

# **Report of the *Fletán Ártico 2012* bottom trawl autumn survey in the Slope of Svalbard**

**by**

**Mikel Basterretxea, Jon Ruiz & Estanis Mugerza**

<sup>1</sup> AZTI-Tecnalia. Instituto Tecnológico, Pesquero y Alimentario.

Txatxarramendi ugartea z/g 48395 Sukarrieta. Bizkaia. Basque Country (Spain).

*[mbasterretxea@azti.es](mailto:mbasterretxea@azti.es)*

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# 1. Introduction

The "*Fletán Artico 2012*" autumn survey is the continuation of the Spanish survey series that Azti-Tecnalia started 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 gillnet 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.
- 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 2012* 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* y *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 codend 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.
  - o Lateral section (8,4 m), with 18” rubber discs separated by two dividers and eight 14” sweepers..
  - o 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 15<sup>th</sup> September to 1<sup>st</sup> October. 49 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.

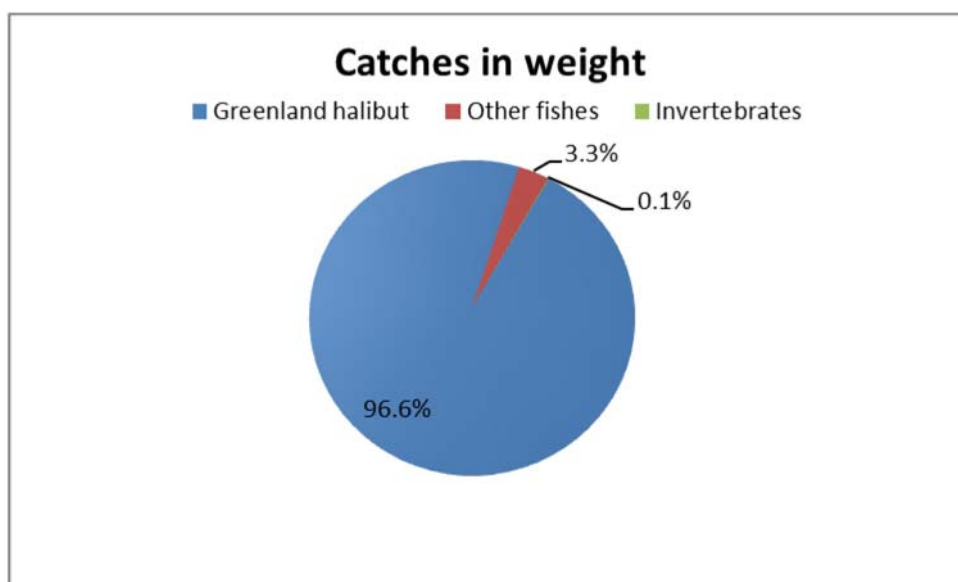
Catches were sorted and weighted by species. Greenland halibut and principal accompanying species were also measured in length. Otoliths and stomach contents were also collected.

### 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.

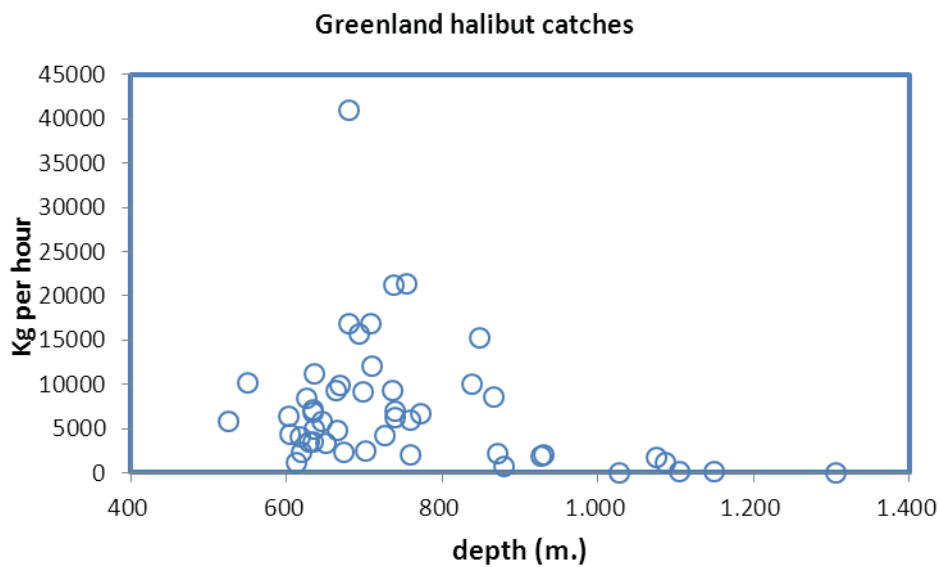
As it is shown in the following figure, 96.6 % of the total catches in weight correspond to Greenland halibut, while the rest of fishes and invertebrates suppose 3.3 % and 0.1 % respectively.



**Figure 1.** Greenland halibut percentage in the catches during *Fletán Ártico 2012* Survey

Table 2, included in Annex I, shows all species catches by haul. Greenland halibut was the principal species, with 178606.5 kg captured. Cod (2279.98 kg), redfish (973.45kg), and wolffish (791.47kg) were the main accompanying species.

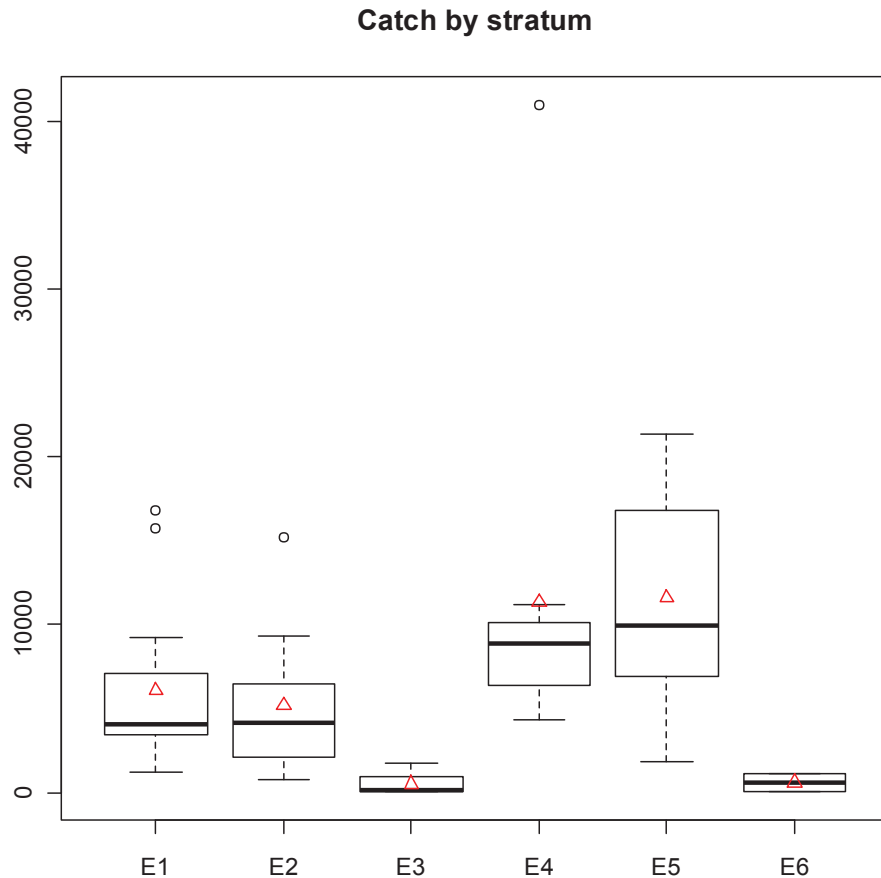
The main Greenland halibut catches were recorded in depths between 600 and 800 meters, reaching its maximum values between 650 and 750 meters depth (figure 2). Below the 1000 meters deep, catches of halibut were scarce, being under 300kg all of them.



