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Results for the Spanish Survey in the NAFO Regulatory Area of Division 3L for the period 2003-2008

by

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Abstract

Since 2003, a stratified random summer bottom trawl survey in the NAFO Regulatory Area of Division 3L (Flemish Pass) was conducted by Spain. The surveys were carried out by the R/V *"Vizconde de Eza"* using bottom trawl net type *Campelen*. Entire series of mean catches, biomass and length distribution for Greenland halibut, American plaice and witch flounder are presented for the period 2003-2008. For Greenland halibut an increasing trend along the whole period in biomass and abundance is observed. A good recruitment, mainly in 2006, can be seeing; although the number of individuals of length over 70 cm. is very low. The American plaice biomass has increased since 2004 and a presence of small individuals in the last years is observer. For witch flounder,there is no a clear trend in the period 2003-2008, in 2008 the biomass increased.

KEYWORDS: Survey, Flemish Pass, Greenland halibut, American plaice, witch flounder.

Material and Methods

The surveys on NAFO Regulatory Area of Div. 3L (Flemish Pass) were initiated by Spain in 2003. The Research vessel *"Vizconde de Eza"* carried out the surveys following the same procedures and using the same bottom trawl gear *Campelen*. In 2003, the survey was carried out in spring (June) and it did not cover all strata adequately (69% of the total area prospected in 2006-2008). In 2004, the survey was carried out in August, for a period of nine days, and it covered only the 96%. In 2005, it was not possible to perform the survey due to problems with the winch of the ship; and in 2006, for the first time, an adequate prospecting survey was conducted in Division 3L with over 100 valid hauls. Table 1 presents the number of valid tows, the depth and number of covered strata and the dates of the survey series. Figure 1 shows haul positions of the Spanish surveys in NAFO Div. 3L in the period 2003-2008.

The survey area was stratified following the standard stratification schemes (Bishop, 1994). All surveys had a stratified random design following NAFO specifications (Doubleday, 1981). Sets were allocated to strata proportionally to their size, with a minimum of two planned hauls per stratum and the trawl positions were chosen at random. A synoptic sheet of the survey with the vessel and gear characteristics is shown in Table 2. 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 out and weighted by species and a sample of each species was taken in order to measure it and obtain the length distribution. For Greenland halibut, American plaice and witch flounder, each individual of the sample was measured to the total length to the nearest lower cm. and data are given in 2 cm intervals. We present the mean catch per haul, the stratified mean catch per haul and the biomass with their variance per year and the length distribution in number per haul stratified mean catches per length, sex and year for each

species in the period 2003-2008. To obtain the biomass from length distribution, the following formula was used: Weight=a $(Length+0.5)^b$.

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.

Results

In this report, only the results for Greenland halibut, American plaice and witch flounder are presented. The results for the rest of target species will be presented in other SCR in this SC meeting. The detailed results for Northern shrimp, the most abundant species in the catches of all surveys, were presented in Casas *et al*., 2008.

Greenland halibut (*Reinhardtius hippoglossoides* **Walbaum, 1792**)

The Greenland halibut stock in Subarea 2 and Div. 3KLMNO is considered to be part of a biological stock complex, which includes Subareas 0 and 1. Abundance and biomass indices were available from research vessel surveys by Canada in Div. 2J+3KLMNO (1978-2008), EU in Div. 3M (1988-2008) and EU-Spain in Div. 3NO (1995-2008). Greenland halibut is managed under a fifteen year rebuilding programme that started in 2004.

Catches increased sharply in 1990 due to a developing fishery in the NAFO Regulatory Area in Div. 3LMNO and continued at high levels during 1991-94. The exploitable biomass was reduced to low levels in 1995-97 due to very high catches and high fishing mortality. It increased during 1998-2000 due to greatly reduced catches, much lower fishing mortality and improved recruitment. The exploitable biomass has declined in recent years and the current estimates (2004-2008) are amongst the lowest in the series. Recent recruitment has been below average, and fishing mortality remains high (NAFO, 2008).

Mean catches and biomass
Table 3 shows the swept area, the tow number, the mean catches and their variance per haul and year for Greenland halibut. Table 4 and Figure 2 present the stratified mean catches per stratum with the total variance per year. Table 5 and Figure 3 present the abundance, the biomass per swept area per stratum and their total variance per year. Table 6 presents the length-weight relationships.

The biomass of the Greenland halibut has had a increase in the prospected area along the whole period, mainly in 2008. The biomass presents the same trend as mean catches since the year 2004. In 2003, the mean catch does not follow the same pattern; this is probably due to the less area covered in 2003 survey.

Length distribution
Table 7 presents the stratified mean catches per haul length distribution for the Greenland halibut, by sex and year, with the number of samples in which there were length measures, the total number of individuals measured in these samples, the sampled catch and the range of lengths met, as well as the total catch of this species and the total hauls made in the survey. In Figures 4 and 5 the evolution along the years can be followed.

The biomass of the Greenland halibut has had a increase in the 2008 and we can see a high increase in the numbers of individuals. In this period a good recruitment can be seeing, although the number of individuals of length over 70 cm. is very low. Although biomass and stratified mean catch increased in 2007, the number of individuals per stratified mean catches decreased in this year, due to the good recruitment in 2006. The highest recruitment was in 2006, that appears in Fig. 4, with length classes mode 14 cm. We must wait for next years data to see the evolution of this recruitment.

American plaice (*Hippoglossoides platesoides* **Fabricius, 1780**)

There was no directed fishing of American plaice in 1994 and there has been under moratorium since 1995. Catches increased after the moratorium until 2003 after which they began to decline. Biomass and SSB remain low compared to historic levels. SSB declined to the lowest estimated level in 1994 and 1995. It has increased since then still remains very low. There has been no good recruitment to the exploitable biomass since the mid-1980s (NAFO, 2008).

Mean catches and biomass
American plaice haul mean catches by stratum are presented in Table 8, including swept area, number of hauls and SD. Stratified mean catches per tow by stratum and year and their variance are presented in Table 9. The entire time

series (2003-2008) of biomass and their SD estimates of American plaice are shown in Table 10. Length-weight relationships are presented in Table 6.

The American plaice indices show a general increasing trend in the prospected area along the years (Fig. 6 and 7). The highest values in the estimated biomass have been observed in the shallowest strata, in a range of depth from 93 to 274 meters.

Length distribution
Table 11 presents the stratified mean catches per haul length distribution by sex and year. As well as the number of samples in which there were length measures, the total number of individuals measured in these samples, the sampled catch and the range of lengths met. The total catch of this species and the total hauls made in the survey are shown too. In Figures 5 and 8 the evolution along the years can be followed.

For this species, there is quite good presence of small individuals (around 12-14 cm) since 2006. There is a higher proportion of females than males.

Witch flounder (*Glyptocephalus cynoglossus* Linnaeus, 1758)

Witch flounder stock has remained at a low level since 1995. A moratorium on directed fishing was implemented in 1995. Increases in biomass indices for the whole stock area were not observed in abundance indices, suggesting the slight increasing trends in biomass are the result of growth and not recruitment (NAFO, 2008).

Mean catches and biomass
Table 12 shows the swept area, the tow number, the mean catches and their variance per haul and year for witch flounder. Table 13 and Figure 9 present the stratified mean catches per stratum with the total variance per year. Table 14 and Figure 10 present the abundance and biomass per swept area per stratum and their total variance per year. The length-weight relationships are presented in Table 6.

For witch flounder, there is no a clear trend in this period; we can see a decreasing in the indices between 2004 and 2007, and an increasing for 2203-2004 and 2007-2008. Estimated biomass ranged from 483 t in 2008 to a 297 t and 298 t in 2003 and 2007 respectively, although most estimate results comes from few strata. The stratified mean catches per stratum followed similar trends as the biomass and abundance indices (Fig. 9 and 10).

Length distribution
Table 15 presents the stratified mean catches per haul length distribution for this specie, by sex and year, with the number of samples in which there were length measures, the total number of individuals measured in these samples, the sampled catch and the range of lengths met, as the total catch of this species and the total hauls made in the survey. In Figures 5 and 8 we can follow the evolution along the years.

The highest recruitment was in 2003, but since then the number of younger individuals have declined.

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TABLE 1.- Spanish bottom trawl surveys in NAFO Division 3L for the period 2003-2008.

Year	Vessel	Valid tows	Depth strata covered (m)	Surveyed strata (no.)	Dates
2003	R/V *"Vizconde de Eza"*	39	118-1100	17	June 2 - June 6, June 29
2004	R/V *"Vizconde de Eza"*	50	141-1452	23	August 7 - August 15
2005	-	-	-	-	-
2006	R/V *"Vizconde de Eza"*	100	116-1449	24	July 31 - August 18
2007	R/V *"Vizconde de Eza"*	94	119-1449	24	July 23 - August 11
2008	R/V *"Vizconde de Eza"*	100	105-1455	24	July 24 - August 11

TABLE 2.- Technical data of the Spanish survey in NAFO Division 3L for the period 2003-2008.

Procedure	Specification
Vessel	R/V *"Vizconde de Eza"*
GT	1400 t.
Power	1800 HP
Surveyed area	Div. 3L (depth < 1500 m, outside ZEE Canada)
Mean trawl speed	3 knots
Trawling time	30 minutes effective time
Fishing gear type	*Campelen 1800*
Headline	29.5 m
Groundrope	19.5 m
Type of groundrope	34 rockhopper
Floats	(2 x 39) + 10
Bridle	40 m (20 mm)
Vertical opening	4-5
Horizontal opening	26
Trawl doors	Polyvalent, 1400 Kg
Warp	20 mm
Warp to depth ratio	$22.287 * Depth (m)^{0.6667}$
Mesh size in the cod-end	44 mm
Type of survey:	Stratified random bottom trawl survey
Criterion to change position of a selected tow	Unsuitable bottom for trawling according to commercial fish information or ecosonder register. Information on gear damage from previous surveys.
Criterion to reject data from tow	- Severe tears in the gear - tears in cod-end - Less of 20 minutes tow - Bad behaviour of the gear
Daily period for fishing	6.00 to 22.00 hours
Target species	Greenland halibut, American plaice, Atlantic cod, roughhead grenadier, witch flounder, thorny skate, red fish, black dogfish, northern shrimp.

TABLE 3.- Swept area, number of hauls and **Greenland halibut** mean catch (Kg) and SD (**) by stratum. Spanish Survey on NAFO Div. 3L in the period 2003-2008, on board R/V "*Vizconde de Eza"*. (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2008.

