

Report of the *Fletán Ártico 2011* bottom trawl spring survey in the Slope of Svalbard

by

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1. Introduction

The "*Fletán Artico 2011*" spring 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, during the spring.

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. The advice for the fishery in 2011 was the same as the advice given in previous years: "*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*" (ICES, 2010).

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 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

B/C Nuevo Virgen de la Barca was the selected vessel to conduct *Fletan Ártico 2011* survey in June, being its main characteristics:

Nationality: Spanish

Registered port & number: 3^a VI-59972

Overall length: 56m.

Tonnage: 971 GT

Year: 1988

Engine: 2555CV

Equipment:

Echo sounder: *Simrad ES60*

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.

In figure 3, included in annex II, a trawl gear plane is shown. This gear is mounted with a 37.5 meters of headline and a 52 meters long rockhooper. .

Gear main characteristics:

- Ground gear
 - Central section (8,2 m), with 21” rubber discs separated by dividers.
 - Lateral section (6,4m), with 18” rubber discs separated by dividers.

- Floats: 250mm diameter floats.
- Codend: (Polyethylene 28 mm), with 140mm mesh size + 40mm cover codend.
- Legs: 17 m.
- Doors: “Injector doors”, Shark model 2800 Kg.

2.3 Survey planning

The Survey took place from 1st to 19th June. 114 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 80° 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	26
2	76° 00' - 81° 00' N	700- 999	1263	26
3	76° 00' - 81° 00' N	1000-1500	2693	5
4	73° 30' - 76° 00' N	500- 699	488	29
5	73° 30' - 76° 00' N	700- 999	761	23
6	73° 30' - 76° 00' N	1000-1500	1672	5

The duration of each haul was 30 to 60 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, 93 % of the total catches in weight correspond to Greenland halibut, while the rest of fishes and invertebrates suppose 6.5 % and 0.5 % respectively.

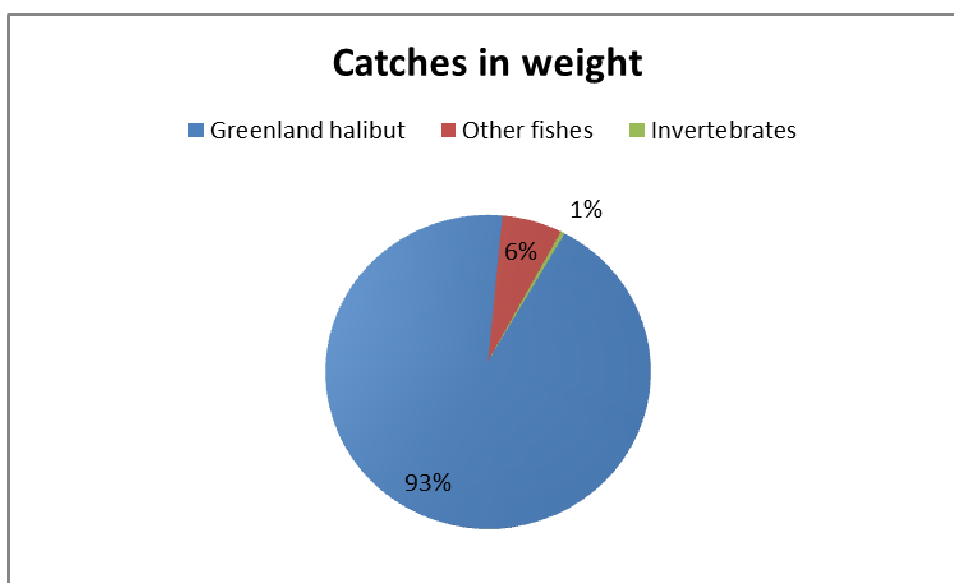


Figure 1. Greenland halibut percentage in the catches during *Fletán Ártico 2011* Survey

Table 2, included in Annex I, shows all species catches by haul. Greenland halibut was the principal species, with 136 610,54 kg captured. Cod (4 703,27 kg), redfish (1 816,94 kg), and wolffish (899,11 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.

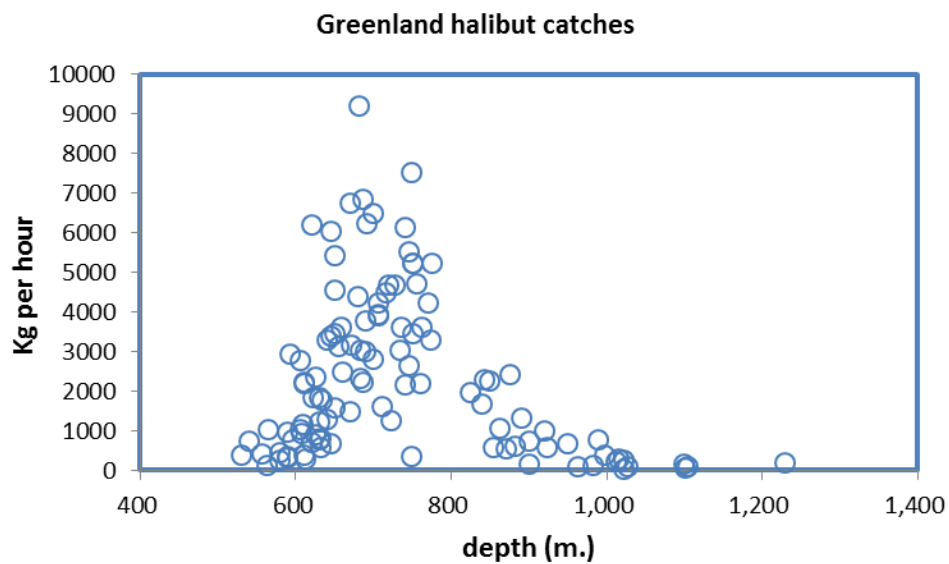


Figure 2. Greenland halibut catches in relation to depth, during *Campaña Fletán Ártico 2011 Survey*.

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 analyzing 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.

Catch by stratum

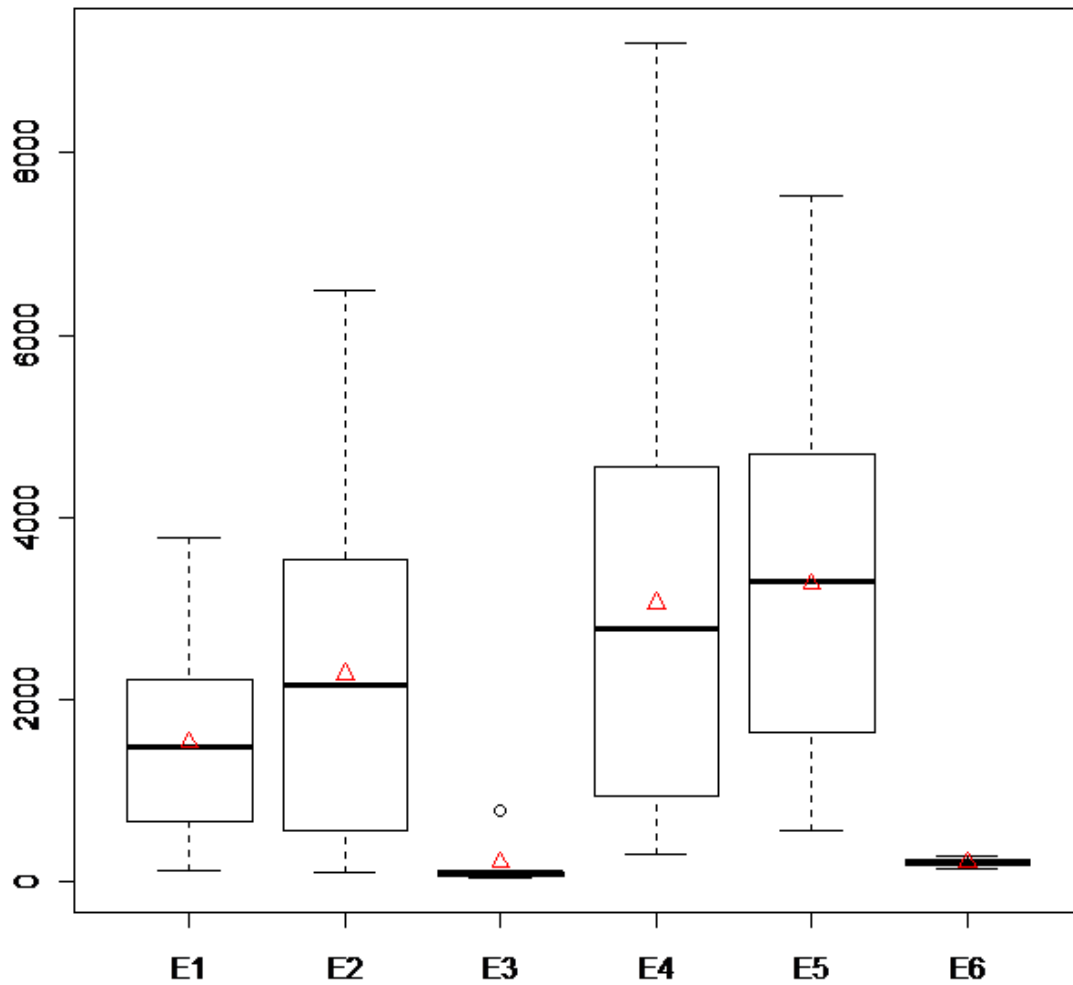


Figure 3.Greenland halibut catches (Kg) by stratum. (Mean (▲), median (—) and percentiles 25 & 75).