**Figure 2.** Greenland halibut catches in relation to depth, during *Campaña Fletán Ártico 2012 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. (Mean (▲), median (—) and percentiles 25 & 75).

Figures 5, 6, 7, 8, 9, and 10 of annex II, show the maps of the catches by haul of the main accompanying species.

None of them presents a clear distribution pattern in relation to the latitude except from the redfish that appears mostly in the southern latitudes.

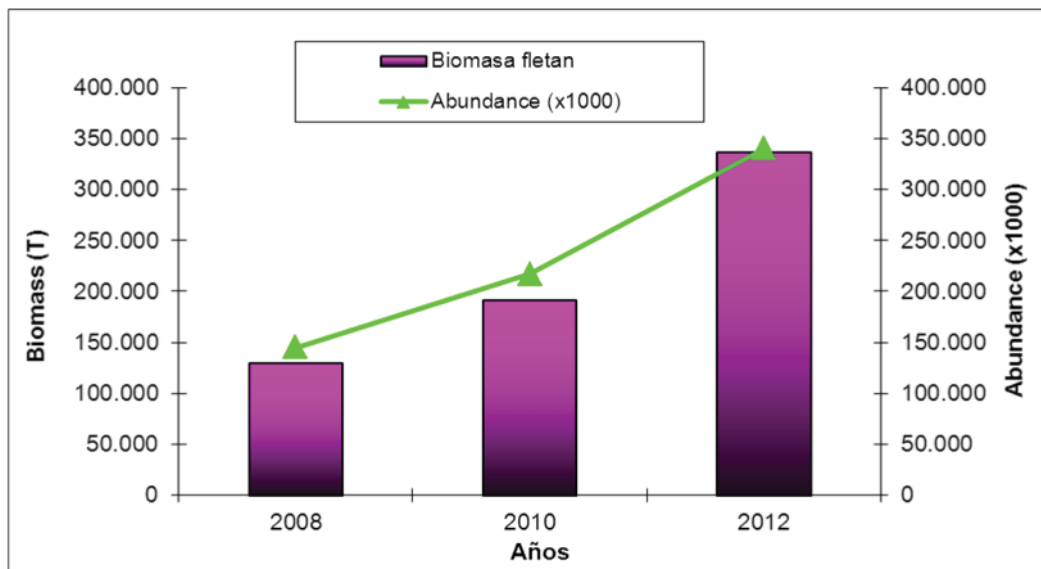
### 3.2 Greenland halibut biomass and abundance

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

The estimated Greenland halibut biomass in this survey was 336.543 ton and the abundance, 339.697 (x1000) individuals. This supposes an increase of 75.7% in biomass and 57 % in



abundance, comparing with last October survey in 2010. It has to be pointed out that with the purpose of comparing data, no survey was deployed in autumn during 2009 and 2011.



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

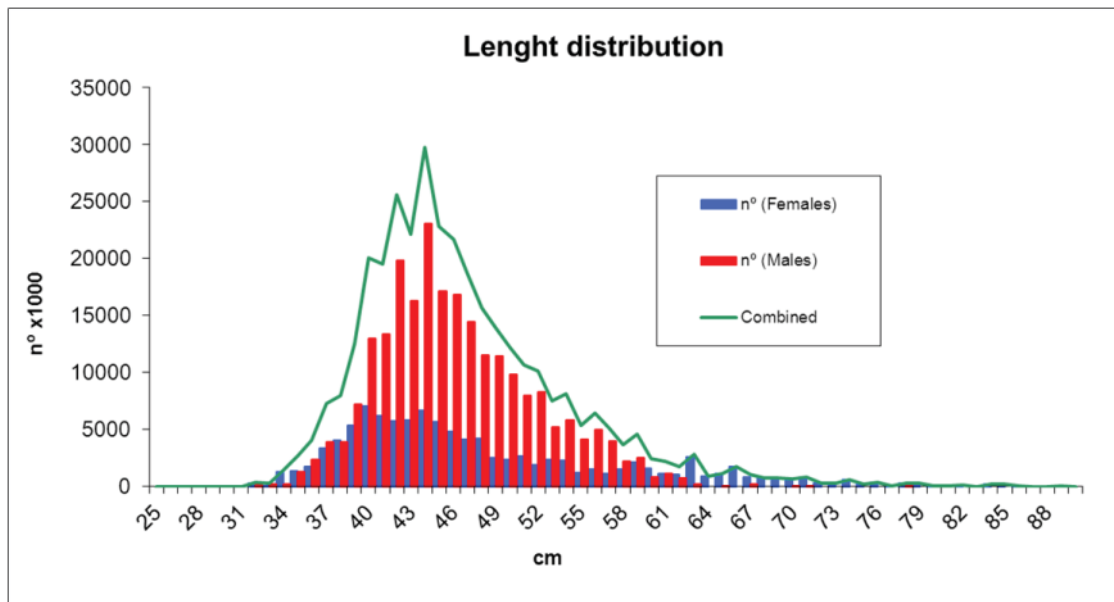
Table 3 included in the annex I, shows the biomass and abundance values by stratum.

