

# SPANISH BOTTOM TRAWL SURVEY “FLETÁN ÁRTICO 2004” IN THE SLOPE OF SVALBARD AREA, ICES DIVISION IIb.

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The “Fletán Ártico 2004” survey was the eighth survey of the series of Spanish survey intended to obtain biomass and abundance indices and to determine the structure of the population's adult fraction of Greenland halibut (*Reinhardtius hippoglossoides*) and other species (redfish, cod,...) in the Svalbard Archipelago protection area, ICES Division IIb. The purposes and characteristic of the Survey they went identical to those of the last years.

The Survey was conducted by the same hired factory trawler at 500-1464 meters covering an area in the Protection Svalbard, between 73° 30 – 80° N (Table 1 , Figure 1).

The objectives of the survey were:

1. To define the distribution and relative abundance of commercially important groundfish species, in particular of: Greenland halibut (*Reinhardtius hippoglossoides*), redfish (*Sebastes mentella*), cod (*Gadus morhua*), long rough dab (*Hippoglossoides platessoides*) and roughead grenadier (*Macrourus berglax*) inhabiting depths from 500 m to 1464 m.
2. To obtain biological data from groundfish species including length, weight and sex.
3. To collect age structures from Greenland halibut, cod and long rough dab.
4. To collect special project samples or information.

## **Charter Vessel and Gear Specifications**

The characteristics of the vessel are described in the Table 1. An experienced captain, a crewmembers staffed and six scientist participated in the survey.

The vessel used a type of gear "Pedreira" (Table 2 an Figures 2, 3 and 4) with two panel bottom trawl with a small-mesh (40 mm stretched measure or less) liner in the codend in order to retain small organisms. The "Pedreira" trawls were fitted with 18" rubber discs footropes and spread with steel "TIBURON 125" doors (weight doors: 2000 Kg/u). A Scanmar trawl instrumentation system was employed to monitor trawl performance and ensure that the gear's haul-to-haul catching performance (sampling efficiency) was kept as constant as possible.

## **Survey Design and Methods**

As in previous years, the Survey was developed in a depth range of between 500 and 1464 meters on the west slope of the Svalbard archipelago, covering an area between 73° 30 – 80° N (Figure 1). The Survey took place from 2<sup>th</sup> to 27<sup>th</sup> October, with 24 effective fishing days using the same gear as the previous year to carry out 149 valid hauls. The position of the hauls can be seen in the Figure 5.

The Table 3 shows the surface area for each stratum surveyed, the latitude and depth range limits, as well as the number of valid hauls made in each.

The West slope survey was designed primarily to assess the distribution and abundance of Greenland halibut. The duration of each haul was 30 minutes long from the time the net was properly configured on the bottom until haul back. Captain was instructed to attempt to maintain a constant speed  $3,05 \pm 0.28$  knots. Bottom contact sensors, placed on the footrope of the net, verified that the trawl was on the bottom and monitored the duration of the tow. Acoustic instruments attached to the net recorded various aspects of their mechanical performance while other data on operational conditions (e.g. depth, amount of towing cable deployed, towing speed, tow duration,) were recorded.

Catches were sorted to species or other appropriate taxon and weighed. In the Figures 6 and 7 can see the distribution of the catches of the Greenland halibut and cod in the Spanish bottom trawl survey. Samples were taken of the principal species for length-frequency determinations or acquisition of other biological data, using an electronic measuring board to log data. Also, in this survey, ovarian samples and feeding data were taken of the Greenland halibut for their study in the laboratory.

## **Results**

The mean of hauls per day was 6.2 at mean speed values of 3.05 knots at mean depth of 761 m.. The catches of the main species are shows in the Table 4.

Biological information was gathered from 9 different fish species. In the Table 5 and 6 is shown a summary of biological data of the main species carried out during the survey, the length samples from 6 different fish species and age structures collected.

The length composition by sex of Greenland halibut is shown in the Table 7 and figure 8. As previous years the presence of males was higher than the females.

Total catch and the corresponding total yield for the 149 valid hauls of the principal species as well as their biomass and abundance estimate according to the method used in the area covered are shown in the Table 8. The presence of different species other than Greenland halibut in the catches was very limited, accounting for 3.1 % of the total. Only the Blue whiting catches attained 1107.6 kg, almost half of the catch of the previous year, followed by the cod 1029.1 kg and redfish with 976.6 kg (Table 8). The catches show a increasing for Greenland halibut and some of the other species.

The abundance and biomass estimates by strata for Greenland halibut can see in the Table 9 and figure 10. The biomass value estimated for this specie was very high compared with the others species presents in the area.

The densest concentrations of Greenland halibut were detected between 500 and 700 meters and a relative decreasing in the stratum 2 higher concentration was noted

from 75° 30'N to 76° 30'N. In deeper strata (3 and 6 see figure 1) the catches were very scarce: 36.5 Kg/h in the stratum 5 and 59.4 Kg/h in the stratum 6 (figure 6).

In this period the sex ratio for Greenland halibut indicates a very high proportion of males throughout the zone, 2,7 times more abundant than the females, identical value than last year. Sampling length and weight data collected during this survey were used to produce relationship and length-weight plots for Greenland halibut (Figure 9). The parameter values were obtained by sex.

The population's structure was very similar to that of previous years. The length range for both sexes was from 25 to 95 (Table 5), in the last year range values were: 24 to 98 cm even though the length of most of the individuals was between 43 and 53 cm. But with a relative decreasing. The most abundant ages by sex were: 6 years old for the males and 5 and 10 years old for the females<sup>1</sup>. The individuals below 35 cm were very scarce (4.55%), also the presence of males larger than 62 cm (0.3%) and females larger than 76 cm was very low (0.62%). This indicates a relatively low level of spawning biomass and the absence of recruits is probably due to the depth range surveyed.

The catches of Greenland halibut (as much in number as in weight) as well as the abundance and biomass estimated were above to those last year (Table 10 and figure 10). The situation seems confirms the light improvement of the resource observed in the last two years. This increasing could be due to the changes in the distribution of the species. The relatively high value of the fishing mortality in the period could be the reason of the low level of biomass.

January, 2005

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<sup>1</sup> Applying the age-length key of the previous year.

**Table 1.-** Characteristics of the vessel, date and hauls performed in the Spanish bottom trawl survey in ICES IIb (2004).

