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Results for redfish from the Spanish Surveys conducted in the NAFO Regulatory Area of Divisions 3NO, 1995 - 2009

by

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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 were transformed. The transformed entire series of mean catches, biomass and length distribution for redfish (*Sebastes marinus*, *Sebastes mentella* and *Sebastes fasciatus* collectively reported) are presented for the period 1995-2000, and the no-transformed data for the years 2002-2009. In 2001, there are data from the two vessels. The summed biomass based on conversion of the length frequencies are presented and compared to the estimates from the method used to convert the CPUE. The indices of this species were variable over the time, with a sharp increase in year 2009. There are no recent good recent recruitments.

Material and methods

Survey design and gear used

The survey on NAFO Regulatory Area of Div. 3NO 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* 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*. 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 vessels and gears combinations. A series of 92 paired hauls was carried out, 90 of then were valid hauls. Mean catch, stratified mean catch, biomass and their respective standard deviations, as length distribution, were transformed from C/V *Playa de Menduíña* series to R/V *Vizconde de Eza* series for the main caught species.

The main specifications and geometry of the used 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 Table 1 the number of valid tows, the depth strata covered and the dates of the survey series (1995-2009) are presented. In the period 1998-2009, the surveyed depth stratum 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).

There are three redfish species in the Northwest Atlantic, *Sebastes fasciatus* (Acadian redfish), *Sebastes mentella* (deepwater redfish) and *Sebastes marinus* (golden redfish). All the three redfish species are very similar in

appearance and are recorded collectively as an unique species. In its regulations, NAFO does not differentiate between species and the catches are reported by genus only (*Sebastes spp.*). In the case of the Grand Banks, there are two different stocks, the 3LN stock and the 3O stock, so the Spanish survey covers the stocks partially. The biomass was separated into the two covered Divisions, 3N and 3O, in order to can use them in the assessments.

The catch of each haul was sorted by species and weighted and a sample of each species was taken in order to measure the length distribution. For redfish each individual of the sample was measured to the total length to the nearest lower cm. Biomass and abundance indices were calculated by the swept area method (Cochran, 1997), assuming catchability factor of 1.

Due to technical problems in the vessel, this year two strata were not surveyed and six more have only one haul, so there are no standard deviations for these strata. As only one of these strata has usually catches of redfish, this fact is not significant for the calculation of the total standard deviation by year for the mean catch per tow and biomass for this species.

Redfish 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 and biomass. Although there are many models to convert the CPUE, we choose one of them that have 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.

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

$\alpha, \beta\ and\ \delta$ 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, biomass was obtained from the two methods and compared. For obtained the biomass from the length distribution, we use the following formula:

$$W = a\left(l + 0.25\right)^b N$$

where:

$W = weight\ in\ gr$

$l = length\ in\ cm$

$N = number$

The length distribution in number per tow is presented. In order to adjust the differences between the biomass transformed by FPC and the biomass obtained from the transformed length distribution in the series, in the period 1995-2001 we convert the length distribution by multiplying each length by the factor $\frac{Biomass_{FPC}}{Biomass_{length}}$, where $Biomass_{FPC}$ is the result of the converted biomass by the FPC, and $Biomass_{length}$ is the biomass obtained from the length distribution (in years 2002-2009 we assume that this factor is 1). Then, to get the length distribution in number per tow, the length distribution obtained before is multiplying by the factor $\frac{Stratified\ mean\ catch}{Biomass}$, where the biomass is obtained by the swept method, transformed or not.

Data series

For 1995-2000, transformed C/V *Playa de Menduíña* data series are presented. For 2002-2009, original R/V *Vizconde de Eza* data series are presented. In 2001, the deeper strata were not surveyed by the calibration experience. As the objective is to have data in all the strata surveyed last years, to obtain 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 were put, and in the strata surveyed the original R/V *Vizconde de Eza* data are presented. Besides this, in 2001 there were five hauls made by the C/V *Playa de Menduíña* in five strata surveyed by the R/V *Vizconde de Eza* too. These five hauls were transformed, too, and incorporated to the R/V *Vizconde de Eza* catches.

In this way, we present per strata the mean catches and variance, the stratified mean catches and the biomass. The length distribution in number per tow is presented.

The method to convert the indices from the length distribution has no accurate variance. Because of that, we do not consider this method as the best one for estimating the biomass indices.

Results

Redfish Mean Catches and Biomass

Redfish was present in 44 of the 90 valid hauls, but it was present only in 34 of them in both vessels. Of them, one was assumed to be an outlier, as the R/V *Vizconde de Eza* caught more than 12 tons in front of 91 kg in the C/V *Playa de Menduíña*. To convert mean catches and biomass, the CPUE was adjusted in model (1), giving the $\hat{F}PC$ =0.57149305.

The redfish mean catches by stratum are presented in Table 2, included swept area, number of hauls and SD. Stratified mean catch per tow and its SD are presented in Table 3 and Figure 1. The entire time series (1995-2009) of biomass and their SD estimates are presented in Table 4 and Figure 2. Besides the transformed biomass series, we present the biomass obtained from the transformed length distribution. The length-weight relationship parameters *a* and *b* are presented in Table 6, and in Table 4 and Figure 3 we present the comparison between the two indices. In general the trend in both cases is the same. The fact that in the first years of the time series the difference between the two indices is sometimes sharp is due to the poor length distribution coverage of redfish in these years.

The redfish indices show a quick increase from 1996 to 2000 following by a deeper decrease until 2002, and started increasing since then up to the levels of the first years of the time series. But in 2009 a sharp increase was occurred, reaching almost 5 times the second value of the series, which happened in 2005 (Fig. 1 and 2). This was not due only for just a few hauls, because of the 43 hauls in which redfish was caught, in 11 of them the catch was more than 1 ton, and there were three hauls with more than 15 tons of catch.

In table 5 there are presented the biomass and the mean catch per tow by Division, as the number of strata covered in each case, and the percentage of the biomass that the 3N has have over the total. We can see that in the 3N there is always more biomass than in the 3O, although that percentage is very spread over the time. In last years (since 2006), the main percentage of the biomass (always more than the 85%) was occurred in Division 3N.

Redfish Length Distribution

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

$$\text{Ln(Ratio)} = \exp(1.7287 - 0.3884\ln(l) - 0.0418\, l)$$

Figure 4 shows the ratios and their fit. In this figure, we can observe that there is a clear extreme value in the ratio of the length 11, and in the right tail the ratios are spread. For that, different adjusts were made with the data, including or not the first lengths and/or the final lengths, but the fit was not improved significantly from the one including all the lengths, so it was decided to take this one.

In Table 7 is shown redfish number per tow by sex, besides the sampled size and its catch for the period 1995-2009. In Figures 5 and 6 we can see the mean number per tow evolution along the years. Due to the large catch in the year 2009, in Figure 5 the y-axis upper limit was changed in the period 1995-2008 in order to see the length distribution, and the same data as in Figure 6 are presented in Figure 7 without the 2009 data. The last good recruit was in 2004, and since then we can follow the cohort up to 2009. In recent years there is only a discrete presence of juveniles. In 2009 there is a clear mode in 18 cm that seems to be a consequence of the 2004 recruitment.

References

Bishop, C. A. 1994. Revisions and additions to stratification schemes used during research vessel surveys in NAFO subareas 2 and 3. NAFO SCR Doc., Nº 43, Serial nº N2413, 23 pp.

Cochran, W. G. 1997. Sampling techniques. J. Wiley and Sons, N.Y., 428 pp.

Doubleday, W. G. 1981. Manual on groundfish surveys in the Northwest Atlantic. NAFO Sci. Coun. Studies, 2, 55.

González-Troncoso, D. and X. Paz. 2003. Testing methods for estimating the Factor Power Correction obtained from the comparative Fishing Trial: C/V *Playa de Menduíña* versus R/V *Vizconde de Eza*. NAFO SCR Doc. 03/5. Serial nº 4811.

Paz, X., D. González-Troncoso and P. Durán Muñoz. 2002. Comparative Exercise between the C/V *Playa de Menduíña* and the R/V *Vizconde de Eza* in the NAFO Divisions 3NO in May 2001. NAFO SCR Doc. 02/5. Serial nº N4603, 25 pp.

Robson, D. S. 1966. Estimation of the relative fishing power in individual ships. Res. Bull. Int. Comm. N. W. Atl. Fish. 3: 5-14

Sissenwine, M. P. and E. W. Bowman. 1978. An analysis of some factors affecting the catchability of fish by bottom trawls. ICNAF, Res. Bull. 13: 81-97

Walsh, J.S., X. Paz and P. Durán. 2001. A preliminary investigation of the efficiency of Canadian and Spanish Survey bottom trawls on the Southern Bank. NAFO SCR Doc., 01/74, Serial nº N4453, 18 pp.

Warren, W. G. 1997. Report on the comparative fishing trial between the *Gadus Atlantica* and *Teleost*. NAFO Sci. Coun. Studies, 29: 81-92

Wilderbuer, T. K., R. F. Kappenman and D. R. Gunderson. 1998. Analysis of fishing power correction factor estimates from a trawl comparison experiment. N. Am. J. Fish. Manage, 18: 11-18.

TABLE 1.- Spanish spring bottom trawl surveys on NAFO Div. 3NO: 1995-2009

Year	Vessel	Valid tows	Depth strata covered (m)	Dates
1995	C/V *Playa de Menduíña*	77	42-684	May 18-May 29
1996	C/V *Playa de Menduíña*	112	41-1135	May 07-May 24
1997	C/V *Playa de Menduíña*	128	42-1263	April 26-May 18
1998	C/V *Playa de Menduíña*	124	42-1390	May 06-May 26
1999	C/V *Playa de Menduíña*	114	41-1381	May 07-May 26
2000	C/V *Playa de Menduíña*	118	42-1401	May 07-May 28
2001(*)	R/V *Vizconde de Eza*	83	36-1156	May 03-May 24
	C/V *Playa de Menduíña*	121	40-1500	May 05-May 23
2002	R/V *Vizconde de Eza*	125	38-1540	April 29-May 19
2003	R/V *Vizconde de Eza*	118	38-1666	May 11-June 02
2004	R/V *Vizconde de Eza*	120	43-1539	June 06–June 24
2005	R/V *Vizconde de Eza*	119	47-1485	June 10–June 29
2006	R/V *Vizconde de Eza*	120	45-1480	June 7–June 27
2007	R/V *Vizconde de Eza*	110	45-1374	May 29–June 19
2008	R/V *Vizconde de Eza*	122	38-1460	May 27–June 16
2009	R/V *Vizconde de Eza*	109	45-1374	May 31–June 18

(*) 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 redfish mean catch (kg) and SD by stratum. Spanish Spring Surveys on NAFO Div. 3NO: 1995-2009. Swept area in square miles. n.s. means stratum not surveyed. 1995-2000 data are transformed C/V *Playa de Menduíña* data, and 2002-2009 data are original from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels.

