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Biomass and length distribution for roughhead grenadier, thorny skate and white hake from the surveys conducted by Spain in NAFO 3NO

by

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**Abstract**

Data for roughhead grenadier (*Macrourus berglax*), thorny skate (*Amblyraja radiata*) and white hake (*Urophycis tenuis*) from the Spanish Spring survey are presented. Abundance and biomass were estimated for roughhead grenadier and thorny skate for the period 1997-2011 and for white hake for the period 2001-2011. The length distribution is presented as numbers per haul stratified mean catches. The indices of roughhead grenadier show no trend until 2003, increasing in years 2004-2006 but mainly in 2004. Biomass in 2007 declined to 2003 levels, increased slightly afterwards. The values obtained in 2010-2011 are similar to those in 2003 and 2007. The thorny skate indices increased to a historical maximum in 2000 and after which it has followed an oscillating trend until 2011. White hake biomass shows a decline since the great maximum in 2001, with a small peak in 2005. Values in 2011 were slightly higher than in previous year but nevertheless represented one fifth of the 2001 maximum. Individuals within the length range 16 - 26 cm can only be seen in 2001 and 2004.

**Material and Methods**

Spain has carried out a spring survey in Div. 3NO of the NAFO Regulatory Area since 1995. To this purpose, the vessel C/V *Playa de Menduíña*, equipped with a bottom trawl net type *Pedreira* was used until 2001, when it was replaced by the R/V *Vizconde de Eza* with a bottom trawl net type *Campelen*. The technical specifications and geometry of these gears, their rigging profile and the net plan, and an abstract with the survey technical information are described in Walsh *et al.*, 2001. The number of valid tows, the depth strata covered and survey dates for the period 1997-2011 are shown in Table 1. The survey area was stratified following the standard stratification schemes (Bishop, 1994). The number of hauls was assigned to each stratum proportionally to their size on a random way, with a minimum of two planned hauls per stratum (Doubleday, 1981). Biomass and abundance indices were calculated by swept area method (Cochran, 1997), assuming a catchability factor of 1. The swept area and number of hauls by stratum for the entire period are presented in table 2.

The catch of each haul is sorted and weighted by species and a sample of each species is length measured. For roughhead grenadier, pre-anal length in 0.5 cm intervals to the inferior 0.5 cm is taken. Thorny skate and white hake are measured to the nearest lower cm of total length. This paper presents the 1997-2011 indices for roughhead grenadier and thorny skate. Years 1995 and 1996 are not representative as the deeper strata were not surveyed those years, thus they are excluded from the analysis. White hake data are only available since 2001.

Mean catch with variance and stratified mean catches with annual variance by stratum and year are presented for each species, transformed until 2000 and no-transformed for the period 2002-2011. Biomass per stratum and year,

with annual variance, and length distribution of catches per haul are also presented. For 2001 there are both transformed data from C/V *Playa de Menduiña* and original data from R/V *Vizconde de Eza*. White hake data did not need calibration (González Troncoso and Paz, 2005). Further information about the calculation of these indices is available in González Troncoso *et al.*, 2005.

## Results

### **Roughhead grenadier**

There is no directed fishery for roughhead grenadier. Most of the catches are taken as by-catch in the Greenland halibut fishery in Subareas 2 and 3. At the beginning of the Greenland halibut fishery in Subarea 3 of the Regulatory Area in 1988, grenadier catches were systematically misreported as roundnose grenadier. Grenadier biomass shows a decreasing trend over the last years (NAFO, 2011).

#### **Mean Catches and Biomass**

Mean catch and SD of roughhead grenadier by stratum are presented in Table 3. Stratified mean catches and SD per stratum and year are presented in Table 4.

Biomass estimates and SD for the period 1997-2011 are presented in Table 5. The estimated parameters *a* and *b* values of length-weight relationship are presented in Table 6.

The roughhead grenadier indices show no trend until 2003. It reached a maximum in 2004- 2006 and afterwards stabilised at levels slightly higher than in the early years (Figs. 1 and 2).

#### **Length Distribution**

Table 7 and Figures 3 and 4 show the annual length distribution of the stratified mean catches, besides the sampled size and catch, for the period 1997-2011. Results are presented in length intervals of 1 cm. The 1998 cohort is easily followed, but it has started to disappear over the past years. Recruitment seems to be good recently, whereas all the length classes were poor, specially the largest.

### **Thorny skate**

Thorny skate catches comprises the most of the skates catches during the Spanish Spring survey and the Canadian surveys. This species has been managed with a TAC since 2004. Nominal catches increased in the mid-1980s with the beginning of a directed fishery, reaching a minimum during the period 1993-1995. Biomass has been relatively stable from 1996 to 2004, but at a lower level than in the mid-1980s. During recent years the biomass has increased slightly (NAFO, 2011).

#### **Mean Catches and Biomass**

Mean catch and SD per stratum are presented in Table 8. Stratified mean catches per tow by stratum and year, next to their SD, are presented in Table 9.

Biomass estimates and SD for the period 1997-2011 are presented in Table 10. The estimated parameters *a* and *b* values of length-weight relationship are presented in Table 11.

The thorny skate indices follows a large oscillating trend, with maximum values of roughly 50000 tons 2001 and 2004-2006, and minimum values of 10000 -20000 tons in 1997, 1993 and 2011 (Fig. 5 and 6).

#### **Length Distribution**

Length distribution of stratified mean catch by sex and year, sample size and catch for the period 1997-2011 are presented in Table 12 and Figures 7 and 8. Length is aggregated into 2 cm intervals. The recruitment modal value was in 1997 and can be followed until 2011. A second modal value at small lengths starting in 1998 can be roughly

followed throughout years, reaching a maximum in 2002. Recruitment was also quite good in 2002, but this cohort is not seen in following years. All length classes have been poorer than usual over the last years, but recruitment was quite good in 2010 and all the length classes have more or less the same level.

### **White hake**

Catches of white hake in Div. 3NO peaked in 1987 and then declined until 1994, with non-Canadian landings dropping to 0 following by fishing restriction for foreign countries in 1992. Average catch reached a minimum in 1995-2001, increased in 2002 and 2003 and declined sharply in 2004-2007. The 1999 year-class was large and prompted the 2000 stock biomass increase, but following cohorts have been very small in comparison. Subsequently, the biomass index has decreased and remains at levels comparable to the beginning of the *Campelen* time series in 1996-1999 (NAFO, 2011).

### **Mean catches and biomass**

Mean catch and SD per stratum are presented in table 13. Table 14 and Figure 9 show the stratified mean catch per tow disaggregated by stratum and year, as well as the annual variance. Table 15 and Figure 10 present biomass per stratum and year and annual variance.

Table 16 presents the length weight relationship parameters for white hake for the period 2002-2011. The 2001 data were insufficient to calculate the parameters, thus 2002 parameters were used instead.

The white hake biomass index was highest in 2001 and shows an overall decreasing trend since, with a much smaller peak in 2005. The 2011 index is very low but nevertheless the highest since 2007.

### **Length distribution**

Table 17 presents the length distribution of the stratified mean catches per tow by sex and year, number of samples, sample size, sampled catch, length range, total catch and numbers of hauls. Figures 11 and 12 show length distribution by year. White hake was not sexed in 2011.

Individuals within the length range 30-38 cm were very abundant in 2001 and can be followed the following years, but by 2006 can hardly be seen. A small recruitment event was detected in 2004, with individuals between 16 - 26 cm. In 2005, the length distribution decreased although the biomass increased. Individuals in the ranges 52-70 cm and 14-38 were most abundant, but nevertheless scarcer than in 2001 and 2002. All year classes have been poor in 2006-2011.

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**TABLE 1.-** Spanish spring bottom trawl surveys in NAFO Div. 3NO: 1997-2011

Year	Vessel	Valid tows	Depth strata covered (m)	Dates
1997	C/V <i>Playa de Menduña</i>	128	42-1263	April 26-May 18
1998	C/V <i>Playa de Menduña</i>	124	42-1390	May 06-May 26
1999	C/V <i>Playa de Menduña</i>	114	41-1381	May 07-May 26
2000	C/V <i>Playa de Menduña</i>	118	42-1401	May 07-May 28
2001 <sup>(*)</sup>	R/V <i>Vizconde de Eza</i>	83	36-1156	May 03-May 24
	C/V <i>Playa de Menduña</i>	121	40-1500	May 05-May 23
2002	R/V <i>Vizconde de Eza</i>	125	38-1540	April 29-May 19
2003	R/V <i>Vizconde de Eza</i>	118	38-1666	May 11-June 02
2004	R/V <i>Vizconde de Eza</i>	120	43-1539	June 06-June 24
2005	R/V <i>Vizconde de Eza</i>	119	47-1485	June 10-June 29
2005	R/V <i>Vizconde de Eza</i>	119	47-1485	June 10-June 29
2006	R/V <i>Vizconde de Eza</i>	120	45-1480	June 7-June 27
2007	R/V <i>Vizconde de Eza</i>	110	45-1374	May 29-June 19
2008	R/V <i>Vizconde de Eza</i>	122	45-1374	May 27-June 16
2009	R/V <i>Vizconde de Eza</i>	109	45-1374	May 31-June 18
2010	R/V <i>Vizconde de Eza</i>	95	45-1374	May 30-June 18
2011	R/V <i>Vizconde de Eza</i>	122	44-1450	June 5-June 24

(\*) A total of 83 hauls from the R/V *Vizconde de Eza* and 40 hauls from the C/V *Playa de Menduña* (123 hauls in total) were used for data analysis.

**TABLE 2.**- Swept area and number of hauls by stratum. Spanish Spring Surveys in NAFO Div. 3NO: 1997-2011. Swept area in square miles. n.s. means stratum not surveyed. 1997-2000 data are from C/V *Playa de Mendiña* data, and 2002-2011 data are from R/V *Vizconde de Eza*. For 2001 there are data from the two vessels.

Stratum	1997		1998		1999		2000		2001		2002		2003		2004	
	Swept area	Tow number														
353	0.0480	4	0.0465	4	0.0360	3	0.0356	3	0.0341	3	0.0476	4	0.0334	3	0.0338	3
354	0.0233	2	0.0356	3	0.0218	2	0.0356	3	0.0338	3	0.0356	3	0.0338	3	0.0345	3
355	0.0233	2	0.0221	2	0.0229	2	0.0233	2	0.0240	2	0.0236	2	0.0229	2	0.0229	2
356	0.0225	2	0.0221	2	0.0229	2	0.0225	2	0.0240	2	0.0233	2	0.0225	2	0.0221	2
357	0.0443	4	0.0240	2	0.0236	2	0.0124	1	0.0244	2	0.0240	2	0.0229	2	0.0229	2
358	0.0563	5	0.0236	3	0.0349	3	0.0341	3	0.0345	3	0.0345	3	0.0338	3	0.0330	3
359	0.0690	6	0.0698	6	0.0364	3	0.0469	4	0.0803	7	0.0686	6	0.0791	7	0.0791	7
360	0.3754	32	0.2561	25	0.2325	19	0.2396	20	0.2423	20	0.2865	25	0.2254	20	0.2310	20
374	0.0353	3	0.0353	3	0.0244	2	0.0240	2	0.0240	2	0.0345	3	0.0225	2	0.0233	2
375	0.0116	1	0.0345	3	0.0236	2	0.0244	2	0.0338	3	0.0353	3	0.0330	3	0.0338	3
376	0.1583	14	0.0930	10	0.1219	10	0.1200	10	0.1155	10	0.1140	10	0.1125	10	0.1166	10
377	0.0116	1	0.0229	2	0.0240	2	0.0229	2	0.0229	2	0.0229	2	0.0225	2	0.0218	2
378	0.0210	2	0.0120	2	0.0229	2	0.0233	2	0.0236	2	0.0233	2	0.0225	2	0.0225	2
379	0.0206	2	0.0356	3	0.0236	2	0.0225	2	0.0229	2	0.0229	2	0.0229	2	0.0124	1
380	0.0210	2	0.0113	2	0.0236	2	0.0236	2	0.0206	2	0.0225	2	0.0229	2	0.0221	2
381	0.0221	2	0.0229	2	0.0229	2	0.0236	2	0.0236	2	0.0229	2	0.0229	2	0.0225	2
382	0.0461	4	0.0229	3	0.0484	4	0.0499	4	0.0469	4	0.0341	3	0.0454	4	0.0461	4
721	0.0221	2	0.0203	2	0.0244	2	0.0236	2	0.0248	2	0.0233	2	0.0225	2	0.0221	2
722	0.0214	2	0.0101	2	0.0229	2	0.0218	2	0.0233	2	0.0236	2	0.0221	2	0.0218	2
723	0.0210	2	0.0233	2	0.0229	2	0.0248	2	0.0240	2	0.0233	2	0.0229	2	0.0229	2
724	0.0225	2	0.0206	2	0.0225	2	0.0233	2	0.0353	3	0.0225	2	0.0225	2	0.0214	2
725	0.0206	2	0.0086	1	0.0229	2	0.0210	2	0.0116	1	0.0225	2	0.0229	2	0.0225	2
726	n.s.	n.s.	0.0094	2	0.0225	2	0.0221	2	0.0116	1	0.0214	2	0.0225	2	0.0225	2
727	0.0094	1	0.0233	2	0.0236	2	0.0210	2	0.0225	2	0.0233	2	0.0218	2	0.0233	2
728	0.0214	2	0.0206	2	0.0233	2	0.0210	2	0.0229	2	0.0229	2	0.0225	2	0.0180	2
752	0.0218	2	0.0229	2	0.0233	2	0.0206	2	0.0210	2	0.0116	1	0.0229	2	0.0214	2
753	0.0214	2	0.0218	2	0.0229	2	0.0218	2	0.0214	2	0.0229	2	0.0229	2	0.0218	2
754	0.0330	3	0.0210	2	0.0206	2	0.0195	2	0.0195	2	0.0341	3	0.0218	2	0.0214	2
755	n.s.	n.s.	0.0206	2	0.0311	3	0.0431	4	0.0416	4	0.0338	3	0.0221	2	0.0319	3
756	0.0109	1	0.0225	2	0.0225	2	0.0203	2	0.0113	1	0.0229	2	0.0221	2	0.0218	2
757	0.0304	3	0.0206	2	0.0233	2	0.0214	2	0.0233	2	0.0225	2	0.0221	2	0.0218	2
758	0.0214	2	0.0105	2	0.0214	2	0.0210	2	0.0218	2	0.0225	2	0.0221	2	0.0214	2
759	n.s.	n.s.	0.0214	2	0.0218	2	0.0210	2	0.0221	2	0.0225	2	0.0113	1	0.0214	2
760	0.0105	1	0.0214	2	0.0225	2	0.0210	2	0.0229	2	0.0229	2	0.0218	2	0.0221	2
761	0.0315	3	0.0206	2	0.0210	2	0.0221	2	0.0225	2	0.0225	2	0.0225	2	0.0221	2
762	0.0308	3	0.0094	2	0.0210	2	0.0203	2	0.0116	1	0.0225	2	0.0225	2	0.0233	2
763	n.s.	n.s.	0.0218	2	0.0311	3	0.0416	4	0.0330	3	0.0225	2	0.0311	3	0.0326	3
764	0.0206	2	0.0218	2	0.0225	2	0.0218	2	0.0240	2	0.0236	2	0.0221	2	0.0229	2
765	0.0206	2	0.0098	2	0.0221	2	0.0203	2	0.0113	1	0.0236	2	0.0113	1	0.0225	2
766	0.0308	3	0.0191	2	0.0218	2	0.0214	2	0.0203	2	0.0233	2	0.0225	2	0.0225	2
767	n.s.	n.s.	0.0109	2	0.0214	2	0.0210	2	0.0218	2	0.0225	2	0.0229	2	0.0218	2

**TABLE 2 (cont.).-** Swept area and number of hauls by stratum. Spanish Spring Surveys in NAFO Div. 3NO: 1997-2011. Swept area in square miles. n.s. means stratum not surveyed. 1997-2000 data are from C/V *Playa de Menduña* data, and 2002-2011 data are from R/V *Vizconde de Eza*. For 2001 there are data from the two vessels.

Stratum	2005		2006		2007		2008		2009		2010		2011	
	Swept area	Tow number	Swept area	Tow aa	Swept area	Tow number								
353	0.0353	3	0.0371	3	0.0364	3	0.0341	3	0.0345	3	0.0225	2	0.0349	3
354	0.0353	3	0.0364	3	0.0364	3	0.0345	3	0.0338	3	0.0225	2	0.0345	3
355	0.0225	2	0.0248	2	0.0240	2	0.0221	2	0.0233	2	0.0229	2	0.0233	2
356	0.0233	2	0.0240	2	0.0240	2	0.0236	2	0.0229	2	0.0225	2	0.0229	2
357	0.0233	2	0.0244	2	0.0360	3	0.0233	2	0.0116	2	0.0225	2	0.0225	2
358	0.0349	3	0.0349	3	0.0368	3	0.0345	3	0.0341	3	0.0225	2	0.0345	3
359	0.0814	7	0.0975	8	0.0855	7	0.0799	7	0.0795	7	0.0705	6	0.0806	7
360	0.2325	20	0.2340	19	0.2378	20	0.2340	20	0.2273	20	0.1628	14	0.2374	20
374	0.0229	2	0.0236	2	0.0240	2	0.0233	2	0.0225	2	0.0225	2	0.0225	2
375	0.0349	3	0.0364	3	0.0364	3	0.0334	3	0.0341	3	0.0364	3	0.0360	3
376	0.1174	10	0.1219	10	0.1185	10	0.1129	10	0.1133	10	0.0788	7	0.1178	10
377	0.0233	2	0.0236	2	0.0240	2	0.0233	2	0.0225	2	0.0233	2	0.0233	2
378	0.0225	2	0.0240	2	0.0233	2	0.0240	2	0.0229	2	0.0225	2	0.0240	2
379	0.0236	2	0.0236	2	0.0240	2	0.0229	2	0.0229	2	0.0229	2	0.0221	2
380	0.0229	2	0.0229	2	0.0240	2	0.0225	2	0.0229	2	0.0236	2	0.0229	2
381	0.0233	2	0.0229	2	0.0240	2	0.0229	2	0.0229	2	0.0244	2	0.0233	2
382	0.0458	4	0.0469	4	0.0484	4	0.0458	4	0.0450	4	0.0233	2	0.0450	4
721	0.0229	2	0.0236	2	0.0116	1	0.0225	2	0.0229	2	0.0225	2	0.0229	2
722	0.0233	2	0.0240	2	0.0225	2	0.0206	2	0.0225	2	0.0225	2	0.0225	2
723	0.0233	2	0.0236	2	0.0240	2	0.0225	2	0.0225	2	0.0225	2	0.0218	2
724	0.0225	2	0.0233	2	0.0233	2	0.0221	2	0.0233	2	0.0229	2	0.0233	2
725	0.0236	2	0.0233	2	0.0225	2	0.0229	2	0.0229	2	0.0233	2	0.0240	2
726	0.0113	1	0.0225	2	0.0229	2	0.0225	2	0.0229	2	0.0233	2	0.0225	2
727	0.0229	2	0.0225	2	0.0240	2	0.0221	2	0.0113	1	0.0240	2	0.0225	2
728	0.0109	1	0.0225	2	0.0225	2	0.0221	2	0.0229	2	0.0240	2	0.0229	2
752	0.0236	2	0.0225	2	0.0225	2	0.0218	2	0.0229	2	0.0240	2	0.0236	2
753	0.0225	2	0.0225	2	0.0225	2	0.0221	2	0.0116	1	n.s.	n.s.	0.0225	2
754	0.0225	2	0.0225	2	0.0225	2	0.0218	2	0.0113	1	0.0225	2	0.0225	2
755	0.0450	4	0.0338	3	0.0338	3	0.0431	4	0.0116	1	0.0120	1	0.0454	4
756	0.0233	2	0.0229	2	0.0225	2	0.0218	2	0.0225	2	0.0225	2	0.0206	2
757	0.0225	2	0.0225	2	0.0229	2	0.0221	2	0.0229	2	0.0221	2	0.0236	2
758	0.0225	2	0.0225	2	0.0225	2	0.0218	2	0.0225	2	0.0225	2	0.0225	2
759	0.0229	2	0.0225	2	n.s.	n.s.	0.0221	2	0.0113	1	0.0225	2	0.0218	2
760	0.0229	2	0.0225	2	0.0233	2	0.0225	2	0.0229	2	0.0225	2	0.0214	2
761	0.0221	2	0.0233	2	0.0225	2	0.0214	2	0.0225	2	0.0229	2	0.0236	2
762	0.0225	2	0.0233	2	n.s.	n.s.	0.0214	2	0.0225	2	0.0229	2	0.0225	2
763	0.0334	3	0.0225	2	n.s.	n.s.	0.0311	3	n.s.	n.s.	n.s.	n.s.	0.0349	3
764	0.0233	2	0.0233	2	0.0225	2	0.0221	2	0.0116	1	n.s.	n.s.	0.0225	2
765	0.0229	2	0.0236	2	0.0225	2	0.0214	2	0.0225	2	0.0225	2	0.0225	2
766	0.0229	2	0.0229	2	n.s.	n.s.	0.0218	2	0.0225	2	0.0225	2	0.0225	2
767	0.0113	1	0.0233	2	n.s.	n.s.	0.0214	2	n.s.	n.s.	n.s.	n.s.	0.0233	2

**TABLE 3.-** Roughhead grenadier mean catch (kg) and SD by stratum. Spanish Spring Surveys in NAFO Div. 3NO: 1997-2011. Swept area in square miles. n.s. means stratum not surveyed.  
1997-2000 data are transformed from C/V *Playa de Menduña* and 2002-2011 data are original from R/V *Vizconde de Eza*. For 2001 there are data from the two vessels.

