

# **Report of the *Fletán Ártico 2010* bottom trawl autumn survey in the Slope of Svalbard**

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# 1. Introduction

The "*Fletán Artico 2010*" survey is the continuation of the Spanish survey series that the Spanish Institute of Oceanography (IEO) has been carrying out in autumn during 1997-2005, 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. In 2007 two surveys were carried out, one in autumn, continuing the survey series, and another one in spring, starting a new survey series. From 2008 onwards, one survey has been conducted each year, alternating spring and autumn series. This report shows the principal results obtained during the 2010 autumn survey.

The Arctic Fisheries Working Group (AFWG), group within ICES in charge of the advice for this stock, states, that "*the stock has remained at a relatively low size in the last 25 years at catch levels of 15 000 25 000 t. In order to increase the SSB, catches should be kept well below that range. Catches should be below 13 000 t as advised since 2003; this is the level below which SSB has increased in the past*". Additionally, ICES notes that the evaluation of this stock is uncertain due to age-reading problems and lack of contrast in the data. The age-reading issue is being addressed and should be resolved in the not too distant future. Corrections to the whole time-series are required (ICES, 2010).

The 38<sup>th</sup> Session of the Joint Norwegian-Russian Fisheries Commission in 2009 decided to cancel the ban against targeted Greenland halibut fishery and established a TAC at 15 000 t for next three years (2010-2012). The TAC was allocated between Norway, Russia and other countries with shares of 51%, 45% and 4% respectively.

The main aim is to obtain indices of abundance 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 obtain information about Greenland halibut feeding behaviour.
- Likewise, information will be obtained on accompanying fish fauna.

## 2. Survey design and methods

### 2.1 Vessel specifications

*Eirado do Costal* was the selected vessel to conduct *Fletan Ártico 2010* survey in October, 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 140mm 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 5<sup>th</sup> to 19<sup>th</sup> October. 73 hauls were carried out. Table 1, included in the annex I, shows specific data by haul.

As in 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 80° 00 ' N (Figure 1, annex II). For the sampling scheme, the stratification designed in 1994 was used. Next table shows latitude and depth range limits for each stratum, as well as the surface area and the number of valid hauls made.

<b>Strata</b>	<b>Latitude</b>	<b>Depth (m)</b>	<b>Surface Square nautical miles</b>	<b>n° hauls</b>
1	76° 00' - 81° 00' N	500- 699	702	19
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	20
5	73° 30' - 76° 00' N	700- 999	761	17
6	73° 30' - 76° 00' N	1000-1500	1672	2
	73° 30' - 81° 00' N	500-1500	7579	73

In order to study the feeding of the Greenland halibut, some extra hauls were made for intensive study of stomach contents.

The duration of each haul was 30 minutes, since the moment when the net was on the bottom until the haul back (during rough sea conditions, due to safety reasons, haul duration was increased to 60 minutes, reducing the number of fishing operations). 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 subsamples were also measured. Otoliths and stomach contents were collected for the Greenland halibut.

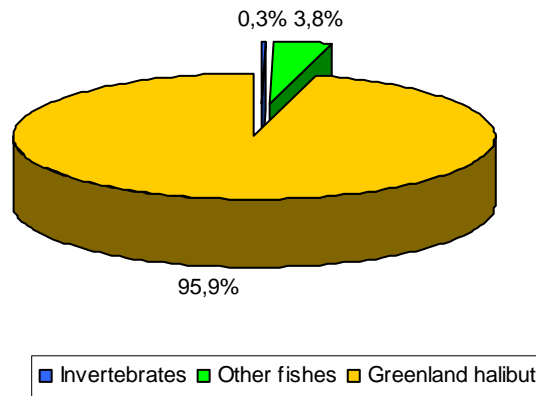
### 3. Results

#### 3.1 Catches

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

As the following figure shows, 95,9 % of the total catch correspond to Greenland halibut, while the rest of fishes and invertebrates suppose 3,8 % and 0,3 % respectively.

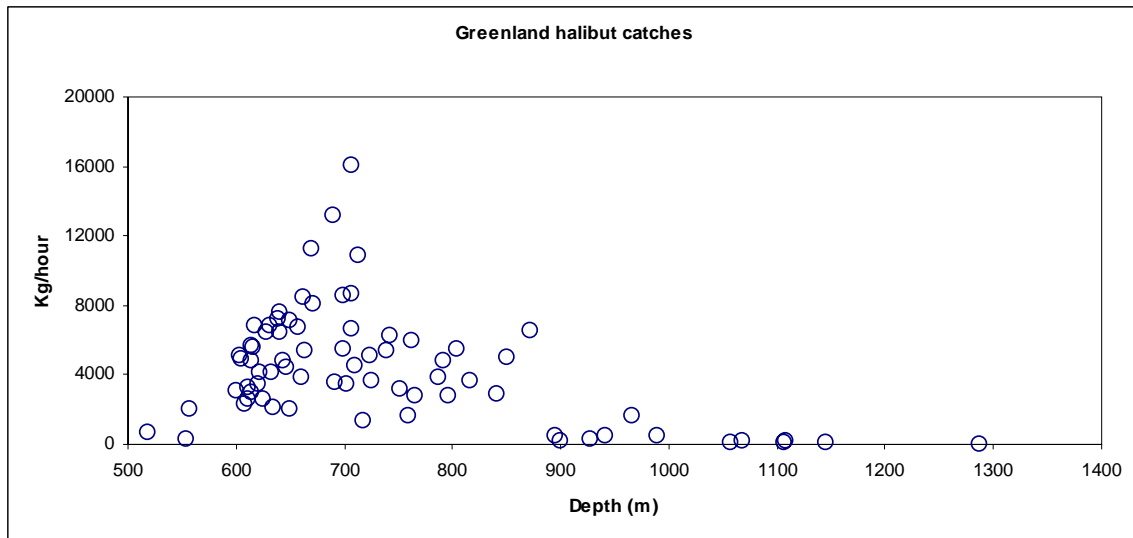
**Grenland halibut percentage in the catches**



**Graph1.** Greenland halibut percentage in the catches during *Fletán Ártico 2010* Survey

Table 2, included in annex I, shows all species catches by haul. Greenland halibut was the principal species, with 167861.59 Kg captured. Cod (1891.26 Kg), redfish (1015.14 Kg), wolffish (673.84 Kg), roughhead grenadier (677.75 Kg), and thorny skate (577.46 Kg) were the main accompanying species.

The main Greenland halibut catches were recorded in depths between 600 and 900 meters, reaching its maximum values around 700 meters depth (graph2). Above the 1000 meters deep, catches of halibut were scarce, being under 100kg/hour all of them.



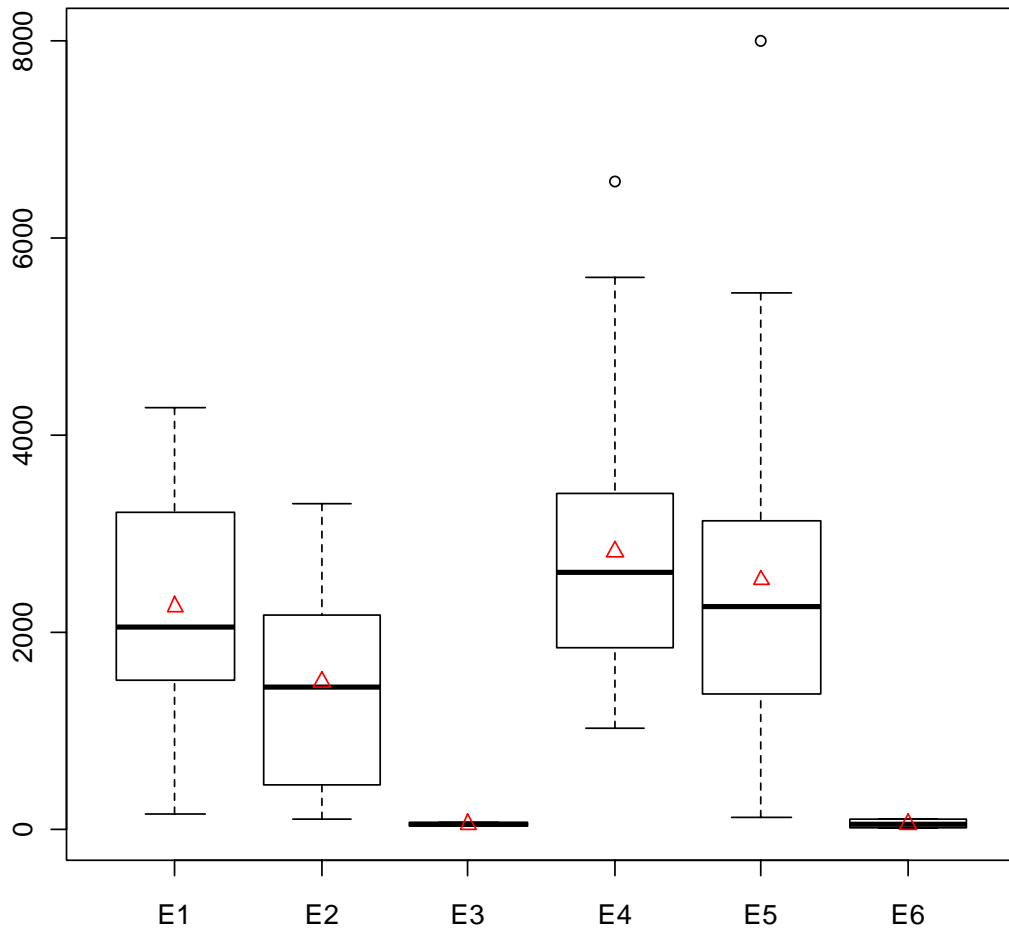
**Graph2.** Greenland halibut catches by hour in relation to depth, during *Campaña Fletán Ártico 2010 Survey*.

