Report of the *Fletán Ártico 2008* bottom trawl survey in *May* in the Slope of Svalbard

by

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1. Introduction

The *"Fletán Artico 2008"* survey is the continuation of the Spanish survey series that the Spanish Institute of Oceanography (IEO) has been carrying out since 1997. 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.

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. During this period, mean catches have been around 13.000 tonnes. Given the state of the stock and the current paucity of information, primarily because of the difficulties in the interpretation of the age from the otoliths, the fishery should not be increased further until there is better information and firm evidence of a larger stock size (ICES, 2007).

During the last years, the AFWG has advised a maximum catch of 13.000 t, this is the level below which SSB has increased in the past.

From 1992, the Greenland halibut fishery has been restricted to vessels smaller than 28 m using long-line and gillnet. Trawl catches are limited to by-catch only.

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 2008* survey in May, being its main characteristics:

Nationality: Spanish
Registered port & number: VI-5-9972
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 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.
- Legs: 17 m.
- Doors: "Inyector doors", Shark model 2800 Kg.

- Bridles: 150 m

2.3 Survey planning

The Survey took place from 2nd to 17th May. 84 hauls were carried out. Table 1, included in the annex I, shows specific data by haul.

As IEO used to do 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 73º 30' N and 80º 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	Latitude	Depth (m)	Surface Square nautical miles	nº hauls
1	76º 00' - 81º 00' N	500- 699	702	27
2	76º 00' - 81º 00' N	700- 999	1263	11
3	76º 00' - 81º 00' N	1000-1500	2693	3
4	73º 30' - 76º 00' N	500- 699	488	22
5	73º 30' - 76º 00' N	700- 999	761	16
6	73º 30' - 76º 00' N	1000-1500	1672	5
Total	73º 30' - 81º 00' N	500-1500	7579	84

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. 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. Gonad samples, 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 Annex II shows the map with the prospected area and the position of each haul performed.

As it is shown in the following figure, 92 % of the total catches correspond to Greenland halibut, while the rest of fishes and invertebrates suppose 3 % and 5 % respectively.

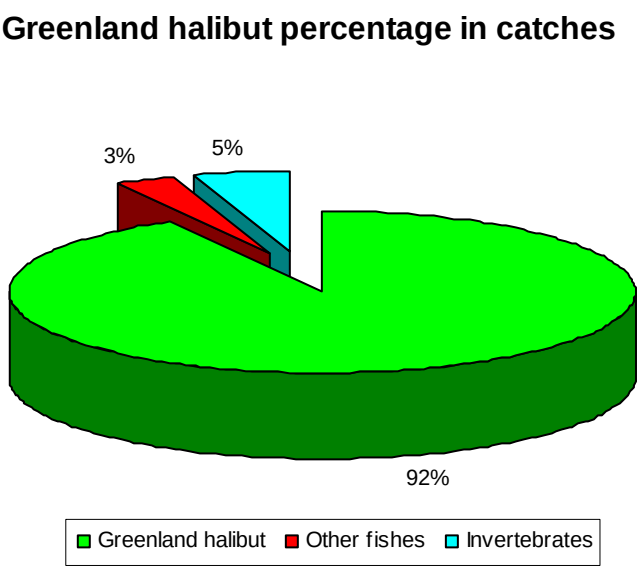


Figure 1. Greenland halibut percentage in the catches during *Fletán Ártico 2008* Survey

Table 2, included in Annex I, shows all species catches by haul. Greenland halibut was the principal species, with 96797 kg captured. Cod (1139,53 kg), wolffish (332,89 kg), thorny skate (390,1 kg), and redfish (740,76 kg) were the main accompanying species.

The main Greenland halibut catches were recorded in depths between 600 and 750 meters, reaching its maximum values between 600 and 715 meters depth (figure 2). It should be noted that all hauls exceeding 1000 Kg of Greenland halibut, were made in this range of depth. Above the 1000 meters deep, catches of halibut were scarce, being under 100kg all of them.

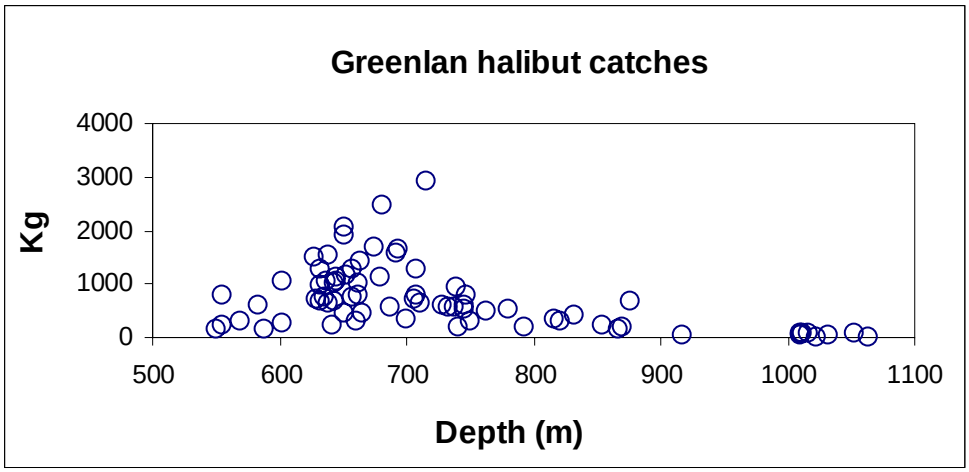


Figure 2. Greenland halibut catches in relation to depth, during *Campaña Fletán Ártico 2008 Survey.*

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 79º N catches are really scarce in all depths (figure 4, annex II).

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

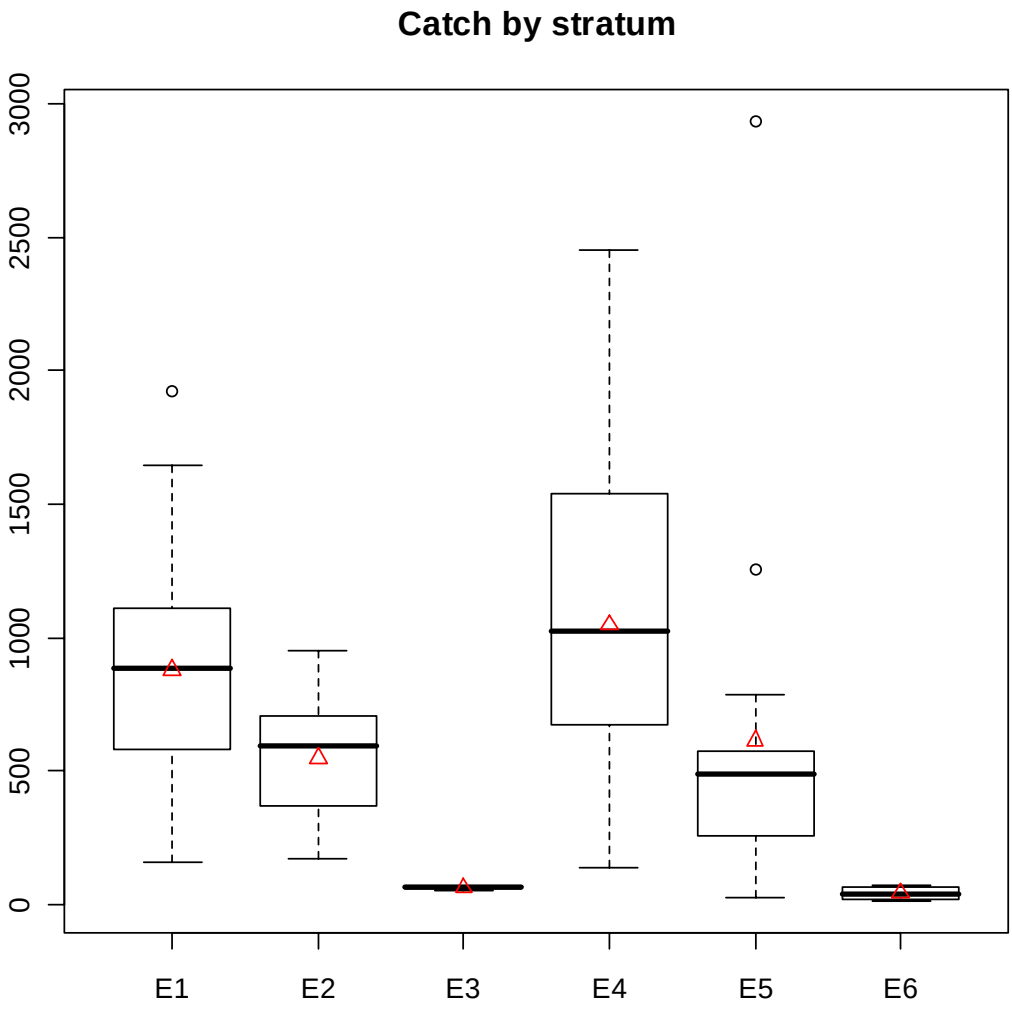


Figure 3.Greenland halibut catches (Kg) by stratum. (Mean (▲), median (▬) and percentiles 25 & 75.

