Northwest Atlantic Fisheries Organization

Serial No. N4955 **NAFO SCR Doc. 04/10**

SCIENTIFIC COUNCIL MEETING – JUNE 2004

New time series for Yellowtail flounder from the comparative experience between the C/V *Playa de Menduíña* and the R/V *Vizconde de Eza* in the NAFO Regulatory Area of Divisions 3NO, 1995-2003

by

X. Paz, D. González Troncoso and E. Román.

Instituto Español de Oceanografía,
P.O. Box 1552. Vigo, Spain.

Abstract

Since 1995, a stratified random spring bottom trawl survey in the NAFO Regulatory Area of Div. 3NO was conducted by Spain. In 2001, the trawl vessel was replaced; so, the time series indices was transformed. The transformed entire series of mean catches, abundance, biomass and length distribution for Yellowtail flounder are presented for the period 1995-2000, and the no-transformed data for the years 2001-2003. The standard deviation is shown for abundance and biomass. The summed abundance and biomass based on conversion of the length frequencies are presented and compared to the estimates from the method used to convert the CPUE. The results are similar in both cases. The resource seems to be stable since 2000, although in 2001 there was a little increasing and this year there was a little decreasing.

Material and Methods

Survey design and gear used

The surveys on NAFO Regulatory Area of Div. 3NO was initiated by Spain in 1995. Until 2001, the surveys 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 that year, the *R/V Vizconde de Eza* replaced the *C/V Playa de Menduíña* as the research vessel for the survey, using bottom trawl net type *Campelen*. 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 previous paper (Walsh *et. al.*, 2001). In the Table 1 are presented the number of valid tows, the depth strata covered and the dates of the survey series. In the period 1998-2003, the surveyed depth strata was the same (extended to 1464 m). 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 and abundance indices were calculated by the swept area method (Cochran, 1997), assuming catchability factor of 1.
The catch from each haul was sorted by species and weighted. Random samples of Yellowtail flounder were measured to the total length to the nearest lower cm**.** Length distribution estimated from catches is presented for the period 1995-2003.

R/V *Vizconde de Eza* had replaced C/V *Playa de Menduíña* in 2001 survey, so, in order to maintain the data series obtained since 1995, comparative fishing trials were conducted in spring 2001 to develop factors between the two fishing vessel and gear combinations. A series of 92 paired hauls was carried out, 90 of then were valid hauls. Mean

catch, stratified mean catch, abundance, biomass and their respective standard deviations, and length distribution, were transformed from C/V *Playa de Menduíña* series to R/V *Vizconde de Eza* series.

Yellowtail flounder stratified mean catches and SD

The mean catch ($\overline{y}_i$) and the variance (Var_i) are calculated by stratum by the following formulas:

$$\overline{y}_i = \sum_{j=1}^{T_i} \frac{y_j}{T_i}, \quad i = 1,...,h$$

$$Var_i = \sum_{j=1}^{T_i} \frac{(y_j - \overline{y}_i)^2}{T_i - 1}, \quad i = 1,...,h$$

where: y_j is the catch in haul j

T_i is the number of hauls in the stratum i

h is the total number of strata

and the stratified mean catch ($\overline{y}_i^{str}$) and the stratified variance (Var_i^{str}) by stratum are obtained as follow:

$$\overline{y}_i^{str} = \overline{y}_i n_i, \quad i = 1,...,h$$

$$Var_i^{str} = Var_i \frac{n_i^2}{T_i}, \quad i = 1,...,h$$

where: n_i is the area of the stratum i, $i = 1,...,h$

Then the total stratified mean catch ($\overline{y}$) and the variance (Var) by year are calculated according to the formulas:

$$\overline{Y} = \sum_{i=1}^{h} \frac{\overline{y}_i^{str}}{N}$$

$$Var = \sum_{i=1}^{h} \frac{Var_i^{str}}{N^2}$$

where: $N = \sum_{i=1}^{h} n_i$ is the total area by year

The stratified standard deviation (SD) by year is calculated as the square root of the stratified variance by year.

Conversion factors

To convert data series it was necessary to calculate the factor power correction (FPC), typically estimated by use of catch per unit of effort (CPUE) observations for the two vessels. In this case, a multiplicative model solved by generalized method by haul was adjusted to convert mean catch, abundance and biomass. Although there are many models to convert the CPUE, we choose one of them that has less error (Wilderbuer *et al.*, 1998, González Troncoso and Paz, 2003).

Robson (1966) proposed the following multiplicative model to establish the relationship between the CPUEs for the two ships:

$$CPUE_{ij} = e^{\mu + t_i + h_j + \varepsilon_{ij}}$$

where: t_i is the effect of the ship i, $i = 1, 2$

h_j is the effect of the haul j, $j = 1, ..., 90$

μ is the model parameter

ε is the model error

A logarithmic transformation is performed in order to obtain a linear expression:

$$\ln(CPUE_{ij}) = \mu + t_i + h_j + \varepsilon_{ij}$$

This equation was adjusted by generalized linear regression assuming the following restriction necessary to estimate all parameters:

$$\sum_{i=1}^{2} t_i = 0 \Rightarrow t_1 = t = -t_2$$

giving the following estimation of the FPC (Sissenwine and Bowman, 1978):

$$FPC = \frac{\overline{CPUE}_2}{\overline{CPUE}_1} = e^{2t(1+0.5s^2)} \qquad (1)$$

where s^2 is the variance obtained in the estimate of t.

This model was applied to convert mean catches and biomass. To convert abundance, we used the same formula but with abundance per unit of effort, instead of CPUE.

In the other hand, to convert the length distribution, the following multiplicative model, proposed by Warren (1997) was adjusted:

$$Ratio = \alpha l^{\beta} e^{\delta l} \qquad (2)$$

where: $Ratio = \frac{Campelen\ Catch}{Pedreira\ Catch}$ by length

l is the length

α, β *and* δ are the estimated parameters.

For more details, see Paz *et al.* (2002).

We use, in all cases, only the hauls in which both vessels had non cero catch.

Following the recommendations of the 2003 Scientific Council Meeting, abundance and biomass were obtained from the two methods and compared. For obtained the biomass from the length distribution, we use the following formula:

$$W = a\left(l + 0.5\right)^b N$$

where: $W = weight$
$l = length$
$N = number$

Data series

For 1995-2000, transformed C/V *Playa de Menduíña* data series are presented. For 2002 and 2003, original R/V *Vizconde de Eza* data series are presented. In 2001, the deeper strata was not surveyed by the calibration experience. As the objective is to have data in all the strata surveyed last years, to obtained the more annual homogeneity possible in the series, in the no surveyed strata by the R/V *Vizconde de Eza* the transformed C/V *Playa de Menduíña* data are put. This was made to mean catch, stratified mean catch, abundance and biomass. In this way, in the strata surveyed the original R/V *Vizconde de Eza* data are presented and in the strata not surveyed the transformed C/V *Playa de Menduíña* are offered.

A few errors were found in the data series, so they were updated and the FPC parameters recalculated for the new data. The results were quite the same.

