



**SCIENTIFIC COUNCIL MEETING – JUNE 2005**

Biomass and Length Distribution for Atlantic Cod, Thorny Skate and White Hake from the Surveys  
Conducted by Spain in NAFO Divisions 3NO

by

Diana González Troncoso and Xabier Paz

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

**Abstract**

Data for Atlantic cod (*Gadus morhua*), Thorny skate (*Amblyraja radiata*) and White hake (*Urophycis tenuis*) from Spanish Spring survey are presented. The survey vessel changed in 2001, from the *C/V Playa de Menduñña* to the *R/V Vizconde de Eza*, so, in order to maintain the historical series, we transformed the data for Atlantic cod and Thorny skate until that year. 1997-2000 data are transformed data from the *C/V Playa de Menduñña* and 2002-2004 data are original data from *R/V Vizconde de Eza*. In 2001, there are data from the two vessels for the three species. The abundance and biomass were estimated for the period 1997-2004 for Atlantic cod and Thorny skate, and 2001-2004 for White hake. The length distribution was obtained and presented in numbers per haul stratified mean catches. For Atlantic cod we can see a decreasing of the biomass since the year 2002, and it remains in a very low level. For this species, a good recruitment can be seen this year. Thorny skate indices decreased since 2001 until 2003 and increase last year, reaching the second higher value of the series. For White hake, there were great catches 2001, and a sharp decreasing since then. In 2004 we can see a presence of individuals between 16 and 26 cm.

**Material and Methods**

Spain carries out a spring survey since 1995 on board the vessel *C/V Playa de Menduñña* in Div. 3NO of the NAFO Regulatory Area, using a bottom trawl net type *Pedreira*. In 2001, this vessel was replaced by the *R/V Vizconde de Eza*, with a bottom trawl net type *Campelen*, in the carrying out of the survey. The main specifications and geometry of these gears, as the rigging profile and the net plan, and a sheet with the resume of the main technical data of the survey, are described in a previous paper (Walsh *et al.*, 2001). The number of valid tows, the depth strata covered and the dates of the surveys are presented in Table 1 for the period 1997-2004. The survey area was stratified following the standard stratification schemes (Bishop, 1994). The number of hauls was assigned to each strata 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 catchability factor of 1.

The catch of each haul was sorted and weighted into species and a sample of each species was taken in order to measure the length distribution. For Atlantic cod, Thorny skate and White hake, each individual of the sample was measured to the total length to the nearest lower cm. We present the indices for the period 1997-2004 for Atlantic cod and Thorny skate. Years 1995 and 1996 are not representative, because these years the deeper strata were not surveyed, so they are not included in the analysis. Before 2001, we have no data for White hake in this survey. For this species, we present the data for the period 2001-2004.

In 2001, the *R/V Vizconde de Eza* replaced the *C/V Playa de Menduñña* in the realization of the survey, so, in order to maintain the historical series, comparative fishing trawls were made that year to calculate the factors to convert

the series of the old vessel into the new vessel. For more details about the transformation, see González Troncoso *et al.*, 2004. For Atlantic cod and Thorny skate, the transformed series are presented for the period 1997-2000, and the non-transformed series for 2002-2004. In 2001, R/V *Vizconde de Eza* did not survey all the strata covered by the experience as the C/V *Playa de Menduñña* did, so, in order to maintain the characteristics of the survey, we present the transformed indices from the commercial vessel in those strata. Besides this, there are five hauls from the C/V *Playa de Menduñña* in five strata surveyed by de R/V *Vizconde de Eza*. Those hauls were added, transformed, to the data. Those hauls were missing last year, so the indices can change regarding the last data presented.

Although we would have to make the calibration between the two vessels for White hake in order to transform the catches of the old vessel in the new vessel, we did not make it because the old vessel had only one haul with catch of White hake in the strata not surveyed by the new vessel, a catch of 230 g. Besides this, the strata not surveyed by the R/V *Vizconde de Eza* that year are typically without catches of White hake; in the period 2002-2004, only in the year 2004 there were very small catches in two of those strata. So, we think that the effort of performing the calibration, besides the error that it bears, are not justified. For this reason, for this species, in the year 2001 we only have used the data from the R/V *Vizconde de Eza*, that made 83 hauls that year.

For each species, we present the mean catch, the stratified mean catch and the biomass by stratum and year, with their respective standard deviations, and the length distribution per haul stratified mean catches by sex and year.

## Results

### Atlantic cod

According to the Canadian data, the stock of Atlantic cod in Divisions 3NO declined dramatically during the mid-1980s, and is currently at an extreme low level. Moreover, all recent recruitment has been weak (Healey *et al.*, 2003). Although we have no data before 1995, our data agree with these results.

### Mean Catches and Biomass

The Atlantic cod haul mean catches by stratum are presented in Table 2, including swept area, number of hauls and SD. Atlantic cod stratified haul mean catches by stratum and year and their SD are presented in Table 3.

The entire time series (1997-2004) of biomass and their SD estimates of Atlantic cod are presented in Table 4. In this table we can see the biomass from the length distribution. Parameters *a* and *b* for the calculation of this biomass are presented in Table 5.

We can see a great variation in the cod indices since 1997, but this is due to a few hauls in that the presence of cod was very high. For example, in 1998 and 2001, the C/V *Playa de Menduñña* made a more than seven tons cod catch in a single haul. Besides this, in 2001, the R/V *Vizconde de Eza* made two hauls with more than a ton of cod catches. But in general, and apart from those hauls, the catches of cod are very poor. Although the stock has been under a moratorium to all direct fishing since February 1994, it seems not to recover. Moreover, this last year, the indices show a decreasing with regards to the previous years. The great value of the variance in some years is due to the tows with a large catch. (Fig. 1 and 2).

### Length Distribution

Table 6 and Figures 3 and 4 show the length distribution per haul stratified mean catches and year, besides the sampled size and its catch, for the period 1997-2004. The data have been grouped two by two, so we present the data every two cm. Except in 2001, the modal values are very low. All lengths presence is very low, even it is very difficult to follow the modal values. Only in 2001 we have a good presence of individuals between 36 and 58 cm, but probably this is due to the three hauls with great catches of this year. There is no good recruitment until this year, in which the individuals between 12 and 16 cm correspond to the greatest presence in the series. Last recruitments were very weak, as in the Canadian surveys (Healey *et al.*, 2003).

### Thorny skate

Thorny skate catches comprises the most of the skates catches during the Spanish spring survey. The Canadian surveys show that this species is being congregated on the southern of the Grand Bank, so, the catch ratio of Thorny

skate is increasing last years. Apart from this, the catches reached their lowest value in the period 1993-1995, and increased moderately between 1996-1999, but since then has been flat or slightly increasing (Kulka *et al.*, 2004).

### Mean Catches and Biomass

In Table 7 we present the Thorny skate haul mean catches by stratum, included swept area, number of hauls and SD. Their stratified haul mean catches by stratum and year, next to their SD, are presented in Table 8.

The entire time series (1997-2004) of biomass and their SD estimates of Thorny skate are presented in Table 9, beside the biomass calculated from the length distribution. The parameters a and b to calculate this biomass are presented in Table 10.

The indices of the Thorny skate present a decreasing since the year 2001, but in 2004 an increasing in the biomass occurs, reaching the second higher value of the series (Fig. 5 and 6).

### Length Distribution

The length distribution per haul stratified mean catches by sex and year are presented in Table 11 and Figures 7 and 8, besides the sampled size and its catch, for the period 1997-2004, in two-cm groups. In 1997, we have a modal value that can be followed until 2004. In 1998 there is another modal value at small lengths that can be more or less followed along the years, reaching a maximum in 2002. In 2002, too, there was a quite good recruitment, but we can no follow this peak in the following years.

## White hake

### Mean catches and biomass

Table 12 presents the mean catches per stratum, besides the standard deviation, the surveyed area and the number of hauls. In table 13 and in Figure 9, the stratified mean catches per stratum and year, as well as the annual variance, are presented. And in table 14 and Figure 10 we present the biomass per stratum and year, and the correspondent annual variance.

Table 15 presents the length weight relationship parameters for White hake for the period 2002-2004. In 2001, we have no sufficient data to calculate the parameters, so we used the parameters of the year 2002.

The indices of the White hake show a great presence in 2001, with a peak in the biomass that is more than the double of the 2002 biomass, that is the second value of the series. In 2003 and 2004 the biomass have decreased respect to the two previous years.

### Length distribution

Table 16 presents the length distribution per haul stratified mean catches, by sex and year, as the number of samples, the number of sampled individuals, the sampled catch, the sampled range, the total catch and the total numbers of hauls, and in Figures 11 and 12 it we can be seeing the distribution along the years.

The length distribution of this species agrees with the biomass results; in 2001, we can see a great presence of individuals, that decreasing in the later years. In 2002 and 2003, it is no presence of juveniles, although in 2004 there is a quite good presence of individuals between 16 and 26 cm. In Figure 12, we can follow a cohort since 2001 until 2004. Until this year, no presence of new cohort was seen.

## **References**

- Bishop, C A.. 1994. Revisions and additions to stratification schemes used during research vessel surveys in NAFO subareas 2 and 3. NAFO SCR Doc., N° 43, Serial n° N2413, 23 pp.
- Cochran, W. G.. 1997. Sampling techniques. Ed. J. Wiley and Sons, N.Y., 428 pp.
- Doubleday, W. G.. 1981. Manual on groundfish surveys in the Northwest Atlantic. NAFO Sci. Coun. Studies, 2, 55.
- González Troncoso, D., X. Paz and C. González. 2004. Atlantic cod population indices from the surveys conducted by Spain in the NAFO Regulatory Area of Divisions 3NO, 1995-2003. NAFO SCR Doc., 04/12, Serial n° N4957, 21 pp.

- Healey, B. P., E. F. Murphy, D. E. Stansbury and J- Bratney. 2003. An assessment of the cod stock in NAFO Divisions 3NO. NAFO SCR Doc. 03/59, Serial n° N4878, 60 pp.
- Kulka, D. W., C. M. Miri, M. R. Simpson and K. A. Sosebee. 2004. Thorny skate (*Ambiraja radiata* Donovan, 1808) on the Grand Banks of Newfoundland. NAFO SCR Doc. 04/35, Serial n° N4985, 108 pp.
- Walsh, J.S., X. Paz and P. Durán. 2001. A preliminary investigation of the efficiency of Canadian and Spanish Survey bottom trawls on the Southern Bank. NAFO SCR Doc., 01/74, Serial n° N4453, 18 pp.

**TABLE 1.-** Spanish spring bottom trawl surveys on NAFO Div. 3NO: 1997-2004

Year	Vessel	Valid tows	Depth strata covered (m)	Dates
1997	<i>C/V Playa de Mendiña</i>	128	56-1280	April 26-May 18
1998	<i>C/V Playa de Mendiña</i>	124	56-1464	May 06-May 26
1999	<i>C/V Playa de Mendiña</i>	114	56-1464	May 07-May 26
2000	<i>C/V Playa de Mendiña</i>	118	56-1464	May 07-May 28
2001(*)	<i>R/V Vizconde de Eza</i>	83	56-1116	May 03-May 24
	<i>C/V Playa de Mendiña</i>	121	56-1464	May 05-May 23
2002	<i>R/V Vizconde de Eza</i>	125	56-1464	April 29-May 19
2003	<i>R/V Vizconde de Eza</i>	118	56-1464	May 11-Jun 02
2004	<i>R/V Vizconde de Eza</i>	120	56-1464	Jun 06 – Jun 24

(\*) We took, for the calculation of the series, 83 hauls from the *R/V Vizconde de Eza* and 40 hauls from the *C/V Playa de Mendiña* (123 hauls in total)

**TABLE 2.-** Swept area, number of hauls and Atlantic cod mean catch (kg) and SD (\*\*) by stratum. Spanish Spring Surveys on NAFO Div. 3NO: 1997-2004. Swept area in square miles. n.s. means stratum not surveyed. 1997-2000 data are transformed C/V *Playa de Mendiña* data, and 2002-2004 data are original from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels.