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. Further north the catches decrease, and above 79° N catches are really scarce in all depths (figure 4, annex II).

This means, that analyzing catches by stratum, as shown in graph 3, deeper strata, 3 and 6, would show lower concentration of Greenland halibut, while strata 4 and 5 (strata of the south, below 1000 meters), show greatest concentrations. In these strata of greater concentration, the variability was also higher, particularly in the strata 5.



### Catch by stratum



**Graph3.** Box Plot. Greenland halibut catches (Kg / 0,5 hours) by stratum. (Mean (▲), median (—) and percentiles 25 & 75).

Figures 5, 7, 9 and 11 of annex II, show the maps of the catches by haul of the main accompanying species (cod, wolffish, redfish and thorny skate), as well as their distribution in relation to the depth.

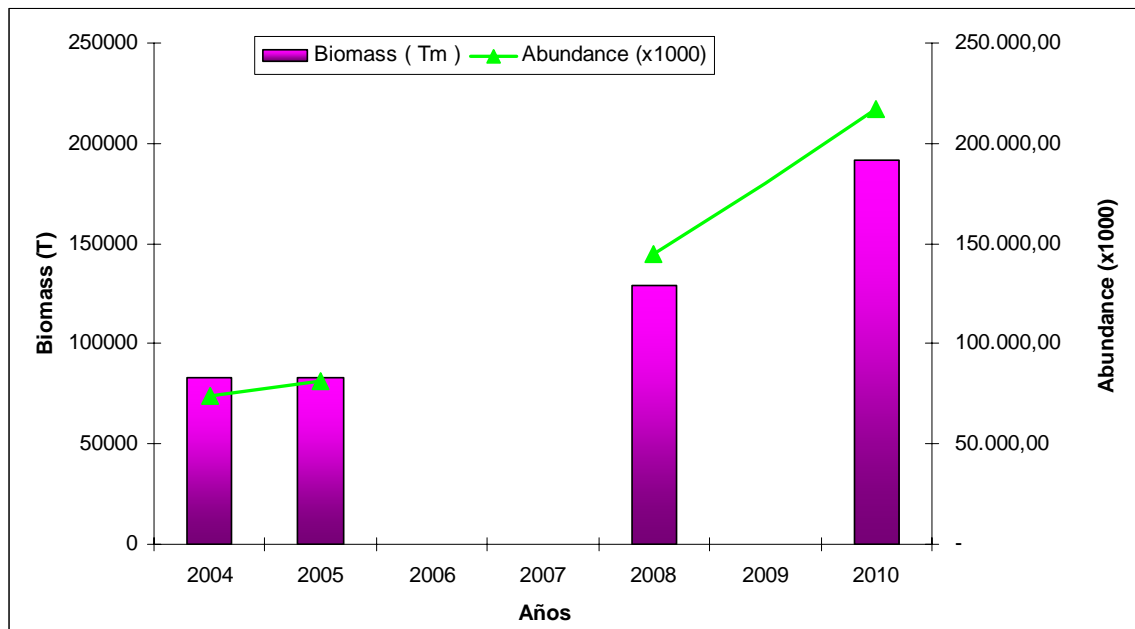
None of them presents a clear distribution pattern in relation to the latitude. Cod, redfish and wolffish are concentrated mostly in shallower depths, around 600-700 meters. In the case of the thorny skate, it seems that the depth it is no limiting factor in the distribution (Figures 6, 8, 10 and 12 of annex II).

### 3.2 Greenland halibut biomass and abundance

The abundance and biomass was estimated with the Swept Area method, as in previous year. However, the estimation methodology used by IEO during the period 1997-2005 was different (Ruiz & Mugerza. 2009). This means that the comparison between the abundances estimated until 2005 and abundances estimated after 2008 must be made with prudence.

Graph 4 shows the Greenland halibut biomass and abundance values estimated during the “Fletán Ártico” autumn survey series. The Greenland halibut biomass estimated in 2010 is 191.509 tonnes, and the abundance, 216.731 (x1000) individuals. The positive trend in the series continues, an increase of 48% in biomass and 49 % in abundance is appreciated comparing with last autumn survey (2008).

Table 3.1 included in the annex I, shows the biomass and abundance values by stratum for the 2010 survey. Table 3.2., shows biomass (t) and abundance (x1000) estimated for the period 2004-2010.



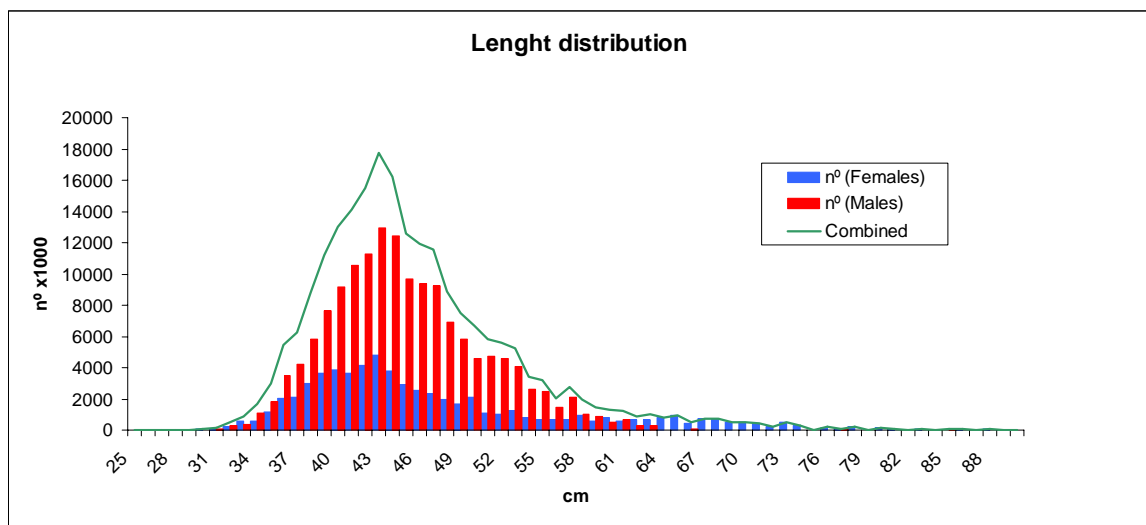
**Graph4:** Greenland halibut biomass (t) and abundance (x1000) estimates during the autumn survey.

### 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. Table 4 of Annex II, shows estimated biomass values for the main accompanying species.

### 3.4 Length distribution

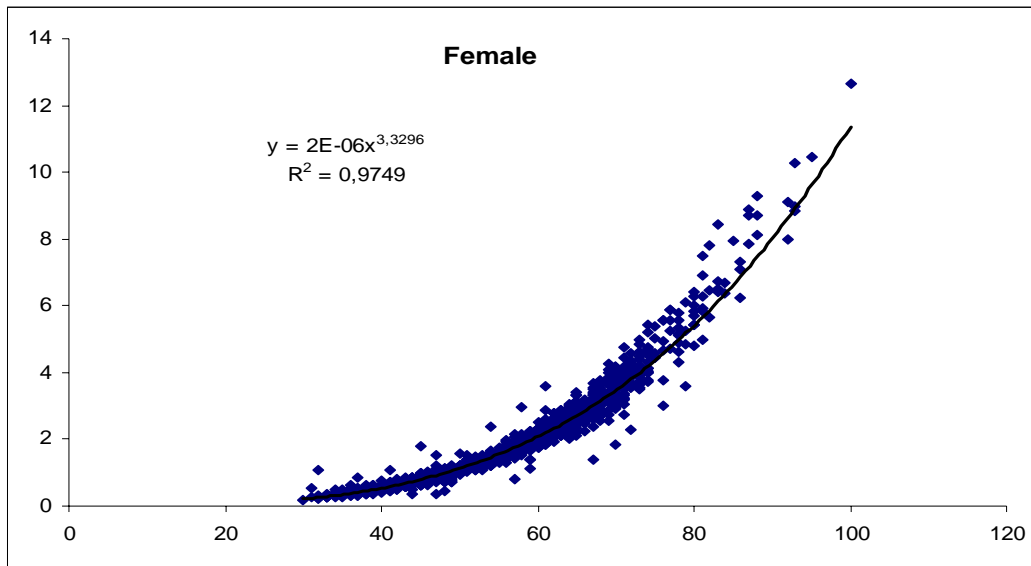
The population's structure was similar to the described in previous surveys (Paz X., *et al*, 2006, Ruiz & Mugerza, 2009). Length range for both sexes was from 30 cm to 100 cm. As in previous cruises, the male proportion was higher, 70 % of males versus 30 % females.