### 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.

### 3.4 Length distribution

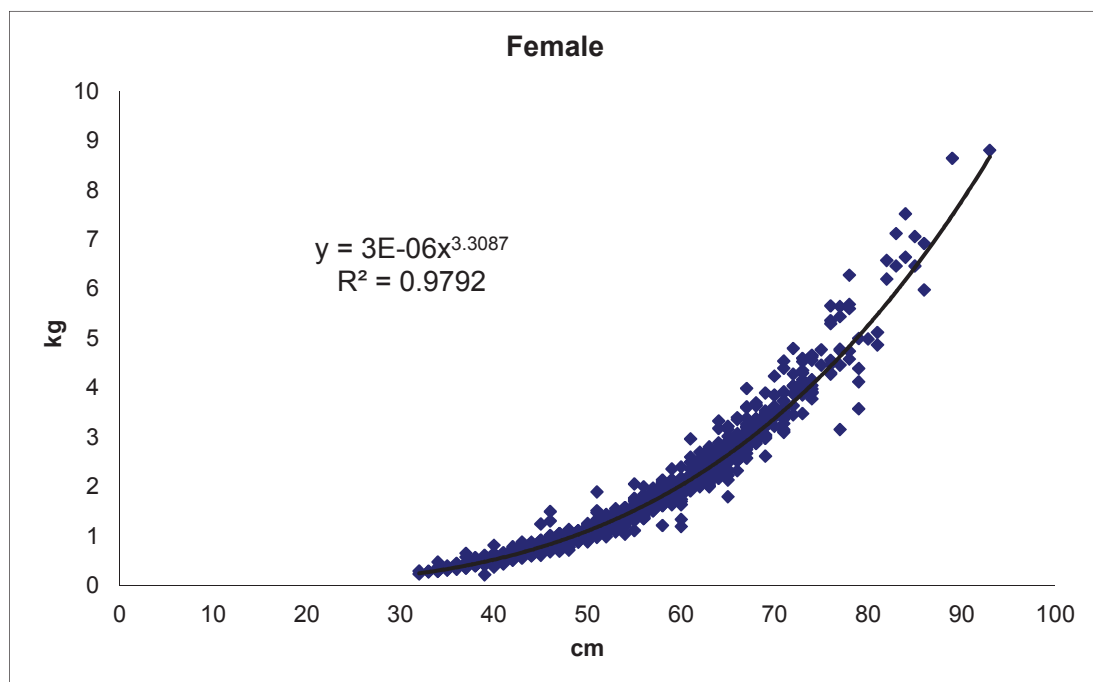
The population's structure was similar to the described in previous surveys (Ruiz J., *et al.*, 2009). (Paz X., *et al.*, 2006). Length range for both sexes was from 30 cm to 100 cm. As in previous cruises, the male proportion was higher, 67 % of males versus 33 % females.



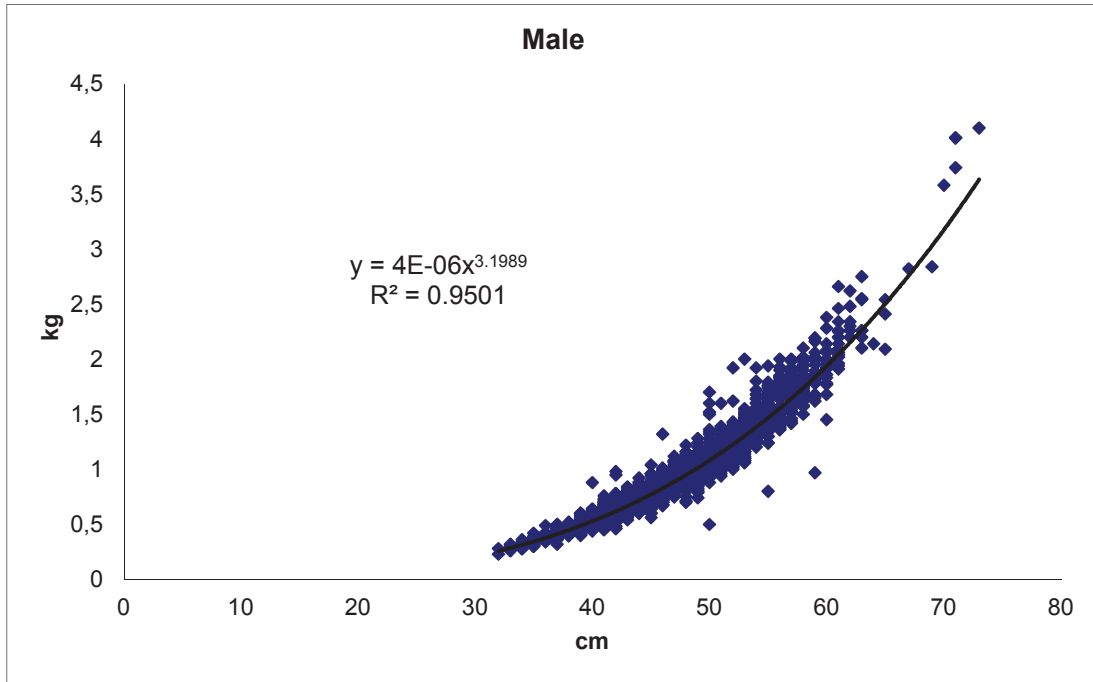
**Figure 5.** Greenland halibut length distribution in Svalbard

#### 4.5 Length – weight relationship

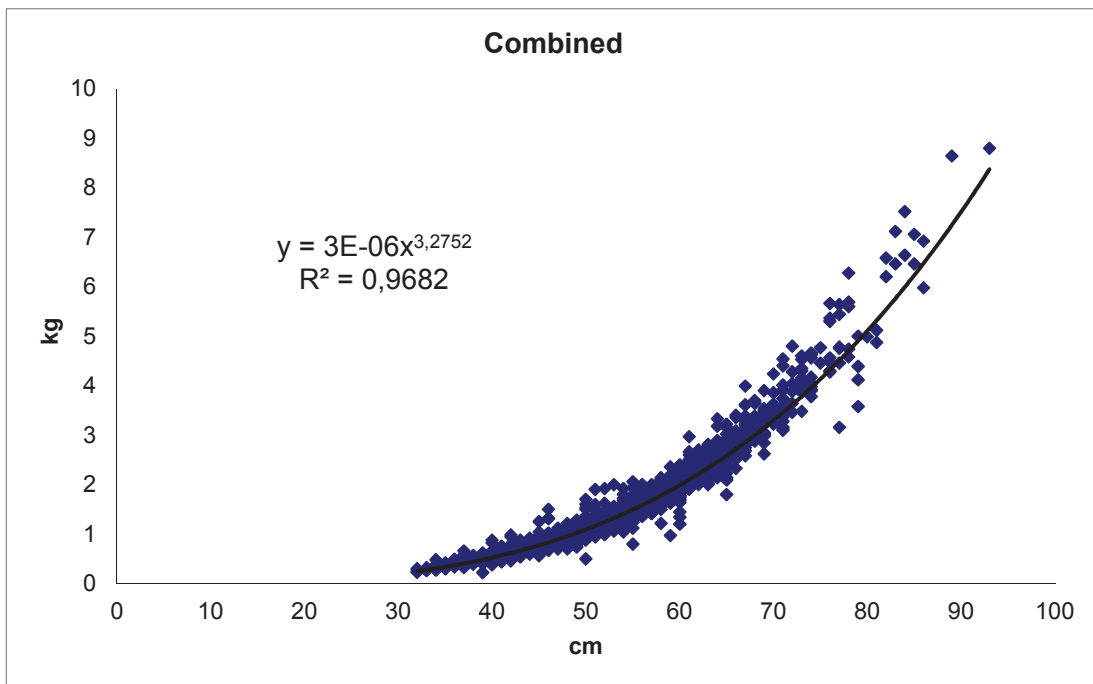
Figures 6, 7, and 8, show the Greenland halibut length – weight relationship, separated by sexes, and combined.



