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Results for Greenland halibut from the surveys conducted by Spain in the
NAFO Regulatory Area of Divisions 3NO, 1996-2003

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 in the realization of the trawls; so, the time series indices was transformed. The transformed entire series of mean catches, abundance, biomass and length distribution for Greenland halibut are presented for the period 1996-2000, and the no-transformed data for the years 2001-2003. The standard deviation are 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. A decreasing in Greenland halibut biomass and abundance is observed in last years (2000-2003). A high percent of juvenile individuals could indicate a good recruitment in recent years.

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). Sets 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 Greenland halibut were measured to the total length to the nearest lower cm. Length distribution estimated from catches is presented for the period 1996-2003. The year 1995 is not representative for this species, because in that year more deeper strata were not surveyed, so it is not included in the analysis.

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.

Greenland halibut stratified mean catches and SD

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

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

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

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

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

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

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

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

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

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

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, we obtained a estimated FPC as the ratio of sum of CPUE, in this way:

$$\bar{F}PC = \frac{\sum Campelen\ CPUE}{\sum Pedreira\ CPUE} \qquad (1)$$

This method has minor error than other methods used to convert CPUE data (González and Paz, 2003). Besides this, we had a large number of paired hauls without Greenland halibut catches, so in other models appeared problems in the fit (Wilderbuer *et al.*, 1998). Usually, fit methods are not appropriate for this species' series.

It was applied to convert mean catches and biomass. To convert abundance, we used the ratio of sum of abundance of each vessel.

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

l is the length

$\alpha,\ \beta\ and\ \delta$ are the estimated parameters.

A logarithmic transformation was made to this model in order to adjust a linear expression.

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 1996-2000, 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 transformation parameters recalculated. For abundance and biomass, no changes were made, but for length distribution the parameter changed, although the results were quite the same.

The method to convert the indices from the length distribution has some problems: no accurate variance and, 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 the best one for estimating the indices.

<div align="center">Results</div>

Greenland halibut Mean Catches

To convert mean catches, we calculated the equation (1), giving the FPC_{bio} =0.09282661.

The Greenland halibut mean catches by stratum are presented in Table 2, included swept area, number of hauls and SD. Greenland halibut stratified mean catches and its SD are presented in Table 3. The Greenland halibut indices show an increasing until 1999, and a decreasing in the last four years (Fig. 1).

Greenland halibut Biomass

The entire time series (1996-2003) of biomass and their SD estimates of Greenland halibut are presented (updated and converted) in Table 4. The biomass presents the same trend as mean catches (Fig. 2).

To convert biomass, we calculated the equation (1), giving the FPC_{bio} =0.09282661. Besides the transformed biomass series, we present the biomass obtained from the 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).Years 2002-2003 have the original data, so both values are almost the same. The difference in 2001 value is due to the added C/V *Playa de Menduiña* tows to estimate the biomass (FPC-biomass). The original R/V *Vizconde de Eza* value is given, in order to compare it with the length-obtained biomass.

Greenland halibut Abundance

As in biomass, the entire time series (1996-2003) of abundance and their SD estimates of Greenland halibut are presented (updated and converted) in Table 6.

To adjust the abundance, we calculated the equation (1), now for sum of abundance per unit of effort instead of CPUE, obtained FPC_{ab} =0.10587360. 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 indices. The trend in both cases is the same (Fig. 5).Years 2002-2003 have the original data, so both values are almost the same. As in biomass, the strange 2001 value is due to the C/V *Playa de Menduiña* tows to estimate the abundance (FPC-abundance). The original R/V *Vizconde de Eza* value, in order to compare it with the length-obtained abundance.

In 2001, an increasing in the abundance occurs, as we can see in Fig. 4, due to a presence of two strong length year classes.

Greenland halibut Length Distribution

The result of the model proposed by Warren (2) for Greenland halibut was the following (for more details, see González *et al.*, 2003):

> For $l \leq 18$: cf = 1.35
> For $19 \leq l \leq 27$: cf = 0.309
> For $28 \leq l \leq 63$: cf = exp(14.847-6.2521ln(l)+0.1356l)
> For $l \geq 64$: cf = 0.5

In Table 7 is shown Greenland halibut length distribution per thousand, besides the sampled size and its catch for the period 1996-2003. In Fig. 6 we can see the length distribution evolution along the years. We can see a great presence of juveniles along the years, so we can expect an increasing in biomass next years.

In 2001, there is a presence of two strong year-classes, that appears in Fig. 6, with classes length mode of 13 cm. and 23 cm. This presence produces an increasing in the total abundance in that year.

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TABLE 1.- Spanish spring bottom trawl surveys on NAFO Div. 3NO: 1996-2003

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 Greenland halibut mean catch (kg) and SD (**) by stratum. Spanish Spring Surveys on NAFO Div. 3NO: 1996-2003. Swept area in square miles. n.s. means stratum not surveyed. 1996-2000 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 Menduíña*.