Figures 5, 6, 7, 8, 9, 10 and 11 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 98 142 ton and the abundance, 117 666 (x1000) individuals. This supposes an increase of 59% in biomass and 55 % in abundance, comparing with last May survey in 2009. In has to be pointed out that with the purpose of comparing data, no survey was deployed in May during 2010.

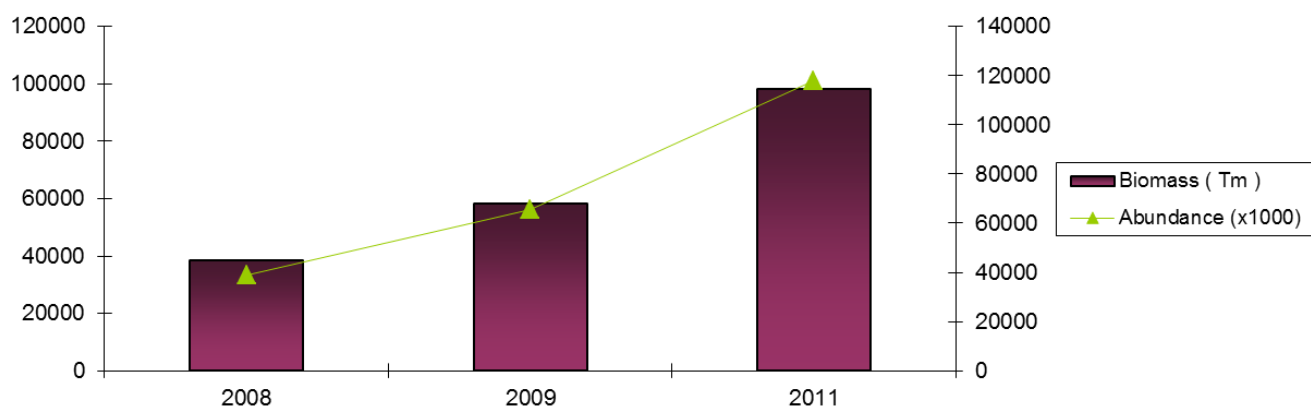


Figure4. Comparison between 2008, 2009 and 2011 May survey Greenland halibut biomass and abundance results.

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. 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 (Ruiz J., *et al.*, 2009). (Paz X., *et al.*, 2006). Length range for both sexes was from 31 cm to 99 cm. As in previous cruises, the male proportion was higher, 66 % of males versus 34 % females.

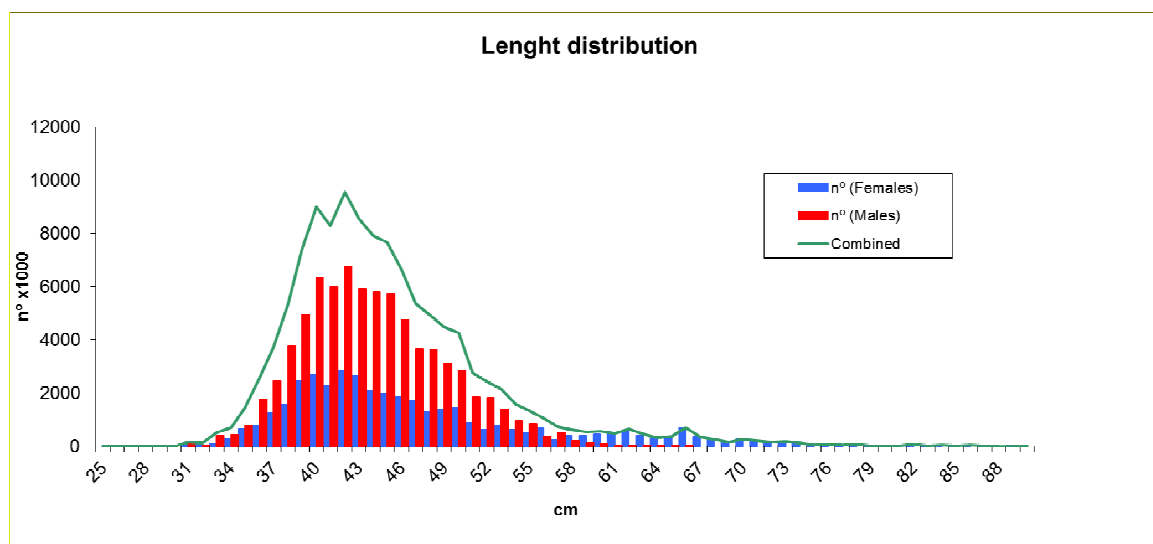


Figure 5. Greenland halibut length distribution in Svalbard

4. CONCLUSION

Main conclusions derived from the results obtained during the *Campaña Fletán Ártico 2011* 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. Nevertheless, absolute biomass and abundance values must be taken with care, principally due to the used gear, less efficiency with the benthonic species as the Greenland halibut and skates and better with species less associated to the bottom, as cod and redfish.
- 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 & Ruiz, 2008. 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 500m., been the trawl fishery in that bathymetric range monospecific, addressed to the Greenland halibut.

- 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. This work is expected to be carried out in the future as data series is getting longer.

5. BIBLIOGRAPHY

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6. ANNEX I: TABLES Campaña Fletán Ártico 2011