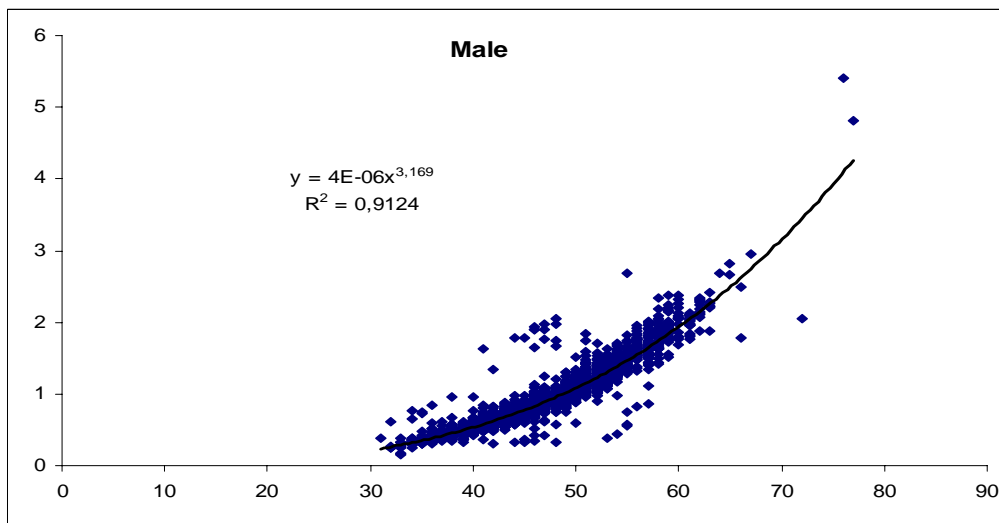
Graph6. Greenland halibut length distribution by sexes in Svalbard.

### 4.5 Length – weight relationship

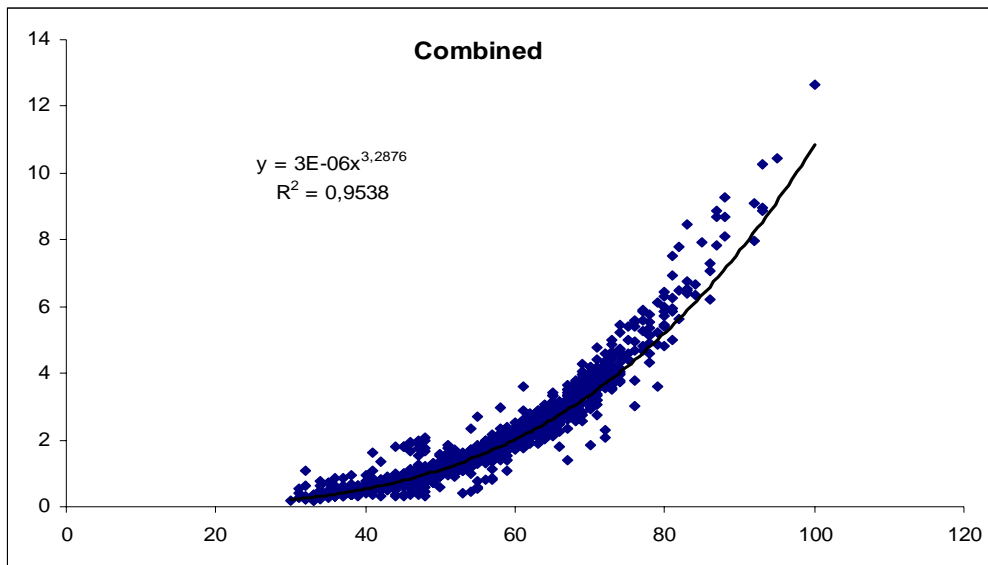
Graphs 7, 8, and 9, show the Greenland halibut length – weight relationship, separated by sexes, and combined.



**Graph7.** Length – weight relationship (females)



**Graph8.** Length – weight relationship (Males)



**Graph9.** Length – weight relationship (sexes combined)

## 5 CONCLUSION

Main conclusions derived from the results obtained during the *Campaña Fletán Ártico 2010* Survey:

- Positive trend in the stock of Greenland halibut (*Reinhardtius hippoglossoides*) in the Archipelago of Svalbard continue, as the increase in the abundances show.
- Inter-annual stability situation continue. Both spatial and bathymetric distributions, as the structure of the population are similar to those described by other authors ((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 resource open to commercial exploitation to depths greater than 500., been the trawl fishery in that bathymetric range monospecific, addressed to the Greenland halibut.

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*Campaña Fletán Ártico 2010*

# ANNEX I: TABLES

Haul	Strata	Valid	Depth Larg (m)	Def Vir (m)	Latitud largada		Longitud largada		Latitud virada		Longitud virada		Speed (knots)	Doors opening (m)
					Gr	Min	Gr	Min	Gr	Min	Gr	Min		
1	6	Yes	1050	1085	73	45	14	59	73	46	15	1	3,3	270
2	5	Yes	941	914	73	50	15	19	73	51	15	23	3,1	251
3	5	Yes	756	730	73	46	15	29	73	48	15	25	3,1	247
4	5	Yes	748	756	73	49	15	25	73	46	15	22	3,1	238
5	4	Yes	690	690	73	52	15	35	73	53	15	40	3,3	231
6	4	Yes	581	534	73	53	15	46	73	55	15	50	3,3	249
7	4	Yes	628	588	73	57	15	51	73	56	15	49	3	250
8	5	Yes	798	784	73	55	15	38	73	57	15	41	3,3	248
9	5	Yes	807	785	73	58	15	44	74	0	15	49	3,2	255
10	5	Yes	740	673	74	1	15	54	74	3	15	58	3,2	242
11	4	Yes	578	643	74	2	16	3	74	1	15	59	3	253
12	5	Yes	720	705	74	3	15	56	74	5	15	59	3,1	232
13	4	Yes	616	627	74	5	16	5	74	7	16	8	3,2	253
14	5	Yes	771	836	74	8	16	4	74	10	16	2	3,1	250
15	5	Yes	847	728	74	14	16	5	74	15	16	9	3,1	246
16	4	Yes	682	657	74	15	16	11	74	17	16	12	3,2	246
17	4	Yes	640	610	74	30	16	10	74	34	16	1	3,2	236
18	5	Yes	710	710	74	33	16	4	74	34	16	1	3,3	249
19	5	Yes	862	882	74	35	15	48	74	34	15	43	3	253
20	4	Yes	600	621	74	36	16	4	74	34	16	6	3,1	242
21	4	Yes	633	659	74	40	15	51	74	41	15	46	3,1	240
22	4	Yes	692	705	74	45	15	36	74	47	15	33	3,1	258
23	4	Yes	684	658	74	49	15	32	74	51	15	32	3,1	280
24	5	Yes	955	976	74	53	15	18	74	55	15	16	3,1	245
25	4	Yes	660	656	74	53	15	31	74	55	15	32	3,1	241
26	5	Yes	703	710	74	56	15	30	74	57	15	32	3,1	242
27	4	Yes	820	880	74	56	15	22	74	58	15	21	3,1	270
28	4	Yes	644	682	74	57	15	34	74	59	15	35	3,1	255
29	4	Yes	639	624	75	3	15	29	75	5	15	21	3	250
30	4	Yes	621	610	75	6	15	20	75	8	15	10	3,1	246
31	4	Yes	601	610	75	10	15	3	75	12	14	54	3	245
32	4	Yes	605	624	75	22	14	22	75	23	14	19	3,1	258
33	5	Yes	742	737	75	23	14	11	75	25	14	8	3,1	258
34	6	Yes	1275	1300	75	25	13	27	75	26	13	24	3	256
35	5	Yes	832	801	75	31	13	54	75	33	13	54	3	250
36	4	Yes	630	652	75	44	14	0	75	46	13	59	3,1	250
37	4	Yes	616	619	75	47	14	1	75	49	14	1	3	252
38	5	Yes	780	739	75	52	13	53	75	54	13	56	3	269
39	5	Yes	975	1005	75	56	13	42	75	58	13	40	3	279
40	1	Yes	700	698	76	59	12	11	76	59	12	8	3,1	254
41	1	Yes	640	639	77	3	11	51	77	4	11	46	3,1	256
42	1	Yes	638	648	77	7	11	36	77	9	11	31	3,1	252
43	1	Yes	625	630	77	20	11	15	77	22	11	14	3,2	256
44	2	Yes	757	773	77	22	11	9	77	24	11	7	3,2	256
45	2	Yes	927	957	77	30	10	50	77	31	10	46	3,2	278
46	1	Yes	605	595	77	38	10	37	77	40	10	32	3,2	243
47	1	Yes	638	630	78	5	9	18	78	7	9	17	3,2	251
48	1	Yes	686	698	78	12	9	14	78	14	9	15	3,2	235
49	3	Yes	1084	1032	78	22	9	7	78	23	9	6	3,1	259
50	1	Yes	662	661	78	32	9	4	78	34	8	59	3,2	245
51	2	Yes	729	720	78	43	8	32	78	44	8	28	3,2	252
52	1	Yes	514	524	78	53	8	29	78	55	8	27	3,3	250
53	2	Yes	733	718	78	58	8	22	78	59	8	22	3,2	261
54	2	Yes	714	721	79	54	7	21	79	53	7	25	3,1	248
55	2	Yes	901	898	79	27	7	29	79	25	7	30	3,1	268
56	3	Yes	1093	1121	79	18	7	26	79	16	7	27	3,2	248
57	1	Yes	577	530	79	18	7	59	79	16	8	3	3,3	244
58	1	Yes	643	655	79	10	8	12	79	9	8	15	3,2	244
59	1	Yes	618	612	77	56	9	30	77	55	9	34	3,2	243
60	3	Yes	1143	1148	77	51	9	19	77	49	9	23	3	252
61	1	Yes	611	617	77	47	9	58	77	44	10	14	3,2	251
62	2	Yes	896	893	77	43	10	6	77	41	10	12	3,2	258
63	2	Yes	828	855	76	55	12	26	76	53	12	30	3,1	250
64	1	Yes	621	659	76	52	12	42	76	51	12	47	3,1	248
65	3	Yes	1109	1107	76	42	12	53	76	40	12	58	3,1	278
66	2	Yes	709	706	76	20	14	24	76	19	14	22	3,1	251
67	2	Yes	751	775	76	16	14	14	76	14	14	11	3,1	256
68	2	Yes	700	705	76	13	14	15	76	11	14	13	3,2	249
69	1	Yes	657	664	76	12	14	16	76	13	14	18	3,2	260
70	1	Yes	641	625	76	7	14	13	76	6	14	11	3,2	246
71	1	Yes	623	618	76	5	14	11	76	3	14	10	3,1	244
72	1	Yes	600	607	76	1	14	9	75	59	14	7	3,1	255
73	1	Yes	646	652	75	57	14	3	75	55	14	1	3,2	257

