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Results for the Spanish Survey in the NAFO Regulatory Area of Division 3L for the period 2003-2015

by

Esther Román, Concepción González-Iglesias, Diana González-Troncoso and Marisol Álvarez

Instituto Español de Oceanografía
P.O. Box 1552. Vigo, Spain
e-mail: esther.roman@vi.ieo.es

Abstract

Since 2003, a stratified random summer bottom trawl survey was conducted by Spain in the NAFO Regulatory Area of Division 3L (Flemish Pass). The surveys were carried out by the R/V “*Vizconde de Eza*” using bottom trawl net type *Campelen 1800*. Entire series of mean catches, biomass and length distribution for Greenland halibut, American plaice and witch flounder are presented for the period 2003-2015. Greenland halibut biomass and abundance estimates show an increasing trend since 2011, reaching the maximum values in the series in 2008 and 2014. In last years it can be seen a presence of juveniles (around 12-15 cm). American plaice biomass and abundance estimates present an increasing trend since 2010, reaching in 2015 the highest value in the series. Regarding witch flounder, the biomass and abundance increased in 2015, but there is no a clear trend in the whole period 2003-2015.

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

Material and Methods

The Spanish surveys in Div. 3L of NAFO Regulatory Area (Flemish Pass) were initiated in 2003. The Research vessel “*Vizconde de Eza*” has carried out these surveys following the same procedures and using the same bottom trawl gear *Campelen 1800*. In 2003, the survey was carried out in spring (June) and it did not cover all strata adequately (17 of the 24 strata). In 2004, the survey was carried out 50 valid hauls in August, for a period of nine days, and not adequately covered all strata. 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 strata covered and the dates of the survey series. Figure 1 shows haul positions of Spanish surveys in NAFO Div. 3L in the period 2003-2015.

The survey area was stratified following the standard stratification schemes (Bishop, 1994). All surveys had a stratified random design following NAFO specifications (Doubleday, 1981). Hauls were allocated to strata proportionally to stratum 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 randomly selected sample of each species was taken in order to measure it and to 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 on a yearly basis: the mean catch per haul, the stratified mean catch per haul, the biomass with its variance per year and the length distribution in number per haul stratified mean catches by length, sex and year for each species in the period 2003-2015.

Biological studies (age, growth, feeding,..), oceanographic data and special studies (occurrence of marine mammals and sea birds) were collected from NAFO Regulatory area Div. 3L during the survey aboard *Vizconde de Eza*. The following formula was used to obtain the biomass from length distribution: $Weight=a (Length+0.5)^b / Weight=a (Length+0.25)^b$.

Stratified mean catches and SD

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

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

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

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:

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

$$Var_i^{str} = Var_i \frac{n_i^2}{T_i}, \quad i = 1, \dots, h \quad \text{where: } n_i \text{ is the area of the stratum } i, i = 1, \dots, h$$

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

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

$$Var = \sum_{i=1}^h \frac{Var_i^{str}}{N^2} \quad \text{where: } N = \sum_{i=1}^h n_i \text{ is the total area by year}$$

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

Results

In 2015, the bottom trawl survey in Div. 3L (Flemish pass) of NAFO Regulatory Area was carried out on board R/V *Vizconde de Eza* using the usual survey gear (*Campelen 1800*) from July 28th to August 17th and following the same procedure as in previous years. A total of 104 hauls (7 of them null) were performed in a depth range of 112-1458 m. (Table 1).

Biological studies

Biological data (length, sex, sexual maturity, weight and stomach repletion degree) on 9 target species and other 34 species were collected from Div. 3L in 2015 (19200 individuals sampled).

Maturity and fecundity – 627 samples for histological maturity and fecundity of Greenland halibut, cod, American plaice, roughhead grenadier and Atlantic wolffish (*Anarhichas lupus*) were taken.

Age and Growth – otoliths (1308 samples) of Greenland halibut, American plaice, roughhead grenadier and cod were collected for growth studies.

Feeding studies were performed on some demersal species and 111 stomach contents were analysed from depths of 1045 to 1458 m.

Hydrographic Studies

Temperature and salinity were measured in each haul by means of CTD ((SBE Se 25 SEALOGGER CTD). Hydrographic profile samplings were performed at 89 fishing stations in a depth range of 104-1395 m. The minimum and maximum observed temperatures were -1.59 and 3.77 °C respectively and the observed salinity range was 33.05 - 34.92 PSU. Results are presented in MEDS (Marine Environmental Data Service of Canada) every year.

Special studies

Benthic invertebrate

The study of benthic invertebrates was performed as a routine work during the survey (catch in weight and number, photographs and collection for study in the laboratory). This study will help us to have more knowledge about these species and their relation to the marine environment in the surveyed area.

Marine mammals and sea birds

Observations and incidental catches of marine mammals occasionally occurred were recorded during fishing time in the surveyed area of Flemish Pass. Occurrence, date, position, number, T^a, fishing time and other data were collected related to marine mammals throughout the survey. In 10 hauls, observations of 2 marine mammals species (*Physeter macrocephalus* and *Hyperoodon Ampullatus*) were recorded (Román *et al*, 2015).

Regarding seabirds, information about species, and incidental catches was also collected in the surveyed area. This will help us get a better understanding of these species, their relation to the marine environment and the interaction of seabirds with fishing. *Fulmarus glacialis*, *Puffinus gravis*, *Puffinus griseus*, *Morus bassanus* and *Catharacta skua* were the most common seabird species.

Results for Greenland halibut, American plaice and witch flounder are presented in this report.

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*, 2015.

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 (1978-2014), EU in Div. 3M (1988-2014) and EU-Spain in Div. 3NO (1995-2014).

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 fishable biomass declined 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. Biomass increased over 2004-2008 with decreased in fishing mortality. Survey data from 2010-2014 are variable which complicates the interpretation of overall status. The Canadian autumn 2J3K survey has increased since 2010 to the highest level since 1995. The EU survey of 3M to 1 400 m has been variable with little overall trend since 2004. The Canadian spring survey of 3LNO was at a very low level in 2013 and 2014, equal to the lowest observed. The survey by Spain in 3NO has declined since the high levels of 2010. The survey by Spain in 3L increased from 2012 to 2014 to a level equal to the series high. In 2003, a fifteen year rebuilding plan was implemented by Fisheries Commission for this stock (NAFO, 2015).

Mean catches and biomass

Table 3 shows the swept area, the tow number, the mean catches and their variance per haul and year (2011-2015) 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 (2007-2015).

The biomass of the Greenland halibut has had an increase in the surveyed area along the whole period, reaching the maximum values in the series in 2008 and 2014.

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 was probably due to the less area covered in 2003 survey (Figures 2 and 3).

Figure 4 shows a map with the distribution of Greenland halibut catches per haul in 2015 Spanish 3L survey.

Length distribution

Table 7 and 8 present the stratified mean catches per haul length distribution for the Greenland halibut, by sex and year (2008-2015), 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 valid hauls made in the survey. In 2013 and 2014 there is a quite good presence of small individuals (<30cm).

In Figures 5 and 6 the evolution along the years can be followed.

American plaice (*Hippoglossoides platessoides* Fabricius, 1780)

There was no fishing targeting American plaice in 1994 and it has been under moratorium since 1995. Catches increased after the moratorium until 2003 and began to decline afterwards. Biomass and SSB remain low compared to historic levels. There has been no good recruitment to the exploitable biomass since the mid-1980s. The stock remains low compared to historic levels and, although SSB is increasing, it is still estimated to be below Blim. (NAFO, 2015).

Mean catches and biomass

American plaice haul mean catches by stratum are presented in Table 9, including swept area, number of hauls and SD. Stratified mean catches per tow by stratum and year and their variance are presented in Table 10.

The entire time series (2003-2015) of biomass and their SD estimates of American plaice are shown in Table 11. Length-weight relationships are presented in Table 6 (2007-2015).

The American plaice indices showed a general increasing trend in the prospected area since 2004 (Fig. 7 and 8). But in 2010 this increasing trend was broken and the value was below the 2006 value, following by an increase in 2011-2015. The highest values in the estimated biomass have been observed in the shallowest strata, in a range of depth from 93 to 274 meters. Figure 4 shows a map with the distribution of American plaice catches per haul in 2015 Spanish 3L survey.

Length distribution

Tables 12 and 13 present the stratified mean catches per haul length distribution by sex and year (2008-2015). They present also the number of samples in which length measurements were performed, the total number of individuals measured in these samples, the sampled catch and the range of lengths found. The total catch of this species and the total valid hauls made in the survey are shown too. In Figures 6 and 9 the evolution along the years can be followed.

In last years it can be seen a great increase of small individuals (individuals <16 cm). There is higher proportion of females than males.

Witch flounder (*Glyptocephalus cynoglossus* Linnaeus, 1758)

The fishery for witch flounder in NAFO Divisions 2J, 3K and 3L began in the early 1960s and increased steadily from about 1 000 t in 1963 to a peak of over 24 000 t in 1973. A moratorium on directed fishing on this stock was implemented in 1995 following drastic declines in catch from the mid-70s, and catches since then have been low levels of by-catch in other fisheries. From 1999 to 2004 catches were estimated to be very low, between 300 and 800 tons and from 2005-2014, catches averaged less than 150 tons. Based on survey indices for the current year, there is nothing to indicate a change in the status of the stock (NAFO, 2015).

Mean catches and biomass

Table 14 shows the swept area, the tow number, the mean catches and their variance per haul and year (2011-2015) for witch flounder. Table 15 and Figure 10 present the stratified mean catches per stratum with the total variance per year. Table 16 and Figure 11 present the abundance and biomass per swept area per stratum and their total variance per year. Parameters *a* and *b* estimated values of length-weight distribution are presented in Table 6 (2007-2015). Figure 4 shows a map with the distribution of the witch flounder catches per haul in 2015 Spanish 3L survey.

Witch flounder indices show no clear trend throughout the period 2003-2015, the index peaked in 2010 and 2015. Estimated biomass ranged from 691 t in 2010 to 297 t and 298 t in 2003 and 2007 respectively; although most estimate results come from few strata. The stratified mean catches per stratum followed similar trends as the biomass and abundance indices (Fig. 10 and 11).

Length distribution

Table 17 and 18 present the stratified mean catches per haul length distribution for this species, by sex and year (2008-2015), 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 valid hauls made in the survey. In Figures 6 and 12 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 2003-2015.

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
2009	R/V "Vizconde de Eza"	98	111-1458	24	July 25 - August 12
2010	R/V "Vizconde de Eza"	97	119-1462	24	July 25 - August 14
2011	R/V "Vizconde de Eza"	89	115-1419	24	August 10 - August 24
2012	R/V "Vizconde de Eza"	98	112-1478	24	July 30 - August 18
2013	R/V "Vizconde de Eza"	100	117-1420	24	July 30 - August 19
2014	R/V "Vizconde de Eza"	102	104-1411	24	July 30 - August 19
2015	R/V "Vizconde de Eza"	97	112-1458	24	July 28 - August 17

TABLE 2. Technical data of the Spanish survey in NAFO Division 3L for the period 2003-2015.

Procedure	Specification
Vessel	R/V " <i>Vizconde de Eza</i> "
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	<i>Campelen 1800</i>
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	$22.287 * \text{Depth (m)}^{0.6667}$
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 ecosounder register. Information on gear damage from previous surveys.
Criterion to reject data from tow	<ul style="list-style-type: none"> - 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 2011-2015, on board R/V "Vizconde de Eza".

Stratum	2011				2012				2013				2014				2015			
	Swept area	Tow No.	Mean catch	SD	Swept area	Tow No.	Mean catch	SD	Swept area	Tow No.	Mean catch	SD	Swept area	Tow No.	Mean catch	SD	Swept area	Tow No.	Mean catch	SD
385	0.0229	2	13.100	18.526	0.0225	2	0.077	0.033	0.0229	2	12.038	12.942	0.0225	2	28.010	4.087	0.0236	2	1.315	1.817
387	0.0450	4	12.053	6.860	0.0450	4	12.385	6.631	0.0450	4	24.693	2.830	0.0461	4	29.520	10.827	0.0458	4	22.070	9.568
388	0.0563	5	8.313	4.980	0.0570	5	11.348	9.920	0.0570	5	9.154	6.708	0.0585	5	14.622	5.692	0.0574	5	13.772	14.528
389	0.0675	6	11.408	7.061	0.0799	7	31.210	19.695	0.0791	7	13.366	9.837	0.0814	7	20.275	7.421	0.0814	7	20.861	11.980
390	0.1009	9	0.272	0.682	0.1354	12	0.546	0.949	0.1358	12	0.557	1.129	0.1369	12	1.963	3.686	0.1260	11	0.769	1.503
391	0.0458	4	2.492	2.592	0.0458	4	13.929	11.759	0.0450	4	3.163	1.607	0.0465	4	18.290	14.860	0.0465	4	11.388	4.974
392	0.0229	2	14.425	3.910	0.0225	2	15.750	9.405	0.0225	2	19.055	1.054	0.0225	2	15.100	1.980	0.0229	2	13.136	1.080
729	0.0338	3	9.022	8.348	0.0338	3	12.673	0.142	0.0341	3	8.883	1.937	0.0338	3	13.350	8.349	0.0345	3	5.933	3.272
730	0.0334	3	7.777	1.600	0.0338	3	5.110	3.891	0.0334	3	12.314	3.679	0.0345	3	29.443	12.920	0.0345	3	29.528	14.310
731	0.0334	3	4.090	4.112	0.0341	3	12.457	6.138	0.0334	3	17.314	4.736	0.0345	3	24.067	8.201	0.0345	3	6.689	2.090
732	0.0454	4	21.440	9.450	0.0454	4	18.880	0.566	0.0450	4	19.328	4.346	0.0454	4	24.390	5.572	0.0465	4	26.188	19.068
733	0.0454	4	10.543	4.091	0.0454	4	10.857	4.842	0.0450	4	27.162	5.242	0.0458	4	23.969	5.297	0.0454	4	13.349	6.614
734	0.0225	2	11.243	0.457	0.0233	2	15.680	7.212	0.0221	2	21.064	24.503	0.0225	2	23.770	13.393	0.0225	2	12.387	5.279
741	0.0218	2	19.255	22.267	0.0218	2	25.510	1.287	0.0221	2	52.555	24.728	0.0225	2	18.700	16.829	0.0236	2	116.643	42.204
742	0.0225	2	11.545	4.320	0.0206	2	22.640	13.520	0.0218	2	7.470	2.065	0.0221	2	36.260	23.957	0.0233	2	49.498	32.948
743	0.0221	2	23.185	0.813	0.0206	2	8.713	11.791	0.0218	2	13.625	13.654	0.0221	2	21.265	8.818	0.0233	2	26.880	4.554
744	0.0221	2	25.710	28.100	0.0221	2	15.390	1.994	0.0221	2	38.970	12.968	0.0225	2	32.770	3.960	0.0225	2	46.070	0.735
745	0.0446	4	26.923	10.448	0.0570	5	32.570	9.295	0.0559	5	18.320	7.611	0.0578	5	20.729	11.408	0.0578	5	31.340	5.653
746	0.0566	5	14.369	8.047	0.0675	6	11.888	7.577	0.0675	6	16.688	7.884	0.0683	6	41.292	30.093	0.0686	6	36.425	5.713
747	0.0893	8	8.655	3.839	0.1121	10	10.522	7.681	0.1125	10	15.870	11.712	0.1125	10	18.530	10.421	0.1028	9	18.494	10.818
748	0.0221	2	13.755	0.502	0.0225	2	5.680	3.776	0.0225	2	36.700	31.820	0.0229	2	24.250	14.637	0.0233	2	22.550	6.435
749	0.0221	2	15.695	9.199	0.0221	2	7.755	3.118	0.0225	2	4.053	3.815	0.0225	2	25.050	17.890	0.0225	2	40.815	33.114
750	0.0668	6	28.880	31.040	0.0885	8	17.024	14.241	0.0896	8	27.221	14.388	0.0904	8	58.413	76.657	0.0934	8	36.278	21.030
751	0.0334	3	80.024	73.402	0.0218	2	42.725	48.755	0.0446	4	60.988	52.459	0.0334	3	41.967	44.197	0.0341	3	98.633	73.695

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

TABLE 4. Stratified mean catches (Kg) and SD of **Greenland halibut** by stratum and year (2003-2015). Research Vessel *Vizconde de Eza*. n.s. means stratum not surveyed. In 2003: the data correspond to 69% of the total area prospected in 2006-2015.