Table1. Haul characteristics during *Campaña Fletán Ártico 2011 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)
					Gr	Min	Gr	Min	Gr	Min	Gr	Min		
1	6	yes	1016	1005	73	51	15	17	73	54	15	26	3.7	240
2	1	yes	632	620	78	1	9	22	78	0	9	24	3.5	260
3	2	yes	700	702	77	58	9	25	77	56	9	28	3.5	230
4	1	yes	606	600	77	58	9	29	78	0	9	26	3.5	225
5	2	yes	900	889	77	55	9	22	77	53	9	27	3.7	240
6	3	yes	1105	1101	77	49	9	28	77	48	9	33	3.7	224
7	1	yes	610	550	77	49	9	55	77	51	9	51	3.8	220
8	1	yes	646	620	77	48	9	57	77	49	9	51	3.5	225
9	2	yes	736	712	77	45	10	3	77	44	10	10	3	na
10	2	yes	843	843	77	42	10	15	77	40	10	21	3	na
11	1	yes	580	570	77	40	10	32	77	39	10	37	3.1	180
12	1	yes	670	670	77	36	10	42	77	35	10	47	3	na
13	1	yes	579	574	77	33	10	58	77	31	11	1	3.1	na
14	2	yes	900	900	77	29	10	53	77	28	10	56	3.1	na
15	2	yes	740	747	77	21	11	12	77	19	11	12	3.1	na
16	2	yes	727	718	77	16	11	15	77	15	11	18	3.1	na
17	2	yes	997	1002	76	53	12	16	76	52	12	25	3	259
18	2	yes	854	860	76	52	12	37	76	51	12	40	3.2	na
19	3	yes	1102	1116	76	41	12	59	76	39	13	3	3	215
20	2	yes	750	709	76	38	13	24	76	37	13	32	3.2	na
21	3	yes	989	1010	76	36	13	20	76	37	13	15	3.1	na
22	2	yes	706	723	76	36	13	37	76	35	13	44	3.1	na
23	1	yes	656	648	76	21	14	30	76	19	14	28	3.1	240
24	2	yes	689	669	76	18	14	23	76	20	14	26	3.2	238
25	2	yes	870	865	76	15	14	4	76	13	14	1	3.2	240
26	2	no	760	776	76	12	14	9	76	10	14	6	3	235
27	1	no	650	624	76	10	14	14	76	8	14	15	3.2	240
28	1	yes	610	620	76	7	14	14	76	5	14	11	3.1	232
29	2	yes	712	715	76	6	14	7	76	8	14	8	3.4	208
30	1	yes	650	660	76	2	14	8	76	4	14	9	3.8	228
31	1	yes	625	640	76	3	14	9	76	1	14	7	3.3	260
32	2	yes	982	940	76	3	13	45	76	1	13	47	3.2	221
33	4	yes	590	587	76	0	14	9	75	58	14	7	3.2	245
34	4	yes	632	640	75	59	14	4	75	55	14	2	3.2	239
35	5	yes	883	900	75	57	13	49	75	59	13	49	3.6	250
36	4	yes	683	671	75	56	14	0	75	52	13	59	3.3	238
37	6	yes	1023	1024	75	50	13	36	75	48	13	34	3.1	235
38	4	yes	612	603	75	47	14	0	75	44	14	0	3.2	210
39	5	yes	706	714	75	42	13	58	75	44	13	55	3.4	235
40	4	yes	650	660	75	40	13	59	75	48	14	1	3.1	229
41	4	yes	564	560	75	37	14	7	75	35	14	9	3	237
42	5	yes	762	763	75	35	13	56	75	33	13	57	3	248
43	6	yes	1230	1226	75	25	13	32	75	27	13	28	3	216
44	4	yes	660	662	75	26	14	10	75	28	14	7	3.5	na
45	5	yes	862	837	75	31	14	0	75	33	13	51	3.3	na
46	4	yes	640	615	75	32	14	6	75	30	14	9	3.3	na
47	5	yes	735	743	75	22	14	15	75	21	14	17	3.1	na
48	5	yes	949	952	75	14	14	19	75	13	14	22	3.2	240
49	4	yes	687	670	75	18	14	25	75	19	14	23	3.3	240
50	4	yes	606	647	75	19	14	27	75	17	14	31	3.4	234
51	5	yes	890	832	75	11	14	36	75	9	14	48	3.1	231
52	4	yes	645	640	75	4	15	25	75	3	15	29	3.3	236
53	5	yes	850	820	74	55	15	23	74	53	15	25	3.3	240
54	5	yes	716	684	74	54	15	30	74	56	15	32	3.3	na
55	6	yes	1012	1014	74	34	15	45	74	32	15	47	3	230
56	4	yes	620	590	74	30	16	10	74	28	16	10	3.4	210
57	4	yes	640	620	74	17	16	13	74	20	16	17	3.8	230
58	4	yes	556	515	74	16	16	16	74	14	16	15	3.3	200
59	4	yes	670	590	74	16	16	12	74	17	16	18	3.5	230
60	5	yes	825	840	74	13	16	5	74	11	16	4	3	236
61	5	yes	750	800	74	13	16	5	74	15	16	10	3.4	240
62	4	yes	683	696	74	9	16	7	74	12	16	10	3.5	na
63	4	yes	630	610	74	6	16	4	74	7	16	8	3.5	na
64	5	yes	746	722	73	48	15	24	73	50	15	27	3.7	222
65	5	yes	923	939	73	50	15	20	73	52	15	24	3.4	224
66	5	yes	756	777	73	50	15	25	73	48	15	21	3.5	210
67	4	yes	680	689	73	51	15	33	73	53	15	39	3.5	205
68	4	yes	530	590	73	53	15	45	73	54	15	47	3.5	189
69	5	yes	771	765	73	56	15	40	73	57	15	43	3.5	214
70	4	yes	596	584	73	56	15	50	73	55	15	47	3.4	200
71	5	yes	774	768	73	59	15	47	74	0	15	50	3.3	212
72	4	yes	540	570	73	59	15	59	74	1	16	3	3.5	212
73	5	yes	745	720	74	2	15	53	74	3	16	0	3.3	214
74	4	yes	608	623	74	2	16	1	74	4	16	2	3.5	210
75	5	yes	720	700	74	4	15	57	74	6	16	0	3.4	210
76	4	yes	590	550	74	6	16	7	74	8	16	11	3.4	200
77	5	yes	775	776	74	9	16	3	74	11	16	6	3.4	210
78	6	yes	1100	1147	74	16	15	53	74	17	15	55	3.5	210

Table1(cont). Haul characteristics during *Campaña Fletán Ártico 2011 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)
					Gr	Min	Gr	Min	Gr	Min	Gr	Min		
79	4	yes	691	690	74	33	16	6	74	35	16	0	3.6	197
80	4	yes	682	676	74	37	15	58	74	38	15	53	3.2	184
81	4	yes	592	597	74	35	16	5	74	37	16	2	3.5	173
82	5	yes	876	850	74	36	15	46	74	38	15	43	3.4	na
83	5	yes	750	750	74	37	15	53	74	39	15	49	3.3	170
84	4	yes	646	680	74	39	15	52	74	40	15	48	3.4	185
85	4	yes	659	660	74	45	15	38	74	47	15	36	3.3	211
86	5	yes	920	936	74	51	15	21	74	49	15	21	3.4	227
87	4	yes	650	655	74	49	15	32	74	51	15	31	3.5	226
88	5	yes	750	740	74	48	15	29	74	50	15	29	3.3	200
89	2	yes	700	737	76	11	14	12	76	12	14	11	3.5	229
90	1	yes	650	645	76	15	14	18	76	16	14	23	3.6	220
91	2	yes	740	723	77	0	12	0	77	1	11	53	3.6	232
92	1	yes	622	618	77	3	11	56	77	4	11	49	3.6	230
93	1	yes	630	628	77	6	11	40	77	8	11	36	3.6	225
94	1	yes	690	680	78	4	9	18	78	6	9	18	3.7	236
95	1	yes	630	638	78	6	9	19	78	3	9	20	3.4	210
96	1	yes	686	695	78	11	9	14	78	13	9	14	3.6	218
97	1	yes	609	600	78	12	9	17	78	15	9	19	3.6	218
98	2	yes	840	856	78	17	9	11	78	19	9	13	3.5	230
99	1	yes	626	630	78	20	9	23	78	22	9	27	3.5	na
100	3	yes	1027	1021	78	22	9	8	78	24	9	5	3.5	239
101	1	yes	621	619	78	22	9	27	78	24	9	26	3.5	211
102	1	yes	672	667	78	26	9	21	78	28	9	16	3.4	219
103	1	yes	634	670	78	32	9	8	78	39	9	2	3.6	200
104	1	yes	610	612	78	43	8	44	78	44	8	37	3.4	195
105	2	yes	760	750	78	44	8	27	78	46	8	22	3.6	230
106	1	yes	590	580	78	55	8	26	78	57	8	26	3.7	216
107	2	yes	707	727	78	58	8	22	79	0	8	22	3.6	203
108	2	yes	749	750	79	8	8	17	79	10	8	13	3.7	208
109	1	yes	563	590	79	18	8	1	79	19	7	57	3.6	225
110	2	no	872	888	79	27	7	31	79	27	7	32	3.6	na
111	2	yes	723	721	79	53	7	25	79	51	7	32	3.2	198
112	2	yes	963	970	79	43	6	40	79	41	6	48	3.3	196
113	3	yes	1022	1020	79	18	7	31	79	17	7	35	3.3	180
114	2	no	718	708	79	0	8	23	78	57	8	22	3.4	212

Table2. Catch by haul during *Campaña Fletán Ártico 2011 Survey*.