Stratum	1996				1997				1998				1999			
	Swept area	Tow number	G. halibut Mean catch	G. halibut SD	Swept area	Tow number	G. halibut Mean catch	G. halibut SD	Swept area	Tow number	G. halibut Mean catch	G. halibut SD	Swept area	Tow number	G. halibut Mean catch	G. halibut SD
353	0.0371	3	0.20	0.236	0.0480	4	0.06	0.053	0.0465	4	1.37	1.274	0.0360	3	0.61	0.569
354	0.0319	3	1.24	0.729	0.0233	2	0.70	0.095	0.0356	3	2.36	1.246	0.0218	2	0.86	0.781
355	0.0221	2	5.60	0.466	0.0233	2	4.07	0.230	0.0221	2	0.29	0.066	0.0229	2	0.22	0.295
356	0.0203	2	1.46	1.076	0.0225	2	4.11	1.871	0.0221	2	4.27	4.759	0.0229	2	0.23	0.174
357	0.0218	2	4.50	5.195	0.0443	4	1.08	1.341	0.0240	2	8.40	6.433	0.0236	2	1.69	0.276
358	0.0319	3	3.36	3.463	0.0563	5	1.38	1.168	0.0236	3	2.35	1.843	0.0349	3	4.10	3.155
359	0.0548	5	0.40	0.354	0.0690	6	0.66	0.623	0.0698	6	0.22	0.185	0.0364	3	2.15	3.725
360	0.3761	31	0.01	0.044	0.3754	32	0.04	0.183	0.2561	25	0.04	0.158	0.2325	19	0.31	0.918
374	0.0233	2	0.00	0.000	0.0353	3	0.00	0.000	0.0353	3	0.05	0.080	0.0244	2	0.00	0.000
375	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	0.1650	14	0.00	0.000	0.1583	14	0.00	0.000	0.0930	10	0.00	0.000	0.1219	10	0.00	0.000
377	0.0229	2	1.33	1.231	0.0116	1	0.00	-	0.0229	2	0.03	0.039	0.0240	2	0.48	0.683
378	0.0330	3	1.60	1.180	0.0210	2	0.78	0.985	0.0120	2	0.66	0.873	0.0229	2	1.03	0.330
379	0.0113	1	5.22	-	0.0206	2	2.23	1.031	0.0356	3	1.88	0.826	0.0236	2	0.96	0.013
380	0.0221	2	3.45	1.004	0.0210	2	2.64	1.210	0.0113	2	2.48	2.022	0.0236	2	3.94	1.326
381	0.0229	2	4.85	3.354	0.0221	2	0.21	0.009	0.0229	2	0.70	0.144	0.0229	2	2.82	0.985
382	0.0338	3	0.77	1.175	0.0461	4	0.00	0.000	0.0229	3	0.04	0.064	0.0484	4	0.00	0.001
721	0.0214	2	1.62	0.039	0.0221	2	2.98	1.053	0.0203	2	11.82	9.833	0.0244	2	0.62	0.249
722	0.0206	2	3.09	3.338	0.0214	2	1.53	2.163	0.0101	2	24.84	1.628	0.0229	2	13.36	7.909
723	0.0109	1	3.60	-	0.0210	2	5.16	2.543	0.0233	2	5.32	1.956	0.0229	2	11.07	10.916
724	0.0203	2	2.44	1.083	0.0225	2	1.92	0.624	0.0206	2	8.40	1.044	0.0225	2	4.55	1.181
725	0.0225	2	1.35	0.236	0.0206	2	7.85	4.225	0.0086	1	2.07	-	0.0229	2	4.97	5.763
726	0.0218	2	1.52	0.292	n.s.	n.s.	n.s.	n.s.	0.0094	2	27.96	33.187	0.0225	2	29.04	26.314
727	0.0210	2	4.06	1.871	0.0094	1	5.16	-	0.0233	2	7.80	6.754	0.0236	2	10.48	8.316
728	0.0218	2	18.02	4.936	0.0214	2	36.24	23.055	0.0206	2	57.21	56.042	0.0233	2	62.32	12.655
752	0.0109	1	15.84	-	0.0218	2	36.90	9.964	0.0229	2	54.22	23.669	0.0233	2	56.93	8.677
753	0.0199	2	23.32	6.413	0.0214	2	32.43	8.270	0.0218	2	33.32	8.507	0.0229	2	64.23	4.417
754	n.s.	n.s.	n.s.	n.s.	0.0330	3	18.70	4.941	0.0210	2	17.32	4.706	0.0206	2	17.12	11.204
755	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0206	2	19.07	0.177	0.0311	3	15.94	8.279
756	0.0210	2	29.43	17.722	0.0109	1	68.36	-	0.0225	2	220.13	34.559	0.0225	2	125.28	46.721
757	0.0188	2	47.78	56.915	0.0304	3	34.70	10.823	0.0206	2	95.25	21.628	0.0233	2	106.53	27.496
758	n.s.	n.s.	n.s.	n.s.	0.0214	2	39.36	23.502	0.0105	2	52.55	9.813	0.0214	2	52.72	11.736
759	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0214	2	48.19	35.497	0.0218	2	44.72	44.096
760	0.0210	2	12.15	4.266	0.0105	1	10.44	-	0.0214	2	32.89	28.743	0.0225	2	44.98	46.019
761	0.0199	2	30.20	12.051	0.0315	3	61.90	36.985	0.0206	2	46.01	16.364	0.0210	2	37.88	1.004
762	n.s.	n.s.	n.s.	n.s.	0.0308	3	45.89	27.172	0.0094	2	38.22	15.038	0.0210	2	63.34	37.289
763	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0218	2	35.02	27.312	0.0311	3	21.44	8.946
764	0.0210	2	22.10	3.748	0.0206	2	20.63	2.422	0.0218	2	21.31	10.686	0.0225	2	28.81	12.412
765	0.0199	2	17.44	5.048	0.0206	2	35.43	14.289	0.0098	2	22.82	3.131	0.0221	2	31.43	0.328
766	n.s.	n.s.	n.s.	n.s.	0.0308	3	62.87	9.784	0.0191	2	20.82	3.479	0.0218	2	31.31	20.000
767	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0109	2	10.21	50.629	0.0214	2	25.90	9.786

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

TABLE 2 (cont.).- Swept area, number of hauls and Greenland halibut mean catch (kg) and SD (**) by stratum. Spanish Spring Surveys on NAFO Div. 3NO: 1996-2003. Swept area in square miles. n.s. means stratum not surveyed. 1996-2000 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 Menduíña*.