Stratum	2003 (*) Swept area	Tow number	Mean catch	SD	2004 Swept area	Tow number	Mean catch	SD	2006 Swept area	Tow number	Mean catch	SD	2007 Swept area	Tow number	Mean catch	SD	2008 Swept area	Tow number	Mean catch	SD
385	0.0225	2	0.000	0.000	0.0229	2	6.025	7.814	0.0229	2	15.721	8.173	0.0225	2	16.750	6.293	0.0229	2	18.011	17.521
387	0.0229	2	15.890	6.661	0.0214	2	65.550	13.930	0.0225	2	52.500	4.950	0.0225	2	31.050	6.576	0.0435	4	46.511	13.072
388	0.0334	3	20.870	13.452	0.0105	1	42.700	-	0.0566	5	47.424	8.026	0.0563	5	50.036	21.899	0.0559	5	31.870	17.546
389	0.0454	4	0.459	0.507	0.0225	2	5.770	1.796	0.0795	7	32.941	14.261	0.0900	8	37.473	14.697	0.0780	7	42.616	22.552
390	0.0563	5	0.020	0.029	0.0345	3	0.000	0.000	0.1249	11	12.967	16.007	0.1350	12	6.454	10.772	0.1395	12	5.138	7.236
391	0.0338	3	0.313	0.369	0.0218	2	5.710	4.398	0.0450	4	17.633	5.302	0.0450	4	15.750	5.063	0.0454	4	22.882	4.673
392	0.0116	1	12.500	-	0.0214	2	15.600	10.607	0.0229	2	6.900	3.111	0.0225	2	42.350	34.153	0.0221	2	11.370	3.210
729	0.0210	2	34.860	7.552	0.0221	2	30.500	3.394	0.0338	3	24.120	9.552	0.0338	3	24.695	4.326	0.0338	3	17.887	7.697
730	0.0221	2	24.400	5.798	0.0221	2	7.650	2.616	0.0326	3	8.403	6.415	0.0225	2	4.840	3.620	0.0323	3	40.777	14.460
731	0.0229	2	36.350	2.758	0.0233	2	27.260	3.338	0.0341	3	16.643	6.408	0.0338	3	31.299	16.813	0.0330	3	42.527	10.506
732	0.0113	1	43.100	-	0.0210	2	11.050	0.778	0.0334	3	6.570	3.380	0.0338	3	9.847	3.027	0.0446	4	42.878	42.441
733	n.s.	n.s.	n.s.	n.s.	0.0330	3	18.233	2.495	0.0454	4	18.556	8.530	0.0338	3	24.610	12.655	0.0431	4	31.780	5.015
734	n.s.	n.s.	n.s.	n.s.	0.0304	3	20.567	11.620	0.0225	2	4.478	1.340	0.0225	2	4.639	1.940	0.0221	2	7.603	1.948
741	0.0113	1	27.200	-	0.0323	3	11.517	6.225	0.0218	2	5.648	0.583	0.0225	2	4.590	6.491	0.0210	2	7.005	5.961
742	0.0116	1	31.800	-	0.0120	1	31.100	-	0.0229	2	10.593	1.453	0.0225	2	4.728	1.503	0.0210	2	14.420	16.150
743	n.s.	n.s.	n.s.	n.s.	0.0188	2	8.765	10.090	0.0225	2	4.750	6.718	0.0225	2	10.925	2.185	0.0203	2	6.460	2.531
744	n.s.	n.s.	n.s.	n.s.	0.0101	1	7.500	-	0.0229	2	10.520	9.588	0.0218	2	28.770	21.835	0.0221	2	23.345	16.553
745	0.0341	3	11.000	8.296	0.0319	3	12.933	1.026	0.0686	6	7.227	3.098	0.0675	6	8.536	4.108	0.0555	5	20.900	19.813
746	0.0446	4	29.503	16.252	0.0338	3	9.533	5.315	0.0675	6	5.672	4.188	0.0664	6	6.965	6.921	0.0638	6	56.842	58.887
747	n.s.	n.s.	n.s.	n.s.	0.0308	3	0.507	0.443	0.1230	11	4.328	5.447	0.1238	11	5.519	6.837	0.1069	10	14.341	11.441
748	0.0109	1	13.700	-	0.0199	2	6.375	5.056	0.0326	3	3.428	4.404	0.0338	3	6.460	6.984	0.0218	2	13.600	5.940
749	0.0221	2	8.540	4.016	0.0221	2	6.550	9.263	0.0229	2	4.250	6.010	0.0113	1	4.010	-	0.0214	2	20.670	21.171
750	n.s.	n.s.	n.s.	n.s.	0.0180	2	0.000	0.000	0.1005	9	10.041	12.221	0.0679	6	9.362	16.847	0.0844	8	14.689	17.321
751	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s	n.s	0.0454	4	4.570	5.958	0.0225	2	20.400	15.981	0.0413	4	20.053	13.204

TABLE 4.- Stratified mean catches (Kg) and SD of **Greenland halibut** by stratum and year (2003-2008). n.s. means stratum not surveyed. In 2003, the data correspond to 69% of the total area prospected in 2006-2008.

			Survey			
Stratum	2003	2004	2005	2006	2007	2008
385	0.00	710.95	-	1855.08	1976.50	2125.24
387	4067.84	16780.80	-	13440.00	7948.80	11906.69
388	7450.59	15243.90	-	16930.37	17862.78	11377.52
389	233.76	2936.93	-	16767.19	19073.88	21691.69
390	16.30	0.00	-	10567.88	5259.74	4187.33
391	88.36	1610.22	-	4972.37	4441.50	6452.72
392	1812.50	2262.00	-	1000.50	6140.75	1648.65
729	6483.96	5673.00	-	4486.32	4593.27	3326.92
730	4148.00	1300.50	-	1428.57	822.80	6932.03
731	7851.60	5888.16	-	3594.96	6760.51	9185.76
732	9956.10	2552.55	-	1517.67	2274.58	9904.70
733	n.s.	4266.60	-	4342.16	5758.74	7436.52
734	n.s.	3146.70	-	685.06	709.69	1163.18
741	2720.00	1151.67	-	564.75	459.00	700.50
742	2035.20	1990.40	-	677.92	302.56	922.88
743	n.s.	447.02	-	242.25	557.18	329.46
744	n.s.	495.00	-	694.32	1898.82	1540.77
745	3828.00	4500.80	-	2514.88	2970.59	7273.20
746	11564.98	3737.07	-	2223.29	2730.28	22281.93
747	n.s.	366.83	-	3133.67	3995.56	10382.88
748	2178.30	1013.63	-	545.11	1027.14	2162.40
749	1076.04	825.30	-	535.50	505.26	2604.42
750	n.s.	0.00	-	5582.86	5205.09	8166.95
751	n.s.	n.s.	-	1046.53	4671.60	4592.14
TOTAL	65511.53	76900.01	-	99349.19	107946.61	158296.49
$(\bar{y})$	14.64	12.29	-	15.32	16.64	24.40
SD	1.09	0.59	-	0.95	1.33	2.12

TABLE 5.- Survey estimates (by the swept area method) of **Greenland halibut** biomass (t.) and SD by stratum and year in NAFO Div. 3L (R/V *"Vizconde de Eza"*). n.s. means stratum not surveyed. In 2003: the data correspond to 69% of the total area prospected in 2006-2008.

			Survey			
Stratum	2003	2004	2005	2006	2007	2008
385	0	62	-	162	176	186
387	356	1570	-	1195	707	1095
388	670	1452	-	1495	1588	1018
389	21	261	-	1476	1695	1947
390	1	0	-	931	468	360
391	8	148	-	442	395	569
392	156	212	-	87	546	149
729	618	513	-	399	408	296
730	375	118	-	131	73	645
731	686	507	-	316	601	835
732	885	243	-	136	202	888
733	n.s.	388	-	383	512	690
734	n.s.	311	-	61	63	105
741	242	107	-	52	41	67
742	175	166	-	59	27	88
743	n.s.	48	-	22	50	33
744	n.s.	49	-	61	175	139
745	337	424	-	220	264	655
746	1037	332	-	198	247	2097
747	n.s.	36	-	280	355	971
748	200	102	-	50	91	199
749	97	75	-	47	45	244
750	n.s.	0	-	500	460	774
751	n.s.	n.s.	-	92	415	445
TOTAL	5863	7121	-	8795	9603	14494
SD	445	325	-	551	769	1223

Table 6.- Length-weight relationships in the calculation of biomass, for Division 3L (out ZEE Canada), 2003-2008 for **Greenland halibut, American plaice and witch flounder**. The equation is *Weight=a(Length+0.5)^b*. To calculate the parameters for the indeterminate individuals, we used the total data (males+females+indeterminate individuals).

		Greenland halibut					American plaice					Witch flounder		
Year	Sex	L-W Equations	N	r^2	Year	Sex	L-W Equations	N	r^2	Year	Sex	L-W Equations	N	r^2
2003	All	W = 0.0020 L$^{3.3855}$	429	0.9897	2003	All	W = 0.0018 L$^{3.4328}$	725	0.9873	2003	All	W = 0.0019 L$^{3.3452}$	96	0.9883
	Males	W = 0.0020 L$^{3.3776}$	231	0.9858		Males	W = 0.0025 L$^{3.3191}$	205	0.9813		Males	W = 0.0018 L$^{3.3564}$	39	0.9901
	Females	W = 0.0020 L$^{3.3914}$	198	0.9922		Females	W = 0.0016 L$^{3.4755}$	516	0.9887		Females	W = 0.0018 L$^{3.3457}$	55	0.9861
2004	All	W = 0.0025 L$^{3.3067}$	724	0.9817	2004	All	W = 0.0026 L$^{3.4033}$	515	0.9808	2004	All	W = 0.0013 L$^{3.4496}$	139	0.9888
	Males	W = 0.0021 L$^{3.3591}$	335	0.9886		Males	W = 0.0045 L$^{3.1673}$	142	0.9473		Males	W = 0.0009 L$^{3.5684}$	51	0.9796
	Females	W = 0.0030 L$^{3.2628}$	389	0.9769		Females	W = 0.0022 L$^{3.4001}$	373	0.9856		Females	W = 0.0013 L$^{3.4636}$	72	0.9907
2006	All	W = 0.0021 L$^{3.3631}$	1220	0.9835	2006	All	W = 0.0025 L$^{3.3723}$	759	0.9784	2006	All	W = 0.0026 L$^{3.2619}$	193	0.9694
	Males	W = 0.0019 L$^{3.3863}$	583	0.9831		Males	W = 0.0026 L$^{3.3615}$	267	0.9629		Males	W = 0.0046 L$^{3.0994}$	65	0.9630
	Females	W = 0.0023 L$^{3.3342}$	637	0.9835		Females	W = 0.0031 L$^{3.3146}$	486	0.9776		Females	W = 0.0021 L$^{3.3201}$	123	0.9631
2007	All	W = 0.0033 L$^{3.2385}$	1544	0.9890	2007	All	W = 0.0024 L$^{3.3710}$	1276	0.9873	2007	All	W = 0.0023 L$^{3.3024}$	249	0.9776
	Males	W = 0.0032 L$^{3.2464}$	694	0.9876		Males	W = 0.0026 L$^{3.3456}$	444	0.9734		Males	W = 0.0033 L$^{3.1948}$	106	0.9618
	Females	W = 0.0037 L$^{3.2183}$	842	0.9898		Females	W = 0.0028 L$^{3.3289}$	809	0.9910		Females	W = 0.0025 L$^{3.2803}$	135	0.9880
2008	All	W = 0.0037 L$^{3.2060}$	1704	0.9900	2008	All	W = 0.0044 L$^{3.2282}$	1196	0.9894	2008	All	W = 0.0031 L$^{3.2244}$	381	0.9844
	Males	W = 0.0036 L$^{3.2070}$	700	0.9890		Males	W = 0.0057 L$^{3.1501}$	386	0.9853		Males	W = 0.0028 L$^{3.2523}$	147	0.9860
	Females	W = 0.0038 L$^{3.2008}$	998	0.9900		Females	W = 0.0042 L$^{3.2366}$	773	0.9931		Females	W = 0.0031 L$^{3.2241}$	210	0.9882

TABLE 7.- Greenland halibut length distribution per haul mean catches by sex and year. Number per stratified mean catches. Spanish Summer Survey on NAFO 3L: 2003-2008 (R/*V "Vizconde de Eza"*). Indet. means indeterminate. (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2008. (M – Males; F-Females; I-Indet.;T-Total).