	1995				1996				1997				1998				1999			
Stratum	Swept area	Tow number	Redfish Mean catch	Redfish SD	Swept area	Tow number	Redfish Mean catch	Redfish SD	Swept area	Tow number	Redfish Mean catch	Redfish SD	Swept area	Tow number	Redfish Mean catch	Redfish SD	Swept area	Tow number	Redfish Mean catch	Redfish SD
353	0.0353	3	0.00	0.000	0.0371	3	0.00	0.000	0.0480	4	0.00	0.000	0.0465	4	0.00	0.000	0.0360	3	0.00	0.000
354	0.0353	3	0.02	0.033	0.0319	3	0.00	0.000	0.0233	2	0.14	0.202	0.0356	3	438.34	759.219	0.0218	2	5.34	6.425
355	n.s.	n.s.	n.s.	n.s.	0.0221	2	172.59	228.805	0.0233	2	1.80	1.334	0.0221	2	480.45	351.492	0.0229	2	1082.06	1440.398
356	n.s.	n.s.	n.s.	n.s.	0.0203	2	123.61	86.075	0.0225	2	7.60	1.212	0.0221	2	1139.44	1071.610	0.0229	2	2684.53	2762.311
357	0.0109	1	101.73	-	0.0218	2	4.11	0.808	0.0443	4	25.36	23.238	0.0240	2	23.72	24.085	0.0236	2	76.52	69.991
358	0.0319	3	1800.58	2146.117	0.0319	3	3.45	5.533	0.0563	5	1.73	2.382	0.0236	3	17.10	28.548	0.0349	3	59.42	88.506
359	0.0345	3	0.00	0.000	0.0548	5	0.00	0.000	0.0690	6	0.00	0.000	0.0698	6	0.00	0.000	0.0364	3	0.04	0.076
360	0.3563	31	0.00	0.000	0.3761	31	0.00	0.000	0.3754	32	0.00	0.000	0.2561	25	0.00	0.000	0.2325	19	0.00	0.017
374	0.0225	2	0.00	0.000	0.0233	2	0.00	0.000	0.0353	3	0.00	0.000	0.0353	3	0.00	0.000	0.0244	2	0.00	0.000
375	0.0225	2	0.00	0.000	0.0229	2	0.00	0.000	0.0116	1	0.00	-	0.0345	3	0.00	0.000	0.0236	2	0.00	0.000
376	0.1729	15	0.00	0.000	0.1650	14	0.00	0.000	0.1583	14	0.01	0.037	0.0930	10	0.00	0.000	0.1219	10	0.00	0.000
377	0.0221	2	0.00	0.000	0.0229	2	0.89	0.525	0.0116	1	0.00	-	0.0229	2	0.00	0.000	0.0240	2	0.56	0.788
378	0.0435	4	3.17	5.148	0.0330	3	1.41	1.016	0.0210	2	1.71	2.425	0.0120	2	0.43	0.606	0.0229	2	1.53	0.715
379	0.0221	2	25.86	17.579	0.0113	1	2.57	-	0.0206	2	20.31	10.054	0.0356	3	11.14	4.068	0.0236	2	31.66	26.024
380	n.s.	n.s.	n.s.	n.s.	0.0221	2	2.44	0.343	0.0210	2	0.09	0.024	0.0113	2	1.37	0.323	0.0236	2	5.77	6.466
381	n.s.	n.s.	n.s.	n.s.	0.0229	2	0.23	0.323	0.0221	2	0.09	0.121	0.0229	2	0.00	0.000	0.0229	2	0.03	0.044
382	n.s.	n.s.	n.s.	n.s.	0.0338	3	0.00	0.000	0.0461	4	0.00	0.000	0.0229	3	0.00	0.000	0.0484	4	0.00	0.000
721	n.s.	n.s.	n.s.	n.s.	0.0214	2	353.93	395.782	0.0221	2	169.96	217.567	0.0203	2	143.53	125.798	0.0244	2	2152.90	1622.771
722	n.s.	n.s.	n.s.	n.s.	0.0206	2	120.53	50.837	0.0214	2	17.28	4.793	0.0101	2	18.77	12.568	0.0229	2	63.92	70.759
723	n.s.	n.s.	n.s.	n.s.	0.0109	1	154.42	-	0.0210	2	37.49	22.226	0.0233	2	107.33	120.343	0.0229	2	418.90	326.761
724	0.0105	1	451.54	-	0.0203	2	64.26	20.650	0.0225	2	22.49	17.740	0.0206	2	64.64	72.173	0.0225	2	140.87	183.788
725	0.0334	3	44.39	31.615	0.0225	2	42.69	24.327	0.0206	2	46.54	14.362	0.0086	1	17.77	-	0.0229	2	2579.77	3537.230
726	0.0214	2	56.52	42.916	0.0218	2	38.98	31.763	n.s.	n.s.	n.s.	n.s.	0.0094	2	2298.69	3221.013	0.0225	2	194.45	27.600
727	n.s.	n.s.	n.s.	n.s.	0.0210	2	10.06	4.930	0.0094	1	3.83	-	0.0233	2	11.77	6.870	0.0236	2	30.23	10.749
728	n.s.	n.s.	n.s.	n.s.	0.0218	2	40.42	32.914	0.0214	2	35.84	2.982	0.0206	2	61.35	19.438	0.0233	2	108.18	35.723
752	n.s.	n.s.	n.s.	n.s.	0.0109	1	5.94	-	0.0218	2	7.63	8.688	0.0229	2	168.19	171.260	0.0233	2	236.17	164.431
753	n.s.	n.s.	n.s.	n.s.	0.0199	2	0.00	0.000	0.0214	2	0.17	0.242	0.0218	2	0.94	0.113	0.0229	2	7.26	10.264
754	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0330	3	0.19	0.330	0.0210	2	0.00	0.000	0.0206	2	0.00	0.000
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	0.000	0.0311	3	0.00	0.000
756	n.s.	n.s.	n.s.	n.s.	0.0210	2	45.31	53.120	0.0109	1	4.29	-	0.0225	2	8.57	1.863	0.0225	2	439.22	575.003
757	n.s.	n.s.	n.s.	n.s.	0.0188	2	0.71	0.202	0.0304	3	0.00	0.000	0.0206	2	1.39	1.964	0.0233	2	85.64	77.710
758	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0214	2	0.00	0.000	0.0105	2	0.03	0.040	0.0214	2	0.35	0.065
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	0.000	0.0218	2	2.83	4.001
760	n.s.	n.s.	n.s.	n.s.	0.0210	2	123.26	56.797	0.0105	1	162.94	-	0.0214	2	43.80	34.147	0.0225	2	214.45	303.282
761	n.s.	n.s.	n.s.	n.s.	0.0199	2	0.00	0.000	0.0315	3	0.29	0.286	0.0206	2	4.43	3.673	0.0210	2	0.00	0.000
762	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0308	3	0.00	0.000	0.0094	2	0.00	0.000	0.0210	2	17.09	24.166
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	0.000	0.0311	3	0.00	0.000
764	n.s.	n.s.	n.s.	n.s.	0.0210	2	2.71	3.839	0.0206	2	1.34	1.899	0.0218	2	0.00	0.000	0.0225	2	0.05	0.069
765	n.s.	n.s.	n.s.	n.s.	0.0199	2	0.00	0.000	0.0206	2	0.00	0.000	0.0098	2	13.83	19.559	0.0221	2	0.00	0.000
766	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	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.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0109	2	0.11	0.152	0.0214	2	0.00	0.000

TABLE 2 (cont.).- Swept area, number of hauls and redfish mean catch (kg) and SD by stratum. Spanish Spring Surveys on NAFO Div. 3NO: 1995-2009. Swept area in square miles. n.s. means stratum not surveyed. 1995-2000 data are transformed C/V *Playa de Menduíña* data, and 2002-2009 data are original from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels.