The method to convert the indices from the length distribution has no accurate variance. Besides this, as the fit is very poor in the extreme data, we must apply another parameters for the extreme lengths, and the cut points are choosing without objective criterion. Because of that, we do not consider this method as the best one for estimating the biomass indices.

Results

Yellowtail flounder Mean Catches

To convert mean catches, the CPUE was adjusted in model (1), giving the $\hat{FPC}_{bio}$ =0.33437385.

The Yellowtail flounder mean catches by stratum are presented in Table 2, included swept area, number of hauls and SD. Yellowtail flounder stratified mean catches and its SD are presented in Table 3. Data from year 1995 are added, although in that year a few sets were made, so it is not representative. The Yellowtail flounder indices show a general increasing until 1999, and a little decreasing in last years, except in 2001 (Fig. 1). The high value of the year 1999 may be due to a change of the catchability, so it is a year effect (Walsh *et al.*, 2001).

Yellowtail flounder Biomass

The entire time series (1995-2003) of biomass and their SD estimates of Yellowtail flounder are presented (updated) in Table 4. The biomass presents the same trend as mean catches (Fig. 2).

To convert biomass, the CPUE was adjusted in model (1), giving the $\hat{FPC}_{bio}$ =0.33437385. Besides the transformed biomass series, we present the biomass obtained from the transformed length distribution. Parameters a and b are presented in Table 5, and in Table 4 we present the comparison between the two indices. The trend in both cases is the same (Fig. 3), and the biomass obtained is very similar in both cases. Years 2001-2003 have the original data, so both values are almost the same.

Yellowtail flounder Abundance

As in biomass, the entire time series (1995-2003) of abundance and their SD estimates of Yellowtail flounder are presented (updated) in Table 6. The abundance table shows an increasing in the survey estimates until 1999, and a decreasing since that year, except in year 2001 (Fig. 4).

To convert abundance, the abundance per unit of effort was adjusted in model (1), giving the $\hat{FPC}_{ab}$ =0.32538801. Besides the transformed abundance series, we present the abundance obtained summing the transformed length distribution. In Table 6 we present the comparison between the two series indices. The trend in both cases is the

same (Fig. 5), and the abundance obtained is practically the same in both cases. Years 2001-2003 have the original data, so both values are almost the same.

Yellowtail flounder Length Distribution

The result of the model proposed by Warren (2) for Yellowtail flounder was the following (for more details, see Paz *et al.*, 2002) (cf = conversion factor):

For $l \leq 14$: cf = 2.74
For $15 \leq l \leq 21$: cf = 0.59
For $22 \leq l \leq 46$: cf = exp(11.4618-4.9801ln(l)+0.1388l)
For $l \geq 47$: cf = 0.4

In Table 7 is shown Yellowtail flounder length distribution per thousand, besides the sampled size and its catch for the period 1995-2003. In Fig. 6 we can see the length distribution evolution along the years. It can be seen an increasing in the adult fraction of the population and a quite presence of recruitment.

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TABLE 1.- Spanish spring bottom trawl surveys on NAFO Div. 3NO: 1995-2003.

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	90	>56-1116	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-Jun 02

TABLE 2.- Swept area, number of hauls and Yellowtail flounder mean catch (kg) and SD (**) by stratum. Spanish Spring Surveys on NAFO Div. 3NO: 1995-2003. Swept area in square miles. n.s. means stratum not surveyed. 1995-2000 data are transformed C/V *Playa de Menduíña* data, and 2001-2003 data are original from R/V *Vizconde de Eza.* In 2001, (*) indicates transformed data from C/V *Playa de Menduiña.*

	1995				1996				1997			
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	0.0353	3	5.82	4.105	0.0371	3	74.88	94.62	0.0480	4	12.55	14.26
354	0.0353	3	1.78	3.089	0.0319	3	1.11	0.84	0.0233	2	1.41	1.56
355	n.s.	n.s.	n.s.	n.s.	0.0221	2	0.25	0.35	0.0233	2	2.20	0.31
356	n.s.	n.s.	n.s.	n.s.	0.0203	2	0.00	0.00	0.0225	2	0.32	0.46
357	0.0109	1	0.00	-	0.0218	2	0.00	0.00	0.0443	4	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
359	0.0345	3	1.35	2.336	0.0548	5	0.92	0.83	0.0690	6	0.08	0.14
360	0.3563	31	20.44	40.707	0.3761	31	142.09	128.86	0.3754	32	80.92	155.59
374	0.0225	2	0.00	0.000	0.0233	2	0.00	0.00	0.0353	3	0.00	0.00
375	0.0225	2	1.48	1.875	0.0229	2	41.40	58.54	0.0116	1	0.20	-
376	0.1729	15	35.06	58.691	0.1650	14	71.40	86.94	0.1583	14	162.35	179.83
377	0.0221	2	0.00	0.000	0.0229	2	0.00	0.00	0.0116	1	0.00	-
378	0.0435	4	0.00	0.000	0.0330	3	0.06	0.10	0.0210	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
380	n.s.	n.s.	n.s.	n.s.	0.0221	2	0.00	0.00	0.0210	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
382	n.s.	n.s.	n.s.	n.s.	0.0338	3	0.00	0.00	0.0461	4	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
722	n.s.	n.s.	n.s.	n.s.	0.0206	2	0.00	0.00	0.0214	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
724	0.0105	1	0.00	-	0.0203	2	0.00	0.00	0.0225	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
726	0.0214	2	0.00	0.000	0.0218	2	0.00	0.00	n.s.	n.s.	n.s.	n.s.
727	n.s.	n.s.	n.s.	n.s.	0.0210	2	0.00	0.00	0.0094	1	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
752	n.s.	n.s.	n.s.	n.s.	0.0109	1	0.00	-	0.0218	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
754	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0330	3	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.
756	n.s.	n.s.	n.s.	n.s.	0.0210	2	0.00	0.00	0.0109	1	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
758	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0214	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.
760	n.s.	n.s.	n.s.	n.s.	0.0210	2	0.00	0.00	0.0105	1	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
762	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0308	3	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.
764	n.s.	n.s.	n.s.	n.s.	0.0210	2	0.00	0.00	0.0206	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
766	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0308	3	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.

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

TABLE 2 (cont.).- Swept area, number of hauls and Yellowtail flounder mean catch (kg) and SD (**) by stratum. Spanish Spring Surveys on NAFO Div. 3NO: 1995-2003. Swept area in square miles. n.s. means stratum not surveyed. 1995-2000 data are transformed C/V *Playa de Menduíña* data, and 2001-2003 data are original from R/V *Vizconde de Eza.* In 2001, (*) indicates transformed data from C/V *Playa de Menduiña*..