Table1. Haul characteristics during *Campaña Fletán Ártico 2010 Survey*.



Lance	( <i>Reinhardtius hippoglossoides</i> )	( <i>Micromesistius poutassou</i> )	( <i>Gadus morhua</i> )	( <i>Sebastes mentella</i> )	( <i>Anarhichas lupus</i> )	( <i>Amblyraja hyperborea</i> )	( <i>Macrourus berglax</i> )
1	99,59			0,65		6,19	
2	123,5					7,05	
3	3129	3,05	15,88	1,3		1,98	12,41
4	1588,5	0,33				0,4	6,71
5	6585	1,55	89,35	15,84		2,16	12,08
6	1021,5	5,02	62,15	127,16	34,82	10,37	5,49
7	1176	7,58	98,96	123,55	38,02	5,74	6,17
8	2382	0,98	4	0,3			5,11
9	1377		3,55			0,74	9,68
10	8015,5		60,2	1,17	21,51		72,17
11	1294,5	10,55	38,41	21,6	17,8	13,4	65,18
12	5445	1,6	87,69	5,6	12,09	3,82	39,77
13	2069,5	11,41	61,85	130,88	24,69	0,88	2,85
14	2758,5			4,32			33,79
15	1924,5					0,83	10,05
16	5607	10,61	50,09	0,43		4,85	69,28
17	1279,5	11,21	6,97	21,41		5,36	5,35
18	1881	6,06		12,32		10,32	1,17
19	3285					275,77	4,51
20	1624,5	16,64	10,7	27,9			3,18
21	2188,5	21,18	24,27	22,6			2,72
22	2757	5,52		6,27	9,27	3,24	4,99
23	4053	19,31	28,95	9,7		3,32	10,34
24	817,5	0,5		0,56			0,2
25	3342	4,1	13,64	7,03		0,04	2,57
26	4348,5	11,14		10,88		2,31	9,07
27	2505			0,48		1,01	0,9
28	2715	14,12	18,77	65,9		1,65	10,61
29	6808,5	27,09	34,74	25,68		3,05	14,3
30	5547	7,87	45,11	7,27		4,97	6
31	4923	2,88	37,08	4,01		1,03	5,6
32	2422,5	3,38	204,89	31,45		8,71	14,27
33	2689,5	4,05	2,94	6		0,78	8,92
34	13,58	0,25		0,61			1,8
35	1810,42	2,05	4,05	2,31		5,21	2,03
36	3786	4,63	2,21	5,52		0,34	4,02
37	3424,5	3,6	102,68	11,04		3,18	8,51
38	826,5			0,75		1,13	7,6
39	229,5					1,18	
40	1567,5						
41	3619,5	1,32	21,75	2,91	116	3,38	24,78
42	2421	1,99	46,83	1,9	35	11,86	16,76
43	3228	47,02	14,42	4,07		4,77	3,08
44	1407,34	1,63				1,31	3,01
45	221,66	0,26				0,99	
46	1542	3,2	92,48	4,94	34,66	12,78	5,63
47	1047	0,54	13,07	6,37		5,79	3,95
48	1755	1,82	21,72	0,81	39,2	9,13	14,93
49	49						
50	4236	1,64	16,35	16,75	18,42	12,5	22,05
51	2556	0,72	27,65	4,42		11,22	24,35
52	336	8,47	155,25	142,45	24,17	9,8	5,3
53	1804,5	0,27	7,67	14,44	21,83	15,13	10,26
54	651		27,66	0,71		2,95	
55	108		4,6				
56	31						
57	160	4,06	235,83	31,12	43,75	5,03	0,83
58	1006,5	0,18	21,6	1,61		10,22	2,94
59	2844	0,96	25,34	0,65	76,87	5,63	7,08
60	48						
61	4512	4,77	14,13	5,28	105,74	10,58	12,78
62	250			0,43			
63	1438,5					1,08	1,27
64	3223,5	5,19	12,62	2,09		2,39	9,79
65	75						
66	3307,5	0,45		0,47			0,81
67	2986,5					1,18	6,15
68	1737						5,62
69	1944	0,21		1,54		0,46	1,97
70	2059,5	8,68	8,96	24,11		0,95	9,39
71	1725	10,95	14,2	22,91		0,23	
72	2541	15,1		9,75		0,9	2,56
73	3549	6,76		2,92		1,2	3,06
<b>Total (kg)</b>	<b>167861,59</b>	<b>344,45</b>	<b>1891,26</b>	<b>1015,14</b>	<b>673,84</b>	<b>527,47</b>	<b>677,75</b>

Table2. Catch by haul during *Campaña Fletán Ártico 2010* Survey.

Lance	( <i>Hippoglossoides platessoides</i> )	( <i>Amblyraja radiata</i> )	( <i>Bathyraja spinicauda</i> )	<i>Lycodes esmarki</i>	<i>Cottunculus microps</i>	Invertebrates	( <i>Anarhichas denticulatus</i> )	<i>Lycodes spp</i>
1		3,54		3,81	0,7	0,37		
2		1,13		5,05	0,52	14,39		0,1
3		5,53		10,4	1,03	10,6		
4		12,4		8,9	1,6	0,9	1,8	0,1
5		2,87	0,74	4,15	0,88	0,2		0,27
6	1,45	1,59		2,6	0,02	0,32	3,45	
7		5,22		4,03		1		
8		3,33		14,32		0,15		
9				6,23	0,31	0,05		
10		6,6		2,86				1,86
11	0,85			5,77				0,99
12	0,42					0,5		
13	1,67	21,55		9,66		0,22	1,59	
14		6,73	0,84	5,23	0,24			
15		11,22		6,63	0,3	0,12		
16	0,54	30,45	0,68	13,9			15,85	
17	1,01			5,3			2,68	0,25
18	1,61			3,31	0,72		17,95	
19			4,19	5,7	0,05			
20	2,7	0,82		7,85		1,5	4,48	
21	1,15		1,96	5,93	0,57	0,08		
22	0,58	4,07	11,14	11,46	1,41		6,61	
23			0,4	11,3	1,02			
24		16,83		2,8		0,2		
25	0,95		0,21	6,81		0,2	2,34	
26	0,85	3,25		8,49		0,71	1,27	2,09
27		15,23		1,21	0,1	0,1		
28	1,99	4,91		11,97	0,23			
29	2,07			6,88	0,22	0,46		
30	0,43			11,75		0,72		
31	0,56	5,24		8,19	0,56	1,03	1,2	
32	3,7	2,2	2,63		0,5	1		
33	1,32	4,15	0,9	3,89	0,77	0,28		
34		56,25		9,62	0,76	5,65		1,13
35			6,1	5,08	0,06	0,66		
36	0,62	3,08		7,4	0,19	0,34		
37	3,19	3,11		7,56	0,3	1,71		
38		14,49		1,72	0,51	3,16		
39		8,95		0,16		5,6		
40								
41	7,52	8,83	4,83	6,7		2,5		
42	4,23	7,77	8,35	7,97	0,85	8,21	2,22	
43	35,41	0,75		6,88	0,4	8,09	4,17	
44	0,75	15,22		5,01	1,46	12,28		
45	0,19	11,19		5,62		12,78		
46	17,54	6,91	3,17	4,86	1,05	10,56		
47		1,29		2,08	1,12	5,21		
48		15,17		2,72	0,19	54,59		
49		24,87		7,49	0,63	1,74		
50	1,27	6,72		2,03	1,3	47,03		
51	6,44	36,87		3,09		11,5		
52		4,06		5,57		0,5	10,98	
53		6,3		0,94	0,12	2,7		
54	1,2	9,8	1,86	28,74	0,32	149,96		
55		27,99		4,7	0,14	0,3		
56		21,81		0,63	0,24	1,42		
57	5,11			0,31	0,32	4,5		
58	4,63			0,53	0,36	4,5		
59	16,53	12,03		5,15	0,76	6,75	3,72	
60	0,13	7,77		0,73		0,13		
61	29,76	1,14	4,43	5,06	1,29	2,1	4,3	
62		0,13		3	0,82	47,13		
63		20,6		5,12	1,8	5,68		
64	5,42			11,1	0,18	1		
65	0,17	21,42		3,24		1,3		0,11
66		4,47		2,3	0,38	2,83		0,72
67		39,86		5,6	1,21	2,98		0,52
68		4,72		7,09	0,26	1,01	17,9	
69	0,27	2,31		10,32		1,67		
70	1,65			14,4		3,56		
71	0,67			8,04		1,75		
72	1,71	2,72		9,56		2,02	4,64	
73	0,96			13,08		3,97		
<b>Total (kg)</b>	<b>169,22</b>	<b>577,46</b>	<b>52,43</b>	<b>447,58</b>	<b>28,77</b>	<b>474,47</b>	<b>107,15</b>	<b>8,14</b>