<b>Vessel:</b>	Garoya Segundo (EHIM)
<b>Total length (m):</b>	68.2 m
<b>Breadth:</b>	13 m
<b>Building year:</b>	1989
<b>Principal engine:</b>	Echavarria WARTD 6R32E, 1950 CV
<b>Maximun speed:</b>	13 Knots
<b>Hold capacity:</b>	800 Tm
<b>Freezing capacity:</b>	25 Tm/day
<b>Gear:</b>	<i>Pedreira</i>
<b>Date:</b>	1 <sup>th</sup> to 28 <sup>th</sup> October
<b>Valid hauls:</b>	149
<b>Void hauls:</b>	4

**Table 2.-** Description of the gear “*Pedreira*”, used in the Spanish bottom trawl survey in ICES IIb (2004).

Bottom trawl “ <i>Pedreira</i> ” type	
<u>Float rope:</u>	43.50 m
<u>Ground rope:</u>	34.50 m
Vertical opening of trawl:	3 m
NET:	Bag of coral (23 m) with 140 mm mesh size Codend of nylon with 40 mm mesh size
GROUND GEAR:	Central section (6.33 m): with rubber discs of 18” Lateral sections (7.0 m): with rubber half spheres of 18” and stried spacers Lateral extensions (6.0 m): with rubber spacers
DOORS:	Type of doors: TIBURON 125 Weight of doors: 2000 kg/u
FLOATS:	Number of floats: 56 Float diameter: 250 mm
LEGS:	12 m
BRIDLES:	Length of bridles: 175 m (28 mm)

**Table 3.-** Stratum characteristics and hauls performed. Spanish bottom trawl survey, *Fletán Ártico 2004*. Svalbard Area. ICES Division II b

<b>Strata</b>	<b>Latitude</b>	<b>Depth (m)</b>	<b>Surface</b> (Square nautical miles)	<b>Valid hauls</b>
1	76°00' - 81°00' N	500-699	702	37
2	76°00' - 81°00' N	700-999	1263	21
3	76°00' - 81°00' N	1000-1500	2693	10
4	73°30' - 76°00' N	500-699	488	42
5	73°30' - 76°00' N	700-999	761	29
6	73°30' - 76°00' N	1000-1500	1672	12
<b>Total</b>	<b>73°30'a 81°00' N</b>	<b>500-1500</b>	<b>7579</b>	<b>149</b>

**Table 4.-** Catches (kg) of the main species. Spanish Survey "*Fletán Ártico 2004*". Svalbard Area. ICES Division II b.

<b>SPECIE</b> Common name	<b>Scientific name</b>	<b>Total Catch (kg)</b>
Greenland halibut	<i>Reinhardtius hippoglossoides</i>	153859
Blue Whiting	<i>Micromesistius poutasou</i>	1107.6
Cod	<i>Gadus morhua</i>	1029.1
Northern wolffish	<i>Anarhichas denticulatus</i>	565.9
Redfish	<i>Sebastes mentella</i>	976.6
Arctic Skate	<i>Amblyraja hyperborea</i>	542.3
Long rough dab	<i>Hippoglossoides platessoides</i>	79.1
Greater eelpout	<i>Lycodes esmarkii</i>	142.7
Routhead grenadier	<i>Macrourus berglax</i>	217.8
Thorny skate	<i>Amblyraja radiata</i>	98.2

**Table 5.-** Summary of length samples of the main species during Spanish Survey (2004).

Specie	Length Samples				
	N° samples	Males	Females	Total	Range (cm)
Greenland halibut ( <i>Reinhardtius hippoglossoides</i> )	149	23418	11499	34917	25-98
Cod ( <i>Gadus morhua</i> )	61		307	307	10-130
Redfish ( <i>Sebastes mentella</i> )	109	950	770	1720	19-43
Long rough dab ( <i>Hippoglossoides platessoides</i> )	71	219	108	327	11-44
Blue Whiting ( <i>Micromesistius poutassou</i> )	63	920	3541	4461	18-40
Arctic hyperborea ( <i>Amblyraja hyperborea</i> )	72	203	112	315	11-88
Spinytail skate ( <i>Bathyraja spinicauda</i> )	15	11	7	18	26-58
Roughead grenadier ( <i>Macrourus berglax</i> )	76	122	172	294	4.5-35
Northern wolffish ( <i>Anarhichas denticulatus</i> )	32		46	46	57-123
<b>TOTAL:</b>	<b>648</b>	<b>25843</b>	<b>16209</b>	<b>42405</b>	

**Table 6.-** Summary of biological samples and age structures of the main species during Spanish Survey (2004).

Specie	Biological Samples				
	N° samples	Males	Females	TOTAL	Range (cm)
Greenland halibut ( <i>Reinhardtius hippoglossoides</i> )	135	832	1325	2157	4-102
Otoliths		139	316	455	
Gonads				239	
Stomachs				1460	10-99
Cod ( <i>Gadus morhua</i> )	62	155	138	293	10-130
Otoliths:		79	96	175	
Stomachs				304	10-130
Redfish ( <i>Sebastes mentella</i> )	77	140	106	246	21.42
Stomachs					
Long rough dab ( <i>Hippoglossoides platessoides</i> )	70	216	112	328	14-44
Otoliths		49	64	113	
Gonads				57	
Stomachs				170	11-42
Roughead grenadier ( <i>Macrourus berglax</i> )	73	112	171	283	4.5-35
Stomachs					
Blue Whiting ( <i>Micromesistius poutassou</i> )	6	62	91	153	19-39
Arctic Skate ( <i>Amblyraja hyperborea</i> )	72	205	113	318	11-88
Thorny Skate ( <i>Amblyraja radiata</i> )	60	47	91	138	10-55
Spinytail Skate ( <i>Bathyraja spinicauda</i> )	14	11	6	17	26-52

**Table 7.-** Length composition by sex of Greenland halibut (*Reinhardtius hippoglossoides*) in the Spanish bottom trawl survey "Fletán Ártico 2004".