**Figure 6.** Length – weight relationship (females).



**Figure 7.** Length – weight relationship (Males).



**Figure 8.** Length – weight relationship (sexes combined).

## 4. CONCLUSION

Main conclusions derived from the results obtained during the *Campaña Fletán Ártico 2012* Survey:

- Positive trend in the stock of Greenland halibut (*Reinhardtius hippoglossoides*) in the Archipelago of Svalbard continues, as the increase in the biomass and abundance shows.
- 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 (Mugerza E., *et al*, 2008. 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.
- In general, after 3 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. This work is expected to be carried out in the future as data series is getting longer.

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## **ANNEX I: TABLES Campaña Fletán Ártico 2011**

**Table 1.** Haul characteristics during *Campaña Fletán Ártico 2012 Survey*. (na: not available)

Haul	Strata	Valid	Depth larg (m)	Depth vir (m)	Latitud largada		Longitud largada		Latitud virada		Longitud virada		Speed (knots)	Doors opening (m)
					Grad	Min	Grad	Min	Grad	Min	Grad	Min		
1	6	si	1087	1108	73	46,8	15	1,49	73	48,09	15	3,88	3,4	315
2	5	si	525	622	73	46,16	15	30,94	73	47,45	15	28,17	2,9	255
3	5	si	738	751	73	48	15	23,71	73	49,94	15	26,23	3	287
4	5	si	928	924	73	52,15	15	24,15	73	53,44	15	28	3,2	310
5	5	si	708	723	73	52,41	15	37,09	73	53,71	15	40,6	3,2	277
6	4	si	550	530	73	54,38	15	48,29	73	56,06	15	53	3,2	310
7	4	si	664	618	74	31,1	16	9,11	74	32,57	16	5,62	3,1	250
8	5	si	710	718	74	33,64	16	4,18	74	35,04	16	0,08	3,2	272
9	5	si	866	853	74	36,59	15	47,03	74	35,42	15	50,18	2,9	299
10	4	si	626	641	75	5,48	15	23,31	75	4,12	15	27,42	3	294
11	4	si	605	610	75	7,17	15	18,24	75	8,4	15	11,5	3,3	297
12	4	si	603	606	75	10,29	15	3,49	75	11,65	14	58,75	3,1	285
13	5	si	740	733	75	23,51	14	11,75	75	24,96	14	9,5	3,1	288
14	6	si	1305	1303	75	26,54	13	24,01	75	28,04	13	22,73	3,2	313
15	5	si	839	808	75	31,71	13	54,1	75	33,16	13	54,36	3	297
16	4	si	634	644	75	45,15	14	0,07	75	47	14	0,16	3,7	289
17	5	si	755	751	75	53,01	13	54,53	75	54,81	13	56,96	3,4	288
18	1	si	635	639	76	51,44	12	48,57	76	52,71	12	43,13	3	291
19	2	si	849	816	76	54,3	12	28,55	76	55,93	12	22,4	3,1	310
20	3		1105	1106	76	41,45	12	56,36	76	53,32	12	53,62		307
21	2	si	702	703	76	59,35	12	12,02	77	0,28	12	5,21	3,2	294
22	1	si	617	630	77	2,87	11	55,61	77	4,03	11	49,7	3,3	259
23	1	si	630	627	77	7,88	11	36,65	77	9,21	11	32,63	3,2	273
24	1	si	634	645	77	20,46	11	15,81	77	22,12	11	14,64	3,1	274
25	2	si	760	772	77	23,12	11	9	77	24,54	11	7,47	3,1	309
26	2	si	930	959	77	30,58	10	49,25	77	32,23	10	44,57	3,1	301
27	1	si	620	610	77	38,62	10	38,03	77	39,98	10	32,64	3,1	298
28	2	si	872	893	77	41,98	10	12,6	77	42,95	10	7,33	3	295
29	1	si	613	597	77	44,53	10	12,39	77	46,32	10	5,5	3	285
30	3	si	1149	1139	77	50,32	9	22,39	77	51,7	9	18,7	3	315
31	1	si	636	640	77	56,67	9	29,71	77	58,33	9	26,59	3,1	289
32	1	si	651	638	78	5,66	9	18,74	78	7,18	9	17,61	3,1	269
33	1	si	698	688	78	11,86	9	14,72	78	13,61	9	14,6	3,1	282
34	3	si	1076	1040	78	22,36	9	7,73	78	23,83	9	6,41	3	281
35	1	si	674	660	78	32,66	9	4,5	78	34,04	8	59,36	3	275
36	2	si	736	744	78	43,89	8	30,03	78	45,27	8	25,29	3,1	288
37	2	si	879	896	79	26,51	7	31,87	79	27,74	7	28,81	3,1	279
38	2	si	726	718	79	53,67	7	22,26	79	55,11	7	18,58	3,1	286
39	2	si	760	765	80	1,87	6	37,64	80	0,34	6	44,77	3	295
40	3	si	1028	1086	79	20,1	7	27,01	79	18,6	7	26,79	3	277
41	1	si	666	651	79	10,49	8	12,12	79	8,91	8	15,05	3	398
42	2	si	740	747	78	57,67	8	21,5	78	55,94	8	20,66	3,1	295
43	2	si	773	763	78	28,17	9	14,54	78	26,71	9	17,94	3,1	275
44	1	si	694	690	77	51,15	9	39,63	77	50,92	9	44,64	3,1	279
45	1	si	680	681	76	46,56	13	2,67	76	45,17	13	6,33	3	281
46	4	si	645	650	75	57,49	14	3,42	75	55,92	14	2,31	3	261
47	4	si	636	644	75	48,98	14	0,15	75	47,57	14	0,52	3	284
48	4	si	668	627	74	57,92	15	34,82	74	56,17	15	34,6	3	292
49	4	si	681	680	74	54,53	15	31,86	74	52,92	15	31,49	3	269