Lenght (cm.)	2003 (*) M	F	I	T	2004 M	F	I	T	2006 M	F	I	T	2007 M	F	I	T	2008 M	F	I	T
6	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.01	0.00	0.01	0.02	0.01	0.02	0.02	0.05
10	0.49	0.64	0.00	1.14	0.00	0.04	0.00	0.04	0.26	0.08	0.01	0.35	0.16	0.16	0.06	0.38	0.37	0.35	0.12	0.85
12	1.04	1.65	0.00	2.69	0.49	0.68	0.10	1.27	2.12	1.48	0.00	3.60	0.94	0.99	0.06	1.99	0.93	1.14	0.14	2.21
14	0.89	1.25	0.00	2.14	1.08	1.42	0.00	2.49	2.64	3.18	0.00	5.82	1.09	1.47	0.00	2.56	0.24	0.44	0.05	0.73
16	0.03	0.03	0.00	0.06	0.99	1.20	0.02	2.22	1.01	1.38	0.00	2.40	0.26	0.45	0.00	0.72	0.00	0.00	0.00	0.00
18	0.06	0.06	0.00	0.12	0.06	0.42	0.00	0.49	0.05	0.15	0.00	0.19	0.06	0.01	0.00	0.07	0.00	0.03	0.00	0.03
20	0.36	0.62	0.00	0.99	0.01	0.02	0.00	0.03	0.01	0.01	0.00	0.02	0.02	0.04	0.00	0.06	0.04	0.13	0.00	0.17
22	2.07	2.63	0.00	4.71	0.28	0.10	0.00	0.38	0.01	0.09	0.00	0.10	0.19	0.04	0.00	0.23	0.46	0.55	0.00	1.01
24	3.81	3.68	0.00	7.49	0.95	0.33	0.00	1.29	0.16	0.08	0.00	0.24	0.43	0.45	0.00	0.88	0.89	1.16	0.00	2.05
26	3.03	2.55	0.00	5.58	1.70	0.81	0.00	2.51	0.40	0.35	0.00	0.75	0.60	0.69	0.00	1.29	0.72	1.57	0.00	2.29
28	1.44	1.85	0.00	3.29	1.35	1.14	0.00	2.49	0.65	0.74	0.00	1.39	0.35	0.52	0.00	0.88	0.27	0.67	0.00	0.94
30	2.21	2.13	0.00	4.35	1.94	1.30	0.00	3.24	0.82	0.70	0.00	1.52	0.21	0.08	0.00	0.29	0.23	0.21	0.00	0.44
32	2.60	2.52	0.00	5.12	2.32	1.85	0.00	4.16	0.85	0.79	0.00	1.64	0.55	0.28	0.00	0.83	0.50	0.46	0.00	0.96
34	2.47	1.88	0.00	4.36	2.22	2.11	0.00	4.33	1.54	1.36	0.00	2.90	0.88	0.78	0.00	1.67	0.94	0.88	0.00	1.82
36	1.55	1.43	0.00	2.98	1.70	2.29	0.00	3.99	1.57	1.62	0.00	3.19	1.22	1.30	0.00	2.52	1.12	1.20	0.00	2.32
38	1.12	1.34	0.00	2.46	1.34	1.75	0.00	3.09	1.26	1.92	0.00	3.18	1.43	1.58	0.00	3.01	0.97	1.24	0.00	2.21
40	0.47	1.00	0.00	1.47	0.96	1.47	0.00	2.43	1.28	1.72	0.00	2.99	1.32	2.13	0.00	3.45	1.18	1.26	0.00	2.43
42	0.40	0.81	0.00	1.21	0.35	0.80	0.00	1.15	1.31	1.56	0.00	2.87	1.12	2.05	0.00	3.16	1.69	2.02	0.00	3.71
44	0.30	0.62	0.00	0.92	0.26	0.67	0.00	0.93	0.85	1.69	0.00	2.53	1.02	1.92	0.00	2.94	1.23	2.24	0.00	3.47
46	0.08	0.25	0.00	0.33	0.12	0.28	0.00	0.40	0.48	1.02	0.00	1.50	0.69	1.41	0.00	2.10	1.16	2.06	0.00	3.22
48	0.16	0.21	0.00	0.37	0.09	0.19	0.00	0.28	0.30	0.81	0.00	1.12	0.34	1.03	0.00	1.37	0.87	2.08	0.00	2.95
50	0.13	0.22	0.00	0.36	0.08	0.08	0.00	0.16	0.13	0.42	0.00	0.54	0.15	0.72	0.00	0.87	0.42	1.62	0.00	2.04
52	0.14	0.17	0.00	0.30	0.00	0.07	0.00	0.07	0.05	0.28	0.00	0.33	0.16	0.58	0.00	0.74	0.29	1.30	0.00	1.59
54	0.05	0.20	0.00	0.25	0.05	0.07	0.00	0.12	0.07	0.17	0.00	0.24	0.06	0.32	0.00	0.38	0.18	0.80	0.00	0.98
56	0.01	0.10	0.00	0.12	0.02	0.03	0.00	0.05	0.01	0.07	0.00	0.08	0.03	0.13	0.00	0.16	0.15	0.43	0.00	0.58
58	0.03	0.02	0.00	0.05	0.01	0.04	0.00	0.05	0.03	0.06	0.00	0.09	0.03	0.06	0.00	0.09	0.03	0.28	0.00	0.30
60	0.00	0.00	0.00	0.00	0.02	0.03	0.00	0.05	0.00	0.08	0.00	0.08	0.01	0.09	0.00	0.10	0.01	0.13	0.00	0.14
62	0.00	0.08	0.00	0.08	0.00	0.01	0.00	0.01	0.01	0.02	0.00	0.03	0.00	0.07	0.00	0.07	0.02	0.06	0.00	0.08
64	0.02	0.04	0.00	0.07	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.08
66	0.00	0.04	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.02	0.00	0.02	0.00	0.05	0.00	0.05
68	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.04	0.00	0.02	0.00	0.02	0.00	0.01	0.00	0.01	0.00	0.02	0.00	0.02
70	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.04	0.00	0.04
72	0.00	0.04	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02
74	0.00	0.02	0.00	0.02	0.00	0.04	0.00	0.04	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03
76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.01	0.00	0.01
78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02
80	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.04	0.00	0.04
82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
88	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Total	**24.98**	**28.14**	**0.00**	**53.12**	**18.38**	**19.32**	**0.12**	**37.82**	**17.90**	**21.93**	**0.01**	**39.84**	**13.32**	**19.43**	**0.14**	**32.88**	**14.90**	**24.67**	**0.34**	**39.91**
Nº Ind.:	920	1035	0	1955	935	985	4	1924	1549	1907	1	3457	1205	1759	13	2977	1447	2416	37	3900
Sampled catch:				585				695				1397				1533				2431
Range:				10-88				7-75				9-87				9-80				9-92
Total catch:				585				695				1397				1533				2431
Total hauls:				40				58				101				99				103

TABLE 8.- Swept area, number of hauls and **American plaice** mean catch (Kg) and SD (**) by stratum. Spanish Survey on NAFO Div. 3L in the period 2003-2008, on board R/V "*Vizconde de Eza*". (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2008.

Stratum	2003 (*)				2004				2006				2007				2008			
	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD
385	0.0225	2	3.985	2.920	0.0229	2	19.100	15.132	0.0229	2	48.530	33.757	0.0225	2	31.925	7.955	0.0229	2	64.750	60.033
387	0.0229	2	3.850	4.031	0.0214	2	17.810	2.814	0.0225	2	6.653	5.533	0.0225	2	7.992	2.039	0.0435	4	5.906	4.512
388	0.0334	3	7.317	2.249	0.0105	1	13.450	-	0.0566	5	7.618	2.653	0.0563	5	8.390	2.267	0.0559	5	2.925	1.905
389	0.0454	4	6.455	2.150	0.0225	2	8.950	4.073	0.0795	7	20.584	12.793	0.0900	8	25.475	13.677	0.0780	7	12.982	11.014
390	0.0563	5	1.854	1.584	0.0345	3	27.777	14.246	0.1249	11	76.086	51.616	0.1350	12	69.235	50.977	0.1395	12	117.141	134.128
391	0.0338	3	6.207	1.670	0.0218	2	14.890	3.125	0.0450	4	10.585	9.713	0.0450	4	37.163	30.535	0.0454	4	20.580	28.816
392	0.0116	1	8.400	-	0.0214	2	0.300	0.424	0.0229	2	0.000	0.000	0.0225	2	1.055	0.658	0.0221	2	0.000	0.000
729	0.0210	2	55.190	19.643	0.0221	2	0.150	0.212	0.0338	3	0.000	0.000	0.0338	3	0.000	0.000	0.0338	3	0.000	0.000
730	0.0221	2	59.000	21.779	0.0221	2	0.000	0.000	0.0326	3	0.000	0.000	0.0225	2	0.000	0.000	0.0323	3	0.000	0.000
731	0.0229	2	25.610	11.017	0.0233	2	1.450	2.051	0.0341	3	0.000	0.000	0.0338	3	0.253	0.439	0.0330	3	0.327	0.566
732	0.0113	1	40.700	-	0.0210	2	0.000	0.000	0.0334	3	0.000	0.000	0.0338	3	0.000	0.000	0.0446	4	0.000	0.000
733	n.s.	n.s.	n.s.	n.s.	0.0330	3	1.267	1.186	0.0454	4	0.000	0.000	0.0338	3	0.320	0.554	0.0431	4	0.426	0.762
734	n.s.	n.s.	n.s.	n.s.	0.0304	3	0.000	0.000	0.0225	2	0.000	0.000	0.0225	2	0.000	0.000	0.0221	2	0.066	0.093
741	0.0113	1	0.000	-	0.0323	3	0.000	0.000	0.0218	2	0.000	0.000	0.0225	2	0.000	0.000	0.0210	2	0.000	0.000
742	0.0116	1	0.000	-	0.0120	1	0.000	-	0.0229	2	0.000	0.000	0.0225	2	0.000	0.000	0.0210	2	0.000	0.000
743	n.s.	n.s.	n.s.	n.s.	0.0188	2	0.000	0.000	0.0225	2	0.000	0.000	0.0225	2	0.000	0.000	0.0203	2	0.000	0.000
744	n.s.	n.s.	n.s.	n.s.	0.0101	1	0.000	-	0.0229	2	0.000	0.000	0.0218	2	0.000	0.000	0.0221	2	0.000	0.000
745	0.0341	3	0.610	0.849	0.0319	3	0.000	0.000	0.0686	6	0.000	0.000	0.0675	6	0.000	0.000	0.0555	5	0.000	0.000
746	0.0446	4	0.000	0.000	0.0338	3	0.000	0.000	0.0675	6	0.000	0.000	0.0664	6	0.000	0.000	0.0638	6	0.000	0.000
747	n.s.	n.s.	n.s.	n.s.	0.0308	3	0.000	0.000	0.1230	11	0.000	0.000	0.1238	11	0.000	0.000	0.1069	10	0.000	0.000
748	0.0109	1	1.010	-	0.0199	2	0.000	0.000	0.0326	3	0.000	0.000	0.0338	3	0.000	0.000	0.0218	2	0.000	0.000
749	0.0221	2	0.000	0.000	0.0221	2	0.000	0.000	0.0229	2	0.000	0.000	0.0113	1	0.000	-	0.0214	2	0.000	0.000
750	n.s.	n.s.	n.s.	n.s.	0.0180	2	0.000	0.000	0.1005	9	0.000	0.000	0.0679	6	0.000	0.000	0.0844	8	0.000	0.000
751	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s	n.s	0.0454	4	0.000	0.000	0.0225	2	0.000	0.000	0.0413	4	0.000	0.000

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

TABLE 9.- Stratified mean catches (Kg) and SD of **American plaice** by stratum and year (2003-2008). n.s. means stratum not surveyed. In 2003, the data correspond to 69% of the total area prospected in 2006-2008.