Table2(cont). Catch by haul during *Campaña Fletán Ártico 2010* Survey.

Lance	( <i>Onogadus argentatus</i> )	<i>Careproctus reinhardtii</i>	Capelín ( <i>Mallotus villosus</i> )	Brosmio ( <i>Brosme brosme</i> )	Eglefino ( <i>Melanogrammus aeglefinus</i> )	Tomasa ( <i>Argentina silus</i> )
1	0,81					
2	0,13					
3						
4	0,25					
5						1,83
6						2,03
7						3,21
8	0,15					
9						
10						
11						1,38
12						
13				3		2,31
14						
15	0,72					
16	0,07					0,23
17						0,4
18						
19						
20						0,62
21						
22	0,15					
23						
24	0,28					
25						
26						
27						
28					1,86	
29						
30					2,72	
31					1,01	0,41
32	0,4				7,62	8,65
33						0,6
34						0,75
35						
36	0,37					0,31
37						
38						
39	0,68					
40						
41	0,05				0,9	
42						
43						
44						
45						
46			0,02			
47						
48						
49	2,59	0,04				
50		0,08				
51	0,4					
52						
53						
54	0,29	0,54				
55	1,53					
56	0,11	0,001				
57			0,07			
58						
59		0,09	0,76			
60	0,7					
61			0,15			
62						
63			0,05			
64						
65	0,3					
66	0,34					
67						
68						
69						
70						0,1
71						
72	1,03					
73						
<b>Total (kg)</b>	<b>11,35</b>	<b>0,751</b>	<b>1,05</b>	<b>3</b>	<b>14,11</b>	<b>22,83</b>

Table2(cont). Catch by haul during *Campaña Fletán Ártico 2010* Survey.

Strata	Swept area	N° Hauls	Area Total	Catch (Kg)	Biomass (t)	Abundance (n° x1000)
1	0,74	19	702	43317	41260	42120
2	0,41	11	1263	16468	51145	58945
3	0,15	4	2693	203	3730	3828
4	0,81	20	488	65130	39127	35241
5	0,60	17	761	42631	53747	76118
6	0,08	2	1672	113	2500	480
<b>Total</b>	<b>2,78</b>	<b>73</b>	<b>7579</b>	<b>167862</b>	<b>191510</b>	<b>216731</b>

Table3.1. Greenland halibut biomass (t) and abundance (x1000) by stratum.

	Biomass ( Tm )	Abundance (x1000)
<b>2004</b>	83320	73808
<b>2005</b>	82673	81638
<b>2006</b>	NA	NA
<b>2007</b>	NA	NA
<b>2008</b>	129221	144651
<b>2009</b>	NA	NA
<b>2010</b>	191510	216731

Table3.2 Greenland halibut biomass (t) and abundance (x1000) during the autumn Spanish Survey for the period 2004-2010. (NA: Not Available )

#### Cod

Strata	Swept area	N° Hauls	Area Total	Catch (Kg)	Biomass (t)
1	0,74	19	702	714,55	680,63
2	0,41	11	1263	67,58	209,88
3	0,15	4	2693	0	0,00
4	0,81	20	488	930,82	559,20
5	0,60	17	761	178,31	224,80
6	0,08	2	1672	0	0,00
<b>Total</b>	<b>2,78</b>	<b>73</b>	<b>7579</b>	<b>1891,26</b>	<b>1674,52</b>

#### Red fish

Strata	Swept area	N° Hauls	Area Total	Catch (Kg)	Biomass (t)
1	0,74	19	702	282,18	268,78
2	0,41	11	1263	20,47	63,57
3	0,15	4	2693	0	0,00
4	0,81	20	488	665,72	399,94
5	0,60	17	761	45,51	57,38
6	0,08	2	1672	1,26	27,84
<b>Total</b>	<b>2,78</b>	<b>73</b>	<b>7579</b>	<b>1015,14</b>	<b>817,51</b>

**Thorny skate**

Strata	Swept area	N° Hauls	Area Total	Catch (Kg)	Biomass (t)
1	0,74	19	702	69,7	66,39
2	0,41	11	1263	177,15	550,18
3	0,15	4	2693	75,87	1394,05
4	0,81	20	488	100,34	60,28
5	0,60	17	761	94,61	119,28
6	0,08	2	1672	59,79	1320,89
<b>Total</b>	<b>2,78</b>	<b>73</b>	<b>7579</b>	<b>577,46</b>	<b>3511,07</b>

**Wolffish**

Strata	Swept area	N° Hauls	Area Total	Catch (Kg)	Biomass (t)
1	0,74	19	702	493,81	470,37
2	0,41	11	1263	21,83	67,80
3	0,15	4	2693	0	0,00
4	0,81	20	488	124,6	74,85
5	0,60	17	761	33,6	42,36
6	0,08	2	1672	0	0,00
<b>Total</b>	<b>2,78</b>	<b>73</b>	<b>7579</b>	<b>673,84</b>	<b>655,38</b>

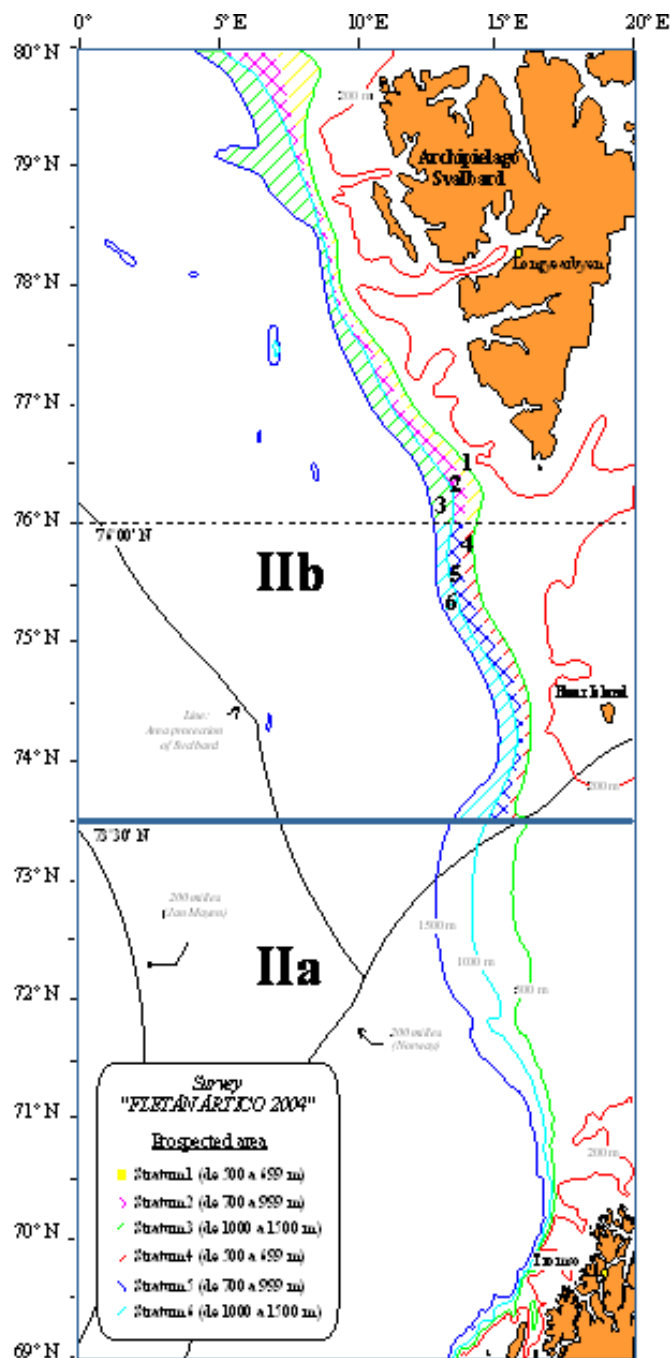
**Roughhead grenadier**

Strata	Swept area	N° Hauls	Area Total	Catch (Kg)	Biomass (t)
1	0,74	19	702	146,88	139,91
2	0,41	11	1263	51,47	159,85
3	0,15	4	2693	0	0,00
4	0,81	20	488	254,41	152,84
5	0,60	17	761	223,19	281,39
6	0,08	2	1672	1,8	39,77
<b>Total</b>	<b>2,78</b>	<b>73</b>	<b>7579</b>	<b>677,75</b>	<b>773,75</b>