Stratum	1997		1998		1999		2000		2001		2002		2003		2004	
	R. grenadier Mean catch	R. grenadier SD														
353	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
354	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
355	0.000	0.000	0.000	0.000	0.000	0.000	0.083	0.117	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
356	0.000	0.000	0.426	0.602	0.019	0.026	0.084	0.016	0.000	0.000	0.000	0.000	0.115	0.163	1.225	1.732
357	0.101	0.202	0.000	0.000	0.216	0.152	0.473	-	0.170	0.240	1.050	1.061	1.385	1.959	0.027	0.037
358	0.000	0.000	0.000	0.000	0.233	0.403	0.000	0.000	0.000	0.000	0.500	0.700	0.000	0.000	0.007	0.012
359	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.041	0.100	0.000	0.000	0.479	1.267
360	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.390	1.744	0.000	0.000	0.000	0.000	0.000	0.000
374	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
375	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
376	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
377	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.273	0.386	0.000	0.000	0.000	0.000
378	0.447	0.632	0.000	0.000	0.298	0.421	0.149	0.211	0.000	0.000	0.008	0.011	0.000	0.000	0.000	0.000
379	0.000	0.000	0.011	0.020	0.024	0.034	0.511	0.722	0.430	0.580	0.265	0.375	0.124	0.175	3.960	-
380	0.219	0.309	0.000	0.000	0.003	0.005	0.157	0.220	0.03	0.048	0.008	0.011	0.085	0.120	278.650	209.516
381	0.000	0.000	0.000	0.000	0.000	0.000	0.074	0.100	0.00	0.00	0.000	0.000	0.000	0.000	4.145	5.169
382	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.009	0.00	0.00	0.002	0.004	0.000	0.000	0.080	0.160
721	0.000	0.000	0.758	0.253	2.443	0.132	0.812	0.778	0.220	0.085	1.250	1.768	0.000	0.000	3.473	0.449
722	0.026	0.036	3.950	0.385	3.865	3.202	4.767	1.204	2.465	2.878	10.930	14.213	4.315	4.547	4.530	2.676
723	0.000	0.000	0.255	0.361	2.367	2.528	2.859	1.554	1.705	0.304	0.700	0.283	8.370	3.253	10.053	4.938
724	0.562	0.048	1.064	0.349	3.678	0.217	4.130	1.074	7.507	3.835	10.000	4.384	4.980	1.669	10.746	0.701
725	0.000	0.000	0.077	-	3.718	3.790	12.646	17.511	1.415	1.832	2.650	1.344	0.377	0.532	92.415	82.046
726	n.s.	n.s.	2.213	2.336	7.296	0.205	14.727	0.120	4.304	5.509	2.650	1.909	0.000	0.000	59.865	19.608
727	0.358	-	0.196	0.181	0.661	0.236	2.499	2.726	0.21	0.132	0.570	0.806	21.900	24.607	16.700	1.697
728	0.835	0.167	0.919	0.457	17.996	15.217	7.249	6.640	1.00	0.241	0.620	0.876	32.650	3.748	15.650	9.687
752	8.836	3.973	8.172	6.983	9.032	3.744	26.663	9.968	6.04	3.455	1.950	2.758	77.900	100.268	94.610	95.162
753	15.528	7.705	35.635	9.342	28.442	30.760	49.154	1.830	31.57	21.165	5.400	7.637	57.050	55.791	63.835	45.912
754	70.193	8.839	60.723	3.985	26.373	8.716	66.801	41.403	75.61	17.890	98.450	82.237	65.600	40.729	33.355	11.377
755	n.s.	n.s.	42.088	3.130	23.467	7.041	28.192	7.595	24.29	19.579	1.460	1.307	18.200	25.597	14.658	21.304
756	3.252	-	6.895	5.707	29.642	5.995	17.852	0.205	12.796	11.520	11.750	10.819	7.160	9.051	9.772	3.778
757	20.873	17.870	39.313	39.079	8.896	5.646	88.705	79.940	20.43	16.686	16.250	16.193	8.575	2.765	12.890	8.330
758	46.823	8.232	77.034	32.807	46.200	23.151	55.334	32.746	69.10	46.916	141.550	101.470	41.050	58.053	32.955	10.260
759	n.s.	n.s.	66.392	41.956	22.491	13.002	32.826	6.694	59.11	50.035	69.250	97.934	78.080	-	39.980	4.921
760	3.916	-	8.862	1.890	4.010	1.409	17.758	2.817	7.195	9.468	11.950	4.172	40.650	3.465	76.475	94.293
761	19.198	3.744	25.190	8.102	16.592	10.125	11.535	5.093	15.515	2.524	5.350	5.445	12.750	9.263	25.610	28.055
762	24.278	18.462	30.068	18.564	17.354	9.397	18.990	4.928	2.839	3.040	0.325	0.460	14.650	3.861	15.729	4.594
763	n.s.	n.s.	10.820	5.285	11.447	3.789	14.523	15.110	15.35	12.271	1.225	1.732	2.717	4.705	28.000	21.696
764	6.393	4.081	4.827	2.059	4.044	1.240	4.427	2.047	5.550	3.323	20.050	11.526	19.420	19.771	40.790	41.988
765	11.752	5.592	6.734	3.431	6.197	1.421	7.755	4.467	4.385	0.685	2.700	2.404	10.400	-	5.347	2.710
766	7.741	2.498	6.895	1.902	5.516	3.371	3.184	1.156	2.65	1.233	9.125	9.016	5.690	6.548	7.214	1.582
767	n.s.	n.s.	6.529	2.950	4.844	0.277	2.537	0.506	3.09	1.673	9.150	12.940	3.130	2.461	3.667	0.401

**TABLE 3 (cont.).-** Roughhead grenadier mean catch (kg) and SD by stratum. Spanish Spring Surveys in NAFO Div. 3NO: 1997-2011. Swept area in square miles. n.s. means stratum not surveyed. 1997-2000 data are transformed from C/V *Playa de Mendoña* and 2002-2011 data are original from R/V *Vizconde de Eza*. For 2001 there are data from the two vessels.

Stratum	2005		2006		2007		2008		2009		2010		2011	
	R. grenadier Mean catch	R. grenadier SD												
353	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
354	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
355	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.225	1.732	0.000	0.000	0.000	0.000
356	0.260	0.368	0.350	0.495	0.000	0.000	0.000	0.000	0.000	0.000	0.112	0.158	0.000	0.000
357	15.785	3.090	42.575	1.407	1.907	1.661	0.845	0.813	15.888	19.160	3.872	3.495	7.236	10.047
358	0.000	0.000	0.000	0.000	0.283	0.491	0.320	0.554	0.000	0.000	0.000	0.000	0.307	0.531
359	0.103	0.217	0.000	0.000	0.000	0.000	0.000	0.000	0.066	0.187	0.000	0.000	0.000	0.000
360	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
374	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
375	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
376	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
377	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
378	0.620	0.877	0.260	0.367	0.000	0.000	0.000	0.000	0.000	0.000	1.190	1.683	0.440	0.622
379	26.975	17.006	112.080	148.252	6.478	1.813	2.890	3.881	7.140	3.620	17.113	1.615	1.928	0.987
380	194.750	113.491	130.294	89.342	22.490	15.712	17.273	4.847	7.528	9.153	25.550	0.212	53.845	58.202
381	17.450	11.384	101.485	42.122	0.000	0.000	0.000	0.000	0.000	0.000	0.180	0.255	119.680	136.076
382	0.235	0.286	0.200	0.400	0.163	0.325	0.000	0.000	0.000	0.000	0.000	0.000	7.475	14.950
721	1.173	1.609	3.005	3.415	0.830	-	0.876	1.238	4.205	0.777	1.045	0.500	0.825	0.403
722	5.415	4.985	0.901	1.005	3.945	1.902	2.791	2.044	0.744	0.723	3.524	2.226	1.850	0.775
723	21.528	23.869	20.810	0.919	4.417	2.512	3.870	1.032	17.995	3.825	4.124	0.208	3.628	0.046
724	9.500	8.514	4.712	4.322	8.758	3.297	8.207	6.406	9.931	4.258	5.179	0.841	3.333	4.521
725	104.420	135.072	48.050	48.578	12.730	7.742	4.897	4.530	5.905	1.633	10.950	3.041	8.924	7.812
726	34.900	-	21.017	5.822	40.814	22.325	40.678	6.418	34.425	22.026	41.600	18.950	21.875	20.259
727	18.650	12.657	14.650	7.283	10.079	6.405	6.987	1.466	7.942	-	12.450	1.344	6.797	1.280
728	35.400	-	25.250	1.626	17.355	10.953	8.250	4.738	7.339	2.176	19.705	7.630	6.261	0.496
752	21.590	3.677	25.200	10.041	19.404	27.432	60.305	30.342	30.594	14.292	80.550	70.216	4.564	3.318
753	63.320	12.629	14.863	7.973	31.106	20.248	115.900	93.904	117.400	-	n.s.	n.s.	35.399	45.067
754	13.957	14.981	5.055	7.148	53.404	6.218	44.000	20.648	145.500	-	69.059	94.821	11.416	4.152
755	34.228	9.637	22.257	27.055	28.680	19.358	27.444	18.211	11.291	-	10.439	-	14.548	11.444
756	23.675	12.693	26.875	13.103	85.074	23.863	33.632	38.465	39.305	29.380	9.176	5.199	40.313	53.807
757	17.758	8.403	7.399	6.079	46.664	28.618	25.709	21.867	18.680	1.584	11.806	0.840	42.742	11.742
758	34.043	1.042	111.965	139.915	18.887	14.302	43.538	28.655	43.930	8.726	8.685	1.761	12.365	14.737
759	46.825	37.512	2.410	3.242	n.s.	n.s.	29.143	17.052	48.810	-	14.235	7.304	6.929	7.495
760	57.790	20.492	42.124	31.854	27.625	32.492	4.170	1.222	22.890	6.633	6.665	4.967	16.436	21.688
761	37.553	18.438	18.333	4.104	20.654	18.550	16.773	10.221	10.145	1.916	90.079	121.086	7.827	1.084
762	11.938	8.432	22.712	29.399	n.s.	n.s.	22.299	3.500	10.315	7.898	24.257	19.012	33.367	21.681
763	13.424	3.205	29.163	24.236	n.s.	n.s.	14.405	3.867	n.s.	n.s.	n.s.	n.s.	10.090	8.233
764	1.161	1.642	3.134	0.699	22.213	23.443	11.735	15.308	20.543	-	n.s.	n.s.	9.600	13.062
765	7.252	2.647	15.093	19.846	5.328	4.173	6.893	6.777	6.485	0.898	1.854	1.815	1.684	1.843
766	6.355	4.794	3.463	2.077	n.s.	n.s.	8.243	4.294	1.946	0.629	1.982	1.431	3.113	3.248
767	4.646	-	2.495	3.528	n.s.	n.s.	9.859	4.599	n.s.	n.s.	n.s.	n.s.	2.410	1.160

**TABLE 4.**- Stratified mean catches (Kg) by stratum and year and SD by year for roughhead grenadier (1997-2011). n.s. means stratum not surveyed. 1997-2000 data are transformed from C/V *Playa de Mendumia*. 2002-2011 data are original from R/V *Vizconde de Eza*. For 2001 there are data from the two vessels.

Stratum	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
353	0.00	0.00	0.00	0.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
354	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
355	0.00	0.00	0.00	6.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	90.65	0.00	0.00
356	0.00	20.01	0.88	3.96	0.00	0.00	5.41	57.58	12.22	16.45	0.00	0.00	0.00	5.24	0.00
357	16.54	0.00	35.46	77.62	27.88	172.20	227.14	4.35	2588.74	6982.30	312.69	138.58	2605.63	634.93	1186.70
358	0.00	0.00	52.35	0.00	0.00	112.50	0.00	1.50	0.00	0.00	63.75	72.00	0.00	0.00	69.00
359	0.00	0.00	0.00	0.00	0.00	17.19	0.00	201.66	43.30	0.00	0.00	0.00	27.89	0.00	0.00
360	0.00	0.00	0.00	0.00	1085.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
374	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
375	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
376	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
377	0.00	0.00	0.00	0.00	0.00	27.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
378	62.12	0.00	41.42	20.71	0.00	1.04	0.00	0.00	86.18	36.07	0.00	0.00	0.00	165.41	61.16
379	0.00	1.20	2.53	54.14	45.58	28.09	13.14	419.76	2859.35	11880.48	686.67	306.29	756.84	1813.98	204.37
380	21.00	0.00	0.33	15.12	3.27	0.72	8.16	26750.40	18696.00	12508.18	2159.04	1658.16	722.64	2452.80	5169.12
381	0.00	0.00	0.00	10.67	0.00	0.00	0.00	596.88	2512.80	14613.84	0.00	0.00	0.00	25.92	17233.92
382	0.00	0.00	0.00	1.46	0.00	0.80	0.00	27.44	80.61	68.60	55.74	0.00	0.00	0.00	2563.93
721	0.00	49.25	158.81	52.79	14.30	81.25	0.00	225.71	76.21	195.33	53.95	56.91	273.29	67.89	53.63
722	2.15	331.80	324.65	400.45	207.06	918.12	362.46	380.48	454.86	75.64	331.38	234.44	62.45	296.02	155.40
723	0.00	39.59	366.82	443.22	264.28	108.50	1297.35	1558.14	3336.84	3225.55	684.56	599.85	2789.23	639.22	562.26
724	69.67	131.95	456.02	512.18	930.83	1240.00	617.52	1332.50	1178.00	584.29	1085.93	1017.67	1231.44	642.13	413.23
725	0.00	8.04	390.44	1327.83	148.53	278.25	39.53	9703.58	10964.10	5045.25	1336.60	514.19	620.03	1149.75	937.02
726	n.s.	159.36	525.28	1060.37	309.91	190.80	0.00	4310.28	2512.80	1513.22	2938.57	2928.82	2478.60	2995.20	1574.96
727	34.32	18.80	63.42	239.94	20.43	54.72	2102.40	1603.20	1790.40	1406.40	967.58	670.70	762.43	1195.20	652.51
728	65.14	71.71	1403.72	565.40	78.35	48.32	2546.70	1220.70	2761.20	1969.50	1353.69	643.50	572.44	1536.99	488.36
752	1157.57	1070.59	1183.22	3492.80	790.67	255.45	10204.90	12393.91	2828.29	3301.20	2541.92	7899.96	4007.81	10552.05	597.82
753	2142.81	4917.66	3924.96	6783.22	4356.11	745.20	7872.90	8809.23	8738.16	2051.03	4292.56	15994.20	16201.20	n.s.	4885.06
754	12634.78	10930.12	4747.16	12024.20	13610.16	17721.00	11808.00	6003.90	2512.26	909.81	9612.63	7920.00	26190.00	12430.53	2054.88
755	n.s.	16203.89	9034.94	10853.88	9350.67	562.10	7007.00	5643.46	13177.59	8568.82	11041.67	10565.84	4347.04	4019.02	5600.98
756	328.45	696.44	2993.85	1803.02	1292.39	1186.75	723.16	986.92	2391.18	2714.38	8592.42	3396.83	3969.81	926.78	4071.61
757	2129.06	4009.91	907.40	9047.90	2083.97	1657.50	874.65	1314.78	1811.32	754.65	4759.73	2622.27	1905.36	1204.21	4359.68
758	4635.47	7626.33	4573.78	5478.08	6840.86	14013.45	4063.95	3262.55	3370.26	11084.54	1869.81	4310.26	4349.07	859.82	1224.09
759	n.s.	8431.85	2856.38	4168.89	7507.47	8794.75	9916.16	5077.46	5946.78	306.01	n.s.	3701.10	6198.87	1807.85	879.98
760	603.06	1364.74	617.48	2734.73	1108.03	1840.30	6260.10	11777.15	8899.66	6487.10	4254.25	642.18	3525.06	1026.33	2531.07
761	3282.93	4307.46	2837.19	1972.49	2653.07	914.85	2180.25	4379.31	6421.48	3134.94	3531.75	2868.10	1734.80	15403.51	1338.33
762	5147.01	6374.36	3678.97	4025.85	601.93	68.90	3105.80	3334.44	2530.75	4814.94	n.s.	4727.39	2186.78	5142.38	7073.70
763	n.s.	2824.01	2987.69	3790.53	4005.31	319.73	709.05	7307.91	3503.58	7611.41	n.s.	3759.62	n.s.	n.s.	2633.58
764	639.32	482.68	404.37	442.67	555.00	2005.00	1942.00	4079.00	116.10	313.40	2221.30	1173.45	2054.30	n.s.	960.00
765	1457.26	834.98	768.48	961.66	543.70	334.80	1289.60	662.97	899.19	1871.53	660.61	854.73	804.14	229.83	208.75
766	1114.72	992.95	794.36	458.47	381.98	1314.00	819.36	1038.74	915.12	498.67	n.s.	1186.92	280.15	285.41	448.27
767	n.s.	1031.65	765.33	400.82	488.25	1445.70	494.54	579.31	734.07	394.21	n.s.	1557.72	n.s.	n.s.	380.78
TOTAL	35543	72931	46898	73232	59305	56459	76491	125045	114749	114938	65409	82022	90748	67508	70574
$\bar{Y}$	3.81	7.05	4.53	7.08	5.73	5.46	7.40	12.09	11.10	11.11	6.93	7.93	9.15	6.97	6.82
S.D.	0.31	0.61	0.45	0.85	0.77	1.51	1.42	2.17	1.38	1.89	0.83	1.11	0.40	2.10	1.61

**TABLE 5.**- Survey estimates (by the swept area method) of roughhead grenadier biomass (t) and SD by stratum and year in NAFO Div. 3NO. n.s. means stratum not surveyed. 1997-2000 data are transformed from C/V *Playa de Mendumá*. 2002-2011 data are original from R/V *Vizconde de Eza*. For 2001 there are data from the two vessels. The last row presents the biomass obtained from the length distribution.

Stratum	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
353	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
354	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
355	0	0	0	1	0	0	0	0	0	0	0	0	8	0	0
356	0	2	0	0	0	0	0	5	1	1	0	0	0	0	0
357	1	0	3	6	2	14	20	0	223	573	26	12	448	56	105
358	0	0	5	0	0	10	0	0	0	0	5	6	0	0	6
359	0	0	0	0	0	2	0	18	4	0	0	0	3	0	0
360	0	0	0	0	90	0	0	0	0	0	0	0	0	0	0
374	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
376	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
377	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
378	6	0	4	2	0	0	0	0	8	3	0	0	0	15	5
379	0	0	0	5	4	2	1	34	242	1006	57	27	66	159	18
380	2	0	0	1	0	0	1	2418	1635	1094	180	147	63	208	452
381	0	0	0	1	0	0	0	53	216	1278	0	0	0	2	1482
382	0	0	0	0	0	0	0	2	7	6	5	0	0	0	228
721	0	5	13	4	1	7	0	20	7	17	5	5	24	6	5
722	0	31	28	37	18	78	33	35	39	6	29	23	6	26	14
723	0	3	32	36	22	9	113	136	287	273	57	53	248	57	52
724	6	13	41	44	79	110	55	125	105	50	93	92	106	56	36
725	0	1	34	126	13	25	3	863	928	434	119	45	54	99	78
726	0	15	47	96	25	18	0	383	223	135	257	260	217	258	140
727	4	2	5	23	2	5	193	138	157	125	81	61	68	100	58
728	6	7	121	54	7	4	226	136	254	175	120	58	50	128	43
752	106	94	102	339	75	22	892	1160	239	293	226	726	350	879	51
753	200	452	343	624	407	65	688	810	777	182	382	1446	1394	n.s.	434
754	1149	1041	460	1233	1395	1549	1086	562	223	81	854	728	2328	1105	183
755	n.s.	1571	871	1007	899	50	633	531	1171	762	981	980	374	335	494
756	30	62	266	178	113	104	65	91	206	237	764	312	353	82	395
757	210	389	78	847	179	147	79	121	161	67	416	237	167	109	369
758	434	701	428	522	629	1246	367	305	300	985	166	396	387	76	109
759	n.s.	789	263	397	679	782	881	475	520	27	n.s.	335	551	161	81
760	57	128	55	260	97	161	576	1065	778	577	366	57	308	91	237
761	313	418	270	178	236	81	194	396	580	270	314	268	154	1347	113
762	502	618	350	398	54	6	276	287	225	414	n.s.	442	194	450	629
763	n.s.	260	288	364	364	28	68	672	315	677	n.s.	362	n.s.	n.s.	227
764	62	44	36	41	46	170	176	357	10	27	197	106	177	n.s.	85
765	141	80	69	95	49	28	115	59	79	158	59	80	71	20	19
766	109	104	73	43	38	113	73	92	80	44	n.s.	109	25	25	40
767	n.s.	93	72	38	45	129	43	53	65	34	n.s.	146	n.s.	n.s.	33
TOTAL	3340	6922	4357	7000	5568	4968	6860	11402	10064	10010	5760	7521	8193	5850	6219
S.D.	290	644	431	807	700	1365	1316	2043	1236	1716	695	1028	286	1773	1508

**TABLE 6.-** Length weight relationships used for the estimation of roughhead grenadier biomass. The equation is  $Weight = a(l + 0.25)^b$ <sup>b</sup>  
 Spanish Spring Surveys in NAFO Div. 3NO: 1997-2011. The parameters for indeterminate individuals were estimated  
 from total number of individuals (males + females + indeterminate individuals). *E* means Error.

		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Males	a	0.0687 E = 0.3814	0.1094 E = 0.0983	0.0650 E = 0.1812	0.0554 E = 0.1403	0.1095 E = 0.0689	0.0882 E = 0.0485	0.1141 E = 0.0628	0.0904 E = 0.0792	0.0600 E = 0.1014	0.1058 E = 0.1087	0.1287 E = 0.0819	0.1096 E = 0.1182	0.0811 E = 0.1408	0.0825 E = 0.2275	0.1732 E = 0.1574
	b	3.0453 E = 0.1340	2.8929 E = 0.0937	3.1085 E = 0.0728	3.1411 E = 0.0547	2.8906 E = 0.0279	2.9672 E = 0.0200	2.8805 E = 0.0262	2.9517 E = 0.0311	3.1090 E = 0.0389	2.9150 E = 0.0442	2.8342 E = 0.0317	2.8880 E = 0.0473	2.9975 E = 0.0554	3.0003 E = 0.0892	2.7508 E = 0.0620
		R <sup>2</sup> = 0.979 N = 26	R <sup>2</sup> = 0.995 N = 201	R <sup>2</sup> = 0.984 N = 102	R <sup>2</sup> = 0.989 N = 269	R <sup>2</sup> = 0.997 N = 116	R <sup>2</sup> = 0.998 N = 292	R <sup>2</sup> = 0.997 N = 496	R <sup>2</sup> = 0.995 N = 525	R <sup>2</sup> = 0.994 N = 411	R <sup>2</sup> = 0.995 N = 463	R <sup>2</sup> = 0.995 N = 473	R <sup>2</sup> = 0.994 N = 468	R <sup>2</sup> = 0.988 N = 217	R <sup>2</sup> = 0.968 N = 210	R <sup>2</sup> = 0.982 N = 415
Females	a	0.0937 E = 0.1618	0.0673 E = 0.0938	0.1185 E = 0.1245	0.0790 E = 0.0608	0.2843 E = 0.3519	0.0856 E = 0.0950	0.1132 E = 0.0441	0.0804 E = 0.0351	0.0802 E = 0.0499	0.3193 E = 0.3878	0.1128 E = 0.0627	0.1472 E = 0.1062	0.1202 E = 0.0194	0.1225 E = 0.0986	0.1350 E = 0.0955
	b	2.9395 E = 0.0531	3.0551 E = 0.0315	2.8739 E = 0.0422	3.0192 E = 0.0209	2.5397 E = 0.1311	2.9736 E = 0.0336	2.8864 E = 0.0156	2.9919 E = 0.0123	2.9950 E = 0.0175	2.5373 E = 0.1408	2.8872 E = 0.0218	2.7984 E = 0.072	2.8658 E = 0.0551	2.8545 E = 0.0341	2.8396 E = 0.0334
		R <sup>2</sup> = 0.993 N = 41	R <sup>2</sup> = 0.993 N = 450	R <sup>2</sup> = 0.987 N = 233	R <sup>2</sup> = 0.997 N = 548	R <sup>2</sup> = 0.901 N = 168	R <sup>2</sup> = 0.992 N = 477	R <sup>2</sup> = 0.998 N = 788	R <sup>2</sup> = 0.999 N = 806	R <sup>2</sup> = 0.998 N = 626	R <sup>2</sup> = 0.918 N = 737	R <sup>2</sup> = 0.997 N = 907	R <sup>2</sup> = 0.994 N = 792	R <sup>2</sup> = 0.997 N = 465	R <sup>2</sup> = 0.992 N = 449	R <sup>2</sup> = 0.992 N = 769
Indet.	a	0.0909 E = 0.1433	0.0907 E = 0.0484	0.1185 E = 0.1043	0.0736 E = 0.0625	0.1862 E = 0.1546	0.1040 E = 0.0542	0.1104 E = 0.0425	0.0924 E = 0.0578	0.0833 E = 0.0451	0.2939 E = 0.3531	0.1168 E = 0.0399	0.1116 E = 0.0578	0.1179 E = 0.0743	0.1506 E = 0.1350	0.1368 E = 0.0727
	b	2.9494 E = 0.0475	2.9631 E = 0.0164	2.8773 E = 0.0357	3.0409 E = 0.0218	2.6892 E = 0.0603	2.9096 E = 0.0196	2.8949 E = 0.0151	2.9466 E = 0.0207	2.9832 E = 0.0161	2.5661 E = 0.1301	2.8774 E = 0.0143	2.8880 E = 0.0204	2.8704 E = 0.0271	2.7834 E = 0.0492	2.8363 E = 0.0263
		R <sup>2</sup> = 0.994 N = 67	R <sup>2</sup> = 0.998 N = 655	R <sup>2</sup> = 0.990 N = 338	R <sup>2</sup> = 0.997 N = 820	R <sup>2</sup> = 0.977 N = 292	R <sup>2</sup> = 0.997 N = 787	R <sup>2</sup> = 0.998 N = 1288	R <sup>2</sup> = 0.997 N = 1379	R <sup>2</sup> = 0.998 N = 1078	R <sup>2</sup> = 0.928 N = 1218	R <sup>2</sup> = 0.998 N = 1401	R <sup>2</sup> = 0.998 N = 1263	R <sup>2</sup> = 0.995 N = 710	R <sup>2</sup> = 0.982 N = 665	R <sup>2</sup> = 0.995 N = 1210

**TABLE 7.-** Roughhead grenadier length distribution per sex and year. Estimated numbers per haul stratified mean catches. Spanish Spring Survey in NAFO 3NO: 1997-2011. Indet. means indeterminate. 1997-2000 data are transformed from C/V *Playa de Menduña* data. 2002-2011 data are original R/V *Vizconde de Eza* data. For 2001 there are data from the two vessels. (\*) indicates untransformed data.