Stratum	2000 Swept area	Tow number	G. halibut Mean catch	G. halibut SD	2001 Swept area	Tow number	G. halibut Mean catch	G. halibut SD	2002 Swept area	Tow number	G. halibut Mean catch	G. halibut SD	2003 Swept area	Tow number	G. halibut Mean catch	G. halibut SD
353	0,0356	3	0,19	0,178	0,0341	3	0,03	0,038	0,0476	4	0,21	0,278	0,0334	3	0,01	0,013
354	0,0356	3	0,11	0,057	0,0338	3	3,22	1,927	0,0356	3	0,85	0,839	0,0338	3	0,04	0,029
355	0,0233	2	0,22	0,274	0,0240	2	17,25	15,486	0,0236	2	0,43	0,467	0,0229	2	2,46	2,492
356	0,0225	2	0,49	0,043	0,0240	2	0,07	0,042	0,0233	2	1,40	1,131	0,0225	2	2,95	3,695
357	0,0124	1	0,11	-	0,0244	2	2,69	2,135	0,0240	2	1,15	1,626	0,0229	2	6,72	5,070
358	0,0341	3	0,48	0,529	0,0345	3	8,46	12,298	0,0345	3	3,20	0,819	0,0338	3	3,45	5,973
359	0,0469	4	1,35	2,014	0,0803	7	1,97	2,329	0,0686	6	0,28	0,219	0,0791	7	0,30	0,438
360	0,2396	20	0,13	0,352	0,2423	20	0,17	0,484	0,2865	25	0,00	0,007	0,2254	20	0,02	0,056
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
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	0,002
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	0,003
377	0,0229	2	0,16	0,221	0,0229	2	0,42	0,537	0,0229	2	0,00	0,001	0,0225	2	1,55	1,884
378	0,0233	2	1,09	1,214	0,0236	2	5,69	8,040	0,0233	2	1,85	0,636	0,0225	2	2,97	3,008
379	0,0225	2	1,23	0,880	0,0229	2	4,61	4,236	0,0229	2	5,85	4,313	0,0229	2	7,67	5,275
380	0,0236	2	2,42	1,447	0,0206	2	(*) 4.06	(*) 0.066	0,0225	2	5,05	3,041	0,0229	2	4,35	0,205
381	0,0236	2	1,36	0,352	0,0236	2	(*) 0.90	(*) 1.271	0,0229	2	0,53	0,145	0,0229	2	1,06	1,188
382	0,0499	4	0,12	0,147	0,0469	4	(*) 0.05	(*) 0.080	0,0341	3	0,40	0,683	0,0454	4	0,05	0,061
721	0,0236	2	0,48	0,681	0,0248	2	0,40	0,431	0,0233	2	0,08	0,062	0,0225	2	0,12	0,051
722	0,0218	2	19,49	9,977	0,0233	2	1,09	0,863	0,0236	2	2,63	2,906	0,0221	2	1,66	0,410
723	0,0248	2	2,85	1,094	0,0240	2	1,33	0,240	0,0233	2	1,24	1,075	0,0229	2	4,02	5,416
724	0,0233	2	5,83	2,179	0,0353	3	3,45	2,786	0,0225	2	4,75	1,202	0,0225	2	7,07	4,971
725	0,0210	2	10,03	8,796	0,0116	1	3,04	-	0,0225	2	7,35	6,718	0,0229	2	10,55	0,778
726	0,0221	2	12,95	3,348	0,0116	1	4,50	-	0,0214	2	3,25	3,323	0,0225	2	0,00	0,000
727	0,0210	2	2,65	1,181	0,0225	2	(*) 3.79	(*) 0.243	0,0233	2	2,01	1,400	0,0218	2	18,48	11,066
728	0,0210	2	29,91	0,098	0,0229	2	(*) 8.62	(*) 1.654	0,0229	2	7,93	10,986	0,0225	2	39,95	17,748
752	0,0206	2	23,33	1,989	0,0210	2	(*) 26.37	(*) 8.723	0,0116	1	0,34	-	0,0229	2	39,80	39,032
753	0,0218	2	49,77	21,700	0,0214	2	(*) 22.66	(*) 4.883	0,0229	2	2,45	3,465	0,0229	2	16,64	12,721
754	0,0195	2	46,69	14,381	0,0195	2	(*) 41.09	(*) 41.477	0,0341	3	20,33	4,996	0,0218	2	19,12	6,484
755	0,0431	4	35,73	20,076	0,0416	4	(*) 27.16	(*) 16.279	0,0338	3	0,46	0,655	0,0221	2	1,88	2,652
756	0,0203	2	60,60	40,187	0,0113	1	18,70	-	0,0229	2	10,55	14,920	0,0221	2	23,11	27,994
757	0,0214	2	37,41	10,108	0,0233	2	(*) 42.23	(*) 4.326	0,0225	2	9,95	2,192	0,0221	2	2,49	2,348
758	0,0210	2	56,67	11,487	0,0218	2	(*) 42.11	(*) 8.828	0,0225	2	17,15	1,485	0,0221	2	0,00	0,000
759	0,0210	2	29,43	8,579	0,0221	2	(*) 76.11	(*) 21.890	0,0225	2	2,15	3,041	0,0113	1	21,61	-
760	0,0210	2	30,56	2,862	0,0229	2	9,42	10,861	0,0229	2	4,75	4,172	0,0218	2	19,38	13,188
761	0,0221	2	36,09	26,813	0,0225	2	8,10	7,778	0,0225	2	16,65	16,900	0,0225	2	13,26	3,387
762	0,0203	2	36,37	1,726	0,0116	1	7,60	-	0,0225	2	2,11	1,563	0,0225	2	34,91	19,622
763	0,0416	4	25,64	21,799	0,0330	3	(*) 31.61	(*) 22.554	0,0225	2	0,74	1,047	0,0311	3	1,75	3,037
764	0,0218	2	16,96	6,498	0,0240	2	53,64	1,888	0,0236	2	6,95	5,869	0,0221	2	28,37	15,882
765	0,0203	2	37,13	30,587	0,0113	1	26,60	-	0,0236	2	45,90	39,739	0,0113	1	31,80	-
766	0,0214	2	16,76	2,475	0,0203	2	(*) 16.42	(*) 9.557	0,0233	2	9,53	1,025	0,0225	2	8,91	1,966
767	0,0210	2	21,21	6,393	0,0218	2	(*) 5.72	(*) 2.593	0,0225	2	0,85	1,202	0,0229	2	15,96	21,270

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

TABLE 3.- Stratified mean catches (Kg) by stratum and year and SD by year of Greenland halibut (1996-2003). n.s. means stratum not surveyed. 1996-2000 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 (**) represents the original results of R/V *Vizconde de Eza* without the C/V *Playa de Menduíña* data.

Strata	1996	1997	1998	1999	2000	2001	2002	2003
353	54,10	15,61	368,31	164,80	50,27	7,17	57,16	2,06
354	0,01	171,84	581,54	211,23	27,55	792,94	209,92	10,33
355	0,08	301,21	21,29	16,18	16,14	1276,50	31,86	181,89
356	0,03	193,06	200,47	10,97	23,25	3,29	65,80	138,51
357	737,96	176,36	1377,73	277,07	17,81	441,16	188,60	1101,26
358	755,38	310,53	529,11	921,77	108,61	1903,50	720,00	776,85
359	168,83	279,62	94,44	905,35	568,81	827,57	116,83	125,94
360	35,83	120,66	100,23	852,78	358,57	461,98	5,79	49,54
374	0,00	0,00	9,93	0,00	0,00	0,00	0,00	0,00
375	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,36
376	0,00	0,00	0,00	0,00	0,00	0,00	0,00	1,73
377	133,44	0,00	2,78	48,27	15,59	42,00	0,10	154,80
378	223,01	108,38	92,26	143,03	151,61	790,22	257,15	413,25
379	553,48	236,64	199,42	101,35	130,87	488,13	620,10	813,02
380	331,06	253,84	237,93	377,84	232,32	(*) 389.43	484,80	417,12
381	698,43	30,54	100,25	406,36	196,29	(*) 129.93	75,96	152,64
382	265,33	0,00	12,74	0,16	42,51	(*) 16.16	137,54	15,44
721	104,99	193,53	768,09	40,40	31,32	25,68	5,23	7,54
722	259,46	128,46	2086,59	1122,44	1637,46	91,56	220,50	139,44
723	558,26	799,62	824,44	1715,78	441,21	206,15	192,20	623,18
724	302,15	237,69	1041,12	564,01	722,86	427,80	589,00	876,06
725	141,33	824,43	217,35	521,45	1052,65	319,20	771,75	1107,75
726	109,78	n.s.	2013,07	2090,94	932,35	324,00	234,00	0,00
727	389,87	495,47	749,00	1006,54	253,97	(*) 364.03	192,96	1773,60
728	36,04	2826,86	4462,31	4861,26	2333,24	(*) 672.64	618,66	3116,10
752	2074,54	4833,71	7102,82	7457,90	3056,49	(*) 3454.13	44,41	5213,80
753	3218,53	4475,84	4597,53	8863,93	6868,76	(*) 3126.94	338,10	2295,63
754	n.s.	3365,21	3117,02	3081,94	8403,69	(*) 7396.15	3660,00	3440,70
755	n.s.	n.s.	7342,42	6136,26	13757,44	(*) 10457.90	177,23	721,88
756	2972,03	6904,11	22233,50	12653,16	6121,02	1888,70	1065,55	2333,61
757	4873,81	3539,38	9715,91	10866,31	3815,73	(*) 4307.61	1014,90	253,98
758	n.s.	3896,21	5202,82	5218,91	5610,39	(*) 4168.97	1697,85	0,00
759	n.s.	n.s.	6119,66	5679,93	3737,70	(*) 9666.37	273,05	2744,47
760	1871,25	1608,22	5065,54	6926,79	4706,01	1450,68	731,50	2983,75
761	5163,60	10584,19	7867,63	6477,12	6170,76	1385,10	2847,15	2266,61
762	n.s.	9728,04	8102,93	13428,13	7711,31	1611,20	446,26	7399,86
763	n.s.	n.s.	9139,92	5595,80	6691,10	(*) 8250.35	193,14	457,62
764	2209,74	2063,07	2131,30	2880,87	1695,94	5363,50	695,00	2837,00
765	2162,25	4392,98	2829,86	3897,46	4604,20	3298,40	5691,60	3943,20
766	n.s.	9053,27	2998,23	4508,03	2413,42	(*) 2364.63	1371,60	1283,04
767	n.s.	n.s.	1613,33	4092,64	3351,32	(*) 904.20	134,30	2521,68
TOTAL	30404,58	72148,61	121270,85	124125,15	98060,56	79095,85	26177,55	51917,35
							(**) 23426.42		
$\left(\overline{Y}\right)$	3,46	7,73	11,73	12,00	9,48	7,65	2,64	5,10
							(**) 2.98		
S.D.	0,54	0,62	0,89	1,00	0,75	0,76	0,45	0,61