Stratum	Survey												
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
385	0.00	710.95	-	1855.08	1976.50	2125.24	587.05	147.50	1545.80	9.09	1420.43	3305.18	155.17
387	4067.84	16780.80	-	13440.00	7948.80	11906.69	8465.92	6105.15	3085.44	3170.62	6321.41	7557.18	5649.92
388	7450.59	15243.90	-	16930.37	17862.78	11377.52	4791.15	6998.06	2967.74	4051.16	3267.91	5220.20	4916.46
389	233.76	2936.93	-	16767.19	19073.88	21691.69	10057.48	5163.08	5806.67	15885.89	6803.08	10319.98	10618.03
390	16.30	0.00	-	10567.88	5259.74	4187.33	1272.22	137.14	221.50	445.19	453.62	1599.57	626.81
391	88.36	1610.22	-	4972.37	4441.50	6452.72	1365.02	1797.75	702.67	3927.91	891.83	5157.78	3211.28
392	1812.50	2262.00	-	1000.50	6140.75	1648.65	1926.91	1506.55	2091.63	2283.75	2762.98	2189.50	1904.72
729	6483.96	5673.00	-	4486.32	4593.27	3326.92	4482.35	3856.40	1678.09	2357.24	1652.30	2483.10	1103.60
730	4148.00	1300.50	-	1428.57	822.80	6932.03	5111.33	3478.77	1322.09	868.70	2093.32	5005.37	5019.82
731	7851.60	5888.16	-	3594.96	6760.51	9185.76	4839.12	8546.40	883.51	2690.64	3739.90	5198.40	1444.75
732	9956.10	2552.55	-	1517.67	2274.58	9904.70	11118.61	13093.66	4952.58	4361.28	4464.65	5634.09	6049.31
733	n.s.	4266.60	-	4342.16	5758.74	7436.52	8585.81	8691.35	2467.00	2540.48	6355.85	5608.69	3123.72
734	n.s.	3146.70	-	685.06	709.69	1163.18	9004.05	4957.20	1720.18	2399.04	3222.72	3636.81	1895.21
741	2720.00	1151.67	-	564.75	459.00	700.50	3543.50	2923.50	1925.50	2551.00	5255.50	1870.00	11664.25
742	2035.20	1990.40	-	677.92	302.56	922.88	2492.80	3682.56	738.88	1448.96	478.08	2320.64	3167.84
743	n.s.	447.02	-	242.25	557.18	329.46	1234.38	2548.73	1182.44	444.34	694.88	1084.52	1370.88
744	n.s.	495.00	-	694.32	1898.82	1540.77	2058.54	3246.21	1696.86	1015.74	2572.02	2162.82	3040.62
745	3828.00	4500.80	-	2514.88	2970.59	7273.20	10348.82	11367.77	9369.03	11334.36	6375.36	7213.83	10906.32
746	11564.98	3737.07	-	2223.29	2730.28	22281.93	9042.92	16205.28	5632.73	4660.23	6541.83	16186.33	14278.60
747	n.s.	366.83	-	3133.67	3995.56	10382.88	8198.79	8901.58	6266.04	7617.93	11489.59	13415.86	13389.82
748	2178.30	1013.63	-	545.11	1027.14	2162.40	10676.85	2965.35	2187.05	903.12	5835.30	3855.75	3585.45
749	1076.04	825.30	-	535.50	505.26	2604.42	2551.50	1359.54	1977.57	977.13	510.62	3156.30	5142.69
750	n.s.	0.00	-	5582.86	5205.09	8166.95	8288.21	25152.05	16057.28	9465.55	15135.08	32477.35	20170.29
751	n.s.	n.s.	-	1046.53	4671.60	4592.14	4583.82	9045.50	18325.42	9784.03	13966.14	9610.37	22587.03
TOTAL	65511.53	76900.01	-	99349.19	107946.61	158296.49	134627.15	151877.06	94803.69	95193.38	112304.36	156269.61	155022.59
(\bar{y})	14.64	12.29	-	15.32	16.64	24.40	20.75	23.41	14.61	14.67	17.31	24.09	23.90
SD	1.09	0.59	-	0.95	1.33	2.12	1.68	1.92	1.97	1.55	1.42	2.75	1.96

TABLE 5. Survey estimates (by the swept area method) of **Greenland halibut** biomass (t.) and SD by stratum and year on 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 2006-2015.

Stratum	Survey												
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
385	0	62	-	162	176	186	52	13	135	1	124	294	13
387	356	1570	-	1195	707	1095	772	534	274	282	562	655	494
388	670	1452	-	1495	1588	1018	432	614	264	355	287	446	428
389	21	261	-	1476	1695	1947	877	455	516	1392	602	888	913
390	1	0	-	931	468	360	111	12	20	39	40	140	55
391	8	148	-	442	395	569	119	158	61	343	79	444	276
392	156	212	-	87	546	149	168	134	183	203	246	195	167
729	618	513	-	399	408	296	394	343	149	210	145	221	96
730	375	118	-	131	73	645	454	313	119	77	188	435	437
731	686	507	-	316	601	835	425	760	79	237	336	452	126
732	885	243	-	136	202	888	988	1164	437	384	397	497	520
733	n.s.	388	-	383	512	690	763	773	217	224	565	490	275
734	n.s.	311	-	61	63	105	828	441	153	206	291	323	168
741	242	107	-	52	41	67	320	260	177	235	475	166	987
742	175	166	-	59	27	88	233	327	66	141	44	210	273
743	n.s.	48	-	22	50	33	122	227	107	43	64	98	118
744	n.s.	49	-	61	175	139	196	284	153	92	232	192	270
745	337	424	-	220	264	655	926	1010	840	994	571	625	944
746	1037	332	-	198	247	2097	813	1433	497	414	581	1423	1248
747	n.s.	36	-	280	355	971	734	791	562	679	1021	1193	1173
748	200	102	-	50	91	199	933	264	198	80	519	337	308
749	97	75	-	47	45	244	227	119	179	88	45	281	457
750	n.s.	0	-	500	460	774	733	2236	1443	856	1351	2875	1728
751	n.s.	n.s.	-	92	415	445	407	804	1647	900	1252	864	1986
TOTAL	5863	7121	-	8795	9603	14494	12030	13466	8477	8476	10018	13743	13462
SD	445	325	-	551	769	1223	979	1107	1147	909	822	1539	1114

Table 6. Length-weight relationships in the calculation of biomass, for Division 3L (out ZEE Canada), 2007-2015 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	Sex	L-W Equations	N	r ²	Sex	L-W Equations	N	r ²
2007	All	$W = 0.0033 L^{3.2385}$	1544	0.989	All	$W = 0.0024 L^{3.3710}$	1276	0.9873	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	0.991	Females	$W = 0.0025 L^{3.2803}$	135	0.988
2008	All	$W = 0.0037 L^{3.2060}$	1704	0.99	All	$W = 0.0044 L^{3.2282}$	1196	0.9894	All	$W = 0.0031 L^{3.2244}$	381	0.9844
	Males	$W = 0.0036 L^{3.2070}$	700	0.989	Males	$W = 0.0057 L^{3.1501}$	386	0.9853	Males	$W = 0.0028 L^{3.2523}$	147	0.986
	Females	$W = 0.0038 L^{3.2008}$	998	0.99	Females	$W = 0.0042 L^{3.2366}$	773	0.9931	Females	$W = 0.0031 L^{3.2241}$	210	0.9882
2009	All	$W = 0.0032 L^{3.2445}$	1407	0.9945	All	$W = 0.0038 L^{3.2226}$	812	0.9890	All	$W = 0.0020 L^{3.3367}$	221	0.9906
	Males	$W = 0.0030 L^{3.2546}$	568	0.9936	Males	$W = 0.0043 L^{3.1859}$	263	0.9847	Males	$W = 0.0016 L^{3.3951}$	74	0.9845
	Females	$W = 0.0034 L^{3.2303}$	826	0.9954	Females	$W = 0.0037 L^{3.2324}$	542	0.9881	Females	$W = 0.0018 L^{3.3712}$	134	0.9891
2010	All	$W = 0.0045 L^{3.1518}$	1434	0.9898	All	$W = 0.0030 L^{3.3098}$	975	0.9910	All	$W = 0.0016 L^{3.4075}$	193	0.9936
	Males	$W = 0.0045 L^{3.1470}$	609	0.9903	Males	$W = 0.0035 L^{3.2635}$	288	0.9810	Males	$W = 0.0012 L^{3.4881}$	55	0.9787
	Females	$W = 0.0048 L^{3.1409}$	824	0.9897	Females	$W = 0.0030 L^{3.3045}$	667	0.9927	Females	$W = 0.0015 L^{3.4199}$	119	0.9923
2011	All	$W = 0.0043 L^{3.1624}$	1469	0.9948	All	$W = 0.0029 L^{3.3106}$	1285	0.9914	All	$W = 0.0017 L^{3.3810}$	193	0.9926
	Males	$W = 0.0045 L^{3.1411}$	599	0.9946	Males	$W = 0.0036 L^{3.2430}$	431	0.9848	Males	$W = 0.0016 L^{3.4021}$	88	0.9858
	Females	$W = 0.0043 L^{3.1658}$	868	0.9949	Females	$W = 0.0027 L^{3.3356}$	854	0.9924	Females	$W = 0.0015 L^{3.4172}$	105	0.9896
2012	All	$W = 0.0053 L^{3.1125}$	1624	0.9895	All	$W = 0.0033 L^{3.2658}$	1033	0.9891	All	$W = 0.0024 L^{3.2947}$	193	0.9872
	Males	$W = 0.0058 L^{3.0782}$	658	0.9870	Males	$W = 0.0051 L^{3.1338}$	335	0.9790	Males	$W = 0.0025 L^{3.2771}$	54	0.9846
	Females	$W = 0.0051 L^{3.1255}$	966	0.9909	Females	$W = 0.0030 L^{3.2978}$	682	0.9918	Females	$W = 0.0016 L^{3.4063}$	139	0.9848
2013	All	$W = 0.0034 L^{3.2311}$	1816	0.9943	All	$W = 0.0045 L^{3.1777}$	1544	0.9903	All	$W = 0.0018 L^{3.3681}$	301	0.9901
	Males	$W = 0.0035 L^{3.2198}$	774	0.9936	Males	$W = 0.0034 L^{3.2558}$	487	0.9898	Males	$W = 0.0015 L^{3.4287}$	106	0.987
	Females	$W = 0.0035 L^{3.2247}$	1027	0.9948	Females	$W = 0.0038 L^{3.2259}$	929	0.9948	Females	$W = 0.0024 L^{3.2851}$	192	0.9888
2014	All	$W = 0.0037 L^{3.2014}$	1668	0.9946	All	$W = 0.0042 L^{3.1947}$	996	0.9934	All	$W = 0.0016 L^{3.4054}$	205	0.9853
	Males	$W = 0.0045 L^{3.1468}$	683	0.9937	Males	$W = 0.0043 L^{3.1921}$	343	0.9905	Males	$W = 0.0014 L^{3.4497}$	58	0.9723
	Females	$W = 0.0036 L^{3.2185}$	977	0.9952	Females	$W = 0.0037 L^{3.2324}$	631	0.9941	Females	$W = 0.0017 L^{3.3924}$	144	0.9817

2015	All	W = 0.0041 L ^{3.1770}	1670	0.9945
	Males	W = 0.0043 L ^{3.1618}	668	0.9927
	Females	W = 0.0042 L ^{3.1756}	998	0.9953

All	W = 0.0038 L ^{3.2259}	1218	0.9952
Males	W = 0.0035 L ^{3.2562}	431	0.9908
Females	W = 0.0039 L ^{3.2169}	777	0.9958

All	W = 0.0020 L ^{3.3390}	330	0.9930
Males	W = 0.0022 L ^{3.3309}	110	0.9849
Females	W = 0.0020 L ^{3.3459}	201	0.9900

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: 2008-2011 (R/V *Vizconde de Eza*). Indet. means indeterminate.

