Northwest Atlantic Fisheries Organization

Serial No. N5228 **NAFO SCR Doc. 06/13**

SCIENTIFIC COUNCIL MEETING – JUNE 2006

Atlantic Cod and Yellowtail Flounder Indices from the Spanish Survey Conducted in Divisions 3NO of the NAFO Regulatory Area

by

Diana González-Troncoso, C. González and Xabier Paz

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

Abstract

Since 1995, Spain carries out a stratified random spring bottom trawl survey in Divisions 3NO of the NAFO Regulatory Area. In 2001, the trawl vessel and gear were replaced; so, the time series indices were transformed. The transformed entire series of mean catches, biomass and length distribution for Atlantic cod (*Gadus morhua*) are presented for the period 1997-2000 and for Yellowtail flounder (*Limanda ferruginea*) for the period 1995-2000, and the both species no-transformed data for the years 2002-2005. For 2001, there are data from the two vessels. This year the data were updated, so a new calibration was made. The changes affect the species length distribution. For Atlantic cod and yellowtail flounder there are no significant changes, both numbers and trend of the stocks. For Atlantic cod we can see a decreasing of the biomass since the year 2002, with a slight increasing this year but without reaching the level of 2003, and it remains in a very low level. For this species, a good recruitment can be seen in the last two years. For yellowtail flounder, this is no a clear trend since 1998; its indices are almost constant along this period.

Material and Methods

The survey in Div. 3NO of NAFO Regulatory Area was initiated by Spain in 1995. Until 2001, the survey was carried out in spring (May), on board the Spanish vessel C/V *Playa de Menduiña* (338 GT and 800 HP) using bottom trawl net type *Pedreira*. Since 2001, the R/V *Vizconde de Eza* replaced the C/V *Playa de Menduíña* as the research vessel for the survey, and *Campelen* net replaced *Pedreira* net as survey gear. 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). Table 1 presents the number of valid tows, the depth strata covered and the dates of the survey series. The survey area was stratified following the standard stratification schemes (Bishop, 1994). Set number was allocated to strata proportionally to their size, with a minimum of two planned hauls per stratum and the trawl positions were chosen at random (Doubleday, 1981). Biomass indices were calculated by the swept area method (Cochran, 1997), assuming catchability factor of 1.

For Atlantic cod, the series are presented since 1997 because in years 1995 and 1996 the surveyed depth strata were only until 1 000 meters, so they are not representative. As the strata where the yellowtail flounder is presented were well surveyed, the series for this species are presented since 1995.

The catch from each haul was sorted by species and weighted. Random samples of each species catches were measured to total length to the nearest lower cm. Length distribution scaled from catches was estimated for the period 1997-2005 (Atlantic cod) and 1995-2005 (yellowtail flounder) in two cm range. Data were grouping beginning with the pair number.

This year, errors in the length distribution data process tools were found. The changes affect both the numbers and the shape of the length distribution. A new calibration factors for the length distribution were calculated for each species following identical method employed in previous years, fitting the ratios of the number of the two vessels length by length. There is a length range in which the ratios of the data are scattered, so it seems to be better not to apply the fit to the entire length range but to cut in an appropriate point. A residual analysis was made in order to choose the best length to make the cut, or if it was better to cut or not. The new transformation factors and their graph are presented for both transformed species. The changes do not affect the mean catches and the biomass, so these indices are the same than last years. For details about the transformation, see González Troncoso *et al.*, 2004, and Paz *et al*., 2004.

For each species, the haul mean catch, with its variance, and the stratified mean catches by stratum and year, with the annual variance, are presented, transformed until 2000 and no-transformed in the period 2002-2005. In the year 2001, there are data transformed from the former vessel with original data from the new vessel. Besides this, the biomass per stratum and year, with the annual variance, are presented, as the length distribution in number per haul stratified mean catch. To more information about the calculation of these indices, see González Troncoso *et al.*, 2004.

Results

Atlantic cod

Introduction

According to the NAFO Fisheries Commission evaluation, the stock of Atlantic cod in Div. 3NO declined dramatically during the mid-1980s, and the total biomass and the spawning biomass are currently at an extreme low level. Moreover, all recent year-classes have been weak (NAFO, 2005). Although we have no data before 1995, our data are in general agreed with these results, while in recent years our data show an increasing in the recruitment.

Mean Catches and Biomass

The Atlantic cod haul mean catches by stratum are presented in Table 2, included 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 (1997-2005) of biomass and their SD estimates for Atlantic cod are presented in Table 4. Estimated parameters values of length-weight relationship *a* and *b* 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 Menduíña* 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. Since 2002, a decreasing in the biomass can be seen, with a slight increasing this year but without reaching the level of 2003. The great value of the variance in some years is due to the tows with a large catch (Fig. 1 and 2).

Length Distribution

The result of the model proposed by Warren for Atlantic cod was the following:

$$\ln(\text{ratio}) = \exp(5.8410 + 0.0862l - 2.5701\ln(l))$$

Figure 3 shows the ratios and their fit. In this figure, we observed that, from the middle of the length range, the data are very scattered, so, for these values, the mean of the ratios factor is applied, and two length-classes are formed as follow:

$$\text{For } l \leq 60 \quad : \text{cf} = 1.0821$$
$$\text{For } l \geq 61 \quad : \text{cf} = \exp(5.8410 + 0.0862l - 2.5701\ln(l))$$

Table 6 and Fig. 4 and 5 showed the length distribution per haul stratified mean catches and year, besides the sampled size and its catch, for the period 1997-2005. 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 2004, in which the individuals between 12 and 16 cm correspond to the greatest presence in the series, and in 2005 between 24 and 32, with a new mode between 12 and 16 cm, as in last year. So, cod recruitment showed an increasing in the two last years.

Yellowtail flounder

Introduction

After a moratorium between 1994 and 1997, the yellowtail flounder fishery is under TAC. According to the Report of NAFO Scientific Council Meeting, this species had a minimum in the mid-1990's, but since then the biomass is increasing and these last years is in their maximum value in the period 1984-2004. Last year there was nothing to indicate a change in the status of the stock (NAFO, 2005).

Mean Catches and Biomass

In Table 7 we present the haul mean catches by stratum for yellowtail flounder, included swept area, number of hauls and SD. The stratified haul mean catches by stratum and year and their SD are presented in Table 8 for this species.

The entire time series (1995-2005) of biomass by the swept area method and their SD estimates of yellowtail flounder are presented in Table 9. The parameters *a* and *b* for the calculation of the length-weight relationship are presented in Table 10.

The yellowtail flounder indices show no clear trend along the time (in the entire series). Anyway, there was a decreasing since 2001 broken in 2004 with a slight increasing in the indices, to decline briefly again in 2005 (Fig. 6 and 7).

Length Distribution

The result of the model proposed by Warren (2) for yellowtail flounder was the following:

$$\ln(\text{ratio}) = \exp(6.7114 + 0.0813l - 3.0543\ln(l))$$

Figure 8 shows the ratios and their fit. In this figure, we observed that, for the smallest lengths, the data are very scattered, so for the values under 15 cm, the mean of the ratios factor is applied, and two length-classes are formed as:

$$\text{For } l \leq 14 \quad : \text{cf} = 2.5892$$
$$\text{For } l \geq 15 \quad : \text{cf} = \exp(6.7114 + 0.0813\ln(l) - 3.0543l)$$

The length distribution per haul stratified mean catches by sex and year, besides the sampled size and its catch, are presented in Table 11 and Fig. 9 the period 1995-2005. The data have been grouped two by two**,** so we present the data every two cm. There is no presence of good recruitment last years. In Fig. 10, we can see the evolution of a modal value since the beginning of the series, but, although there is a presence of juveniles in the lengths, this presence is very low.

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TABLE 1. Spanish spring bottom trawl surveys on NAFO Div. 3NO: 1995-2005

Year	Vessel	Valid tows	Depth strata covered (m)	Dates
1995	C/V *Playa de Menduíña*	77	56-731	May 18-May 29
1996	C/V *Playa de Menduíña*	112	56-1098	May 07-May 24
1997	C/V *Playa de Menduíña*	128	56-1280	April 26-May 18
1998	C/V *Playa de Menduíña*	124	56-1464	May 06-May 26
1999	C/V *Playa de Menduíña*	114	56-1464	May 07-May 26
2000	C/V *Playa de Menduíña*	118	56-1464	May 07-May 28
2001(*)	R/V *Vizconde de Eza* C/V *Playa de Menduíña*	83 121	56-1116 56-1464	May 03-May 24 May 05-May 23
2002	R/V *Vizconde de Eza*	125	56-1464	April 29-May 19
2003	R/V *Vizconde de Eza*	118	56-1464	May 11-June 02
2004	R/V *Vizconde de Eza*	120	56-1464	June 06–June 24
2005	R/V *Vizconde de Eza*	119	56-1464	June 10–June 29

(*) 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 Menduíña* (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: 1997-2005. Swept area in square miles. n.s. means stratum not surveyed. 1997-2000 data are transformed C/V *Playa de Menduíña* data, and 2002-2005 data are original from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels.

	1997				1998				1999			
Stratum	Swept area	Tow number	A. cod Mean catch	A. cod SD	Swept area	Tow number	A. cod Mean catch	A. cod SD	Swept area	Tow number	A. cod Mean catch	A. cod SD
353	0.0480	4	0.00	0.000	0.0465	4	0.00	0.004	0.0360	3	6.26	8.593
354	0.0233	2	0.00	0.000	0.0356	3	17.67	29.046	0.0218	2	4.92	3.192
355	0.0233	2	4.29	5.711	0.0221	2	27.05	3.662	0.0229	2	6.39	2.549
356	0.0225	2	7.80	0.495	0.0221	2	6.23	0.247	0.0229	2	41.19	0.346
357	0.0443	4	91.55	174.202	0.0240	2	7.45	0.742	0.0236	2	10.12	11.461
358	0.0563	5	1.77	1.655	0.0236	3	4.46	4.030	0.0349	3	9.98	4.006
359	0.0690	6	1.13	2.385	0.0698	6	0.39	0.858	0.0364	3	7.25	11.394
360	0.3754	32	0.11	0.226	0.2561	25	0.22	0.700	0.2325	19	2.33	3.801
374	0.0353	3	0.06	0.099	0.0353	3	0.00	0.000	0.0244	2	0.58	0.594
375	0.0116	1	0.00	-	0.0345	3	0.78	0.403	0.0236	2	0.97	0.579
376	0.1583	14	0.00	0.000	0.0930	10	0.20	0.187	0.1219	10	0.62	0.545
377	0.0116	1	0.27	-	0.0229	2	1.89	2.375	0.0240	2	0.21	0.302
378	0.0210	2	2.34	3.316	0.0120	2	3.46	0.940	0.0229	2	7.76	5.951
379	0.0206	2	3.68	0.307	0.0356	3	8.30	5.847	0.0236	2	5.22	4.147
380	0.0210	2	0.36	0.515	0.0113	2	2.33	1.361	0.0236	2	38.58	48.720
381	0.0221	2	0.07	0.099	0.0229	2	0.21	0.187	0.0229	2	0.87	0.388
382	0.0461	4	0.00	0.000	0.0229	3	0.32	0.336	0.0484	4	0.05	0.036
721	0.0221	2	20.98	7.052	0.0203	2	0.61	0.866	0.0244	2	88.29	106.743
722	0.0214	2	0.31	0.139	0.0101	2	0.00	0.000	0.0229	2	0.00	0.000
723	0.0210	2	9.90	2.425	0.0233	2	4.39	3.736	0.0229	2	16.87	20.735
724	0.0225	2	1.30	1.269	0.0206	2	1488.84	2101.820	0.0225	2	0.02	0.032
725	0.0206	2	23.50	17.734	0.0086	1	30.86	-	0.0229	2	13.65	19.102
726	n.s.	n.s.	n.s.	n.s.	0.0094	2	4.74	5.617	0.0225	2	0.81	0.492
727	0.0094	1	0.12	-	0.0233	2	2.66	2.821	0.0236	2	9.20	4.701
728	0.0214	2	1.17	0.569	0.0206	2	1.54	2.177	0.0233	2	0.00	0.000
752	0.0218	2	0.00	0.000	0.0229	2	0.00	0.000	0.0233	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
754	0.0330	3	0.00	0.000	0.0210	2	0.00	0.000	0.0206	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
756	0.0109	1	0.00	-	0.0225	2	0.32	0.449	0.0225	2	0.24	0.334
757	0.0304	3	0.00	0.000	0.0206	2	0.00	0.000	0.0233	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
759	n.s.	n.s.	n.s.	n.s.	0.0214	2	0.00	0.000	0.0218	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
761	0.0315	3	0.00	0.000	0.0206	2	0.00	0.000	0.0210	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
763	n.s.	n.s.	n.s.	n.s.	0.0218	2	0.00	0.000	0.0311	3	0.00	0.000
764	0.0206	2	0.00	0.000	0.0218	2	0.00	0.000	0.0225	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
766	0.0308	3	0.00	0.000	0.0191	2	0.00	0.000	0.0218	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

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

TABLE 2 (cont.). Swept area, number of hauls and Atlantic cod mean catch (kg) and SD (**) by stratum. Spanish Spring Surveys on NAFO Div. 3NO: 1997-2005. Swept area in square miles. n.s. means stratum not surveyed. 1997-2000 data are transfomed C/V *Playa de Menduíña* data, and 2002-2005 data are original from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels.

