

# Report of the "Fletán Ártico 2019" bottom trawl autumn survey in the Slope of Svalbard

by

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# 1 Introduction

The "Fletán Artico 2019" autumn survey is the continuation of the Spanish bottom trawl survey series started in 1997 (**Table 1**) on the slope of Svalbard (ICES Division 2b2). Along all this series, the main objective has been to obtain biomass/abundance indices to determine the population structure of Greenland halibut (*Reinhardtius hippoglossoides*) in the protection area of the Svalbard Archipelago.

**Table 1.** Spanish investigations (*Fletán Ártico* survey series) on Greenland halibut on the slope of Svalbard since 1997 using factory trawlers. EBVD: Eirado do Costal; EDKX: Nuevo Virgen de la Barca; EDKW: Nuevo Virgen de Lodairo; EFJS: Puente Pereiras Cuatro; EHIM: Garoya Segundo; EHKC: Playa de Sartaxens.

Nº	Year	Vessel	Nº of hauls	Period	Dates	Institution
1	1997	EHKC	156	Spring	26 Sep-27 Oct	IEO
2	1998	EFJS	148	Autumn	1-24 Oct	IEO
3	1999	EFJS	133	Autumn	4-29 Oct	IEO
4	2000	EHIM	147	Autumn	2-31 Oct	IEO
5	2001	EHIM	146	Autumn	2-28 Oct	IEO
6	2002	EHIM	155	Autumn	4-30 Oct	IEO
7	2003	EHIM	150	Autumn	2-29 Oct	IEO
8	2004	EHIM	149	Autumn	2-28 Oct	IEO
9	2005	EHIM	144	Autumn	3-28 Oct	IEO
10	2008	EDKX/EBVD	84/74	Spring/Autumn	2-15 May/1-15 Oct	AZTI
11	2009	EDKW	91	Spring	21 Apr-8 May	AZTI
12	2010	EBVD	73	Autumn	5-10 Oct	AZTI
13	2011	EDKX	114	Spring	1-19 Jun	AZTI
14	2012	EBVD	49	Autumn	15 Sep-1 Oct	AZTI
15	2013	EBVD	63	Autumn	4-18 Sep	IEO
16	2014	EBVD	57	Autumn	2-19 Sep	IEO
17	2015	EDKW	81	Spring	19 Jun-10 Jul	IEO
18	2016	EBVD	68	Autumn	5-24 Sep	IEO
19	2019	EBVD	19	Autumn	16-23 Sep	AZTI

The results from these studies enable (i) the provision of updated information to the ICES Arctic Fisheries Working Group – AFWG which contributes to advice on sustainable management of deep-water fisheries resources and (ii) continuity of the Spanish fisheries studies into the Fisheries Protection Zone around Svalbard within the framework of the Paris Treaty (1920).

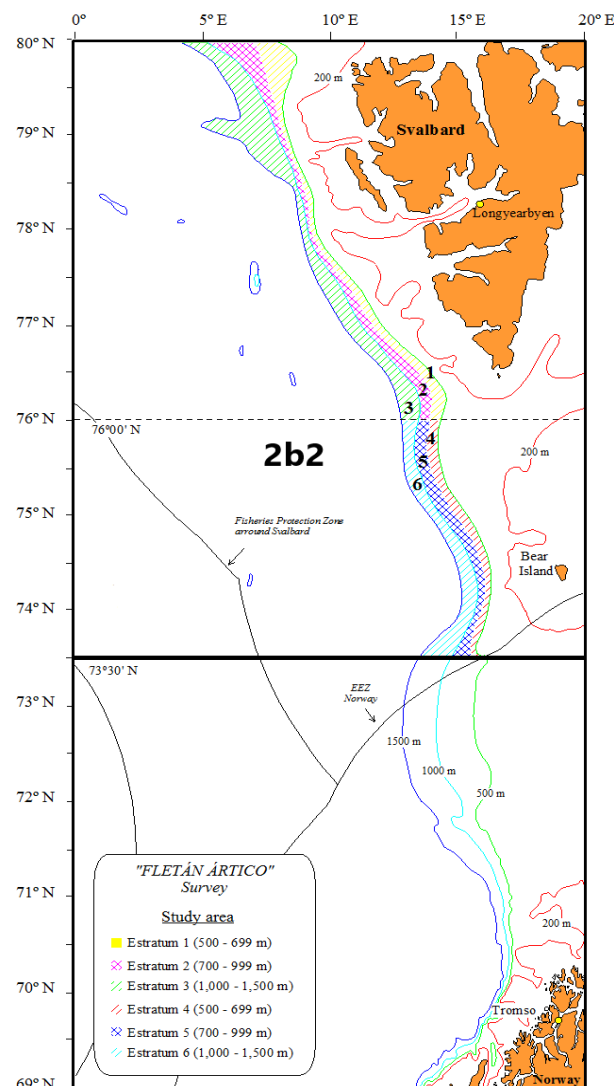
In addition to the main objective of this study (abundance/biomass indices and spatial/bathymetric distribution of Greenland halibut), complementary information was also collected:

- length/weight relationships by sex for Greenland halibut.
- accompanying fish fauna.
- accompanying invertebrates, and vulnerable habitats indicators.

## 2 Material and methods

### 2.1 Study area

As in previous surveys, the study area (Figure 1) is located on Western slope of Svalbard, between 73° 30' N and 80° 00' N (North-East Arctic, ICES Division 2b2). The zone lies within the Fisheries Protection Zone around Svalbard, at depth strata between 500 and 1,500 m.



**Figure 1.** Study area of the Fletán Ártico Spanish bottom trawl survey series.

## 2.2 Characteristics of the vessel

B/C Eirado do Costal was the selected vessel to conduct “Fletan Ártico 2019” 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 m3
- Freezing capacity: 50 Tm / day
- Engine: Mak6M25PX,1645,6 C.V
- Equipment:
- Echo sounder: Simrad ES60 y Furuno FCU 1200L
- Scanmar net sensors.



## 2.3 Characteristics of the fishing gear

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 2** and **Figure 3**, a trawl gear plane is shown. This gear is mounted with a 49,7 meters headline and 66 meters long rockhooper, indicated for Greenland Halibut fishery.

Main gear characteristics:

- Ground gear

- Central section (7,5 m), with 18'' rubber discs separated by a divider and four 14'' sweepers.
- Lateral section (8,4 m), with 18'' rubber discs separated by two dividers and eight 14'' sweepers.
- Lateral extensions (7m), with half spheres of 16'' separated by four dividers.

- Floats: 240mm and 300 mm diameter floats

- Codend: (Polyethylene 6 mm), with 140 mm mesh size. A 40 mm mesh size cover codend was added

- Legs: 14 m.

- Doors: Oval Floyd, 6,8 m<sup>2</sup> and 2200 kg.

