



**SPANISH BOTTOM TRAWL AUTUMN SURVEY *FLETÁN ÁRTICO 2013*  
IN THE SLOPE OF SVALBARD AREA, ICES DIVISION IIb.**

by

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## **Table of contents**

<b>1. INTRODUCTION .....</b>	<b>4</b>
<b>2. SURVEY DESIGN AND METHODS .....</b>	<b>5</b>
2.1 VESSEL SPECIFICATIONS.....	5
2.2 GEAR SPECIFICATIONS .....	5
2.3 SURVEY PLANNING.....	6
<b>3. RESULTS.....</b>	<b>7</b>
3.1 CATCHES.....	7
3.2 GREENLAND HALIBUT BIOMASS AND ABUNDANCE .....	9
3.3 ACCOMPANYING FAUNA BIOMASS .....	10
3.4 LENGTH DISTRIBUTION .....	11
3.5. LENGTH–WEIGHT RELATIONSHIP .....	12
3.6. MATURATION AND FEEDING ACTIVITY.....	13
<b>4. CONCLUSION.....</b>	<b>14</b>
<b>5. BIBLIOGRAPHY .....</b>	<b>15</b>
<b>6. ANNEX I TABLES FLETÁN ÁRTICO 2013 SURVEY .....</b>	<b>16</b>
<b>7. ANNEX II: FIGURES CAMPAÑA FLETÁN ÁRTICO 2013.....</b>	<b>23</b>

# 1.- Introduction

The "*Fletán Artico 2013*" autumn survey is the continuation of the Spanish survey series that IEO started in 1997 and continued AZTI-Tecnalia in 2008. The objective is to obtain biomass and abundance indices to determine the population structure of Greenland halibut (*Reinhardtius hippoglossoides*) in the protection area of the Svalbard Archipelago, ICES Division IIb.

From 1992 the fishery has been regulated by allowing only the long line and gillnets fisheries by vessels smaller than 28 m to be directed for Greenland halibut. This fishery is also regulated by seasonal closure. Target trawl fishery has been prohibited and trawl catches limited to bycatch only. The regulations enforced in 1992 reduced the total landings of Greenland halibut by trawlers from 20,000 to about 6,000 t. Since then and until 1998 annual trawler landings have varied between 5,000 and 8,000 t without any clear trend attributable to changes in allowable bycatch. But there are indications of an increase in recent years. The 38th Session of the Joint Russian–Norwegian Fisheries Commission (JRNFC) in 2009 decided to cancel the ban against targeted Greenland halibut fishery and established the annual TAC at 15 000 t for 2010 until 2012. The 40th Session of JRNFC raised the TAC for 2012 to 18 000 t.

The Arctic Fisheries Working Group (AFWG), group within ICES in charge of the advice for this stock, states, that the stock has been at a low level for several years. But there are indications of an increase in recent years. There are signs that the regulations of the last two decades have improved the status of the stock, and measures should be taken to maintain the positive trends. ICES advises on the basis of precautionary considerations that catches should not be allowed to increase above 15 000 t, the average catch for the last 10 years (ICES, 2012).

The results from nine survey series are evaluated by the Working Group; 6 Norwegian surveys, one Russian survey, one Spanish survey and one Polish survey.

The main aim of the survey is to obtain indices of abundance by age and data of the spatial and bathymetric distribution of the Arctic Greenland halibut (*Reinhardtius hippoglossoides*) population.

In addition to the main objective, complementary information was collected, both of Greenland halibut as of the main accompanying species. Thus, the following objectives were also covered within the survey:

- To obtain length/weight relationships parameters by sex.
- To get biological samples from Greenland halibut (otoliths, ovaries) for growth and reproduction studies.
- Likewise, information will be obtained on accompanying fish fauna.

## 2. Survey design and methods

### 2.1 Vessel specifications

*B/C Eirado do Costal* was the selected vessel to conduct *Fletan Ártico 2013* survey in September, being its main characteristics:

Nationality: Spanish

Registered port & number: VI-4-4-01

Overall length: 56 m.

Maximum draught: 6,20 m

Net tonnage: 1167 GT

Year: 2004

Fridge capacity: 9938 m<sup>3</sup>

Freezing capacity: 50 Tm / day

Engine: Mak6M25PX,1645,6C.V

Equipment:

Echo sounder: *Simrad ES60* and  
*Furuno FCU 1200L*

*Scanmar* net sensors.



### 2.2 Gear specifications

*Pedreira* type bottom trawl gear was used. This gear is often used in the commercial Greenland halibut fishery. Furthermore a 40 mm mesh size cover cod end was added.

In Figure 3, included in Annex II, a trawl gear plane is shown. This gear is mounted with a 49,7 meters headline and a 66 meters long rockhooper, indicated for Greenland Halibut fishery.

Gear main characteristics:

- Ground gear
  - o Central section (7,5 m), with 18” rubber discs separated by a divider and four 14” sweepers.

- Lateral section (8,4 m), with 18” rubber discs separated by two dividers and eight 14” sweepers..
- Lateral extensions (7m), with half spheres of 16” separated by four dividers.
- Floats: 240mm and 300 mm diameter floats
- Codend: (Polyethylene 6 mm), with 140 mm mesh size. A 40 mm mesh size cover codend was added
- Legs: 14 m.
- Doors: Oval Floyd, 6,8 m<sup>2</sup> and 2200 kg.
- Bridles: 300 m

## 2.3 Survey planning

The Survey took place from 4<sup>th</sup> September to 18<sup>th</sup> September 2013. 63 hauls were carried out. Table 1, included in the Annex I, shows specific data by haul.

As previous years, the survey was developed in a depth range between 500 and 1500 meters on the west slope of the Svalbard archipelago, covering an area between 73° 30' N and 81° 00' N (Figure 1, Annex II). For the sampling scheme, the stratification designed in 1994 was used. In the table below latitude and depth range limits for each stratum, as well as the surface area and the number of valid hauls made is shown.

Strata	Latitud	Depth (m)	Area ( squared nautical miles)	n° hauls
1	76° 00' - 81° 00' N	500- 699	702	13
2	76° 00' - 81° 00' N	700- 999	1263	11
3	76° 00' - 81° 00' N	1000-1500	2693	4
4	73° 30' - 76° 00' N	500- 699	488	10
5	73° 30' - 76° 00' N	700- 999	761	9
6	73° 30' - 76° 00' N	1000-1500	1672	2

The duration of each haul was 30 minutes, since the moment when the net was on the bottom until the haul back. The moment in which the gear was properly configured in the bottom was controlled thanks to Scanmar sensors, in addition to know the geometry of the net and the distance between doors.

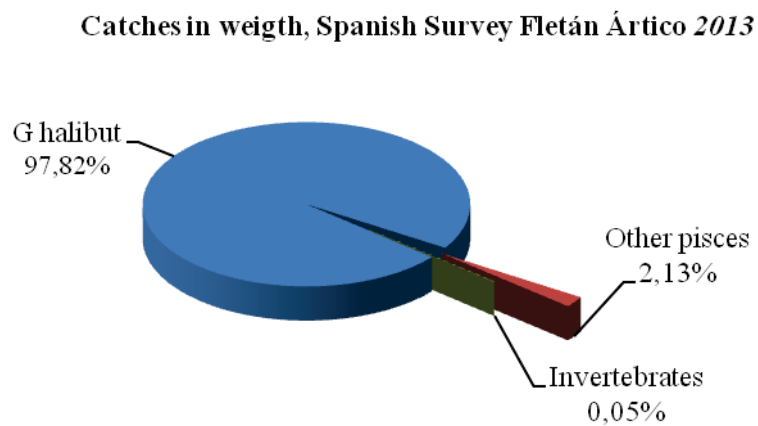
Catches were sorted and weighted by species. Greenland halibut and principal accompanying species were also measured in length. Otoliths and ovaries were also collected.

### 3. Results

#### 3.1 Catches

Detailed data of each haul are shown in Table 1 included in Annex I. Figure 2, in Annex II shows the map with the prospected area and the position of each haul performed.