	2000				2001				2002			
Stratum	Swept area	Tow number	A. cod Mean catch	A. cod SD	Swept area	Tow number	A. cod Mean catch	A. cod SD	Swept area	Tow number	A. cod Mean catch	A. cod SD
353	0.0356	3	8.59	9.984	0.0341	3	7.33	8.145	0.0476	4	0.00	0.003
354	0.0356	3	18.44	27.099	0.0338	3	16.07	3.315	0.0356	3	0.01	0.012
355	0.0233	2	94.83	76.209	0.0240	2	56.11	64.898	0.0236	2	0.96	0.370
356	0.0225	2	16.34	17.172	0.0240	2	149.60	76.650	0.0233	2	15.20	10.889
357	0.0124	1	9.15	-	0.0244	2	27.20	36.062	0.0240	2	6.65	1.909
358	0.0341	3	184.88	194.829	0.0345	3	3.42	2.592	0.0345	3	2.63	1.429
359	0.0469	4	18.26	17.367	0.0803	7	176.35	433.935	0.0686	6	2.72	3.436
360	0.2396	20	2.16	3.561	0.2423	20	11.36	27.470	0.2865	25	0.82	2.887
374	0.0240	2	0.00	0.000	0.0240	2	0.00	0.000	0.0345	3	0.00	0.000
375	0.0244	2	0.00	0.000	0.0338	3	0.00	0.000	0.0353	3	0.47	0.503
376	0.1200	10	0.90	1.852	0.1155	10	0.04	0.119	0.1140	10	0.00	0.000
377	0.0229	2	0.02	0.027	0.0229	2	0.00	0.000	0.0229	2	0.00	0.000
378	0.0233	2	10.65	11.169	0.0236	2	11.98	15.726	0.0233	2	1.45	2.051
379	0.0225	2	41.12	54.683	0.0229	2	9.54	9.001	0.0229	2	24.83	32.492
380	0.0236	2	8.21	3.236	0.0206	2	6.00	2.895	0.0225	2	0.31	0.035
381	0.0236	2	1.74	0.730	0.0236	2	0.66	0.891	0.0229	2	0.04	0.057
382	0.0499	4	0.71	0.561	0.0469	4	0.12	0.145	0.0341	3	0.04	0.076
721	0.0236	2	28.34	17.122	0.0248	2	4.85	6.859	0.0233	2	1.01	1.430
722	0.0218	2	0.90	1.277	0.0233	2	0.00	0.000	0.0236	2	0.00	0.000
723	0.0248	2	22.02	12.010	0.0240	2	676.15	932.179	0.0233	2	55.60	69.155
724	0.0233	2	0.70	0.341	0.0353	3	6.16	10.254	0.0225	2	49.80	70.428
725	0.0210	2	4.34	3.857	0.0116	2	1367.61	1856.733	0.0225	2	9.25	7.849
726	0.0221	2	8.85	12.221	0.0116	2	1.83	2.593	0.0214	2	1122.95	1569.289
727	0.0210	2	9.16	10.803	0.0225	2	10.40	4.810	0.0233	2	2.80	3.960
728	0.0210	2	0.90	1.267	0.0229	2	0.00	0.000	0.0229	2	21.40	30.264
752	0.0206	2	0.00	0.000	0.0210	2	0.00	0.000	0.0116	1	0.00	0.000
753	0.0218	2	0.00	0.000	0.0214	2	0.00	0.000	0.0229	2	0.00	0.000
754	0.0195	2	0.00	0.000	0.0195	2	0.00	0.000	0.0341	3	0.00	0.000
755	0.0431	4	0.00	0.000	0.0416	4	0.00	0.000	0.0338	3	0.00	0.000
756	0.0203	2	0.36	0.257	0.0113	2	0.04	0.057	0.0229	2	0.00	0.000
757	0.0214	2	0.00	0.000	0.0233	2	0.00	0.000	0.0225	2	64.40	91.075
758	0.0210	2	0.00	0.000	0.0218	2	0.00	0.000	0.0225	2	2.80	3.960
759	0.0210	2	0.00	0.000	0.0221	2	0.00	0.000	0.0225	2	0.00	0.000
760	0.0210	2	0.00	0.000	0.0229	2	0.00	0.000	0.0229	2	0.00	0.000
761	0.0221	2	0.00	0.000	0.0225	2	0.00	0.000	0.0225	2	0.17	0.236
762	0.0203	2	0.00	0.000	0.0116	2	0.00	0.000	0.0225	2	0.15	0.212
763	0.0416	4	1.08	2.170	0.0330	3	0.00	0.000	0.0225	2	0.00	0.000
764	0.0218	2	0.00	0.000	0.0240	2	0.00	0.000	0.0236	2	0.00	0.000
765	0.0203	2	0.00	0.000	0.0113	2	0.00	0.000	0.0236	2	0.00	0.000
766	0.0214	2	0.00	0.000	0.0203	2	0.00	0.000	0.0233	2	0.00	0.000
767	0.0210	2	0.00	0.000	0.0225	2	0.00	0.000	0.0229	2	0.00	0.000

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

TABLE 2 (cont.). Swept area, number of hauls and Atlantic cod mean catch (kg) and SD (**) by stratum. Spanish Spring Surveys on NAFO Div. 3NO: 1997-2005. Swept area in square miles. n.s. means stratum not surveyed. 1997-2000 data are transformed C/V *Playa de Menduíña* data, and 2002-2005 data are original from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels.

	2003					2004				2005			
Stratum	Swept area	Tow number	A. cod Mean catch	A. cod Mean catch	A. cod SD	Swept area	Tow number	A. cod Mean catch	A. cod SD	Swept area	Tow number	A. cod Mean catch	A. cod SD
353	0.0334	3	0.00	0.000		0.033750	3	10.21	8.691	0.0353	3	4.20	3.962
354	0.0338	3	7.63	13.221		0.034500	3	4.76	3.335	0.0353	3	6.76	8.311
355	0.0229	2	3.02	2.390		0.022875	2	5.09	3.267	0.0225	2	1.97	0.255
356	0.0225	2	15.61	1.605		0.022125	2	2.97	0.714	0.0233	2	1.43	1.478
357	0.0229	2	5.28	7.460		0.022875	2	13.30	17.727	0.0233	2	3.98	4.603
358	0.0338	3	207.22	260.186		0.033000	3	14.41	12.455	0.0349	3	22.75	17.967
359	0.0791	7	1.03	1.522		0.079125	7	29.83	54.712	0.0814	7	57.31	134.609
360	0.2254	20	1.14	2.952		0.231000	20	3.55	4.484	0.2325	20	2.47	4.698
374	0.0225	2	0.00	0.000		0.023250	2	0.00	0.000	0.0229	2	0.11	0.148
375	0.0330	3	0.48	0.826		0.033750	3	0.05	0.081	0.0349	3	0.00	0.000
376	0.1125	10	0.65	1.987		0.116625	10	0.60	0.733	0.1174	10	0.76	0.963
377	0.0225	2	1.25	1.768		0.021750	2	19.60	24.020	0.0233	2	61.19	64.955
378	0.0225	2	19.18	19.141		0.022500	2	17.75	3.989	0.0225	2	8.59	10.087
379	0.0229	2	4.35	0.481		0.012375	1	23.95	-	0.0236	2	5.70	7.078
380	0.0229	2	1.09	0.976		0.022125	2	7.77	2.305	0.0229	2	27.53	24.784
381	0.0229	2	0.00	0.000		0.022500	2	5.47	4.150	0.0233	2	3.63	3.765
382	0.0454	4	0.00	0.000		0.046125	4	0.47	0.888	0.0458	4	0.97	0.639
721	0.0225	2	9.40	13.287		0.022125	2	2.20	3.111	0.0229	2	0.00	0.000
722	0.0221	2	1.73	2.447		0.021750	2	0.00	0.000	0.0233	2	0.00	0.000
723	0.0229	2	0.65	0.919		0.022875	2	1.94	2.744	0.0233	2	0.00	0.000
724	0.0225	2	10.46	14.786		0.021375	2	0.00	0.000	0.0225	2	0.00	0.000
725	0.0229	2	2.17	3.062		0.022500	2	0.29	0.403	0.0236	2	1.47	2.073
726	0.0225	2	0.00	0.000		0.022500	2	0.00	0.000	0.0113	1	0.00	-
727	0.0218	2	7.45	9.405		0.023250	2	0.00	0.000	0.0229	2	0.00	0.000
728	0.0225	2	0.00	0.000		0.018000	2	0.00	0.000	0.0109	1	0.00	-
752	0.0229	2	0.00	0.000		0.021375	2	0.00	0.000	0.0236	2	0.00	0.000
753	0.0229	2	0.00	0.000		0.021750	2	0.00	0.000	0.0225	2	0.00	0.000
754	0.0218	2	0.00	0.000		0.021375	2	0.00	0.000	0.0225	2	0.00	0.000
755	0.0221	2	0.00	0.000		0.031875	3	0.00	0.000	0.0450	4	0.00	0.000
756	0.0221	2	0.00	0.000		0.021750	2	0.00	0.000	0.0233	2	0.00	0.000
757	0.0221	2	0.00	0.000		0.021750	2	0.00	0.000	0.0225	2	0.00	0.000
758	0.0221	2	0.00	0.000		0.021375	2	0.00	0.000	0.0225	2	0.00	0.000
759	0.0113	1	0.00	-		0.021375	2	0.00	0.000	0.0229	2	0.00	0.000
760	0.0218	2	0.00	0.000		0.022125	2	0.00	0.000	0.0229	2	0.00	0.000
761	0.0225	2	0.00	0.000		0.022125	2	0.00	0.000	0.0221	2	0.00	0.000
762	0.0225	2	0.00	0.000		0.023250	2	0.00	0.000	0.0225	2	0.00	0.000
763	0.0311	3	0.00	0.000		0.032625	3	0.00	0.000	0.0334	3	0.00	0.000
764	0.0221	2	0.00	0.000		0.022875	2	0.00	0.000	0.0233	2	0.00	0.000
765	0.0113	1	0.00	-		0.022500	2	0.00	0.000	0.0229	2	0.00	0.000
766	0.0225	2	0.00	0.000		0.022500	2	0.00	0.000	0.0229	2	0.00	0.000
767	0.0229	2	0.00	0.000		0.021750	2	0.00	0.000	0.0113	1	0.00	-