	2000				2001				2002				2003				2004			
Stratum	Swept area	Tow number	Redfish Mean catch	Redfish SD	Swept area	Tow number	Redfish Mean catch	Redfish SD	Swept area	Tow number	Redfish Mean catch	Redfish SD	Swept area	Tow number	Redfish Mean catch	Redfish SD	Swept area	Tow number	Redfish Mean catch	Redfish SD
353	0.0356	3	0.00	0.000	0.0341	3	0.00	0.000	0.0476	4	0.00	0.000	0.0334	3	0.03	0.052	0.033750	3	0.00	0.000
354	0.0356	3	0.02	0.033	0.0338	3	60.03	101.794	0.0356	3	0.46	0.768	0.0338	3	0.00	0.000	0.034500	3	48.27	83.338
355	0.0233	2	886.53	626.406	0.0240	2	161.20	145.381	0.0236	2	246.50	46.103	0.0229	2	425.05	8.980	0.022875	2	336.45	14.779
356	0.0225	2	1274.17	484.645	0.0240	2	1069.10	766.645	0.0233	2	397.15	375.969	0.0225	2	252.98	85.532	0.022125	2	759.93	64.523
357	0.0124	1	802.95	-	0.0244	2	60.30	2.263	0.0240	2	49.65	26.941	0.0229	2	125.85	80.964	0.022875	2	511.45	555.291
358	0.0341	3	1358.82	2353.545	0.0345	3	3.96	2.070	0.0345	3	3.60	2.088	0.0338	3	181.05	226.985	0.033000	3	143.27	91.983
359	0.0469	4	0.10	0.194	0.0803	7	30.02	78.721	0.0686	6	0.57	1.013	0.0791	7	0.07	0.154	0.079125	7	1.17	2.841
360	0.2396	20	0.00	0.000	0.2423	20	0.25	1.118	0.2865	25	0.06	0.213	0.2254	20	0.00	0.013	0.231000	20	0.36	1.588
374	0.0240	2	0.00	0.000	0.0240	2	0.00	0.000	0.0345	3	0.00	0.000	0.0225	2	0.00	0.000	0.023250	2	0.00	0.000
375	0.0244	2	0.00	0.000	0.0338	3	0.00	0.000	0.0353	3	0.00	0.000	0.0330	3	0.00	0.000	0.033750	3	0.00	0.000
376	0.1200	10	0.00	0.000	0.1155	10	0.00	0.000	0.1140	10	0.00	0.000	0.1125	10	0.00	0.000	0.116625	10	0.00	0.000
377	0.0229	2	0.20	0.283	0.0229	2	0.00	0.000	0.0229	2	1.60	2.263	0.0225	2	0.61	0.863	0.021750	2	0.00	0.000
378	0.0233	2	2.29	0.808	0.0236	2	0.86	1.061	0.0233	2	2.05	1.202	0.0225	2	3.41	3.946	0.022500	2	150.50	202.091
379	0.0225	2	70.72	100.016	0.0229	2	30.15	36.699	0.0229	2	18.35	12.233	0.0229	2	20.88	14.177	0.012375	1	135.50	-
380	0.0236	2	0.00	0.000	0.0206	2	2.29	1.859	0.0225	2	1.17	1.174	0.0229	2	1.61	0.841	0.022125	2	149.70	160.372
381	0.0236	2	0.00	0.000	0.0236	2	0.11	0.000	0.0229	2	0.15	0.212	0.0229	2	0.10	0.096	0.022500	2	0.85	0.919
382	0.0499	4	0.10	0.200	0.0469	4	0.06	0.089	0.0341	3	0.46	0.626	0.0454	4	0.00	0.000	0.046125	4	0.00	0.000
721	0.0236	2	3120.12	1232.202	0.0248	2	466.20	229.103	0.0233	2	43.75	20.860	0.0225	2	105.00	38.042	0.022125	2	274.85	201.738
722	0.0218	2	271.74	384.305	0.0233	2	55.00	2.121	0.0236	2	5.80	6.134	0.0221	2	28.11	38.311	0.021750	2	26.71	30.533
723	0.0248	2	1655.39	2341.070	0.0240	2	202.75	207.112	0.0233	2	131.50	61.518	0.0229	2	161.65	151.109	0.022875	2	610.30	381.131
724	0.0233	2	628.93	889.439	0.0353	3	4295.90	6925.13	0.0225	2	238.00	239.992	0.0225	2	94.50	85.418	0.021375	2	88.58	98.818
725	0.0210	2	12.57	17.781	0.0116	2	37.34	14.09	0.0225	2	51.80	9.758	0.0229	2	51.20	62.515	0.022500	2	163.50	27.294
726	0.0221	2	0.00	0.000	0.0116	2	107.85	57.07	0.0214	2	39.80	14.566	0.0225	2	0.05	0.064	0.022500	2	117.51	153.265
727	0.0210	2	5.56	5.072	0.0225	2	5.80	1.50	0.0233	2	3.61	5.077	0.0218	2	31.33	13.824	0.023250	2	63.65	7.990
728	0.0210	2	0.00	0.000	0.0229	2	61.09	47.52	0.0229	2	19.50	27.577	0.0225	2	82.75	13.506	0.018000	2	10.03	1.075
752	0.0206	2	0.00	0.000	0.0210	2	26.40	35.16	0.0116	1	9.15	12.940	0.0229	2	43.95	47.023	0.021375	2	2.55	0.308
753	0.0218	2	0.00	0.000	0.0214	2	1.66	2.02	0.0229	2	0.22	0.304	0.0229	2	0.00	0.000	0.021750	2	0.00	0.000
754	0.0195	2	0.00	0.000	0.0195	2	0.00	0.00	0.0341	3	1.33	1.226	0.0218	2	0.00	0.000	0.021375	2	0.00	0.000
755	0.0431	4	0.00	0.000	0.0416	4	0.00	0.00	0.0338	3	0.00	0.000	0.0221	2	0.00	0.000	0.031875	3	0.00	0.000
756	0.0203	2	0.00	0.000	0.0113	2	39.40	51.76	0.0229	2	20.23	26.828	0.0221	2	3.32	3.910	0.021750	2	1.50	2.114
757	0.0214	2	0.00	0.000	0.0233	2	0.69	0.97	0.0225	2	66.45	92.843	0.0221	2	8.30	11.738	0.021750	2	0.00	0.000
758	0.0210	2	1.75	1.026	0.0218	2	0.00	0.00	0.0225	2	9.05	10.819	0.0221	2	0.00	0.000	0.021375	2	0.00	0.000
759	0.0210	2	0.00	0.000	0.0221	2	0.00	0.00	0.0225	2	0.05	0.071	0.0113	1	0.00	-	0.021375	2	0.00	0.000
760	0.0210	2	11.09	15.679	0.0229	2	99.10	132.23	0.0229	2	3.85	5.445	0.0218	2	12.92	14.828	0.022125	2	3.38	1.945
761	0.0221	2	0.43	0.614	0.0225	2	4.75	6.72	0.0225	2	11.60	14.001	0.0225	2	0.00	0.000	0.022125	2	0.55	0.778
762	0.0203	2	0.00	0.000	0.0116	2	0.00	0.00	0.0225	2	4.91	6.350	0.0225	2	0.00	0.000	0.023250	2	0.00	0.000
763	0.0416	4	115.73	231.455	0.0330	3	0.00	0.00	0.0225	2	0.00	0.000	0.0311	3	0.00	0.000	0.032625	3	0.13	0.233
764	0.0218	2	0.00	0.000	0.0240	2	14.86	20.28	0.0236	2	1.05	1.485	0.0221	2	5.51	1.047	0.022875	2	0.00	0.000
765	0.0203	2	5.14	7.274	0.0113	2	1.62	1.24	0.0236	2	9.25	13.081	0.0113	1	0.00	-	0.022500	2	0.00	0.000
766	0.0214	2	0.00	0.000	0.0203	2	0.80	1.131	0.0233	2	0.00	0.000	0.0225	2	0.48	0.678	0.022500	2	0.00	0.000
767	0.0210	2	0.00	0.000	0.0218	2	0.00	0.000	0.0225	2	0.03	0.046	0.0229	2	0.00	0.000	0.021750	2	0.00	0.000

TABLE 2 (cont.).- Swept area, number of hauls and redfish mean catch (kg) and SD by stratum. Spanish Spring Surveys on NAFO Div. 3NO: 1995-2009. Swept area in square miles. n.s. means stratum not surveyed. 1995-2000 data are transformed C/V *Playa de Menduíña* data, and 2002-2009 data are original from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels.

	2005				2006				2007				2008				2009			
Stratum	Swept area	Tow number	Redfish Mean catch	Redfish SD	Swept area	Tow number	Redfish Mean catch	Redfish SD	Swept area	Tow number	Redfish Mean catch	Redfish SD	Swept area	Tow number	Redfish Mean catch	Redfish SD	Swept area	Tow number	Redfish Mean catch	Redfish SD
353	0.0353	3	0.04	0.069	0.0371	3	1.25	2.034	0.0364	3	0.00	0.000	0.0341	3	0.00	0.000	0.0345	3	0.11	0.196
354	0.0353	3	21.34	36.380	0.0364	3	79.99	134.667	0.0364	3	9.95	2.685	0.0345	3	0.73	1.270	0.0338	3	2.67	3.866
355	0.0225	2	658.00	495.406	0.0248	2	1427.34	1241.630	0.0240	2	1023.66	498.312	0.0221	2	604.35	633.073	0.0233	2	851.40	56.003
356	0.0233	2	1048.51	471.506	0.0240	2	1124.70	216.509	0.0240	2	951.50	924.189	0.0236	2	421.60	498.652	0.0229	2	1109.75	350.371
357	0.0233	2	3120.47	2946.698	0.0244	2	1533.90	1417.891	0.0360	3	845.49	1296.007	0.0233	2	277.50	136.472	0.0116	2	12944.66	6837.525
358	0.0349	3	520.71	755.878	0.0349	3	821.37	1252.774	0.0368	3	1269.76	921.602	0.0345	3	1073.07	575.908	0.0341	3	4709.51	3691.878
359	0.0814	7	1.00	2.044	0.0975	8	2.24	5.002	0.0855	7	0.54	1.417	0.0799	7	0.34	0.500	0.0795	7	0.42	1.083
360	0.2325	20	0.08	0.202	0.2340	19	0.00	0.000	0.2378	20	0.00	0.000	0.2340	20	0.20	0.678	0.2273	20	0.20	0.883
374	0.0229	2	0.00	0.000	0.0236	2	0.00	0.000	0.0240	2	0.00	0.000	0.0233	2	0.00	0.000	0.0225	2	0.00	0.000
375	0.0349	3	0.00	0.000	0.0364	3	0.73	1.270	0.0364	3	0.00	0.000	0.0334	3	0.00	0.000	0.0341	3	0.00	0.000
376	0.1174	10	0.59	1.780	0.1219	10	0.00	0.000	0.1185	10	0.00	0.000	0.1129	10	0.20	0.639	0.1133	10	0.00	0.000
377	0.0233	2	0.00	0.000	0.0236	2	0.49	0.693	0.0240	2	0.00	0.000	0.0233	2	0.00	0.000	0.0225	2	0.00	0.000
378	0.0225	2	3660.93	4755.328	0.0240	2	1392.20	1375.040	0.0233	2	31.44	40.814	0.0240	2	456.60	152.594	0.0229	2	1001.95	1399.435
379	0.0236	2	2547.70	158.250	0.0236	2	2008.20	692.682	0.0240	2	4428.25	851.003	0.0229	2	2794.83	3845.706	0.0229	2	12745.33	5943.473
380	0.0229	2	390.27	417.709	0.0229	2	411.35	334.815	0.0240	2	362.40	204.920	0.0225	2	392.21	190.623	0.0229	2	21.74	24.374
381	0.0233	2	2.02	0.339	0.0229	2	6.91	1.916	0.0240	2	0.46	0.628	0.0229	2	1.61	1.894	0.0229	2	0.08	0.093
382	0.0458	4	0.41	0.825	0.0469	4	0.11	0.224	0.0484	4	0.58	1.168	0.0458	4	0.76	1.525	0.0450	4	0.00	0.000
721	0.0229	2	242.29	145.261	0.0236	2	108.10	86.833	0.0116	1	168.60	-	0.0225	2	52.45	26.375	0.0229	2	3197.60	4102.634
722	0.0233	2	52.17	68.893	0.0240	2	1.98	2.008	0.0225	2	2.61	2.594	0.0206	2	8.88	8.881	0.0225	2	2.58	0.177
723	0.0233	2	1141.00	1389.323	0.0236	2	595.46	249.694	0.0240	2	206.75	171.615	0.0225	2	215.73	57.947	0.0225	2	9914.19	12350.058
724	0.0225	2	83.20	11.738	0.0233	2	17.41	23.922	0.0233	2	174.75	179.959	0.0221	2	164.85	27.082	0.0233	2	173.01	122.605
725	0.0236	2	414.15	306.955	0.0233	2	500.75	663.195	0.0225	2	504.10	269.973	0.0229	2	285.92	98.458	0.0229	2	398.45	69.367
726	0.0113	1	72.20	-	0.0225	2	72.73	63.958	0.0229	2	119.15	69.933	0.0225	2	100.00	98.995	0.0229	2	301.95	427.022
727	0.0229	2	18.00	2.263	0.0225	2	11.70	8.910	0.0240	2	9.47	10.621	0.0221	2	14.42	1.011	0.0113	1	279.10	-
728	0.0109	1	73.50	-	0.0225	2	6.53	1.803	0.0225	2	8.90	5.370	0.0221	2	7.44	0.233	0.0229	2	30.65	7.990
752	0.0236	2	0.17	0.233	0.0225	2	0.63	0.884	0.0225	2	0.51	0.725	0.0218	2	2.06	1.771	0.0229	2	6.16	8.704
753	0.0225	2	0.00	0.000	0.0225	2	0.00	0.000	0.0225	2	0.00	0.000	0.0221	2	0.00	0.000	0.0116	1	0.00	-
754	0.0225	2	0.00	0.000	0.0225	2	0.00	0.000	0.0225	2	0.00	0.000	0.0218	2	0.00	0.000	0.0113	1	0.00	-
755	0.0450	4	0.00	0.000	0.0338	3	0.08	0.144	0.0338	3	0.00	0.000	0.0431	4	0.00	0.000	0.0116	1	0.00	-
756	0.0233	2	1.20	1.697	0.0229	2	0.28	0.396	0.0225	2	9.65	13.647	0.0218	2	18.49	24.770	0.0225	2	4.05	5.728
757	0.0225	2	0.72	1.011	0.0225	2	0.00	0.000	0.0229	2	0.00	0.000	0.0221	2	0.09	0.115	0.0229	2	0.20	0.283
758	0.0225	2	0.00	0.000	0.0225	2	1.13	1.591	0.0225	2	0.00	0.000	0.0218	2	0.00	0.000	0.0225	2	0.00	0.000
759	0.0229	2	0.18	0.247	0.0225	2	0.37	0.516	n.s.	n.s.	n.s.	n.s.	0.0221	2	0.00	0.000	0.0113	1	0.00	-
760	0.0229	2	22.26	1.633	0.0225	2	24.90	21.927	0.0233	2	5.53	5.996	0.0225	2	0.61	0.028	0.0229	2	7.96	0.007
761	0.0221	2	0.37	0.516	0.0233	2	0.00	0.000	0.0225	2	0.00	0.000	0.0214	2	0.00	0.000	0.0225	2	0.00	0.000
762	0.0225	2	0.00	0.000	0.0233	2	0.25	0.346	n.s.	n.s.	n.s.	n.s.	0.0214	2	0.00	0.000	0.0225	2	0.00	0.000
763	0.0334	3	0.43	0.751	0.0225	2	0.00	0.000	n.s.	n.s.	n.s.	n.s.	0.0311	3	0.68	0.302	n.s.	n.s.	n.s.	n.s.
764	0.0233	2	1.70	0.612	0.0233	2	0.00	0.000	0.0225	2	0.00	0.000	0.0221	2	0.00	0.000	0.0116	1	0.61	-
765	0.0229	2	0.00	0.000	0.0236	2	0.00	0.000	0.0225	2	0.00	0.000	0.0214	2	0.00	0.000	0.0225	2	0.00	0.000
766	0.0229	2	1.10	0.962	0.0229	2	0.00	0.000	n.s.	n.s.	n.s.	n.s.	0.0218	2	0.11	0.151	0.0225	2	0.00	0.000
767	0.0113	1	0.00	-	0.0233	2	0.00	0.000	n.s.	n.s.	n.s.	n.s.	0.0214	2	0.00	0.000	n.s.	n.s.	n.s.	n.s.