Figures 5, 6, 7 and 8 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. Except from skates, the others are concentrated mostly in shallower depths, around 600-700 meters. In the case of the skates, it seems that the depth it is no limiting factor in the distribution.

3.2 Greenland halibut biomass and abundance

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

It should be noted however, that some of the parameters used in this survey for the calculation of the Swept Area, have been different to those used in previous years by the Spanish Institute of Oceanography (IEO).

The methodology for calculating the horizontal opening of the net has been different to that the IEO uses regularly. The data received from scanmar sensors, indicated a 55 ± 3 meters long horizontal opening for the 2008 survey, while the IEO estimated minor values, for a net with similar characteristics. The difference in this parameter, supposes a big difference in the values scored for the Swept Area, with a clear effect on the biomass and abundance results.

The estimated Greenland halibut biomass in this survey was 38406 t and the abundance, 38951 (x1000) individuals. Using the methodology of the IEO surveys the estimated biomass is 302303 t and the abundance 321431 (x1000). This supposes a difference of the 77% in function of the methodology used.

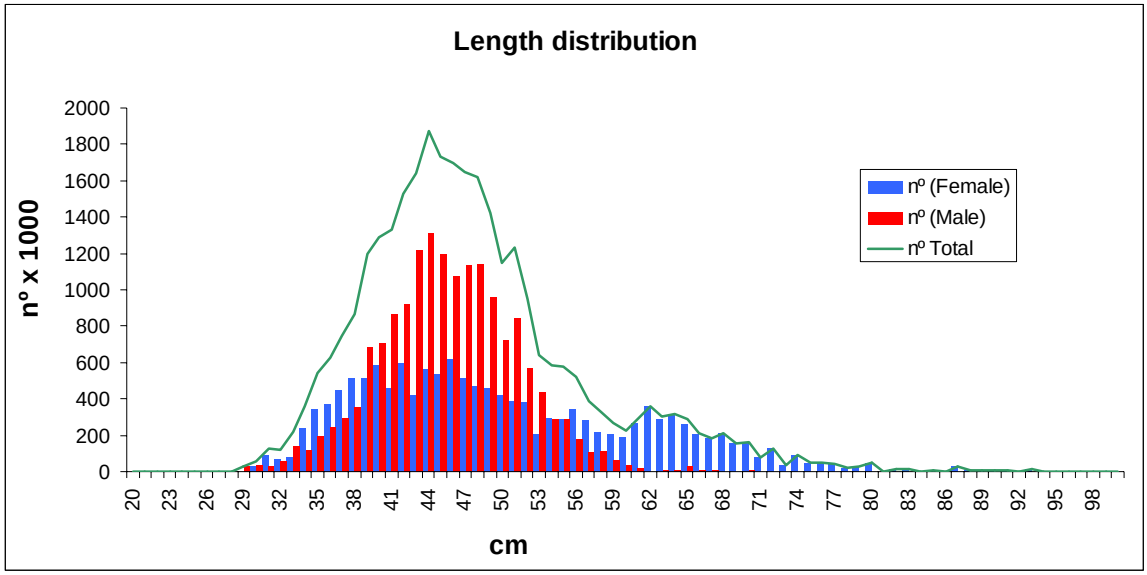
Table 3 included in the annex I, show the biomass and abundance values by stratum.

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 (Paz X., *et al, 2006).* Length range for both sexes was from 29 cm to 97 cm. As in previous cruises, the male proportion was higher, 54 % of males versus 46 % females.



Graph6. Greenland halibut length distribution in Svalbard.

3.5. Length – weight relationship

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

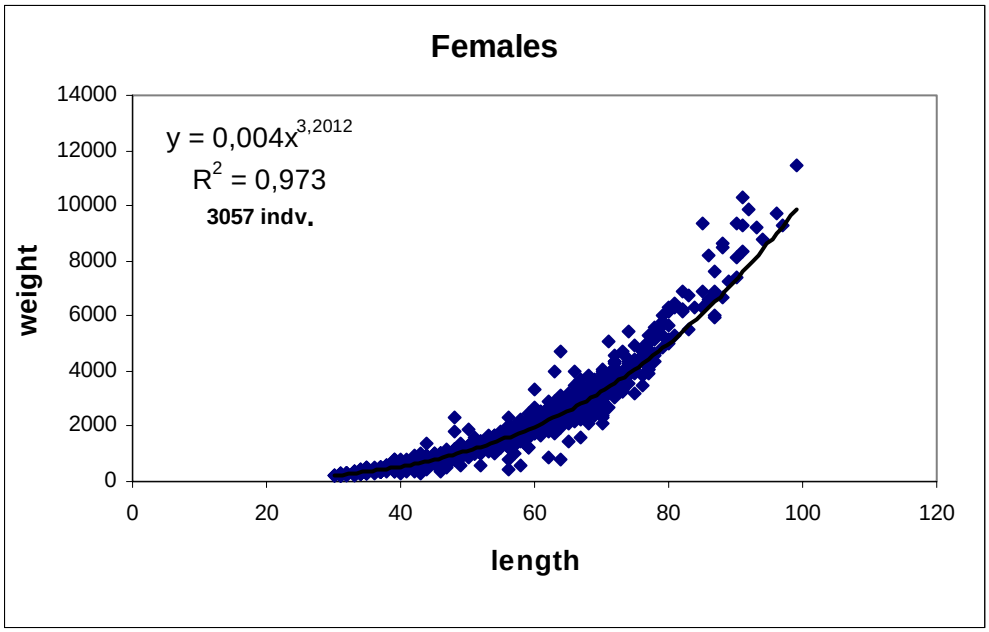


Figure 7. Length – weight relationship (females)

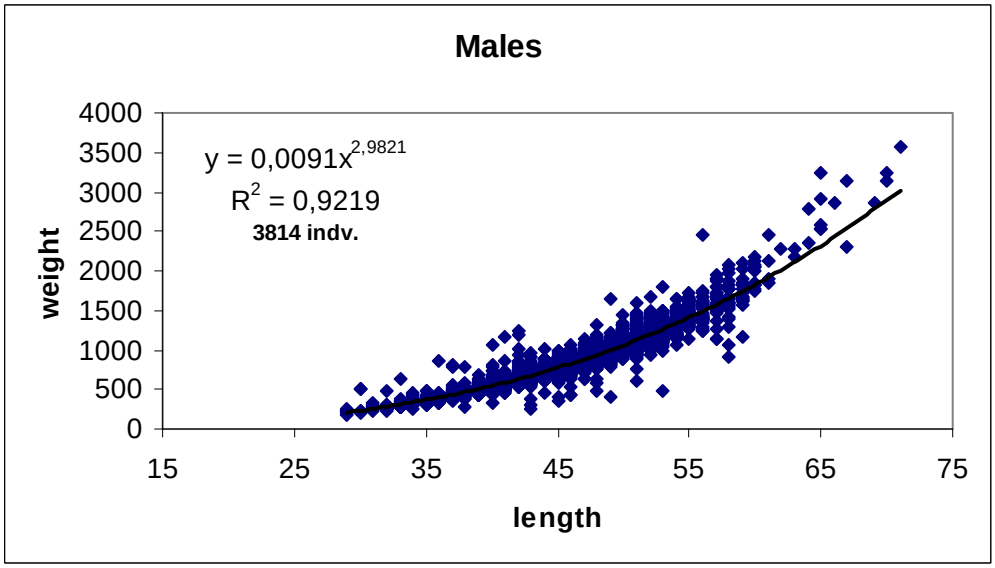


Figure 8. Length – weight relationship (Males)