As it is shown in the following figure, 97.8 % of the total catches in weight correspond to Greenland halibut, while the rest of fishes and invertebrates suppose 2.1 % and 0.05 % respectively.

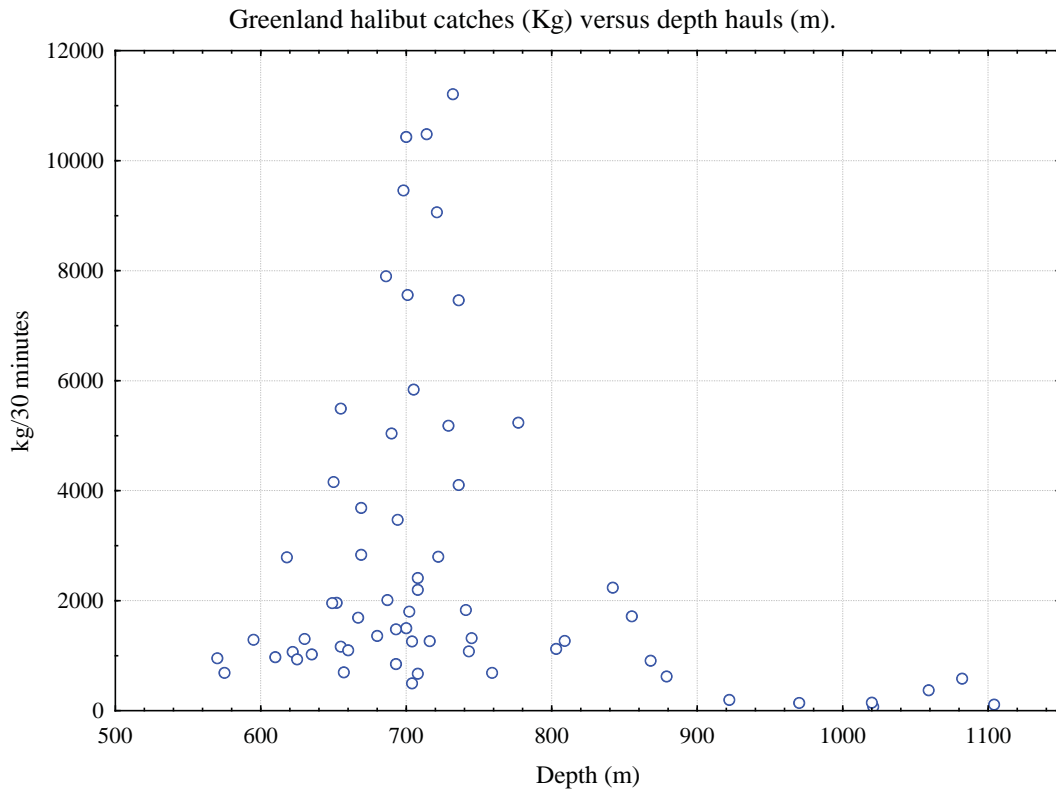


**Figure 1.** Greenland halibut percentage in the catches during *Fletán Ártico 2013* Survey

The main species catches appears in the table below.

Table 2, included in Annex I, shows main species catches by haul. Greenland halibut was the principal species, with 178502 kg captured. Redfish (513.7kg), Arctic skate (482.9 kg) and roughead grenadier (420.1 kg) were the main accompanying species

The main Greenland halibut catches were recorded in depths between 600 and 800 meters, reaching its maximum values between 650 and 750 meters depth (Figure 2). Below the 1000 meters deep, catches of halibut were scarce, being under 300kg all of them.

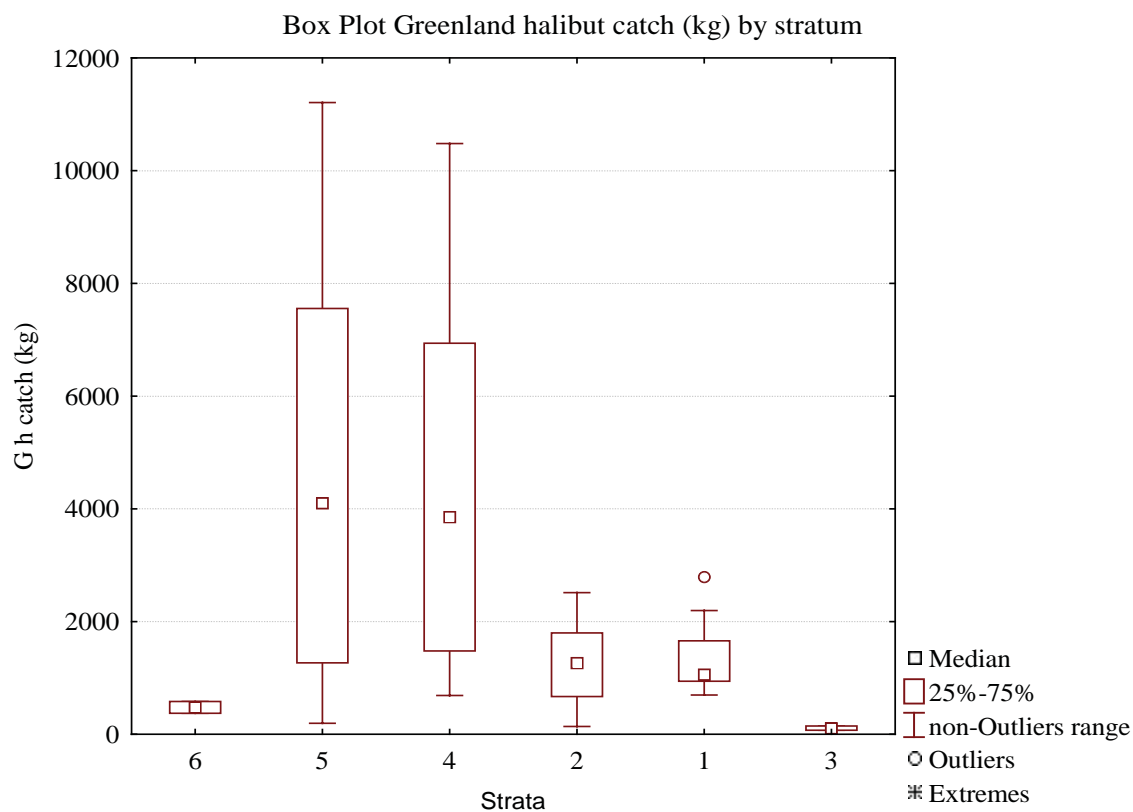


**Figure 2.** Greenland halibut catches in relation to depth, during *Fletán Ártico 2013 Survey*.

However, it seems that the depth is not the unique factor related with the abundance of Greenland halibut. Including the latitude in the analysis, we can see how hauls carried out further south, below the latitude 76-30'N, show greater abundance (Figure 4, Annex II).

This means, that analysing catches by stratum, as shown in Figure 3, deeper strata, 3 and 6, would show lower concentration of Greenland halibut, while the shallower strata of the south, strata 4 and 5, show greatest concentrations. In these strata of greater concentration, the variability was also higher.





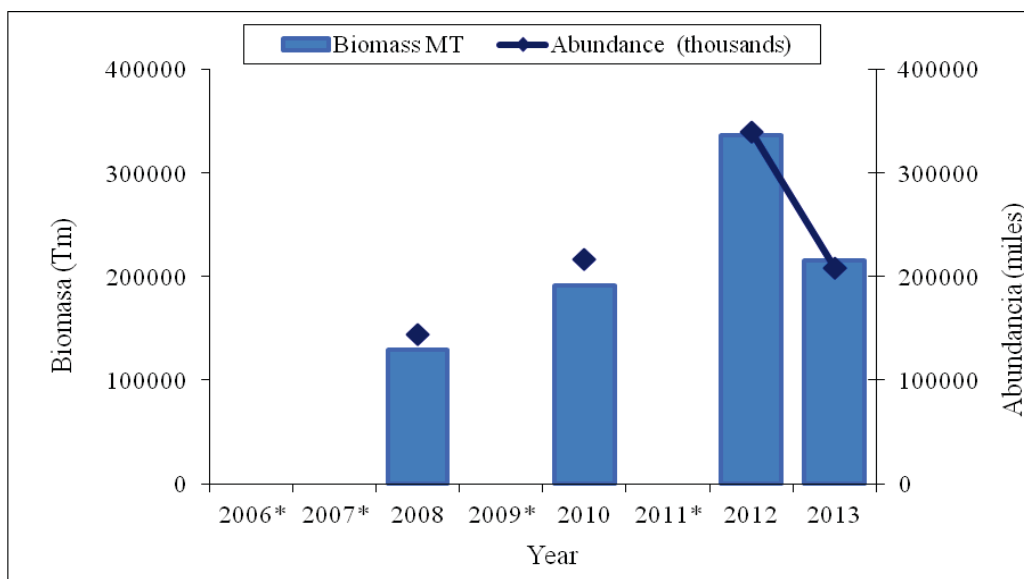
**Figure 3.** Greenland halibut catches (Kg/h) by stratum in the *Fletán Ártico 2013* survey.