TABLE 3.- Stratified mean catches (Kg) by stratum and year and SD by year of redfish (1995-2009). n.s. means stratum not surveyed. 1995-2000 data are transformed C/V *Playa de Menduíña* data. 2002-2009 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	2006	2007	2008	2009
353	0	0	0	0	0	0	0	0	8	0	11	337	0	0	30
354	5	0	35	107830	1314	5	14767	114	0	11874	5250	19678	2448	180	656
355	n.s.	12772	133	35554	80073	65603	11929	18241	31454	24897	48692	105623	75751	44722	63004
356	n.s.	5810	357	53554	126173	59886	50248	18666	11890	35716	49280	52861	44721	19815	52158
357	16683	675	4158	3890	12550	131683	9889	8143	20639	83878	511757	251560	138660	45510	2122924
358	405131	776	389	3848	13369	305734	891	810	40736	32235	117161	184808	285696	241440	1059641
359	0	0	0	0	18	41	12639	239	31	493	419	941	226	144	178
360	0	0	0	0	11	0	696	168	9	988	225	0	0	551	550
374	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
375	0	0	0	0	0	0	0	0	0	0	0	199	0	0	0
376	0	0	19	0	0	0	0	0	0	0	782	0	0	269	0
377	0	89	0	0	56	20	0	160	61	0	0	49	0	0	0
378	440	196	238	60	213	318	120	285	474	20920	508869	193516	4370	63467	139271
379	2741	273	2153	1181	3356	7497	3196	1945	2213	14363	270056	212869	469395	296251	1351005
380	n.s.	235	8	132	554	0	384	112	154	14371	37465	39490	34790	37652	2087
381	n.s.	33	12	0	5	0	29	22	15	122	291	994	66	232	12
382	n.s.	0	0	0	0	34	38	157	0	0	141	38	200	262	0
721	n.s.	23005	11047	9329	139939	202808	30303	2844	6825	17865	15749	7027	10959	3409	207844
722	n.s.	10124	1451	1577	5369	22827	4620	487	2361	2244	4382	166	220	746	216
723	n.s.	23935	5811	16636	64930	256585	31426	20383	25056	94597	176855	92296	32046	33437	1536699
724	55991	7969	2789	8015	17468	77987	532692	29512	11718	10983	10317	2159	21669	20441	21453
725	4661	4483	4886	1866	270876	1320	4998	5439	5375	17168	43486	52579	52931	30022	41837
726	4069	2806	n.s.	165506	14000	0	9587	2866	3	8460	5198	5236	8579	7200	21740
727	n.s.	966	368	1130	2902	534	974	347	3007	6110	1728	1123	909	1384	26794
728	n.s.	3153	2795	4785	8438	0	8338	1521	6455	782	5733	509	694	580	2391
752	n.s.	779	999	22033	30938	0	6052	1199	5757	334	22	82	67	270	806
753	n.s.	0	24	129	1002	0	400	30	0	0	0	0	0	0	0
754	n.s.	n.s.	34	0	0	0	0	240	0	0	0	0	0	0	0
755	n.s.	n.s.	n.s.	0	0	0	0	0	0	0	0	32	0	0	0
756	n.s.	4576	433	866	44361	0	4085	2043	335	151	121	28	975	1867	409
757	n.s.	73	0	142	8735	0	122	6778	847	0	73	0	0	9	20
758	n.s.	n.s.	0	3	35	174	0	896	0	0	0	111	0	0	0
759	n.s.	n.s.	n.s.	0	359	0	0	6	0	0	22	46	n.s.	0	0
760	n.s.	18982	25093	6746	33026	1707	15261	593	1989	520	3427	3834	852	94	1225
761	n.s.	0	49	758	0	74	812	1984	0	94	62	0	0	0	0
762	n.s.	n.s.	0	0	3623	0	0	1041	0	0	0	52	n.s.	0	0
763	n.s.	n.s.	n.s.	0	0	30205	0	0	0	35	113	0	n.s.	178	n.s.
764	n.s.	271	134	0	5	0	1486	105	551	0	170	0	0	0	61
765	n.s.	0	0	1715	0	638	236	1147	0	0	0	0	0	0	0
766	n.s.	n.s.	0	0	0	0	202	0	69	0	158	0	n.s.	15	0
767	n.s.	n.s.	0	17	0	0	0	5	0	0	0	0	n.s.	0	n.s.
TOTAL	489721	121977	63418	447300	883699	1165680	756419	128525	178032	399201	1818016	1228243	1186222	850149	6653012
$\overline{Y}$	74.50	13.90	6.79	43.25	85.45	112.71	73.14	12.43	17.21	38.60	175.79	118.76	125.66	82.20	670.46
S.D.	42.42	7.56	1.15	19.50	29.56	40.03	48.13	2.60	3.55	8.05	58.86	27.83	20.19	29.14	172.93

TABLE 4.- Survey estimates (by the swept area method) of redfish 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. 2002-2009 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	2006	2007	2008	2009
353	0	0	0	0	0	0	0	0	1	0	1	27	0	0	3
354	0	0	3	9080	121	0	1313	10	0	1033	447	1623	202	16	58
355	n.s.	1155	11	3214	7001	5643	994	1544	2750	2177	4328	8535	6313	4043	5420
356	n.s.	574	32	4841	11032	5323	4187	1606	1057	3229	4239	4405	3727	1677	4560
357	1534	62	376	324	1062	10641	812	679	1805	7334	44022	20641	11555	3915	365234
358	38130	73	35	331	1150	26878	77	70	3621	2930	10078	15897	23322	20995	93155
359	0	0	0	0	2	3	1102	21	3	44	36	77	18	13	18
360	0	0	0	0	1	0	57	15	1	86	19	0	0	47	48
374	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
375	0	0	0	0	0	0	0	0	0	0	0	16	0	0	0
376	0	0	2	0	0	0	0	0	0	0	67	0	0	24	0
377	0	8	0	0	5	2	0	14	5	0	0	4	0	0	0
378	40	18	23	5	19	27	10	25	42	1860	45233	16126	376	5289	12177
379	248	24	209	99	284	666	279	170	193	1161	22862	18021	39116	25902	118121
380	n.s.	21	1	12	47	0	21	10	13	1299	3276	3453	2899	3347	182
381	n.s.	3	1	0	0	0	1	2	1	11	25	87	5	20	1
382	n.s.	0	0	0	0	3	2	14	0	0	12	3	17	23	0
721	n.s.	2153	999	921	11482	17169	2450	245	607	1615	1377	595	943	303	18172
722	n.s.	982	136	148	469	2099	397	41	213	206	377	14	20	72	19
723	n.s.	2201	553	1431	5677	20734	2619	1753	2191	8271	15213	7813	2671	2972	136596
724	5332	787	248	777	1553	6709	45323	2623	1042	1028	917	186	1864	1848	1845
725	419	398	474	216	23683	126	337	483	470	1526	3681	4523	4705	2625	3658
726	381	258	n.s.	16049	1244	0	637	268	0	752	462	465	750	640	1901
727	n.s.	92	39	97	246	51	49	30	277	526	151	100	76	125	2382
728	n.s.	290	262	464	726	0	417	133	574	87	527	45	62	52	209
752	n.s.	72	92	1926	2661	0	329	105	503	31	2	7	6	25	70
753	n.s.	0	2	12	88	0	21	3	0	0	0	0	0	0	0
754	n.s.	n.s.	3	0	0	0	0	21	0	0	0	0	0	0	0
755	n.s.	n.s.	n.s.	0	0	0	0	0	0	0	0	3	0	0	0
756	n.s.	436	40	77	3943	0	348	179	30	14	10	2	87	172	36
757	n.s.	8	0	14	751	0	6	602	77	0	6	0	0	1	2
758	n.s.	n.s.	0	0	3	17	0	80	0	0	0	10	0	0	0
759	n.s.	n.s.	n.s.	0	33	0	0	1	0	0	2	4	n.s.	0	0
760	n.s.	1808	2390	631	2936	163	1334	52	183	47	300	341	73	8	107
761	n.s.	0	5	73	0	7	72	176	0	9	6	0	0	0	0
762	n.s.	n.s.	0	0	345	0	0	93	0	0	0	4	n.s.	0	0
763	n.s.	n.s.	n.s.	0	0	2903	0	0	0	3	10	0	n.s.	17	n.s.
764	n.s.	26	13	0	0	0	124	9	50	0	15	0	0	0	5
765	n.s.	0	0	163	0	63	18	97	0	0	0	0	0	0	0
766	n.s.	n.s.	0	0	0	0	11	0	6	0	14	0	n.s.	1	0
767	n.s.	n.s.	n.s.	2	0	0	0	0	0	0	0	0	n.s.	0	n.s.
TOTAL	46085	11447	5947	40909	76564	99226	63350	11172	15714	35275	157716	103029	98805	74172	763980
S.D.	26520	2305	988	20512	27740	33453	41460	2374	3224	7332	52646	23332	15893	26168	145765
Warren method	63371	1513	5062	29040	75153	108550	67036								

TABLE 5.- Mean catch per tow (kg) and biomass by the swept area method (t) of redfish and SD by Division and year on NAFO Div. 3NO. 1995-2000 data are transformed C/V *Playa de Menduíña* data. 2002-2009 data are original from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels. In the final row it is presented the percentage of the 3N Biomass over the Total Biomass.