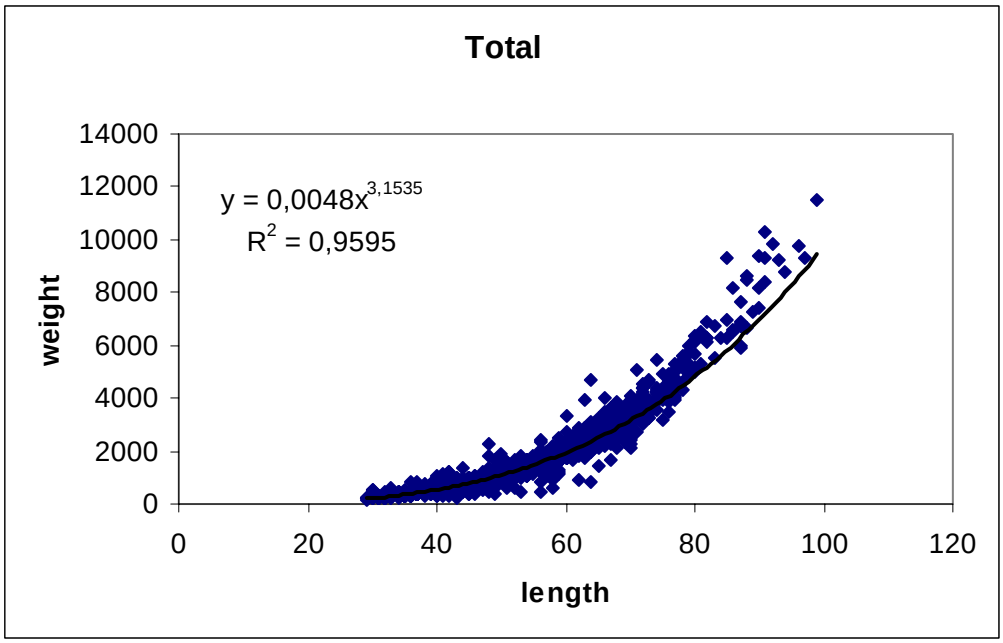


Figure 9. Length – weight relationship (total)

4 CONCLUSION

Main conclusions derived from the results obtained during the *Campaña Fletán Ártico 2008* Survey:

- Comparison with the rest of the *"Fletán Ártico"* Survey series must be made with prudence, mainly due to the change of vessel. It is also important to note that although the gear characteristics are similar between the rest surveys and this one, some specific modifications on the gears could have a direct influence in the yield. The gear used in this survey, show 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.

- The no utilization in this survey of a 40 mm mesh size cover cod end has a direct influence in the captures. This is the reason of why, length distribution shape could be slightly different or the presence of the blue whiting is insignificance due to the rest of the surveys.

- It's also important to be in account the different results obtained in biomass and abundance, depending on the methodology used for the Swept Area between this and the IEO historical surveys.

- Positive trend in the stock of Greenland halibut (Reinhardtius hippoglossoides) in the Archipelago of Svalbard continue, as the increase in the abundances shows.

- 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 recourse open to commercial exploitation to depths greater than 500., been the trawl fishery in that bathymetric range monospecific, addressed to the Greenland halibut.

5 BIBLIOGRAPHY

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Campaña Fletán Ártico 2008

ANNEX I: TABLES

Table1. Haul characteristics during *Campaña Fletán Ártico 2008 Survey.*

					Latitude largada		Longitud largada		Latitude virada		Longitude virada			
Haul	Strata	Valid	Depth Larg (m)	Depth Vir (m)	Gr	Min	Gr	Min	Gr	Min	Gr	Min	Speed (nudes)	Doors opening (m)
1	6	yes	1059	1068	73	47	15	4	73	48	15	8	3,3	230
2	5	yes	701	698	73	48	15	25	73	50	15	28	3,3	240
3	4	yes	663	698	73	51	15	34	73	53	15	38	3,1	220
4	4	yes	538	562	73	54	15	49	73	57	15	53	3,3	220
5	5	no	790	790	73	54	15	36	73	56	15	41	3,1	220
6	5	yes	748	754	73	56	15	41	73	58	15	45	3,1	200
7	5	yes	750	750	73	58	15	53	73	42	15	16	3,3	200
8	4	yes	610	596	74	0	15	18	74	2	16	2	3,7	202
9	5	yes	801	761	73	58	15	44	74	1	15	51	3,4	220
10	5	yes	714	702	74	2	15	58	74	4	15	58	3,4	228
11	4	yes	645	620	74	7	16	8	74	9	16	12	3,5	215
12	5	yes	787	738	74	12	16	7	74	14	16	8	3,6	220
13	4	yes	651	651	74	14	16	11	74	16	16	12	3,6	220
14	4	yes	650	650	74	19	16	14	74	5	16	5	3,3	220
15	6	yes	1054	970	74	14	15	59	74	19	16	3	3,7	190
16	6	yes	1060	1044	74	16	15	59	74	19	16	5	3,6	230
17	5	yes	740	750	74	16	16	13	74	19	16	16	3,8	200
18	4	yes	627	656	74	31	16	10	74	34	16	7	3,8	220
19	5	yes	911	830	74	36	15	44	74	40	15	39	3,8	210
20	4	yes	610	648	74	42	15	48	74	40	15	51	3,6	200
21	5	yes	756	734	74	50	15	28	74	53	15	29	3,7	223
22	4	yes	650	650	74	53	15	32	73	35	16	3	3,6	200
23	4	yes	742	643	74	53	15	32	74	50	15	33	3,2	210
24	6	yes	1025	1021	74	33	15	47	74	35	15	40	3,1	230
25	5	yes	863	870	74	58	15	23	74	46	15	24	3,3	210
26	5	yes	690	740	74	56	15	32	74	59	15	32	3,6	200
27	4	yes	676	640	75	0	15	34	75	2	15	32	3,5	204
28	4	yes	563	547	75	8	15	16	75	10	15	7	3,6	190
29	5	yes	870	838	75	11	14	37	75	14	14	27	3,6	240
30	4	yes	650	655	75	23	14	28	75	47	14	9	3,6	220
31	4	yes	656	676	75	18	14	27	75	21	14	20	3,7	215
32	6	yes	1031	1033	75	52	13	36	75	50	13	35	3,3	228
33	4	yes	652	636	75	51	14	0	75	48	14	4	3,4	216
34	4	yes	551	560	75	41	14	4	75	38	14	4	3,5	216
35	5	yes	751	744	75	37	13	56	75	36	13	57	3,6	195
36	4	yes	650	664	75	35	14	3	75	33	14	0	3,6	195
37	4	yes	630	636	75	28	14	10	75	26	14	14	3,6	210
38	4	yes	635	650	75	26	14	15	75	45	13	54	3,6	210
39	5	yes	731	746	75	25	14	8	75	23	14	11	3,4	218
40	4	yes	636	642	75	44	14	0	75	47	14	0	3,5	210
41	4	yes	689	660	75	54	13	45	75	56	13	46	3,5	220
42	5	yes	810	824	75	57	14	0	76	0	14	5	3,6	200
43	1	yes	650	625	75	57	13	53	76	0	13	55	3,5	215
44	1	yes	595	573	76	1	14	6	76	3	14	10	3,6	203
45	5	yes	910	925	76	3	14	11	76	6	14	15	3,7	203
46	4	yes	652	635	76	10	14	9	75	46	13	53	3,6	205
47	1	yes	656	631	76	8	14	12	76	10	14	16	3,6	228
48	2	yes	875	877	76	16	14	4	76	19	14	8	3,5	229
49	1	yes	698	678	76	21	14	25	76	24	14	31	3,6	210
50	3	yes	1010	1012	76	25	14	1	76	23	13	58	3,3	230
51	2	yes	711	703	76	20	14	25	76	18	14	22	3,4	212
52	2	yes	815	772	76	16	14	10	76	13	14	10	3,5	230
53	1	yes	685	675	76	36	13	37	76	38	13	26	3,6	200
54	1	yes	670	650	76	37	13	11	76	36	13	31	3,6	205
55	3	yes	1010	1012	76	37	13	16	76	38	13	11	3,4	225
56	1	yes	653	654	76	40	13	19	76	43	13	13	3,5	200
57	2	yes	840	801	76	53	13	32	76	55	12	25	3,4	220
58	2	yes	734	687	77	0	12	4	77	2	11	51	3,5	210
59	1	yes	652	637	77	5	11	44	77	7	11	37	3,6	190
60	1	yes	653	650	77	9	11	32	77	11	11	27	3,5	200
61	2	yes	731	727	77	18	11	13	77	21	11	12	3,6	216
62	1	yes	610	625	77	16	11	20	77	35	10	48	6,6	215
63	2	yes	705	710	77	23	11	12	77	25	11	9	3,4	220
64	1	yes	605	601	77	23	11	15	77	26	11	11	3,6	217
65	1	yes	653	625	77	28	11	5	77	31	11	0	3,5	208
66	2	yes	831	832	77	41	10	17	77	44	10	3	3,4	240
67	2	yes	745	734	77	43	10	12	77	42	10	19	3,6	215
68	1	yes	664	627	77	49	9	50	77	52	9	41	3,6	210
69	1	yes	660	642	77	58	9	26	78	1	9	21	3,6	204
70	1	yes	660	668	78	5	9	18	78	8	9	16	3,3	212
71	3	yes	1007	1027	79	23	7	25	79	20	7	26	3,2	230
72	1	yes	572	568	79	22	7	55	79	18	7	59	3,2	204
73	1	yes	670	652	79	14	8	4	79	11	8	10	3,3	208
74	2	yes	743	722	79	3	8	25	79	0	8	23	3,3	220
75	1	yes	577	600	78	56	8	27	78	51	8	28	3,4	224
76	2	yes	740	743	78	46	8	23	78	44	8	23	3,5	212
77	1	yes	626	646	78	34	8	59	78	32	9	6	3,4	219
78	1	yes	658	666	78	29	9	18	78	25	9	24	3,5	214
79	1	yes	650	665	78	20	9	23	77	58	9	24	3,5	215
80	1	yes	640	616	78	6	9	18	78	10	9	17	3,6	209
81	1	yes	698	689	78	11	9	14	78	14	9	15	3,6	201
82	1	yes	627	639	78	12	9	16	78	16	9	18	3,5	208
83	1	yes	640	683	78	20	9	21	78	23	9	25	3,6	204
84	1	yes	645	655	78	20	9	21	78	5	9	18	3,6	205