TABLE 4.- Survey estimates (by the swept area method) of Greenland halibut biomass (t) and SD by stratum and year on NAFO Div. 3NO. n.s. means stratum not surveyed. 1996-2000 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 (**) represents the original results of R/V *Viaconde de Eza* without the C/V *Playa de Menduíña* data. The last row presents the biomass obtained from the length distribution (Warren method).

Strata	1996	1997	1998	1999	2000	2001	2002	2003
353	4	1	32	14	4	1	5	0
354	29	15	49	19	2	70	18	1
355	37	26	2	1	1	106	3	16
356	7	17	18	1	2	0	6	12
357	68	16	115	23	1	37	16	96
358	71	28	46	79	10	164	63	69
359	15	24	8	75	49	73	10	11
360	3	10	9	70	30	41	1	4
374	0	0	1	0	0	0	0	0
375	0	0	0	0	0	0	0	0
376	0	0	0	0	0	0	0	0
377	12	0	0	4	1	4	0	14
378	20	10	8	13	13	66	22	37
379	49	23	17	9	12	43	54	71
380	30	24	21	32	20	(*) 38	43	36
381	61	3	9	36	17	(*) 11	7	13
382	24	0	1	0	3	(*) 1	12	1
721	10	17	76	3	3	2	0	1
722	25	12	195	98	151	8	19	13
723	51	76	71	150	36	17	17	54
724	30	21	101	50	62	37	52	78
725	13	80	25	46	100	27	69	97
726	10	n.s.	195	186	84	28	22	0
727	37	53	64	85	24	(*) 32	17	163
728	129	265	433	418	222	(*) 59	54	277
752	191	444	621	642	296	(*) 325	151	456
753	324	419	423	775	632	(*) 303	30	201
754	n.s.	306	297	299	862	(*) 680	275	316
755	n.s.	n.s.	712	591	1276	(*) 979	14	65
756	283	635	1976	1125	605	168	93	211
757	520	350	942	935	357	(*) 370	90	23
758	n.s.	365	478	488	534	(*) 389	151	0
759	n.s.	n.s.	573	522	356	(*) 871	24	244
760	178	153	474	616	448	129	64	274
761	520	1008	763	617	558	123	253	201
762	n.s.	949	786	1279	762	139	40	658
763	n.s.	n.s.	840	539	643	(*) 738	17	44
764	210	200	196	256	156	447	59	256
765	218	426	270	352	455	293	482	351
766	n.s.	883	314	415	226	(*) 234	118	114
767	n.s.	n.s.	146	383	319	(*) 83	12	220
TOTAL	3179	6859	11305	11246	9331	7134	2380	4701
							(**) 2022		
SD	440	546	860	973	707	638	410	575
Warren Method	4418	9163	11474	13216	12689	1757	2244	3961

TABLE 5.- Length weight relationship in the calculation of Greenland halibut biomass. The equation is $Weight = a\left(l+0.5\right)^{b}$ Spanish Spring surveys on NAFO Div. 3NO: 1996-2003. The values for the indeterminate individuals were obtained with all individuals.

		1996	1997	1998	1999	2000	2001	2002	2003
Males	a	0,0035	0,0042	0,0042	0,0044	0,0020	0,0036	0,0031	0,0033
		Error = 0.0824	Error = 0.0663	Error = 0.0824	Error = 0.1112	Error = 0.1562	Error = 0.2538	Error = 0.0962	Error = 0.1081
	b	3,2077	3,1561	3,1622	3,1587	3,3625	3,1925	3,2496	3,2318
		Error = 0.0225	Error = 0.0185	Error = 0.0226	Error = 0.0308	Error = 0.0433	Error = 0.0846	Error = 0.0285	Error = 0.0318
		$R^2 = 0.999$	$R^2 = 0.999$	$R^2 = 0.999$	$R^2 = 0.995$	$R^2 = 0.996$	$R^2 = 0.997$	$R^2 = 0.987$	$R^2 = 0.995$
		N = 269	N = 893	N = 417	N = 267	N = 315	N = 15	N = 316	N = 509
Females	a	0,0031	0,0033	0,0038	0,0033	0,0018	0,0034	0,0027	0,0034
		Error = 0.0760	Error = 0.0650	Error = 0.0692	Error = 0.0897	Error = 0.1003	Error = 0.2252	Error = 0.1315	Error = 0.0871
	b	3,2546	3,2308	3,2043	3,2547	3,4066	3,2240	3,2950	3,2302
		Error = 0.0198	Error = 0.0170	Error = 0.0179	Error = 0.0237	Error = 0.0262	Error = 0.0656	Error = 0.0368	Error = 0.0241
		$R^2 = 0.999$	$R^2 = 0.999$	$R^2 = 0.999$	$R^2 = 0.996$	$R^2 = 0.995$	$R^2 = 0.995$	$R^2 = 0.993$	$R^2 = 0.997$
		N = 326	N = 1473	N = 681	N = 408	N = 642	N = 26	N = 456	N = 726
Indet.	a	0,0030	0,0032	0,0036	0,0040	0,0019	0,0038	0,0028	0,0027
		Error = 0.0743	Error = 0.0547	Error = 0.0706	Error = 0.1010	Error = 0.0893	Error = 0.1320	Error = 0.0941	Error = 0.08139
	b	3,2574	3,2409	3,2201	3,2009	3,3882	3,1925	3,2837	3,2894
		Error = 0.0194	Error = 0.0145	Error = 0.0183	Error = 0.0269	Error = 0.0234	Error = 0.0394	Error = 0.0263	Error = 0.0226
		$R^2 = 0.999$	$R^2 = 0.999$	$R^2 = 0.999$	$R^2 = 0.987$	$R^2 = 0.998$	$R^2 = 0.997$	$R^2 = 0.996$	$R^2 = 0.997$
		N = 598	N = 2383	N = 1105	N = 679	N = 966	N = 44	N = 776	N = 1243