TABLE 3. Stratified mean catches (Kg) by stratum and year and SD by year of Atlantic cod (1997-2005). n.s. means stratum not surveyed. 1997-2000 data are transformed C/V *Playa de Menduíña* data (by FPC). 2002-2005 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	2005
353	0.00	0.59	1684.29	2310.56	1972.67	0.40	0.00	2746.49	1129.80
354	0.00	4347.10	1209.44	4536.47	3954.04	1.64	1877.80	1172.11	1662.39
355	317.46	2001.63	472.57	7017.36	4152.14	71.15	223.48	376.66	145.78
356	366.75	292.75	1935.74	768.05	7031.20	714.40	733.44	139.36	66.98
357	15014.55	1222.35	1659.07	1500.68	4460.80	1090.60	865.10	2180.38	651.90
358	397.76	1002.53	2246.51	41597.12	768.75	592.50	46625.25	3241.50	5119.50
359	473.87	164.50	3052.91	7687.04	74245.15	1146.52	435.31	12557.95	24128.71
360	301.58	616.24	6478.57	6017.33	31605.14	2283.17	3169.28	9886.61	6869.14
374	12.23	0.00	124.31	0.00	0.00	0.00	0.00	0.00	22.47
375	0.00	211.79	261.73	0.00	0.00	126.47	129.18	12.65	0.00
376	0.00	263.27	822.50	1202.94	50.03	0.00	864.70	801.87	1010.91
377	26.59	188.96	21.35	1.92	0.00	0.00	125.00	1959.50	6119.00
378	325.88	481.53	1078.58	1480.09	1665.22	201.55	2665.33	2466.56	1194.36
379	390.21	880.31	553.41	4358.29	1010.71	2631.45	461.10	2538.70	603.67
380	34.94	223.39	3703.59	788.08	576.11	30.19	104.64	745.92	2642.40
381	10.08	30.36	125.22	250.68	95.74	5.76	0.00	787.90	523.08
382	0.00	108.42	18.00	243.65	41.41	14.98	0.00	160.78	332.28
721	1363.56	39.80	5738.57	1842.35	315.25	65.75	610.68	143.00	0.00
722	26.16	0.00	0.00	75.84	0.00	0.00	145.32	0.00	0.00
723	1534.94	680.69	2614.28	3413.20	104803.25	8618.00	100.75	300.70	0.00
724	161.20	184615.64	2.82	87.21	764.25	6175.20	1296.42	0.00	0.00
725	2467.77	3240.64	1432.94	455.78	143598.88	971.25	227.33	29.93	153.93
726	n.s	341.39	58.07	637.55	132.02	80852.04	0.00	0.00	0.00
727	11.42	255.30	883.49	879.12	998.37	268.80	715.20	0.00	0.00
728	91.43	120.09	0.00	69.87	0.00	1669.20	0.00	0.00	0.00
752	0.00	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	0.00
754	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
756	0.00	32.07	23.86	36.40	4.04	0.00	0.00	0.00	0.00
757	0.00	0.00	0.00	0.00	0.00	6568.80	0.00	0.00	0.00
758	0.00	0.00	0.00	0.00	0.00	277.20	0.00	0.00	0.00
759	n.s	0.00	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	0.00
761	0.00	0.00	0.00	0.00	0.00	28.56	0.00	0.00	0.00
762	0.00	0.00	0.00	0.00	0.00	31.80	0.00	0.00	0.00
763	n.s	0.00	0.00	283.12	0.00	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	0.00
765	0.00	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	0.00
767	n.s	0.00	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	52376.29
	2.50	19.47	3.50	8.46	36.96	11.07	5.93	4.09	5.06
S.D.	1.54	17.82	0.75	2.58	17.97	7.82	3.29	0.95	2.16

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 Menduíña* data. 2002-2005 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	2005
353	0	0	140	195	173	0	0	244	96
354	0	366	111	382	351	0	167	102	141
355	27	181	41	604	346	6	20	33	13
356	33	26	169	68	586	61	65	13	6
357	1357	102	140	121	366	91	76	191	56
358	35	86	194	3657	67	52	4144	295	440
359	41	14	252	656	6476	100	39	1111	2076
360	26	53	529	502	2609	199	281	856	591
374	1	0	10	0	0	0	0	0	2
375	0	18	22	0	0	11	12	1	0
376	0	23	67	100	4	0	77	69	86
377	2	17	2	0	0	0	11	180	526
378	31	41	95	127	141	17	237	219	106
379	38	74	47	387	88	230	40	205	51
380	3	20	314	67	56	3	9	67	231
381	1	3	11	21	8	1	0	70	45
382	0	10	1	20	4	1	0	14	29
721	123	4	471	156	25	6	54	13	0
722	2	0	0	7	0	0	13	0	0
723	146	59	229	276	8734	741	9	26	0
724	14	17902	0	8	65	549	115	0	0
725	239	376	125	43	12347	86	20	3	13
726	n.s.	33	5	58	11	7565	0	0	0
727	1	22	75	84	89	23	66	0	0
728	9	12	0	7	0	146	0	0	0
752	0	0	0	0	0	0	0	0	0
753	0	0	0	0	0	0	0	0	0
754	0	0	0	0	0	0	0	0	0
755	n.s.	0	0	0	0	0	0	0	0
756	0	3	2	4	0	0	0	0	0
757	0	0	0	0	0	584	0	0	0
758	0	0	0	0	0	25	0	0	0
759	n.s.	0	0	0	0	0	0	0	0
760	0	0	0	0	0	0	0	0	0
761	0	0	0	0	0	3	0	0	0
762	0	0	0	0	0	3	0	0	0
763	n.s.	0	0	27	0	0	0	0	0
764	0	0	0	0	0	0	0	0	0
765	0	0	0	0	0	0	0	0	0
766	0	0	0	0	0	0	0	0	0
767	n.s.	0	0	0	0	0	0	0	0
TOTAL	2131	19444	3054	7576	32548	10502	5455	3712	4509
S.D.	1322	18206	655	2566	15903	7971	3016	848	1984

TABLE5. Length weight relationships in the calculation of Atlantic cod biomass. The equation is $Weight = a\left(l + 0.5\right)^{b}$ Spanish Spring Surveys on NAFO Div. 3NO: 1997-2005.

	1997	1998	1999	2000	2001	2002	2003	2004	2005
a	0.0102 Error = 0.2480	0.0061 Error = 0.0748	0.0048 Error = 0.0788	0.0060 Error = 0.0706	0.0048 Error = 0.0893	0.0057 Error = 0.1025	0.0046 Error = 0.0581	0.0052 Error = 0.0698	0.0052 Error = 0.0715
b	2.9387 Error = 0.0629	3.0671 Error = 0.0197	3.1313 Error = 0.0203	3.0822 Error = 0.0179	3.1198 Error = 0.0228	3.0783 Error = 0.0274	3.1370 Error = 0.0153	3.1107 Error = 0.0185	3.1238 Error = 0.0189
	R^2 = 0.975 N = 431	R2 = 0.997 N = 687	R^2 = 0.997 N = 430	R^2 = 0.997 N = 877	R^2 = 0.996 N = 488	R^2 = 0.995 N = 678	R^2 = 0.998 N = 516	R^2 = 0.997 N = 656	R^2 = 0.997 N = 612

TABLE 6. Atlantic cod length distribution per haul mean catches by sex and year. Number per stratified mean catches. Spanish Spring Survey on NAFO 3NO: 1997-2005. Indet. means indeterminate. 1997-2000 data are transformed C/V *Playa de Menduíña* data. 2002-2005 data are original R/V *Vizconde de Eza* data. (*) indicates untransformed data.

Length (cm.)	1997.	1998	1999	2000	2001	2002	2003	2004	2005
8	0.000	0.000	0.013	0.000	0.009	0.011	0.000	0.000	0.000
10	0.000	0.000	0.011	0.000	0.000	0.039	0.000	0.408	0.088
12	0.000	0.010	0.010	0.006	0.000	0.030	0.054	2.141	0.722
14	0.000	0.025	0.205	0.020	0.000	0.000	0.065	1.542	1.129
16	0.000	0.011	0.741	0.124	0.021	0.040	0.028	0.828	0.644
18	0.000	0.007	0.774	0.115	0.019	0.007	0.037	0.186	0.245
20	0.000	0.004	0.287	0.211	0.103	0.000	0.061	0.063	0.036
22	0.000	0.002	0.478	0.285	0.184	0.083	0.062	0.076	0.094
24	0.002	0.005	1.173	0.241	0.175	0.096	0.075	0.119	0.224
26	0.002	0.009	1.740	0.319	0.194	0.139	0.150	0.219	0.515
28	0.013	0.028	1.251	0.385	0.216	0.153	0.189	0.141	1.044
30	0.013	0.037	0.525	0.417	0.132	0.284	0.243	0.162	1.151
32	0.051	0.028	0.172	0.327	0.162	0.312	0.087	0.149	0.551
34	0.087	0.030	0.096	0.438	0.380	0.524	0.067	0.330	0.393
36	0.142	0.022	0.070	0.559	0.923	0.596	0.071	0.421	0.189
38	0.184	0.026	0.090	1.038	1.787	0.572	0.121	0.420	0.129
40	0.108	0.105	0.086	1.030	3.363	0.689	0.081	0.217	0.135
42	0.066	0.075	0.031	0.897	3.463	1.005	0.078	0.248	0.113
44	0.106	0.365	0.047	0.473	4.234	1.141	0.117	0.101	0.097
46	0.073	0.603	0.025	0.307	5.028	1.483	0.111	0.110	0.136
48	0.091	0.931	0.045	0.183	5.686	1.090	0.175	0.077	0.173
50	0.043	0.963	0.044	0.137	4.959	1.058	0.225	0.060	0.101
52	0.074	0.924	0.063	0.099	4.098	1.111	0.298	0.088	0.128
54	0.087	1.499	0.106	0.109	3.195	0.895	0.390	0.072	0.026
56	0.142	1.537	0.081	0.069	1.224	0.691	0.428	0.065	0.028
58	0.124	1.764	0.113	0.136	0.693	0.223	0.322	0.110	0.012
60	0.195	1.026	0.130	0.101	0.532	0.370	0.306	0.074	0.055
62	0.114	0.540	0.098	0.065	0.181	0.126	0.183	0.093	0.078
64	0.088	0.505	0.072	0.152	0.032	0.005	0.227	0.104	0.092
66	0.111	0.163	0.049	0.134	0.047	0.057	0.098	0.063	0.089
68	0.014	0.271	0.067	0.101	0.014	0.000	0.093	0.071	0.077
70	0.029	0.157	0.019	0.137	0.015	0.061	0.085	0.042	0.093
72	0.004	0.193	0.013	0.104	0.028	0.007	0.027	0.031	0.083
74	0.013	0.136	0.018	0.142	0.012	0.000	0.011	0.033	0.078
76	0.002	0.086	0.011	0.066	0.017	0.002	0.015	0.030	0.079
78	0.003	0.080	0.008	0.034	0.022	0.000	0.010	0.017	0.056
80	0.006	0.079	0.015	0.073	0.039	0.000	0.027	0.036	0.047
82	0.001	0.038	0.005	0.032	0.013	0.000	0.000	0.009	0.018
84	0.003	0.000	0.004	0.044	0.000	0.011	0.025	0.003	0.006
86	0.001	0.048	0.012	0.026	0.021	0.000	0.008	0.000	0.022
88	0.000	0.042	0.010	0.021	0.003	0.007	0.002	0.022	0.014
90	0.001	0.000	0.000	0.016	0.011	0.000	0.000	0.008	0.014
92	0.000	0.003	0.019	0.020	0.000	0.000	0.000	0.009	0.000
94	0.000	0.000	0.000	0.005	0.003	0.000	0.000	0.013	0.000
96	0.000	0.000	0.005	0.003	0.012	0.000	0.008	0.000	0.000
98	0.000	0.000	0.005	0.003	0.008	0.000	0.000	0.000	0.000
100	0.000	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000
102	0.000	0.000	0.000	0.010	0.000	0.000	0.008	0.000	0.000
104	0.000	0.001	0.000	0.000	0.000	0.011	0.000	0.027	0.000
106	0.000	0.000	0.000	0.005	0.000	0.000	0.014	0.000	0.000
108	0.000	0.000	0.000	0.000	0.011	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
112	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000
114	0.001	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
118	0.002	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000
120	0.000	0.000	0.006	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
124	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
128	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
132	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.000
Total	1.997	12.378	8.847	9.220	41.290	12.930	4.684	9.035	9.005
Nº samples (*):	40	55	72	70	32	41	42	58	59
Nº Ind. (*):	742	967	2770	2753	1591	1030	539	939	1126
Sampled catch:	248	410	527	752	1107	776	654	554	778
Range (*):	24-118	12-104	9-121	13-118	8-132	9-104	12-106	10-105	11-91
Total catch:	572	3873	613	1274	3487	2806	846	554	794
Total hauls (*):	128	124	114	118	123	125	118	120	119

TABLE 7. Swept area, number of hauls and Yellowtail flounder mean catch (kg) and SD (**) by stratum. Spanish Spring Surveys on NAFO Div. 3NO: 1995-2005. Swept area in square miles. n.s. means stratum not surveyed. 1995-2000 data are transformed C/V *Playa de Menduíña* data, and 2002-2005 data are original from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels.