**Table 2.** Catch by haul (Kg) during *Campaña Fletán Ártico 2012 Survey*.

Haul	<i>Reinhardtius hippoglossoides</i>	<i>Sebastes mentell</i>	<i>Gadus morhua</i>	<i>Anarhichas denticulatus</i>	<i>Lycodes smalk</i>	<i>Amolyraja radiata</i>	<i>Amolyraja lipetborei</i>	<i>Echthyraja spinicauda</i>	<i>Macrourus bergii</i>	<i>Micromesistius pouassoni</i>	<i>Hippoglossoides platessoides</i>	<i>Argentina silus</i>	<i>Anarhichas lupus</i>	<i>Centunculus microce</i>	<i>Sebastes marinus</i>	<i>Myoxo molit</i>	<i>Gaidropsarus argentatus</i>	<i>Anarhichas minck</i>	<i>Fajella fyllea</i>	<i>Careproctus reinhardt</i>	<i>Lycodes spp</i>	Invertebrates
1	582,1				14	1,1										0,3						0,1
2	2817,7	66,7	51,1							14,1	0,4	30,1										
3	10604,0	13,6			3,2	4,2			3,6			1,5	14,8	0,2								
4	915,5				1,5	7,5								0,1								1,7
5	8412,0		22,2	2,6	3,7	6,0	3,5		1,9	1,7		17,5		0,4	28,9							1,7
6	5078,3	168,8	69,3	6,2	4,9	3,4	4,0		8,6	19,8	1,0	51,2	70,9		3,1							
7	4680,0	18,8	37,1	7,1									2,7				1,7					
8	6048,0			4,6	3,4	1,3	2,6		1,0	2,4	0,3	1,1			33,4							
9	4321,0				4,0	186,1		1,9	2,1					0,3								0,4
10	4203,0	24,3	37,7	6,2		3,8	1,1		11,5	1,9	1,1	4,6		4,5								0,2
11	2184,5	15,3	16,7	18,7	7,6				7,8	0,8	0,2	1,7										0,6
12	3210,1	58,3	53,3	2,8	7,9	3,2		4,6	5,5	12,5		1,1	70,7									
13	3465,0	20,6			4,4	9,3			3,1	0,5				0,2			0,5					
14	21,0	1,1			0,3	14,0																
15	4991,0	5,2			0,8	10,7			2,0								0,3					1,0
16	3404,0	95,7	26,4	14,7	3,0				8,0	5,4		0,6		0,1								
17	10692,0	47,1	4,4		0,8	6,8	1,4		19,3	0,5				0,3								
18	1748,9		149,0	11,0	4,4		2,3	0,2	8,0	18,8	4,3		14,3				1,1					1,6
19	7601,0	5,6		3,2	5,4	29,3	0,3	2,7	11,3	1,5	0,6											
20	80,6				0,5	6,2					0,3						0,3					
21	1242,7	1,4			6,7	7,1	3,3		1,2	4,7			23,8									1,0
22	2018,3	12,7	19,1	31,7	4,0				6,5	8,4	3,4											
23	1750,6	44,8	180,5		6,4	10,1	4,5	3,7	10,7	10,4	4,0		35,4	0,1								2,5
24	3546,0	138,4	725,0		5,3		10,4	10,2	27,8	21,5	8,0		59,4									5,0
25	2987,0	15,5	34,0		2,8	13,9	4,0		5,7	3,0	1,3											7,2
26	1025,8	6,2	8,7		5,7	12,5	0,7		1,7	0,3												8,9
27	1131,7	15,8	336,1	19,8	5,0	9,2	13,6		4,9	22,9	10,1		139,9									1,6
28	1087,8	6,9	20,7	2,4	2,4	26,2			1,6	4,6			25,2	0,1			0,1					29,3
29	610,3	11,4	201,9	9,4	11,6	3,2	10,3		5,0	16,9	17,4		197,1									7,0
30	46,0				0,8					0,5							0,6					0,0
31	2476,2	22,6	91,9	9,9	15,1	18,3	8,0		13,4	21,2	19,2		37,2	0,4			0,6					12,5
32	1705,4	0,4	9,0	1,7	2,2	3,2	2,7		4,7	7,3	2,6		13,6									0,6
33	4597,0	9,2	34,2		3,6	7,2	7,3		26,6	6,5	1,8		30,1									10,7
34	855,2	0,8			4,5	10,9	2,1		0,9					0,1					0,5			0,9
35	1187,9	0,7			1,3	7,9	4,8		13,0	1,1	1,1		33,3									1,6
36	4669,0	4,2			0,4	26,3	4,0		37,7	0,2												1,1
37	373,0				0,3	1,8																0,2
38	2079,1	3,0	86,2		16,8	0,3	1,5	2,0	0,8	0,3							0,3			0,2		32,9
39	996,1	12,6			5,7									0,1						12,6		7,8
40	21,0				1,5	4,3															0,0	0,6
41	2426,6	1,1	6,2	2,4	1,7	5,2	3,2		3,9	1,9	4,2			0,8								1,4
42	3094,2	0,7			5,8	1,3	0,3	1,3		12,3	1,8		6,1				0,3					
43	3375,0				1,5	11,6	4,4	0,1	21,1	1,2												1,0
44	7860,0	6,7		2,5	2,6			2,3	6,8	14,6	14,5	0,7		15,6						0,1		0,3
45	8424,0	7,0	7,2			16,3	0,3		25,8	1,3												1,0
46	2884,0	54,3	40,8	9,3	6,7				3,3	3,7				0,1								0,4
47	5607,0	45,5			7,6		0,6	0,6	3,6	1,1			1,5									0,2
48	4976,0	2,9	8,1	2,8	11,4		2,3		11,2	2,1	0,6	0,5										
49	20494,0	11,0	3,2		17,1		2,3	3,6	51,1		2,1	0,7										



**Table3.** Greenland halibut biomass (Tn) and abundance (x1000) by stratum.

<b>Estrato</b>	<b>Total área</b>	<b>Nº Hauls</b>	<b>Swept Area</b>	<b>Catch (kg)</b>	<b>Biomás (t)</b>	<b>Catch (nº)</b>	<b>Abundance (x1000)</b>
1	702	13	0,53	39.483	52.556	37.906	50.457
2	1263	11	0,46	28.531	79.194	32.879	91.263
3	2693	4	0,16	1.003	16.578	1.207	19.953
4	488	10	0,41	56.721	68.175	51.075	61.389
5	761	9	0,36	52.266	109.376	51.042	106.706
6	1672	2	0,09	603	10.665	561	9.928
<b>Total</b>	<b>7579</b>	<b>49</b>	<b>2,01</b>	<b>178.607</b>	<b>336.543</b>	<b>174.670</b>	<b>339.697</b>

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

<b>Estrato</b>	<b>Total area</b>	<b>Nº Hauls</b>	<b>Swept Area</b>	<b>Catch (kg)</b>	<b>Biomás (t)</b>
1	702	13	0,53	1.760	2.343
2	1.263	11	0,46	150	415
3	2.693	4	0,16		
4	488	10	0,41	293	352
5	761	9	0,36	78	162
6	1.672	2	0,09		
<b>Total</b>	<b>7.579</b>	<b>49</b>	<b>2,01</b>	<b>2.280</b>	<b>3.272</b>

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

<b>Estrato</b>	<b>Total area</b>	<b>Nº Hauls</b>	<b>Swept Area</b>	<b>Catch (kg)</b>	<b>Biomás (t)</b>
1	702	13	0,53	89	117.829
2	1.263	11	0,46	11	31.477
3	2.693	4	0,16		0
4	488	10	0,41	68	81.468
5	761	9	0,36	7	14.927
6	1.672	2	0,09		0
<b>Total</b>	<b>7579</b>	<b>49</b>	<b>2,01</b>	<b>175</b>	<b>245.700</b>

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

<b>Estrato</b>	<b>Total area</b>	<b>N° Hauls</b>	<b>Swept Area</b>	<b>Catch (kg)</b>	<b>Biomass (t)</b>
1	702	13	0,53	153	203.260
2	1.263	11	0,46	18	49.242
3	2.693	4	0,16	1	13.226
4	488	10	0,41	47	56.840
5	761	9	0,36	19	40.118
6	1.672	2	0,09		0
<b>Total</b>	<b>7.579</b>	<b>49</b>	<b>2,01</b>	<b>238</b>	<b>362.685</b>