Stratum	1997				1998				1999				2000			
	Swept area	Tow number	Atlantic cod Mean catch	Atlantic cod SD	Swept area	Tow number	Atlantic cod Mean catch	Atlantic cod SD	Swept area	Tow number	Atlantic cod Mean catch	Atlantic cod SD	Swept area	Tow number	Atlantic cod Mean catch	Atlantic cod SD
353	0.0480	4	0.00	0.000	0.0465	4	0.00	0.004	0.0360	3	6.26	8.593	0.0356	3	8.59	9.984
354	0.0233	2	0.00	0.000	0.0356	3	17.67	29.046	0.0218	2	4.92	3.192	0.0356	3	18.44	27.099
355	0.0233	2	4.29	5.711	0.0221	2	27.05	3.662	0.0229	2	6.39	2.549	0.0233	2	94.83	76.209
356	0.0225	2	7.80	0.495	0.0221	2	6.23	0.247	0.0229	2	41.19	0.346	0.0225	2	16.34	17.172
357	0.0443	4	91.55	174.202	0.0240	2	7.45	0.742	0.0236	2	10.12	11.461	0.0124	1	9.15	-
358	0.0563	5	1.77	1.655	0.0236	3	4.46	4.030	0.0349	3	9.98	4.006	0.0341	3	184.88	194.829
359	0.0690	6	1.13	2.385	0.0698	6	0.39	0.858	0.0364	3	7.25	11.394	0.0469	4	18.26	17.367
360	0.3754	32	0.11	0.226	0.2561	25	0.22	0.700	0.2325	19	2.33	3.801	0.2396	20	2.16	3.561
374	0.0353	3	0.06	0.099	0.0353	3	0.00	0.000	0.0244	2	0.58	0.594	0.0240	2	0.00	0.000
375	0.0116	1	0.00	-	0.0345	3	0.78	0.403	0.0236	2	0.97	0.579	0.0244	2	0.00	0.000
376	0.1583	14	0.00	0.000	0.0930	10	0.20	0.187	0.1219	10	0.62	0.545	0.1200	10	0.90	1.852
377	0.0116	1	0.27	-	0.0229	2	1.89	2.375	0.0240	2	0.21	0.302	0.0229	2	0.02	0.027
378	0.0210	2	2.34	3.316	0.0120	2	3.46	0.940	0.0229	2	7.76	5.951	0.0233	2	10.65	11.169
379	0.0206	2	3.68	0.307	0.0356	3	8.30	5.847	0.0236	2	5.22	4.147	0.0225	2	41.12	54.683
380	0.0210	2	0.36	0.515	0.0113	2	2.33	1.361	0.0236	2	38.58	48.720	0.0236	2	8.21	3.236
381	0.0221	2	0.07	0.099	0.0229	2	0.21	0.187	0.0229	2	0.87	0.388	0.0236	2	1.74	0.730
382	0.0461	4	0.00	0.000	0.0229	3	0.32	0.336	0.0484	4	0.05	0.036	0.0499	4	0.71	0.561
721	0.0221	2	20.98	7.052	0.0203	2	0.61	0.866	0.0244	2	88.29	106.743	0.0236	2	28.34	17.122
722	0.0214	2	0.31	0.139	0.0101	2	0.00	0.000	0.0229	2	0.00	0.000	0.0218	2	0.90	1.277
723	0.0210	2	9.90	2.425	0.0233	2	4.39	3.736	0.0229	2	16.87	20.735	0.0248	2	22.02	12.010
724	0.0225	2	1.30	1.269	0.0206	2	1488.84	2101.820	0.0225	2	0.02	0.032	0.0233	2	0.70	0.341
725	0.0206	2	23.50	17.734	0.0086	1	30.86	-	0.0229	2	13.65	19.102	0.0210	2	4.34	3.857
726	n.s.	n.s.	n.s.	n.s.	0.0094	2	4.74	5.617	0.0225	2	0.81	0.492	0.0221	2	8.85	12.221
727	0.0094	1	0.12	-	0.0233	2	2.66	2.821	0.0236	2	9.20	4.701	0.0210	2	9.16	10.803
728	0.0214	2	1.17	0.569	0.0206	2	1.54	2.177	0.0233	2	0.00	0.000	0.0210	2	0.90	1.267
752	0.0218	2	0.00	0.000	0.0229	2	0.00	0.000	0.0233	2	0.00	0.000	0.0206	2	0.00	0.000
753	0.0214	2	0.00	0.000	0.0218	2	0.00	0.000	0.0229	2	0.00	0.000	0.0218	2	0.00	0.000
754	0.0330	3	0.00	0.000	0.0210	2	0.00	0.000	0.0206	2	0.00	0.000	0.0195	2	0.00	0.000
755	n.s.	n.s.	n.s.	n.s.	0.0206	2	0.00	0.000	0.0311	3	0.00	0.000	0.0431	4	0.00	0.000
756	0.0109	1	0.00	-	0.0225	2	0.32	0.449	0.0225	2	0.24	0.334	0.0203	2	0.36	0.257
757	0.0304	3	0.00	0.000	0.0206	2	0.00	0.000	0.0233	2	0.00	0.000	0.0214	2	0.00	0.000
758	0.0214	2	0.00	0.000	0.0105	2	0.00	0.000	0.0214	2	0.00	0.000	0.0210	2	0.00	0.000
759	n.s.	n.s.	n.s.	n.s.	0.0214	2	0.00	0.000	0.0218	2	0.00	0.000	0.0210	2	0.00	0.000
760	0.0105	1	0.00	-	0.0214	2	0.00	0.000	0.0225	2	0.00	0.000	0.0210	2	0.00	0.000
761	0.0315	3	0.00	0.000	0.0206	2	0.00	0.000	0.0210	2	0.00	0.000	0.0221	2	0.00	0.000
762	0.0308	3	0.00	0.000	0.0094	2	0.00	0.000	0.0210	2	0.00	0.000	0.0203	2	0.00	0.000
763	n.s.	n.s.	n.s.	n.s.	0.0218	2	0.00	0.000	0.0311	3	0.00	0.000	0.0416	4	1.08	2.170
764	0.0206	2	0.00	0.000	0.0218	2	0.00	0.000	0.0225	2	0.00	0.000	0.0218	2	0.00	0.000
765	0.0206	2	0.00	0.000	0.0098	2	0.00	0.000	0.0221	2	0.00	0.000	0.0203	2	0.00	0.000
766	0.0308	3	0.00	0.000	0.0191	2	0.00	0.000	0.0218	2	0.00	0.000	0.0214	2	0.00	0.000
767	n.s.	n.s.	n.s.	n.s.	0.0109	2	0.00	0.000	0.0214	2	0.00	0.000	0.0210	2	0.00	0.000

$$(**)SD = \frac{\sum (x_i - \bar{x})^2}{n-1}$$

**TABLE 2 (cont.).**- Swept area, number of hauls and Atlantic cod mean catch (kg) and SD (\*\*) by stratum. Spanish Spring Surveys on NAFO Div. 3NO: 1997-2004. Swept area in square miles. n.s. means stratum not surveyed. 1997-2000 data are transformed C/V *Playa de Menduñá* data, and 2002-2004 data are original from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels.

Stratum	2001				2002				2003				2004			
	Swept area	Tow number	Atlantic cod Mean catch	Atlantic cod SD	Swept area	Tow number	Atlantic cod Mean catch	Atlantic cod SD	Swept area	Tow number	Atlantic cod Mean catch	Atlantic cod SD	Swept area	Tow number	Atlantic cod Mean catch	Atlantic cod SD
353	0.0341	3	7.33	8.145	0.0476	4	0.00	0.003	0.0334	3	0.00	0.000	0.033750	3	10.21	8.691
354	0.0338	3	16.07	3.315	0.0356	3	0.01	0.012	0.0338	3	7.63	13.221	0.034500	3	4.76	3.335
355	0.0240	2	56.11	64.898	0.0236	2	0.96	0.370	0.0229	2	3.02	2.390	0.022875	2	5.09	3.267
356	0.0240	2	149.60	76.650	0.0233	2	15.20	10.889	0.0225	2	15.61	1.605	0.022125	2	2.97	0.714
357	0.0244	2	27.20	36.062	0.0240	2	6.65	1.909	0.0229	2	5.28	7.460	0.022875	2	13.30	17.727
358	0.0345	3	3.42	2.592	0.0345	3	2.63	1.429	0.0338	3	207.22	260.186	0.033000	3	14.41	12.455
359	0.0803	7	176.35	433.935	0.0686	6	2.72	3.436	0.0791	7	1.03	1.522	0.079125	7	29.83	54.712
360	0.2423	20	11.36	27.470	0.2865	25	0.82	2.887	0.2254	20	1.14	2.952	0.231000	20	3.55	4.484
374	0.0240	2	0.00	0.000	0.0345	3	0.00	0.000	0.0225	2	0.00	0.000	0.023250	2	0.00	0.000
375	0.0338	3	0.00	0.000	0.0353	3	0.47	0.503	0.0330	3	0.48	0.826	0.033750	3	0.05	0.081
376	0.1155	10	0.04	0.119	0.1140	10	0.00	0.000	0.1125	10	0.65	1.987	0.116625	10	0.60	0.733
377	0.0229	2	0.00	0.000	0.0229	2	0.00	0.000	0.0225	2	1.25	1.768	0.021750	2	19.60	24.020
378	0.0236	2	11.98	15.726	0.0233	2	1.45	2.051	0.0225	2	19.18	19.141	0.022500	2	17.75	3.989
379	0.0229	2	9.54	9.001	0.0229	2	24.83	32.492	0.0229	2	4.35	0.481	0.012375	1	23.95	-
380	0.0206	2	6.00	2.895	0.0225	2	0.31	0.035	0.0229	2	1.09	0.976	0.022125	2	7.77	2.305
381	0.0236	2	0.66	0.891	0.0229	2	0.04	0.057	0.0229	2	0.00	0.000	0.022500	2	5.47	4.150
382	0.0469	4	0.12	0.145	0.0341	3	0.04	0.076	0.0454	4	0.00	0.000	0.046125	4	0.47	0.888
721	0.0248	2	4.85	6.859	0.0233	2	1.01	1.430	0.0225	2	9.40	13.287	0.022125	2	2.20	3.111
722	0.0233	2	0.00	0.000	0.0236	2	0.00	0.000	0.0221	2	1.73	2.447	0.021750	2	0.00	0.000
723	0.0240	2	676.15	932.179	0.0233	2	55.60	69.155	0.0229	2	0.65	0.919	0.022875	2	1.94	2.744
724	0.0353	3	6.16	10.254	0.0225	2	49.80	70.428	0.0225	2	10.46	14.786	0.021375	2	0.00	0.000
725	0.0116	2	1367.61	1856.733	0.0225	2	9.25	7.849	0.0229	2	2.17	3.062	0.022500	2	0.29	0.403
726	0.0116	2	1.83	2.593	0.0214	2	1122.95	1569.289	0.0225	2	0.00	0.000	0.022500	2	0.00	0.000
727	0.0225	2	10.40	4.810	0.0233	2	2.80	3.960	0.0218	2	7.45	9.405	0.023250	2	0.00	0.000
728	0.0229	2	0.00	0.000	0.0229	2	21.40	30.264	0.0225	2	0.00	0.000	0.018000	2	0.00	0.000
752	0.0210	2	0.00	0.000	0.0116	1	0.00	0.000	0.0229	2	0.00	0.000	0.021375	2	0.00	0.000
753	0.0214	2	0.00	0.000	0.0229	2	0.00	0.000	0.0229	2	0.00	0.000	0.021750	2	0.00	0.000
754	0.0195	2	0.00	0.000	0.0341	3	0.00	0.000	0.0218	2	0.00	0.000	0.021375	2	0.00	0.000
755	0.0416	4	0.00	0.000	0.0338	3	0.00	0.000	0.0221	2	0.00	0.000	0.031875	3	0.00	0.000
756	0.0113	2	0.04	0.057	0.0229	2	0.00	0.000	0.0221	2	0.00	0.000	0.021750	2	0.00	0.000
757	0.0233	2	0.00	0.000	0.0225	2	64.40	91.075	0.0221	2	0.00	0.000	0.021750	2	0.00	0.000
758	0.0218	2	0.00	0.000	0.0225	2	2.80	3.960	0.0221	2	0.00	0.000	0.021375	2	0.00	0.000
759	0.0221	2	0.00	0.000	0.0225	2	0.00	0.000	0.0113	1	0.00	-	0.021375	2	0.00	0.000
760	0.0229	2	0.00	0.000	0.0229	2	0.00	0.000	0.0218	2	0.00	0.000	0.022125	2	0.00	0.000
761	0.0225	2	0.00	0.000	0.0225	2	0.17	0.236	0.0225	2	0.00	0.000	0.022125	2	0.00	0.000
762	0.0116	2	0.00	0.000	0.0225	2	0.15	0.212	0.0225	2	0.00	0.000	0.023250	2	0.00	0.000
763	0.0330	3	0.00	0.000	0.0225	2	0.00	0.000	0.0311	3	0.00	0.000	0.032625	3	0.00	0.000
764	0.0240	2	0.00	0.000	0.0236	2	0.00	0.000	0.0221	2	0.00	0.000	0.022875	2	0.00	0.000
765	0.0113	2	0.00	0.000	0.0236	2	0.00	0.000	0.0113	1	0.00	-	0.022500	2	0.00	0.000
766	0.0203	2	0.00	0.000	0.0233	2	0.00	0.000	0.0225	2	0.00	0.000	0.022500	2	0.00	0.000
767	0.0218	2	0.00	0.000	0.0225	2	0.00	0.000	0.0229	2	0.00	0.000	0.021750	2	0.00	0.000

$$(**)SD = \frac{\sum (x_i - \bar{x})^2}{n-1}$$

**TABLE 3.-** Stratified mean catches (Kg) by stratum and year and SD by year of Atlantic cod (1997-2004). n.s. means stratum not surveyed. 1997-2000 data are transformed C/V Playa de Mendiña data. 2002-2004 data are original from R/V Vizconde de Eza. In 2001, there are data from the two vessels.

Stratum	1997	1998	1999	2000	2001	2002	2003	2004
353	0.00	0.59	1684.29	2310.56	1972.67	0.40	0.00	2746.49
354	0.00	4347.10	1209.44	4536.47	3954.04	1.64	1877.80	1172.11
355	317.46	2001.63	472.57	7017.36	4152.14	71.15	223.48	376.66
356	366.75	292.75	1935.74	768.05	7031.20	714.40	733.44	139.36
357	15014.55	1222.35	1659.07	1500.68	4460.80	1090.60	865.10	2180.38
358	397.76	1002.53	2246.51	41597.12	768.75	592.50	46625.25	3241.50
359	473.87	164.50	3052.91	7687.04	74245.15	1146.52	435.31	12557.95
360	301.58	616.24	6478.57	6017.33	31605.14	2283.17	3169.28	9886.61
374	12.23	0.00	124.31	0.00	0.00	0.00	0.00	0.00
375	0.00	211.79	261.73	0.00	0.00	126.47	129.18	12.65
376	0.00	263.27	822.50	1202.94	50.03	0.00	864.70	801.87
377	26.59	188.96	21.35	1.92	0.00	0.00	125.00	1959.50
378	325.88	481.53	1078.58	1480.09	1665.22	201.55	2665.33	2466.56
379	390.21	880.31	553.41	4358.29	1010.71	2631.45	461.10	2538.70
380	34.94	223.39	3703.59	788.08	576.11	30.19	104.64	745.92
381	10.08	30.36	125.22	250.68	95.74	5.76	0.00	787.90
382	0.00	108.42	18.00	243.65	41.41	14.98	0.00	160.78
721	1363.56	39.80	5738.57	1842.35	315.25	65.75	610.68	143.00
722	26.16	0.00	0.00	75.84	0.00	0.00	145.32	0.00
723	1534.94	680.69	2614.28	3413.20	104803.25	8618.00	100.75	300.70
724	161.20	184615.64	2.82	87.21	764.25	6175.20	1296.42	0.00
725	2467.77	3240.64	1432.94	455.78	143598.88	971.25	227.33	29.93
726	n.s	341.39	58.07	637.55	132.02	80852.04	0.00	0.00
727	11.42	255.30	883.49	879.12	998.37	268.80	715.20	0.00
728	91.43	120.09	0.00	69.87	0.00	1669.20	0.00	0.00
752	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
753	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
754	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
756	0.00	32.07	23.86	36.40	4.04	0.00	0.00	0.00
757	0.00	0.00	0.00	0.00	0.00	6568.80	0.00	0.00
758	0.00	0.00	0.00	0.00	0.00	277.20	0.00	0.00
759	n.s	0.00	0.00	0.00	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
761	0.00	0.00	0.00	0.00	0.00	28.56	0.00	0.00
762	0.00	0.00	0.00	0.00	0.00	31.80	0.00	0.00
763	n.s	0.00	0.00	283.12	0.00	0.00	0.00	0.00
764	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
765	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
766	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
767	n.s	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	23328.40	201361.35	36201.79	87540.73	382245.17	114437.38	61375.29	42248.54
( $\bar{Y}$ )	2.50	19.47	3.50	8.46	36.96	11.07	5.93	4.09
S.D.	1.54	17.82	0.75	2.58	17.97	7.82	3.29	0.95

**TABLE 4.-** Survey estimates (by the swept area method) of Atlantic cod biomass (t) and SD by stratum and year on NAFO Div. 3NO. n.s. means stratum not surveyed. 1997-2000 data are transformed C/V *Playa de Menguña* data. 2002-2004 data are original from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels.

