55	0.42	13.89	2.75	9.17

TABLE 4.- Survey estimates (by the swept area method) of **Atlantic cod** biomass (t.) by stratum and year and their SD on NAFO Div. 3L (R/V *Vizconde de Eza*). n.s. means stratum not surveyed. In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

	Survey							
Stratum	2003	2004	2005	2006	2007	2008	2009	2010
385	1	5	-	18	9	62	55	8
387	98	45	-	9	45	127	542	77
388	253	45	-	222	236	596	238	1941
389	38	23	-	474	188	1394	1815	6763
390	0	0	-	6	99	609	1599	2667
391	4	0	-	359	280	8509	1609	3582
392	5	179	-	26	180	0	1	911
729	22	0	-	0	0	0	0	0
730	0	0	-	0	0	0	0	0
731	423	9	-	0	10	3	0	5
732	0	0	-	0	0	0	0	0
733	n.s	0	-	0	9	0	0	0
734	n.s	0	-	0	0	0	0	0
741	0	0	-	0	0	0	0	0
742	0	0	-	0	0	0	0	0
743	n.s	0	-	0	0	0	0	0
744	n.s	0	-	0	0	0	0	0
745	0	0	-	0	0	0	0	0
746	0	0	-	0	0	0	0	0
747	n.s	0	-	0	0	0	0	0
748	0	0	-	0	0	0	0	0
749	0	0	-	0	0	0	0	0
750	n.s	0	-	0	0	0	0	0
751	n.s	n.s	-	0	0	0	0	0
TOTAL	844	306	-	1114	1057	11300	5859	15953
SD	222	180	-	315	245	7745	1556	5265

Table 5.- Length-weight relationships in the calculation of biomass, for Division 3L (out ZEE Canada), 2003-2010 for **Atlantic cod, roughhead grenadier and redfish**. The equation is Weight=a(Length+0.5)^b. To calculate the parameters for the indeterminate individuals, we used the total data (males+females+indeterminate individuals).

	Atlantic cod				Roughhead grenadier				Redfish			
Year	Sex	L-W Equations	N	r^2	Sex	L-W Equations	N	r^2	Sex	L-W Equations	N	r^2
2003	All	$W = 0.0059\ L^{3.0965}$	161	0.9875	All	$W = 0.0766\ L^{3.0029}$	478	0.9872	All	$W = 0.0037\ L^{3.3842}$	238	0.9902
	Males	-	-	-	Males	$W = 0.0482\ L^{3.1908}$	172	0.9772	Males	$W = 0.0103\ L^{3.0686}$	95	0.9787
	Females	-	-	-	Females	$W = 0.0824\ L^{2.9761}$	290	0.9913	Females	$W = 0.0060\ L^{3.2380}$	90	0.993
2004	All	$W = 0.0045\ L^{3.2037}$	58	0.9805	All	$W = 0.0791\ L^{3.0113}$	1066	0.9896	All	$W = 0.0083\ L^{3.1377}$	237	0.9808
	Males	-	-	-	Males	$W = 0.0085\ L^{2.9868}$	458	0.9866	Males	$W = 0.0161\ L^{2.9333}$	97	0.9877
	Females	-	-	-	Females	$W = 0.0788\ L^{3.0119}$	597	0.9906	Females	$W = 0.0190\ L^{2.8927}$	117	0.9881
2006	All	$W = 0.0057\ L^{3.3142}$	308	0.9854	All	$W = 0.0773\ L^{3.0264}$	1645	0.9817	All	$W = 0.0096\ L^{3.1034}$	920	0.9835
	Males	$W = 0.0043\ L^{3.2188}$	142	0.9808	Males	$W = 0.0664\ L^{3.0810}$	655	0.9748	Males	$W = 0.0100\ L^{3.0871}$	444	0.9843
	Females	$W = 0.0069\ L^{3.0874}$	166	0.9896	Females	$W = 0.0893\ L^{2.9794}$	975	0.986	Females	$W = 0.0091\ L^{3.1221}$	471	0.9811
2007	All	$W = 0.0055\ L^{3.1370}$	225	0.983	All	$W = 0.0885\ L^{2.9691}$	1950	0.9895	All	$W = 0.0080\ L^{3.1588}$	881	0.9842
	Males	$W = 0.0061\ L^{3.1114}$	107	0.991	Males	$W = 0.0946\ L^{2.9435}$	754	0.9859	Males	$W = 0.0140\ L^{2.9836}$	432	0.9858
	Females	$W = 0.0047\ L^{3.1750}$	118	0.9735	Females	$W = 0.0877\ L^{2.9727}$	1165	0.9897	Females	$W = 0.0133\ L^{3.0115}$	392	0.9868
2008	All	$W = 0.0083\ L^{3.0479}$	819	0.9856	All	$W = 0.1237\ L^{2.8681}$	1773	0.9871	All	$W = 0.0142\ L^{2.9849}$	699	0.9701
	Males	$W = 0.0083\ L^{3.0493}$	403	0.9855	Males	$W = 0.1174\ L^{2.8868}$	754	0.9832	Males	$W = 0.0337\ L^{2.7219}$	338	0.9343
	Females	$W = 0.0084\ L^{3.0467}$	416	0.9856	Females	$W = 0.1144\ L^{2.8938}$	1024	0.988	Females	$W = 0.0314\ L^{2.7511}$	340	0.9412
2009	All	$W = 0.0084\ L^{3.0256}$	684	0.9824	All	$W = 0.0903\ L^{2.9583}$	1457	0.9911	All	$W = 0.0083\ L^{3.1392}$	818	0.9854
	Males	$W = 0.0089\ L^{3.0085}$	296	0.9824	Males	$W = 0.0847\ L^{2.9803}$	540	0.9871	Males	$W = 0.0135\ L^{2.9882}$	354	0.9738
	Females	$W = 0.0083\ L^{3.0299}$	388	0.9821	Females	$W = 0.0927\ L^{2.9505}$	899	0.9904	Females	$W = 0.0174\ L^{2.9204}$	389	0.9763
2010	All	$W = 0.0086\ L^{3.0302}$	756	0.980	All	$W = 0.1006\ L^{2.9369}$	1539	0.991	All	$W = 0.0110\ L^{3.0593}$	808	0.9859
	Males	$W = 0.0076\ L^{3.0636}$	364	0.980	Males	$W = 0.0909\ L^{2.9770}$	547	0.984	Males	$W = 0.0153\ L^{2.9565}$	372	0.9754
	Females	$W = 0.0095\ L^{3.0027}$	392	0.979	Females	$W = 0.1071\ L^{2.9152}$	947	0.990	Females	$W = 0.0161\ L^{2.9484}$	397	0.9706

TABLE 6.- Atlantic cod length distribution per haul mean catches by sex and year. Number per stratified mean catches. Spanish Summer Survey on NAFO 3L: 2003-2010 (R/V *Vizconde de Eza*). Indet. means indeterminate. (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

	2003 (*)				2004				2006				2007			
Length (cm.)	M	F	I	T	M	F	I	T	M	F	I	T	M	F	I	T
12	0.00	0.00	0.03	0.03	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.01
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01
16	0.00	0.00	0.10	0.10	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02	0.00	0.00	0.02
18	0.00	0.00	0.06	0.06	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.04	0.03	0.00	0.07
20	0.00	0.00	0.10	0.10	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.03	0.04	0.00	0.00	0.04
22	0.00	0.00	0.18	0.18	0.00	0.00	0.00	0.00	0.05	0.02	0.00	0.08	0.02	0.01	0.00	0.03
24	0.00	0.00	0.34	0.34	0.00	0.00	0.02	0.02	0.08	0.10	0.00	0.18	0.01	0.01	0.00	0.02
26	0.00	0.00	0.38	0.38	0.00	0.00	0.03	0.03	0.09	0.16	0.00	0.25	0.01	0.00	0.00	0.01
28	0.00	0.00	0.24	0.24	0.00	0.00	0.06	0.06	0.09	0.19	0.00	0.27	0.02	0.04	0.00	0.06
30	0.00	0.00	0.30	0.30	0.00	0.00	0.15	0.15	0.13	0.19	0.00	0.32	0.05	0.02	0.00	0.07
32	0.00	0.00	0.27	0.27	0.00	0.00	0.03	0.03	0.20	0.11	0.00	0.30	0.05	0.06	0.00	0.12
34	0.00	0.00	0.28	0.28	0.00	0.00	0.05	0.05	0.15	0.10	0.00	0.25	0.07	0.06	0.00	0.14
36	0.00	0.00	0.37	0.37	0.00	0.00	0.09	0.09	0.12	0.11	0.00	0.23	0.07	0.13	0.00	0.21
38	0.00	0.00	0.35	0.35	0.00	0.00	0.15	0.15	0.11	0.12	0.00	0.23	0.14	0.17	0.00	0.31
40	0.00	0.00	0.20	0.20	0.00	0.00	0.10	0.10	0.05	0.12	0.00	0.17	0.11	0.14	0.00	0.25
42	0.00	0.00	0.38	0.38	0.00	0.00	0.10	0.10	0.12	0.07	0.00	0.18	0.10	0.14	0.00	0.24
44	0.00	0.00	0.10	0.10	0.00	0.00	0.06	0.06	0.13	0.10	0.00	0.23	0.11	0.07	0.00	0.18
46	0.00	0.00	0.12	0.12	0.00	0.00	0.03	0.03	0.11	0.13	0.00	0.24	0.02	0.13	0.00	0.15
48	0.00	0.00	0.13	0.13	0.00	0.00	0.01	0.01	0.03	0.09	0.00	0.12	0.07	0.04	0.00	0.12
50	0.00	0.00	0.08	0.08	0.00	0.00	0.03	0.03	0.03	0.05	0.00	0.08	0.02	0.03	0.00	0.05
52	0.00	0.00	0.12	0.12	0.00	0.00	0.00	0.00	0.02	0.05	0.00	0.08	0.02	0.05	0.00	0.07
54	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.04	0.00	0.04	0.05	0.02	0.00	0.07
56	0.00	0.00	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.00	0.06
58	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.03	0.03	0.00	0.06
60	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.02
62	0.00	0.00	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.02
64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00
66	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
68	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01
70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00
80	0.00	0.00	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.00	4.30	4.30	0.00	0.00	0.92	0.92	1.57	1.82	0.00	3.38	1.13	1.30	0.00	2.43
Nº samples:				14				9				22				32
Nº Ind.:	-	-	160	160	-	-	55	55	143	167	0	310	107	119	0	226
Sampled catch:				84				34				176				168
Range:				13-81				24-55				13-79				12-76
Total catch:				84				34				176				168
Total valid hauls:				39				50				100				94

TABLE 6 (cont.).- Atlantic cod length distribution per haul mean catches by sex and year. Number per stratified mean catches. Spanish Summer Survey on NAFO 3L: 2007-2010 (R/V *Vizconde de Eza*). Indet. means indeterminate. (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

	2008				2009				2010			
Length (cm.)	M	F	I	T	M	F	I	T	M	F	I	T
12	0.01	0.02	0.00	0.04	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00
14	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
16	0.08	0.03	0.00	0.11	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00
18	0.19	0.15	0.00	0.34	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.03
20	0.14	0.13	0.00	0.27	0.02	0.01	0.00	0.03	0.00	0.00	0.00	0.00
22	0.12	0.19	0.00	0.31	0.06	0.06	0.00	0.12	0.01	0.00	0.00	0.01
24	1.21	1.36	0.00	2.56	0.08	0.05	0.00	0.13	0.07	0.07	0.00	0.13
26	5.14	6.23	0.00	11.37	0.12	0.12	0.00	0.24	0.21	0.24	0.00	0.45
28	8.51	10.05	0.00	18.56	0.14	0.18	0.00	0.32	0.49	0.88	0.00	1.37
30	6.60	7.42	0.00	14.02	0.20	0.15	0.00	0.36	0.99	1.06	0.00	2.05
32	2.99	3.61	0.00	6.60	0.39	0.37	0.00	0.77	1.34	1.23	0.00	2.57
34	1.94	0.81	0.00	2.74	0.66	1.04	0.00	1.70	0.87	1.07	0.00	1.95
36	0.83	0.78	0.00	1.61	1.11	1.16	0.00	2.26	1.27	1.35	0.00	2.62
38	0.32	0.35	0.00	0.67	1.09	1.42	0.00	2.51	1.31	1.44	0.00	2.75
40	0.14	0.29	0.00	0.43	0.92	1.07	0.00	1.99	1.65	2.08	0.00	3.72
42	0.06	0.37	0.00	0.43	0.49	0.76	0.00	1.25	1.91	2.12	0.00	4.02
44	0.13	0.05	0.00	0.19	0.28	0.47	0.00	0.75	1.79	2.52	0.00	4.31
46	0.09	0.29	0.00	0.37	0.15	0.37	0.00	0.52	1.60	2.24	0.00	3.85
48	0.07	0.24	0.00	0.31	0.04	0.15	0.00	0.18	1.17	1.48	0.00	2.65
50	0.06	0.09	0.00	0.16	0.08	0.14	0.00	0.22	0.51	0.95	0.00	1.46
52	0.22	0.07	0.00	0.29	0.07	0.13	0.00	0.20	0.28	0.43	0.00	0.71
54	0.04	0.06	0.00	0.10	0.07	0.08	0.00	0.15	0.18	0.31	0.00	0.49
56	0.04	0.02	0.00	0.06	0.09	0.11	0.00	0.20	0.05	0.21	0.00	0.25
58	0.19	0.03	0.00	0.22	0.01	0.13	0.00	0.14	0.12	0.13	0.00	0.26
60	0.02	0.02	0.00	0.04	0.02	0.07	0.00	0.09	0.16	0.06	0.00	0.22
62	0.05	0.03	0.00	0.09	0.03	0.04	0.00	0.07	0.05	0.07	0.00	0.12
64	0.01	0.05	0.00	0.06	0.01	0.06	0.00	0.07	0.05	0.01	0.00	0.06
66	0.04	0.00	0.00	0.04	0.01	0.03	0.00	0.04	0.02	0.05	0.00	0.07
68	0.00	0.01	0.00	0.01	0.01	0.02	0.00	0.03	0.04	0.01	0.00	0.05
70	0.01	0.00	0.00	0.01	0.01	0.03	0.00	0.04	0.01	0.00	0.00	0.01
72	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01
74	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00
76	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00
78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Total	29.27	32.78	0.00	62.05	6.18	8.25	0.00	14.44	16.19	20.07	0.00	36.25
Nº samples:				34				32				36
Nº Ind.:	739	827	0	1566	580	781	0	1361	1014	1265	0	2279
Sampled catch:				1814				957				2509
Range:				12-74				13-77				12-93
Total catch:				1814				957				2509
Total valid hauls:				100				98				97

TABLE 7.- Swept area, number of hauls and **roughhead grenadier** mean catch (Kg) and SD (**) by stratum. Spanish Survey on NAFO Div. 3L in the period 2003-2010, on board R/V "*Vizconde de Eza*". (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

Stratum	2003 (*)				2004				2006				2007			
	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD
385	0.0225	2	0.000	0.000	0.0229	2	0.000	0.000	0.0229	2	0.000	0.000	0.0225	2	0.000	0.000
387	0.0229	2	0.000	0.000	0.0214	2	59.987	23.598	0.0225	2	34.790	20.520	0.0225	2	45.990	51.746
388	0.0334	3	0.000	0.000	0.0105	1	43.300		0.0566	5	26.406	7.803	0.0563	5	37.663	22.136
389	0.0454	4	0.000	0.000	0.0225	2	1.875	2.652	0.0795	7	1.426	2.642	0.0900	8	3.075	8.697
390	0.0563	5	0.560	1.252	0.0345	3	0.007	0.012	0.1249	11	0.000	0.000	0.1350	12	0.000	0.000
391	0.0338	3	0.017	0.029	0.0218	2	0.018	0.025	0.0450	4	178.123	304.579	0.0450	4	86.525	171.255
392	0.0116	1	3.900	-	0.0214	2	200.650	255.195	0.0229	2	118.025	159.347	0.0225	2	129.950	138.805
729	0.0210	2	37.750	4.596	0.0221	2	29.475	17.501	0.0338	3	25.164	23.944	0.0338	3	26.490	13.222
730	0.0221	2	101.050	37.972	0.0221	2	33.715	0.544	0.0326	3	53.270	7.021	0.0225	2	81.378	33.061
731	0.0229	2	3.510	1.824	0.0233	2	10.450	5.162	0.0341	3	10.512	3.252	0.0338	3	14.333	7.365
732	0.0113	1	34.400	-	0.0210	2	39.490	7.594	0.0334	3	22.164	9.200	0.0338	3	11.151	3.253
733	n.s.	n.s.	n.s.	n.s.	0.0330	3	15.553	5.137	0.0454	4	23.450	16.806	0.0338	3	19.104	14.162
734	n.s.	n.s.	n.s.	n.s.	0.0304	3	65.850	106.305	0.0225	2	39.315	9.638	0.0225	2	23.400	8.202
741	0.0113	1	8.700	-	0.0323	3	1.055	1.342	0.0218	2	17.557	23.112	0.0225	2	4.650	6.166
742	0.0116	1	24.400	-	0.0120	1	4.700	-	0.0229	2	20.933	7.015	0.0225	2	14.493	2.011
743	n.s.	n.s.	n.s.	n.s.	0.0188	2	26.245	6.017	0.0225	2	10.574	6.353	0.0225	2	29.666	25.928
744	n.s.	n.s.	n.s.	n.s.	0.0101	1	2.550	-	0.0229	2	15.365	15.111	0.0218	2	33.965	0.375
745	0.0341	3	17.547	10.764	0.0319	3	5.800	2.722	0.0686	6	8.238	5.438	0.0675	6	3.624	1.509
746	0.0446	4	63.800	71.784	0.0338	3	26.205	21.151	0.0675	6	41.767	29.972	0.0664	6	34.607	22.333
747	n.s.	n.s.	n.s.	n.s.	0.0308	3	43.627	13.999	0.1230	11	42.307	40.112	0.1238	11	62.510	26.732
748	0.0109	1	55.980	-	0.0199	2	22.515	18.547	0.0326	3	67.920	73.796	0.0338	3	33.533	16.455
749	0.0221	2	145.200	23.193	0.0221	2	45.900	51.336	0.0229	2	25.930	31.919	0.0113	1	28.700	-
750	n.s.	n.s.	n.s.	n.s.	0.0180	2	56.750	36.416	0.1005	9	16.866	18.117	0.0679	6	19.516	24.114
751	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0454	4	4.253	3.543	0.0225	2	24.445	7.983

$$(**)\ SD = \frac{\sum (x_i - \bar{x})}{n-1}$$

TABLE 7 (cont).- Swept area, number of hauls and **roughhead grenadier** mean catch (Kg) and SD (**) by stratum. Spanish Survey on NAFO Div. 3L in the period 2003-2010, on board R/V "*Vizconde de Eza*". (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

Stratum	2008				2009				2010							
	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD
385	0.0229	2	0.000	0.000	0.0225	2	0.000	0.000	0.0225	2	0.000	0.000				
387	0.0435	4	20.320	11.817	0.0439	4	30.045	16.013	0.0458	4	14.399	12.704				
388	0.0559	5	15.056	11.298	0.0555	5	27.627	27.428	0.0570	5	17.174	8.563				
389	0.0780	7	19.007	23.458	0.0803	7	31.105	63.627	0.0795	7	8.231	10.443				
390	0.1395	12	0.580	1.338	0.1373	12	4.648	14.283	0.1249	11	1.071	3.295				
391	0.0454	4	248.947	142.328	0.0458	4	72.878	56.298	0.0454	4	169.525	25.560				
392	0.0221	2	58.175	54.836	0.0229	2	60.934	78.701	0.0225	2	35.050	15.203				
729	0.0338	3	19.943	6.923	0.0341	3	9.991	5.382	0.0338	3	10.817	4.348				
730	0.0323	3	35.119	29.483	0.0338	3	75.453	99.963	0.0334	3	26.400	4.084				
731	0.0330	3	14.333	10.000	0.0341	3	4.980	1.654	0.0338	3	10.508	7.656				
732	0.0446	4	21.545	3.045	0.0450	4	8.289	3.314	0.0450	4	16.060	6.489				
733	0.0431	4	23.939	36.979	0.0450	4	19.108	13.978	0.0450	4	8.785	9.702				
734	0.0221	2	30.580	20.182	0.0218	2	28.777	12.760	0.0225	2	65.625	48.826				
741	0.0210	2	10.359	10.390	0.0221	2	11.334	6.316	0.0225	2	14.350	3.606				
742	0.0210	2	16.861	11.943	0.0214	2	3.425	1.803	0.0225	2	3.870	1.987				
743	0.0203	2	25.509	13.847	0.0203	2	13.278	13.438	0.0225	2	30.937	37.283				
744	0.0221	2	58.670	15.570	0.0210	2	8.208	6.495	0.0229	2	13.319	1.031				
745	0.0555	5	14.284	7.402	0.0559	5	3.787	2.256	0.0563	5	7.959	3.864				
746	0.0638	6	30.720	16.486	0.0668	6	23.474	20.537	0.0679	6	13.030	7.624				
747	0.1069	10	28.717	25.198	0.1118	10	33.180	25.868	0.1125	10	36.785	18.008				
748	0.0218	2	217.340	286.322	0.0229	2	92.330	127.477	0.0225	2	50.350	51.548				
749	0.0214	2	47.452	11.670	0.0225	2	13.700	9.334	0.0229	2	20.482	26.189				
750	0.0844	8	11.937	6.673	0.0791	7	16.895	14.145	0.0900	8	12.763	11.150				
751	0.0413	4	9.038	8.141	0.0338	3	88.193	144.495	0.0225	2	22.150	8.980				

$$(**)\ SD = \frac{\sum (x_i - \bar{x})}{n-1}$$

TABLE 8.- Stratified mean catches (Kg) of **roughhead grenadier** by stratum and year (2003-2010) and SD. Research Vessel *Vizconde de Eza*. n.s. means stratum not surveyed. In 2003: the data correspond to 69% of the total area prospected in 2006-2010.