		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
3N	Biomass	46084	6558	4753	22540	46459	68928	53855	7620	11031	27016	146918	87830	87602	68059	735743
	SD	26807	782.7	352.9	17632	25022	33109	41371	2106	3199	7174	52267	22675	15364	25890	143334
	MCPT	80.84	9.012	6.14	26.32	58.78	90.12	71.16	9.624	13.83	33.95	187.61	115.4	124.8	86.51	721.67
	SD	46.02	1.044	0.465	18.33	30.08	45.16	55	2.614	4.045	9.056	67.31	30.96	22.09	33.12	194.48
	Nº Strata	13	25	27	31	31	31	31	31	31	31	31	31	28	31	30
3O	Biomass	0.399	4888	1194	18369	30105	30298	9494	3552	4684	8259	10797	15199	11203	6113	28238
	SD	0.392	2158	922.3	10490	12129	6073	2702	1117	369.4	1326	2728	5279	3362	3258	16762
	MCPT	0.009	51.52	11.41	159.9	269.2	268.3	86.8	31.74	40.55	70.63	94.349	141.6	132.9	52.55	280.98
	SD	0.009	21.97	8.677	87.87	107	54.27	24.47	9.778	3.103	11.68	24.188	52.04	39.93	28.27	163.87
	Nº Strata	2	8	9	10	10	10	10	10	10	10	10	10	8	10	9
3N/Total (%)	Biomass	100	57	80	55	61	69	85	68	70	77	93	85	89	92	96

TABLE 6.- Length weight relationships in the calculation of redfish biomass. The equation is $Weight = a(l + 0.25)^b$. Spanish Spring Surveys on NAFO Div. 3NO: 1995-2009. To calculate the parameters for the indeterminate individuals, we used the total data (males + females + indeterminate individuals)). *E* means Error. *n.d.* means not data avaliable.

		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Males	a	n.d	n.d.	0.0111	n.d.	n.d.	0.0066	n.d.	0.0204	0.0119	0.0079	0.0107	0.0296	0.0131	0.0152	0.0093
		n.d	n.d.	E = 0.3722	n.d.	n.d.	E = 0.3003	n.d.	E = 0.2048	E = 0.1119	E = 0.1549	E = 0.1094	E = 0.1458	E = 0.1337	E = 0.1044	E = 0.1059
	b	n.d	n.d.	3.0152	n.d.	n.d.	3.2102	n.d.	2.8433	3.0127	3.1334	3.0481	2.7477	2.9972	2.9429	3.0825
		n.d	n.d.	E = 0.1116	n.d.	n.d.	E = 0.0950	n.d.	E = 0.0647	E = 0.0350	E = 0.0489	E = 0.0338	E = 0.0456	E = 0.0428	E = 0.0315	E = 0.0341
		n.d	n.d.	R2 = 0.991	n.d.	n.d.	R2 = 0.992	n.d.	R2 = 0.987	R2 = 0.996	R2 = 0.993	R2 = 0.996	R2 = 0.992	R2 = 0.993	R2 = 0.997	R2 = 0.996
		n.d	n.d.	N=19	n.d.	n.d.	N=26	n.d.	N=181	N=417	N=203	N=281	N=336	N= 562	N= 348	N= 272
Females	a	n.d	n.d.	0.0061	n.d.	n.d.	0.0083	n.d.	0.0085	0.0096	0.0141	0.0071	0.0199	0.0175	0.0125	0.0121
		n.d	n.d.	E = 1.0881	n.d.	n.d.	E = 0.2467	n.d.	E = 0.1346	E = 0.1162	E = 0.1282	E = 0.1279	E = 0.2300	E = 0.1358	E = 0.1539	E = 0.1250
	b	n.d	n.d.	3.2127	n.d.	n.d.	3.1406	n.d.	3.1207	3.0731	2.9742	3.1823	2.8736	2.9166	3.0167	3.0134
		n.d	n.d.	E = 0.3318	n.d.	n.d.	E = 0.0773	n.d.	E = 0.0415	E = 0.0363	E = 0.0389	E = 0.0397	E = 0.0707	E = 0.0430	E = 0.0456	E = 0.0389
		n.d	n.d.	R2 = 0.949	n.d.	n.d.	R2 = 0.993	n.d.	R2 = 0.996	R2 = 0.996	R2 = 0.996	R2 = 0.995	R2 = 0.981	R2 = 0.993	R2 = 0.993	R2 = 0.995
		n.d	n.d.	N=21	n.d.	n.d.	N=24	n.d.	N=190	N=401	N=258	N=316	N=361	N= 563	N= 410	N= 258
Indet.	a	n.d	n.d.	0.0110	n.d.	n.d.	0.0070	n.d.	0.0079	0.0087	0.0065	0.0063	0.0155	0.0116	0.0054	0.0083
		n.d	n.d.	E = 0.4972	n.d.	n.d.	E = 0.1240	n.d.	E = 0.1031	E = 0.1063	E = 0.1368	E = 0.1138	E = 0.1350	E = 0.1405	E = 0.1191	E = 0.1427
	b	n.d	n.d.	3.0254	n.d.	n.d.	3.1921	n.d.	3.1371	3.1045	3.1996	3.2109	2.9410	3.0378	3.2553	3.1239
		n.d	n.d.	E = 0.1487	n.d.	n.d.	E = 0.0386	n.d.	E = 0.0326	E = 0.0347	E = 0.0437	E = 0.0361	E = 0.0433	E = 0.0451	E = 0.0369	E = 0.0460
		n.d	n.d.	R2 = 0.979	n.d.	n.d.	R2 = 0.998	n.d.	R2 = 0.997	R2 = 0.995	R2 = 0.995	R2 = 0.995	R2 = 0.992	R2 = 0.992	R2 = 0.996	R2 = 0.992
		n.d	n.d.	N=40	n.d.	n.d.	N=50	n.d.	N=374	N=844	N=466	N=616	N=781	N= 1126	N= 770	N= 532

TABLE 7.- Redfish length distribution. Estimated numbers per haul mean catches. Spanish Spring Survey on NAFO 3NO: 1995-2009. Indet. means indeterminate. 1995-2000 data are transformed C/V *Playa de Menduíña* data. 2002-2009 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				1999			
Lenght (cm.)	Males	Females	Indet.	Total	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	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	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	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.373	0.373
10	1.568	0.167	0.000	1.735	0.000	0.304	0.304	0.608	0.000	0.186	0.000	0.186	0.000	0.000	0.000	0.000	0.191	0.000	0.021	0.211
12	0.000	0.000	0.000	0.000	0.000	0.262	0.000	0.262	0.022	0.036	0.000	0.058	0.040	0.008	0.008	0.055	1.950	0.730	0.000	2.680
14	0.588	0.000	0.000	0.588	0.000	0.228	0.244	0.472	0.490	0.330	0.000	0.820	0.806	0.554	0.007	1.367	3.072	1.419	0.000	4.491
16	31.125	20.294	0.000	51.418	1.398	0.000	0.000	1.398	0.946	0.619	0.000	1.565	3.584	2.252	0.000	5.835	14.143	9.646	0.000	23.788
18	160.928	195.648	0.000	356.576	9.625	4.654	0.000	14.279	3.054	1.336	0.000	4.390	3.956	2.589	0.000	6.545	25.597	16.121	0.000	41.718
20	79.077	84.761	0.000	163.838	11.810	16.314	0.000	28.124	6.772	3.978	0.000	10.750	28.656	15.413	0.000	44.069	103.936	26.874	0.000	130.810
22	20.697	17.898	0.000	38.595	3.778	4.779	0.000	8.557	3.850	2.553	0.000	6.402	38.558	40.190	0.000	78.747	92.112	54.349	0.000	146.461
24	3.661	9.337	0.000	12.998	0.775	0.883	0.000	1.658	1.600	1.546	0.000	3.146	17.115	27.574	0.000	44.690	22.120	48.203	0.000	70.322
26	3.835	1.894	0.000	5.729	0.627	0.133	0.000	0.760	1.517	1.000	0.000	2.516	7.699	14.565	0.000	22.264	11.792	22.407	0.000	34.199
28	5.954	5.448	0.000	11.402	2.264	1.500	0.000	3.764	0.863	0.639	0.000	1.502	4.151	6.007	0.000	10.157	6.475	10.949	0.000	17.424
30	2.620	1.416	0.000	4.036	4.042	3.409	0.000	7.452	1.238	1.244	0.000	2.482	1.286	2.311	0.000	3.597	4.543	5.023	0.000	9.566
32	0.006	0.448	0.000	0.454	1.683	2.532	0.000	4.215	1.516	1.025	0.000	2.540	1.259	1.941	0.000	3.199	2.672	3.126	0.000	5.798
34	0.005	0.028	0.000	0.033	0.334	0.334	0.000	0.668	0.222	0.194	0.000	0.416	0.538	0.589	0.000	1.126	0.448	1.456	0.000	1.905
36	0.167	0.010	0.000	0.176	0.000	0.154	0.000	0.154	0.100	0.046	0.000	0.147	0.188	0.064	0.000	0.252	0.145	0.261	0.000	0.406
38	0.122	0.038	0.000	0.160	0.000	0.000	0.000	0.000	0.168	0.118	0.000	0.285	0.287	0.008	0.000	0.295	0.270	0.253	0.000	0.523
40	0.046	0.033	0.000	0.078	0.000	0.000	0.000	0.000	0.022	0.074	0.000	0.096	0.140	0.029	0.000	0.169	0.010	0.002	0.000	0.013
42	0.000	0.031	0.000	0.031	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.103	0.000	0.000	0.103	0.021	0.021	0.000	0.042
44	0.000	0.070	0.000	0.070	0.000	0.000	0.000	0.000	0.000	0.017	0.000	0.017	0.000	0.000	0.000	0.000	0.003	0.002	0.000	0.005
46	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
48	0.000	0.060	0.000	0.060	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
52	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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	310.398	337.580	0.000	647.978	36.336	35.486	0.548	72.370	22.380	14.940	0.000	37.320	108.363	114.093	0.015	222.471	289.499	200.841	0.394	490.734
Nº samples (*):				11				2				19				23				48
Nº Ind. (*):	887	804	0	1691	252	251	2	2	1165	696	0	1861	1591	1451	2	3044	3291	2607	17	5915
Sampled catch:				244				183				370				544				1403
Range (*):				11-48				11-36				11-45				12-42				8-45
Total catch:				10964				4324				1791				18553				37339
Total hauls (*):				77				112				128				124				114

TABLE 7 (cont.).- Redfish length distribution. Estimated numbers per haul mean catches. Spanish Spring Survey on NAFO 3NO: 1995-2009. Indet. means indeterminate. 1995-2000 data are transformed C/V *Playa de Menduíña* data. 2002-2009 data are original R/V *Vizconde de Eza* data. In 2001, there are data from the two vessels. (*) indicates untransformed data.