	1998				1999				2000			
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	0.0465	4	12.22	20.16	0.0360	3	150.18	182.44	0.0356	3	67.87	91.37
354	0.0356	3	1.22	0.24	0.0218	2	0.08	0.12	0.0356	3	1.79	1.93
355	0.0221	2	0.13	0.18	0.0229	2	0.00	0.00	0.0233	2	0.00	0.00
356	0.0221	2	0.00	0.00	0.0229	2	0.00	0.00	0.0225	2	0.00	0.00
357	0.0240	2	0.00	0.00	0.0236	2	0.00	0.00	0.0124	1	0.00	-
358	0.0236	3	0.00	0.00	0.0349	3	0.00	0.00	0.0341	3	0.00	0.00
359	0.0698	6	0.17	0.22	0.0364	3	0.34	0.47	0.0469	4	2.36	2.93
360	0.2561	25	373.90	629.84	0.2325	19	545.18	424.37	0.2396	20	391.18	331.64
374	0.0353	3	0.04	0.02	0.0244	2	74.16	103.18	0.0240	2	20.47	23.55
375	0.0345	3	12.37	21.37	0.0236	2	347.15	168.25	0.0244	2	153.36	2.06
376	0.0930	10	279.27	181.29	0.1219	10	551.60	165.61	0.1200	10	435.27	236.60
377	0.0229	2	0.00	0.00	0.0240	2	0.00	0.00	0.0229	2	0.05	0.06
378	0.0120	2	0.00	0.00	0.0229	2	0.00	0.00	0.0233	2	0.00	0.00
379	0.0356	3	0.00	0.00	0.0236	2	0.00	0.00	0.0225	2	0.00	0.00
380	0.0113	2	0.00	0.00	0.0236	2	0.00	0.00	0.0236	2	0.00	0.00
381	0.0229	2	0.00	0.00	0.0229	2	0.00	0.00	0.0236	2	0.00	0.00
382	0.0229	3	0.00	0.00	0.0484	4	0.00	0.00	0.0499	4	0.00	0.00
721	0.0203	2	0.00	0.00	0.0244	2	0.00	0.00	0.0236	2	0.00	0.00
722	0.0101	2	0.00	0.00	0.0229	2	0.00	0.00	0.0218	2	0.00	0.00
723	0.0233	2	0.00	0.00	0.0229	2	0.00	0.00	0.0248	2	0.00	0.00
724	0.0206	2	0.00	0.00	0.0225	2	0.00	0.00	0.0233	2	0.00	0.00
725	0.0086	1	0.00	-	0.0229	2	0.00	0.00	0.0210	2	0.00	0.00
726	0.0094	2	0.00	0.00	0.0225	2	0.00	0.00	0.0221	2	0.00	0.00
727	0.0233	2	0.00	0.00	0.0236	2	0.00	0.00	0.0210	2	0.00	0.00
728	0.0206	2	0.00	0.00	0.0233	2	0.00	0.00	0.0210	2	0.00	0.00
752	0.0229	2	0.00	0.00	0.0233	2	0.00	0.00	0.0206	2	0.00	0.00
753	0.0218	2	0.00	0.00	0.0229	2	0.00	0.00	0.0218	2	0.00	0.00
754	0.0210	2	0.00	0.00	0.0206	2	0.00	0.00	0.0195	2	0.00	0.00
755	0.0206	2	0.00	0.00	0.0311	3	0.00	0.00	0.0431	4	0.00	0.00
756	0.0225	2	0.00	0.00	0.0225	2	0.00	0.00	0.0203	2	0.00	0.00
757	0.0206	2	0.00	0.00	0.0233	2	0.00	0.00	0.0214	2	0.00	0.00
758	0.0105	2	0.00	0.00	0.0214	2	0.00	0.00	0.0210	2	0.00	0.00
759	0.0214	2	0.00	0.00	0.0218	2	0.00	0.00	0.0210	2	0.00	0.00
760	0.0214	2	0.00	0.00	0.0225	2	0.00	0.00	0.0210	2	0.00	0.00
761	0.0206	2	0.00	0.00	0.0210	2	0.00	0.00	0.0221	2	0.00	0.00
762	0.0094	2	0.00	0.00	0.0210	2	0.00	0.00	0.0203	2	0.00	0.00
763	0.0218	2	0.00	0.00	0.0311	3	0.00	0.00	0.0416	4	0.00	0.00
764	0.0218	2	0.00	0.00	0.0225	2	0.00	0.00	0.0218	2	0.00	0.00
765	0.0098	2	0.00	0.00	0.0221	2	0.00	0.00	0.0203	2	0.00	0.00
766	0.0191	2	0.00	0.00	0.0218	2	0.00	0.00	0.0214	2	0.00	0.00
767	0.0109	2	0.00	0.00	0.0214	2	0.00	0.00	0.0210	2	0.00	0.00

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

TABLE 2 (cont.).- Swept area, number of hauls and Yellowtail flounder mean catch (kg) and SD (**) by stratum. Spanish Spring Surveys on NAFO Div. 3NO: 1995-2003. Swept area in square miles. n.s. means stratum not surveyed. 1995-2000 data are transformed C/V *Playa de Menduíña* data, and 2001-2003 data are original from R/V *Vizconde de Eza.* In 2001, (*) indicates transformed data from C/V *Playa de Menduiña*..