Stratum	2003	2004	2005	2006	2007	2008
			Survey			
385	470.23	2253.80	-	5726.54	3767.15	7640.50
387	985.60	4559.36	-	1703.04	2045.95	1511.87
388	2612.05	4801.65	-	2719.48	2995.09	1044.23
389	3285.60	4555.55	-	10477.26	12966.65	6608.06
390	1511.01	22637.98	-	62010.39	56426.39	95469.71
391	1750.28	4198.98	-	2984.97	10479.83	5803.56
392	1218.00	43.50	-	0.00	152.90	0.00
729	10265.34	27.90	-	0.00	0.00	0.00
730	10030.00	0.00	-	0.00	0.00	0.00
731	5531.76	313.20	-	0.00	54.72	70.56
732	9401.70	0.00	-	0.00	0.00	0.00
733	n.s	296.40	-	0.00	74.88	99.68
734	n.s	0.00	-	0.00	0.00	10.10
741	0.00	0.00	-	0.00	0.00	0.00
742	0.00	0.00	-	0.00	0.00	0.00
743	n.s	0.00	-	0.00	0.00	0.00
744	n.s	0.00	-	0.00	0.00	0.00
745	212.28	0.00	-	0.00	0.00	0.00
746	0.00	0.00	-	0.00	0.00	0.00
747	n.s	0.00	-	0.00	0.00	0.00
748	160.59	0.00	-	0.00	0.00	0.00
749	0.00	0.00	-	0.00	0.00	0.00
750	n.s	0.00	-	0.00	0.00	0.00
751	n.s	n.s	-	0.00	0.00	0.00
TOTAL	47434.44	43688.32	-	85621.68	88963.55	118258.27
	10.60	6.98	-	13.20	13.71	18.23
SD	0.95	1.12	-	2.06	2.00	4.98

TABLE 10.- Survey estimates (by the swept area method) of **American plaice** biomass (t.) and SD by stratum and year in NAFO Div. 3L (R/V *"Vizconde de Eza"*). n.s. means stratum not surveyed. In 2003: the data correspond to 69% of the total area prospected in 2006-2008.

			Survey			
Stratum	2003	2004	2005	2006	2007	2008
385	42	197	-	501	335	668
387	86	427	-	151	182	139
388	235	457	-	240	266	93
389	290	405	-	923	1153	593
390	134	1969	-	5462	5016	8212
391	156	386	-	265	932	512
392	105	4	-	0	14	0
729	978	3	-	0	0	0
730	907	0	-	0	0	0
731	484	27	-	0	5	6
732	836	0	-	0	0	0
733	n.s	27	-	0	7	9
734	n.s	0	-	0	0	1
741	0	0	-	0	0	0
742	0	0	-	0	0	0
743	n.s	0	-	0	0	0
744	n.s	0	-	0	0	0
745	19	0	-	0	0	0
746	0	0	-	0	0	0
747	n.s	0	-	0	0	0
748	15	0	-	0	0	0
749	0	0	-	0	0	0
750	n.s	0	-	0	0	0
751	n.s	n.s	-	0	0	0
TOTAL	4284	3901	-	7542	7908	10234
SD	362	626	-	1150	1156	2805

TABLE 11.- American plaice length distribution per haul mean catches by sex and year. Number per stratified mean catches. Spanish Summer Survey on NAFO 3L: 2003-2008 (R/*V "Vizconde de Eza"*). Indet. means indeterminate. (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2008. (M – Males; F-Females; I-Indet.;T-Total).

Lenght (cm.)	2003(*) M	2003(*) F	2003(*) I	2003(*) T	2004 M	2004 F	2004 I	2004 T	2006 M	2006 F	2006 I	2006 T	2007 M	2007 F	2007 I	2007 T	2008 M	2008 F	2008 I	2008 T
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.10	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00
6	0.00	0.03	0.07	0.10	0.05	0.00	0.00	0.05	0.02	0.02	0.29	0.33	0.02	0.00	1.10	1.12	0.00	0.00	0.76	0.76
8	0.24	0.19	0.04	0.47	0.04	0.00	0.06	0.10	0.23	0.10	1.28	1.62	0.06	0.02	0.73	0.82	0.01	0.02	0.87	0.90
10	0.15	0.32	0.04	0.50	0.09	0.09	0.19	0.37	0.07	0.05	0.02	0.14	0.36	0.33	0.03	0.72	0.55	0.39	0.05	0.99
12	0.55	0.70	0.00	1.26	0.03	0.42	0.06	0.52	1.10	1.39	0.00	2.49	2.67	2.75	0.00	5.43	3.49	3.58	0.06	7.13
14	0.43	1.06	0.00	1.50	0.65	0.56	0.31	1.52	1.87	2.18	0.00	4.05	2.16	2.08	0.00	4.24	1.95	2.05	0.00	4.00
16	1.28	3.08	0.00	4.36	0.62	0.81	0.00	1.43	0.56	0.80	0.00	1.36	1.14	1.79	0.00	2.93	0.86	1.36	0.00	2.22
18	1.16	3.38	0.00	4.53	0.59	1.37	0.00	1.96	0.34	0.63	0.00	0.97	1.72	3.00	0.00	4.72	1.45	2.22	0.00	3.67
20	0.97	3.38	0.00	4.35	0.43	2.85	0.00	3.29	0.42	0.60	0.00	1.03	1.19	2.15	0.00	3.34	0.92	2.03	0.00	2.94
22	0.49	3.34	0.00	3.83	0.71	4.01	0.00	4.73	0.66	1.06	0.00	1.72	0.52	1.28	0.00	1.80	0.94	2.10	0.00	3.04
24	0.41	2.34	0.00	2.75	0.88	4.92	0.00	5.79	0.56	1.28	0.00	1.85	0.68	1.36	0.00	2.04	1.12	1.96	0.00	3.08
26	0.21	1.55	0.00	1.76	0.32	3.80	0.00	4.12	0.47	1.47	0.02	1.96	0.63	1.50	0.00	2.13	0.94	1.68	0.00	2.62
28	0.18	1.08	0.00	1.26	0.34	2.16	0.00	2.50	0.48	2.43	0.00	2.91	0.53	1.52	0.00	2.05	0.75	1.70	0.00	2.46
30	0.33	0.86	0.00	1.20	0.06	0.94	0.00	1.00	0.35	2.95	0.00	3.30	0.29	1.65	0.00	1.94	0.56	1.26	0.00	1.81
32	0.39	0.51	0.00	0.90	0.04	0.55	0.00	0.59	0.34	2.59	0.00	2.93	0.18	2.14	0.00	2.32	0.62	1.00	0.00	1.63
34	0.43	0.90	0.00	1.33	0.04	0.45	0.00	0.49	0.20	2.57	0.00	2.77	0.16	2.87	0.00	3.03	0.46	0.83	0.00	1.30
36	0.29	1.35	0.00	1.64	0.00	0.51	0.00	0.51	0.20	1.90	0.00	2.10	0.20	2.45	0.00	2.65	0.44	1.45	0.00	1.89
38	0.19	2.03	0.00	2.22	0.00	0.47	0.00	0.47	0.09	1.15	0.00	1.24	0.08	2.29	0.00	2.38	0.35	1.89	0.00	2.23
40	0.06	2.07	0.00	2.13	0.12	0.68	0.00	0.80	0.02	0.74	0.00	0.75	0.04	1.83	0.00	1.88	0.12	2.43	0.00	2.55
42	0.07	1.78	0.00	1.85	0.00	0.70	0.00	0.70	0.01	0.74	0.00	0.76	0.00	1.23	0.00	1.23	0.07	2.41	0.00	2.48
44	0.07	1.51	0.00	1.58	0.00	0.43	0.00	0.43	0.02	1.00	0.00	1.02	0.01	0.90	0.00	0.91	0.00	1.88	0.00	1.88
46	0.02	0.83	0.00	0.85	0.00	0.62	0.00	0.62	0.02	1.01	0.00	1.03	0.02	0.74	0.00	0.77	0.00	1.59	0.00	1.59
48	0.00	0.32	0.00	0.32	0.00	0.20	0.00	0.20	0.03	1.11	0.00	1.15	0.00	0.57	0.00	0.57	0.00	1.09	0.00	1.09
50	0.00	0.36	0.00	0.36	0.00	0.17	0.00	0.17	0.02	0.50	0.00	0.52	0.02	0.60	0.00	0.63	0.00	0.83	0.00	0.83
52	0.00	0.07	0.00	0.07	0.00	0.02	0.00	0.02	0.00	0.50	0.00	0.50	0.01	0.35	0.00	0.36	0.00	0.66	0.00	0.66
54	0.00	0.04	0.00	0.04	0.00	0.02	0.00	0.02	0.00	0.15	0.00	0.15	0.00	0.23	0.00	0.23	0.00	0.34	0.00	0.34
56	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.07	0.00	0.07	0.00	0.09	0.00	0.09	0.00	0.04	0.00	0.04
58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.10	0.00	0.10	0.00	0.04	0.00	0.04
60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.04	0.00	0.04
62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.00
Total	7.95	33.07	0.14	41.16	5.02	26.77	0.62	32.41	8.20	29.04	1.62	38.86	12.72	35.86	1.88	50.46	15.61	36.88	1.75	54.24

	2003 (*)	2004	2006	2007	2008
Nº samples:		30	17	31	37
Nº Ind.:	333 1297 5 1635	178 846 10 1034	704 2441 136 3281	1129 3116 179 4424	924 2383 98 3405
Sampled catch:		423	226	1172	1309
Range:		6-54	7-57	3-60	4-63
Total catch:		423	226	1172	1309
Total hauls:		40	58	101	99

Nº samples: 30 17 31 37 37
Sampled catch: 423 226 1172 1309 1749
Range: 6-54 7-57 3-60 4-63 6-61
Total catch: 423 226 1172 1309 1749
Total hauls: 40 58 101 99 103

TABLE 12.- Swept area, number of hauls and **witch flounder** mean catch (Kg) and SD (**) by stratum. Spanish Survey on NAFO Div. 3L in the period 2003-2008, on board R/V "*Vizconde de Eza*". (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2008.