- Bridles: 300 m

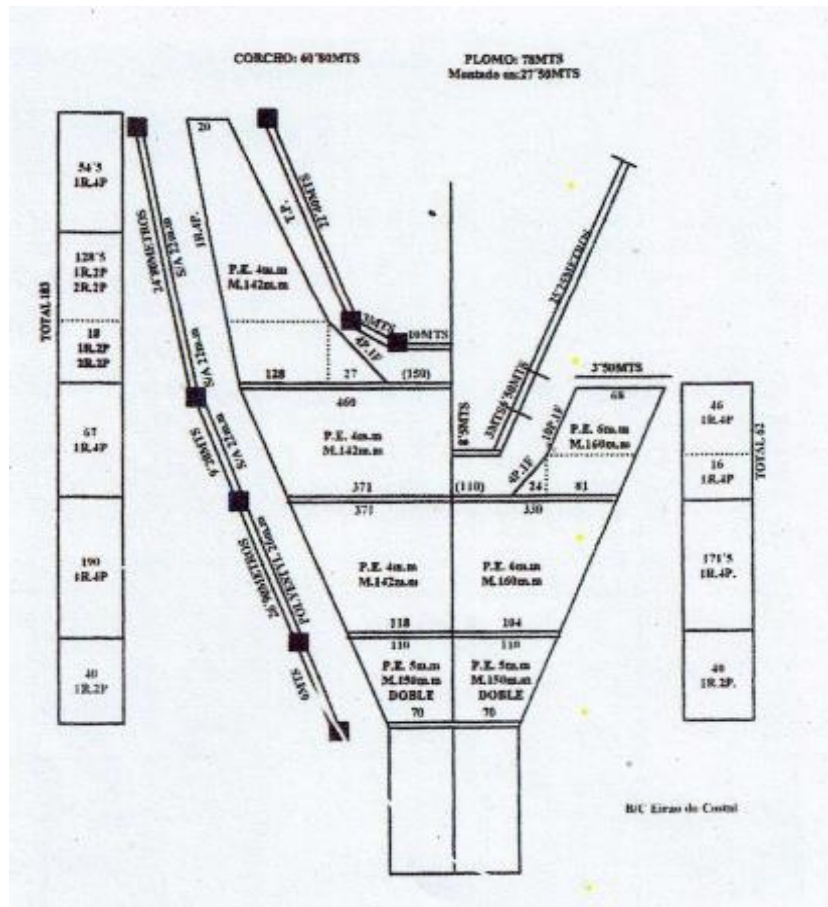


Figure 2. Net diagram. Spanish bottom trawl autumn survey *Fletán Ártico* 2019.

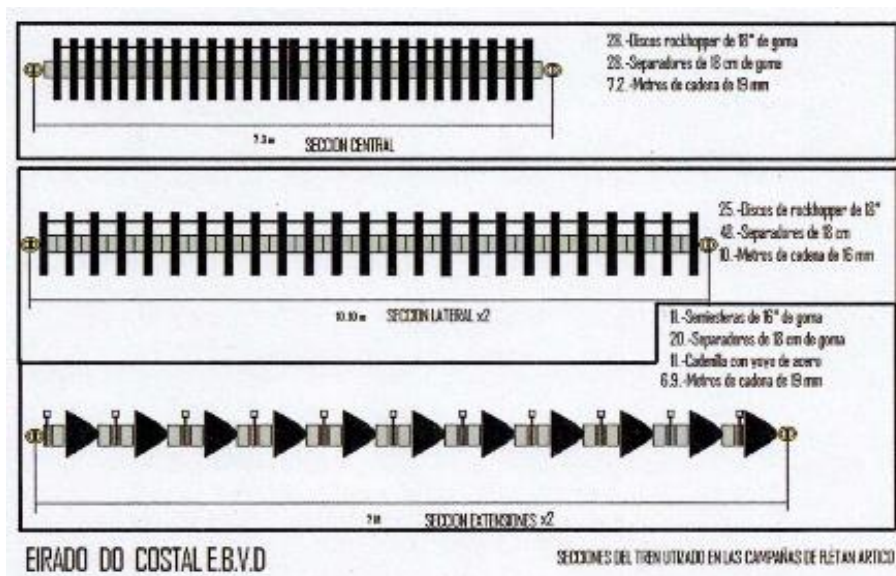


Figure 3. Rock hopper diagram. Spanish bottom trawl autumn survey *Fletán Ártico* 2019.



## 2.4 Survey planning

The 2019 survey was carried out from 16<sup>th</sup> to 23<sup>rd</sup> September 2019, and sampling took place from 18<sup>th</sup> to 22<sup>nd</sup> September. **Table 1a**, 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 81° 00' N (**Figure 4**). For the sampling scheme, the stratification designed in 1994 was used. Hauls were carried out on locations previously trawled in the *Fletán Ártico* survey series (1997-2016).

Survey plan was developed without incidences. A total of 19 valid hauls were carried out. The number of hauls was limited by the “authorized Research quota of Greenland halibut” (a total of 50 tons round weight in 2019). In **Table 2** latitude and depth range limits for each stratum, as well as the surface area and the number of valid hauls made is shown.

**Table 2.** Survey stratification and number of hauls by stratum. Spanish bottom trawl autumn survey *Fletán Ártico* 2019. nm: nautical mile.

Strata	Latitude	Depth (m)	Area (nm <sup>2</sup> )	nº hauls
1	76° 00' - 81° 00' N	500- 699	702	4
2	76° 00' - 81° 00' N	700- 999	1263	3
3	76° 00' - 81° 00' N	1000-1500	2693	1
4	73° 30' - 76° 00' N	500- 699	488	6
5	73° 30' - 76° 00' N	700- 999	761	4
6	73° 30' - 76° 00' N	1000-1500	1672	1

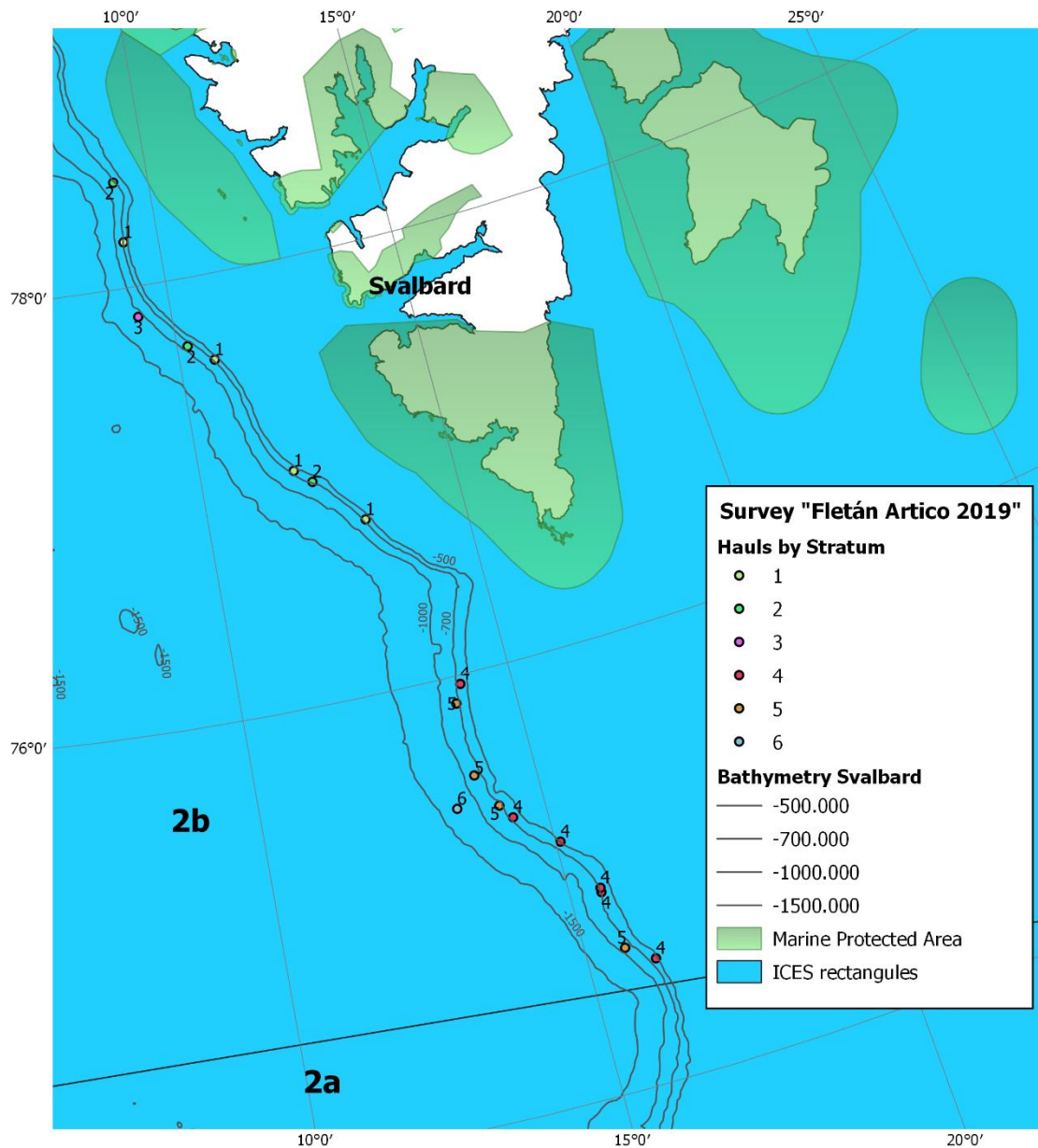


Figure 4. Locations of the trawls performed during the Spanish bottom trawl autumn survey *Fletán Ártico 2019*.