Length (cm.)	1997				1998				1999				2000				2001				
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	
1.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
2.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.036	0.036	0.036	
3.5	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.023	0.023	0.007	0.021	0.050	0.079	0.079	
4.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.061	0.009	0.070	0.016	0.063	0.000	0.079	0.059	0.013	0.029	0.102	
5.5	0.000	0.042	0.000	0.042	0.000	0.000	0.030	0.030	0.265	0.186	0.021	0.472	0.191	0.393	0.000	0.584	0.110	0.143	0.010	0.263	
6.5	0.000	0.000	0.000	0.000	0.005	0.013	0.007	0.024	0.105	0.171	0.003	0.280	0.153	0.169	0.027	0.349	0.074	0.087	0.000	0.161	
7.5	0.000	0.055	0.000	0.055	0.061	0.025	0.002	0.087	0.213	0.296	0.000	0.509	0.253	0.159	0.000	0.412	0.051	0.060	0.000	0.111	
8.5	0.087	0.070	0.000	0.156	0.201	0.152	0.000	0.353	0.191	0.253	0.000	0.444	0.172	0.174	0.000	0.346	0.121	0.134	0.000	0.254	
9.5	0.006	0.054	0.000	0.060	0.238	0.208	0.000	0.446	0.301	0.331	0.000	0.631	0.379	0.358	0.000	0.737	0.158	0.090	0.000	0.248	
10.5	0.055	0.097	0.000	0.152	0.725	0.612	0.000	1.337	0.702	0.754	0.000	1.456	0.420	0.461	0.000	0.881	0.189	0.215	0.000	0.404	
11.5	0.095	0.211	0.000	0.305	0.537	0.691	0.000	1.227	1.232	1.447	0.000	2.679	0.955	1.019	0.000	1.974	0.319	0.371	0.000	0.690	
12.5	0.141	0.208	0.000	0.349	0.399	0.471	0.000	0.870	1.156	1.582	0.000	2.738	1.506	1.653	0.000	3.159	0.476	0.550	0.000	1.026	
13.5	0.236	0.332	0.000	0.568	0.522	0.484	0.000	1.006	0.643	0.889	0.000	1.532	1.993	2.471	0.000	4.464	0.959	1.182	0.000	2.141	
14.5	0.639	0.529	0.000	1.168	0.899	0.678	0.000	1.576	0.498	0.569	0.000	1.067	1.107	1.762	0.000	2.869	1.521	1.543	0.000	3.063	
15.5	0.699	0.836	0.000	1.536	1.242	1.013	0.000	2.255	0.728	0.565	0.000	1.293	0.879	0.972	0.000	1.851	1.453	1.650	0.000	3.104	
16.5	0.471	0.554	0.000	1.025	1.159	1.006	0.000	2.165	0.698	0.663	0.000	1.361	0.709	0.771	0.000	1.480	0.844	1.158	0.000	2.003	
17.5	0.251	0.374	0.000	0.625	0.920	0.943	0.000	1.862	0.480	0.561	0.000	1.041	0.626	0.789	0.000	1.415	0.773	0.628	0.000	1.401	
18.5	0.244	0.319	0.000	0.563	0.455	0.707	0.000	1.162	0.245	0.318	0.000	0.563	0.427	0.589	0.000	1.016	0.646	0.464	0.000	1.111	
19.5	0.263	0.288	0.000	0.551	0.380	0.429	0.000	0.808	0.151	0.181	0.000	0.332	0.191	0.412	0.000	0.603	0.283	0.317	0.000	0.600	
20.5	0.235	0.280	0.000	0.514	0.235	0.303	0.000	0.538	0.067	0.131	0.000	0.198	0.057	0.250	0.000	0.308	0.071	0.361	0.000	0.432	
21.5	0.159	0.198	0.000	0.358	0.118	0.359	0.000	0.476	0.022	0.116	0.000	0.138	0.028	0.274	0.000	0.302	0.025	0.148	0.000	0.173	
22.5	0.042	0.212	0.000	0.254	0.035	0.237	0.000	0.272	0.008	0.079	0.000	0.087	0.007	0.167	0.000	0.174	0.001	0.095	0.000	0.095	
23.5	0.022	0.165	0.000	0.187	0.025	0.223	0.000	0.248	0.002	0.071	0.000	0.074	0.006	0.118	0.000	0.124	0.000	0.082	0.000	0.082	
24.5	0.000	0.116	0.000	0.116	0.002	0.203	0.000	0.204	0.001	0.074	0.000	0.075	0.000	0.143	0.000	0.143	0.000	0.061	0.000	0.061	
25.5	0.002	0.082	0.000	0.084	0.001	0.187	0.000	0.188	0.001	0.058	0.000	0.059	0.005	0.092	0.000	0.097	0.002	0.058	0.000	0.060	
26.5	0.000	0.046	0.000	0.046	0.003	0.076	0.000	0.079	0.002	0.045	0.000	0.047	0.002	0.091	0.000	0.094	0.004	0.040	0.000	0.044	
27.5	0.000	0.014	0.000	0.014	0.009	0.071	0.000	0.080	0.000	0.038	0.000	0.038	0.004	0.070	0.000	0.074	0.000	0.026	0.000	0.026	
28.5	0.000	0.033	0.000	0.033	0.000	0.066	0.000	0.066	0.000	0.033	0.000	0.033	0.000	0.057	0.000	0.057	0.002	0.040	0.000	0.041	
29.5	0.008	0.022	0.000	0.030	0.007	0.051	0.000	0.057	0.002	0.033	0.000	0.035	0.000	0.034	0.000	0.034	0.000	0.027	0.000	0.027	
30.5	0.000	0.014	0.000	0.014	0.001	0.054	0.000	0.054	0.000	0.013	0.000	0.013	0.000	0.037	0.000	0.037	0.000	0.032	0.000	0.032	
31.5	0.000	0.012	0.000	0.012	0.000	0.044	0.000	0.044	0.000	0.014	0.000	0.014	0.000	0.025	0.000	0.025	0.000	0.029	0.000	0.029	
32.5	0.000	0.011	0.000	0.011	0.000	0.023	0.000	0.023	0.000	0.010	0.000	0.010	0.000	0.018	0.000	0.018	0.000	0.021	0.000	0.021	
33.5	0.000	0.008	0.000	0.008	0.000	0.016	0.000	0.016	0.000	0.013	0.000	0.013	0.000	0.004	0.000	0.004	0.000	0.008	0.000	0.008	
34.5	0.000	0.000	0.000	0.000	0.015	0.000	0.015	0.000	0.004	0.000	0.004	0.000	0.011	0.000	0.011	0.000	0.008	0.000	0.008		
35.5	0.000	0.001	0.000	0.001	0.000	0.010	0.000	0.010	0.000	0.003	0.000	0.003	0.000	0.002	0.000	0.002	0.000	0.008	0.000	0.008	
36.5	0.000	0.005	0.000	0.005	0.000	0.007	0.000	0.007	0.000	0.001	0.000	0.001	0.000	0.019	0.000	0.019	0.000	0.004	0.000	0.004	
37.5	0.000	0.003	0.000	0.003	0.000	0.003	0.000	0.003	0.000	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.003	
38.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.002	0.000	0.002	0.000	0.000	0.000	0.000	
39.5	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
40.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.002	0.000	0.001	0.000	0.001	
41.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
42.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Total	3.654	5.191	0.000	8.845	8.176	9.385	0.039	17.600	7.712	9.565	0.033	17.309	10.087	13.633	0.050	23.770	8.149	9.677	0.125	17.952	
Nº samples (*):					14				47				53				57				22
Nº Ind. (*):	416	609	2	1027	1647	2421	8	4076	2501	3512	7	6020	1957	2967	4	4928	149	208	10	367	
Sampled catch:					89				338				379				318				107
Range (*):					5.5-37				3.5-39.5				4-38				3-40.5				2.5-29
Total catch:					626				892				650				1080				453
Total hauls (*):					128				124				114				118				123

**TABLE 7 (cont.).-** Roughhead grenadier length distribution per sex and year. Estimated numbers per haul stratified mean catches. Spanish Spring Survey in NAFO 3NO: 1997-2011. Indet. means indeterminate. 1997-2000 data are transformed from C/V *Playa de Mendumá* data. 2002-2011 data are original R/V *Vizconde de Eza* data. For 2001 there are data from the two vessels. (\*) indicates untransformed data.

Length (cm.)	2002				2003				2004				2005				2006				
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	
1.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
2.5	0.031	0.009	0.012	0.052	0.016	0.000	0.019	0.035	0.000	0.000	0.026	0.026	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
3.5	0.112	0.036	0.047	0.195	0.219	0.069	0.074	0.362	0.070	0.024	0.651	0.746	0.030	0.026	0.289	0.344	0.120	0.012	0.141	0.273	
4.5	0.088	0.039	0.017	0.144	0.045	0.052	0.015	0.113	0.089	0.006	0.080	0.176	0.046	0.030	0.106	0.182	0.155	0.063	0.007	0.225	
5.5	0.198	0.208	0.009	0.414	0.353	0.390	0.000	0.743	0.161	0.124	0.005	0.290	0.015	0.038	0.000	0.053	0.069	0.063	0.000	0.132	
6.5	0.058	0.102	0.005	0.165	0.653	0.652	0.000	1.305	0.649	0.567	0.000	1.216	0.499	0.510	0.000	1.009	0.374	0.448	0.004	0.826	
7.5	0.095	0.080	0.000	0.175	0.215	0.256	0.000	0.470	0.223	0.196	0.000	0.419	0.324	0.308	0.000	0.633	0.386	0.312	0.000	0.698	
8.5	0.087	0.149	0.000	0.235	0.401	0.491	0.000	0.892	0.617	0.550	0.000	1.167	0.339	0.383	0.009	0.732	0.216	0.140	0.000	0.356	
9.5	0.084	0.063	0.000	0.147	0.254	0.233	0.000	0.487	0.592	0.860	0.000	1.452	0.393	0.671	0.000	1.064	0.378	0.317	0.000	0.695	
10.5	0.110	0.098	0.000	0.208	0.351	0.320	0.000	0.671	0.442	0.694	0.000	1.136	0.452	0.603	0.000	1.055	0.194	0.331	0.000	0.524	
11.5	0.109	0.185	0.000	0.294	0.220	0.407	0.000	0.627	0.715	0.673	0.000	1.387	0.939	1.113	0.000	2.052	0.381	0.428	0.000	0.810	
12.5	0.201	0.243	0.000	0.444	0.312	0.354	0.000	0.665	0.684	0.650	0.000	1.335	0.740	0.907	0.000	1.647	0.493	0.653	0.000	1.146	
13.5	0.378	0.284	0.000	0.662	0.482	0.542	0.000	1.024	0.678	0.716	0.000	1.393	0.631	0.792	0.000	1.423	0.846	0.672	0.000	1.519	
14.5	0.603	0.552	0.000	1.155	0.751	0.859	0.000	1.610	0.932	0.683	0.000	1.615	0.560	0.795	0.000	1.355	0.637	0.790	0.000	1.427	
15.5	0.627	0.904	0.000	1.531	1.246	1.169	0.000	2.414	1.046	0.901	0.000	1.947	0.621	0.821	0.000	1.442	0.748	0.912	0.000	1.660	
16.5	0.612	0.928	0.000	1.540	1.525	1.389	0.000	2.914	1.197	1.295	0.000	2.492	0.781	0.646	0.000	1.427	0.704	0.522	0.000	1.225	
17.5	0.343	0.729	0.000	1.072	0.793	1.335	0.000	2.128	1.429	1.270	0.000	2.699	1.170	1.050	0.000	2.220	0.876	0.619	0.000	1.495	
18.5	0.244	0.502	0.000	0.746	0.384	0.806	0.000	1.190	1.051	1.573	0.000	2.623	1.129	0.991	0.000	2.120	0.884	0.834	0.000	1.718	
19.5	0.202	0.505	0.000	0.707	0.234	0.656	0.000	0.890	0.476	1.333	0.000	1.808	0.668	1.323	0.000	1.991	0.695	1.050	0.000	1.745	
20.5	0.115	0.387	0.000	0.502	0.171	0.356	0.000	0.527	0.334	0.875	0.000	1.209	0.258	1.113	0.000	1.371	0.387	1.165	0.000	1.552	
21.5	0.028	0.349	0.000	0.377	0.005	0.257	0.000	0.262	0.157	0.681	0.000	0.839	0.066	0.708	0.000	0.774	0.154	1.101	0.000	1.255	
22.5	0.017	0.299	0.000	0.316	0.019	0.289	0.000	0.308	0.027	0.597	0.000	0.624	0.061	0.546	0.000	0.607	0.038	0.923	0.000	0.961	
23.5	0.008	0.152	0.000	0.160	0.008	0.187	0.000	0.195	0.028	0.437	0.000	0.466	0.009	0.551	0.000	0.559	0.013	0.748	0.000	0.761	
24.5	0.004	0.102	0.000	0.106	0.000	0.108	0.000	0.108	0.018	0.391	0.000	0.409	0.016	0.481	0.000	0.497	0.008	0.483	0.000	0.491	
25.5	0.000	0.070	0.000	0.070	0.000	0.111	0.000	0.111	0.000	0.266	0.000	0.266	0.009	0.259	0.000	0.268	0.000	0.387	0.000	0.387	
26.5	0.000	0.114	0.000	0.114	0.000	0.109	0.000	0.109	0.005	0.265	0.000	0.270	0.006	0.173	0.000	0.179	0.000	0.266	0.000	0.266	
27.5	0.000	0.149	0.000	0.149	0.000	0.100	0.000	0.100	0.000	0.178	0.000	0.178	0.000	0.235	0.000	0.235	0.013	0.091	0.000	0.105	
28.5	0.000	0.086	0.000	0.086	0.000	0.104	0.000	0.104	0.000	0.154	0.000	0.154	0.000	0.106	0.000	0.106	0.005	0.120	0.000	0.125	
29.5	0.000	0.063	0.000	0.063	0.000	0.083	0.000	0.083	0.005	0.185	0.000	0.190	0.000	0.119	0.000	0.119	0.000	0.112	0.000	0.112	
30.5	0.000	0.059	0.000	0.059	0.000	0.073	0.000	0.073	0.000	0.146	0.000	0.146	0.000	0.120	0.000	0.120	0.000	0.105	0.000	0.105	
31.5	0.000	0.062	0.000	0.062	0.000	0.018	0.000	0.018	0.000	0.086	0.000	0.086	0.000	0.083	0.000	0.083	0.000	0.107	0.000	0.107	
32.5	0.000	0.023	0.000	0.023	0.000	0.040	0.000	0.040	0.000	0.059	0.000	0.059	0.000	0.029	0.000	0.029	0.000	0.080	0.000	0.080	
33.5	0.000	0.034	0.000	0.034	0.000	0.016	0.000	0.016	0.000	0.062	0.000	0.062	0.000	0.025	0.000	0.025	0.000	0.060	0.000	0.060	
34.5	0.000	0.000	0.000	0.000	0.005	0.000	0.005	0.005	0.000	0.040	0.000	0.040	0.000	0.046	0.000	0.046	0.000	0.000	0.000	0.000	
35.5	0.000	0.041	0.000	0.041	0.000	0.030	0.000	0.030	0.000	0.018	0.000	0.018	0.000	0.016	0.000	0.016	0.000	0.015	0.000	0.015	
36.5	0.000	0.018	0.000	0.018	0.000	0.010	0.000	0.010	0.000	0.013	0.000	0.013	0.000	0.016	0.000	0.016	0.000	0.004	0.000	0.004	
37.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
38.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
39.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.009	0.000	0.009	0.000	0.009	0.000	0.000	0.000	0.000	
40.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
41.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
42.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Total	4.352	7.622	0.090	12.063	8.655	11.875	0.108	20.638	11.623	16.579	0.763	28.964	9.762	15.641	0.403	25.807	8.775	13.935	0.152	22.862	
Nº samples (*):					48				43				59				61				57
Nº Ind. (*):	604	1018	18	1640	1089	1500	21	2610	1535	2270	157	3962	1250	2028	57	3335	1140	1930	20	3090	
Sampled catch:					754				931				1742				1499				1629
Range (*):					2-36.5				2.5-36				2.5-39				3-39				3-36
Total catch:					877				990				2055				1781				1779
Total hauls (*):					125				118				120				119				120

**TABLE 7 (cont.).-** Roughhead grenadier length distribution per sex and year. Estimated numbers per haul stratified mean catches. Spanish Spring Survey in NAFO 3NO: 1997-2011. Indet. means indeterminate. 1997-2000 data are transformed from C/V *Playa de Mendoña* data. 2002-2011 data are original R/V *Vizconde de Eza* data. For 2001 there are data from the two vessels. (\*) indicates untransformed data.

Length (cm.)	2007				2008				2009				2010				2011				
	Males	Females	Indet.	Total	Males	Females	Indet.	Total													
1.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
2.5	0.000	0.000	0.027	0.027	0.005	0.005	0.005	0.015	0.000	0.000	0.015	0.015	0.000	0.000	0.151	0.151	0.000	0.000	0.000	0.000	
3.5	0.090	0.041	0.623	0.754	0.072	0.025	0.051	0.148	0.006	0.000	0.233	0.239	0.041	0.007	0.209	0.257	0.005	0.005	0.148	0.158	
4.5	0.010	0.027	0.089	0.126	0.022	0.010	0.000	0.032	0.023	0.005	0.022	0.050	0.011	0.011	0.000	0.022	0.006	0.000	0.014	0.020	
5.5	0.054	0.077	0.000	0.131	0.054	0.074	0.000	0.127	0.029	0.041	0.043	0.114	0.074	0.045	0.007	0.125	0.027	0.013	0.000	0.040	
6.5	0.266	0.278	0.005	0.550	0.318	0.249	0.012	0.580	0.134	0.173	0.053	0.361	0.461	0.334	0.000	0.795	0.070	0.069	0.000	0.139	
7.5	0.089	0.083	0.000	0.173	0.038	0.099	0.000	0.137	0.076	0.138	0.000	0.213	0.102	0.075	0.000	0.177	0.043	0.052	0.000	0.095	
8.5	0.129	0.355	0.000	0.485	0.191	0.161	0.000	0.352	0.220	0.261	0.000	0.481	0.132	0.059	0.000	0.191	0.152	0.149	0.000	0.301	
9.5	0.315	0.204	0.000	0.520	0.214	0.235	0.000	0.449	0.167	0.211	0.000	0.378	0.087	0.131	0.000	0.218	0.141	0.141	0.000	0.282	
10.5	0.301	0.249	0.000	0.550	0.192	0.343	0.000	0.535	0.235	0.324	0.000	0.559	0.164	0.300	0.000	0.464	0.048	0.087	0.000	0.134	
11.5	0.364	0.414	0.000	0.778	0.227	0.331	0.000	0.559	0.275	0.421	0.000	0.696	0.173	0.229	0.000	0.403	0.067	0.103	0.013	0.183	
12.5	0.264	0.414	0.000	0.678	0.278	0.398	0.005	0.681	0.225	0.514	0.000	0.739	0.166	0.200	0.000	0.366	0.122	0.126	0.000	0.248	
13.5	0.370	0.397	0.000	0.768	0.388	0.286	0.000	0.674	0.358	0.583	0.000	0.941	0.301	0.301	0.000	0.602	0.274	0.276	0.000	0.550	
14.5	0.475	0.511	0.000	0.987	0.484	0.462	0.000	0.946	0.592	0.834	0.000	1.426	0.282	0.413	0.000	0.696	0.260	0.380	0.000	0.640	
15.5	0.459	0.457	0.000	0.916	0.663	0.501	0.000	1.164	0.633	0.692	0.000	1.325	0.444	0.424	0.000	0.868	0.472	0.337	0.000	0.808	
16.5	0.470	0.471	0.000	0.941	0.662	0.547	0.000	1.209	0.812	0.879	0.000	1.691	0.593	0.461	0.000	1.055	0.574	0.507	0.000	1.081	
17.5	0.317	0.323	0.000	0.639	0.358	0.521	0.000	0.878	0.476	0.849	0.000	1.324	0.491	0.520	0.000	1.011	0.598	0.419	0.000	1.017	
18.5	0.403	0.318	0.000	0.721	0.331	0.332	0.000	0.664	0.267	0.487	0.000	0.754	0.259	0.529	0.000	0.789	0.547	0.522	0.000	1.069	
19.5	0.568	0.373	0.000	0.941	0.354	0.368	0.000	0.722	0.270	0.330	0.000	0.600	0.254	0.246	0.000	0.500	0.254	0.520	0.000	0.774	
20.5	0.274	0.407	0.000	0.681	0.176	0.266	0.000	0.442	0.101	0.408	0.000	0.509	0.052	0.321	0.000	0.374	0.148	0.540	0.000	0.689	
21.5	0.105	0.492	0.000	0.597	0.135	0.339	0.000	0.474	0.095	0.426	0.000	0.522	0.068	0.256	0.000	0.324	0.067	0.283	0.000	0.350	
22.5	0.067	0.422	0.000	0.489	0.037	0.510	0.000	0.547	0.048	0.535	0.000	0.583	0.020	0.270	0.000	0.290	0.032	0.208	0.000	0.239	
23.5	0.020	0.437	0.000	0.456	0.053	0.581	0.000	0.634	0.027	0.390	0.000	0.418	0.016	0.321	0.000	0.337	0.000	0.282	0.000	0.282	
24.5	0.000	0.442	0.000	0.442	0.000	0.525	0.000	0.525	0.000	0.665	0.000	0.665	0.035	0.354	0.000	0.388	0.014	0.271	0.000	0.286	
25.5	0.014	0.299	0.000	0.314	0.000	0.522	0.000	0.522	0.000	0.551	0.000	0.551	0.000	0.476	0.000	0.476	0.000	0.350	0.000	0.350	
26.5	0.000	0.261	0.000	0.261	0.008	0.288	0.000	0.296	0.000	0.519	0.000	0.519	0.000	0.436	0.000	0.436	0.000	0.307	0.000	0.307	
27.5	0.000	0.219	0.000	0.219	0.000	0.329	0.000	0.329	0.003	0.474	0.000	0.477	0.011	0.335	0.000	0.346	0.000	0.269	0.000	0.269	
28.5	0.005	0.095	0.000	0.101	0.000	0.172	0.000	0.172	0.000	0.154	0.000	0.154	0.000	0.201	0.000	0.201	0.000	0.207	0.000	0.207	
29.5	0.000	0.115	0.000	0.115	0.000	0.138	0.000	0.138	0.000	0.177	0.000	0.177	0.000	0.201	0.000	0.201	0.000	0.163	0.000	0.163	
30.5	0.000	0.089	0.000	0.089	0.000	0.059	0.000	0.059	0.000	0.087	0.000	0.087	0.000	0.095	0.000	0.095	0.000	0.102	0.000	0.102	
31.5	0.000	0.031	0.000	0.031	0.000	0.036	0.000	0.036	0.000	0.052	0.000	0.052	0.000	0.061	0.000	0.061	0.000	0.042	0.000	0.042	
32.5	0.000	0.016	0.000	0.016	0.000	0.037	0.000	0.037	0.000	0.024	0.000	0.024	0.000	0.043	0.000	0.043	0.000	0.029	0.000	0.029	
33.5	0.000	0.033	0.000	0.033	0.000	0.041	0.000	0.041	0.000	0.029	0.000	0.029	0.000	0.028	0.000	0.028	0.000	0.014	0.000	0.014	
34.5	0.000	0.014	0.000	0.014	0.000	0.013	0.000	0.013	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.009	0.000	0.007	0.000	0.007	
35.5	0.000	0.000	0.000	0.000	0.000	0.035	0.000	0.035	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
36.5	0.000	0.000	0.000	0.000	0.000	0.019	0.000	0.019	0.000	0.008	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
37.5	0.000	0.000	0.000	0.000	0.000	0.016	0.000	0.016	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.011	0.000	0.008	0.000	0.008	
38.5	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.010	0.000	0.023	0.000	0.023	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
39.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
40.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
41.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
42.5	0.000	0.000	0.000	0.000	0.000	0.010	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Total	5.432	8.365	0.744	14.541	5.260	8.890	0.073	14.223	5.072	11.265	0.372	16.709	4.238	7.705	0.367	12.310	3.923	6.787	0.174	10.884	
Nº samples (*):					46				57				46				48				62
Nº Ind. (*):	671	1149	83	1903	786	1373	14	2173	430	940	45	1415	580	1030	48	1658	470	859	27	1356	
Sampled catch:					1009				1213				723				929				862
Range (*):					2.5-				2.5-				1.5-				2-37.5				3-37
Total catch:					1009				1213				945				940				1049
Total hauls (*):					110				122				110				95				122

**TABLE 8.-** Thorny skate mean catch (kg) and SD by stratum. Spanish Spring Surveys in NAFO Div. 3NO: 1997-2011. Swept area in square miles. n.s. means stratum not surveyed. 1997-2000 data are transformed from C/V *Playa de Menduiña*, and 2002-2011 data are original from R/V *Vizconde de Eza*. For 2001 there are data from the two vessels.