Stratum	2003 (*)				2004				2006				2007				2008			
	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD	Swept area	Tow number	Mean catch	SD
385	0.0225	2	0.000	0.000	0.0229	2	0.000	0.000	0.0229	2	0.240	0.339	0.0225	2	0.000	0.000	0.0229	2	0.000	0.000
387	0.0229	2	0.260	0.368	0.0214	2	2.650	2.263	0.0225	2	3.434	2.996	0.0225	2	1.300	1.399	0.0435	4	3.040	1.153
388	0.0334	3	0.159	0.122	0.0105	1	4.327	-	0.0566	5	0.876	0.480	0.0563	5	1.492	1.300	0.0559	5	1.830	2.034
389	0.0454	4	0.013	0.019	0.0225	2	0.093	0.131	0.0795	7	0.284	0.372	0.0900	8	0.001	0.002	0.0780	7	0.184	0.262
390	0.0563	5	0.000	0.000	0.0345	3	0.000	0.000	0.1249	11	0.079	0.185	0.1350	12	0.000	0.000	0.1395	12	0.105	0.246
391	0.0338	3	0.000	0.000	0.0218	2	0.000	0.000	0.0450	4	0.388	0.775	0.0450	4	0.102	0.204	0.0454	4	1.003	1.551
392	0.0116	1	0.008	-	0.0214	2	0.004	0.006	0.0229	2	0.195	0.276	0.0225	2	1.175	1.300	0.0221	2	1.694	2.336
729	0.0210	2	0.785	1.110	0.0221	2	2.310	0.820	0.0338	3	1.450	1.422	0.0338	3	4.823	3.341	0.0338	3	2.770	3.289
730	0.0221	2	5.105	4.052	0.0221	2	1.885	2.666	0.0326	3	0.460	0.797	0.0225	2	0.000	0.000	0.0323	3	0.743	1.287
731	0.0229	2	1.815	0.969	0.0233	2	3.765	3.373	0.0341	3	3.395	2.651	0.0338	3	3.854	4.324	0.0330	3	3.445	1.075
732	0.0113	1	7.150	-	0.0210	2	2.150	1.131	0.0334	3	1.367	1.623	0.0338	3	0.317	0.548	0.0446	4	2.056	1.827
733	n.s.	n.s.	n.s.	n.s.	0.0330	3	2.489	2.543	0.0454	4	6.706	9.359	0.0338	3	2.052	2.218	0.0431	4	5.530	4.719
734	n.s.	n.s.	n.s.	n.s.	0.0304	3	0.000	0.000	0.0225	2	0.190	0.269	0.0225	2	0.066	0.093	0.0221	2	0.200	0.283
741	0.0113	1	0	-	0.0323	3	0.003	0.003	0.0218	2	0.000	0.000	0.0225	2	0.000	0.000	0.0210	2	0.000	0.000
742	0.0116	1	0	-	0.0120	1	0.000	-	0.0229	2	0.000	0.000	0.0225	2	0.000	0.000	0.0210	2	0.000	0.000
743	n.s.	n.s.	n.s.	n.s.	0.0188	2	0.000	0.000	0.0225	2	0.000	0.000	0.0225	2	0.000	0.000	0.0203	2	0.000	0.000
744	n.s.	n.s.	n.s.	n.s.	0.0101	1	0.000	-	0.0229	2	0.000	0.000	0.0218	2	0.000	0.000	0.0221	2	0.000	0.000
745	0.0341	3	0.377	0.635	0.0319	3	0.000	0.000	0.0686	6	0.000	0.000	0.0675	6	0.002	0.004	0.0555	5	0.000	0.000
746	0.0446	4	0.000	0.000	0.0338	3	0.000	0.000	0.0675	6	0.000	0.000	0.0664	6	0.000	0.000	0.0638	6	0.000	0.000
747	n.s.	n.s.	n.s.	n.s.	0.0308	3	0.007	0.012	0.1230	11	0.000	0.000	0.1238	11	0.000	0.000	0.1069	10	0.000	0.000
748	0.0109	1	0.000	-	0.0199	2	0.002	0.003	0.0326	3	0.021	0.036	0.0338	3	0.000	0.000	0.0218	2	0.000	0.000
749	0.0221	2	0.000	0.000	0.0221	2	0.000	0.000	0.0229	2	0.000	0.000	0.0113	1	0.000	-	0.0214	2	0.000	0.000
750	n.s.	n.s.	n.s.	n.s.	0.0180	2	0.000	0.000	0.1005	9	0.000	0.000	0.0679	6	0.000	0.000	0.0844	8	0.000	0.000
751	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	0.0454	4	0.000	0.000	0.0225	2	0.000	0.000	0.0413	4	0.000	0.000

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

TABLE 13.- Stratified mean catches (Kg) and SD of **witch flounder** by stratum and year (2003-2008). n.s. means stratum not surveyed. In 2003, the data correspond to 69% of the total area prospected in 2006-2008.

Stratum	Survey					
	2003	2004	2005	2006	2007	2008
385	0.00	0.00	-	28.32	0.00	0.00
387	66.56	678.40	-	878.98	332.67	778.18
388	56.88	1544.74	-	312.80	532.50	653.38
389	6.36	47.08	-	144.34	0.38	93.58
390	0.00	0.00	-	64.46	0.00	85.58
391	0.00	0.00	-	109.28	28.69	282.71
392	1.16	0.58	-	28.28	170.30	245.56
729	146.01	429.66	-	269.70	897.14	515.22
730	867.85	320.45	-	78.20	0.00	126.37
731	392.04	813.24	-	733.32	832.46	744.12
732	1651.65	496.65	-	315.70	73.15	474.94
733	n.s	582.50	-	1569.26	480.17	1293.90
734	n.s	0.00	-	29.07	10.02	30.60
741	0.00	0.27	-	0.00	0.00	0.00
742	0.00	0.00	-	0.00	0.00	0.00
743	n.s	0.00	-	0.00	0.00	0.00
744	n.s	0.00	-	0.00	0.00	0.00
745	131.08	0.00	-	0.00	0.58	0.00
746	0.00	0.00	-	0.00	0.00	0.00
747	n.s	4.83	-	0.00	0.00	0.00
748	0.00	0.32	-	3.34	0.00	0.00
749	0.00	0.00	-	0.00	0.00	0.00
750	n.s	0.00	-	0.00	0.00	0.00
751	n.s	n.s	-	0.00	0.00	0.00
TOTAL	3319.59	4918.72	-	4565.04	3358.07	5324.12
	0.74	0.79		0.70	0.52	0.82
SD	0.12	0.13		0.20	0.12	0.13

TABLE 14.- Survey estimates (by the swept area method) of **witch flounder** biomass (t.) and SD by stratum and year in NAFO Div. 3L (R/V *"Vizconde de Eza"*). n.s. means stratum not surveyed. In 2003: the data correspond to 69% of the total area prospected in 2006-2008.

Stratum	Survey					
	2003	2004	2005	2006	2007	2008
385	0	0	-	2	0	0
387	6	63	-	78	30	72
388	5	147	-	28	47	58
389	1	4	-	13	0	8
390	0	0	-	6	0	7
391	0	0	-	10	3	25
392	0	0	-	2	15	22
729	14	39	-	24	80	46
730	78	29	-	7	0	12
731	34	70	-	64	74	68
732	147	47	-	28	7	43
733	n.s	53	-	138	43	120
734	n.s	0	-	3	1	3
741	0	0	-	0	0	0
742	0	0	-	0	0	0
743	n.s	0	-	0	0	0
744	n.s	0	-	0	0	0
745	12	0	-	0	0	0
746	0	0	-	0	0	0
747	n.s	0	-	0	0	0
748	0	0	-	0	0	0
749	0	0	-	0	0	0
750	n.s	0	-	0	0	0
751	n.s	n.s	-	0	0	0
TOTAL	297	453		404	298	483
SD	51	75		116	71	80

TABLE 15.- Witch flounder length distribution per haul mean catches by sex and year. Number per stratified mean catches. Spanish Summer Survey on NAFO 3L: 2003-2008 (R/*V "Vizconde de Eza"*). Indet. means indeterminate. (*) In 2003, the data correspond to 69% of the total area prospected in 2006-2008. (M – Males; F-Females; I-Indet.;T-Total).

Lenght (cm.)	2003 (*)				2004				2006				2007				2008			
	M	F	I	T	M	F	I	T	M	F	I	T	M	F	I	T	M	F	I	T
6	0.00	0.00	0.03	0.03	0.00	0.00	0.06	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02
8	0.00	0.00	0.03	0.03	0.00	0.00	0.31	0.31	0.02	0.00	0.06	0.09	0.00	0.01	0.02	0.03	0.00	0.01	0.22	0.23
10	0.03	0.03	0.00	0.05	0.04	0.00	0.10	0.14	0.03	0.02	0.01	0.07	0.02	0.01	0.05	0.09	0.03	0.01	0.08	0.12
12	0.13	0.22	0.00	0.35	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.01
14	0.38	0.70	0.00	1.08	0.01	0.00	0.07	0.09	0.04	0.01	0.01	0.06	0.01	0.07	0.03	0.11	0.07	0.12	0.04	0.23
16	0.03	0.03	0.00	0.06	0.14	0.17	0.06	0.37	0.15	0.18	0.00	0.34	0.03	0.02	0.01	0.07	0.11	0.10	0.02	0.23
18	0.05	0.03	0.00	0.08	0.11	0.18	0.06	0.35	0.11	0.15	0.00	0.26	0.02	0.01	0.01	0.04	0.17	0.20	0.00	0.37
20	0.15	0.12	0.00	0.27	0.11	0.32	0.00	0.43	0.06	0.07	0.00	0.14	0.04	0.13	0.00	0.17	0.05	0.08	0.00	0.13
22	0.04	0.07	0.00	0.12	0.20	0.37	0.00	0.57	0.10	0.32	0.00	0.42	0.12	0.26	0.00	0.38	0.15	0.10	0.00	0.25
24	0.07	0.00	0.00	0.07	0.17	0.08	0.00	0.25	0.22	0.31	0.00	0.52	0.22	0.15	0.00	0.37	0.11	0.11	0.00	0.23
26	0.04	0.05	0.00	0.09	0.09	0.18	0.00	0.28	0.02	0.11	0.00	0.13	0.14	0.10	0.01	0.25	0.13	0.08	0.00	0.21
28	0.00	0.07	0.00	0.07	0.21	0.18	0.00	0.39	0.07	0.09	0.00	0.16	0.32	0.34	0.00	0.66	0.29	0.32	0.00	0.61
30	0.18	0.23	0.00	0.41	0.14	0.05	0.00	0.19	0.10	0.22	0.00	0.33	0.12	0.11	0.00	0.23	0.09	0.15	0.00	0.24
32	0.02	0.00	0.00	0.02	0.04	0.14	0.00	0.18	0.21	0.24	0.00	0.46	0.03	0.03	0.00	0.07	0.14	0.14	0.00	0.29
34	0.09	0.09	0.00	0.18	0.01	0.23	0.00	0.25	0.13	0.12	0.00	0.25	0.03	0.07	0.00	0.10	0.06	0.09	0.00	0.15
36	0.09	0.08	0.00	0.17	0.01	0.02	0.00	0.03	0.02	0.05	0.00	0.07	0.03	0.04	0.00	0.08	0.09	0.08	0.00	0.16
38	0.08	0.04	0.00	0.12	0.07	0.03	0.00	0.10	0.02	0.13	0.00	0.15	0.02	0.08	0.00	0.10	0.04	0.17	0.00	0.21
40	0.09	0.00	0.00	0.09	0.03	0.09	0.00	0.12	0.03	0.09	0.00	0.12	0.02	0.03	0.00	0.05	0.04	0.11	0.00	0.15
42	0.02	0.10	0.00	0.13	0.00	0.18	0.00	0.18	0.00	0.07	0.00	0.07	0.02	0.01	0.00	0.03	0.01	0.11	0.00	0.12
44	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.12	0.00	0.07	0.00	0.07	0.00	0.04	0.00	0.04	0.00	0.06	0.00	0.06
46	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.06	0.00	0.06	0.00	0.12	0.00	0.12
48	0.00	0.05	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03
50	0.02	0.00	0.00	0.02	0.00	0.03	0.00	0.03	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00
52	0.00	0.05	0.00	0.05	0.00	0.09	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
54	0.00	0.05	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01
56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60	0.00	0.05	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	1.52	2.08	0.05	3.66	1.39	2.47	0.68	4.54	1.36	2.31	0.09	3.76	1.21	1.62	0.14	2.97	1.59	2.19	0.38	4.16