### 3.2 Greenland halibut biomass and abundance

The abundance and biomass was estimated with the Swept Area method, as in previous years.

Figure 4 and Table 1 show the estimated Greenland halibut biomass and abundances for the period 2008-2013. Table 3 included in the Annex I, shows the biomass and abundance values by stratum. Estimated biomass in this survey was 207800 ton and the abundance, 215080 (x1000) individuals. This supposes a decrease of 38.8% in biomass and 36.1% in abundance, comparing with last October survey in 2012, but a increasing in biomass (66.4%) comparing with survey in 2010. With the purpose of comparing data, no survey was deployed in autumn during 2009 and 2011.

Mean weight in the stock shows a increasing in the last years: 0.88Kg in 2012; 0.99 Kg in 2012 and 1.04 Kg in 2013.



**Figure 4.** Comparison between 2008, 2010, 2012 and 2013 autumn survey, showing estimated Greenland halibut biomass and abundances.

Year	Abundance	Biomass
2008	144.65	129.22
2009*	Na	Na
2010	216.73	191.51
2011*	Na	Na
2012	339.7	336.54
2013	215.08	207.8000

**Table 1.** Greenland halibut biomass (tons) and abundances (x1000) obtained during 2008, 2010, 2102 and 2013 autumn surveys. (\*No survey was developed during 2009 and 2011).

### 3.3 Accompanying fauna biomass.

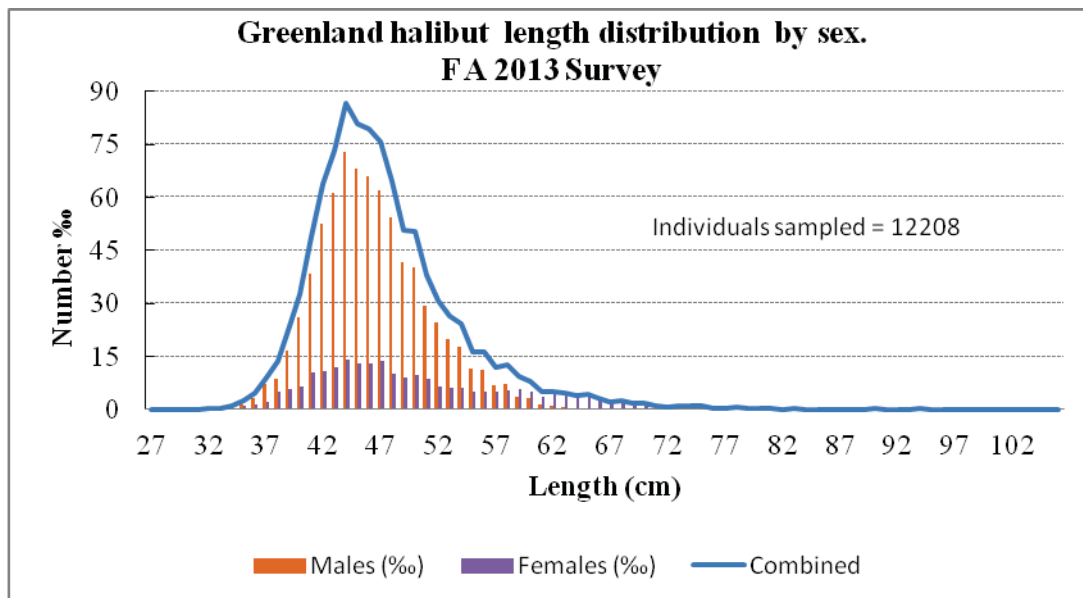
Biomass valued estimated for the accompanying fauna were really low. These values indicate that, in the slope of Svalbard Archipelago, Greenland halibut constitutes the dominant species. Tables 4, 5, 6, 7, 8, 9 and 10 of Annex I, shows estimated biomass values for the main accompanying species.

Catches main species appears in the following table.

Especie	Total catch (Kg.)	CPUE (Kg/hour)	Biomass (Tm)	Abundance (miles)
<i>R. hipoglossoides</i>	178502	1373	207797.8	215089
<i>Sebastes sp.</i>	513.7	18.7	558	1541
<i>Gadus morhua</i>	157.9	5.7	175	40
<i>M. poutassou</i>	329.2	12.0	426.2	2075
<i>A. hyperborean</i>	482.9	17.6	1218	806
<i>H. platessoides</i>	6.5	0.2	8.5	27
<i>M. blerghax</i>	420.1	15.3	469.5	684

### 3.4 Length distribution

The population's structure was similar to the described in previous surveys (Ruiz J., *et al.*, 2009). (Paz X., *et al.*, 2006). Although the modal length was lower and equal for both sexes (44 cm). Length range for both sexes was from 27 cm to 106 cm. As in previous cruises, the male proportion was higher, but this year was even higher, 76.2% versus 23.8% females (67 % versus 33 % in 2012).



**Figure 5.** Greenland halibut length distribution in Svalbard Area.

### 3.5. Length–weight relationship

Figures 6, 7, and 8, show the Greenland halibut length–weight relationship, separated by sexes, and combined.

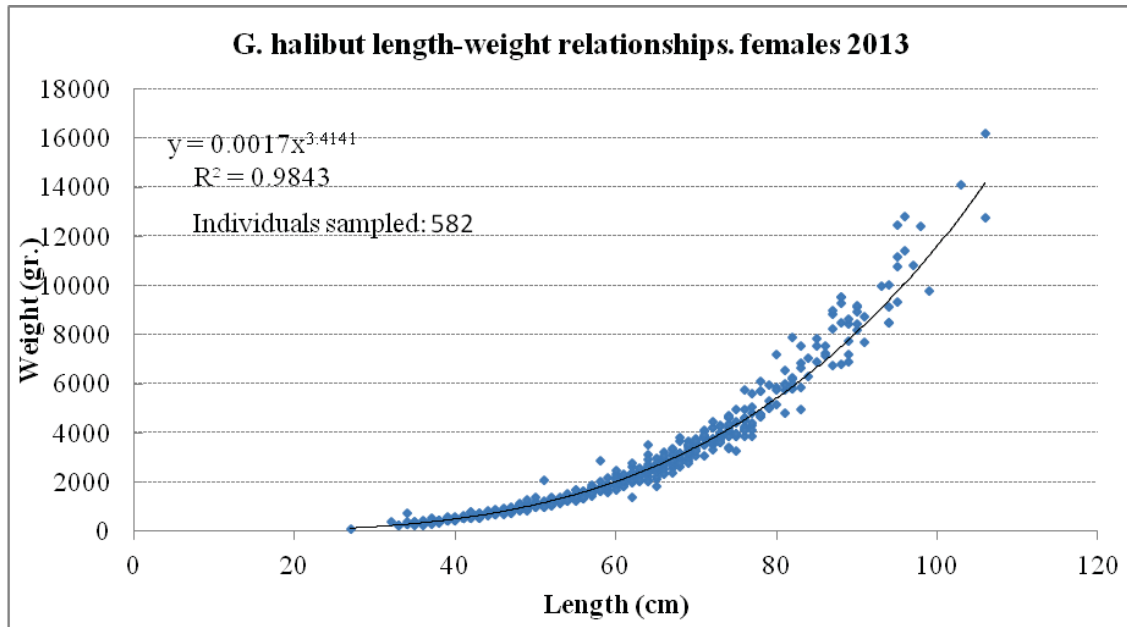


Figure 6. Length-weight relationship (females).