Stratum	1997	1998	1999	2000	2001	2002	2003	2004
353	0	0	140	195	173	0	0	244
354	0	366	111	382	351	0	167	102
355	27	181	41	604	346	6	20	33
356	33	26	169	68	586	61	65	13
357	1357	102	140	121	366	91	76	191
358	35	86	194	3657	67	52	4144	295
359	41	14	252	656	6476	100	39	1111
360	26	53	529	502	2609	199	281	856
374	1	0	10	0	0	0	0	0
375	0	18	22	0	0	11	12	1
376	0	23	67	100	4	0	77	69
377	2	17	2	0	0	0	11	180
378	31	41	95	127	141	17	237	219
379	38	74	47	387	88	230	40	205
380	3	20	314	67	56	3	9	67
381	1	3	11	21	8	1	0	70
382	0	10	1	20	4	1	0	14
721	123	4	471	156	25	6	54	13
722	2	0	0	7	0	0	13	0
723	146	59	229	276	8734	741	9	26
724	14	17902	0	8	65	549	115	0
725	239	376	125	43	12347	86	20	3
726	n.s.	33	5	58	11	7565	0	0
727	1	22	75	84	89	23	66	0
728	9	12	0	7	0	146	0	0
752	0	0	0	0	0	0	0	0
753	0	0	0	0	0	0	0	0
754	0	0	0	0	0	0	0	0
755	n.s.	0	0	0	0	0	0	0
756	0	3	2	4	0	0	0	0
757	0	0	0	0	0	584	0	0
758	0	0	0	0	0	25	0	0
759	n.s.	0	0	0	0	0	0	0
760	0	0	0	0	0	0	0	0
761	0	0	0	0	0	3	0	0
762	0	0	0	0	0	3	0	0
763	n.s.	0	0	27	0	0	0	0
764	0	0	0	0	0	0	0	0
765	0	0	0	0	0	0	0	0
766	0	0	0	0	0	0	0	0
767	n.s.	0	0	0	0	0	0	0
TOTAL	2131	19444	3054	7576	32548	10502	5455	3712
S.D.	1322	18206	655	2566	15903	7971	3016	848



**TABLE 5.-** Length weight relationships in the calculation of Atlantic cod biomass. The equation is  $Weight = a(l + 0.5)^b$   
 Spanish Spring Surveys on NAFO Div. 3NO: 1997-2004.

	1997	1998	1999	2000	2001	2002	2003	2004
a	0.0102	0.0061	0.0048	0.0060	0.0048	0.0057	0.0046	0.0052
	Error = 0.2480	Error = 0.0748	Error = 0.0788	Error = 0.0706	Error = 0.0893	Error = 0.1025	Error = 0.0581	Error = 0.0698
b	2.9387	3.0671	3.1313	3.0822	3.1198	3.0783	3.1370	3.1107
	Error = 0.0629	Error = 0.0197	Error = 0.0203	Error = 0.0179	Error = 0.0228	Error = 0.0274	Error = 0.0153	Error = 0.0185
	R <sup>2</sup> = 0.975	R <sup>2</sup> = 0.997	R <sup>2</sup> = 0.997	R <sup>2</sup> = 0.997	R <sup>2</sup> = 0.996	R <sup>2</sup> = 0.995	R <sup>2</sup> = 0.998	R <sup>2</sup> = 0.997
	N = 431	N = 687	N = 430	N = 877	N = 488	N = 678	N = 516	N = 656

**TABLE 6.-** Atlantic cod length distribution. Estimated numbers per haul stratified mean catches. Spanish Spring Survey on NAFO 3NO: 1997-2004. 1997-2000 data are transformed C/V *Playa de Mendiña* data. 2002-2004 data are original R/V *Vizconde de Eza* data. In 2001, there are data from the two vessels. (\*) indicates untransformed data.

Length (cm.)	1997.	1998	1999	2000	2001	2002	2003	2004
8	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000
10	0.000	0.000	0.000	0.000	0.000	0.013	0.000	0.029
12	0.000	0.001	0.001	0.001	0.000	0.008	0.007	0.675
14	0.000	0.005	0.028	0.004	0.000	0.013	0.050	1.277
16	0.000	0.003	0.144	0.033	0.019	0.008	0.021	0.646
18	0.000	0.002	0.201	0.045	0.015	0.016	0.050	0.183
20	0.000	0.002	0.089	0.110	0.094	0.000	0.050	0.073
22	0.000	0.002	0.178	0.215	0.216	0.012	0.064	0.051
24	0.001	0.005	0.570	0.232	0.243	0.054	0.086	0.117
26	0.002	0.008	0.990	0.312	0.311	0.094	0.109	0.139
28	0.007	0.026	0.855	0.377	0.309	0.095	0.172	0.161
30	0.010	0.034	0.367	0.439	0.206	0.165	0.159	0.125
32	0.037	0.028	0.150	0.349	0.244	0.231	0.159	0.110
34	0.065	0.030	0.087	0.466	0.391	0.370	0.072	0.279
36	0.109	0.021	0.066	0.568	1.045	0.470	0.086	0.374
38	0.138	0.029	0.090	1.035	2.025	0.598	0.130	0.426
40	0.082	0.098	0.087	1.071	3.130	0.599	0.072	0.345
42	0.049	0.067	0.034	0.927	3.426	0.913	0.101	0.235
44	0.073	0.306	0.052	0.488	4.018	1.161	0.109	0.176
46	0.048	0.477	0.022	0.323	4.368	1.430	0.111	0.117
48	0.063	0.691	0.031	0.176	5.107	1.418	0.183	0.088
50	0.023	0.664	0.036	0.119	4.338	0.996	0.128	0.110
52	0.045	0.582	0.041	0.077	3.591	1.157	0.299	0.059
54	0.047	0.876	0.066	0.068	2.728	1.046	0.401	0.095
56	0.151	1.672	0.104	0.086	1.702	0.756	0.398	0.095
58	0.122	1.763	0.153	0.127	1.155	0.442	0.313	0.147
60	0.212	1.111	0.195	0.116	0.441	0.260	0.353	0.095
62	0.148	0.769	0.169	0.094	0.206	0.236	0.239	0.059
64	0.121	0.718	0.134	0.218	0.154	0.058	0.194	0.132
66	0.150	0.234	0.099	0.186	0.110	0.058	0.197	0.103
68	0.018	0.386	0.123	0.144	0.026	0.004	0.072	0.081
70	0.040	0.221	0.034	0.197	0.077	0.054	0.088	0.073
72	0.004	0.271	0.028	0.146	0.048	0.012	0.074	0.015
74	0.018	0.188	0.034	0.182	0.022	0.000	0.000	0.037
76	0.002	0.125	0.022	0.090	0.055	0.000	0.021	0.044
78	0.002	0.112	0.009	0.053	0.066	0.004	0.014	0.015
80	0.002	0.026	0.003	0.021	0.095	0.000	0.026	0.029
82	0.000	0.012	0.001	0.013	0.012	0.000	0.011	0.015
84	0.000	0.000	0.002	0.015	0.000	0.000	0.007	0.000
86	0.000	0.015	0.002	0.006	0.029	0.004	0.011	0.007
88	0.000	0.013	0.002	0.005	0.004	0.000	0.007	0.007
90	0.000	0.000	0.000	0.003	0.015	0.004	0.007	0.015
92	0.000	0.001	0.003	0.005	0.000	0.000	0.000	0.007
94	0.000	0.000	0.000	0.001	0.004	0.000	0.000	0.007
96	0.000	0.000	0.001	0.001	0.015	0.000	0.007	0.000
98	0.000	0.000	0.001	0.001	0.007	0.000	0.000	0.000
100	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
102	0.000	0.000	0.000	0.002	0.000	0.000	0.007	0.000
104	0.000	0.001	0.000	0.000	0.000	0.004	0.000	0.000
106	0.000	0.000	0.000	0.001	0.000	0.000	0.007	0.015
108	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000
110	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
112	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000
114	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
116	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
118	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000
120	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
122	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
124	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
126	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
128	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
130	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
132	0.000	0.000	0.000	0.000	0.007	0.000	0.000	0.000
<b>Total</b>	<b>1.792</b>	<b>11.593</b>	<b>5.307</b>	<b>9.148</b>	<b>40.098</b>	<b>12.762</b>	<b>4.673</b>	<b>6.890</b>
N° samples (*):	40	55	72	70	32	41	42	58
N° Ind. (*):	742	967	2770	2753	1591	1030	539	939
Sampled catch:	248	410	527	752	1107	776	654	554
Range (*):	24-118	12-104	9-121	13-118	8-132	9-104	12-106	10-105
Total catch:	572	3873	613	1274	3487	2806	846	554
Total hauls (*):	128	124	114	118	83	125	122	122

**TABLE 7.-** Swept area, number of hauls and Thorny skate mean catch (kg) and SD (\*\*) by stratum. Spanish Spring Surveys on NAFO Div. 3NO: 1997-2004. Swept area in square miles. n.s. means stratum not surveyed. 1997-2000 data are transformed C/V *Playa de Menduña* data, and 2002-2004 data are original from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels.

Stratum	1997				1998				1999				2000			
	Swept area	Tow number	T. skate Mean catch	T. skate SD	Swept area	Tow number	T. skate Mean catch	T. skate SD	Swept area	Tow number	T. skate Mean catch	T. skate SD	Swept area	Tow number	T. skate Mean catch	T. skate SD
353	0.0480	4	6.21	1.73	0.0465	4	26.06	11.09	0.0360	3	319.35	89.29	0.0356	3	149.95	44.45
354	0.0233	2	1.20	1.12	0.0356	3	68.23	87.97	0.0218	2	20.21	28.57	0.0356	3	82.44	34.12
355	0.0233	2	27.19	22.38	0.0221	2	3.43	0.23	0.0229	2	12.40	17.54	0.0233	2	33.14	41.19
356	0.0225	2	2.72	0.61	0.0221	2	0.69	0.42	0.0229	2	1.55	0.28	0.0225	2	2.21	0.51
357	0.0443	4	1.32	1.56	0.0240	2	1.69	1.37	0.0236	2	2.98	1.74	0.0124	1	0.00	-
358	0.0563	5	1.56	1.52	0.0236	3	0.99	1.17	0.0349	3	2.81	2.22	0.0341	3	15.49	17.71
359	0.0690	6	7.47	2.92	0.0698	6	7.93	5.95	0.0364	3	13.25	14.73	0.0469	4	71.73	91.22
360	0.3754	32	10.11	11.61	0.2561	25	17.95	23.86	0.2325	19	67.68	55.88	0.2396	20	132.15	142.67
374	0.0353	3	2.29	1.19	0.0353	3	0.41	0.61	0.0244	2	5.91	0.14	0.0240	2	0.71	1.00
375	0.0116	1	0.84	-	0.0345	3	1.97	1.81	0.0236	2	6.57	0.77	0.0244	2	3.48	0.40
376	0.1583	14	15.16	16.62	0.0930	10	24.06	35.48	0.1219	10	75.94	45.71	0.1200	10	68.84	52.60
377	0.0116	1	1.28	-	0.0229	2	0.32	0.31	0.0240	2	1.04	0.18	0.0229	2	0.57	0.81
378	0.0210	2	2.07	0.59	0.0120	2	2.07	2.40	0.0229	2	8.32	5.01	0.0233	2	5.54	3.31
379	0.0206	2	0.54	0.24	0.0356	3	1.69	1.09	0.0236	2	0.76	0.53	0.0225	2	1.10	0.51
380	0.0210	2	1.27	0.37	0.0113	2	4.50	2.78	0.0236	2	3.96	1.95	0.0236	2	1.26	1.17
381	0.0221	2	6.17	7.81	0.0229	2	7.65	0.24	0.0229	2	1.03	0.28	0.0236	2	3.94	0.36
382	0.0461	4	0.64	0.95	0.0229	3	1.02	0.85	0.0484	4	4.44	3.05	0.0499	4	5.36	0.80
721	0.0221	2	2.28	0.18	0.0203	2	8.17	9.33	0.0244	2	1.16	1.64	0.0236	2	6.54	6.27
722	0.0214	2	7.54	10.66	0.0101	2	38.34	45.25	0.0229	2	10.79	15.26	0.0218	2	13.79	6.07
723	0.0210	2	6.32	7.25	0.0233	2	2.62	0.40	0.0229	2	3.77	3.99	0.0248	2	4.05	4.37
724	0.0225	2	2.06	2.45	0.0206	2	12.29	3.71	0.0225	2	9.83	6.80	0.0233	2	2.33	3.29
725	0.0206	2	0.27	0.31	0.0086	1	3.89	-	0.0229	2	3.63	5.13	0.0210	2	4.11	5.03
726	n.s.	n.s.	n.s.	n.s.	0.0094	2	0.26	0.37	0.0225	2	0.89	1.25	0.0221	2	9.68	10.56
727	0.0094	1	3.37	-	0.0233	2	6.02	2.84	0.0236	2	2.83	0.63	0.0210	2	0.58	0.60
728	0.0214	2	1.45	1.11	0.0206	2	4.68	2.68	0.0233	2	4.91	3.22	0.0210	2	1.85	1.22
752	0.0218	2	4.25	2.51	0.0229	2	58.62	78.69	0.0233	2	2.24	1.11	0.0206	2	1.20	1.30
753	0.0214	2	13.56	17.61	0.0218	2	4.01	5.19	0.0229	2	17.13	19.39	0.0218	2	3.01	4.26
754	0.0330	3	45.32	25.00	0.0210	2	112.25	14.65	0.0206	2	16.66	23.56	0.0195	2	54.96	23.46
755	n.s.	n.s.	n.s.	n.s.	0.0206	2	7.84	5.34	0.0311	3	0.00	0.00	0.0431	4	2.74	5.48
756	0.0109	1	13.91	-	0.0225	2	63.66	36.74	0.0225	2	16.21	19.54	0.0203	2	3.69	3.64
757	0.0304	3	32.68	39.04	0.0206	2	67.38	86.94	0.0233	2	10.74	10.98	0.0214	2	55.50	20.36
758	0.0214	2	52.54	7.90	0.0105	2	235.97	239.70	0.0214	2	117.49	142.60	0.0210	2	55.87	79.01
759	n.s.	n.s.	n.s.	n.s.	0.0214	2	114.12	147.96	0.0218	2	0.43	0.26	0.0210	2	41.86	56.21
760	0.0105	1	0.00	-	0.0214	2	6.73	3.05	0.0225	2	9.20	11.14	0.0210	2	12.97	11.59
761	0.0315	3	59.26	86.28	0.0206	2	17.62	10.16	0.0210	2	0.71	0.32	0.0221	2	10.20	13.55
762	0.0308	3	50.77	82.75	0.0094	2	5.24	4.35	0.0210	2	8.28	10.49	0.0203	2	5.54	7.83
763	n.s.	n.s.	n.s.	n.s.	0.0218	2	0.00	0.00	0.0311	3	0.00	0.00	0.0416	4	0.00	0.00
764	0.0206	2	14.84	5.60	0.0218	2	12.47	10.81	0.0225	2	0.00	0.00	0.0218	2	0.00	0.00
765	0.0206	2	14.88	18.39	0.0098	2	12.08	15.52	0.0221	2	0.00	0.00	0.0203	2	1.35	1.91
766	0.0308	3	15.23	9.42	0.0191	2	0.51	0.20	0.0218	2	0.00	0.00	0.0214	2	0.00	0.00
767	n.s.	n.s.	n.s.	n.s.	0.0109	2	2.83	3.87	0.0214	2	0.00	0.00	0.0210	2	0.00	0.00

$$(**)SD = \frac{\sum (x_i - \bar{x})^2}{n-1}$$

**TABLE 7 (cont.).**- Swept area, number of hauls and Thorny skate mean catch (kg) and SD (\*\*) by stratum. Spanish Spring Surveys on NAFO Div. 3NO: 1997-2004. Swept area in square miles. n.s. means stratum not surveyed. 1997-2000 data are transformed C/V *Playa de Menduña* data, and 2002-2004 data are original from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels.