	2001				2002				2003			
Stratum	Swept area	Tow number	Y. flounder Mean catch	Y. flounder SD	Swept area	Tow number	Y. flounder Mean catch	Y. flounder SD		Tow number	Y. flounder Mean catch	Y. flounder SD
353	0.0341	3	61.42	102.797	0.0476	4	75.13	88.259	0.0334	3	11.15	19.307
354	0.0338	3	0.34	0.322	0.0356	3	0.17	0.289	0.0338	3	0.00	0.000
355	0.0240	2	0.00	0.000	0.0236	2	0.00	0.000	0.0229	2	0.00	0.000
356	0.0240	2	0.01	0.007	0.0233	2	0.00	0.000	0.0225	2	0.00	0.000
357	0.0244	2	0.00	0.000	0.0240	2	0.00	0.000	0.0229	2	0.00	0.000
358	0.0345	3	0.00	0.000	0.0345	3	0.00	0.000	0.0338	3	0.00	0.000
359	0.0803	7	1.42	2.836	0.0686	6	0.11	0.261	0.0791	7	0.00	0.000
360	0.2423	20	536.80	488.657	0.2865	25	340.23	356.687	0.2254	20	360.55	298.992
374	0.0240	2	238.75	111.369	0.0345	3	32.04	52.542	0.0225	2	16.13	8.238
375	0.0338	3	100.33	68.319	0.0353	3	48.61	68.927	0.0330	3	28.45	35.557
376	0.1155	10	443.12	196.619	0.1140	10	533.62	416.745	0.1125	10	391.60	257.289
377	0.0229	2	0.00	0.000	0.0229	2	0.00	0.000	0.0225	2	0.70	0.990
378	0.0236	2	0.00	0.000	0.0233	2	0.00	0.000	0.0225	2	0.00	0.000
379	0.0229	2	0.00	0.000	0.0229	2	0.00	0.000	0.0229	2	0.00	0.000
380	0.0206	2	(*) 0.00	(*) 0.000	0.0225	2	0.00	0.000	0.0229	2	0.00	0.000
381	0.0236	2	(*) 0.00	(*) 0.000	0.0229	2	0.00	0.000	0.0229	2	0.00	0.000
382	0.0469	4	(*) 0.02	(*) 0.030	0.0341	3	0.00	0.000	0.0454	4	0.00	0.000
721	0.0248	2	0.00	0.000	0.0233	2	0.00	0.000	0.0225	2	0.00	0.000
722	0.0233	2	0.00	0.000	0.0236	2	0.00	0.000	0.0221	2	0.00	0.000
723	0.0240	2	0.00	0.000	0.0233	2	0.00	0.000	0.0229	2	0.00	0.000
724	0.0353	3	0.00	0.000	0.0225	2	0.00	0.000	0.0225	2	0.52	0.735
725	0.0116	1	0.00	-	0.0225	2	0.00	0.000	0.0229	2	0.00	0.000
726	0.0116	1	0.00	-	0.0214	2	0.00	0.000	0.0225	2	0.00	0.000
727	0.0225	2	(*) 0.00	(*) 0.000	0.0233	2	0.00	0.000	0.0218	2	0.00	0.000
728	0.0229	2	(*) 0.00	(*) 0.000	0.0229	2	0.00	0.000	0.0225	2	0.00	0.000
752	0.0210	2	(*) 0.06	(*) 0.083	0.0116	1	0.00	-	0.0229	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
754	0.0195	2	(*) 0.00	(*) 0.000	0.0341	3	0.00	0.000	0.0195	2	0.00	0.000
755	0.0416	4	(*) 0.00	(*) 0.000	0.0338	3	0.00	0.000	0.0416	4	0.00	0.000
756	0.0113	1	0.00	-	0.0229	2	0.00	0.000	0.0113	1	0.00	0.000
757	0.0233	2	(*) 0.00	(*) 0.000	0.0225	2	0.00	0.000	0.0233	2	0.00	0.000
758	0.0218	2	(*) 0.00	(*) 0.000	0.0225	2	0.00	0.000	0.0218	2	0.00	0.000
759	0.0221	2	(*) 0.00	(*) 0.000	0.0225	2	0.00	0.000	0.0221	2	0.00	-
760	0.0229	2	0.00	0.000	0.0229	2	0.00	0.000	0.0229	2	0.00	0.000
761	0.0225	2	0.00	0.000	0.0225	2	0.00	0.000	0.0225	2	0.00	0.000
762	0.0116	1	0.00	-	0.0225	2	0.00	0.000	0.0116	1	0.00	0.000
763	0.0330	3	(*) 0.00	(*) 0.000	0.0225	2	0.00	0.000	0.0330	3	0.00	0.000
764	0.0240	2	0.00	0.000	0.0236	2	0.00	0.000	0.0240	2	0.00	0.000
765	0.0113	1	0.00	-	0.0236	2	0.00	0.000	0.0113	1	0.00	-
766	0.0203	2	(*) 0.00	(*) 0.000	0.0233	2	0.00	0.000	0.0203	2	0.00	0.000
767	0.0218	2	(*) 0.00	(*) 0.000	0.0225	2	0.00	0.000	0.0218	2	0.00	0.000

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

TABLE 3.- Stratified mean catches (Kg) by stratum and year and SD by year of Yellowtail flounder (1995-2003). n.s. means stratum not surveyed. 1995-2000 data are transformed C/V *Playa de Menduíña* data (by FPC). 2001-2003 data are original from R/V *Vizconde de Eza*. In 2001, (*) indicates transformed data from C/V *Playa de Menduíña*, and (**) represent the original results of *R/V Vizconde de Eza* without the *C/V Playa de Menduíña* data.

Strata	1995	1996	1997	1998	1999	2000	2001	2002	2003
353	1565.07	20142.03	3376.59	3288.11	40399.20	18255.85	16521.08	20208.63	2998.45
354	438.70	0.00	346.30	299.00	20.56	439.52	83.64	41.00	0.00
355	n.s.	0.00	163.06	9.34	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
357	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
359	567.78	385.71	34.00	72.73	143.12	994.90	597.82	44.91	0.00
360	56884.98	395448.50	225203.35	1040562.34	1517232.56	1088647.76	1493908.83	946847.84	1003413.43
374	0.00	0.00	0.00	9.54	15871.12	4379.59	51092.50	6856.85	3450.75
375	401.88	11218.18	54.37	3352.77	94076.82	41560.71	27190.33	13173.31	7709.95
376	46774.78	95247.02	216576.13	372549.36	735836.39	580653.95	591126.08	711849.08	522389.06
377	0.00	0.00	0.00	0.00	0.00	4.51	0.00	0.00	70.00
378	0.00	7.75	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
380	n.s.	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
382	n.s.	0.00	0.00	0.00	0.00	0.00	(*) 5.16	0.00	0.00
721	n.s.	2.17	48.90	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
723	n.s.	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
725	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
727	n.s.	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
752	n.s.	0.00	0.00	0.00	0.00	0.00	(*) 7.67	0.00	0.00
753	n.s.	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
755	n.s.	n.s.	n.s.	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
757	n.s.	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
759	n.s.	n.s.	n.s.	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
761	n.s.	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
763	n.s.	n.s.	n.s.	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
765	n.s.	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
767	n.s.	n.s.	n.s.	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	2180533.36	1699021.61	1540096.13
							(**) 2180520.53		
$(\bar{Y})$	16.22	59.54	47.74	137.32	232.41	167.76	210.23	164.28	148.92
							(**) 277.42		
S.D.	4.37	8.41	10.69	34.70	27.41	22.21	30.58	24.92	20.84

TABLE 4.- 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. 2001-2003 data are original from R/V *Vizconde de Eza*. In 2001, (*) indicates transformed data from C/V *Playa de Menduíña*, and (**) represent the original results of *R/V Vizconde de Eza* without the *C/V Playa de Menduíña* data. The last row presents the biomass obtained from the length distribution.