	2000				2001				2002				2003				2004			
Lenght (cm.)	Males	Females	Indet.	Total	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	0.032	0.032	0.000	0.000	0.049	0.049	0.000	0.000	0.000	0.000
6	0.000	0.000	0.000	0.000	0.093	0.000	0.635	0.729	0.007	0.000	0.824	0.831	0.000	0.000	0.494	0.494	0.000	0.000	1.835	1.835
8	0.235	0.000	0.000	0.235	0.070	0.140	0.246	0.456	0.009	0.000	0.146	0.155	0.041	0.010	0.137	0.188	0.096	0.009	15.440	15.544
10	0.550	0.000	0.000	0.550	0.132	0.105	0.088	0.325	0.024	0.012	0.030	0.066	0.071	0.010	0.092	0.173	0.585	0.490	2.260	3.335
12	11.077	0.370	0.000	11.448	1.112	0.252	0.133	1.497	0.117	0.011	0.007	0.135	0.076	0.016	0.051	0.143	2.988	1.786	0.035	4.808
14	26.016	2.705	0.000	28.722	3.068	0.714	0.000	3.783	0.547	0.271	0.000	0.818	0.666	0.302	0.000	0.968	3.194	1.185	0.000	4.379
16	45.205	15.696	0.000	60.901	7.262	3.300	0.000	10.562	2.825	2.453	0.005	5.283	3.104	1.212	0.000	4.316	7.986	3.334	0.000	11.320
18	95.961	65.994	0.000	161.955	30.279	11.125	0.000	41.403	8.402	6.602	0.000	15.005	13.571	6.794	0.000	20.365	14.848	8.334	0.000	23.182
20	124.018	69.840	0.000	193.858	80.845	52.392	0.000	133.238	13.836	9.661	0.000	23.497	20.579	13.557	0.000	34.137	25.352	15.023	0.000	40.376
22	164.144	62.062	0.000	226.206	93.056	29.592	0.000	122.648	11.573	9.492	0.007	21.072	17.586	11.589	0.000	29.175	29.020	17.416	0.000	46.435
24	44.640	74.516	0.000	119.156	54.145	26.851	0.000	80.996	4.945	4.364	0.000	9.309	9.445	6.249	0.000	15.695	20.864	11.753	0.000	32.616
26	5.084	26.067	0.000	31.151	5.520	25.614	0.000	31.135	1.374	1.503	0.000	2.877	3.028	3.058	0.000	6.087	8.074	12.950	0.000	21.025
28	0.957	5.879	0.000	6.836	1.112	4.952	0.000	6.064	1.345	0.928	0.000	2.273	1.090	1.396	0.000	2.486	4.091	10.927	0.000	15.018
30	0.118	2.656	0.000	2.774	1.232	1.733	0.000	2.965	0.564	0.973	0.000	1.537	0.598	0.634	0.000	1.232	3.311	5.628	0.000	8.939
32	0.264	0.576	0.000	0.840	0.910	1.082	0.000	1.992	0.614	0.734	0.000	1.347	0.604	0.638	0.000	1.242	1.010	3.365	0.000	4.375
34	0.040	0.399	0.000	0.439	0.342	0.615	0.000	0.958	0.189	0.352	0.000	0.541	0.293	0.446	0.000	0.739	0.813	2.093	0.000	2.906
36	0.000	0.032	0.000	0.032	0.209	0.349	0.000	0.558	0.080	0.159	0.000	0.239	0.119	0.148	0.000	0.267	0.262	0.491	0.000	0.753
38	0.000	0.000	0.000	0.000	0.025	0.023	0.000	0.048	0.033	0.006	0.000	0.039	0.055	0.077	0.000	0.132	0.063	0.090	0.000	0.153
40	0.000	0.000	0.000	0.000	0.035	0.011	0.000	0.047	0.003	0.000	0.000	0.003	0.037	0.050	0.000	0.087	0.044	0.094	0.000	0.137
42	0.000	0.000	0.000	0.000	0.004	0.000	0.000	0.004	0.000	0.006	0.000	0.006	0.037	0.005	0.000	0.042	0.000	0.000	0.000	0.000
44	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.019	0.000	0.019	0.010	0.000	0.000	0.010
46	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
48	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
52	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	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	518.308	326.794	0.000	845.102	279.454	158.851	1.103	439.408	46.486	37.526	1.051	85.063	71.002	46.210	0.822	118.034	122.610	94.967	19.569	237.147
Nº samples (*):				21				36				58				45				45
Nº Ind. (*):	2169	1499	0	3668	2651	1831	104	4586	2186	1744	157	4087	2854	1968	131	4953	3287	2771	688	6746
Sampled catch:				578				798				685				908				1326
Range (*):				9-37				6-42				5-43				5-44				6-44
Total catch:				37160				17897				2794				3463				7270
Total hauls (*):				118				123				125				118				120

TABLE 7 (cont.).- Redfish length distribution. Estimated numbers per haul mean catches. Spanish Spring Survey on NAFO 3NO: 1995-2009. Indet. means indeterminate. 1995-2000 data are transformed C/V *Playa de Menduíña* data. 2002-2009 data are original R/V *Vizconde de Eza* data. In 2001, there are data from the two vessels. (*) indicates untransformed data.

	2005				2006				2007				2008				2009			
Lenght (cm.)	Males	Females	Indet.	Total	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	0.054	0.054	0.000	0.000	0.029	0.029
6	0.000	0.000	1.299	1.299	0.000	0.000	1.925	1.925	1.538	0.992	1.932	4.463	0.000	0.000	0.609	0.609	0.012	0.006	0.157	0.175
8	0.025	0.016	13.803	13.844	0.101	0.000	7.759	7.860	1.962	1.041	0.765	3.768	0.000	0.000	0.235	0.235	0.561	0.214	0.383	1.158
10	2.311	0.791	65.499	68.601	0.046	0.005	18.813	18.864	0.271	0.346	0.038	0.655	0.176	0.000	0.312	0.488	17.045	1.568	0.282	18.894
12	2.604	1.086	9.894	13.584	3.827	0.257	144.295	148.379	6.388	5.708	0.000	12.096	0.913	0.706	0.084	1.703	22.492	11.619	0.194	34.304
14	8.181	3.746	4.718	16.645	33.406	11.929	74.618	119.953	39.163	21.848	0.253	61.264	13.336	6.951	0.015	20.302	69.841	31.618	0.173	101.633
16	31.540	18.911	0.000	50.451	38.481	22.435	0.295	61.211	53.019	34.924	0.022	87.965	97.925	72.091	0.521	170.537	651.956	387.072	0.000	1039.028
18	127.565	95.825	0.000	223.390	43.868	17.528	0.000	61.396	32.554	26.051	0.000	58.605	58.825	43.382	0.174	102.381	2024.106	1346.781	2.424	3373.311
20	99.190	82.519	0.000	181.709	101.412	67.577	0.000	168.990	38.128	24.719	0.000	62.847	27.018	19.002	0.000	46.019	435.925	536.721	0.000	972.645
22	139.418	78.585	0.000	218.003	101.794	64.618	0.000	166.412	70.528	41.682	0.000	112.210	54.626	21.270	0.000	75.896	268.644	161.718	0.000	430.363
24	118.143	75.200	0.000	193.342	46.037	39.015	0.000	85.052	70.387	42.600	0.000	112.986	52.035	37.069	0.000	89.105	188.590	165.000	0.000	353.591
26	27.239	64.010	0.000	91.249	20.205	30.957	0.000	51.162	28.763	35.643	0.000	64.406	16.620	33.127	0.000	49.747	47.409	126.397	0.000	173.806
28	7.480	48.991	0.000	56.471	5.828	19.128	0.000	24.956	5.758	26.387	0.000	32.144	2.858	15.003	0.000	17.861	16.106	49.709	0.000	65.815
30	4.489	18.600	0.000	23.089	1.813	10.604	0.000	12.416	3.989	21.517	0.000	25.506	0.993	5.352	0.000	6.345	4.672	20.094	0.000	24.765
32	1.967	8.347	0.000	10.314	0.951	5.798	0.000	6.749	6.761	14.422	0.000	21.183	2.179	2.796	0.000	4.975	1.869	4.131	0.000	6.000
34	0.955	3.538	0.000	4.493	0.385	2.818	0.000	3.202	5.081	7.270	0.000	12.351	1.536	1.828	0.000	3.364	1.645	2.313	0.000	3.958
36	2.018	1.154	0.000	3.172	0.215	0.957	0.000	1.173	2.247	7.218	0.000	9.465	0.414	0.752	0.000	1.166	3.251	1.316	0.000	4.567
38	0.428	0.347	0.000	0.775	0.259	0.175	0.000	0.434	1.745	0.991	0.000	2.736	0.225	0.268	0.000	0.493	0.165	0.180	0.000	0.345
40	0.120	0.295	0.000	0.415	0.267	0.068	0.000	0.335	0.328	0.057	0.000	0.385	0.058	0.144	0.000	0.202	0.078	0.013	0.000	0.092
42	0.127	0.161	0.000	0.288	0.000	0.075	0.000	0.075	0.066	0.040	0.000	0.106	0.024	0.050	0.000	0.074	0.090	0.022	0.000	0.112
44	0.000	0.027	0.000	0.027	0.000	0.000	0.000	0.000	0.000	0.013	0.000	0.013	0.018	0.000	0.000	0.018	0.028	0.006	0.000	0.034
46	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
48	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
52	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.013	0.000	0.013	0.000	0.000	0.000	0.000
Total	573.800	502.147	95.213	1171.160	398.896	293.944	247.705	940.545	368.676	313.470	3.009	685.155	329.779	259.804	2.004	591.587	3754.484	2846.498	3.642	6604.624
Nº samples (*):				55				55				42				52				39
Nº Ind. (*):	3892	3835	1387	9114	3677	3437	1408	8522	3413	3162	341	6916	3445	3398	128	6971	3418	2763	68	6249
Sampled catch:				1875				1785				1378				1453				1034
Range (*):				6-45				6-43				6-44				5-52				5-44
Total catch:				28602				21223				22229				14874				99847
Total hauls (*):				119				120				110				122				109

