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Results from Bottom Trawl Survey on Flemish Cap of June-July 2022

by

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Abstract

A stratified random bottom trawl survey on Flemish Cap was carried out from 6 July to 18 August 2022. Following the same procedures as in previous years, the area surveyed extends up to depths of 800 fathoms (1460 meters) and 181 fishing stations were planned. The survey was carried out by the R/V *Vizconde de Eza* with the usual survey gear (*Lofoten*). A total of 182 valid hauls were made, 121 up to 730 meters depth and 61 up to 1460 meters. Survey results are presented, including abundance indices of the main commercial species and age distributions for cod, redfish, American plaice, Greenland halibut, roughhead grenadier, squid and shrimp. 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 2022. A total of 182 valid bottom trawls were made up to a depth of 1460 m (800 fathoms) (Figure 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 35th survey of the series initiated by the EU in 1988. All years, the survey has had a stratified random design following NAFO specifications (Doubleday, 1981). In 2022, the survey started on 6th July, but due to problems with the winches during the fourth haul, the vessel had to go to land and the survey was resumed on 18th July. Dates, vessel, number of valid tows (including the number of valid tows until 700 m in brackets since 2002) and dates of the survey each year were:

Year	Vessel	Valid tows	Dates	Year	Vessel	Valid tows	Dates
1988	Cornide de Saavedra	115	08/07 – 22/07	**2005**	Vizconde de Eza	176 (117)	01/07 – 21/08
1989	Cyros	116	12/07 – 01/08	**2006**	Vizconde de Eza	179 (115)	01/07 – 26/07
1990	Ignat Pavlyuchenkov	113	18/07 – 06/08	**2007**	Vizconde de Eza	174 (117)	23/06 – 19/07
1991	Cornide de Saavedra	117	24/06 – 11/07	**2008**	Vizconde de Eza	179 (111)	23/06 – 19/07
1992	Cornide de Saavedra	117	29/06 – 18/07	**2009**	Vizconde de Eza	178 (119)	23/06 – 20/07
1993	Cornide de Saavedra	101	23/06 – 08/07	**2010**	Vizconde de Eza	153 (97)	22/06 – 21/07
1994	Cornide de Saavedra	116	06/07 – 23/07	**2011**	Vizconde de Eza	128 (79)	29/06 – 09/08
1995	Cornide de Saavedra	121	02/07 – 19/07	**2012**	Vizconde de Eza	174(118)	26/06 – 24/07
1996	Cornide de Saavedra	117	28/06 – 14/07	**2013**	Vizconde de Eza	181(120)	26/06 – 23/07
1997	Cornide de Saavedra	117	16/07 – 01/08	**2014**	Vizconde de Eza	181(120)	25/06 – 23/07
1998	Cornide de Saavedra	119	17/07 – 02/08	**2015**	Vizconde de Eza	181(120)	23/06 – 22/07
1999	Cornide de Saavedra	117	02/07 – 20/07	**2016**	Vizconde de Eza	181(120)	23/06 – 22/07
2000	Cornide de Saavedra	120	10/07 – 28/07	**2017**	Vizconde de Eza	181(120)	16/06 – 15/07
2001	Cornide de Saavedra	120	03/07 – 20/07	**2018**	Vizconde de Eza	181(120)	26/06 – 24/07
2002	Cornide de Saavedra	120	30/06 – 17/07	**2019**	Vizconde de Eza	180(120)	01/07 – 27/07
2003	Vizconde de Eza	177 (114)	02/06 – 02/07	**2020**	Vizconde de Eza	181(120)	30/06 – 29/07
	Cornide de Saavedra	50**	07/06 – 17/06	**2021**	Vizconde de Eza	181(120)	12/07 – 09/08
2004	Vizconde de Eza	177 (124)	25/06 – 02/08	**2022**	Vizconde de Eza	182(121)	06/07 – 18/08
	Cornide de Saavedra	61**	23/07 – 02/08				

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

Material and Methods

As last years, 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 during the survey 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
	2019	42460	7654	143297	5496	590	363	9273
	2020	67442	7752	227261	6649	624	142	6734
	2021	51501	9372	148914	5872	699	329	2101
	2022	62206	6654	201837	4226	546	4	862
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
2019	42460	7654	143390	20673	6500	365	9325
2020	67442	7752	227332	16194	4037	142	6869
2021	51501	9372	148929	19969	3964	351	2246
2022	62206	6654	201850	16527	3720	4	902

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 2022 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 since then. 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´s. American plaice biomass has increased since 2014 and it seems to show signs of recovery, being the 2021 value the highest of the series since 1991, with a slight decrease in 2022.

Cod

Mean catch per haul and biomass by strata with standard errors for 2022 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		**2003**	1,593		-	
1984		31,210		**2004**	4,071			
1985		28,070		**2005**	5,242			
1986		26,060		**2006**	12,505			
1987		10,150	21,600	**2007**	23,866			
1988	40,839	7,720	34,200	**2008**	43,675			
1989	114,050	36,520	78,300	**2009**	75,228			
1990	59,362	3,920	15,200	**2010**	69,295			
1991	40,248	6,740	8,200	**2011**	106,151			
1992	26,719	2,490	2,400	**2012**	113,227			
1993	60,963	8,990	9,700	**2013**	72,289			
1994	26,463	-	-	**2014**	159,939			
1995	9,695	8,260	-	**2015**	114,807			
1996	9,013	730	-	**2016**	80,583			
1997	9,966	-	-	**2017**	89,414			
1998	4,986	-	-	**2018**	75,795			
1999	2,854	-	-	**2019**	42,460			
2000	3,062	-	-	**2020**	67,442			
2001	2,695	784	-	**2021**	51,501			
2002	2,496	694	-	**2022**	62,206			tons

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. Table 6 presents the 2022 ALKs, and Table 7 the abundance at age by stratum.

Distribution of survey catches in the last four surveys 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 and Figure 4.

The 1992 to 2003 year-classes failed almost completely. The abundances of 2004-2008 years classes were higher than in previous 12 years. The abundance of the 2010 year-class was the highest of the series, and the 2009 and 2011 ones were also high. The 2012-2018 year-classes failed according to current results at age 1 and the 2019-2021 years classes seems to be better than in recent years but it remains still at low level (Figure 4). In 2022, the recruitment shows a new decrease.