Strata	1995	1996	1997	1998	1999	2000	2001	2002	2003
353	133	1628	281	282	3367	1537	1452	1697	270
354	37	26	30	25	2	37	7	3	0
355	n.s.	2	14	0	0	0	0	0	0
356	n.s.	0	1	0	0	0	0	0	0
357	0	0	0	0	0	0	0	0	0
358	0	3	0	0	0	0	0	0	0
359	49	35	3	6	12	85	52	4	0
360	4950	32593	19198	89742	123989	90863	123336	82622	89057
374	0	0	0	0	1302	365	4258	596	307
375	36	981	5	291	7964	3410	2417	1121	701
376	4059	8082	19160	32255	60376	48388	51180	62443	46435
377	0	0	0	0	0	0	0	0	6
378	0	1	0	0	0	0	0	0	0
379	0	0	0	0	0	0	0	0	0
380	n.s.	0	0	0	0	0	(*) 0	0	0
381	n.s.	0	0	0	0	0	(*) 0	0	0
382	n.s.	0	0	0	0	0	(*) 0	0	0
721	n.s.	0	4	0	0	0	0	0	0
722	n.s.	0	0	0	0	0	0	0	0
723	n.s.	0	0	0	0	0	0	0	0
724	0	0	0	0	0	0	0	0	0
725	0	0	0	0	0	0	0	0	0
726	0	0	n.s.	0	0	0	0	0	0
727	n.s.	0	0	0	0	0	(*) 0	0	0
728	n.s.	0	0	0	0	0	(*) 0	0	0
752	n.s.	0	0	0	0	0	(*) 1	0	0
753	n.s.	0	0	0	0	0	(*) 0	0	0
754	n.s.	n.s.	0	0	0	0	(*) 0	0	0
755	n.s.	n.s.	n.s.	0	0	0	(*) 0	0	0
756	n.s.	0	0	0	0	0	0	0	0
757	n.s.	0	0	0	0	0	0	0	0
758	n.s.	n.s.	0	0	0	0	0	0	0
759	n.s.	n.s.	n.s.	0	0	0	0	0	0
760	n.s.	0	0	0	0	0	0	0	0
761	n.s.	0	0	0	0	0	0	0	0
762	n.s.	n.s.	0	0	0	0	0	0	0
763	n.s.	n.s.	n.s.	0	0	0	0	0	0
764	n.s.	0	0	0	0	0	0	0	0
765	n.s.	0	0	0	0	0	0	0	0
766	n.s.	n.s.	0	0	0	0	0	0	0
767	n.s.	n.s.	n.s.	0	0	0	0	0	0
TOTAL	9264	43349	38697	122601	197012	144685	182704	148487	136775
							(**) 182703		
S.D.	2484	6032	8527	31358	22938	19097	25847	23368	19287
Warren Method	8515	38766	36413	110951	168528	116463	193569	146956	136432

TABLE 5.- 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: 1995-2003. 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
Males	a	0.0079	0.0080	0.0081	0.0075	0.0084	0.0036	0.0081	0.0075	0.0121
		Error = 0.2653	Error = 0.0907	Error = 0.0936	Error = 0.1034	Error = 0.2119	Error = 0.0994	Error = 0.1248	Error = 0.0729	Error = 0.1109
	b	3.0416	3.0342	3.0197	3.0376	3.0098	3.2403	3.0176	3.0271	2.8978
		Error = 0.0799	Error = 0.0269	Error = 0.0281	Error = 0.0313	Error = 0.0610	Error = 0.0300	Error = 0.0374	Error = 0.0226	Error = 0.0348
		R^2 = 0.984	R^2 = 0.998	R^2 = 0.997	R^2 = 0.997	R^2 = 0.994	R^2 = 0.997	R^2 = 0.995	R^2 = 0.998	R^2 = 0.995
		0.0063	0.0056	0.0056	0.0067	0.0073	0.0026	0.0060	0.0051	0.0061
Females	a	Error = 0.1251	Error = 0.0632	Error = 0.0517	Error = 0.1290	Error = 0.2607	Error = 0.0914	Error = 0.0841	Error = 0.0901	Error = 0.0995
		3.1083	3.1496	3.1382	3.0788	3.0577	3.3504	3.1122	3.1448	3.1079
	b	Error = 0.0367	Error = 0.0179	Error = 0.0152	Error = 0.0384	Error = 0.0739	Error = 0.0267	Error = 0.0249	Error = 0.0274	Error = 0.0307
		R^2 = 0.995	R^2 = 0.999	R^2 = 0.999	R^2 = 0.994	R^2 = 0.989	R^2 = 0.998	R^2 = 0.997	R^2 = 0.997	R^2 = 0.996
		0.0088	0.0060	0.0060	0.0071	0.0078	0.0026	0.0092	0.0060	0.0069
		Error = 0.1109	Error = 0.0656	Error = 0.0580	Error = 0.0652	Error = 0.1656	Error = 0.0835	Error = 0.1075	Error = 0.0402	Error = 0.1095
Indet.	a	3.0144	3.1285	3.1166	3.0614	3.0406	3.3423	2.9883	3.0977	3.0737
		Error = 0.0330	Error = 0.0188	Error = 0.0171	Error = 0.0195	Error = 0.0477	Error = 0.0245	Error = 0.0329	Error = 0.0123	Error = 0.0337
	b	R^2 = 0.996	R^2 = 0.999	R^2 = 0.999	R^2 = 0.994	R^2 = 0.995	R^2 = 0.999	R^2 = 0.994	R^2 = 0.999	R^2 = 0.995
		0.0079	0.0080	0.0081	0.0075	0.0084	0.0036	0.0081	0.0075	0.0121
		Error = 0.2653	Error = 0.0907	Error = 0.0936	Error = 0.1034	Error = 0.2119	Error = 0.0994	Error = 0.1248	Error = 0.0729	Error = 0.1109
		3.0416	3.0342	3.0197	3.0376	3.0098	3.2403	3.0176	3.0271	2.8978

TABLE 6.- Survey estimates (by the swept area method) of Yellowtail flounder abundance (,000) 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. 2001-2003 data are original from R/V *Vizconde de Eza*. In 2001, (*) indicates transformed data from C/V *Playa de Menduíña*, and (**) represent the original results of *R/V Vizconde de Eza* without the *C/V Playa de Menduíña* data. The last row presents the biomass obtained from the length distribution.

Strata	1995	1996	1997	1998	1999	2000	2001	2002	2003
353	248	2976	625	589	6785	2876	3228	3188	548
354	0	0	59	65	4	87	22	7	0
355	n.s.	0	28	1	0	0	0	0	0
356	n.s.	0	3	0	0	0	0	0	0
357	0	0	0	0	0	0	0	0	0
358	0	0	1	0	0	0	0	0	0
359	79	59	14	17	26	239	126	6	0
360	17381	117234	95048	386709	468443	294001	429169	261818	261019
374	0	0	0	5	4568	919	9692	1159	666
375	90	2375	8	781	28975	12340	6313	3680	1823
376	21235	49707	109911	156793	283474	212973	248948	249811	183782
377	0	0	0	0	0	1	0	0	18
378	0	0	0	0	0	0	0	0	0
379	0	0	0	0	0	0	0	0	0
380	n.s.	0	0	0	0	0	(*) 0	0	0
381	n.s.	0	0	0	0	0	(*) 0	0	0
382	n.s.	0	0	0	0	0	(*) 2	0	0
721	n.s.	0	9	0	0	0	0	0	0
722	n.s.	0	0	0	0	0	0	0	0
723	n.s.	0	0	0	0	0	0	0	0
724	0	0	0	0	0	0	0	0	0
725	0	0	0	0	0	0	0	0	0
726	0	0	n.s.	0	0	0	0	0	0
727	n.s.	0	0	0	0	0	(*) 0	0	0
728	n.s.	0	0	0	0	0	(*) 0	0	0
752	n.s.	0	0	0	0	0	(*) 2	0	0
753	n.s.	0	0	0	0	0	(*) 0	0	0
754	n.s.	n.s.	0	0	0	0	(*) 0	0	0
755	n.s.	n.s.	n.s.	0	0	0	(*) 0	0	0
756	n.s.	0	0	0	0	0	0	0	0
757	n.s.	0	0	0	0	0	(*) 0	0	0
758	n.s.	n.s.	0	0	0	0	(*) 0	0	0
759	n.s.	n.s.	n.s.	0	0	0	(*) 0	0	0
760	n.s.	0	0	0	0	0	0	0	0
761	n.s.	0	0	0	0	0	0	0	0
762	n.s.	n.s.	0	0	0	0	0	0	0
763	n.s.	n.s.	n.s.	0	0	0	(*) 0	0	0
764	n.s.	0	0	0	0	0	0	0	0
765	n.s.	0	0	0	0	0	0	0	0
766	n.s.	n.s.	0	0	0	0	(*) 0	0	0
767	n.s.	n.s.	n.s.	0	0	0	(*) 0	0	0
TOTAL	39034	172349	205704	544960	792275	523436	697502	519668	447855
							(**) 697498		
S.D.	10329	25697	51939	141937	82097	70250	95696	80292	63865
Warren Method	46493	187821	223069	510857	781010	506980	697498	519700	447855