	Survey							
Stratum	2003	2004	2005	2006	2007	2008	2009	2010
385	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00
387	0.00	15356.54	-	8906.24	11773.44	5201.92	7691.52	3686.21
388	0.00	15458.10	-	9426.94	13445.76	5374.85	9862.70	6131.05
389	0.00	954.38	-	725.69	1565.18	9674.64	15832.37	4189.80
390	456.40	5.43	-	0.00	0.00	472.70	3787.71	872.79
391	4.70	4.94	-	50230.55	24400.05	70203.05	20551.46	47806.05
392	565.50	29094.25	-	17113.63	18842.75	8435.38	8835.43	5082.25
729	7021.50	5482.35	-	4680.44	4927.20	3709.46	1858.39	2011.90
730	17178.50	5731.55	-	9055.90	13834.26	5970.29	12827.07	4488.00
731	758.16	2257.20	-	2270.52	3095.93	3095.93	1075.61	2269.73
732	7946.40	9122.19	-	5119.88	2575.96	4976.90	1914.82	3709.74
733	n.s	3639.48	-	5487.30	4470.26	5601.67	4471.16	2055.69
734	n.s	10075.05	-	6015.20	3580.20	4678.66	4402.88	10040.63
741	870.00	105.53	-	1755.70	465.00	1035.90	1133.40	1435.00
742	1561.60	300.80	-	1339.68	927.55	1079.10	219.20	247.68
743	n.s	1338.50	-	539.27	1512.97	1300.93	677.18	1577.79
744	n.s	168.30	-	1014.09	2241.69	3872.22	541.70	879.05
745	6106.24	2018.40	-	2866.88	1261.09	4970.83	1317.95	2769.59
746	25009.60	10272.36	-	16372.53	13565.94	12042.24	9201.61	5107.56
747	n.s	31585.71	-	30630.47	45257.17	20791.04	24022.61	26632.56
748	8900.82	3579.89	-	10799.28	5331.80	34557.06	14680.47	8005.65
749	18295.20	5783.40	-	3267.18	3616.20	5978.95	1726.20	2580.67
750	n.s	31553.00	-	9377.25	10850.99	6636.90	9393.86	7096.23
751	n.s	n.s	-	973.82	5597.91	2069.59	20196.12	5072.35
TOTAL	94674.62	183887.34	-	197968.44	193139.30	221730.20	176221.39	153747.96
	21.16	29.38	-	30.52	29.77	34.18	27.17	23.70
SD	3.38	5.27	-	7.41	4.86	6.12	4.97	1.71

TABLE 9.- Survey estimates (by the swept area method) of **roughhead grenadier** biomass (t.) by stratum and year and their SD on NAFO Div. 3L (R/V *Vizconde de Eza*). n.s. means stratum not surveyed. In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

	Survey							
Stratum	2003	2004	2005	2006	2007	2008	2009	2010
385	0	0	-	0	0	0	0	0
387	0	1437	-	792	1047	478	701	322
388	0	1472	-	832	1195	481	889	538
389	0	85	-	64	139	868	1381	369
390	41	0	-	0	0	41	331	77
391	0	0	-	4465	2169	6189	1797	4214
392	49	2722	-	1496	1675	763	772	452
729	669	496	-	416	438	330	163	179
730	1553	518	-	833	1230	555	1140	403
731	66	194	-	200	275	281	95	202
732	706	869	-	460	229	446	170	330
733	n.s	331	-	484	397	520	397	183
734	n.s	995	-	535	318	423	405	893
741	77	10	-	161	41	99	102	128
742	134	25	-	117	82	103	21	22
743	n.s	143	-	48	134	128	67	140
744	n.s	17	-	89	206	350	52	77
745	537	190	-	251	112	448	118	246
746	2242	913	-	1455	1226	1133	827	451
747	n.s	3082	-	2739	4023	1945	2150	2367
748	818	360	-	993	474	3178	1284	712
749	1654	523	-	286	321	559	153	226
750	n.s	3506	-	840	959	629	831	631
751	n.s	n.s	-	86	498	201	1795	451
TOTAL	8546	17887	-	17641	17190	20148	15641	13612
SD	1340	3240	-	4271	2799	3534	2844	972

TABLE 10.- Roughhead grenadier length distribution per haul mean catches by sex and year. Number per stratified mean catches. Spanish Summer Survey on NAFO 3L: 2003-2010 (R/V *Vizconde de Eza*). Indet. means indeterminate. (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

	2003 (*)				2004				2006				2007			
Length (cm.)	M	F	I	T	M	F	I	T	M	F	I	T	M	F	I	T
1.5	0.00	0.00	0.03	0.03	0.00	0.00	0.02	0.02	0.00	0.00	0.04	0.04	0.00	0.02	0.01	0.03
2.5	0.37	0.16	0.67	1.20	0.02	0.02	0.06	0.10	0.07	0.04	0.02	0.13	0.00	0.04	0.15	0.19
3.5	0.17	0.11	0.20	0.48	0.77	0.21	0.18	1.15	0.61	0.16	0.14	0.91	0.40	0.17	0.70	1.26
4.5	0.18	0.20	0.00	0.39	0.09	0.07	0.00	0.16	0.14	0.00	0.00	0.14	0.08	0.06	0.02	0.16
5.5	1.68	1.70	0.00	3.38	0.36	0.42	0.00	0.77	0.12	0.15	0.00	0.27	0.34	0.21	0.02	0.57
6.5	0.94	0.88	0.00	1.82	0.72	1.08	0.00	1.80	0.91	0.71	0.00	1.63	0.94	0.75	0.00	1.69
7.5	0.55	0.34	0.00	0.88	0.32	0.39	0.00	0.71	0.62	0.48	0.00	1.10	0.28	0.33	0.00	0.61
8.5	0.60	0.86	0.00	1.46	0.80	0.92	0.00	1.72	0.46	0.50	0.00	0.97	0.54	0.68	0.01	1.23
9.5	0.53	0.68	0.00	1.21	1.05	1.12	0.00	2.17	0.95	0.87	0.00	1.82	0.60	0.81	0.00	1.42
10.5	1.17	1.10	0.00	2.27	0.87	0.55	0.00	1.42	0.87	0.98	0.00	1.84	0.84	0.55	0.00	1.39
11.5	0.90	0.94	0.00	1.84	1.03	1.13	0.00	2.16	1.36	1.26	0.00	2.62	1.21	1.12	0.00	2.32
12.5	1.48	0.84	0.00	2.33	1.47	1.27	0.00	2.74	1.83	1.78	0.01	3.61	1.13	1.22	0.00	2.35
13.5	1.87	1.40	0.00	3.26	1.64	1.05	0.00	2.69	1.66	1.75	0.01	3.41	1.46	1.45	0.00	2.91
14.5	2.95	2.53	0.00	5.48	2.35	1.70	0.00	4.05	1.91	1.77	0.00	3.67	1.89	1.71	0.00	3.60
15.5	3.44	2.54	0.00	5.98	3.43	2.57	0.00	6.00	2.21	1.64	0.00	3.85	1.54	1.47	0.00	3.01
16.5	2.94	3.11	0.00	6.04	4.60	3.44	0.00	8.03	2.19	1.86	0.00	4.04	1.74	1.56	0.00	3.29
17.5	1.76	2.94	0.00	4.70	3.98	3.20	0.00	7.18	3.45	1.88	0.01	5.34	1.97	1.45	0.00	3.41
18.5	0.82	1.67	0.00	2.49	3.59	2.73	0.00	6.32	2.99	2.03	0.00	5.02	1.85	1.38	0.00	3.23
19.5	0.63	1.36	0.00	1.99	1.98	2.90	0.00	4.88	1.73	2.94	0.00	4.66	1.57	1.57	0.00	3.14
20.5	0.18	1.10	0.00	1.28	1.09	1.73	0.00	2.82	0.91	2.50	0.00	3.41	0.98	1.70	0.00	2.67
21.5	0.07	1.07	0.00	1.14	0.13	1.13	0.00	1.26	0.51	2.60	0.00	3.11	0.40	2.38	0.00	2.78
22.5	0.03	0.76	0.00	0.79	0.22	0.75	0.00	0.97	0.10	1.73	0.00	1.83	0.15	2.18	0.00	2.32
23.5	0.01	0.61	0.00	0.62	0.00	0.57	0.00	0.57	0.03	1.44	0.00	1.47	0.05	1.90	0.00	1.95
24.5	0.00	0.41	0.00	0.41	0.00	0.69	0.00	0.69	0.01	0.94	0.00	0.95	0.00	1.49	0.00	1.49
25.5	0.00	0.58	0.00	0.58	0.01	0.43	0.00	0.45	0.00	0.84	0.00	0.84	0.01	1.18	0.00	1.20
26.5	0.00	0.47	0.00	0.47	0.00	0.60	0.00	0.60	0.00	0.63	0.00	0.63	0.00	1.05	0.00	1.05
27.5	0.00	0.47	0.00	0.47	0.00	0.15	0.00	0.15	0.00	0.25	0.00	0.25	0.00	0.69	0.00	0.69
28.5	0.00	0.35	0.00	0.35	0.00	0.30	0.00	0.30	0.00	0.31	0.00	0.31	0.01	0.37	0.00	0.38
29.5	0.00	0.26	0.00	0.26	0.00	0.24	0.00	0.24	0.00	0.20	0.00	0.20	0.01	0.35	0.00	0.37
30.5	0.00	0.23	0.00	0.23	0.00	0.21	0.00	0.21	0.00	0.10	0.00	0.10	0.00	0.28	0.00	0.28
31.5	0.00	0.09	0.00	0.09	0.00	0.24	0.00	0.24	0.00	0.13	0.00	0.13	0.00	0.21	0.00	0.21
32.5	0.00	0.07	0.00	0.07	0.00	0.04	0.00	0.04	0.00	0.09	0.00	0.09	0.00	0.07	0.00	0.07
33.5	0.00	0.06	0.00	0.06	0.00	0.01	0.00	0.01	0.00	0.04	0.00	0.04	0.00	0.03	0.00	0.03
34.5	0.00	0.03	0.00	0.03	0.00	0.09	0.00	0.09	0.00	0.03	0.00	0.03	0.00	0.08	0.00	0.08
35.5	0.00	0.03	0.00	0.03	0.00	0.08	0.00	0.08	0.00	0.01	0.00	0.01	0.00	0.05	0.00	0.05
36.5	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.05	0.00	0.05	0.00	0.04	0.00	0.04
37.5	0.00	0.04	0.00	0.04	0.00	0.06	0.00	0.06	0.00	0.01	0.00	0.01	0.00	0.02	0.00	0.02
38.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01
39.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02
41.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	23.27	29.98	0.89	54.14	30.53	32.08	0.26	62.86	25.64	32.68	0.23	58.54	19.99	30.65	0.90	51.54
Nº samples:				22				43				83				71
Nº Ind.:	943	1268	37	2248	1188	1359	17	2564	2107	2423	25	4555	1589	2246	69	3904
Sampled catch:				1013				1579				2985				2712
Range:				2-38				2-37.5				1.5-39				2-41
Total catch:				1013				1579				2985				2712
Total valid hauls:				39				50				100				94

TABLE 10 (cont.).- Roughhead grenadier length distribution per haul mean catches by sex and year. Number per stratified mean catches. Spanish Summer Survey on NAFO 3L: 2007-2010 (R/V *Vizconde de Eza*). Indet. means indeterminate. (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

	2008				2009				2010			
Length (cm.)	M	F	I	T	M	F	I	T	M	F	I	T
1.5	0.00	0.00	0.02	0.02	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00
2.5	0.00	0.03	0.09	0.13	0.01	0.00	0.13	0.15	0.03	0.00	0.26	0.29
3.5	0.28	0.08	1.42	1.78	0.27	0.16	1.01	1.44	0.07	0.05	0.33	0.46
4.5	0.11	0.01	0.03	0.15	0.07	0.00	0.05	0.12	0.04	0.09	0.01	0.15
5.5	0.10	0.13	0.01	0.24	0.12	0.13	0.00	0.25	0.29	0.20	0.00	0.48
6.5	0.69	0.64	0.03	1.36	0.38	0.45	0.00	0.83	0.58	0.59	0.00	1.17
7.5	0.24	0.38	0.00	0.62	0.11	0.23	0.00	0.35	0.26	0.22	0.00	0.47
8.5	0.39	0.46	0.00	0.85	0.25	0.30	0.00	0.54	0.28	0.36	0.00	0.64
9.5	0.74	0.58	0.00	1.31	0.38	0.51	0.00	0.89	0.54	0.43	0.00	0.97
10.5	0.87	0.77	0.00	1.63	0.56	0.52	0.00	1.08	0.76	0.66	0.00	1.42
11.5	1.19	1.32	0.00	2.51	0.56	0.99	0.00	1.55	0.95	0.89	0.00	1.83
12.5	1.07	1.20	0.00	2.26	1.24	0.91	0.00	2.15	1.26	1.10	0.00	2.37
13.5	1.58	1.36	0.00	2.93	1.33	1.44	0.00	2.77	1.84	1.74	0.00	3.59
14.5	2.16	1.77	0.00	3.94	1.58	1.53	0.00	3.11	2.46	2.38	0.00	4.85
15.5	2.61	2.21	0.00	4.82	1.92	1.90	0.00	3.81	2.29	2.10	0.00	4.40
16.5	2.60	2.67	0.00	5.26	1.96	1.80	0.00	3.76	2.32	2.49	0.00	4.80
17.5	1.92	1.97	0.00	3.89	1.71	1.96	0.00	3.67	1.89	2.35	0.00	4.24
18.5	1.60	1.74	0.00	3.34	1.31	1.52	0.00	2.83	1.35	2.30	0.00	3.65
19.5	1.36	1.77	0.00	3.13	0.97	1.24	0.00	2.22	0.75	1.78	0.00	2.52
20.5	0.82	1.89	0.00	2.71	0.59	1.22	0.00	1.81	0.36	1.26	0.00	1.62
21.5	0.37	1.71	0.00	2.09	0.30	1.23	0.00	1.53	0.16	1.20	0.00	1.36
22.5	0.10	1.82	0.00	1.91	0.15	1.21	0.00	1.37	0.04	0.85	0.00	0.89
23.5	0.03	1.83	0.00	1.86	0.01	1.33	0.00	1.35	0.04	0.93	0.00	0.96
24.5	0.00	2.28	0.00	2.29	0.00	1.25	0.00	1.25	0.00	0.56	0.00	0.56
25.5	0.00	1.87	0.00	1.87	0.01	1.18	0.00	1.19	0.00	0.80	0.00	0.80
26.5	0.00	1.53	0.00	1.53	0.00	1.19	0.00	1.19	0.00	0.56	0.00	0.56
27.5	0.00	0.88	0.00	0.88	0.00	0.82	0.00	0.82	0.00	0.44	0.00	0.44
28.5	0.00	0.62	0.00	0.62	0.00	0.52	0.00	0.52	0.00	0.38	0.00	0.38
29.5	0.00	0.58	0.00	0.58	0.00	0.46	0.00	0.46	0.00	0.23	0.00	0.23
30.5	0.00	0.15	0.00	0.15	0.00	0.27	0.00	0.27	0.00	0.11	0.00	0.11
31.5	0.00	0.11	0.00	0.11	0.00	0.23	0.00	0.23	0.00	0.09	0.00	0.09
32.5	0.00	0.07	0.00	0.07	0.00	0.14	0.00	0.14	0.00	0.06	0.00	0.06
33.5	0.00	0.03	0.00	0.03	0.00	0.09	0.00	0.09	0.00	0.06	0.00	0.06
34.5	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.08	0.00	0.06	0.00	0.06
35.5	0.00	0.01	0.00	0.01	0.00	0.03	0.00	0.03	0.00	0.02	0.00	0.02
36.5	0.00	0.02	0.00	0.02	0.00	0.03	0.00	0.03	0.00	0.05	0.00	0.05
37.5	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.04	0.00	0.04
38.5	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
39.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40.5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
41.5	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.02	0.00	0.02
Total	20.84	34.48	1.59	56.91	15.78	26.93	1.21	43.93	18.58	27.44	0.61	46.63
Nº samples:				87				81				84
Nº Ind.:	2022	3019	176	5217	1409	2319	105	3833	1486	1997	65	3548
Sampled catch:				3287				2541				2234
Range:				1.5-42.5				2.0-41.5				2.5-42
Total catch:				3287				2543				2234
Total valid hauls:				100				98				97