Length (cm)	Males	Females	TOTAL	Length (cm)	Males	Females	TOTAL
25	3	1	4	63	112	1265	1377
26	1	2	3	64	56	1371	1427
27	5	0	5	65	7	1009	1016
28	7	11	18	66	7	1091	1098
29	11	7	18	67	10	1049	1059
30	47	38	85	68	7	877	884
31	135	43	178	69	7	562	569
32	316	128	444	70	0	700	700
33	451	280	731	71	0	513	513
34	849	458	1307	72	13	436	449
35	1257	768	2025	73	0	249	249
36	1861	1187	3048	74	0	359	359
37	2455	1390	3845	75	0	134	134
38	2699	1571	4270	76	0	174	174
39	2910	1578	4488	77	0	100	100
40	3415	1591	5006	78	0	54	54
41	4039	1719	5758	79	0	105	105
42	4283	1515	5798	80	0	59	59
43	4633	1197	5830	81	0	102	102
44	5125	1004	6129	82	0	35	35
45	5827	867	6694	83	0	24	24
46	6135	767	6902	84	0	40	40
47	6048	726	6774	85	0	36	36
48	6588	692	7280	86	0	14	14
49	5531	735	6266	87	0	18	18
50	5264	580	5844	88	0	16	16
51	4588	544	5132	89	0	21	21
52	4151	802	4953	90	0	2	2
53	3496	697	4193	91	0	3	3
54	3053	814	3867	92	0	0	0
55	2836	695	3531	93	0	15	15
56	2191	906	3097	94	0	7	7
57	1499	1065	2564	95	0	14	14
58	1033	1108	2141	96	0	2	2
59	743	1095	1838	97	0	0	0
60	577	1145	1722	98	0	1	1
61	265	1171	1436				
62	190	1499	1689				
				<b>TOTAL</b>	<b>94736</b>	<b>40853</b>	<b>135589</b>



**Table 8.-** Total catch (kg), yield (kg/h), biomass and abundance for the main species. Spain bottom trawl survey "Fletán Ártico 2004".

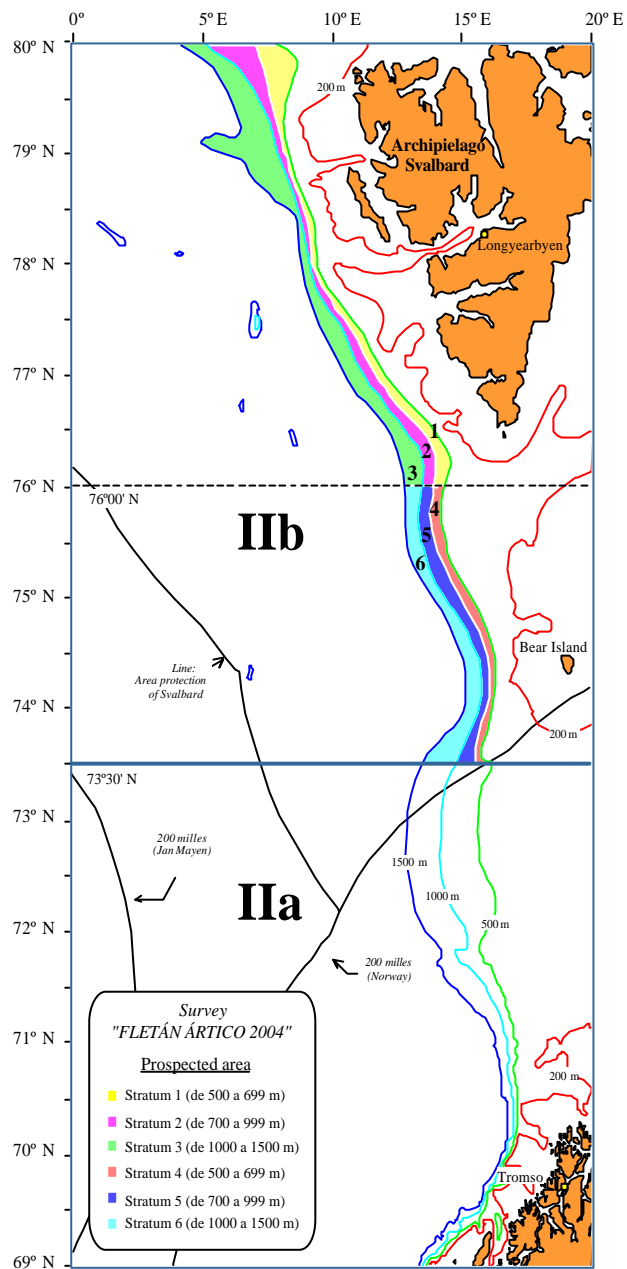
Common name	Scientific name	Catch (Kg)	Yield (kg/h)	Biomass (mt)	Abundance (000)
Greenland halibut	<i>Reinhardtius hippoglossoides</i>	135631	2065.2	320485	320485
Blue Whiting	<i>Micromesistius poutasou</i>	1107.6	14.9	1566.8	11346
Redfish	<i>Sebastes mentella</i>	976.6	13.1	1289.9	3092
Arctic skate	<i>Amblyraja hyperborea</i>	542.3	7.3	4504.1	3114
Cod	<i>Gadus morhua</i>	1029.1	13.8	1754	514
Northern wolffish	<i>Anarhichas denticulatus</i>	976.6	13.1	1289.9	3092
Long rough dab	<i>Hippoglossoides platessoides</i>	79.1	1.1	134.7	566
Routhead grenadier	<i>Macrourus berglax</i>	217.8	2.9	393	536

**Table 9.-** Greenland halibut (*Reinhardtius hippoglossoides*) abundance (number) and biomass (kg) estimates. Spain bottom trawl survey "Fletán Ártico 2004".

Strata	Area	N° hauls	Catch (N°)	Catch (Kg)	Steep Area	Abundance	Biomass
1	702	37	38438	39833.6	0.4103	65773	68161.4
2	1263	21	15335	17239.5	0.2381	81333	91436.9
3	2693	10	310	364.7	0.1129	7399	8700.9
4	488	42	47306	57326.6	0.4928	46850	56774.0
5	761	29	33801	38500.5	0.3375	76214	86811.5
6	1672	10	442	594.1	0.1155	6394	8600.3
TOTAL	7579	149	135631	153859	1.707	283965	320485.0

**Table 10.-** Greenland halibut catch in weight and numbers and Biomass and abundance estimated from Spanish survey 1997-2004.

Year	Catch (Kg)	Catch (núm)	Biomass <sup>TM</sup>	Abundance (*000)
1997	195055.5	211533	344013.5	379444
1998	180973.9	187259	351466.3	373149
1999	198780.7	172687	436955.9	377792
2000	169389.3	140355	340618.5	291265
2001	152681.4	129289	283510.6	249219
2002	144335	115213	256459.5	207466
2003	151952.2	132125	283644.1	256327
2004	153859	135631	320485	283965



**Figure 1.-** Spanish bottom trawl *FLETÁN ÁRTICO 2004*. Map of the area showing the six considered strata and its ranges of depth .