Length (cm.)	2008				2009				2010				2011			
	M	F	I	T	M	F	I	T	M	F	I	T	M	F	I	T
6	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	0.00	0.01
8	0.01	0.02	0.02	0.05	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.03
10	0.37	0.35	0.12	0.85	0.28	0.40	0.11	0.79	0.01	0.04	0.07	0.12	0.00	0.00	0.04	0.04
12	0.93	1.14	0.14	2.21	1.66	2.28	0.20	4.14	0.12	0.16	0.26	0.53	0.10	0.09	0.00	0.18
14	0.24	0.44	0.05	0.73	0.77	1.22	0.01	2.00	0.15	0.17	0.23	0.55	0.52	0.51	0.00	1.03
16	0.00	0.00	0.00	0.00	0.06	0.10	0.00	0.16	0.06	0.03	0.01	0.11	1.20	1.50	0.00	2.70
18	0.00	0.03	0.00	0.03	0.02	0.02	0.00	0.04	0.05	0.04	0.00	0.09	0.32	0.38	0.00	0.70
20	0.04	0.13	0.00	0.17	0.05	0.09	0.00	0.14	0.04	0.17	0.00	0.21	0.09	0.07	0.00	0.16
22	0.46	0.55	0.00	1.01	0.21	0.26	0.00	0.48	0.34	0.43	0.00	0.76	0.27	0.28	0.00	0.54
24	0.89	1.16	0.00	2.05	0.44	0.66	0.00	1.10	0.91	0.98	0.00	1.90	0.38	0.61	0.00	0.99
26	0.72	1.57	0.00	2.29	0.31	0.41	0.00	0.71	0.76	1.00	0.00	1.76	0.37	0.48	0.00	0.85
28	0.27	0.67	0.00	0.94	0.23	0.20	0.00	0.42	0.44	0.42	0.00	0.86	0.24	0.28	0.00	0.51
30	0.23	0.21	0.00	0.44	0.56	0.29	0.00	0.85	0.23	0.18	0.00	0.41	0.24	0.21	0.00	0.45
32	0.50	0.46	0.00	0.96	0.62	0.96	0.00	1.59	0.53	0.57	0.00	1.11	0.25	0.44	0.00	0.69
34	0.94	0.88	0.00	1.82	0.88	1.28	0.00	2.17	0.67	0.73	0.00	1.41	0.42	0.41	0.00	0.84
36	1.12	1.20	0.00	2.32	0.90	1.09	0.00	1.99	1.01	0.99	0.00	1.99	0.46	0.55	0.00	1.01
38	0.97	1.24	0.00	2.21	0.91	1.18	0.00	2.09	1.28	1.24	0.00	2.52	0.64	0.51	0.00	1.14
40	1.18	1.26	0.00	2.43	0.92	1.67	0.00	2.59	1.31	1.82	0.00	3.14	0.60	0.85	0.00	1.45
42	1.69	2.02	0.00	3.71	0.85	1.63	0.00	2.48	1.14	1.72	0.00	2.86	0.65	0.82	0.00	1.48
44	1.23	2.24	0.00	3.47	0.88	1.65	0.00	2.53	0.86	1.49	0.00	2.35	0.54	0.95	0.00	1.49
46	1.16	2.06	0.00	3.22	0.82	1.47	0.00	2.29	0.80	1.48	0.00	2.28	0.56	0.88	0.00	1.43
48	0.87	2.08	0.00	2.95	0.59	1.81	0.00	2.39	0.81	1.40	0.00	2.21	0.43	0.83	0.00	1.26
50	0.42	1.62	0.00	2.04	0.37	1.13	0.00	1.50	0.50	1.19	0.00	1.68	0.28	0.73	0.00	1.02
52	0.29	1.30	0.00	1.59	0.23	1.13	0.00	1.36	0.38	1.08	0.00	1.45	0.30	0.71	0.00	1.01
54	0.18	0.80	0.00	0.98	0.13	0.82	0.00	0.95	0.24	0.99	0.00	1.23	0.15	0.61	0.00	0.76
56	0.15	0.43	0.00	0.58	0.07	0.57	0.00	0.64	0.11	0.84	0.00	0.95	0.13	0.48	0.00	0.61
58	0.03	0.28	0.00	0.30	0.02	0.31	0.00	0.32	0.00	0.56	0.00	0.56	0.03	0.44	0.00	0.47
60	0.01	0.13	0.00	0.14	0.02	0.28	0.00	0.30	0.04	0.34	0.00	0.38	0.01	0.28	0.00	0.29
62	0.02	0.06	0.00	0.08	0.00	0.15	0.00	0.15	0.00	0.20	0.00	0.20	0.00	0.19	0.00	0.19
64	0.00	0.08	0.00	0.08	0.00	0.09	0.00	0.09	0.00	0.11	0.00	0.11	0.00	0.18	0.00	0.18
66	0.00	0.05	0.00	0.05	0.00	0.03	0.00	0.03	0.00	0.07	0.00	0.07	0.00	0.08	0.00	0.08
68	0.00	0.02	0.00	0.02	0.01	0.01	0.00	0.02	0.00	0.06	0.00	0.06	0.00	0.02	0.00	0.02
70	0.00	0.04	0.00	0.04	0.00	0.01	0.00	0.01	0.00	0.04	0.00	0.04	0.00	0.06	0.00	0.06
72	0.00	0.02	0.00	0.02	0.00	0.04	0.00	0.04	0.00	0.03	0.00	0.03	0.00	0.04	0.00	0.04
74	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.03	0.00	0.03
76	0.00	0.01	0.00	0.01	0.00	0.02	0.00	0.02	0.00	0.03	0.00	0.03	0.00	0.03	0.00	0.03
78	0.00	0.02	0.00	0.02	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03
80	0.00	0.04	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.01	0.00	0.00	0.01
82	0.00	0.01	0.00	0.01	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
84	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.04	0.00	0.04	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	0.00	0.00	0.00	0.00	0.00	0.00	0.00
88	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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
92	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
94	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
Total	14.9	24.7	0.3	39.9	12.8	23.3	0.3	36.5	12.8	20.7	0.6	34.0	9.2	14.5	0.1	23.8
Nº samples:				98				96				88				82
Nº Ind.:	1447	2416	37	3900	1256	2298	31	3585	1275	2055	42	3372	813	1275	4	2092
Sampled catch:				2431				2098				2403				1319
Range:				9-92				9-85				10-94				7-80
Total catch:				2431				2098				2403				1319
Total valid hauls:				100				98				97				89

TABLE 8. **Greenland halibut** length distribution per haul mean catches by sex and year. Number per stratified mean catches. Spanish Summer Survey on NAFO 3L: 2012-2015 (R/V *Vizconde de Eza*). Indet. means indeterminate.

Length (cm.)	2012				2013				2014				2015			
	M	F	I	T	M	F	I	T	M	F	I	T	M	F	I	T
6	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
8	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.02	0.03	0.00	0.00	0.00	0.00
10	0.03	0.06	0.00	0.09	0.50	0.28	0.04	0.83	0.52	0.51	0.76	1.79	0.12	0.17	0.00	0.28
12	0.41	0.52	0.01	0.93	3.45	3.74	0.11	7.30	2.30	2.26	0.48	5.04	0.41	0.40	0.00	0.81
14	0.80	0.78	0.00	1.57	2.24	2.54	0.01	4.79	0.67	0.91	0.03	1.61	0.18	0.22	0.00	0.39
16	0.21	0.36	0.00	0.57	0.11	0.10	0.00	0.21	0.05	0.04	0.00	0.10	0.00	0.02	0.00	0.02
18	0.00	0.01	0.00	0.01	0.20	0.19	0.00	0.38	0.13	0.12	0.00	0.25	0.14	0.15	0.00	0.29
20	0.00	0.01	0.00	0.01	0.31	0.36	0.00	0.67	0.76	1.07	0.00	1.83	0.40	0.50	0.00	0.89
22	0.26	0.14	0.00	0.40	0.20	0.38	0.00	0.59	1.87	2.61	0.00	4.48	1.12	1.20	0.00	2.32
24	1.00	1.07	0.00	2.07	0.14	0.26	0.00	0.40	1.37	1.92	0.00	3.29	1.15	1.13	0.00	2.29
26	1.33	2.41	0.00	3.73	0.11	0.06	0.00	0.18	0.73	0.89	0.00	1.62	0.42	0.36	0.00	0.79
28	1.48	2.26	0.00	3.74	0.18	0.09	0.00	0.28	0.35	0.34	0.00	0.70	0.27	0.36	0.00	0.63
30	0.69	1.22	0.00	1.91	0.35	0.30	0.00	0.65	0.28	0.24	0.00	0.53	0.63	0.55	0.00	1.18
32	0.34	0.52	0.00	0.86	0.71	0.60	0.00	1.30	0.36	0.35	0.00	0.71	0.58	0.56	0.00	1.14
34	0.42	0.60	0.00	1.01	1.02	1.09	0.00	2.11	0.47	0.56	0.00	1.03	0.39	0.54	0.00	0.93
36	0.52	0.57	0.00	1.09	0.87	1.54	0.00	2.41	0.83	0.83	0.00	1.66	0.39	0.41	0.00	0.80
38	0.56	0.75	0.00	1.31	1.06	1.02	0.00	2.08	0.80	1.26	0.00	2.05	0.49	0.65	0.00	1.14
40	0.82	0.80	0.00	1.62	0.71	1.05	0.00	1.75	0.98	1.27	0.00	2.25	0.61	0.81	0.00	1.42
42	0.80	1.14	0.00	1.94	0.81	1.44	0.00	2.25	0.96	1.73	0.00	2.69	0.66	1.18	0.00	1.84
44	0.54	1.07	0.00	1.61	0.63	1.52	0.00	2.14	0.95	1.83	0.00	2.78	0.70	1.01	0.00	1.72
46	0.40	0.90	0.00	1.30	0.63	1.43	0.00	2.07	0.64	1.50	0.00	2.13	0.58	1.46	0.00	2.05
48	0.41	0.92	0.00	1.33	0.46	1.13	0.00	1.58	0.37	1.71	0.00	2.07	0.56	1.41	0.00	1.97
50	0.36	0.52	0.00	0.88	0.25	0.98	0.00	1.23	0.42	1.63	0.00	2.05	0.59	1.57	0.00	2.16
52	0.28	0.48	0.00	0.76	0.17	0.71	0.00	0.87	0.24	1.32	0.00	1.56	0.31	1.60	0.00	1.91
54	0.18	0.35	0.00	0.52	0.14	0.39	0.00	0.53	0.17	0.96	0.00	1.14	0.17	1.18	0.00	1.35
56	0.11	0.25	0.00	0.36	0.07	0.42	0.00	0.49	0.15	0.74	0.00	0.88	0.08	1.10	0.00	1.18
58	0.02	0.26	0.00	0.28	0.05	0.25	0.00	0.30	0.06	0.46	0.00	0.53	0.05	0.75	0.00	0.80
60	0.02	0.17	0.00	0.19	0.03	0.16	0.00	0.18	0.04	0.31	0.00	0.35	0.01	0.39	0.00	0.40
62	0.01	0.12	0.00	0.13	0.00	0.09	0.00	0.09	0.00	0.29	0.00	0.29	0.01	0.48	0.00	0.50
64	0.01	0.11	0.00	0.13	0.00	0.11	0.00	0.11	0.00	0.17	0.00	0.17	0.00	0.26	0.00	0.26
66	0.00	0.06	0.00	0.06	0.00	0.12	0.00	0.12	0.01	0.16	0.00	0.17	0.00	0.19	0.00	0.19
68	0.00	0.13	0.00	0.13	0.00	0.07	0.00	0.07	0.00	0.08	0.00	0.08	0.00	0.08	0.00	0.08
70	0.00	0.03	0.00	0.03	0.00	0.03	0.00	0.03	0.00	0.07	0.00	0.07	0.00	0.14	0.00	0.14
72	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.03	0.00	0.03	0.00	0.06	0.00	0.06
74	0.00	0.02	0.00	0.02	0.00	0.01	0.00	0.01	0.00	0.04	0.00	0.04	0.00	0.04	0.00	0.04
76	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	0.04	0.00	0.04
78	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.05	0.00	0.05	0.00	0.02	0.00	0.02
80	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.03	0.00	0.03	0.00	0.03	0.00	0.03
82	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	0.01	0.00	0.01
84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.01	0.00	0.01
86	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	0.01	0.00	0.01
88	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
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
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
94	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
Total	12.0	18.6	0.0	30.6	15.4	22.6	0.2	38.1	16.5	28.4	1.3	46.1	11.0	21.1	0.0	32.1
Nº samples:				94				100				98				94
Nº Ind.:	966	1503	1	2470	1434	2116	16	3566	1535	2594	133	4262	1023	2046	0	3069
Sampled catch:				1392				1782				2404				2426
Range:				11-81				9-88				8-87				10-87
Total catch:				1392				1782				2404				2428
Total valid hauls:				98				100				99				97

TABLE 9. Swept area, number of hauls and **American plaice** mean catch (Kg) and SD (**) by stratum. Spanish Survey on NAFO Div. 3L in the period 2011-2015, on board R/V "Vizconde de Eza".

Stratum	2011				2012				2013				2014				2015			
	Swept area	Tow No.	Mean catch	SD	Swept area	Tow No.	Mean catch	SD	Swept area	Tow No.	Mean catch	SD	Swept area	Tow No.	Mean catch	SD	Swept area	Tow No.	Mean catch	SD
385	0.0229	2	202.65	197.07	0.0225	2	193.48	181.97	0.0229	2	205.05	211.50	0.0225	2	299.25	128.77	0.0236	2	545.50	220.48
387	0.0450	4	3.59	2.78	0.0450	4	2.42	2.02	0.0450	4	9.09	8.03	0.0461	4	18.61	12.88	0.0458	4	22.44	14.72
388	0.0563	5	2.98	3.12	0.0570	5	1.94	1.59	0.0570	5	4.52	4.79	0.0585	5	16.25	21.81	0.0574	5	5.16	2.87
389	0.0675	6	9.28	6.82	0.0799	7	29.40	19.17	0.0791	7	30.81	33.30	0.0814	7	55.60	68.96	0.0814	7	128.62	166.16
390	0.1009	9	54.05	27.07	0.1354	12	97.01	63.78	0.1358	12	98.07	152.10	0.1369	12	85.16	95.39	0.1260	11	66.48	72.71
391	0.0458	4	21.83	22.49	0.0458	4	31.40	44.84	0.0450	4	29.30	19.53	0.0465	4	159.38	178.33	0.0465	4	90.01	98.23
392	0.0229	2	0.55	0.77	0.0225	2	0.01	0.02	0.0225	2	0.76	0.36	0.0225	2	0.01	0.02	0.0229	2	0.42	0.59
729	0.0338	3	0.11	0.18	0.0338	3	0.00	0.00	0.0341	3	0.24	0.41	0.0338	3	0.00	0.00	0.0345	3	0.00	0.00
730	0.0334	3	0.00	0.00	0.0338	3	0.00	0.00	0.0334	3	0.00	0.00	0.0345	3	0.00	0.00	0.0345	3	0.00	0.00
731	0.0334	3	0.00	0.00	0.0341	3	0.04	0.07	0.0334	3	0.10	0.17	0.0345	3	0.09	0.16	0.0345	3	0.64	1.10
732	0.0454	4	0.00	0.00	0.0454	4	0.00	0.00	0.0450	4	0.00	0.00	0.0454	4	0.00	0.00	0.0465	4	0.00	0.00
733	0.0454	4	0.02	0.05	0.0454	4	0.07	0.11	0.0450	4	0.23	0.34	0.0458	4	0.12	0.24	0.0454	4	0.99	1.22
734	0.0225	2	0.00	0.00	0.0233	2	0.00	0.00	0.0221	2	0.00	0.00	0.0225	2	0.00	0.00	0.0225	2	0.00	0.00
741	0.0218	2	0.00	0.00	0.0218	2	0.00	0.00	0.0221	2	0.00	0.00	0.0225	2	0.00	0.00	0.0236	2	0.01	0.01
742	0.0225	2	0.00	0.00	0.0206	2	0.00	0.00	0.0218	2	0.00	0.00	0.0221	2	0.00	0.00	0.0233	2	0.00	0.00
743	0.0221	2	0.00	0.00	0.0206	2	0.00	0.00	0.0218	2	0.00	0.00	0.0221	2	0.00	0.00	0.0233	2	0.00	0.00
744	0.0221	2	0.00	0.00	0.0221	2	0.00	0.00	0.0221	2	0.00	0.00	0.0225	2	0.00	0.00	0.0225	2	0.00	0.00
745	0.0446	4	0.00	0.00	0.0570	5	0.00	0.00	0.0559	5	0.00	0.00	0.0578	5	0.00	0.00	0.0578	5	0.00	0.00
746	0.0566	5	0.00	0.00	0.0675	6	0.00	0.00	0.0675	6	0.00	0.00	0.0683	6	0.00	0.00	0.0686	6	0.00	0.00
747	0.0893	8	0.00	0.00	0.1121	10	0.00	0.00	0.1125	10	0.00	0.00	0.1125	10	0.00	0.00	0.1028	9	0.00	0.00
748	0.0221	2	0.00	0.00	0.0225	2	0.00	0.00	0.0225	2	0.00	0.00	0.0229	2	0.00	0.00	0.0233	2	0.00	0.00
749	0.0221	2	0.00	0.00	0.0221	2	0.00	0.00	0.0225	2	0.00	0.00	0.0225	2	0.00	0.00	0.0225	2	0.00	0.00
750	0.0668	6	0.00	0.00	0.0885	8	0.00	0.00	0.0896	8	0.00	0.00	0.0904	8	0.00	0.00	0.0934	8	0.00	0.00
751	0.0334	3	0.00	0.00	0.0218	2	0.00	0.00	0.0446	4	0.00	0.00	0.0334	3	0.00	0.00	0.0341	3	0.00	0.00

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

TABLE 10. Stratified mean catches (Kg) and SD of **American plaice** by stratum and year (2003-2015). Research Vessel *Vizconde de Eza*. n.s. means stratum not surveyed. In 2003: the data correspond to 69% of the total area prospected in 2006-2015.