	1995				1996				1997				1998			
Stratum	Swept area	Tow number	Y. flounder Mean catch	Y. flounder SD	Swept area	Tow number	Y. flounder Mean catch	Y. flounder SD	Swept area	Tow number	Y. flounder Mean catch	Y. flounder SD	Swept area	Tow number	Y. flounder Mean catch	Y. flounder SD
353	0.0353	3	5.82	4.105	0.0371	3	74.88	94.62	0.0480	4	12.55	14.26	0.0465	4	12.22	20.16
354	0.0353	3	1.78	3.089	0.0319	3	1.11	0.84	0.0233	2	1.41	1.56	0.0356	3	1.22	0.24
355	n.s.	n.s.	n.s.	n.s.	0.0221	2	0.25	0.35	0.0233	2	2.20	0.31	0.0221	2	0.13	0.18
356	n.s.	n.s.	n.s.	n.s.	0.0203	2	0.00	0.00	0.0225	2	0.32	0.46	0.0221	2	0.00	0.00
357	0.0109	1	0.00	-	0.0218	2	0.00	0.00	0.0443	4	0.00	0.00	0.0240	2	0.00	0.00
358	0.0319	3	0.00	0.000	0.0319	3	0.13	0.23	0.0563	5	0.02	0.04	0.0236	3	0.00	0.00
359	0.0345	3	1.35	2.336	0.0548	5	0.92	0.83	0.0690	6	0.08	0.14	0.0698	6	0.17	0.22
360	0.3563	31	20.44	40.707	0.3761	31	142.09	128.86	0.3754	32	80.92	155.59	0.2561	25	373.90	629.84
374	0.0225	2	0.00	0.000	0.0233	2	0.00	0.00	0.0353	3	0.00	0.00	0.0353	3	0.04	0.02
375	0.0225	2	1.48	1.875	0.0229	2	41.40	58.54	0.0116	1	0.20	-	0.0345	3	12.37	21.37
376	0.1729	15	35.06	58.691	0.1650	14	71.40	86.94	0.1583	14	162.35	179.83	0.0930	10	279.27	181.29
377	0.0221	2	0.00	0.000	0.0229	2	0.00	0.00	0.0116	1	0.00	-	0.0229	2	0.00	0.00
378	0.0435	4	0.00	0.000	0.0330	3	0.06	0.10	0.0210	2	0.00	0.00	0.0120	2	0.00	0.00
379	0.0221	2	0.00	0.000	0.0113	1	0.00	-	0.0206	2	0.00	0.00	0.0356	3	0.00	0.00
380	n.s.	n.s.	n.s.	n.s.	0.0221	2	0.00	0.00	0.0210	2	0.00	0.00	0.0113	2	0.00	0.00
381	n.s.	n.s.	n.s.	n.s.	0.0229	2	0.00	0.00	0.0221	2	0.00	0.00	0.0229	2	0.00	0.00
382	n.s.	n.s.	n.s.	n.s.	0.0338	3	0.00	0.00	0.0461	4	0.00	0.00	0.0229	3	0.00	0.00
721	n.s.	n.s.	n.s.	n.s.	0.0214	2	0.03	0.05	0.0221	2	0.75	1.06	0.0203	2	0.00	0.00
722	n.s.	n.s.	n.s.	n.s.	0.0206	2	0.00	0.00	0.0214	2	0.00	0.00	0.0101	2	0.00	0.00
723	n.s.	n.s.	n.s.	n.s.	0.0109	1	0.00	-	0.0210	2	0.00	0.00	0.0233	2	0.00	0.00
724	0.0105	1	0.00	-	0.0203	2	0.00	0.00	0.0225	2	0.00	0.00	0.0206	2	0.00	0.00
725	0.0334	3	0.00	0.000	0.0225	2	0.00	0.00	0.0206	2	0.00	0.00	0.0086	1	0.00	-
726	0.0214	2	0.00	0.000	0.0218	2	0.00	0.00	n.s.	n.s.	n.s.	n.s.	0.0094	2	0.00	0.00
727	n.s.	n.s.	n.s.	n.s.	0.0210	2	0.00	0.00	0.0094	1	0.00	-	0.0233	2	0.00	0.00
728	n.s.	n.s.	n.s.	n.s.	0.0218	2	0.00	0.00	0.0214	2	0.00	0.00	0.0206	2	0.00	0.00
752	n.s.	n.s.	n.s.	n.s.	0.0109	1	0.00	-	0.0218	2	0.00	0.00	0.0229	2	0.00	0.00
753	n.s.	n.s.	n.s.	n.s.	0.0199	2	0.00	0.00	0.0214	2	0.00	0.00	0.0218	2	0.00	0.00
754	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0330	3	0.00	0.00	0.0210	2	0.00	0.00
755	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0206	2	0.00	0.00
756	n.s.	n.s.	n.s.	n.s.	0.0210	2	0.00	0.00	0.0109	1	0.00	-	0.0225	2	0.00	0.00
757	n.s.	n.s.	n.s.	n.s.	0.0188	2	0.00	0.00	0.0304	3	0.00	0.00	0.0206	2	0.00	0.00
758	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0214	2	0.00	0.00	0.0105	2	0.00	0.00
759	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0214	2	0.00	0.00
760	n.s.	n.s.	n.s.	n.s.	0.0210	2	0.00	0.00	0.0105	1	0.00	-	0.0214	2	0.00	0.00
761	n.s.	n.s.	n.s.	n.s.	0.0199	2	0.00	0.00	0.0315	3	0.00	0.00	0.0206	2	0.00	0.00
762	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0308	3	0.00	0.00	0.0094	2	0.00	0.00
763	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0218	2	0.00	0.00
764	n.s.	n.s.	n.s.	n.s.	0.0210	2	0.00	0.00	0.0206	2	0.00	0.00	0.0218	2	0.00	0.00
765	n.s.	n.s.	n.s.	n.s.	0.0199	2	0.00	0.00	0.0206	2	0.00	0.00	0.0098	2	0.00	0.00
766	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0308	3	0.00	0.00	0.0191	2	0.00	0.00
767	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0109	2	0.00	0.00

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

TABLE 7 (cont.). Swept area, number of hauls and Yellowtail flounder mean catch (kg) and SD (**) by stratum. Spanish Spring Surveys on NAFO Div. 3NO: 1995-2005. Swept area in square miles. n.s. means stratum not surveyed. 1995-2000 data are transformed C/V *Playa de Menduíña* data, and 2002-2005 data are original from R/V *Vizconde de Eza*. In 2001,there are data from the two vessels.

	1999				2000				2001				2002			
Stratum	Swept area	Tow number	Y. flounder Mean catch	Y. flounder SD	Swept area	Tow number	Y. flounder Mean catch	Y. flounder SD	Swept area	Tow number	Y. flounder Mean catch	Y. flounder SD	Swept area	Tow number	Y. flounder Mean catch	Y. flounder SD
353	0.0360	3	150.18	182.44	0.0356	3	67.87	91.37	0.0341	3	61.42	102.797	0.0476	4	75.13	88.259
354	0.0218	2	0.08	0.12	0.0356	3	1.79	1.93	0.0338	3	0.34	0.322	0.0356	3	0.17	0.289
355	0.0229	2	0.00	0.00	0.0233	2	0.00	0.00	0.0240	2	0.00	0.000	0.0236	2	0.00	0.000
356	0.0229	2	0.00	0.00	0.0225	2	0.00	0.00	0.0240	2	0.01	0.007	0.0233	2	0.00	0.000
357	0.0236	2	0.00	0.00	0.0124	1	0.00	-	0.0244	2	0.00	0.000	0.0240	2	0.00	0.000
358	0.0349	3	0.00	0.00	0.0341	3	0.00	0.00	0.0345	3	0.00	0.000	0.0345	3	0.00	0.000
359	0.0364	3	0.34	0.47	0.0469	4	2.36	2.93	0.0803	7	1.42	2.836	0.0686	6	0.11	0.261
360	0.2325	19	545.18	424.37	0.2396	20	391.18	331.64	0.2423	20	536.80	488.657	0.2865	25	340.23	356.687
374	0.0244	2	74.16	103.18	0.0240	2	20.47	23.55	0.0240	2	238.75	111.369	0.0345	3	32.04	52.542
375	0.0236	2	347.15	168.25	0.0244	2	153.36	2.06	0.0338	3	100.33	68.319	0.0353	3	48.61	68.927
376	0.1219	10	551.60	165.61	0.1200	10	435.27	236.60	0.1155	10	443.12	196.619	0.1140	10	533.62	416.745
377	0.0240	2	0.00	0.00	0.0229	2	0.05	0.06	0.0229	2	0.00	0.000	0.0229	2	0.00	0.000
378	0.0229	2	0.00	0.00	0.0233	2	0.00	0.00	0.0236	2	0.00	0.000	0.0233	2	0.00	0.000
379	0.0236	2	0.00	0.00	0.0225	2	0.00	0.00	0.0229	2	0.00	0.000	0.0229	2	0.00	0.000
380	0.0236	2	0.00	0.00	0.0236	2	0.00	0.00	0.0206	2	0.00	0.000	0.0225	2	0.00	0.000
381	0.0229	2	0.00	0.00	0.0236	2	0.00	0.00	0.0236	2	0.00	0.000	0.0229	2	0.00	0.000
382	0.0484	4	0.00	0.00	0.0499	4	0.00	0.00	0.0469	4	0.02	0.030	0.0341	3	0.00	0.000
721	0.0244	2	0.00	0.00	0.0236	2	0.00	0.00	0.0248	2	0.00	0.000	0.0233	2	0.00	0.000
722	0.0229	2	0.00	0.00	0.0218	2	0.00	0.00	0.0233	2	0.00	0.000	0.0236	2	0.00	0.000
723	0.0229	2	0.00	0.00	0.0248	2	0.00	0.00	0.0240	2	0.00	0.000	0.0233	2	0.00	0.000
724	0.0225	2	0.00	0.00	0.0233	2	0.00	0.00	0.0353	3	0.00	0.000	0.0225	2	0.00	0.000
725	0.0229	2	0.00	0.00	0.0210	2	0.00	0.00	0.0116	2	0.00	0.000	0.0225	2	0.00	0.000
726	0.0225	2	0.00	0.00	0.0221	2	0.00	0.00	0.0116	2	0.00	0.000	0.0214	2	0.00	0.000
727	0.0236	2	0.00	0.00	0.0210	2	0.00	0.00	0.0225	2	0.00	0.000	0.0233	2	0.00	0.000
728	0.0233	2	0.00	0.00	0.0210	2	0.00	0.00	0.0229	2	0.00	0.000	0.0229	2	0.00	0.000
752	0.0233	2	0.00	0.00	0.0206	2	0.00	0.00	0.0210	2	0.06	0.083	0.0116	1	0.00	-
753	0.0229	2	0.00	0.00	0.0218	2	0.00	0.00	0.0214	2	0.00	0.000	0.0229	2	0.00	0.000
754	0.0206	2	0.00	0.00	0.0195	2	0.00	0.00	0.0195	2	0.00	0.000	0.0341	3	0.00	0.000
755	0.0311	3	0.00	0.00	0.0431	4	0.00	0.00	0.0416	4	0.00	0.000	0.0338	3	0.00	0.000
756	0.0225	2	0.00	0.00	0.0203	2	0.00	0.00	0.0113	2	0.00	0.000	0.0229	2	0.00	0.000
757	0.0233	2	0.00	0.00	0.0214	2	0.00	0.00	0.0233	2	0.00	0.000	0.0225	2	0.00	0.000
758	0.0214	2	0.00	0.00	0.0210	2	0.00	0.00	0.0218	2	0.00	0.000	0.0225	2	0.00	0.000
759	0.0218	2	0.00	0.00	0.0210	2	0.00	0.00	0.0221	2	0.00	0.000	0.0225	2	0.00	0.000
760	0.0225	2	0.00	0.00	0.0210	2	0.00	0.00	0.0229	2	0.00	0.000	0.0229	2	0.00	0.000
761	0.0210	2	0.00	0.00	0.0221	2	0.00	0.00	0.0225	2	0.00	0.000	0.0225	2	0.00	0.000
762	0.0210	2	0.00	0.00	0.0203	2	0.00	0.00	0.0116	2	0.00	0.000	0.0225	2	0.00	0.000
763	0.0311	3	0.00	0.00	0.0416	4	0.00	0.00	0.0330	3	0.00	0.000	0.0225	2	0.00	0.000
764	0.0225	2	0.00	0.00	0.0218	2	0.00	0.00	0.0240	2	0.00	0.000	0.0236	2	0.00	0.000
765	0.0221	2	0.00	0.00	0.0203	2	0.00	0.00	0.0113	2	0.00	0.000	0.0236	2	0.00	0.000
766	0.0218	2	0.00	0.00	0.0214	2	0.00	0.00	0.0203	2	0.00	0.000	0.0233	2	0.00	0.000
767	0.0214	2	0.00	0.00	0.0210	2	0.00	0.00	0.0218	2	0.00	0.000	0.0225	2	0.00	0.000

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

TABLE 7 (cont.). Swept area, number of hauls and Yellowtail flounder mean catch (kg) and SD (**) by stratum. Spanish Spring Surveys on NAFO Div. 3NO: 1995-2005. Swept area in square miles. n.s. means stratum not surveyed. 1995-2000 data are transformed C/V *Playa de Menduíña* data, and 2002-2005 data are original from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels.