After the historic maximum in biomass in 2014, the biomass has decreased successively and it is now slightly below the average of the whole period. The abundance had a peak in 2011 due to the very high recruitment, and since then has decreased, indicating an increase in older ages and a fail in recruitment. After a low biomass in 2019, in the level of the 2008 one, the biomass increased in 2020 and is now slightly below the level of 2013.

American plaice

Mean catch per haul and biomass by strata with standard errors for 2022 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	**1997**	3,026		**2011**	4,084	
1984		7,500	**1998**	3,437		**2012**	4,491	
1985		7,800	**1999**	2,585		**2013**	3,698	
1986		20,200	**2000**	1,606		**2014**	3,800	
1987		9,300	**2001**	2,404		**2015**	3,821	
1988	16,046	6,500	**2002**	2,049		**2016**	4,325	
1989	14,047	5,000	**2003**	2,286	548	**2017**	7,475	
1990	11,983	1,200	**2004**	3,525	1,398	**2018**	6,109	
1991	10,087	14,400	**2005**	2,760		**2019**	7,654	
1992	8,656	1,200	**2006**	1,691		**2020**	7,752	
1993	7,861	2,700	**2007**	1,053		**2021**	9,372	
1994	8,227		**2008**	1,766		**2022**	6,654	ton
1995	6,785		**2009**	1,442				
1996	4,098	ton	**2010**	2,446	ton			

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

Table 10 shows the length distribution and Tables 12 and 13 the age-length key and the abundances at age by stratum respectively (no updated since 2020). Figure 5 shows the distribution of the survey catches in the last four surveys. The abundance at age along the series is shown in Table 14 (no updated since 2020). Also, the evolution of survey biomass and abundance along the series is presented in Figure 6. Figure 7 shows the age distribution over the years (no updated since 2020).

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 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. We have to wait to see what happened since 2020. The biomass and abundance were more or less stable from 2011 to 2016, showing an upward trend since 2017 reaching in 2021 the maximum values since 1991.

The ALKs for American plaice since 2020 are not available yet due to lack of time, so the indices by age are presented only until year 2018. The length distribution doesn´t indicate a change with regards to previous years.

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 haul 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	*Sebastes norvegicus*	*Sebastes spp.*			Total
		mentella	*fasciatus*	*juvenile*	
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	100,512
2019	22,588	49,464	43,222	28,023	143,297
2020	70,138	95,372	58,304	3,508	227,261
2021	15,723	78,212	51,733	3,246	148,914
2022	27,286	93,914	73,761	6,876	201,837

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 in the 2022 survey 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 standard haul and the estimated biomass by strata with their standard errors in the 2022 survey 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. (1988-2022) and in depths up to 1460 m. (2004-2022).

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	**2019**	5,496	20,673
		2020	6,649	16,194
		2021	5,872	19,969
		2022	4,226	16,527

Age-length keys and length frequency are presented in Tables 31 and 32 respectively. Frequency at age by stratum for 2022 is presented in Table 33. Catch per haul distribution for the last four surveys 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 2020 biomass to 1400m is the lowest value in the historical series, since 2004. The 2022 biomass is almost the same as in 2020. The 2017 age 1 numbers were the highest since 2004, but no good recruitments can be seen since then.

Roughhead grenadier (*Macrourus berglax*)

Mean catch per standard haul and estimated biomass by strata with their standard errors for 2022 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	**2019**	590	6,500
		2020	624	4,037
		2021	699	3,964
		2022	546	3,720

Age-length keys and length frequency and are presented in Tables 37 and 38. Frequency at age by strata is presented in Table 39. 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

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). Catch per haul distribution for the last four surveys is presented in Figure 16. The indices could be seen in Figure 17. No all the years squid is present in the survey, and the indices show a high variability.

Shrimp

Total biomass and mean catch per town, as well as those indices for females, are presented in Table 42 and Figure 19 by year. Abundance at age by year is presented in Table 43 and Figure 20. Catch per haul distribution for the last four surveys is presented in Figure 18. All indices are up to 700 meters. The biomass and abundance estimated in 2022 EU survey were mainly represented by female; young specimens (mainly males around 25% in number) remain well below average. The 2022 female biomass values are between the lowest estimated in the historical survey series, confirming the downward trend started in 2020. More detailed results are presented in Casas *et al.*, 2022.

Biodiversity

Figure 22 shows the biodiversity of the survey. The percentage of catch of the species analyzed in this work, together with each functional group (other Fish, other Crustacea, other Mollusca, human rests and others), is presented. At the beginning of the series, other Fishes as well as Atlantic cod were the most caught taxa, but since 1994 the catch is dominated by the three redfish species, followed since 2008 for the Atlantic cod due to the recovery of this stock. The importance of the shrimp varies depending on the year, being a good part of the catches between 1998 and 2003.

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Table 1. Technical data of the 2022 survey.

Procedure	Specification
Vessel	R/V *Vizconde de Eza*
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 *Lofoten*
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 ecosonder 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 (*Sebastes sp.*), Greenland halibut and roughhead grenadier (*Macrourus berglax*).

Table 2. Biomass (t.) for the most important species or groups of species in 1988-2022 surveys in depths lesser than 730 m.