TABLE 11.- Swept area, number of hauls and **redfish** mean catch (Kg) and SD (**) by stratum. Spanish Survey on NAFO Div. 3L in the period 2003-2010, on board R/V "*Vizconde de Eza"*. (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

Stratum	2003 (*)				2004				2006				2007			
	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD
385	0.0225	2	0.001	0.001	0.0229	2	0.005	0.007	0.0229	2	0.000	0.000	0.0225	2	0.041	0.027
387	0.0229	2	1.715	1.110	0.0214	2	56.000	51.619	0.0225	2	113.685	116.171	0.0225	2	80.400	34.083
388	0.0334	3	6.453	6.142	0.0105	1	11.800	-	0.0566	5	66.040	32.355	0.0563	5	162.078	100.787
389	0.0454	4	0.801	0.912	0.0225	2	33.050	44.901	0.0795	7	46.008	84.876	0.0900	8	10.723	18.542
390	0.0563	5	0.580	1.242	0.0345	3	0.000	0.000	0.1249	11	0.188	0.318	0.1350	12	0.173	0.473
391	0.0338	3	0.087	0.085	0.0218	2	1.435	1.718	0.0450	4	7.135	5.793	0.0450	4	6.013	6.351
392	0.0116	1	46.300	-	0.0214	2	1222.320	1712.075	0.0229	2	4367.190	5741.976	0.0225	2	959.650	350.230
729	0.0210	2	88.800	73.963	0.0221	2	310.250	239.780	0.0338	3	202.167	262.943	0.0338	3	128.889	184.792
730	0.0221	2	231.080	64.389	0.0221	2	55.550	72.761	0.0326	3	145.923	148.390	0.0225	2	367.737	518.964
731	0.0229	2	39.365	8.252	0.0233	2	79.550	68.236	0.0341	3	19.053	7.921	0.0338	3	37.100	28.646
732	0.0113	1	72.200	-	0.0210	2	42.025	55.119	0.0334	3	5.638	7.067	0.0338	3	12.115	13.539
733	n.s.	n.s.	n.s.	n.s.	0.0330	3	111.667	109.389	0.0454	4	72.600	47.167	0.0338	3	115.667	70.383
734	n.s.	n.s.	n.s.	n.s.	0.0304	3	5.383	7.029	0.0225	2	12.328	3.921	0.0225	2	24.728	28.585
741	0.0113	1	2240.000	-	0.0323	3	0.255	0.255	0.0218	2	0.000	0.000	0.0225	2	0.000	0.000
742	0.0116	1	0.000	-	0.0120	1	0.331	-	0.0229	2	0.000	0.000	0.0225	2	0.300	0.424
743	n.s.	n.s.	n.s.	n.s.	0.0188	2	2.090	2.956	0.0225	2	0.000	0.000	0.0225	2	0.000	0.000
744	n.s.	n.s.	n.s.	n.s.	0.0101	1	0.000	-	0.0229	2	0.000	0.000	0.0218	2	0.479	0.677
745	0.0341	3	1753.100	3028.408	0.0319	3	0.000	0.000	0.0686	6	0.119	0.221	0.0675	6	0.380	0.450
746	0.0446	4	0.000	0.000	0.0338	3	0.000	0.000	0.0675	6	0.118	0.185	0.0664	6	0.000	0.000
747	n.s.	n.s.	n.s.	n.s.	0.0308	3	0.200	0.346	0.1230	11	0.000	0.000	0.1238	11	0.000	0.000
748	0.0109	1	2.700	-	0.0199	2	0.440	0.622	0.0326	3	0.130	0.225	0.0338	3	0.830	1.050
749	0.0221	2	0.000	0.000	0.0221	2	0.000	0.000	0.0229	2	0.000	0.000	0.0113	1	0.000	-
750	n.s.	n.s.	n.s.	n.s.	0.0180	2	0.000	0.000	0.1005	9	0.000	0.000	0.0679	6	0.000	0.000
751	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0454	4	0.000	0.000	0.0225	2	0.000	0.000

$$(**)\ SD = \frac{\sum (x_i - \bar{x})}{n-1}$$

TABLE 11 (cont).- Swept area, number of hauls and **redfish** mean catch (Kg) and SD (**) by stratum. Spanish Survey on NAFO Div. 3L in the period 2003-2010, on board R/V "*Vizconde de Eza*". (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

Stratum	2008				2009				2010							
	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD
385	0.0229	2	0.495	0.644	0.0225	2	0.275	0.389	0.0225	2	0.000	0.000				
387	0.0435	4	185.125	58.384	0.0439	4	568.427	761.003	0.0458	4	278.625	163.544				
388	0.0559	5	212.750	142.882	0.0555	5	1686.275	2522.618	0.0570	5	922.261	770.678				
389	0.0780	7	385.331	509.833	0.0803	7	321.423	836.313	0.0795	7	3449.476	9037.325				
390	0.1395	12	0.922	2.280	0.1373	12	0.086	0.182	0.1249	11	0.005	0.011				
391	0.0454	4	1093.130	1444.102	0.0458	4	243.571	371.869	0.0454	4	2337.331	4421.647				
392	0.0221	2	209.150	15.203	0.0229	2	797.546	42.491	0.0225	2	480.100	211.425				
729	0.0338	3	618.467	508.067	0.0341	3	50.830	11.765	0.0338	3	284.767	335.507				
730	0.0323	3	29.790	42.861	0.0338	3	167.600	193.999	0.0334	3	147.447	167.733				
731	0.0330	3	132.967	154.885	0.0341	3	37.000	30.152	0.0338	3	89.033	43.263				
732	0.0446	4	11.975	11.596	0.0450	4	8.311	9.503	0.0450	4	16.665	14.441				
733	0.0431	4	132.600	203.165	0.0450	4	59.725	53.776	0.0450	4	174.368	45.484				
734	0.0221	2	22.485	27.457	0.0218	2	16.220	17.367	0.0225	2	5.945	3.868				
741	0.0210	2	0.555	0.049	0.0221	2	0.903	0.012	0.0225	2	0.000	0.000				
742	0.0210	2	0.000	0.000	0.0214	2	0.000	0.000	0.0225	2	0.000	0.000				
743	0.0203	2	0.000	0.000	0.0203	2	5.575	7.884	0.0225	2	0.000	0.000				
744	0.0221	2	0.000	0.000	0.0210	2	0.000	0.000	0.0229	2	0.133	0.188				
745	0.0555	5	0.364	0.664	0.0559	5	0.000	0.000	0.0563	5	0.436	0.632				
746	0.0638	6	0.000	0.000	0.0668	6	0.043	0.106	0.0679	6	0.053	0.131				
747	0.1069	10	0.012	0.039	0.1118	10	0.000	0.000	0.1125	10	0.000	0.000				
748	0.0218	2	4.290	6.067	0.0229	2	1.576	2.228	0.0225	2	0.000	0.000				
749	0.0214	2	0.000	0.000	0.0225	2	0.000	0.000	0.0229	2	0.000	0.000				
750	0.0844	8	0.000	0.000	0.0791	7	0.230	0.609	0.0900	8	0.184	0.520				
751	0.0413	4	0.000	0.000	0.0338	3	0.000	0.000	0.0225	2	0.000	0.000				

$$(**)\ SD = \frac{\sum (x_i - \bar{x})}{n-1}$$

TABLE 12.- Stratified mean catches (Kg) of **redfish** by stratum and year (2003-2010) and SD. Research Vessel *Vizconde de Eza*. n.s. means stratum not surveyed. In 2003: the data correspond to 69% of the total area prospected in 2006-2010.

	Survey							
Stratum	2003	2004	2005	2006	2007	2008	2009	2010
385	0.12	0.59	-	0.00	4.84	58.35	32.45	0.00
387	439.04	14336.00	-	29103.36	20582.40	47392.00	145517.18	71328.00
388	2303.84	4212.60	-	23576.28	57861.85	75951.75	602000.18	329247.18
389	407.58	16822.45	-	23418.22	5458.01	196133.55	163604.53	1755783.21
390	472.70	0.00	-	153.59	141.00	751.23	70.36	3.93
391	24.44	404.67	-	2012.07	1695.53	308262.66	68687.02	659127.27
392	6713.50	177236.40	-	633242.55	139149.25	30326.75	115644.17	69614.50
729	16516.80	57706.50	-	37603.00	23973.29	115034.80	9454.32	52966.60
730	39283.60	9443.50	-	24806.97	62515.29	5064.30	28492.00	25065.93
731	8502.84	17182.80	-	4115.52	8013.60	28720.80	7992.00	19231.20
732	16678.20	9707.78	-	1302.46	2798.49	2766.23	1919.90	3849.62
733	n.s	26130.00	-	16988.40	27066.00	31028.40	13975.65	40802.00
734	n.s	823.65	-	1886.11	3783.31	3440.21	2481.66	909.59
741	224000.00	25.50	-	0.00	0.00	55.50	90.25	0.00
742	0.00	21.18	-	0.00	19.20	0.00	0.00	0.00
743	n.s	106.59	-	0.00	0.00	0.00	284.33	0.00
744	n.s	0.00	-	0.00	31.58	0.00	0.00	8.78
745	610078.80	0.00	-	41.47	132.24	126.74	0.00	151.73
746	0.00	0.00	-	46.39	0.00	0.00	16.99	20.91
747	n.s	144.80	-	0.00	0.00	8.98	0.00	0.00
748	429.30	69.96	-	20.67	131.97	682.11	250.50	0.00
749	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00
750	n.s	0.00	-	0.00	0.00	0.00	127.88	102.17
751	n.s	n.s	-	0.00	0.00	0.00	0.00	0.00
TOTAL	925850.76	334374.97		798317.04	353357.83	845804.35	1160641.36	3028212.59
	206.94	53.43		123.06	54.47	130.38	178.92	466.81
SD	136.03	28.87		90.99	11.94	36.35	69.07	285.47

TABLE 13.- Survey estimates (by the swept area method) of **redfish** biomass (t.) by stratum and year and their SD on NAFO Div. 3L (R/V *Vizconde de Eza*). n.s. means stratum not surveyed. In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

	Survey							
Stratum	2003	2004	2005	2006	2007	2008	2009	2010
385	0	0	-	0	0	5	3	0
387	38	1341	-	2587	1830	4358	13267	6236
388	207	401	-	2082	5143	6797	54234	28881
389	36	1495	-	2062	485	17602	14271	154597
390	42	0	-	14	13	65	6	0
391	2	37	-	179	151	27175	6005	58105
392	578	16584	-	55365	12369	2741	10111	6188
729	1573	5216	-	3342	2131	10225	831	4708
730	3551	854	-	2281	5557	471	2533	2253
731	743	1478	-	362	712	2611	703	1709
732	1483	925	-	117	249	248	171	342
733	n.s	2375	-	1498	2406	2878	1242	3627
734	n.s	81	-	168	336	311	228	81
741	19911	2	-	0	0	5	8	0
742	0	2	-	0	2	0	0	0
743	n.s	11	-	0	0	0	28	0
744	n.s	0	-	0	3	0	0	1
745	53633	0	-	4	12	11	0	13
746	0	0	-	4	0	0	2	2
747	n.s	14	-	0	0	1	0	0
748	39	7	-	2	12	63	22	0
749	0	0	-	0	0	0	0	0
750	n.s	0	-	0	0	0	11	9
751	n.s	n.s	-	0	0	0	0	0
TOTAL	81837	30825		70066	31410	75567	103675	266754
SD	50717	17163		50718	6885	20435	40871	164597

TABLE 14.- Redfish length distribution per haul mean catches by sex and year. Number per stratified mean catches. Spanish Summer Survey on NAFO 3L: 2003-2010 (R/V *Vizconde de Eza*). Indet. means indeterminate. (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

	2003 (*)				2004				2006				2007			
Length (cm.)	M	F	I	T	M	F	I	T	M	F	I	T	M	F	I	T
4	0.00	0.00	0.19	0.19	0.00	0.00	0.04	0.04	0.00	0.01	0.00	0.01	0.00	0.00	0.04	0.04
6	0.00	0.00	7.29	7.29	0.00	0.00	3.68	3.68	0.10	0.05	2.83	2.98	0.00	0.00	17.45	17.45
8	0.03	0.09	1.64	1.77	0.24	0.09	5.05	5.39	0.90	1.28	13.68	15.86	0.01	0.19	26.86	27.06
10	1.24	0.70	0.71	2.64	3.48	2.03	1.69	7.20	2.18	1.28	1.82	5.28	1.45	2.17	1.64	5.26
12	2.75	1.19	0.00	3.94	4.86	3.30	4.93	13.09	3.00	3.27	0.12	6.40	4.45	3.71	0.53	8.69
14	3.74	28.78	0.00	32.52	3.92	1.83	2.16	7.91	11.25	8.43	0.00	19.68	3.44	1.80	0.01	5.25
16	3.18	1.41	0.00	4.59	8.87	5.17	0.26	14.30	20.69	19.49	0.00	40.18	5.97	3.81	0.00	9.77
18	4.39	27.40	0.00	31.79	11.87	12.09	0.00	23.96	14.29	13.66	0.00	27.95	11.85	13.08	0.00	24.92
20	6.00	4.17	0.00	10.18	23.04	20.03	0.00	43.07	23.65	11.01	0.00	34.66	25.50	15.85	0.00	41.35
22	5.98	5.11	0.00	11.09	19.46	18.47	0.00	37.93	41.88	31.01	0.00	72.89	36.00	30.40	0.00	66.41
24	65.49	63.97	0.00	129.46	30.92	12.78	0.00	43.70	40.39	44.21	0.00	84.60	19.89	32.60	0.00	52.48
26	11.52	141.79	0.00	153.31	35.91	14.43	0.00	50.34	9.50	58.30	0.00	67.79	7.34	11.29	0.00	18.63
28	52.41	5.79	0.00	58.21	16.80	12.42	0.00	29.22	8.69	64.05	0.00	72.74	4.69	6.69	0.00	11.39
30	54.15	82.48	0.00	136.63	5.36	5.65	0.00	11.01	6.12	47.61	0.00	53.73	4.33	5.57	0.00	9.90
32	56.44	29.72	0.00	86.16	0.52	2.70	0.00	3.22	4.13	23.73	0.00	27.86	5.48	7.42	0.00	12.90
34	1.45	29.51	0.00	30.96	0.16	0.59	0.00	0.76	0.72	3.74	0.00	4.47	2.66	2.82	0.00	5.48
36	0.18	0.65	0.00	0.83	0.30	0.37	0.00	0.66	0.12	2.15	0.00	2.27	0.20	0.96	0.00	1.16
38	0.09	0.00	0.00	0.09	0.12	0.05	0.00	0.17	0.08	1.05	0.00	1.12	0.05	0.13	0.00	0.18
40	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.03	0.02	0.03	0.00	0.06
42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.03	0.00	0.04
44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01
46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.00
48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01
52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	269.04	422.79	9.83	701.67	165.84	111.99	17.82	295.65	187.71	334.38	18.45	540.54	133.36	138.57	46.53	318.46
Nº samples:				22				28				48				51
Nº Ind.:	965	799	304	2068	1903	1662	409	3974	3205	3089	1205	7499	2669	2360	2016	7045
Sampled catch:				8366				3970				11080				4675
Range:				5-40				5-39				5-48				5-53
Total catch:				8368				3970				11080				4675
Total valid hauls:				39				50				100				94

TABLE 14 (cont.).- Redfish length distribution per haul mean catches by sex and year. Number per stratified mean catches. Spanish Summer Survey on NAFO 3L: 2007-2010 (R/V *Vizconde de Eza*). Indet. means indeterminate. (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

	2008				2009				2010			
Length (cm.)	M	F	I	T	M	F	I	T	M	F	I	T
4	0.00	0.00	0.16	0.16	0.00	0.00	0.01	0.01	0.00	0.00	0.05	0.05
6	0.00	0.00	8.19	8.19	0.00	0.00	1.44	1.44	0.00	0.00	3.06	3.06
8	0.00	0.00	17.35	17.35	0.00	0.00	7.73	7.73	0.00	0.00	5.23	5.23
10	0.81	0.21	57.74	58.76	0.12	0.14	6.53	6.79	0.20	0.00	4.23	4.43
12	3.70	2.13	17.78	23.62	0.78	0.36	8.74	9.87	0.21	0.12	3.91	4.24
14	8.31	3.62	0.11	12.04	3.23	2.04	5.53	10.80	2.31	8.76	2.81	13.87
16	19.39	18.88	0.00	38.27	46.42	22.66	0.79	69.87	52.93	20.23	0.33	73.50
18	66.37	46.99	0.05	113.41	133.26	137.85	0.00	271.11	362.56	228.57	0.00	591.13
20	96.85	63.72	0.00	160.57	115.15	92.22	0.08	207.45	557.56	698.41	0.00	1255.97
22	81.51	63.44	0.00	144.94	117.95	120.09	0.00	238.03	260.01	387.04	0.00	647.05
24	49.16	50.05	0.00	99.21	67.44	106.44	0.00	173.88	91.63	122.89	0.00	214.51
26	25.59	33.03	0.00	58.62	15.72	82.79	0.00	98.51	53.99	95.89	0.00	149.88
28	22.11	21.05	0.00	43.16	9.27	17.36	0.00	26.62	21.46	66.19	0.00	87.65
30	10.25	9.73	0.00	19.99	2.75	10.77	0.00	13.52	8.10	14.77	0.00	22.87
32	3.50	4.98	0.00	8.48	2.46	4.50	0.00	6.96	4.85	10.51	0.00	15.36
34	1.11	2.86	0.00	3.96	2.23	2.06	0.00	4.29	2.69	4.84	0.00	7.54
36	0.49	0.68	0.00	1.18	0.60	1.49	0.00	2.10	1.25	2.39	0.00	3.64
38	0.06	0.29	0.00	0.35	0.15	0.03	0.00	0.19	0.60	1.72	0.00	2.31
40	0.01	0.12	0.00	0.13	0.32	0.37	0.00	0.70	0.06	0.95	0.00	1.01
42	0.01	0.11	0.00	0.12	0.00	0.04	0.00	0.04	0.06	1.79	0.00	1.85
44	0.00	0.00	0.00	0.00	0.00	0.31	0.00	0.31	0.00	0.11	0.00	0.11
46	0.00	0.13	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.05
48	0.00	0.00	0.00	0.00	0.00	0.30	0.00	0.30	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03
Total	389.23	322.03	101.39	812.65	517.84	601.84	30.85	1150.53	1420.47	1665.26	19.63	3105.35
Nº samples:				52				51				48
Nº Ind.:	3957	3147	1372	8476	3016	2723	558	6297	3216	3082	1178	7476
Sampled catch:				12283				16615				42525
Range:				5-47				5-49				5-55
Total catch:				12283				16615				42526
Total valid hauls:				100				98				97

TABLE 15.- Swept area, number of hauls and **thorny skate** mean catch (Kg) and SD (**) by stratum. Spanish Survey on NAFO Div. 3L in the period 2003-2010, on board R/V "*Vizconde de Eza*". (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