	2003				2004				2005			
Stratum	Swept area	Tow number	Y. flounder Mean catch	Y. flounder SD	Swept area	Tow number	Y. flounder Mean catch	Y. flounder SD	Swept area	Tow number	Y. flounder Mean catch	Y. flounder SD
353	0.0334	3	11.15	19.307	0.0338	3	8.79	14.005	0.0353	3	58.83	99.610
354	0.0338	3	0.00	0.000	0.0345	3	0.62	1.065	0.0353	3	0.21	0.188
355	0.0229	2	0.00	0.000	0.0229	2	0.00	0.000	0.0225	2	0.00	0.000
356	0.0225	2	0.00	0.000	0.0221	2	0.00	0.000	0.0233	2	0.00	0.000
357	0.0229	2	0.00	0.000	0.0229	2	0.00	0.000	0.0233	2	0.00	0.000
358	0.0338	3	0.00	0.000	0.0330	3	0.26	0.442	0.0349	3	0.00	0.000
359	0.0791	7	0.00	0.000	0.0791	7	25.01	38.371	0.0814	7	99.52	142.727
360	0.2254	20	360.55	298.992	0.2310	20	403.19	333.463	0.2325	20	342.14	223.566
374	0.0225	2	16.13	8.238	0.0233	2	193.46	225.058	0.0229	2	300.46	128.092
375	0.0330	3	28.45	35.557	0.0338	3	543.04	155.015	0.0349	3	288.64	138.290
376	0.1125	10	391.60	257.289	0.1166	10	481.06	140.810	0.1174	10	500.53	238.908
377	0.0225	2	0.70	0.990	0.0218	2	0.00	0.000	0.0233	2	42.84	60.518
378	0.0225	2	0.00	0.000	0.0225	2	0.00	0.000	0.0225	2	0.00	0.000
379	0.0229	2	0.00	0.000	0.0124	1	0.00	-	0.0236	2	0.00	0.000
380	0.0229	2	0.00	0.000	0.0221	2	0.00	0.000	0.0229	2	0.00	0.000
381	0.0229	2	0.00	0.000	0.0225	2	0.00	0.000	0.0233	2	0.00	0.000
382	0.0454	4	0.00	0.000	0.0461	4	0.00	0.000	0.0458	4	0.00	0.000
721	0.0225	2	0.00	0.000	0.0221	2	0.00	0.000	0.0229	2	0.00	0.000
722	0.0221	2	0.00	0.000	0.0218	2	0.00	0.000	0.0233	2	0.00	0.000
723	0.0229	2	0.00	0.000	0.0229	2	0.00	0.000	0.0233	2	0.00	0.000
724	0.0225	2	0.52	0.735	0.0214	2	0.00	0.000	0.0225	2	0.00	0.000
725	0.0229	2	0.00	0.000	0.0225	2	0.00	0.000	0.0236	2	0.00	0.000
726	0.0225	2	0.00	0.000	0.0225	2	0.00	0.000	0.0113	1	0.00	-
727	0.0218	2	0.00	0.000	0.0233	2	0.00	0.000	0.0229	2	0.00	0.000
728	0.0225	2	0.00	0.000	0.0180	2	0.00	0.000	0.0109	1	0.00	-
752	0.0229	2	0.00	0.000	0.0214	2	0.00	0.000	0.0236	2	0.00	0.000
753	0.0229	2	0.00	0.000	0.0218	2	0.00	0.000	0.0225	2	0.00	0.000
754	0.0218	2	0.00	0.000	0.0214	2	0.00	0.000	0.0225	2	0.00	0.000
755	0.0221	2	0.00	0.000	0.0319	3	0.00	0.000	0.0450	4	0.00	0.000
756	0.0221	2	0.00	0.000	0.0218	2	0.00	0.000	0.0233	2	0.00	0.000
757	0.0221	2	0.00	0.000	0.0218	2	0.00	0.000	0.0225	2	0.00	0.000
758	0.0221	2	0.00	0.000	0.0214	2	0.00	0.000	0.0225	2	0.00	0.000
759	0.0113	1	0.00	-	0.0214	2	0.00	0.000	0.0229	2	0.00	0.000
760	0.0218	2	0.00	0.000	0.0221	2	0.00	0.000	0.0229	2	0.35	0.488
761	0.0225	2	0.00	0.000	0.0221	2	0.00	0.000	0.0221	2	0.00	0.000
762	0.0225	2	0.00	0.000	0.0233	2	0.00	0.000	0.0225	2	0.00	0.000
763	0.0311	3	0.00	0.000	0.0326	3	0.00	0.000	0.0334	3	0.00	0.000
764	0.0221	2	0.00	0.000	0.0229	2	0.00	0.000	0.0233	2	0.00	0.000
765	0.0113	1	0.00	-	0.0225	2	0.00	0.000	0.0229	2	0.00	0.000
766	0.0225	2	0.00	0.000	0.0225	2	0.00	0.000	0.0229	2	0.00	0.000
767	0.0229	2	0.00	0.000	0.0218	2	0.00	0.000	0.0113	1	0.00	-

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

TABLE 8. Stratified mean catches (Kg) by stratum and year and SD by year of Yellowtail flounder (1995-2005). n.s. means stratum not surveyed. 1995-2000 data are transformed C/V *Playa de Menduíña* data. 2002-2005 data are original from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels.

Stratum	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
353	1565.07	20142.03	3376.59	3288.11	40399.20	18255.85	16521.08	20208.63	2998.45	2364.96	15825.27
354	438.70	0.00	346.30	299.00	20.56	439.52	83.64	41.00	0.00	151.29	52.07
355	n.s.	0.00	163.06	9.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00
356	n.s.	0.00	15.24	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.00
357	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
358	0.00	30.09	4.21	0.00	0.00	0.00	0.00	0.00	0.00	57.45	0.00
359	567.78	385.71	34.00	72.73	143.12	994.90	597.82	44.91	0.00	10527.59	41896.12
360	56884.98	395448.50	225203.35	1040562.34	1517232.56	1088647.76	1493908.83	946847.84	1003413.43	1122077.77	952164.35
374	0.00	0.00	0.00	9.54	15871.12	4379.59	51092.50	6856.85	3450.75	41400.44	64297.37
375	401.88	11218.18	54.37	3352.77	94076.82	41560.71	27190.33	13173.31	7709.95	147164.74	78220.54
376	46774.78	95247.02	216576.13	372549.36	735836.39	580653.95	591126.08	711849.08	522389.06	641736.71	667712.36
377	0.00	0.00	0.00	0.00	0.00	4.51	0.00	0.00	70.00	0.00	4283.75
378	0.00	7.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
379	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
380	n.s.	0.00	0.00	0.00	0.00	0.00	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	5.16	0.00	0.00	0.00	0.00
721	n.s.	2.17	48.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
722	n.s.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
723	n.s.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
724	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.48	0.00	0.00
725	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
726	0.00	0.00	n.s.	0.00	0.00	0.00	0.00	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	0.00	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	7.67	0.00	0.00	0.00	0.00
753	n.s.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
754	n.s.	n.s.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
755	n.s.	n.s.	n.s.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
756	n.s.	0.00	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.	n.s.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
759	n.s.	n.s.	n.s.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
760	n.s.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.13
761	n.s.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
762	n.s.	n.s.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
763	n.s.	n.s.	n.s.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
764	n.s.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
765	n.s.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
766	n.s.	n.s.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
767	n.s.	n.s.	n.s.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	106633.19	522481.47	445822.16	1420143.19	2403579.77	1734936.80	2180533.35	1699021.61	1540096.13	1965480.95	1824504.95
$(\bar{Y})$	16.22	59.54	47.74	137.32	232.41	167.76	210.84	164.28	148.92	190.05	176.42
S.D.	4.37	8.41	10.69	34.70	27.41	22.21	30.58	24.92	20.84	21.27	17.06

TABLE 9. Survey estimates (by the swept area method) of Yellowtail flounder biomass (t) and SD by stratum and year on NAFO Div. 3NO. n.s. means stratum not surveyed. 1995-2000 data are transformed C/V *Playa de Menduíña* data. 2002-2005 data are original from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels.

Stratum	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
353	133	1628	281	282	3367	1537	1452	1697	270	210	1347
354	37	26	30	25	2	37	7	3	0	13	4
355	n.s.	2	14	0	0	0	0	0	0	0	0
356	n.s.	0	1	0	0	0	0	0	0	0	0
357	0	0	0	0	0	0	0	0	0	0	0
358	0	3	0	0	0	0	0	0	0	5	0
359	49	35	3	6	12	85	52	4	0	931	3604
360	4950	32593	19198	89742	123989	90863	123341	82622	89057	97150	81907
374	0	0	0	0	1302	365	4258	596	307	3561	5622
375	36	981	5	291	7964	3410	2417	1121	701	13081	6729
376	4059	8082	19160	32255	60376	48388	51175	62443	46435	55026	56887
377	0	0	0	0	0	0	0	0	6	0	368
378	0	1	0	0	0	0	0	0	0	0	0
379	0	0	0	0	0	0	0	0	0	0	0
380	n.s.	0	0	0	0	0	0	0	0	0	0
381	n.s.	0	0	0	0	0	0	0	0	0	0
382	n.s.	0	0	0	0	0	0	0	0	0	0
721	n.s.	0	4	0	0	0	0	0	0	0	0
722	n.s.	0	0	0	0	0	0	0	0	0	0
723	n.s.	0	0	0	0	0	0	0	0	0	0
724	0	0	0	0	0	0	0	0	0	0	0
725	0	0	0	0	0	0	0	0	0	0	0
726	0	0	n.s.	0	0	0	0	0	0	0	0
727	n.s.	0	0	0	0	0	0	0	0	0	0
728	n.s.	0	0	0	0	0	0	0	0	0	0
752	n.s.	0	0	0	0	0	1	0	0	0	0
753	n.s.	0	0	0	0	0	0	0	0	0	0
754	n.s.	n.s.	0	0	0	0	0	0	0	0	0
755	n.s.	n.s.	n.s.	0	0	0	0	0	0	0	0
756	n.s.	0	0	0	0	0	0	0	0	0	0
757	n.s.	0	0	0	0	0	0	0	0	0	0
758	n.s.	n.s.	0	0	0	0	0	0	0	0	0
759	n.s.	n.s.	n.s.	0	0	0	0	0	0	0	0
760	n.s.	0	0	0	0	0	0	0	0	0	5
761	n.s.	0	0	0	0	0	0	0	0	0	0
762	n.s.	n.s.	0	0	0	0	0	0	0	0	0
763	n.s.	n.s.	n.s.	0	0	0	0	0	0	0	0
764	n.s.	0	0	0	0	0	0	0	0	0	0
765	n.s.	0	0	0	0	0	0	0	0	0	0
766	n.s.	n.s.	0	0	0	0	0	0	0	0	0
767	n.s.	n.s.	n.s.	0	0	0	0	0	0	0	0
TOTAL	9264	43349	38697	122601	197012	144685	182704	148487	136775	169978	156472
S.D.	2484	6032	8527	31359	22938	19097	25847	23368	19287	18869	15271

TABLE 10. Length weight relationships in the calculation of Yellowtail flounder biomass. The equation is $Weight = a(l+0.5)^b$ Spanish Spring Surveys on NAFO Div. 3NO: 1995-2005. To calculate the parameters for the indeterminate individuals, we used the total data (males + females + indeterminate individuals)

		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Males	a	0.0079 Error = 0.2653	0.0080 Error = 0.0907	0.0081 Error = 0.0936	0.0075 Error = 0.1034	0.0084 Error = 0.2119	0.0036 Error = 0.0994	0.0081 Error = 0.1248	0.0075 Error = 0.0729	0.0121 Error = 0.1109	0.0053 Error = 0.1352	0.0027 Error = 0.0882
	b	3.0416 Error = 0.0799	3.0342 Error = 0.0269	3.0197 Error = 0.0281	3.0376 Error = 0.0313	3.0098 Error = 0.0610	3.2403 Error = 0.0300	3.0176 Error = 0.0374	3.0271 Error = 0.0226	2.8978 Error = 0.0348	3.1236 Error = 0.0419	3.3274 Error = 0.0274
		R2 = 0.984 N=137	R2 = 0.998 N=430	R2 = 0.997 N=556	R2 = 0.997 N=523	R2 = 0.994 N=56	R2 = 0.997 N=270	R2 = 0.995 N=271	R2 = 0.998 N=274	R2 = 0.995 N=316	R2 = 0.995 N=411	R2 = 0.997 N=311
Females	a	0.0063 Error = 0.1251	0.0056 Error = 0.0632	0.0056 Error = 0.0517	0.0067 Error = 0.1290	0.0073 Error = 0.2607	0.0026 Error = 0.0914	0.0060 Error = 0.0841	0.0051 Error = 0.0901	0.0061 Error = 0.0995	0.0047 Error = 0.0630	0.0027 Error = 0.0634
	b	3.1083 Error = 0.0367	3.1496 Error = 0.0179	3.1382 Error = 0.0152	3.0788 Error = 0.0384	3.0577 Error = 0.0739	3.3504 Error = 0.0267	3.1122 Error = 0.0249	3.1448 Error = 0.0274	3.1079 Error = 0.0307	3.1768 Error = 0.0191	3.3290 Error = 0.0177
		R2 = 0.995 N=246	R2 = 0.999 N=735	R2 = 0.999 N=910	R2 = 0.994 N=682	R2 = 0.989 N=62	R2 = 0.998 N=344	R2 = 0.997 N=378	R2 = 0.997 N=343	R2 = 0.996 N=513	R2 = 0.999 N=547	R2 = 0.998 N=569
Indet.	a	0.0088 Error = 0.1109	0.0060 Error = 0.0656	0.0060 Error = 0.0580	0.0071 Error = 0.0652	0.0078 Error = 0.1656	0.0026 Error = 0.0835	0.0092 Error = 0.1075	0.0060 Error = 0.0402	0.0069 Error = 0.1095	0.0040 Error = 0.0608	0.0025 Error = 0.0523
	b	3.0144 Error = 0.0330	3.1285 Error = 0.0188	3.1166 Error = 0.0171	3.0614 Error = 0.0195	3.0406 Error = 0.0477	3.3423 Error = 0.0245	2.9883 Error = 0.0329	3.0977 Error = 0.0123	3.0737 Error = 0.0337	3.2137 Error = 0.0186	3.3552 Error = 0.0148
		R2 = 0.996 N=391	R2 = 0.999 N=1181	R2 = 0.999 N=1466	R2 = 0.994 N=1211	R2 = 0.995 N=118	R2 = 0.999 N=614	R2 = 0.994 N=703	R2 = 0.999 N=620	R2 = 0.995 N=833	R2 = 0.999 N=969	R2 = 0.999 N=884