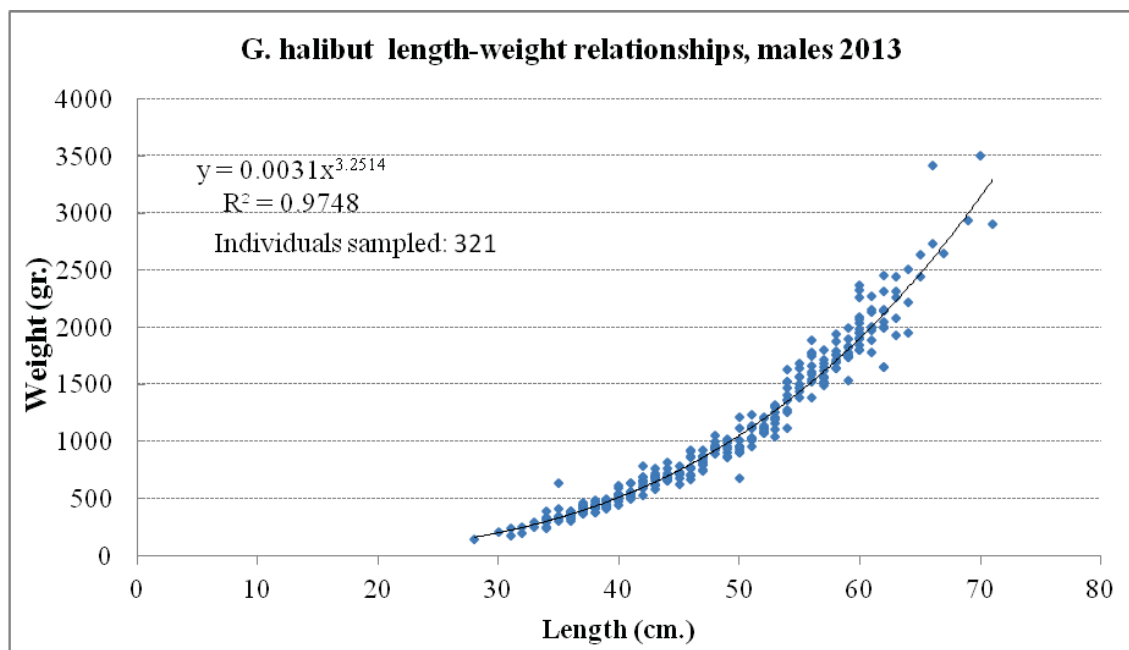
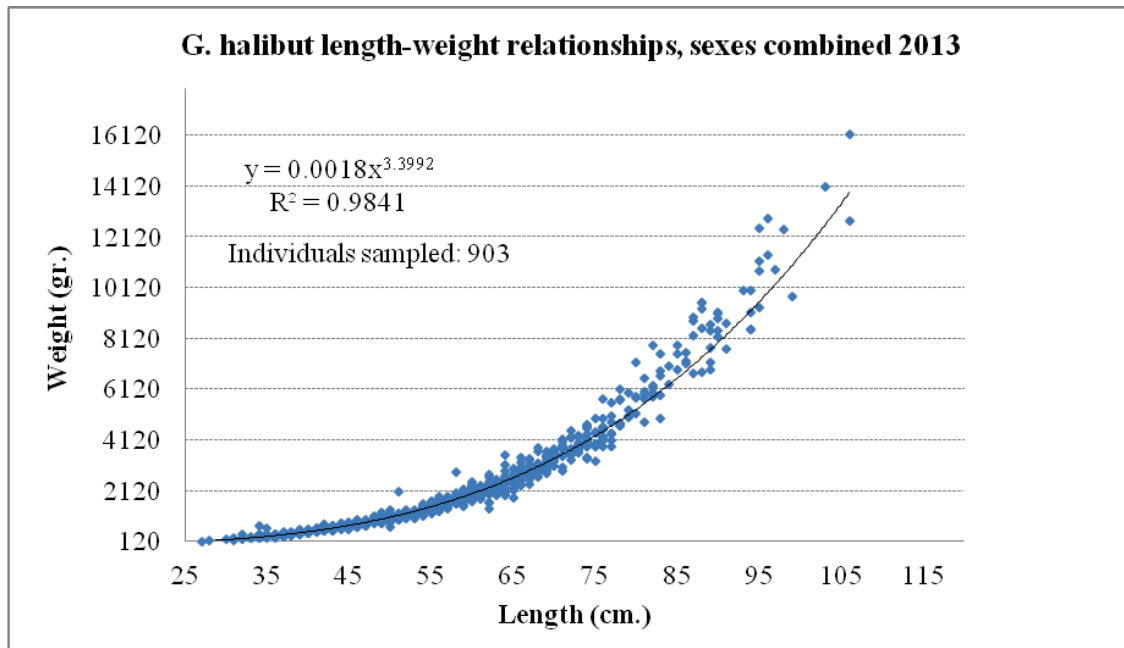


Figure 7. Length-weight relationships (males).



**Figure 8.** Length-weight relationships (sexes combined).

### 3.6. Maturation and feeding activity.

From 908 individuals, corresponding to 63 samples is appreciated advanced maturation state. 92% of males were mature inactive and mature developing; the 80% of females appears in the same states.

On the other hand, females have a more advanced state than males, with 41.3% of individuals "developing mature" compared to only 4% of males in that state. However, there is a greater proportion of immature females over males: 19.1% versus 7.4%.

An analysis of stomach fullness status of individuals who underwent biological sampling, is deduced a low level of intensity food, very similar in both sexes. The 81.5% of males and 80.6% of females showed empty stomachs. This low feeding activity in both sexes reinforces the idea that the activity has already started maturing, it is known that fish usually alternate in reproductive period (winter / spring) with the most intense food (summer) and in many species during the reproductive period feeding activity ceases

The degree of maturation was advanced in males and especially in females, the feeding activity was very low in both sexes. This indicates a pre-spawning stage in this fraction of the Greenland halibut population.

## 4. Conclusion

Main conclusions derived from the results obtained during the *Fletán Ártico 2013* Survey:

- Negative interannual trend in the stock of Greenland halibut (*Reinhardtius hippoglossoides*) in the Archipelago of Svalbard, as the decreasing in the biomass and abundance shows. However, the estimates of abundance and biomass are the second highest in recent years.
- Inter-annual stability situation continue. Both spatial and bathymetric distributions, as the structure of the population are similar to those describe in previous years and by other authors (Basterretxea , 2012; Ruiz J., *et al*, 2010; Paz X., *et al*, 2006; Godo and Haug, 1989).
- The Greenland halibut is the dominant species on the slope of Svalbard Archipelago, and the only recourse open to commercial exploitation to depths greater than 500 m., been the trawl fishery in that bathymetric range monospecific, addressed to the Greenland halibut.
- The degree of maturation was advanced in males and especially in females; the feeding activity was very low in both sexes. This indicates a pre-spawning stage in this fraction of the Greenland halibut population
- In general, after 4 years of data, trends can be extracted from the series. It is outstanding the increase in biomass along the data series. More detailed analysis will be desired to be deployed if data series would be elongated. Thus, physical parameters could be overlapped to the geographical distribution of catches for a better understanding of the stock distribution.