# Armado red

## Corcho 43,50 mts Burlon 58 mts

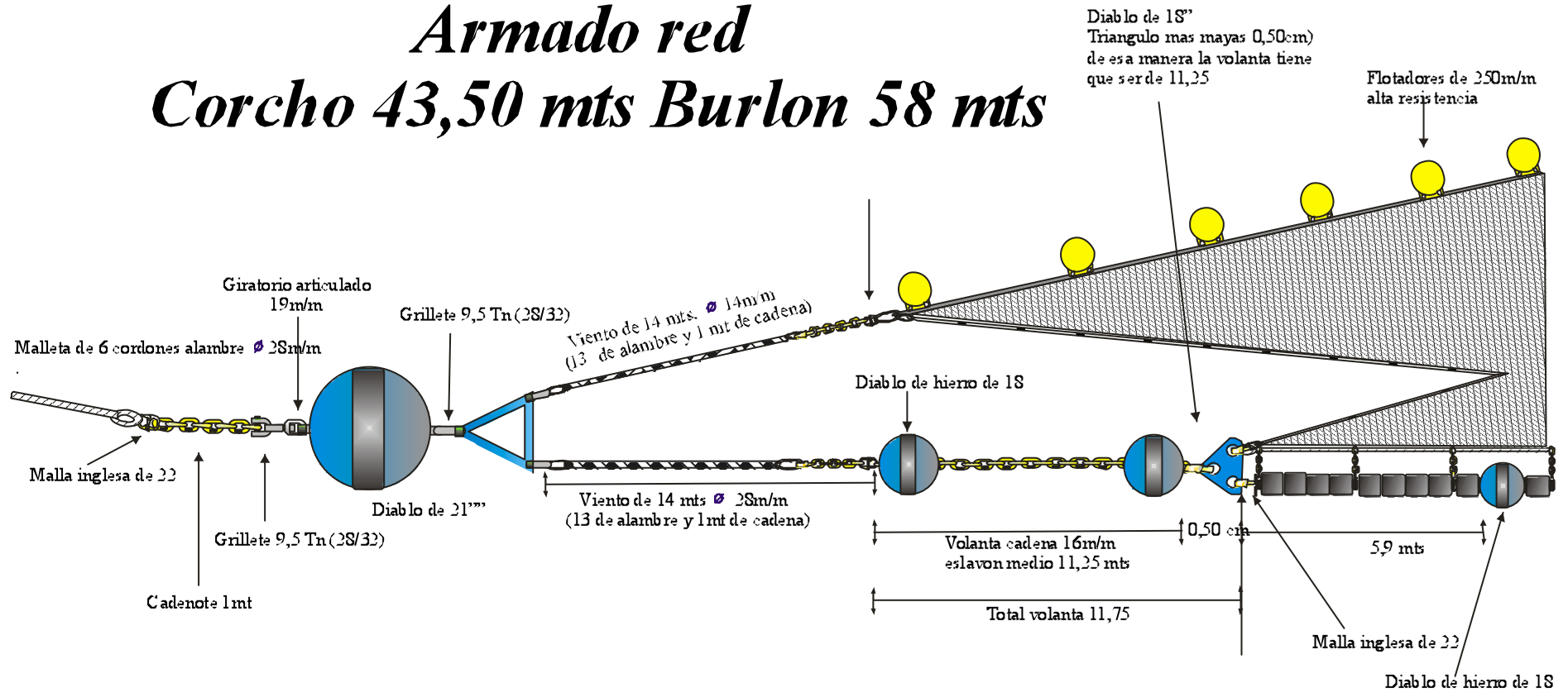
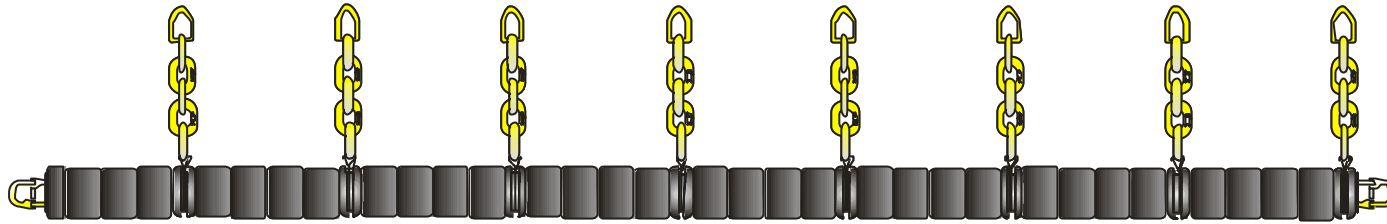
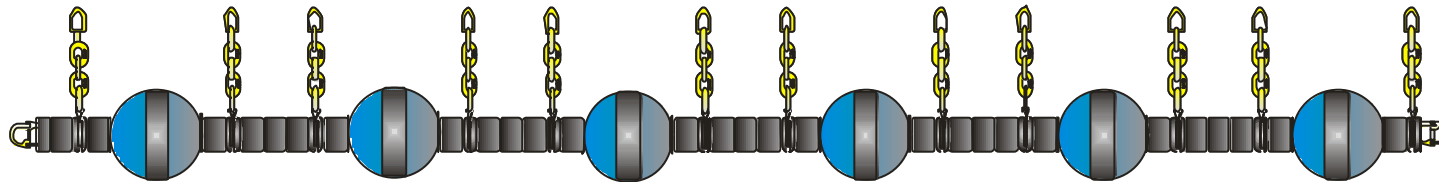


Figure 2.- Rigging profile of the Spanish "Pedreira" survey trawl.

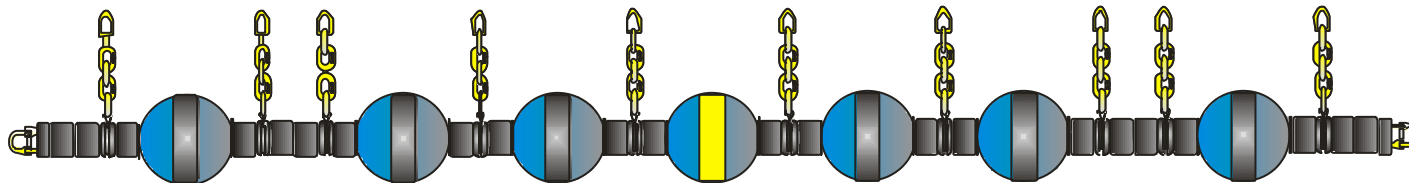
SECCIONES LATERALES GOMA DE 5,90 mts.