Stratum	1997		1998		1999		2000		2001		2002		2003		2004			
	T. skate catch	Mean	T. skate SD	T. skate catch	Mean	T. skate SD	T. skate Mean catch	T. skate SD										
353	6.21	1.73		26.06	11.09		319.35	89.29	149.95	44.45	351.90	283.060	356.30	215.772	78.36	33.796	53.70	33.407
354	1.20	1.12		68.23	87.97		20.21	28.57	82.44	34.12	67.63	19.515	89.80	80.809	40.33	40.683	147.46	134.348
355	27.19	22.38		3.43	0.23		12.40	17.54	33.14	41.19	20.60	11.031	2.67	3.723	19.53	22.422	25.07	4.384
356	2.72	0.61		0.69	0.42		1.55	0.28	2.21	0.51	0.29	0.410	1.55	2.192	5.19	7.333	16.31	7.732
357	1.32	1.56		1.69	1.37		2.98	1.74	0.00	-	2.35	1.669	2.00	2.828	2.25	3.182	46.05	28.438
358	1.56	1.52		0.99	1.17		2.81	2.22	15.49	17.71	4.05	6.974	11.47	19.861	21.14	25.809	42.24	13.838
359	7.47	2.92		7.93	5.95		13.25	14.73	71.73	91.22	15.45	24.999	72.34	148.583	25.86	23.965	46.56	62.119
360	10.11	11.61		17.95	23.86		67.68	55.88	132.15	142.67	67.67	79.827	20.63	24.987	35.53	29.397	93.53	78.305
374	2.29	1.19		0.41	0.61		5.91	0.14	0.71	1.00	0.73	1.032	0.30	0.520	0.00	0.000	1.89	2.673
375	0.84	-		1.97	1.81		6.57	0.77	3.48	0.40	0.51	0.878	1.40	2.425	2.29	2.414	10.32	5.359
376	15.16	16.62		24.06	35.48		75.94	45.71	68.84	52.60	22.67	19.650	12.59	12.093	10.77	12.802	89.67	62.815
377	1.28	-		0.32	0.31		1.04	0.18	0.57	0.81	5.70	2.270	1.17	1.655	0.46	0.438	7.23	9.648
378	2.07	0.59		2.07	2.40		8.32	5.01	5.54	3.31	0.16	0.099	0.02	0.021	2.98	4.076	26.20	17.402
379	0.54	0.24		1.69	1.09		0.76	0.53	1.10	0.51	0.00	0.000	5.45	1.909	0.01	0.014	13.61	-
380	1.27	0.37		4.50	2.78		3.96	1.95	1.26	1.17	1.35	0.209	4.42	4.476	4.09	0.559	119.25	56.639
381	6.17	7.81		7.65	0.24		1.03	0.28	3.94	0.36	0.74	0.419	0.71	0.071	3.40	3.394	70.60	17.536
382	0.64	0.95		1.02	0.85		4.44	3.05	5.36	0.80	1.77	1.265	0.65	0.257	0.00	0.000	6.28	6.990
721	2.28	0.18		8.17	9.33		1.16	1.64	6.54	6.27	0.00	0.000	0.00	0.000	10.63	7.481	2.70	3.818
722	7.54	10.66		38.34	45.25		10.79	15.26	13.79	6.07	10.10	5.374	0.00	0.000	0.91	0.021	0.00	0.000
723	6.32	7.25		2.62	0.40		3.77	3.99	4.05	4.37	2.40	2.121	0.60	0.849	5.19	4.865	4.85	1.913
724	2.06	2.45		12.29	3.71		9.83	6.80	2.33	3.29	67.38	91.221	25.85	14.354	26.32	0.226	0.00	0.000
725	0.27	0.31		3.89	-		3.63	5.13	4.11	5.03	1.91	1.235	1.82	2.574	1.31	0.506	44.22	57.679
726	n.s.	n.s.		0.26	0.37		0.89	1.25	9.68	10.56	1.32	1.381	3.30	1.980	0.00	0.000	0.00	0.000
727	3.37	-		6.02	2.84		2.83	0.63	0.58	0.60	0.64	0.905	3.05	4.313	96.69	91.097	10.16	10.380
728	1.45	1.11		4.68	2.68		4.91	3.22	1.85	1.22	1.65	1.531	6.69	9.454	17.23	8.301	2.69	3.804
752	4.25	2.51		58.62	78.69		2.24	1.11	1.20	1.30	8.93	5.430	0.49	0.686	183.35	38.537	0.00	0.000
753	13.56	17.61		4.01	5.19		17.13	19.39	3.01	4.26	13.11	15.123	12.90	18.243	7.99	1.775	0.00	0.000
754	45.32	25.00		112.25	14.65		16.66	23.56	54.96	23.46	98.76	126.307	595.65	819.042	3.35	4.731	0.00	0.000
755	n.s.	n.s.		7.84	5.34		0.00	0.00	2.74	5.48	0.14	0.283	0.00	0.000	0.00	0.000	1.26	2.188
756	13.91	-		63.66	36.74		16.21	19.54	3.69	3.64	7.04	3.761	9.36	7.835	133.16	187.864	0.00	0.000
757	32.68	39.04		67.38	86.94		10.74	10.98	55.50	20.36	15.10	19.889	1.55	2.192	6.99	9.885	0.00	0.000
758	52.54	7.90		235.97	239.70		117.49	142.60	55.87	79.01	184.47	248.733	32.45	41.224	4.29	6.060	0.00	0.000
759	n.s.	n.s.		114.12	147.96		0.43	0.26	41.86	56.21	4.93	3.950	3.70	5.233	3.89	-	0.00	0.000
760	0.00	-		6.73	3.05		9.20	11.14	12.97	11.59	6.47	5.282	1.89	2.673	30.68	30.717	0.00	0.000
761	59.26	86.28		17.62	10.16		0.71	0.32	10.20	13.55	66.60	89.661	11.90	4.667	0.00	0.000	2.69	0.912
762	50.77	82.75		5.24	4.35		8.28	10.49	5.54	7.83	0.00	0.000	0.00	0.000	2.99	1.570	1.15	1.619
763	n.s.	n.s.		0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
764	14.84	5.60		12.47	10.81		0.00	0.00	0.00	0.00	2.45	3.465	0.00	0.000	42.05	45.064	4.35	6.152
765	14.88	18.39		12.08	15.52		0.00	0.00	1.35	1.91	1.03	1.462	0.71	1.004	2.23	-	0.00	0.000
766	15.23	9.42		0.51	0.20		0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.000	0.00	0.000	0.67	0.940
767	n.s.	n.s.		2.83	3.87		0.00	0.00	0.00	0.00	0.00	0.000	0.00	0.000	1.13	0.215	2.41	3.401

**TABLE 8 (cont.).-** Thorny skate mean catch (kg) and SD by stratum. Spanish Spring Surveys in NAFO Div. 3NO: 1997-2011. Swept area in square miles. n.s. means stratum not surveyed. 1997-2000 data are transformed from C/V *Playa de Mendoña*, and 2002-2011 data are original from R/V *Vizconde de Eza*. For 2001 there are data from the two vessels.

Stratum	2005		2006		2007		2008		2009		2010		2011	
	T. skate Mean catch	T. skate SD												
353	40.97	40.382	48.27	33.965	23.20	8.044	55.00	18.097	39.40	49.720	32.65	38.254	21.75	17.878
354	48.19	40.450	62.30	19.336	52.94	32.333	127.21	63.410	53.70	35.954	20.00	2.546	22.70	7.225
355	17.80	2.628	1.51	2.128	20.47	0.990	6.00	8.485	10.80	0.566	26.03	28.949	28.30	33.976
356	10.81	2.242	19.15	18.314	4.02	2.461	10.25	14.489	30.59	27.174	21.48	24.360	22.69	12.070
357	51.88	55.763	28.29	40.007	7.02	6.365	10.56	9.397	46.26	47.489	2.10	2.970	8.07	11.406
358	72.15	80.699	5.75	6.983	76.01	65.231	17.81	5.687	17.42	15.082	21.60	30.547	15.61	1.803
359	45.11	63.415	45.28	34.608	28.01	25.576	27.28	41.820	36.17	56.574	24.75	40.888	21.97	14.373
360	59.30	63.584	74.59	59.722	46.42	42.247	40.69	26.252	27.22	33.734	34.64	45.576	18.21	15.053
374	2.70	1.082	9.84	3.118	0.00	0.000	1.81	2.553	0.00	0.000	1.92	2.708	5.67	8.019
375	12.31	10.043	34.35	17.964	35.80	59.229	9.01	4.406	5.27	5.352	1.44	2.488	1.17	2.026
376	154.50	136.423	183.56	254.026	40.71	34.911	70.05	51.740	41.19	39.191	40.33	32.789	11.78	10.838
377	29.36	30.186	61.48	33.411	1.08	1.520	32.35	2.475	2.44	3.444	7.11	4.825	7.82	6.032
378	6.10	7.264	5.86	8.280	7.48	3.055	31.62	0.820	11.87	16.787	27.23	32.145	19.33	4.285
379	32.60	16.971	181.31	256.409	33.71	20.209	11.69	3.083	15.35	21.708	4.19	4.943	20.33	23.144
380	66.74	45.199	110.30	2.687	77.10	66.320	92.75	74.741	10.38	10.215	57.37	58.611	111.27	103.655
381	52.28	28.354	72.41	8.775	5.05	7.142	16.49	20.687	0.00	0.000	0.14	0.165	20.31	14.743
382	5.06	4.563	3.41	3.064	0.00	0.000	0.48	0.950	0.00	0.000	6.79	6.520	6.38	5.390
721	6.15	8.697	0.00	0.000	0.00	-	0.00	0.000	116.69	145.250	27.81	19.219	7.23	3.804
722	6.90	9.758	0.00	0.000	3.43	4.844	14.00	19.799	1.90	2.687	2.50	3.536	5.63	7.955
723	0.00	0.000	5.41	4.226	13.23	10.529	5.31	7.502	19.28	9.228	5.46	0.438	3.05	4.313
724	4.20	5.940	0.00	0.000	7.22	10.204	4.28	6.053	3.40	4.808	10.22	14.453	2.95	4.172
725	30.95	43.775	73.01	100.261	19.87	18.314	1.95	2.755	3.23	4.561	4.61	6.495	2.44	3.451
726	0.00	-	3.66	1.237	2.11	2.984	0.65	0.919	38.98	21.107	7.20	1.358	1.98	2.800
727	7.57	7.969	0.00	0.000	10.56	4.327	8.49	12.007	111.50	-	28.85	16.007	9.29	13.138
728	0.00	-	1.32	1.860	12.85	14.107	1.63	2.298	53.78	27.400	5.56	3.196	0.00	0.000
752	0.00	0.000	0.73	1.025	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
753	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	-	n.s.	n.s.	0.00	0.000
754	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	-	0.00	0.000	0.00	0.000
755	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	-	0.00	-	0.00	0.000
756	0.00	0.000	0.01	0.008	0.00	0.000	0.00	0.000	2.46	3.479	1.73	2.447	0.00	0.000
757	0.00	0.000	0.51	0.718	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
758	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
759	0.00	0.000	0.00	0.000	n.s.	n.s.	0.00	0.000	0.00	-	0.00	0.000	0.00	0.000
760	4.43	6.265	0.00	0.000	1.65	2.333	0.00	0.000	2.92	4.130	2.70	3.818	0.00	0.000
761	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	2.80	3.960	0.00	0.000
762	0.00	0.000	1.45	2.044	n.s.	n.s.	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
763	0.00	0.000	0.00	0.000	n.s.	n.s.	0.00	0.000	n.s.	n.s.	n.s.	n.s.	0.00	0.000
764	0.00	0.000	7.90	11.172	0.00	0.000	0.00	0.000	0.00	-	n.s.	n.s.	0.00	0.000
765	0.00	0.000	4.40	6.223	3.92	5.537	1.70	2.404	0.00	0.000	0.00	0.000	0.00	0.000
766	0.00	0.000	0.00	0.000	n.s.	n.s.	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
767	0.00	-	0.00	0.000	n.s.	n.s.	0.00	0.000	n.s.	n.s.	n.s.	n.s.	0.00	0.000

**TABLE 9.-** Stratified mean catches (Kg) by stratum and year and annual SD for thorny skate (1997-2011). n.s. means stratum not surveyed. 1997-2000 data are transformed from C/V *Playa de Mendoña*. 2002-2011 data are original from R/V *Vizconde de Eza*. For 2001 there are data from the two vessels.

Stratum	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
353	1669.97	7010.90	85905.05	40337.51	94661.10	95844.70	21079.74	14444.04	11021.83	12983.73	6241.70	14795.00	10598.60	8782.85	5849.41
354	295.14	16784.41	4970.54	20279.74	16637.80	22090.80	9922.00	36275.57	11854.08	15324.98	13024.06	31294.48	13210.53	4920.00	5583.38
355	2012.42	254.06	917.88	2452.15	1524.40	197.40	1444.85	1855.18	1317.05	111.37	1514.78	444.00	799.20	1926.22	2093.83
356	127.82	32.39	72.76	104.05	13.63	72.85	243.70	766.45	507.84	900.05	188.94	481.52	1437.50	1009.33	1066.20
357	216.74	276.48	488.38	0.00	385.40	328.00	369.00	7551.46	8508.73	4639.40	1151.83	1731.02	7586.64	344.40	1322.66
358	351.96	223.34	632.19	3484.89	910.50	2580.00	4755.75	9504.23	16232.63	1293.75	17102.25	4006.43	3918.45	4860.00	3511.50
359	3142.88	3339.74	5577.75	30200.14	6505.05	30455.91	10885.26	19600.14	18990.11	19063.93	11792.21	11486.26	15225.47	10419.47	9251.17
360	28142.65	49941.51	188345.34	367770.68	188311.70	57415.52	98885.56	260307.63	165039.55	207581.48	129182.27	113253.49	75746.30	96404.31	50687.47
374	490.16	87.78	1264.01	151.68	156.22	64.20	0.00	404.46	576.73	2104.69	0.00	386.27	0.00	409.81	1213.38
375	226.76	533.56	1780.76	942.07	137.31	379.40	619.69	2796.27	3336.91	9307.95	9702.70	2442.61	1427.27	389.34	317.07
376	20225.18	32095.39	101299.43	91833.65	30244.45	16788.39	14361.84	119622.45	206104.33	244867.71	54306.47	93444.70	54943.46	53800.22	15712.79
377	127.98	31.99	103.98	56.97	569.50	117.05	46.00	723.25	2935.50	6147.50	107.50	3235.00	243.50	711.20	781.50
378	287.36	287.36	1156.26	769.70	22.24	2.09	413.87	3641.11	847.41	813.85	1039.72	4395.18	1649.93	3784.97	2686.87
379	57.26	179.13	80.48	116.74	0.00	577.70	1.06	1442.66	3455.60	19218.70	3573.26	1239.14	1627.10	443.61	2154.45
380	121.68	432.36	380.38	121.44	129.94	423.84	392.16	11448.00	6406.99	10588.80	7401.12	8904.00	996.19	5507.95	10681.44
381	887.94	1102.17	148.85	567.92	106.50	102.24	489.60	10166.40	7528.46	10426.32	727.20	2374.27	0.00	19.51	2923.92
382	220.75	350.60	1522.42	1838.77	607.79	224.32	0.00	2153.18	1734.72	1167.92	0.00	162.93	0.00	2328.97	2189.80
721	148.37	531.10	75.19	425.20	0.00	0.00	690.95	175.50	399.75	0.00	0.00	0.00	7585.01	1807.65	469.95
722	633.11	3220.86	906.51	1158.73	848.40	0.00	76.02	0.00	579.60	0.00	287.70	1176.00	159.60	210.00	472.50
723	979.42	406.26	584.98	627.32	372.00	93.00	804.45	752.22	0.00	838.78	2049.88	822.28	2987.63	846.30	472.75
724	254.82	1524.34	1219.17	288.39	8355.12	3205.40	3263.68	0.00	520.80	0.00	894.66	530.72	421.60	1267.28	365.80
725	28.43	408.29	381.16	431.94	200.22	191.10	137.81	4642.58	3250.12	7665.53	2086.35	204.54	338.63	483.79	256.20
726	n.s.	18.61	63.79	697.27	95.29	237.60	0.00	0.00	0.00	263.16	151.92	46.80	2806.20	518.40	142.56
727	323.68	577.66	271.70	56.11	61.43	292.80	9281.76	975.36	726.24	0.00	1013.76	815.04	10704.00	2769.46	891.84
728	113.26	364.73	382.97	143.97	128.62	521.43	1343.94	209.82	0.00	102.57	1001.91	126.75	4194.45	433.68	0.00
752	556.95	7679.60	293.39	157.17	1170.32	63.54	24018.85	0.00	0.00	94.98	0.00	0.00	0.00	0.00	0.00
753	1871.36	553.60	2364.16	416.05	1808.52	1780.20	1101.93	0.00	0.00	0.00	0.00	0.00	0.00	n.s.	0.00
754	8157.59	20204.97	2999.07	9892.06	17777.36	107217.00	602.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
755	n.s.	3017.84	0.00	1054.11	54.48	0.00	0.00	486.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00
756	1404.41	6429.24	1636.83	372.60	711.08	945.36	13449.16	0.00	0.00	0.61	0.00	0.00	248.46	174.73	0.00
757	3333.76	6873.20	1095.75	5660.73	1540.20	158.10	712.98	0.00	0.00	51.77	0.00	0.00	0.00	0.00	0.00
758	5201.49	23360.86	11631.70	5530.78	18262.55	3212.55	424.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
759	n.s.	14493.27	54.38	5316.60	626.68	469.90	494.03	0.00	0.00	0.00	n.s.	0.00	0.00	0.00	0.00
760	0.00	1036.58	1417.48	1997.36	995.61	291.06	4724.72	0.00	682.22	0.00	254.10	0.00	449.68	415.80	0.00
761	10133.38	3013.25	121.20	1744.82	11388.60	2034.90	0.00	459.14	0.00	0.00	0.00	0.00	0.00	478.80	0.00
762	10763.16	1111.32	1755.68	1173.93	0.00	0.00	633.88	242.74	0.00	306.34	n.s.	0.00	0.00	0.00	0.00
763	n.s.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	n.s.	0.00	n.s.	n.s.	0.00
764	1484.03	1246.54	0.00	0.00	245.00	0.00	4204.50	435.00	0.00	790.00	0.00	0.00	0.00	n.s.	0.00
765	1844.78	1498.40	0.00	167.85	128.17	88.04	276.52	0.00	0.00	545.60	485.46	210.80	0.00	0.00	0.00
766	2192.53	73.89	0.00	0.00	0.00	0.00	0.00	95.76	0.00	0.00	n.s.	0.00	0.00	0.00	0.00
767	n.s.	446.89	0.00	0.00	0.00	0.00	178.22	379.99	0.00	0.00	n.s.	0.00	n.s.	n.s.	0.00
TOTAL	108029	211054	421902	598341	405693	348466	230330	511557	472557	577201	265282	298009	219305	205468	121098.43
Ȳ	11.57	20.41	40.79	57.86	39.23	33.69	22.27	49.46	45.69	55.81	28.10	28.82	22.10	21.22	11.71
S.D.	1.74	3.26	4.32	9.12	6.99	10.91	2.57	5.82	7.00	11.22	3.57	2.92	3.13	4.11	1.32

**TABLE 10.-** Survey estimates (by the swept area method) of thorny skate biomass (t) and SD by stratum and year in NAFO Div. 3NO. n.s. means stratum not surveyed. 1997-2000 data are transformed from C/V *Playa de Mendoña* data. 2002-2011 data are original from R/V *Vizconde de Eza*. For 2001 there are data from the two vessels.