**Table 7.** Rough head grenadier biomass (Tn) by strata in the Svalbard Archipelago.

<b>Estrato</b>	<b>Total area</b>	<b>N° Hauls</b>	<b>Swept Area</b>	<b>Catch (kg)</b>	<b>Biomass (t)</b>
1	702	13	0,53	165	219.326
2	1.263	11	0,46	93	259.337
3	2.693	4	0,16	1	14.548
4	488	10	0,41	111	132.875
5	761	9	0,36	33	68.989
6	1.672	2	0,09		0
<b>Total</b>	<b>7.579</b>	<b>49</b>	<b>2,01</b>	<b>403</b>	<b>695.075</b>

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

<b>Estrato</b>	<b>Total area</b>	<b>N° Hauls</b>	<b>Swept Area</b>	<b>Catch (kg)</b>	<b>Biomass (t)</b>
1	702	13	0,53	73	96.878
2	1.263	11	0,46	20	54.238
3	2.693	4	0,16	2	34.387
4	488	10	0,41	10	12.308
5	761	9	0,36	7	15.637
6	1.672	2	0,09		0
<b>Total</b>	<b>7.579</b>	<b>49</b>	<b>2,01</b>	<b>112</b>	<b>213.448</b>

**Table 9.** Thorny skate biomass (Tn) by strata in the Svalbard Archipelago.

<b>Estrato</b>	<b>Total area</b>	<b>Nº Hauls</b>	<b>Swept Area</b>	<b>Catch (kg)</b>	<b>Biomass (t)</b>
1	702	13	0,53	73	96.771
2	1.263	11	0,46	129	358.569
3	2.693	4	0,16	21	353.790
4	488	10	0,41	10	12.572
5	761	9	0,36	232	484.801
6	1.672	2	0,09	15	268.082
<b>Total</b>	<b>7.579</b>	<b>49</b>	<b>2,01</b>	<b>481</b>	<b>1.574.586</b>

**Table 10.** Redfish biomass (Tn) by strata in the Svalbard Archipelago.

<b>Estrato</b>	<b>Total area</b>	<b>Nº Hauls</b>	<b>Swept Area</b>	<b>Catch (kg)</b>	<b>Biomass (t)</b>
1	702	13	0,53	271	360.370
2	1.263	11	0,46	56	156.024
3	2.693	4	0,16	1	13.226
4	488	10	0,41	495	594.756
5	761	9	0,36	153	320.253
6	1.672	2	0,09	1	19.452
<b>Total</b>	<b>7.579</b>	<b>49</b>	<b>2,01</b>	<b>977</b>	<b>1.464.081</b>

## **6. ANNEX II: FIGURES Campaña Fletán Ártico 2011**

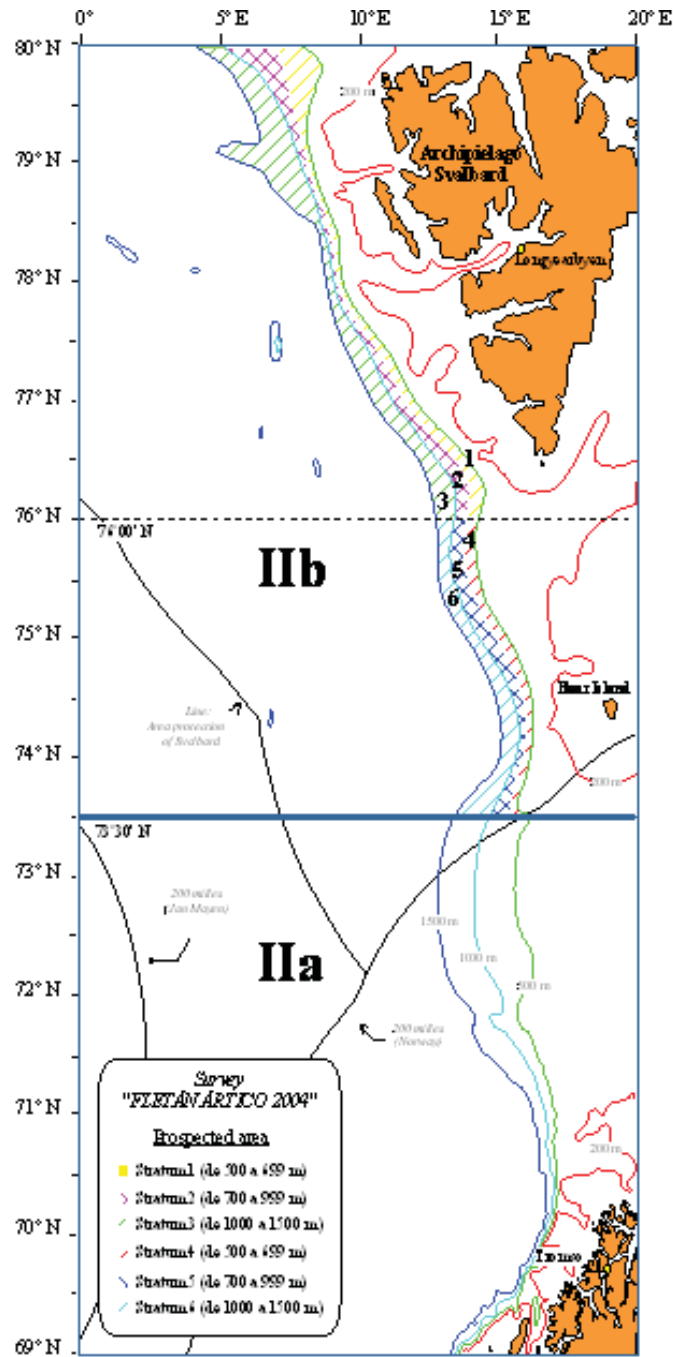
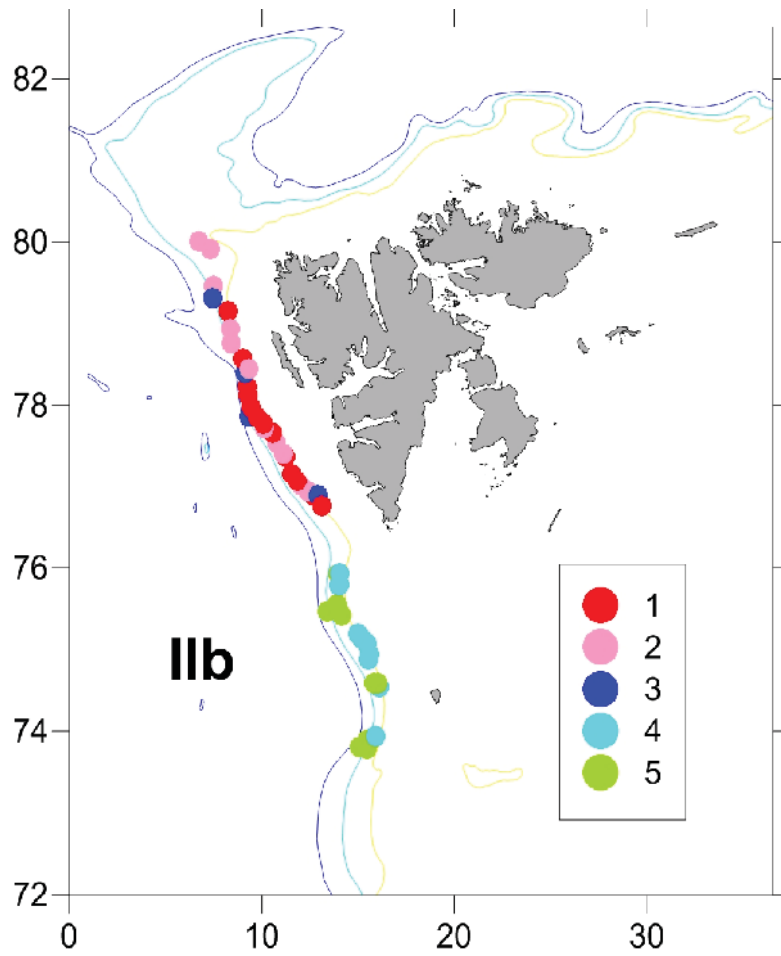