Stratum	Survey												
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
385	470.23	2253.80	-	5726.54	3767.15	7640.50	66217.94	325.80	23912.70	22830.05	24195.90	35310.91	64369.00
387	985.60	4559.36	-	1703.04	2045.95	1511.87	1763.14	356.97	918.27	618.37	2327.04	4763.52	5744.77
388	2612.05	4801.65	-	2719.48	2995.09	1044.23	1314.12	7892.20	1062.36	691.15	1613.93	5800.54	1843.33
389	3285.60	4555.55	-	10477.26	12966.65	6608.06	12543.72	18300.40	4725.39	14965.33	15680.91	28302.15	65468.53
390	1511.01	22637.98	-	62010.39	56426.39	95469.71	93311.86	7899.18	44052.56	79061.11	79928.41	69406.08	54181.94
391	1750.28	4198.98	-	2984.97	10479.83	5803.56	2707.34	148.33	6156.13	8854.31	8262.60	44943.75	25383.53
392	1218.00	43.50	-	0.00	152.90	0.00	153.70	0.00	79.03	1.81	109.91	1.60	60.61
729	10265.34	27.90	-	0.00	0.00	0.00	3.72	0.00	19.84	0.00	44.08	0.00	0.00
730	10030.00	0.00	-	0.00	0.00	0.00	32.92	0.00	0.00	0.00	0.00	0.00	0.00
731	5531.76	313.20	-	0.00	54.72	70.56	22.54	0.00	0.00	8.64	20.88	20.02	137.52
732	9401.70	0.00	-	0.00	0.00	0.00	0.00	9.07	0.00	0.00	0.00	0.00	0.00
733	n.s	296.40	-	0.00	74.88	99.68	4.15	129.87	5.73	16.50	54.52	28.08	231.78
734	n.s	0.00	-	0.00	0.00	10.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
741	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80
742	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
743	n.s	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
744	n.s	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
745	212.28	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
746	0.00	0.00	-	0.00	0.00	0.00	25.48	0.00	0.00	0.00	0.00	0.00	0.00
747	n.s	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
748	160.59	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
749	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
750	n.s	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
751	n.s	n.s	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	47434.44	43688.32	-	85621.68	88963.55	118258.27	178100.64	35061.82	80932.01	127047.27	132238.18	188576.63	217421.80
(\bar{y})	10.60	6.98	-	13.20	13.71	18.23	27.46	5.40	12.48	19.58	20.39	29.07	33.52
SD	0.95	1.12	-	2.06	2.00	4.98	6.11	1.32	2.83	3.48	6.25	5.85	6.68

TABLE 11. Survey estimates (by the swept area method) of **American plaice** biomass (t.) and SD by stratum and year on 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 2006-2015.

Stratum	Survey												
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
385	42	197	-	501	335	668	5886	685	2091	2029	2115	3139	5449
387	86	427	-	151	182	139	161	54	82	55	207	413	502
388	235	457	-	240	266	93	118	44	94	61	142	496	161
389	290	405	-	923	1153	593	1094	991	420	1312	1387	2435	5632
390	134	1969	-	5462	5016	8212	8158	2581	3930	7008	7065	6085	4730
391	156	386	-	265	932	512	237	241	538	774	734	3866	2184
392	105	4	-	0	14	0	13	7	7	0	10	0	5
729	978	3	-	0	0	0	0	0	2	0	4	0	0
730	907	0	-	0	0	0	3	0	0	0	0	0	0
731	484	27	-	0	5	6	2	0	0	1	2	2	12
732	836	0	-	0	0	0	0	0	0	0	0	0	0
733	n.s	27	-	0	7	9	0	1	1	1	5	2	20
734	n.s	0	-	0	0	1	0	8	0	0	0	0	0
741	0	0	-	0	0	0	0	0	0	0	0	0	0
742	0	0	-	0	0	0	0	0	0	0	0	0	0
743	n.s	0	-	0	0	0	0	0	0	0	0	0	0
744	n.s	0	-	0	0	0	0	0	0	0	0	0	0
745	19	0	-	0	0	0	0	0	0	0	0	0	0
746	0	0	-	0	0	0	2	0	0	0	0	0	0
747	n.s	0	-	0	0	0	0	0	0	0	0	0	0
748	15	0	-	0	0	0	0	0	0	0	0	0	0
749	0	0	-	0	0	0	0	0	0	0	0	0	0
750	n.s	0	-	0	0	0	0	0	0	0	0	0	0
751	n.s	n.s	-	0	0	0	0	0	0	0	0	0	0
TOTAL	4284	3901	-	7542	7908	10234	15676	4611	7165	11241	11671	16438	18695
SD	362	626	-	1150	1156	2805	3411	925	1580	2006	3513	3229	3750

TABLE 12. **American plaice** length distribution per haul mean catches by sex and year. Number per stratified mean catches. Spanish Summer Survey on NAFO 3L: 2008-2011 (R/V *Vizconde de Eza*). Indet. means indeterminate.

Length (cm.)	2008				2009				2010				2011			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
2	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
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00
6	0.00	0.00	0.76	0.76	0.06	0.04	0.15	0.25	0.20	0.10	0.97	1.28	0.00	0.00	0.00	0.00
8	0.01	0.02	0.87	0.90	0.22	0.12	0.07	0.41	0.22	0.26	0.76	1.24	0.04	0.00	0.00	0.04
10	0.55	0.39	0.05	0.99	4.28	3.78	0.09	8.15	0.49	0.58	0.17	1.25	0.56	0.76	0.00	1.32
12	3.49	3.58	0.06	7.13	3.28	3.70	0.01	6.99	1.60	1.48	0.03	3.10	5.41	5.60	0.00	11.01
14	1.95	2.05	0.00	4.00	2.29	4.64	0.01	6.95	1.05	2.29	0.00	3.34	3.77	5.50	0.00	9.28
16	0.86	1.36	0.00	2.22	3.81	7.38	0.00	11.19	1.27	1.93	0.00	3.20	2.07	2.98	0.00	5.05
18	1.45	2.22	0.00	3.67	1.42	2.83	0.00	4.26	0.78	1.76	0.00	2.54	2.00	3.42	0.00	5.43
20	0.92	2.03	0.00	2.94	1.07	3.16	0.00	4.23	0.78	2.20	0.00	2.98	1.16	3.70	0.00	4.86
22	0.94	2.10	0.00	3.04	0.88	3.30	0.00	4.18	0.33	1.25	0.00	1.58	0.63	2.16	0.00	2.80
24	1.12	1.96	0.00	3.08	0.82	3.04	0.00	3.86	0.19	0.68	0.00	0.87	0.45	3.01	0.00	3.46
26	0.94	1.68	0.00	2.62	1.27	3.98	0.00	5.25	0.23	0.85	0.00	1.08	0.44	1.66	0.00	2.10
28	0.75	1.70	0.00	2.46	1.09	3.71	0.00	4.81	0.21	0.84	0.00	1.05	0.41	1.27	0.00	1.68
30	0.56	1.26	0.00	1.81	0.77	3.61	0.00	4.38	0.20	0.74	0.00	0.94	0.44	1.16	0.00	1.61
32	0.62	1.00	0.00	1.63	0.81	3.21	0.00	4.02	0.11	0.98	0.00	1.08	0.37	1.52	0.00	1.89
34	0.46	0.83	0.00	1.30	0.64	3.33	0.00	3.97	0.07	1.02	0.00	1.08	0.40	2.24	0.00	2.64
36	0.44	1.45	0.00	1.89	0.43	2.47	0.00	2.91	0.09	0.63	0.00	0.72	0.12	2.16	0.00	2.28
38	0.35	1.89	0.00	2.23	0.24	3.29	0.00	3.53	0.02	0.70	0.00	0.71	0.17	2.39	0.00	2.56
40	0.12	2.43	0.00	2.55	0.12	4.41	0.00	4.53	0.02	0.39	0.00	0.41	0.07	1.64	0.00	1.71
42	0.07	2.41	0.00	2.48	0.02	4.78	0.00	4.80	0.02	0.49	0.00	0.51	0.00	1.04	0.00	1.04
44	0.00	1.88	0.00	1.88	0.08	4.09	0.00	4.16	0.01	0.53	0.00	0.53	0.00	1.02	0.00	1.02
46	0.00	1.59	0.00	1.59	0.04	2.20	0.00	2.24	0.00	0.46	0.00	0.46	0.00	0.93	0.00	0.93
48	0.00	1.09	0.00	1.09	0.00	1.62	0.00	1.62	0.00	0.21	0.00	0.21	0.00	0.56	0.00	0.56
50	0.00	0.83	0.00	0.83	0.00	1.13	0.00	1.13	0.02	0.12	0.00	0.14	0.00	0.43	0.00	0.43
52	0.00	0.66	0.00	0.66	0.00	0.73	0.00	0.73	0.00	0.14	0.00	0.14	0.00	0.23	0.00	0.23
54	0.00	0.34	0.00	0.34	0.04	0.40	0.00	0.44	0.00	0.07	0.00	0.07	0.01	0.11	0.00	0.12
56	0.00	0.04	0.00	0.04	0.00	0.13	0.00	0.13	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.00
58	0.00	0.04	0.00	0.04	0.00	0.12	0.00	0.12	0.00	0.01	0.00	0.01	0.00	0.05	0.00	0.05
60	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	0.00	0.00	0.00
62	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
Total	15.61	36.88	1.75	54.24	23.70	75.22	0.34	99.26	7.90	20.75	1.94	30.58	18.54	45.54	0.00	64.08
N° samples:				37				41				35				33
N° Ind.:	924	2383	98	3405	1033	2843	16	3892	740	2014	231	2985	1044	2582	0	3626
Sampled catch:				1749				2757				739				1066
Range:				6-61				6-59				5-63				9-63
Total catch:				1749				2757				739				1066
Total valid hauls:				100				98				97				89

TABLE 13. **American plaice** length distribution per haul mean catches by sex and year. Number per stratified mean catches. Spanish Summer Survey on NAFO 3L: 2012-2015 (R/V *Vizconde de Eza*). Indet. means indeterminate.

Length (cm.)	2012				2013				2014				2015			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
2	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
4	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.45	0.00	0.00	0.45	0.45	0.00	0.00	0.00	0.00
6	0.00	0.03	0.30	0.32	0.02	0.00	8.05	8.06	0.02	0.00	8.05	8.06	0.00	0.20	0.06	0.26
8	0.36	0.16	0.54	1.06	0.01	0.02	3.63	3.66	0.01	0.02	3.63	3.66	1.22	0.99	1.77	3.98
10	0.07	0.07	0.11	0.26	2.10	1.71	0.27	4.08	2.10	1.71	0.27	4.08	8.81	5.20	4.74	18.76
12	0.08	0.09	0.00	0.17	3.07	3.38	0.05	6.50	3.07	3.38	0.05	6.50	23.59	31.50	0.26	55.35
14	2.68	2.16	0.00	4.84	1.95	1.71	0.00	3.66	1.95	1.71	0.00	3.66	37.48	57.71	0.00	95.19
16	6.60	7.80	0.00	14.40	0.73	1.30	0.00	2.03	0.73	1.30	0.00	2.03	17.98	29.50	0.00	47.48
18	3.60	6.55	0.00	10.15	1.24	3.08	0.00	4.32	1.24	3.08	0.00	4.32	5.31	11.30	0.00	16.61
20	3.47	5.47	0.00	8.93	2.38	5.09	0.00	7.47	2.38	5.09	0.00	7.47	3.06	5.14	0.00	8.19
22	1.53	3.88	0.00	5.40	1.98	5.89	0.00	7.87	1.98	5.89	0.00	7.87	2.16	4.46	0.00	6.62
24	1.30	4.96	0.00	6.26	1.36	5.98	0.00	7.34	1.36	5.98	0.00	7.34	1.73	3.09	0.00	4.82
26	1.04	4.99	0.00	6.04	1.15	4.48	0.00	5.62	1.15	4.48	0.00	5.62	2.53	5.73	0.00	8.26
28	0.80	5.05	0.00	5.84	1.30	4.12	0.00	5.42	1.30	4.12	0.00	5.42	1.30	10.19	0.00	11.49
30	0.76	3.35	0.00	4.12	0.67	3.48	0.00	4.15	0.67	3.48	0.00	4.15	0.74	9.54	0.00	10.28
32	0.37	2.53	0.00	2.90	0.47	2.98	0.00	3.45	0.47	2.98	0.00	3.45	0.66	7.47	0.00	8.13
34	0.45	2.31	0.00	2.76	0.20	2.89	0.04	3.12	0.20	2.89	0.04	3.12	0.56	6.04	0.00	6.60
36	0.31	2.58	0.00	2.89	0.14	2.10	0.00	2.25	0.14	2.10	0.00	2.25	0.31	3.32	0.00	3.63
38	0.10	2.55	0.00	2.65	0.04	1.99	0.00	2.04	0.04	1.99	0.00	2.04	0.09	3.32	0.00	3.41
40	0.11	2.16	0.00	2.26	0.02	2.37	0.00	2.39	0.02	2.37	0.00	2.39	0.18	2.51	0.00	2.69
42	0.00	2.11	0.00	2.11	0.02	1.71	0.00	1.73	0.02	1.71	0.00	1.73	0.00	3.73	0.00	3.73
44	0.00	1.61	0.00	1.61	0.01	1.86	0.00	1.87	0.01	1.86	0.00	1.87	0.00	1.42	0.00	1.42
46	0.00	0.94	0.00	0.94	0.00	1.45	0.00	1.45	0.00	1.45	0.00	1.45	0.00	1.52	0.00	1.52
48	0.00	1.20	0.00	1.20	0.00	0.89	0.00	0.89	0.00	0.89	0.00	0.89	0.00	1.01	0.00	1.01
50	0.00	0.70	0.00	0.70	0.00	1.01	0.00	1.01	0.00	1.01	0.00	1.01	0.00	1.19	0.00	1.19
52	0.00	0.71	0.00	0.71	0.00	0.62	0.00	0.62	0.00	0.62	0.00	0.62	0.00	0.58	0.00	0.58
54	0.00	0.16	0.00	0.16	0.00	0.56	0.00	0.56	0.00	0.56	0.00	0.56	0.00	0.62	0.00	0.62
56	0.00	0.05	0.00	0.05	0.00	0.14	0.00	0.14	0.00	0.14	0.00	0.14	0.00	0.15	0.00	0.15
58	0.00	0.07	0.00	0.07	0.00	0.15	0.00	0.15	0.00	0.15	0.00	0.15	0.00	0.15	0.00	0.15
60	0.00	0.03	0.00	0.03	0.00	0.08	0.00	0.08	0.00	0.08	0.00	0.08	0.00	0.00	0.00	0.00
62	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.04	0.00	0.04	0.00	0.04	0.00	0.00	0.00	0.00
Total	23.63	64.27	0.95	88.84	18.87	61.06	12.49	92.41	18.87	61.06	12.49	92.41	107.72	207.58	6.84	322.13
Nº samples:				38				39				37				37
Nº Ind.:	1044	2917	35	3996	908	2969	534	4411	1324	3141	551	5016	1497	3034	55	4586
Sampled catch:				1902				1982				2804				3199
Range:				6-60				5-62				4-59				7-59
Total catch:				1902				1982				2804				3205
Total valid hauls:				98				100				99				97