Haul	<i>Reinhardtius hippoglossoides</i>	<i>(Microstomus pomason)</i>	<i>Gadus morhua</i>	<i>Sebastes mentella</i>	<i>Anarhichas lupus</i>	<i>Amblyraja hyperborea</i>	<i>Macrourus berglax</i>	<i>Hippoglossoides platessoides</i>	<i>Amblyraja radiata</i>	<i>Bathyraja spinicauda</i>	<i>Lycodes spp.</i>	<i>Cottuncubus microps</i>	Invertebrates	<i>Anarhichas dentidatus</i>	<i>Gaidropsarus argentatus</i>	<i>Molva molva</i>	<i>Brosme brosme</i>	<i>Melanogrammus aeglefinus</i>	<i>Argentinus silax</i>	<i>Rajella tyllae</i>	<i>Anarhichas minor</i>
1	142.61								4.51		0.36	0.04	0.05								
2	291.8	1.63	52.3	2.78	8.14				2.21		0.4		1.9								15.84
3	3244.4				31.25		6.94				0.2		0								20.63
4	524.5	0.3		7.21	19.17		0.3				0.2		0	12.1							11.2
5	377.1		13.95	0.16	21.98	0.35			36.42		2		100								
6	50								9.39				0								
7	164	3.19	375.24	31.27	34.65	1.64	0.5	0.79	0.82		0.91		0	3.2							
8	335.67	2.07		3.52	33.85	1.22	1.66	0.25	0.52		0.97		4.23						1.05		
9	1804.9	0.24	18.28	1.68		0.8	7.1	0.21			0.33	0.18	24.01								
10	1152		50.42			8.14			20.64		1.66	0.77	300		0.24						
11	218.5	0.8	290.11	16.4	40	3.88		0.2	2.76		2.3	0	3.5								
12	738.08		70.17	2.22	19.21		0.75		1.99		0.28	0	3.2						0.5		
13	144.72	0.2	100	4.71	16.58	0.4					2	0	0.8					1.35	1.6		6.92
14	82.06			2.58	18	1.45		0.5	14.8		2.1	0.18	16.3		1.4						
15	3073.9		3.22	0.4		2.42	0.22		2.29		1.16	0	50								
16	2342.1		3.81			2.1	1.74		3.29		0.29	0.24	1.2		0.68						
17	187.71								5.12				0								
18	288.58					6.31			4.2		2.01		30								
19	31.63			0.36		3.6			5.46				3.19								
20	1726.2		89.47			0.51	3.29	0.2	11.52		3.57	0.25	1.41								
21	393.12								7.12		0.34		2		0.15						
22	1977.6	1.55	149.83	2.25		1.4	2.4		1.91				0								3.8
23	1566.9	0.52	7.84	1.2			2.82				2.84		0								1.8
24	1502.4			0.36			2.53				1.92	0.16	0								
25	273.27										0.4	0	0.2								
26											0	0	0								
27	1141.2										0	0	0								
28	1110.12	5.9	32.92	5.5	67.48	0.31	3				4	0.08	0.5	2.32							8.37
29	802.8	2	20.56	1.06		0.38	1.28		3.59		1.75	0.41	0.54						1.3		
30	798.57	2.1	28.01	2.84			2.37		13.3		1.24		0					0.87			10.33
31	449.16	0.91	35.91	5.41	32.47	1.61	0.74				4.14		0	9.6			0.64	0.34			11
32	68.4			0.4							1.2		0								
33	172	2.32	54.33	5.56	42.14				0.68		2.17		1.01	6.02					0.43		12.32
34	798.37	1.7	90.24	6.75	65.22		3.48	0.15			5.04		0				0.2	0.28			
35	306.24	0.19		0.52					10.19		1.14	0.05	3.4								
36	3050.7	5.8	60.79	2.55		1.6	0.34		1.58		1.61		0.5						0.19		
37	127.32					0.31	0.94		6.57				0						0.41		
38	305.81	6.9	16	18.9	32.4	1.5	0.2				3.3		0.4						1.72		
39	1960.5	1.89	13.15	15.4	17.89						1.56		0	1.91					0.26		
40	2709.3	0.5	19.99	29.74		0.75	1.16				4.06		0						0.6		
41	517.21	7.53	16.55	55.05	30.66						4.59		0								6.12
42	1800.9	0.25	5.42	6.3		0.4	1.87		8.04		2.5	0.23	0								
43	89.62				11.05								0								
44	1251.27	1.4	13.38	13.31		0.3	2.6				2.17	0.21	0		0.34				0.4		
45	529.71	0.2	13.92	1.55					12.62		0.89	0.12	2.05								
46	648.88	1.23	21.67						1.5		1.7	0.2	1	2.4							
47	1517.7			0.6		0.69	1.65				1.66		0								
48	343.22			0.4		0.35	1.3		1.22		0.7		0.5								
49	3421.2	1.05		1.37			2.34		5.84		1.61		1.05								
50	1394.36	6.96	38.95	16.72		0.52	0.54				3.72	0.21	0.9						0.72		11.25
51	1330.12			1.2					0.08		2.35	0.24	2.06		0.43						
52	3018.9	0.77		6.13			6.62		2.89		0.92		1.29								
53	1134.08			1.82		1.36			9.6				0								
54	2252.4		7.11				4.16				2.78		0								
55	106.92			0.2		0.2	6.81		1.6		1.5		0.3								
56	3098.08	2.78	77.42	173.28		1.38	1.24		1.39		2.41		0.5	4.53			0.53	0.87			
57	1654.5		56.26	31.43		2.27	9.9		0.8		1.36		0.5	10.36				9.48	0.22		
58	213.78	8.28	261.47	49.45	28.23	3.52	17.24	0.99			1.3	0	9.07	2.14			16.15	0.6			6.32
59	3368.4	0.44		3.09			5.95				0.97		0						0.21		
60	984.6			2.52		1.43	9.85				5.64		0								
61	2617.2	1	9.28	14.64			40.15		21.5		1.57		0	3.56							
62	2334.3	1.37	7.9	29.79			10.76		5.87		1.21		3	0							
63	618	11.37	53.26	85.27		0.8	6.64	0.7			2.57		0.8	1.74			2.84	1.25			
64	2760.3	1.11	28.99	5		0.49	2.3	0.25			0.52	0.15	0	3.29							
65	286.85						0.41		3.02		0.6	0.01	2.3	0	0.23						
66	2355.3					9.9		0.63	0.7			1.72	0.8	0							0.46
67	2188.2	4.99	60.73	5.79		4.96	8.86				2.07		0	2.37							
68	200.55	12.38	611.71	302.34	15.46	4.35	1.09	1.85			1.37		1	5.45		5.33	24.65	0.66			
69	2120.1	0.45	32.4	71.03			2.32	0.35			0.81	0.49	0	4.32							
70	380.03	10.47	130.2	46.1			1.93	0.71			3.38		0	2.29		1.86	0.91				
71	1653.7	1.04	1.44	7.34			0.72	0.64	0.41		3.45		0	0				0.89			
72	371.66	35.82	191.05	227.04		1.5	1.86	2.56	1.55		1.96		0	1.56	0.5			12.68	0.53		
73	1316.32	1.73	62.87	30.27	16.25	0.72	3.01	0.4	8.52		4.4		0	0							
74	474.45	17.28	189.74	185.53	16.01	3.6	2.71	1.43	2.41		2.36		0	0				4.76	1.36		
75	2345.61	4.8	53.57	17.38		1.94	21.8	0.73	5.04		4.25		0	0				1.4		0.25	
76	483.7	5.16	211.08	52.8		4.55	11.9	0.56	1.69	0.32	2.29		0	0				0.57	0.33		
77	2616.11		20.91	15.14	12.75	0.87	71.46		3.82		4.88		0	0				1.41			
78	76.69						6.22		3.42		1.08		0	0	0.42						