Species	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Rajidae	4495	1938	2823	4061	3780	6241	3506	2268	2051	1842	1978	1608	1150	2236	1544	4608	6241
Synaphobranchus sp.	217	88	40	80	72	105	8	16	0	8	40	0	0	24	8	24	88
Urophycis sp.	643	169	169	257	72	169	217	80	80	32	225	249	169	394	129	547	667
Antimora sp.	394	306	281	563	724	820	796	193	185	233	491	290	265	667	346	306	1158
Macrouridae	3088	1456	1222	2252	2589	6498	3233	2606	2340	2292	2831	2332	1809	3080	2043	3691	4914
Notacanthus sp.	499	410	64	474	450	740	458	346	177	290	169	64	97	105	64	24	145
Illex sp.	8	8	1649	1158	64	0	209	0	88	64	72	16	0	8	8	225	474
Anarhichadidae	7994	7487	8122	10101	9095	14355	15642	19220	20563	14033	10985	5581	4471	5863	5227	5983	10591
Witch flounder	909	338	418	772	820	1045	788	708	507	322	241	378	410	458	209	844	1568
Greenland halibut	6924	4471	5798	8171	8725	6530	8034	10873	11596	16100	24230	21207	16960	13872	12103	6216	12288
Zoarcidae	563	1142	1206	1978	1359	3474	1874	2179	1705	1729	2059	893	780	1246	812	2067	3683
Cod	40837	114050	59365	40250	26715	60966	26466	9699	9015	9964	4986	2855	3064	2694	2493	1592	4069
American plaice	16044	14049	11982	10085	8653	7865	8227	6787	4101	3024	3434	2581	1608	2405	2051	2284	3522
Redfish	188333	162535	126757	76953	130206	72610	162527	87641	119664	165816	70833	98650	177991	77347	121312	93817	250602
Shrimp*	5742	2300	3490	11661	25155	12087	3981	7503	10905	7704	41971	25734	19719	28316	40177	21512	20129
Total	277325	310956	224530	169483	218909	193504	236440	150512	183669	224039	165655	163058	230087	140162	189459	149394	322866

Species	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Rajidae	4238	3506	2179	6289	2244	3471	2188	1658	743	680	836	1073	1365	775	1592	1650	1339	866
Synaphobranchus sp.	72	32	64	40	24	14	2	20	40	14	9	23	10	25	19	11	12	7
Urophycis sp.	740	611	249	547	217	685	682	380	332	258	145	113	107	130	199	305	663	433
Antimora sp.	1110	474	587	893	499	670	342	727	655	649	630	748	520	442	455	370	243	136
Macrouridae	3353	5026	2364	3957	1166	1926	561	1190	1253	980	843	655	848	855	1065	1227	1384	1438
Notacanthus sp.	64	145	64	88	32	21	12	69	68	40	17	69	55	109	91	83	83	91
Illex sp.	80	3546	410	5139	1737	43	89	0	0	0	0	3	2350	49	363	142	329	4
Anarhichadidae	9570	9272	8195	9867	4600	4256	3739	5073	3893	4775	5402	5371	6182	6333	8802	9121	4635	4238
Witch flounder	1777	893	595	2220	764	1836	1458	2283	940	1810	2163	2126	3134	2465	3380	4291	3223	1819
Greenland halibut	11701	11709	13044	11999	7777	6299	6481	4291	2884	5168	6577	6139	7633	5578	5277	6649	5872	4226
Zoarcidae	3080	1801	354	458	56	75	20	1	6	0	1	5	1	0	30	58	61	46
Cod	5243	12505	23884	43676	75232	69295	106151	113227	71903	159939	114807	80583	89414	75621	42460	67442	51501	62206
American plaice	2758	1689	1053	1769	1440	2446	4084	4491	3632	3800	3821	4325	7475	6105	7654	7752	9372	6654
Redfish	453041	766924	464621	566649	358476	212212	196493	305947	219729	179925	158001	171198	163262	100484	143297	227261	148915	201837
Shrimp*	30672	16237	17049	11066	2799	4889	1593	1055	844	900	1551	2478	2885	4395	9273	6734	2101	862
Total	529181	845252	534714	664655	457062	317805	320886	448661	319157	365459	300443	283269	325190	212421	236417	343032	246150	293835

* 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 haul and the estimated biomass by strata and its standard error in the 2022 survey.

	area	tow	catch (kg)		Biomass (t.)	
stratum	sq. miles	number	mean	s. e.	value	s.e.
1	342	4	67.73	29.94	1765	780
2	838	10	64.47	23.89	4116	1525
3	628	7	105.18	27.88	5032	1334
4	348	4	244.84	196.14	6492	5200
5	703	8	59.33	13.70	3177	734
6	496	6	138.92	44.12	5250	1667
7	822	9	190.12	105.79	11907	6625
8	646	7	41.35	13.30	2035	655
9	314	3	48.83	8.73	1168	209
10	951	11	52.55	18.22	3808	1320
11	806	9	126.19	62.51	7749	3839
12	670	8	16.78	4.38	857	223
13	249	3	114.84	80.22	2179	1522
14	602	7	64.26	50.73	2947	2327
15	666	9	71.23	41.18	3615	2090
16	634	7	0.61	0.61	30	30
17	216	2	4.41	4.41	73	73
18	210	2				
19	414	5	0.19	0.19	6	6
Total < 730 m.	10555	121	77.35	12.93	62206	10396
Total < 1460 m.	16070	182	50.80	8.49	62206	10396

Table 4. Cod (*Gadus morhua*) length distribution ('000) in the 2022 survey.

length	number	length	number	length	number	length	number
9-11	7	45-47	1827	81-83	364	117-119	14
12-14	174	48-50	5421	84-86	313	120-122	7
15-17	2054	51-53	7586	87-89	198	123-125	14
18-20	1837	54-56	4957	90-92	125	126-128	
21-23	1807	57-59	2199	93-95	108	129-131	
24-26	9840	60-62	1012	96-98	70	132-134	
27-29	10269	63-65	947	99- 101	36	135-137	
30-32	3927	66-68	666	102- 104	51	138-140	
33-35	1713	69-71	828	105- 107	15	141-143	7
36-38	3184	72-74	714	108-110			
39-41	2609	75-77	687	111-113			
42-44	1165	78-80	448	114-116		total	67200

Table 5. Cod (*Gadus morhua*) biomass (t.) by strata in 1988-2022 surveys.