TABLE 14. Swept area, number of hauls and **Witch flounder** mean catch (Kg) and SD (**) by stratum. Spanish Survey on NAFO Div. 3L in the period 2011-2015, on board R/V "Vizconde de Eza".

Stratum	2011				2012				2013				2014				2015			
	Swept area	Tow No.	Mean catch	SD	Swept area	Tow No.	Mean catch	SD	Swept area	Tow No.	Mean catch	SD	Swept area	Tow No.	Mean catch	SD	Swept area	Tow No.	Mean catch	SD
385	0.0229	2	0.00	0.00	0.0225	2	0.00	0.00	0.0229	2	0.60	0.84	0.0225	2	0.31	0.44	0.0236	2	0.00	0.00
387	0.0450	4	4.65	1.24	0.0450	4	1.15	1.02	0.0450	4	3.62	2.74	0.0461	4	2.16	1.38	0.0458	4	9.12	5.86
388	0.0563	5	1.50	1.96	0.0570	5	1.75	2.63	0.0570	5	2.13	1.56	0.0585	5	2.21	1.40	0.0574	5	1.02	0.86
389	0.0675	6	0.14	0.22	0.0799	7	0.02	0.04	0.0791	7	0.22	0.33	0.0814	7	0.36	0.62	0.0814	7	0.13	0.36
390	0.1009	9	0.00	0.00	0.1354	12	0.00	0.00	0.1358	12	0.20	0.52	0.1369	12	0.07	0.25	0.1260	11	0.07	0.22
391	0.0458	4	0.00	0.00	0.0458	4	0.16	0.32	0.0450	4	0.00	0.00	0.0465	4	0.00	0.00	0.0465	4	0.29	0.59
392	0.0229	2	0.30	0.33	0.0225	2	1.26	1.73	0.0225	2	0.70	0.98	0.0225	2	0.80	1.14	0.0229	2	0.73	0.97
729	0.0338	3	12.22	7.49	0.0338	3	10.50	8.97	0.0341	3	6.43	4.77	0.0338	3	4.12	3.81	0.0345	3	8.81	5.09
730	0.0334	3	0.00	0.00	0.0338	3	0.60	1.04	0.0334	3	0.60	0.82	0.0345	3	2.74	3.17	0.0345	3	0.40	0.69
731	0.0334	3	3.00	1.75	0.0341	3	1.81	2.10	0.0334	3	4.19	3.09	0.0345	3	4.09	2.06	0.0345	3	5.65	3.80
732	0.0454	4	2.57	1.95	0.0454	4	3.39	1.68	0.0450	4	3.57	2.82	0.0454	4	4.39	2.02	0.0465	4	4.15	1.63
733	0.0454	4	2.00	2.41	0.0454	4	2.16	2.46	0.0450	4	4.27	2.44	0.0458	4	1.15	1.51	0.0454	4	3.78	4.95
734	0.0225	2	0.22	0.30	0.0233	2	0.00	0.00	0.0221	2	0.02	0.03	0.0225	2	0.57	0.81	0.0225	2	0.29	0.42
741	0.0218	2	0.00	0.00	0.0218	2	0.00	0.00	0.0221	2	0.00	0.00	0.0225	2	0.00	0.00	0.0236	2	0.00	0.00
742	0.0225	2	0.00	0.00	0.0206	2	0.00	0.00	0.0218	2	0.00	0.00	0.0221	2	0.00	0.00	0.0233	2	0.00	0.00
743	0.0221	2	0.00	0.00	0.0206	2	0.00	0.00	0.0218	2	0.00	0.00	0.0221	2	0.00	0.00	0.0233	2	0.00	0.00
744	0.0221	2	0.00	0.00	0.0221	2	0.00	0.00	0.0221	2	0.00	0.00	0.0225	2	0.00	0.00	0.0225	2	0.00	0.00
745	0.0446	4	0.00	0.00	0.0570	5	0.00	0.00	0.0559	5	0.07	0.09	0.0578	5	0.15	0.31	0.0578	5	0.05	0.08
746	0.0566	5	0.00	0.00	0.0675	6	0.00	0.00	0.0675	6	0.00	0.00	0.0683	6	0.00	0.00	0.0686	6	0.00	0.00
747	0.0893	8	0.00	0.00	0.1121	10	0.00	0.00	0.1125	10	0.00	0.00	0.1125	10	0.09	0.27	0.1028	9	0.04	0.11
748	0.0221	2	0.00	0.00	0.0225	2	0.00	0.00	0.0225	2	0.00	0.00	0.0229	2	0.00	0.00	0.0233	2	0.00	0.00
749	0.0221	2	0.00	0.00	0.0221	2	0.00	0.00	0.0225	2	0.00	0.00	0.0225	2	0.00	0.00	0.0225	2	0.00	0.00
750	0.0668	6	0.06	0.14	0.0885	8	0.05	0.11	0.0896	8	0.02	0.05	0.0904	8	0.01	0.04	0.0934	8	0.00	0.00
751	0.0334	3	0.00	0.00	0.0218	2	0.00	0.00	0.0446	4	0.00	0.00	0.0334	3	0.00	0.00	0.0341	3	0.00	0.00

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

TABLE 15. Stratified mean catches (Kg) and SD of **Witch flounder** **Witch flounder** by stratum and year (2003-2015). Research Vessel *Vizconde de Eza*. n.s. means stratum not surveyed. In 2003: the data correspond to 69% of the total area prospected in 2006-2015.

Stratum	Survey												
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
385	0.00	0.00	-	28.32	0.00	0.00	0.00	0.00	0.24	0.00	70.21	36.58	0.00
387	66.56	678.40	-	878.98	332.67	778.18	45.38	393.86	1189.70	294.85	926.08	551.94	2333.57
388	56.88	1544.74	-	312.80	532.50	653.38	473.74	709.43	535.00	625.89	761.55	789.97	363.57
389	6.36	47.08	-	144.34	0.38	93.58	2.47	41.59	71.51	11.34	111.62	185.57	68.35
390	0.00	0.00	-	64.46	0.00	85.58	0.00	0.00	0.00	0.00	165.04	59.09	54.31
391	0.00	0.00	-	109.28	28.69	282.71	28.98	125.42	0.00	44.70	0.00	0.00	82.49
392	1.16	0.58	-	28.28	170.30	245.56	179.87	13.70	43.65	182.27	101.57	116.44	106.14
729	146.01	429.66	-	269.70	897.14	515.22	592.78	1370.20	2273.11	1952.50	1195.36	766.26	1638.66
730	867.85	320.45	-	78.20	0.00	126.37	0.00	87.83	0.00	102.23	101.89	465.69	67.83
731	392.04	813.24	-	733.32	832.46	744.12	1294.34	1758.96	646.92	390.74	905.98	883.22	1219.39
732	1651.65	496.65	-	315.70	73.15	474.94	723.32	1281.47	594.65	783.26	825.13	1014.03	958.07
733	n.s	582.50	-	1569.26	480.17	1293.90	1692.76	1979.35	468.35	506.08	998.01	269.51	883.47
734	n.s	0.00	-	29.07	10.02	30.60	0.00	9.95	32.90	0.00	3.60	87.21	44.98
741	0.00	0.27	-	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.05
742	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
743	n.s	0.00	-	0.00	0.00	0.00	4.69	0.00	0.00	0.00	0.00	0.00	0.00
744	n.s	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
745	131.08	0.00	-	0.00	0.58	0.00	3.48	2.51	0.00	0.00	25.20	52.83	18.30
746	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
747	n.s	4.83	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.26	27.03
748	0.00	0.32	-	3.34	0.00	0.00	0.00	0.00	0.00	0.32	0.00	0.00	0.32
749	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
750	n.s	0.00	-	0.00	0.00	0.00	0.00	12.09	31.97	30.51	10.43	7.65	0.00
751	n.s	n.s	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	3319.59	4918.72	-	4565.04	3358.07	5324.12	5041.81	7786.36	5888.14	4924.70	6201.65	5348.23	7866.53
(\bar{y})	0.74	0.79	-	0.70	0.52	0.82	0.78	1.20	0.91	0.76	0.96	0.82	1.21
SD	0.12	0.13	-	0.20	0.12	0.13	0.13	0.24	0.15	0.18	0.14	0.11	0.19

TABLE 16. Survey estimates (by the swept area method) of **Witch flounder** biomass (t.) and SD by stratum and year on 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 2006-2015.

Stratum	Survey												
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
385	0	0	-	2	0	0	0	0	0	0	6	3	0
387	6	63	-	78	30	72	4	34	106	26	82	48	204
388	5	147	-	28	47	58	43	62	48	55	67	68	32
389	1	4	-	13	0	8	0	4	6	1	10	16	6
390	0	0	-	6	0	7	0	0	0	0	15	5	5
391	0	0	-	10	3	25	3	11	0	4	0	0	7
392	0	0	-	2	15	22	16	1	4	16	9	10	9
729	14	39	-	24	80	46	52	122	202	174	105	68	142
730	78	29	-	7	0	12	0	8	0	9	9	40	6
731	34	70	-	64	74	68	114	156	58	34	81	77	106
732	147	47	-	28	7	43	64	114	52	69	73	89	82
733	n.s	53	-	138	43	120	150	176	41	45	89	24	78
734	n.s	0	-	3	1	3	0	1	3	0	0	8	4
741	0	0	-	0	0	0	0	0	0	0	0	0	0
742	0	0	-	0	0	0	0	0	0	0	0	0	0
743	n.s	0	-	0	0	0	0	0	0	0	0	0	0
744	n.s	0	-	0	0	0	0	0	0	0	0	0	0
745	12	0	-	0	0	0	0	0	0	0	2	5	2
746	0	0	-	0	0	0	0	0	0	0	0	0	0
747	n.s	0	-	0	0	0	0	0	0	0	0	6	2
748	0	0	-	0	0	0	0	0	0	0	0	0	0
749	0	0	-	0	0	0	0	0	0	0	0	0	0
750	n.s	0	-	0	0	0	0	1	3	3	1	1	0
751	n.s	n.s	-	0	0	0	0	0	0	0	0	0	0
TOTAL	297	453	-	404	298	483	447	691	523	436	550	467	685
SD	51	75	-	116	71	80	74	137	86	103	80	65	107

TABLE 17. **Witch flounder** length distribution per haul mean catches by sex and year. Number per stratified mean catches. Spanish Summer Survey on NAFO 3L: 2008-2011 (R/V *Vizconde de Eza*). Indet. means indeterminate.