Table2 (cont). Catch by haul during *Campaña Fletán Ártico 2011 Survey*

Haul	<i>Reinhardtius hippoglossoides</i>	<i>(Micromesistius pontassou)</i>	<i>Gadus marthae</i>	<i>Sebastes mentella</i>	Anarhichas lupus	<i>Amblyraja hyperborea</i>	<i>Macrourus berglax</i>	<i>Hippoglossoides platessoides</i>	<i>Amblyraja radata</i>	<i>Bathyraja spinicauda</i>	<i>Lycodes spp.</i>	<i>Cottunculus microps</i>	Invertebrates	<i>Anarhichas denticulatus</i>	<i>Gaidropsarus argentatus</i>	<i>Moba moha</i>	<i>Brosme brosme</i>	<i>Melanogrammus aeglefinus</i>	<i>Argentina silax</i>	Rajella fyllae	Anarhichas minor
79	3636.9	0.22	12.17	7.65		1.09	5.99		5.42	1.99	2.42	0.33	0	0							
80	4604.7																	0.49			
81	1472.21	1.1	22.79					0.26		0.14	1.55		0	0				1.13			
82	1205.65			2.07	12.36		1.89		10.44		3.08		0	0							
83	3758.4	0.98	4.74	4.77			5.36				3.51	0.94	0	2.3							
84	1694.4				5.64		1.72	0.4			0.76		0	0							
85	1806.9	1.57	14.1	8.04			6.97			6.27	3.9	0.25	0	6.26				1.79			
86	505.28						1.62		2.76		2.69	0.78	0	0	0.35						
87	2275	4.02	15.77	27.21			3.75				4.57		0.5	0							
88	2620.8	0.33		4.68			7.41			0.24	2.71	0.16	0	2.13					0.56		
89	1402.78	0.93	3.24	0.79			4.44				2.05		0.5	0							
90	1734.01	1.24	4.03	1.86			3.54		9.95		1.16		0.5	0							
91	1084.7		38.42			0.29	4.52		3.27		1.27	0.3	2.5	0							
92	915.41	0.45	80.4	0.55	26.09	1.55	1.71				2.16	0.06	3.5	0							6.67
93	928.25	0.52	17.36	1.14	4.72		2.66	0.18			0.98		2.5	0							14.5
94	1891.5	1	155.2	18.26		1.82	11.72		18.14		1.1	0.16	0	0							17.12
95	391.97	5.05	214.88	30.9		1.6	0.92	0.3			2	0	1	32.27							18.63
96	1117.2	10.38	72.06	7.41	36.61	2.8	6.65		3.52		0.51	1.02	0	0					0.51		33.43
97	576.42	2.21	27.85	3.83	13.46		1.18				0.38		0	4.82					0.3		20.87
98	838.39			0.62		1.93	0.12		6.96		1.45	1.5	1	0							6.55
99	1178.05	0.81	11.59	0.6	30.02	0.87	1.61	0.16	6.65		0.82		0	2.16							8.86
100	53.83		4.05	0.26			1.13		10.49		3.1		0	0	0.29						
101	359.94	0.81	3.82	0.2		1.22	3.75		7.98		0.46	0.07	3.05	2.66	0.71						
102	1574.79	1.69		2.89	39.35	0.86	8.97				0.38	1.42	1.05	0							
103	891.36	1.41		3.55	15.67		8.45		5.65		1.32		1	0							
104	1097.4	0.47	11.79	6.68	40.49	2.08	1.55		9.49				0	0	0.48						
105	1091.36					2.12	11.16		6.69		0.83	0.46	50	0							13.35
106	156.31	3.43	72.2	15.23		2.91	2.42	0.58			0.5		0	0					0.29		
107	2116.33	0.57	26.4	5.3	28.25	0.86	3.9		12.95		0.42		0	0							
108	183.87	6.16	9.22	0.56	15.61		1.54	0.18			0.35	0.11	0.5	0					0.58		
109	64.22	9.62	103.35	27.22		1.98	1.89				0.33		0	4.9					0.52		
110	0	0.63	4.02	3.06					3.8		4.8	0.1	0	0					0.56		1.21
111	624.22								2.14		0.26	0.15	0	0				14.62			
112	51.78					0.41			7.22				2	0	1.17						
113	21.65																				
114	2375.4																				

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

Strata	Total Area	Nº Hauls	Swept Area	Catch (Kg)	Biomass (t)	Catch (nº)	Abundance (nºx1000)
1	702	25	1,16	19.219	11.603	27.457	16.577
2	1.263	23	1,02	26.297	32.438	35.481	43.767
3	2.693	5	0,22	550	6.828	634	7.873
4	488	29	1,47	48.164	16.031	61.613	20.508
5	761	23	1,07	38.321	27.174	34.812	24.685
6	1.672	5	0,22	543	4.068	568	4.255
Total	7.579	110	5,17	133.094	98.142	160.566	117.666

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

COD					
Strata	Total Area	Nº Hauls	Swept Area	Catch (Kg)	Biomass (t)
1	702	25	1,16	1.767	1.067
2	1.263	23	1,02	431	531
3	2.693	5	0,22	4	50
4	488	29	1,47	2.248	748
5	761	23	1,07	254	180
6	1.672	5	0,22	0	0
Total	7.579	110	5,17	4.703	2.577

Redfish					
Strata	Total Area	Nº Hauls	Swept Area	Catch (Kg)	Biomass (t)
1	702	25	1,16	203	123
2	1.263	23	1,02	19	24
3	2.693	5	0,22	1	8
4	488	29	1,47	1.391	463
5	761	23	1,07	203	144
6	1.672	5	0,22	0	1
Total	7.579	110	5,17	1.817	762

Wolffish					
Strata	Total Area	Nº Hauls	Swept Area	Catch (Kg)	Biomass (t)
1	702	25	1,16	478	289
2	1.263	23	1,02	115	142
3	2.693	5	0,22	0	0
4	488	29	1,47	236	78
5	761	23	1,07	59	42
6	1.672	5	0,22	11	83
Total	7.579	110	5,17	899	634

Artic skate					
Strata	Total Area	Nº Hauls	Swept Area	Catch (Kg)	Biomass (t)
1	702	25	1,16	25	15
2	1.263	23	1,02	29	36
3	2.693	5	0,22	4	45
4	488	29	1,47	33	11
5	761	23	1,07	18	13
6	1.672	5	0,22	1	4
Total	7.579	110	5,17	109	124

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

Rough head grenadier					
Strata	Total Area	Nº Hauls	Swept Area	Catch (Kg)	Biomass (t)
1	702	25	1,16	69	42
2	1.263	23	1,02	51	63
3	2.693	5	0,22	1	14
4	488	29	1,47	114	38
5	761	23	1,07	177	126
6	1.672	5	0,22	14	105
Total	7.579	110	5,17	427	387

Blue whiting					
Strata	Total Area	Nº Hauls	Swept Area	Catch (Kg)	Biomass (t)
1	702	25	1,16	57	34
2	1.263	23	1,02	12	15
3	2.693	5	0,22	0	0
4	488	29	1,47	153	51
5	761	23	1,07	14	10
6	1.672	5	0,22	0	0
Total	7.579	110	5,17	236	110

Thorny skate					
Strata	Total Area	Nº Hauls	Swept Area	Catch (Kg)	Biomass (t)
1	702	25	1,16	83	50
2	1.263	23	1,02	149	184
3	2.693	5	0,22	32	403
4	488	29	1,47	33	11
5	761	23	1,07	98	69
6	1.672	5	0,22	16	121
Total	7.579	110	5,17	411	837

7. ANNEX II: FIGURES Campaña Fletán Ártico 2011

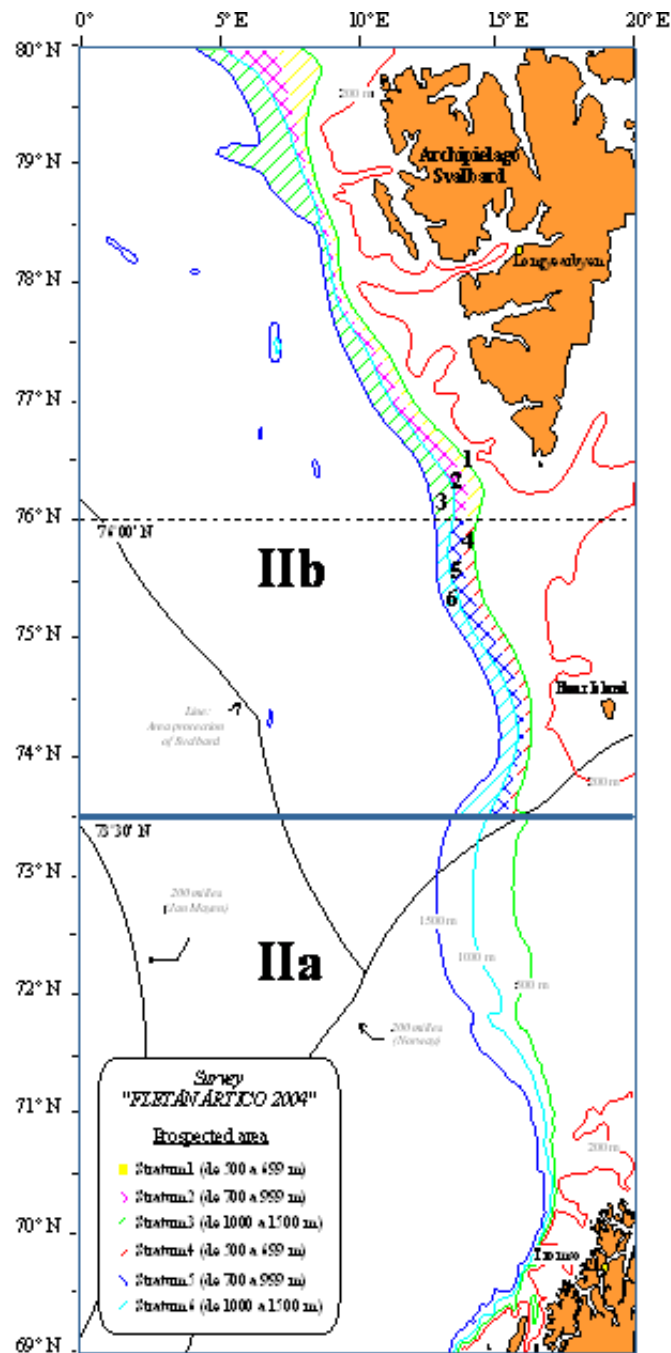


Figure 1. Map of the area showing the six considered strata and its ranges of depth.