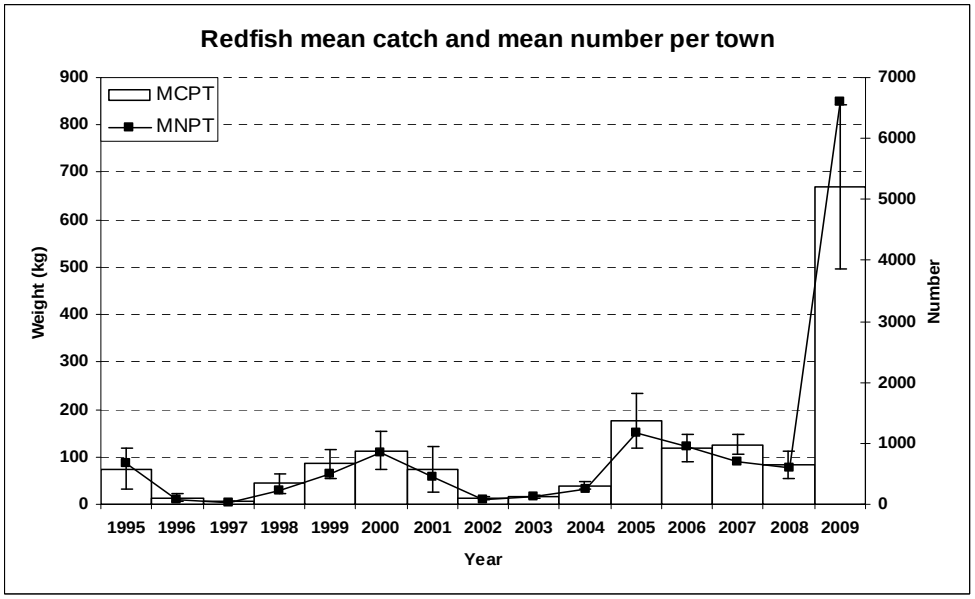

FIGURE 1.- Redfish stratified mean catches in Kg and ±SD and mean number per tow by year. Spanish Spring surveys on NAFO Div. 3NO: 1995-2004 (1995-2000 transformed data from C/V *Playa de Menduíña*; 2002-2009 original data from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels).

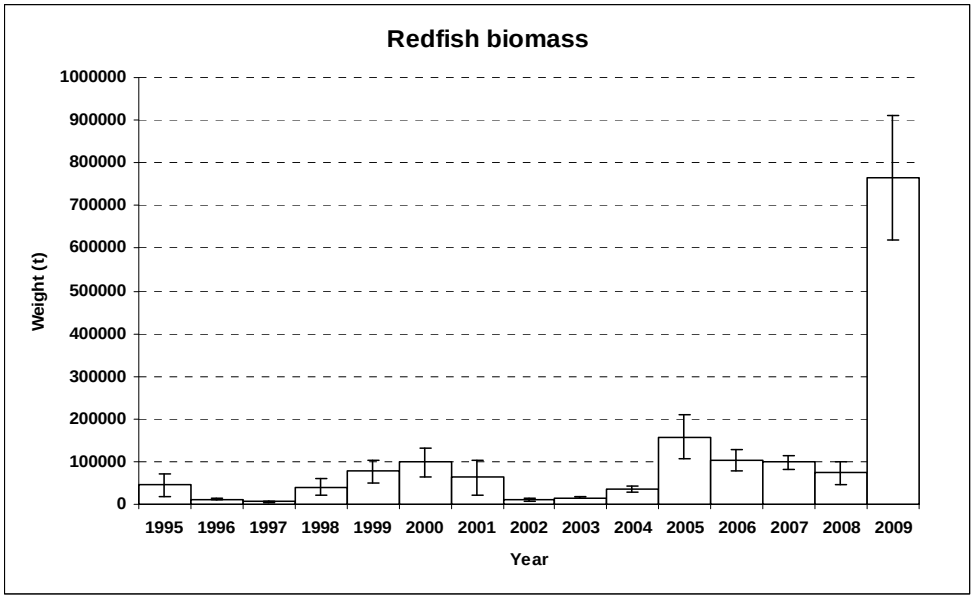

FIGURE 2.- Redfish biomass in tons and ±SD by year. Spanish Spring surveys on NAFO Div. 3NO: 1995-2004 (1995-2000 transformed data from C/V *Playa de Menduíña*; 2002-2004 original data from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels).

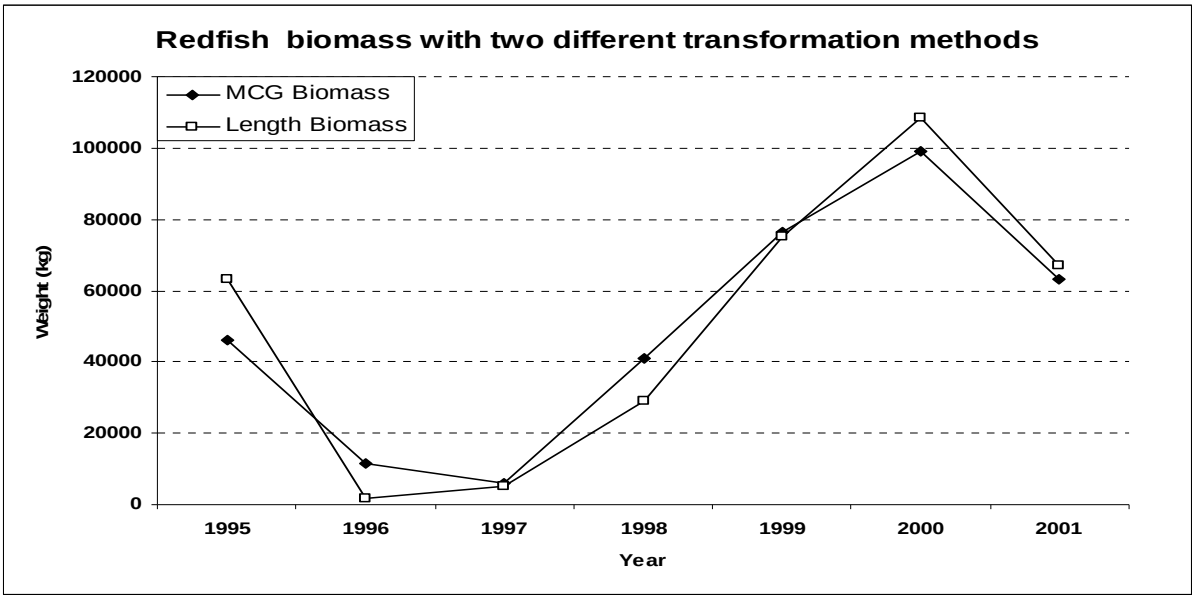

FIGURE 3.- Redfish biomass in tons transformed with the two different methods: MCG and Warren.

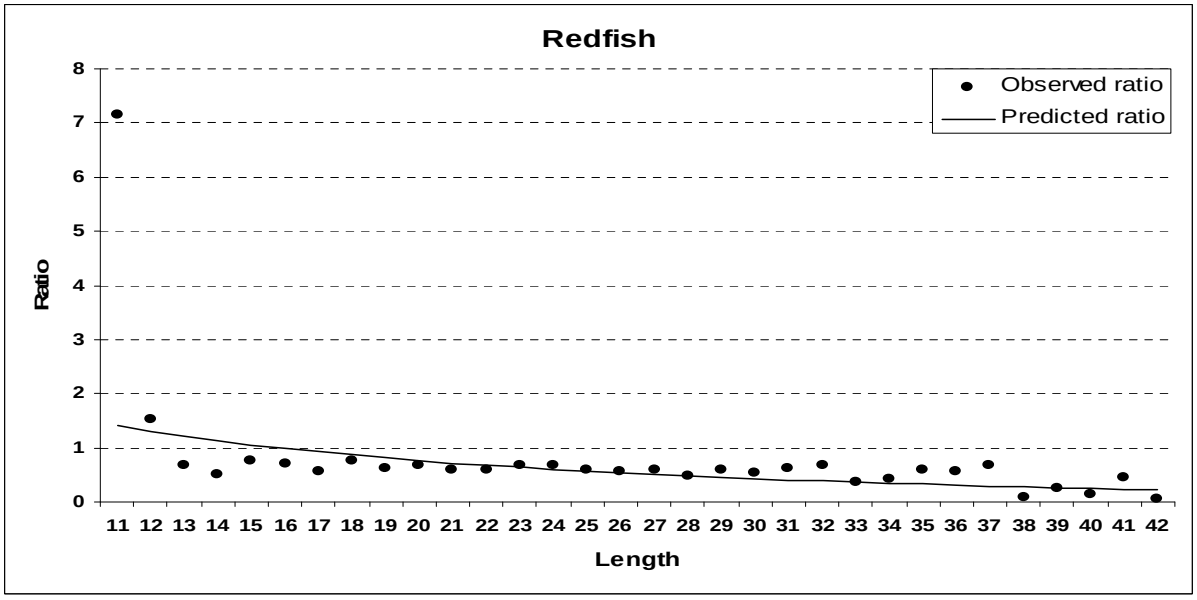

FIGURE 4.- Ratios of *Campelen* catch to *Pedreira* catch, by length group, of redfish, from comparative fishing trials between the two gears on the C/V *Playa de Menduíña* and the R/V *Vizconde de Eza*. The dots are the observed ratios and the curve is the fitted line.