Length (cm.)	2008				2009				2010				2011			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
6	0.00	0.00	0.02	0.02	0.00	0.00	0.07	0.07	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00
8	0.00	0.01	0.22	0.23	0.00	0.00	0.07	0.07	0.00	0.00	0.18	0.18	0.00	0.01	0.06	0.07
10	0.03	0.01	0.08	0.12	0.00	0.00	0.01	0.01	0.00	0.02	0.04	0.06	0.00	0.00	0.04	0.04
12	0.01	0.00	0.00	0.01	0.01	0.01	0.00	0.02	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.02
14	0.07	0.12	0.04	0.23	0.03	0.05	0.00	0.08	0.06	0.06	0.02	0.15	0.03	0.03	0.00	0.06
16	0.11	0.10	0.02	0.23	0.03	0.04	0.00	0.07	0.05	0.05	0.00	0.10	0.04	0.02	0.00	0.06
18	0.17	0.20	0.00	0.37	0.04	0.05	0.00	0.09	0.00	0.03	0.01	0.04	0.07	0.03	0.00	0.11
20	0.05	0.08	0.00	0.13	0.01	0.07	0.00	0.08	0.03	0.05	0.00	0.08	0.06	0.03	0.00	0.09
22	0.15	0.10	0.00	0.25	0.11	0.10	0.00	0.21	0.10	0.09	0.00	0.19	0.08	0.09	0.00	0.17
24	0.11	0.11	0.00	0.23	0.07	0.15	0.00	0.22	0.13	0.19	0.00	0.33	0.04	0.06	0.00	0.10
26	0.13	0.08	0.00	0.21	0.07	0.10	0.00	0.17	0.15	0.12	0.00	0.27	0.07	0.09	0.00	0.16
28	0.29	0.32	0.00	0.61	0.07	0.16	0.00	0.23	0.30	0.24	0.00	0.55	0.07	0.20	0.00	0.27
30	0.09	0.15	0.00	0.24	0.15	0.15	0.00	0.30	0.34	0.24	0.00	0.58	0.19	0.19	0.00	0.38
32	0.14	0.14	0.00	0.29	0.23	0.16	0.00	0.40	0.12	0.21	0.00	0.32	0.16	0.14	0.00	0.30
34	0.06	0.09	0.00	0.15	0.10	0.16	0.00	0.26	0.08	0.23	0.00	0.31	0.07	0.19	0.00	0.27
36	0.09	0.08	0.00	0.16	0.05	0.15	0.00	0.20	0.11	0.23	0.00	0.33	0.03	0.09	0.00	0.12
38	0.04	0.17	0.00	0.21	0.08	0.12	0.00	0.20	0.10	0.17	0.00	0.27	0.05	0.20	0.00	0.25
40	0.04	0.11	0.00	0.15	0.02	0.13	0.00	0.15	0.10	0.27	0.00	0.37	0.04	0.16	0.00	0.20
42	0.01	0.11	0.00	0.12	0.01	0.14	0.00	0.15	0.02	0.16	0.00	0.18	0.03	0.15	0.00	0.18
44	0.00	0.06	0.00	0.06	0.01	0.04	0.00	0.05	0.00	0.11	0.00	0.11	0.00	0.19	0.00	0.19
46	0.00	0.12	0.00	0.12	0.00	0.10	0.00	0.10	0.00	0.07	0.00	0.07	0.00	0.07	0.00	0.07
48	0.00	0.03	0.00	0.03	0.00	0.04	0.00	0.04	0.00	0.06	0.00	0.06	0.00	0.03	0.00	0.03
50	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	0.01	0.00	0.01
52	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	0.04	0.00	0.04
54	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	0.00	0.00	0.00
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
58	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
60	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
Total	1.59	2.19	0.38	4.16	1.11	1.93	0.15	3.18	1.69	2.65	0.28	4.62	1.04	2.03	0.10	3.17
Nº samples:				36				28				35				29
Nº Ind.:	159	223	37	419	110	193	13	316	169	272	25	466	103	206	10	319
Sampled catch:				83				80				123				92
Range:				7-54				6-50				6-55				8-53
Total catch:				83				80				123				92
Total valid hauls:				100				98				97				89

TABLE 18. **Witch flounder** length distribution per haul mean catches by sex and year. Number per stratified mean catches. Spanish Summer Survey on NAFO 3L: 2012-2015 (R/V *Vizconde de Eza*). Indet. means indeterminate.

Length (cm.)	2012				2013				2014				2015			
	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total	Males	Females	Indet.	Total
6	0.00	0.00	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05
8	0.00	0.00	0.07	0.07	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.14	0.14
10	0.00	0.00	0.01	0.01	0.02	0.00	0.00	0.02	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00
12	0.02	0.00	0.01	0.03	0.01	0.04	0.01	0.06	0.01	0.01	0.01	0.03	0.01	0.00	0.01	0.02
14	0.04	0.07	0.00	0.11	0.06	0.04	0.00	0.10	0.03	0.00	0.00	0.03	0.01	0.01	0.00	0.02
16	0.02	0.11	0.01	0.14	0.03	0.05	0.01	0.09	0.02	0.00	0.00	0.02	0.00	0.01	0.00	0.01
18	0.00	0.03	0.00	0.03	0.07	0.02	0.00	0.09	0.02	0.04	0.00	0.06	0.02	0.01	0.00	0.03
20	0.03	0.02	0.00	0.05	0.16	0.01	0.00	0.17	0.06	0.05	0.00	0.11	0.06	0.12	0.00	0.18
22	0.01	0.07	0.00	0.08	0.15	0.13	0.00	0.27	0.01	0.02	0.00	0.03	0.03	0.09	0.00	0.11
24	0.04	0.03	0.00	0.07	0.13	0.20	0.00	0.34	0.03	0.05	0.00	0.08	0.03	0.08	0.00	0.11
26	0.04	0.12	0.00	0.15	0.06	0.06	0.00	0.11	0.13	0.07	0.00	0.19	0.04	0.03	0.00	0.07
28	0.05	0.10	0.00	0.15	0.07	0.10	0.00	0.17	0.11	0.15	0.00	0.26	0.13	0.16	0.00	0.29
30	0.05	0.11	0.00	0.16	0.17	0.13	0.00	0.30	0.11	0.14	0.00	0.25	0.18	0.13	0.00	0.31
32	0.06	0.08	0.00	0.14	0.08	0.05	0.00	0.13	0.07	0.09	0.00	0.16	0.29	0.21	0.00	0.50
34	0.03	0.08	0.00	0.11	0.08	0.13	0.00	0.21	0.06	0.09	0.00	0.16	0.18	0.23	0.00	0.41
36	0.08	0.12	0.00	0.20	0.04	0.12	0.00	0.15	0.04	0.12	0.00	0.16	0.12	0.10	0.00	0.22
38	0.06	0.18	0.00	0.24	0.02	0.15	0.00	0.18	0.03	0.06	0.00	0.09	0.08	0.21	0.00	0.29
40	0.02	0.15	0.00	0.17	0.03	0.20	0.00	0.23	0.00	0.15	0.00	0.15	0.03	0.20	0.00	0.23
42	0.02	0.23	0.00	0.25	0.01	0.20	0.00	0.21	0.01	0.14	0.00	0.15	0.03	0.14	0.00	0.17
44	0.00	0.11	0.00	0.11	0.00	0.16	0.00	0.16	0.00	0.20	0.00	0.20	0.00	0.18	0.00	0.18
46	0.00	0.09	0.00	0.09	0.00	0.11	0.00	0.11	0.00	0.12	0.00	0.12	0.00	0.13	0.00	0.13
48	0.00	0.03	0.00	0.03	0.00	0.09	0.00	0.09	0.00	0.10	0.00	0.10	0.00	0.06	0.00	0.06
50	0.00	0.01	0.00	0.01	0.00	0.02	0.00	0.02	0.00	0.04	0.00	0.04	0.00	0.07	0.00	0.07
52	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	0.01	0.00	0.01	0.00	0.03	0.00	0.03
54	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
56	0.00	0.01	0.00	0.01	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	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60	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
Total	0.56	1.75	0.14	2.44	1.19	2.04	0.02	3.25	0.74	1.66	0.03	2.43	1.23	2.20	0.20	3.64
Nº samples:				31				38				36				37
Nº Ind.:	56	178	12	246	117	202	2	321	73	161	3	237	123	223	19	365
Sampled catch:				78				97				83				123
Range:				7-56				9-58				9-52				6-54
Total catch:				78				97				83				123
Total valid hauls:				98				100				99				97

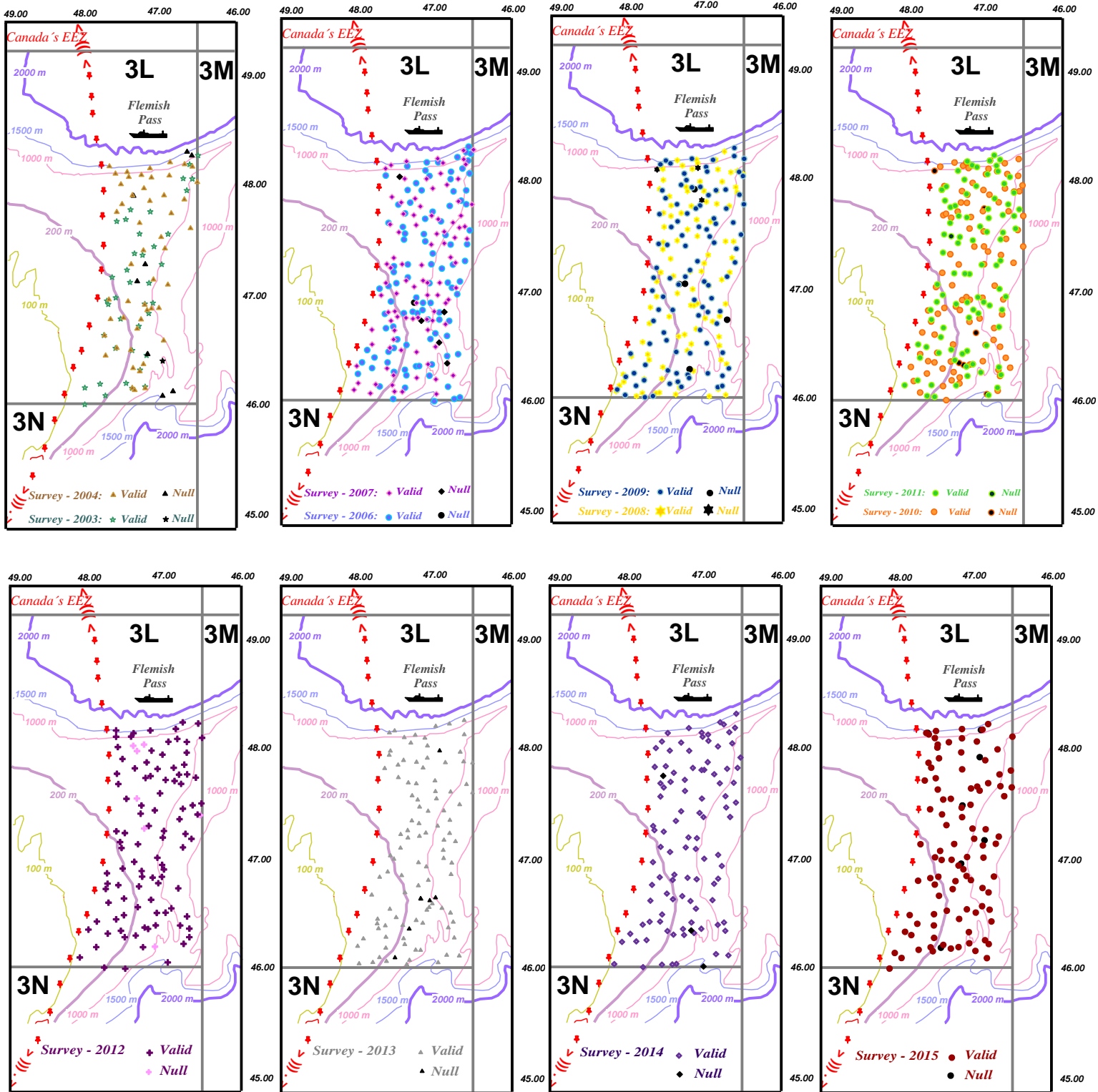


Fig. 1. Haul positions of the Spanish surveys in NAFO Division 3L in the period 2003 - 2015 (R/V "Vizconde de Eza").

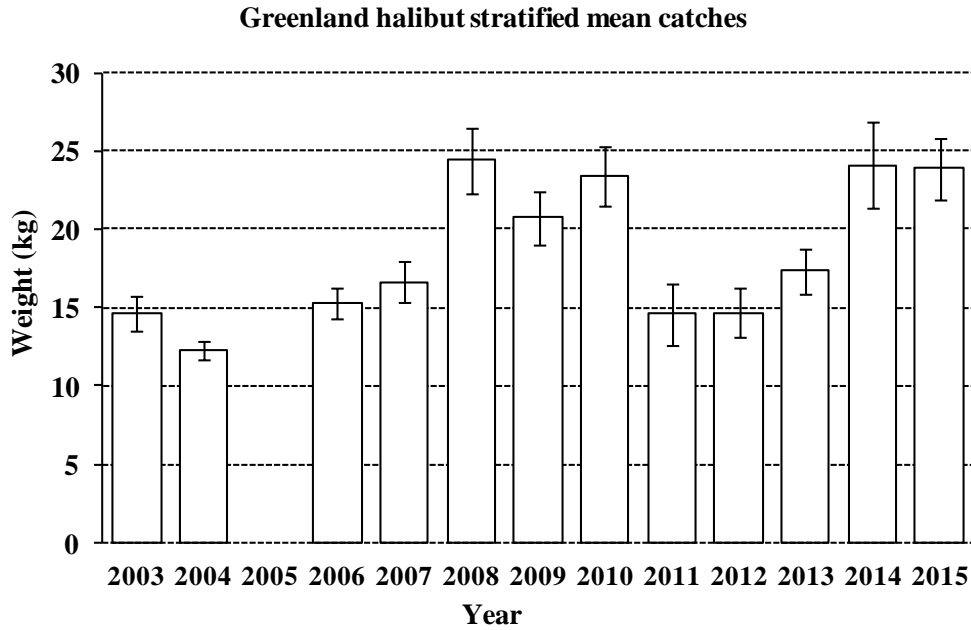


Fig. 2. **Greenland halibut** stratified mean catches in Kg and \pm SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2015 (R/V "Vizconde de Eza"). In 2003, the data correspond to 69% of the total area prospected in 2006-2015.

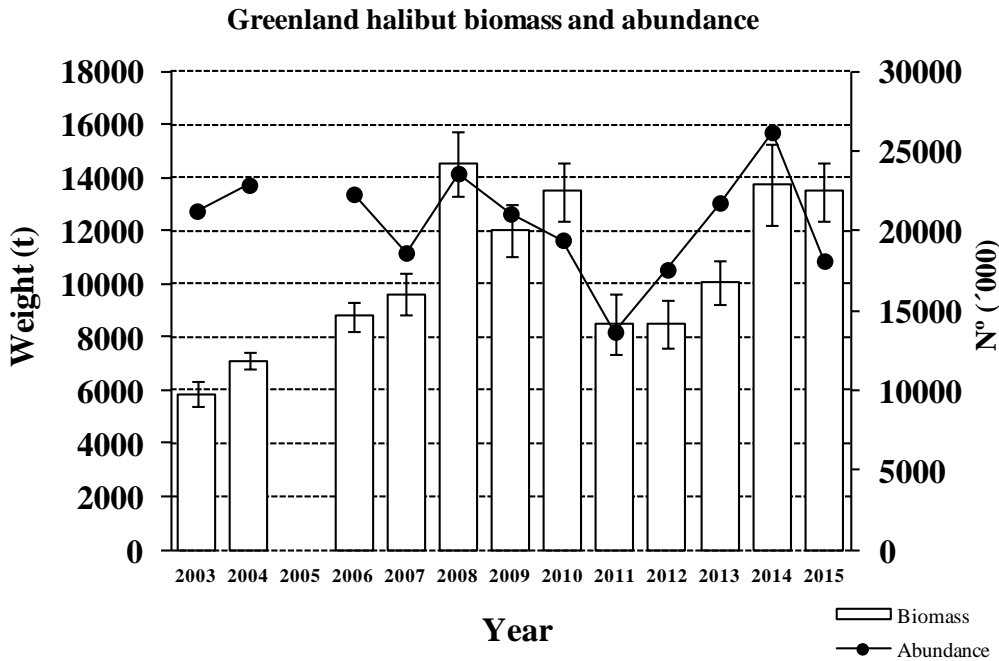


Fig. 3. **Greenland halibut** abundance ('000), biomass in tonnes and \pm SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2015 (R/V "Vizconde de Eza"). In 2003, the data correspond to 69% of the total area prospected in 2006-2015.