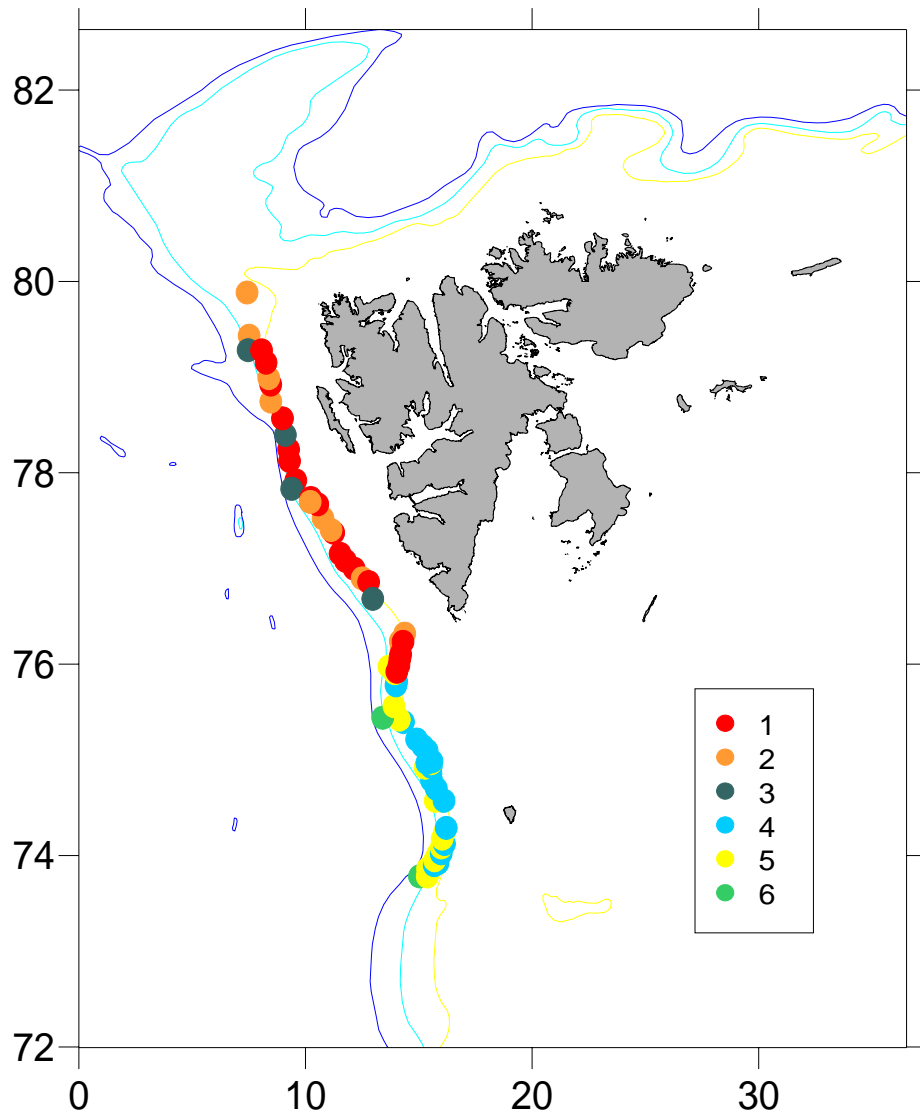
Table4. Accompanying fauna biomass (t) by strata in the Svalbard Archipelago.