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## 6. ANNEX I: TABLES

### *Fletán Ártico 2013 Survey*

**Table 1.** Haul characteristics during *Fletán Ártico 2013 Survey*.

Haul number	Stratum	Date	Speed knod	Wire (m)	Latitude start	Latitude stop	Latitude start	Latitude stop	Depth start (m)	Depth stop (m)
1	6	04/09/2013	3,1	2500	734587	734730	150038	150221	1059	1081
2	5	05/09/2013	2,7	2250	738154	735078	152298	151962	922	944
3	4	05/09/2013	3,1	1900	734809	734957	152353	152545	736	745
4	4	05/09/2013	3,2	1775	735238	735369	153678	154067	686	702
5	4	06/09/2013	3,2	1750	743091	743229	160926	160642	650	701
6	4	06/09/2013	3,4	1800	743340	743475	160490	160100	698	700
7	5	06/09/2013	3,2	2100	743477	743605	155177	154835	855	851
8	4	07/09/2013	3,2	1775	750369	750494	152880	152465	630	632
9	4	07/09/2013	3,2	1700	750654	750724	152205	151710	575	608
10	4	08/09/2013	3	1800	755606	745450	153242	153165	669	678
11	4	08/09/2013	3	1675	751003	751102	150493	150081	595	590
12	5	08/09/2013	3	1800	752369	752496	141145	140959	736	730
13	5	08/09/2013	2,8	2000	753278	753418	135419	135417	809	795
14	4	08/09/2013	2,9	1750	754441	754594	140033	135998	622	630
15	2	09/09/2013	2,8	1800	764485	764609	130616	130265	702	701
16	1	09/09/2013	3	1800	765123	765226	124826	124487	655	634
17	2	09/09/2013	3	2025	765370	765476	123056	122700	842	827
18	2	09/09/2013	3	1750	765947	770022	121086	120542	704	700
19	1	09/09/2013	2,9	1750	770371	770491	115066	114540	625	635
20	1	10/09/2013	3	1750	772080	772233	111542	111407	610	644
21	2	10/09/2013	3	1850	772297	772460	110909	110720	759	773
22	1	10/09/2013	3	1800	773842	773969	103808	103339	635	622
23	1	10/09/2013	3,2	1850	775100	775233	94415	93872	693	697
24	1	10/09/2013	3,1	1775	775659	775834	92882	92624	657	645
25	2	11/09/2013	3	2150	792610	792463	73224	73422	868	854
26	3	11/09/2013	3,1	2200	791993	791852	72700	72803	1021	1062
27	4	11/09/2013	3	1800	791112	790776	81061	81316	667	667
28	5	11/09/2013	3,1	1850	785944	785788	82167	82121	743	745
29	2	11/09/2013	3	1850	784522	784394	82705	83067	708	725
30	1	11/09/2013	2,9	1850	783514	783380	85524	85891	660	679
31	2	12/09/2013	2,8	1900	782910	782773	91228	91548	745	775
32	3	12/09/2013	2,8	2100	782385	782257	90692	90736	1020	1068
33	2	12/09/2013	2,8	1800	781396	781244	91468	91422	700	709
34	1	12/09/2013	2,8	1750	780760	780613	91779	91825	618	640
35	3	12/09/2013	2,8	2575	775368	775245	91537	91709	1104	1123
36	1	12/09/2013	2,9	1775	774698	774578	100185	100712	570	575
37	2	12/09/2013	2,8	2000	774274	774162	100881	101291	879	885
38	2	13/09/2013	2,9	2275	773295	773184	104259	104615	970	937
39	2	13/09/2013	2,9	1800	771820	771691	111411	111556	708	702
40	1	13/09/2013	2,9	1800	770936	770816	113110	113476	652	646
41	2	13/09/2013	3,1	1850	770224	770130	115131	115703	716	718



**Table 1 (Cont.).** Haul characteristics during *Fletán Ártico 2013 Survey*.

Haul number	Stratum	Date	Speed knod	Wire (m)	Latitude			Depth start (m)	Depth stop (m)	
					Latitude start	Latitude stop	Latitude start			
42	1	13/09/2013	3	1850	765659	765550	122659	123076	708	700
43	1	13/09/2013	3	1800	764684	764546	130187	130535	680	684
44	2	13/09/2013	2,9	1850	764130	763896	131499	132255	704	702
45	4	14/09/2013	2,8	1800	755780	755629	140326	140224	649	647
46	5	14/09/2013	3	1850	755405	755267	135590	135426	729	762
47	4	14/09/2013	3	1850	754916	754768	135896	135943	655	648
48	5	14/09/2013	3	1875	754460	754308	135394	135446	741	728
49	4	14/09/2013	2,9	1900	754016	753871	135710	135788	693	699
50	4	14/09/2013	2,9	1900	752559	752297	141058	141585	694	695
51	4	15/09/2013	2,9	1850	745769	745609	153477	153442	669	625
52	5	15/09/2013	2,9	1900	745132	744979	153018	153090	705	712
53	5	15/09/2013	2,9	1900	744850	744692	153211	153366	701	703
54	4	15/09/2013	2,9	1900	744448	744205	153783	154352	687	695
55	5	16/09/2013	2,9	1900	743966	743850	154809	155183	722	710
56	5	16/09/2013	2,9	1900	743669	743551	155551	155903	721	705
57	5	16/09/2013	2,9	1900	743504	743379	155910	160227	732	715
58	4	17/09/2013	3	1950	743085	742928	160712	160651	690	715
59	4	17/09/2013	3	1900	741354	741529	161025	161110	714	671
60	5	17/09/2013	3	1900	740628	740496	160226	155860	700	718
61	5	18/09/2013	3	2100	735815	735672	154305	154093	803	807
62	5	18/09/2013	3	2000	735471	735808	153911	153702	777	733
63	6	18/09/2013	2,9	2500	735297	735169	151836	151443	1082	1088

**Table 2.** Main species catch by haul (Kg) during *Fletán Ártico 2013 Survey*.

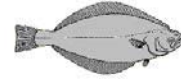
Haul number	Long Rough Dab	G. halibut	Redfish	Roughead grenadier	Blue whiting	Cod	Thorny skate	Arctic skate	Wolffish
1	0	375,9	0	0	0	0	1,05	0	0
2	0	197,4	0	0	0	0	0	0,88	0
3	0	7464,2	5,3	37,03	5,754	0	3,04	3	1,88
4	0	7901	0	8,5	8,3	18,29	3,4	5	0
5	0,35	4159	44,9	4,7	16,88	19,34	2,52	8,12	15,16
6	0,12	9458	26,55	3,82	8,88	0	1,09	0	8,72
7	0	1717	0,69	2,94	0	0	0,34	24,39	0
8	0	1307	3,576	4,246	4,25	0	0	0	8,83
9	0	690	18,12	3,65	0,42	18,55	3,26	0	23,02
10	0,224	3690	9,41	3,384	14,9	0	0,536	0	0
11	0,25	1289	18,66	2,38	10,1	0	0	0	0
12	0	4103	5,366	21,84	0	0	0,96	14	0
13	0	1270	0	4,39	0	0	0	4,69	0
14	0	1070	11,256	7,732	0	0	1,86	0,78	6,16
15	0,52	1800	4,818	10,744	5,67	0	1,58	10,04	6,01
16	0	1165	9,26	12,892	9,009	0	2,356	0	2,75
17	0	2239	0	0,72	0,12	7,4	0	27,54	0
18	0	498	3,14	3,45	0,81	0	0,63	7,96	3,54
19	0,14	933	18,57	5,42	2,23	9,67	7,41	13,23	4,71
20	0,48	975	13,84	22,53	62,15	16,245	11,14	40,04	13,62
21	0,3	691	2,11	0,6	0,86	0	2,33	0	0
22	1,29	1027	15,5	10,58	1,81	14,305	4,55	18,88	23,7
23	0	848	11,77	4,44	1,01	4,95	3,52	6,74	29,6
24	0	699	20,8	3,51	0	5,61	7,06	15,5	53,5
25	0	908	2,08	0	0	0	0	21,86	0
26	0	74,8	0	0	0	0	0	12,83	0
27	0	1690	19,02	4,37	6,38	0,005	1,11	13,91	0
28	0	1079	1,72	7,56	1,71	0	3,54	14,795	24,05
29	0	671	4,13	1,27	17,24	0	3,14	10,54	9,96
30	0	1097	15,06	4,57	21,54	11,36	1,99	19,94	15,18
31	0	1322	3,95	1,17	1,44	0	0	0	0
32	0	150,25	0	0	0,58	0	0	9,9	0
33	0	1499	10,97	4,76	8,54	0	5,85	4,53	4,01
34	1,11	2791	71,15	8,4	41,6	8,5	7,32	29,47	6,51
35	0	109	0	0	0	0	0	1,44	0
36	0	953	39,04	1,31	8,11	3,73	2,01	18,23	9,43
37	0	622	0	0	0	0	0	0	0
38	0	141,43	0	0	0	0	0	21,35	0
39	0	2415,1	0,9	3,17	11,34	0	0	14,48	1,24