SECCIONES LATERALES 7,70 mts.

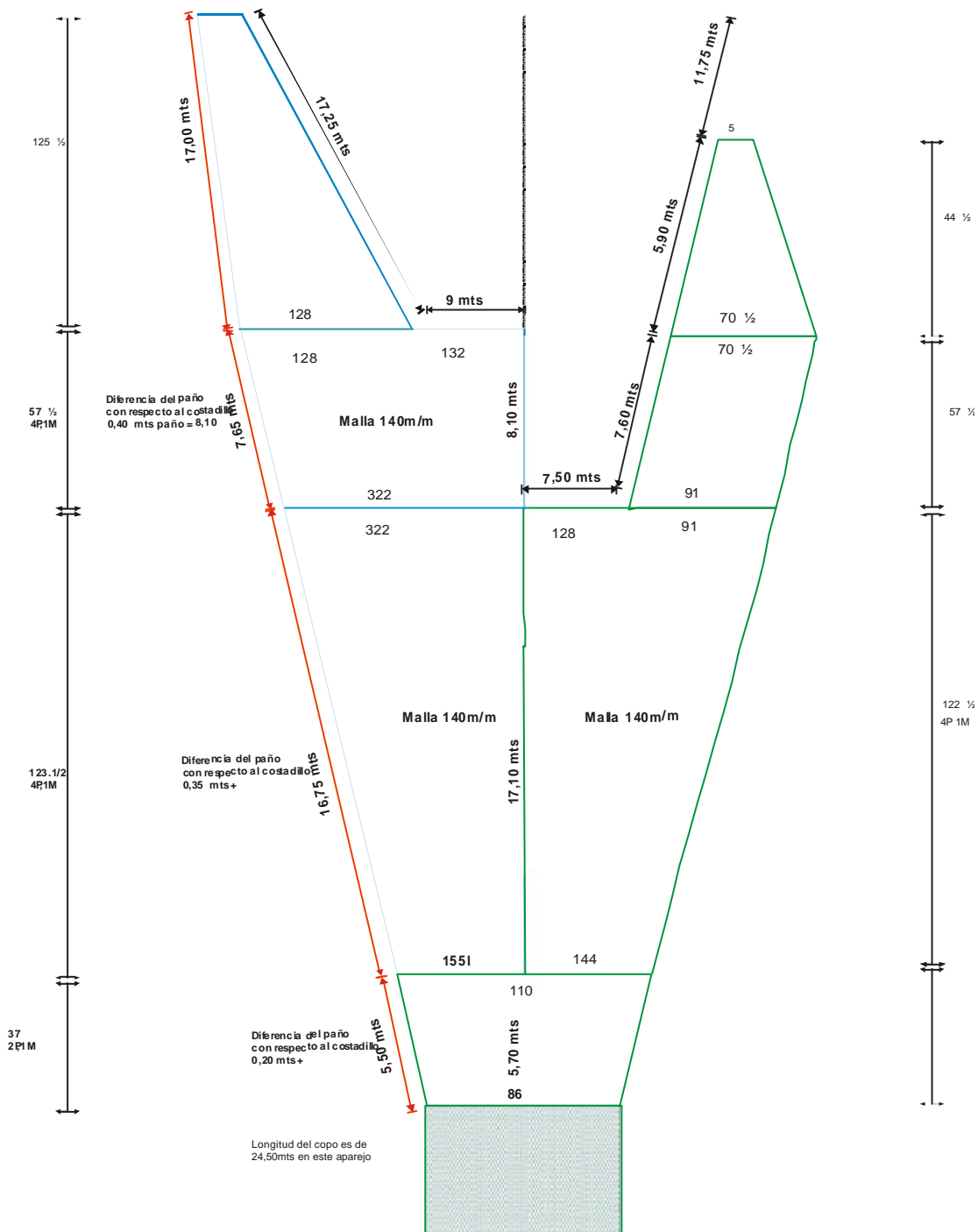


SECCION CENTRAL 7,50 mts.