*Campaña Fletán Ártico 2010*

## ANNEX II: FIGURES



**Figure1.** Map of the area showing the six considered strata and its ranges of depth.



**Figure2.** Map showing the positions of the hauls made during the *Campaña Fletán Ártico 2010* Survey.



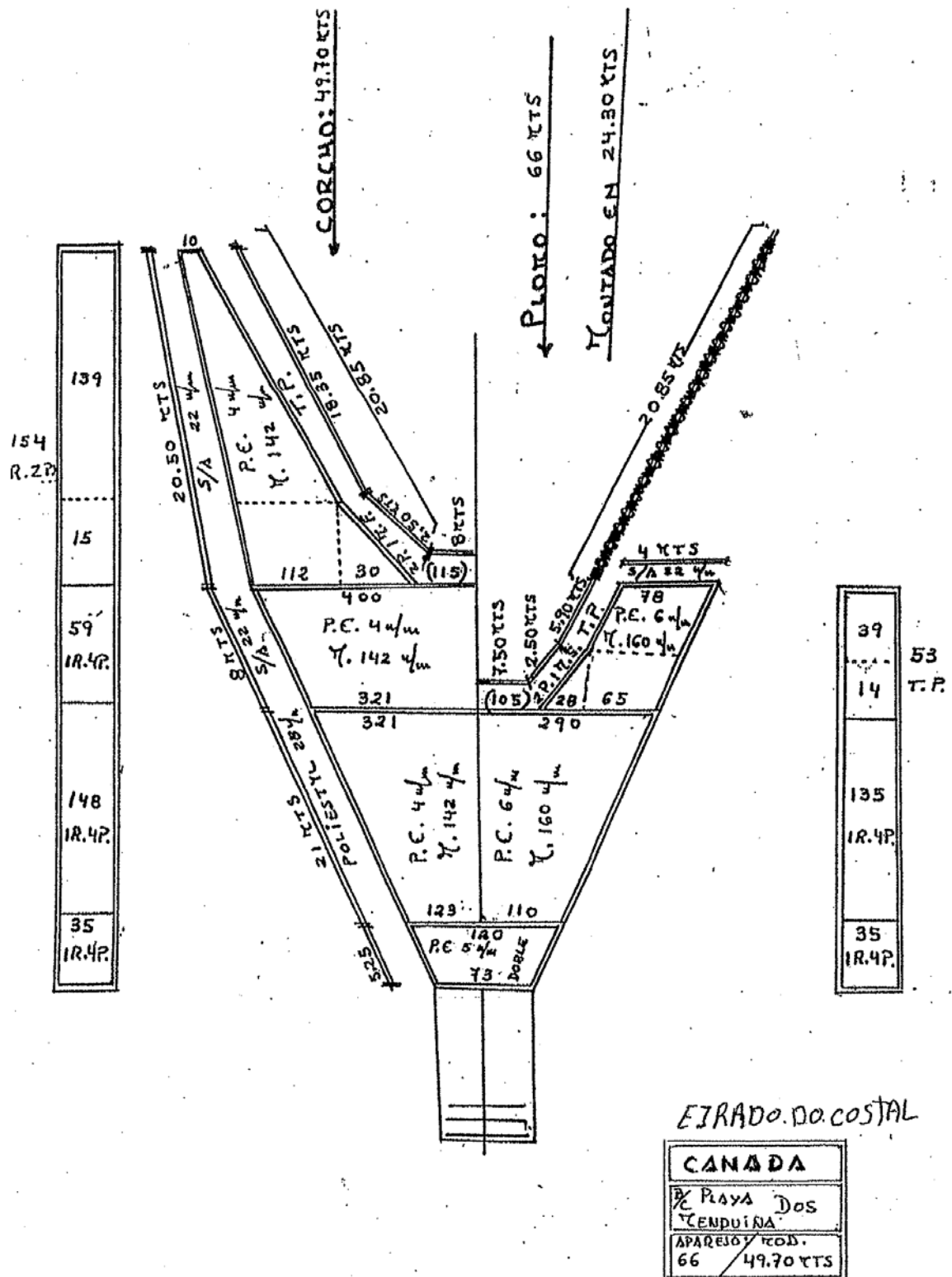
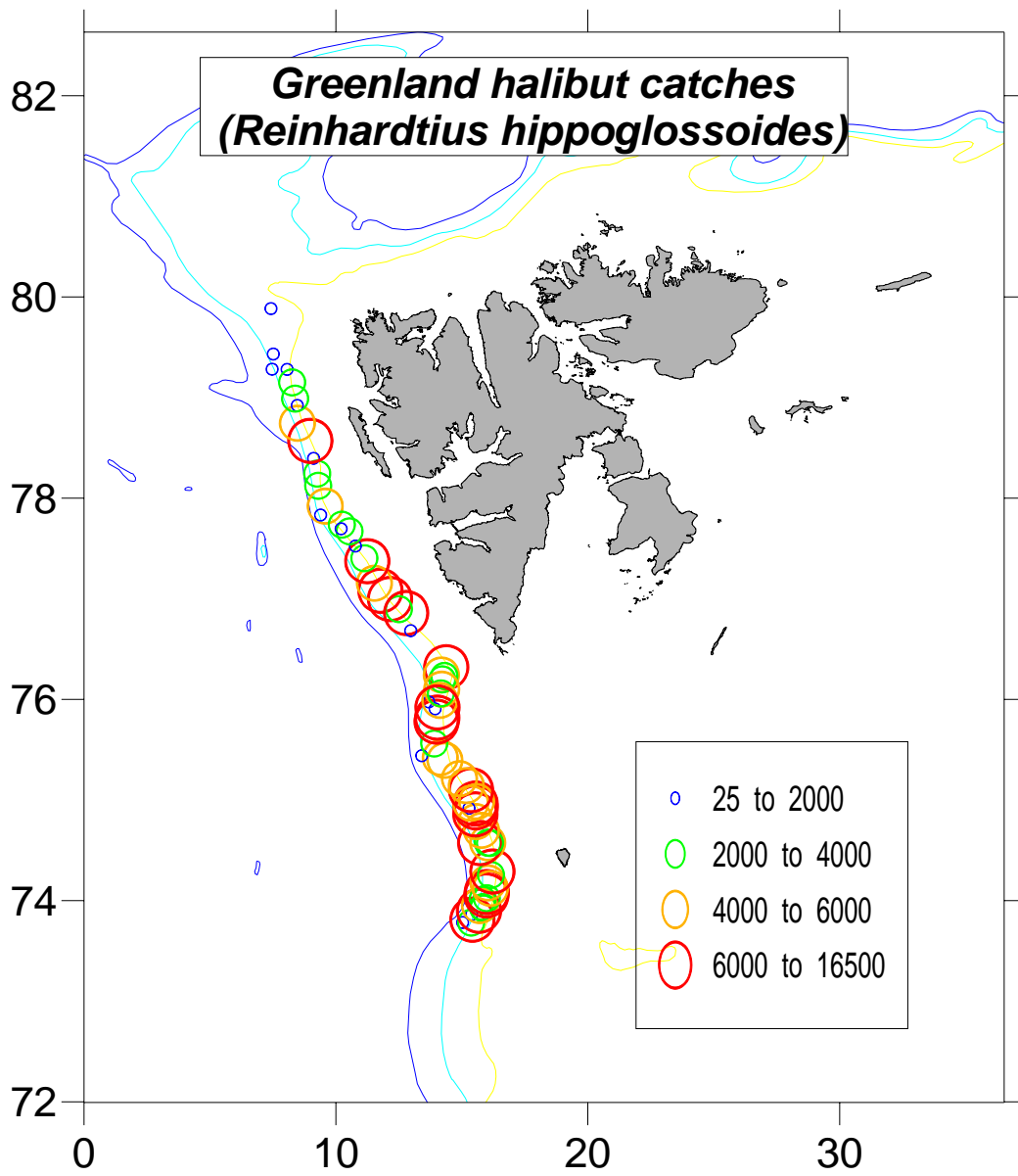
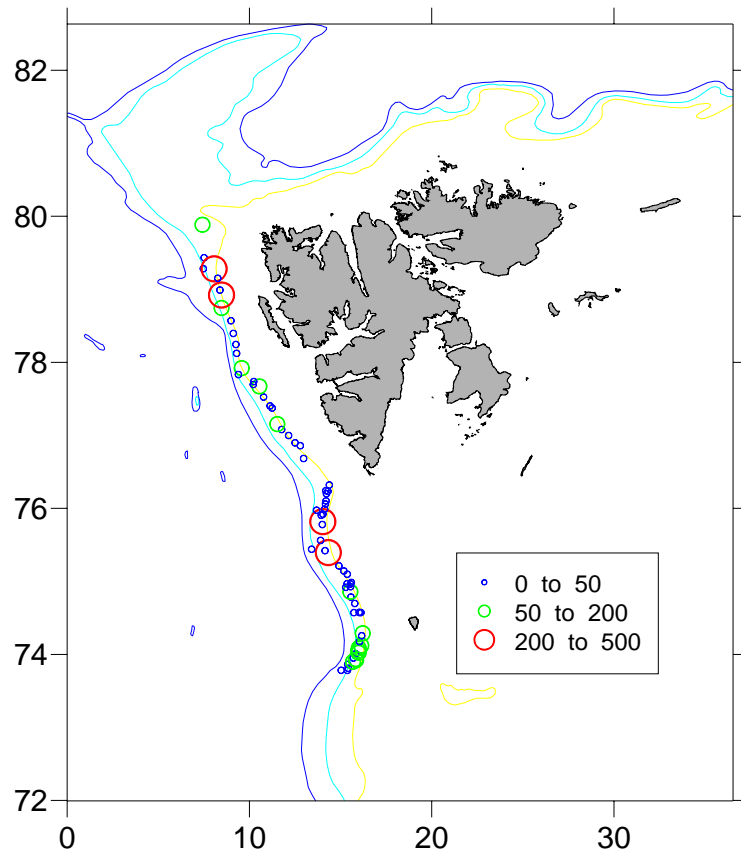


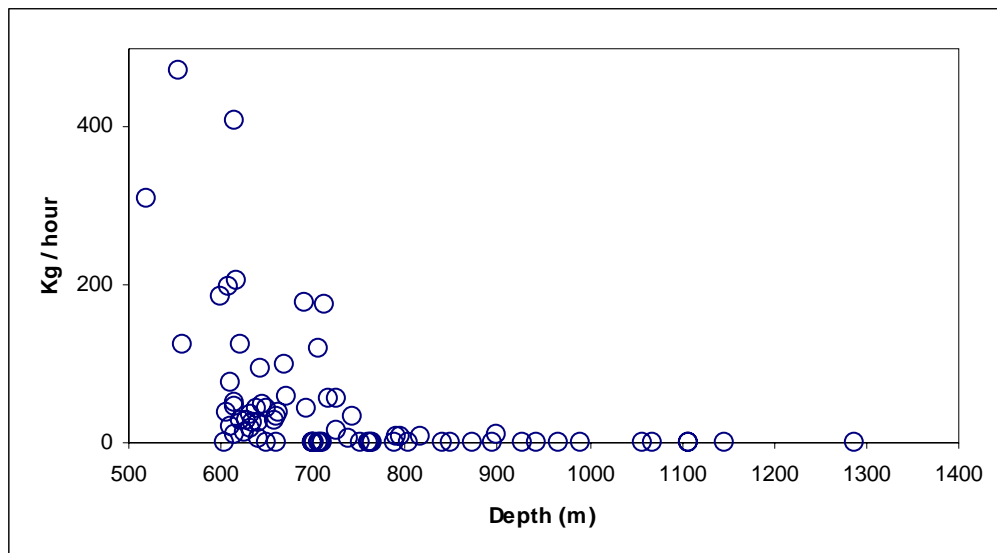
Figure 3. Schematic of the net plan of the Spanish "Pedreira" survey trawl



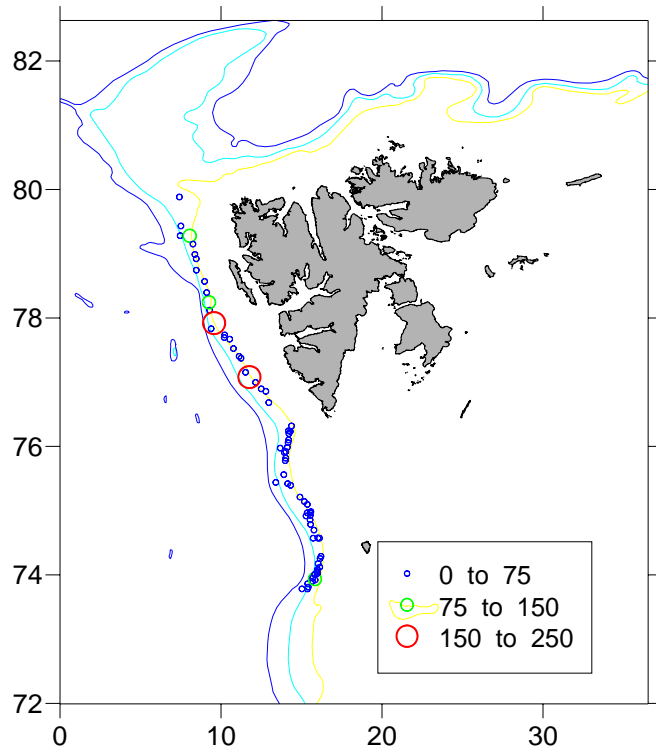
**Figure4.** Distribution of the **Greenland halibut** catches (Kg/ hour).