The effective 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 with Scanmar net/doors sensors, in addition to the knowledge of net geometry and the distance between doors.

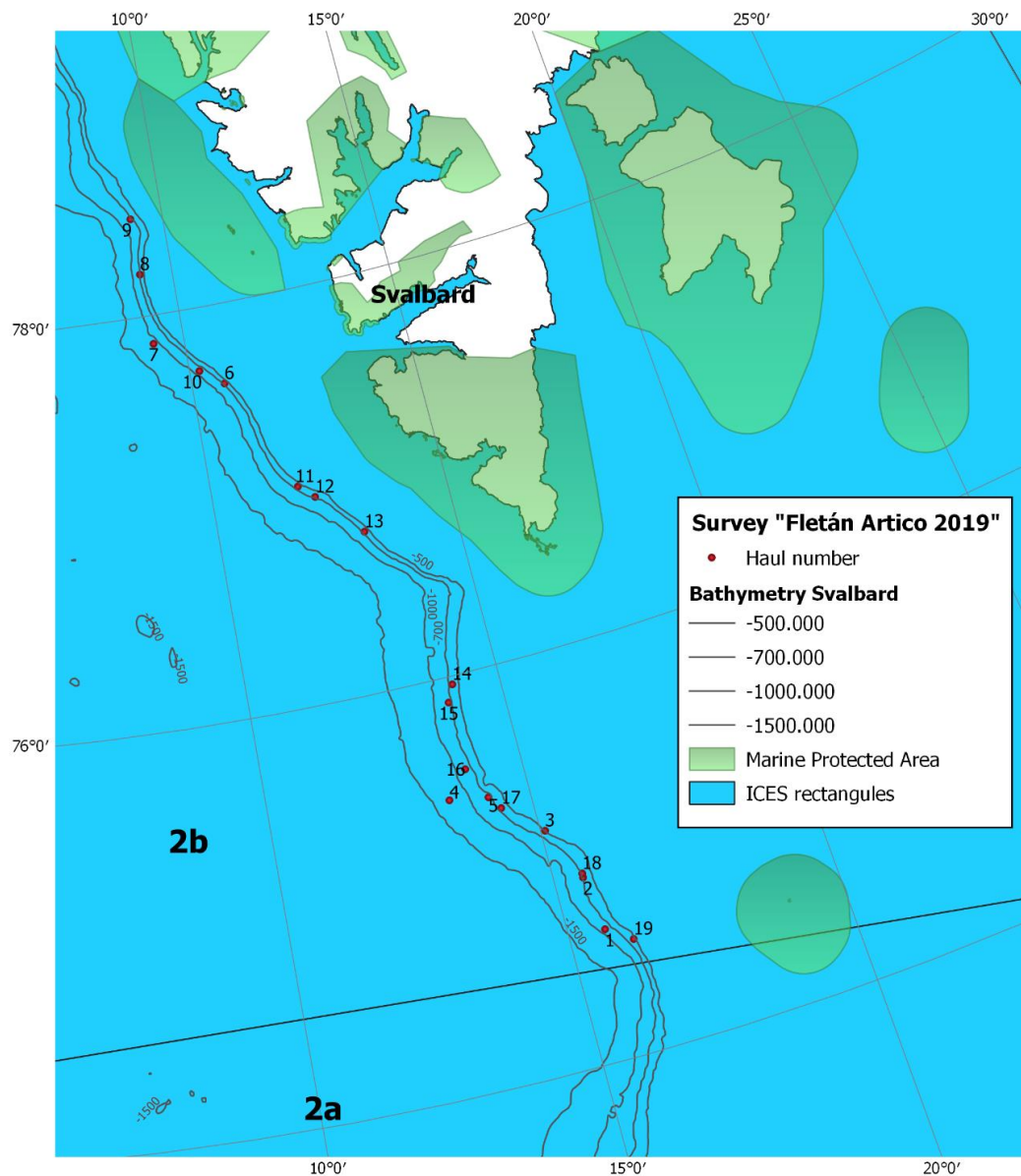
Catches were sorted and weighted by species. Fish and invertebrates were identified at the lowest possible taxonomical level. Length frequencies of Greenland halibut were obtained by taking random samples: size, weight and sex data were collected. Otoliths of different size were also collected. Furthermore, total weights of the principal accompanying species were noted.

Abundance and biomass were estimated as in previous reports, using the swept area method. The swept area was obtained multiplying the estimated horizontal opening of the net by the distance travelled by the net.

## 3 Results

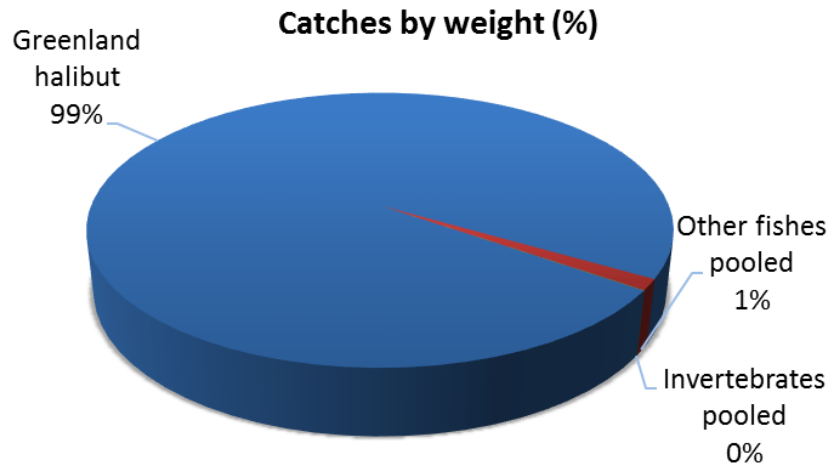
### 3.1 Catch composition

Detailed data of each haul are shown in **Table 1a**, included in Annex I. **Figure 5** shows the map with the prospected area and the position of each haul performed.



**Figure 5.** Names of the trawls (chronologically ordered) performed during the Spanish bottom trawl autumn survey *Fletán Ártico* 2019.

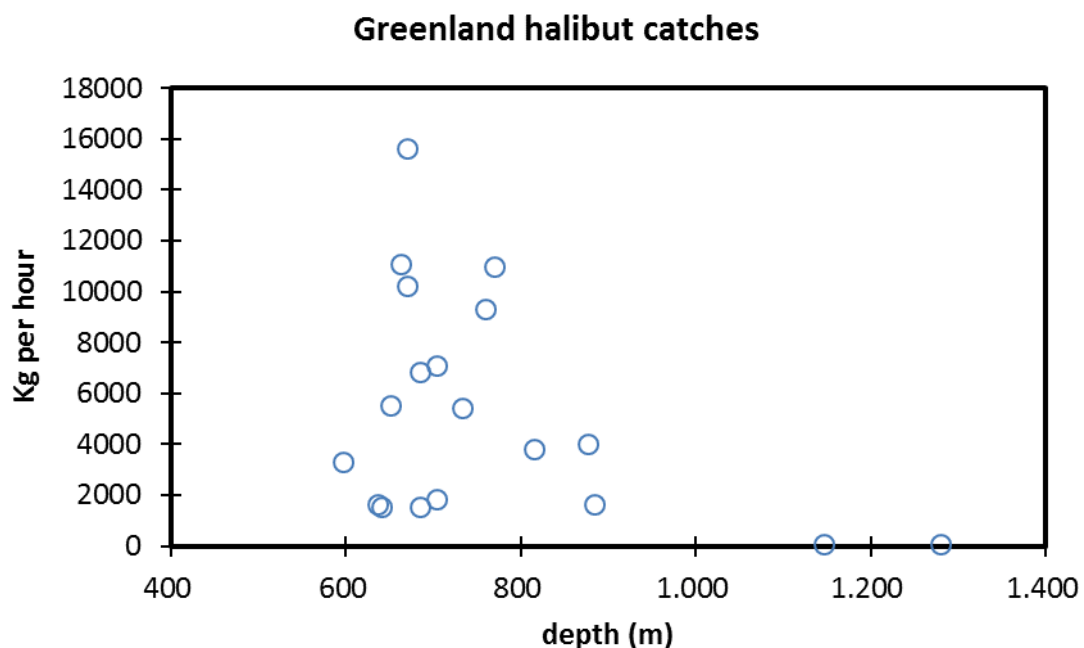
As it is shown in **Figure 6**, 98.7 % of the total catches in weight corresponded to Greenland halibut, while the rest of fishes and invertebrates represented 1.3 % and 0.04 % respectively.