Stratum	2003 (*)				2004				2006				2007			
	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD
385	0.0225	2	0.000	0.000	0.0229	2	7.050	9.970	0.0229	2	6.044	4.588	0.0225	2	30.260	11.653
387	0.0229	2	5.295	4.957	0.0214	2	10.700	2.263	0.0225	2	16.438	16.599	0.0225	2	32.485	2.143
388	0.0334	3	13.273	13.347	0.0105	1	16.700		0.0566	5	44.186	24.414	0.0563	5	31.096	13.246
389	0.0454	4	5.984	5.117	0.0225	2	10.900	13.294	0.0795	7	32.979	14.712	0.0900	8	25.861	11.704
390	0.0563	5	0.190	0.425	0.0345	3	1.997	1.730	0.1249	11	5.529	7.479	0.1350	12	7.366	7.441
391	0.0338	3	1.723	1.509	0.0218	2	64.250	65.125	0.0450	4	151.088	51.460	0.0450	4	100.658	56.818
392	0.0116	1	10.050	-	0.0214	2	62.300	0.141	0.0229	2	149.500	165.604	0.0225	2	330.100	170.554
729	0.0210	2	54.955	31.176	0.0221	2	140.375	186.712	0.0338	3	49.261	27.663	0.0338	3	164.760	243.624
730	0.0221	2	71.400	60.670	0.0221	2	0.000	0.000	0.0326	3	4.348	7.532	0.0225	2	0.000	0.000
731	0.0229	2	38.705	25.873	0.0233	2	18.510	22.330	0.0341	3	46.757	62.791	0.0338	3	57.448	64.552
732	0.0113	1	76.200		0.0210	2	0.000	0.000	0.0334	3	2.015	1.851	0.0338	3	0.000	0.000
733	n.s.	n.s.	n.s.	n.s.	0.0330	3	9.363	5.299	0.0454	4	14.573	8.911	0.0338	3	6.427	8.497
734	n.s.	n.s.	n.s.	n.s.	0.0304	3	0.000	0.000	0.0225	2	0.000	0.000	0.0225	2	0.000	0.000
741	0.0113	1	0	-	0.0323	3	0.000	0.000	0.0218	2	0.000	0.000	0.0225	2	0.000	0.000
742	0.0116	1	0	-	0.0120	1	0.000		0.0229	2	0.000	0.000	0.0225	2	0.000	0.000
743	n.s.	n.s.	n.s.	n.s.	0.0188	2	0.000	0.000	0.0225	2	0.000	0.000	0.0225	2	0.000	0.000
744	n.s.	n.s.	n.s.	n.s.	0.0101	1	0.000		0.0229	2	0.000	0.000	0.0218	2	0.000	0.000
745	0.0341	3	22.077	21.917	0.0319	3	0.000	0.000	0.0686	6	0.000	0.000	0.0675	6	0.000	0.000
746	0.0446	4	2.318	3.703	0.0338	3	0.000	0.000	0.0675	6	0.000	0.000	0.0664	6	0.000	0.000
747	n.s.	n.s.			0.0308	3	0.000	0.000	0.1230	11	0.000	0.000	0.1238	11	0.000	0.000
748	0.0109	1	65.220	-	0.0199	2	0.000	0.000	0.0326	3	0.837	1.449	0.0338	3	0.000	0.000
749	0.0221	2	8.060	6.067	0.0221	2	0.000	0.000	0.0229	2	0.000	0.000	0.0113	1	0.000	-
750	n.s.	n.s.	n.s.	n.s.	0.0180	2	1.375	1.945	0.1005	9	0.393	1.180	0.0679	6	0.000	0.000
751	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0454	4	0.000	0.000	0.0225	2	0.000	0.000

$$(**)\ SD = \frac{\sum (x_i - \bar{x})}{n-1}$$

TABLE 15 (cont).- Swept area, number of hauls and **thorny skate** mean catch (Kg) and SD (**) by stratum. Spanish Survey on NAFO Div. 3L in the period 2003-2010, on board R/V "*Vizconde de Eza"*. (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

Stratum	2008				2009				2010							
	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD
385	0.0229	2	37.608	26.315	0.0225	2	22.855	12.155	0.0225	2	4.230	5.204				
387	0.0435	4	26.276	17.380	0.0439	4	20.590	15.584	0.0458	4	22.350	21.258				
388	0.0559	5	37.148	12.932	0.0555	5	33.480	11.888	0.0570	5	34.932	33.326				
389	0.0780	7	33.065	8.029	0.0803	7	12.954	7.076	0.0795	7	27.170	24.762				
390	0.1395	12	5.044	7.191	0.1373	12	14.043	24.187	0.1249	11	12.900	8.972				
391	0.0454	4	190.795	35.749	0.0458	4	31.899	30.002	0.0454	4	24.041	14.994				
392	0.0221	2	159.247	95.534	0.0229	2	41.322	31.215	0.0225	2	36.728	7.462				
729	0.0338	3	34.265	25.540	0.0341	3	38.090	23.526	0.0338	3	6.453	5.814				
730	0.0323	3	0.000	0.000	0.0338	3	0.000	0.000	0.0334	3	0.012	0.021				
731	0.0330	3	9.140	13.870	0.0341	3	22.847	22.201	0.0338	3	11.114	11.389				
732	0.0446	4	0.727	1.454	0.0450	4	7.100	11.428	0.0450	4	0.000	0.000				
733	0.0431	4	14.693	15.502	0.0450	4	4.315	6.530	0.0450	4	5.573	4.374				
734	0.0221	2	0.000	0.000	0.0218	2	0.000	0.000	0.0225	2	0.000	0.000				
741	0.0210	2	0.000	0.000	0.0221	2	0.000	0.000	0.0225	2	0.000	0.000				
742	0.0210	2	0.000	0.000	0.0214	2	0.000	0.000	0.0225	2	0.011	0.016				
743	0.0203	2	0.000	0.000	0.0203	2	1.395	1.973	0.0225	2	0.000	0.000				
744	0.0221	2	0.000	0.000	0.0210	2	0.000	0.000	0.0229	2	0.000	0.000				
745	0.0555	5	0.000	0.000	0.0559	5	0.000	0.000	0.0563	5	0.650	1.453				
746	0.0638	6	0.000	0.000	0.0668	6	0.000	0.000	0.0679	6	0.000	0.000				
747	0.1069	10	0.000	0.000	0.1118	10	0.000	0.000	0.1125	10	0.000	0.000				
748	0.0218	2	0.000	0.000	0.0229	2	0.000	0.000	0.0225	2	0.000	0.000				
749	0.0214	2	0.000	0.000	0.0225	2	0.000	0.000	0.0229	2	0.000	0.000				
750	0.0844	8	0.000	0.000	0.0791	7	0.000	0.000	0.0900	8	0.000	0.000				
751	0.0413	4	0.000	0.000	0.0338	3	0.000	0.000	0.0225	2	0.000	0.000				

$$(**)\ SD = \frac{\sum (x_i - \bar{x})}{n-1}$$

Table 16.- Length-weight relationships in the calculation of biomass, for Division 3L (out ZEE Canada), 2003-2010 for **thorny skate and black dogfish**. The equation is Weight=a(Length+0.5)^{b}. To calculate the parameters for the indeterminate individuals, we used the total data (males+females+indeterminate individuals).

	Thorny skate				**Black dogfish**			
Year	Sex	L-W Equations	N	r^2	Sex	L-W Equations	N	r^2
2003	All	$W = 0.0050\ L^{3.1712}$	305	0.9896	All	$W = 0.0081\ L^{2.8882}$	20	0.9637
	Males	$W = 0.0051\ L^{3.1619}$	141	0.9906	Males	$W = 0.1143\ L^{2.2194}$	5	0.9382
	Females	$W = 0.0048\ L^{3.1855}$	164	0.9888	Females	$W = 0.0072\ L^{2.9265}$	15	0.9782
2004	All	$W = 0.0067\ L^{3.1187}$	186	0.9661	All	$W = 0.0025\ L^{3.1608}$	113	0.9592
	Males	$W = 0.0054\ L^{3.1684}$	94	0.97	Males	$W = 0.0272\ L^{2.5776}$	58	0.8969
	Females	$W = 0.0086\ L^{3.0629}$	92	0.9639	Females	$W = 0.0013\ L^{3.3314}$	55	0.9809
2006	All	$W = 0.0084\ L^{3.0587}$	491	0.983	All	$W = 0.0011\ L^{3.3758}$	283	0.9216
	Males	$W = 0.0103\ L^{3.0011}$	210	0.9847	Males	$W = 0.0071\ L^{2.9000}$	99	0.9233
	Females	$W = 0.0061\ L^{3.1402}$	281	0.9814	Females	$W = 0.0008\ L^{3.4608}$	184	0.9363
2007	All	$W = 0.0080\ L^{3.0609}$	539	0.9848	All	$W = 0.0008\ L^{3.4421}$	362	0.9155
	Males	$W = 0.0091\ L^{3.0242}$	255	0.9868	Males	$W = 0.0099\ L^{2.8281}$	147	0.9029
	Females	$W = 0.0072\ L^{3.0929}$	284	0.9839	Females	$W = 0.0006\ L^{3.5445}$	215	0.9373
2008	All	$W = 0.0071\ L^{3.0883}$	598	0.9884	All	$W = 0.0014L^{3.3183}$	279	0.9006
	Males	$W = 0.0077\ L^{3.0618}$	282	0.9903	Males	$W = 0.0087\ L^{2.8575}$	160	0.8956
	Females	$W = 0.0064\ L^{3.1175}$	316	0.9867	Females	$W = 0.0008\ L^{3.4541}$	119	0.9283
2009	All	$W = 0.0072\ L^{3.0862}$	283	0.9864	All	$W = 0.0007\ L^{3.4922}$	236	0.9246
	Males	$W = 0.0093\ L^{3.0231}$	171	0.9848	Males	$W = 0.0132\ L^{2.7605}$	75	0.8865
	Females	$W = 0.0057\ L^{3.1507}$	112	0.9881	Females	$W = 0.0007\ L^{3.5184}$	161	0.9465
2010	All	$W = 0.0060\ L^{3.1361}$	290	0.9906	All	$W = 0.0019\ L^{3.2510}$	299	0.9506
	Males	$W = 0.0060\ L^{3.1285}$	149	0.9892	Males	$W = 0.0137\ L^{2.7559}$	130	0.9408
	Females	$W = 0.0056\ L^{3.1630}$	141	0.9927	Females	$W = 0.0012\ L^{3.3617}$	169	0.9637

Sex	L-W Equations	N	r^2

TABLE 17.- Stratified mean catches (Kg) of **thorny skate** by stratum and year (2003-2010) and SD. Research Vessel *Vizconde de Eza*. n.s. means stratum not surveyed. In 2003: the data correspond to 69% of the total area prospected in 2006-2010.

	Survey							
Stratum	2003	2004	2005	2006	2007	2008	2009	2010
385	0.00	831.90	-	713.19	3570.68	4437.69	2696.89	499.14
387	1355.52	2739.20	-	4208.00	8316.16	6726.59	5271.04	5721.60
388	4738.58	5961.90	-	15774.40	11101.27	13261.69	11952.50	12470.58
389	3045.60	5548.10	-	16786.09	13163.25	16830.16	6593.66	13829.31
390	154.85	1627.28	-	4506.21	6003.36	4110.66	11444.98	10513.50
391	485.98	18118.50	-	42606.68	28385.42	53804.19	8995.45	6779.63
392	1457.25	9033.50	-	21677.50	47864.50	23090.82	5991.69	5325.49
729	10221.63	26109.75	-	9162.48	30645.36	6373.35	7084.74	1200.20
730	12138.00	0.00	-	739.22	0.00	0.00	0.00	2.04
731	8360.28	3998.16	-	10099.44	12408.84	1974.24	4934.88	2400.70
732	17602.20	0.00	-	465.47	0.00	167.94	1640.10	0.00
733	n.s	2191.02	-	3410.14	1503.84	3438.05	1009.71	1304.02
734	n.s	0.00	-	0.00	0.00	0.00	0.00	0.00
741	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00
742	0.00	0.00	-	0.00	0.00	0.00	0.00	0.70
743	n.s	0.00	-	0.00	0.00	0.00	71.15	0.00
744	n.s	0.00	-	0.00	0.00	0.00	0.00	0.00
745	7682.68	0.00	-	0.00	0.00	0.00	0.00	226.20
746	908.46	0.00	-	0.00	0.00	0.00	0.00	0.00
747	n.s	0.00	-	0.00	0.00	0.00	0.00	0.00
748	10369.98	0.00	-	133.03	0.00	0.00	0.00	0.00
749	1015.56	0.00	-	0.00	0.00	0.00	0.00	0.00
750	n.s	764.50	-	218.69	0.00	0.00	0.00	0.00
751	n.s	n.s	-	0.00	0.00	0.00	0.00	0.00
TOTAL	79536.57	76923.81	-	130500.54	162962.67	134215.36	67686.78	60273.11
	17.78	12.29	-	20.12	25.12	20.69	10.43	9.29
SD	2.41	4.54	-	3.27	5.19	1.92	1.44	1.30

TABLE 18.- Survey estimates (by the swept area method) of **thorny skate** biomass (t.) by stratum and year and their SD on NAFO Div. 3L (R/V *Vizconde de Eza*). n.s. means stratum not surveyed. In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

	Survey							
Stratum	2003	2004	2005	2006	2007	2008	2009	2010
385	0	73	-	62	317	388	240	44
387	119	256	-	374	739	619	481	500
388	426	568	-	1393	987	1187	1077	1094
389	268	493	-	1478	1170	1510	575	1218
390	14	142	-	397	534	354	1001	926
391	43	1666	-	3787	2523	4743	786	598
392	125	845	-	1895	4255	2087	524	473
729	973	2360	-	814	2724	567	623	107
730	1097	0	-	68	0	0	0	0
731	731	344	-	888	1103	179	434	213
732	1565	0	-	42	0	15	146	0
733	n.s	199	-	301	134	319	90	116
734	n.s	0	-	0	0	0	0	0
741	0	0	-	0	0	0	0	0
742	0	0	-	0	0	0	0	0
743	n.s	0	-	0	0	0	7	0
744	n.s	0	-	0	0	0	0	0
745	675	0	-	0	0	0	0	20
746	81	0	-	0	0	0	0	0
747	n.s	0	-	0	0	0	0	0
748	954	0	-	12	0	0	0	0
749	92	0	-	0	0	0	0	0
750	n.s	85	-	20	0	0	0	0
751	n.s	n.s	-	0	0	0	0	0
TOTAL	7164	7031	-	11531	14486	11968	5982	5310
SD	942	2642	-	1887	2993	1124	808	740

TABLE 19.- Thorny skate length distribution per haul mean catches by sex and year. Number per stratified mean catches. Spanish Summer Survey on NAFO 3L: 2003-2010 (R/V *Vizconde de Eza*). Indet. means indeterminate. (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

	2003 (*)				2004				2006				2007			
Length (cm.)	M	F	I	T	M	F	I	T	M	F	I	T	M	F	I	T
10	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.09	0.07	0.00	0.15	0.00	0.00	0.00	0.00	0.04	0.01	0.00	0.05	0.16	0.08	0.00	0.24
14	0.19	0.08	0.00	0.27	0.04	0.00	0.00	0.04	0.09	0.00	0.00	0.09	0.08	0.12	0.00	0.21
16	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.04	0.03	0.00	0.07	0.05	0.10	0.00	0.15
18	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.02	0.03	0.02	0.00	0.06	0.13	0.12	0.00	0.25
20	0.00	0.03	0.00	0.03	0.00	0.02	0.00	0.02	0.03	0.03	0.00	0.06	0.18	0.10	0.00	0.28
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.15	0.19	0.00	0.34
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.01	0.00	0.05	0.13	0.14	0.00	0.27
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.13	0.16	0.00	0.30
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.03	0.10	0.06	0.00	0.16
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.08	0.05	0.00	0.12
32	0.07	0.02	0.00	0.09	0.01	0.02	0.00	0.04	0.03	0.01	0.00	0.05	0.08	0.06	0.00	0.13
34	0.05	0.08	0.00	0.13	0.01	0.00	0.00	0.01	0.01	0.03	0.00	0.05	0.09	0.03	0.00	0.12
36	0.19	0.20	0.00	0.39	0.01	0.00	0.00	0.01	0.02	0.01	0.00	0.03	0.06	0.05	0.00	0.11
38	0.23	0.40	0.00	0.64	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.04	0.05	0.06	0.00	0.11
40	0.14	0.43	0.00	0.57	0.04	0.05	0.00	0.10	0.05	0.03	0.00	0.08	0.02	0.01	0.00	0.03
42	0.35	0.65	0.00	1.00	0.07	0.07	0.00	0.13	0.00	0.03	0.00	0.03	0.03	0.06	0.00	0.09
44	0.32	0.61	0.00	0.93	0.10	0.25	0.00	0.35	0.01	0.03	0.00	0.05	0.04	0.04	0.00	0.08
46	0.23	0.46	0.00	0.69	0.14	0.14	0.00	0.28	0.09	0.08	0.00	0.17	0.05	0.09	0.00	0.14
48	0.42	0.51	0.00	0.94	0.17	0.12	0.00	0.30	0.10	0.08	0.00	0.18	0.05	0.09	0.00	0.14
50	0.35	0.34	0.00	0.69	0.26	0.24	0.00	0.50	0.13	0.17	0.00	0.30	0.12	0.13	0.00	0.25
52	0.57	0.36	0.00	0.93	0.35	0.26	0.00	0.61	0.22	0.13	0.00	0.35	0.09	0.15	0.00	0.24
54	0.32	0.32	0.00	0.64	0.33	0.14	0.00	0.47	0.27	0.37	0.00	0.64	0.21	0.24	0.00	0.44
56	0.56	0.43	0.00	0.99	0.32	0.23	0.00	0.55	0.22	0.24	0.00	0.45	0.19	0.34	0.00	0.53
58	0.25	0.39	0.00	0.63	0.32	0.24	0.00	0.56	0.22	0.46	0.00	0.67	0.30	0.27	0.00	0.57
60	0.17	0.26	0.00	0.44	0.41	0.20	0.00	0.61	0.36	0.39	0.00	0.75	0.27	0.59	0.00	0.86
62	0.36	0.14	0.00	0.50	0.11	0.15	0.00	0.26	0.22	0.53	0.00	0.76	0.46	0.76	0.00	1.22
64	0.28	0.17	0.00	0.45	0.18	0.19	0.00	0.37	0.41	0.54	0.00	0.95	0.42	0.62	0.00	1.04
66	0.10	0.02	0.00	0.12	0.22	0.14	0.00	0.37	0.34	0.39	0.00	0.72	0.34	0.54	0.00	0.88
68	0.06	0.15	0.00	0.21	0.12	0.05	0.00	0.17	0.17	0.41	0.00	0.58	0.37	0.64	0.00	1.02
70	0.10	0.04	0.00	0.14	0.05	0.02	0.00	0.08	0.19	0.22	0.00	0.41	0.25	0.38	0.00	0.62
72	0.06	0.08	0.00	0.14	0.06	0.00	0.00	0.06	0.08	0.13	0.00	0.21	0.18	0.24	0.00	0.43
74	0.06	0.02	0.00	0.09	0.00	0.00	0.00	0.00	0.09	0.07	0.00	0.16	0.12	0.13	0.00	0.25
76	0.02	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.08	0.05	0.00	0.13	0.04	0.05	0.00	0.10
78	0.05	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.03	0.03	0.00	0.06
80	0.02	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.02	0.01	0.00	0.00	0.01
82	0.00	0.02	0.00	0.02	0.08	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01
84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
88	0.04	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	5.66	6.35	0.00	12.01	3.44	2.56	0.00	5.99	3.61	4.66	0.00	8.27	5.10	6.71	0.00	11.81
Nº samples:				26				18				42				43
Nº Ind.:	197	226	0	423	170	135	0	305	312	420	0	732	457	621	0	1078
Sampled catch:				648				617				1832				2325
Range:				11-89				14-83				13-81				12-82
Total catch:				654				682				1832				2325
Total valid hauls:				39				50				100				94