Table2. Catch by haul during *Campaña Fletán Ártico 2008* Survey.

Lance	Fletan (*Reinhardtius hippoglossoides*)	Gallineta (*Sebastes mentella*)	Bacalao (*Gadus morhua*)	Granadero (*Macrourus berglax*)	Raja radiata (*Amblyraja radiata*)	Raja ferreiro (*Bathyraja spinicauda*)	Raja ártica (*Amblyraja hyperborea*)	Cottunculus microps
1	17,6					12,34		
2	353,19	1,3				1,1		0,8
3	2452,31	15,94		8,8		1,5		0,3
4	141,62	213,84	13,6	6,45				
5								
6	282,9	5,25		0,74		1,25		0,98
7	4188							
8	1038,51	7,6	10,8	1,2	6	0,8		
9	515,41			2,2		3,1		0,4
10	1254,86	3,95	1,3	4,36		1,12		
11	671,42	13,87	229,95	3,5			1,15	
12	488,07	0,75		2,1		5,6	2,55	
13	2045,22		28,58	6,6				0,2
14	4653							
15	69,88	0,6				4,17		
16	68,34		1,16					
17	538,28	2,72	46,13	29,06			1,72	
18	235,84	1,15	36,9	9,9		3,5		0,6
19	169,13	3,2		3,94		11,36		
20	712,87	219	77,37	2,15			1,74	
21	596,58	2,14					0,49	
22	8850							
23	1579,84	9,1	4,38	0,98				
24	13,42	9,37						
25	158,85				22,63		0,5	
26	2934,54	3,23		15,6	2,5	2,95	1,51	0,54
27	1278,43	3,45	6,25	0,48	0,95		1,2	
28	223,99	14,04	16,64	1,12			2,28	
29	236,12	2,25				8,12	1,88	0,07
30	285							
31	430,44		6,24				8,38	0,24
32	38,69	2,35			1,7			0,25
33	1024,23	3,3		0,48	2,6		1,9	0,55
34	800,88	30,66	14,61					
35	787,42	2,08	5,76	0,85			15	
36	742,88	4,5	4,52	1,95			2,96	0,25
37	1254,48	0,85		2,7			2,7	
38	3693							
39	550,82					3,55	1,43	0,78
40	1541,06			1,6			0,35	0,8
41	1664,58					25,95		
42	322,77	0,47			27,78			1,1
43	1032,94	12,69	20,13	3,62			6,4	0,5
44	581,87	14	60,87	2,23	3,43	2,06	5,6	
45	24,75	0,6		0,35	18,59			
46	8406							
47	654,38	12,17	14,4	0,92	2,88		5,23	
48	678,51				12,91			
49	578,11	4,1	7,62		24,6			0,08
50	50,7				9,13			
51	728,79	5,97	4,74		32,42			0,7
52	203,16				8,17			0,16
53	1111,09	0,5		0,9	17,65		4,2	
54	1614							
55	68,62				5,01			
56	1161,34	1,8	13,45	4,75	12,02		9,66	
57	315,31		2,86		33,1		0,13	1,38
58	629,08				20,77		1,05	
59	1109,21	0,66	38,58		25,01		2,13	
60	437,38	0,3	55,86	0,6	6,8		4,9	
61	596,05		2,15		8,2		2,2	1,05
62	4653							
63	777,74		13,82		2,08		1,06	0,42
64	272,05		21				1,7	
65	628,83	26,44	11,4	1,4			5,13	0,2
66	419,24		6,3		3,05		2,24	1,95
67	948,87		9,14	0,86	4,16		2,27	1,66
68	1036,3		2,4	3,67			3,85	0,75
69	1924,17	3,26	16,04	2,5			7,19	1,2
70	1405,91	4,95	21,5	1			1,28	0,8
71	66,17	0,7			18,35			
72	299,87	57,29	143,04	0,51	6,44		2,4	0,31
73	310,84	2,53	8,96	1,3	2,63		1,17	0,5
74	554,71		9,59	1,15	2,26		0,91	0,43
75	160,13	2,06	35,23	0,54				1
76	174,61	0,67		1,4	5,85			0,4
77	731,73			4,6	14,75		5,73	1,28
78	998,12		17,5	8,57				0,4
79	4944							
80	1488,09	2,37	28,3	1,48			4,83	0,21
81	1648,03		2,7	2,57	10,85		3,93	2,07
82	988,17	9,74	53,26				2,9	0,2
83	780,78	1	14,5	2,35	14,83		3,15	0,7
84	2700							
Total	**96797,12**	**740,76**	**1139,53**	**145,23**	**390,1**	**88,47**	**138,98**	**26,21**

.

Table2(cont). Catch by haul during *Campaña Fletán Ártico 2008* Survey.