**Figure 6.** Greenland halibut percentage in the catches during *Fletán Ártico* 2019 survey.

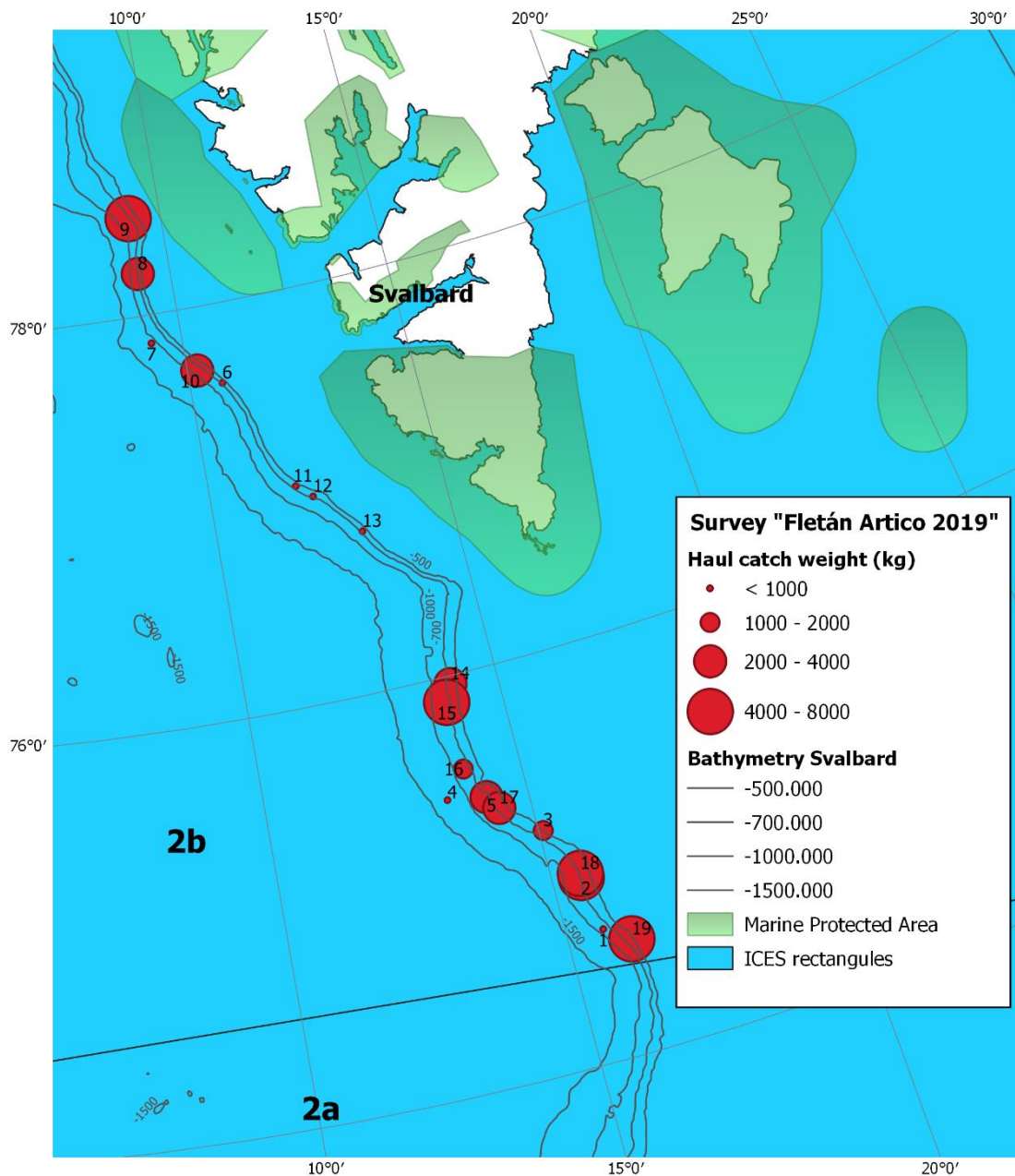
**Table 2a**, included in Annex I, shows all species catches by haul. Greenland halibut was the principal species, with 50880.4 kg captured. Blue whiting (131.6 kg), arctic skate (93.6 kg), roughhead grenadier (90.7 kg), spinytail skate (88.7 kg) and deep sea redfish (88.6 kg) were the main accompanying 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 7**). Below the 1000 meters deep, catches of halibut were scarce, being under 100 kg hour<sup>-1</sup> all of them.



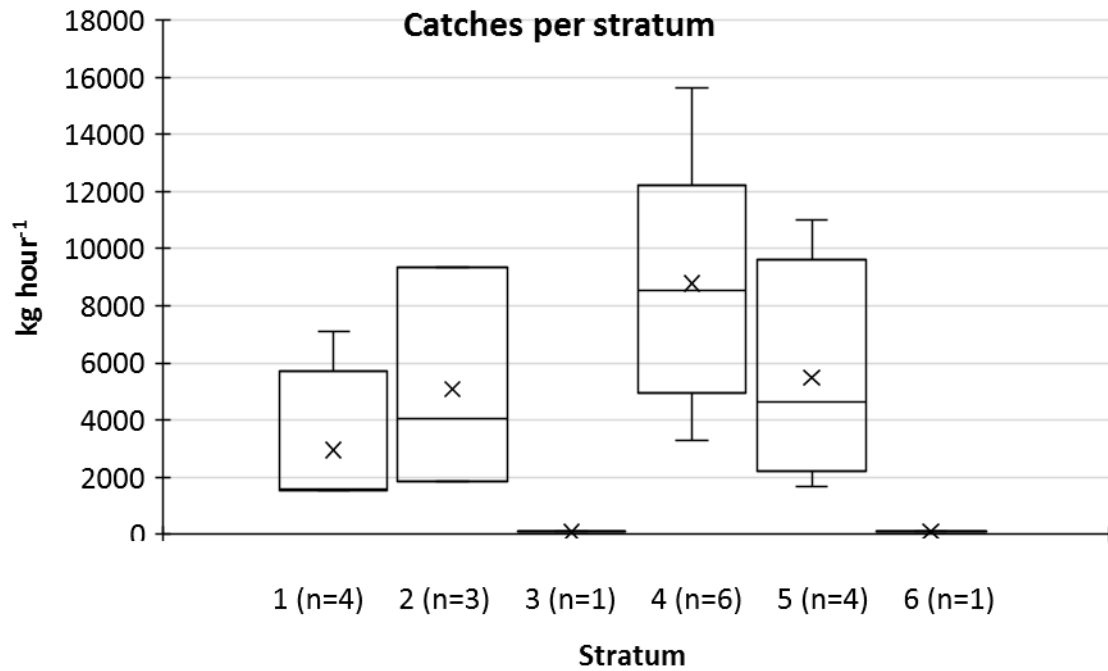
**Figure 7.** Greenland halibut catches in relation to depth, during *Fletán Ártico* 2019 survey.

