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Results from Bottom Trawl Survey on Flemish Cap of June-July 2018

by

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Abstract

A stratified random bottom trawl survey on Flemish Cap was carried out from June 26th to July 24th 2018. The area surveyed was extended up to depths of 800 fathoms (1460 meters) following the same procedures as in previous years and 181 fishing stations planned. The survey was carried out by the R/V *Vizconde de Eza* with the usual survey gear (*Lofoten*). A total of 181 valid hauls were made by the vessel R/V *Vizconde de Eza*, 120 up to 730 meters depth and 61 up to 1460 meters. Survey results including abundance indices of the main commercial species and age distributions for cod, redfish, American plaice, Greenland halibut, roughhead grenadier, squid and shrimp are presented. The general indexes for this year are estimated taken into account the traditional swept area (strata 1-19, up to depths of 730 m.) and the total area surveyed (strata 1-34, up to depths of 1460 m.).

Introduction

The survey on Flemish Cap was carried out on board R/V *Vizconde de Eza* in 2018. A total of 181 valid bottom trawls were made up to a depth of 1460 m (800 fathoms) (Fig. 1). The survey covered all strata of the bank adequately with the exception of the strata corresponding with the Beothuk knoll (35-39 strata) in the Southwest of the bank and the strata 26 and 27 in the Southeast. In this Figure we can observe the closed areas for Vulnerable Marine Ecosystems. Although the closed areas are tried to be avoided during the survey, sometimes this is impossible due to the lack of trawled zones. A synoptic sheet of the survey with vessel and gear characteristics is shown in Table 1. This was the 31st survey of the series initiated by the EU in 1988. All surveys had a stratified random design following NAFO specifications (Doubleday, 1981). Dates, vessel, number of valid tows (including the number of valid tows until 700 m in brackets since 2002) and dates of all the surveys were:



Year	Vessel	Valid tows	Dates	Year	Vessel	Valid tows	Dates
1988	Cornide de Saavedra	115	08/07 – 22/07	2003	Vizconde de Eza	177 (114)	02/06 – 02/07
					Cornide de Saavedra	50**	07/06 – 17/06
1989	Cryos	116	12/07 – 01/08	2004	Vizconde de Eza	177 (124)	25/06 – 02/08
					Cornide de Saavedra	61**	23/07 – 02/08
1990	Ignat Pavlyuchenkov	113	18/07 – 06/08	2005	Vizconde de Eza	176 (117)	01/07 – 21/08
1991	Cornide de Saavedra	117	24/06 – 11/07	2006	Vizconde de Eza	179 (115)	01/07 – 26/07
1992	Cornide de Saavedra	117	29/06 – 18/07	2007	Vizconde de Eza	174 (117)	23/06 – 19/07
1993	Cornide de Saavedra	101	23/06 – 08/07	2008	Vizconde de Eza	179 (111)	23/06 – 19/07
1994	Cornide de Saavedra	116	06/07 – 23/07	2009	Vizconde de Eza	178 (119)	23/06 – 20/07
1995	Cornide de Saavedra	121	02/07 – 19/07	2010	Vizconde de Eza	153 (97)	22/06 – 21/07
1996	Cornide de Saavedra	117	28/06 – 14/07	2011	Vizconde de Eza	128 (79)	29/06 – 9/08
1997	Cornide de Saavedra	117	16/07 – 01/08	2012	Vizconde de Eza	174(118)	26/06 – 24/07
1998	Cornide de Saavedra	119	17/07 – 02/08	2013	Vizconde de Eza	181(120)	26/06 – 23/07
1999	Cornide de Saavedra	117	02/07 – 20/07	2014	Vizconde de Eza	181(120)	25/06 – 23/07
2000	Cornide de Saavedra	120	10/07 – 28/07	2015	Vizconde de Eza	181(120)	23/06 – 22/07
2001	Cornide de Saavedra	120	03/07 – 20/07	2016	Vizconde de Eza	181(120)	23/06 – 22/07
2002	Cornide de Saavedra	120	30/06 – 17/07	2017	Vizconde de Eza	181(120)	16/06 – 15/07
				2018	Vizconde de Eza	181(120)	26/06 – 24/07

() valid tows carried out in depths lesser than 400 fathoms

** calibration tows

Material and Methods

As the last year, the R/V *Vizconde de Eza* carried out the survey following the same procedures as in previous years, the same bottom trawl net *Lofoten*, with a cod-end mesh size of 35 mm, as well as all other details of its use (Vazquez *et al.*, 2014).

Results

Biomass of the main species in past surveys estimated by swept area method (tons) are:

	Survey	Cod	American plaice	Redfish	Greenland halibut	Roughhead grenadier	Squid	Shrimp
120-730 m	1988	40839	16046	188331	6926	2009	6	5615
	1989	114050	14047	162535	4472	871	9	2252
	1990	59362	11983	126757	5799	852	2107	3405
	1991	40248	10087	76955	8169	1335	1483	11352
	1992	26719	8656	130209	8728	1577	83	24508
	1993	60963	7861	72608	6529	3021	1	11673
	1994	26463	8227	162525	8037	1975	269	3879
	1995	9695	6785	87644	10875	1558	1	7276
	1996	9013	4098	119662	11594	1362	113	10461
	1997	9966	3026	165816	16098	1197	81	7449
	1998	4986	3437	70832	24229	1691	92	39367
	1999	2854	2585	98651	21207	1250	22	24692
	2000	3062	1606	177990	16959	1047	3	19003
	2001	2695	2404	77345	13872	2079	10	27204
	2002	2496	2049	121312	12100	1211	8	36510
	2003	1593	2286	93816	6214	2348	222	21087
	2004	4071	3525	250605	12292	3597	470	20182
	2005	5242	2760	451215	11698	2387	79	30675
	2006	12505	1691	766922	11708	3933	3541	16235
	2007	23886	1053	464628	13040	1367	411	17046
2008	43675	1766	566126	11997	2961	5137	11092	
2009	75228	1442	358479	7777	782	1688	2797	
2010	69295	2446	212211	6657	1402	43	4894	
2011	106151	4084	197031	6765	888	89	1621	
2012	113227	4491	305946	4291	612	38	1041	
2013	72289	3698	219737	2799	807		844	
2014	159939	3800	179925	5168	399	3	900	
2015	114807	3821	158001	6577	478		1551	
2016	80583	4325	171199	6139	373	3	2478	
2017	89414	7475	163262	7632	616	2350	2884	
2018	75795	6109	100483	5578	625	49	4394	
120-1460 m	2004	4071	3525	250638	28676	17184	479	20195
	2005	5242	2760	453086	20460	14253	83	31186
	2006	12505	1691	766952	23475	12109	3551	15250
	2007	23886	1053	464660	30731	7807	411	17120
	2008	43675	1766	566647	39614	12139	5144	11141
	2009	75228	1442	358521	36047	7304	1694	2792
	2010	69295	2446	212282	27096	9091	43	4896

2011	106151	4084	196574	32309	8997	90	1733
2012	113227	4491	305974	23505	5476	41	1063
2013	72289	3698	219767	23391	4298		855
2014	159939	3800	179956	29288	4111	3	901
2015	114807	3821	158055	58180	3702		1551
2016	80583	4325	171219	34642	3836	4	2479
2017	89414	7475	163273	52237	5141	2366	2897
2018	75795	6109	100512	36482	4375	52	4404

Values for surveys before 2003, when R/V *Cornide de Saavedra* was used, are transformed to their equivalences for R/V *Vizconde de Eza* following the accepted calibration among the two vessels (González Troncoso and Casas, 2005). From 2004 onwards, abundances are calculated for 19 shallowest strata covering the bank up to 730 m deep, as it was done in previous years, and for 32 strata up to 1460 m deep.

These survey indices are also presented in Table 2, and even they belong to different species and pelagic vs. demersal character and the transformation to the new scale (since 2003 the R/V *Cornide de Saavedra* was substituted by the R/V *Vizconde de Eza*) only was carried out for the main species, a global index is presented for each year, which minimum occurred in 2001. The composition of the species in 2018 is similar to that found in the beginning of the series: cod at high levels, shrimp residual, redfish fluctuating around 150-300 kt. and grenadiers and Greenland halibut (<730m) at low levels. Greenland halibut biomass index (<1400m) increased in 2017 next to historic maximums, decreasing again in 2018 to 2016 values. Everything seems to point to a return to the situation found at the beginning of the EU survey series, and prior to the changes induced by the collapse of cod in the late 90. American plaice, after four years of continuous increases in biomass, appeared to show signs of recovery, but by 2018 this recovery was halted.

Change of Spanish legislation in 2018 has prevented the extension of the agreement between the Spanish Oceanographic Institute (IEO) and the Institute of Marine Research (IIM-CSIC), one of the partners in the Flemish Cap project, and in consequence the IIM-CSIC is not currently participating in the Data Collection Framework (DCF). Although this fact was fix for year 2018 survey, it is not totally solved and problems could occur again next year. The indices that last year could not be presented due to this problem are presented in this paper.

Cod

Mean catch per towed mile and biomass by strata with standard errors are presented in Table 3. These indices are compared with results of previous surveys in Table 5. Total biomass calculated by the swept area method and compared with Russian survey results are:

Year	EU (1)	Russia: (2)	(3)	Year	EU (1)	Russia: (2)	(3)
1983		23,070		2001	2,695	784	-
1984		31,210		2002	2,496	694	-
1985		28,070		2003	1,593		-
1986		26,060		2004	4,071		
1987		10,150	21,600	2005	5,242		
1988	40,839	7,720	34,200	2006	12,505		
1989	114,050	36,520	78,300	2007	23,866		
1990	59,362	3,920	15,200	2008	43,675		
1991	40,248	6,740	8,200	2009	75,228		
1992	26,719	2,490	2,400	2010	69,295		
1993	60,963	8,990	9,700	2011	106,151		
1994	26,463	-	-	2012	113,227		
1995	9,695	8,260	-	2013	72,289		
1996	9,013	730	-	2014	159,939		
1997	9,966	-	-	2015	114,807		
1998	4,986	-	-	2016	80,583		
1999	2,854	-	-	2017	89,414		tons
2000	3,062	-	-	2018	75,795		

1) Biomass estimated from bottom trawl survey. 2) Biomass estimated from bottom trawl survey (Kiseleva and Vaskov 1994; Kiseleva 1996, 1997; Vaskov and Igashov, 2003). 3) Biomass estimated of bottom trawlable plus pelagic biomass (Borovkov *et al.* 1993; Kiseleva and Vaskov 1994).

Table 4 shows the length distribution of this stock. Due to the problems with the IEO/IIM agreement, last year 2017 ALK for cod was not produced, but it was processed this year together with the 2018 ALK. Table 6 (a and b) presents the 2017 and 2018 ALKs, and Table 7 (a and b) the abundance at age by stratum.

Distribution of survey catches is presented in Figure 2. Evolution of biomass and abundance are illustrated in Figure 3. The abundance at age along the series is presented in Table 8.

The 1992 to 2003 year-classes failed almost completely. The abundances of 2004-2008 year classes were higher than in previous 12 years. The abundance of the 2010 year-class was the highest of those in previous recent years, and the 2009 and 2011 ones were also high. The 2012-2017 year-classes seem to have failed according to current results at age 1 (Figure 4).

After the historic maximum in biomass in 2014, the biomass has decreased until 2018. The biomass is still at high levels, above the mean of the whole period. The abundance had a peak in 2011 due to a very high recruitment, and since then has decreased, indicating an increase in older ages and a fail in recruitment.

American plaice

Mean catch per towed mile and biomass by strata with standard errors are presented in Table 9. Survey biomass, as calculated by the swept area method, is compared with results of previous surveys in Table 11. This biomass is compared with Russian survey results in the following table:

Year	EU	Russia (1)	Year	EU	Russia (1)	Year	EU	Russia (1)
1983		8,900	1996	4,098		2009	1,442	
1984		7,500	1997	3,026		2010	2,446	
1985		7,800	1998	3,437		2011	4,084	
1986		20,200	1999	2,585		2012	4,491	
1987		9,300	2000	1,606		2013	3,698	
1988	16,046	6,500	2001	2,404		2014	3,800	
1989	14,047	5,000	2002	2,049		2015	3,821	
1990	11,983	1,200	2003	2,286	548	2016	4,325	
1991	10,087	14,400	2004	3,525	1,398	2017	7,475	
1992	8,656	1,200	2005	2,760		2018	6,109	tons
1993	7,861	2,700	2006	1,691				
1994	8,227		2007	1,053				
1995	6,785	ton	2008	1,766	ton			

1) Rikhter *et al.* 1991; Borovkov *et al.* 1992, 1993, 1994; Vaskov and Igashov, 2003.

Table 10 show the length distribution and Tables 12 and 13 the age-length key and the abundances at age by stratum respectively (no updated yet). Figure 5 shows the distribution of the survey catches in 2018. The abundance at age along the series is shown in Table 14 (excluding the 2017 and 2018 indices). Also, the evolution of survey biomass and abundance along the series is presented in Figure 6.

Fish aged 6 or more roughly correspond with fishable biomass. Results indicate two periods for recruitment, and a change from an upper abundance level to a lower one. The 1991 year-class was the first weak cohort. The 2006 year-class is the more abundant since 1991, but its abundance is only intermediate. Recruitment for later year-classes seems to be weaker; too weak for a quick recovery of the stock. Figure 7 shows the age distribution over the years. It illustrates the lack of recruitment that occurred for many years, and how most recent year-classes are weaker than those at the beginning of the series. The biomass and abundance have been more or less stable since 2011, with an increase in 2017 reaching the maximum values since 1994, being a bit lower in 2018.

The ALKs for American plaice for 2017 and 2018 are not available yet due to lack of time, so the indices by age are presented only until year 2016. The length distribution doesn't indicate a change with regards to previous year.

Redfish

All redfish catches were classified by species. The group name *juvenile* contains those individuals of small size for which routine classification was not possible. The 15 cm maximum length is a good reference for this group, but it has been never used as a criterion. The skill required to identify the species increased over time, so the group *juvenile* is not a uniform defined group, but it is maintained for practical reasons.

Mean catch per standard towed mile and biomass by strata with the standard errors are presented in Tables 15, 19, 23 and 27 for *Sebastes norvegicus*, *S. mentella*, *S. fasciatus* and the *juvenile* group respectively. The following table shows the total biomass (tons) by year in the traditional strata (<730 m.).

Year	<i>Sebastes</i>	<i>Sebastes spp.</i>			Total
	<i>norvegicus</i>	<i>mentella</i>	<i>fasciatus</i>	<i>juvenile</i>	
1988	18,229		170,102		188,331
1989	27,312		135,223		162,535
1990	16,751	86,695		23,311	126,757
1991	4,864	59,552	6,755	5,784	76,955
1992	4,909	85,408	6,314	33,578	130,209
1993	4,789	21,235	5,175	41,409	72,608
1994	39,516	42,495	9,303	71,211	162,525
1995	10,754	70,567	5,986	337	87,644
1996	13,431	92,647	13,112	472	119,662
1997	77,125	66,710	20,780	1,201	165,816
1998	7,640	53,946	7,656	1,590	70,832
1999	11,215	77,610	9,460	366	98,651
2000	53,388	106,283	15,364	2,955	177,990
2001	10,244	45,931	13,715	7,455	77,345
2002	11,651	48,760	27,556	33,345	121,312
2003	40,110	28,785	15,031	9,890	93,816
2004	85,383	45,999	76,164	43,059	250,605
2005	147,688	105,110	123,326	75,762	451,215
2006	298,290	105,849	319,387	43,396	766,922
2007	88,071	51,191	261,790	63,576	464,628
2008	240,777	42,570	202,288	80,491	566,126
2009	72,211	111,787	171,676	2,804	358,479
2010	47,377	62,684	97,067	5,083	212,211
2011	29,056	103,678	59,753	4,543	197,030
2012	55,410	166,693	82,539	1,304	305,946
2013	32,016	102,500	84,801	420	219,737
2014	37,171	96,158	46,174	422	179,925
2015	30,672	45,668	80,494	1,167	158,001
2016	35,069	79,143	55,394	1,593	171,199
2017	23,371	92,136	47,521	234	163,262
2018	10,771	57,403	30,407	1,931	10,0512

Tables 16-18, 20-22, 24-26 show the age length key, length frequency and the abundance at age by stratum for the three species of redfish respectively. Catches per haul distributions and biomass of the three species and juveniles are presented in the Figure 8 and 9 respectively. Table 28 shows the length frequency of the juveniles.

Greenland halibut

Mean catch per towed mile and the estimated biomass by strata with their standard errors are presented in Table 29. These indices are compared with results of previous surveys in Table 30. The following table summarises the total biomass in tons by year in depths <730 m. (1988-2018 years) and in depths up to 1460 m. (2004-2018 years).

Year	EU < 730 m.	Year	EU < 730 m.	EU < 1460 m.
1988	6,926	2004	12,292	28,343
1989	4,472	2005	11,698	21,515
1990	5,799	2006	11,706	24,357
1991	8,169	2007	13,040	31,723
1992	8,728	2008	11,995	39,614
1993	6,529	2009	7,775	36,047
1994	8,037	2010	6,299	26,739
1995	10,875	2011	6,713	32,257
1996	11,594	2012	4,291	23,505
1997	16,098	2013	2,799	23,391
1998	24,229	2014	5,168	29,288
1999	21,207	2015	6,577	58,180
2000	16,959	2016	6,139	34,642
2001	13,872	2017	7,632	52,237
2002	12,100	2018	5,578	36,482
2003	6,214			

Age-length keys and length frequency are presented in Tables 31 and 32 respectively. Frequency at age by stratum for 2017 and 2018 (Tables 33a and 33b) is presented. The 2017 index was not presented last year due to the lack of maintenance of the software that manages the data of the survey as a result of the loss of the agreement with the IIM-CSIC. Catch per haul distribution is presented in Figure 10. Figure 11 shows the estimated biomass with their standard error and numbers by year. The abundance at age along the series is shown in Table 34. Figure 12 shows the age distribution by year in the EU Flemish Cap surveys. The 2017 biomass and abundance indices until 1430 m are the second highest of the series, after the 2015 values. The 2018 biomass is at 2016 biomass level. The 2017 age 1 numbers were the highest since 2004.