Lance	Perro del norte (Anarhichas lupus)	Perro pintado (Anarhichas minor)	Lycodes esmarki	Eglefino (Melanogrammus aeglefinus)	Lirio (Micromesistius poutassou)	Platija americana (*Hippoglossoides platessoides*)	Invertebrados
1							
2							
3				4,7			
4					0,52	0,21	
5							
6							
7							
8							
9				2,9			
10	21,42						
11							
12							
13							
14							
15							
16							
17	17,55		0,3		0,1		
18	14,4	3,3		0,3		0,8	
19							
20							
21			2,85				0,2
22							
23					0,1		
24							
25					0,35		
26			2,1				0,45
27	20,7					0,45	0,55
28	11,1	20,5					
29						0,75	
30							
31	17,83						
32					0,32	0,35	0,74
33					0,5		0,77
34			1,03				0,26
35					0,25		0,32
36					0,1		
37						0,2	0,1
38							
39							
40							
41							2,92
42							13,92
43							8,5
44							
45							1,5
46							
47							5,56
48							7,7
49							1,5
50							4,1
51							6,35
52							1,76
53							0,97
54							
55							3,5
56					0,2		1,05
57							1,8
58							3,5
59							1,94
60			0,3				1,8
61							7,93
62							
63		3,13					
64	44					0,17	2,15
65						0,4	4,95
66							5000
67							0,79
68							7
69	15,87						3,25
70	51,32						5,62
71							0,57
72	57,29	5,86	0,6				0,5
73		4,3					1,05
74							1,1
75							
76						0,41	0,53
77							201,18
78							20,23
79							
80	10,91		0,5				3,85
81	50,5		0,2				0,4
82							26,75
83							40
84							
Total	**332,89**	**37,09**	**7,88**	**7,9**	**2,44**	**3,74**	**5399,61**

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

Greenland halibut

Strata	Surface	Valid hauls	Swept Area	Catch (Kg)	Biomass (mt))	Abundance(x1000)
1	702	27	3,4135	33250	6838,16	6184
2	1263	11	0,5712	6026	13325,39	12810
3	2693	3	0,1512	185	3303,67	4043
4	488	22	3,7250	43726	5728,41	8385
5	761	16	1,2965	13402	7866,33	5331
6	1672	5	0,2586	208	1344,17	2198
Total	**7579**	**84**	**9,4159**	**96797**	**38406,13**	**38951**

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

Cod

Strata	Surface	Valid hauls	Swept Area	Catch (Kg)	Biomass (mt))
1	702	22	1,1882	586,74	346,65
2	1263	11	0,5712	48,60	107,47
3	2693	3	0,1512	0,00	0,00
4	488	17	0,8787	449,84	249,83
5	761	16	0,7790	53,19	51,96
6	1672	5	0,2586	1,16	7,50
Total	**7579**	**74**	**3,8269**	**1139,53**	**763,41**

Redfish

Strata	Surface	Valid hauls	Swept Area	Catch (Kg)	Biomass (mt))
1	702	22	1,1882	155,86	92,08
2	1263	11	0,5712	6,64	14,68
3	2693	3	0,1512	0,70	12,47
4	488	17	0,8787	537,30	298,40
5	761	16	0,7790	27,94	27,29
6	1672	5	0,2586	12,32	79,64
Total	**7579**	**74**	**3,8269**	**740,76**	**524,57**

Wolffish

Strata	Surface	Valid hauls	Swept Area	Catch (Kg)	Biomass (mt))
1	702	22	1,1882	229,89	135,82
2	1263	11	0,5712	0,00	0,00
3	2693	3	0,1512	0,00	0,00
4	488	17	0,8787	64,03	35,56
5	761	16	0,7790	38,97	38,07
6	1672	5	0,2586	0,00	0,00
Total	**7579**	**74**	**3,8269**	**332,89**	**209,45**

Artic skate

Strata	Surface	Valid hauls	Swept Area	Catch (Kg)	Biomass (mt))
1	702	22	1,1882	81,38	48,08
2	1263	11	0,5712	9,86	21,80
3	2693	3	0,1512	0,00	0,00
4	488	17	0,8787	22,66	12,58
5	761	16	0,7790	25,08	24,50
6	1672	5	0,2586	0,00	0,00
Total	**7579**	**74**	**3,8269**	**138,98**	**106,97**

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

Roughhead grenadier

Strata	Surface	Valid hauls	Swept Area	Catch (Kg)	Biomass (mt))
1	702	22	1,1882	43,51	25,71
2	1263	11	0,5712	3,41	7,54
3	2693	3	0,1512	0,00	0,00
4	488	17	0,8787	39,11	21,72
5	761	16	0,7790	59,20	57,83
6	1672	5	0,2586	0,00	0,00
Total	**7579**	**74**	**3,8269**	**145,23**	**112,80**

Long rough dab

Strata	Surface	Valid hauls	Swept Area	Catch (Kg)	Biomass (mt))
1	702	22	1,1882	0,57	0,34
2	1263	11	0,5712	0,41	0,91
3	2693	3	0,1512	0,00	0,00
4	488	17	0,8787	1,66	0,92
5	761	16	0,7790	0,75	0,73
6	1672	5	0,2586	0,35	2,26
Total	**7579**	**74**	**3,8269**	**3,74**	**5,16**

Thorny Skate

Strata	Surface	Valid hauls	Swept Area	Catch (Kg)	Biomass (mt))
1	702	22	1,1882	141,89	83,83
2	1263	11	0,5712	132,97	294,04
3	2693	3	0,1512	32,49	578,66
4	488	17	0,8787	9,55	5,30
5	761	16	0,7790	71,50	69,85
6	1672	5	0,2586	1,70	10,99
Total	**7579**	**74**	**3,8269**	**390,1**	**1042,67**

Campaña Fletán Ártico 2008

ANNEX II: FIGURES

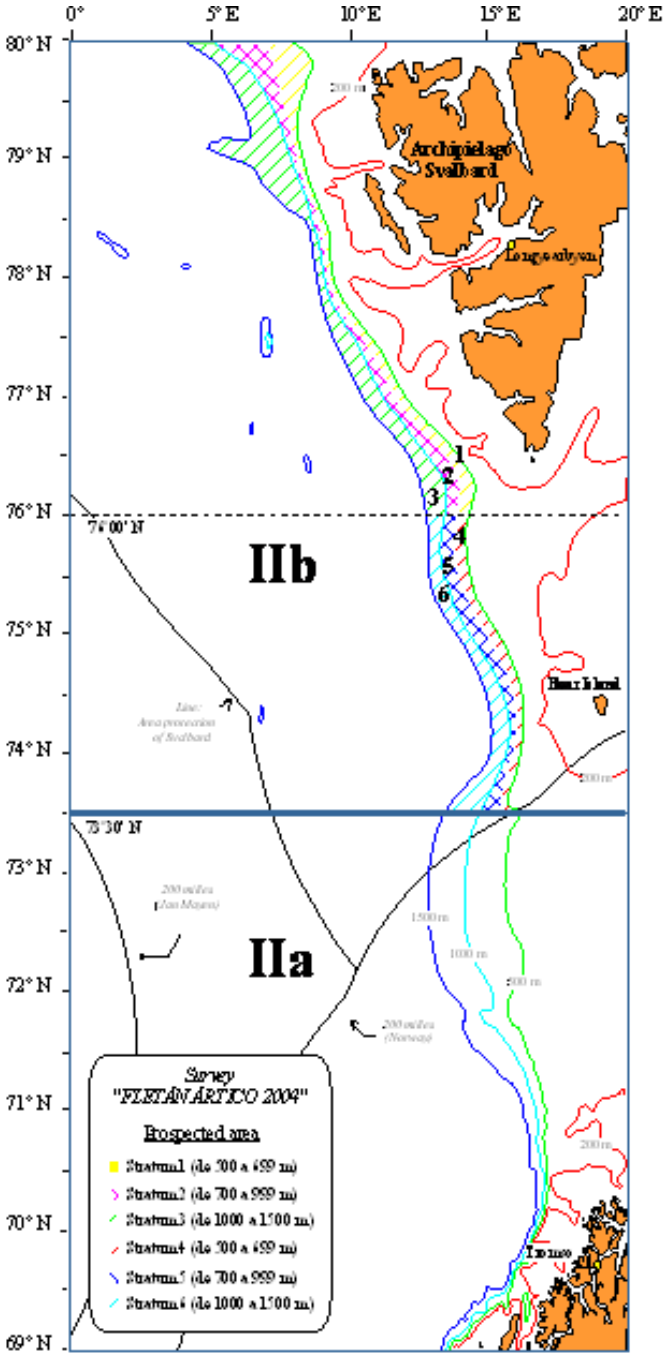

Figure1. Map of the area showing the six considered strata and its ranges of depth.