TABLE 11. Yellowtail flounder length distribution. Estimated numbers per haul mean catches. Spanish Spring Survey on NAFO 3NO: 1995-2005. Indet. means indeterminate. 1995-2000 data are transformed C/V *Playa de Menduíña* data. 2002-2005 data are original R/V *Vizconde de Eza* data. In 2001, there are data from the two vessels. (*) indicates untransformed data.

	1995				1996				1997				1998			
Lenght (cm.)	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8	0.000	0.000	0.185	0.185	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	0.000	0.000	0.456	0.456	0.000	0.000	0.498	0.498	0.000	0.000	0.000	0.000	0.000	0.000	0.071	0.071
12	0.103	0.870	2.350	3.323	0.000	0.000	0.877	0.877	1.356	0.560	0.000	1.916	0.000	0.000	1.538	1.538
14	1.557	1.441	2.842	5.840	0.000	0.048	2.711	2.759	0.155	0.819	0.000	0.974	0.121	0.157	0.000	0.278
16	2.045	3.581	0.277	5.903	0.288	3.152	5.167	8.607	2.947	1.811	0.000	4.758	1.500	1.535	0.000	3.034
18	2.649	3.358	0.031	6.038	2.334	15.279	3.167	20.780	5.076	4.415	0.000	9.491	8.365	5.129	0.000	13.495
20	2.984	3.212	0.000	6.196	5.319	26.981	0.750	33.050	13.857	15.055	0.000	28.912	8.974	10.166	0.000	19.140
22	4.807	6.015	0.000	10.823	8.522	32.231	0.065	40.818	28.296	23.048	0.000	51.345	25.957	20.452	0.000	46.409
24	4.810	6.082	0.000	10.892	10.962	32.203	0.000	43.165	31.348	27.786	0.000	59.134	44.950	37.421	0.000	82.371
26	2.340	2.446	0.000	4.786	9.552	16.875	0.000	26.427	24.015	26.970	0.000	50.985	72.376	60.520	0.000	132.896
28	2.704	2.544	0.000	5.248	9.151	11.591	0.000	20.742	13.921	21.248	0.000	35.169	57.459	62.401	0.000	119.861
30	2.588	4.738	0.000	7.325	7.206	9.915	0.000	17.122	6.159	10.349	0.000	16.508	32.472	56.275	0.000	88.747
32	1.664	4.451	0.000	6.115	6.379	6.166	0.000	12.545	3.761	5.090	0.000	8.851	15.566	32.294	0.000	47.859
34	1.290	3.070	0.000	4.361	5.565	6.928	0.000	12.493	1.894	2.803	0.000	4.698	5.840	22.613	0.000	28.453
36	0.661	1.797	0.000	2.459	4.143	9.508	0.000	13.651	1.195	2.683	0.000	3.878	2.638	12.385	0.000	15.023
38	0.475	1.395	0.000	1.870	2.083	6.687	0.000	8.771	0.485	2.407	0.000	2.892	2.475	8.439	0.000	10.914
40	0.373	0.937	0.000	1.310	0.724	5.018	0.000	5.742	0.245	1.723	0.000	1.968	1.060	7.705	0.000	8.765
42	0.059	0.588	0.000	0.647	0.694	3.305	0.000	4.000	0.099	0.801	0.000	0.899	0.065	3.260	0.000	3.324
44	0.004	0.471	0.000	0.475	0.087	1.550	0.000	1.637	0.031	0.281	0.000	0.311	0.008	1.729	0.000	1.737
46	0.004	0.081	0.000	0.085	0.081	0.969	0.000	1.050	0.006	0.044	0.000	0.049	0.000	0.600	0.000	0.600
48	0.000	0.191	0.000	0.191	0.018	0.286	0.000	0.304	0.000	0.052	0.000	0.052	0.004	0.273	0.000	0.277
50	0.000	0.027	0.000	0.027	0.000	0.045	0.000	0.045	0.000	0.018	0.000	0.018	0.000	0.000	0.000	0.000
52	0.000	0.052	0.000	0.052	0.000	0.053	0.000	0.053	0.000	0.018	0.000	0.018	0.000	0.000	0.000	0.000
54	0.000	0.005	0.000	0.005	0.000	0.039	0.000	0.039	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
56	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
Total	31.117	47.358	6.141	84.616	73.109	188.829	13.235	275.173	134.845	147.982	0.000	282.827	279.828	343.354	1.609	624.791
Nº samples (*):				43				33				54				48
Nº Ind. (*):	1876	3003	81	4960	1837	4584	249	6670	3635	4469	0	8104	2848	3693	3	6544
Sampled catch:				375				532				585				536
Range (*):				9-56				10-55				12-53				11-49
Total catch:				2731				5721				4956				12231
Total hauls (*):				77				112				128				124

TABLE 11 (cont.). Yellowtail flounder length distribution. Estimated numbers per haul mean catches. Spanish Spring Survey on NAFO 3NO: 1995-2005. Indet. means indeterminate. 1995-2000 data are transformed C/V *Playa de Menduíña* data. 2002-2005 data are original R/V *Vizconde de Eza* data. In 2001, there are data from the two vessels. (*) indicates untransformed data.

	1999				2000				2001				2002			
Lenght (cm.)	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
4	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.325	0.325	0.000	0.141	0.475	0.616
8	0.000	0.000	1.516	1.516	0.000	0.000	0.000	0.000	0.000	0.000	1.937	1.937	0.349	0.639	0.332	1.321
10	5.154	3.352	2.960	11.465	0.000	0.793	0.000	0.793	0.104	0.356	1.850	2.310	1.315	0.712	0.000	2.027
12	12.807	8.911	0.000	21.718	3.716	1.266	0.000	4.982	0.320	1.239	1.187	2.746	0.620	0.675	0.000	1.295
14	19.227	16.710	0.000	35.938	7.773	11.915	0.000	19.687	0.952	1.477	1.114	3.543	1.544	1.064	0.000	2.608
16	13.999	15.356	0.000	29.355	10.311	10.506	0.000	20.817	3.575	4.509	0.412	8.497	1.889	2.134	0.000	4.023
18	8.893	10.757	0.000	19.650	14.266	16.475	0.000	30.741	10.107	10.530	0.149	20.786	3.180	2.479	0.000	5.660
20	14.809	10.199	0.000	25.008	16.177	19.576	0.000	35.753	17.815	24.898	0.000	42.713	7.908	6.122	0.000	14.030
22	33.285	22.789	0.000	56.073	17.231	18.660	0.000	35.891	21.299	29.178	0.000	50.477	16.552	12.664	0.000	29.217
24	61.756	39.009	0.000	100.765	21.395	20.983	0.000	42.378	24.254	23.840	0.000	48.094	21.724	22.245	0.000	43.968
26	98.561	59.521	0.000	158.083	48.000	33.100	0.000	81.100	28.911	24.809	0.000	53.720	27.246	24.307	0.000	51.553
28	107.816	84.193	0.000	192.009	67.229	39.182	0.000	106.412	58.237	33.305	0.000	91.542	40.151	22.443	0.000	62.594
30	72.947	92.236	0.000	165.183	64.336	44.684	0.000	109.020	72.412	45.107	0.000	117.519	57.549	34.445	0.000	91.994
32	28.850	75.169	0.000	104.018	36.450	53.416	0.000	89.865	49.179	59.052	0.000	108.232	46.938	50.680	0.000	97.618
34	15.810	43.595	0.000	59.405	12.695	39.970	0.000	52.665	22.267	64.772	0.000	87.039	18.047	57.599	0.000	75.646
36	9.185	24.775	0.000	33.960	6.653	25.712	0.000	32.365	8.702	46.598	0.000	55.300	7.014	45.699	0.000	52.713
38	3.658	14.964	0.000	18.623	3.526	15.747	0.000	19.274	6.293	30.315	0.000	36.608	2.651	25.514	0.000	28.165
40	1.466	8.582	0.000	10.049	1.996	10.642	0.000	12.638	2.145	12.925	0.000	15.070	1.183	12.427	0.000	13.610
42	0.262	5.318	0.000	5.580	0.286	6.803	0.000	7.089	0.857	7.788	0.000	8.645	0.616	6.257	0.000	6.873
44	0.111	2.620	0.000	2.731	0.013	4.005	0.000	4.018	0.614	4.596	0.000	5.210	0.042	2.690	0.000	2.732
46	0.028	0.988	0.000	1.016	0.000	1.806	0.000	1.806	0.221	1.968	0.000	2.190	0.024	1.150	0.000	1.174
48	0.096	0.486	0.000	0.582	0.003	0.845	0.000	0.848	0.000	0.775	0.000	0.775	0.000	0.818	0.000	0.818
50	0.000	0.140	0.000	0.140	0.000	0.246	0.000	0.246	0.000	0.242	0.000	0.242	0.020	0.149	0.000	0.169
52	0.000	0.032	0.000	0.032	0.000	0.000	0.000	0.000	0.000	0.051	0.000	0.051	0.000	0.038	0.000	0.038
54	0.000	0.000	0.000	0.000	0.000	0.033	0.000	0.033	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
56	0.000	0.000	0.000	0.000	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	508.721	539.702	4.475	1052.898	332.057	376.364	0.000	708.421	328.265	428.326	6.975	763.567	256.565	333.090	0.807	590.462
Nº samples (*):				39				42				43				43
Nº Ind. (*):	4616	5076	6	9698	3323	4100	0	7423	3358	4684	80	8122	3419	4576	7	8002
Sampled catch:				796				717				2298				2269
Range (*):				8-52				11-54				6-53				6-52
Total catch:				17169				12742				16141				14385
Total hauls (*):				114				118				123				125

TABLE 11 (cont.). Yellowtail flounder length distribution. Estimated numbers per haul mean catches. Spanish Spring Survey on NAFO 3NO: 1995-2005. Indet. means indeterminate. 1995-2000 data are transformed C/V *Playa de Menduíña* data. 2002-2005 data are original R/V *Vizconde de Eza* data. In 2001, there are data from the two vessels. (*) indicates untransformed data.