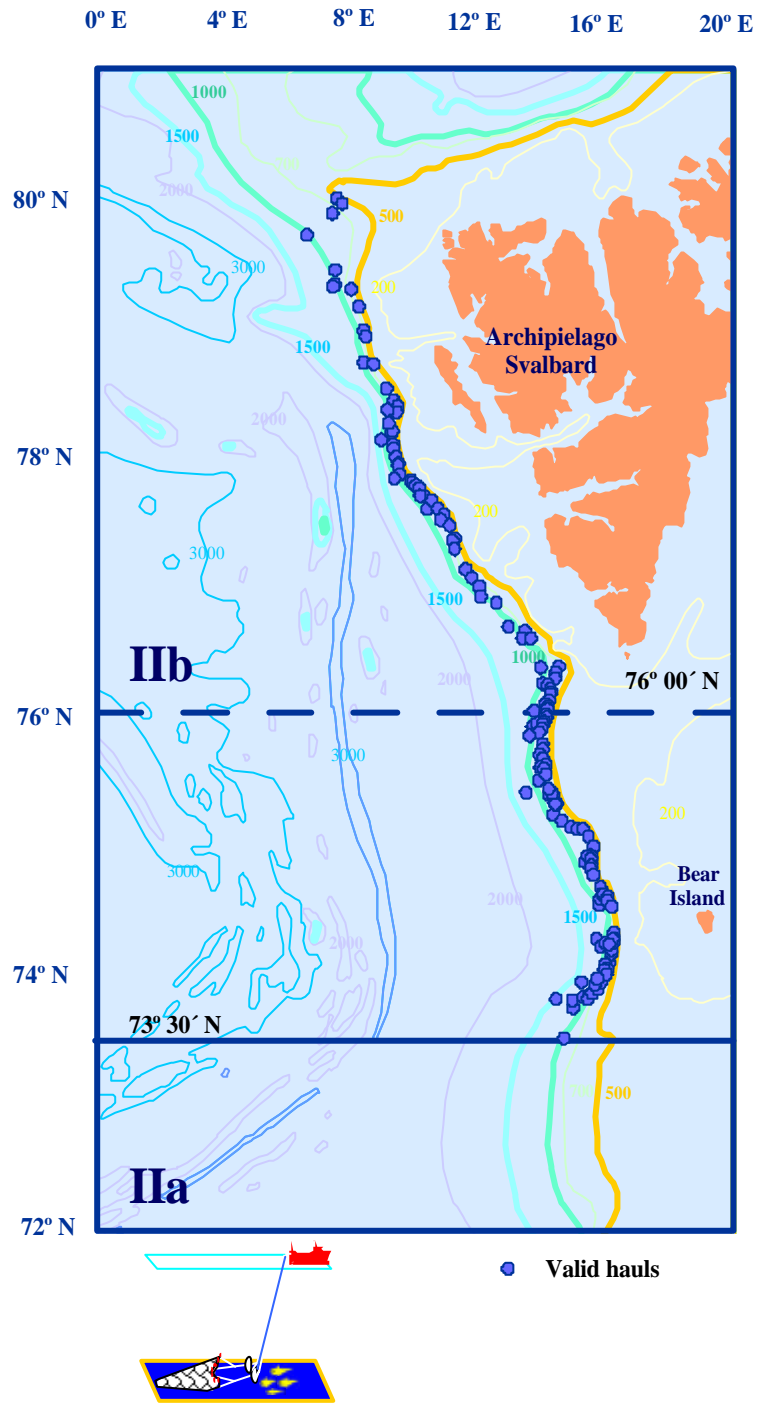


**Figure 3.-** Spanish “Pedreira” survey trawl. Detail of the groundrope.

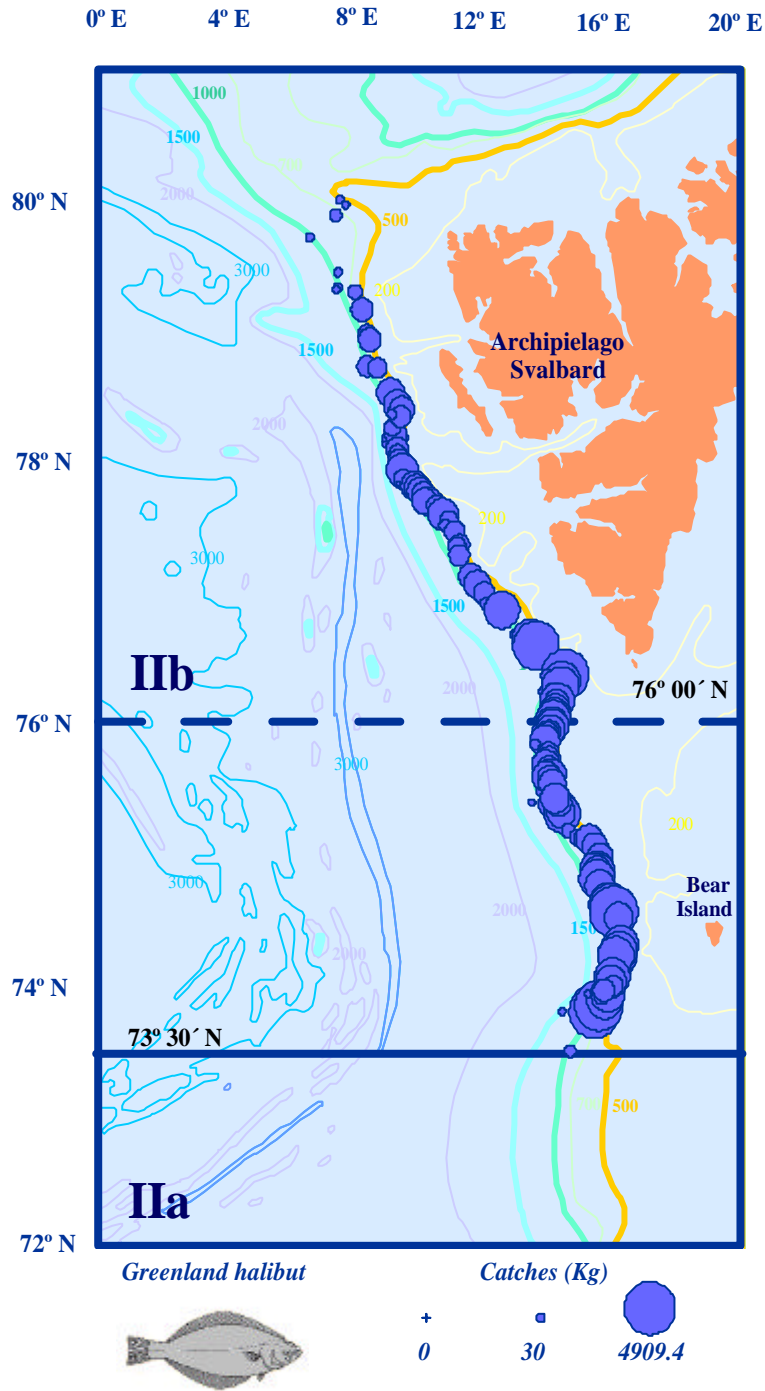
**Red Pedreira 58 mts Burlon, 43,50 mts Corcho  
Montada sobre burloncillo de 34,5 mts**



**Figure 4 .-** Schematic of net plan of the Spanish “Pedreira” survey trawl.



**Figure 5.-** Location of the valid hauls in the Spanish bottom trawl Survey in ICES División IIb (2004).



**Figura 6.-** Catches Distribution of Greenland halibut carried out Spanish annual research survey *Fletán Ártico 2004*. The symbols show the catches (kg) by haul (proportionally scale = square root).