Stratum	2001				2002				2003				2004			
	Swept area	Tow number	T. skate Mean catch	T. skate SD	Swept area	Tow number	T. skate Mean catch	T. skate SD	Swept area	Tow number	T. skate Mean catch	T. skate SD	Swept area	Tow number	T. skate Mean catch	T. skate SD
353	0.0341	3	351.90	283.060	0.0476	4	356.30	215.772	0.0334	3	78.36	33.796	0.033750	3	53.70	33.407
354	0.0338	3	67.63	19.515	0.0356	3	89.80	80.809	0.0338	3	40.33	40.683	0.034500	3	147.46	134.348
355	0.0240	2	20.60	11.031	0.0236	2	2.67	3.723	0.0229	2	19.53	22.422	0.022875	2	25.07	4.384
356	0.0240	2	0.29	0.410	0.0233	2	1.55	2.192	0.0225	2	5.19	7.333	0.022125	2	16.31	7.732
357	0.0244	2	2.35	1.669	0.0240	2	2.00	2.828	0.0229	2	2.25	3.182	0.022875	2	46.05	28.438
358	0.0345	3	4.05	6.974	0.0345	3	11.47	19.861	0.0338	3	21.14	25.809	0.033000	3	42.24	13.838
359	0.0803	7	15.45	24.999	0.0686	6	72.34	148.583	0.0791	7	25.86	23.965	0.079125	7	46.56	62.119
360	0.2423	20	67.67	79.827	0.2865	25	20.63	24.987	0.2254	20	35.53	29.397	0.231000	20	93.53	78.305
374	0.0240	2	0.73	1.032	0.0345	3	0.30	0.520	0.0225	2	0.00	0.000	0.023250	2	1.89	2.673
375	0.0338	3	0.51	0.878	0.0353	3	1.40	2.425	0.0330	3	2.29	2.414	0.033750	3	10.32	5.359
376	0.1155	10	22.67	19.650	0.1140	10	12.59	12.093	0.1125	10	10.77	12.802	0.116625	10	89.67	62.815
377	0.0229	2	5.70	2.270	0.0229	2	1.17	1.655	0.0225	2	0.46	0.438	0.021750	2	7.23	9.648
378	0.0236	2	0.16	0.099	0.0233	2	0.02	0.021	0.0225	2	2.98	4.076	0.022500	2	26.20	17.402
379	0.0229	2	0.00	0.000	0.0229	2	5.45	1.909	0.0229	2	0.01	0.014	0.012375	1	13.61	-
380	0.0206	2	1.35	0.209	0.0225	2	4.42	4.476	0.0229	2	4.09	0.559	0.022125	2	119.25	56.639
381	0.0236	2	0.74	0.419	0.0229	2	0.71	0.071	0.0229	2	3.40	3.394	0.022500	2	70.60	17.536
382	0.0469	4	1.77	1.265	0.0341	3	0.65	0.257	0.0454	4	0.00	0.000	0.046125	4	6.28	6.990
721	0.0248	2	0.00	0.000	0.0233	2	0.00	0.000	0.0225	2	10.63	7.481	0.022125	2	2.70	3.818
722	0.0233	2	10.10	5.374	0.0236	2	0.00	0.000	0.0221	2	0.91	0.021	0.021750	2	0.00	0.000
723	0.0240	2	2.40	2.121	0.0233	2	0.60	0.849	0.0229	2	5.19	4.865	0.022875	2	4.85	1.913
724	0.0353	3	67.38	91.221	0.0225	2	25.85	14.354	0.0225	2	26.32	0.226	0.021375	2	0.00	0.000
725	0.0116	2	1.91	1.235	0.0225	2	1.82	2.574	0.0229	2	1.31	0.506	0.022500	2	44.22	57.679
726	0.0116	2	1.32	1.381	0.0214	2	3.30	1.980	0.0225	2	0.00	0.000	0.022500	2	0.00	0.000
727	0.0225	2	0.64	0.905	0.0233	2	3.05	4.313	0.0218	2	96.69	91.097	0.023250	2	10.16	10.380
728	0.0229	2	1.65	1.531	0.0229	2	6.69	9.454	0.0225	2	17.23	8.301	0.018000	2	2.69	3.804
752	0.0210	2	8.93	5.430	0.0116	1	0.49	0.686	0.0229	2	183.35	38.537	0.021375	2	0.00	0.000
753	0.0214	2	13.11	15.123	0.0229	2	12.90	18.243	0.0229	2	7.99	1.775	0.021750	2	0.00	0.000
754	0.0195	2	98.76	126.307	0.0341	3	595.65	819.042	0.0218	2	3.35	4.731	0.021375	2	0.00	0.000
755	0.0416	4	0.14	0.283	0.0338	3	0.00	0.000	0.0221	2	0.00	0.000	0.031875	3	1.26	2.188
756	0.0113	2	7.04	3.761	0.0229	2	9.36	7.835	0.0221	2	133.16	187.864	0.021750	2	0.00	0.000
757	0.0233	2	15.10	19.889	0.0225	2	1.55	2.192	0.0221	2	6.99	9.885	0.021750	2	0.00	0.000
758	0.0218	2	184.47	248.733	0.0225	2	32.45	41.224	0.0221	2	4.29	6.060	0.021375	2	0.00	0.000
759	0.0221	2	4.93	3.950	0.0225	2	3.70	5.233	0.0113	1	3.89	#,DIV/0!	0.021375	2	0.00	0.000
760	0.0229	2	6.47	5.282	0.0229	2	1.89	2.673	0.0218	2	30.68	30.717	0.022125	2	0.00	0.000
761	0.0225	2	66.60	89.661	0.0225	2	11.90	4.667	0.0225	2	0.00	0.000	0.022125	2	2.69	0.912
762	0.0116	2	0.00	0.000	0.0225	2	0.00	0.000	0.0225	2	2.99	1.570	0.023250	2	1.15	1.619
763	0.0330	3	0.00	0.000	0.0225	2	0.00	0.000	0.0311	3	0.00	0.000	0.032625	3	0.00	0.000
764	0.0240	2	2.45	3.465	0.0236	2	0.00	0.000	0.0221	2	42.05	45.064	0.022875	2	4.35	6.152
765	0.0113	2	1.03	1.462	0.0236	2	0.71	1.004	0.0113	1	2.23	-	0.022500	2	0.00	0.000
766	0.0203	2	0.00	0.000	0.0233	2	0.00	0.000	0.0225	2	0.00	0.000	0.022500	2	0.67	0.940
767	0.0218	2	0.00	0.000	0.0225	2	0.00	0.000	0.0229	2	1.13	0.215	0.021750	2	2.41	3.401

$$(**) SD = \frac{\sum (x_i - \bar{x})^2}{n-1}$$

**TABLE 8.-** Stratified mean catches (Kg) by stratum and year and SD by year of Thorny skate (1997-2004). n.s. means stratum not surveyed. 1997-2000 data are transformed C/V *Playa de Mendiña* data. 2002-2004 data are original from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels.

Stratum	1997	1998	1999	2000	2001	2002	2003	2004
353	1669.97	7010.90	85905.05	40337.51	94661.10	95844.70	21079.74	14444.04
354	295.14	16784.41	4970.54	20279.74	16637.80	22090.80	9922.00	36275.57
355	2012.42	254.06	917.88	2452.15	1524.40	197.40	1444.85	1855.18
356	127.82	32.39	72.76	104.05	13.63	72.85	243.70	766.45
357	216.74	276.48	488.38	0.00	385.40	328.00	369.00	7551.46
358	351.96	223.34	632.19	3484.89	910.50	2580.00	4755.75	9504.23
359	3142.88	3339.74	5577.75	30200.14	6505.05	30455.91	10885.26	19600.14
360	28142.65	49941.51	188345.34	367770.68	188311.70	57415.52	98885.56	260307.63
374	490.16	87.78	1264.01	151.68	156.22	64.20	0.00	404.46
375	226.76	533.56	1780.76	942.07	137.31	379.40	619.69	2796.27
376	20225.18	32095.39	101299.43	91833.65	30244.45	16788.39	14361.84	119622.45
377	127.98	31.99	103.98	56.97	569.50	117.05	46.00	723.25
378	287.36	287.36	1156.26	769.70	22.24	2.09	413.87	3641.11
379	57.26	179.13	80.48	116.74	0.00	577.70	1.06	1442.66
380	121.68	432.36	380.38	121.44	129.94	423.84	392.16	11448.00
381	887.94	1102.17	148.85	567.92	106.50	102.24	489.60	10166.40
382	220.75	350.60	1522.42	1838.77	607.79	224.32	0.00	2153.18
721	148.37	531.10	75.19	425.20	0.00	0.00	690.95	175.50
722	633.11	3220.86	906.51	1158.73	848.40	0.00	76.02	0.00
723	979.42	406.26	584.98	627.32	372.00	93.00	804.45	752.22
724	254.82	1524.34	1219.17	288.39	8355.12	3205.40	3263.68	0.00
725	28.43	408.29	381.16	431.94	200.22	191.10	137.81	4642.58
726	n.s.	18.61	63.79	697.27	95.29	237.60	0.00	0.00
727	323.68	577.66	271.70	56.11	61.43	292.80	9281.76	975.36
728	113.26	364.73	382.97	143.97	128.62	521.43	1343.94	209.82
752	556.95	7679.60	293.39	157.17	1170.32	63.54	24018.85	0.00
753	1871.36	553.60	2364.16	416.05	1808.52	1780.20	1101.93	0.00
754	8157.59	20204.97	2999.07	9892.06	17777.36	107217.00	602.10	0.00
755	n.s.	3017.84	0.00	1054.11	54.48	0.00	0.00	486.38
756	1404.41	6429.24	1636.83	372.60	711.08	945.36	13449.16	0.00
757	3333.76	6873.20	1095.75	5660.73	1540.20	158.10	712.98	0.00
758	5201.49	23360.86	11631.70	5530.78	18262.55	3212.55	424.22	0.00
759	n.s.	14493.27	54.38	5316.60	626.68	469.90	494.03	0.00
760	0.00	1036.58	1417.48	1997.36	995.61	291.06	4724.72	0.00
761	10133.38	3013.25	121.20	1744.82	11388.60	2034.90	0.00	459.14
762	10763.16	1111.32	1755.68	1173.93	0.00	0.00	633.88	242.74
763	n.s.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
764	1484.03	1246.54	0.00	0.00	245.00	0.00	4204.50	435.00
765	1844.78	1498.40	0.00	167.85	128.17	88.04	276.52	0.00
766	2192.53	73.89	0.00	0.00	0.00	0.00	0.00	95.76
767	n.s.	446.89	0.00	0.00	0.00	0.00	178.22	379.99
TOTAL								
( $\bar{Y}$ )	108029.16	211054.49	421901.59	598341.10	405693.16	348466.38	230329.79	511556.95
S.D.	11.57	20.41	40.79	57.86	39.23	33.69	22.27	49.46
	1.74	3.26	4.32	9.12	6.99	10.91	2.57	5.82

**TABLE 9.-** Survey estimates (by the swept area method) of Thorny skate biomass (t) and SD by stratum and year on NAFO Div. 3NO. n.s. means stratum not surveyed. 1997-2000 data are transformed C/V *Playa de Mendiña* data. 2002-2004 data are original from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels.

Stratum	1997	1998	1999	2000	2001	2002	2003	2004
353	139	603	7159	3397	8321	8050	1895	1284
354	25	1413	457	1708	1479	1860	882	3154
355	173	23	80	211	127	17	126	162
356	11	3	6	9	1	6	22	69
357	20	23	41	0	32	27	32	660
358	31	19	54	306	79	224	423	864
359	273	287	460	2577	567	2663	963	1734
360	2399	4307	15392	30696	15548	5010	8775	22537
374	42	7	104	13	13	6	0	35
375	20	46	151	77	12	32	56	249
376	1789	2779	8312	7653	2618	1473	1277	10257
377	11	3	9	5	50	10	4	67
378	27	25	101	66	2	0	37	324
379	6	15	7	10	0	51	0	117
380	12	38	32	10	13	38	34	1035
381	80	96	13	48	9	9	43	904
382	19	31	126	147	52	20	0	187
721	13	52	6	36	0	0	61	16
722	59	301	79	107	73	0	7	0
723	93	35	51	51	31	8	70	66
724	23	148	108	25	711	285	290	0
725	3	47	33	41	17	17	12	413
726	n.s.	2	6	63	8	22	0	0
727	35	50	23	5	5	25	853	84
728	11	35	33	14	11	46	119	23
752	51	671	25	15	111	6	2100	0
753	175	51	207	38	169	156	96	0
754	742	1924	291	1015	1822	9374	55	0
755	n.s.	293	0	98	5	0	0	46
756	129	571	145	37	62	83	1216	0
757	329	666	94	530	132	14	64	0
758	487	2148	1088	527	1679	286	38	0
759	n.s.	1356	5	506	57	42	44	0
760	0	97	126	190	87	25	434	0
761	965	292	12	158	1012	181	0	42
762	1050	108	167	116	0	0	56	21
763	n.s.	0	0	0	0	0	0	0
764	144	115	0	0	20	0	380	38
765	179	143	0	17	12	7	25	0
766	214	8	0	0	0	0	0	9
767	n.s.	40	0	0	0	0	16	35
TOTAL	9779	18875	35004	50521	34948	30072	20508	44429
S.D.	1544	3114	3736	7991	10687	9699	2371	5281

**TABLE 10.-** Length weight relationships in the calculation of Thorny skate biomass. The equation is  $Weight = a(l + 0.5)^b$  Spanish Spring Surveys on NAFO Div. 3NO: 1997-2004. To calculate the parameters for the indeterminate individuals, we used the total data (males + females + indeterminate individuals).