strata	year																	
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1	1345	649	767	5585	76	516	2165	1563	1006	243	125	99	250	86	477	173	1996	1091
2	10150	10323	2065	5486	5150	9044	8186	3040	3991	2049	1899	1502	740	491	736	102	1668	1888
3	4471	10276	2391	2459	8473	8435	6092	1146	1054	1132	703	145	360	230	451	90	9	1791
4	3130	4843	2446	2900	3443	14171	1885	746	1068	857	140	25	443	488	66	136	168	152
5	2130	10702	8447	10651	4570	6824	924	1274	936	1149	976	256	425	260	146	303	19	30
6	3230	6789	3286	1531	952	4220	1412	1310	620	1074	613	375	511	749	525	24	155	206
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		28
11	2505	13219	3859	1787	224	1678	582	78	41	310	176	255	106	175	18	58	33	56
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	5242
s.e.	5784	12205	8225	6704	5837	17397	7367	2070	1459	1725	646	451	593	380	398	273	780	813

s.e.: standard error

strata	year																
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
1	2433	4420	4224	2253	11815	4694	1567	1931	4688	11089	3195	5589	15884	11385	959	3943	1765
2	4145	1775	5346	6627	23368	22989	13861	10230	27320	1896	8348	18068	15592	3691	7608	8928	4116
3	1948	11466	4129	7630	4512	16922	17743	12291	22585	5572	21702	10439	8556	5364	3002	3389	5032
4	466	1132	771	5190	1716	10114	2903	7106	3081	2046	11268	5305	2466	2389	971	1429	6492
5	644	548	1129	6947	3600	10947	11639	5528	5090	2051	3499	11273	4189	5000	3639	1817	3177
6	1224	3214	12487	10734	2303	9510	9991	3849	11494	7413	2298	8027	8814	4312	2145	5119	5250
7	473	140	4692	12659	4667	2586	6824	5872	37607	5914	7099	8053	4630	2292	38851	5045	11907
8	347	475	3471	2814	4204	10921	7739	4641	9335	5732	5284	2708	2260	1342	2265	5658	2035
9	64	151	81	503	2048	1997	5963	970	9040	256	9058	2334	2670	653	1086	530	1168
10	304	246	2625	5071	4275	5247	16988	5153	6655	9852	1676	3217	1005	1780	981	3690	3808
11	381	272	3699	4336	4458	4557	5701	4205	9585	1490	2457	7350	1929	1778	1747	6821	7749
12			42	339	588	1135	2538	1323	927	747	974	1974	1475	1334	2319	1529	857
13			15	135	124	419	875	940	529	311	846	213	513	120	17	1382	2179
14	76		160	9795	1056	3186	3663	6094	8331	3093	1092	1297	3355	175	220	772	2947
15		47	805	195	475	926	5133	1961	3532	532	1787	3567	2375	815	1630	1229	3615
16								82	142	93						17	30
17													80				73
18							100										
19					88			113		17				32		204	6
total	12505	23886	43675	75228	69295	106151	113227	72289	159939	114807	80583	89414	75795	42460	67442	51501	62206
s.e.	980	4526	5507	8109	16269	11805	12293	8904	25425	19966	14715	11056	16599	6846	13801	6639	10396

s.e.: standard error

Table 6. Cod (*Gadus morhua*) age-length key in 2022.

Length (cm)	Age																	
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	total
09-11		1																1
12-14		13																13
15-17		61	1															62
18-20		49	12															61
21-23		7	58															65
24-26			61	1														62
27-29			28	40														68
30-32			17	49														66
33-35			1	61	4													66
36-38				43	21													64
39-41				28	38													66
42-44				10	51	1												62
45-47					58	5												63
48-50					61	4												65
51-53					51	15												66
54-56					34	39												73
57-59					18	40	5											63
60-62						40	26											66
63-65						9	48	1	3									61
66-68						2	40	11	7	3								63
69-71							34	7	16	3	1							61
72-74							19	8	26	4	2	3	1					63
75-77							7	10	23	9	4	7						60
78-80							3	3	21	8	3	9	3					50
81-83								5	11	7	4	6	13	3	1			50
84-86								2	5	6	1	3	14	2				33
87-89									1	6	4	2	10	2				25
90-92									2	3	1	5	5	1	1			18
93-95									1	3	1	2	7	2	1			17
96-98									1	1		3	4					9
99- 101												2	1	1				4
102- 104											1		3	3	1			8
105- 107											1	1						2
108-110																		
111-113																		
114-116																		
117-119														2				2
120-122																1		1
123-125													2					2
126-128																		
129-131																		
132-134																		
135-137																		
138-140																		
141-143															1			1
TOTAL		131	178	232	336	155	182	47	117	53	23	43	63	16	5	1		1582

Table 7. Cod (*Gadus morhua*) frequency ('000) at age and stratum in the 2022 survey.

	Strata																			Mean	
Age	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	19	total	Weight (g)	Length (cm)
1	240	1680	800	350	670	140	0	0	0	0	10	0	0	0	0	0	0	0	3870	46	17
2	170	1970	6600	1580	3450	2270	240	90	0	260	290	0	0	0	0	0	0	0	16920	150	26
3	230	1420	4210	800	3370	1740	780	390	10	680	490	0	30	0	20	0	0	0	14160	294	32
4	420	1090	1850	2010	690	2030	4880	970	370	1240	1900	100	730	230	740	0	0	10	19240	1069	49
5	220	370	340	1320	80	590	1400	330	170	440	680	90	340	230	410	0	0	0	6990	1504	55
6	110	130	90	340	40	190	330	90	70	90	300	90	140	310	230	0	0	0	2540	2613	66
7	20	30	20	40	10	40	60	10	10	20	90	20	30	60	60	0	0	0	500	3511	73
8	60	80	50	60	30	90	160	10	20	50	260	40	50	150	130	0	0	0	1250	3823	75
9	20	50	20	30	20	30	70	0	10	20	120	10	10	50	40	0	0	0	500	4664	80
10	0	20	10	10	10	20	30	0	0	10	40	0	10	10	20	0	0	0	200	5127	82
11	10	30	10	10	10	20	60	0	10	20	90	10	10	40	30	0	0	0	370	5361	83
12	10	60	20	30	40	40	80	0	10	50	100	0	10	30	20	0	0	0	500	6425	88
13	0	10	0	10	10	0	20	10	0	10	20	0	0	10	0	0	0	0	120	7852	94
14	0	0	0	0	10	0	0	0	0	0	10	0	0	0	0	0	0	0	30	11134	103
15	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	10	16144	121
16+	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0		
Sets	4	10	7	4	8	6	9	7	3	10	9	7	3	7	8	1	1	1	105	909	
n	1510	6950	14030	6570	8430	7210	8110	1900	680	2880	4400	360	1360	1120	1680	10	10	10	67200	6112	41