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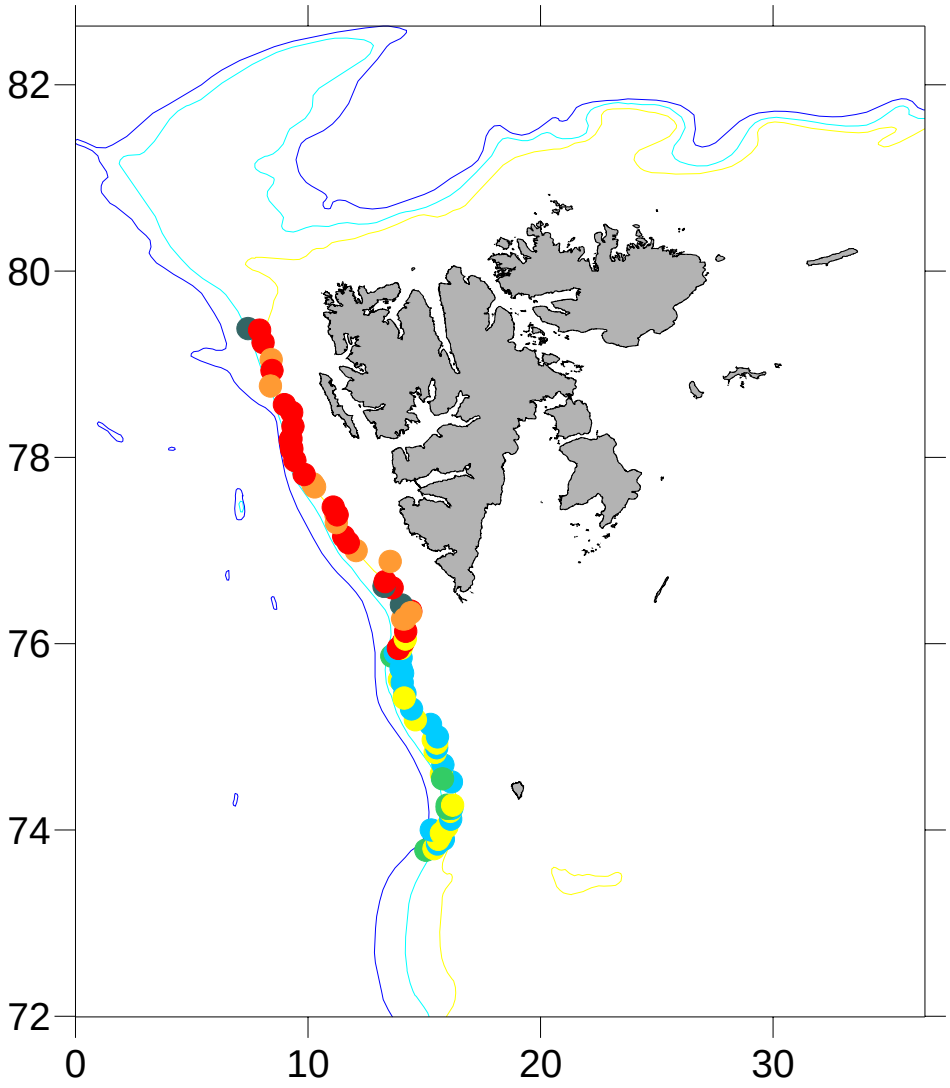

Figure2. Map showing the positions of the hauls made during the *Campaña Fletán Ártico 2008* Survey in May.