**Table 2 (Cont.).** Main species catch by haul (Kg) during *Fletán Ártico 2013 Survey*.

Haul number	Long Rough Dab	G. halibut	Redfish	Roughead grenadier	Blue whiting	Cod	Thorny skate	Arctic skate	Walffish
40	0,32	1964	10,75	7,45	2,46	10,95	0,52	0	2,02
41	0	1265	0	4,64	0	0	0	18,36	0
42	0	2197	1,05	9,4	0,64	0	0	30,07	2,28
43	0	1359	4,24	6,45	9,16	0	0,58	2,25	2,92
44	0	2515	0	0	0	0	0	0	0
45	0,14	1956	20,02	3,82	2,17	0	0	0	1,6
46	0	5182	2,59	10,6	1,6	0	0	16	3,1
47	0	5495	7,26	5,23	0,9	0	0	4,88	1,28
48	0,49	1832	0,72	6,96	0	0	0	2,1	0
49	0	1480	4,58	6,95	5,66	0	0	0	0
50	0	6940	0	0	0	0	0	0	0
51	0,21	2836	7,43	7,73	4,2	0	0	0	0
52	0	5840	1,77	8,22	1,68	0	0	0	2,44
53	0	7558	3,16	7,15	0,77	0	0	0	0
54	0	4026	0	0	0	0	0	0	0
55	0	2799	1,27	1,89	7,36	0	0	0	3,79
56	0,58	9063	3,42	1,82	2,55	0	0,98	0	17,59
57	0	11210	4,83	19,89	10,18	0	1,68	0	11,77
58	0	5041	4,56	13,33	1,19	0	3,14	0	1,67
59	0	10483	20,1	21,55	4,86	5,1	0,99	8,94	3,52
60	0	10430	2,48	29,08	0,21	3,91	0	3,05	0
61	0	1123	0	1,34	0,06	0	0,47	3,22	0
62	0	5235	1,84	30,58	1,47	0	1,88	0	0
63	0	584	0	0	0,52	0	0	0	0
<b>Total</b>	<b>6,524</b>	<b>178502,1</b>	<b>513,7</b>	<b>420,</b>	<b>329,3</b>	<b>157,9</b>	<b>93,8</b>	<b>482,9</b>	<b>325,5</b>

**Table 3.** Greenland halibut biomass (Tn) and abundance (x1000) by strata in the Svalbard Archipelago

*Reinhardtius hippoglossoides*



Strata	Total area	Hauls number	Swept area	Catch (kg)	Biomass (t)	Catch (n°)	Abundance (x1000)
1	702	12	15012,4	16008,0	0,5	21708,9	20358,7
2	1263	13	14619,8	15329,0	0,6	35044,9	33423,5
3	2693	3	409,0	334,1	0,1	7131,2	8731,2
4	488	18	67907,3	71492,2	0,8	44148,3	41934,6
5	761	15	75441,5	68638,4	0,6	81316,8	89376,5
6	1672	2	1106,5	959,9	0,1	18447,7	21264,4
<b>Total</b>	<b>7579</b>	<b>63</b>	<b>174496,5</b>	<b>172761,6</b>	<b>2,7</b>	<b>207797,8</b>	<b>215088,8</b>

**Table 4.** Blue Whiting biomass (Tn) by strata in the Svalbard Archipelago

*Micromesistius poutassou*



Strata	Total area	Hauls number	Swept area	Catch (kg)	Biomass (t)	Catch (n°)	Abundance (x1000)
1	702	12	159,7	844,4	0,5	216,6	1145,1
2	1263	13	46,0	223,0	0,6	105,2	509,8
3	2693	3	0,6	0,0	0,1	12,4	0,0
4	488	18	79,9	404,6	0,8	49,4	249,8
5	761	15	27,6	144,2	0,6	32,7	170,8
6	1672	2	0,5	0,0	0,1	10,0	0,0
<b>TOTAL</b>	<b>7579</b>	<b>63</b>	<b>314,4</b>	<b>1616,1</b>	<b>2,7</b>	<b>426,2</b>	<b>2075,5</b>

**Table 5.** Cod biomass (Tn) by strata in the Svalbard Archipelago

*Gadus morhua*



Strata	Total area	Hauls number	Swept area	Catch (kg)	Biomass (t)	Catch (n°)	Abundance (x1000)
1	702	12	85,3	22,8	0,5	115,7	30,9
2	1263	13	7,4	1,0	0,6	16,9	2,3
3	2693	3	0,0	0,0	0,1	0,0	0,0
4	488	18	61,3	9,8	0,8	37,8	6,1
5	761	15	3,9	1,0	0,6	4,6	1,2
6	1672	2	0,0	0,0	0,1	0,0	0,0
<b>Total</b>	<b>7579</b>	<b>63</b>	<b>157,9</b>	<b>34,6</b>	<b>2,7</b>	<b>175,1</b>	<b>40,5</b>

**Table 6.** Redfish biomass (Tn) by strata in the Svalbard Archipelago.

*Sebastes sp.*



Strata	Total area	Hauls number	Swept area	Catch (kg)	Biomass (t)	Catch (n°)	Abundance (x1000)
1	702	12	231,0	373,6	0,5	313,3	506,7
2	1263	13	32,1	54,9	0,6	73,4	125,6
3	2693	3	0,0	0,0	0,1	0,0	0,0
4	488	18	220,7	1.387,5	0,8	136,3	856,8
5	761	15	29,9	44,4	0,6	35,4	52,6
6	1672	2	0,0	0,0	0,1	0,0	0,0
<b>Total</b>	<b>7579</b>	<b>63</b>	<b>513,7</b>	<b>1.860,4</b>	<b>2,7</b>	<b>558,4</b>	<b>1.541,6</b>

**Table 7.-** Wolffish biomass (Tn) by strata in the Svalbard Archipelago.

*Anarhichas denticulatus*



Strata	Total area	Hauls number	Swept area	Catch (kg)	Biomass (t)	Catch (n°)	Abundance (x1000)
1	702	12	59	166,2	0,5	79,6	225,4
2	1263	13	7,78	24,8	0,6	17,8	56,6
3	2693	3	0	0,0	0,1	0,0	0,0
4	488	18	27	71,8	0,8	16,8	44,4
5	761	15	14	62,7	0,6	16,5	74,3
6	1672	2	0	0,0	0,1	0,0	0,0
<b>Total</b>	<b>7579</b>	<b>63</b>	<b>107,66</b>	<b>325,6</b>	<b>2,7</b>	<b>130,7</b>	<b>400,7</b>

**Table 8.** Artic skate biomass (Tn) by strata in the Svalbard Archipelago.

*Amblyraja hyperborea*



Strata	Total area	Hauls number	Swept area	Catch (kg)	Biomass (t)	Catch (n°)	Abundance (x1000)
1	702	12	194,4	61,2	0,5	263,6	82,9
2	1263	13	136,7	58,9	0,6	312,4	134,7
3	2693	3	24,2	25,4	0,1	516,0	542,7
4	488	18	44,6	13,7	0,8	27,6	8,4
5	761	15	83,1	32,0	0,6	98,5	37,9
6	1672	2	0,0	0,0	0,1	0,0	0,0
<b>Total</b>	<b>7579</b>	<b>63</b>	<b>482,9</b>	<b>191,1</b>	<b>2,7</b>	<b>1218,0</b>	<b>806,6</b>