		1997	1998	1999	2000	2001	2002	2003	2004
Males	a	0.0069 Error = 0.202	0.0064 Error = 0.259	0.025 Error = 0.456	0.0506 Error = 0.192	0.0085 Error = 0.091	0.0075 Error = 0.086	0.0079 Error = 0.101	0.0060 Error = 0.0978
	b	3.0921 Error = 0.052	3.1161 Error = 0.075	2.769 Error = 0.124	2.5954 Error = 0.049	3.0171 Error = 0.022	3.0566 Error = 0.022	3.0414 Error = 0.026	3.1122 Error = 0.0251
		R <sup>2</sup> = 0.987 N = 107	R <sup>2</sup> = 0.986 N = 67	R <sup>2</sup> = 0.967 N = 33	R <sup>2</sup> = 0.983 N = 199	R <sup>2</sup> = 0.998 N = 104	R <sup>2</sup> = 0.996 N = 374	R <sup>2</sup> = 0.995 N = 426	R <sup>2</sup> = 0.996 N = 368
Females	a	0.0072 Error = 0.182	0.0098 Error = 0.169	0.0294 Error = 0.268	0.0313 Error = 0.223	0.0073 Error = 0.119	0.0061 Error = 0.074	0.0067 Error = 0.101	0.0071 Error = 0.1072
	b	3.0927 Error = 0.046	2.9904 Error = 0.046	2.7383 Error = 0.072	2.7247 Error = 0.058	3.0509 Error = 0.031	3.1115 Error = 0.019	3.0887 Error = 0.026	3.0752 Error = 0.0281
		R <sup>2</sup> = 0.991 N = 113	R <sup>2</sup> = 0.992 N = 89	R <sup>2</sup> = 0.985 N = 53	R <sup>2</sup> = 0.977 N = 245	R <sup>2</sup> = 0.996 N = 77	R <sup>2</sup> = 0.997 N = 425	R <sup>2</sup> = 0.996 N = 477	R <sup>2</sup> = 0.994 N = 442
Indet.	a	0.0068 Error = 0.144	0.0072 Error = 0.166	0.0267 Error = 0.205	0.0423 Error = 0.174	0.0077 Error = 0.079	0.0066 Error = 0.068	0.0075 Error = 0.095	0.0071 Error = 0.0091
	b	3.099 Error = 0.037	3.073 Error = 0.046	2.7618 Error = 0.055	2.6472 Error = 0.045	3.0411 Error = 0.020	3.0887 Error = 0.018	3.0552 Error = 0.025	3.0730 Error = 0.0237
		R <sup>2</sup> = 0.993 N = 220	R <sup>2</sup> = 0.991 N = 156	R <sup>2</sup> = 0.990 N = 86	R <sup>2</sup> = 0.984 N = 444	R <sup>2</sup> = 0.998 N = 181	R <sup>2</sup> = 0.998 N = 800	R <sup>2</sup> = 0.995 N = 903	R <sup>2</sup> = 0.996 N = 810

**TABLE 11.-** Thorny skate length distribution. Estimated numbers per haul stratified mean catches. Spanish Spring Survey on NAFO 3NO: 1997-2004. Indet. means indeterminate. 1997-2000 data are transformed C/V *Playa de Menduña* data. 2002-2004 data are original R/V *Vizconde de Eza* data. In 2001, there are data from the two vessels. (\*) indicates untransformed data.

Length (cm.)	1997				1998				1999				2000			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
12	0.000	0.005	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14	0.061	0.038	0.000	0.099	0.009	0.000	0.000	0.009	0.022	0.022	0.004	0.047	0.017	0.015	0.000	0.032
16	0.108	0.085	0.000	0.193	0.009	0.004	0.000	0.013	0.026	0.068	0.009	0.102	0.107	0.058	0.000	0.164
18	0.123	0.151	0.000	0.274	0.009	0.013	0.000	0.022	0.034	0.058	0.000	0.092	0.046	0.023	0.000	0.069
20	0.108	0.168	0.000	0.276	0.027	0.018	0.000	0.044	0.064	0.051	0.000	0.115	0.057	0.046	0.000	0.103
22	0.259	0.224	0.000	0.482	0.013	0.250	0.000	0.263	0.055	0.061	0.000	0.116	0.058	0.099	0.000	0.156
24	0.257	0.183	0.000	0.440	0.283	0.040	0.000	0.323	0.089	0.072	0.000	0.162	0.042	0.075	0.000	0.118
26	0.293	0.331	0.000	0.624	0.115	0.064	0.000	0.180	0.116	0.090	0.000	0.206	0.158	0.091	0.000	0.249
28	0.162	0.246	0.000	0.408	0.131	0.126	0.000	0.257	0.200	0.208	0.000	0.408	0.177	0.160	0.000	0.337
30	0.073	0.117	0.000	0.191	0.183	0.129	0.000	0.313	0.122	0.144	0.000	0.266	0.084	0.091	0.000	0.175
32	0.111	0.106	0.000	0.217	0.193	0.186	0.000	0.380	0.205	0.163	0.000	0.368	0.136	0.145	0.000	0.280
34	0.060	0.116	0.000	0.176	0.254	0.445	0.000	0.699	0.294	0.235	0.000	0.530	0.149	0.197	0.000	0.345
36	0.196	0.144	0.000	0.339	0.275	0.387	0.000	0.662	0.286	0.280	0.000	0.566	0.274	0.182	0.000	0.456
38	0.105	0.142	0.000	0.247	0.259	0.378	0.000	0.637	0.360	0.542	0.000	0.903	0.308	0.312	0.000	0.620
40	0.157	0.104	0.000	0.261	0.253	0.315	0.000	0.568	0.427	0.409	0.000	0.837	0.371	0.369	0.000	0.739
42	0.126	0.116	0.000	0.242	0.273	0.224	0.000	0.497	0.670	0.644	0.000	1.314	0.438	0.511	0.000	0.949
44	0.135	0.127	0.000	0.262	0.228	0.225	0.000	0.454	0.677	0.662	0.000	1.339	0.469	0.605	0.000	1.074
46	0.197	0.108	0.000	0.305	0.216	0.191	0.000	0.408	0.600	0.735	0.000	1.336	0.618	0.612	0.000	1.230
48	0.102	0.105	0.000	0.207	0.158	0.242	0.000	0.400	0.452	0.561	0.007	1.020	0.661	0.604	0.000	1.265
50	0.080	0.111	0.000	0.191	0.185	0.199	0.000	0.383	0.475	0.517	0.000	0.991	0.712	0.635	0.000	1.346
52	0.106	0.150	0.000	0.256	0.222	0.234	0.000	0.456	0.559	0.413	0.000	0.972	0.647	0.510	0.000	1.157
54	0.094	0.124	0.000	0.218	0.093	0.146	0.000	0.238	0.378	0.374	0.000	0.752	0.629	0.518	0.000	1.146
56	0.062	0.162	0.000	0.223	0.169	0.259	0.000	0.428	0.347	0.442	0.000	0.789	0.579	0.525	0.000	1.104
58	0.045	0.117	0.000	0.162	0.179	0.170	0.000	0.349	0.320	0.289	0.000	0.609	0.517	0.608	0.000	1.124
60	0.127	0.068	0.000	0.195	0.209	0.190	0.000	0.399	0.402	0.338	0.000	0.740	0.477	0.349	0.000	0.826
62	0.096	0.212	0.000	0.308	0.133	0.168	0.000	0.301	0.413	0.256	0.000	0.668	0.417	0.396	0.000	0.813
64	0.075	0.036	0.000	0.111	0.208	0.192	0.000	0.400	0.288	0.339	0.000	0.627	0.506	0.423	0.000	0.929
66	0.069	0.169	0.000	0.238	0.187	0.229	0.000	0.416	0.306	0.295	0.000	0.601	0.396	0.523	0.000	0.919
68	0.144	0.070	0.000	0.214	0.108	0.279	0.000	0.387	0.351	0.259	0.000	0.610	0.339	0.644	0.000	0.983
70	0.046	0.106	0.000	0.152	0.082	0.233	0.000	0.315	0.326	0.362	0.000	0.688	0.375	0.699	0.000	1.074
72	0.069	0.110	0.000	0.179	0.121	0.197	0.000	0.318	0.335	0.350	0.000	0.685	0.389	0.680	0.000	1.069
74	0.077	0.124	0.000	0.202	0.133	0.062	0.000	0.195	0.300	0.331	0.000	0.631	0.466	0.530	0.000	0.995
76	0.027	0.109	0.000	0.136	0.042	0.052	0.000	0.094	0.291	0.154	0.000	0.445	0.454	0.375	0.000	0.829
78	0.025	0.073	0.000	0.098	0.095	0.045	0.000	0.139	0.453	0.360	0.000	0.813	0.411	0.510	0.000	0.921
80	0.055	0.052	0.000	0.106	0.039	0.029	0.000	0.068	0.201	0.162	0.000	0.363	0.323	0.184	0.000	0.507
82	0.069	0.029	0.000	0.098	0.034	0.015	0.000	0.048	0.235	0.084	0.000	0.319	0.355	0.157	0.000	0.512
84	0.000	0.030	0.000	0.030	0.057	0.006	0.000	0.063	0.252	0.073	0.000	0.325	0.223	0.103	0.000	0.327
86	0.034	0.000	0.000	0.034	0.007	0.000	0.000	0.007	0.055	0.007	0.000	0.062	0.219	0.114	0.000	0.333
88	0.047	0.000	0.000	0.047	0.000	0.031	0.000	0.031	0.109	0.007	0.000	0.116	0.148	0.076	0.000	0.224
90	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.035	0.000	0.000	0.035	0.216	0.000	0.000	0.216
92	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.017	0.000	0.017	0.049	0.000	0.000	0.049
94	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.032	0.000	0.000	0.032	0.038	0.000	0.000	0.038
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	0.060	0.000	0.000	0.060
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	0.040	0.000	0.000	0.040
100	0.000	0.000	0.000	0.000	0.000	0.019	0.000	0.019	0.000	0.000	0.000	0.000	0.000	0.013	0.000	0.013
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
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
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
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
110	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
112	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
114	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
116	0.000	0.000	0.000	0.000	0.029	0.000	0.000	0.029	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
118	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
120	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
122	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
124	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
126	0.000	0.000	0.000	0.000	0.066	0.000	0.000	0.066	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
128	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
130	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
132	0.000	0.000	0.000	0.000	0.000	0.091	0.000	0.091	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	3.978	4.468	0.000	8.446	5.287	6.083	0.000	11.370	11.161	10.434	0.019	21.615	13.153	12.768	0.000	25.920
Nº samples (*):				33				33				88				83
Nº Ind. (*):	404	425	0	829	723	812	0	1535	2082	2200	4	4286	2397	2429	0	4826
Sampled catch:				212				461				1526				2289
Range (*):				12-87				13-131				13-93				13-99
Total catch:				1579				2698				3672				5076
Total hauls (*):				139				136				117				123



**TABLE 11 (cont.).-** Thorny skate length distribution. Estimated numbers per haul stratified mean catches. Spanish Spring Survey on NAFO 3NO: 1997-2004. Indet. means indeterminate. 1997-2000 data are transformed C/V *Playa de Menduïña* data. 2002-2004 data are original R/V *Vizconde de Eza* data. In 2001, there are data from the two vessels. (\*) indicates untransformed data.

Length (cm.)	2001				2002				2003				2004			
	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	0.008	0.000	0.008	0.000	0.000	0.000	0.000	0.022	0.000	0.000	0.022
14	0.000	0.082	0.000	0.082	0.106	0.041	0.000	0.147	0.035	0.009	0.000	0.043	0.088	0.120	0.000	0.208
16	0.093	0.081	0.000	0.174	0.110	0.307	0.008	0.425	0.009	0.035	0.000	0.043	0.099	0.044	0.000	0.142
18	0.023	0.081	0.000	0.104	0.151	0.143	0.000	0.294	0.026	0.017	0.000	0.043	0.055	0.077	0.000	0.131
20	0.048	0.012	0.000	0.060	0.084	0.402	0.000	0.486	0.052	0.043	0.000	0.095	0.066	0.066	0.000	0.132
22	0.000	0.058	0.000	0.058	0.042	0.083	0.000	0.126	0.061	0.052	0.000	0.113	0.110	0.077	0.000	0.186
24	0.012	0.023	0.000	0.035	0.025	0.034	0.000	0.059	0.009	0.017	0.000	0.026	0.077	0.044	0.000	0.120
26	0.000	0.023	0.000	0.023	0.025	0.059	0.000	0.084	0.026	0.017	0.000	0.044	0.077	0.033	0.000	0.110
28	0.038	0.073	0.000	0.111	0.016	0.049	0.000	0.065	0.053	0.000	0.000	0.053	0.098	0.044	0.000	0.142
30	0.012	0.059	0.000	0.071	0.038	0.032	0.000	0.070	0.054	0.035	0.000	0.089	0.109	0.109	0.000	0.219
32	0.047	0.050	0.000	0.097	0.092	0.130	0.000	0.222	0.115	0.063	0.000	0.178	0.219	0.219	0.000	0.438
34	0.051	0.110	0.000	0.160	0.069	0.186	0.000	0.254	0.124	0.160	0.000	0.283	0.241	0.263	0.000	0.503
36	0.051	0.149	0.000	0.200	0.158	0.290	0.000	0.448	0.206	0.143	0.000	0.349	0.318	0.252	0.000	0.570
38	0.165	0.220	0.000	0.385	0.239	0.185	0.000	0.424	0.242	0.169	0.000	0.411	0.383	0.416	0.000	0.799
40	0.284	0.438	0.000	0.722	0.531	0.431	0.000	0.962	0.319	0.353	0.000	0.672	0.394	0.471	0.000	0.865
42	0.382	0.360	0.000	0.742	0.757	0.869	0.000	1.626	0.424	0.400	0.000	0.823	0.657	0.593	0.000	1.250
44	0.413	0.528	0.000	0.941	0.725	0.907	0.000	1.632	0.449	0.451	0.000	0.900	0.789	0.866	0.000	1.655
46	0.459	0.549	0.000	1.008	0.872	0.779	0.000	1.651	0.505	0.503	0.000	1.008	0.691	0.700	0.000	1.392
48	0.439	0.652	0.000	1.091	0.720	0.960	0.000	1.680	0.310	0.468	0.000	0.778	0.680	0.790	0.000	1.470
50	0.622	0.519	0.000	1.142	0.593	0.821	0.000	1.414	0.343	0.475	0.000	0.818	0.625	0.692	0.000	1.317
52	0.562	0.405	0.000	0.967	0.695	0.690	0.000	1.385	0.387	0.368	0.000	0.755	0.658	0.722	0.000	1.380
54	0.458	0.595	0.000	1.053	0.523	0.516	0.000	1.038	0.335	0.492	0.000	0.828	0.702	0.604	0.000	1.305
56	0.539	0.480	0.000	1.019	0.375	0.465	0.000	0.840	0.325	0.333	0.000	0.658	0.551	0.758	0.000	1.309
58	0.637	0.330	0.000	0.968	0.325	0.246	0.000	0.571	0.353	0.323	0.000	0.676	0.450	0.756	0.000	1.206
60	0.263	0.380	0.000	0.643	0.396	0.239	0.000	0.635	0.324	0.288	0.000	0.611	0.526	0.713	0.000	1.238
62	0.308	0.409	0.000	0.717	0.202	0.236	0.000	0.438	0.174	0.244	0.000	0.418	0.427	0.702	0.000	1.129
64	0.304	0.313	0.000	0.616	0.262	0.173	0.000	0.435	0.158	0.243	0.000	0.401	0.405	0.658	0.000	1.063
66	0.299	0.446	0.000	0.744	0.215	0.201	0.000	0.416	0.158	0.217	0.000	0.375	0.339	0.613	0.000	0.952
68	0.278	0.555	0.000	0.832	0.112	0.411	0.000	0.523	0.122	0.244	0.000	0.365	0.296	0.438	0.000	0.734
70	0.250	0.461	0.000	0.711	0.230	0.375	0.000	0.605	0.191	0.217	0.000	0.408	0.372	0.548	0.000	0.920
72	0.294	0.397	0.000	0.692	0.182	0.281	0.000	0.463	0.131	0.175	0.000	0.305	0.373	0.427	0.000	0.800
74	0.262	0.323	0.000	0.585	0.141	0.420	0.000	0.561	0.130	0.182	0.000	0.312	0.284	0.471	0.000	0.755
76	0.388	0.345	0.000	0.734	0.270	0.089	0.000	0.360	0.096	0.139	0.000	0.235	0.394	0.263	0.000	0.657
78	0.438	0.289	0.000	0.726	0.167	0.126	0.000	0.292	0.070	0.147	0.000	0.218	0.285	0.295	0.000	0.580
80	0.253	0.149	0.000	0.402	0.157	0.074	0.000	0.231	0.087	0.026	0.000	0.113	0.230	0.120	0.000	0.350
82	0.193	0.152	0.000	0.345	0.146	0.150	0.000	0.295	0.044	0.043	0.000	0.087	0.142	0.109	0.000	0.252
84	0.145	0.023	0.000	0.168	0.119	0.033	0.000	0.152	0.052	0.017	0.000	0.070	0.175	0.022	0.000	0.197
86	0.195	0.024	0.000	0.219	0.049	0.009	0.000	0.058	0.018	0.009	0.000	0.026	0.077	0.022	0.000	0.099
88	0.042	0.012	0.000	0.054	0.030	0.008	0.000	0.038	0.017	0.000	0.000	0.017	0.066	0.022	0.000	0.088
90	0.025	0.000	0.000	0.025	0.008	0.000	0.000	0.008	0.009	0.000	0.000	0.009	0.022	0.000	0.000	0.022
92	0.012	0.000	0.000	0.012	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.022	0.000	0.000	0.022
94	0.013	0.000	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
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	0.011	0.000	0.000	0.011
98	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	0.000	0.000	0.000
100	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	0.000	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
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
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
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
110	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
112	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
114	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
116	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
118	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
120	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
122	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
124	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
126	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
128	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
130	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
132	0.000	0.000	0.000	0.000	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	9.307	10.159	0.000	19.466	9.959	11.456	0.008	21.423	6.540	7.116	0.000	13.655	12.602	14.138	0.000	26.739
N° samples (*):				66				78				88				83
N° Ind. (*):	629	632	0	1261	888	928	1	1817	743	811	0	1554	1150	1290	0	2440
Sampled catch:				2777				2961				2627				4666
Range (*):				13-99				12-89				13-90				12-95
Total catch:				3413				4271				2656				4674
Total hauls (*):				83				127				122				122