TABLE 7.- Yellowtail flounder length distribution. Estimated numbers in frequency in ‰. Spanish Spring Survey on NAFO 3NO: 1995-2003. Indet. means indeterminate. 1995-2000 data are transformed C/V *Playa de Menduíña* data. 2001-2003 data are original R/V *Vizconde de Eza* data. (*) indicates untransformed data.

	1995			1996			1997		
Lenght (cm.)	Males	Females	Indet.	Males	Females	Indet.	Males	Females	Indet.
6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	0.000	0.000	3.884	0.000	0.000	0.116	0.000	0.000	0.000
12	0.000	0.000	8.662	0.000	0.000	2.724	0.555	0.555	0.000
14	9.802	21.729	50.211	0.000	0.000	6.906	4.351	3.566	0.000
16	17.751	20.868	8.556	0.461	1.357	10.792	4.158	3.658	0.000
18	31.147	49.336	2.043	3.500	34.379	20.662	12.772	7.003	0.000
20	38.737	47.024	0.000	18.811	101.476	5.320	39.482	45.431	0.000
22	54.257	53.939	0.000	27.446	124.505	0.925	88.041	70.299	0.000
24	65.453	82.828	0.000	37.906	120.527	0.000	109.040	99.443	0.000
26	38.165	50.183	0.000	34.579	87.273	0.000	92.277	94.152	0.000
28	25.371	22.552	0.000	30.563	39.387	0.000	65.688	81.571	0.000
30	27.683	39.844	0.000	27.056	38.018	0.000	29.887	50.364	0.000
32	22.738	50.066	0.000	20.142	25.502	0.000	13.717	21.478	0.000
34	17.636	42.452	0.000	22.402	18.938	0.000	9.443	12.525	0.000
36	9.692	23.398	0.000	15.981	28.922	0.000	4.566	9.149	0.000
38	5.513	15.499	0.000	9.004	27.374	0.000	2.832	7.504	0.000
40	5.574	13.342	0.000	5.141	18.447	0.000	1.188	7.440	0.000
42	1.769	9.136	0.000	1.554	13.931	0.000	0.351	4.138	0.000
44	0.108	5.838	0.000	1.717	7.581	0.000	0.263	2.000	0.000
46	0.098	2.390	0.000	0.379	5.216	0.000	0.019	0.571	0.000
48	0.000	2.133	0.000	0.116	1.504	0.000	0.000	0.143	0.000
50	0.000	1.592	0.000	0.000	1.036	0.000	0.000	0.299	0.000
52	0.000	0.673	0.000	0.000	0.262	0.000	0.000	0.000	0.000
54	0.000	0.257	0.000	0.000	0.000	0.000	0.000	0.082	0.000
56	0.000	0.068	0.000	0.000	0.161	0.000	0.000	0.000	0.000
Total	371.496	555.147	73.357	256.758	695.796	47.446	478.628	521.372	0.000
Nº Ind. (*):	1876	3003	81	1837	4584	249	3635	4469	0
Nº samples:		43			33			54	
Range:		9-56			10-55			12-53	
Total catch:		1189			5702			4923	
Sampled catch:		375			532			585	
Total hauls:		77			112			128	

TABLE 7 (cont.).- Yellowtail flounder length distribution. Estimated numbers in frequency in ‰. Spanish Spring Survey on NAFO 3NO: 1995-2003. Indet. means indeterminate. 1995-2000 data are transformed C/V *Playa de Menduíña* data. 2001-2003 data are original R/V *Vizconde de Eza* data. (*) indicates untransformed data.

	1998			1999			2000		
Lenght (cm.)	Males	Females	Indet.	Males	Females	Indet.	Males	Females	Indet.
6	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8	0.000	0.000	0.000	0.000	0.000	0.847	0.000	0.000	0.000
10	0.000	0.000	0.000	0.711	0.711	2.252	0.000	0.000	0.000
12	0.000	0.000	2.949	12.276	5.041	1.694	1.567	1.180	0.000
14	0.000	0.000	0.000	19.260	19.844	0.000	8.922	13.083	0.000
16	0.695	1.235	0.000	11.276	9.778	0.000	10.879	11.747	0.000
18	6.250	4.394	0.000	12.637	15.474	0.000	21.514	20.888	0.000
20	21.224	15.739	0.000	11.804	11.127	0.000	25.494	30.445	0.000
22	27.057	24.952	0.000	30.198	18.135	0.000	29.542	39.488	0.000
24	53.762	45.206	0.000	44.081	31.251	0.000	28.072	28.206	0.000
26	100.991	78.713	0.000	76.802	45.381	0.000	47.361	37.910	0.000
28	105.031	105.954	0.000	104.708	71.497	0.000	81.922	48.776	0.000
30	73.860	95.137	0.000	83.346	77.946	0.000	95.344	52.856	0.000
32	35.580	65.289	0.000	42.172	79.732	0.000	63.842	69.216	0.000
34	11.712	41.690	0.000	17.842	51.480	0.000	31.383	64.121	0.000
36	6.912	26.995	0.000	11.361	28.459	0.000	10.499	42.364	0.000
38	4.321	14.469	0.000	5.719	18.152	0.000	6.178	27.652	0.000
40	1.886	12.461	0.000	1.980	10.065	0.000	3.896	16.696	0.000
42	1.129	7.487	0.000	0.583	7.261	0.000	1.161	12.280	0.000
44	0.111	3.988	0.000	0.351	3.515	0.000	0.190	8.079	0.000
46	0.008	1.186	0.000	0.037	1.455	0.000	0.006	4.009	0.000
48	0.012	1.344	0.000	0.120	1.121	0.000	0.009	1.947	0.000
50	0.000	0.270	0.000	0.000	0.468	0.000	0.000	0.915	0.000
52	0.000	0.000	0.000	0.000	0.050	0.000	0.000	0.305	0.000
54	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.057	0.000
56	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	450.542	546.509	2.949	487.263	507.943	4.793	467.781	532.219	0.000
Nº Ind. (*):	2848	3693	3	4616	5076	6	3323	4100	0
Nº samples:		48			39			42	
Range:		11-49			8-52			11-54	
Total catch:		12231			17169			12742	
Sampled catch:		536			796			717	
Total hauls:		124			114			118	

TABLE 7 (cont.).- Yellowtail flounder length distribution. Estimated numbers in frequency in ‰. Spanish Spring Survey on NAFO 3NO: 1995-2003. Indet. means indeterminate. 1995-2000 data are transformed C/V *Playa de Menduíña* data. 2001-2003 data are original R/V *Vizconde de Eza* data. (*) indicates untransformed data.