Roughhead grenadier (*Macrourus berglax*)

Mean catch per standard towed mile and estimated biomass by strata with their standard errors are presented in Table 35. These indices are compared with results of previous surveys in Table 36. The following table summarises the total biomass in tons by year:

Year	EU < 730 m.	Year	EU < 730 m.	EU < 1460 m.
1988	2,009	2004	3,597	17,185
1989	871	2005	2,387	12,560
1990	852	2006	3,933	11,336
1991	1,335	2007	1,367	7,271
1992	1,577	2008	2,961	12,138
1993	3,021	2009	781	7,303
1994	1,975	2010	1,403	9,092
1995	1,558	2011	729	8,800
1996	1,362	2012	612	5,477
1997	1,197	2013	807	4,298
1998	1,691	2014	399	4,111
1999	1,250	2015	478	3,702
2000	1,047	2016	373	3,836
2001	2,079	2017	616	5,141
2002	1,211	2018	625	4,375
2003	2,348			

Age-length keys and length frequency and are presented in Tables 37 and 38. Frequency at age by strata for years 2017 and 2018 are presented in Table 39 (a and b), as last year 2017 indices were not presented, as in the case of the Greenland halibut. Catch per haul distribution is presented in Figure 13. Figure 14 shows the estimated biomass with their standard error and numbers by year. The abundance at age along the series is shown in Table 40. Figure 15 shows the age distribution by year in the EU Flemish Cap surveys. Biomass and abundance have been stable in the last years at low levels.

Squid

For the very first time, some indices of the squid (*Illex illecebrosus*) are presented. Total biomass and abundance are presented in Table 41. The biomass is presented by stratum and year. The 1988-2002 indices were transformed for the R/V *Cornide de Saavedra* to the R/V *Vizconde de Eza* level (González-Troncoso, 2016). The indices could be seen in Figure 16. No all the years squid is present in the survey, and the indices show a high variability.

Shrimp

Casas J.M. (2018) presented detailed results.

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Table 1. Technical data of the 2018 survey.

Procedure	Specification
Vessel	R/V <i>Vizconde de Eza</i>
GT	1 400 t
Power	1 800 HP
Mean trawling speed	3.0 -3.5 knots
Trawling time	30 minutes effective time
Fishing gear	type <i>Lofoten</i>
footrope / handrope	31.20 / 17.70 m
footgear	27 steel bobbins of 35 cm
vertical opening	3.0 m (MARPORT)
warps	100 meters, 45 mm, 200 Kg/100m
trawl doors	polyvalent, 850 Kg
wire length	2 × depth echo sounder (m.) + 250.
mesh size in cod-end	35 mm
Type of survey	Stratified sampling
Station selection procedure	Random
Criterion to change position of a selected tow	- Unsuitable bottom for trawling according to ecosounder register. - Information on gear damage from previous surveys.
Criterion to reject data from tow	- tears in cod-end - severe tears in the gear - less than 20 minutes tow - bad behaviour of the gear
Daily period for fishing	6.30 to 18:30 hours
Species for sampling	All fish, cephalopods, shrimp and invertebrates
Species for age determination	Cod, American plaice, redfish (<i>Sebastes sp.</i>), Greenland halibut and Roughhead grenadier (<i>Macrourus berglax</i>).

Table 2. Biomass (t.) for the most important species or groups of species in 1988-2017 surveys in depths lesser than 730 m.

Species	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Rajidae	4495	1938	2823	4061	3780	6241	3506	2268	2051	1842	1978	1608	1150	2236	1544	4608
<i>Synaphobranchus sp.</i>	217	88	40	80	72	105	8	16	0	8	40	0	0	24	8	24
<i>Urophycis sp.</i>	643	169	169	257	72	169	217	80	80	32	225	249	169	394	129	547
<i>Antimora sp.</i>	394	306	281	563	724	820	796	193	185	233	491	290	265	667	346	306
Macrouridae	3088	1456	1222	2252	2589	6498	3233	2606	2340	2292	2831	2332	1809	3080	2043	3691
<i>Notacanthus sp.</i>	499	410	64	474	450	740	458	346	177	290	169	64	97	105	64	24
<i>Illex sp.</i>	8	8	1649	1158	64	0	209	0	88	64	72	16	0	8	8	225
Anarhichadidae	7994	7487	8122	10101	9095	14355	15642	19220	20563	14033	10985	5581	4471	5863	5227	5983
Witch flounder	909	338	418	772	820	1045	788	708	507	322	241	378	410	458	209	844
Greenland halibut	6924	4471	5798	8171	8725	6530	8034	10873	11596	16100	24230	21207	16960	13872	12103	6216
Zoarcidae	563	1142	1206	1978	1359	3474	1874	2179	1705	1729	2059	893	780	1246	812	2067
Cod	40837	114050	59365	40250	26715	60966	26466	9699	9015	9964	4986	2855	3064	2694	2493	1592
American plaice	16044	14049	11982	10085	8653	7865	8227	6787	4101	3024	3434	2581	1608	2405	2051	2284
Redfish	188333	162535	126757	76953	130206	72610	162527	87641	119664	165816	70833	98650	177991	77347	121312	93817
Shrimp*	5742	2300	3490	11661	25155	12087	3981	7503	10905	7704	41971	25734	19719	28316	40177	21512
Total	277325	310956	224530	169483	218909	193504	236440	150512	183669	224039	165655	163058	230087	140162	189459	149394

Species	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Rajidae	6241	4238	3506	2179	6289	2244	3471	2188	1658	743	680	836	1073	1365	905
<i>Synaphobranchus sp.</i>	88	72	32	64	40	24	14	2	20	40	14	9	23	10	1236
<i>Urophycis sp.</i>	667	740	611	249	547	217	685	682	380	332	258	145	113	107	132
<i>Antimora sp.</i>	1158	1110	474	587	893	499	670	342	727	655	649	630	748	520	7837
Macrouridae	4914	3353	5026	2364	3957	1166	1926	561	1190	1253	980	843	655	848	11176
<i>Notacanthus sp.</i>	145	64	145	64	88	32	21	12	69	68	40	17	69	55	822
<i>Illex sp.</i>	474	80	3546	410	5139	1737	43	89	0	0	0	0	3	2350	52
Anarhichadidae	10591	9570	9272	8195	9867	4600	4256	3739	5073	3893	4775	5402	5371	6182	7857
Witch flounder	1568	1777	893	595	2220	764	1836	1458	2283	940	1810	2163	2126	3134	2493
Greenland halibut	12288	11701	11709	13044	11999	7777	6299	6481	4291	2884	5168	6577	6139	7633	36171
Zoarcidae	3683	3080	1801	354	458	56	75	20	1	6	0	1	5	1	3
Cod	4069	5243	12505	23884	43676	75232	69295	106151	113227	71903	159939	114807	80583	89414	75795
American plaice	3522	2758	1689	1053	1769	1440	2446	4084	4491	3632	3800	3821	4325	7475	6109
Redfish	250602	453041	766924	464621	566649	358476	212212	196493	305947	219729	179925	158001	171198	163262	100513
Shrimp*	20129	30672	16237	17049	11066	2799	4889	1593	1055	844	900	1551	2478	2885	4404
Total	322866	529181	845252	534714	664655	457062	317805	320886	448661	319157	365459	300443	283269	325190	278088

*) Values affected by mesh size cod-end: 40 mm in 1994, 25 mm in 1998 and 30 mm in 1999.

Table 3. Cod (*Gadus morhua*) mean catch per standard towed mile and the estimated biomass by strata and its standard error in the 2018 survey.

stratum	area sq. miles	tow number	catch (kg)		Biomass (t.)	
			mean	s. e.	value	s.e.
1	342	4	348.33	274.33	15884	12510
2	838	10	139.55	69.28	15592	7741
3	628	7	102.18	48.87	8556	4092
4	348	5	53.15	26.34	2466	1222
5	703	7	44.7	19.98	4189	1873
6	496	6	133.28	83.5	8814	5522
7	822	9	42.25	15.51	4630	1700
8	646	7	26.23	7.46	2260	642
9	314	3	63.78	13.44	2670	563
10	951	11	7.93	2.16	1005	273
11	806	9	17.95	5.89	1929	633
12	670	8	16.52	6.44	1475	575
13	249	3	15.46	6.33	513	210
14	602	7	41.8	18.18	3355	1459
15	666	8	26.74	5.58	2375	495
16	634	7				
17	216	2	2.77	2.77	80	80
18	210	2				
19	414	5				
Total < 730 m.	10555	120	53.86	11.79	75795	16599
Total < 1460 m.	16070	181	35.37	7.75	75795	16599

Table 4. Cod (*Gadus morhua*) length distribution ('000) in the 2018 survey.

length		length		length		length	
9-11	6	42-44	1136	75-77	693	108-110	27
12-14		45-47	2603	78-80	471	111-113	46
15-17	180	48-50	3711	81-83	286	114-116	53
18-20	180	51-53	3894	84-86	126	117-119	32
21-23		54-56	4991	87-89	220	120-122	32
24-26	66	57-59	4093	90-92	98	123-125	19
27-29	752	60-62	3188	93-95	27	126-128	6
30-32	2458	63-65	3235	96-98	83	129-131	
33-35	1000	66-68	2554	99- 101	53	132-134	8
36-38	41	69-71	2148	102-104	54		
39-41	158	72-74	1336	105- 107	73	total	40137

Table 5. Cod (*Gadus morhua*) Biomass (t.) by strata in 1988-2018 surveys.

strata	year																
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1	1345	649	767	5585	76	516	2165	1563	1006	243	125	99	250	86	477	173	1996
2	10150	10323	2065	5486	5150	9044	8186	3040	3991	2049	1899	1502	740	491	736	102	1668
3	4471	10276	2391	2459	8473	8435	6092	1146	1054	1132	703	145	360	230	451	90	9
4	3130	4843	2446	2900	3443	14171	1885	746	1068	857	140	25	443	488	66	136	168
5	2130	10702	8447	10651	4570	6824	924	1274	936	1149	976	256	425	260	146	303	19
6	3230	6789	3286	1531	952	4220	1412	1310	620	1074	613	375	511	749	525	24	155
7	2224	16025	4385	2538	945	6153	857	122	55	1067	78	52	5	12	24	107	18
8	8931	16434	15973	5107	2349	7964	3615	349	93	1610	77	23	74	123	37	111	5
9	184	5261	6340	188	143	998	239	9	103	174		20	41		14	376	
10	1338	4898	4193	1558	327	936	506	58	46	301	199	102	107	81	2	24	
11	2505	13219	3859	1787	224	1678	582	78	41	310	176	255	106	175	18	58	33
12	335	2469	1587	126		24											71
13	9	2534	734	93													
14	107	1121	545	131	67												
15	748	8436	2344	108													18
16		66															
17		5															
18	2																
19																	
total	40839	114050	59362	40248	26719	60963	26463	9695	9013	9966	4986	2854	3062	2695	2496	1593	4071
s.e.	5784	12205	8225	6704	5837	17397	7367	2070	1459	1725	646	451	593	380	398	273	780

s.e.: standard error

strata	year														
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
1	1091	2433	4420	4224	2253	11815	4694	1567	1931	4688	11089	3195	5589	15884	
2	1888	4145	1775	5346	6627	23368	22989	13861	10230	27320	1896	8348	18068	15592	
3	1791	1948	11466	4129	7630	4512	16922	17743	12291	22585	5572	21702	10439	8556	
4	152	466	1132	771	5190	1716	10114	2903	7106	3081	2046	11268	5305	2466	
5	30	644	548	1129	6947	3600	10947	11639	5528	5090	2051	3499	11273	4189	
6	206	1224	3214	12487	10734	2303	9510	9991	3849	11494	7413	2298	8027	8814	
7		473	140	4692	12659	4667	2586	6824	5872	37607	5914	7099	8053	4630	
8		347	475	3471	2814	4204	10921	7739	4641	9335	5732	5284	2708	2260	
9		64	151	81	503	2048	1997	5963	970	9040	256	9058	2334	2670	
10	28	304	246	2625	5071	4275	5247	16988	5153	6655	9852	1676	3217	1005	
11	56	381	272	3699	4336	4458	4557	5701	4205	9585	1490	2457	7350	1929	
12				42	339	588	1135	2538	1323	927	747	974	1974	1475	
13				15	135	124	419	875	940	529	311	846	213	513	
14		76		160	9795	1056	3186	3663	6094	8331	3093	1092	1297	3355	
15			47	805	195	475	926	5133	1961	3532	532	1787	3567	2375	
16									82	142	93				
17														80	
18								100							
19						88			113		17				
total	5242	12505	23886	43675	75228	69295	106151	113227	72289	159939	114807	80583	89414	75795	
s.e.	813	980	4526	5507	8109	16269	11805	12293	8904	25425	19966	14715	11056	16599	

s.e.: standard error

Table 6a. Cod (*Gadus morhua*) age-length key in 2017.

Length cm	age																total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	
12-14	1																1
15-17	53																53
18-20	60																60
21-23	3																3
24-26		5															5
27-29		12	1														13
30-32		10	28	1													39
33-35		1	54	5													60
36-38			52	8													60
39-41			9	54													63
42-44			3	59	1												63
45-47				57	5	1											63
48-50				39	16	5											60
51-53				20	18	23											61
54-56					17	47	1										65
57-59					6	56	4										66
60-62					1	53	10	1									65
63-65					1	31	28	1									61
66-68						25	38	1									64
69-71						8	44	11									63
72-74						3	33	25	1		1						63
75-77							21	34	2								57
78-80							6	37	8	3							54
81-83							4	26	10								40
84-86							1	19	17	1							38
87-89							1	9	12	1							23
90-92								6	8	4							18
93-95								5	16	4							25
96-98									6	8							14
99-101									1	8	4	2					15
102-104										5	8						13
105-107										4	5	4					13
108-110										4	2		1				7
111-113										1	3	2					6
114-116										2	2	1	1				6
117-119										2	2	2		1			7
120-122											1	3	1				5
123-125																	0
126-128														1		1	2
TOTAL	117	28	147	243	65	252	191	176	97	47	17	8	4	1	1		1394

Table 6b. Cod (*Gadus morhua*) age-length key in 2018.

Length cm	age																total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	
9-11	1																1
12-14																	
15-17	11																11
18-20	11																11
21-23																	
24-26		9															9
27-29		29															29
30-32		48															48
33-35		40															40
36-38		4	1														5
39-41			12	2													14
42-44			7	41													48
45-47				41	6												47
48-50				26	22												48
51-53				10	44	1											55
54-56				1	43	6											50
57-59					30	16	1										47
60-62					10	13	22	2									47
63-65					4	5	32	8									49
66-68						2	38	10									50
69-71						1	20	19	3								43
72-74							11	32	7								50
75-77						1	3	26	5								35
78-80							5	13	7	2							27
81-83							1	10	4	1							16
84-86								3	8								11
87-89									13	4	1						18
90-92									6	1							7
93-95									1	1							2
96-98									2	2	1						5
99-101									1	2	2	1					6
102-104									1	2	2	1					6
105-107									1	4	1						6
108-110									1		4						5
111-113										2							2
114-116											2	1					3
117-119											2						2
120-122										1		1				1	3
123-125												1	1				2
126-128										1		1					2
129-131																	
132-134																1	1
TOTAL	23	130	20	121	159	45	133	123	60	23	15	6	1			2	861

Table 7a. Cod (*Gadus morhua*) frequency ('0000) at age and stratum in the 2017 survey.

age	strata															total	mean	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		Weight (g)	Length (cm)
1	14	109	4	60	13			1								201	49	18
2	1	14	3	8	3	1										31	230	29
3	12	221	56	154	151	34	11	7	1	5	4					656	434	36
4	141	727	138	180	257	96	59	29	3	12	17				1	1658	791	44
5	25	104	40	25	42	29	30	6	1	3	23	1			1	330	1332	52
6	72	286	252	88	193	178	198	44	23	21	185	16	1	6	25	1587	2024	60
7	40	123	112	32	102	97	104	32	29	16	90	23	2	12	40	854	2839	67
8	20	39	27	10	30	24	16	11	15	10	21	15	2	7	26	272	4121	76
9	7	14	6	4	9	2	3	3	4	7	4	4	1	2	8	78	6784	89
10	3	6	2	2	3	2	2	1	1	5	2	1		2	3	35	9274	98
11	1	1	1		1	1	1	1		2	1			1	1	13	11607	105
12						1				2				1		5	15336	117
13										1	1					3	15716	118
14																1	15659	118
15																1	19594	127
Set	4	10	7	4	8	6	9	7	3	11	9	8	3	6	8	103	1740	53.2
n	337	1644	641	563	804	466	424	135	76	85	347	60	6	30	104	5723		

Table 7b. Cod (*Gadus morhua*) frequency ('0000) at age and stratum in the 2018 survey.

age	strata																total	mean	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	17		Weight (g)	Length (cm)
1		8	12	16	1												37	47	17
2	32	56	90	56	47	40	48	41	7	7	6						431	273	31
3	1	7	3	1	2	1	4	2	2	3	4						31	652	42
4	101	130	85	26	52	43	79	43	26	7	21				1		614	977	47
5	417	288	193	48	46	108	94	43	22	2	25	6		5	3		1300	1498	54
6	112	62	44	11	13	41	22	10	5	1	6	3	1	5	3		339	1935	59
7	155	114	79	15	36	124	40	20	14	5	21	15	5	34	22	1	699	2643	66
8	63	68	36	7	27	59	15	11	15	3	12	15	7	31	26	1	395	3394	71
9	11	25	8	3	9	12	5	3	7	4	3	5	2	9	10		113	5043	80
10	1	11	2	2	2	1	2		3	3	1			2	1		32	9254	98
11		7	1		1	1	1	1	1	1				1			15	12091	108
12		2			1	1											6	14463	114
13																	1	18216	124
14																			
15																			
16						1											1	16905	121
17									1								1	22556	133
Set	4	10	7	4	8	6	9	7	3	11	9	8	3	6	8	1	104	1922	55.8
n	893	777	553	186	237	434	309	173	102	36	99	44	15	87	65	2	4013	7713	

Table 8. Cod (*Gadus morhua*) abundance ('000) at age in 1988-2018 surveys.

age	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
1	4868	19604	2303	129032	71533	4075	3017	1425	36	37	23	5	178	473	0	684
2	79905	10800	12348	26220	41923	138357	4130	11901	3121	150	83	84	16	1990	1330	54
3	49496	91303	5121	16903	5578	31096	27756	1338	6659	3478	95	116	327	13	641	628
4	13448	54613	16952	2125	2385	1099	5097	3892	892	4803	1256	117	198	122	29	134
5	1457	20424	15834	6757	385	1317	130	928	2407	391	1572	717	96	79	70	22
6	211	1336	4492	1731	1398	173	67	33	192	952	78	444	446	15	33	42
7	225	143	340	299	244	489	7	23	8	21	146	19	172	142	26	7
8	72	126	146	68	14	87	111	0	5	0	0	5	11	99	96	8
9	0	6	77	32	0	0	0	21	0	0	6	0	17	6	30	39
10	0	7	25	4	0	0	5	5	0	0	0	0	0	6	0	24
11	0	0	0	10	8	0	0	0	0	0	0	0	0	6	5	0
12	0	0	0	0	0	0	0	0	0	4	0	0	5	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

age	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
1	14	8069	19709	3917	6096	5139	66370	347674	103494	5525	7282	1141	56	2010	366
2	3380	16	3886	11620	16671	7479	27689	142999	128087	67521	2372	12952	4485	314	4303
3	25	1118	62	5022	12433	16150	8654	16993	10942	32339	48564	7250	14356	6516	271
4	600	78	1481	21	4530	14310	7633	6309	11721	4776	43168	25614	2230	16645	6114
5	168	709	85	1138	72	4154	4911	7739	4967	4185	17861	14107	14540	3267	13117
6	5	136	592	58	946	26	1780	3089	4781	2782	6842	21854	12375	15842	3370
7	10		115	425	56	1091	8	1191	1630	1807	3447	3434	4814	8519	7074
8	3	17	7	74	231	0	442	0	832	963	1931	1426	1157	2765	3948
9	5	16	0	13	76	335	46	215	24	278	1551	762	522	789	1030
10	15	8	7	20	0	0	251	0	93	40	600	366	303	345	272
11	0	0	14	0	14	0	26	89	30	29	79	194	145	137	182
12	0	0	0	0	0	14	0	0	101	32	54	14	28	53	63
13	0	0	7	0	0	0	0	0	0	5	8	21	20	27	13
14	0	0	0	0	0	0	0	0	17	0	0	21	0	6	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	7	
16	0	0	0	0	0	0	0	0	0	0	0	7	0	0	6
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
Total	4226	10166	25965	22308	41124	48697	117810	526300	266720	120280	133760	89164	55032	57241	40139

Table 9. American plaice (*Hippoglossoides platessoides*) mean catch per towed mile and the estimated biomass by stratum, and their standard error in the 2018 survey.

stratum	area sq. miles	tow number	catch (kg)		Biomass (t.)	
			mean	s. e.	value	s.e.
1	342	4	29.31	8.37	764	218
2	838	10	28.30	5.27	1807	336
3	628	7	11.17	3.12	534	149
4	348	4	10.73	7.11	285	188
5	703	8	7.86	3.17	421	169
6	496	6	19.88	5.02	751	190
7	822	9	6.21	1.30	389	81
8	646	7	4.88	1.80	241	88
9	314	3				
10	951	11	5.57	1.37	403	98
11	806	9	6.46	0.88	397	54
12	670	8	0.32	0.18	16	9
13	249	3				
14	602	7	0.84	0.39	39	17
15	666	8	1.00	0.39	51	20
16	634	7				
17	216	2				
18	210	2	0.75	0.75	12	12
19	414	5				
Total < 730 m.	10555	120	7.60	0.70	6109	558
Total < 1460 m.	16070	181	4.99	0.46	6109	558

Table 10. American plaice (*Hippoglossoides platessoides*) length frequency ('000) in the 2018 survey.