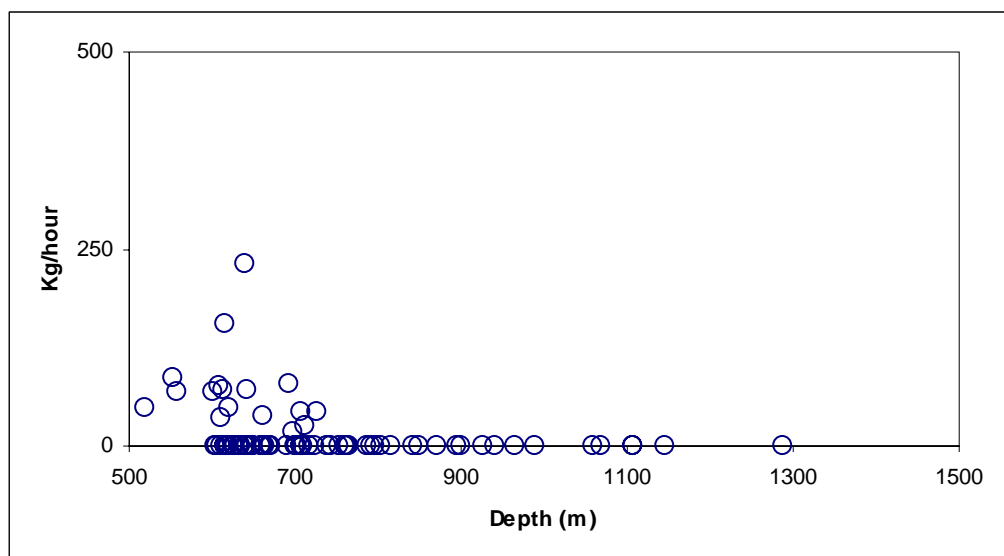
**Figure5.** Distribution of the **Cod** catches (Kg/hour).



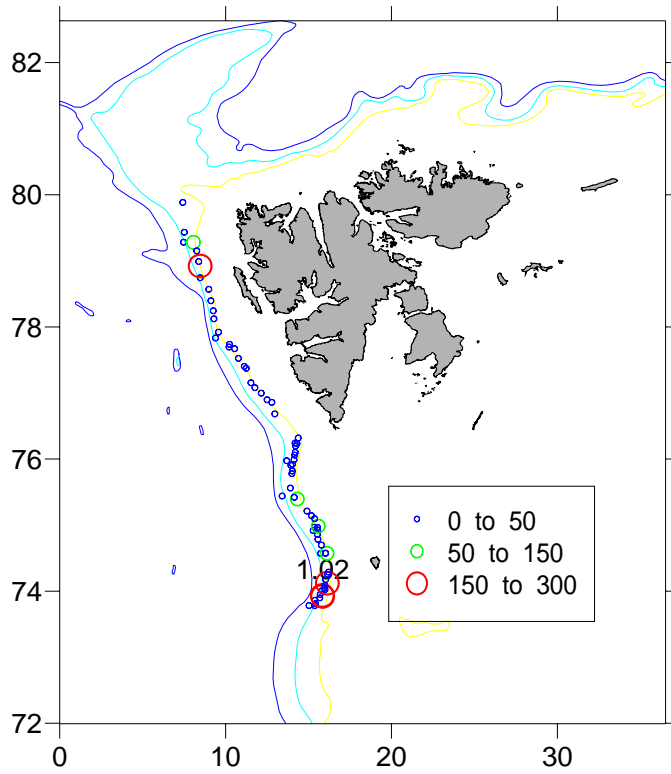
**Figure6.** Distribution of the **cod** catches in relation to depth



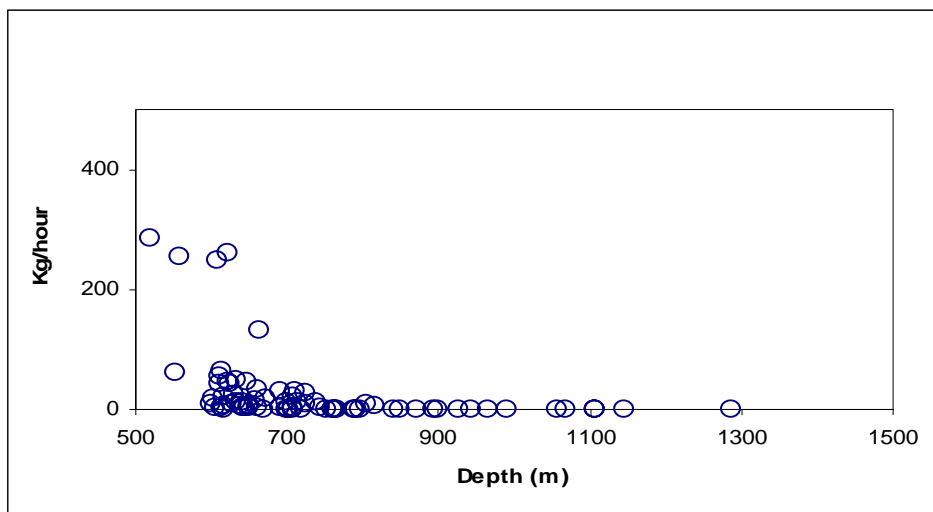
**Figure7.** Distribution of the **wolfish** catches (Kg/ hour).



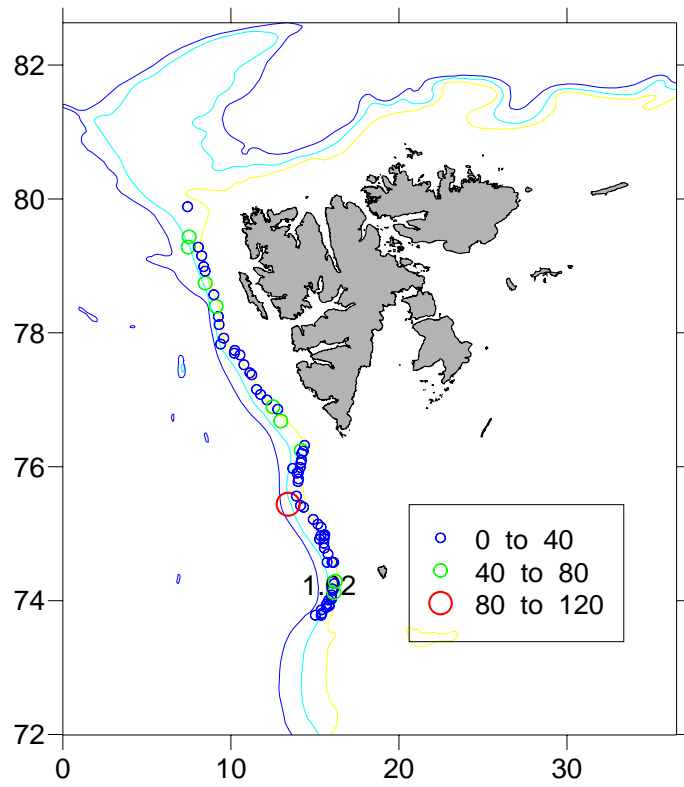
**Figure8.** Distribution of the **wolfish** catches in relation to depth



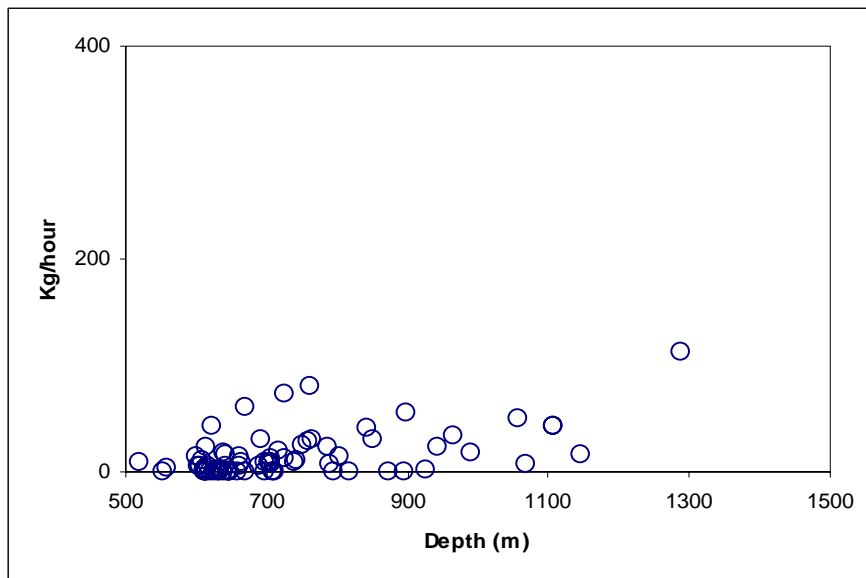
**Figure9.** Distribution of the **redfish** catches (Kg/hour).



**Figure10.** Distribution of the **redfish** catches in relation to d



**Figure11.** Distribution of the **thorny skate** catches (Kg/hour)



**Figure12.** . Distribution of the **thorny skate** catches in relation to depth.