Figure 1. Map of the area showing the six considered strata and its ranges of depth.



**Figure 2.** Map showing the positions of the hauls by strata made during the *Campaña Fletán Ártico 2012* Survey.



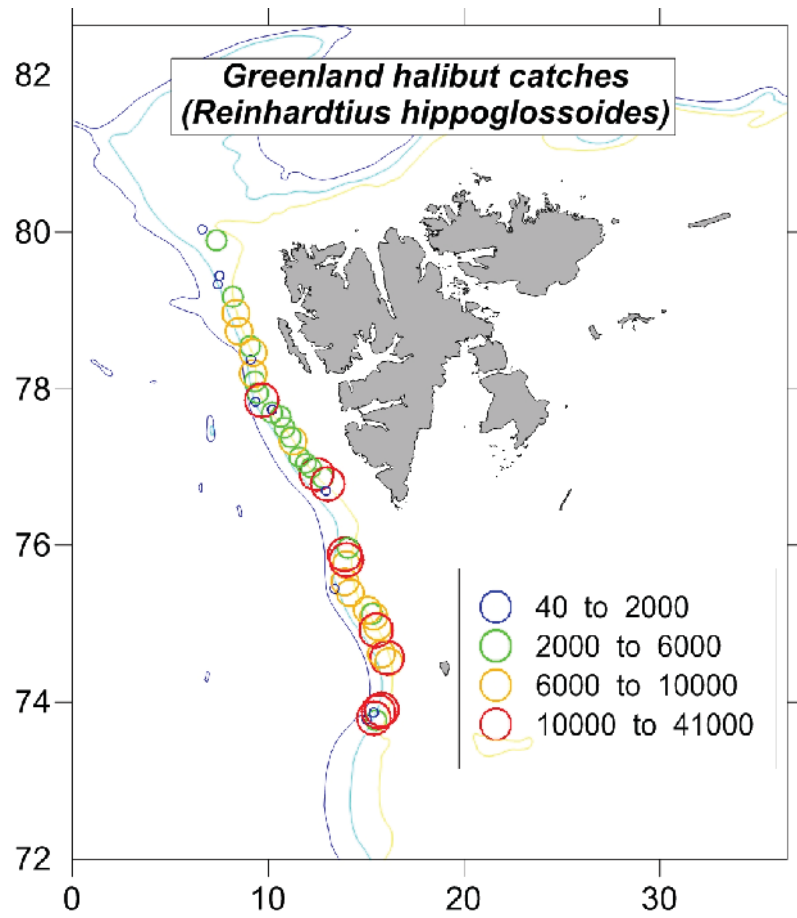


Figure 4. Distribution of the **Greenland halibut** catches (Kg/h).



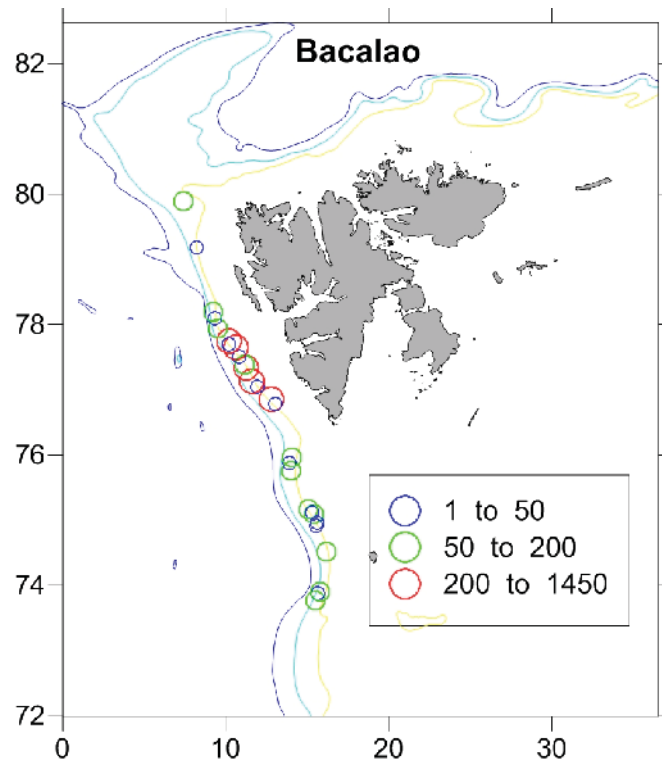


Figure5. Distribution of the Cod catches (Kg/h).

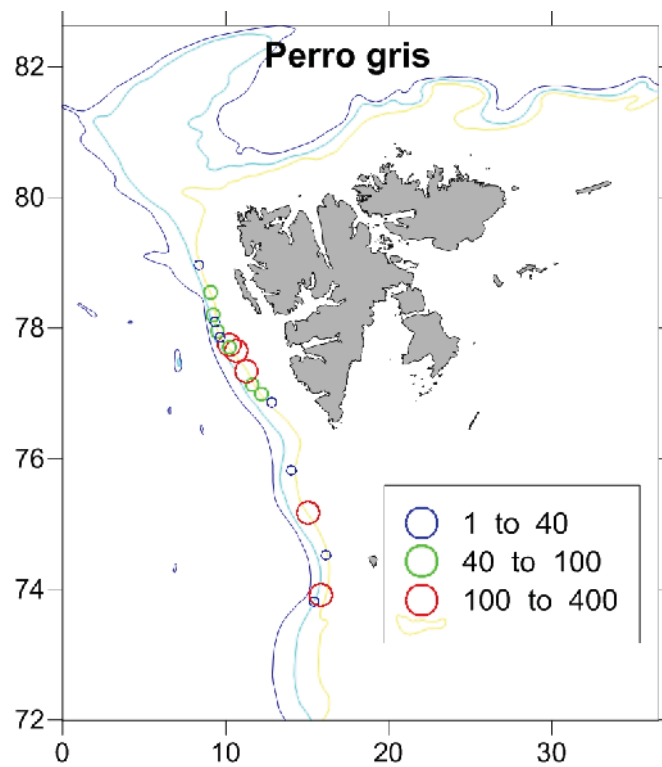


Figure 6. Distribution of the wolffish catches (Kg/h)