Table 8. Cod (*Gadus morhua*) abundance ('000) at age in 1988-2022 surveys.

age	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	4868	19604	2303	129032	71533	4075	3017	1425	36	37	23	5	178	473	0	684	14
2	79905	10800	12348	26220	41923	138357	4130	11901	3121	150	83	84	16	1990	1330	54	3380
3	49496	91303	5121	16903	5578	31096	27756	1338	6659	3478	95	116	327	13	641	628	25
4	13448	54613	16952	2125	2385	1099	5097	3892	892	4803	1256	117	198	122	29	134	600
5	1457	20424	15834	6757	385	1317	130	928	2407	391	1572	717	96	79	70	22	168
6	211	1336	4492	1731	1398	173	67	33	192	952	78	444	446	15	33	42	5
7	225	143	340	299	244	489	7	23	8	21	146	19	172	142	26	7	10
8	72	126	146	68	14	87	111	0	5	0	0	5	11	99	96	8	3
9	0	6	77	32	0	0	0	21	0	0	6	0	17	6	30	39	5
10	0	7	25	4	0	0	5	5	0	0	0	0	0	6	0	24	15
11	0	0	0	10	8	0	0	0	0	0	0	0	0	6	5	0	0
12	0	0	0	0	0	0	0	0	0	4	0	0	5	0	0	0	0
13	0	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	0
15	0	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	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	149683	198363	57637	183181	123468	176693	40319	19567	13320	9837	3259	1507	1470	2951	2261	1642	4226

age	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0
1	8069	19709	3917	6096	5139	66370	347674	103494	5525	7282	1141	56	2010	366	11900	7137	19195	3787
2	16	3886	11620	16671	7479	27689	142999	128087	67521	2372	12952	4485	314	4303	1740	4733	8871	17222
3	1118	62	5022	12433	16150	8654	16993	10942	32339	48564	7250	14356	6516	271	5210	25203	9272	14010
4	78	1481	21	4530	14310	7633	6309	11721	4776	43168	25614	2230	16645	6114	310	13495	19074	19231
5	709	85	1138	72	4154	4911	7739	4967	4185	17861	14107	14540	3267	13117	3310	5678	3913	6971
6	136	592	58	946	26	1780	3089	4781	2782	6842	21854	12375	15842	3370	5700	4109	960	2485
7		115	425	56	1091	8	1191	1630	1807	3447	3434	4814	8519	7074	400	3336	1061	507
8	17	7	74	231	0	442	0	832	963	1931	1426	1157	2765	3948	1460	687	1035	1253
9	16	0	13	76	335	46	215	24	278	1551	762	522	789	1030	1960	631	289	485
10	8	7	20	0	0	251	0	93	40	600	366	303	345	272	830	938	558	205
11	0	14	0	14	0	26	89	30	29	79	194	145	137	182	130	566	636	377
12	0	0	0	0	14	0	0	101	32	54	14	28	53	63	30	126	195	506
13	0	7	0	0	0	0	0	0	5	8	21	20	27	13	10	54	31	125
14	0	0	0	0	0	0	0	17	0	0	21	0	6	0	10	14	37	32
15	0	0	0	0	0	0	0	0	0	0	0	0	7		0	29	0	7
16	0	0	0	0	0	0	0	0	0	0	7	0	0	6	0	0	7	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0
Total	10166	25965	22308	41124	48697	117810	526300	266720	120280	133760	89164	55032	57241	40139	33002	66744	65149	67204

Table 9. American plaice (*Hippoglossoides platessoides*) mean catch per haul and the estimated biomass by stratum, and their standard error in the 2022 survey.

	area	tow	catch (kg)		Biomass (t.)	
stratum	sq. miles	number	mean	s. e.	value	s.e.
1	342	4	15.79	13.35	411	348
2	838	10	32.83	12.67	2096	809
3	628	7	19.09	5.48	914	262
4	348	4	17.62	7.70	467	204
5	703	8	8.72	2.64	467	142
6	496	6	19.99	5.44	755	206
7	822	9	4.06	1.16	255	72
8	646	7	3.90	1.77	192	87
9	314	3			17	10
10	951	11	3.89	0.65	282	47
11	806	9	12.23	3.05	751	187
12	670	8	0.18	0.18	9	9
13	249	3	1.30	0.70	25	13
14	602	7				
15	666	9	0.25	0.25	13	13
16	634	7				
17	216	2				
18	210	2				
19	414	5				
Total < 730 m.	10555	121	8.28	1.24	6654	999
Total < 1460 m.	16070	182	5.44	0.82	6654	999

Table 10. American plaice (*Hippoglossoides platessoides*) length frequency ('000) in the 2022 survey.

length	male	female	length	male	female	length	male	female
12-13		14	32-33	35	35	52-53		438
14-15			34-35	55	28	54-55		380
16-17	15		36-37	157	49	56-57		287
18-19	21	22	38-39	149	58	58-59		122
20-21	14	35	40-41	184	42	60-61		47
22-23	20	27	42-43	548	42	62-63		20
24-25	13	7	44-45	668	148	64-65		7
26-27	21		46-47	463	330			
28-29	28	35	48-49	120	462			
30-31	83	35	50-51	34	491	total	2626	3158

Table 11. American plaice (*Hippoglossoides platessoides*) survey biomass (t) by strata in 1988-2022.

	year																
stratum	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1	1306	1000	505	1078	709	1079	661	2230	1462	381	156	372	345	1043	141	1292	1507
2	2845	3602	1375	2663	1714	1267	1199	1335	943	740	1587	1810	976	835	1262	713	768
3	1367	1118	1668	1247	631	444	325	252	168	495	284	97	21	93	75	17	427
4	2199	461	817	320	557	572	853	489	268	203	343	53	100	85		128	395
5	2599	3093	1830	1407	837	1291	1230	549	500	619	744	73	56	112	189	82	72
6	479	1130	954	501	601	305	808	123	32	13	35	40	25	37	63	29	26
7	1174	531	837	389	639	319	316	249	72	83	47	19	15	28	52	30	84
8	417	164	263	251	727	487	171	132	56	123	165	3		45	43	14	55
9	103	163	343		373	205	20	500	55	36					1	9	77
10	2323	1491	2000	1308	1406	1459	2236	708	415	287	36	72	45	95	36	54	45
11	1186	1168	1316	401	372	292	303	109	68	32	29	37	23	27	59	29	69
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	3525
s.e.	1845	2048	1276	1180	954	1040	1373	1083	912	708	751	869	332	429	729	748	740