However, it seems that the depth is not the unique factor related with the abundance of Greenland halibut. In addition to depth, latitude also seems to be another influencing factor: it can be seen how those hauls carried out further south, below the latitude 76° 30' N, showed greater abundance than the northern ones (**Figure 8**).



**Figure 8.** Distribution of the Greenland halibut catches by haul ( $\text{kg } 30 \text{ min}^{-1}$ ) during *Fletán Ártico 2019* survey.

The boxplot in **Figure 9** shows, as in previous surveys, lower concentration of Greenland halibut in deeper strata (named 3 and 6), while the shallower strata (especially in the south), strata 4 and 5, show greatest concentrations. Furthermore, the variability was also higher in these strata of greater concentration.



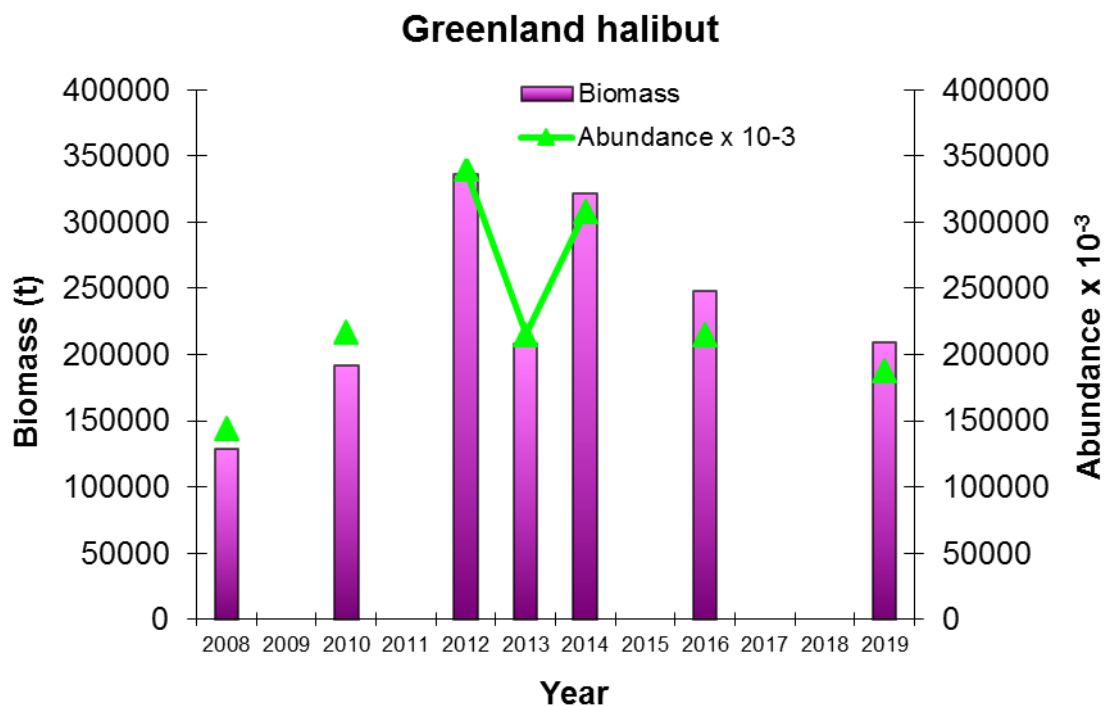
**Figure 9.** Greenland halibut catches ( $\text{kg h}^{-1}$ ) by stratum. (Mean (x), median (—) and percentiles 25 & 75).

### 3.2 Greenland halibut biomass and abundance

The estimated Greenland halibut biomass and abundances recorded in the present survey were respectively 209,439 t and 187,830 individuals. This supposes a slight decrease compared to the last survey carried out three years ago in 2016: a decrease of 15,4% in biomass and 12,5% in abundance (**Table 3** and **Figure 10**).

**Table 3.** Abundance (Abund) and biomass of Greenland halibut. Spanish bottom trawl autumn survey *Fletán Ártico* 2019. nm: nautical mile.

Strata	Total area (nm <sup>2</sup> )	Nº Hauls	Swept Area (nm <sup>2</sup> )	Catch (kg)	Biomass (t)	Catch (nº)	Abund x 10 <sup>-3</sup>
1	702	4	0.159	5,901	26,108	5,292	23,414
2	1,263	3	0.116	7,617	82,780	6,831	74,239
3	2,693	1	0.046	41	2,395	36	2,148
4	488	6	0.249	26,324	51,517	23,608	46,201
5	761	4	0.184	10,951	45,219	9,821	40,553
6	1,672	1	0.055	47	1,421	42	1,274
<b>Tot</b>	<b>7,579</b>	<b>19</b>	<b>0.809</b>	<b>50,880</b>	<b>209,439</b>	<b>45,631</b>	<b>187,830</b>

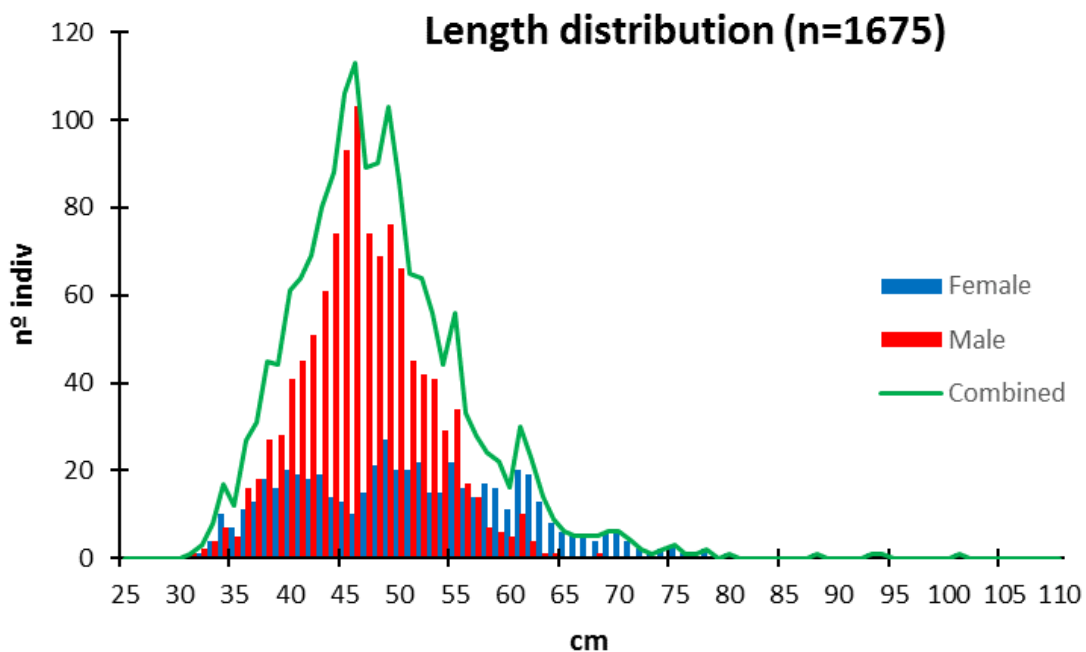


**Figure 10.** Greenland halibut biomass and abundance. Comparison between the recent Spanish autumn surveys *Fletán Ártico*. (No autumn surveys were conducted in 2009, 2011, 2015, 2017 and 2018).



### 3.3 Greenland halibut length distribution

The population structure was similar to the described in previous surveys (Paz et al., 2003a, 2003b, 2004, 2005, 2006; Ruiz *et al.*, 2009; Ruiz and Mugerza, 2010, 2011; Basterretxea *et al.*, 2012; Paz and Expósito, 2013; Durán Muñoz *et al.*, 2015, 2017). The length range for both sexes combined was from 31 cm to 101 cm: males ranged from 31 cm to 68 cm, and females ranged from 32 cm to 101 cm (**Figure 11**). As in previous cruises, the male proportion was higher: 67% of males versus 33% of females. Modal length was 46 cm for males and 49 cm for females.