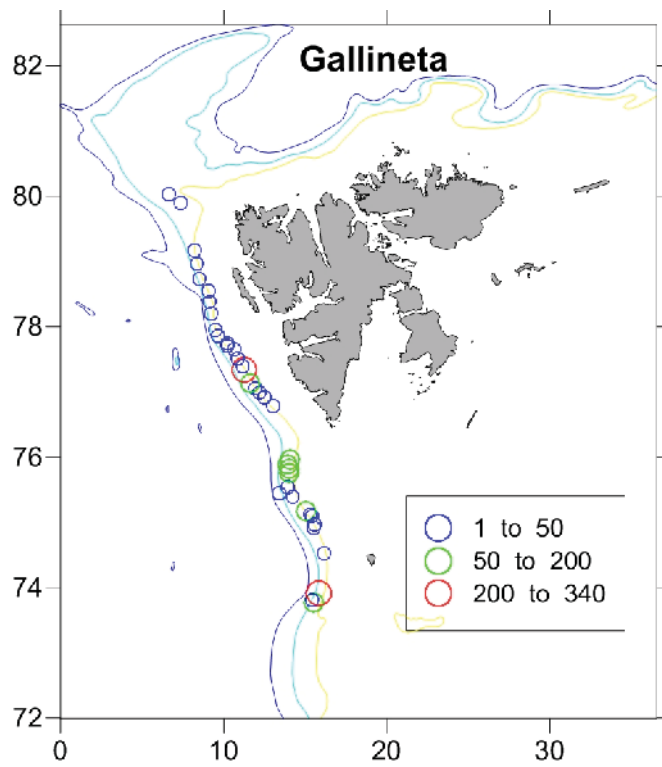


Figure 7. Distribution of the **redfish** catches (Kg/h).

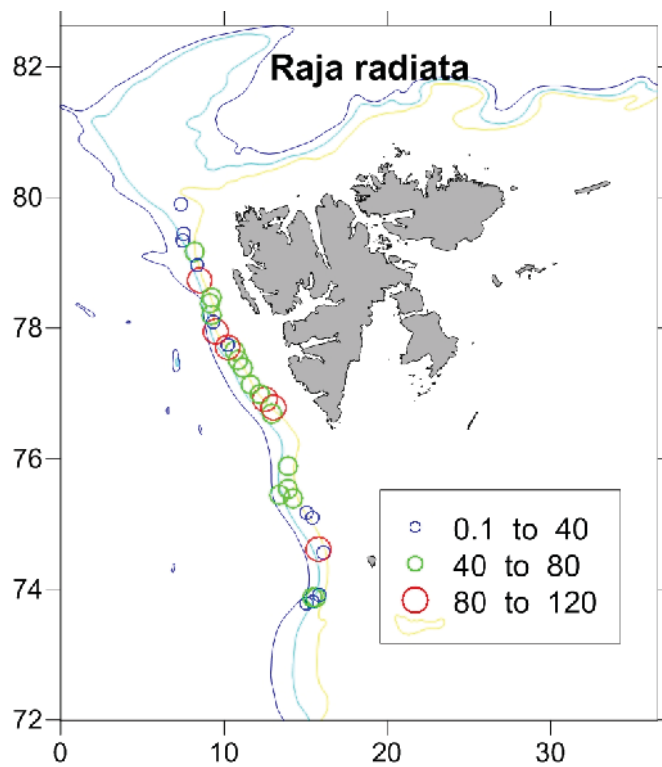


Figure 8. Distribution of the **thorny skate** catches (Kg/h)

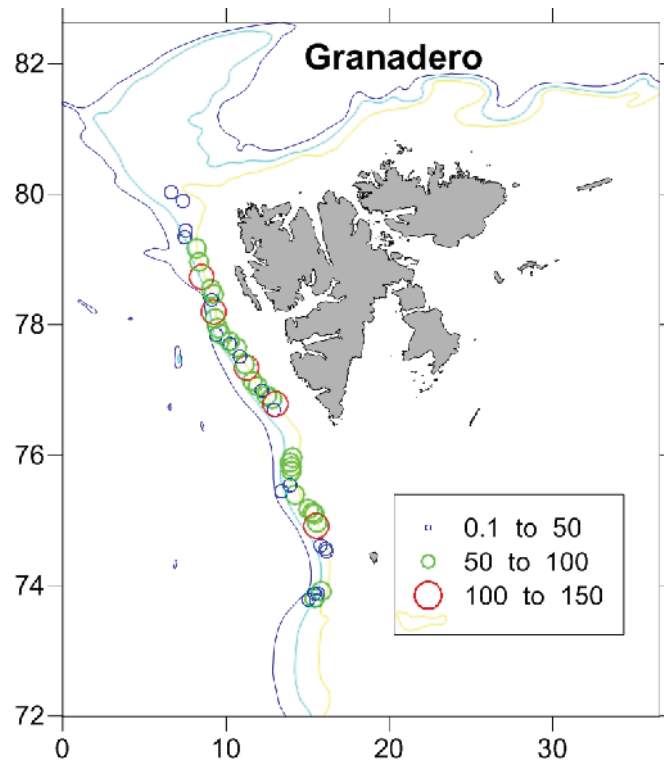


Figure 9. Distribution of the **grenadier** catches (Kg/h)

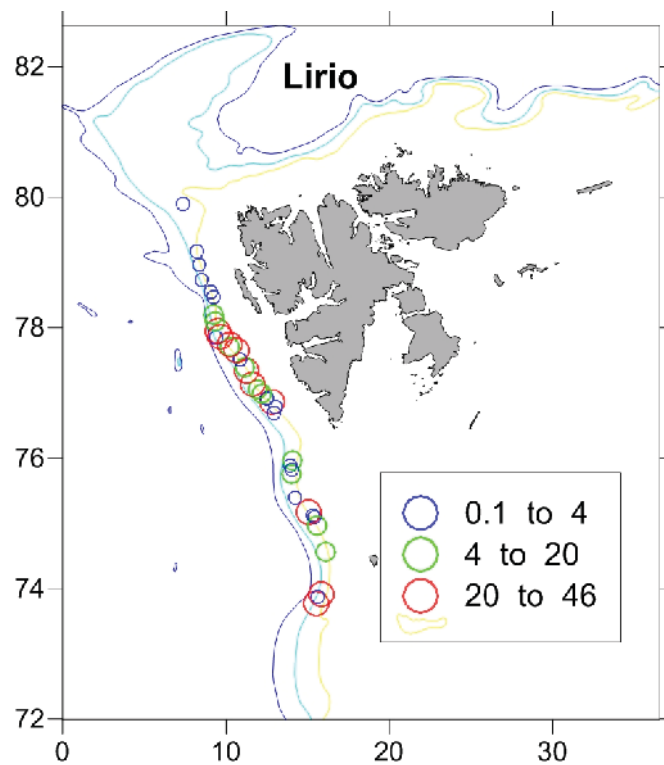


Figure 10. Distribution of the **blue whiting** catches (Kg/h)