**TABLE 12.-** Swept area, number of hauls and White hake mean catch (kg) and SD (\*\*) by stratum. Spanish Spring Surveys on NAFO Div. 3NO: 2001-2004. Swept area in square miles. n.s. means strata not surveyed.

Stratum	2001				2002				2003				2004			
	Swept area	Tow number	White hake Mean catch	White hake SD	Swept area	Tow number	White hake Mean catch	White hake SD	Swept area	Tow number	White hake Mean catch	White hake SD	Swept area	Tow number	White hake Mean catch	White hake SD
353	0.0356	3	1.04	1.180	0.0476	4	0.05	0.100	0.0334	3	0.00	0.000	0.033750	3	0.00	0.000
354	0.0356	3	76.70	117.298	0.0356	3	0.07	0.115	0.0338	3	0.00	0.000	0.034500	3	23.15	32.074
355	0.0233	2	131.95	135.128	0.0236	2	156.75	55.649	0.0229	2	31.24	26.955	0.022875	2	14.95	15.203
356	0.0225	2	23.95	12.092	0.0233	2	85.90	90.651	0.0225	2	14.83	9.935	0.022125	2	4.15	5.869
357	0.0124	2	1.75	2.475	0.0240	2	0.00	0.000	0.0229	2	2.25	3.182	0.022875	2	0.90	1.273
358	0.0341	3	0.43	0.751	0.0345	3	0.17	0.289	0.0338	3	0.40	0.693	0.033000	3	12.02	20.597
359	0.0469	7	16.50	41.790	0.0686	6	0.00	0.000	0.0791	7	0.00	0.000	0.079125	7	0.00	0.000
360	0.2396	20	0.01	0.022	0.2865	25	0.00	0.000	0.2254	20	0.00	0.000	0.231000	20	0.07	0.172
374	0.0240	2	0.00	0.000	0.0345	3	0.00	0.000	0.0225	2	0.00	0.000	0.023250	2	0.00	0.000
375	0.0244	3	0.00	0.000	0.0353	3	0.00	0.000	0.0330	3	0.00	0.000	0.033750	3	0.00	0.000
376	0.1200	10	0.00	0.000	0.1140	10	0.00	0.000	0.1125	10	0.00	0.000	0.116625	10	0.00	0.000
377	0.0229	2	0.00	0.000	0.0229	2	0.00	0.000	0.0225	2	0.00	0.000	0.021750	2	0.00	0.000
378	0.0233	2	0.03	0.042	0.0233	2	0.00	0.000	0.0225	2	0.00	0.000	0.022500	2	0.00	0.000
379	0.0225	2	0.00	0.000	0.0229	2	0.02	0.033	0.0229	2	0.00	0.000	0.012375	1	0.00	-
380	0.0236	2	n.s.	n.s.	0.0225	2	0.00	0.000	0.0229	2	0.00	0.000	0.022125	2	0.04	0.049
381	0.0236	2	n.s.	n.s.	0.0229	2	0.00	0.000	0.0229	2	0.00	0.000	0.022500	2	0.00	0.000
382	0.0499	4	n.s.	n.s.	0.0341	3	0.00	0.000	0.0454	4	0.00	0.000	0.046125	4	0.00	0.000
721	0.0236	2	10.90	2.828	0.0233	2	50.00	6.223	0.0225	2	23.69	27.280	0.022125	2	3.50	0.544
722	0.0218	2	21.75	30.759	0.0236	2	18.20	23.624	0.0221	2	28.08	24.911	0.021750	2	1.29	1.824
723	0.0248	2	1.60	2.263	0.0233	2	0.00	0.000	0.0229	2	0.00	0.000	0.022875	2	1.05	1.485
724	0.0233	3	1.34	1.404	0.0225	2	2.05	0.071	0.0225	2	0.00	0.000	0.021375	2	0.00	0.000
725	0.0210	1	0.00	-	0.0225	2	0.00	0.000	0.0229	2	0.00	0.000	0.022500	2	0.00	0.000
726	0.0221	1	0.00	-	0.0214	2	0.00	0.000	0.0225	2	0.00	0.000	0.022500	2	0.00	0.000
727	0.0210	2	n.s.	n.s.	0.0233	2	0.00	0.000	0.0218	2	0.00	0.000	0.023250	2	0.00	0.000
728	0.0210	2	n.s.	n.s.	0.0229	2	0.00	0.000	0.0225	2	0.00	0.000	0.018000	2	0.06	0.078
752	0.0206	2	n.s.	n.s.	0.0116	1	0.00	0.000	0.0229	2	0.00	0.000	0.021375	2	0.00	0.000
753	0.0218	2	n.s.	n.s.	0.0229	2	0.00	0.000	0.0229	2	0.00	0.000	0.021750	2	0.73	1.025
754	0.0195	2	n.s.	n.s.	0.0341	3	0.00	0.000	0.0218	2	0.00	0.000	0.021375	2	0.00	0.000
755	0.0431	4	n.s.	n.s.	0.0338	3	0.00	0.000	0.0221	2	0.00	0.000	0.031875	3	0.00	0.000
756	0.0203	1	0.000	-	0.0229	2	0.00	0.006	0.0221	2	0.00	0.000	0.021750	2	0.00	0.000
757	0.0214	2	n.s.	n.s.	0.0225	2	0.00	0.000	0.0221	2	0.00	0.000	0.021750	2	0.00	0.000
758	0.0210	2	n.s.	n.s.	0.0225	2	0.00	0.000	0.0221	2	0.00	0.000	0.021375	2	0.00	0.000
759	0.0210	2	n.s.	n.s.	0.0225	2	0.00	0.000	0.0113	1	0.00	-	0.021375	2	0.00	0.000
760	0.0210	2	0.000	0.000	0.0229	2	0.00	0.000	0.0218	2	0.00	0.000	0.022125	2	0.00	0.000
761	0.0221	2	0.000	0.000	0.0225	2	0.00	0.000	0.0225	2	0.00	0.000	0.022125	2	0.00	0.000
762	0.0203	1	0.000	-	0.0225	2	0.00	0.000	0.0225	2	0.00	0.000	0.023250	2	0.00	0.000
763	0.0416	3	n.s.	n.s.	0.0225	2	0.00	0.000	0.0311	3	0.00	0.000	0.032625	3	0.00	0.000
764	0.0218	2	0.000	0.000	0.0236	2	0.00	0.000	0.0221	2	3.78	4.236	0.022875	2	0.00	0.000
765	0.0203	1	0.000	-	0.0236	2	1.65	2.333	0.0113	1	0.00	-	0.022500	2	0.00	0.000
766	0.0214	2	n.s.	n.s.	0.0233	2	0.00	0.000	0.0225	2	0.00	0.000	0.022500	2	0.00	0.000
767	0.0210	2	n.s.	n.s.	0.0225	2	0.00	0.000	0.0229	2	0.00	0.000	0.021750	2	0.00	0.000

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

**TABLE 13.-** Stratified mean catches (Kg) by stratum and year and SD by year of White hake (2001-2004). n.s. means strata not surveyed.

Stratum	2001	2002	2003	2004
353	279.76	13.45	0.00	0.00
354	18868.20	16.40	0.00	5694.08
355	9764.30	11599.50	2311.76	1106.30
356	1125.65	4037.30	696.78	195.05
357	287.00	0.00	369.00	147.60
358	97.50	37.50	90.00	2703.75
359	6946.50	0.00	0.00	0.00
360	13.92	0.00	0.00	201.77
374	0.00	0.00	0.00	0.00
375	0.00	0.00	0.00	0.00
376	0.00	0.00	0.00	0.00
377	0.00	0.00	0.00	0.00
378	4.17	0.00	0.00	0.00
379	0.00	2.44	0.00	0.00
380	n.s.	0.00	0.00	3.36
381	n.s.	0.00	0.00	0.00
382	n.s.	0.00	0.00	0.00
721	708.50	3250.00	1539.85	227.18
722	1827.00	1528.38	2358.30	108.36
723	248.00	0.00	0.00	162.75
724	166.16	254.20	0.00	0.00
725	0.00	0.00	0.00	0.00
726	0.00	0.00	0.00	0.00
727	n.s.	0.00	0.00	0.00
728	n.s.	0.00	0.00	4.29
752	n.s.	0.00	0.00	0.00
753	n.s.	0.00	0.00	100.05
754	n.s.	0.00	0.00	0.00
755	n.s.	0.00	0.00	0.00
756	0.00	0.45	0.00	0.00
757	n.s.	0.00	0.00	0.00
758	n.s.	0.00	0.00	0.00
759	n.s.	0.00	0.00	0.00
760	0.00	0.00	0.00	0.00
761	0.00	0.00	0.00	0.00
762	0.00	0.00	0.00	0.00
763	n.s.	0.00	0.00	0.00
764	0.00	0.00	377.50	0.00
765	0.00	204.60	0.00	0.00
766	n.s.	0.00	0.00	0.00
767	n.s.	0.00	0.00	0.00
TOTAL	40336.66	20944.22	7743.19	10654.53
( $\bar{Y}$ )	5.13	2.03	0.75	1.03
S.D.	1.87	0.43	0.24	0.52

**TABLE 14.-** Survey estimates (by the swept area method) of White hake biomass (t) and SD by stratum and year on NAFO Div. 3NO. n.s. means stratum not surveyed.

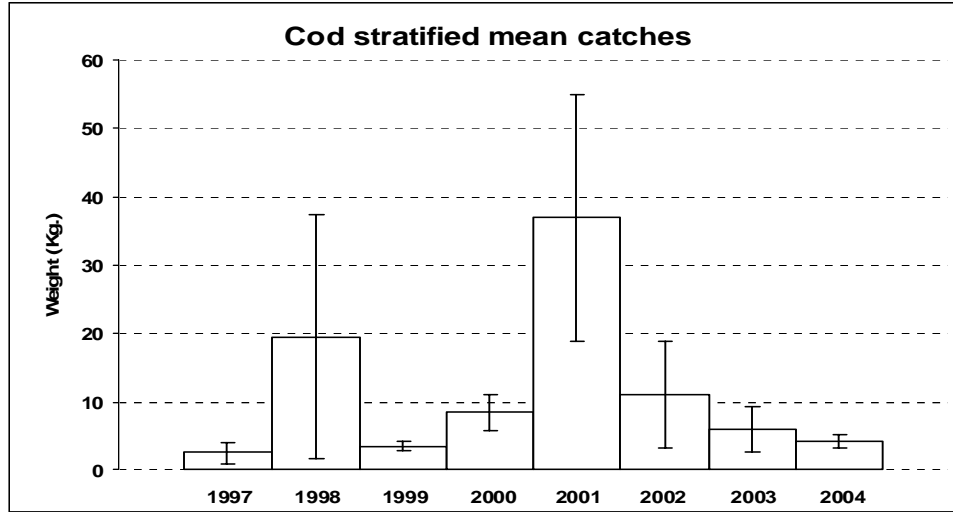
Stratum	2001	2002	2003	2004
353	25	1	0	0
354	1677	1	0	495
355	814	982	202	97
356	94	347	62	18
357	24	0	32	13
358	8	3	8	246
359	606	0	0	0
360	1	0	0	17
374	0	0	0	0
375	0	0	0	0
376	0	0	0	0
377	0	0	0	0
378	0	0	0	0
379	0	0	0	0
380	0	0	0	0
381	0	0	0	0
382	0	0	0	0
721	57	280	137	21
722	157	129	213	10
723	21	0	0	14
724	15	23	0	0
725	0	0	0	0
726	0	0	0	0
727	0	0	0	0
728	0	0	0	0
752	0	0	0	0
753	0	0	0	9
754	0	0	0	0
755	0	0	0	0
756	0	0	0	0
757	0	0	0	0
758	0	0	0	0
759	0	0	0	0
760	0	0	0	0
761	0	0	0	0
762	0	0	0	0
763	0	0	0	0
764	0	0	34	0
765	0	17	0	0
766	0	0	0	0
767	0	0	0	0
TOTAL	3498	1784	688	940
S.D.	1107	389	224	464

**TABLE 15.-** Length weight relationships in the calculation of White hake biomass. The equation is  $Weight = a(l + 0.5)^b$  Spanish Spring Surveys on NAFO Div. 3NO: 2002-2004. To calculate the parameters for the indeterminate individuals, we used the total data (males + females + indeterminate individuals).