**Figure 11.** Greenland halibut length distribution in *Fletán Ártico* 2019 survey.

### 3.4 Greenland halibut length-weight relationship

Figure 12 shows the Greenland halibut length–weight relationship, separated by sexes, and combined.

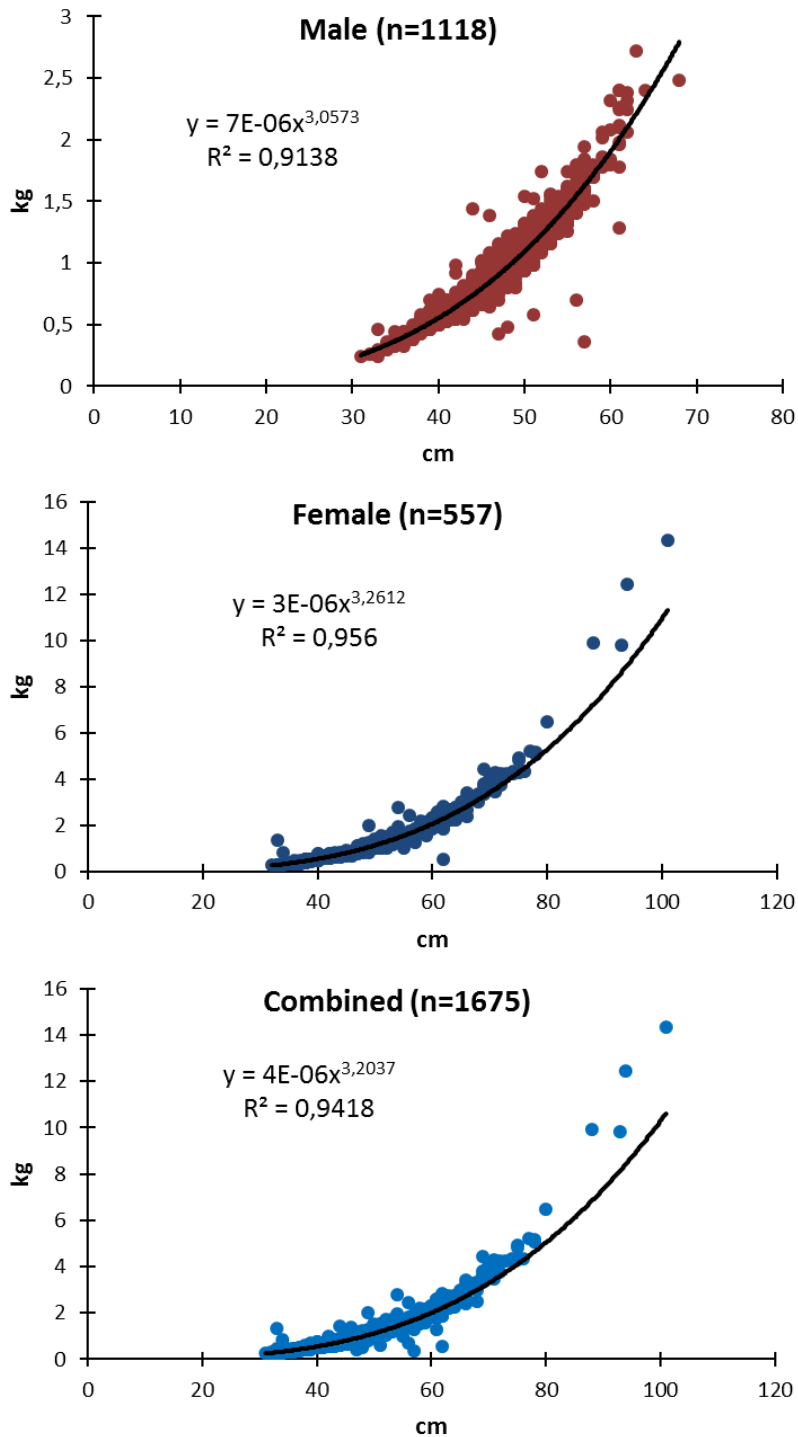


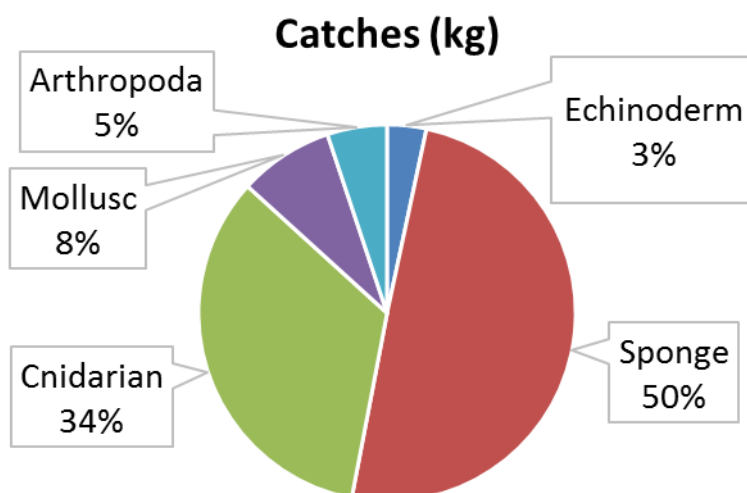
Figure 12. Greenland halibut length distribution in *Fletán Ártico* 2019 survey.

### 3.5 Accompanying fauna

The estimated biomass valued for the principal accompanying fish species were really low. These values indicate that, in the slope of Svalbard Archipelago, Greenland halibut constitutes the dominant species. **Tables 3a-11a** of Annex I, show estimated biomass values for the main accompanying species.

### 3.6 Invertebrates

In general, by-catch of invertebrate species was very low: from the total catch of 51567 kg during the whole survey, only 18.5 kg (0.04%) belonged to invertebrate species. Among them, sponges and cnidarians were the dominant groups (**Figure 13**).



**Figure 13.** Invertebrates catches in *Fletán Ártico* 2019 survey.

Only six of the hauls showed more than 0.5 kg of invertebrates (mainly due to the contribution of sponges, seapens and cephalopods), with a maximum of 7.9 kg. Considering the whole survey, those invertebrate species contributing with a higher weight were sponges (49.7%), seapens (33%), cephalopods (8%) and sea stars (2.6%) (**Table 4**).

On the other hand, although this low quantity, the presence of invertebrates was very extended, being sampled in 94,56% of the hauls. The invertebrate most common groups were sea stars (in 78.9% of the hauls), prawns and shrimps (in 78.9%), pycnogonids (in 73.7%), sponges (in 57.9%), seapens (in 52.6%), cephalopods (in 47.4%) and anemones (in 42.1%) (Table 4).

**Table 4.** Catch of invertebrates in the Spanish bottom trawl autumn survey *Fletán Ártico* 2019. Amounts higher than 0.5 kg are highlighted in blue. In grey, percentages with respect to total invertebrates. Pres: presence, number of hauls where it is present.