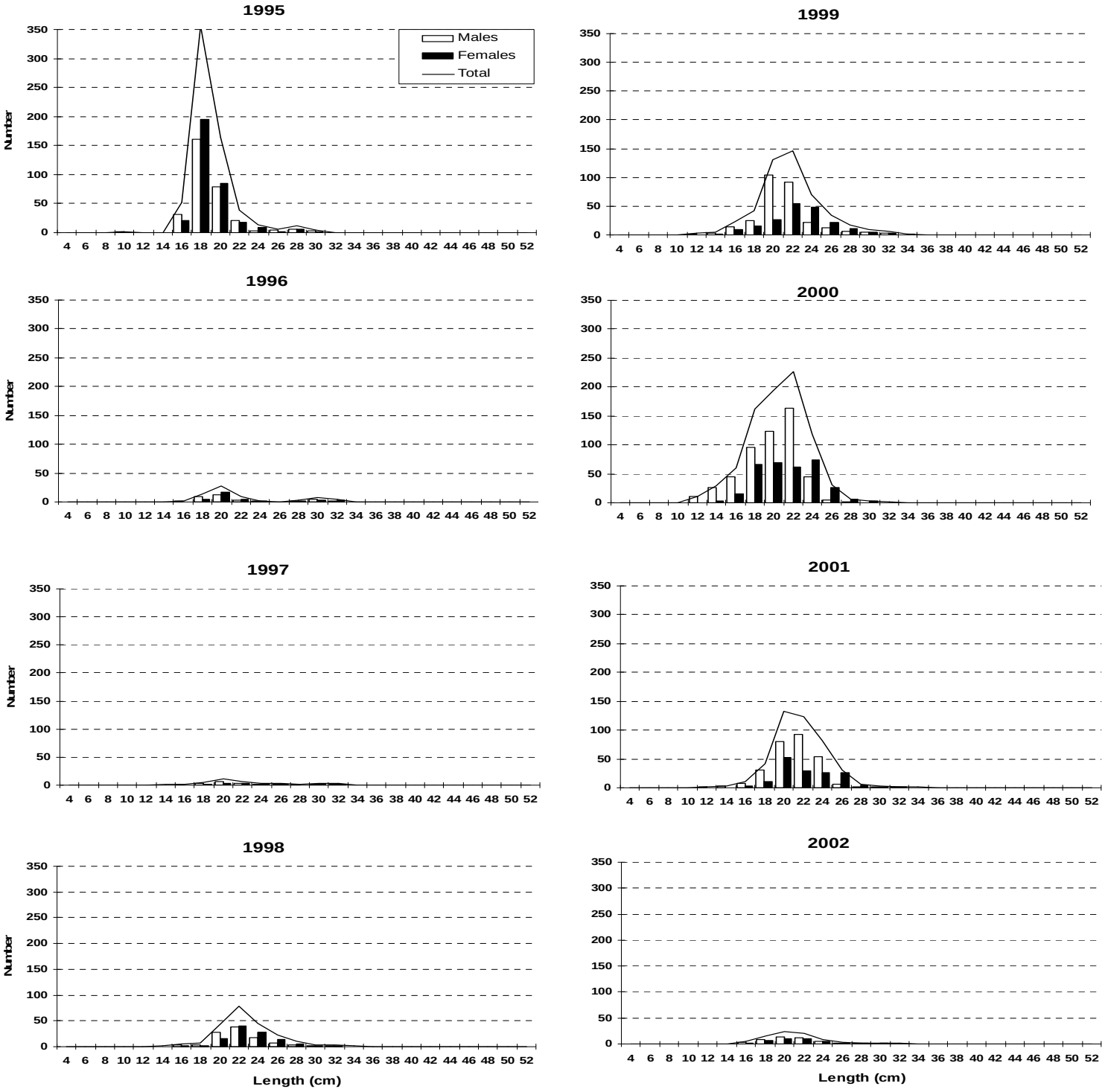

FIGURE 5.- Redfish length distribution (cm) on NAFO 3NO: 1995-2009. Number per stratified mean catches. 1995-2000 data are transformed data from C/V *Playa de Menduíña*, and 2002-2004 data are original from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels. The 2009 graph has a different y-axis upper limit.

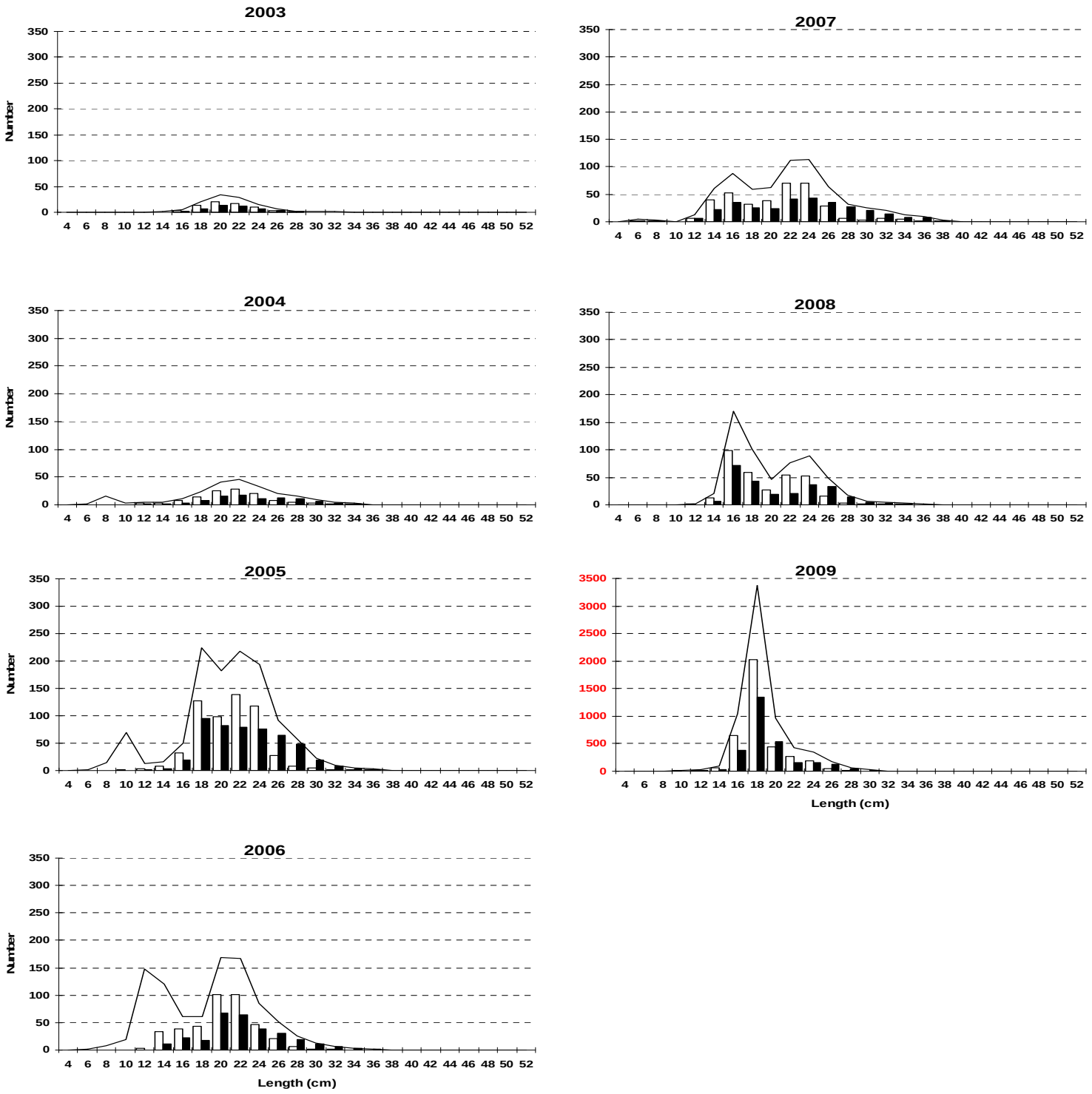

FIGURE 5 (cont.).- Redfish length distribution (cm) on NAFO 3NO: 1995-2009. Number per stratified mean catches. 1995-2000 data are transformed data from C/V *Playa de Menduíña*, and 2002-2004 data are original from R/V *Vizconde de Eza*. In 2001, there are data from the two vessels. The 2009 graph has a different y-axis upper limit.

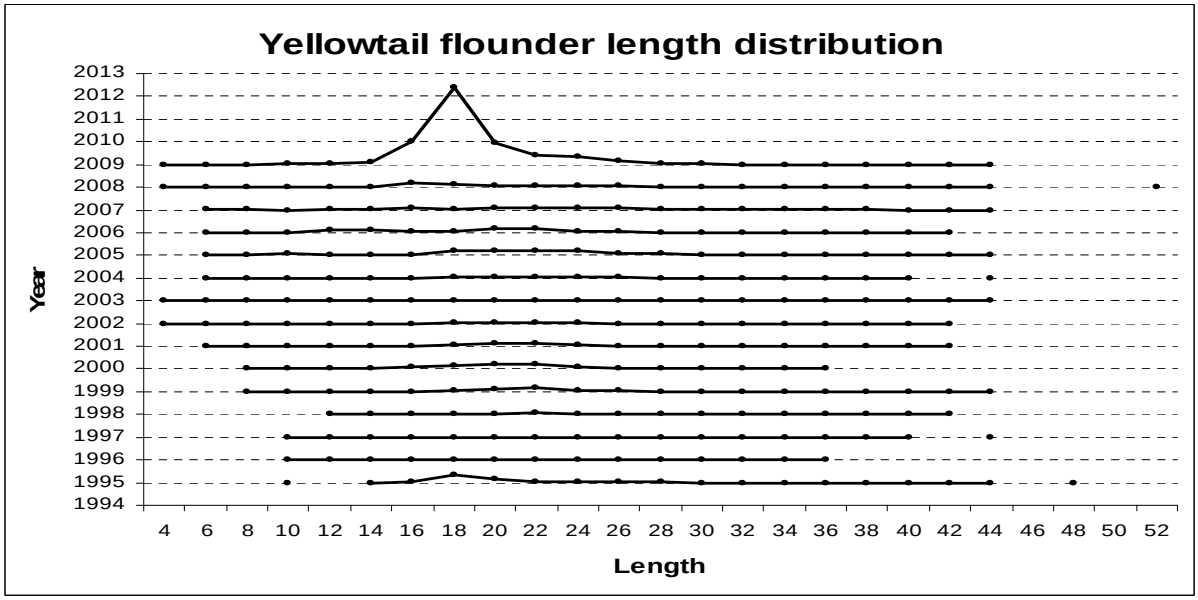

FIGURE 6.- Redfish length distribution (cm) on NAFO 3NO: 1995-2009.

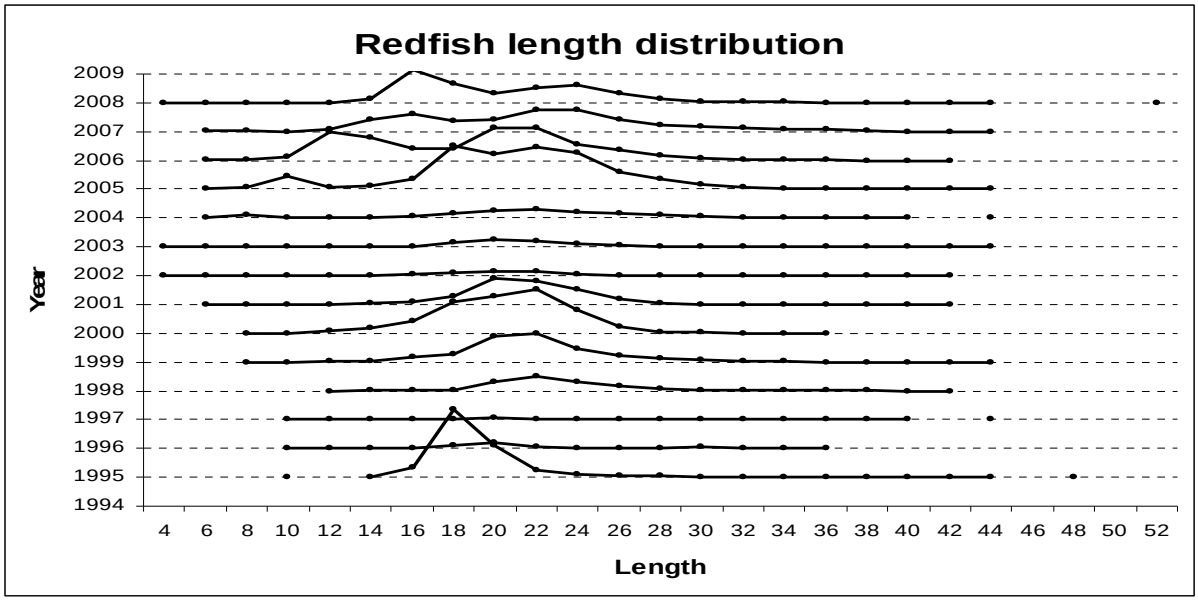

FIGURE 7.- Redfish length distribution (cm) on NAFO 3NO: 1995-2008.