Stratum	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
353	139	603	7159	3397	8321	8050	1895	1284	938	1049	515	1301	922	781	503
354	25	1413	457	1708	1479	1860	882	3154	1009	1264	1074	2721	1174	437	486
355	173	23	80	211	127	17	126	162	117	9	126	40	69	168	180
356	11	3	6	9	1	6	22	69	44	75	16	41	126	90	93
357	20	23	41	0	32	27	32	660	732	381	96	149	1305	31	118
358	31	19	54	306	79	224	423	864	1396	111	1396	348	344	432	305
359	273	287	460	2577	567	2663	963	1734	1634	1564	965	1007	1347	887	803
360	2399	4307	15392	30696	15548	5010	8775	22537	14197	16855	10867	9680	6666	8293	4271
374	42	7	104	13	13	6	0	35	50	178	0	33	0	36	108
375	20	46	151	77	12	32	56	249	287	768	800	220	125	32	26
376	1789	2779	8312	7653	2618	1473	1277	10257	17559	20092	4583	8279	4852	4782	1334
377	11	3	9	5	50	10	4	67	253	520	9	278	22	61	67
378	27	25	101	66	2	0	37	324	75	68	89	366	144	336	224
379	6	15	7	10	0	51	0	117	293	1627	298	108	142	39	195
380	12	38	32	10	13	38	34	1035	560	926	617	791	87	466	934
381	80	96	13	48	9	9	43	904	648	912	61	208	0	2	252
382	19	31	126	147	52	20	0	187	152	100	0	14	0	200	195
721	13	52	6	36	0	0	61	16	35	0	0	0	663	161	41
722	59	301	79	107	73	0	7	0	50	0	26	114	14	19	42
723	93	35	51	51	31	8	70	66	0	71	171	73	266	75	43
724	23	148	108	25	711	285	290	0	46	0	77	48	36	111	31
725	3	47	33	41	17	17	12	413	275	659	185	18	30	42	21
726	n.s.	2	6	63	8	22	0	0	0	23	13	4	245	45	13
727	35	50	23	5	5	25	853	84	63	0	84	74	951	231	79
728	11	35	33	14	11	46	119	23	0	9	89	11	367	36	0
752	51	671	25	15	111	6	2100	0	0	8	0	0	0	0	0
753	175	51	207	38	169	156	96	0	0	0	0	0	0	n.s.	0
754	742	1924	291	1015	1822	9374	55	0	0	0	0	0	0	0	0
755	n.s.	293	0	98	5	0	0	46	0	0	0	0	0	0	0
756	129	571	145	37	62	83	1216	0	0	0	0	0	22	16	0
757	329	666	94	530	132	14	64	0	0	5	0	0	0	0	0
758	487	2148	1088	527	1679	286	38	0	0	0	0	0	0	0	0
759	n.s.	1356	5	506	57	42	44	0	0	0	n.s.	0	0	0	0
760	0	97	126	190	87	25	434	0	60	0	22	0	39	37	0
761	965	292	12	158	1012	181	0	42	0	0	0	0	0	42	0
762	1050	108	167	116	0	0	56	21	0	26	n.s.	0	0	0	0
763	n.s.	0	0	0	0	0	0	0	0	0	n.s.	0	n.s.	n.s.	0
764	144	115	0	0	20	0	380	38	0	68	0	0	0	n.s.	0
765	179	143	0	17	12	7	25	0	0	46	43	20	0	0	0
766	214	8	0	0	0	0	0	9	0	0	n.s.	0	0	0	0
767	n.s.	40	0	0	0	0	16	35	0	0	n.s.	0	n.s.	n.s.	0
TOTAL	9779	18875	35004	50521	34948	30072	20508	44429	40473	47415	22223	25946	19959	17887	10365
S.D.	1544	3114	3736	7991	10687	9699	2371	5281	6171	9207	2898	2641	2745	3539	1193

**TABLE 11.-** Length weight relationships used for the estimation of thorny skate biomass. The equation is  $Weight = a(l + 0.5)^b$ . Spanish Spring Surveys in NAFO Div. 3NO: 1997-2011. The parameters for indeterminate individuals were estimated from the total number of individuals (males + females + indeterminate individuals).  $E$  means Error.

		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Males	a	0.0069 E = 0.202	0.0064 E = 0.259	0.0250 E = 0.456	0.0506 E = 0.192	0.0085 E = 0.091	0.0075 E = 0.086	0.0079 E = 0.101	0.0060 E = 0.0978	0.0066 E = 0.0954	0.0079 E = 0.1133	0.0091 E = 0.0916	0.0167 E = 0.2359	0.0104 E = 0.1092	0.0083 E = 0.0793	0.0025 E = 0.4129
	b	3.0921 E = 0.052	3.1161 E = 0.075	2.769 E = 0.124	2.5954 E = 0.049	3.0171 E = 0.022	3.0566 E = 0.022	3.0414 E = 0.026	3.1122 E = 0.0251	3.0882 E = 0.0246	3.0399 E = 0.0292	3.0106 E = 0.0232	2.8671 E = 0.0605	2.9701 E = 0.0274	3.0370 E = 0.0206	3.3262 E = 0.1021
		$R^2 = 0.987$ N = 107	$R^2 = 0.986$ N = 67	$R^2 = 0.967$ N = 33	$R^2 = 0.983$ N = 199	$R^2 = 0.998$ N = 104	$R^2 = 0.996$ N = 374	$R^2 = 0.995$ N = 426	$R^2 = 0.996$ N = 368	$R^2 = 0.996$ N = 360	$R^2 = 0.997$ N = 7492	$R^2 = 0.996$ N = 346	$R^2 = 0.985$ N = 350	$R^2 = 0.995$ N = 185	$R^2 = 0.997$ N = 279	$R^2 = 0.957$ N = 186
Females	a	0.0072 E = 0.182	0.0098 E = 0.169	0.0294 E = 0.268	0.0313 E = 0.223	0.0073 E = 0.119	0.0061 E = 0.074	0.0067 E = 0.101	0.0071 E = 0.1072	0.0036 E = 0.2213	0.0104 E = 0.2042	0.0082 E = 0.0952	0.0062 E = 0.1131	0.0103 E = 0.2201	0.0076 E = 0.0807	0.0090 E = 0.1255
	b	3.0927 E = 0.046	2.9904 E = 0.046	2.7383 E = 0.072	2.7247 E = 0.058	3.0509 E = 0.031	3.1115 E = 0.019	3.0887 E = 0.026	3.0752 E = 0.0281	3.2435 E = 0.0575	2.9798 E = 0.0534	3.0399 E = 0.0246	3.1108 E = 0.0294	2.9806 E = 0.0563	3.0677 E = 0.0213	3.0157 E = 0.0309
		$R^2 = 0.991$ N = 113	$R^2 = 0.992$ N = 89	$R^2 = 0.985$ N = 53	$R^2 = 0.977$ N = 245	$R^2 = 0.996$ N = 77	$R^2 = 0.997$ N = 425	$R^2 = 0.996$ N = 477	$R^2 = 0.994$ N = 442	$R^2 = 0.980$ N = 396	$R^2 = 0.990$ N = 583	$R^2 = 0.996$ N = 423	$R^2 = 0.997$ N = 368	$R^2 = 0.982$ N = 193	$R^2 = 0.997$ N = 276	$R^2 = 0.995$ N = 176
Indet.	a	0.0068 E = 0.144	0.0072 E = 0.166	0.0267 E = 0.205	0.0423 E = 0.174	0.0077 E = 0.079	0.0066 E = 0.068	0.0075 E = 0.095	0.0071 E = 0.0091	0.0057 E = 0.1146	0.0091 E = 0.1258	0.0081 E = 0.0800	0.0110 E = 0.1796	0.0093 E = 0.1144	0.0082 E = 0.0674	0.0035 E = 0.3269
	b	3.099 E = 0.037	3.073 E = 0.046	2.7618 E = 0.055	2.6472 E = 0.045	3.0411 E = 0.020	3.0887 E = 0.018	3.0552 E = 0.025	3.0730 E = 0.0237	3.1287 E = 0.0298	3.0086 E = 0.0326	3.0385 E = 0.0206	2.9684 E = 0.0468	3.0029 E = 0.0293	3.0418 E = 0.0176	3.2437 E = 0.0827
		$R^2 = 0.993$ N = 220	$R^2 = 0.991$ N = 156	$R^2 = 0.990$ N = 86	$R^2 = 0.984$ N = 444	$R^2 = 0.998$ N = 181	$R^2 = 0.998$ N = 800	$R^2 = 0.995$ N = 903	$R^2 = 0.996$ N = 810	$R^2 = 0.993$ N = 756	$R^2 = 0.995$ N = 1075	$R^2 = 0.997$ N = 769	$R^2 = 0.991$ N = 178	$R^2 = 0.994$ N = 378	$R^2 = 0.997$ N = 555	$R^2 = 0.964$ N = 362

**TABLE 12.-** Thorny skate length distribution per sex and year. Estimated numbers per haul stratified mean catches. Spanish Spring Survey in NAFO 3NO: 1997-2011. Indet. means indeterminate. 1997-2000 data are transformed from C/V *Playa de Menduña*. 2002-2011 data are original R/V *Vizconde de Eza* data. For 2001 there are data from the two vessels. (\*) indicates untransformed data.

Length (cm.)	1997				1998				1999				2000				2001			
	Males	Females	Indet.	Total																
12	0.014	0.394	0.000	0.408	0.014	0.000	0.000	0.014	0.000	0.013	0.006	0.019	0.006	0.006	0.000	0.013	0.000	0.011	0.000	0.011
14	0.254	0.224	0.000	0.479	0.021	0.013	0.000	0.034	0.035	0.053	0.006	0.094	0.037	0.047	0.000	0.083	0.063	0.089	0.000	0.153
16	0.116	0.272	0.000	0.388	0.026	0.009	0.000	0.035	0.049	0.092	0.006	0.148	0.271	0.106	0.000	0.377	0.026	0.088	0.000	0.114
18	0.033	0.132	0.000	0.165	0.042	0.294	0.000	0.336	0.075	0.120	0.000	0.195	0.039	0.065	0.000	0.104	0.018	0.020	0.000	0.038
20	0.331	0.112	0.000	0.443	0.164	0.030	0.000	0.193	0.094	0.115	0.000	0.209	0.197	0.167	0.000	0.364	0.033	0.010	0.000	0.043
22	0.728	0.202	0.000	0.930	0.337	0.886	0.000	1.223	0.115	0.091	0.000	0.206	0.058	0.135	0.000	0.193	0.008	0.042	0.000	0.050
24	0.635	0.670	0.000	1.305	1.239	0.171	0.000	1.410	0.176	0.073	0.000	0.249	0.178	0.175	0.000	0.353	0.000	0.037	0.000	0.037
26	0.416	0.781	0.000	1.197	0.314	0.238	0.000	0.552	0.305	0.240	0.000	0.545	0.290	0.206	0.000	0.496	0.045	0.019	0.000	0.064
28	0.064	0.282	0.000	0.346	0.217	0.268	0.000	0.485	0.143	0.321	0.000	0.464	0.217	0.174	0.000	0.391	0.000	0.070	0.000	0.070
30	0.044	0.037	0.000	0.080	0.095	0.069	0.000	0.164	0.060	0.041	0.000	0.102	0.028	0.038	0.000	0.066	0.023	0.040	0.000	0.063
32	0.033	0.038	0.000	0.071	0.071	0.156	0.000	0.227	0.105	0.091	0.000	0.196	0.048	0.054	0.000	0.101	0.029	0.077	0.000	0.106
34	0.068	0.085	0.000	0.153	0.190	0.217	0.000	0.407	0.165	0.112	0.000	0.277	0.119	0.105	0.000	0.224	0.075	0.140	0.000	0.215
36	0.131	0.067	0.000	0.197	0.160	0.295	0.000	0.454	0.205	0.237	0.000	0.442	0.170	0.105	0.000	0.275	0.124	0.255	0.000	0.379
38	0.086	0.141	0.000	0.227	0.256	0.217	0.000	0.472	0.294	0.371	0.000	0.665	0.228	0.265	0.000	0.493	0.184	0.249	0.000	0.434
40	0.123	0.058	0.000	0.181	0.168	0.242	0.000	0.410	0.431	0.483	0.000	0.914	0.300	0.322	0.000	0.621	0.400	0.497	0.000	0.897
42	0.092	0.097	0.000	0.189	0.254	0.241	0.000	0.494	0.676	0.634	0.000	1.310	0.410	0.498	0.000	0.908	0.343	0.372	0.000	0.715
44	0.172	0.129	0.000	0.301	0.291	0.191	0.000	0.482	0.737	0.720	0.000	1.458	0.549	0.617	0.000	1.166	0.396	0.575	0.000	0.971
46	0.165	0.100	0.000	0.265	0.169	0.309	0.000	0.478	0.546	0.787	0.010	1.343	0.629	0.762	0.000	1.391	0.474	0.576	0.000	1.049
48	0.066	0.064	0.000	0.130	0.211	0.378	0.000	0.589	0.608	0.541	0.000	1.149	1.035	0.690	0.000	1.725	0.452	0.623	0.000	1.075
50	0.089	0.156	0.000	0.245	0.260	0.286	0.000	0.546	0.709	0.580	0.000	1.290	0.745	0.730	0.000	1.475	0.548	0.473	0.000	1.021
52	0.098	0.181	0.000	0.279	0.231	0.216	0.000	0.447	0.605	0.665	0.000	1.270	0.847	0.726	0.000	1.573	0.618	0.582	0.000	1.199
54	0.064	0.118	0.000	0.182	0.122	0.265	0.000	0.388	0.418	0.436	0.000	0.854	0.702	0.623	0.000	1.325	0.452	0.580	0.000	1.032
56	0.078	0.139	0.000	0.217	0.292	0.341	0.000	0.633	0.411	0.413	0.000	0.824	0.814	0.849	0.000	1.663	0.672	0.381	0.000	1.053
58	0.055	0.071	0.000	0.126	0.186	0.211	0.000	0.397	0.378	0.379	0.000	0.757	0.700	0.605	0.000	1.305	0.377	0.448	0.000	0.825
60	0.200	0.105	0.000	0.305	0.222	0.290	0.000	0.512	0.523	0.523	0.000	1.047	0.562	0.581	0.000	1.143	0.342	0.434	0.000	0.776
62	0.066	0.227	0.000	0.293	0.188	0.227	0.000	0.415	0.364	0.379	0.000	0.743	0.548	0.532	0.000	1.080	0.197	0.349	0.000	0.547
64	0.103	0.079	0.000	0.182	0.403	0.276	0.000	0.679	0.350	0.388	0.000	0.739	0.621	0.600	0.000	1.221	0.392	0.389	0.000	0.781
66	0.116	0.206	0.000	0.322	0.213	0.327	0.000	0.540	0.289	0.339	0.000	0.628	0.317	0.842	0.000	1.159	0.233	0.561	0.000	0.794
68	0.074	0.127	0.000	0.200	0.119	0.331	0.000	0.449	0.439	0.397	0.000	0.836	0.387	0.621	0.000	1.008	0.228	0.580	0.000	0.808
70	0.075	0.116	0.000	0.191	0.066	0.257	0.000	0.323	0.334	0.393	0.000	0.726	0.398	0.799	0.000	1.197	0.274	0.401	0.000	0.675
72	0.040	0.079	0.000	0.119	0.188	0.124	0.000	0.312	0.301	0.343	0.000	0.644	0.398	0.585	0.000	0.983	0.218	0.438	0.000	0.656
74	0.044	0.151	0.000	0.195	0.187	0.125	0.000	0.312	0.179	0.268	0.000	0.447	0.434	0.505	0.000	0.939	0.327	0.342	0.000	0.668
76	0.000	0.098	0.000	0.098	0.085	0.058	0.000	0.144	0.288	0.192	0.000	0.480	0.373	0.405	0.000	0.778	0.481	0.335	0.000	0.816
78	0.067	0.100	0.000	0.167	0.047	0.033	0.000	0.080	0.251	0.282	0.000	0.533	0.317	0.282	0.000	0.599	0.334	0.189	0.000	0.523
80	0.027	0.000	0.000	0.027	0.045	0.012	0.000	0.057	0.161	0.092	0.000	0.253	0.209	0.167	0.000	0.377	0.171	0.196	0.000	0.367
82	0.005	0.055	0.000	0.059	0.050	0.009	0.000	0.060	0.196	0.027	0.000	0.224	0.166	0.077	0.000	0.243	0.131	0.067	0.000	0.198
84	0.005	0.000	0.000	0.005	0.010	0.000	0.000	0.010	0.066	0.028	0.000	0.093	0.109	0.040	0.000	0.149	0.109	0.011	0.000	0.120
86	0.029	0.000	0.000	0.029	0.000	0.031	0.000	0.031	0.050	0.006	0.000	0.056	0.087	0.066	0.000	0.153	0.142	0.014	0.000	0.157
88	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.009	0.116	0.010	0.000	0.126	0.031	0.010	0.000	0.041
90	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.001	0.000	0.015	0.046	0.000	0.000	0.046	0.009	0.000	0.000	0.009
92	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.017	0.003	0.000	0.020	0.023	0.000	0.000	0.023	0.011	0.000	0.000	0.011
94	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.011	0.000	0.000	0.000	0.000
96	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.022	0.000	0.000	0.022	0.000	0.000	0.000	0.000
98	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.001	0.000	0.004	0.003	0.000	0.008
100	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
102	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
104	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
106	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
108	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	0.000	0.000	0.000	0.000																

**TABLE 12 (cont.).-** Thorny skate length distribution per sex and year. Estimated numbers per haul stratified mean catches. Spanish Spring Survey in NAFO 3NO: 1997-2011. Indet. means indeterminate. 1997-2000 data are transformed from C/V *Playa de Mendoña*. 2002-2011 data are original R/V *Vizconde de Eza* data. For 2001 there are data from the two vessels. (\*) indicates untransformed data.

Length (cm.)	2002				2003				2004				2005				2006			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
12	0.035	0.021	0.000	0.056	0.007	0.000	0.000	0.007	0.038	0.019	0.000	0.057	0.030	0.015	0.000	0.045	0.009	0.005	0.000	0.014
14	0.089	0.192	0.005	0.285	0.026	0.043	0.000	0.069	0.090	0.076	0.000	0.166	0.030	0.039	0.000	0.070	0.036	0.022	0.000	0.059
16	0.125	0.181	0.000	0.305	0.016	0.011	0.000	0.027	0.036	0.058	0.000	0.094	0.034	0.013	0.000	0.047	0.014	0.013	0.000	0.027
18	0.094	0.320	0.000	0.415	0.040	0.035	0.000	0.075	0.061	0.059	0.000	0.120	0.085	0.070	0.000	0.155	0.025	0.010	0.000	0.036
20	0.049	0.096	0.000	0.146	0.059	0.008	0.000	0.067	0.076	0.062	0.000	0.138	0.053	0.045	0.000	0.098	0.041	0.085	0.000	0.126
22	0.034	0.074	0.000	0.109	0.050	0.056	0.000	0.106	0.078	0.057	0.000	0.135	0.066	0.064	0.000	0.130	0.090	0.078	0.000	0.168
24	0.014	0.027	0.000	0.041	0.007	0.020	0.000	0.027	0.095	0.048	0.000	0.143	0.116	0.117	0.000	0.233	0.039	0.113	0.000	0.153
26	0.023	0.047	0.000	0.070	0.027	0.000	0.000	0.027	0.085	0.042	0.000	0.127	0.128	0.089	0.000	0.217	0.054	0.049	0.000	0.103
28	0.021	0.044	0.000	0.065	0.040	0.019	0.000	0.059	0.064	0.047	0.000	0.111	0.123	0.120	0.000	0.243	0.066	0.154	0.000	0.220
30	0.060	0.056	0.000	0.115	0.038	0.023	0.000	0.061	0.129	0.133	0.000	0.263	0.149	0.115	0.000	0.264	0.059	0.173	0.000	0.232
32	0.059	0.105	0.000	0.164	0.145	0.095	0.000	0.239	0.217	0.133	0.000	0.349	0.158	0.247	0.000	0.405	0.086	0.260	0.000	0.346
34	0.082	0.336	0.000	0.419	0.096	0.078	0.000	0.174	0.200	0.244	0.000	0.444	0.180	0.136	0.000	0.316	0.142	0.211	0.000	0.353
36	0.180	0.151	0.000	0.331	0.175	0.137	0.000	0.312	0.295	0.284	0.000	0.579	0.241	0.338	0.000	0.579	0.194	0.219	0.000	0.413
38	0.344	0.333	0.000	0.677	0.209	0.172	0.000	0.382	0.332	0.422	0.000	0.755	0.266	0.255	0.000	0.521	0.226	0.164	0.000	0.390
40	0.733	0.617	0.000	1.350	0.295	0.399	0.000	0.694	0.373	0.402	0.000	0.776	0.286	0.306	0.000	0.592	0.296	0.351	0.000	0.647
42	0.811	0.913	0.000	1.724	0.358	0.323	0.000	0.681	0.709	0.681	0.000	1.390	0.455	0.554	0.000	1.009	0.328	0.401	0.000	0.729
44	0.763	0.887	0.000	1.650	0.382	0.400	0.000	0.782	0.760	0.744	0.000	1.504	0.454	0.534	0.000	0.987	0.239	0.635	0.000	0.874
46	0.849	0.920	0.000	1.769	0.309	0.374	0.000	0.683	0.575	0.672	0.000	1.247	0.541	0.592	0.000	1.134	0.484	0.494	0.000	0.977
48	0.651	1.024	0.000	1.675	0.320	0.456	0.000	0.776	0.653	0.759	0.000	1.413	0.693	0.575	0.000	1.268	0.456	0.608	0.000	1.064
50	0.773	0.698	0.000	1.471	0.283	0.377	0.000	0.660	0.469	0.627	0.000	1.096	0.711	0.680	0.000	1.390	0.638	0.680	0.000	1.318
52	0.551	0.711	0.000	1.261	0.257	0.372	0.000	0.630	0.824	0.621	0.000	1.444	0.686	0.615	0.000	1.302	0.872	1.205	0.000	2.077
54	0.482	0.452	0.000	0.934	0.324	0.394	0.000	0.718	0.419	0.576	0.000	0.995	0.531	0.581	0.000	1.112	0.932	0.929	0.000	1.861
56	0.244	0.389	0.000	0.633	0.256	0.285	0.000	0.541	0.498	0.899	0.000	1.398	0.741	0.696	0.000	1.436	0.700	0.939	0.000	1.640
58	0.487	0.325	0.000	0.812	0.284	0.342	0.000	0.626	0.511	0.781	0.000	1.293	0.576	0.525	0.000	1.100	0.644	0.724	0.000	1.367
60	0.179	0.196	0.000	0.375	0.247	0.330	0.000	0.578	0.424	0.680	0.000	1.104	0.527	0.586	0.000	1.114	0.707	0.692	0.000	1.398
62	0.279	0.187	0.000	0.466	0.186	0.257	0.000	0.443	0.449	0.735	0.000	1.184	0.375	0.640	0.000	1.016	0.549	0.776	0.000	1.325
64	0.221	0.212	0.000	0.433	0.083	0.259	0.000	0.342	0.383	0.655	0.000	1.038	0.469	0.394	0.000	0.863	0.472	0.780	0.000	1.252
66	0.171	0.334	0.000	0.505	0.187	0.203	0.000	0.390	0.349	0.562	0.000	0.911	0.398	0.586	0.000	0.984	0.448	0.669	0.000	1.117
68	0.155	0.254	0.000	0.409	0.152	0.332	0.000	0.484	0.343	0.418	0.000	0.761	0.252	0.664	0.000	0.916	0.344	0.766	0.000	1.111
70	0.240	0.292	0.000	0.532	0.144	0.221	0.000	0.365	0.503	0.492	0.000	0.994	0.324	0.433	0.000	0.757	0.429	0.858	0.000	1.287
72	0.142	0.437	0.000	0.580	0.136	0.159	0.000	0.295	0.245	0.461	0.000	0.705	0.248	0.523	0.000	0.771	0.230	0.829	0.000	1.059
74	0.195	0.305	0.000	0.501	0.134	0.274	0.000	0.408	0.360	0.392	0.000	0.752	0.254	0.377	0.000	0.631	0.270	0.519	0.000	0.789
76	0.210	0.086	0.000	0.296	0.091	0.150	0.000	0.240	0.392	0.299	0.000	0.692	0.242	0.186	0.000	0.428	0.377	0.300	0.000	0.677
78	0.152	0.092	0.000	0.245	0.096	0.111	0.000	0.207	0.259	0.164	0.000	0.423	0.263	0.168	0.000	0.431	0.282	0.196	0.000	0.478
80	0.164	0.035	0.000	0.199	0.073	0.040	0.000	0.113	0.226	0.117	0.000	0.342	0.193	0.178	0.000	0.371	0.312	0.077	0.000	0.389
82	0.135	0.157	0.000	0.292	0.074	0.014	0.000	0.088	0.121	0.073	0.000	0.194	0.190	0.004	0.000	0.194	0.234	0.000	0.000	0.234
84	0.048	0.013	0.000	0.062	0.020	0.033	0.000	0.053	0.180	0.003	0.000	0.183	0.062	0.034	0.000	0.096	0.187	0.000	0.000	0.187
86	0.015	0.008	0.000	0.023	0.023	0.000	0.000	0.023	0.076	0.018	0.000	0.094	0.074	0.020	0.000	0.094	0.075	0.017	0.000	0.092
88	0.041	0.013	0.000	0.054	0.000	0.000	0.000	0.000	0.055	0.014	0.000	0.069	0.026	0.000	0.000	0.026	0.058	0.000	0.000	0.058
90	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.009	0.028	0.000	0.000	0.028	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005
92	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
94	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.005	0.003	0.006	0.000	0.009	0.000	0.000	0.000	0.000
96	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.004	0.000	0.000	0.000	0.000
98	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.000	0.000	0.012
100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
102	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
104	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
106	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
108	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	0.000	0.000	0.000	0.000</td																

**TABLE 12 (cont.).-** Thorny skate length distribution per sex and year. Estimated numbers per haul stratified mean catches. Spanish Spring Survey in NAFO 3NO: 1997-2011. Indet. means indeterminate. 1997-2000 data are transformed from C/V *Playa de Mendoña*. 2002-2011 data are original R/V *Vizconde de Eza* data. For 2001 there are data from the two vessels. (\*) indicates untransformed data.