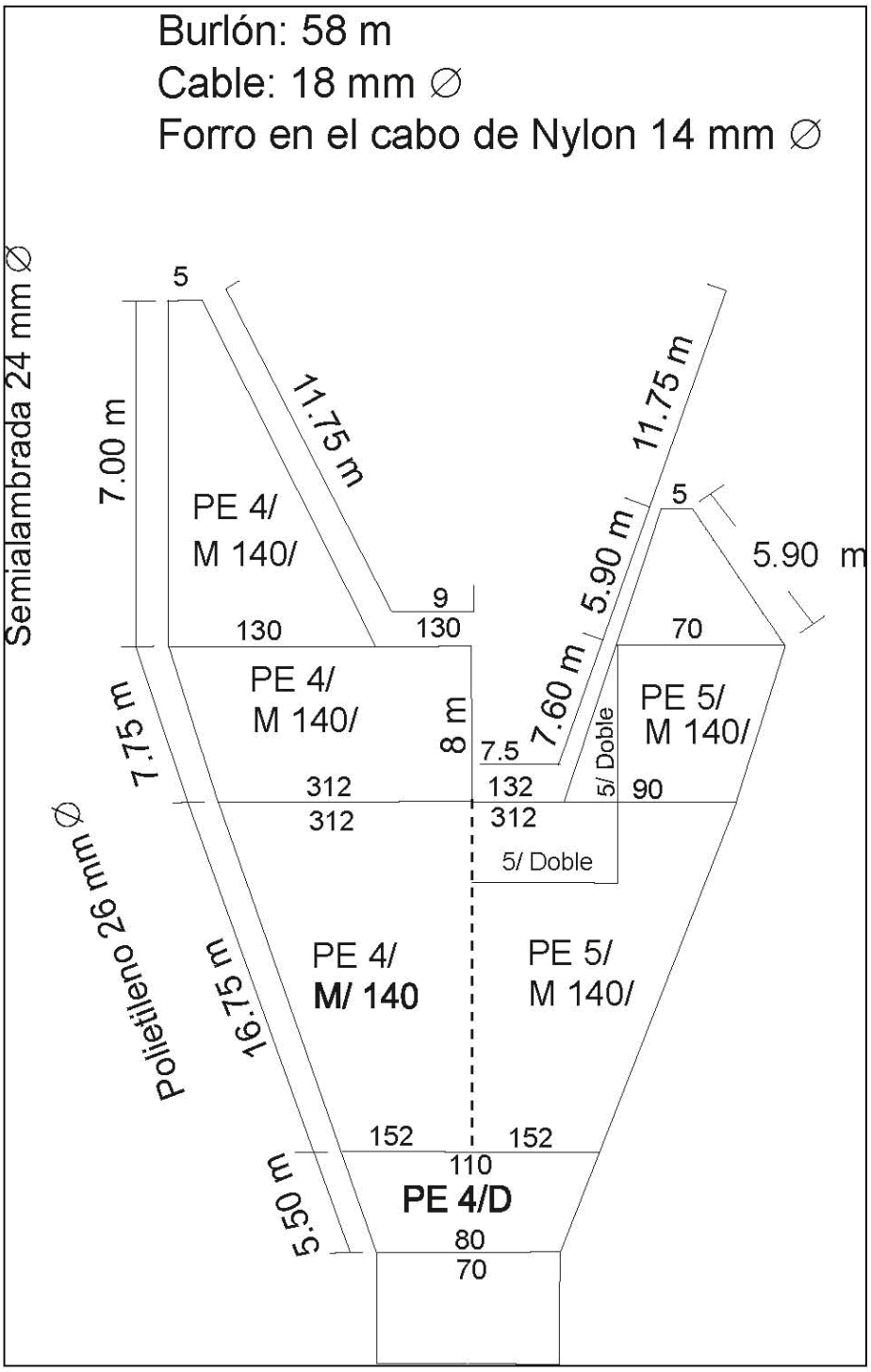

Figure 3. Schematic of the net plan of the Spanish "Pedreira" survey trawl

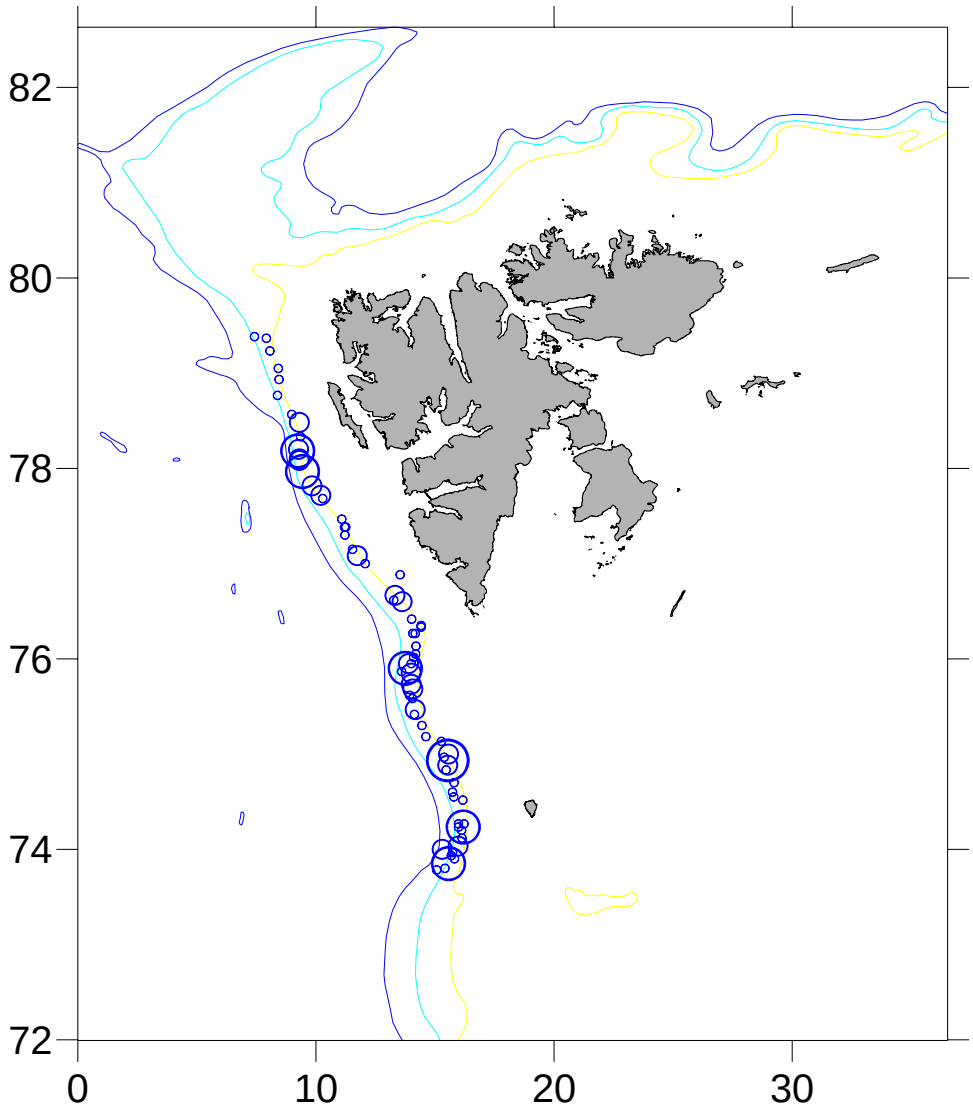

Figure4. Distribution of the **Greenland halibut** catches (Kg).

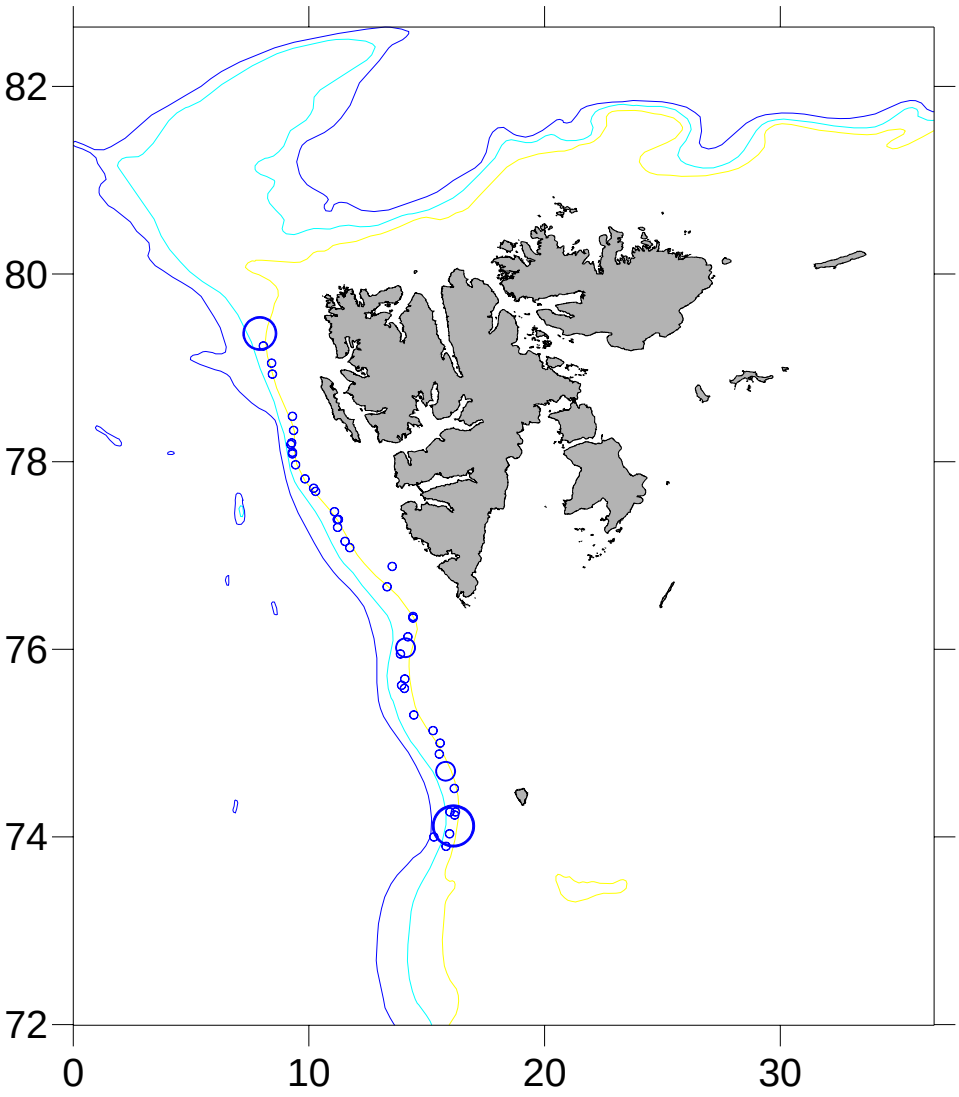

Figure5. Distribution of the **Cod** catches (Kg).