<u>length</u>	<u>ind.</u>	<u>male</u>	<u>female</u>	<u>length</u>	<u>ind.</u>	<u>male</u>	<u>female</u>	<u>length</u>	<u>ind.</u>	<u>male</u>	<u>female</u>
16-17		15		36-37		283	60	56-57			110
18-19		14	20	38-39		295	167	58-59		6	93
20-21		20	27	40-41		471	233	60-61			33
22-23		61	20	42-43		528	272	62-63			20
24-25		14		44-45		391	221	64-65			6
26-27		28	33	46-47		202	182	66-67			7
28-29		204	55	48-49		119	232				
30-31		495	314	50-51		39	301				
32-33		320	192	52-53		13	405				
34-35		256	75	54-55		13	324				
								total		3788	3400

Table 11. American plaice (*Hippoglossoides platessoides*) survey biomass (t) by strata in 1988-2018.

stratum	year															
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
1	1306	1000	505	1078	709	1079	661	2230	1462	381	156	372	345	1043	141	1292
2	2845	3602	1375	2663	1714	1267	1199	1335	943	740	1587	1810	976	835	1262	713
3	1367	1118	1668	1247	631	444	325	252	168	495	284	97	21	93	75	17
4	2199	461	817	320	557	572	853	489	268	203	343	53	100	85		128
5	2599	3093	1830	1407	837	1291	1230	549	500	619	744	73	56	112	189	82
6	479	1130	954	501	601	305	808	123	32	13	35	40	25	37	63	29
7	1174	531	837	389	639	319	316	249	72	83	47	19	15	28	52	30
8	417	164	263	251	727	487	171	132	56	123	165	3		45	43	14
9	103	163	343		373	205	20	500	55	36					1	9
10	2323	1491	2000	1308	1406	1459	2236	708	415	287	36	72	45	95	36	54
11	1186	1168	1316	401	372	292	303	109	68	32	29	37	23	27	59	29
12	9	19	45	17	11	15	33	12	32	7				4		11
13	3		20					3								
14	8	8	7	389	29		24	15	4		4	9				
15	23	99	3	97	37	109	40	68	23	7	7					6
16	5			4	9	12	5									
17																
18																
19				15	4	5	3	11								
total	16046	14047	11983	10087	8656	7861	8227	6785	4098	3026	3437	2585	1606	2404	2049	2286
s.e.	1845	2048	1276	1180	954	1040	1373	1083	912	708	751	869	332	429	729	748

stratum	year															
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
1	1507	1038	714	284	144	548	716	693	462	329	181	410	219	1014	764	
2	768	796	354	209	513	370	1084	1141	1272	1202	1872	1248	1307	4379	1807	
3	427	101	74	101	147	74	103	364	468	266	223	462	488	410	534	
4	395	359	109	153	440	36	91	1201	749	671	258	376	178	342	285	
5	72	45	63	81	88	72	200	190	716	267	328	443	592	277	421	
6	26	71	61	99	37	57	34	160	185	341	187	309	282	314	751	
7	84	31	37	20	47	32	28	160	156	166	208	117	253	215	389	
8	55	175	163	58	128	47	49	65	187	156	249	220	346	114	241	
9	77	18				77			30	25	0	2	12	2		
10	45	87	97	24	163	54	115	35	123	153	105	86	325	190	403	
11	69	35	19	22	50	64	26	33	121	121	185	124	308	188	397	
12						11			11	0				10	16	
13														2		
14								32				3	3	16	39	
15		4		3	7	1		10	13			22	10	4	51	
16																
17																
18															12	
19																
total	3525	2760	1691	1053	1766	1442	2446	4084	4491	3698	3800	3821	4325	7475	6109	
s.e.	740	684	342	159	300	327	526	780	534	439	671	556	481	1547	558	

Table 12. American plaice (*Hippoglossoides platessoides*) age-length key in 2017 and 2018. NOT YET AVAILABLE

Table 13. American plaice (*Hippoglossoides platessoides*) frequency at age in the 2017 and 2018 surveys.
NOT YET AVAILABLE

Table 14. American plaice (*Hippoglossoides platessoides*) abundance ('000) at age in 1988-2018 surveys.
2017 AND 2018 NOT YET UPDATED

age	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
1	0	40	8	40	0	0	0	0	8	8	0	8	16	0	0	8
2	402	563	426	354	852	8	40	32	32	16	24	0	24	40	0	8
3	1882	8364	917	1206	796	1544	48	113	121	113	32	24	8	48	32	32
4	1311	1874	8372	2171	1070	1086	2131	740	257	24	48	64	80	56	64	97
5	4230	4367	1126	5348	1938	780	1037	2131	587	121	72	80	105	105	16	80
6	6385	4359	3370	2445	4769	418	877	1367	1665	418	265	80	153	56	88	56
7	5010	4142	2340	2686	1279	4134	973	1375	893	1206	619	241	121	113	64	48
8	5460	2429	2228	2067	1504	450	3426	909	547	273	901	474	153	265	129	137
9	1753	804	1351	852	828	780	322	1536	402	410	523	507	394	434	161	290
10	458	346	627	298	378	370	651	161	627	290	354	257	426	579	193	233
11	97	40	113	8	177	257	225	177	145	491	298	338	225	483	298	426
12	161	16	16	56	97	306	225	145	80	129	290	209	185	418	225	483
13	129	0	32	0	16	362	249	145	80	24	88	121	72	193	249	281
14	48	0	16	0	0	1070	523	290	105	97	113	121	56	161	145	265
15	56	0	0	0	0	32	491	217	72	48	56	56	48	113	129	145
16+	40	0	0	0	0	40	8	32	24	113	105	97	56	97	185	161
total	27415	27351	20949	17523	13711	11637	11226	9377	5645	3772	3804	2670	2131	3169	1970	2766
N6+	19598	12135	10093	8412	9047	8219	7970	6353	4640	3498	3611	2501	1890	2911	1866	2525
Biomass	16043	14044	11983	10088	8657	7861	8228	6785	4097	3024	3436	2587	1606	2404	2048	2286

age	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
1	0	0	7	207	51	26	10		7	27	8	20	70		
2	113	32	28	7	1492	293	341	394	60	198	344	578	178		
3	281	113	37	13	69	1107	608	601	447	76	219	695	1176		
4	72	290	106	35		147	2000	1384	629	311	144	599	1275		
5	80	105	133	106	32	29	301	2467	980	718	135	101	936		
6	105	105	139	119	127	22	187	454	2833	866	510	109	263		
7	105	129	72	49	120	80	72	94	447	1596	816	328	239		
8	129	105	57	49	108	57	139	49	84	138	1569	609	405		
9	249	225	123	35	104	94	122	90	111	64	190	1320	515		
10	314	201	163	47	111	90	70	176	143	94	65	140	1083		
11	281	225	200	76	63	132	56	144	125	109	55	49	77		
12	595	249	193	122	47	121	176	55	115	108	62	33	49		
13	426	354	192	143	118	63	125	107	45	55	46	41	21		
14	402	394	213	82	110	104	114	148	133	61	64	47	27		
15	330	257	201	75	150	121	134	82	130	54	50	55	34		
16+	523	547	323	236	561	353	497	672	323	195	201	228	175		
total	4013	3329	2188	1401	3262	2838	4952	6917	6614	4670	4477	4950	6523	10127	7187
N6+	3458	2791	1877	1033	1619	1237	1692	2072	4489	3340	3628	2959	2888		
Biomass	3525	2760	1691	1053	1766	1442	2446	4084	4491	3698	3800	3821	4325	7475	6109

Table 15. Redfish (*Sebastes norvegicus*) mean catch per towed mile and the estimated biomass by stratum, and their standard error in the 2018 survey.

stratum	area sq. miles	tow number	catch (kg)		Biomass (t.)		
			mean	s. e.	value	s.e.	
1	342	4	2.12		2.00	55	52
2	838	10	13.30		8.82	849	563
3	628	7	4.50		2.40	215	114
4	348	4	1.02		0.58	27	15
5	703	8	5.78		3.54	309	189
6	496	6	35.11		32.10	1327	1213
7	822	9	22.58		4.03	1414	252
8	646	7	3.41		1.52	168	75
9	314	3	30.64		12.79	733	306
10	951	11	50.02		30.82	3624	2233
11	806	9	31.34		11.64	1925	715
12	670	8	1.26		0.89	64	46
13	249	3					
14	602	7	0.44		0.44	20	20
15	666	8	0.81		0.81	41	41
16	634	7					
17	216	2					
18	210	2					
19	414	5					
20	525	6					
21	517	6					
22	533	6					
23	284	3					
24	253	3					
25	226	3					
28	530	6					
29	488	6					
30	1134	11					
31	203	2					
32	238	2					
33	98	2					
34	486	5					
Total < 1460 m.	16070	181	8.80		2.24	10771	2739
Total < 730 m.	10555	120	13.39		3.41	10771	2739

Table 16. Redfish (*Sebastes norvegicus*): age-length key in the 2018 survey.

Length	age																							total	
	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25+		
16	1																							1	
17	2	1																							3
18	1	1	1																						3
19	1	1																							2
20		2																							2
21			1	1																					2
22																									0
23					2																				2
24				1																					1
25					1																				1
26					1																				1
27								2																	2
28							1	1																	2
29									1																1
30									1																1
31									1		1									1					3
32									1	1		1													3
33														1	1										2
34									1		1	1													3
35											1														1
36												1	1	1	2										5
37											1			1	1		1			1					5
38											1					2		2							5
39												1		1											2
40															1										1
41																	1							1	2
42																									
43																								1	1
44																								1	1
45																					1	1			2
46																								1	1
47																									
48																								1	1
total	5	5	2	2	4		1	7	2	1	4	4	1	4	5	2	2	2	1	2	1			5	62

Table 16 (cont.) Redfish (*Sebastes norvegicus*): age-length key in the 2018 survey.**Female**

Length	age																				total			
	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		23	24	25+
16	5																							5
17	7	2																						9
18	2	7																						9
19		6	1																					7
20		1	4																					5
21			3	3																				6
22			1	2																				3
23				2																				2
24				4	1	1																		6
25				1	2	1																		3
26					1	1																		2
27					1	3																		4
28						2	5																	7
29								1			1			1										3
30									1	2	1													3
31						1		1	1							1	1			1				6
32									1	1											1			2
33									2	1														3
34									1	1	1		1						1					4
35								1	1	1	3	1	1											8
36									1	2	3	3	1						1					11
37										1	1	1	1	1	2	1								8
38									1		1	2	2	4										10
39										2	1	2	2	1	1		1							10
40												3	2					4	1					10
41											2	2		2	2		1		1	1				11
42												1	4		4			1	1	1				12
43											1		1	1	1	3				1				8
44												1		1	3	1			1					7
45													2	1		1		2	2	2				10
46																1	3	4				1		9
47														1			1	3	1					6
48																	2	1	1		1			6
49																	1	2			1			5
50																			2	1		2		5
51																								
52																								1
53																								1
total	14	16	9	12	5	8	6	7	12	15	16	15	9	15	9	9	15	18	7	3	1	2	4	227

Table 17. Redfish (*Sebastes norvegicus*) length frequency ('000) in the 2018 survey.

length	male	female	length	male	female	length	male	female
16	88	90	32	242	71	48	6	143
17	266	152	33	358	149	49		95
18	344	152	34	349	126	50		62
19	146	100	35	427	259	51		22
20	218	55	36	971	286	52		6
21	148	142	37	914	282	53		6
22	128	72	38	762	285			
23	62	72	39	629	307			
24	135	121	40	580	487			
25	118	76	41	337	368			
26	87	42	42	153	341			
27	121	67	43	158	237			
28	167	131	44	114	431			
29	81	28	45	78	428			
30	59	127	46	13	187			
31	153	83	47	6	138	Total	8419	6225

Table 18. *Sebastes norvegicus*: frequency at age ('000) by strata in the 2018 survey.

Age	Strata															total	mean	
	1	2	3	4	5	6	7	8	9	10	11	12	14	15	Weight(g)		Length(cm)	
1																		
2																		
3	1	38	102	14	58	98	202	65	14	22	80				694	83	17	
4	17	13	108	4	45	106	220	42	6	52	103			28	744	107	19	
5	4	6	43	2	11	42	103	14	6	44	66				342	129	20	
6	3	11	25	2	53	66	120	14	45	67	99				505	195	23	
7		1	42	16	27	15	82	7	61	29	67			28	376	253	25	
8		3	8	8	15	27	9	2	6	19	45				142	323	27	
9		5		3	18	14	24	1		53	77			14	210	403	29	
10		24	32	3	30	67	90	17	94	199	140		10	14	721	508	31	
11		24	8		20	70	76	46	39	212	62				558	593	33	
12		27	10		16	86	60	12	42	243	86		10		592	753	36	
13		55	34	7	45	130	117	15	85	536	323			6	1354	830	37	
14		52	24		23	215	175	23	92	375	229		10		1218	898	38	
15		17	7		13	76	29	11	50	175	102				480	960	39	
16		41	22		27	223	194	32	123	416	253				1331	883	38	
17	7	68	17		16	211	255	39	130	673	301				1717	934	39	
18	1	37	7		13	56	78	6	34	200	123	1		11	567	1055	40	
19	9	61	14		14	98	99	7	37	288	192	3			821	1140	41	
20		67	14		32	88	121	6	39	251	193			11	821	1169	42	
21		17	10		9	40	40	2	10	70	65				263	1200	42	
22	1	30	7		7	20	31	5	8	110	58	1			278	1028	40	
23		23	1		4	3	5		1	16	7				60	1471	45	
24		8			3		12			3					25	1963	50	
25	21	116			1	38	92	7	32	134	64	8			515	1303	43	
Set	3	5	6	4	7	6	9	6	3	11	9	2	1	1	73	768	34.7	
n	66	743	535	60	501	1790	2232	375	952	4188	2737	13	30	114	14334	11010		

Table 19. Redfish (*Sebastes mentella*) mean catch per towed mile and the estimated biomass by stratum, and their standard error in the 2018 survey.

stratum	area sq. miles	tow number	catch (kg)		Biomass (t.)	
			mean	s. e.	value	s.e.
1	342	4				
2	838	10				
3	628	7	0.39	0.30	18	14
4	348	4	0.23	0.23	6	6
5	703	8	1.12	1.12	60	60
6	496	6				
7	822	9	10.96	5.99	686	374
8	646	7	8.40	3.55	413	175
9	314	3	3.75	3.33	90	80
10	951	11	39.62	13.16	2870	953
11	806	9	65.96	31.76	4050	1950
12	670	8	65.59	19.83	3348	1012
13	249	3	83.23	6.77	1579	129
14	602	7	430.80	56.09	19759	2573
15	666	8	379.63	105.49	19264	5353
16	634	7	2.70	2.36	130	114
17	216	2	221.78	221.78	3650	3650
18	210	2	89.81	86.31	1437	1381
19	414	5	0.88	0.63	28	20
20	525	6	0.14	0.14	6	6
21	517	6				
22	533	6				
23	284	3				
24	253	3				
25	226	3				
28	530	6	0.09	0.09	4	4
29	488	6				
30	1134	11				
31	203	2				
32	238	2				
33	98	2	0.88	0.88	7	7
34	486	5				
Total < 1460 m.	16070	181	46.88	6.14	57403	7513
Total <730 m.	10555	120	71.37	9.35	57387	7513

Table 20 (cont.) *Sebastes mentella*: age-length key in the 2018 survey.**Female**

Lengt h	age																				total					
	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		23	24	25+		
17		2																							2	
18		1																								1
19		1																								1
20			9																							9
21			11																							11
22			7	9																						16
23				11																						11
24				5	2																					7
25				3	4	1																				8
26					2																					2
27									1																	1
28						2	2	1																		5
29							3			2	1															6
30									1	1				1												3
31												1	1				1									3
32											1	3			1											5
33														4			1									5
34										1		2	1													4
35											1	1		1			2									5
36													2	2												4
37											1							1						1		3
38															1											1
39																										0
40																										0
total		4	27	28	8	3	5	2	3	2	4	7	5	7	2	4	1							1	113	

Table 21. Redfish (*Sebastes mentella*) length frequency ('000) in the 2018 survey.

length	male	female	length	male	female	length	male	female
15		40	27	6250	1050	39		50
16	180	260	28	12870	2910	40	10	10
17	800	530	29	18160	6120	41	10	
18	620	620	30	14060	9070	42		
19	1270	750	31	8470	12770	43	10	50
20	2750	2410	32	3900	13180	44		10
21	3450	2500	33	1350	9060	45		
22	2460	2230	34	540	4470	46		
23	3260	2680	35	280	1980	47		
24	3000	1830	36	60	600	48		10
25	1710	1040	37	200	540			
26	3030	950	38	50	230	Total	88750	77950