**Table 9.** Roughead grenadier e biomass (Tn) by strata in the Svalbard Archipelago.

*Macrourus berglax*



Strata	Total area	Hauls number	Swept area	Catch (kg)	Biomass (t)	Catch (n°)	Abundance (x1000)
1	702	12	97,0	193,4	0,5	131,5	262,2
2	1263	13	30,5	57,2	0,6	69,8	130,8
3	2693	3	0,0	0,0	0,1	0,0	0,0
4	488	18	138,4	185,9	0,8	85,5	114,8
5	761	15	154,3	148,6	0,6	182,8	176,0
6	1672	2	0,0	0,0	0,1	0,0	0,0
<b>Total</b>	<b>7579</b>	<b>63</b>	<b>420,2</b>	<b>585,0</b>	<b>2,7</b>	<b>469,5</b>	<b>683,8</b>

**Table 10.** Long Rough Dab biomass (Tn) by strata in the Svalbard Archipelago.

*Hippoglossoides platessoides*



Strata	Total area	Hauls number	Swept area	Catch (kg)	Biomass (t)	Catch (n°)	Abundance (x1000)
1	702	12	3	12,0	0,5	4,5	16,2
2	1263	13	0,82	2,0	0,6	1,9	4,6
3	2693	3	0	0,0	0,1	0,0	0,0
4	488	18	1	6,0	0,8	0,8	3,7
5	761	15	1	2,2	0,6	1,3	2,6
6	1672	2	0	0,0	0,1	0,0	0,0
<b>Total</b>	<b>7579</b>	<b>63</b>	<b>6,52</b>	<b>22,1</b>	<b>2,7</b>	<b>8,5</b>	<b>27,1</b>

**Table 11.** Thorny skate biomass (Tn) by strata in the Svalbard Archipelago.

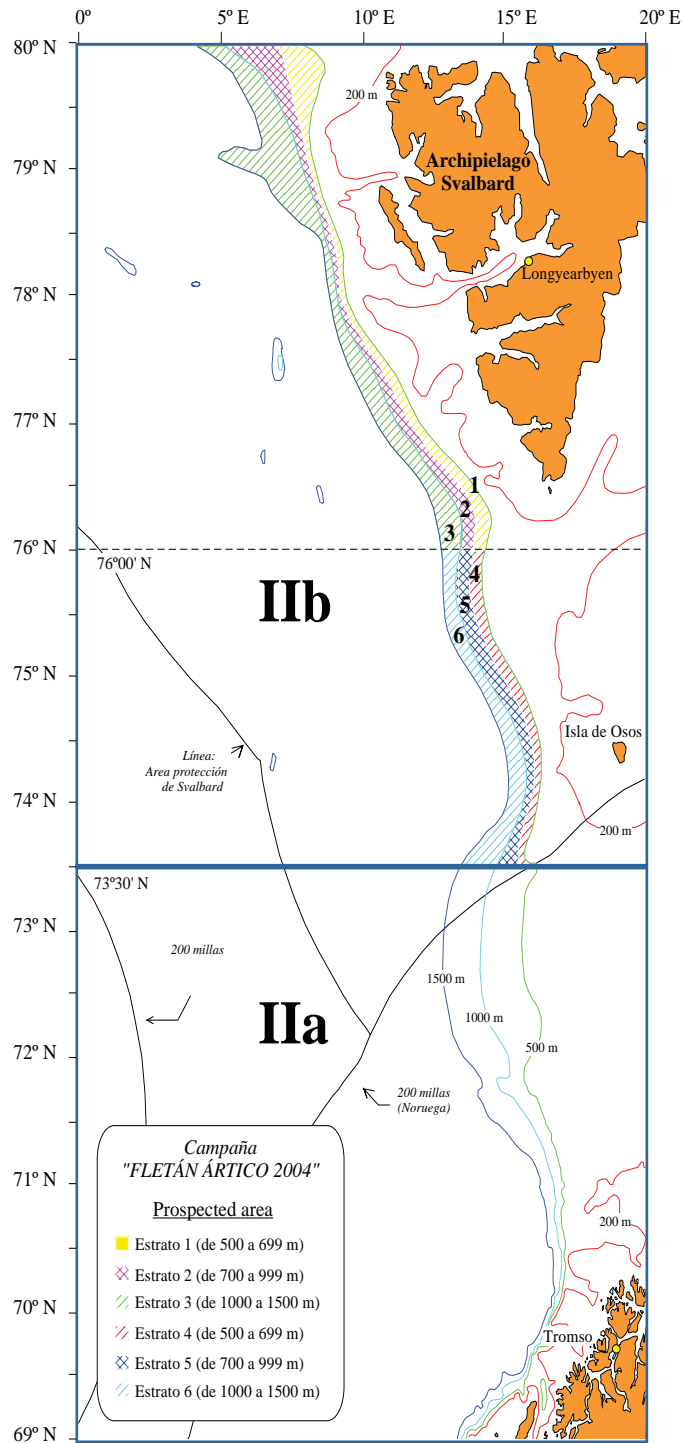
*Amblyraja radiata*



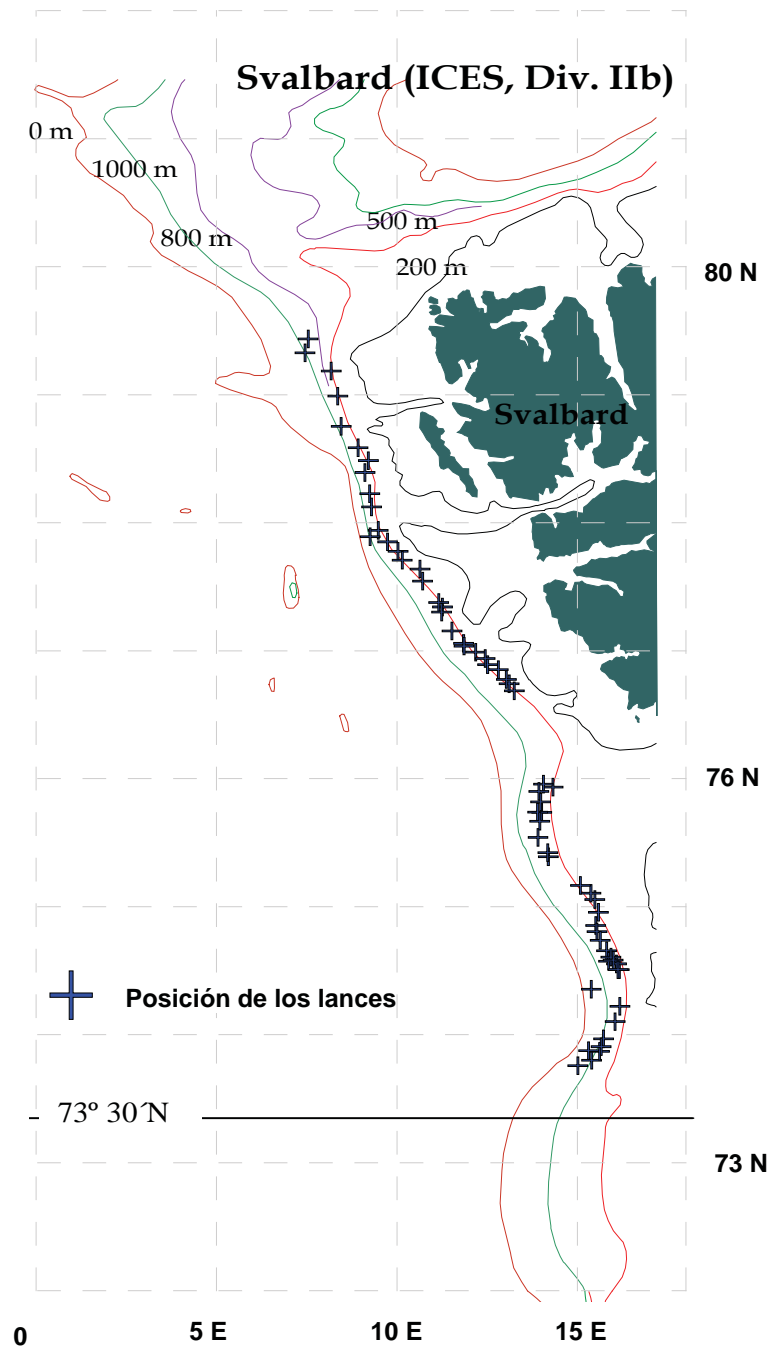
Strata	Total area	Hauls number	Swept area	Catch (kg)	Biomass (t)	Catch (n°)	Abundance (x1000)
1	702	12	48,5	54,0	0,5	65,7	73,3
2	1263	13	13,5	15,0	0,6	30,9	34,3
3	2693	3	0,0	0,0	0,1	0,0	0,0
4	488	18	20,9	29,4	0,8	12,9	18,1
5	761	15	9,9	13,3	0,6	11,7	15,8
6	1672	2	1,1	1,0	0,1	20,2	19,2
<b>Total</b>	<b>7579</b>	<b>63</b>	<b>93,8</b>	<b>112,8</b>	<b>2,7</b>	<b>141,4</b>	<b>160,7</b>