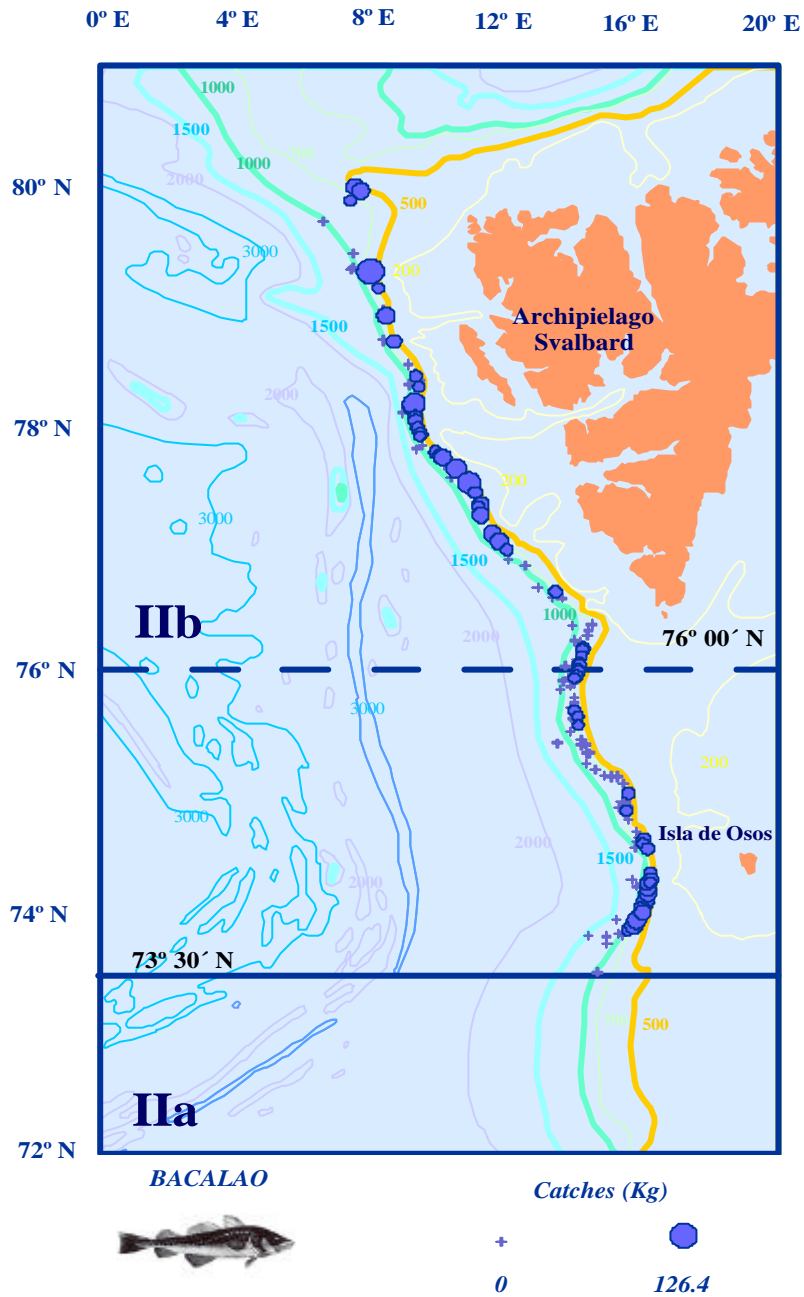
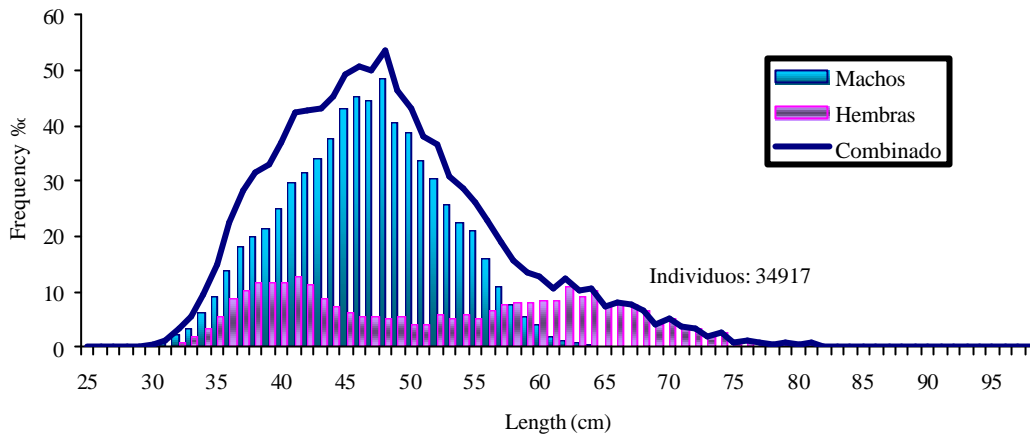


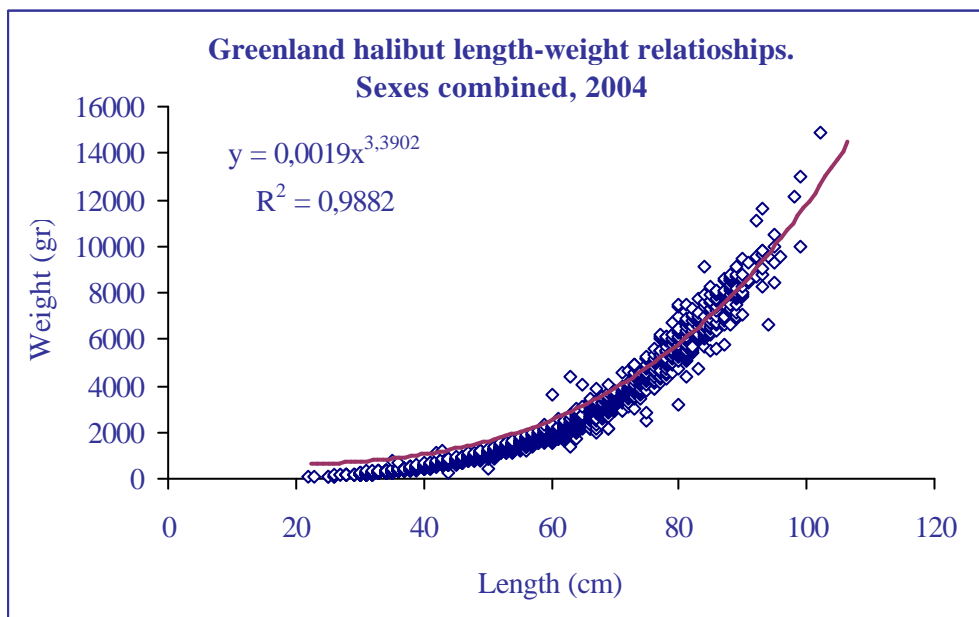
Figura 7.- Catches Distribution of Cod carried out Spanish annual research survey *Fletán Ártico 2004*. The symbols show the catches (kg) by haul (proportionally scale = square root).