	2001			2002			2003		
Lenght (cm.)	Males	Females	Indet.	Males	Females	Indet.	Males	Females	Indet.
6	0.000	0.000	0.137	0.000	0.000	0.201	0.000	0.000	0.027
8	0.000	0.000	1.005	0.215	0.644	0.823	0.027	0.223	1.196
10	0.000	0.121	3.110	1.385	0.919	0.201	0.487	0.793	0.286
12	0.134	1.251	2.102	2.053	1.596	0.000	2.108	2.236	0.000
14	0.796	1.834	1.754	0.286	0.503	0.000	2.145	2.312	0.000
16	2.344	3.560	0.205	3.148	3.491	0.000	2.437	1.027	0.000
18	7.815	8.145	0.652	4.497	3.105	0.000	2.099	1.604	0.000
20	19.776	20.147	0.077	7.500	6.464	0.000	2.774	3.555	0.000
22	26.061	39.400	0.000	19.726	14.963	0.000	6.019	6.771	0.000
24	28.699	34.438	0.000	30.406	25.945	0.000	15.853	12.998	0.000
26	31.027	30.579	0.000	41.384	39.659	0.000	38.930	28.882	0.000
28	57.475	37.091	0.000	52.845	40.782	0.000	70.596	52.980	0.000
30	87.437	49.478	0.000	83.736	42.848	0.000	90.472	59.930	0.000
32	88.774	69.391	0.000	97.471	72.278	0.000	106.832	65.227	0.000
34	43.602	87.801	0.000	58.725	97.327	0.000	63.872	96.590	0.000
36	17.143	73.139	0.000	17.909	91.267	0.000	24.619	106.275	0.000
38	7.750	52.856	0.000	6.649	59.272	0.000	8.400	59.322	0.000
40	7.091	24.456	0.000	4.107	34.607	0.000	2.326	32.145	0.000
42	1.762	14.030	0.000	1.647	14.083	0.000	0.851	11.853	0.000
44	0.902	7.616	0.000	0.402	8.974	0.000	0.579	6.124	0.000
46	0.373	3.776	0.000	0.000	3.459	0.000	0.262	4.042	0.000
48	0.121	2.113	0.000	0.037	1.466	0.000	0.000	1.233	0.000
50	0.000	0.489	0.000	0.031	0.864	0.000	0.000	0.551	0.000
52	0.000	0.103	0.000	0.031	0.070	0.000	0.000	0.133	0.000
54	0.000	0.067	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
Total	429.079	561.879	9.042	434.190	564.584	1.225	441.686	556.805	1.509
Nº Ind. (*):	3358	4684	80	3419	4576	7	2424	3254	12
Nº samples:		43			43			37	
Range:		6-53			6-52			5-52	
Total catch:		16141			14385			11280	
Sampled catch:		2298			2269			1864	
Total hauls:		83			125			122	

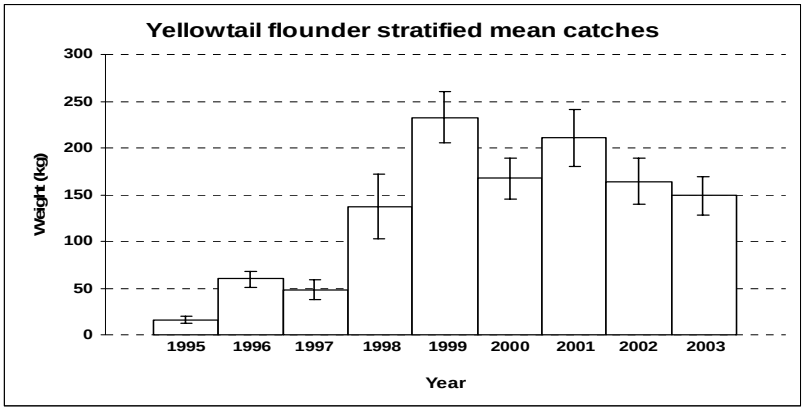

FIG. 1. Yellowtail flounder stratified mean catches in Kg and ±SD by year. Spanish Spring surveys on NAFO Div. 3NO: 1995-2003 (1995-2000 transformed data from C/V *Playa de Menduíña*; 2001-2003 original data from R/V *Vizconde de Eza*).

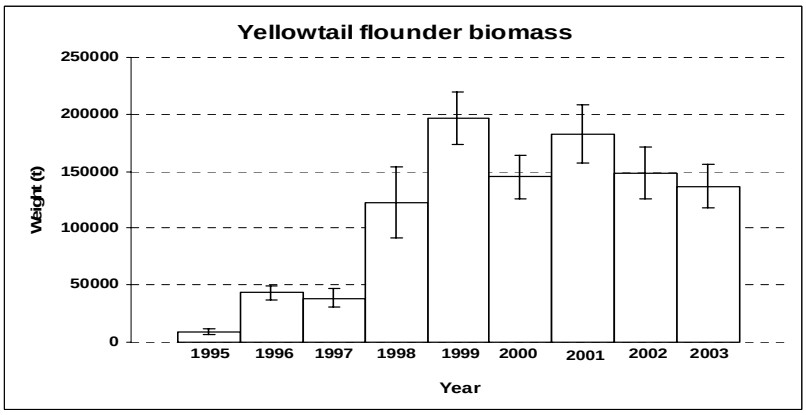

FIG. 2. Yellowtail flounder biomass in tons and ±SD by year. Spanish Spring surveys on NAFO Div. 3NO: 1995-2003 (1995-2000 transformed data from C/V *Playa de Menduíña*; 2001-2003 original data from R/V *Vizconde de Eza*).

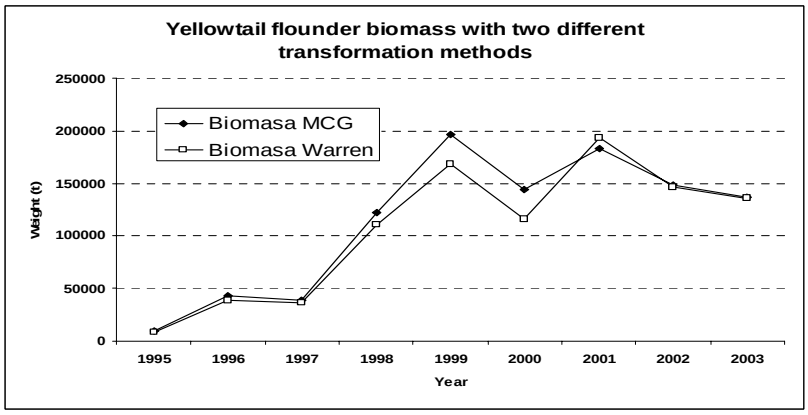

FIG. 3. Yellowtail flounder biomass in tons transformed with the two different methods: MCG and Warren.