TABLE 6.- Survey estimates (by the swept area method) of Greenland halibut abundance (,000) and SD by stratum and year on NAFO Div. 3NO. n.s. means stratum not surveyed. 1996-2000 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 (**) represents 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 (Warren method).

Strata	1996	1997	1998	1999	2000	2001	2002	2003
353	0	9	187	47	16	24	170	8
354	212	95	268	101	23	1429	487	80
355	375	348	4	6	9	1893	31	191
356	46	149	75	4	4	2	58	88
357	469	93	653	84	3	116	61	358
358	1495	423	301	634	26	2984	615	273
359	94	183	53	331	146	1096	483	293
360	0	76	58	308	85	244	50	407
374	0	0	4	0	0	0	0	0
375	0	0	0	0	0	0	0	8
376	0	0	0	0	0	0	0	24
377	75	0	1	31	5	38	4	284
378	171	72	47	112	57	591	233	395
379	285	176	124	75	35	135	171	547
380	214	146	164	1048	122	(*) 274	610	961
381	401	14	45	269	66	(*) 33	200	919
382	98	0	6	1	8	(*) 5	251	113
721	89	132	379	7	6	3	11	12
722	99	67	573	207	213	14	39	15
723	264	407	369	433	82	45	92	298
724	145	94	361	125	85	78	126	176
725	93	444	157	183	258	63	143	413
726	75	n.s.	863	613	175	31	57	0
727	261	295	382	324	92	(*) 123	267	587
728	500	1296	2163	1445	571	(*) 127	280	825
752	497	1008	2136	1978	553	(*) 534	395	1151
753	867	728	726	1782	1093	(*) 402	48	235
754	n.s.	347	309	419	880	(*) 834	197	290
755	n.s.	n.s.	881	788	1712	(*) 1095	11	70
756	780	1457	5558	3380	1256	323	234	425
757	991	515	1620	2639	518	(*) 569	154	60
758	n.s.	706	620	625	589	(*)366	242	0
759	n.s.	n.s.	837	1016	457	(*) 947	34	147
760	425	414	1061	1486	794	259	94	340
761	582	1067	1853	1005	744	167	387	205
762	n.s.	1036	1127	2818	819	74	75	575
763	n.s.	n.s.	967	613	724	(*) 717	12	25
764	411	428	354	597	204	713	80	470
765	1128	548	580	459	769	353	645	540
766	n.s.	1030	317	203	211	(*) 222	81	134
767	n.s.	n.s.	104	364	250	(*) 64	13	180
TOTAL	11143	13804	26286	26555	13658	16987	7142	12123
						(**) 10674		
SD	1903	1130	2497	2830	1225	3227	958	1542
Warren Method	16693	18958	25401	24556	11614	10929	7142	12123

TABLE 7.- Greenland halibut length distribution. Estimated numbers in frequency in ‰. Spanish Spring Survey on NAFO 3NO: 1996-2003. Indet. means indeterminate. 1996-2000 data are transformed C/V *Playa de Menduíña* data. 2001-2003 data are original R/V *Vizconde de Eza* data. (*) indicates untransformed data.