	year																	
stratum	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
1	1038	714	284	144	548	716	693	462	329	181	410	219	1014	764	945	1360	1583	411
2	796	354	209	513	370	1084	1141	1272	1202	1872	1248	1307	4379	1807	831	1793	3603	2096
3	101	74	101	147	74	103	364	468	266	223	462	488	410	534	1042	436	982	914
4	359	109	153	440	36	91	1201	749	671	258	376	178	342	285	801	571	596	467
5	45	63	81	88	72	200	190	716	267	328	443	592	277	421	1602	1107	447	467
6	71	61	99	37	57	34	160	185	341	187	309	282	314	751	805	680	534	755
7	31	37	20	47	32	28	160	156	166	208	117	253	215	389	289	495	419	255
8	175	163	58	128	47	49	65	187	156	249	220	346	114	241	206	119	293	192
9	18				77			30	25	0	2	12	2		121	35		17
10	87	97	24	163	54	115	35	123	153	105	86	325	190	403	336	482	230	282
11	35	19	22	50	64	26	33	121	121	185	124	308	188	397	559	462	667	751
12					11			11	0				10	16	18	128	7	9
13												2			20		4	25
14							32				3	3	16	39	28	13		
15	4		3	7	1		10	13			22	10	4	51	52	72	6	13
16																		
17																		
18														12				
19																		
total	2760	1691	1053	1766	1442	2446	4084	4491	3698	3800	3821	4325	7475	6109	7654	7752	9372	6654
s.e.	684	342	159	300	327	526	780	534	439	671	556	481	1547	558	852	987	1382	999

Table 12a. American plaice (*Hippoglossoides platessoides*) age-length key in 2020.
NOT YET AVAILABLE

MALE

FEMALE

Table 12b. American plaice (*Hippoglossoides platessoides*) age-length key in 2021.
NOT YET AVAILABLE

MALE

FEMALE

Table 12c. American plaice (*Hippoglossoides platessoides*) age-length key in 2022.
NOT YET AVAILABLE

MALE

FEMALE

Table 13a. American plaice (*Hippoglossoides platessoides*) frequency at age in the 2020 survey.
NOT YET AVAILABLE

Table 13b. American plaice (*Hippoglossoides platessoides*) frequency at age in the 2021 survey.
NOT YET AVAILABLE

Table 13c. American plaice (*Hippoglossoides platessoides*) frequency at age in the 2022 survey.
NOT YET AVAILABLE

Table 14. American plaice (*Hippoglossoides platessoides*) abundance ('000) at age in 1988-2022 surveys. 2020, 2021 AND 2022 NOT YET AVAILABLE.

age	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1	0	40	8	40	0	0	0	0	8	8	0	8	16	0	0	8	0
2	402	563	426	354	852	8	40	32	32	16	24	0	24	40	0	8	113
3	1882	8364	917	1206	796	1544	48	113	121	113	32	24	8	48	32	32	281
4	1311	1874	8372	2171	1070	1086	2131	740	257	24	48	64	80	56	64	97	72
5	4230	4367	1126	5348	1938	780	1037	2131	587	121	72	80	105	105	16	80	80
6	6385	4359	3370	2445	4769	418	877	1367	1665	418	265	80	153	56	88	56	105
7	5010	4142	2340	2686	1279	4134	973	1375	893	1206	619	241	121	113	64	48	105
8	5460	2429	2228	2067	1504	450	3426	909	547	273	901	474	153	265	129	137	129
9	1753	804	1351	852	828	780	322	1536	402	410	523	507	394	434	161	290	249
10	458	346	627	298	378	370	651	161	627	290	354	257	426	579	193	233	314
11	97	40	113	8	177	257	225	177	145	491	298	338	225	483	298	426	281
12	161	16	16	56	97	306	225	145	80	129	290	209	185	418	225	483	595
13	129	0	32	0	16	362	249	145	80	24	88	121	72	193	249	281	426
14	48	0	16	0	0	1070	523	290	105	97	113	121	56	161	145	265	402
15	56	0	0	0	0	32	491	217	72	48	56	56	48	113	129	145	330
16+	40	0	0	0	0	40	8	32	24	113	105	97	56	97	185	161	523
total	27415	27351	20949	17523	13711	11637	11226	9377	5645	3772	3804	2670	2131	3169	1970	2766	4013
N6+	19598	12135	10093	8412	9047	8219	7970	6353	4640	3498	3611	2501	1890	2911	1866	2525	3458
Biomass	16043	14044	11983	10088	8657	7861	8228	6785	4097	3024	3436	2587	1606	2404	2048	2286	3525

age	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
1	0	7	207	51	26	10		7	27	8	20	70			30			
2	32	28	7	1492	293	341	394	60	198	344	578	178	847	211	137			
3	113	37	13	69	1107	608	601	447	76	219	695	1176	442	980	458			
4	290	106	35		147	2000	1384	629	311	144	599	1275	923	717	918			
5	105	133	106	32	29	301	2467	980	718	135	101	936	1397	899	719			
6	105	139	119	127	22	187	454	2833	866	510	109	263	891	1136	1032			
7	129	72	49	120	80	72	94	447	1596	816	328	239	282	652	911			
8	105	57	49	108	57	139	49	84	138	1569	609	405	549	300	794			
9	225	123	35	104	94	122	90	111	64	190	1320	515	883	288	318			
10	201	163	47	111	90	70	176	143	94	65	140	1083	1528	467	240			
11	225	200	76	63	132	56	144	125	109	55	49	77	1623	617	488			
12	249	193	122	47	121	176	55	115	108	62	33	49	209	519	652			
13	354	192	143	118	63	125	107	45	55	46	41	21	68	66	504			
14	394	213	82	110	104	114	148	133	61	64	47	27	71	60	307			
15	257	201	75	150	121	134	82	130	54	50	55	34	86	46	75			
16+	547	323	236	561	353	497	672	323	195	201	228	175	329	228	212			
total	3329	2188	1401	3262	2838	4952	6917	6614	4670	4477	4950	6523	10129	7186	7795			
N6+	2791	1877	1033	1619	1237	1692	2072	4489	3340	3628	2959	2888	6519	4379	5533			
Biomass	2760	1691	1053	1766	1442	2446	4084	4491	3698	3800	3821	4325	7475	6109	7654	7752	9372	6654