	2003 (*)	2004	2006	2007	2008
Nº samples:	15	17	32	22	36
Nº Ind.:	57 70 2 129	70 101 20 191	113 198 8 319	106 139 13 258	159 223 37 419
Sampled catch:	25	38	64	46.098	82.871
Range:	7-61	7-53	8-60	9-54	7-54
Total catch:	25	38	64	46.098	82.871
Total hauls:	40	58	101	99	103

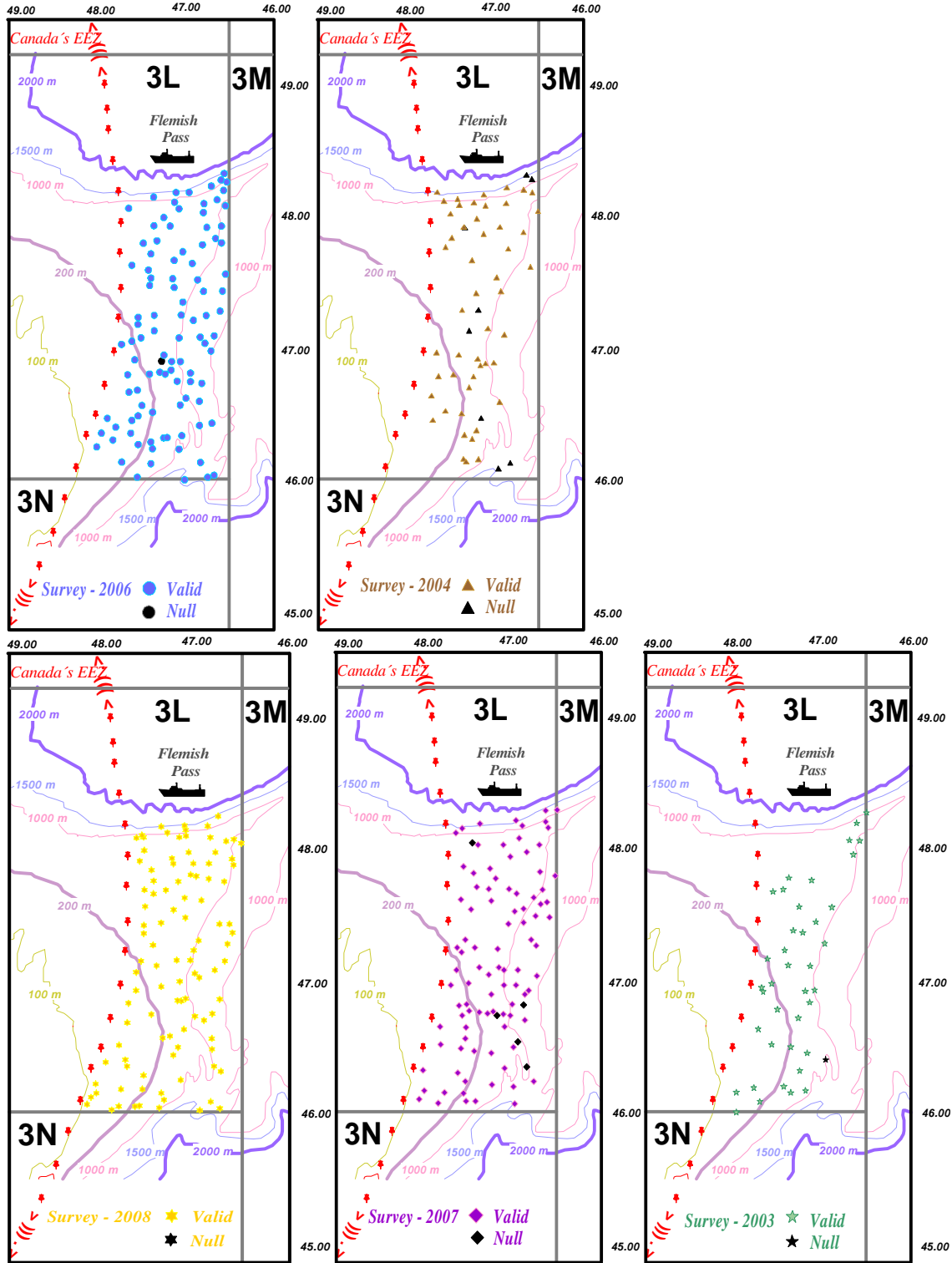**FIGURE 1.-** Haul positions of the Spanish surveys in NAFO Division 3L in the period 2003 - 2008 (R/V *"Vizconde de Eza"*).
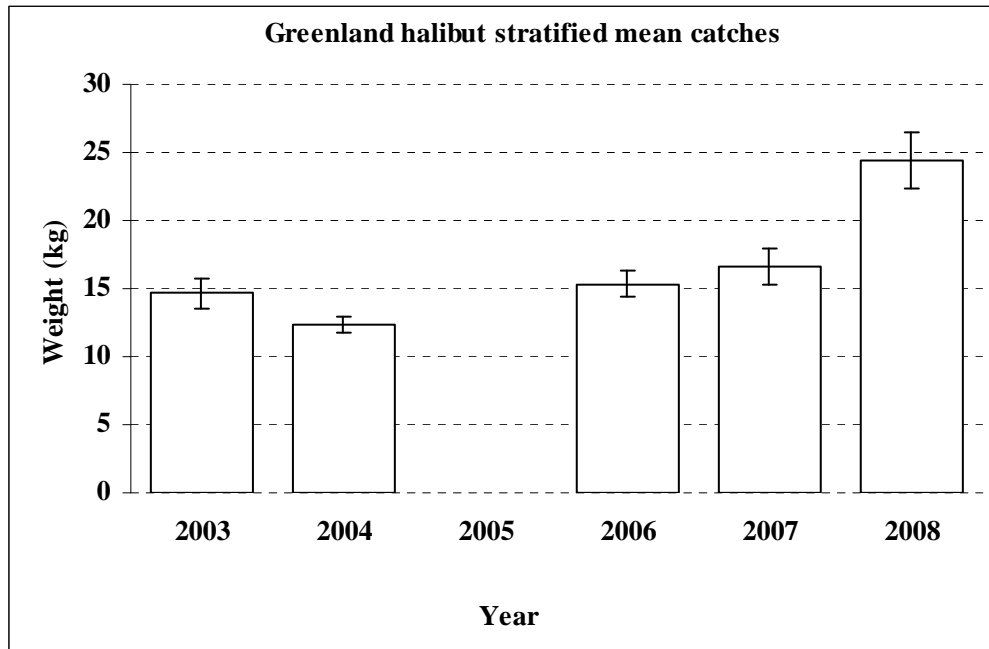
Greenland halibut stratified mean catches