Length (cm.)	1996 Males	Females	Indet.	1997 Males	Females	Indet.	1998 Males	Females	Indet.	1999 Males	Females	Indet.
8	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,303
10	0,000	0,000	0,000	0,000	0,000	2,300	0,000	0,000	0,000	0,000	0,605	0,000
12	0,000	0,000	0,970	5,018	6,843	9,571	0,000	0,000	0,574	2,421	8,376	0,908
14	0,000	1,296	31,518	8,587	31,528	20,005	0,000	6,037	1,721	4,621	22,713	0,303
16	0,000	8,663	4,363	4,311	6,881	0,674	1,494	3,134	1,750	4,282	6,196	0,000
18	8,019	13,286	0,000	27,423	40,505	0,000	1,464	2,296	0,000	4,768	8,850	0,303
20	28,423	43,780	0,112	37,542	43,538	0,362	4,622	5,593	0,000	5,517	8,893	0,000
22	89,980	168,163	2,286	53,779	64,236	0,000	18,073	22,102	0,357	25,653	37,789	0,000
24	64,166	99,661	2,175	28,182	30,810	0,000	26,110	38,331	0,000	15,549	31,957	0,000
26	28,133	41,255	0,544	31,780	40,680	0,000	44,420	44,006	0,000	13,530	21,905	0,000
28	26,420	43,506	0,000	39,179	46,226	0,000	56,688	76,591	0,000	32,778	25,159	0,000
30	11,966	20,579	0,000	22,470	26,720	0,000	46,906	63,719	0,000	32,213	30,421	0,000
32	10,840	16,851	0,000	12,139	20,771	0,000	39,197	47,580	0,000	45,853	50,018	0,000
34	11,955	17,812	0,000	10,776	14,975	0,000	36,939	42,772	0,000	60,885	67,415	0,000
36	14,512	19,567	0,000	9,727	18,873	0,000	34,632	43,202	0,000	48,152	62,783	0,000
38	10,688	17,395	0,000	9,635	20,075	0,000	28,786	43,113	0,000	32,732	52,206	0,000
40	12,336	18,689	0,000	9,404	19,003	0,000	19,333	30,588	0,000	19,984	35,784	0,000
42	8,230	13,150	0,000	9,983	17,267	0,000	11,457	20,213	0,000	11,979	26,781	0,000
44	6,627	10,723	0,000	8,685	16,273	0,000	7,740	17,617	0,000	7,962	16,411	0,000
46	4,218	12,060	0,000	7,942	14,645	0,000	5,805	12,249	0,000	5,044	11,732	0,000
48	3,693	6,270	0,000	5,697	14,997	0,000	4,944	10,151	0,000	3,602	7,929	0,000
50	2,216	6,726	0,000	4,981	10,992	0,000	3,690	8,088	0,000	2,085	6,927	0,000
52	1,328	2,672	0,000	3,697	9,242	0,000	2,776	5,350	0,000	1,697	4,157	0,000
54	0,508	2,984	0,000	2,905	5,932	0,000	1,784	3,419	0,000	1,210	3,733	0,000
56	0,793	3,988	0,000	1,959	4,998	0,000	1,494	3,408	0,000	0,930	2,739	0,000
58	1,558	1,114	0,000	1,885	4,008	0,000	0,618	3,044	0,000	0,786	2,111	0,000
60	0,266	2,126	0,000	1,340	3,699	0,000	0,785	2,361	0,000	0,624	1,838	0,000
62	0,000	0,918	0,000	0,983	3,111	0,000	0,398	0,868	0,000	0,260	1,188	0,000
64	0,410	6,644	0,000	0,079	9,055	0,000	1,404	4,328	0,000	0,668	6,071	0,000
66	0,269	1,202	0,000	1,367	14,506	0,000	2,140	5,225	0,000	0,548	8,106	0,000
68	0,000	1,217	0,000	0,757	11,933	0,000	0,000	3,834	0,000	0,695	5,131	0,000
70	0,000	1,145	0,000	0,243	5,322	0,000	0,154	4,469	0,000	0,234	6,452	0,000
72	0,000	0,742	0,000	0,000	7,500	0,000	0,000	2,715	0,000	0,000	3,488	0,000
74	0,000	1,579	0,000	0,000	4,678	0,000	0,000	3,191	0,000	0,000	6,111	0,000
76	0,000	0,000	0,000	0,000	3,715	0,000	0,000	1,655	0,000	0,000	3,029	0,000
78	0,000	0,947	0,000	0,000	0,905	0,000	0,000	3,337	0,000	0,000	5,091	0,000
80	0,000	0,474	0,000	0,000	4,960	0,000	0,000	2,268	0,000	0,000	5,433	0,000
82	0,000	1,087	0,000	0,000	1,684	0,000	0,000	1,808	0,000	0,000	0,404	0,000
84	0,000	0,538	0,000	0,000	0,326	0,000	0,000	0,833	0,000	0,000	1,233	0,000
86	0,000	0,632	0,000	0,000	0,000	0,000	0,000	0,903	0,000	0,000	1,013	0,000
88	0,000	0,345	0,000	0,000	0,334	0,000	0,000	0,512	0,000	0,000	1,391	0,000
90	0,000	0,345	0,000	0,000	0,866	0,000	0,000	0,253	0,000	0,000	0,112	0,000
92	0,000	0,345	0,000	0,000	2,016	0,000	0,000	0,146	0,000	0,000	0,000	0,000
94	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,436	0,000	0,000	0,122	0,000
96	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	1,001	0,000
98	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
100	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
102	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
104	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,122	0,000
Total	347,553	610,479	41,968	362,456	604,632	32,912	403,855	591,743	4,402	387,258	610,926	1,816
Nº Ind. (*):	2867	4667	60	3444	5550	55	4470	7080	14	4012	6533	6
Nº samples:		52			75			84			78	
Range:		12-91			10-92			11-94			7-104	
Total catch:		520			1243			1885			1898	
Sampled catch:		221			390			539			524	
Total hauls:		112			128			124			114	

TABLE 7 (cont.).- Greenland halibut length distribution. Estimated numbers in frequency in ‰. Spanish Spring Survey on NAFO 3NO: 1996-2003. Indet. means indeterminate. 1996-2000 data are transformed C/V *Playa de Menduíña* data. 2001-2003 data are original R/V *Vizconde de Eza* data. (*) indicates untransformed data.