TABLE 19 (cont.).- Thorny skate length distribution per haul mean catches by sex and year. Number per stratified mean catches. Spanish Summer Survey on NAFO 3L: 2007-2010 (R/V *Vizconde de Eza*). Indet. means indeterminate. (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

	2008				2009				2010			
Length (cm.)	M	F	I	T	M	F	I	T	M	F	I	T
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.09	0.11	0.00	0.20	0.11	0.05	0.00	0.16	0.05	0.05	0.00	0.10
14	0.12	0.09	0.00	0.20	0.06	0.07	0.00	0.13	0.08	0.07	0.00	0.15
16	0.03	0.03	0.00	0.06	0.02	0.02	0.00	0.04	0.00	0.03	0.00	0.03
18	0.04	0.01	0.00	0.05	0.00	0.05	0.00	0.05	0.01	0.02	0.00	0.03
20	0.09	0.01	0.00	0.10	0.01	0.03	0.00	0.04	0.00	0.01	0.00	0.01
22	0.02	0.01	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02
24	0.02	0.02	0.00	0.04	0.02	0.02	0.00	0.05	0.01	0.00	0.00	0.01
26	0.08	0.07	0.00	0.14	0.01	0.00	0.00	0.01	0.01	0.02	0.00	0.03
28	0.02	0.05	0.00	0.08	0.02	0.01	0.00	0.03	0.00	0.01	0.00	0.01
30	0.04	0.05	0.00	0.10	0.02	0.03	0.00	0.06	0.04	0.02	0.00	0.07
32	0.07	0.05	0.00	0.12	0.00	0.01	0.00	0.01	0.00	0.03	0.00	0.03
34	0.05	0.04	0.00	0.10	0.01	0.01	0.00	0.02	0.01	0.04	0.00	0.05
36	0.03	0.05	0.00	0.08	0.00	0.00	0.00	0.00	0.04	0.02	0.00	0.07
38	0.01	0.03	0.00	0.04	0.02	0.01	0.00	0.03	0.02	0.01	0.00	0.03
40	0.05	0.01	0.00	0.06	0.02	0.00	0.00	0.02	0.00	0.01	0.00	0.01
42	0.02	0.05	0.00	0.07	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01
44	0.01	0.02	0.00	0.03	0.01	0.04	0.00	0.05	0.00	0.01	0.00	0.01
46	0.03	0.06	0.00	0.09	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.01
48	0.02	0.01	0.00	0.03	0.01	0.02	0.00	0.03	0.01	0.00	0.00	0.01
50	0.06	0.03	0.00	0.09	0.05	0.01	0.00	0.06	0.00	0.01	0.00	0.01
52	0.07	0.08	0.00	0.15	0.02	0.02	0.00	0.04	0.01	0.02	0.00	0.03
54	0.08	0.09	0.00	0.17	0.05	0.05	0.00	0.09	0.00	0.02	0.00	0.02
56	0.03	0.13	0.00	0.16	0.02	0.15	0.00	0.17	0.02	0.04	0.00	0.07
58	0.12	0.22	0.00	0.34	0.13	0.09	0.00	0.22	0.08	0.09	0.00	0.17
60	0.22	0.28	0.00	0.50	0.16	0.08	0.00	0.24	0.03	0.12	0.00	0.16
62	0.29	0.35	0.00	0.65	0.23	0.24	0.00	0.47	0.08	0.10	0.00	0.18
64	0.35	0.45	0.00	0.81	0.23	0.14	0.00	0.36	0.12	0.16	0.00	0.28
66	0.39	0.45	0.00	0.84	0.25	0.18	0.00	0.43	0.21	0.18	0.00	0.38
68	0.32	0.44	0.00	0.76	0.28	0.18	0.00	0.47	0.19	0.23	0.00	0.42
70	0.25	0.37	0.00	0.62	0.19	0.07	0.00	0.26	0.21	0.07	0.00	0.28
72	0.19	0.15	0.00	0.34	0.17	0.09	0.00	0.25	0.13	0.08	0.00	0.21
74	0.26	0.16	0.00	0.42	0.19	0.01	0.00	0.20	0.11	0.05	0.00	0.16
76	0.10	0.13	0.00	0.23	0.02	0.03	0.00	0.06	0.09	0.03	0.00	0.12
78	0.09	0.03	0.00	0.12	0.04	0.03	0.00	0.07	0.09	0.01	0.00	0.10
80	0.07	0.00	0.00	0.07	0.01	0.00	0.00	0.01	0.03	0.00	0.00	0.03
82	0.05	0.02	0.00	0.07	0.01	0.00	0.00	0.01	0.02	0.00	0.00	0.02
84	0.03	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
86	0.02	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
88	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01
Total	3.85	4.18	0.00	8.03	2.41	1.76	0.00	4.17	1.73	1.62	0.00	3.35
Nº samples:				39				44				46
Nº Ind.:	344	378	0	722	211	156	0	367	159	145	0	304
Sampled catch:				1931.6				996.2				853
Range:				12-89				12-82				12-88
Total catch:				1931.6				996.2				853
Total valid hauls:				100				98				97

TABLE 20.- Swept area, number of hauls and **black dogfish** mean catch (Kg) and SD (**) by stratum. Spanish Survey on NAFO Div. 3L in the period 2003-2010, on board R/V "*Vizconde de Eza*". (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

Stratum	2003 (*)				2004				2006				2007			
	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD
385	0.0225	2	0.000	0.000	0.0229	2	0.000	0.000	0.0229	2	0.000	0.000	0.0225	2	0.000	0.000
387	0.0229	2	0.000	0.000	0.0214	2	0.000	0.000	0.0225	2	0.000	0.000	0.0225	2	0.000	0.000
388	0.0334	3	0.000	0.000	0.0105	1	0.000	-	0.0566	5	0.000	0.000	0.0563	5	0.000	0.000
389	0.0454	4	0.000	0.000	0.0225	2	0.000	0.000	0.0795	7	0.000	0.000	0.0900	8	0.000	0.000
390	0.0563	5	0.000	0.000	0.0345	3	0.000	0.000	0.1249	11	0.000	0.000	0.1350	12	0.000	0.000
391	0.0338	3	0.000	0.000	0.0218	2	0.000	0.000	0.0450	4	0.000	0.000	0.0450	4	0.000	0.000
392	0.0116	1	0.000	-	0.0214	2	0.000	0.000	0.0229	2	0.000	0.000	0.0225	2	0.000	0.000
729	0.0210	2	0.000	0.000	0.0221	2	0.000	0.000	0.0338	3	0.000	0.000	0.0338	3	0.000	0.000
730	0.0221	2	0.000	0.000	0.0221	2	2.175	3.076	0.0326	3	3.690	6.391	0.0225	2	19.488	26.067
731	0.0229	2	0.000	0.000	0.0233	2	0.000	0.000	0.0341	3	0.000	0.000	0.0338	3	0.000	0.000
732	0.0113	1	0.000	-	0.0210	2	0.000	0.000	0.0334	3	0.000	0.000	0.0338	3	0.000	0.000
733	n.s.	n.s.	n.s.	n.s.	0.0330	3	0.000	0.000	0.0454	4	0.000	0.000	0.0338	3	0.000	0.000
734	n.s.	n.s.	n.s.	n.s.	0.0304	3	0.000	0.000	0.0225	2	0.000	0.000	0.0225	2	0.000	0.000
741	0.0113	1	0.000	-	0.0323	3	0.000	0.000	0.0218	2	0.000	0.000	0.0225	2	0.000	0.000
742	0.0116	1	0.000	-	0.0120	1	0.000	-	0.0229	2	0.000	0.000	0.0225	2	0.000	0.000
743	n.s.	n.s.	n.s.	n.s.	0.0188	2	0.626	0.862	0.0225	2	0.000	0.000	0.0225	2	0.000	0.000
744	n.s.	n.s.	n.s.	n.s.	0.0101	1	0.000	-	0.0229	2	0.725	1.025	0.0218	2	1.663	0.541
745	0.0341	3	0.007	0.012	0.0319	3	0.000	0.000	0.0686	6	0.000	0.000	0.0675	6	0.000	0.000
746	0.0446	4	0.000	0.000	0.0338	3	0.000	0.000	0.0675	6	9.033	10.572	0.0664	6	9.171	6.742
747	n.s.	n.s.	n.s.	n.s.	0.0308	3	4.067	3.591	0.1230	11	3.656	2.707	0.1238	11	6.015	5.815
748	0.0109	1	0.000	-	0.0199	2	36.980	52.298	0.0326	3	15.713	18.383	0.0338	3	35.817	40.266
749	0.0221	2	219.750	310.773	0.0221	2	17.300	5.515	0.0229	2	91.125	124.599	0.0113	1	229.700	-
750	n.s.	n.s.	n.s.	n.s.	0.0180	2	2.800	3.960	0.1005	9	6.213	9.605	0.0679	6	13.979	28.671
751	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0454	4	1.103	1.497	0.0225	2	4.405	0.191

$$(**)\ SD = \frac{\sum (x_i - \bar{x})}{n-1}$$

TABLE 20 (cont).- Swept area, number of hauls and **black dogfish** mean catch (Kg) and SD (**) by stratum. Spanish Survey on NAFO Div. 3L in the period 2003-2010, on board R/V "*Vizconde de Eza*". (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

Stratum	2008				2009				2010							
	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD
385	0.0229	2	0.000	0.000	0.0225	2	0.000	0.000	0.0225	2	0.000	0.000				
387	0.0435	4	0.000	0.000	0.0439	4	0.000	0.000	0.0458	4	0.000	0.000				
388	0.0559	5	0.000	0.000	0.0555	5	0.000	0.000	0.0570	5	0.000	0.000				
389	0.0780	7	0.000	0.000	0.0803	7	0.000	0.000	0.0795	7	0.000	0.000				
390	0.1395	12	0.000	0.000	0.1373	12	0.000	0.000	0.1249	11	0.000	0.000				
391	0.0454	4	0.000	0.000	0.0458	4	0.000	0.000	0.0454	4	0.000	0.000				
392	0.0221	2	0.000	0.000	0.0229	2	0.000	0.000	0.0225	2	0.000	0.000				
729	0.0338	3	0.000	0.000	0.0341	3	0.000	0.000	0.0338	3	0.000	0.000				
730	0.0323	3	27.367	47.400	0.0338	3	30.959	51.654	0.0334	3	19.640	25.019				
731	0.0330	3	0.000	0.000	0.0341	3	0.000	0.000	0.0338	3	0.000	0.000				
732	0.0446	4	0.000	0.000	0.0450	4	0.000	0.000	0.0450	4	0.300	0.600				
733	0.0431	4	0.000	0.000	0.0450	4	0.000	0.000	0.0450	4	0.000	0.000				
734	0.0221	2	0.000	0.000	0.0218	2	0.000	0.000	0.0225	2	0.000	0.000				
741	0.0210	2	0.000	0.000	0.0221	2	0.000	0.000	0.0225	2	0.000	0.000				
742	0.0210	2	0.000	0.000	0.0214	2	0.000	0.000	0.0225	2	0.000	0.000				
743	0.0203	2	0.000	0.000	0.0203	2	1.835	1.082	0.0225	2	0.000	0.000				
744	0.0221	2	0.880	0.198	0.0210	2	0.430	0.608	0.0229	2	0.000	0.000				
745	0.0555	5	0.000	0.000	0.0559	5	0.000	0.000	0.0563	5	0.000	0.000				
746	0.0638	6	6.142	1.917	0.0668	6	3.939	5.074	0.0679	6	4.817	2.936				
747	0.1069	10	5.894	5.184	0.1118	10	6.653	4.933	0.1125	10	5.965	5.925				
748	0.0218	2	80.800	114.268	0.0229	2	12.240	17.310	0.0225	2	83.545	40.807				
749	0.0214	2	35.410	19.827	0.0225	2	131.090	156.143	0.0229	2	148.715	196.837				
750	0.0844	8	12.366	21.347	0.0791	7	9.146	7.225	0.0900	8	0.848	1.376				
751	0.0413	4	3.780	2.765	0.0338	3	5.343	4.636	0.0225	2	1.870	1.414				

$$(**)\ SD = \frac{\sum (x_i - \bar{x})}{n-1}$$

TABLE 21.- Stratified mean catches (Kg) of **black dogfish** by stratum and year (2003-2010) and SD. Research Vessel *Vizconde de Eza*. n.s. means stratum not surveyed. In 2003: the data correspond to 69% of the total area prospected in 2006-2010.

	Survey							
Stratum	2003	2004	2005	2006	2007	2008	2009	2010
385	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00
387	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00
388	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00
389	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00
390	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00
391	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00
392	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00
729	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00
730	0.00	369.75	-	627.30	3312.88	4652.33	5262.97	3338.80
731	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00
732	0.00	0.00	-	0.00	0.00	0.00	0.00	69.30
733	n.s	0.00	-	0.00	0.00	0.00	0.00	0.00
734	n.s	0.00	-	0.00	0.00	0.00	0.00	0.00
741	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00
742	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00
743	n.s	31.90	-	0.00	0.00	0.00	93.59	0.00
744	n.s	0.00	-	47.85	109.73	58.08	28.38	0.00
745	2.32	0.00	-	0.00	0.00	0.00	0.00	0.00
746	0.00	0.00	-	3541.07	3594.84	2407.60	1544.22	1888.13
747	n.s	2944.27	-	2646.94	4354.53	4267.26	4816.77	4318.66
748	0.00	5879.82	-	2498.42	5694.85	12847.20	1946.16	13283.66
749	27688.50	2179.80	-	11481.75	28942.20	4461.66	16517.34	18738.09
750	n.s	1556.80	-	3454.61	7772.42	6875.64	5085.02	471.21
751	n.s	n.s	-	252.47	1008.75	865.62	1223.62	428.23
TOTAL	27690.82	12962.34	-	24550.42	54790.18	36435.38	36518.07	42536.08
	6.19	2.07	-	3.78	8.45	5.62	5.63	6.56
SD	6.19	1.01	-	1.78	1.28	2.23	2.33	2.83

TABLE 22.- Survey estimates (by the swept area method) of **black dogfish** biomass (t.) by stratum and year and their SD on NAFO Div. 3L (R/V *Vizconde de Eza*). n.s. means stratum not surveyed. In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

	Survey							
Stratum	2003	2004	2005	2006	2007	2008	2009	2010
385	0	0	-	0	0	0	0	0
387	0	0	-	0	0	0	0	0
388	0	0	-	0	0	0	0	0
389	0	0	-	0	0	0	0	0
390	0	0	-	0	0	0	0	0
391	0	0	-	0	0	0	0	0
392	0	0	-	0	0	0	0	0
729	0	0	-	0	0	0	0	0
730	0	33	-	58	294	433	468	300
731	0	0	-	0	0	0	0	0
732	0	0	-	0	0	0	0	6
733	n.s	0	-	0	0	0	0	0
734	n.s	0	-	0	0	0	0	0
741	0	0	-	0	0	0	0	0
742	0	0	-	0	0	0	0	0
743	n.s	3	-	0	0	0	9	0
744	n.s	0	-	4	10	5	3	0
745	0	0	-	0	0	0	0	0
746	0	0	-	315	325	227	139	167
747	n.s	287	-	237	387	399	431	384
748	0	592	-	230	506	1181	170	1181
749	2503	197	-	1004	2573	417	1468	1638
750	n.s	173	-	309	687	652	450	42
751	n.s	n.s	-	22	90	84	109	38
TOTAL	2503	1286	-	2179	4872	3399	3247	3756
SD	2546	695	-	994	721	1296	1340	1634

TABLE 23.- Black dogfish length distribution per haul mean catches by sex and year. Number per stratified mean catches. Spanish Summer Survey on NAFO 3L: 2003-2010 (R/V *Vizconde de Eza*). Indet. means indeterminate. (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

	2003 (*)				2004				2006				2007			
Length (cm.)	M	F	I	T	M	F	I	T	M	F	I	T	M	F	I	T
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.01
42	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.00	0.02	0.00	0.03	0.00	0.03
44	0.00	0.06	0.00	0.06	0.00	0.00	0.00	0.00	0.02	0.03	0.00	0.05	0.02	0.00	0.00	0.02
46	0.00	0.06	0.00	0.06	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.04	0.01	0.04	0.00	0.04
48	0.03	0.06	0.00	0.08	0.01	0.02	0.00	0.04	0.05	0.02	0.00	0.06	0.01	0.02	0.00	0.03
50	0.08	0.08	0.00	0.17	0.03	0.06	0.00	0.08	0.00	0.03	0.00	0.03	0.03	0.09	0.00	0.12
52	0.20	0.22	0.00	0.42	0.03	0.06	0.00	0.10	0.03	0.06	0.00	0.10	0.05	0.06	0.00	0.11
54	0.20	0.31	0.00	0.51	0.06	0.05	0.00	0.11	0.04	0.06	0.00	0.09	0.11	0.18	0.00	0.28
56	0.34	0.59	0.00	0.93	0.02	0.12	0.00	0.14	0.04	0.06	0.00	0.11	0.11	0.14	0.00	0.25
58	0.28	0.48	0.00	0.76	0.13	0.06	0.00	0.19	0.08	0.12	0.00	0.20	0.28	0.36	0.00	0.64
60	0.39	0.39	0.00	0.79	0.11	0.19	0.00	0.30	0.15	0.15	0.00	0.29	0.45	0.22	0.00	0.68
62	0.20	0.28	0.00	0.48	0.08	0.15	0.00	0.23	0.11	0.23	0.00	0.35	0.65	0.45	0.00	1.10
64	0.34	0.28	0.00	0.62	0.09	0.00	0.00	0.10	0.17	0.19	0.00	0.35	0.38	0.39	0.00	0.77
66	0.20	0.25	0.00	0.45	0.13	0.10	0.00	0.23	0.14	0.18	0.00	0.32	0.23	0.29	0.00	0.51
68	0.03	0.08	0.00	0.11	0.01	0.07	0.00	0.08	0.07	0.14	0.00	0.21	0.13	0.25	0.00	0.38
70	0.00	0.06	0.00	0.06	0.04	0.07	0.00	0.11	0.01	0.15	0.00	0.16	0.05	0.24	0.00	0.29
72	0.00	0.03	0.00	0.03	0.01	0.00	0.00	0.01	0.01	0.15	0.00	0.16	0.00	0.24	0.00	0.24
74	0.00	0.03	0.00	0.03	0.00	0.03	0.00	0.03	0.00	0.11	0.00	0.11	0.00	0.21	0.00	0.21
76	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.00	0.10	0.00	0.10
78	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.06	0.00	0.06
80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.04	0.00	0.04
82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00
86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	2.27	3.31	0.00	5.59	0.77	0.99	0.00	1.77	0.94	1.77	0.00	2.71	2.51	3.41	0.00	5.92
Nº samples:				1				8				28				28
Nº Ind.:	81	118	0	199	58	55	0	113	99	184	0	283	179	245	0	424
Sampled catch:				440				127				397				593
Range:				44-79				17-75				41-84				41-81
Total catch:				440				132				397				593
Total valid hauls:				39				50				100				94