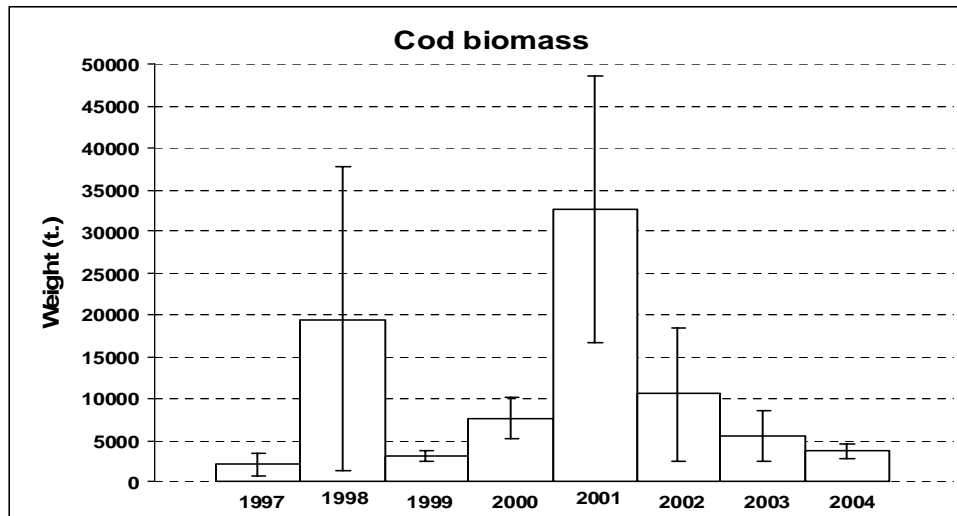
		2002	2003	2004
Males	a	0.0018	0.0045	0.0043
		Error = 0.234	Error = 0.243	Error = 0.237
	b	3.3586	3.1161	3.1313
		Error = 0.060	Error = 0.062	Error = 0.063
		R2 = 0.991	R2 = 0.992	R2 = 0.992
		N = 107	N = 73	N = 41
Females	a	0.0027	0.0013	0.0037
		Error = 0.221	Error = 0.465	Error = 0.202
	b	3.2537	3.4264	3.1960
		Error = 0.056	Error = 0.115	Error = 0.056
		R2 = 0.992	R2 = 0.977	R2 = 0.995
		N = 61	N = 51	N = 32
Indet.	a	0.0025	0.0026	0.0048
		Error = 0.152	Error = 0.254	Error = 0.127
	b	3.2731	3.2565	3.1208
		Error = 0.039	Error = 0.064	Error = 0.035
		R2 = 0.995	R2 = 0.989	R2 = 0.997
		N = 168	N = 125	N = 91

**TABLE 16.-** White hake length distribution per haul mean catches by sex and year. Number per stratified mean catches. Spanish Spring Survey on NAFO 3NO: 2001-2004. Indet. means indeterminate.

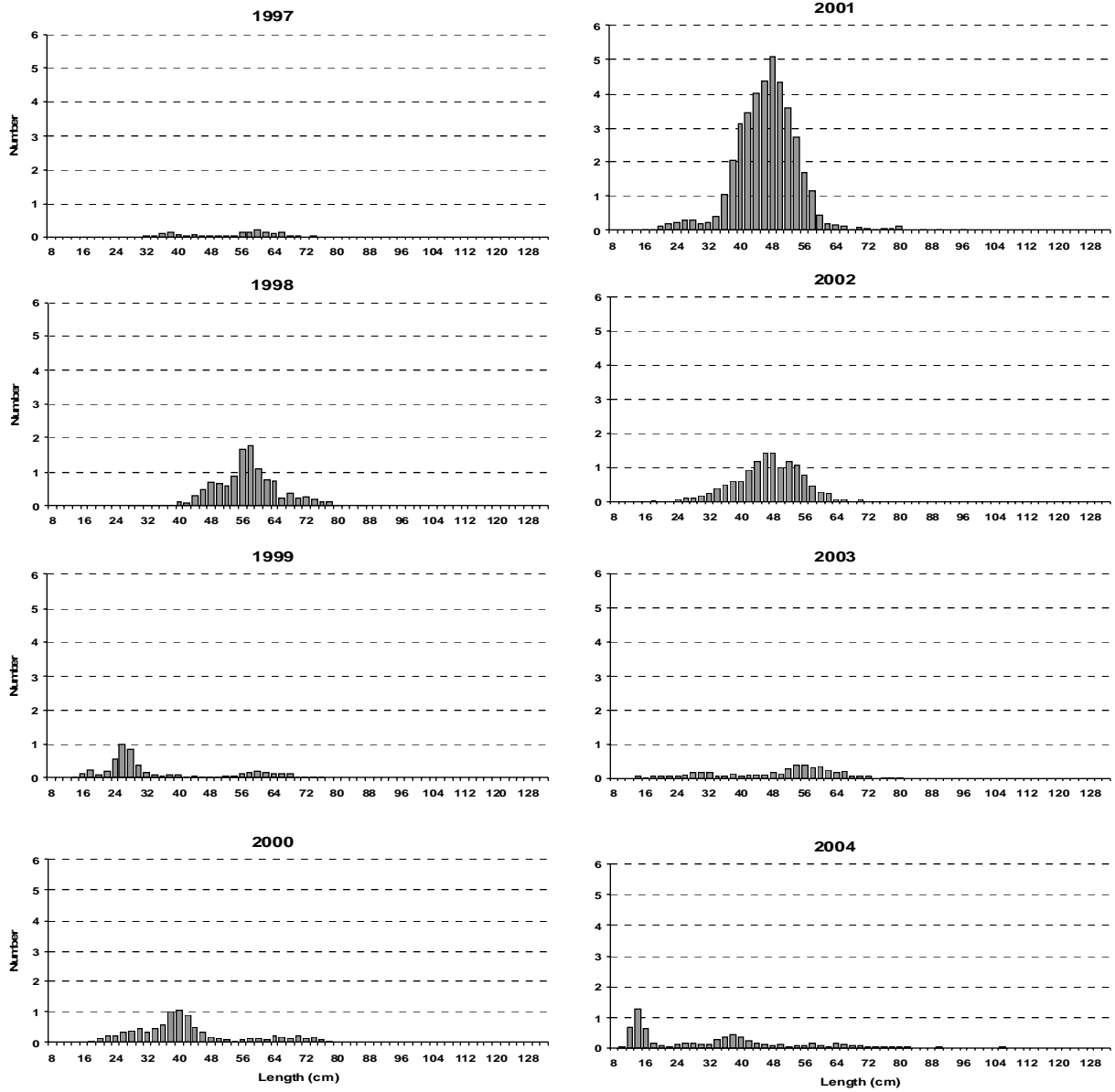
Length (cm.)	2001				2002				2003				2004			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
10	0.000	0.000	0.010	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12	0.000	0.000	0.000	0.000	0.003	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14	0.010	0.023	0.000	0.033	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	0.028	0.010	0.000	0.039	0.006	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.022	0.000	0.022
18	0.042	0.021	0.000	0.063	0.006	0.006	0.000	0.012	0.000	0.000	0.000	0.000	0.022	0.029	0.000	0.051
20	0.080	0.039	0.000	0.119	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.022	0.043	0.000	0.065
22	0.052	0.041	0.000	0.093	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.004	0.043	0.036	0.000	0.080
24	0.059	0.041	0.000	0.101	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.007	0.022	0.000	0.029
26	0.056	0.039	0.000	0.095	0.000	0.000	0.000	0.000	0.012	0.004	0.000	0.015	0.000	0.007	0.000	0.007
28	0.181	0.103	0.000	0.285	0.000	0.000	0.000	0.000	0.004	0.004	0.000	0.008	0.000	0.000	0.000	0.000
30	0.340	0.157	0.000	0.497	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
32	1.008	0.562	0.000	1.570	0.007	0.000	0.000	0.007	0.004	0.004	0.000	0.008	0.000	0.000	0.000	0.000
34	0.896	0.767	0.000	1.663	0.007	0.003	0.000	0.010	0.000	0.004	0.000	0.004	0.000	0.000	0.000	0.000
36	0.543	0.724	0.000	1.266	0.032	0.019	0.000	0.052	0.004	0.000	0.000	0.004	0.000	0.007	0.000	0.007
38	0.312	0.453	0.000	0.765	0.133	0.013	0.000	0.146	0.000	0.004	0.000	0.004	0.000	0.000	0.000	0.000
40	0.108	0.124	0.000	0.232	0.270	0.133	0.000	0.403	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
42	0.101	0.096	0.000	0.198	0.336	0.212	0.000	0.548	0.012	0.015	0.000	0.027	0.000	0.000	0.000	0.000
44	0.137	0.041	0.000	0.178	0.230	0.186	0.000	0.416	0.035	0.004	0.000	0.038	0.000	0.000	0.000	0.000
46	0.067	0.068	0.000	0.135	0.094	0.161	0.000	0.255	0.084	0.012	0.000	0.096	0.000	0.000	0.000	0.000
48	0.064	0.067	0.000	0.132	0.057	0.078	0.000	0.135	0.081	0.031	0.000	0.111	0.043	0.000	0.000	0.043
50	0.098	0.039	0.000	0.137	0.051	0.075	0.000	0.127	0.042	0.046	0.000	0.088	0.051	0.000	0.000	0.051
52	0.109	0.097	0.000	0.207	0.056	0.034	0.000	0.090	0.061	0.031	0.000	0.092	0.051	0.022	0.000	0.072
54	0.088	0.023	0.000	0.111	0.052	0.049	0.000	0.101	0.015	0.027	0.000	0.042	0.036	0.014	0.000	0.051
56	0.065	0.028	0.000	0.093	0.026	0.029	0.000	0.055	0.012	0.027	0.000	0.038	0.051	0.014	0.000	0.065
58	0.028	0.028	0.000	0.056	0.023	0.010	0.000	0.033	0.004	0.031	0.000	0.035	0.022	0.029	0.000	0.051
60	0.038	0.031	0.000	0.069	0.045	0.021	0.000	0.065	0.000	0.015	0.000	0.015	0.022	0.029	0.000	0.051
62	0.026	0.027	0.000	0.052	0.007	0.010	0.000	0.017	0.004	0.004	0.000	0.008	0.022	0.022	0.000	0.043
64	0.021	0.014	0.000	0.034	0.019	0.017	0.000	0.036	0.000	0.012	0.000	0.012	0.007	0.036	0.000	0.043
66	0.021	0.013	0.000	0.033	0.010	0.000	0.000	0.010	0.012	0.000	0.000	0.012	0.007	0.065	0.000	0.072
68	0.013	0.033	0.000	0.046	0.010	0.013	0.000	0.023	0.004	0.008	0.000	0.012	0.007	0.014	0.000	0.022
70	0.019	0.016	0.000	0.035	0.009	0.007	0.000	0.016	0.004	0.004	0.000	0.008	0.014	0.007	0.000	0.022
72	0.000	0.000	0.000	0.000	0.003	0.009	0.000	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
74	0.000	0.010	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.008	0.000	0.007	0.000	0.007
76	0.000	0.008	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
78	0.000	0.010	0.000	0.010	0.000	0.000	0.000	0.000	0.000	0.004	0.000	0.004	0.000	0.000	0.000	0.000
80	0.000	0.008	0.000	0.008	0.000	0.003	0.000	0.003	0.000	0.004	0.000	0.004	0.000	0.000	0.000	0.000
82	0.000	0.023	0.000	0.023	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
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
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
Total	4.611	3.797	0.010	8.418	1.492	1.090	0.000	2.581	0.391	0.303	0.000	0.694	0.427	0.427	0.000	0.855
N° samples:				12				11				9				11
N° Ind.:	427	328	1	756	329	222	0	551	102	79	0	181	59	59	0	118
Sampled catch:				401				303				195				144
Range:				10-89				13-80				22-80				16-75
Total catch:				738				630				209				160
Total hauls:				83				125				122				122



**FIGURE 1.-** Atlantic cod stratified mean catches in Kg and  $\pm$ SD by year. Spanish Spring surveys on NAFO Div. 3NO: 1997-2004 (1997-2000 transformed data from C/V *Playa de Menguña*; 2002-2004 original data from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels).



**FIGURE 2.-** Atlantic cod biomass in tons and  $\pm$ SD by year. Spanish Spring surveys on NAFO Div. 3NO: 1997-2004 (1997-2000 transformed data from C/V *Playa de Menguña*; 2002-2004 original data from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels).



**FIGURE 3.-** Atlantic cod length distribution (cm) on NAFO 3NO: 1997-2004. Estimated numbers per haul stratified mean catches. 1997-2000 data are transformed data from *C/V Playa de Mendiña*, and 2002-2004 data are original from *R/V Vizconde de Eza*. In 2001, there are data from the two vessels.



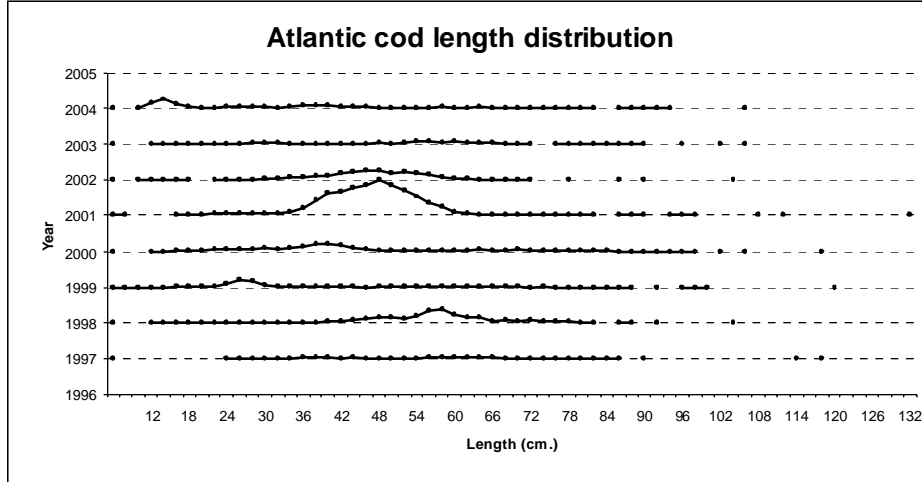


FIGURE 4.- Atlantic cod length distribution (cm) on NAFO 3NO: 1997-2004

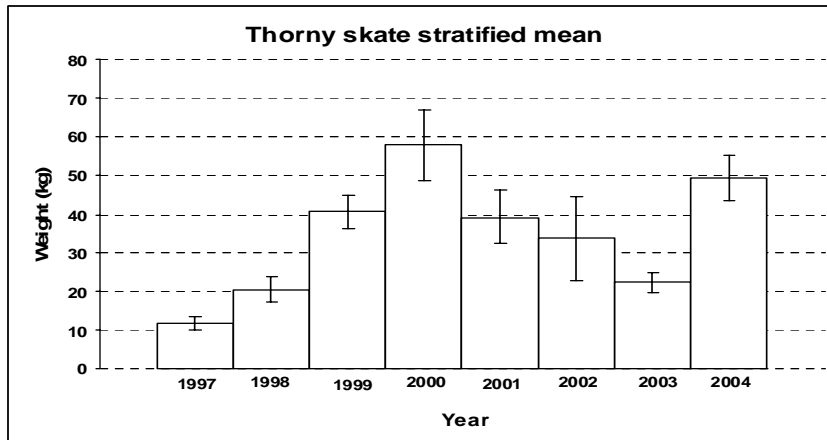


FIGURE 5.- Thorny skate stratified mean catches in Kg and  $\pm$ SD by year. Spanish Spring surveys on NAFO Div. 3NO: 1997-2004 (1997-2000 transformed data from C/V *Playa de Menguña*; 2002-2004 original data from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels).