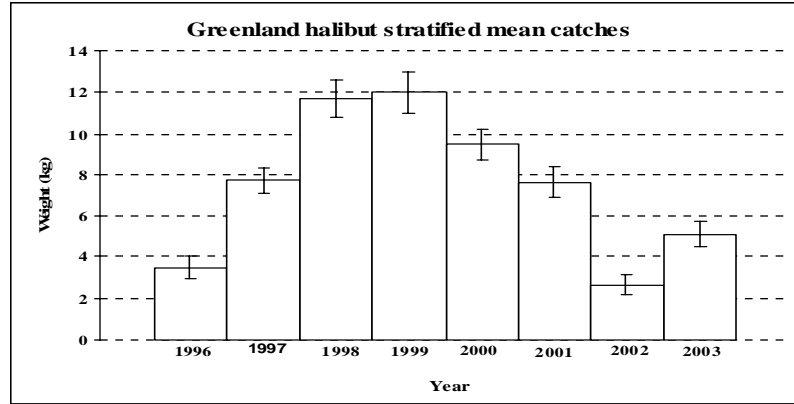| Length (cm.)	2000 Males	2000 Females	2000 Indet.	2001 Males	2001 Females	2001 Indet.	2002 Males	2002 Females	2002 Indet.	2003 Males	2003 Females	2003 Indet.
8	0,000	0,000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0,452	0,000	0,000
10	0,000	0,000	0,000	0.997	3.132	4.283	3.021	8.974	5.261	10,845	8,585	6,326
12	10,088	10,808	2,882	19.600	44.265	22.619	51.745	50.223	4.510	33,890	53,320	1,356
14	18,735	35,990	3,603	60.269	111.261	30.911	85.418	88.423	3.006	51,965	72,751	0,000
16	10,088	13,670	0,000	53.140	73.336	3.286	21.755	26.993	0.000	12,652	22,593	0,000
18	9,367	10,088	0,000	4.882	4.765	0.000	0.752	1.503	0.000	0,904	0,904	0,000
20	2,316	2,482	0,000	23.258	29.579	0.000	3.747	4.509	0.000	5,874	3,163	0,000
22	1,820	3,144	0,000	87.383	70.428	0.000	23.222	19.446	0.000	20,786	21,690	0,000
24	8,575	9,641	0,000	53.671	69.952	0.000	36.728	46.427	0.000	38,442	56,968	0,000
26	9,738	14,320	0,165	10.028	12.637	0.000	24.749	37.506	0.000	19,474	33,482	0,000
28	4,584	6,631	0,000	3.785	2.492	0.000	7.481	9.729	0.000	14,030	13,126	0,000
30	3,309	4,759	0,000	0.997	2.492	0.000	9.729	10.490	0.000	18,549	13,595	0,000
32	7,767	8,376	0,000	6.276	4.384	0.000	18.017	26.259	0.000	30,738	36,177	0,000
34	13,445	17,148	0,000	3.986	5.481	0.000	9.727	29.168	0.000	24,423	32,568	0,000
36	23,128	27,921	0,000	6.479	11.959	0.000	20.988	24.765	0.000	23,508	32,116	0,000
38	35,141	44,996	0,000	12.457	13.456	0.000	17.238	18.741	0.000	13,562	30,292	0,000
40	33,542	62,958	0,000	9.468	16.451	0.000	11.252	35.227	0.000	17,634	35,251	0,000
42	33,318	65,148	0,000	11.959	17.441	0.000	13.515	26.206	0.000	15,821	25,757	0,000
44	24,219	62,863	0,000	4.485	21.925	0.000	11.966	34.533	0.000	9,037	21,238	0,000
46	15,508	40,975	0,000	2.990	15.455	0.000	12.015	14.257	0.000	9,037	16,719	0,000
48	8,584	28,410	0,000	2.000	13.454	0.000	3.757	19.508	0.000	9,489	11,302	0,000
50	6,570	19,469	0,000	0.000	6.976	0.000	8.932	20.277	0.000	4,519	12,652	0,000
52	5,873	13,735	0,000	0.000	2.492	0.000	3.006	8.252	0.000	5,880	9,489	0,000
54	3,303	10,550	0,000	0.498	1.993	0.000	0.752	7.513	0.000	1,807	8,586	0,000
56	3,504	10,330	0,000	0.000	0.498	0.000	1.500	5.261	0.000	2,259	6,326	0,000
58	1,780	6,851	0,000	0.000	0.997	0.000	0.000	3.006	0.000	1,356	5,433	0,000
60	0,989	5,379	0,000	0.000	0.000	0.000	0.000	1.502	0.000	0,000	2,711	0,000
62	1,417	5,921	0,000	0.000	0.997	0.000	0.000	0.748	0.000	0,000	1,807	0,000
64	1,433	12,337	0,000	0.000	0.498	0.000	0.000	1.503	0.000	0,000	2,265	0,000
66	1,593	19,196	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0,452	0,000
68	3,072	21,644	0,000	0.000	0.498	0.000	0.000	1.502	0.000	0,000	0,000	0,000
70	0,000	14,948	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0,000	0,000
72	0,000	13,485	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	1,356	0,000
74	0,000	11,698	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0,904	0,000
76	0,000	10,518	0,000	0.000	0.498	0.000	0.000	0.000	0.000	0,000	0,452	0,000
78	0,000	8,212	0,000	0.000	0.505	0.000	0.000	0.752	0.000	0,000	0,452	0,000
80	0,000	14,351	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0,000	0,000
82	0,000	7,514	0,000	0.000	0.000	0.000	0.000	0.752	0.000	0,000	0,452	0,000
84	0,000	5,270	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0,000	0,000
86	0,000	5,191	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0,000	0,000
88	0,000	1,068	0,000	0.000	0.000	0.000	0.000	1.503	0.000	0,000	0,000	0,000
90	0,000	0,940	0,000	0.000	0.000	0.000	0.000	0.752	0.000	0,000	0,000	0,000
92	0,000	1,041	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0,000	0,000
94	0,000	0,567	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0,000	0,000
96	0,000	0,000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0,452	0,000
98	0,000	0,000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0,000	0,000
100	0,000	0,000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0,000	0,000
102	0,000	0,000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0,000	0,000
104	0,000	0,000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0,000	0,000
Total	302,807	690,542	6,651	378.605	560.295	61.100	401.013	586.210	12.777	396,933	595,385	7,682
Nº Ind. (*):	2991	6162	10	445	739	80	535	782	17	878	1317	17
Nº samples:		81			44			76			79	
Range:		11-94			10-78			9-89			8-95	
Total catch:		1437			332			430			743	
Sampled catch:		635			291			430			742	
Total hauls:		118			83			125			122	

FIG. 1. Greenland halibut stratified mean catches in Kg and ±SD by strata and year. Spanish Spring surveys on NAFO Div. 3NO: 1996-2003 (1996-2000 transformed data from C/V *Playa de Menduíña*; 2001-2003 original data from R/V *Vizconde de Eza*).
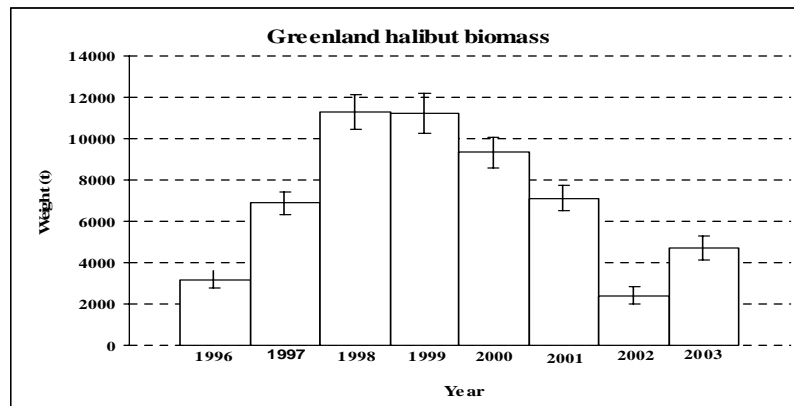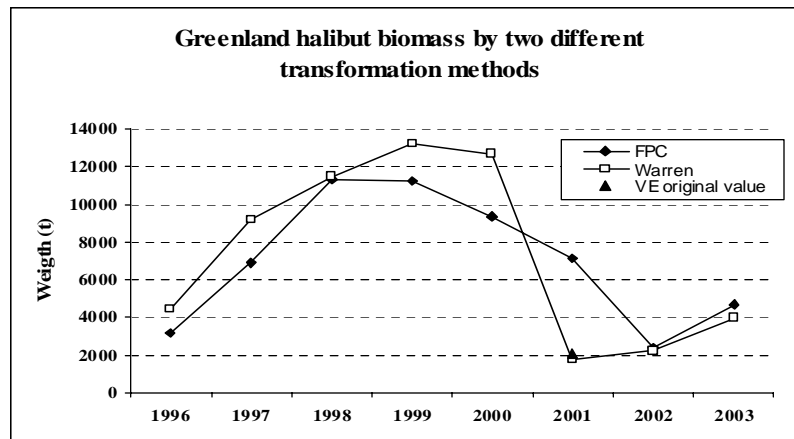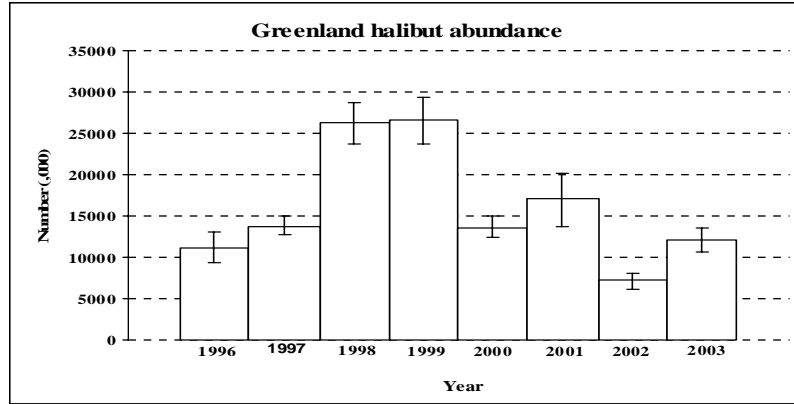