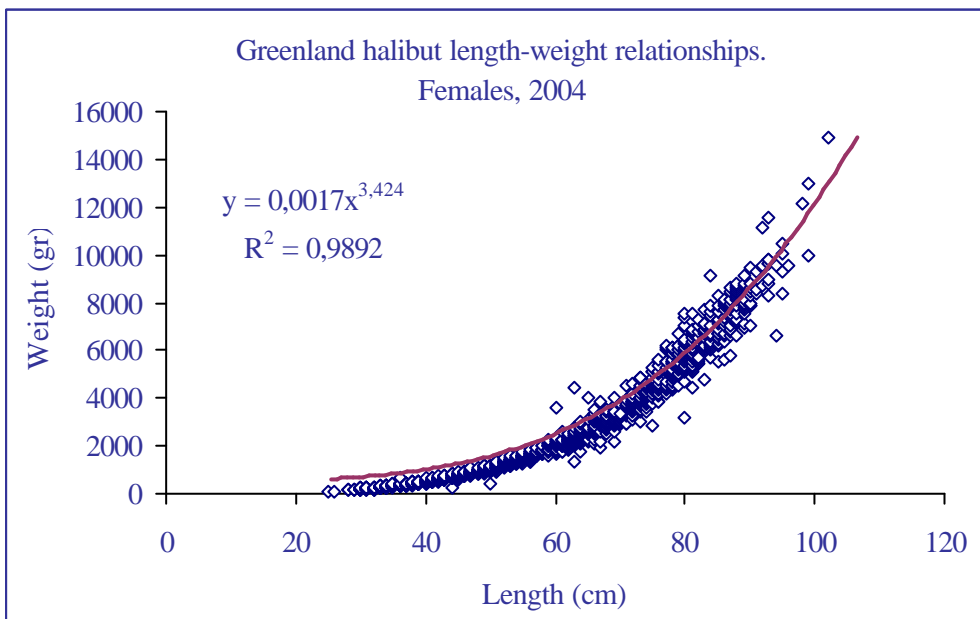
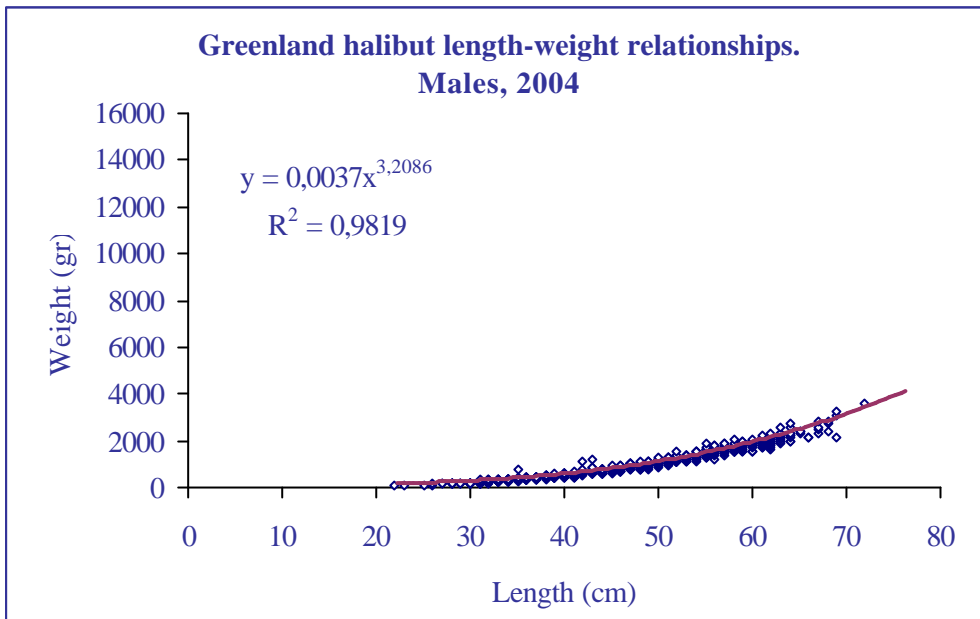
**Length distribución Greenland halibut.**



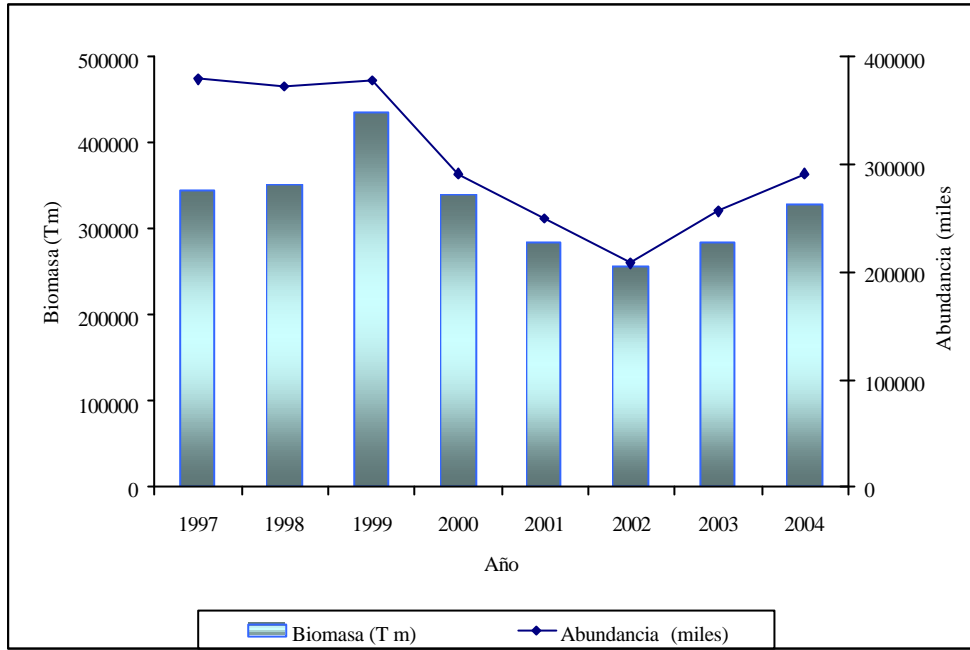
**Figure 8.-** Length Distribution of Greenland halibut (*Reinhardtius hippoglossoides*) as percentage from Spanish Bottom trawl survey, October 2004.



**Figure 9.-** Length/Weight for *Reinhardtius hippoglossoides* during October for slope Svalbard. Sexes combined and by sex. 2004



**Figure 9 (cont.).-** Length/Weight for *Reinhardtius hippoglossoides* during October for slope Svalbard. Sexes combined and by sex. 2004



**Figure 10.-** Greenland halibut (*Reinhardtius hippoglossoides*) abundance and biomass estimated from Spanish Bottom trawl survey: 1997 - 2004.