Table 22. *Sebastes mentella*: frequency at age ('0000) by strata in the 2018 survey.

edad	Strata																			mean			
	3	4	5	7	8	9	10	11	12	13	14	15	16	17	18	19	20	28	33	total	pm(g)	talla	
1																							
2																							
3	1		1	2	3		9	3												18	58	16	
4	2	3		63	24	1	130	220	3		7	3								457	87	18	
5		2	1	186	48	3	377	649	9	2	25	43	1		1					1347	127	21	
6			1	93	64	5	513	479	23	8	116	94			7					1402	182	23	
7				15	20	6	86	74	11	27	165	83			7					495	239	26	
8				5	11	3	21	17	19	25	197	107			7					413	284	27	
9				6	7	2	32	44	115	20	670	580		55	57					1588	342	29	
10				5	17	5	41	47	118	58	612	456		53	36	1				1450	324	28	
11				2	4	1	24	35	85	21	455	436		34	44					1142	352	29	
12				5	3	2	21	29	98	13	509	536		59	47					1322	377	30	
13				1	1		13	24	49	17	247	240	1	45	19					658	439	31	
14			1	10	3	1	41	84	171	72	820	942	4	170	57	1				2377	455	32	
15				1	3	2	30	54	109	41	540	638	5	130	44	2				1598	430	31	
16				3			12	38	57	32	238	370	3	60	9					822	532	33	
17			1	2			5	11	30	17	147	149	1	35	9					407	477	32	
18				2	1		15	33	39	20	232	295	1	29	20					686	474	32	
19						1	1	4	7	7	35	42	2	47	2	1				148	503	33	
20																							
21				1				4	9	5	37	41		21	3					121	428	31	
22							1	3	1	5	10	13	2	11	1					45	518	33	
23							1	3	1	5	10	13	2	11	1					45	518	33	
24																							
25+								1		3	4		11							18	732	37	
Sets	2	1	1	8	7	3	10	8	8	3	7	8	4	1	2	2	1	1	1	78	351	28.5	
n	4	5	4	401	208	33	1373	1857	954	393	5077	5083	21	770	370	5	1	1	2	16560	5817		

Table 23. Redfish (*Sebastes fasciatus*) mean catch per towed mile and the estimated biomass by stratum, and their standard error in the 2018 survey.

stratum	area sq. miles	tow number	catch (kg)		Biomass (t.)	
			mean	s. e.	value	s.e.
1	342	4				
2	838	10	0.33	0.19	21	12
3	628	7	2.40	0.74	115	35
4	348	4	0.53	0.18	14	5
5	703	8	2.91	1.96	156	105
6	496	6	3.75	2.22	142	84
7	822	9	52.68	25.04	3299	1568
8	646	7	35.75	15.00	1760	738
9	314	3	31.20	17.83	746	427
10	951	11	33.97	8.52	2461	617
11	806	9	67.32	18.53	4135	1139
12	670	8	77.23	28.54	3943	1457
13	249	3	144.80	38.52	2747	731
14	602	7	55.74	14.86	2557	682
15	666	8	161.63	53.08	8201	2693
16	634	7	0.32	0.28	15	13
17	216	2				
18	210	2	4.31	3.48	69	56
19	414	5	0.44	0.25	14	8
20	525	6				
21	517	6				
22	533	6				
23	284	3				
24	253	3				
25	226	3	0.09	0.09	2	2
28	530	6	0.26	0.16	11	6
29	488	6				
30	1134	11				
31	203	2				
32	238	2				
33	98	2	0.09	0.09	1	1
34	486	5				
Total < 1460 m.	16070	181	24.83	3.19	30407	3907
Total < 730 m.	10555	120	37.80	4.87	30394	3907

Table 24. *Sebastes fasciatus*: age-length key in the 2018 survey.

Length	age																							total
	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25+	
16	6																							6
17	1	4																						5
18		6	1																					7
19		3	2																					5
20		3	3																					6
21			3	1																				4
22			2	4	1																			7
23				7	1																			8
24				3	2																			5
25					3	1																		4
26					1	5																		6
27									2	1					1									4
28								2	1															3
29								2	1			1					1				1			6
30									1		1	2												4
31												1									1	1		3
32												1									1			2
33												1												1
34													1						1					2
35																								0
36																								0
37																								0
38																								0
39																								0
40																								0
total	7	16	11	15	8	6	4	5	1	1	5	1	1	1	1	1	1	1	1	2	2			88

Table 24 (cont.) *Sebastes fasciatus*: age-length key in the 2018 survey.**Females**

Length	age																				total						
	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22		23	24	25+			
16	4	1																								5	
17	1	2																									3
18		4																									4
19		3	2																								5
20			8																								8
21			4		1																						5
22			3	2																							5
23				5	1																						6
24				5	3																						8
25				1	6																						7
26				4	1																						5
27						1	4						1														6
28						1		4		1							1										7
29								3	2																		5
30											1		1	1	1												4
31											1			1			1										3
32													1	2		1											4
33															1				1								2
34													1		1	1	1		1								5
35														1	3				1								5
36												1			1	1					1						4
37																	1	1									2
38															1												1
39																			1								1
40																								1			1
41																											0
42																									1		1
43																											0
44																			1								1
total	5	10	17	13	15	3	7	6		3	1	3	6	8	3	4	1	5		1		1	1	1	1	##	

Table 27. Juvenile redfish (*Sebastes sp.*) mean catch per towed mile and the estimated biomass by stratum, and their standard error in the 2018 survey.

stratum	area sq. miles	tow number	catch (kg)		Biomass (t.)	
			mean	s. e.	value	s.e.
1	342	4	0.02	0.02	0	0
2	838	10	0.04	0.02	3	1
3	628	7	1.73	0.37	83	17
4	348	4	0.40	0.09	11	2
5	703	8	0.74	0.21	39	11
6	496	6	2.24	0.93	85	35
7	822	9	8.73	1.10	546	69
8	646	7	6.00	3.05	296	150
9	314	3	0.58	0.26	14	6
10	951	11	4.59	1.17	333	85
11	806	9	7.96	1.96	489	120
12	670	8	0.40	0.39	21	20
13	249	3	0.07	0.05	1	1
14	602	7	0.02	0.02	0	0
15	666	8	0.21	0.18	10	9
16	634	7				
17	216	2				
18	210	2				
19	414	5				
Total <730 m	10555	181	1.58	0.19	1931	226
Total < 1460 m.	16070	120	2.40	0.28	1931	226

Table 28. Juvenile redfish (*Sebastes sp.*) length frequency ('000) in the 2018 survey.

length		length	
6	50	12	2000
7	350	13	2770
8	12460	14	3550
9	77610	15	2310
10	47340	16	120
11	5620	Total	154180

Table 29. Greenland halibut (*Reinhardtius hippoglossoides*) mean catch per towed mile by strata and the estimated biomass with their standard errors in the 2018 survey.

stratum	Area sq. miles	tow number	catch (Kg)		Biomass (t.)	
			mean	s.e	value	s.e.
1	342	4	0.00	0.00		
2	838	10	0.00	0.00		
3	628	7	0.09	0.07	4	4
4	348	4	0.47	0.40	12	11
5	703	8	0.09	0.05	4	3
6	496	6	0.09	0.05	3	2
7	822	9	0.28	0.12	18	8
8	646	7	0.40	0.19	20	10
9	314	3	0.00	0.00		
10	951	11	0.16	0.07	11	5
11	806	9	0.28	0.11	17	7
12	670	8	4.29	1.17	218	60
13	249	3	5.15	4.13	98	78
14	602	7	2.87	1.23	131	56
15	666	8	1.59	0.72	81	36
16	634	7	36.68	6.16	1772	298
17	216	2	22.40	17.43	369	287
18	210	2	19.27	16.70	308	267
19	414	5	79.57	14.89	2510	470
20	525	6	87.47	18.66	3498	746
21	517	6	45.92	16.35	1809	644
22	533	6	42.88	21.47	1741	872
23	284	3	44.19	14.95	956	323
24	253	3	22.30	4.17	430	80
25	226	3	22.05	2.85	380	49
28	530	6	121.70	19.62	4914	792
29	488	6	122.68	21.70	4561	807
30	1134	11	84.95	10.27	7340	887
31	203	2	36.38	2.24	563	35
32	238	2	115.85	14.70	2101	266
33	98	2	33.44	4.45	250	33
34	486	5	63.77	11.15	2362	413
Total < 1460 m.	16070	181	29.80	1.75	36482	2152
Total < 730 m.	10555	120	6.93	0.86	5578	691

Table 30. Greenland halibut (*Reinhardtius hippoglossoides*): Biomass (t.) by strata in 1988-2018 surveys.

Strata	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	3	6	0	0	0	0	121	0	2	6	3	0	15	10
3	26	31	8	8	18	3	0	21	108	90	367	347	244	384	140
4	144	20	0	15	27	10	0	5	0	23	41	197	207	157	58
5	74	98	0	28	42	1	2	21	36	98	173	409	307	268	66
6	31	18	15	12	8	15	0	31	106	228	361	301	178	265	104
7	85	63	58	189	246	94	214	904	1148	1423	2607	2356	1570	982	429
8	151	222	62	180	379	140	46	333	359	1065	989	1993	1317	1124	878
9	180	165	53	76	323	30	43	178	160	254	471	354	245	355	138
10	108	82	58	172	362	31	235	526	716	862	1369	1528	1602	1743	744
11	45	61	22	106	229	234	236	492	671	627	1227	1320	1088	1021	338
12	405	647	288	761	619	933	1219	1147	2124	2248	3077	3661	2174	1582	1086
13	64	124	218	44	24	143	152	127	298	484	554	978	382	291	521
14	368	302	284	787	847	0	620	410	902	1589	1461	1080	491	877	1081
15	435	169	525	973	643	1378	1492	1768	1448	2689	4055	2987	2687	1616	1233
16	1374	1363	2543	2527	1827	2175	1524	1861	2098	1770	3356	1143	2016	1328	2182
17	266	120	127	415	40	0	742	742	258	525	737	603	498	170	204
18	106	50	506	354	58	0	386	958	191	557	775	932	179	574	694
19	3064	934	1026	1522	3036	1342	1126	1230	971	1564	2603	1015	1774	1120	2194
20															
21															
22															
23															
24															
25															
28															
29															
30															
31															
32															
33															
34															
Total (1-19)	6926	4472	5799	8169	8728	6529	8037	10875	11594	16098	24229	21207	16959	13872	12100
s.e. (1-19)	768	392	809	817	1389	956	678	1226	882	1136	1348	1520	923	776	662
Total (1-34)															
s.e. total (1-34)															

Table 30 (cont.) Greenland halibut (*Reinhardtius hippoglossoides*): Biomass (t.) by strata in 1988-2018 surveys.

Strata	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
1		2														
2	0	12	7	9												
3	55	852	416	325	22		4	6						0	1	4
4	105	347	91	182	8									0		12
5	92	254	280	231	92	15	7		6			0	6		2	4
6	21	466	332	61	75	8					0	2	1	8		3
7	414	1032	596	778	729	524	11	15	4		4	8	12	21	9	18
8	507	811	934	910	432	226	31	0		0				15	2	20
9	140	464	91	550	487	401	31				9					
10	286	753	1058	850	560	777	25	19	5				1	1	23	11
11	277	631	1063	290	503	563	21	32	2	8	2	3		17	8	17
12	673	902	1020	978	1246	1393	1217	743	126	332	140	239	522	133	282	218
13	61	447	310	219	392	431	217	273	33	19			80	26	9	98
14	885	1658	618	573	878	1023	742	62	35	256	28	22	22	89	121	131
15	607	1084	1747	1783	3041	1621	771	1224	112	111	89	119	241	49	171	81
16	633	1166	1357	1752	2263	1623	2186	2079	1892	1911	1038	2165	3049	2188	3921	1772
17	148	223	429	639	407	411	558	446	236	401	170	298	395	682	562	369
18	1062	578	434	606	865	944	540	526	562	325	395	696	687	277	74	308
19	248	608	915	971	1042	2035	1414	1231	3700	927	924	1615	1560	2633	2447	2510
20		1647	1061	666	2041	4119	1855	1490	2471	2381	1858	3556	2536	1904	4109	3498
21		729	345	359	742	2161	1569	1367	1258	1496	1952	1210	4577	1058	3080	1809
22		454	510	845	551	883	1970	2410	1226	714	1220	1201	4707	1901	3530	1741
23		407	42	130	495	1144	475	715	464	280	534	576	1623	677	1579	956
24		208	328	555	588	1082	1185	461	1749	652	379	541	846	1082	796	430
25		2377	993	322	436	441	732	473	593	459	392	968	450	506	1127	380
28		1728	1162	1239	2857	3920	3153	1994	4188	2244	2150	1956	5627	2920	7414	4914
29		2300	1330	674	1488	3335	2618	2091	2044	2237	2060	4603	7198	3038	6525	4561
30		2024	602	2772	4719	5066	7692	5381	5060	4738	4685	3915	14974	5662	8756	7340
31		546	186	354	347	385	944	319	414	82	461	754	1631	659	1393	563
32		599	596	1357	1040	1755	2391	1539	1916	1097	1244	2610	4308	2588	2597	2101
33		358	147	608	166	698	309	408	707	320	594	475	542	678	597	250
34		2675	1460	1886	2222	2627	3377	1790	3454	2514	3063	1756	2585	5831	3101	2362
Total (1-19)	6214	12292	11698	11708	13040	11997	7777	6656	6713	4291	2799	5168	6576	6139	7633	5578
s.e. (1-19)	611	400	630	609	786	583	363	814	2728	338	345	542	1246	802	812	691
Total (1-34)		28343	21515	24357	31723	39614	36047	27096	32257	23505	23391	29288	58180	34642	52237	36482
s.e (1-34)		1335	933	1263	1270	1312	1538	1791	3862	1416	1847	1880	4046	3454	3263	2152
total_700-1400		16269	8761	11765	17690	27615	28270	20438	25545	19214	20589	24121	51604	28503	44604	30904
s.e._700-1400		2544	664	1080	1958	2349	2988	1597	2721	1375	1816	1802	3849	3360	3161	2038

Table 31. Greenland halibut (*Reinhardtius hippoglossoides*) age-length key in the 2018 survey.**MALE**

Length cm	age																total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	
12-13	5																5
14-15	13	5															18
16-17	5	5															10
18-19	1	2															3
20-21																	
22-23		2	3														5
24-25			4														4
26-27			9														9
28-29			6	1													7
30-31			1	1													2
32-33				5	5												10
34-35				4	7												11
36-37					12	3											15
38-39					17	3											20
40-41					15	8											23
42-43					10	11											21
44-45					3	18											21
46-47					1	16	4										21
48-49					1	12	7										20
50-51						3	14	2	1								20
52-53							14	7									21
54-55							14	5		1							20
56-57							7	10	2	2							21
58-59							5	4	2	2							13
60-61									3	5	1						9
62-63											1	3					4
64-65																	
total	24	14	23	11	71	74	65	28	8	10	2	3					333

Table 31 (cont.) Greenland halibut (*Reinhardtius hippoglossoides*) age-length key in the 2018 survey.**FEMALE**

length cm	age																total	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+		
12-13	3																3	
14-15	15	3															18	
16-17	4	5															9	
18-19		2															2	
20-21		1															1	
22-23		1															1	
24-25		3	5														8	
26-27			3														3	
28-29			3	1	1												5	
30-31				1	1												2	
32-33				1	4												5	
34-35				4	9												13	
36-37				2	16	1											19	
38-39					17	3											20	
40-41					8	13											21	
42-43					5	16											21	
44-45					2	18	2										22	
46-47					1	17	2										20	
48-49						10	11										21	
50-51						1	18	3									22	
52-53							14	8									22	
54-55							10	6	2	1							19	
56-57							9	7	4		1						21	
58-59							3	6	5	5	1						20	
60-61									7	11	3	1					22	
62-63									3	12	5						20	
64-65										8	3	7	1				19	
66-67										4	8	2	6				20	
68-69										2	6	7	3	3			21	
70-71												5	4	7			16	
72-73												1	2	4	5	3	1	16
74-75													1	4	6	3		14
76-77													1	4	1	1		7
78-79															1	3	1	5
80-81															1	4	1	6
82-83																2	4	6
84-85																	3	3
86-87																	1	1
88-89																	1	1
90-91																	2	2
total	22	15	11	9	64	79	69	30	21	43	28	26	26	24	16	14	497	

Table 32. Greenland halibut (*Reinhardtius hippoglossoides*) length frequency ('000) in the 2018 survey.

depths < 730 m

length	male	female	length	male	female	length	male	female
12-13	35	21	36-37	96	101	60-61	15	88
14-15	134	168	38-39	145	82	62-63		40
16-17	84	63	40-41	251	228	64-65		9
18-19	20	14	42-43	368	455	66-67		0
20-21	7	14	44-45	339	436	68-69		21
22-23	28	7	46-47	480	489	70-71		7
24-25	41	49	48-49	318	440			
26-27	76	21	50-51	189	466			
28-29	49	35	52-53	145	424			
30-31	14	14	54-55	96	193			
32-33	27	13	56-57	47	165			
34-35	46	41	58-59	14	170	total	3063	4274

depths < 1460 m

length	male	female	length	male	female	length	male	female
12-13	35	21	42-43	835	978	72-73		125
14-15	134	168	44-45	833	1101	74-75		108
16-17	83	63	46-47	1242	1454	76-77		48
18-19	20	14	48-49	1038	1688	78-79		44
20-21	7	23	50-51	1026	1787	80-81		46
22-23	28	7	52-53	889	2176	82-83		35
24-25	41	56	54-55	590	1976	84-85		23
26-27	76	21	56-57	446	2162	86-87		8
28-29	48	35	58-59	159	1998	88-89		7
30-31	14	14	60-61	81	1583	90-91		16
32-33	70	20	62-63	36	1097			
34-35	91	104	64-65	8	837			
36-37	200	184	66-67		467			
38-39	330	256	68-69		320			
40-41	521	603	70-71		178	total	8881	21851

Table 33a. Greenland halibut (*Reinhardtius hippoglossoides*) frequency at age ('0000) and strata in the 2017 survey.