## 7. ANNEX II: FIGURES

### *Fletán Ártico 2013 Survey*

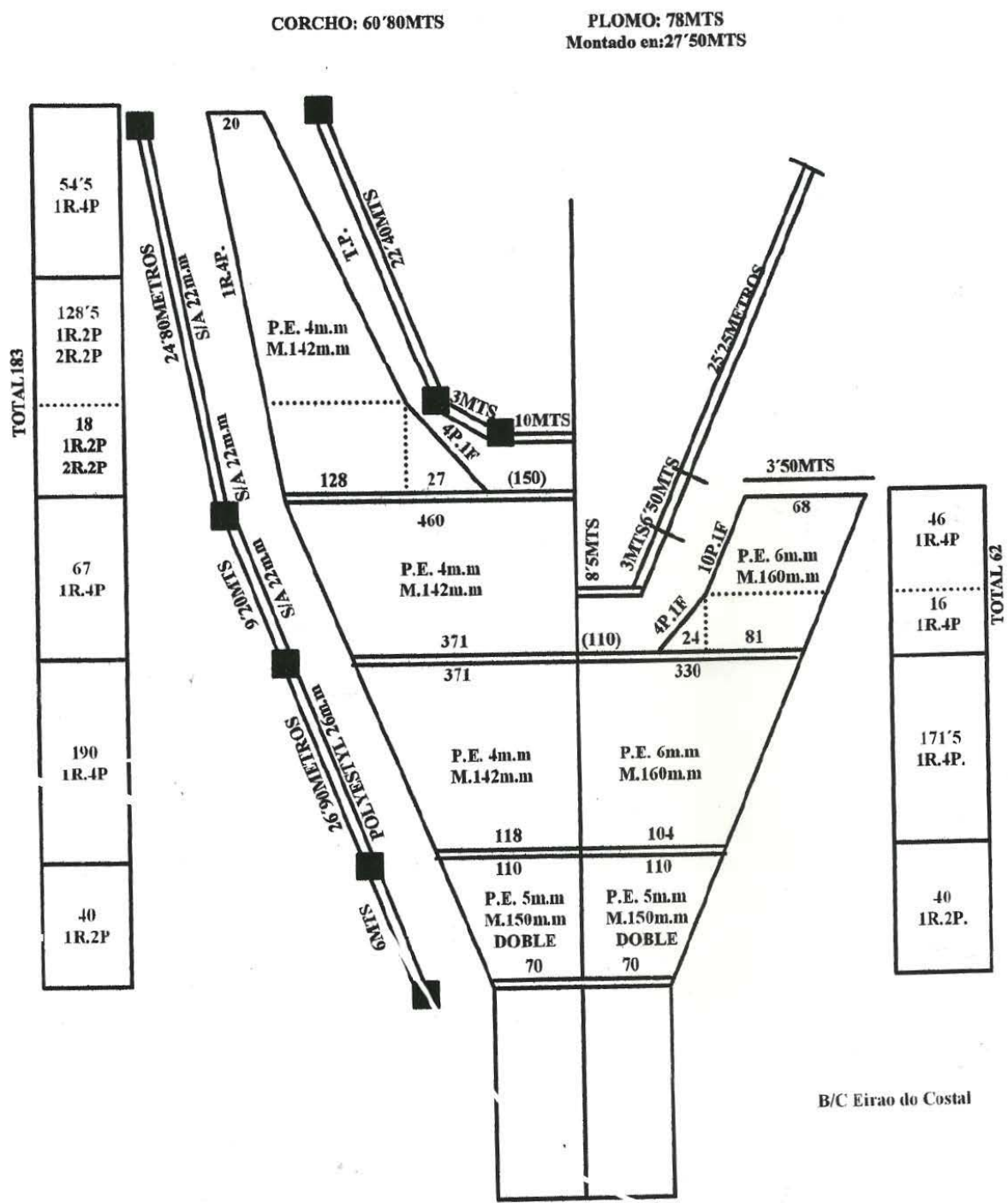


**Figure 1.** Map of the area showing the six considered strata and its ranges of depth.

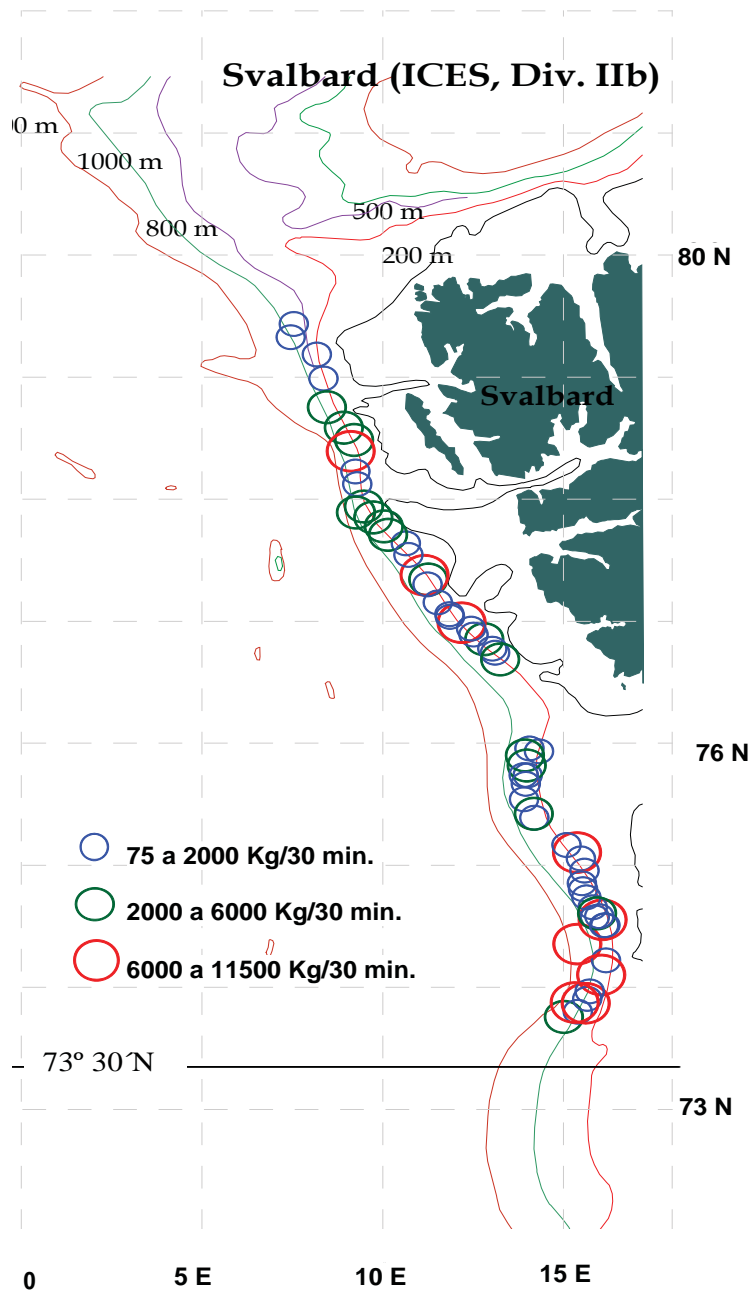


**Figure 2.** Map showing the positions of the hauls by strata made during the *Fletán Ártico 2013* Survey.





**Figure 3.** Schematic of the net plan of the Spanish “Pedreira” survey trawl



**Figure 4.** Distribution of the **Greenland halibut** catches (Kg/30 minutes).