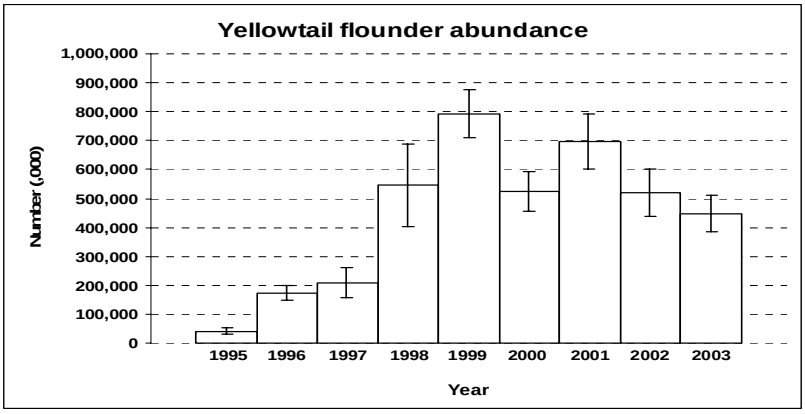

FIG. 4. Yellowtail flounder abundance in thousand and ±SD by year. Spanish Spring surveys on NAFO Div. 3NO: 1995-2003 (1995-2000 transformed data from C/V *Playa de Menduíña*; 2001-2003 original data from R/V *Vizconde de Eza*).

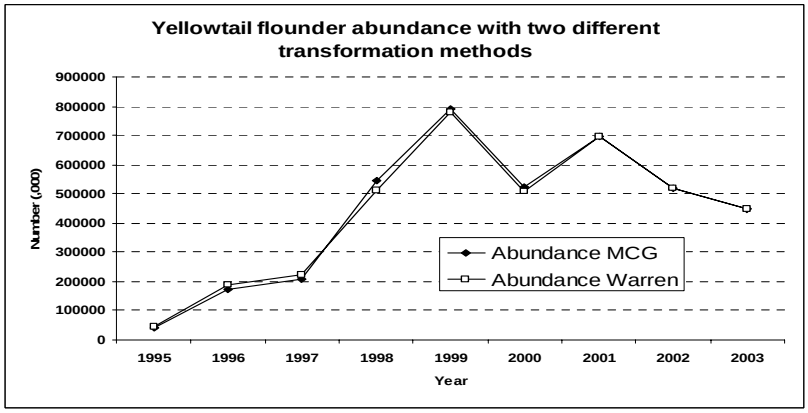

FIG. 5. Yellowtail flounder abundance in thousands transformed with the two different methods: MCG and Warren.

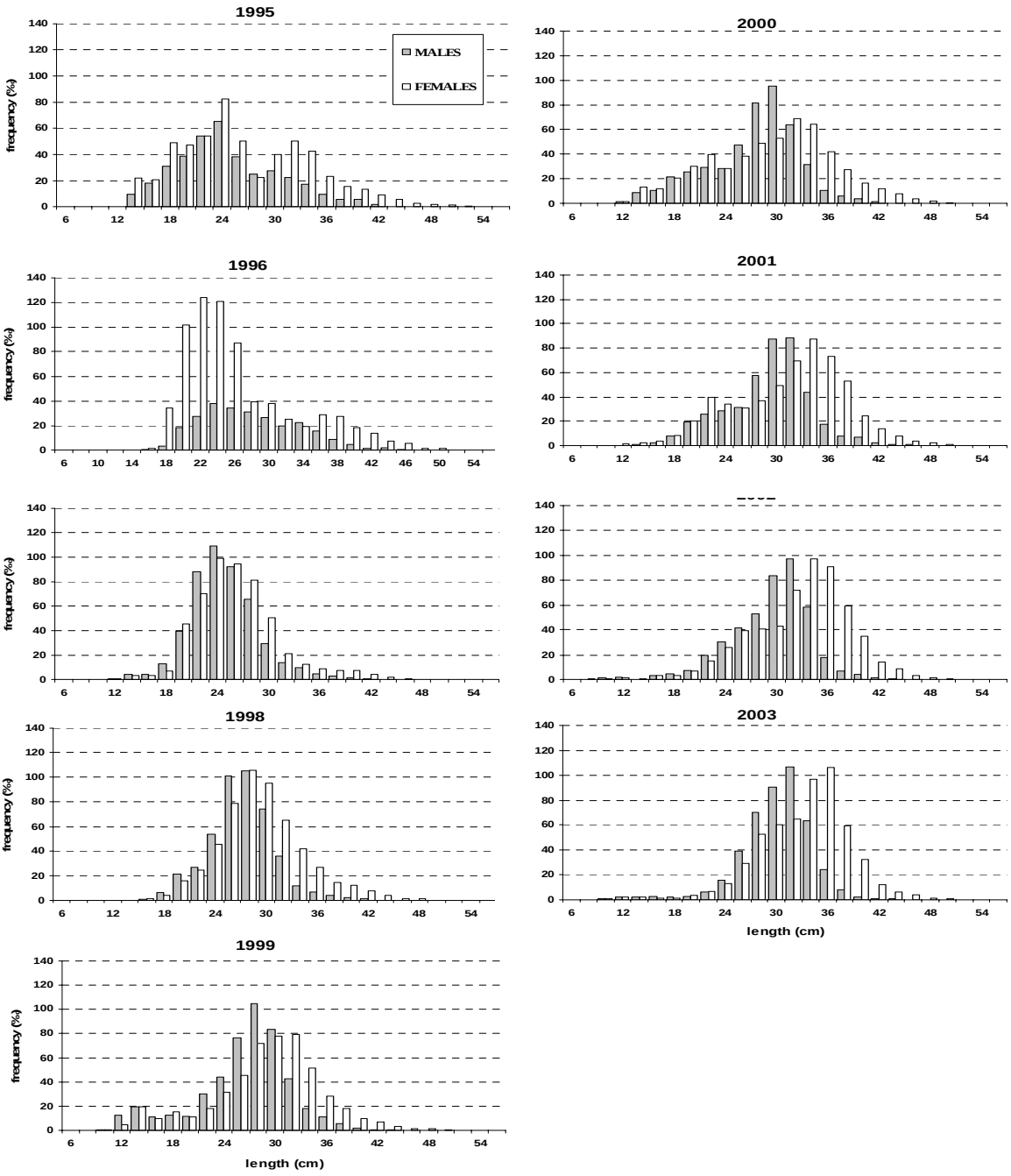

FIG. 6. Yellowtail flounder length distribution (cm) on NAFO 3NO: 1995-2003. Frequency in ‰. 1995-2000 data are transformed data from C/V *Playa de Menduíña*, and 2001-2003 data are original from R/V *Vizconde de Eza*.