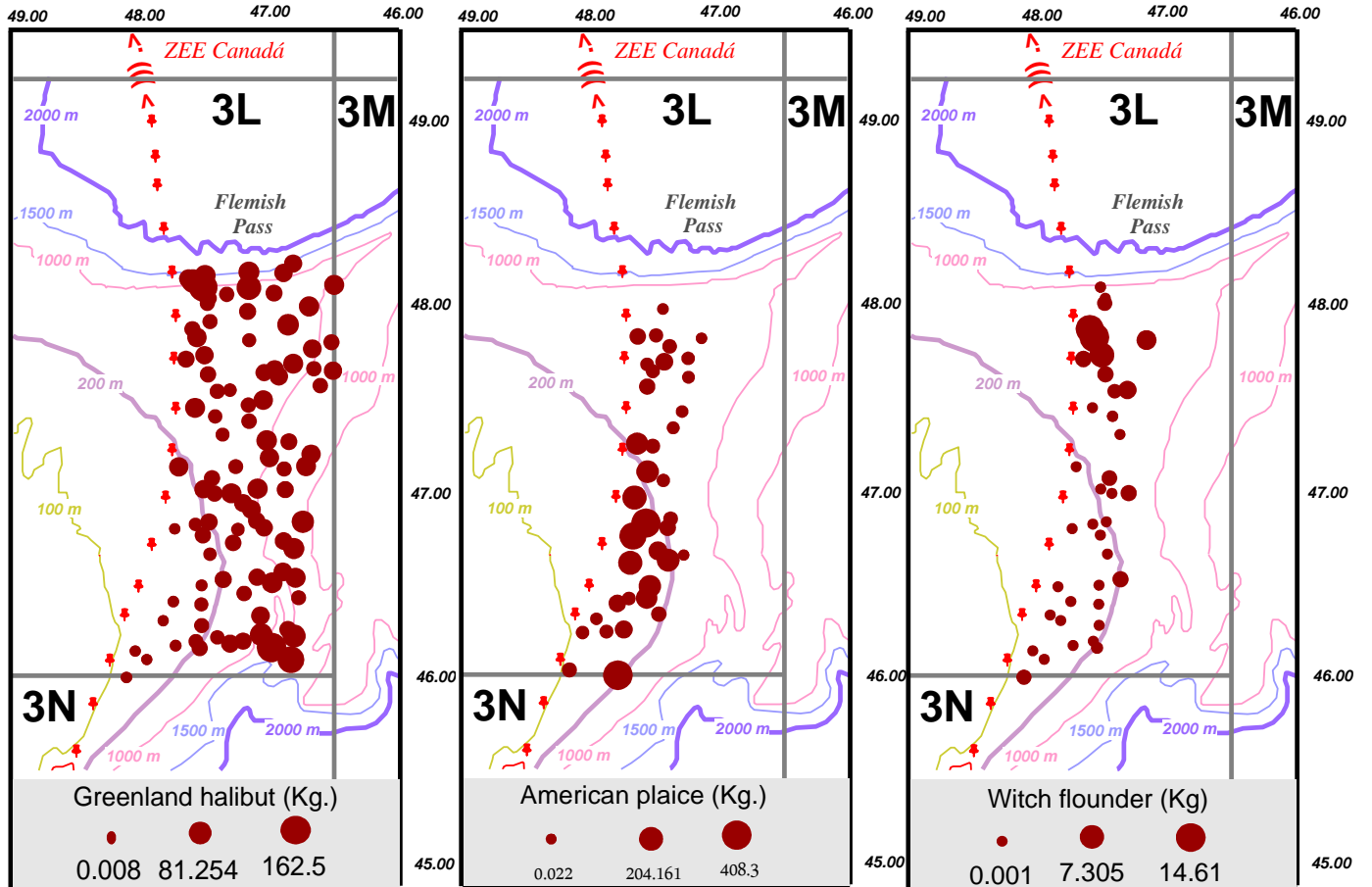


Fig. 4. Distribution of the catches per haul for **Greenland halibut**, **American plaice** and **witch flounder** in 2015 Spanish 3L survey.

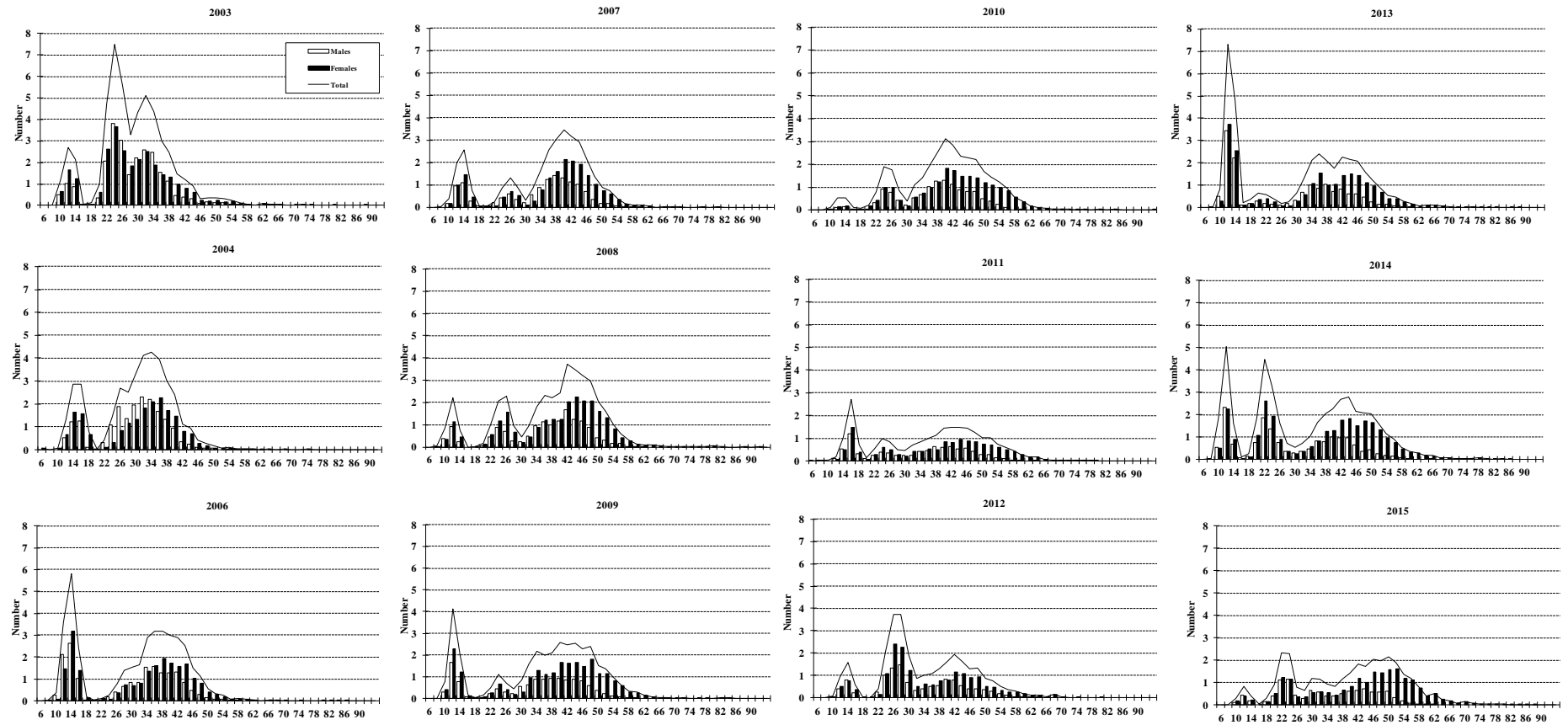


Fig. 5. **Greenland halibut** length distribution (cm) in NAFO 3L: 2003-2015. Number per stratified mean catches. In 2003, the data correspond to 69% of the total area prospected in 2006-2015.

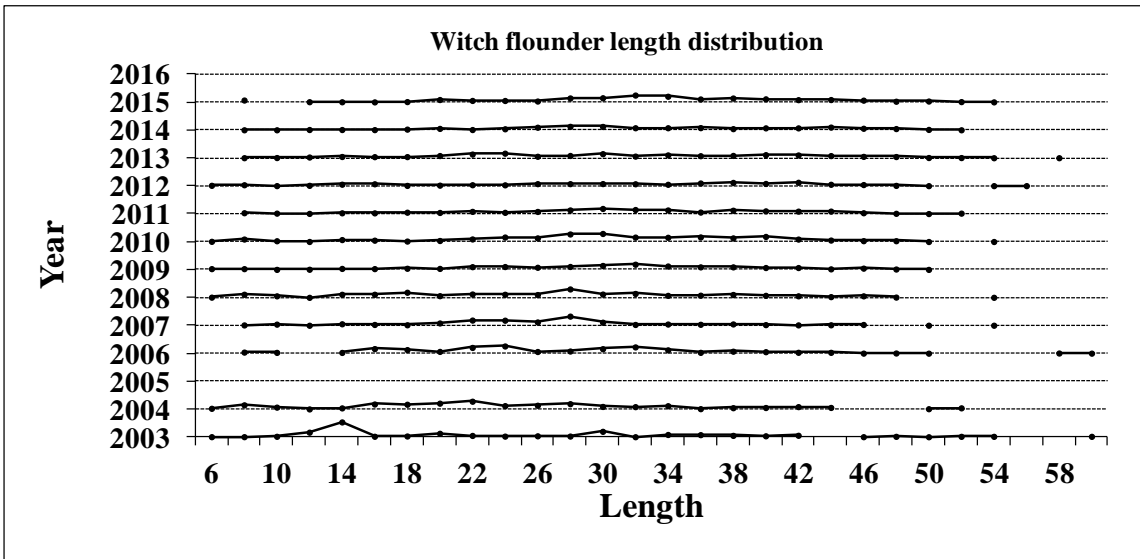
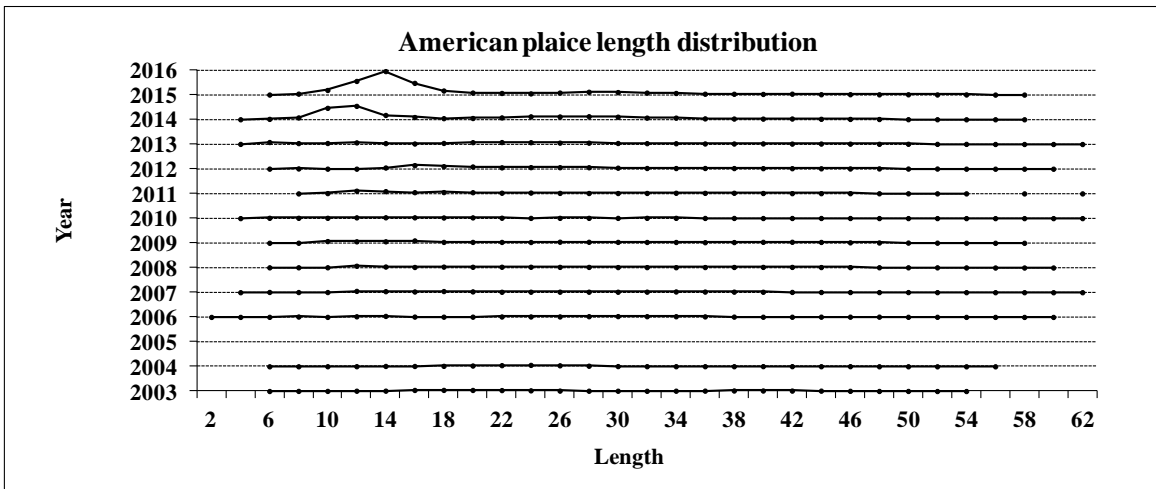
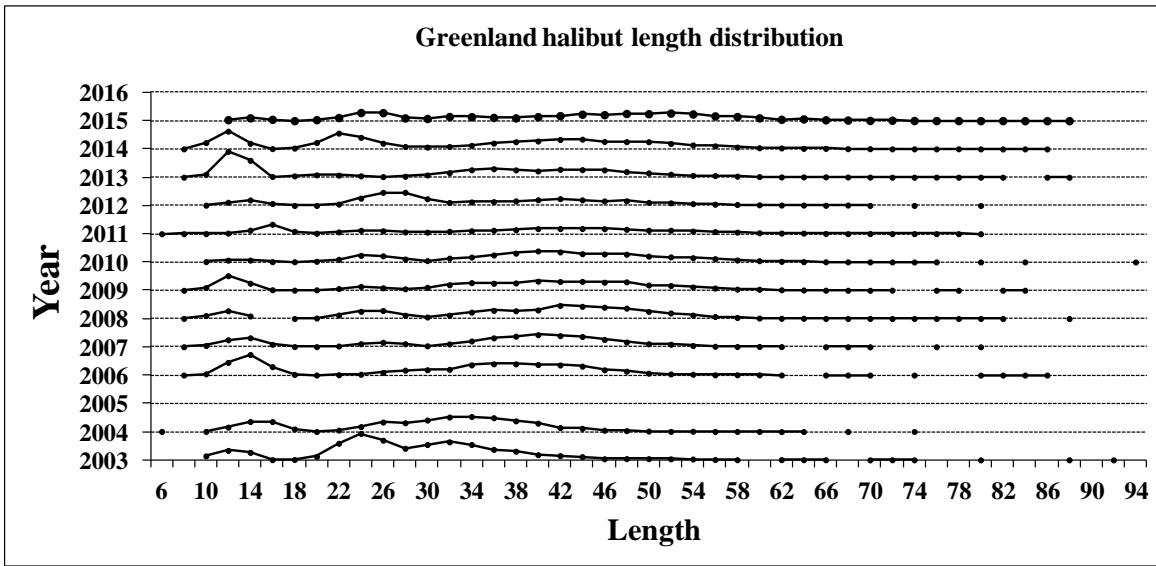


Fig. 6. **Greenland halibut, American plaice and witch flounder** length distribution (cm) in NAFO 3L: 2003-2015.