FIG. 2. Greenland halibut biomass in tons and ±SD by strata and year. Spanish Spring surveys on NAFO Div. 3NO: 1996-2003 (1996-2000 transformed data from C/V *Playa de Menduíña*; 2001-2003 original data from R/V *Vizconde de Eza*).
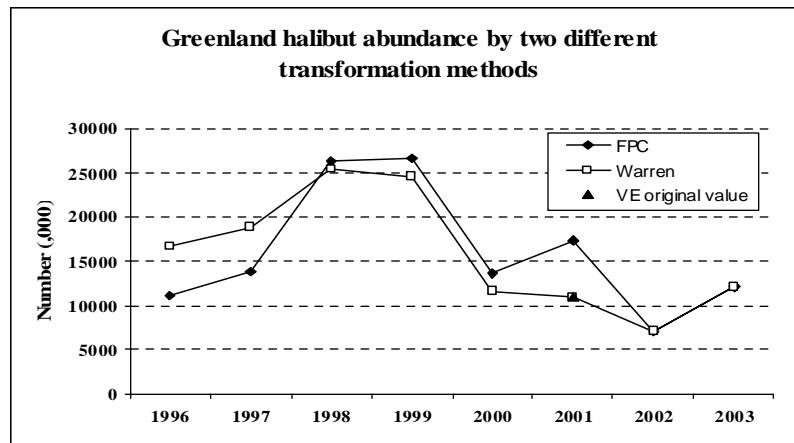

FIG. 3. Greenland halibut biomass in tons transformed by the two different methods: FPC and Warren. The original R/V *Vizconde de Eza* value in 2001 is marked.

FIG. 4. Greenland halibut abundance in thousand and ±SD by strata and year. Spanish Spring surveys on NAFO Div. 3NO: 1996-2003 (1996-2000 transformed data from C/V *Playa de Menduíña*; 2001-2003 original data from R/V *Vizconde de Eza*).

FIG. 5. Greenland halibut abundance in thousand transformed by the two different methods: FPC and Warren. The original R/V *Vizconde de Eza* value in 2001 is marked.
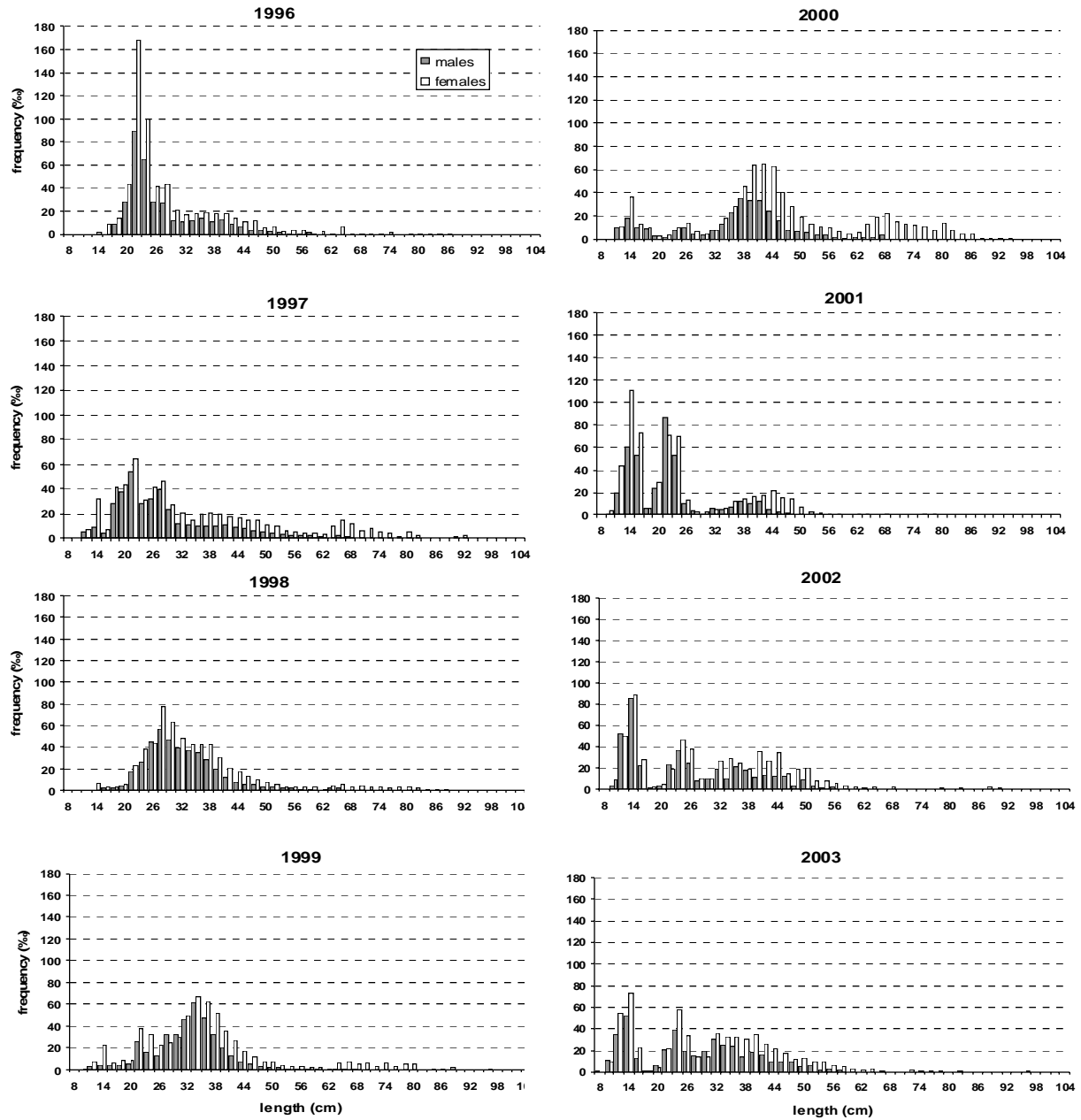
FIG. 6. Greenland halibut length distribution (cm) on NAFO 3NO: 1996-2003. Frequency in ‰. 1996-2000 data are transformed data from C/V *Playa de Menduíña*, and 2001-2003 data are original from R/V *Vizconde de Eza*.