Table 15. Redfish (*Sebastes norvegicus*) mean catch per haul and the estimated biomass by stratum, and their standard error in the 2022 survey.

	area	tow	catch (kg)		Biomass (t.)	
stratum	sq. miles	number	mean	s. e.	value	s.e.
1	342	4	0.19	0.12	5	3
2	838	10	0.05	0.05	4	4
3	628	7	2.52	1.45	121	69
4	348	4	0.09	0.05	3	2
5	703	8	4.38	3.62	235	194
6	496	6	9.59	4.87	363	184
7	822	9	46.74	13.65	2927	855
8	646	7	18.08	10.76	890	529
9	314	3	51.24	47.93	1226	1147
10	951	11	144.64	64.33	10480	4661
11	806	9	178.96	48.74	10989	2993
12	670	8				
13	249	3				
14	602	7	0.60	0.60	27	27
15	666	9	0.33	0.33	17	17
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	182	22.28	4.69	27286	5752
Total < 730 m.	10555	121	33.93	7.16	27286	5752

Table 16a. Redfish (*Sebastes norvegicus*): age-length key in the 2019 survey.

Male

Length	age																							total
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25+	
16		2																							2
17		2	1	1		1																			5
18			3	3																					6
19			1	2																					3
20			2	8	1																				11
21				5	1																				6
22				6	1																				7
23				5	4																				9
24				1	3																				4
25					1	1																			2
26						3	2	1																	6
27							1																		1
28						1	2		1																4
29								2																	2
30							1		1		1		1												4
31							1		3	1	1	1	2												9
32								2	1	1		1					1								6
33								1				1	1	1											4
34												1	1	1			1								4
35									1	1	2		4	1	1	2		1							13
36										1	2		3	2	2	1		1							12
37										2		3		3	2			1	1						12
38										1	1	2	1	2	3	2					1				13
39										1	1	1	2	1	3	3	1	3		1					17
40												1	2		1	1	1	2	1	1					10
41																	1		2			1			4
42																2									2
43														1				1				1			3
44																									0
45																			1						1
46																									0
47																									0
total		4	7	31	11	6	7	6	7	8	8	11	17	12	12	11	5	9	5	2	1	2			182

Table 16a (cont.) Redfish (*Sebastes norvegicus*): age-length key in the 2019 survey.

Female

Length	age																							total
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25+	
15				1																					1
16		3																							3
17		1	3																						4
18		1	8	4																					13
19			4	2																					6
20				8	2																				10
21				8	1																				9
22				7	5																				12
23				4	4																				8
24					9																				9
25					5	4	2																		11
26						3	2																		5
27							1																		1
28						1	2		1																4
29							2	1	1																4
30								1	1	3	1														6
31									1	1		2													4
32								1	2	1															4
33										1															1
34												1	2												3
35									1	1	1	2	2					1							8
36												1	4	2		1	1								9
37												1	2	1	1										5
38									1		2	3	1	2	1										10
39											2	1		1		3	1								8
40													3	3		2					1				9
41											1		4	3	1	1	1		1		1				13
42													4	2	1			1	3						11
43													1	1	1	3	1	1	1		1				10
44												3	1	2			1		2	2					11
45												1	2	3	3	1	1	1	3	1					16
46														2	2	5	1	1							11
47																1	4	2	2	1					10
48																	2		3						5
49														1	1		1			1					4
50																		2	1	1	1			1	6
51																	1		1						2
52																		1							1
total		5	15	34	26	8	9	3	8	7	7	15	26	23	11	17	15	10	17	6	4			1	267

Table 16b. Redfish (*Sebastes norvegicus*): age-length key in the 2020 survey.

Male

Length	age																								total
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25+	
15		1																							1
16	4	10																							14
17		13	1	1																					15
18		8	3	1		1																			13
19			5	8																					13
20				6																					6
21				4	2																				6
22				3	5																				8
23				1	10																				11
24					5	3																			8
25					3			1																	4
26					1	3	2																		6
27						4	1	2																	7
28						2	1	2		1		1	1												8
29						1	4	1			1														7
30						1		3	1																5
31								2		1	1														4
32							1		2	1	4														8
33									3	2	2	1	1												9
34									2				1	1	1										5
35									1	1	1	3	2		2		1								11
36											1	1	1		3		2	1	2	1					12
37											1		1	1		2			1			1			7
38												1	1	1	1	2				2	1				9
39													1		2	2	1	3	1	1		1			12
40												1		1	1		1	1	1	1	1				8
41														1	1			1	1						4
42														1				1	1	3	1				7
43																			1	3	1	1			6
44															1	1			1						3
45																	1								1
46																									0
47																								1	1
48																									0
49																									0
50																						1			1
total	4	32	9	24	26	15	9	11	9	6	11	8	9	6	12	7	6	7	9	11	4	4		1	240

Table 16b (cont.) Redfish (*Sebastes norvegicus*): age-length key in the 2020 survey.

Female

Length	age																								total
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25+	
15	1																								1
16	4	9																							13
17		13	3																						16
18		5	5																						10
19			4	3																					7
20			1	3	2																				6
21				3	2																				5
22				1	5																				6
23					8	1																			9
24					7	1																			8
25					7	2	1																		10
26						5	3																		8
27						7	1	1				1													10
28		1			1	3	4			1															10
29						1	3																		4
30							1		2				1			1				1					6
31								2	2																4
32								1	3	1				1											6
33								1	1		1	1													4
34									2			1													3
35										1			1	1											3
36								1		1		2					1	1	1						7
37									1		2	1	1		1										6
38										2		1	1		1		2								7
39									1						3	1									5
40													3	2	1	1			1						8
41													2			1	1	1	1						6
42													2	3	1	2									8
43											1		1		1	1	1	1	1	1					8
44														3			1		2	2		1	1		10
45														1		1		1	1	1	1				6
46																1	2	2	1	1					7
47														1				2	2	2					7
48														2			2				1	1			6
49																1	1		3	2	1				8
50																			1	1	1				3
51														1						1		2			4
52																			1					1	2
53															1								1		2
54																				1	1				2
total	5	28	13	10	32	20	13	6	12	6	4	7	12	15	9	10	11	8	15	13	5	4	2	1	261

Table 16c. Redfish (*Sebastes norvegicus*): age-length key in the 2021 survey.