Length (cm.)	2007				2008				2009				2010				2011			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
12	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.005	0.000	0.005	0.000	0.005	0.047	0.060	0.000	0.107	0.000	0.000	0.000	0.000
14	0.035	0.000	0.000	0.035	0.013	0.000	0.000	0.013	0.013	0.000	0.000	0.013	0.142	0.166	0.000	0.308	0.026	0.000	0.000	0.026
16	0.006	0.006	0.000	0.012	0.025	0.019	0.000	0.044	0.020	0.018	0.000	0.038	0.106	0.063	0.000	0.169	0.000	0.000	0.000	0.000
18	0.000	0.006	0.000	0.006	0.031	0.006	0.000	0.037	0.000	0.010	0.000	0.010	0.124	0.025	0.000	0.149	0.000	0.005	0.000	0.005
20	0.012	0.013	0.000	0.024	0.013	0.024	0.000	0.037	0.025	0.014	0.000	0.040	0.203	0.163	0.000	0.366	0.000	0.000	0.000	0.000
22	0.006	0.039	0.000	0.045	0.063	0.032	0.000	0.096	0.013	0.015	0.000	0.029	0.071	0.178	0.000	0.249	0.000	0.000	0.000	0.000
24	0.015	0.067	0.000	0.082	0.024	0.043	0.000	0.067	0.033	0.036	0.000	0.069	0.198	0.209	0.000	0.407	0.022	0.000	0.000	0.022
26	0.006	0.040	0.000	0.046	0.042	0.059	0.000	0.100	0.000	0.006	0.000	0.006	0.165	0.126	0.000	0.291	0.000	0.016	0.000	0.016
28	0.052	0.072	0.000	0.124	0.051	0.062	0.000	0.112	0.035	0.045	0.000	0.080	0.113	0.066	0.000	0.179	0.005	0.000	0.000	0.005
30	0.060	0.067	0.000	0.127	0.019	0.073	0.000	0.092	0.058	0.021	0.000	0.079	0.053	0.186	0.000	0.239	0.011	0.000	0.000	0.011
32	0.040	0.065	0.000	0.105	0.099	0.083	0.000	0.182	0.045	0.028	0.000	0.073	0.229	0.279	0.000	0.508	0.028	0.021	0.000	0.049
34	0.087	0.098	0.000	0.185	0.086	0.085	0.000	0.170	0.015	0.098	0.000	0.113	0.161	0.290	0.000	0.451	0.000	0.012	0.000	0.012
36	0.111	0.165	0.000	0.277	0.087	0.084	0.000	0.171	0.117	0.054	0.000	0.171	0.144	0.214	0.000	0.358	0.000	0.000	0.000	0.000
38	0.080	0.085	0.000	0.165	0.171	0.153	0.000	0.324	0.059	0.068	0.000	0.127	0.240	0.300	0.000	0.540	0.011	0.008	0.000	0.020
40	0.072	0.156	0.000	0.227	0.112	0.121	0.000	0.233	0.058	0.115	0.000	0.173	0.147	0.234	0.000	0.381	0.026	0.057	0.000	0.083
42	0.162	0.111	0.000	0.273	0.064	0.171	0.000	0.235	0.082	0.015	0.000	0.097	0.167	0.152	0.000	0.319	0.021	0.000	0.000	0.021
44	0.168	0.101	0.000	0.268	0.109	0.118	0.000	0.227	0.079	0.094	0.000	0.173	0.223	0.144	0.000	0.367	0.011	0.021	0.000	0.032
46	0.212	0.159	0.000	0.371	0.117	0.170	0.000	0.288	0.065	0.064	0.000	0.129	0.218	0.193	0.000	0.411	0.025	0.023	0.000	0.048
48	0.201	0.222	0.000	0.423	0.147	0.121	0.000	0.269	0.088	0.075	0.000	0.164	0.116	0.177	0.000	0.293	0.006	0.013	0.000	0.019
50	0.134	0.151	0.000	0.285	0.098	0.152	0.000	0.250	0.115	0.117	0.000	0.233	0.045	0.098	0.000	0.143	0.068	0.000	0.000	0.068
52	0.168	0.298	0.000	0.466	0.154	0.246	0.000	0.400	0.051	0.105	0.000	0.156	0.083	0.139	0.000	0.222	0.045	0.032	0.000	0.077
54	0.230	0.189	0.000	0.419	0.127	0.185	0.000	0.312	0.135	0.110	0.000	0.245	0.125	0.147	0.000	0.272	0.000	0.032	0.000	0.032
56	0.227	0.349	0.000	0.576	0.208	0.298	0.000	0.506	0.142	0.110	0.000	0.251	0.165	0.242	0.000	0.407	0.038	0.015	0.000	0.053
58	0.278	0.348	0.000	0.626	0.260	0.282	0.000	0.542	0.153	0.133	0.000	0.286	0.156	0.079	0.000	0.234	0.031	0.031	0.000	0.062
60	0.234	0.243	0.000	0.477	0.119	0.294	0.000	0.412	0.224	0.257	0.000	0.480	0.113	0.253	0.000	0.366	0.083	0.023	0.000	0.106
62	0.208	0.296	0.000	0.505	0.302	0.272	0.000	0.574	0.173	0.117	0.000	0.290	0.091	0.254	0.000	0.345	0.049	0.087	0.000	0.136
64	0.205	0.406	0.000	0.611	0.260	0.271	0.000	0.531	0.108	0.336	0.000	0.444	0.157	0.343	0.000	0.500	0.075	0.062	0.000	0.137
66	0.282	0.343	0.000	0.625	0.334	0.342	0.000	0.676	0.149	0.130	0.000	0.279	0.168	0.140	0.000	0.308	0.096	0.180	0.000	0.276
68	0.317	0.500	0.000	0.817	0.164	0.365	0.000	0.528	0.299	0.372	0.000	0.671	0.169	0.165	0.000	0.333	0.061	0.112	0.000	0.173
70	0.342	0.266	0.000	0.608	0.210	0.431	0.000	0.642	0.160	0.463	0.000	0.623	0.358	0.151	0.000	0.509	0.038	0.185	0.000	0.223
72	0.247	0.379	0.000	0.626	0.290	0.343	0.000	0.633	0.223	0.434	0.000	0.657	0.158	0.179	0.000	0.337	0.192	0.156	0.000	0.348
74	0.324	0.277	0.000	0.601	0.349	0.303	0.000	0.652	0.348	0.165	0.000	0.513	0.191	0.221	0.000	0.412	0.218	0.219	0.000	0.437
76	0.257	0.208	0.000	0.465	0.364	0.206	0.000	0.570	0.351	0.209	0.000	0.559	0.155	0.231	0.000	0.386	0.141	0.085	0.000	0.226
78	0.245	0.133	0.000	0.378	0.274	0.145	0.000	0.419	0.222	0.119	0.000	0.341	0.260	0.072	0.000	0.333	0.193	0.055	0.000	0.248
80	0.165	0.045	0.000	0.210	0.342	0.063	0.000	0.405	0.277	0.011	0.000	0.287	0.067	0.064	0.000	0.131	0.095	0.080	0.000	0.175
82	0.128	0.023	0.000	0.151	0.164	0.058	0.000	0.222	0.155	0.012	0.000	0.167	0.174	0.027	0.000	0.202	0.084	0.020	0.000	0.104
84	0.103	0.025	0.000	0.129	0.106	0.000	0.000	0.106	0.083	0.002	0.000	0.086	0.067	0.000	0.000	0.067	0.019	0.019	0.000	0.037
86	0.039	0.000	0.000	0.039	0.052	0.008	0.000	0.060	0.021	0.014	0.000	0.036	0.024	0.000	0.000	0.024	0.079	0.016	0.000	0.095
88	0.033	0.006	0.000	0.039	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.008	0.072	0.000	0.000	0.072	0.000	0.013	0.000	0.013
90	0.006	0.000	0.000	0.006	0.021	0.005	0.000	0.026	0.000	0.000	0.000	0.000	0.020	0.005	0.000	0.025	0.000	0.000	0.000	0.000
92	0.000	0.000	0.000	0.009	0.005	0.000	0.000	0.013	0.014	0.002	0.000	0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
94	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.004	0.008	0.000	0.000	0.008
96	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.006
98	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
102	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
104	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
106	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
108	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	0.000	0.000	0.000	0.000</td																

**TABLE 13.-** White hake mean catch (kg) and SD by stratum. Spanish Spring Surveys in NAFO Div. 3NO: 2001-2011. Swept area in square miles. n.s. means strata not surveyed.

Stratum	2001		2002		2003		2004		2005		2006	
	White hake Mean catch	White hake SD	White hake Mean catch	White hake SD	White hake Mean catch	White hake hake	White hake Mean catch	White hake SD	White hake hake	White hake Mean catch	White hake hake	White hake Mean catch
353	1.04	1.180	0.05	0.100	0.00	0.000	0.00	0.000	0.01	0.023	1.87	3.245
354	76.70	117.298	0.07	0.115	0.00	0.000	23.15	32.074	54.339	1.362	34.593	3.056
355	131.95	135.128	156.75	55.649	31.242	6.955	14.95	15.203	41.754	0.489	2.17	3.062
356	23.95	12.092	85.90	90.651	14.83	9.935	4.15	5.869	12.32	6.795	0.80	1.131
357	1.75	2.475	0.00	0.000	2.25	3.182	0.90	1.273	0.00	0.000	0.00	0.000
358	0.43	0.751	0.17	0.289	0.40	0.693	12.02	20.597	30.645	3.008	1.69	2.923
359	16.50	41.790	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	6.291	0.192
360	0.01	0.022	0.00	0.000	0.00	0.000	0.07	0.172	0.00	0.007	0.00	0.000
374	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
375	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
376	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.01	0.019	0.00	0.000
377	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
378	0.03	0.042	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
379	0.00	0.000	0.02	0.033	0.00	0.000	0.00	-	0.07	0.099	0.10	0.141
380	n.s.	n.s.	0.00	0.000	0.00	0.000	0.04	0.049	0.53	0.049	0.15	0.212
381	n.s.	n.s.	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
382	n.s.	n.s.	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
721	10.90	2.828	50.00	6.223	23.692	7.280	3.50	0.544	0.00	0.000	6.18	6.901
722	21.75	30.759	18.20	23.624	28.082	4.911	1.29	1.824	0.00	0.000	0.00	0.000
723	1.60	2.263	0.00	0.000	0.00	0.000	1.05	1.485	1.51	2.128	1.84	2.496
724	1.34	1.404	2.05	0.071	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
725	0.00	-	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.51	0.714
726	0.00	-	0.00	0.000	0.00	0.000	0.00	0.000	0.00	-	0.00	0.000
727	n.s.	n.s.	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
728	n.s.	n.s.	0.00	0.000	0.00	0.000	0.06	0.078	0.00	-	0.00	0.000
752	n.s.	n.s.	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
753	n.s.	n.s.	0.00	0.000	0.00	0.000	0.73	1.025	0.00	0.000	0.00	0.000
754	n.s.	n.s.	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
755	n.s.	n.s.	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
756	0.00	-	0.00	0.006	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
757	n.s.	n.s.	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
758	n.s.	n.s.	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
759	n.s.	n.s.	0.00	0.000	0.00	-	0.00	0.000	0.00	0.000	0.00	0.000
760	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
761	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
762	0.00	-	0.00	0.000	0.00	0.000	0.00	0.000	0.01	0.014	0.00	0.000
763	n.s.	n.s.	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
764	0.00	0.000	0.00	0.000	3.78	4.236	0.00	0.000	0.00	0.000	0.00	0.000
765	0.00	-	1.65	2.333	0.00	-	0.00	0.000	0.00	0.000	0.00	0.000
766	n.s.	n.s.	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
767	n.s.	n.s.	0.00	0.000	0.00	0.000	0.00	0.000	0.00	-	0.00	0.000

**TABLE 13 (cont.).-** White hake mean catch (kg) and SD by stratum. Spanish Spring Surveys in NAFO Div. 3NO: 2001-2011. Swept area in square miles. n.s. means strata not surveyed.

Stratum	2007		2008		2009		2010		2011	
	White hake Mean catch	White hake SD								
353	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.04	0.072
354	14.76	5.726	0.00	0.000	9.30	3.736	0.02	0.026	20.45	28.282
355	0.00	0.000	5.86	8.280	24.45	1.344	4.89	4.962	24.11	6.208
356	0.00	0.000	6.03	8.521	6.13	6.329	7.90	0.277	9.58	5.063
357	4.02	6.957	0.72	1.011	6.08	2.967	5.96	8.429	0.00	0.000
358	1.54	2.662	0.00	0.000	2.16	3.748	2.34	3.309	3.99	6.917
359	0.04	0.090	0.00	0.000	0.00	0.000	0.01	0.020	1.48	2.527
360	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
374	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
375	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
376	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
377	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
378	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
379	0.00	0.000	0.04	0.057	0.00	0.000	0.00	0.000	0.00	0.000
380	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
381	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
382	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
721	6.10	-	0.00	0.000	1.80	2.546	11.48	12.891	0.00	0.000
722	2.56	3.620	0.00	0.000	0.00	0.000	0.00	0.001	1.70	2.397
723	0.10	0.134	0.00	0.000	0.00	0.000	2.01	2.843	3.03	4.285
724	0.00	0.000	0.00	0.000	0.01	0.011	0.00	0.000	0.00	0.000
725	0.04	0.055	0.00	0.000	0.16	0.226	0.00	0.000	0.00	0.000
726	0.14	0.193	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
727	0.00	0.000	0.00	0.000	0.00	-	0.00	0.000	0.00	0.000
728	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
752	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
753	0.00	0.000	0.00	0.000	0.00	-	n.s.	n.s.	0.00	0.000
754	0.00	0.000	0.00	0.000	0.00	-	0.00	0.000	0.00	0.000
755	0.00	0.000	0.00	0.000	0.00	-	0.00	-	0.00	0.000
756	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
757	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
758	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
759	n.s.	n.s.	0.00	0.000	0.00	-	0.00	0.000	0.00	0.000
760	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
761	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
762	n.s.	n.s.	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
763	n.s.	n.s.	0.00	0.000	n.s.	n.s.	n.s.	n.s.	0.00	0.000
764	0.00	0.000	0.00	0.000	0.00	-	n.s.	n.s.	0.29	0.404
765	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
766	n.s.	n.s.	0.00	0.000	0.00	0.000	0.00	0.000	0.00	0.000
767	n.s.	n.s.	0.00	0.000	n.s.	n.s.	n.s.	n.s.	0.00	0.000

**TABLE 14.-** Stratified mean catches (Kg) by stratum and year and annual SD for white hake (2001-2011).  
n.s. means strata not surveyed.

Stratum	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
353	279.76	13.45	0.00	0.00	3.59	503.93	0.00	0.00	0.00	0.00	11.12
354	18868.20	16.40	0.00	5694.08	13365.18	8509.96	3631.37	0.00	2288.46	4.55	5030.54
355	9764.30	11599.50	2311.76	1106.30	3089.50	160.21	0.00	433.27	1809.30	361.75	1784.14
356	1125.65	4037.30	696.78	195.05	578.81	37.60	0.00	283.18	287.88	371.11	450.26
357	287.00	0.00	369.00	147.60	0.00	0.00	658.73	117.26	996.79	977.44	0.00
358	97.50	37.50	90.00	2703.75	6894.98	379.73	345.75	0.00	486.83	526.50	898.50
359	6946.50	0.00	0.00	0.00	0.00	2648.25	18.28	0.00	0.00	3.51	622.60
360	13.92	0.00	0.00	201.77	6.26	0.00	0.00	0.00	0.00	0.00	0.00
374	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
375	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
376	0.00	0.00	0.00	0.00	8.14	0.00	0.00	0.00	0.00	0.00	0.00
377	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
378	4.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
379	0.00	2.44	0.00	0.00	7.42	10.55	0.00	4.29	0.00	0.00	0.00
380	n.s.	0.00	0.00	3.36	50.40	14.40	0.00	0.00	0.00	0.00	0.00
381	n.s.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
382	n.s.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
721	708.50	3250.00	1539.85	227.18	0.00	401.70	396.50	0.00	117.00	745.88	0.00
722	1827.00	1528.38	2358.30	108.36	0.00	0.00	215.04	0.00	0.00	0.08	142.38
723	248.00	0.00	0.00	162.75	233.28	284.43	14.73	0.00	0.00	311.55	469.65
724	166.16	254.20	0.00	0.00	0.00	0.00	0.00	0.00	0.93	0.00	0.00
725	0.00	0.00	0.00	0.00	0.00	53.03	4.10	0.00	16.80	0.00	0.00
726	0.00	0.00	0.00	0.00	0.00	0.00	9.83	0.00	0.00	0.00	0.00
727	n.s.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
728	n.s.	0.00	0.00	4.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00
752	n.s.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
753	n.s.	0.00	0.00	100.05	0.00	0.00	0.00	0.00	0.00	n.s.	0.00
754	n.s.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
755	n.s.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
756	0.00	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
757	n.s.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
758	n.s.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
759	n.s.	0.00	0.00	0.00	0.00	0.00	n.s.	0.00	0.00	0.00	0.00
760	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
761	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
762	0.00	0.00	0.00	0.00	2.12	0.00	n.s.	0.00	0.00	0.00	0.00
763	n.s.	0.00	0.00	0.00	0.00	0.00	n.s.	0.00	n.s.	n.s.	0.00
764	0.00	0.00	377.50	0.00	0.00	0.00	0.00	0.00	0.00	n.s.	28.55
765	0.00	204.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
766	n.s.	0.00	0.00	0.00	0.00	0.00	n.s.	0.00	0.00	0.00	0.00
767	n.s.	0.00	0.00	0.00	0.00	0.00	n.s.	0.00	n.s.	n.s.	0.00
TOTAL	40337	20944	7743	10655	24240	13004	5294	838	6004	3302	9438
	5.13	2.03	0.75	1.03	2.34	1.26	0.56	0.08	0.61	0.34	0.91
S.D.	1.87	0.43	0.24	0.52	1.44	0.48	0.12	0.05	0.08	0.14	0.40

 $(\bar{Y})$

**TABLE 15.-** Survey estimates (by the swept area method) of white hake biomass (t) and SD by stratum and year in NAFO Div. 3NO. n.s. means stratum not surveyed.

Stratum	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
353	25	1	0	0	0	41	0	0	0	0	1
354	1677	1	0	495	1137	702	299	0	203	0	437
355	814	982	202	97	275	13	0	39	156	32	153
356	94	347	62	18	50	3	0	24	25	33	39
357	24	0	32	13	0	0	55	10	171	87	0
358	8	3	8	246	593	33	28	0	43	47	78
359	606	0	0	0	0	217	1	0	0	0	54
360	1	0	0	17	1	0	0	0	0	0	0
374	0	0	0	0	0	0	0	0	0	0	0
375	0	0	0	0	0	0	0	0	0	0	0
376	0	0	0	0	1	0	0	0	0	0	0
377	0	0	0	0	0	0	0	0	0	0	0
378	0	0	0	0	0	0	0	0	0	0	0
379	0	0	0	0	1	1	0	0	0	0	0
380	0	0	0	0	4	1	0	0	0	0	0
381	0	0	0	0	0	0	0	0	0	0	0
382	0	0	0	0	0	0	0	0	0	0	0
721	57	280	137	21	0	34	34	0	10	66	0
722	157	129	213	10	0	0	19	0	0	0	13
723	21	0	0	14	20	24	1	0	0	28	43
724	15	23	0	0	0	0	0	0	0	0	0
725	0	0	0	0	0	5	0	0	1	0	0
726	0	0	0	0	0	0	1	0	0	0	0
727	0	0	0	0	0	0	0	0	0	0	0
728	0	0	0	0	0	0	0	0	0	0	0
752	0	0	0	0	0	0	0	0	0	0	0
753	0	0	0	9	0	0	0	0	0	n.s.	0
754	0	0	0	0	0	0	0	0	0	0	0
755	0	0	0	0	0	0	0	0	0	0	0
756	0	0	0	0	0	0	0	0	0	0	0
757	0	0	0	0	0	0	0	0	0	0	0
758	0	0	0	0	0	0	0	0	0	0	0
759	0	0	0	0	0	0	n.s.	0	0	0	0
760	0	0	0	0	0	0	0	0	0	0	0
761	0	0	0	0	0	0	0	0	0	0	0
762	0	0	0	0	0	0	n.s.	0	0	0	0
763	0	0	0	0	0	0	n.s.	0	n.s.	n.s.	0
764	0	0	34	0	0	0	0	0	0	n.s.	3
765	0	17	0	0	0	0	0	0	0	0	0
766	0	0	0	0	0	0	n.s.	0	0	0	0
767	0	0	0	0	0	0	n.s.	0	n.s.	n.s.	0
TOTAL	3498	1784	688	940	2082	1073	440	74	610	293	822
S.D.	1107	389	224	464	1270	407	94	46	73	117	361

**TABLE 16.-** Length weight relationships used for the estimation of white hake biomass. The equation is  $Weight = a(l + 0.5)^b$ . Spanish Spring Surveys in NAFO Div. 3NO: 2002-2011. The parameters for indeterminate individuals were estimated from total number of individuals (males + females + indeterminate individuals). White hake was not sexed in 2011.