Haul	Stratum	total catch	Total Invertebrates	Asteroid echinoderm	Ophiuroid echinoderm	Ophiuroid Basket star	Echinoid echinoderm	Holothurioid echinoderm	Sponge	Seapen	Anemone cnidarian	Gastropod mollusc	Cephalopod mollusc	Amphipod crustacean	Prawn/shrimp crustacean	Pycnogonid arthropoda
6	1	854.9	0.402	0.02					0.01	0.16	0.005		0.105		0.102	
8	1	3578.9	0.404	0.065	0.001				0.102	0.02	0.005		0.2	0.01		0.001
11	1	834.3	0.105	0.03					0.02		0.01				0.035	0.01
13	1	805.2	0.342	0.032					0.1						0.2	0.01
9	2	4731.2	0.796	0.08	0.001		0.02	0.02	0.565	0.08			0.015		0.01	0.005
10	2	2029.5	7.935	0.04		0.02			7.62	0.01	0.08				0.16	0.005
12	2	948.1	0.045	0.03						0.01					0.005	
7	3	52.6	0.137	0.02									0.1	0.01	0.005	0.002
2	4	5654.4	3			0.08				2.9	0.01				0.005	0.005
3	4	1700.7	1.095	0.005						0.3	0.005		0.68		0.1	0.005
14	4	2817.5	0.051	0.006							0.005		0.04			
17	4	3457.3	0.011						0.01							0.001
18	4	7819.4	0.014						0.002		0.01				0.002	
19	4	5165.2														
1	5	861.0	2.375	0.025						2.3		0.02			0.02	0.01
5	5	2735.9	0.28	0.01					0.01	0.22		0.005	0.02		0.01	0.005
15	5	5539.1	0.892	0.067					0.48				0.3		0.04	0.005
16	5	1931.3	0.45	0.035					0.28				0.02	0.005	0.1	0.01
4	6	51.0	0.192	0.015						0.12				0.04	0.015	0.002
	kg	51567.4	18.5	0.5	0.0	0.1	0.0	0.0	9.2	6.1	0.1	0.0	1.5	0.1	0.8	0.1
	%		0.04	2.6	0.0	0.5	0.1	0.1	49.7	33.0	0.7	0.1	8.0	0.4	4.4	0.4
	Pres	19	18	15	2	2	1	1	11	10	8	2	9	4	15	14
	%	100	94.7	78.9	10.5	10.5	5.3	5.3	57.9	52.6	42.1	10.5	47.4	21.1	78.9	73.7

Among invertebrate species, some of them are considered as indicators of Vulnerable Marine Ecosystems (VME). In the *Fletán Ártico 2019* survey, VME indicator species showed a low quantity in the sampled bottoms. Corals (hard or soft) were not present in the by-catch. Sponges (different species of Porifera) and seapens (specifically, *Umbellula encrinus*) were the two main VME indicator species in the area (Table 4). However, taking into account the current VME encounter thresholds established for a trawl tow in NEAFC (30 kg of live coral and/or 400 kg of live sponge), no hauls reached the sufficient amount to be considered as encounter of any VME.

## 4 Conclusions

Main conclusions derived from the results obtained during the Spanish bottom trawl autumn survey *Fletán Ártico 2019*:

- The Greenland halibut (*Reinhardtius hippoglossoides*) is the predominant species on the slope of the Archipelago of Svalbard (ICES Division 2b2) in September 2019.
- The values estimated in the 2019 survey show a decrease in biomass and abundance when compared with other autumn surveys carried out in previous years.
- Latitudinal and bathymetric distributions of Greenland halibut are similar to those observed in previous surveys: the main catches were recorded at depths between 600 and 800 m and the shallower strata of the South (4 and 5) show greatest concentrations of the species.
- The length range (both sexes and combined) of the Greenland halibut ranged from 31 cm to 101 cm. The proportion of males was higher (67%), just like in previous surveys. Modal length was 46 cm for males and 49 cm for females.
- The accompanying species show very low abundance and biomass values (1,3%) compared with Greenland halibut catches.
- By-catches of Vulnerable Marine Ecosystems (VME) indicator species were generally absent or low. Sponges and sea pens were collected, but no one encounter (based on NEAFC thresholds) was registered.

## 5 Acknowledgements

We are grateful to the skipper and crew of the trawler Eirado do Costal for their cooperation during the survey and to the scientific staff onboard the vessel (Joxe Mikel Garmendia, Deniz Kukul, Gaizka Bidegain, Arnaitz Mugerza and Lluís Horrach) for the sampling work done during the cruise. Thanks also to Moradiña S.L. for assistance with the logistics of the survey and for trusting AZTI to carry out this research project. The survey was funded by the ship-owner Moradiña S.L. under the IM-19-CAMPAFLETA project.

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# Annex I – Tables

**Table 1a.** Haul characteristics during *Fletán Ártico* 2019 survey.

Haul	Strata	Depth haul (m)		Start Latitude		Start Longitude		End Latitude		End Longitude		Speed (knots)	Doors opening (m)
		Start	End	Deg	Min	Deg	Min	Deg	Min	Deg	Min		
1	5	883	860	74	38	15	40	74	40.5	15	38	3.8	379
2	4	662	655	74	54.05	15	32	74	55.65	15	32.7	3.4	274
3	4	596	604	75	9.97	15	4.88	75	11.21	14	59.65	3.6	286
4	6	1279	1254	75	25.3	13	28	75	24.15	13	32.15	3.8	316
5	5	733	735	75	23.45	14	12.25	75	22.12	14	14.92	2.9	290
6	1	636	633	77	36.95	10	43.53	77	38.3	10	39.04	3.1	286
7	3	1146	1142	77	51.85	9	17.44	77	53.14	9	14.55	2.9	345
8	1	704	710	78	12.32	9	14.24	78	13.98	9	14.94	2.8	289
9	2	759	737	78	28.61	9	13.4	78	30.01	9	10.02	3	274
10	2	876	844	77	41.8	10	13	77	40.95	10	18.61	2.9	299
11	1	640	637	77	3.45	10	13.1	77	2.47	11	56.7	2.9	295
12	2	704	697	76	59.5	12	10.88	76	58.72	12	16.22	2.9	296
13	1	685	692	76	46.54	13	2.56	76	45.08	13	6.1	3.1	299
14	4	650	648	75	57.65	14	3.51	75	56.09	14	2.44	3	299
15	5	769	758	75	52.79	13	54.07	75	51.14	13	54.4	2.6	301
16	5	815	815	75	32.93	13	54.14	75	31.4	13	56.08	3.2	305
17	4	685	677	75	19.51	14	23.31	75	18.12	14	26.75	3.1	295
18	4	670	651	74	55.25	15	32.3	74	53.71	15	32.08	2.8	293
19	4	670	644	74	33.04	16	6.94	74	31.56	16	9.6	3	291

**Table 2a.** Catch by haul (kg) during *Fletán Ártico* 2019 survey. Pres: presence in hauls.

Haul	Stratum	<i>Reinhardtius hippoglossoides</i>	<i>Gadus morhua</i>	<i>Macrourus berglax</i>	<i>Hippoglossoides platessoides</i>	<i>Micromesistius poutassou</i>	<i>Sebastes mentella</i>	<i>Gaidropsarus argentatus</i>	<i>Anarhichas denticulatus</i>	<i>Anarhichas minor</i>	<i>Amblyraja hyperborea</i>	<i>Amblyraja radiata</i>	<i>Bathyraja spinicauda</i>	<i>Rajella fyllae</i>	<i>Lycodes esmarkii</i>	<i>Lycodes eudipleurostictus</i>	<i>Lycodes vahlii</i>	<i>Cottunculus microps</i>	Invertebrates	TOTAL
1	5	826									26.9		4.8		0.5				2.4	861
2	4	5550		4.7		20.3	14.7				30.5		28.2	1.1	1.9				3	5654
3	4	1650		3.3		29.7	10.7												1.1	1701
4	6	47		1.9		0.7		1.2	0.5										0.2	51
5	5	2714				2.7	2						15.4			1.8			0.3	2736
6	1	814	14.2	5.5	0.5	0.6	4.2			8.9	1.5		4.2		0.8				0.4	855
7	3	41		1.7			2.4		0.2		5.1		1.4		0.2	0.2	0.8		0.1	53
8	1	3545	10.6	10.1			2.8		3.1		6.3				0.9				0.4	3579
9	2	4670	28.6	23.7									7.5				0.1	0.0	0.8	4731
10	2	2017		1.7								1.3	0.6		0.6			0.3	7.9	2029
11	1	766	13.9	3.1	0.6	0.9	2.0		35.1		2.7	0.65	5.8		3.4				0.1	834
12	2	930		1.3		0.2	1.1				6.6		8.1		0.6				0.0	948
13	1	776		4.0		6.2	3.3		1.3		12.9				1.6				0.3	805
14	4	2761		3		23	21.4					1.25	7		0.8				0.1	2818
15	5	5502		17.1		8.3	4.4					4.5	1.2	1.4				0.0	0.9	5539
16	5	1909		1.4					17.7			2				0.8	0.1		0.5	1931
17	4	3427		2.3		20.7	3.3		2.2						2.0				0.0	3457
18	4	7812		1.1			4.2							0.3	1.8				0.0	7819
19	4	5124	4.2	5.2		18.5	12.3					0.05			1					5165
<b>Tot</b>		<b>50880</b>	<b>71.4</b>	<b>90.7</b>	<b>1.0</b>	<b>131.6</b>	<b>88.6</b>	<b>1.2</b>	<b>63.2</b>	<b>8.9</b>	<b>93.6</b>	<b>2.6</b>	<b>88.7</b>	<b>2.5</b>	<b>22.4</b>	<b>1.0</b>	<b>0.9</b>	<b>0.4</b>	<b>18.5</b>	<b>51567</b>
<b>%</b>		<b>98.7</b>	<b>0.1</b>	<b>0.2</b>	<b>0.0</b>	<b>0.3</b>	<b>0.2</b>	<b>0.0</b>	<b>0.1</b>	<b>0.0</b>	<b>0.2</b>	<b>0.0</b>	<b>0.2</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
<b>Pres</b>		<b>19</b>	<b>5</b>	<b>17</b>	<b>2</b>	<b>12</b>	<b>14</b>	<b>1</b>	<b>8</b>	<b>1</b>	<b>9</b>	<b>4</b>	<b>11</b>	<b>3</b>	<b>17</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>18</b>	
<b>%</b>		<b>100</b>	<b>26</b>	<b>89</b>	<b>11</b>	<b>63</b>	<b>74</b>	<b>5</b>	<b>42</b>	<b>5</b>	<b>47</b>	<b>21</b>	<b>58</b>	<b>16</b>	<b>89</b>	<b>11</b>	<b>16</b>	<b>16</b>	<b>95</b>	