age	strata																																		total	mean	
	2	3	4	5	6	7	8	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	28	29	30	31	32	33	34	Weight (g)	Length (cm)					
1	1	3	1	4	2	13	1	45	20	1		1	2																				92	25	15		
2							1	1	1					1																			4	67	21		
3							1																		1								2	117	25		
4						1								3	1		3	5	1	1					4	2	6	1	5		2	36	308	34			
5									1	7	1	1	3	37	4		56	35	31	32	10	9	6	77	51	83	10	46	2	31	533	544	41				
6							1				16	1	1	6	134	20		122	104	101	85	32	23	25	215	149	167	23	65	11	87	1386	775	46			
7												7		3	7	153	21		89	120	89	101	41	30	34	260	201	168	28	53	19	102	1526	1135	52		
8												1		2	2	48	7	1	20	51	34	44	20	10	15	95	93	88	17	24	8	37	617	1395	55		
9													1			16	2		5	23	12	18	8	2	6	31	40	53	8	14	3	14	259	1628	58		
10														1		10	2	1	2	19	10	17	7	2	5	21	29	60	8	16	3	13	225	1965	62		
11															3		1	1	6	3	5	3	1	1	5	10	21	3	5	1	3	73	2113	63			
12															1		1		2	2	3	2				2	4	13	3	3	1	1	39	2515	66		
13															1				2	1	4	1				2	4	13	3	3	1	1	38	2721	68		
14																			1	1	1	1					1	6	1	2			14	3310	73		
15																			1	1	1	1					1	5	1	1			14	3851	76		
16+																			1	2	2	2		1			7		1	1			19	5048	83		
Sets	1	2	1	3	3	7	4	8	9	7	1	4	5	7	2	1	5	6	6	6	3	3	3	6	6	11	2	2	2	5	131	1104	49.9				
n	1	3	1	5	2	15	3	46	21	35	2	10	21	406	57	3	298	370	287	314	128	77	94	714	585	692	107	239	49	293	4877						

Table 33b. Greenland halibut (*Reinhardtius hippoglossoides*) frequency at age ('0000) and strata in the 2018 survey.

age	strata																																		total	mean	
	3	4	5	6	7	8	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	28	29	30	31	32	33	34	Weight (g)	Length (cm)						
1	1	1	1	0	9	5	3	12	0	0	1	1				3																		37	21	15	
2	1	2	0	0	4	5	2	6	1	0	1	2				1		0													1			23	43	18	
3	1	0	1	4	3	2	6	3	1	0	3					1		0																26	134	26	
4	1	0	0	0	0	1	0	0	0	0	0		3		0	3	1							0		1	1	1		1	0	1	15	285	33		
5	0	1	0	1	0	1	0	3	2	1	2	24	8	9	61	11	10	6	4	1	1	32	20	29	0	18	3	13	261				529	40			
6		0	0	1	1	0	1	7	5	3	6	60	18	19	150	41	31	21	12	7	5	123	57	83	6	29	8	41	733				751	45			
7	1			0	1			8	4	4	1	59	12	8	72	102	52	37	15	13	10	150	91	124	16	31	6	63	878				1170	52			
8		0			0			3	1	1	0	21	4	2	17	50	22	18	8	7	4	60	46	61	6	14	2	31	379				1357	55			
9								1	0	1	0	7	1	1	5	22	9	10	4	3	2	28	29	41	3	12	1	15	193				1653	58			
10								0		1	0	7	1	1	5	28	8	16	6	2	2	31	45	71	4	20	1	18	267				1917	61			
11								0		0	0	2	0	0	2	10	4	7	3	1	1	13	19	33	2	10	1	6	113				2086	63			
12										0		1	0		0	5	3	3	3	1	0	6	12	20	2	7	1	2	65				2423	66			
13												0			0	2	1	3	2	0		3	6	13	1	5	0	1	36				2819	69			
14												1			0	1	2	2	2			1	5	6	1	3	0	1	23				3230	72			
15															0	1	1	1					2	5	0	1	0	1	12				4048	77			
16+																2	1	1					1	4		0	0	1	10				5201	84			
Sets	2	3	3	2	9	5	6	9	8	2	5	7	7	2	2	5	6	6	6	3	3	3	6	6	11	2	2	2	5	14				1218	51.2		
n	4	5	3	2	18	14	9	25	26	13	12	12	191	45	39	319	273	145	124	60	34	25	448	331	490	41	152	22	193	3072							

Table 34. Greenland halibut (*Reinhardtius hippoglossoides*) Abundance at age ('000) in the 1991-2018 surveys.

<730 m. strata (1-19)														
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1	1302	1677	1423	1429	9978	4699	2674	2200	852	3014	6459	3282	1768	1762
2	207	1260	1245	996	2045	6408	3036	1716	563	235	1153	2364	804	2644
3	348	447	777	1365	1793	1942	4822	6180	2419	479	1456	2248	489	3517
4	1054	1023	692	1435	1535	2442	5225	8843	8419	1741	799	1342	1217	1585
5	2307	1852	1021	1545	2136	3380	5714	9919	10787	5703	2242	3045	1991	5601
6	1291	2249	1545	2385	4099	4680	6800	9085	10119	11336	6262	4498	2362	6271
7	2212	1947	1627	2139	3029	2001	4014	6304	4467	4346	5328	4610	1552	2040
8	534	1054	1266	1180	1706	1299	1731	2108	1466	1865	2584	1025	375	518
9	462	468	776	631	1052	341	528	600	280	361	147	104	105	233
10	352	273	213	219	209	70	177	157	82	92	36	48	79	107
11	141	138	104	90	53	21	23	27	6	44	5	16	15	63
12	12	67	38	47	18	31	17	6	3	0	0	6	4	38
13	0	25	21	18	0	0	17	16	3	0	0	0	0	5
14	0	12	9	0	5	4	0	0	5	0	0	0	0	3
15	15	0	0	0	0	5	6	0	0	0	0	0	0	3
16+	8	0	0	0	0	0	9	0	0	0	0	0	0	3
Total	10245	12490	10757	13479	27659	27323	34792	47160	39470	29216	26471	22587	10762	24390
Freq 10+	528	515	385	374	285	131	249	206	99	136	41	70	98	

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
1	437	550	301	157	61	38			6	20	40	211	924	369
2	652	312	64	78	7	9		8			13	15	41	221
3	2554	525	455	121	30	29		36	4	3		7	21	255
4	2007	949	275	155	81	47	60	87	112	97	48	3	78	84
5	5537	4800	2765	1203	606	894	880	822	643	1089	719	264	1067	1136
6	6105	6002	5928	4586	2905	2469	2930	1827	1733	2315	3440	1826	3071	2705
7	2345	2665	4632	4950	3255	2365	2850	1406	718	1566	2091	2256	2867	1687
8	491	623	1217	909	713	715	570	349	158	283	493	733	735	502
9	89	180	247	283	153	259	160	112	39	63	120	219	225	149
10	97	143	165	210	215	137	110	83	44	66	115	123	160	147
11	44	103	62	100	62	50		54	12	22	50	64	56	47
12	15	45	38	43	47	22	10	15	10	9	12	27	18	16
13	3	10	5	18	35	10		10	6	12	2	17	18	5
14	3		2	10	12	2		10	2	6		5	4	6
15	3			4	0			3	4	3		3		
16+	3			1	0			6	1	2		2		
Total	20374	16907	16156	12825	8182	7046	7420	4823	3492	5156	7143	5775	9284	7330
Freq 10+	168	301	272	386	371	221	120	181	79	54	179	241	256	221

Table 34 (cont.) Greenland halibut (*Reinhardtius hippoglossoides*) Abundance at age ('000) in the 1991-2018 surveys.

< 1460 m. strata (1-34)

Age	Year														
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
1	1710	438	550	310	160	60	38			6	20	40	210	926	369
2	2680	652	320	60	80	10	9		8			10	20	41	232
3	3580	2561	540	480	120	40	29	10	46	15	8	10	10	28	259
4	1880	2117	1110	360	200	100	137	110	200	393	200	150	10	363	152
5	8330	6470	7160	4700	2480	1380	2447	2280	2964	2583	3405	3110	710	5134	2610
6	11210	8314	10480	11130	11020	8330	7356	8260	7073	8608	9839	18180	5970	14080	7333
7	6060	4182	5730	10490	15340	13990	9587	10460	6124	5538	8415	17190	11310	15536	8776
8	1790	1206	1700	3530	3890	4340	3063	3160	2349	2005	1989	5650	4820	5902	3787
9	890	318	510	880	1400	1140	1200	1370	920	643	548	2040	1800	2586	1933
10	450	500	440	720	1060	1260	1019	1500	906	1026	780	1730	1300	2158	2671
11	320	282	370	370	540	440	383	560	587	412	406	960	660	845	1129
12	200	161	180	210	300	340	213	330	233	349	182	360	280	333	647
13	180	74	60	80	160	310	151	270	126	153	235	210	190	382	364
14	70	47	30	60	120	170	114	140	114	73	131	230	100	115	232
15	80	9	10	20	80	50	59	50	75	103	55	150	80	152	122
16+	60	9	10	10	70	70	55	40	140	94	81	120	90	194	101
total	39490	27340	29200	33410	37020	32030	25860	28539	21864	22002	26294	50140	27560	48774	30717
Freq 10+	1360	1082	1100	1470	2330	2640	1994	2890	2181	1184	1090	3760	2700	4178	5266

Table 35. Roughhead grenadier (*Macrourus berglax*) mean catch per towed mile by strata and the estimated biomass with their standard errors in the 2018 survey.

stratum	Area sq. miles	tow number	catch per mile (Kg)		Biomass (t.)	
			mean	s. e.	value	s.e.
1	342	4				
2	838	10				
3	628	7				
4	348	4				
5	703	8				
6	496	6				
7	822	9				
8	646	7				
9	314	3				
10	951	11	0.00	0.00	0	0
11	806	9				
12	670	8	0.68	0.32	35	16
13	249	3	0.61	0.07	12	1
14	602	7	0.40	0.14	19	7
15	666	8	0.74	0.44	38	22
16	634	7	2.59	1.02	125	49
17	216	2	6.67	6.49	110	107
18	210	2	12.22	4.01	195	64
19	414	5	2.91	1.28	91	40
20	525	6	1.38	0.47	55	19
21	517	6	10.12	2.08	399	82
22	533	6	9.26	1.14	376	46
23	284	3	12.20	5.64	264	122
24	253	3	14.42	5.53	278	107
25	226	3	16.01	0.44	276	8
28	530	6	3.48	1.26	141	51
29	488	6	9.15	3.50	340	130
30	1134	11	14.09	2.47	1217	214
31	203	2	7.98	3.54	123	55
32	238	2	5.16	2.29	94	42
33	98	2	3.80	0.51	28	4
34	486	5	4.29	0.74	159	27
Total < 1460 m.	16070	181	3.57	0.30	4375	356
Total <740 m.	10555	120	0.77	0.18	625	142

Table 36. Roughhead grenadier (*Macrourus berglax*) biomass by strata in 1988-2018 surveys.

Stratum	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
1																
2								8								
3																
4																9
5																
6									22							
7					0								3	0		0
8		10		1					11	3		7		16	2	13
9	47	4		5	28	21	3	21	153	18	40	45	29	29		30
10	1								6	1		18	68	18		0
11												3	8	6		
12	112	103	40	108	100	413	55	126	46	137	55	191	81	236	154	165
13	21	64	18	18	60	18	32	75	5	18	78	92	50	116	121	123
14	200	145	107	85	139		73	67	270	77	194	135	103	292	124	346
15	92	5	29	64	52	321	82	180	84	69	101	72	103	60	16	87
16	349	140	212	229	432	1333	523	256	397	211	405	150	225	338	272	352
17	134	45	31	180	123		98	129	27	116	204	96	67	370	380	101
18	311	128	143	356	215		756	414	154	224	189	313	219	383	27	877
19	743	227	273	289	429	915	352	282	187	322	424	129	92	216	116	245
20																
21																
22																
23																
24																
25																
28																
29																
30																
31																
32																
33																
34																
total (1-19)	2009	871	852	1335	1577	3021	1975	1558	1362	1197	1691	1250	1047	2079	1211	2348
s.e. (1-19)	264	142	149	250	270	487	169	223	277	169	243	338	196	284	176	611
total																
s.e. total (1-34)																

Table 36 (cont.) Roughhead grenadier (*Macrourus berglax*) biomass by strata in 1988-2018 surveys.

Stratum	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
1															
2															
3	10														
4															
5															
6															
7	10														
8	28	65	13												
9	282	82	181	17	39										
10	48	38	21											0	0
11	3	2													
12	292	207	97	22	92	73	60	0	27	39	17	14	29	34	35
13	299	94	154	80	108	25	97	43	6			0	2	15	12
14	877	379	362	223	539	1	3	10	67	28	14	27	42	70	19
15	259	16	85	55	12		132	8		34	4	14	20	15	38
16	594	426	1391	242	493	213	79	112	134	122	102	26	80	108	125
17	244	124	603	70	385	40	278	38	111	134	52	142	62	77	110
18	423	588	435	491	610	194	685	445	235	422	173	202	100	227	195
19	228	366	592	167	683	235	69	73	32	29	36	51	37	70	91
20	419	182	353	144	269	130	355	78	88	47	101	25	120	94	55
21	1432	996	763	755	1114	528	1135	1606	768	299	375	198	394	349	399
22	1095	1115	1545	608	1735	1216	967	1610	945	537	747	658	669	548	376
23	897	463	342	332	399	305	388	506	325	382	168	251	259	113	264
24	137	1030	419	165	152	146	207	222	218	97	160	87	53	158	278
25	344	870	817	197	391	362	149	98	146	260	326	226	100	1093	276
28	425	695	610	299	360	273	338	137	68	70	29	57	89	184	141
29	3113	1012	445	527	555	424	509	163	309	200	437	265	154	275	340
30	3553	2869	1108	2139	3356	2560	2816	2965	1582	1224	836	887	1137	1023	1217
31	650	327	235	242	176	225	107	295	137	60	199	270	153	113	123
32	274	267	132	86	222	197	242	172	63	100	80	117	92	361	94
33	118	17	122	105	38	12	57	112	54	22	42	39	89	43	28
34	1131	330	511	305	410	144	419	145	162	191	212	146	154	171	159
total (1-19)	3597	2387	3933	1367	2961	782	1403	729	612	807	399	478	373	616	625
s.e. (1-19)	362	281	700	314	611	209	201	409	258	141	113	147	86	143	142
total	17184	12560	11336	7270	12139	7304	9091	8838	5476	4298	4111	3702	3836	5141	4375
s.e. total (1-34)	1616	1420	1167	808	659	478	930	1212	678	475	407	300	403	914	356

Table 37. Roughhead grenadier (*Macrourus berglax*) age-length key in the 2018 survey.**MALE**

Length cm	age																total	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+		
3	1																	1
4	2																	2
5		3																3
6		11	1															12
7		2	5															7
8			8															8
9			14	3														17
10			5	13														18
11			5	15														20
12				6	12	1												19
13				2	17	1												20
14					15	6	1											22
15					3	17	1											21
16						2	11	7	1									21
17							6	13	1									20
18							4	6	7	4								21
19								3	12	6	1							22
20										5	9	4	2					20
21										1	4	7		1				13
22											1	3	2					6
23													2	1				3
total	3	16	38	39	47	27	23	29	21	16	15	14	6	2	0	0		296

Table 37 (cont.) Roughhead grenadier (*Macrourus berglax*) age-length key in the 2018 survey.**FEMALE**

Length cm	age																total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	
3	2	1															3
4		2															2
5		7															7
6		12	1														13
7		3	3														6
8		1	19														20
9			13	2													15
10			5	14													19
11			3	14	1												18
12				5	15												20
13					13	6											19
14					9	10	1										20
15					1	18	1										20
16					1	5	11	4									21
17							10	7	3								20
18							5	4	5	2							16
19								11	5	2							18
20									1	7	1		1				10
21										5	3	2	1	1			12
22										1	7	4	1	1			14
23											2	6	4				12
24												4	5	1			10
25												2	7	2	2		13
26													5	6	6	3	20
27													1	2	2	4	9
28														3	7	4	14
29														2	2	9	13
30															2	12	14
31															1	7	8
32															1	2	3
33															1	5	6
34																3	3
35																	0
36																4	4
37																2	2
38																1	1
39																1	1
total	2	26	44	35	40	39	28	26	14	17	13	18	25	18	24	57	426

Table 38. Roughhead grenadier (*Macrourus berglax*) length frequency ('000) in the 2018 survey.

depths < 730 m. strata (1-19)

length	indet.	male	female	length	indet.	male	female	length	indet.	male	female
2	7			13		14	15	24			7
3	7		14	14		26	13	25			40
4		16	15	15		27	26	26			42
5		19	27	16		20	42	27			6
6		44	57	17		18	27	28			24
7		14	9	18		26	13	29			23
8		14	46	19		20	46	30			
9		16	7	20		7	35	31			25
10		16	7	21		9	12	32			9
11			29	22			15	33			7
12		13	16	23		16	9	Total	13	334	663

depths < 1460 m. strata (1-34)

length	indet.	male	female	length	indet.	male	female	length	indet.	male	female
2	7			17		562	172	32			23
3	7	8	20	18		559	210	33			46
4		16	15	19		307	173	34			32
5		19	49	20		183	80	35			
6		87	93	21		106	67	36			38
7		49	54	22		40	120	37			14
8		61	123	23		24	86	38			8
9		129	128	24			83	39			7
10		175	132	25			122				
11		251	189	26		8	149				
12		236	235	27			78				
13		352	211	28		7	119				
14		342	210	29			97				
15		376	196	30			101				
16		526	223	31			69	Total	13	4422	3770

Table 39a. Roughhead grenadier (*Macrourus berglax*) frequency ('000) at age and strata in the 2017 survey.

age	strata																			total	mean				
	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	28	29	30	31		32	33	34	Weight (g)	Length (cm)
1				7	13	7			7														34	3	3
2		26	12	16	13	47	11	17	35	38	50	59		16	17	37	7	49		21	7	15	494	19	6
3	7	8	1	18		56	17	24	39	35	73	137	16	74	23	52	42	138	18	45	8	33	864	57	8
4		6	6	7		10	13	27	9	35	164	86	33	39	61	86	48	143	28	52	6	43	902	136	11
5		5		45	1	4	25	26	9	33	150	125	81	18	77	78	75	274	42	164	19	52	1303	216	13
6		10		18	4	3	14	9	1	12	56	52	23	5	38	23	21	129		91	5	32	545	290	15
7		8		24	5	2	7	24		11	50	71	14	9	67	49	40	195	17	118	4	75	791	382	16
8		8		16	2	4	5	23		9	50	61	21	18	70	36	31	193	23	94	4	48	717	450	17
9		8		6	2	4	9	14	1	2	28	32	17	9	26	11	25	101	9	36	3	22	365	555	19
10		16		16	4	14	13	30	4	2	41	70	26	23	48	23	58	179	14	70	4	42	698	634	19
11		5		7	4	7	2	28	6	6	18	48	14	14	43	15	21	88	20	45	2	15	409	796	21
12		2		4	2	6	2	19	1		18	37	17	7	53	16	13	53	7	30	3	8	299	893	22
13			1			13	6	23	2	5	25	57	10	10	93	14	27	41	4	19	3	2	355	1276	25
14			2	2		10	9	29	12	6	15	50	5	21	160	12	20	35	8	13	1	3	414	1547	26
15			2	2		4	7	14	4	5	13	23	3	12	100	10	12	31	1	6	1	2	253	1859	28
16+			1	2		10	4	6	9	14	37	51	2	6	141	5	21	116	10	17	7	9	466	2452	31
Sets	1	6	2	4	4	7	2	2	5	6	6	6	3	3	3	6	6	11	2	2	2	5	94	583	16.5
n	7	101	26	192	52	201	145	313	139	213	789	959	281	280	1018	467	461	1765	200	822	77	401	8908		

Table 39b. Roughhead grenadier (*Macrourus berglax*) frequency ('000) at age and strata in the 2018 survey.

age	strata																																		total	mean	
	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	28	29	30	31	32	33	34	Weight (g)	Length (cm)													
1				7	5	12		9	4								4	8															49	4	3		
2	6	7			8	51	9	29	61	17	16	1		6		22	24	47															304	22	6		
3	1			1	14	32	27	16	20	23	84	55	36	6	11	39	54	197	11			9	13									648	72	9			
4				8			21	11	6	7	25	74	68	54	28	39	47	56	241	23	4	8	47									767	124	11			
5		8		18	11	13	8	6	12	32	142	89	93	53	72	62	72	356	28	45	6	56	1181									211	13				
6		12		6	18	9	2	3	27	22	78	34	86	27	33	26	53	295	57	44		48	879									288	15				
7		14	4	2	19	11	5		10	10	68	70	75	30	32	16	59	307	22	42	5	72	873									409	17				
8		10	7	10	19	6	7	11	8	11	66	79	73	36	38	17	75	398	22	37	5	69	1003									459	17				
9		7	6	6	8	6	2	6	5	8	29	73	26	14	19	6	45	207	17	22	6	36	554									532	18				
10		8	3	3	5	7	2	9	14	4	19	36	18	13	11	6	44	123	10	19	3	27	382									616	19				
11		4			2	1	3	7	6		12	13	16	15	9	11	30	79	9	5		12	234									786	21				
12		1			1	4	5	11	4		16	17	15	17	19	9	30	86	11	2		6	254									925	22				
13		1				15	4	29	6		10	15	14	10	13	11	32	76	1	4	1	8	252									1149	24				
14						7	9	15	6	1	6	9	15	14	11	8	15	32	2	3	2	3	160									1430	26				
15						6	11	19	7	3	13	13	28	17	15	11	13	27	1	3	3	3	193									1792	28				
16+						18	11	26	9	2	53	49	68	36	32	15	22	93	15	1	2	4	457									2453	31				
Sets	1	4	3	4	3	6	2	2	5	5	6	6	3	3	3	6	6	11	2	2	2	5	90									537	16.3				
n	7	72	19	60	110	220	116	200	206	158	689	621	615	322	353	306	630	2573	228	229	52	404	8190														

Table 40. Roughhead grenadier (*Macrourus berglax*). Abundance at age ('000) in the 1994 - 2018 survey.