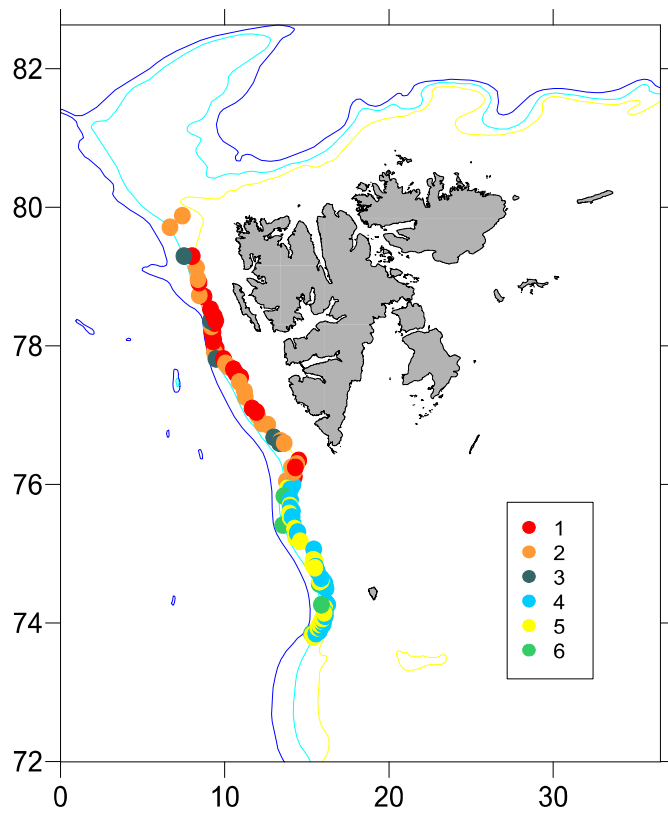


Figure2. Map showing the positions of the hauls by strata made during the *Campaña Fletán Ártico 2011* Survey.

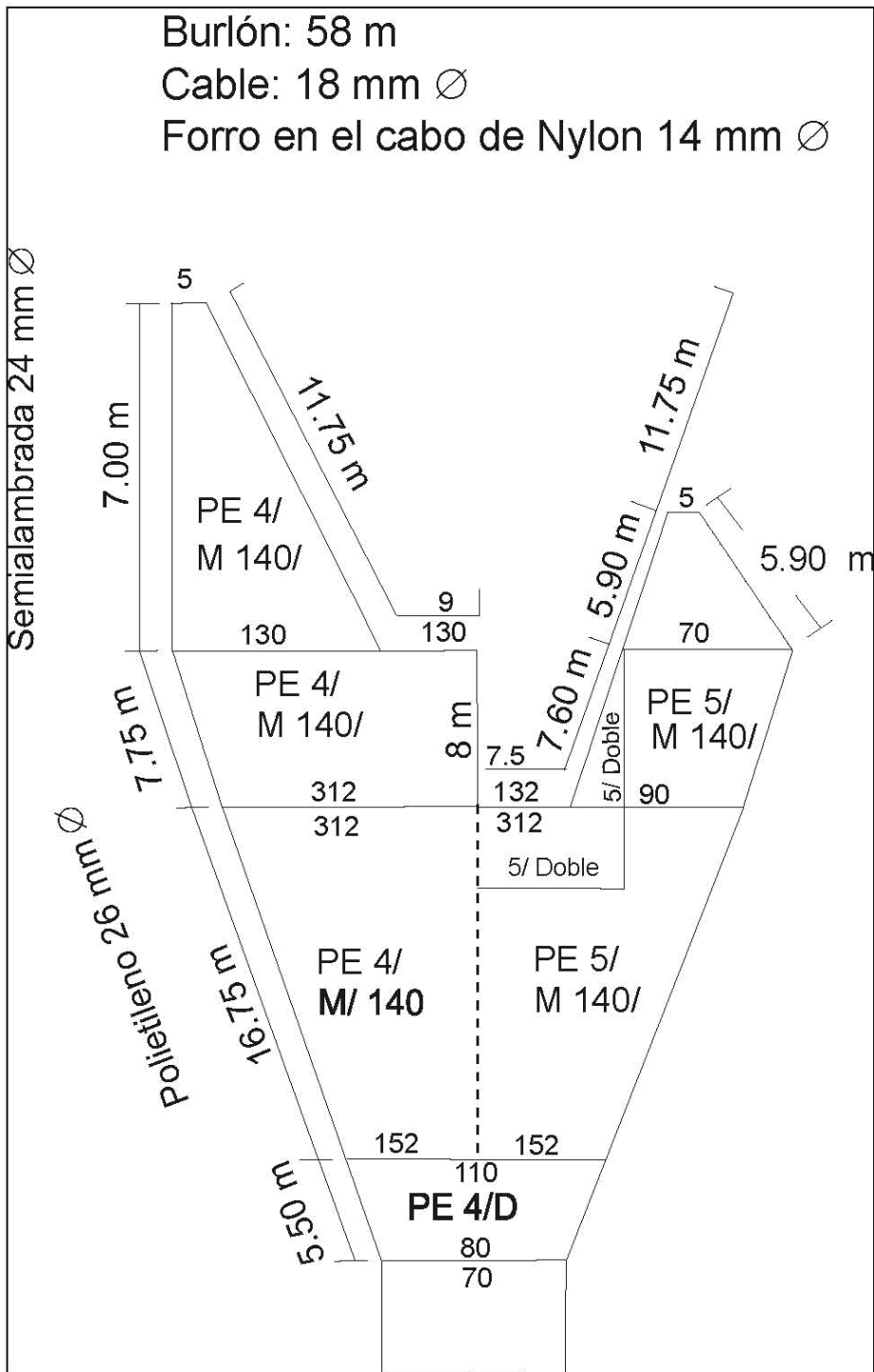


Figure 3. Schematic of the net plan of the Spanish “Pedreira” survey trawl

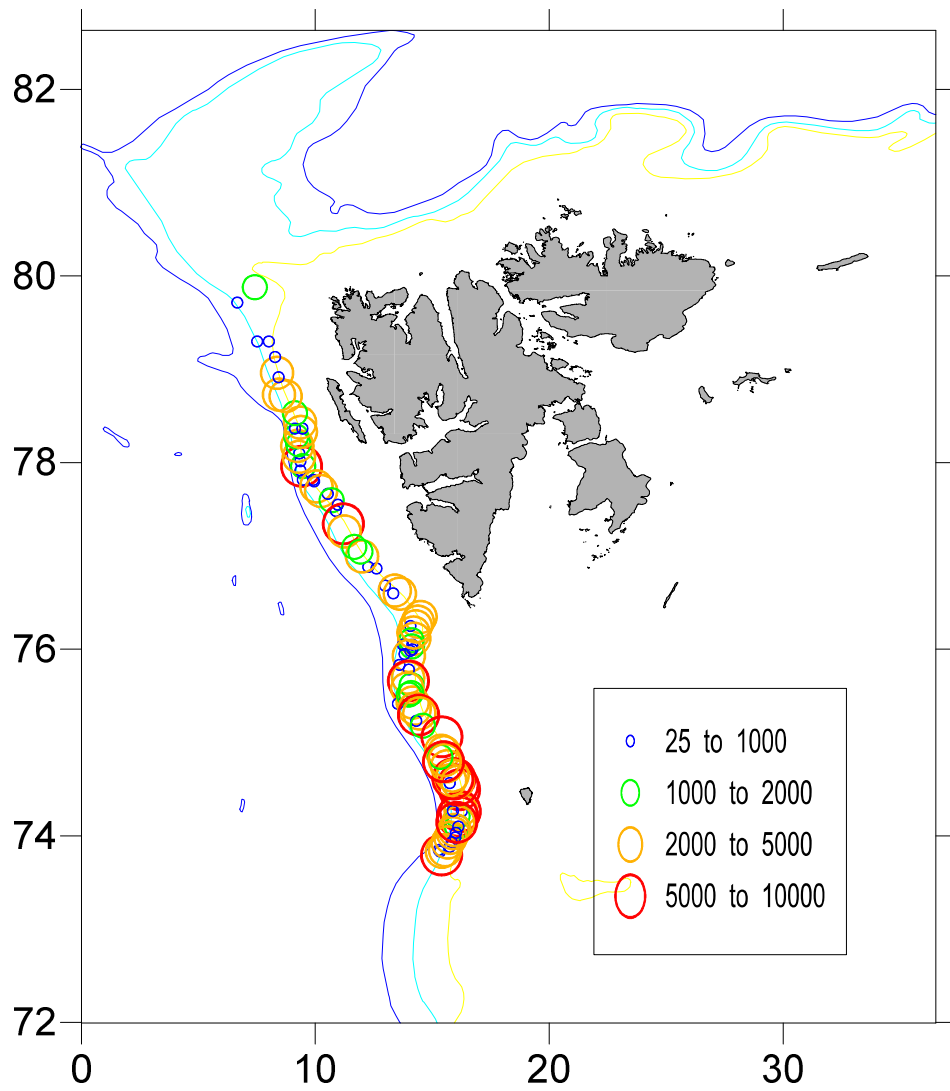


Figure4. Distribution of the **Greenland halibut** catches (Kg/h).