**Table 3a.** Greenland halibut (*Reinhardtius hippoglossoides*) biomass (t) and abundance ( $\times 10^{-3}$ ) by stratum in 2019. 98.7% of the total individuals. Presence in 100% of hauls.

Stratum	Total area (nm <sup>2</sup> )	Nº Hauls	Swept area (nm <sup>2</sup> )	Catch (kg)	Biomass (t)	Catch (nº)	Abund $\times 10^{-3}$
1	702	4	0.16	5901	26108	5292	23414
2	1263	3	0.12	7617	82780	6831	74239
3	2693	1	0.05	41	2395	36	2148
4	488	6	0.25	26324	51517	23608	46201
5	761	4	0.18	10951	45219	9821	40553
6	1672	1	0.05	47	1421	42	1274
<b>Total</b>	<b>7579</b>	<b>19</b>	<b>0.81</b>	<b>50880</b>	<b>209439</b>	<b>45631</b>	<b>187830</b>

**Table 4a.** Blue withing (*Micromesistius poutassou*) biomass (t) by stratum in 2019. 0.26% of the total individuals. Presence in 63% of hauls.

Stratum	Total area (nm <sup>2</sup> )	Nº Hauls	Swept area (nm <sup>2</sup> )	Catch (kg)	Biomass (t)
1	702	4	0.16	8	34
2	1263	3	0.12	0	2
3	2693	1	0.05	0	0
4	488	6	0.25	112	220
5	761	4	0.18	11	45
6	1672	1	0.05	1	20
<b>Total</b>	<b>7579</b>	<b>19</b>	<b>0.81</b>	<b>132</b>	<b>320</b>

**Table 5a.** Arctic skate (*Amblyraja hyperborea*) biomass (t) by stratum in 2019. 0.18% of the total individuals. Presence in 47% of hauls.

Stratum	Total area (nm <sup>2</sup> )	Nº Hauls	Swept area (nm <sup>2</sup> )	Catch (kg)	Biomass (t)
1	702	4	0.16	23	103
2	1263	3	0.12	8	85
3	2693	1	0.05	5	298
4	488	6	0.25	31	60
5	761	4	0.18	27	111
6	1672	1	0.05	0	0
<b>Total</b>	<b>7579</b>	<b>19</b>	<b>0.81</b>	<b>94</b>	<b>657</b>

**Table 6a.** Rough head grenadier (*Macrourus berglax*) biomass (t) by stratum in 2019. 0.18% of the total individuals. Presence in 89% of hauls.

Stratum	Total area (nm <sup>2</sup> )	Nº Hauls	Swept area (nm <sup>2</sup> )	Catch (kg)	Biomass (t)
1	702	4	0.16	23	100
2	1263	3	0.12	27	290
3	2693	1	0.05	2	97
4	488	6	0.25	20	38
5	761	4	0.18	18	76
6	1672	1	0.05	2	58
<b>Total</b>	<b>7579</b>	<b>19</b>	<b>0.81</b>	<b>91</b>	<b>659</b>

**Table 7a.** Spinytail skate (*Bathyraja spinicauda*) biomass (t) by stratum in 2019. 0.17% of the total individuals. Presence in 58% of hauls.

Stratum	Total area (nm <sup>2</sup> )	Nº Hauls	Swept area (nm <sup>2</sup> )	Catch (kg)	Biomass (t)
1	702	4	0.16	10	44
2	1263	3	0.12	16	170
3	2693	1	0.05	1	80
4	488	6	0.25	35	69
5	761	4	0.18	27	110
6	1672	1	0.05	0	0
<b>Total</b>	<b>7579</b>	<b>19</b>	<b>0.81</b>	<b>89</b>	<b>472</b>

**Table 8a.** Deep sea redfish (*Sebastes metella*) biomass (t) by stratum in 2019. 0.17% of the total individuals. Presence in 74% of hauls.

Stratum	Total area (nm <sup>2</sup> )	Nº Hauls	Swept area (nm <sup>2</sup> )	Catch (kg)	Biomass (t)
1	702	4	0.16	12	54
2	1263	3	0.12	1	12
3	2693	1	0.05	2	142
4	488	6	0.25	67	130
5	761	4	0.18	6	26
6	1672	1	0.05	0	0
<b>Total</b>	<b>7579</b>	<b>19</b>	<b>0.81</b>	<b>89</b>	<b>364</b>

**Table 9a.** Cod (*Gadus morhua*) biomass (t) by stratum in 2019. 0.14% of the total individuals. Presence in 26% of hauls.

Stratum	Total area (nm <sup>2</sup> )	Nº Hauls	Swept area (nm <sup>2</sup> )	Catch (kg)	Biomass (t)
1	702	4	0.16	39	171
2	1263	3	0.12	29	310
3	2693	1	0.05	0	0
4	488	6	0.25	4	8
5	761	4	0.18	0	0
6	1672	1	0.05	0	0
<b>Total</b>	<b>7579</b>	<b>19</b>	<b>0.81</b>	<b>71</b>	<b>490</b>

**Table 10a.** Northern wolffish (*Anarhichas denticulatus*) biomass (t) by stratum in 2019. 0.12% of the total individuals. Presence in 42% of hauls.

Stratum	Total area (nm <sup>2</sup> )	Nº Hauls	Swept area (nm <sup>2</sup> )	Catch (kg)	Biomass (t)
1	702	4	0.16	40	175
2	1263	3	0.12	0	0
3	2693	1	0.05	0	11
4	488	6	0.25	5	10
5	761	4	0.18	18	73
6	1672	1	0.05	1	16
<b>Total</b>	<b>7579</b>	<b>19</b>	<b>0.81</b>	<b>63</b>	<b>285</b>

**Table 11a.** Greater eelpout (*Lycodes esmarkii*) biomass (t) by stratum in 2019. 0.04% of the total individuals. Presence in 89% of hauls.

Stratum	Total area (nm <sup>2</sup> )	Nº Hauls	Swept area (nm <sup>2</sup> )	Catch (kg)	Biomass (t)
1	702	4	0.16	7	29
2	1263	3	0.12	2	23
3	2693	1	0.05	0	12
4	488	6	0.25	10	19
5	761	4	0.18	4	15
6	1672	1	0.05	0	0
<b>Total</b>	<b>7579</b>	<b>19</b>	<b>0.81</b>	<b>22</b>	<b>98</b>