	2003				2004				2005			
Length (cm.)	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
4	0.000	0.000	0.009	0.009	0.000	0.000	0.116	0.116	0.000	0.000	0.000	0.000
6	0.000	0.107	0.297	0.404	0.000	0.000	0.337	0.337	0.000	0.013	0.192	0.205
8	0.036	0.121	0.274	0.431	0.109	0.049	0.741	0.899	0.269	0.018	0.054	0.341
10	0.847	0.572	0.140	1.559	0.528	0.637	0.000	1.165	1.725	0.467	0.051	2.243
12	0.969	1.205	0.000	2.174	2.005	1.577	0.000	3.582	2.353	1.877	0.000	4.229
14	0.977	0.869	0.000	1.846	3.503	2.632	0.000	6.135	4.728	3.053	0.000	7.780
16	0.946	0.289	0.000	1.234	4.580	3.608	0.000	8.188	4.674	3.630	0.000	8.304
18	1.665	1.689	0.000	3.355	4.649	3.543	0.000	8.192	3.334	3.348	0.000	6.682
20	1.695	2.233	0.000	3.928	5.414	6.205	0.000	11.619	4.905	4.847	0.000	9.752
22	4.214	4.602	0.000	8.817	5.563	5.757	0.000	11.321	8.934	6.836	0.000	15.770
24	11.364	8.741	0.000	20.105	8.232	7.732	0.000	15.964	8.930	7.162	0.000	16.092
26	27.765	19.581	0.000	47.347	25.572	16.572	0.000	42.145	15.997	8.451	0.000	24.447
28	37.413	29.153	0.000	66.566	57.974	27.637	0.000	85.611	34.840	17.504	0.000	52.344
30	52.296	29.328	0.000	81.624	87.376	52.285	0.000	139.661	75.001	34.103	0.000	109.105
32	45.761	40.076	0.000	85.836	74.712	58.683	0.000	133.396	70.556	58.866	0.000	129.423
34	19.769	52.100	0.000	71.869	30.847	58.596	0.000	89.443	28.072	62.961	0.000	91.032
36	6.757	39.555	0.000	46.312	7.531	46.290	0.000	53.820	8.105	48.672	0.000	56.777
38	2.130	23.649	0.000	25.779	2.056	26.594	0.000	28.650	1.965	26.547	0.000	28.512
40	0.832	9.444	0.000	10.276	1.716	10.932	0.000	12.648	0.908	11.697	0.000	12.606
42	0.256	3.895	0.000	4.151	0.514	3.725	0.000	4.240	0.172	4.746	0.000	4.918
44	0.268	2.432	0.000	2.700	0.028	2.033	0.000	2.061	0.050	2.020	0.000	2.070
46	0.000	1.113	0.000	1.113	0.000	0.575	0.000	0.575	0.000	1.128	0.000	1.128
48	0.000	0.525	0.000	0.525	0.000	0.303	0.000	0.303	0.000	0.200	0.000	0.200
50	0.000	0.202	0.000	0.202	0.000	0.009	0.000	0.009	0.000	0.030	0.000	0.030
52	0.000	0.009	0.000	0.009	0.000	0.055	0.000	0.055	0.000	0.000	0.000	0.000
54	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.079	0.000	0.079
56	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	215.959	271.489	0.721	488.169	322.910	336.032	1.193	660.136	275.518	308.254	0.297	584.069
Nº samples (*):				37				45				48
Nº Ind. (*):	2424	3254	12	5690	3703	4234	16	7953	4790	6556	6	11352
Sampled catch:				1864				2587				3784
Range (*):				5-52				5-53				6-55
Total catch:				11280				15117				14275
Total hauls (*):				118				120				119

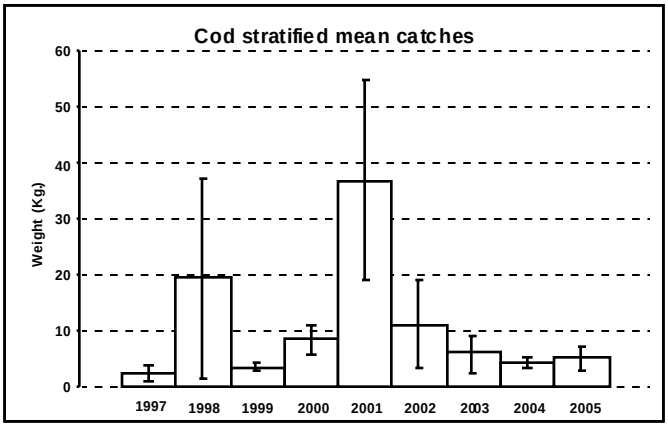

Fig. 1. Atlantic cod stratified mean catches in Kg and ±SD by year. Spanish Spring surveys on NAFO Div. 3NO: 1997-2005 (1997-2000 transformed data from C/V *Playa de Menduíña*; 2002-2005 original data from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels).

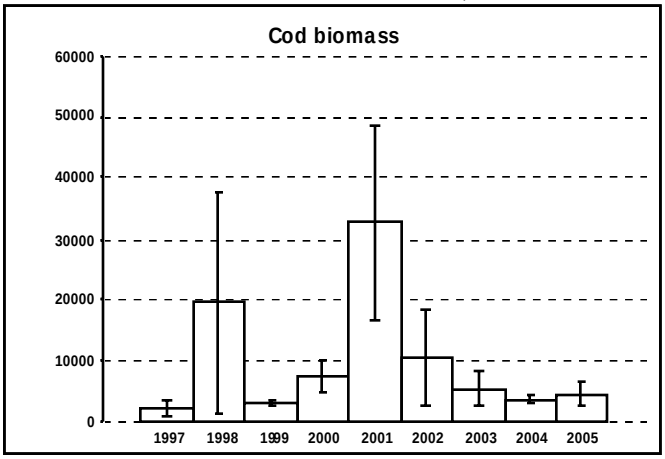

Fig. 2. Atlantic cod biomass in tons and ±SD by year. Spanish Spring surveys on NAFO Div. 3NO: 1997-2005 (1997-2000 transformed data from C/V *Playa de Menduíña*; 2002-2005 original data from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels).

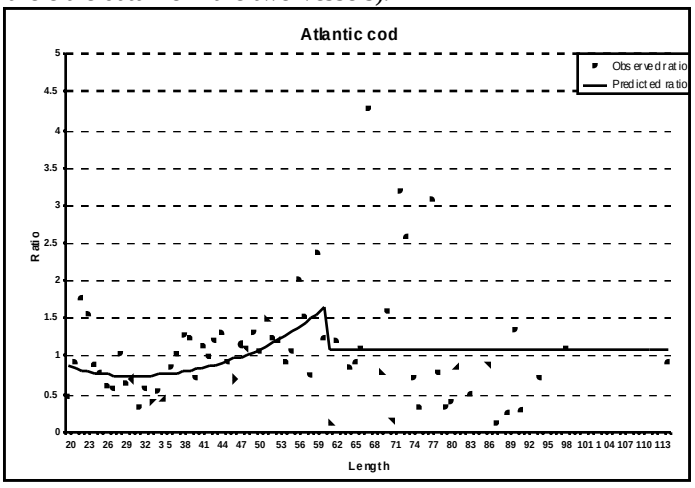

Fig. 3. Ratios of *Campelen* catch to *Pedreira* catch, by length group, of Atlantic cod, from comparative fishing trials between the two gears on the C/V *Playa de Menduíña* and the R/V *Vizconde de Eza*. The dots are the observed ratios and the curve is the fitted line.

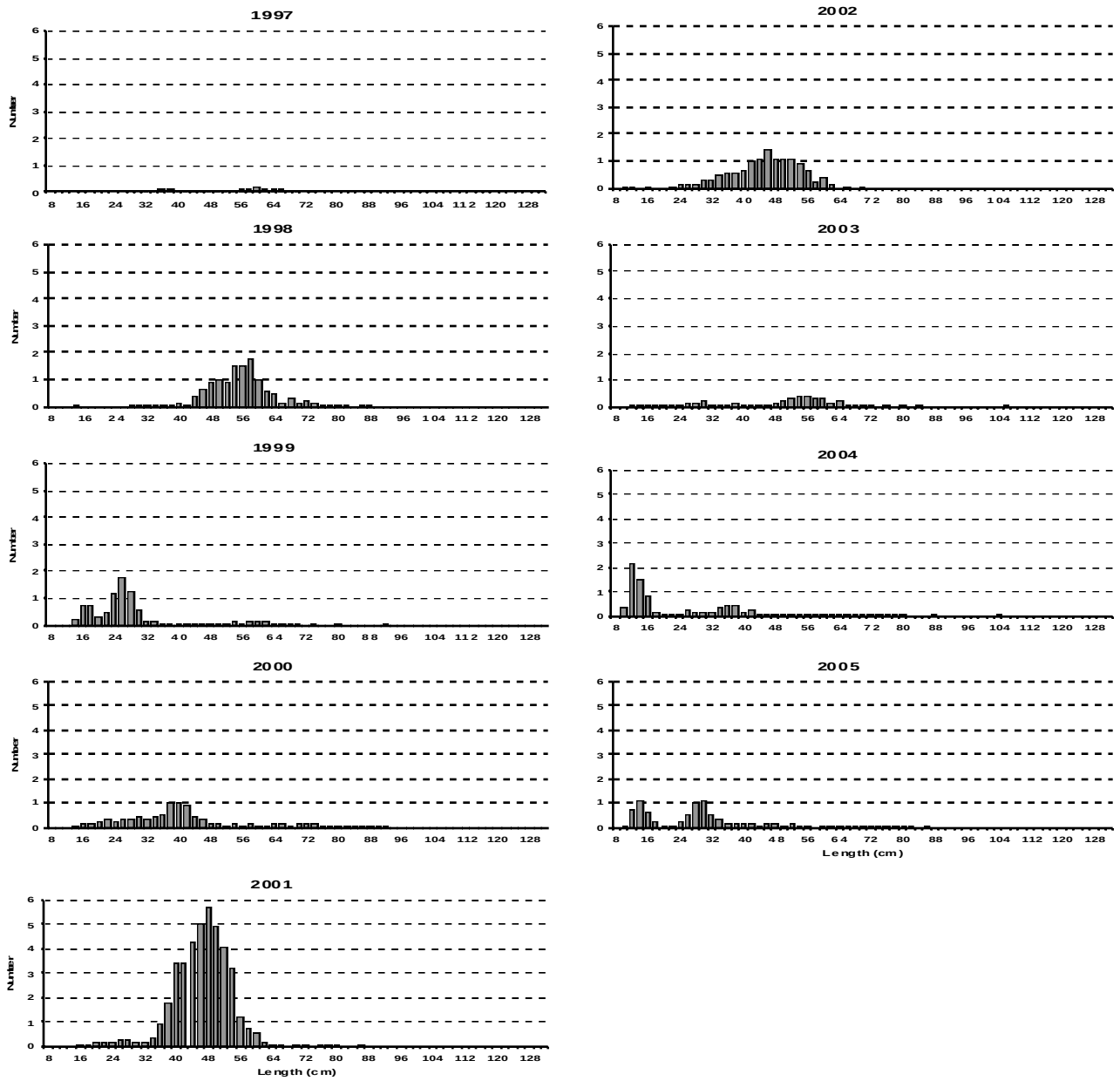

Fig. 4. Atlantic cod length distribution (cm) on NAFO 3NO: 1997-2005. Number per stratified mean catches. 1997-2000 data are transformed data from C/V *Playa de Menduíña*, and 2002-2005 data are original from R/V *Vizconde de Eza*. In 2001, there are data form the two vessels.

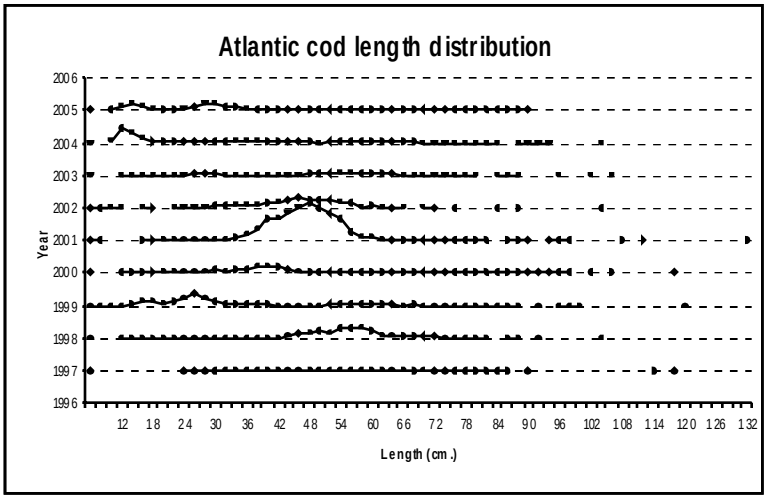

Fig. 5. Atlantic cod length distribution (cm) on NAFO 3NO: 1997-2005.

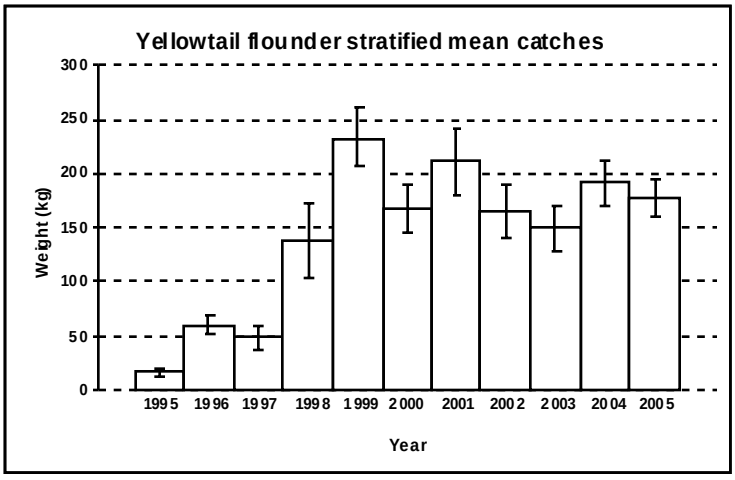

Fig. 6. Yellowtail flounder stratified mean catches in Kg and ±SD by year. Spanish Spring surveys on NAFO Div. 3NO: 1995-2005 (1995-2000 transformed data from C/V *Playa de Menduíña*; 2002-2005 original data from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels).