<730 m. strata (1-19)

age	Year																								
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
1			129		51	15	3	63	39	467	216	109	10	12	5	3	30	18	9	14	16	18	15	34	37
2	46	107	56	46	128	36	77	208	189	2139	466	267	353	23	79	15	73	48	49	31	63	112	255	178	171
3	136	209	110	186	227	49	108	271	220	1077	3119	362	438	59	228	31	232	76	79	26	25	73	81	170	110
4	487	467	224	153	236	216	50	120	57	672	1009	762	392	35	219	42	107	69	14	27	30	41	68	78	53
5	507	861	351	157	138	199	283	283	108	618	877	628	501	87	170	25	81	39	25	22	5	21	34	115	75
6	570	592	586	450	346	247	277	445	189	635	1105	544	561	202	285	96	66	54	24	15	0	32	36	59	77
7	566		351	613	725	445	218	540	290	843	810	499	719	268	458	94	128	63	40	32	8	40	49	71	65
8	493	458	338	162	907	616	231	505	283	901	955	593	519	298	743	168	446	119	98	118	16	63	59	58	78
9	379	263	216	158	250	422	339	510	241	535	962	413	487	178	536	87	492	199	124	126	37	58	39	44	46
10	181	113	264	98	226	197	338	666	266	474	896	579	577	345	471	48	347	251	129	203	52	99	37	97	50
11	109	35	254	151	135	109	72	231	203	472	465	371	727	172	431	82	224	122	154	233	88	86	47	59	22
12	82	23	93	164	182	80	95	131	244	236	392	167	396	108	162	56	113	70	84	115	90	58	39	36	26
13	40	19	38	124	152	55	57	80	75	88	147	227	293	95	318	56	62	43	44	25	52	56	24	47	56
14	15	5	34	42	76	61	55	104	63	31	89	191	211	77	79	49	61	33	23	32	22	23	28	65	38
15	27	15	4	42	48	33	23	55	19	18	18	21	195	39	179	43	21	18	14	12	15	21	23	34	43
16+	9		10	18	34	3	33	76	64	73	60	33	215	72	116	94	19	25	3	18	14	11	16	31	65
Total	3647	3685	3060	2564	3862	2783	2259	4288	2550	9278	11584	5765	6593	2069	4479	988	2501	1247	911	1049	533	811	851	1175	1010

Table 40 (cont.). Roughhead grenadier (*Macrourus berglax*). Abundance at age ('000) in the 1994 - 2018 survey.

< 1460 m. strata (1-34)

Age	Year														
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
1	461	391	34	51	52	19	37	39	52	71	103	70	36	34	49
2	856	719	602	81	549	143	125	172	177	178	244	501	648	494	304
3	6380	1420	855	222	1086	306	622	395	405	279	221	482	575	863	648
4	2989	2303	1532	321	1268	419	616	509	349	320	298	531	818	902	767
5	2576	2425	1399	543	1269	253	755	587	409	316	232	503	697	1303	1181
6	3062	2695	2316	1063	1578	954	1084	775	348	435	346	657	733	545	879
7	2552	2069	2351	1209	1954	936	1054	1009	572	533	344	688	713	791	873
8	3215	2418	1184	1285	2010	1680	2392	1466	1052	836	507	593	602	717	1003
9	2670	1442	1737	770	1649	866	1451	1241	919	610	436	449	405	365	554
10	2282	1666	1643	1109	1454	476	911	1160	517	638	300	442	347	698	382
11	1863	1123	1409	697	1333	824	685	652	650	583	350	295	294	409	234
12	1374	676	739	473	626	564	565	660	491	317	441	219	204	299	254
13	670	1090	823	412	1170	563	461	516	429	116	350	316	200	357	252
14	416	1007	566	432	348	490	510	570	307	247	259	125	214	420	160
15	178	298	478	272	718	434	255	460	215	138	237	280	228	256	193
16+	1130	1113	1069	944	887	959	692	1044	373	443	372	338	352	468	457
total	32674	22855	18737	9884	17951	9886	12215	11255	7265	6059	5039	6487	7066	8920	8190

Table 41. Squid (*Illex illecebrosus*): Biomass (t.) by strata and total abundance (thousands) in 1988-2018 surveys.

Strata	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
1			15	0	0		17		0		8				
2	1	0	120	18	12		19		6	8	17	3		0	0
3			9	93	1		6		12	3	5	1		1	0
4			3	3	4		8		3	1	3	0			0
5	1	4	1090	4	20		58	0	26	9	12	3		0	0
6		0	468	472	4		10	0	6	8	6	1			0
7	1		22	130	1	0	8		5	3	1	1		0	0
8			1	29	3	0	8		13	3	8	1		0	0
9		1	24	4	3		6		3	4	1				0
10	3	4	216	646	17	0	81		28	18	20	3		1	1
11			128	40	12		27	0	3	13	4	3		1	0
12				1				0	3	1	1	1	1	1	1
13				1			8			1	0	0	0		0
14			4	22	4		5	0	4	6	4	1		1	
15			5	13	3		4		1	1	0	1	0	1	1
16				4					0	1	1	1	1	1	1
17					0		1			0		0	0		1
18		0	1		1		4			0	0			0	
19				3	0		0	0	1	1	1	1	0	1	1
20															
21															
22															
23															
24															
25															
28															
29															
30															
31															
32															
33															
34															
Total (1-19)	6	9	2107	1483	83	1	269	1	113	81	92	22	3	10	8
s.e. (1-19)	4	4	604	395	18	1	33	1	15	12	12	4	1	3	3
Total (1-34)															
s.e. total (1-34)															
Abundance (1-19)	67	86	21184	17064	1114	32	3749	62	1561	1104	1481	801	182	608	457
Abundance (1-34)															

Table 41 (cont.) Squid (*Illex illecebrosus*): Biomass (t.) by strata and total abundance (thousands) in 1988-2018 surveys.

Strata	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
1	5	42	2	385	1	7	13	0	1	1					18	0
2	29	36	7	1181	10	1736	296	6	14	11				0	383	4
3	8	19	2	8	62	66	158	1	1	1		0		0	630	1
4	2	51	2	130	0	6	17			1		0		0	31	3
5	81	89	5	1457	40	357	285	3	2	8		0			114	15
6	5	26	4	222	58	37	21	3	3	0					259	2
7	22	39	6	28	38	48	34	3	1	1		0		1	294	2
8	8	8	1	7	24	38	36	2	4	0		1		0	19	1
9	2	25		1	22	16	345		5						10	8
10	25	52	17	26	56	2560	359	16	24	8		0			323	5
11	12	36	13	86	88	104	41	3	28	5		0		1	227	5
12	6	11	1	3	2	2	23				0				0	1
13	0	9	1				0								1	
14	10	15	4	1	6	106	52	5	5			0			17	1
15	6	3	6	4	3	49	2		0						18	0
16	1	4	4			2	0									0
17	0	1	2			0		0							4	
18	1	1	0			1	3			1					1	
19	1	3	2	1		0	1								1	
20		1	3	0			0									1
21		0		0		1	0									
22		0	0	0					0							1
23		1		0												
24		1	1				1									0
25				1		1	0								0	
28		1	0	5			0								2	
29				2			0			1					3	
30		1		3		1	1			0				1	9	
31		1					2									
32				0						0						
33		2														
34		2				4	1			2					2	1
Total (1-19)	222	470	79	3541	411	5137	1688	43	89	38		3		3	2350	49
s.e. (1-19)	60	55	8	1244	64	2392	346	7	19	8		1		1	490	6
Total (1-34)		479	83	3551	411	5144	1694	43	90	41		3		4	2366	52
s.e (1-34)		55	8	1244	64	2392	346	7	19	8		1		1	490	7
Abundance (1-19)	3898	4675	1463	28614	5793	48476	23029	616	699	695		83				683
Abundance (1-34)		4944	1711	28953	5793	48563	23112	616	707	765		83				712

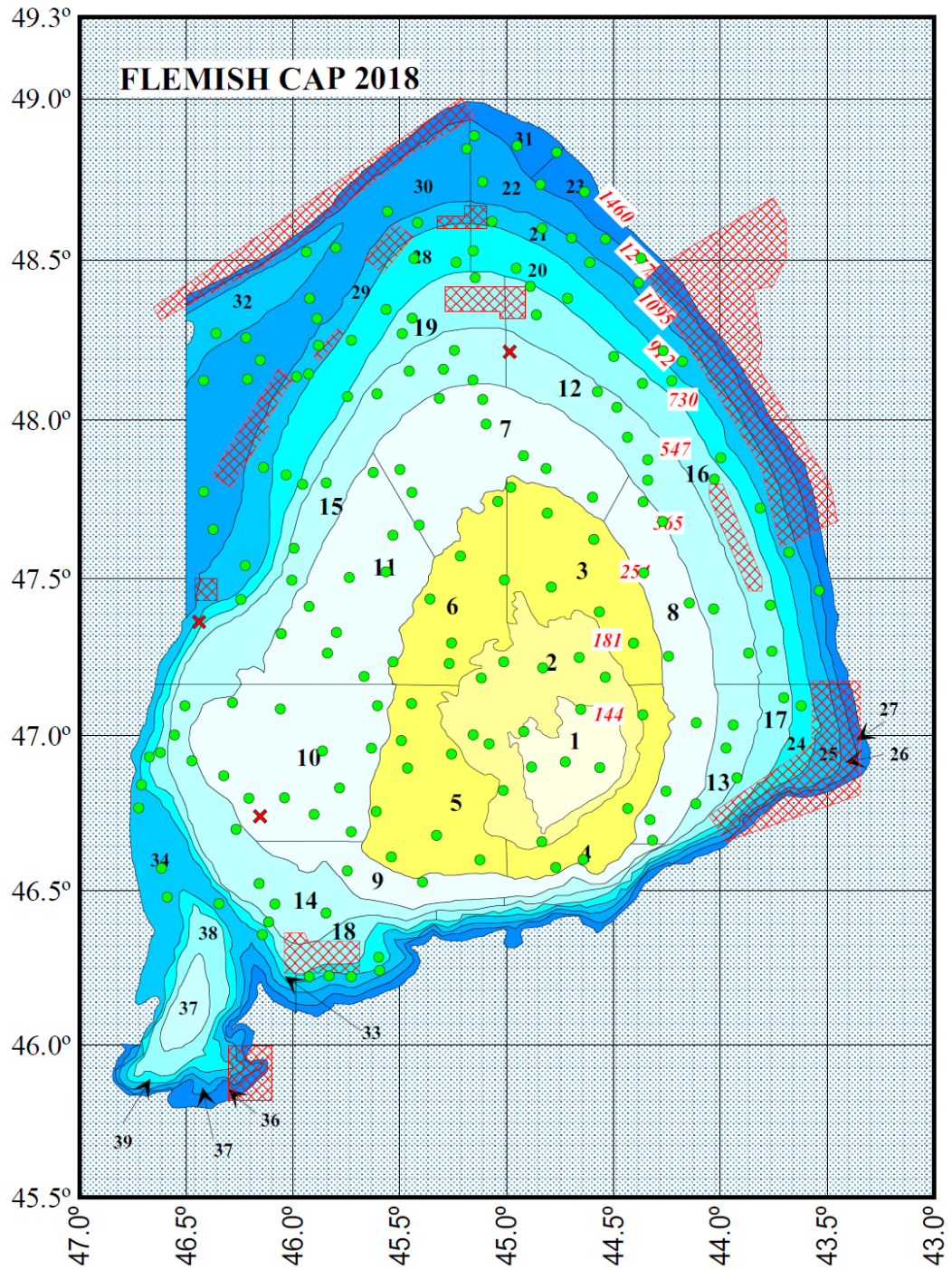


Figure 1. Haul positions in the Flemish Cap survey 2018. Coral and sponge protection areas (red squares); valid hauls (green circles); invalid hauls (red crosses).

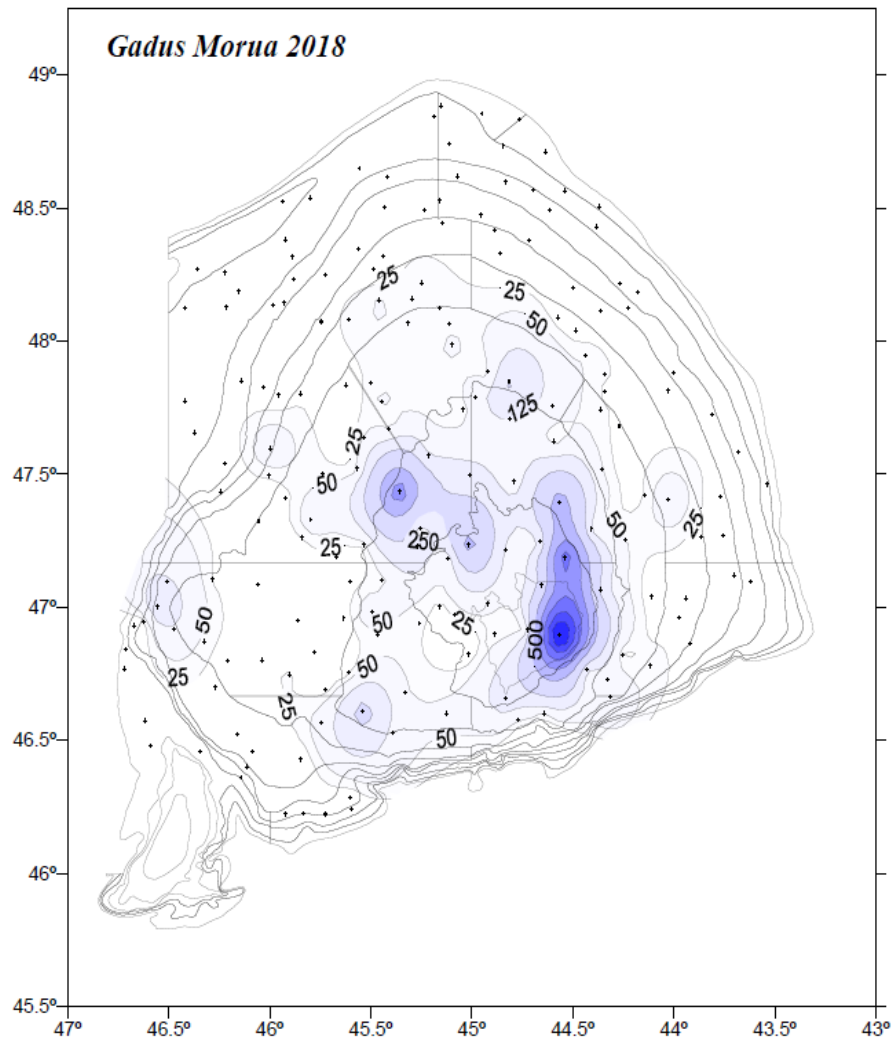


Figure 2. Cod (*Gadus morhua*) catch (kg.) distribution in the 2018 survey.

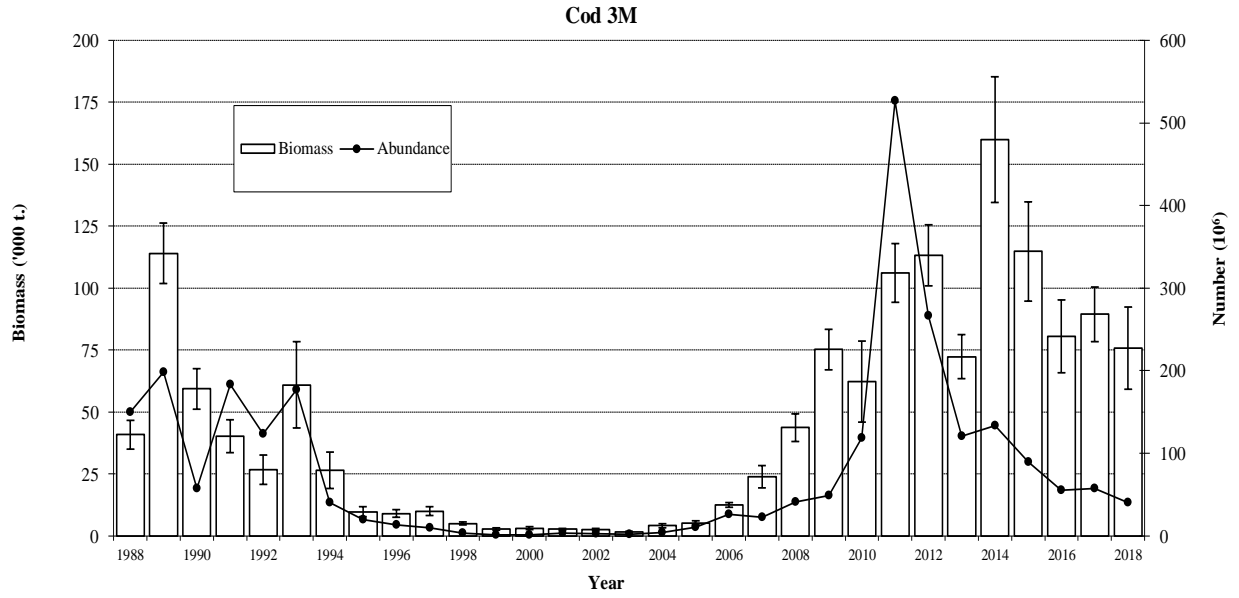


Fig. 3. Cod biomass (t) ± S.E. and abundance 1988-2018.