FIGURE 2.- Greenland halibut stratified mean catches in Kg and ±SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2008 (R/V *"Vizconde de Eza"*). In 2003, the data correspond to 69% of the total area prospected in 2006-2008.
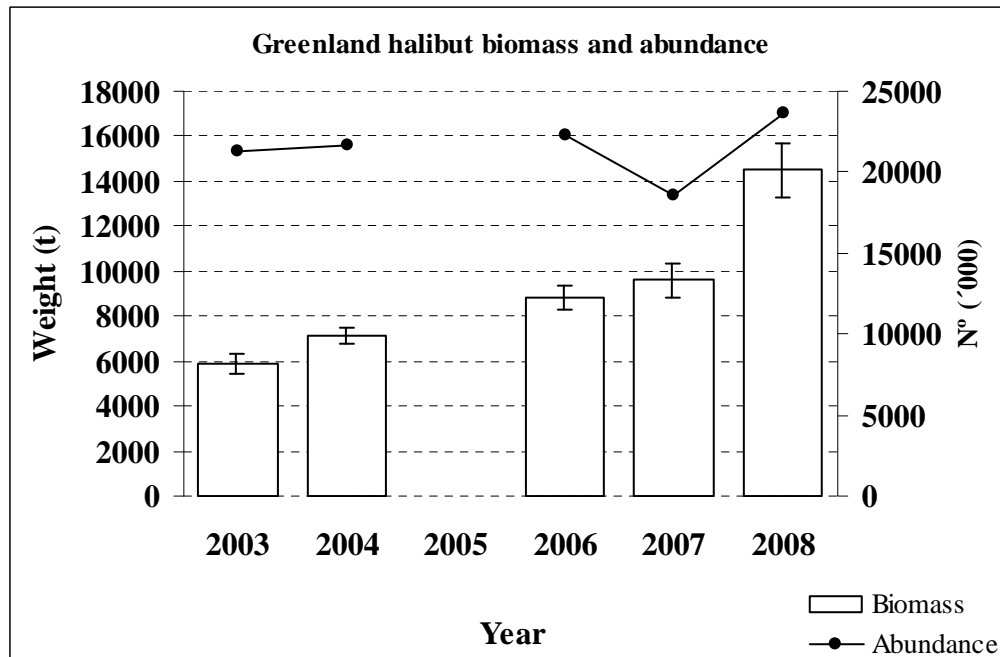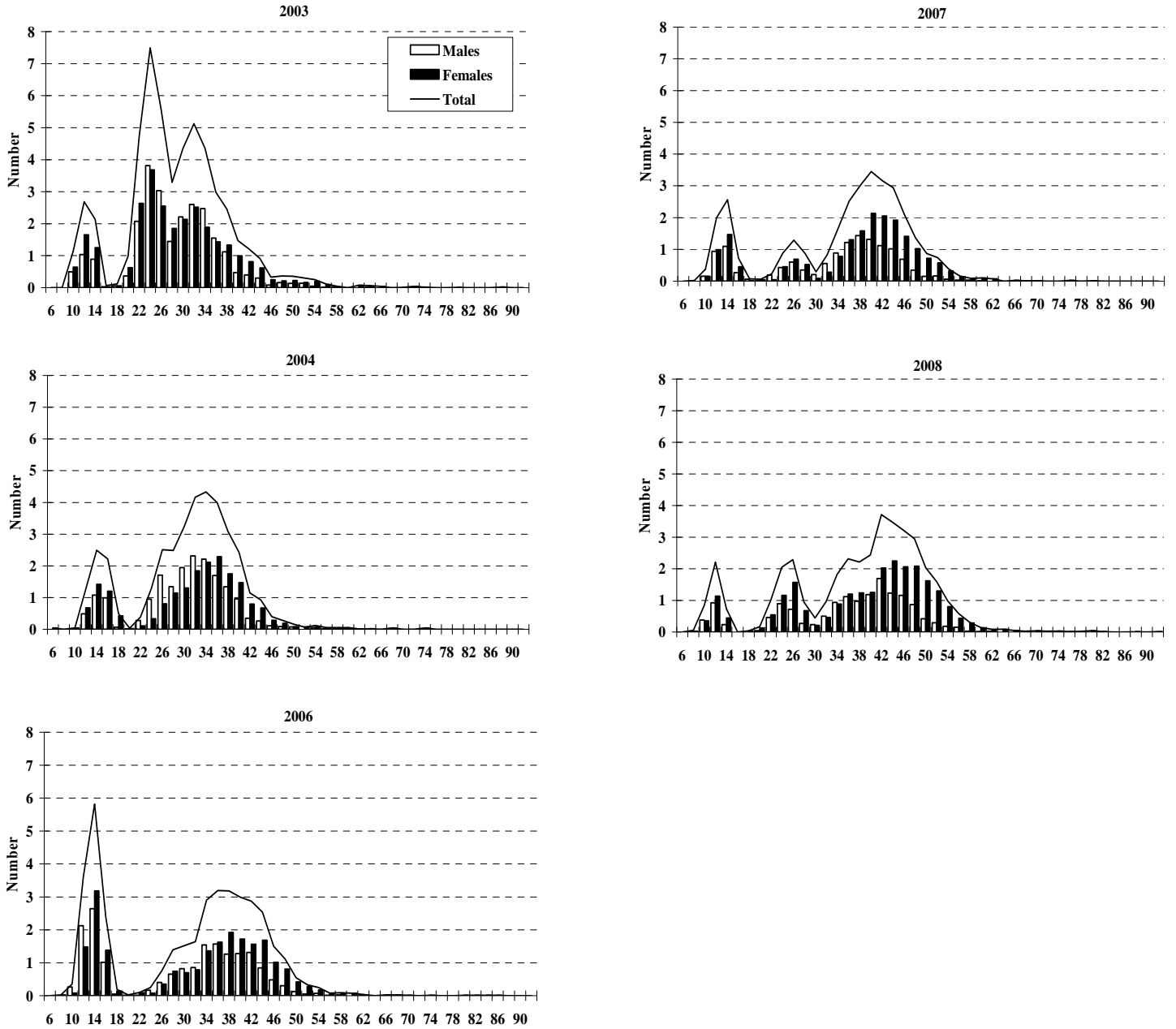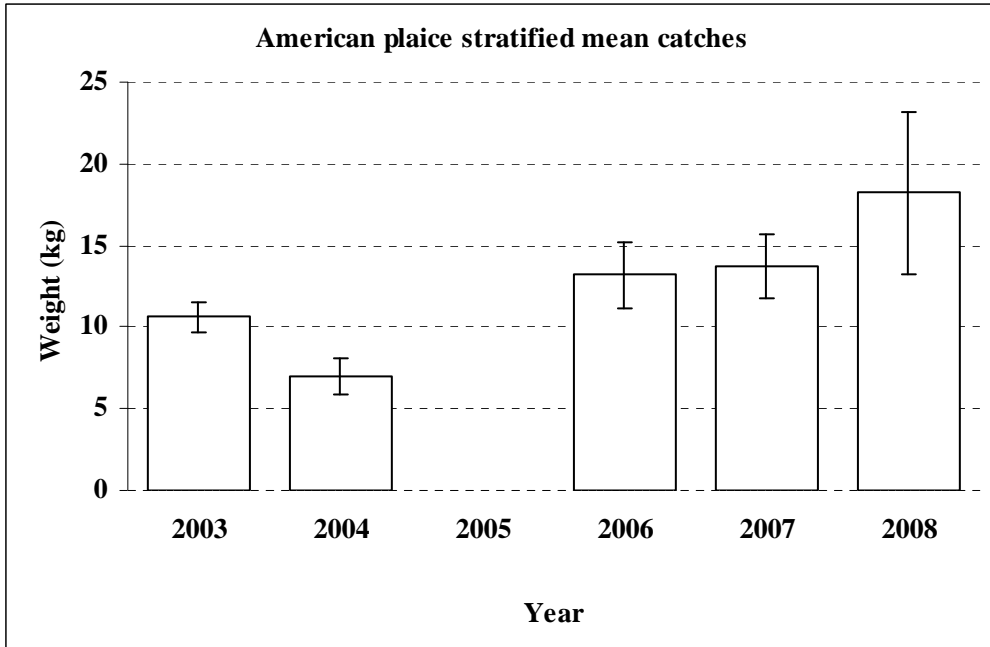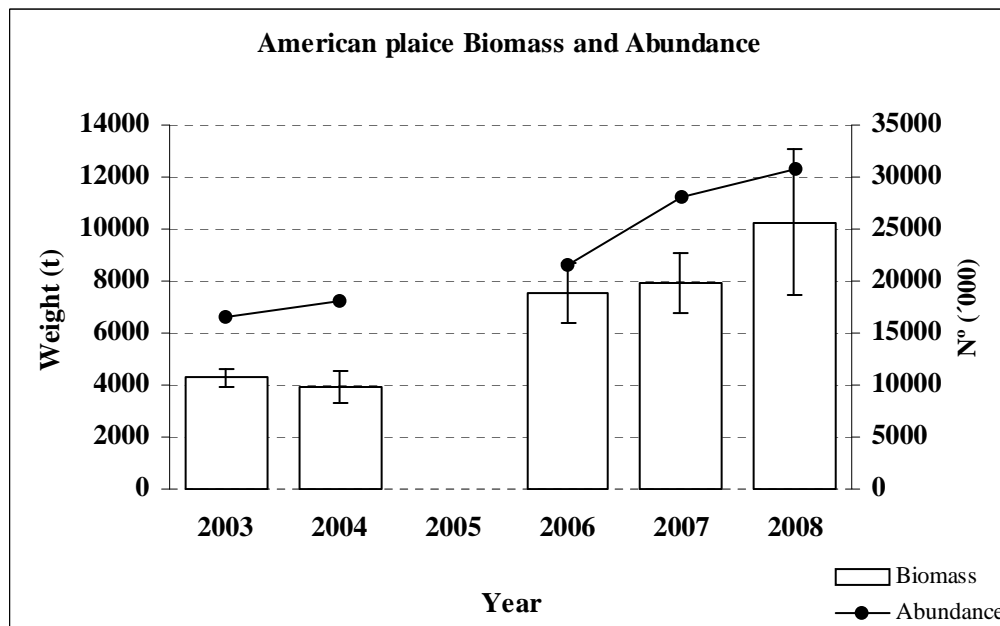
Greenland halibut biomass and abundance