TABLE 23 (cont.).- Black dogfish length distribution per haul mean catches by sex and year. Number per stratified mean catches. Spanish Summer Survey on NAFO 3L: 2007-2010 (R/V *Vizconde de Eza*). Indet. means indeterminate. (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

	2008				2009				2010			
Length (cm.)	M	F	I	T	M	F	I	T	M	F	I	T
16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01
38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
40	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00
42	0.02	0.00	0.00	0.02	0.01	0.04	0.00	0.05	0.06	0.04	0.00	0.09
44	0.01	0.04	0.00	0.05	0.04	0.03	0.00	0.07	0.05	0.09	0.00	0.13
46	0.04	0.06	0.00	0.09	0.01	0.02	0.00	0.03	0.08	0.11	0.00	0.19
48	0.03	0.01	0.00	0.04	0.04	0.02	0.00	0.06	0.05	0.07	0.00	0.12
50	0.07	0.03	0.00	0.10	0.03	0.08	0.00	0.11	0.06	0.06	0.00	0.12
52	0.09	0.08	0.00	0.17	0.11	0.10	0.00	0.21	0.12	0.09	0.00	0.21
54	0.18	0.10	0.00	0.28	0.13	0.10	0.00	0.23	0.09	0.10	0.00	0.19
56	0.19	0.12	0.00	0.30	0.18	0.15	0.00	0.33	0.13	0.14	0.00	0.27
58	0.28	0.15	0.00	0.43	0.19	0.17	0.00	0.37	0.24	0.11	0.00	0.36
60	0.55	0.16	0.00	0.71	0.28	0.20	0.00	0.49	0.29	0.21	0.00	0.51
62	0.63	0.12	0.00	0.75	0.29	0.19	0.00	0.48	0.30	0.20	0.00	0.50
64	0.58	0.13	0.00	0.72	0.18	0.20	0.00	0.38	0.17	0.14	0.00	0.31
66	0.17	0.17	0.00	0.34	0.04	0.31	0.00	0.35	0.12	0.17	0.00	0.30
68	0.08	0.10	0.00	0.18	0.05	0.19	0.00	0.25	0.03	0.16	0.00	0.19
70	0.01	0.12	0.00	0.13	0.00	0.22	0.00	0.22	0.03	0.19	0.00	0.22
72	0.02	0.02	0.00	0.04	0.00	0.17	0.00	0.17	0.00	0.31	0.00	0.31
74	0.00	0.08	0.00	0.08	0.00	0.14	0.00	0.14	0.00	0.28	0.00	0.28
76	0.00	0.07	0.00	0.07	0.00	0.08	0.00	0.08	0.00	0.11	0.00	0.11
78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.10
80	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.04	0.00	0.04
82	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02
84	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
88	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00
Total	2.95	1.59	0.00	4.53	1.58	2.46	0.00	4.04	1.84	2.73	0.00	4.57
Nº samples:				30				32				26
Nº Ind.:	269	152	0	421	157	234	0	391	172	275	0	447
Sampled catch:				526				554				624
Range:				41-85				41-89				37-87
Total catch:				526				554				624
Total valid hauls:				100				98				97

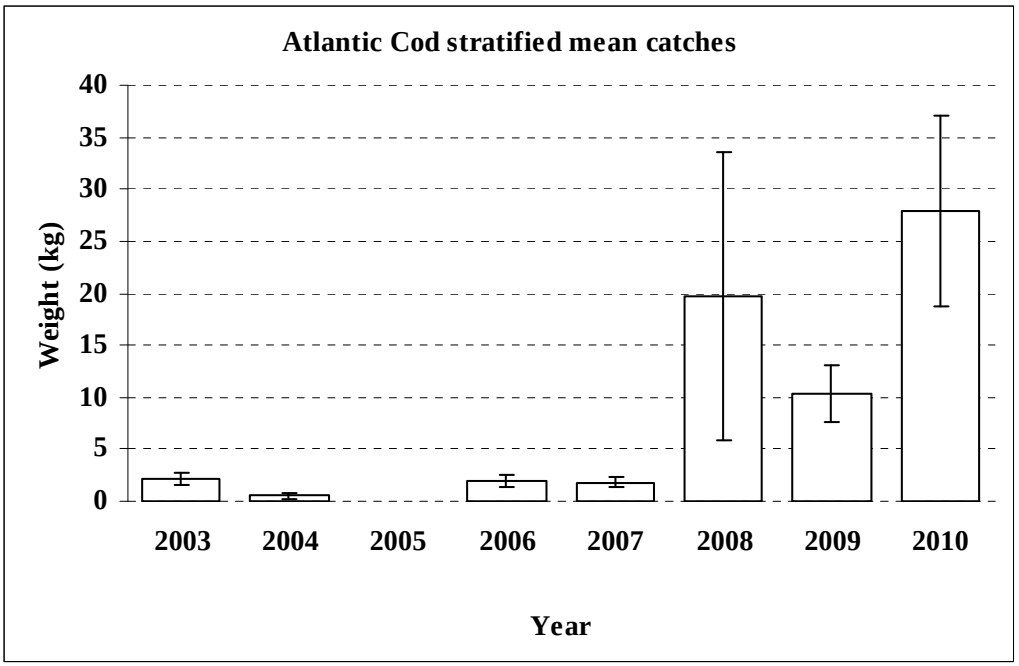


FIGURE 1.- Atlantic cod stratified mean catches in Kg and ±SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2010 (R/V *"Vizconde de Eza"*). In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

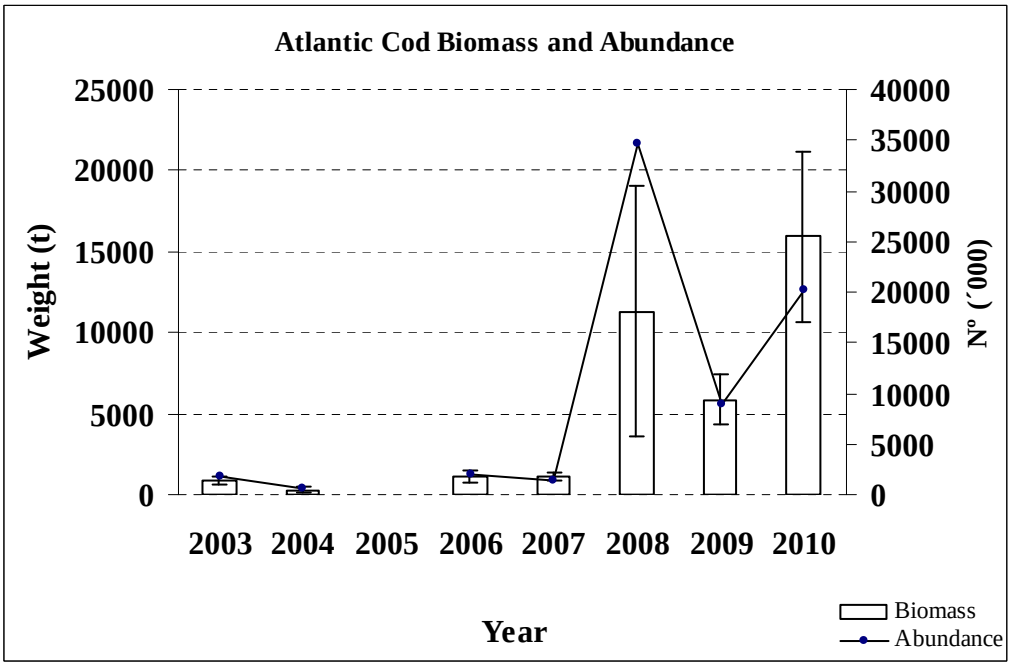


FIGURE 2.- Atlantic cod abundance (´000), biomass in tonnes and ±SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2010 (R/V *"Vizconde de Eza"*). In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

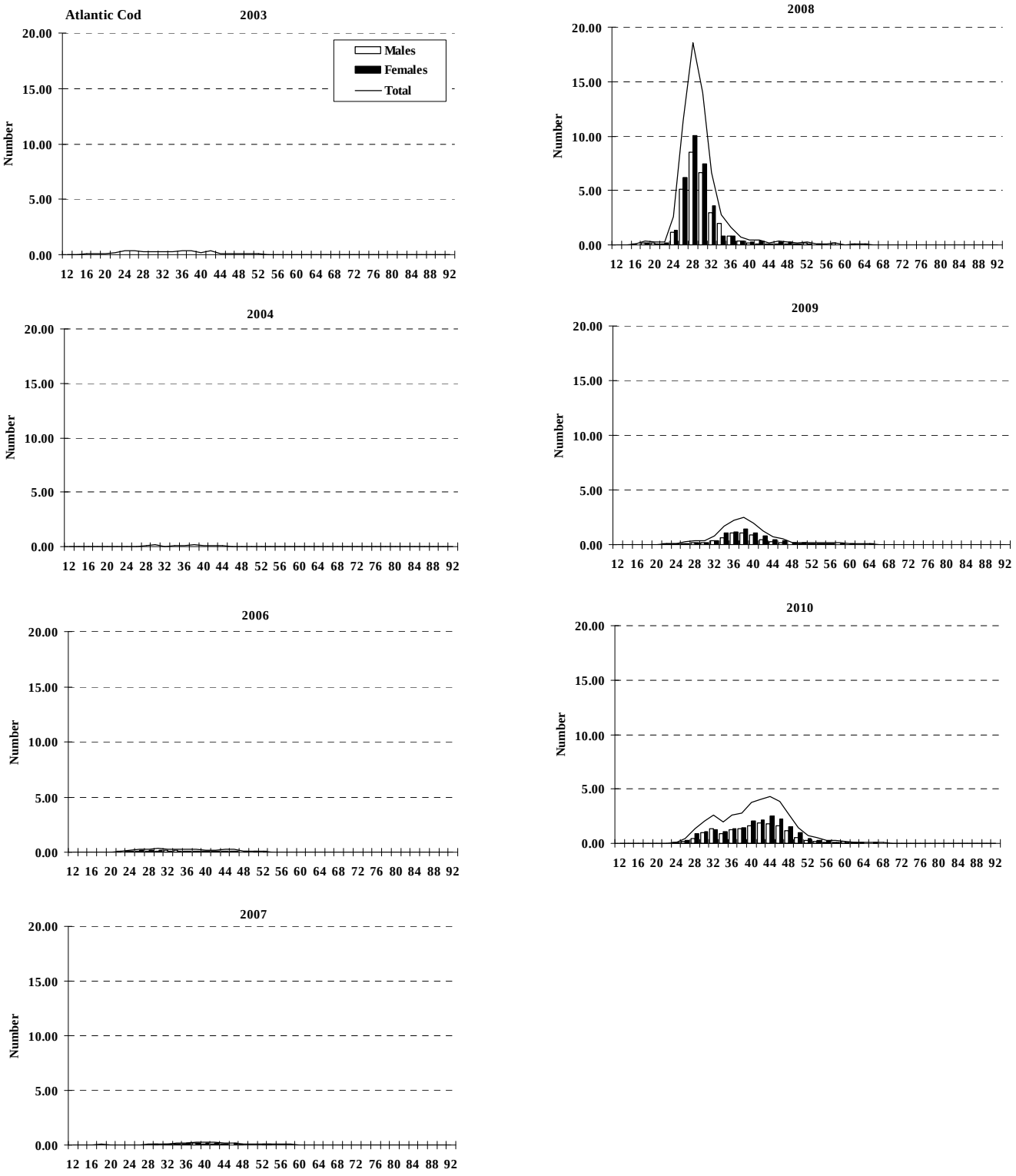
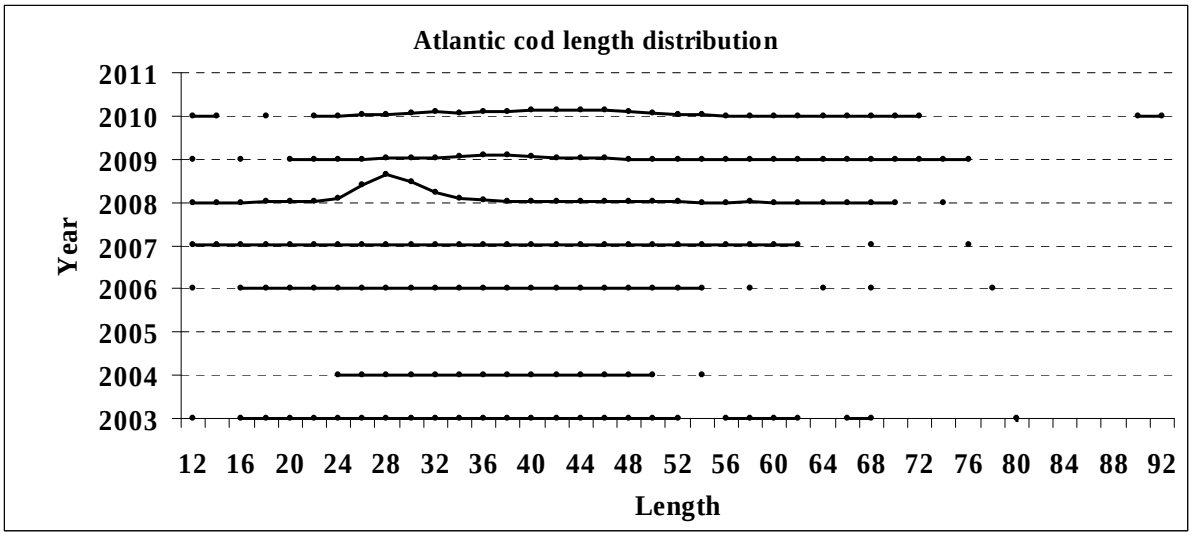
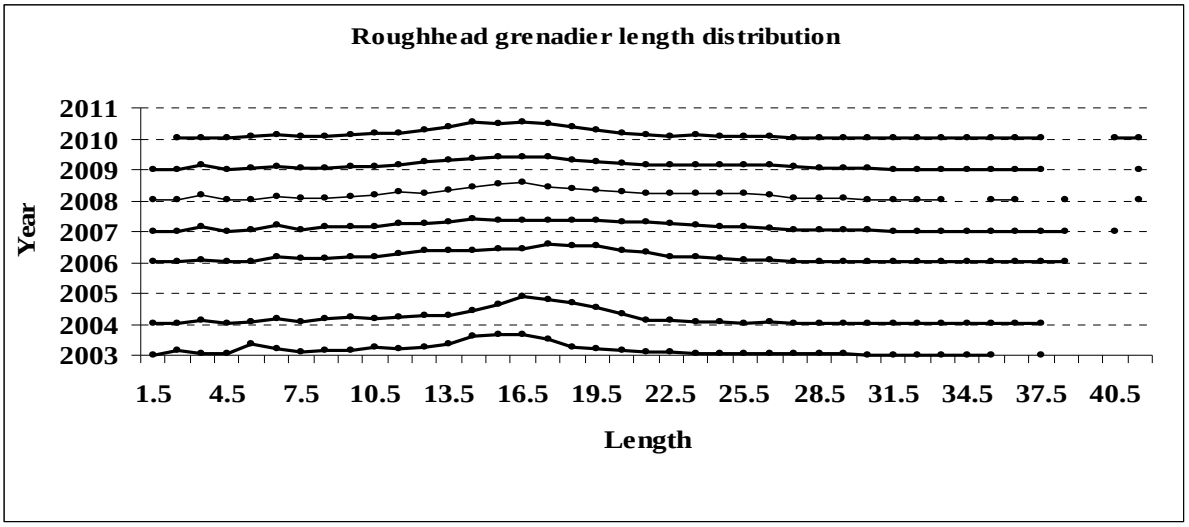


FIGURE 3.- Atlantic cod length distribution (cm) in NAFO 3L: 2003-2010. Number per stratified mean catches. In 2003, the data correspond to 69% of the total area prospected in 2006-2010.





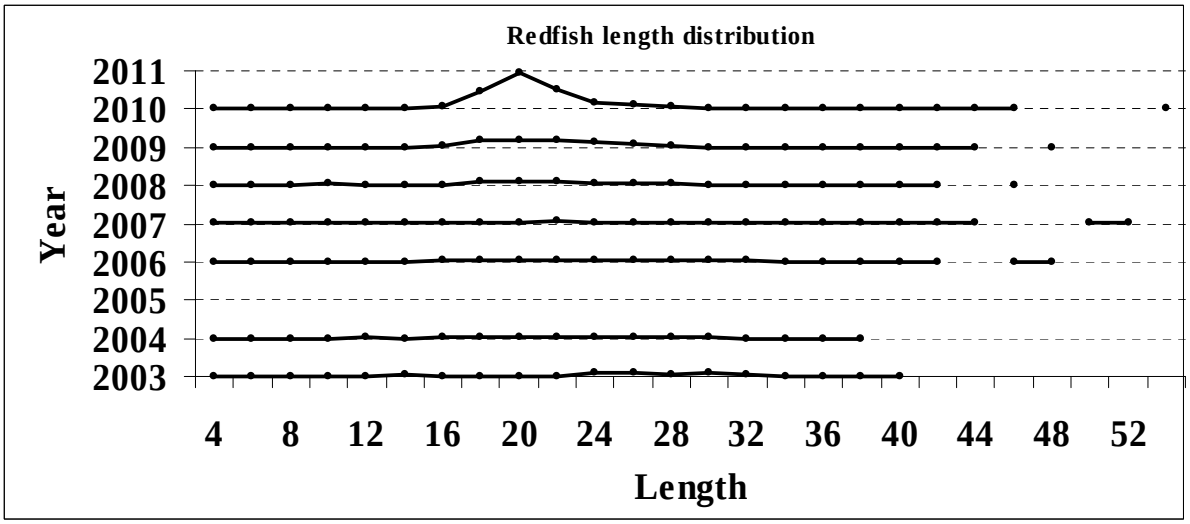


FIGURE 4.- Atlantic cod, roughhead grenadier and redfish length distribution (cm) in NAFO 3L: 2003-2010.