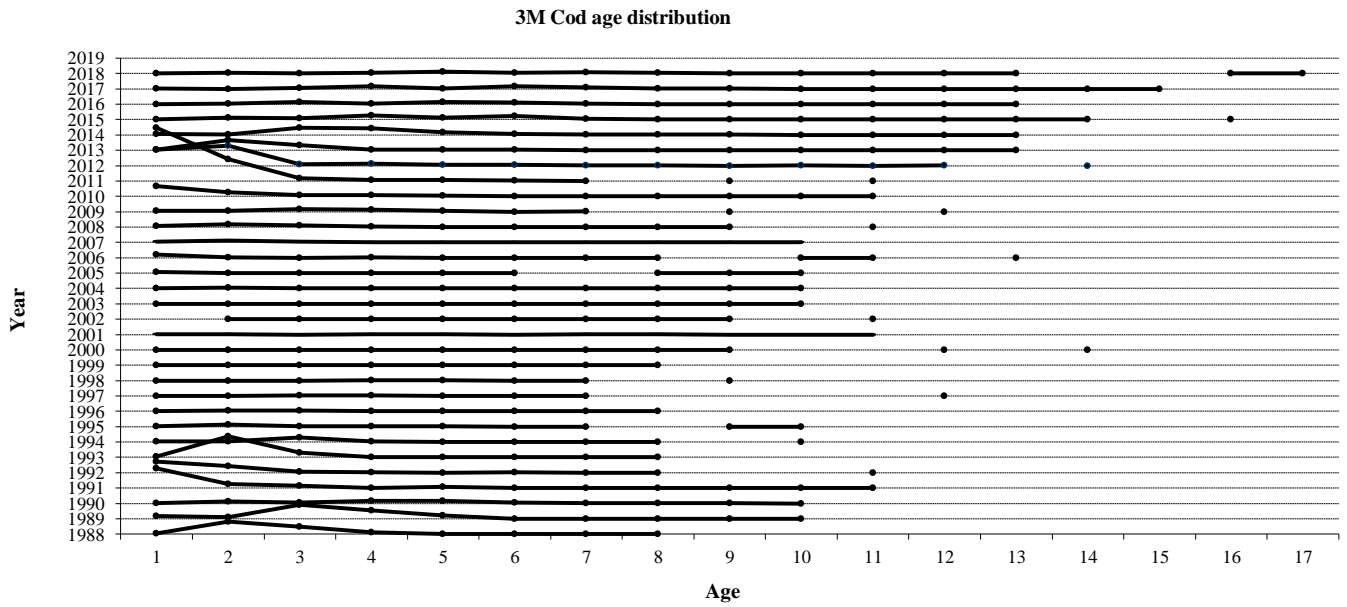


Figure 4. Cod age distribution in Flemish Cap NAFO 3M 1988-2018.

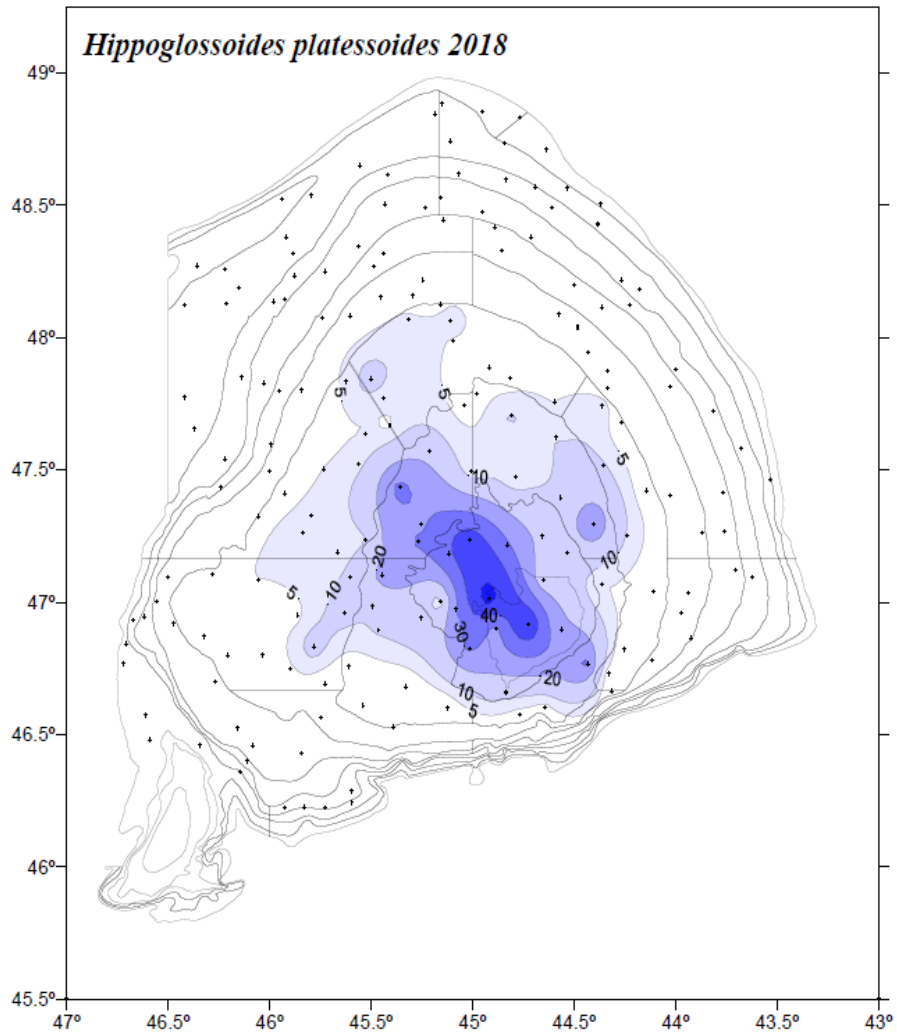


Figure 5. American plaice (*Hippoglossoides platessoides*) catch (kg) distribution in 2018 survey.

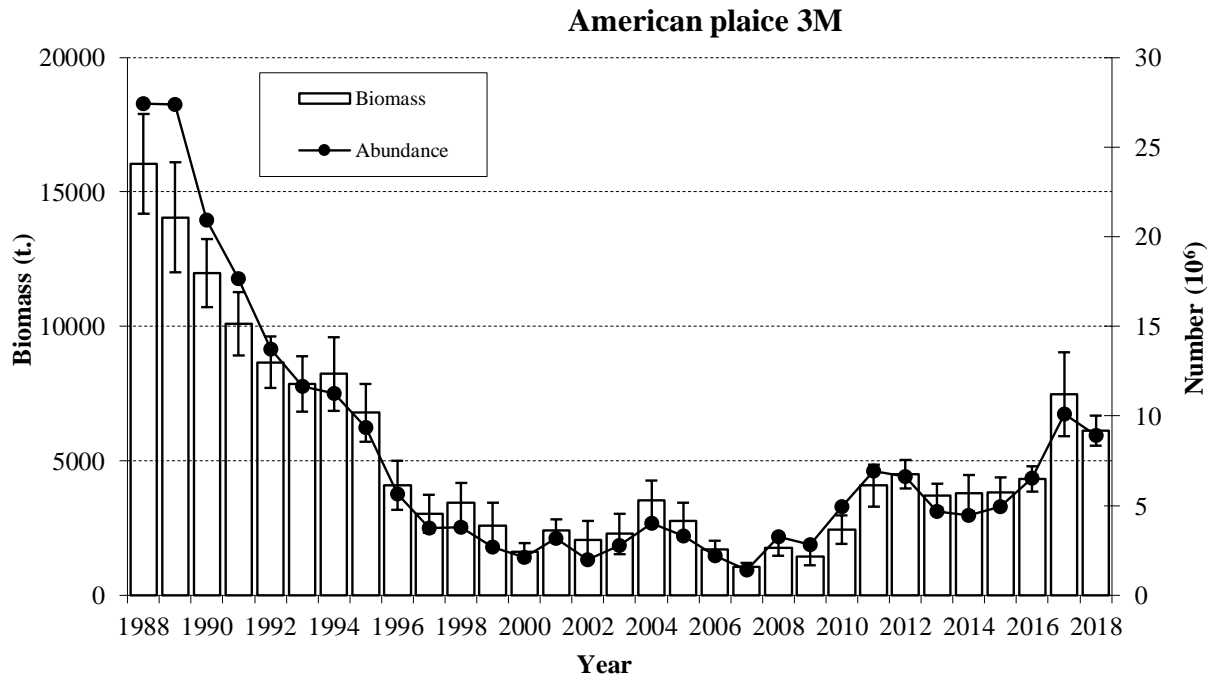


Figure 6. American plaice (*Hippoglossoides platessoides*) biomass (t.) ± S.E. and abundance 1988-2018.

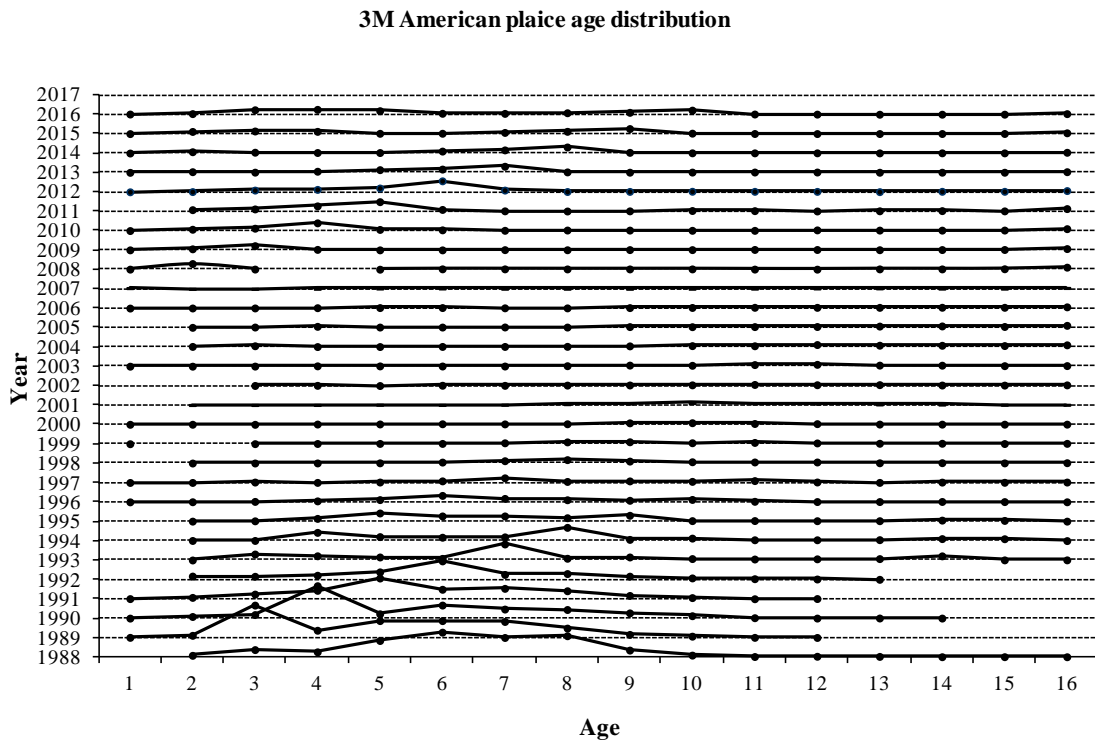


Figure 7. American plaice age distribution on Flemish Cap, NAFO Div. 3M: 1988-2016. 2017 AND 2018 NO YET UPDATED

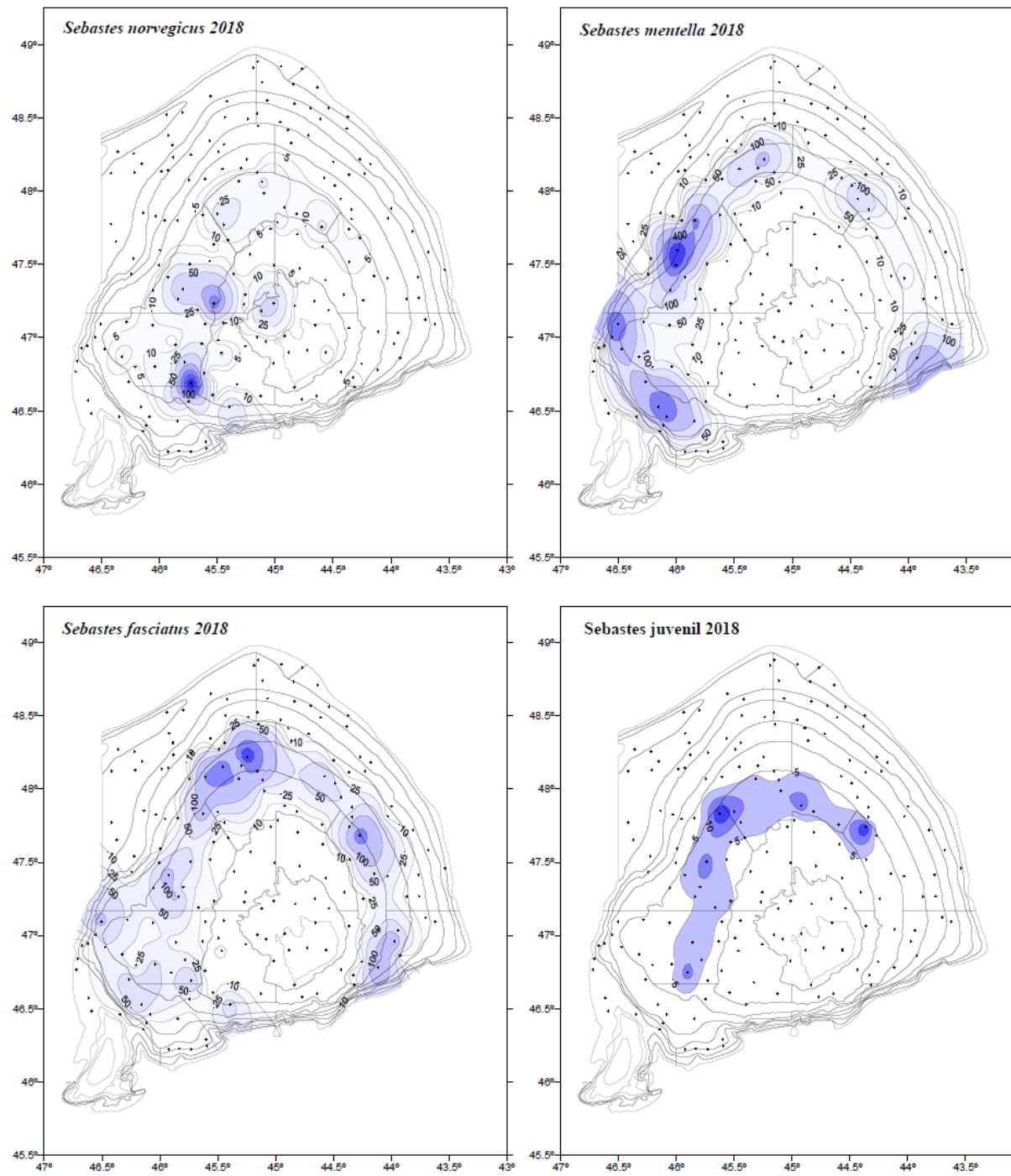


Figure 8. Catch distribution (kg) of *S. norvegicus*, *S. mentella*, *S. fasciatus* and *S. juvenile* in 2018 survey.

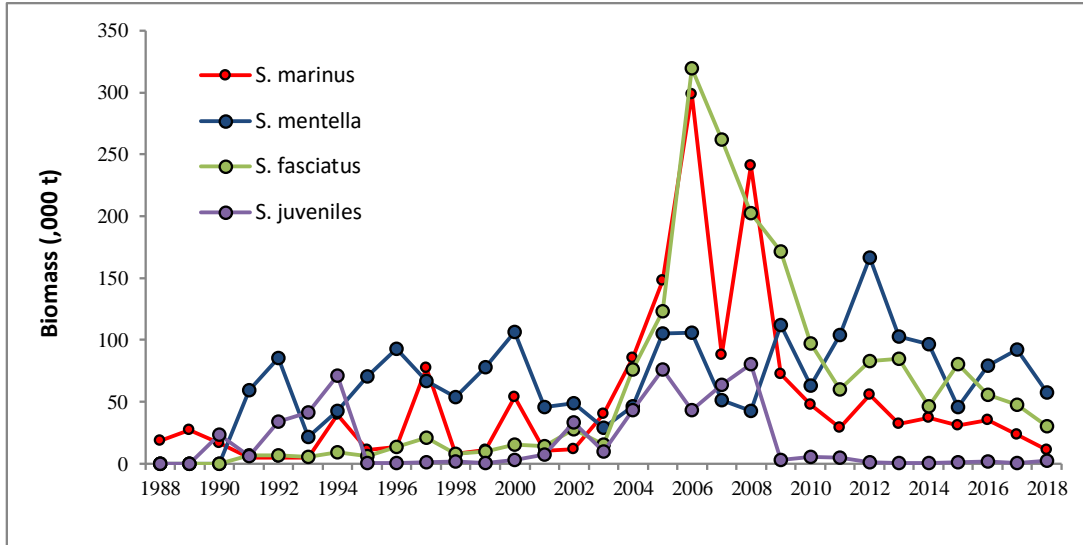


Figure 9. Redfish species biomass (t.) 1988-2018.