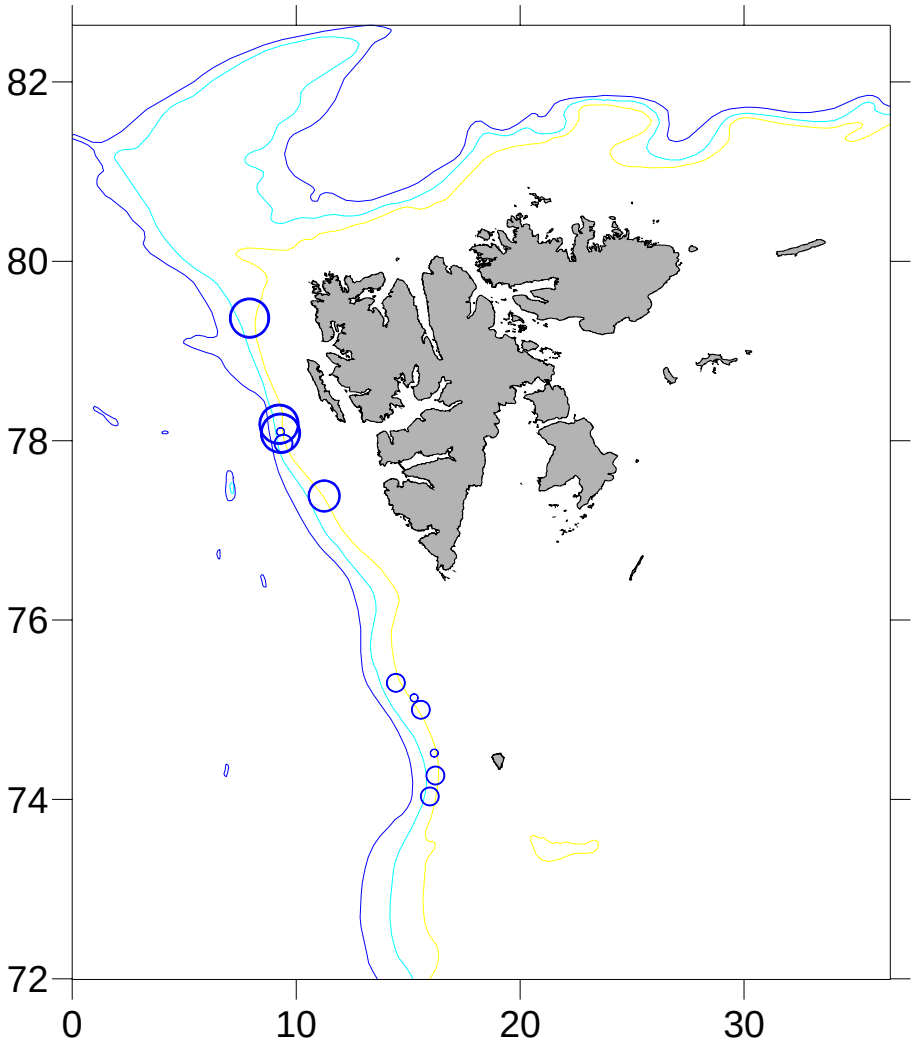

Figure 6. Distribution of the **wolffish** catches (Kg).

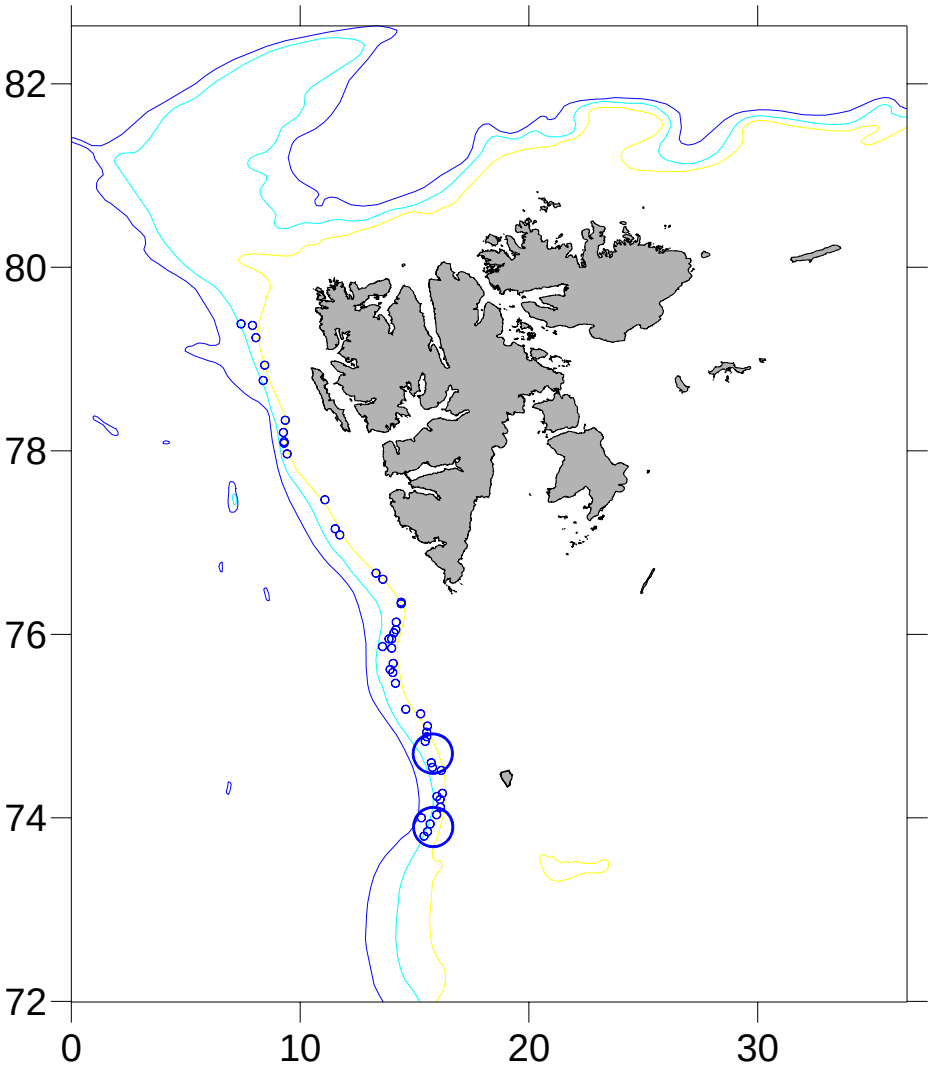

Figure 7. Distribution of the **redfish** catches (Kg)**.**

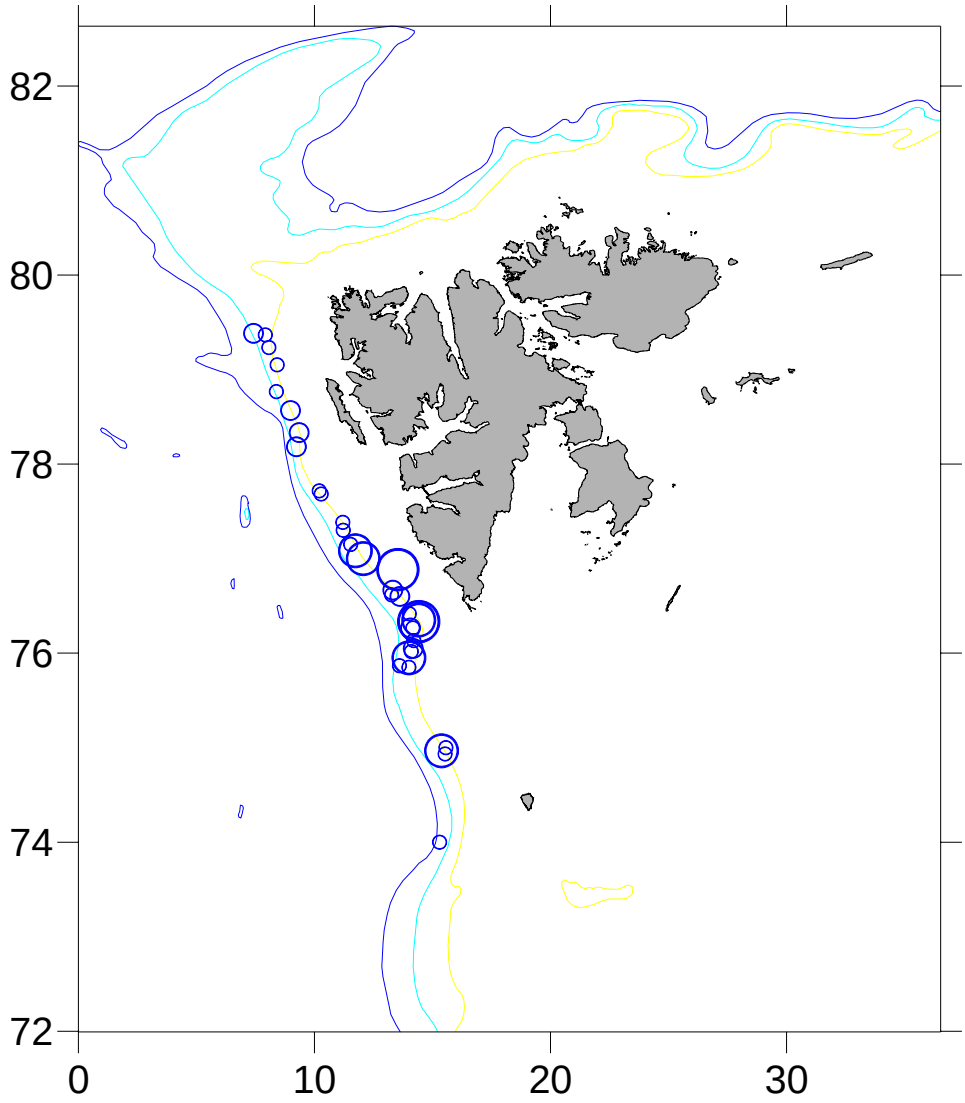

Figure 8. Distribution of the **thorny skate** catches (Kg)