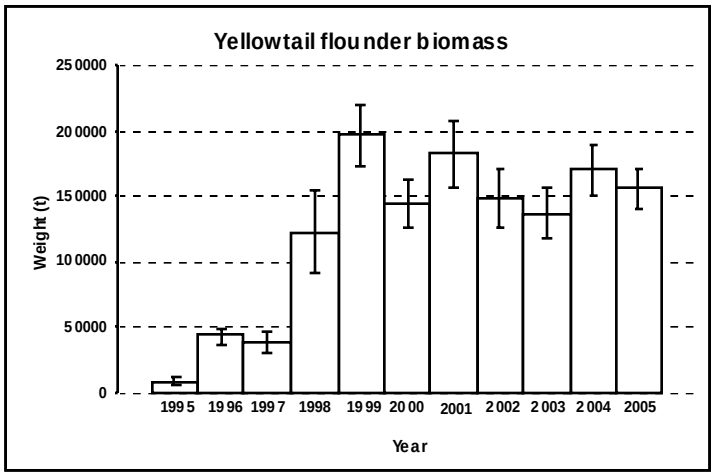

Fig. 7. Yellowtail flounder biomass in tons and ±SD by year. Spanish Spring surveys on NAFO Div. 3NO: 1995-2005 (1995-2000 transformed data from C/V *Playa de Menduíña*; 2002-2005 original data from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels).

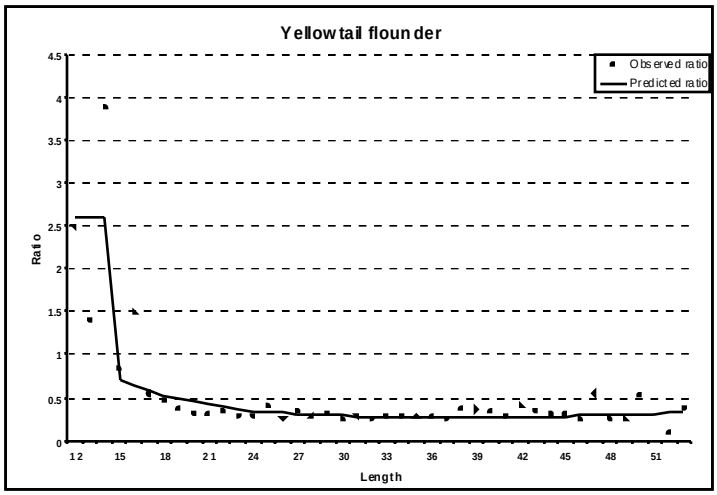

Fig. 8. Ratios of *Campelen* catch to *Pedreira* catch, by length group, of Yellowtail flounder, from comparative fishing trials between the two gears on the C/V *Playa de Menduíña* and the R/V *Vizconde de Eza*. The dots are the observed ratios and the curve is the fitted line.

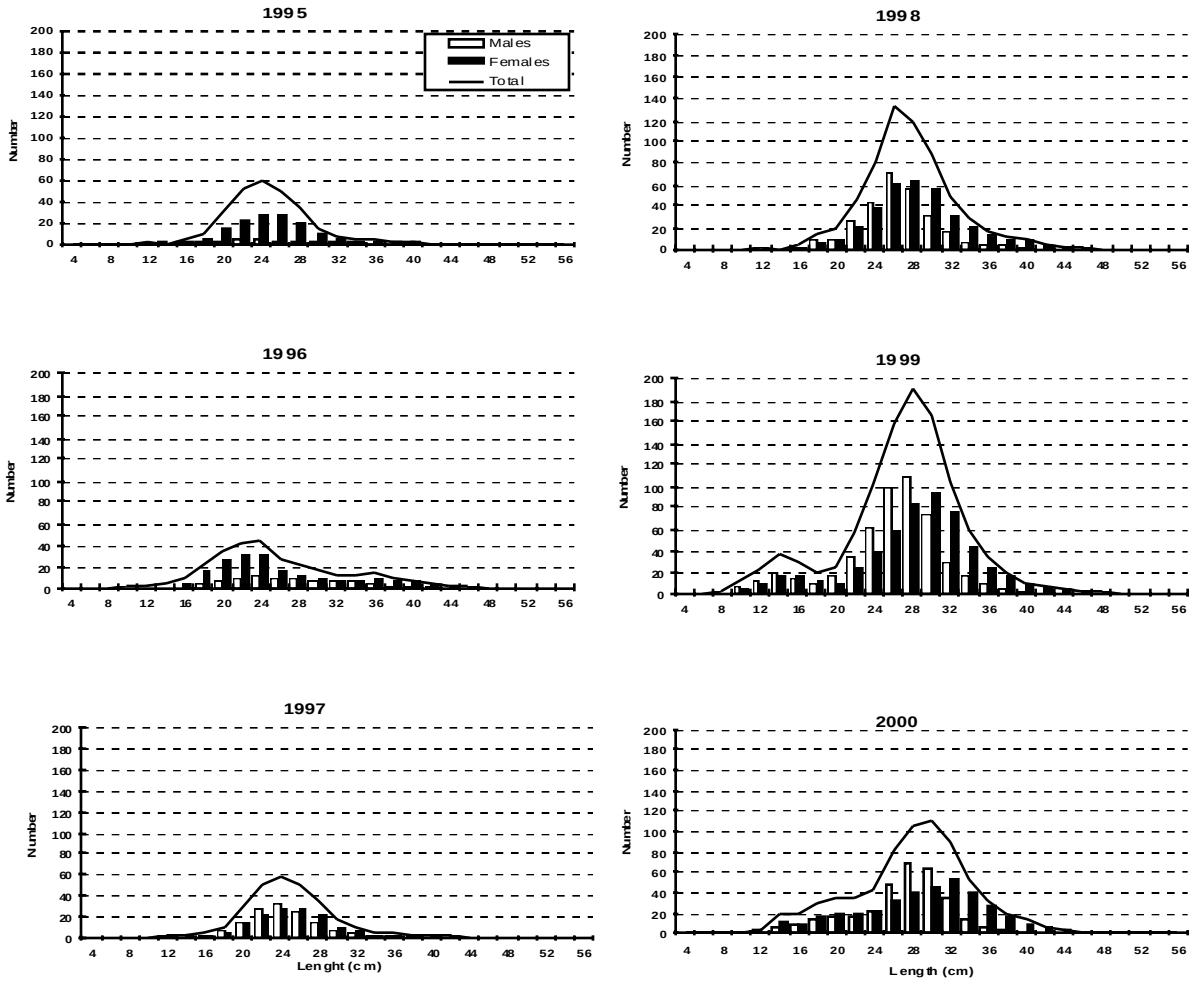

Fig. 9. Yellowtail flounder length distribution (cm) on NAFO 3NO: 1995-2005. Estimated numbers per haul stratified mean catches. 1995-2000 data are transformed data from C/V *Playa de Menduíña*, and 2002-2005 data are original from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels.

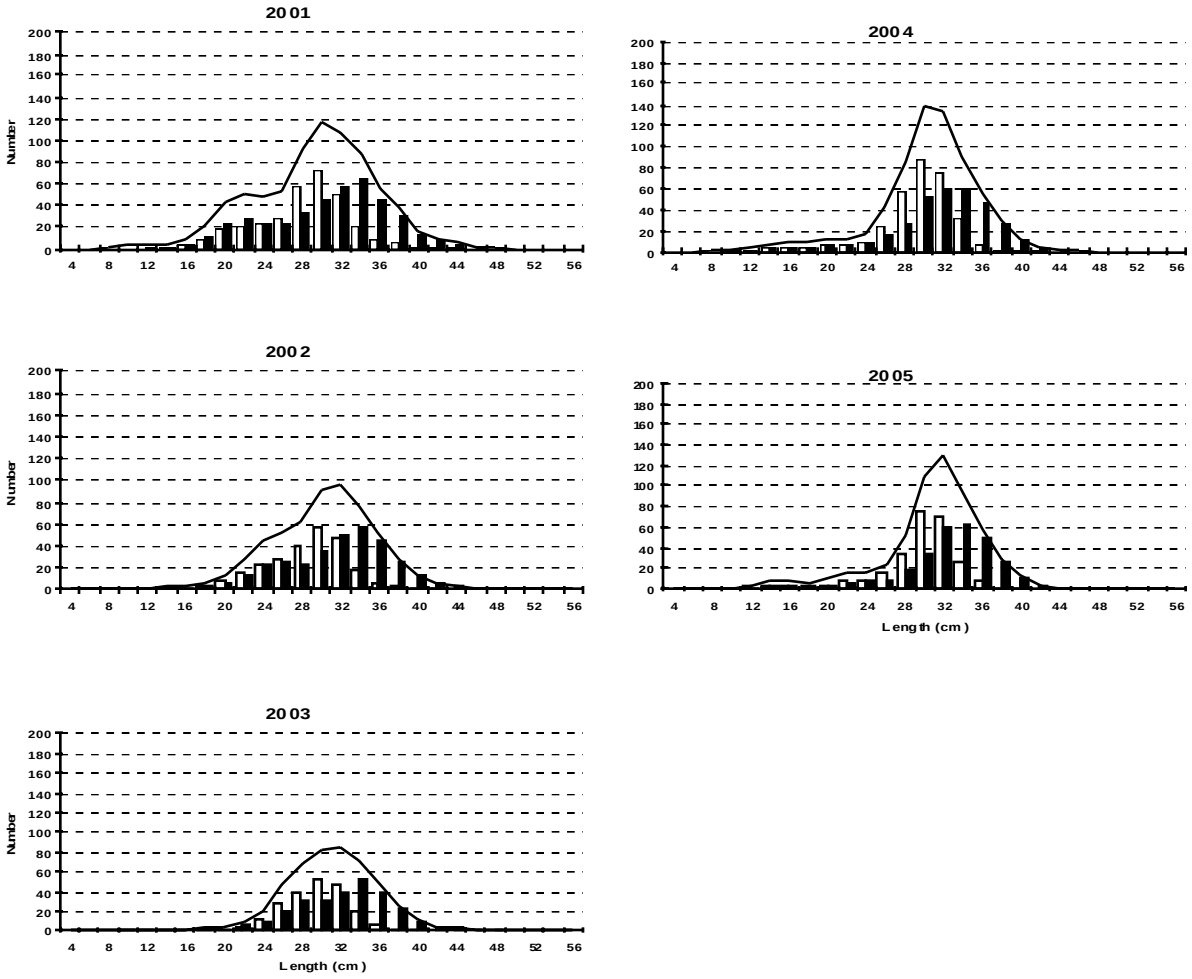

Fig. 9 (Cont.). Yellowtail flounder length distribution (cm) on NAFO 3NO: 1995-2005. Estimated numbers per haul stratified mean catches. 1995-2000 data are transformed data from C/V *Playa de Menduíña*, and 2002-2005 data are original from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels.

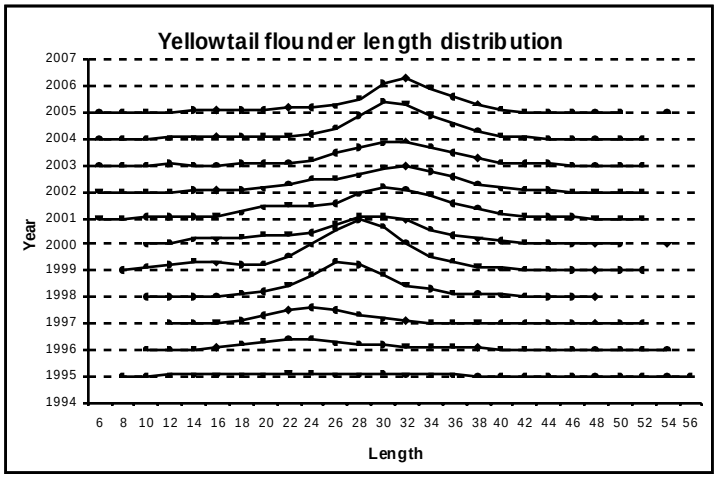

Fig. 10. Yellowtail flounder length distribution (cm) on NAFO 3NO: 1995-2005.