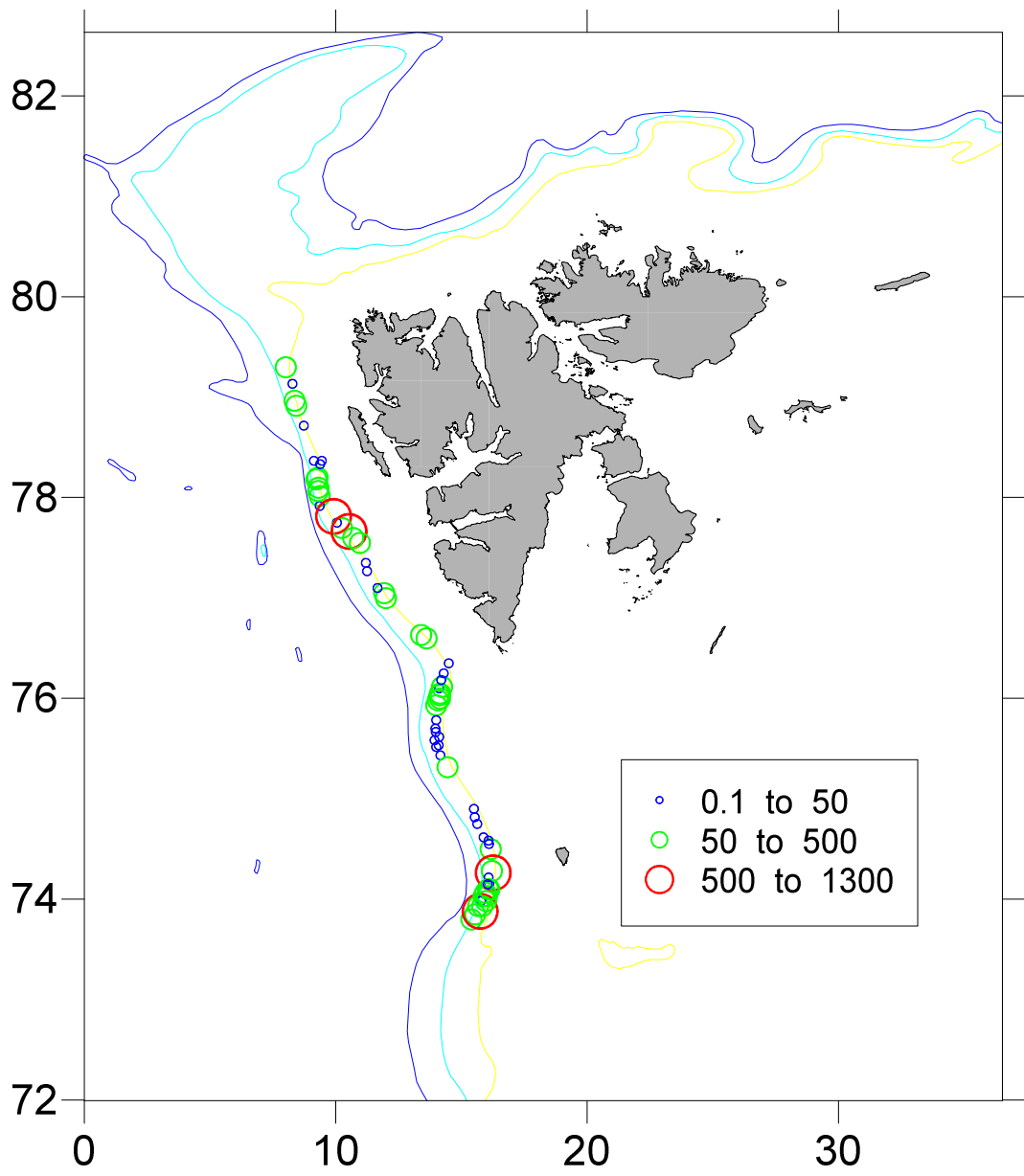


Figure5. Distribution of the **Cod** catches (Kg/h).

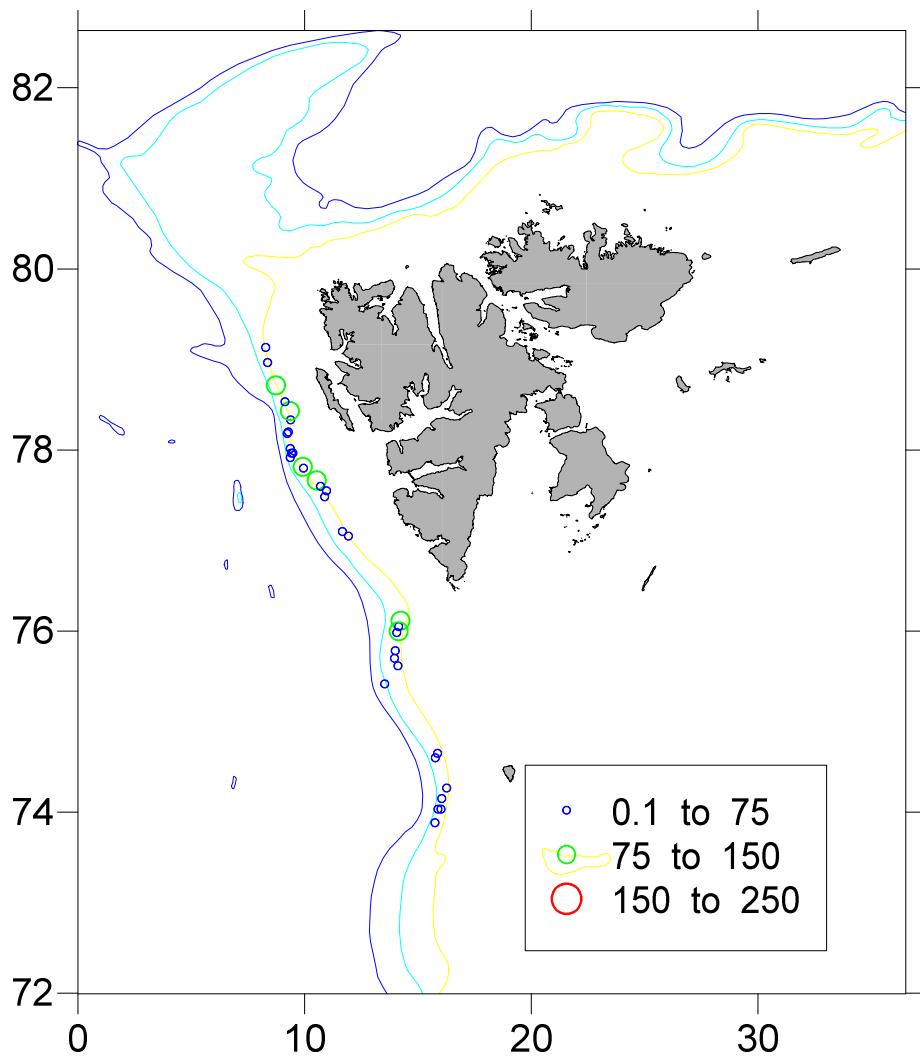


Figure 6. Distribution of the **wolfish** catches (Kg/h).