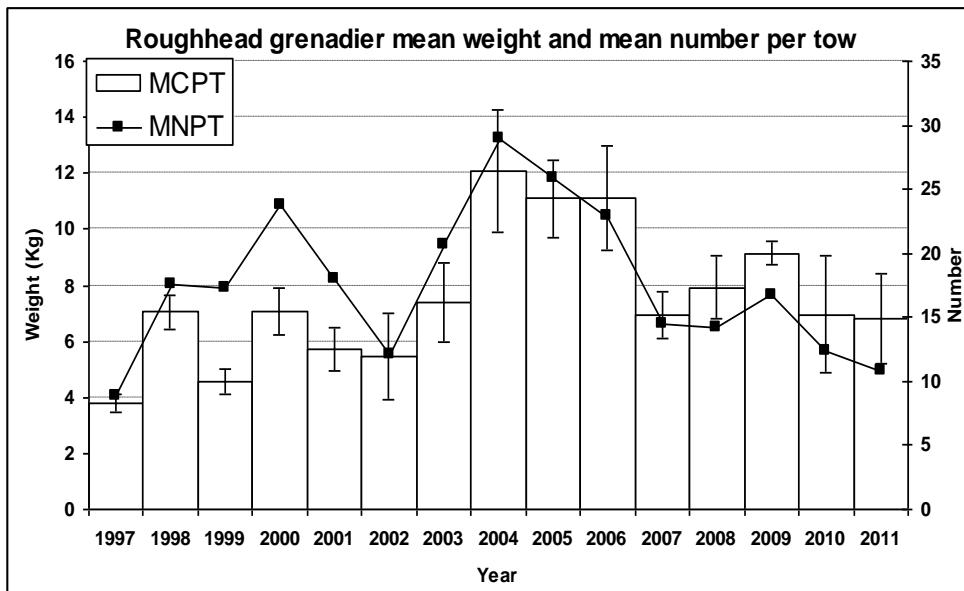
		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Males	a	0.0018 E = 0.234	0.0045 E = 0.243	0.0043 E = 0.237	0.0034 E = 0.1497	0.0175 E = 0.5190	0.0050 E = 0.3158	0.0053 E = 0.1381	0.0090 E = 0.3934	0.0031 E = 0.2034	---
	b	3.3586 E = 0.060	3.1161 E = 0.062	3.1313 E = 0.063	3.2086 E = 0.0395	2.7891 E = 0.1320	3.1245 E = 0.0828	3.0934 E = 0.0351	2.9577 E = 0.0994	3.2186 E = 0.0543	---
		R <sup>2</sup> = 0.991 N = 107	R <sup>2</sup> = 0.992 N = 73	R <sup>2</sup> = 0.992 N = 41	R <sup>2</sup> = 0.995 N = 108	R <sup>2</sup> = 0.965 N = 75	R <sup>2</sup> = 0.992 N= 14	R <sup>2</sup> = 0.999 N= 7	R <sup>2</sup> = 0.978 N= 26	R <sup>2</sup> = 0.997 N= 13	---
Females	a	0.0027 E = 0.221	0.0013 E = 0.465	0.0037 E = 0.202	0.0043 E = 0.0992	0.0019 E = 0.2136	0.0025 E = 0.2163	0.0017 E = 2.2151	0.0034 E = 0.1912	0.0019 E = 0.1809	---
	b	3.2537 E = 0.056	3.4264 E = 0.115	3.1960 E = 0.056	3.1602 E = 0.0253	3.3563 E = 0.0530	3.3097 E = 0.0541	3.3879 E = 0.5170	3.2053 E = 0.0493	3.3734 E = 0.0446	---
		R <sup>2</sup> = 0.992 N = 61	R <sup>2</sup> = 0.977 N = 51	R <sup>2</sup> = 0.995 N = 32	R <sup>2</sup> = 0.997 N = 80	R <sup>2</sup> = 0.998 N = 28	R <sup>2</sup> = 0.997 N= 18	R <sup>2</sup> = 0.997 N= 4	R <sup>2</sup> = 0.996 N= 19	R <sup>2</sup> = 0.998 N= 16	---
Indet.	a	0.0025 E = 0.152	0.0026 E = 0.254	0.0048 E = 0.127	0.0036 E = 0.1026	0.0066 E = 0.367	0.0031 E = 0.1879	0.0038 E = 0.3193	0.0033 E = 0.2001	0.0020 E = 0.1566	0.0034 E = 0.1448
	b	3.2731 E = 0.039	3.2565 E = 0.064	3.1208 E = 0.035	3.1961 E = 0.0266	3.0472 E = 0.0930	3.2481 E = 0.0478	3.1857 E = 0.0786	3.2109 E = 0.0516	3.3506 E = 0.0400	3.2151 E = 0.0382
		R <sup>2</sup> = 0.995 N = 168	R <sup>2</sup> = 0.989 N = 125	R <sup>2</sup> = 0.997 N = 91	R <sup>2</sup> = 0.997 N = 188	R <sup>2</sup> = 0.980 N = 103	R <sup>2</sup> = 0.995 N= 32	R <sup>2</sup> = 0.997 N= 11	R <sup>2</sup> = 0.992 N= 49	R <sup>2</sup> = 0.997 N= 29	R2 = 0.994 N= 122

**TABLE 17.-** White hake length distribution per haul mean catches by sex and year. Number per stratified mean catches. Spanish Spring Survey in NAFO 3NO: 2001-2011. Indet. means indeterminate. White hake was not sexed in 2011.

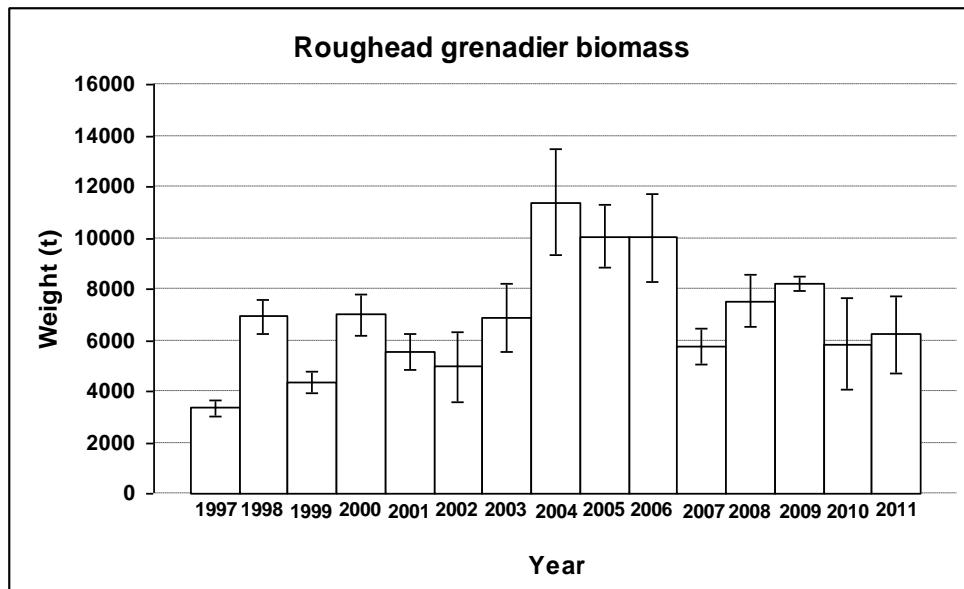
Length (cm.)	2001				2002				2003				2004				2005				
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	
10	0.000	0.000	0.015	0.015	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
12	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
14	0.009	0.020	0.000	0.029	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.040	0.000	0.000	0.040	
16	0.034	0.009	0.000	0.043	0.014	0.000	0.000	0.014	0.000	0.000	0.000	0.000	0.000	0.025	0.000	0.025	0.009	0.000	0.000	0.009	
18	0.048	0.024	0.000	0.073	0.014	0.012	0.000	0.026	0.000	0.000	0.000	0.000	0.058	0.034	0.000	0.092	0.005	0.004	0.000	0.009	
20	0.074	0.055	0.000	0.129	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.025	0.050	0.000	0.075	0.028	0.015	0.000	0.043	
22	0.075	0.044	0.000	0.120	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.004	0.050	0.042	0.000	0.091	0.008	0.000	0.000	0.008	
24	0.069	0.058	0.000	0.127	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.025	0.000	0.033	0.013	0.014	0.000	0.027	
26	0.055	0.055	0.000	0.110	0.000	0.000	0.000	0.000	0.011	0.004	0.000	0.015	0.000	0.005	0.000	0.005	0.043	0.007	0.000	0.051	
28	0.229	0.154	0.000	0.383	0.000	0.000	0.000	0.000	0.004	0.004	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.013	0.000	0.013	
30	0.399	0.188	0.000	0.587	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.005	0.000	0.017	
32	1.092	0.665	0.000	1.758	0.009	0.000	0.000	0.009	0.004	0.004	0.000	0.007	0.000	0.000	0.000	0.000	0.016	0.000	0.000	0.016	
34	1.019	0.873	0.000	1.892	0.007	0.004	0.000	0.011	0.000	0.004	0.000	0.004	0.000	0.000	0.000	0.000	0.007	0.038	0.000	0.045	
36	0.572	0.768	0.000	1.340	0.035	0.018	0.000	0.053	0.004	0.000	0.000	0.004	0.000	0.008	0.000	0.008	0.015	0.023	0.000	0.038	
38	0.294	0.511	0.000	0.806	0.123	0.017	0.000	0.140	0.000	0.004	0.000	0.004	0.000	0.000	0.000	0.000	0.023	0.023	0.000	0.046	
40	0.101	0.159	0.000	0.260	0.268	0.128	0.000	0.397	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.016	0.000	0.016	
42	0.134	0.131	0.000	0.265	0.340	0.212	0.000	0.553	0.010	0.015	0.000	0.025	0.000	0.000	0.000	0.000	0.008	0.019	0.000	0.027	
44	0.165	0.042	0.000	0.207	0.228	0.192	0.000	0.420	0.033	0.004	0.000	0.037	0.000	0.000	0.000	0.000	0.008	0.007	0.000	0.015	
46	0.098	0.110	0.000	0.208	0.093	0.162	0.000	0.256	0.080	0.012	0.000	0.092	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.007	
48	0.107	0.069	0.000	0.177	0.055	0.074	0.000	0.128	0.079	0.028	0.000	0.107	0.046	0.000	0.046	0.008	0.000	0.000	0.000	0.008	
50	0.164	0.053	0.000	0.217	0.052	0.077	0.000	0.129	0.041	0.041	0.000	0.082	0.049	0.000	0.049	0.016	0.000	0.000	0.016	0.000	
52	0.203	0.105	0.000	0.308	0.054	0.033	0.000	0.086	0.061	0.028	0.000	0.089	0.057	0.024	0.000	0.082	0.068	0.004	0.000	0.072	
54	0.119	0.047	0.000	0.166	0.051	0.044	0.000	0.095	0.017	0.026	0.000	0.043	0.030	0.016	0.000	0.047	0.122	0.018	0.000	0.140	
56	0.119	0.050	0.000	0.168	0.028	0.025	0.000	0.053	0.014	0.027	0.000	0.041	0.058	0.016	0.000	0.075	0.085	0.019	0.000	0.104	
58	0.051	0.050	0.000	0.101	0.025	0.009	0.000	0.034	0.004	0.029	0.000	0.034	0.021	0.029	0.000	0.050	0.151	0.028	0.000	0.179	
60	0.078	0.063	0.000	0.141	0.048	0.021	0.000	0.070	0.000	0.016	0.000	0.016	0.017	0.028	0.000	0.045	0.098	0.010	0.000	0.108	
62	0.040	0.040	0.000	0.081	0.008	0.010	0.000	0.018	0.004	0.004	0.000	0.008	0.021	0.021	0.000	0.042	0.092	0.030	0.000	0.122	
64	0.034	0.022	0.000	0.056	0.020	0.018	0.000	0.038	0.000	0.013	0.000	0.013	0.008	0.032	0.000	0.041	0.027	0.026	0.000	0.052	
66	0.035	0.019	0.000	0.054	0.010	0.000	0.000	0.010	0.011	0.000	0.000	0.011	0.008	0.062	0.000	0.070	0.027	0.052	0.000	0.079	
68	0.019	0.046	0.000	0.065	0.011	0.016	0.000	0.027	0.004	0.009	0.000	0.013	0.004	0.013	0.000	0.017	0.019	0.038	0.000	0.057	
70	0.026	0.019	0.000	0.045	0.007	0.008	0.000	0.015	0.004	0.004	0.000	0.009	0.017	0.008	0.000	0.025	0.000	0.081	0.000	0.081	
72	0.000	0.000	0.000	0.000	0.004	0.007	0.000	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.032	0.000	0.032	0.000	
74	0.000	0.015	0.000	0.015	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.008	0.000	0.008	0.000	0.008	0.000	0.011	0.000	0.011	
76	0.000	0.016	0.000	0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.015	0.000	0.015	
78	0.000	0.015	0.000	0.015	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.004	0.000	0.000	0.000	0.000	0.022	0.000	0.022	0.000	
80	0.000	0.016	0.000	0.016	0.000	0.003	0.000	0.003	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
82	0.000	0.020	0.000	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
84	0.000	0.006	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.008	0.000	
86	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
88	0.000	0.006	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
Total	5.462	4.544	0.015	10.022	1.511	1.091	0.000	2.602	0.387	0.295	0.000	0.682	0.480	0.447	0.000	0.927	0.953	0.579	0.000	1.532	
Nº samples (*):					12				11				9				11				14
Nº Ind. (*):	427	328	1	756	329	222	0	551	102	79	0	181	59	59	0	118	137	91	0	228	
Sampled catch:					401				303				195				144				367
Range (*):					10-89				13-80				22-80				16-75				15-85
Total catch:					738				630				209				160				367
Total hauls (*):					123				125				118				120				119

**TABLE 17 (cont.).-** White hake length distribution per haul mean catches by sex and year. Number per stratified mean catches. Spanish Spring Survey in NAFO 3NO: 2001-2011. Indet. means indeterminate. White hake was not sexed in 2011.

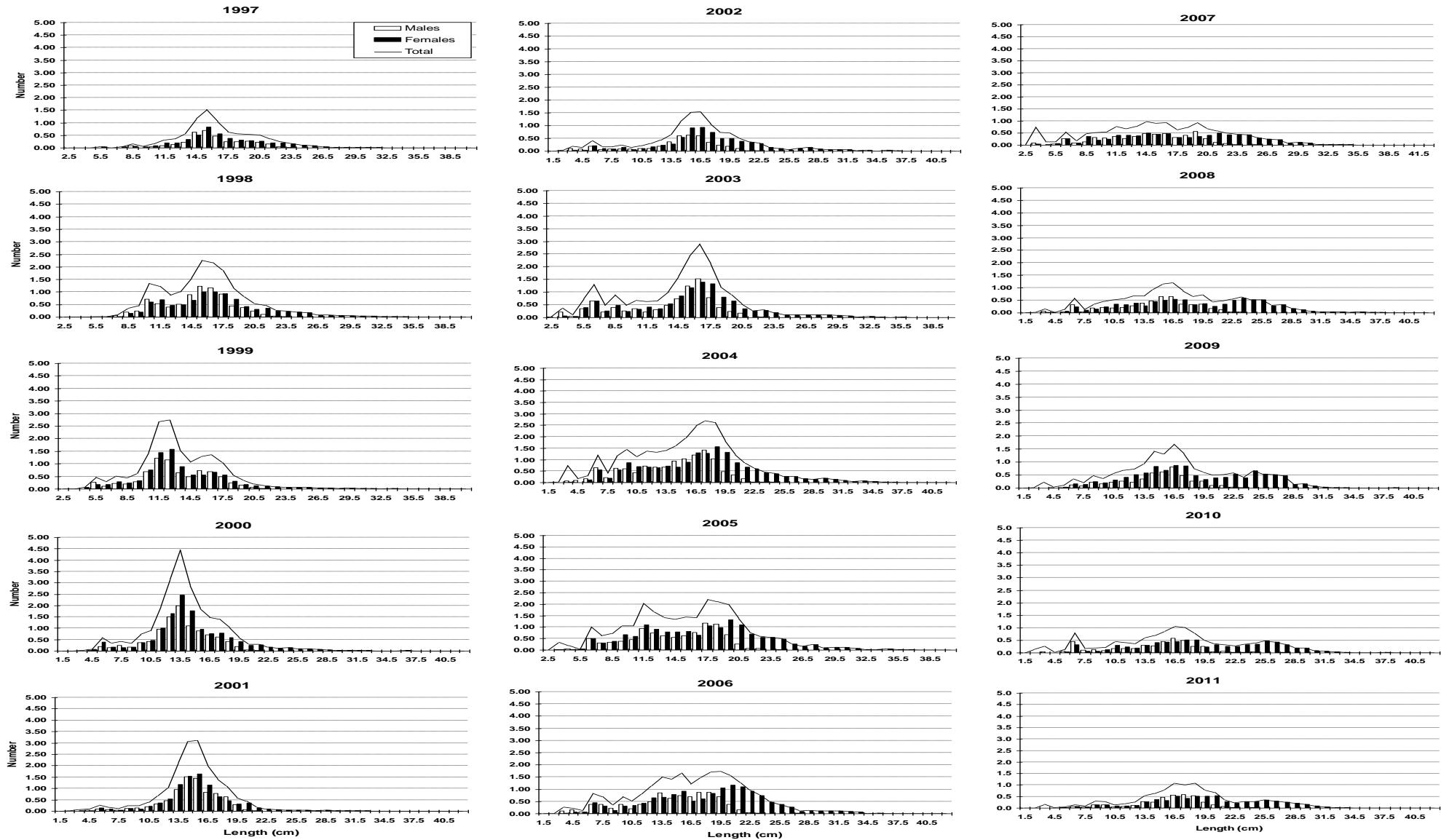
Length (cm.)	2006				2007				2008				2009				2010				2011		
	Males	Females	Indet.	Total	Total																		
10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
20	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.007	0.018	
22	0.005	0.000	0.000	0.005	0.000	0.006	0.000	0.006	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.008	0.000	0.000	0.017	0.022
24	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.003	0.004	0.000	0.000	0.004	0.025	
26	0.005	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.007	0.000	0.000	0.000	0.000	0.044	
28	0.013	0.000	0.000	0.013	0.000	0.009	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.007	0.000	0.014	0.000	0.000	0.000	0.037	
30	0.000	0.011	0.000	0.011	0.008	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.008	0.047	
32	0.000	0.000	0.000	0.000	0.009	0.023	0.000	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.059	
34	0.000	0.011	0.000	0.011	0.009	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.007	0.008	0.000	0.014	0.000	0.000	0.000	0.000	0.069	
36	0.008	0.005	0.000	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.076	
38	0.012	0.000	0.000	0.012	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.008	0.000	0.008	0.000	0.008	0.046	
40	0.012	0.004	0.000	0.015	0.009	0.000	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.008	0.007	0.000	0.014	0.000	0.000	0.000	0.000	0.074	
42	0.015	0.008	0.000	0.023	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.003	0.000	0.011	0.000	0.000	0.000	0.000	0.036	
44	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.007	0.003	0.000	0.000	0.000	0.003	0.005	
46	0.016	0.000	0.000	0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.011	0.000	0.018	0.004	0.002	0.000	0.006	0.021		
48	0.009	0.008	0.000	0.017	0.017	0.000	0.034	0.000	0.000	0.000	0.000	0.013	0.000	0.000	0.013	0.003	0.000	0.003	0.000	0.003	0.000	0.007	
50	0.020	0.000	0.000	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.000	0.000	0.014	0.008	0.000	0.000	0.008	0.012	0.000		
52	0.028	0.000	0.000	0.028	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.018	0.007	0.000	0.024	0.000	0.000	0.000	0.000	0.000	0.000	0.020	
54	0.005	0.010	0.000	0.016	0.000	0.009	0.000	0.009	0.002	0.000	0.000	0.002	0.000	0.014	0.000	0.014	0.000	0.002	0.000	0.002	0.004		
56	0.028	0.008	0.000	0.036	0.000	0.000	0.000	0.010	0.000	0.000	0.010	0.011	0.008	0.000	0.019	0.000	0.006	0.000	0.006	0.000	0.020		
58	0.031	0.000	0.000	0.031	0.000	0.009	0.000	0.009	0.000	0.000	0.000	0.014	0.000	0.002	0.016	0.003	0.000	0.000	0.003	0.000	0.029		
60	0.075	0.013	0.000	0.089	0.000	0.009	0.000	0.009	0.002	0.000	0.000	0.028	0.016	0.000	0.044	0.004	0.003	0.000	0.007	0.000	0.049		
62	0.066	0.000	0.000	0.066	0.017	0.000	0.000	0.017	0.000	0.002	0.000	0.010	0.010	0.003	0.000	0.014	0.000	0.000	0.000	0.000	0.028		
64	0.076	0.000	0.000	0.076	0.014	0.000	0.014	0.000	0.002	0.000	0.002	0.003	0.086	0.000	0.089	0.032	0.000	0.000	0.032	0.000	0.015		
66	0.024	0.000	0.000	0.024	0.000	0.009	0.000	0.009	0.000	0.000	0.000	0.011	0.000	0.000	0.011	0.000	0.008	0.000	0.008	0.000	0.028		
68	0.021	0.000	0.000	0.021	0.009	0.006	0.000	0.014	0.000	0.000	0.000	0.008	0.011	0.000	0.019	0.000	0.000	0.000	0.000	0.000	0.010		
70	0.016	0.008	0.000	0.024	0.009	0.000	0.000	0.009	0.000	0.000	0.000	0.003	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.024		
72	0.016	0.021	0.000	0.037	0.000	0.009	0.000	0.009	0.002	0.000	0.000	0.002	0.000	0.003	0.000	0.003	0.000	0.000	0.000	0.000	0.020		
74	0.000	0.005	0.000	0.005	0.000	0.009	0.000	0.009	0.000	0.000	0.000	0.008	0.008	0.000	0.015	0.000	0.011	0.000	0.011	0.000	0.008		
76	0.008	0.026	0.000	0.034	0.000	0.016	0.000	0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.000	0.003	0.000	0.008		
78	0.000	0.020	0.000	0.020	0.012	0.000	0.012	0.000	0.004	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.007	0.000	0.007	0.000	0.000		
80	0.000	0.013	0.000	0.013	0.000	0.012	0.000	0.012	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
82	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008		
84	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.017	0.000	0.017	0.000	0.015		
86	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
88	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
Total	0.512	0.172	0.000	0.684	0.115	0.161	0.000	0.275	0.025	0.012	0.000	0.037	0.184	0.208	0.002	0.394	0.078	0.085	0.000	0.162	0.882		
Nº samples (*):					14				11				4				9				10	14	
Nº Ind. (*):	73	28	0	101	14	21	0	35	7	4	0	11	38	25	1	64	14	16	0	30	156		
Sampled catch:					187				727				25				100				562	149	
Range (*):					23-80				21-83				22-86				24-75				20-84	20-84	
Total catch:					187				73				25				112				69	161	
Total hauls (*):					120				110				122				109				95	122	



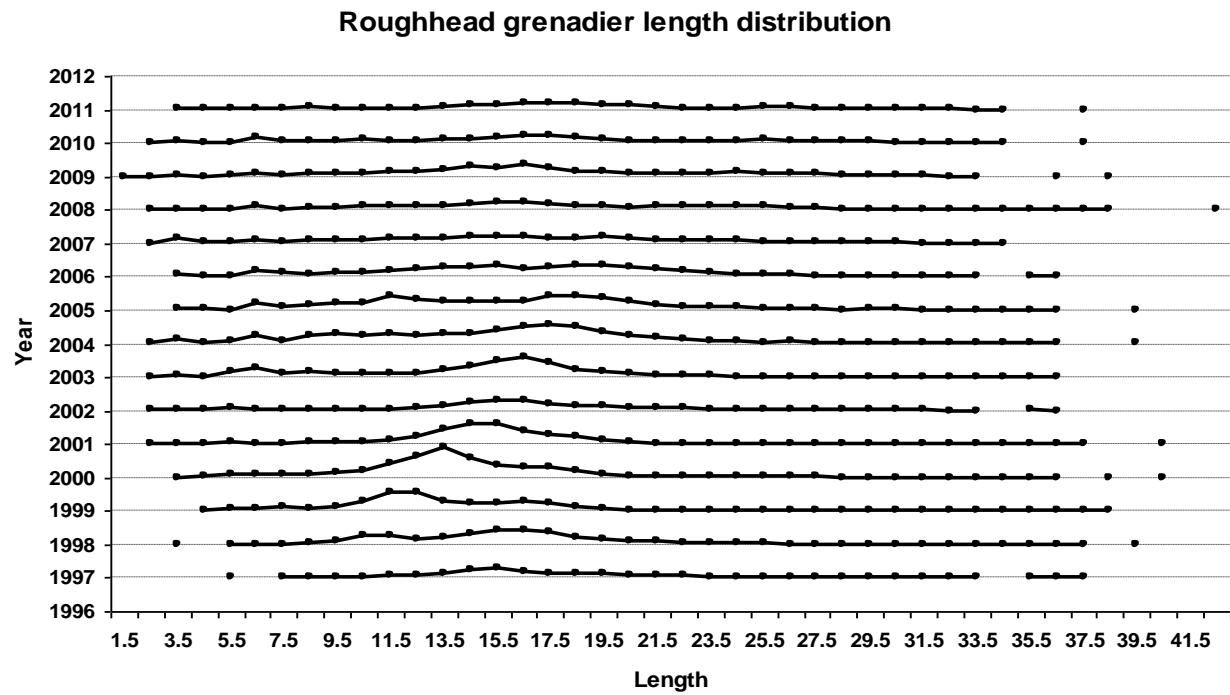
**FIGURE 1.**- Roughhead grenadier stratified mean catches in Kg and  $\pm$ SD and mean number by year. Spanish Spring surveys in NAFO Div. 3NO: 1997-2011 (1997-2000 transformed data from C/V *Playa de Menduña*; 2002-2011 original data from R/V *Vizconde de Eza*. For 2001 there are data from the two vessels).