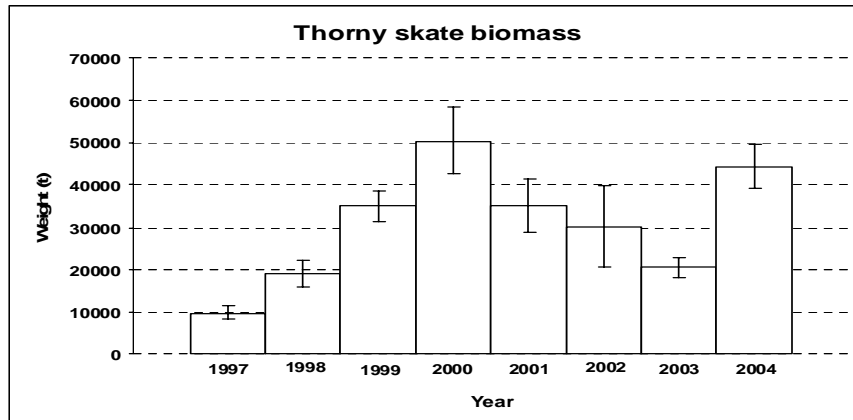


FIGURE 6.- Thorny skate biomass in tons and  $\pm$ SD by year. Spanish Spring surveys on NAFO Div. 3NO: 1997-2004 (1997-2000 transformed data from C/V *Playa de Menguña*; 2002-2004 original data from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels).

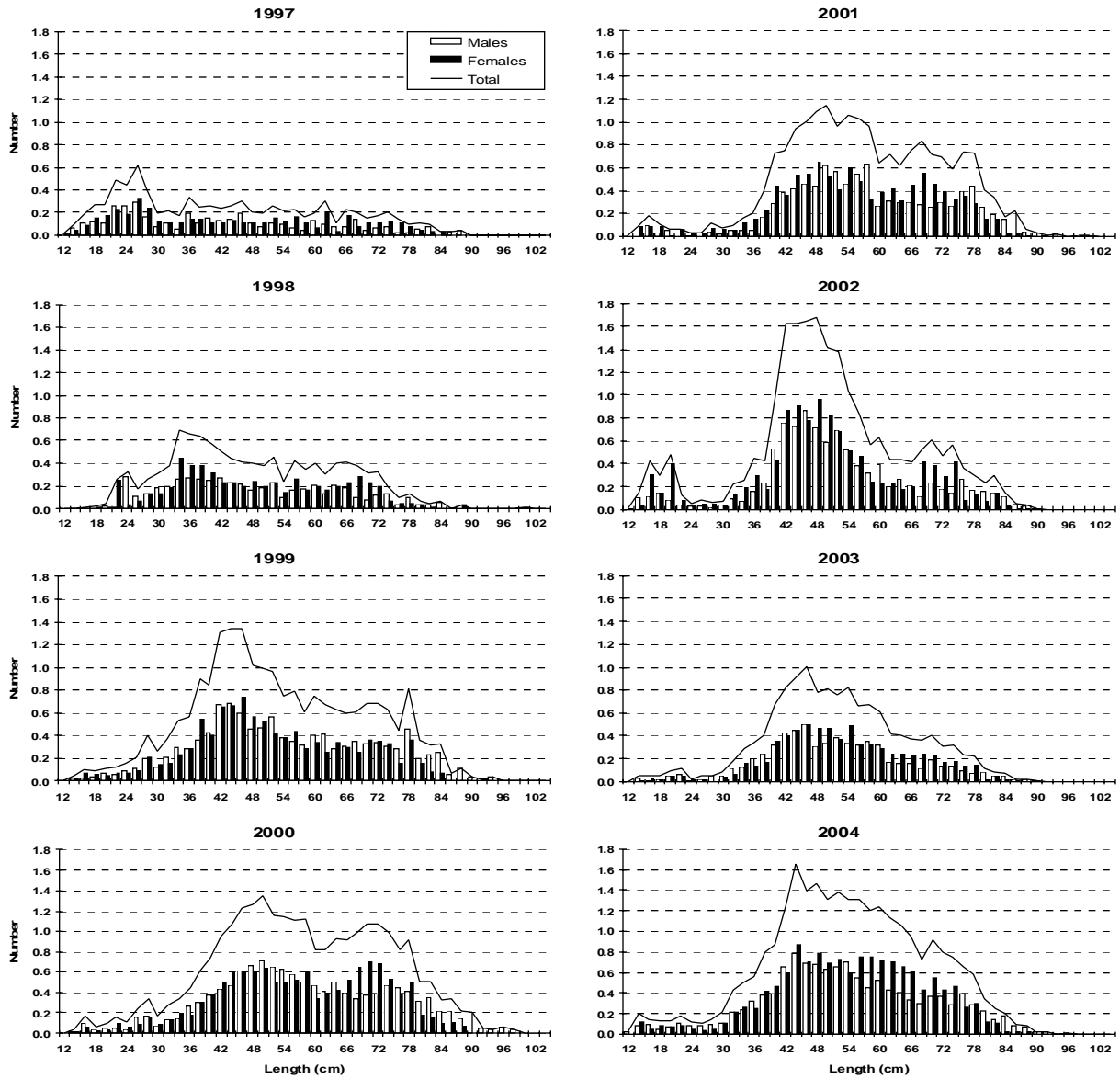
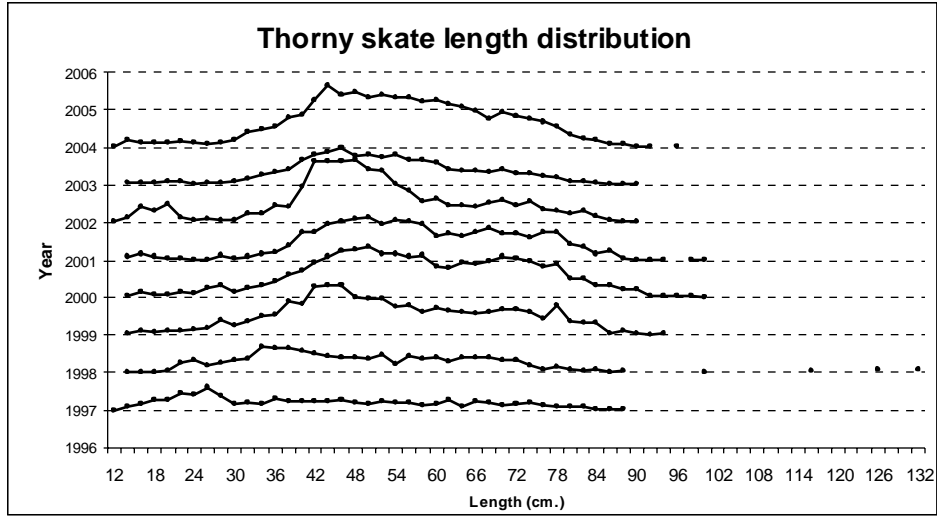
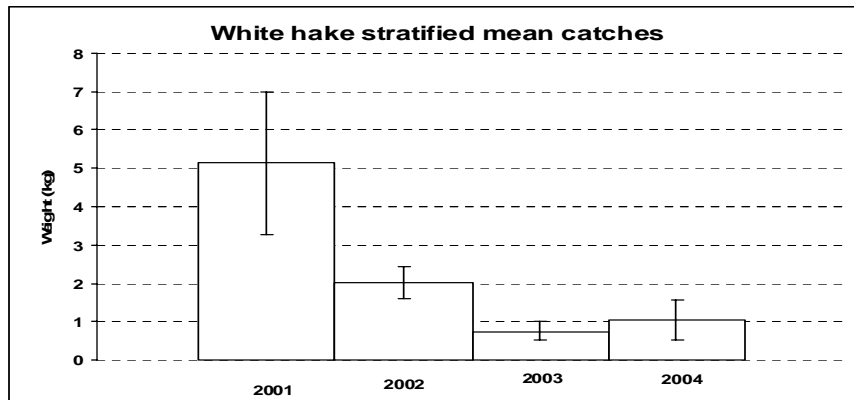


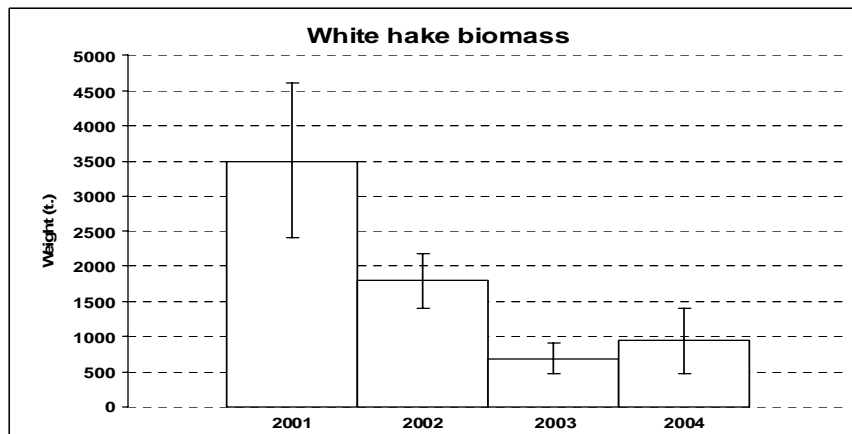
FIGURE 7.- Thorny skate length distribution (cm) on NAFO 3NO: 1997-2004. Estimated numbers per haul stratified mean catches. 1997-2000 data are transformed data from C/V *Playa de Mendiña*, and 2002-2004 data are original from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels



**FIGURE 8.-** Thorny skate length distribution (cm) on NAFO 3NO: 1997-2004.



**FIGURE 9.-** White hake stratified mean catches in Kg and  $\pm$ SD by year. Spanish Spring surveys on NAFO Div. 3NO: 2001-2004



**FIGURE 10.-** White hake biomass in tons and  $\pm$ SD by year. Spanish Spring surveys on NAFO Div. 3NO: 2001-2004

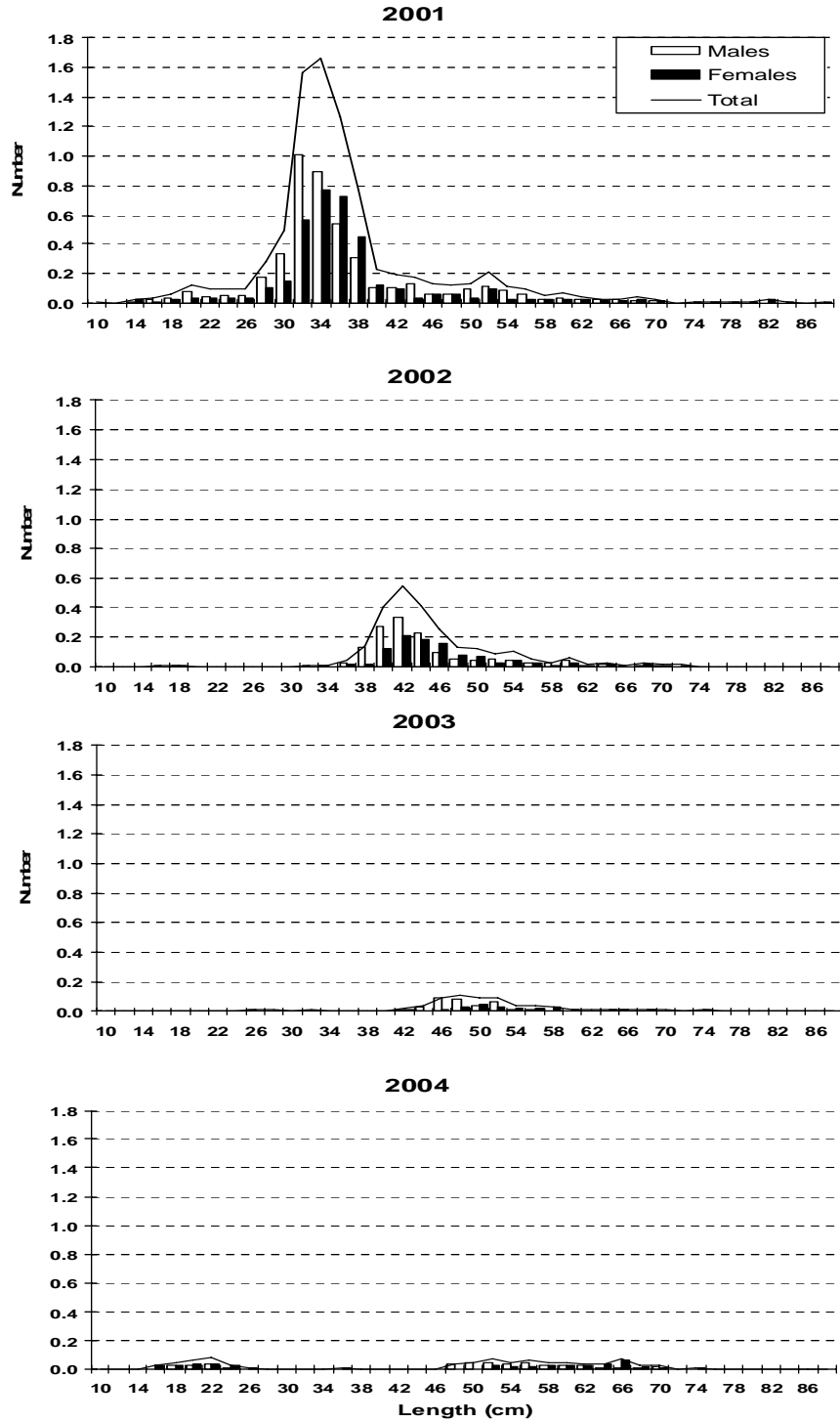
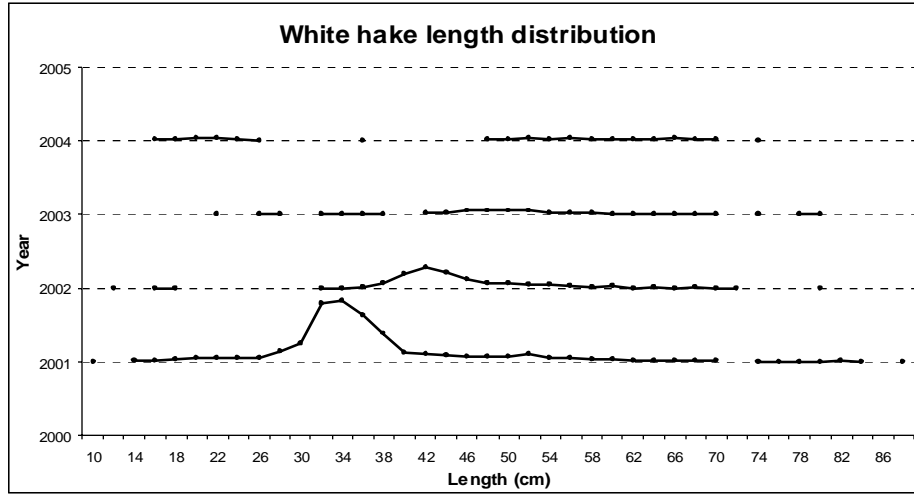


FIGURE 11.- White hake length distribution (cm) on NAFO 3NO: 2001-2004. Number per stratified mean catches.



**FIGURE 12.-** White hake length distribution (cm) on NAFO 3NO: 2001-2004.