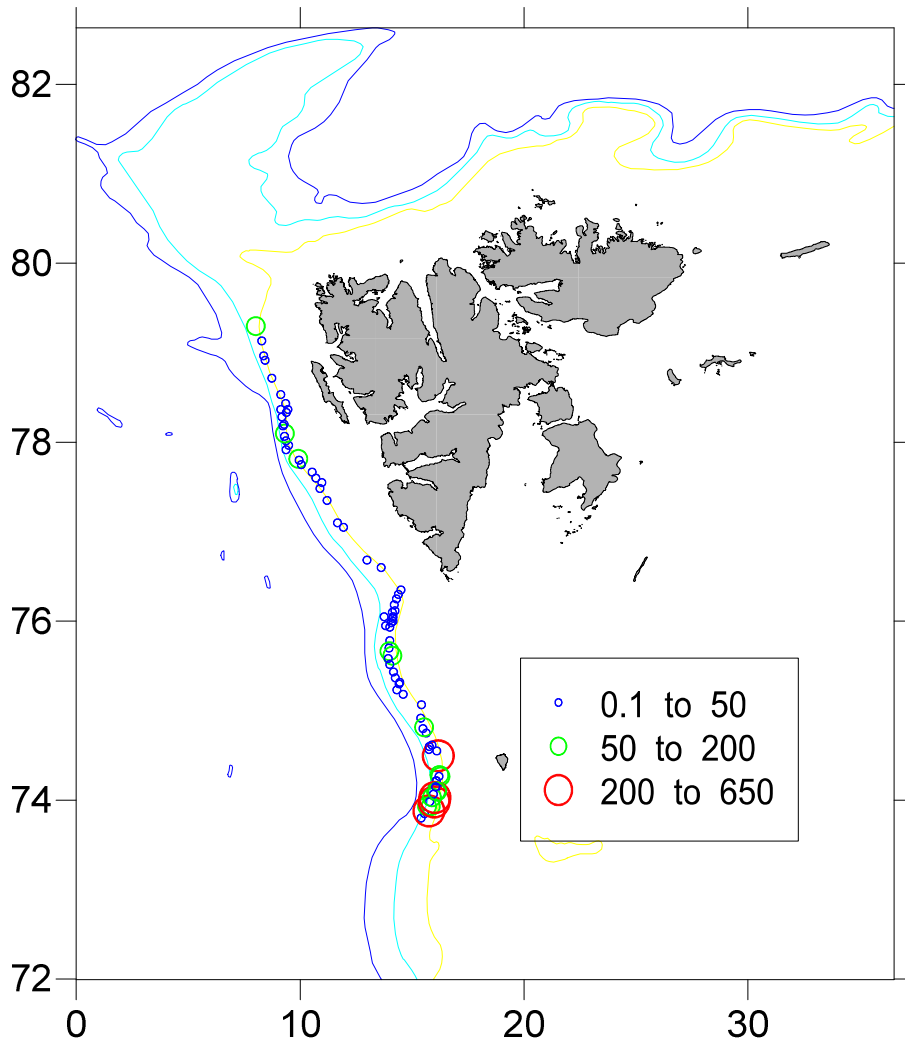


Figure 7. Distribution of the **redfish** catches (Kg/h).

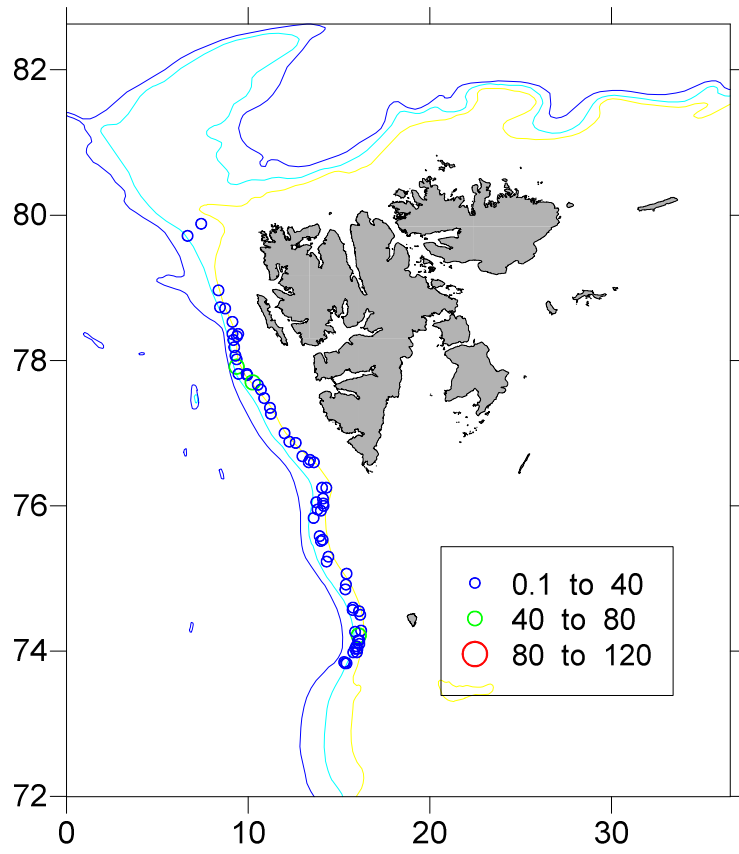


Figure 8. Distribution of the **thorny skate** catches (Kg/h)

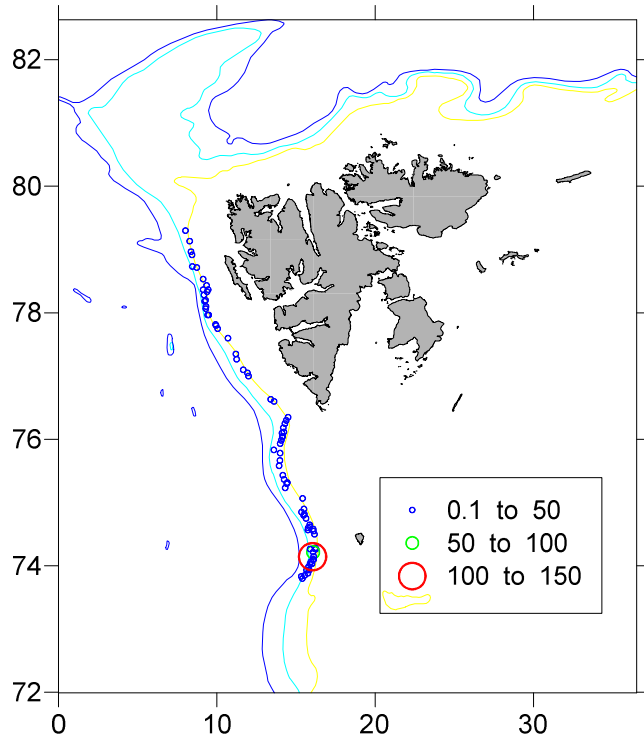


Figure 9. Distribution of the **grenadier** catches (Kg/h)

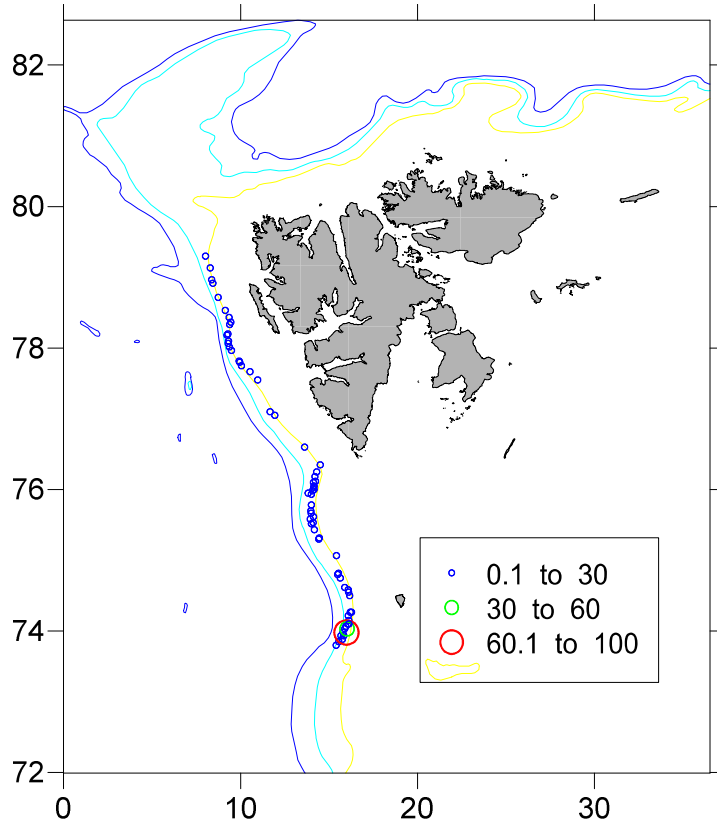


Figure 10. Distribution of the **blue whiting** catches (Kg/h)