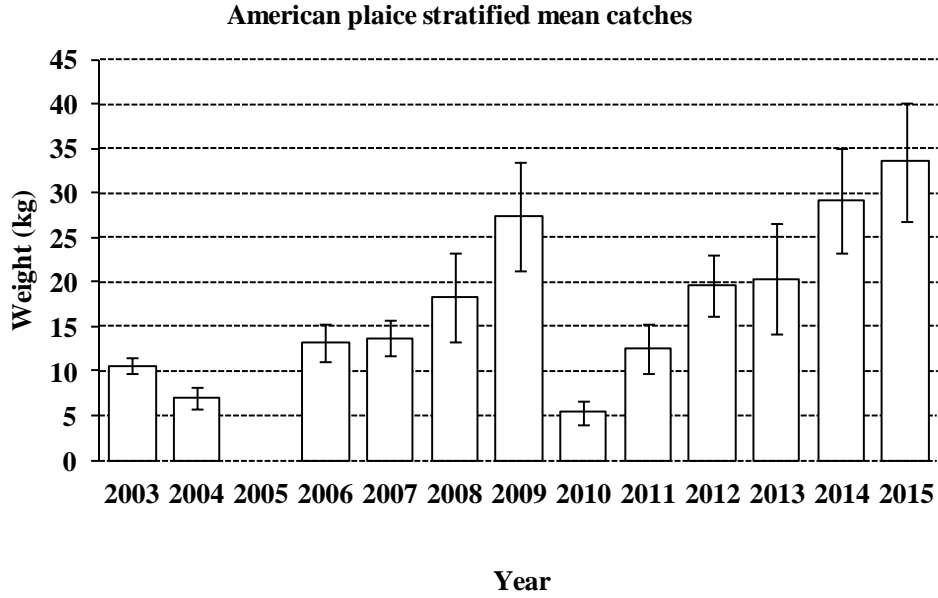


Fig. 7. **American plaice** stratified mean catches in Kg and \pm SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2015 (R/V "Vizconde de Eza"). In 2003, the data correspond to 69% of the total area prospected in 2006-2015.

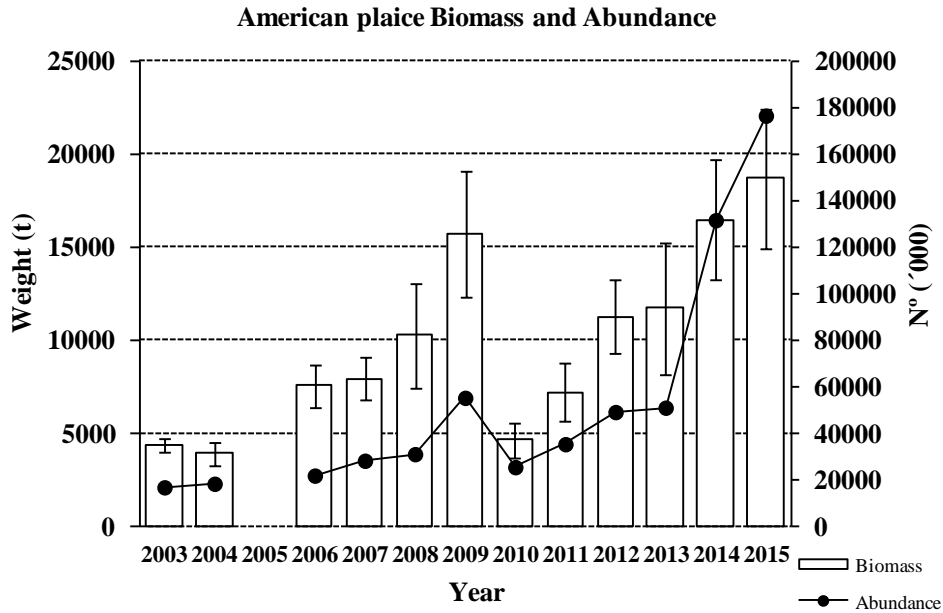


Fig. 8. **American plaice** abundance ('000), biomass in tonnes and \pm SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2015 (R/V "Vizconde de Eza"). In 2003, the data correspond to 69% of the total area prospected in 2006-2015.

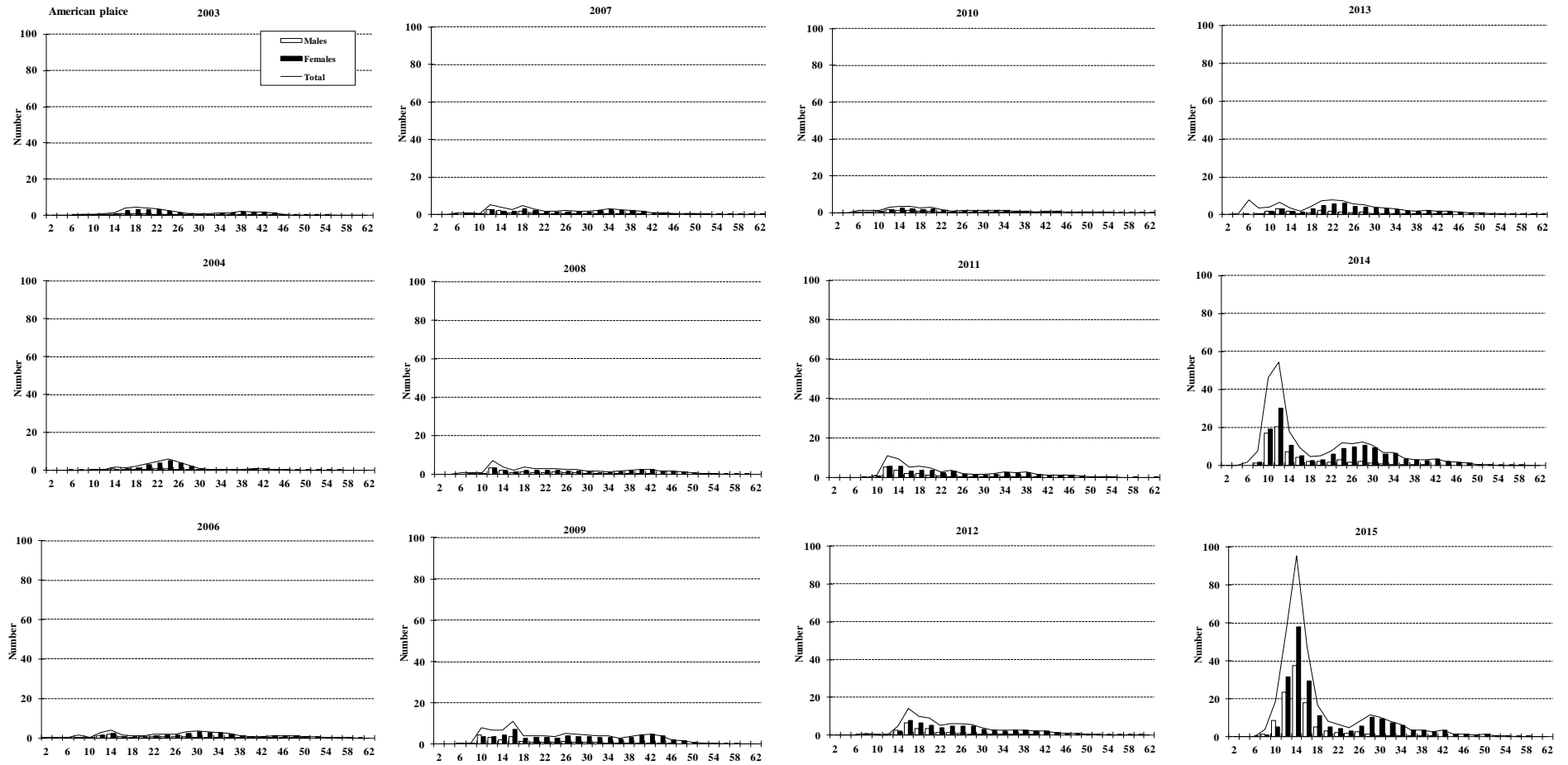


Fig. 9. **American plaice** length distribution (cm) in NAFO 3L: 2003-2015. Number per stratified mean catches. In 2003, the data correspond to 69% of the total area prospected in 2006-2015.

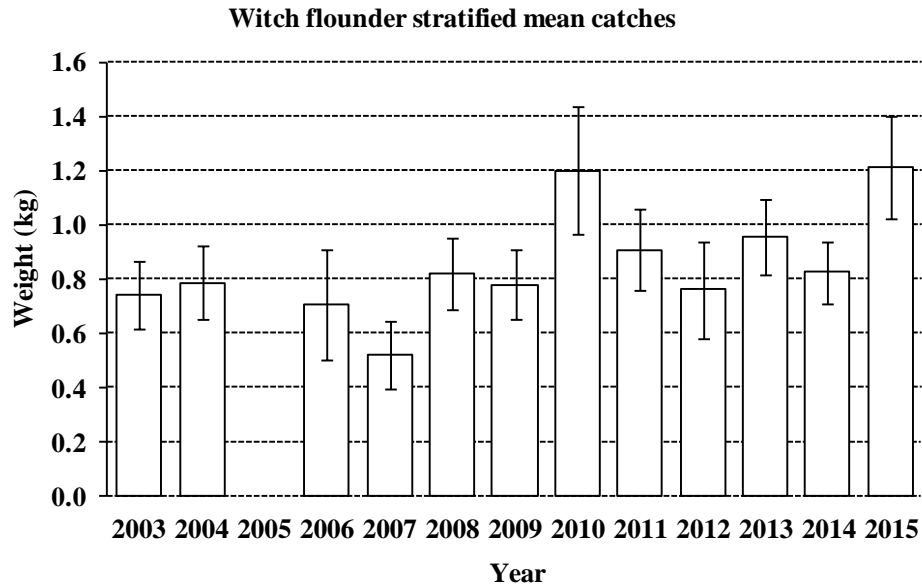


Fig. 10. **Witch flounder** stratified mean catches in Kg and \pm SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2015 (R/V "Vizconde de Eza"). In 2003, the data correspond to 69% of the total area prospected in 2006-2015.

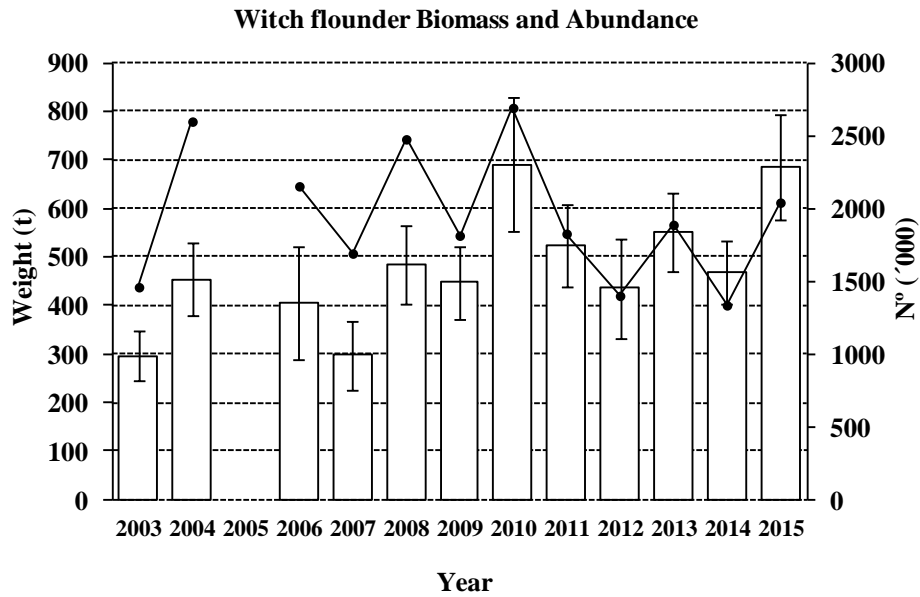


Fig.11. **Witch flounder** abundance ('000), biomass in tonnes and \pm SD by year. Spanish surveys in NAFO Division 3L: 2003 - 2015 (R/V "Vizconde de Eza"). In 2003, the data correspond to 69% of the total area prospected in 2006-2015.

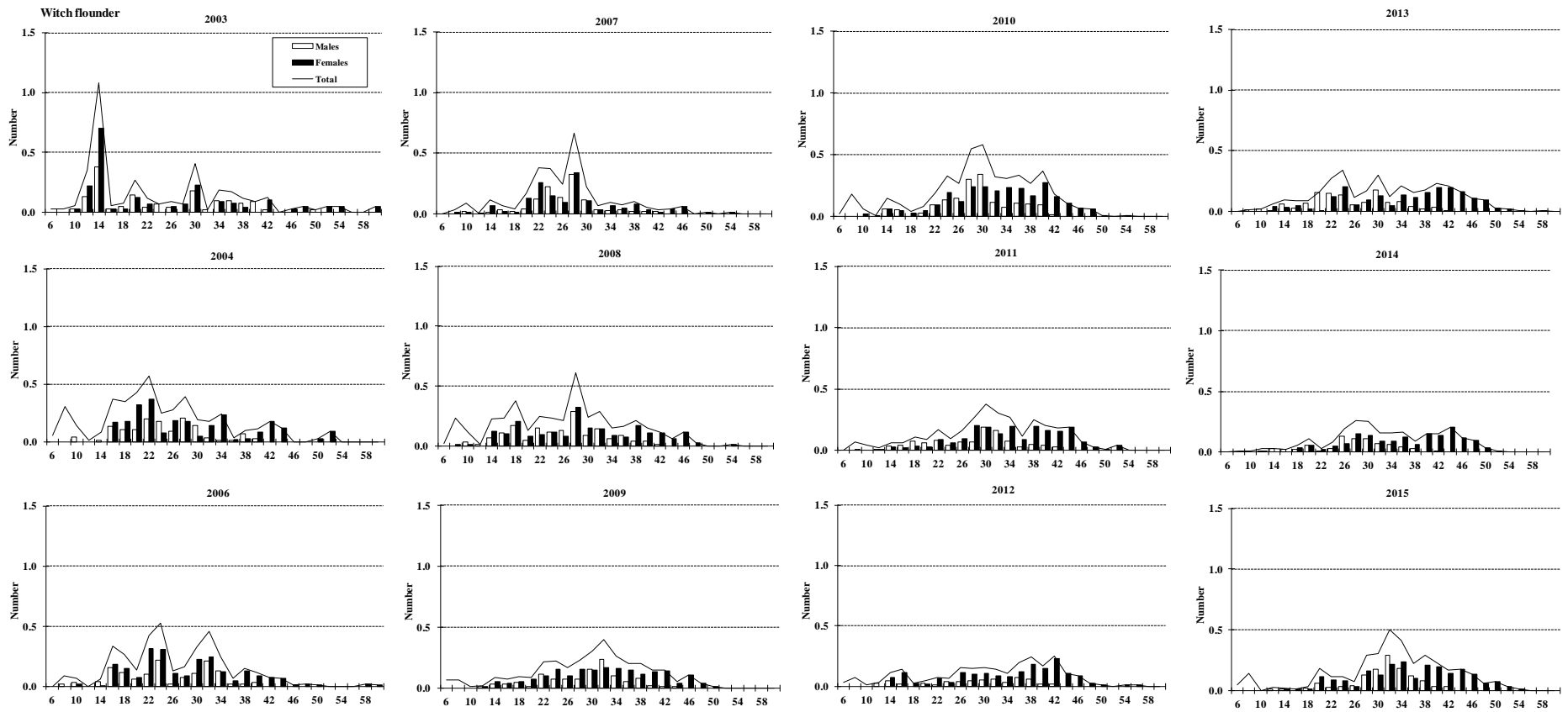


Fig. 12 Witch flounder length distribution (cm) in NAFO 3L: 2006-2015. Number per stratified mean catches.