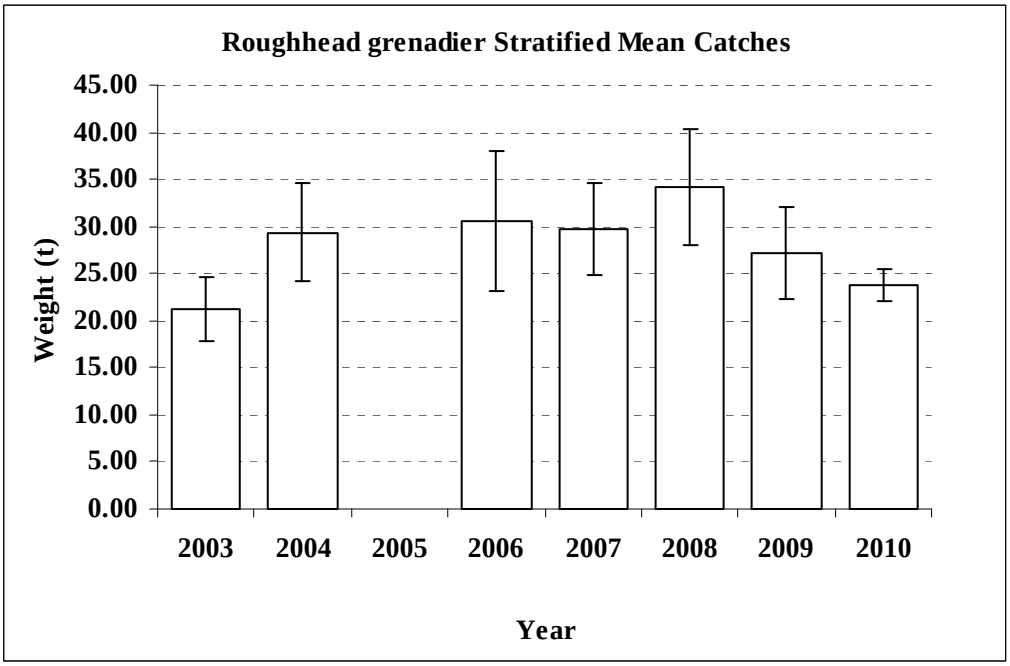


FIGURE 5.- Roughhead grenadier stratified mean catches in Kg and ±SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2010 (R/V *"Vizconde de Eza"*). In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

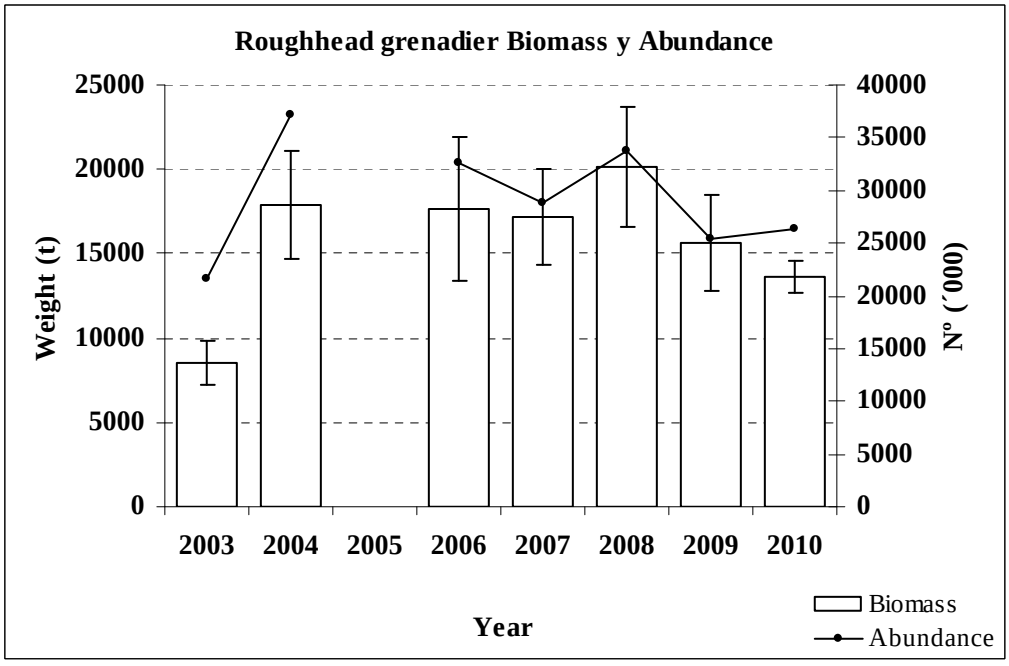


FIGURE 6.- Roughhead grenadier abundance (´000), biomass in tonnes and ±SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2010 (R/V *"Vizconde de Eza"*). In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

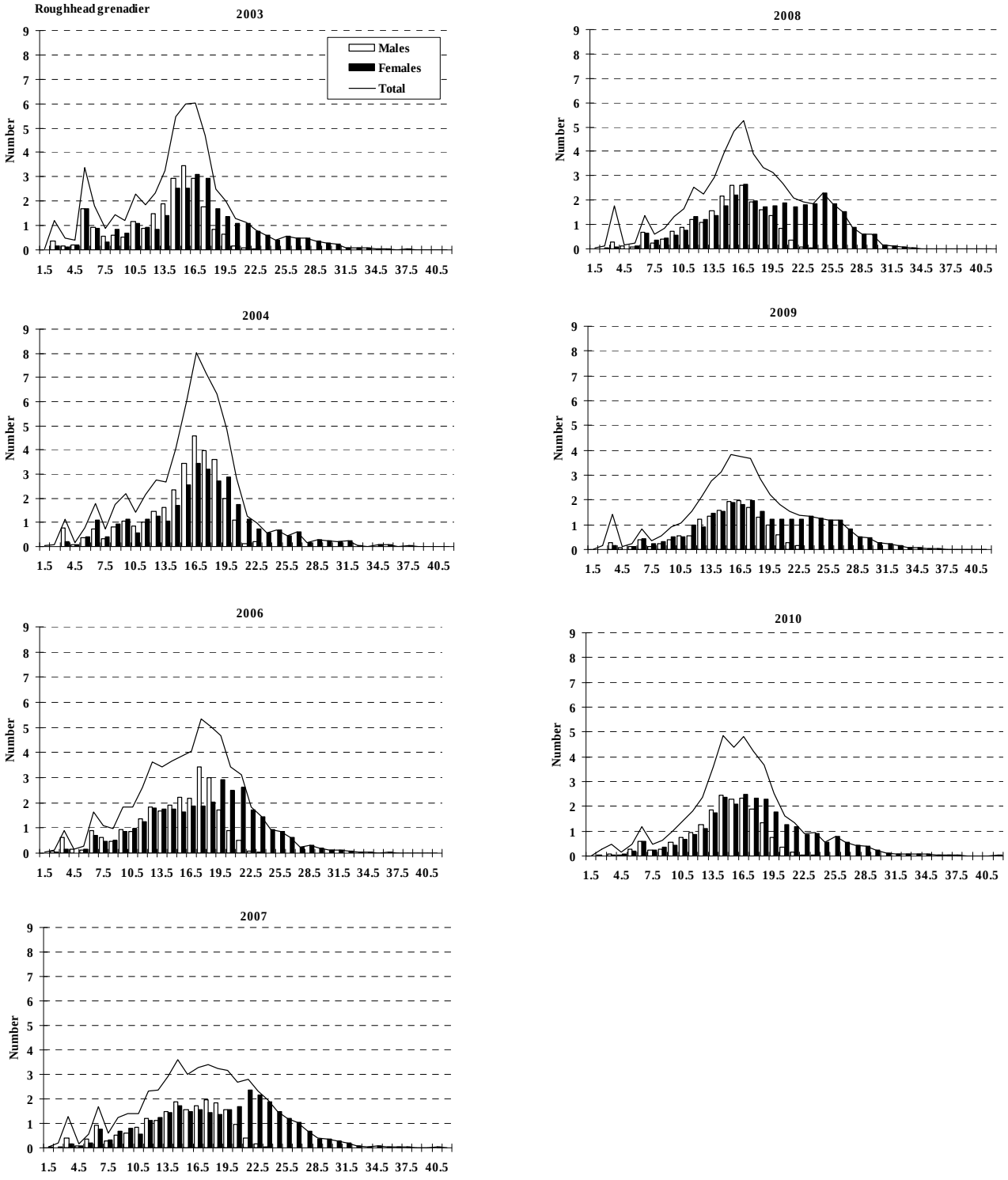


FIGURE 7.- Roughhead grenadier length distribution (cm) in NAFO 3L: 2003-2010. Number per stratified mean catches. In 2003, the data correspond to 69% of the total area prospected in 2006-2010

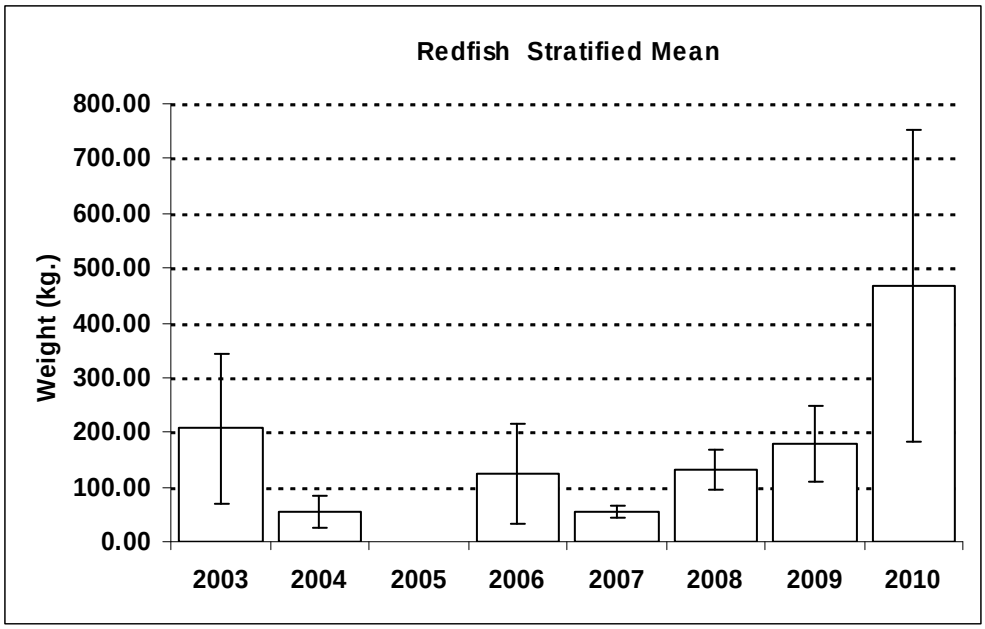


FIGURE 8.- Redfish stratified mean catches in Kg and ±SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2010 (R/V *"Vizconde de Eza"*). In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

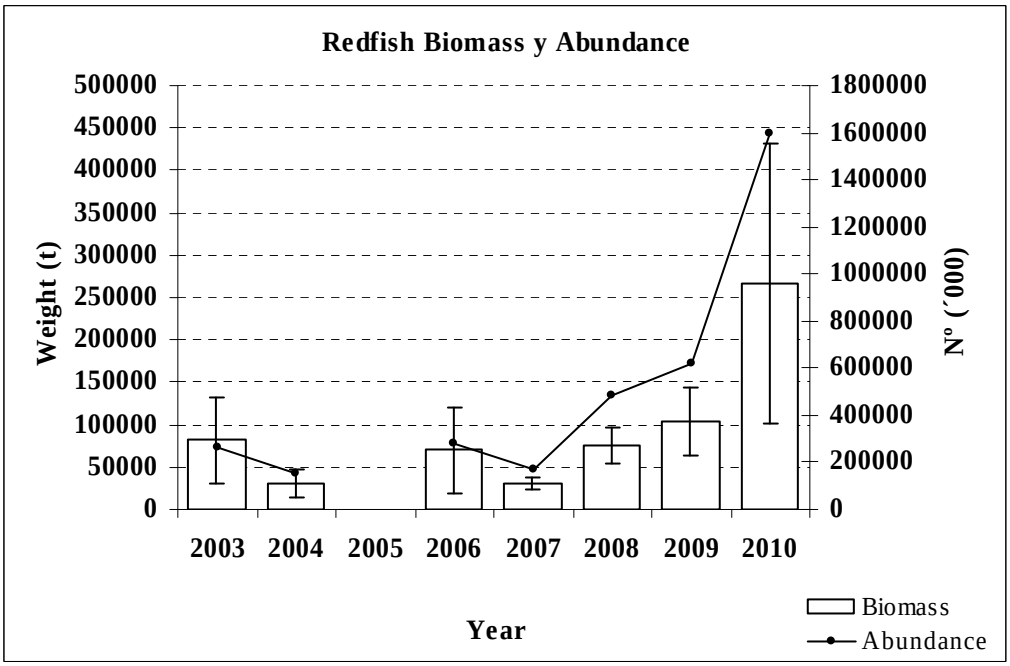


FIGURE 9.- Redfish abundance (´000), biomass in tonnes and ±SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2010 (R/V *"Vizconde de Eza"*). In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

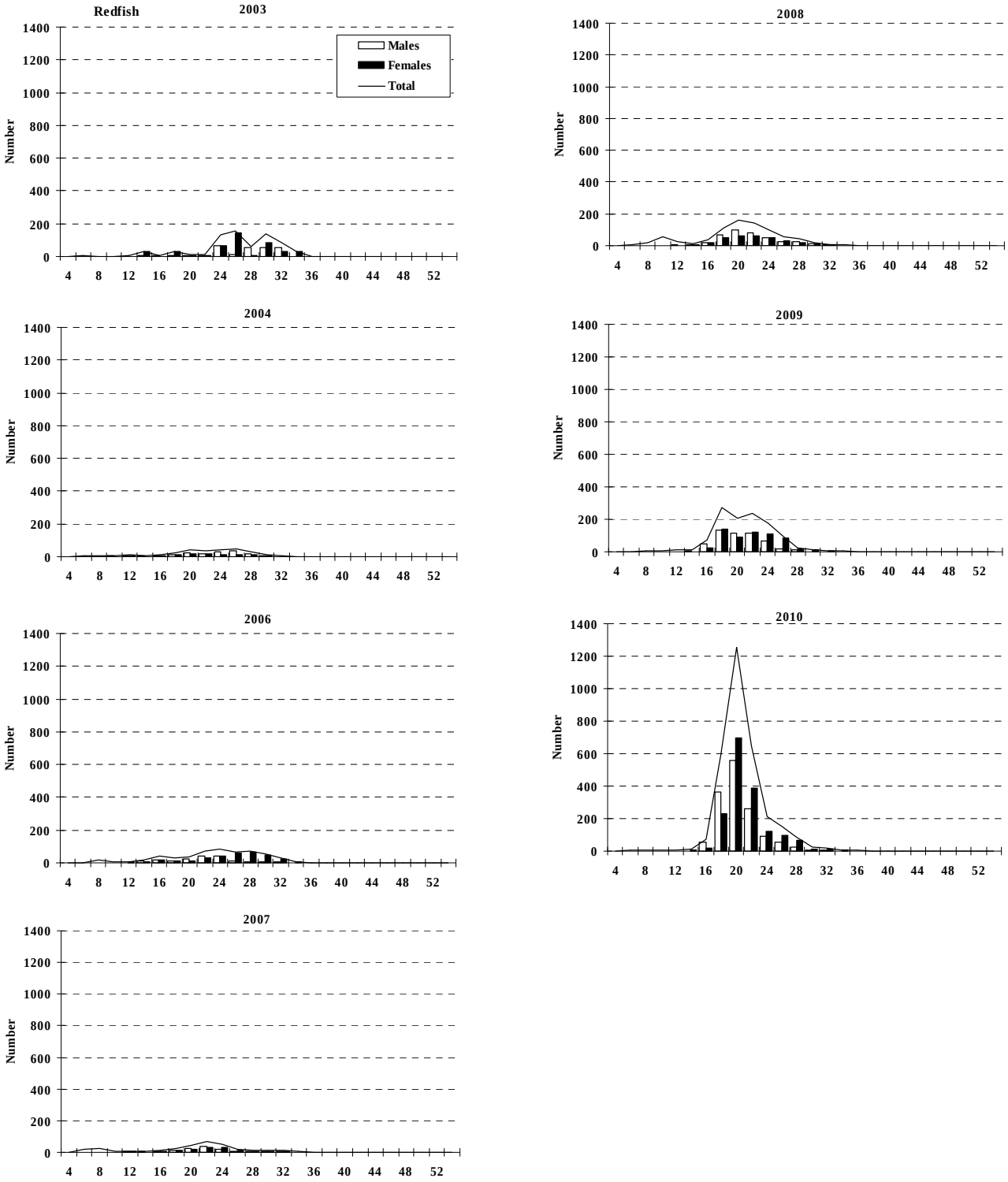


FIGURE 10.- Redfish length distribution (cm) in NAFO 3L: 2003-2010. Number per stratified mean catches. In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

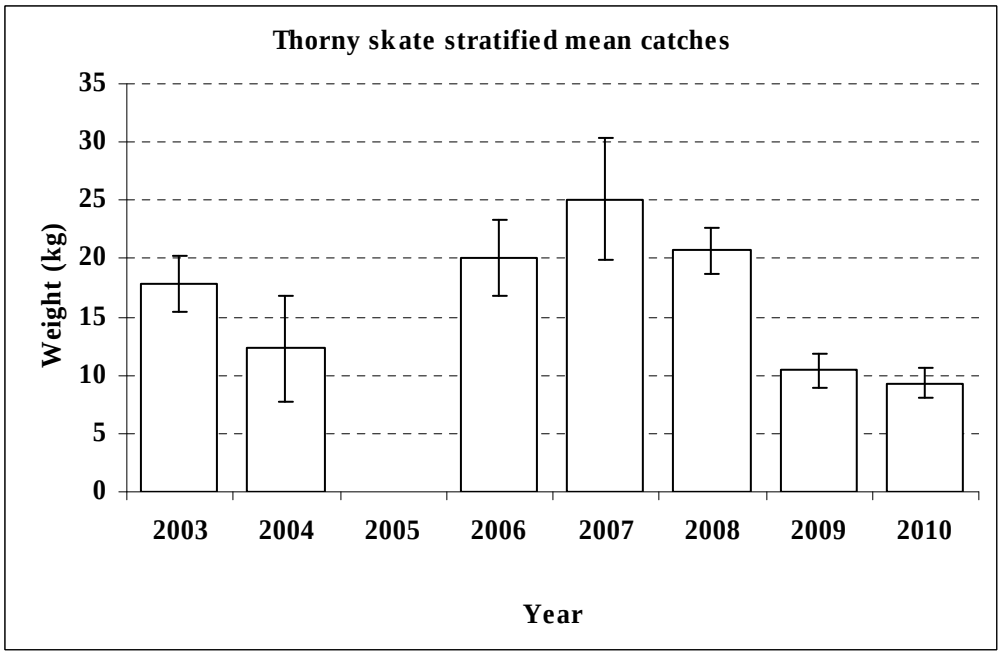


FIGURE 11.- Thorny skate stratified mean catches in Kg and ±SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2010 (R/V *"Vizconde de Eza"*). In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