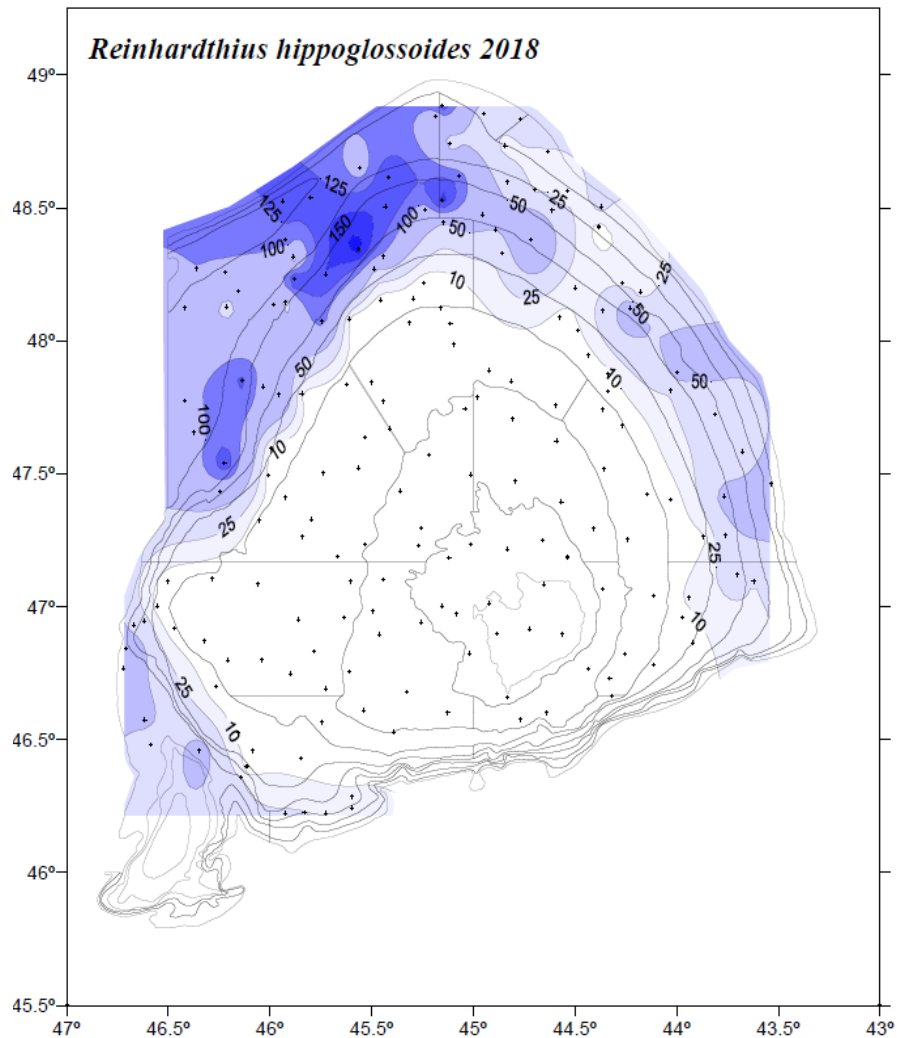


Figure 10. Greenland halibut (*Reinhardtius hippoglossoides*) catch distribution (kg) in 2018 survey.

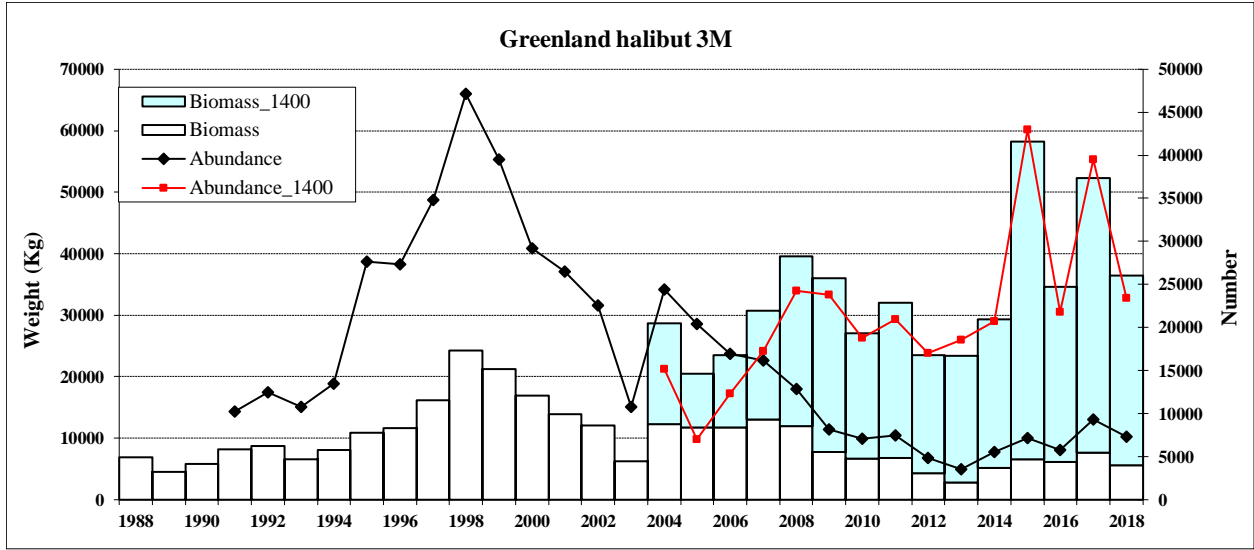


Figure 11. Greenland halibut (*Reinhardtius hippoglossoides*) Biomass (t) ± S.E. and abundance 1988-2018.

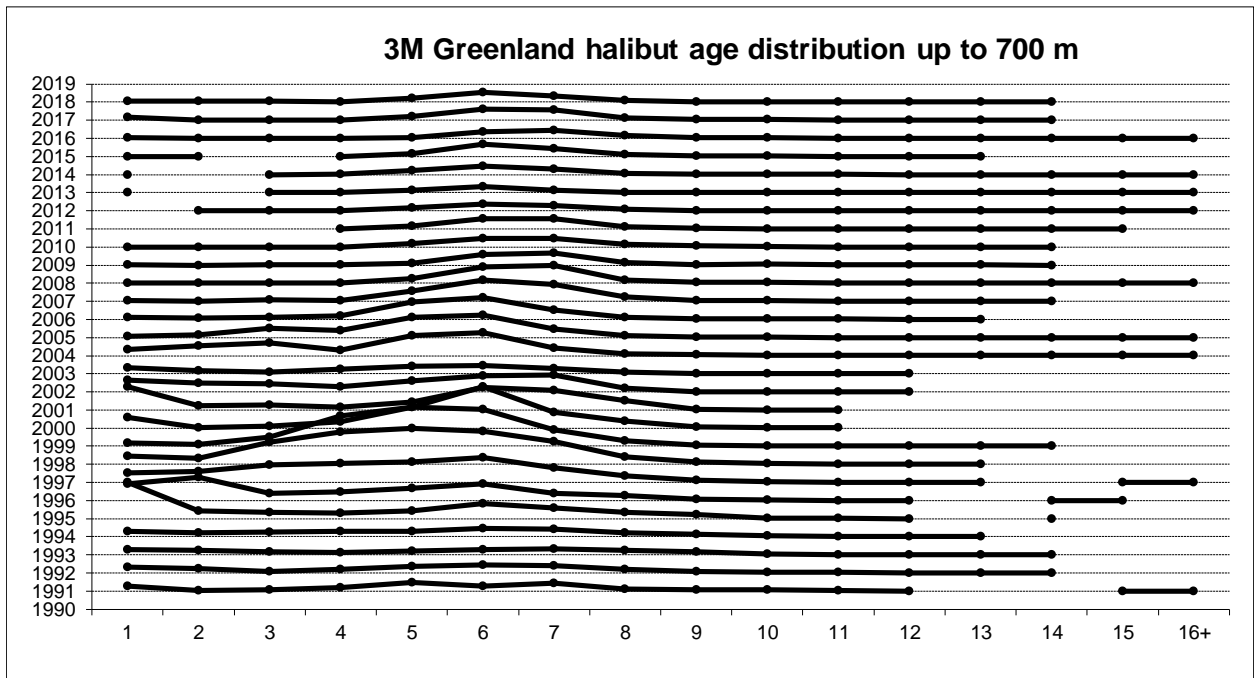


Fig. 12. Greenland halibut age distribution on Flemish Cap, NAFO Div. 3M: 1988-2018.

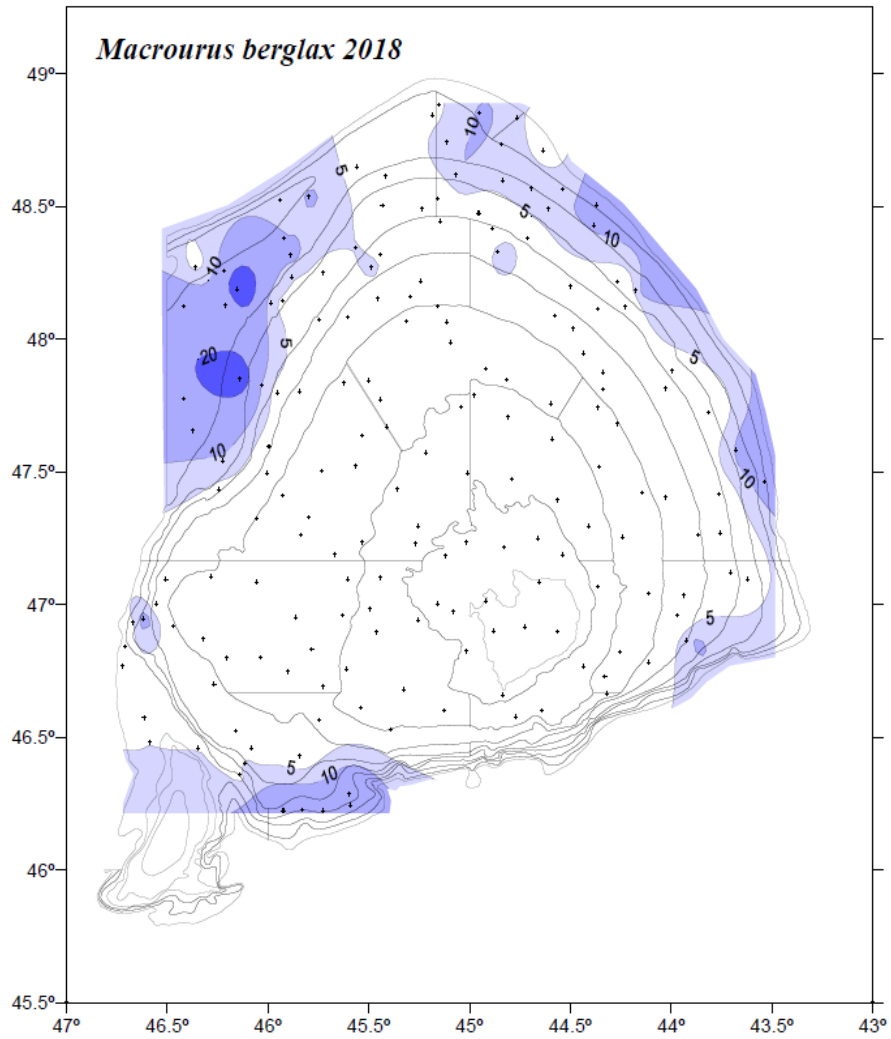


Figure 13. Roughhead grenadier (*Macrourus berglax*) catch distribution (kg) in the 2018 survey.

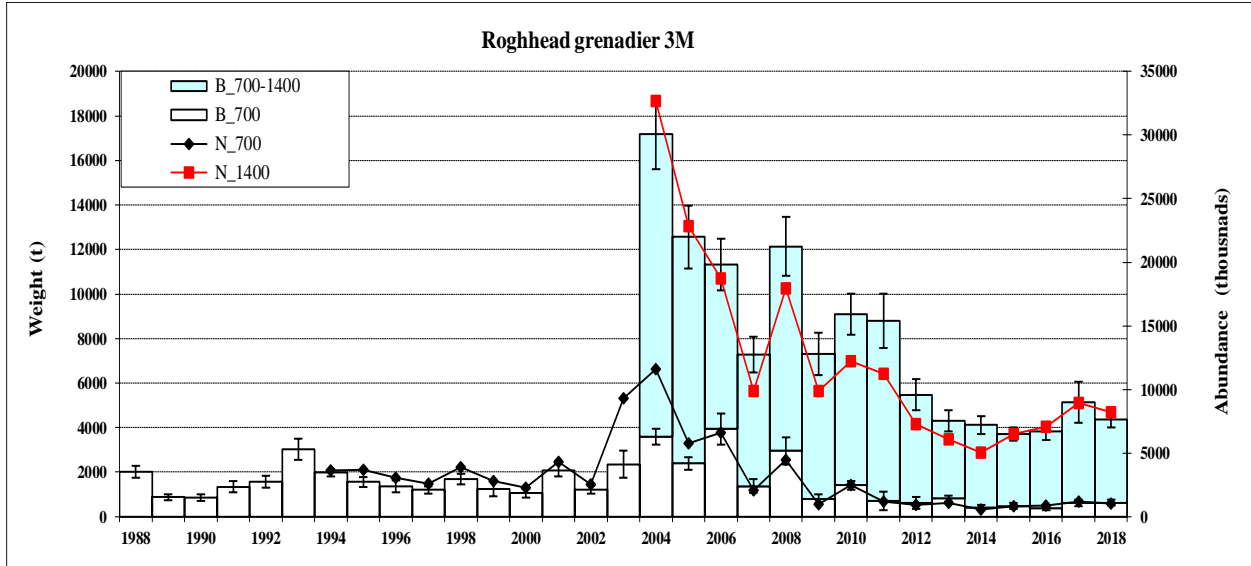


Figure 14. Roughhead grenadier (*Macrourus berglax*) biomass (t.) ± S.E. and number ('000) 1988-2018.

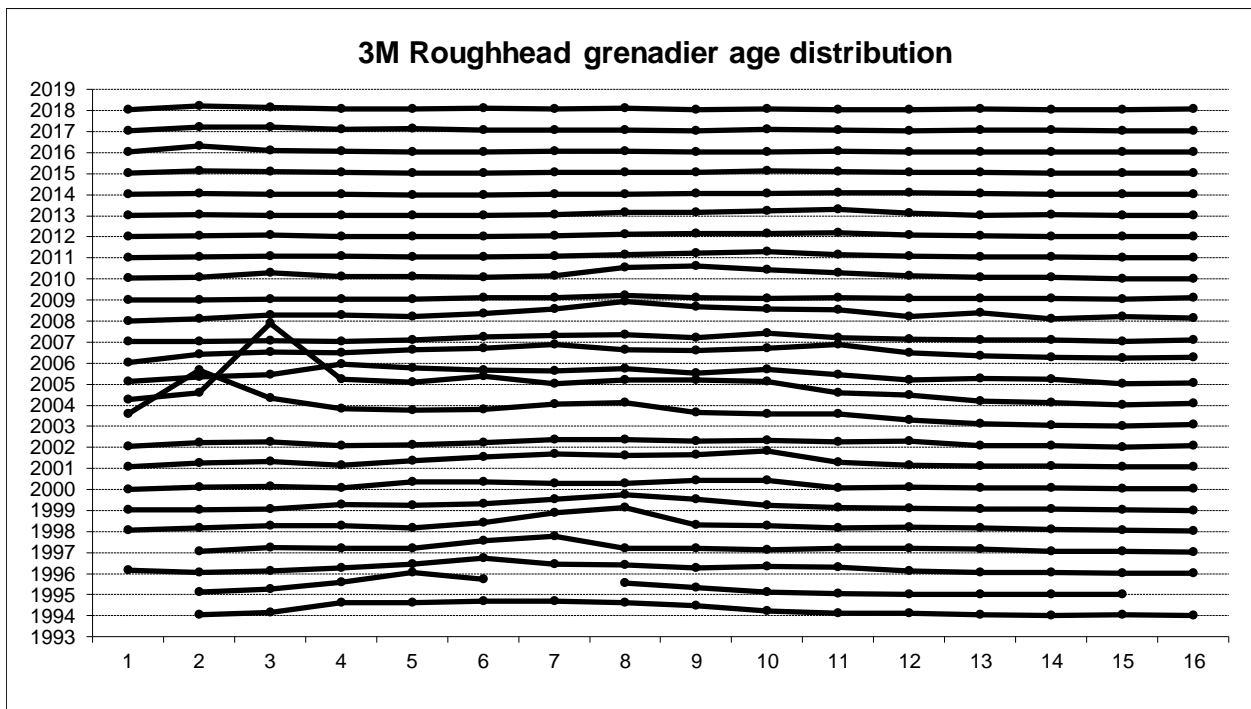


Figure 15. Roughhead grenadier (*Macrourus berglax*) age distribution on Flemish Cap in depths < 730 m, NAFO Div. 3M: 1988-2018.

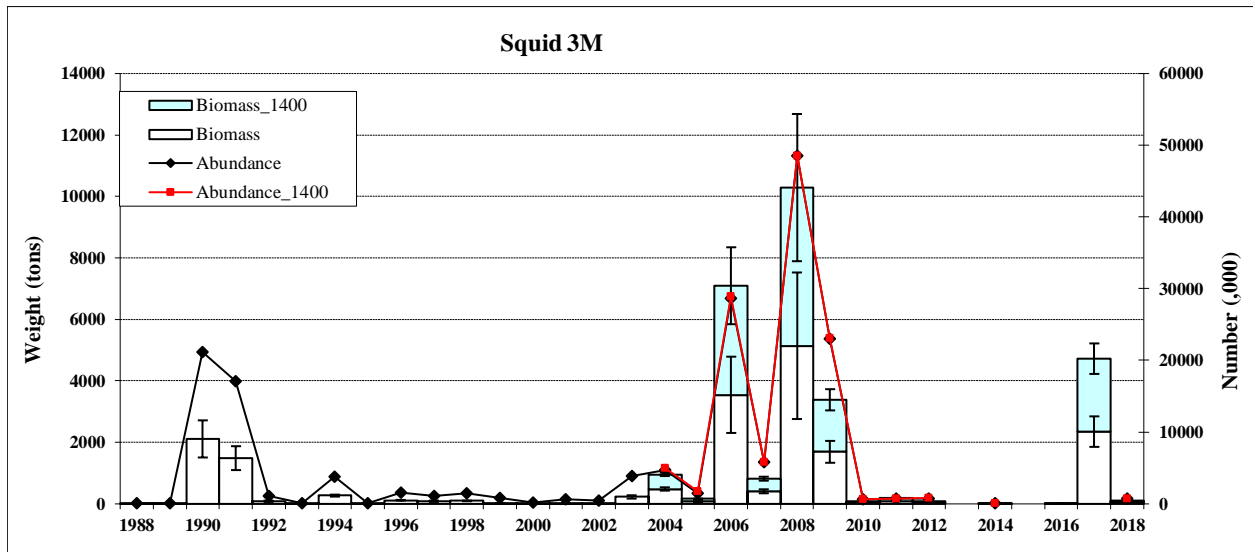


Figure 16. Squid (*Illex illecebrosus*) biomass (t) ± S.E. and number ('000) 1988-2018.