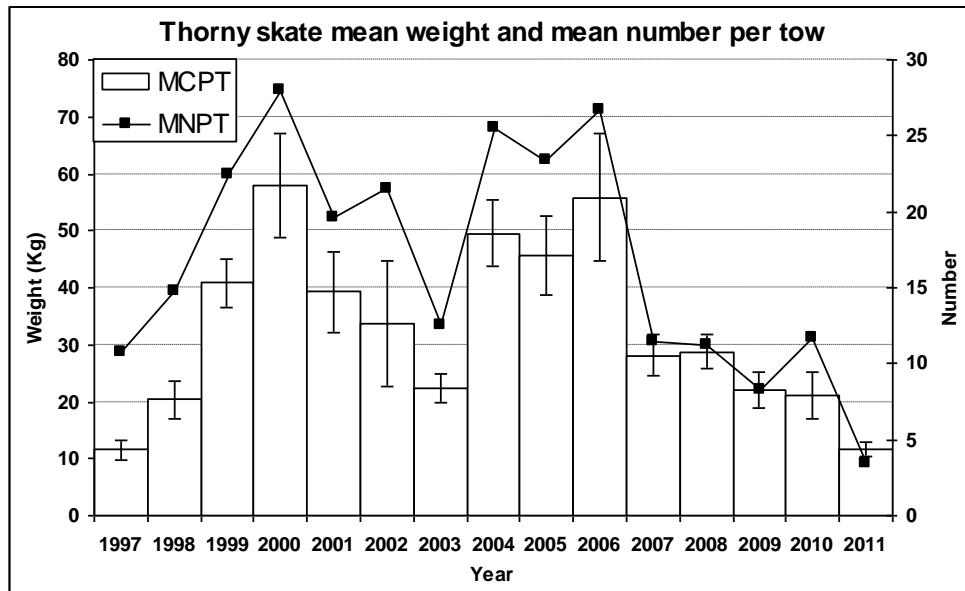
**FIGURE 2.**- Roughhead grenadier biomass calculated by the swept area method in tons and  $\pm$ SD by year. Spanish Spring surveys in NAFO Div. 3NO: 1997-2011 (1997-2000 transformed data from C/V *Playa de Menduña*; 2002-2011 original data from R/V *Vizconde de Eza*. For 2001 there are data from the two vessels).



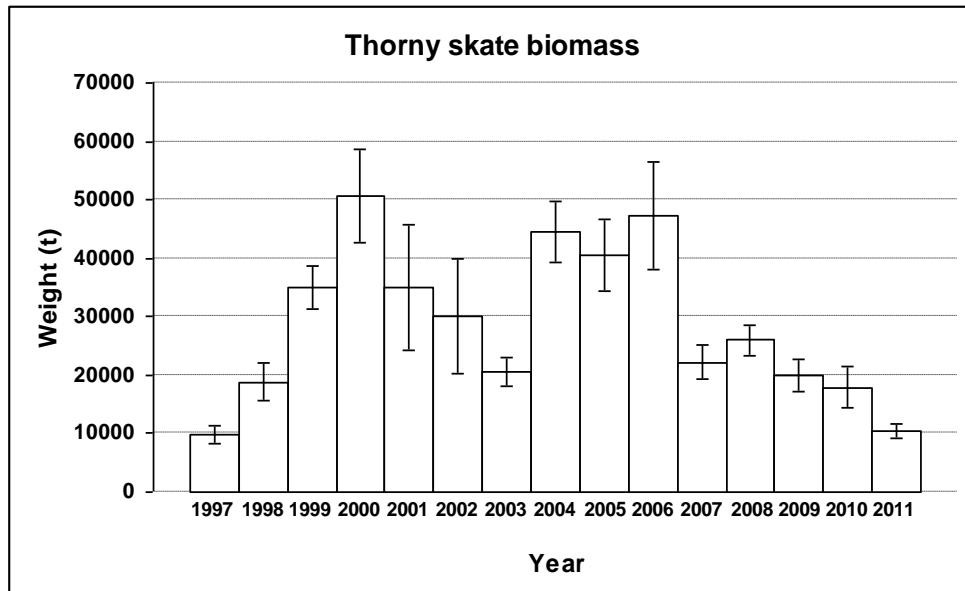
**FIGURE 3.-** Roughhead grenadier length distribution (cm) by sex in NAFO 3NO: 1997-2011. Estimated numbers per haul stratified mean catches. 1997-2000 data are transformed data from C/V *Playa de Menduña*, and 2002-2011 data are original from R/V *Vizconde de Eza*. For 2001 there are data from the two vessels.



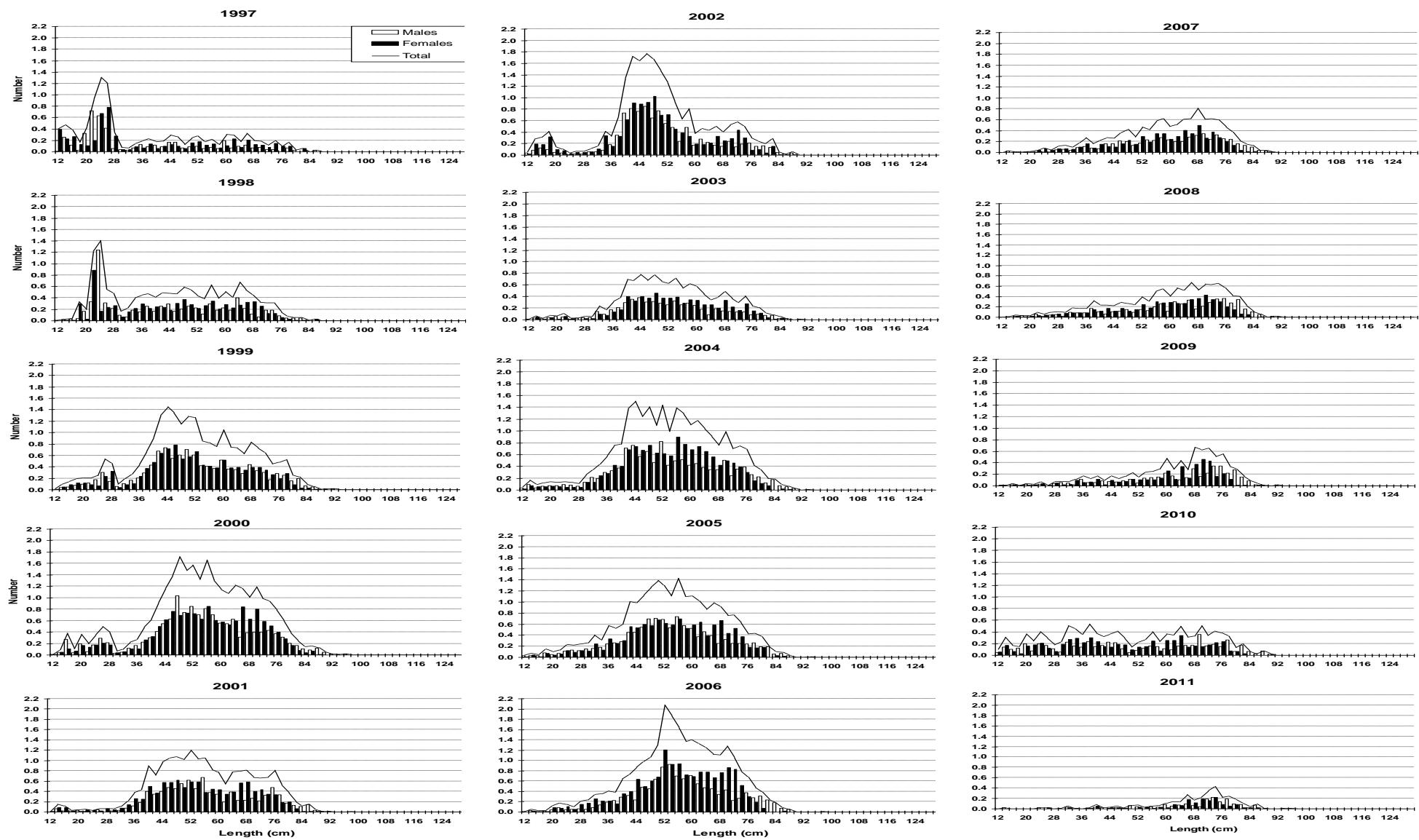
**FIGURE 4.-** Roughhead grenadier mean catches per tow length distribution (cm) in NAFO 3NO: 1997-2011.



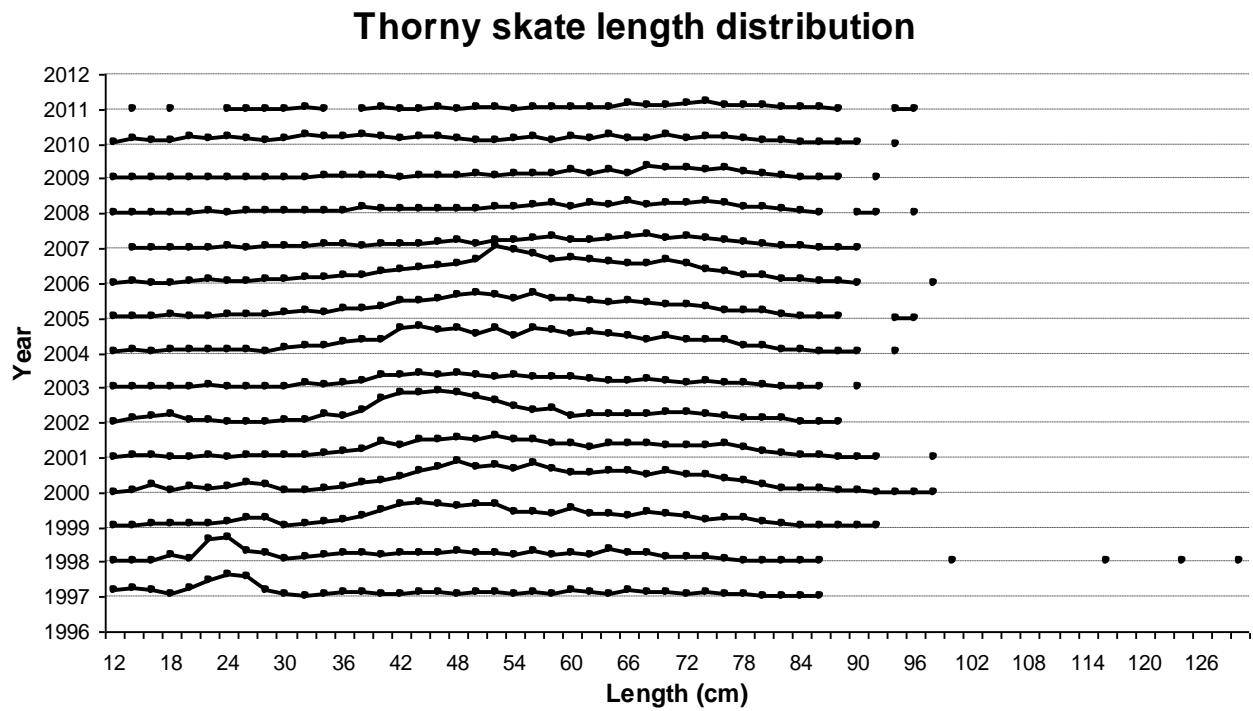
**FIGURE 5.**- Thorny skate stratified mean catches in Kg and  $\pm$ SD and mean number by year. Spanish Spring surveys in NAFO Div. 3NO: 1997-2011 (1997-2000 transformed data from C/V *Playa de Menduiña*; 2002-2011 original data from R/V *Vizconde de Eza*. For 2001 there are data from the two vessels).



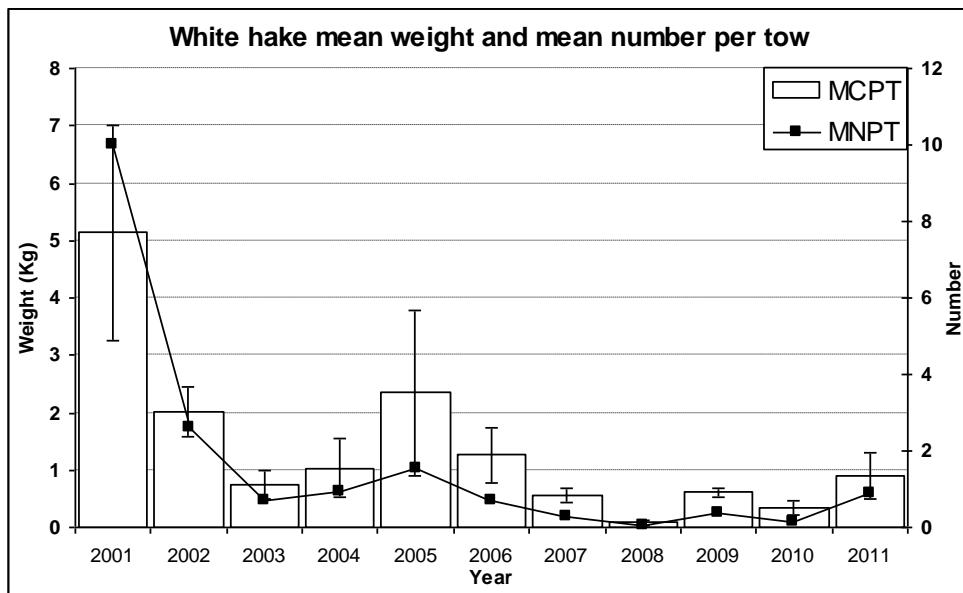
**FIGURE 6.**- Thorny skate biomass calculated by the swept area method in tons and  $\pm$ SD by year. Spanish Spring surveys in NAFO Div. 3NO: 1997-2011 (1997-2000 transformed data from C/V *Playa de Menduiña*; 2002-2011 original data from R/V *Vizconde de Eza*. For 2001 there are data from the two vessels).



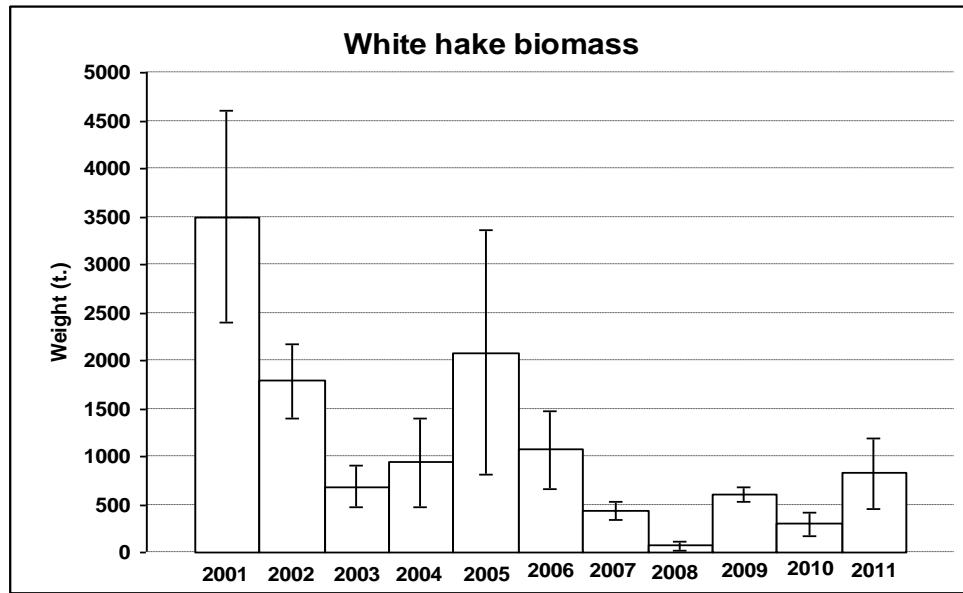
**FIGURE 7.-** Thorny skate length distribution (cm) by sex in NAFO 3NO: 1997-2011. Estimated numbers per haul stratified mean catches. 1997-2000 data are transformed data from C/V *Playa de Menduiña*, and 2002-2011 data are original from R/V *Vizconde de Eza*. For 2001 there are data from the two vessels



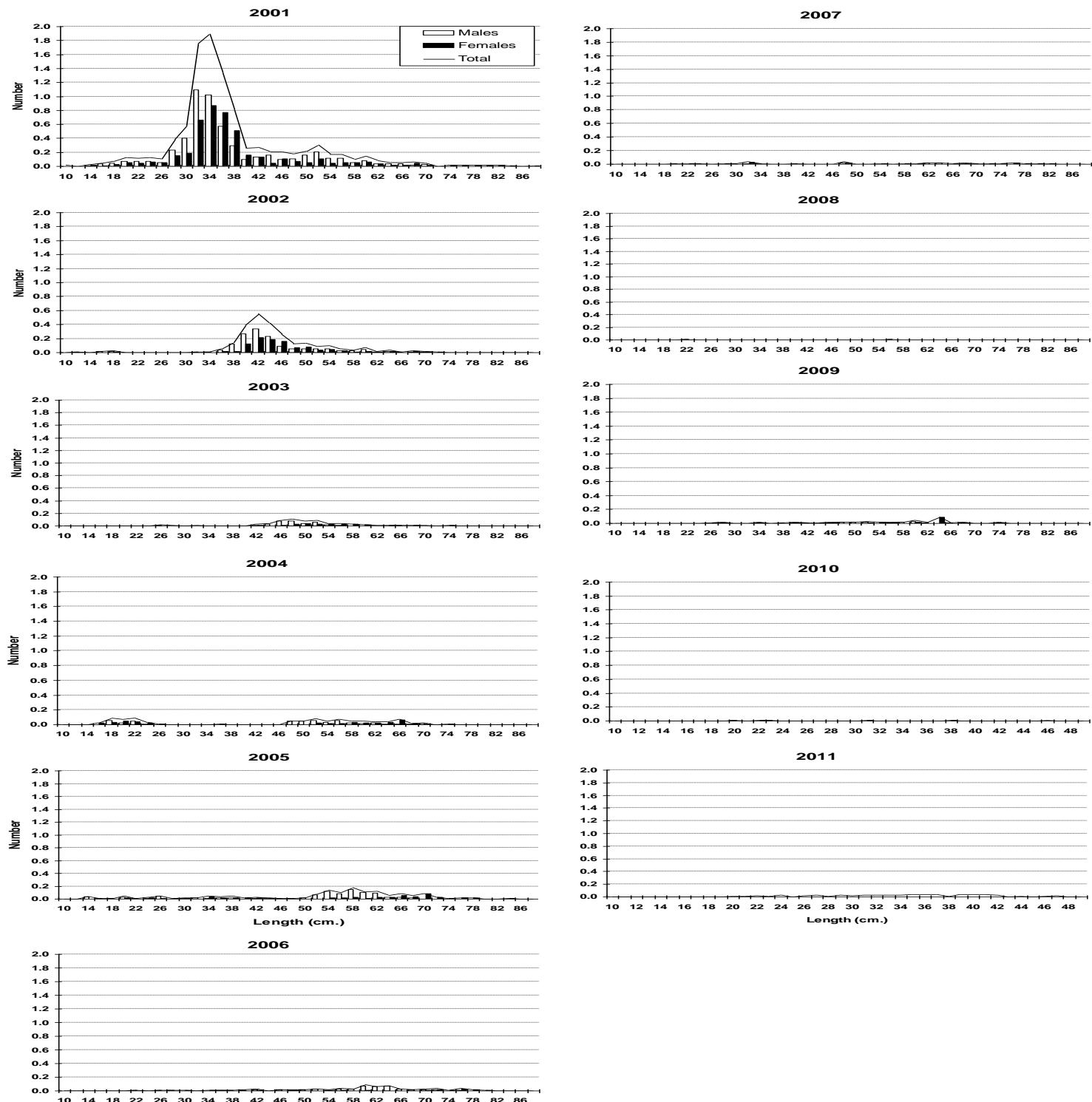
**FIGURE 8.-** Thorny skate mean catches per tow length distribution (cm) in NAFO 3NO: 1997-2011.



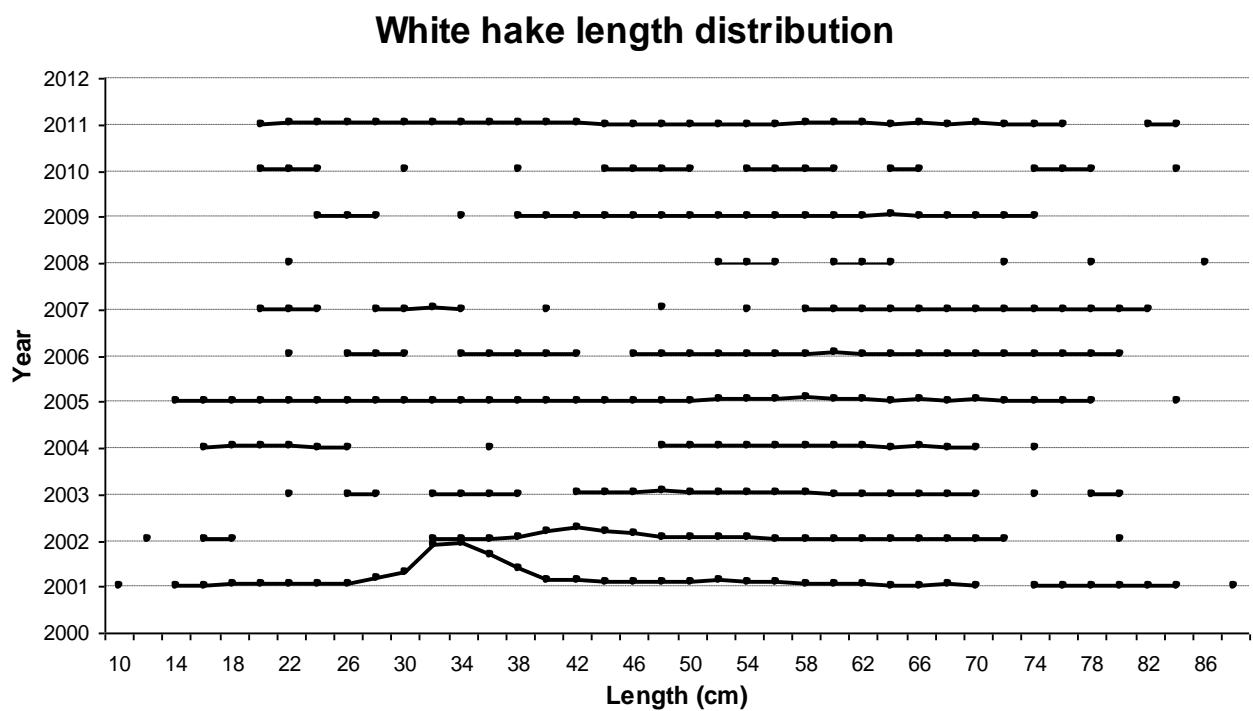
**FIGURE 9.-** White hake stratified mean catches in Kg and  $\pm$ SD and mean number by year. Spanish Spring surveys in NAFO Div. 3NO: 2001-2011.



**FIGURE 10.-** White hake biomass calculated by the swept area method in tons and  $\pm$ SD by year. Spanish Spring surveys in NAFO Div. 3NO: 2001-2011.



**FIGURE 11.-** White hake length distribution (cm) in NAFO 3NO: 2001-2011. Number per stratified mean catches.



**FIGURE 12.-** White hake mean catches per tow length distribution (cm) on NAFO 3NO: 2001-2011.