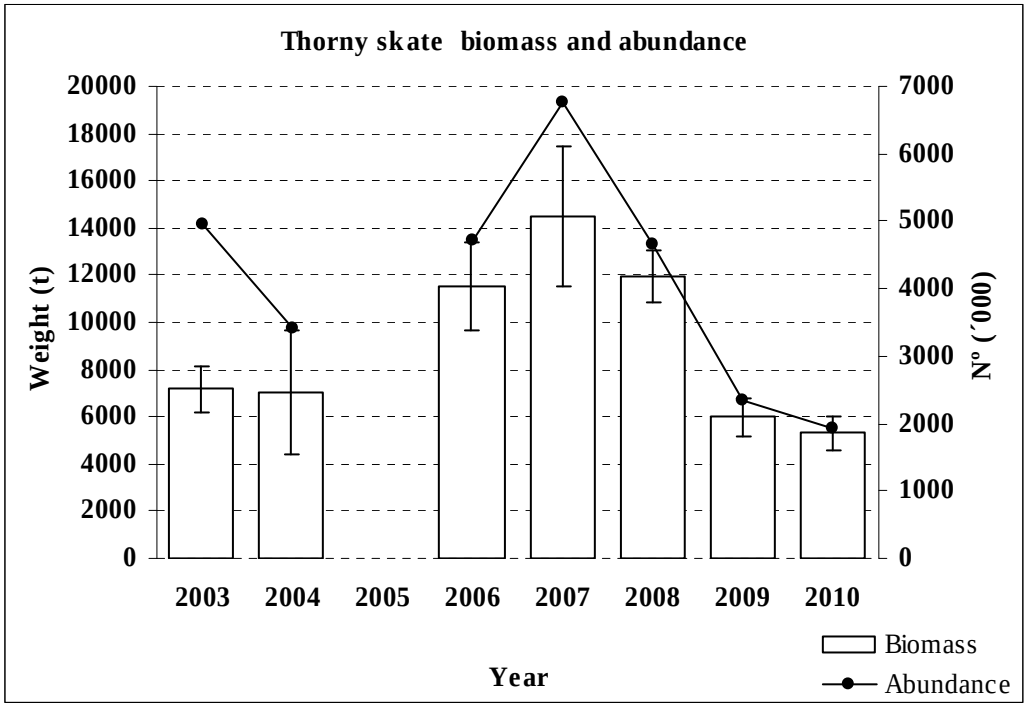


FIGURE 12.- Thorny skate abundance (´000), biomass in tonnes and ±SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2010 (R/V *"Vizconde de Eza"*). In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

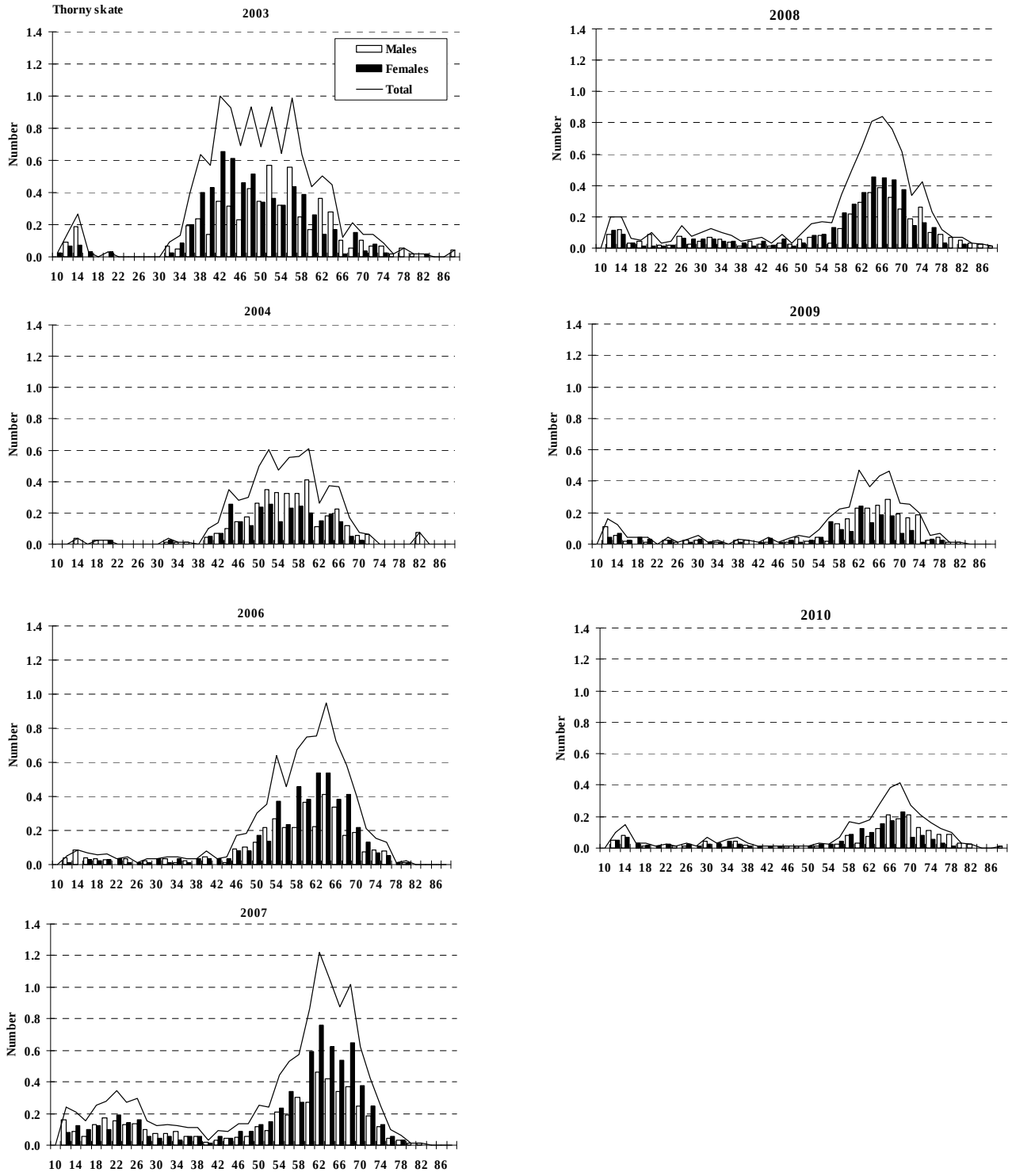
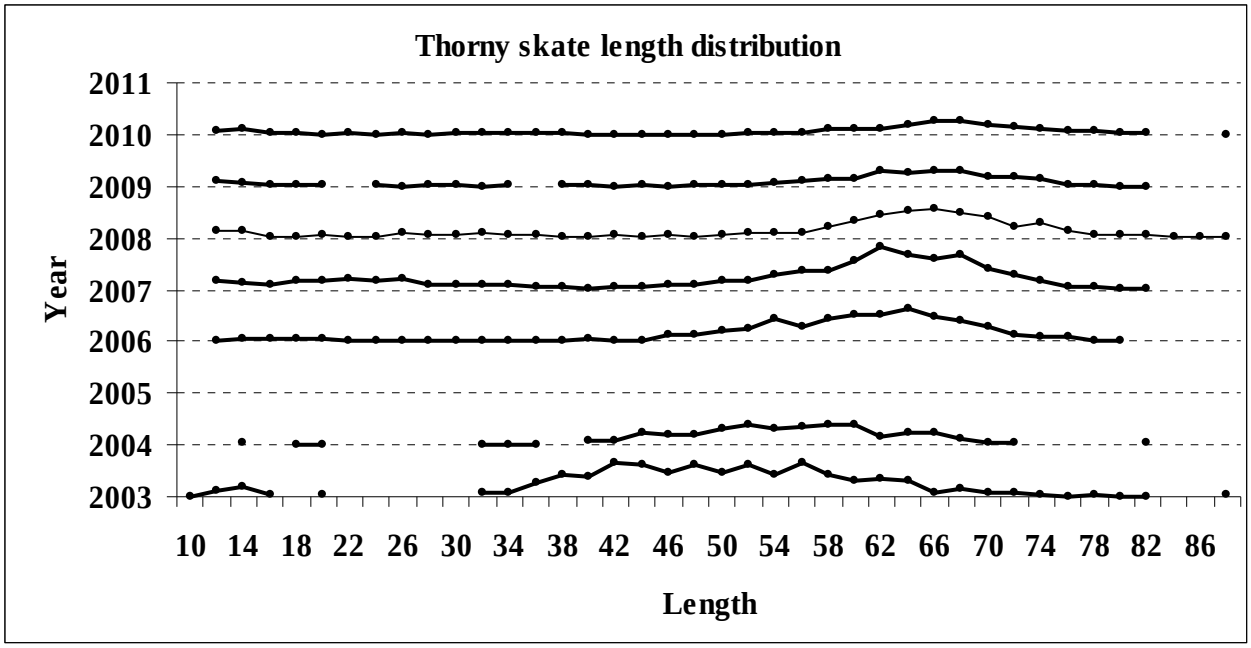


FIGURE 13.- Thorny skate length distribution (cm) in NAFO 3L: 2003-2010. Number per stratified mean catches. In 2003, the data



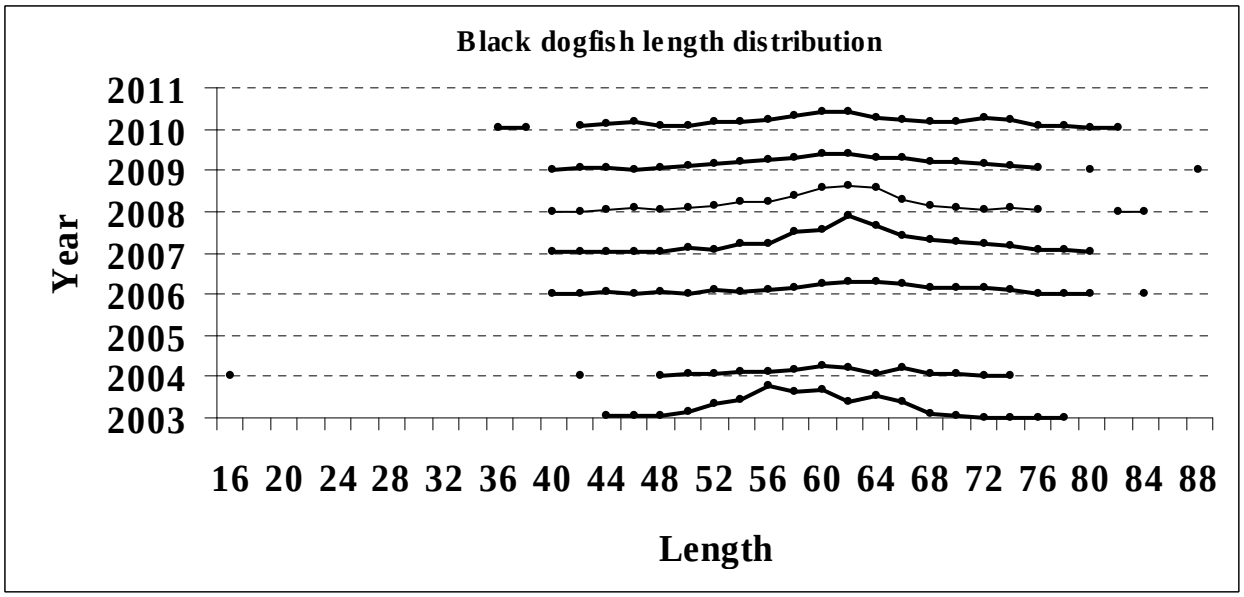


FIGURE 14.- Thorny skate and **black length** distribution (cm) in NAFO 3L: 2003-2010.

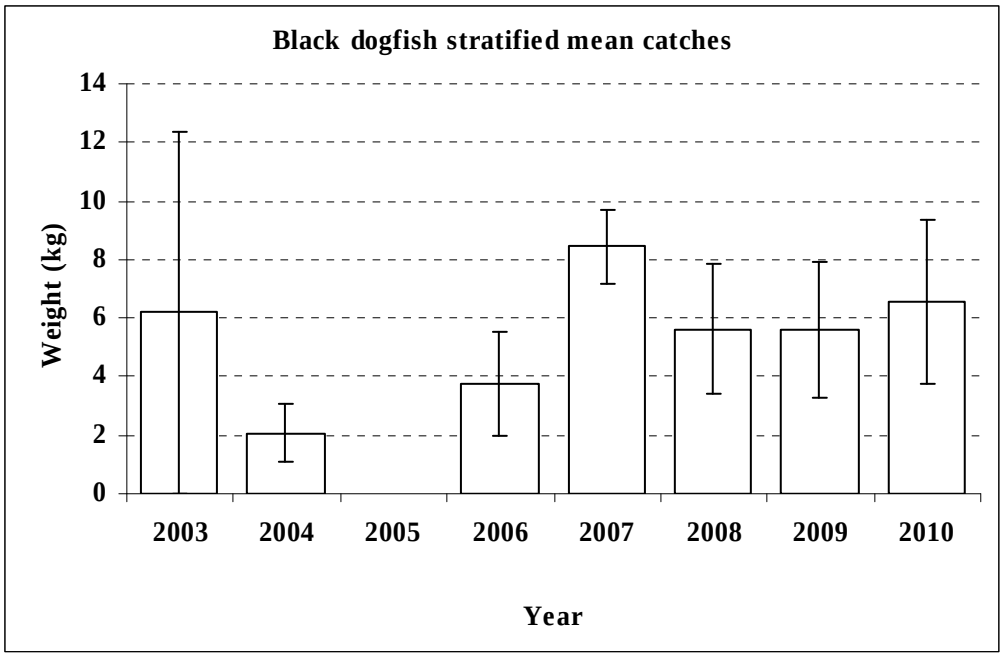


FIGURE 15.- Black dogfish stratified mean catches in Kg and ±SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2010 (R/V *"Vizconde de Eza"*). In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

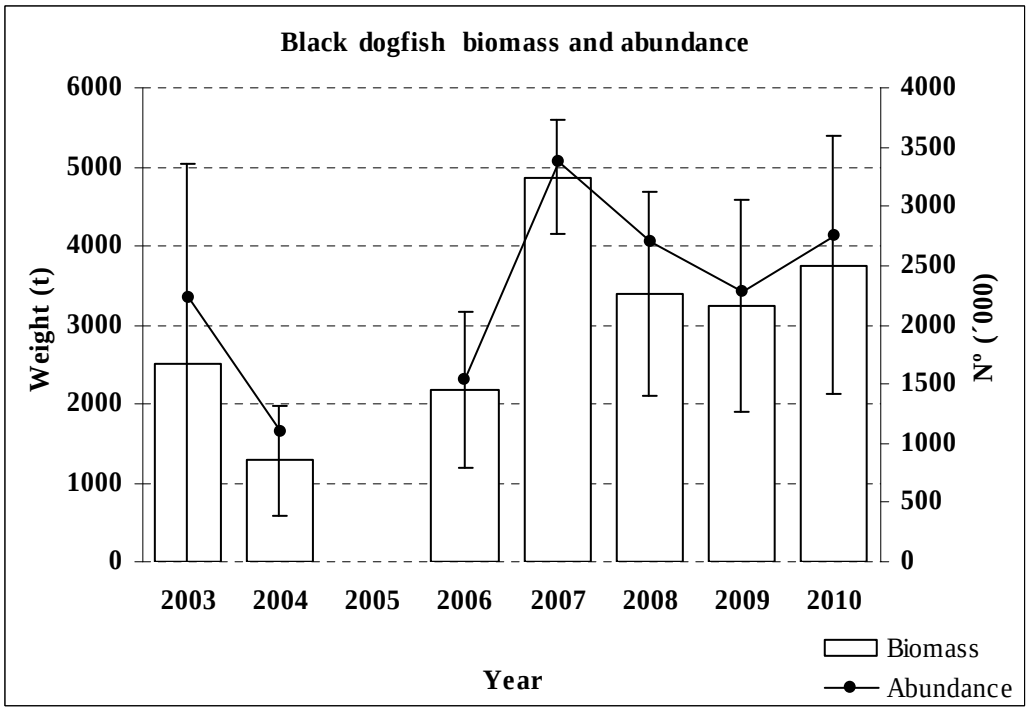


FIGURE 16.- Black dogfish abundance (´000), biomass in tonnes and ±SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2010 (R/V *"Vizconde de Eza"*). In 2003, the data correspond to 69% of the total area prospected in 2006-2010.

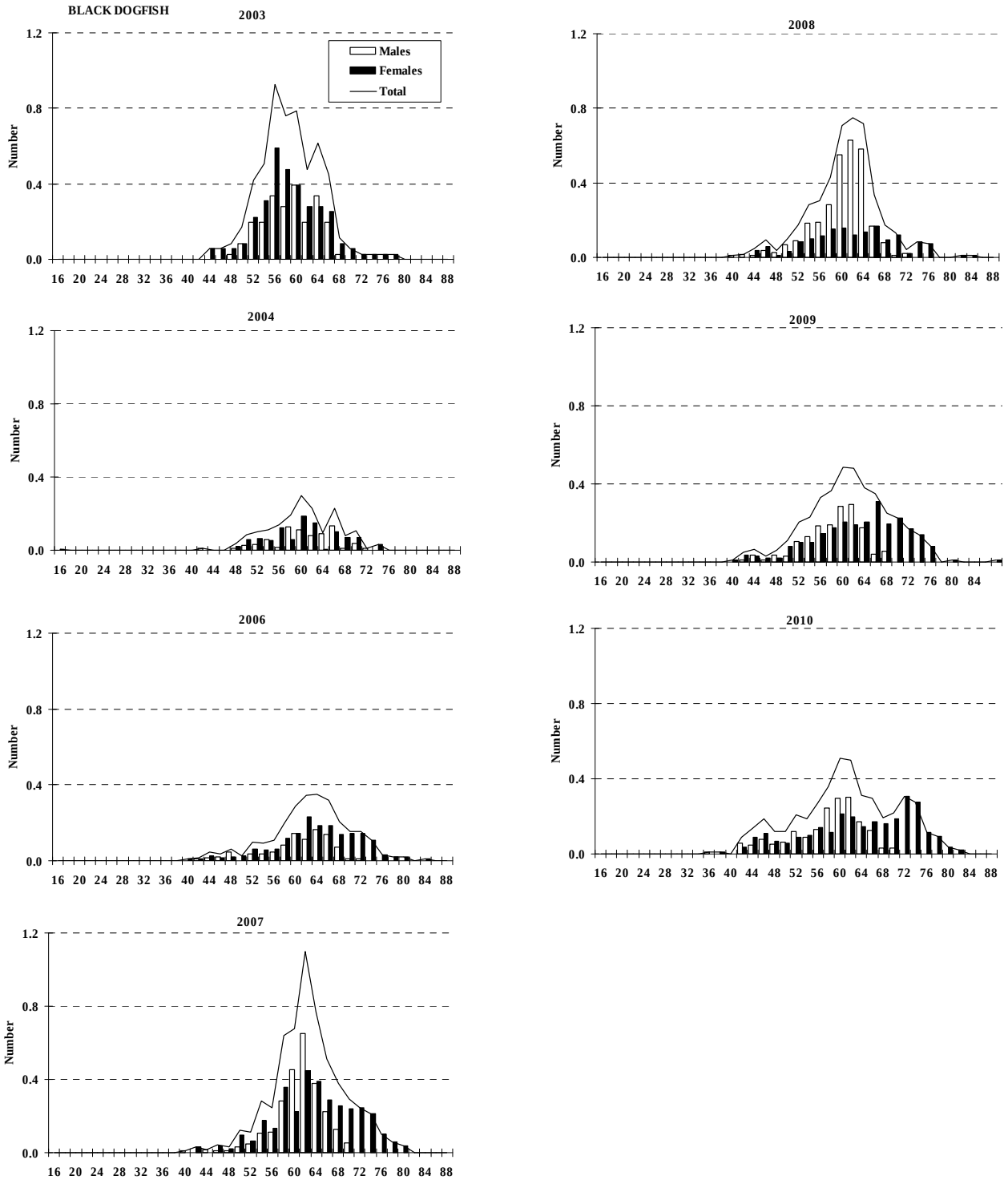


FIGURE 17.- Black dogfish length distribution (cm) in NAFO 3L: 2003-2010. Number per stratified mean catches. In 2003, the data correspond to 69% of the total area prospected in 2006-2010.