FIGURE 3.- Greenland halibut abundance (´000), biomass in tonnes and ±SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2008 (R/V *"Vizconde de Eza"*). In 2003, the data correspond to 69% of the total area prospected in 2006-2008.
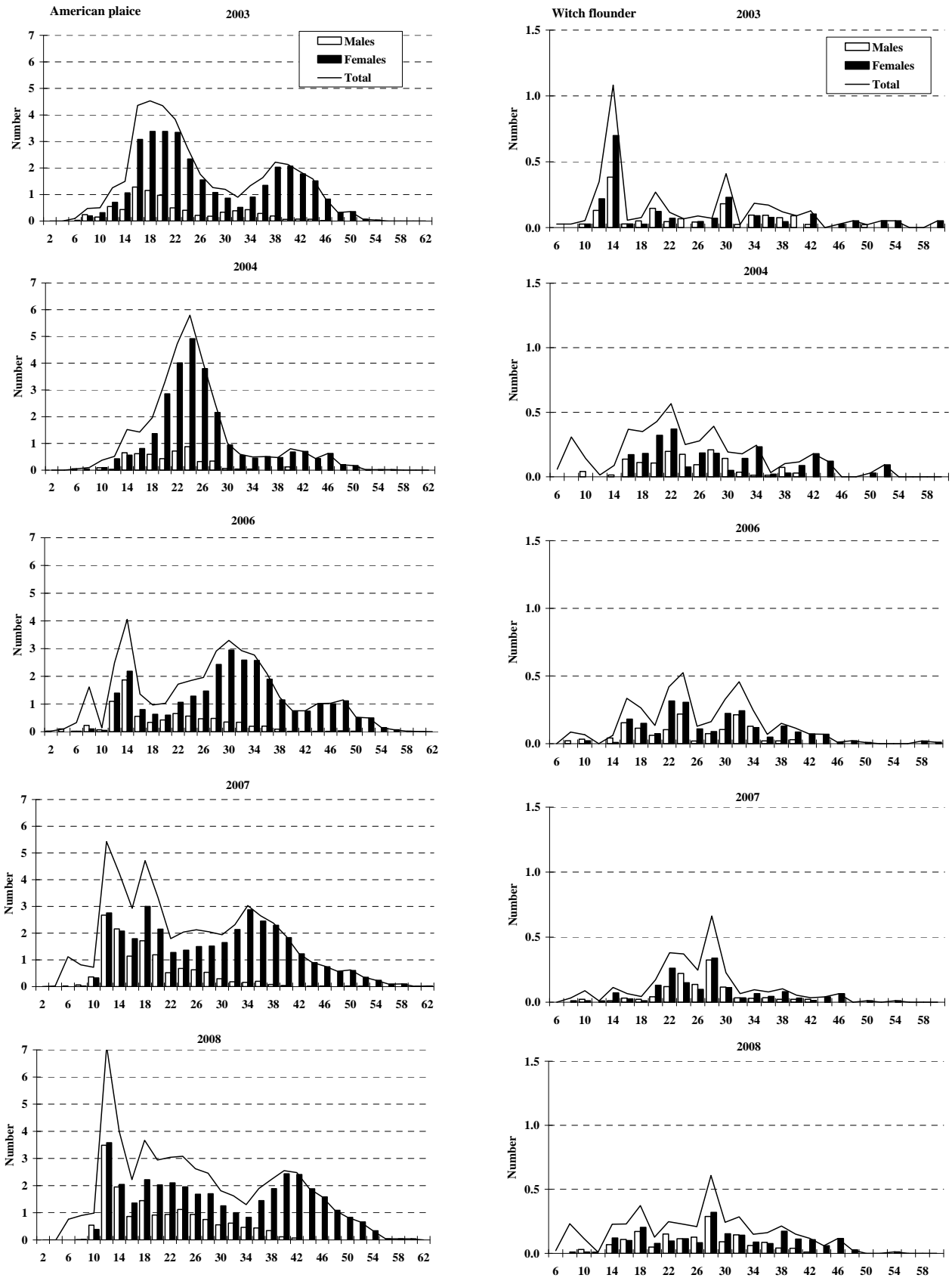
FIGURE 4.- Greenland halibut length distribution (cm) in NAFO 3L: 2003-2008. Number per stratified mean catches. In 2003, the data correspond to 69% of the total area prospected in 2006-2008.
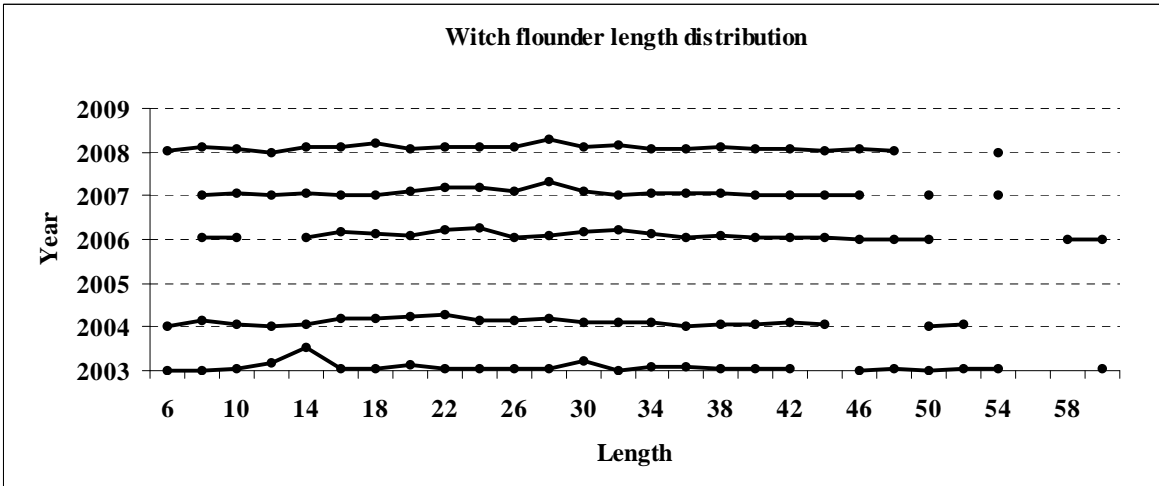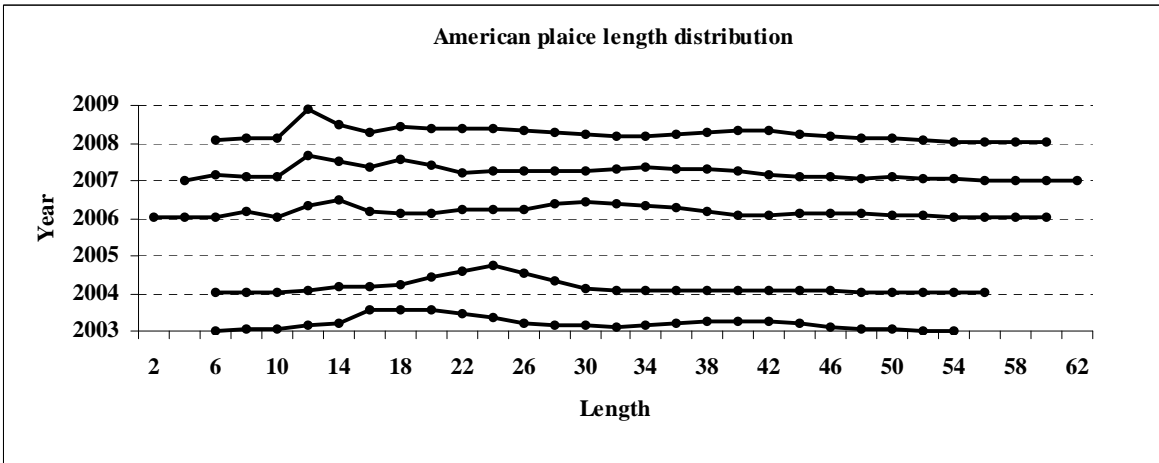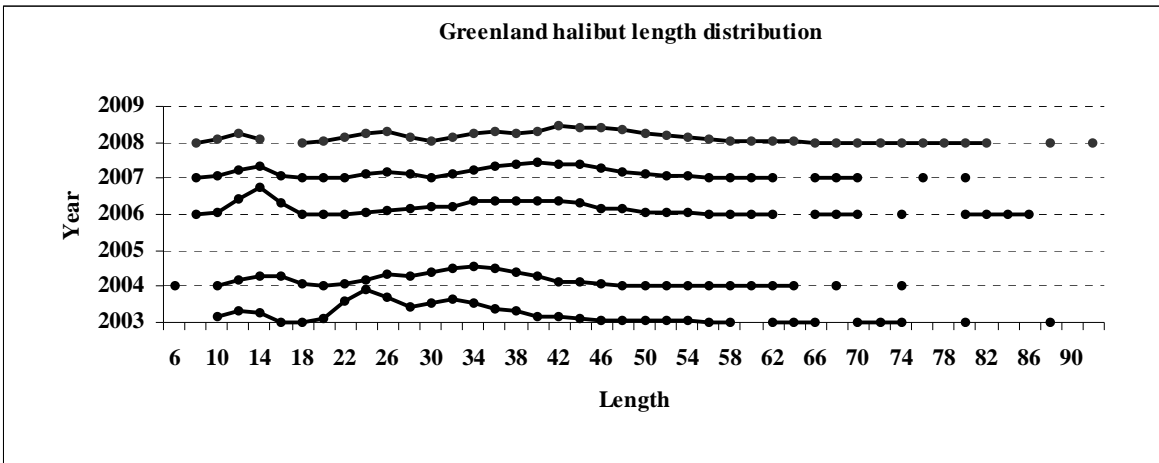
FIGURE 5.- Greenland halibut, American plaice and **witch flounder** length distribution (cm) in NAFO 3L: 2003-2008.

American plaice stratified mean catches

FIGURE 6.- American plaice stratified mean catches in Kg and ±SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2008 (R/V *"Vizconde de Eza"*). In 2003, the data correspond to 69% of the total area prospected in 2006-2008

American plaice Biomass and Abundance

FIGURE 7.- American plaice abundance (´000), biomass in tonnes and ±SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2008 (R/V *"Vizconde de Eza"*). In 2003, the data correspond to 69% of the total area prospected in 2006-2008.

FIGURE 8.- American plaice and **Witch flounder** length distribution (cm) in NAFO 3L: 2003-2008. Number per stratified mean catches. In 2003, the data correspond to 69% of the total area prospected in 2006-2008.
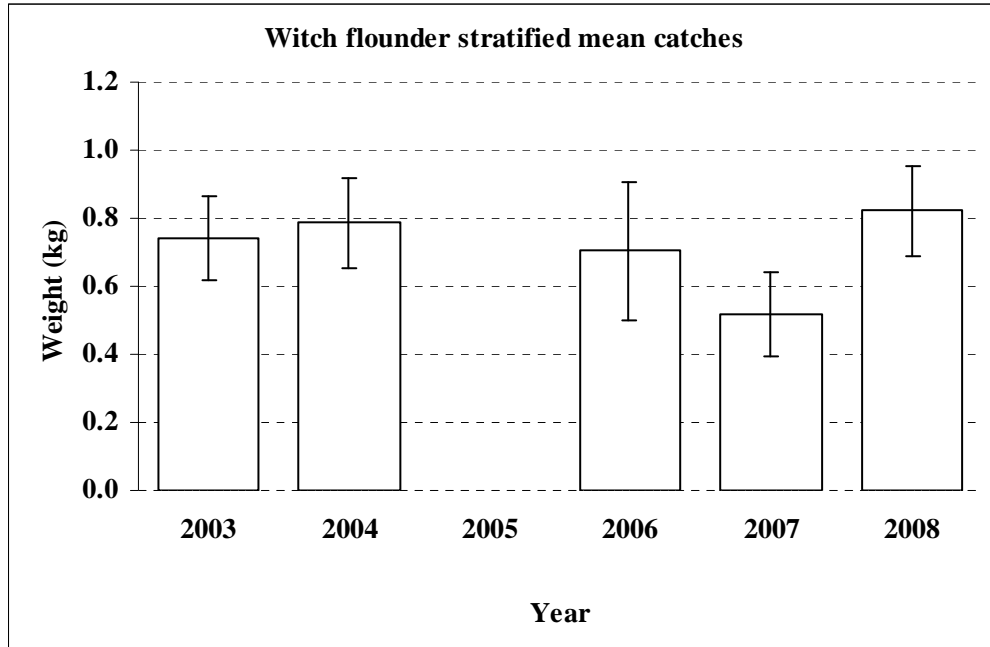
FIGURE 9.- Witch flounder stratified mean catches in Kg and ±SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2008 (R/V *"Vizconde de Eza"*). In 2003, the data correspond to 69% of the total area prospected in 2006-2008.
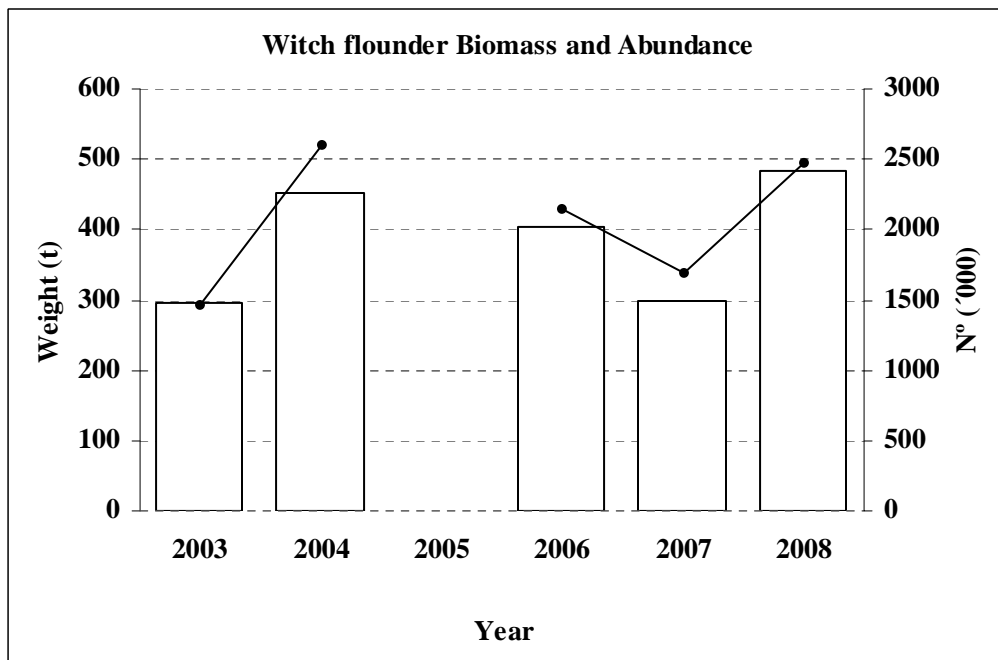

FIGURE 10.- Witch flounder abundance (´000), biomass in tonnes and ±SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2008 (R/V *"Vizconde de Eza"*). In 2003, the data correspond to 69% of the total area prospected in 2006-2008.