Male

Length	age																								total
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25+	
16	2	10	1																						13
17		4	11																						15
18		4	7	1																					12
19		3	11	1																					15
20			11	7																				1	19
21			4	6	6																				16
22				6	3																				9
23				2	8	1																			11
24					5	5																			10
25					4	5	1																		10
26						7	3																		10
27						5	1	2	1											1					10
28						5	3	1	1	1															11
29						2	4	2	1				1												10
30							2	1	2	1	1				1										8
31						1	2	3		2		1													9
32								3		2		1			1										7
33							1	1		1		1			1										5
34											1		1	1	1	2									6
35									1	1	1		1		1	1		1			1				8
36								1	1		2	2			1										7
37										1	2			1	2	3	2	2	1	1					15
38											1	1	2	2	3	3		1	2	1	3				19
39											1				3	2	3	3		1	2	1	1		17
40													1	1	1	1	3	2	2	2	2	3	1	1	20
41									1					1		3					3		1	2	11
42														2	1	2	1		6	2	1	1			16
43																1		1	3	1	1	2		1	10
44																						1	1	1	3
45																				1		1		2	4
total	2	21	45	23	26	31	17	14	8	9	9	6	6	8	16	18	9	10	14	10	13	9	4	8	336

Table 16c (cont.) Redfish (*Sebastes norvegicus*): age-length key in the 2021 survey.

Female

Length	age																								total
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25+	
16		7	1																						8
17		1	9	2																					12
18		1	9	5																					15
19		2	8	4																					14
20			5	13	1																				19
21			1	10	3																				14
22				8	6																				14
23				2	6	1																			9
24					6	1																			7
25					1	8																			9
26						8	1																		9
27					1	5	3	2																	11
28						4	3	1	1	1															10
29						1	3	4	1	1															10
30						1	2		2																5
31							3	2	2	1															8
32							2	1	1							2									6
33								2		1		1	1												5
34												1							1						2
35								1	1		1														3
36											1														1
37								1						1			2	2			2				8
38									1	2	1					1									5
39								1		1	1	1		1		1									6
40											1	1	1		2	1							1		7
41														1	1		1				1				4
42								1			1	1		1					1						5
43												1		1		1									3
44													2	1	2	1	1				1				8
45													1	2		1	1		1		1				7
46																1		1		1					3
47															3	1	1	2	1					1	9
48														1			1	2	2	1	1				8
49													1					1	1	1					4
50																1		1	2	3	1	1			9
51																			2	2					4
52																	1								1
53																				1			1		2
54																									0
55																				1				1	2
total		11	33	44	24	29	17	16	9	7	6	6	6	9	8	11	8	9	11	10	7	1	2	2	286

Table 16d. Redfish (*Sebastes norvegicus*): age-length key in the 2022 survey.

Male

Length	age																								total
	2	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	3																							4
17		3	5																						8
18		1	2	4																					7
19			2	6																					8
20			2	9	2																				13
21			1	10	1	1																			13
22				5	4																				9
23				4	5	1																			10
24					9	1																			10
25					10	3																			13
26					5	5	2																		12
27						1	8	1																	10
28							2																		2
29							5		2	2				1											10
30							2	2	1	5			1												11
31							1	2	4	1															8
32								4	2	2															8
33								2	3	1															6
34									1	1	2	1		1	2										8
35								1	2	2			1	1	1		1			1					10
36												2		3		1		1							7
37											1	1		1	2		1	1	1						8
38										1			1	1		2		3					1		9
39											1		1	1	4			2		1	1		1		12
40															2	1			2	3	3			2	13
41															2	2	1			3	3	1		1	13
42															1			1	4	3	5	2		1	17
43															1	2	1	1		1		3	1		10
44																		1		2	2	1	2	1	9
45																		1		1	2				4
46																					1				1
total	1	7	12	38	36	12	20	12	15	15	4	4	4	9	15	8	4	11	7	15	17	7	5	5	283

Table 16d (cont.) Redfish (*Sebastes norvegicus*): age-length key in the 2022 survey.

Female

Length	age																								total
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25+	
16		2																							2
17		1																							1
18		1	5																						6
19			2	7																					9
20			1	11	1																				13
21				7	1																				8
22				4	1																				5
23				2	9	1																			12
24				2	8	1																			11
25					10	1																			11
26					3	5	3						1												12
27						4	4	1																	9
28							7	3	1																11
29							3	6	1																10
30							1	5	3																9
31							1	4	1	1															7
32								1	4	1	1		1												8
33								2	1	1	2	1													7
34								1	1	1		1	2	1	1										8
35								2	3		1		1					1							8
36									1	1	2	1					2								7
37												2		2	1										5
38										1	1	2	1		2					1					8
39										1		2		1	1										5
40											2				1	2	1								6
41											1	1		1	1	1			1						6
42													2			2									4
43											1		1	1		1									4
44										1				2		1	1								5
45														2		1	1	1			1	2			8
46														1	3		1		1	1		2			9
47															2	2	1			2			2		9
48														1				1		3	2		1		8
49															1	1		2	2	1	2		1		10
50																2	1			1			2	1	7
51																		1			2	1			4
52																				1	2				3
53																					1				1
54																						1			1
total		4	8	33	33	12	19	25	16	8	11	10	9	12	13	13	8	6	4	10	10	6	6	1	277

Table 17. Redfish (*Sebastes norvegicus*) length frequency ('000) in the 2022 survey.

length	male	female	length	male	female	length	male	female
13		43	29	252	361	45	52	854
14			30	638	516	46	44	1130
15			31	397	553	47		647
16	63	14	32	437	452	48		652
17	164	21	33	534	457	49	7	728
18	106	71	34	464	384	50		232
19	228	275	35	638	488	51		121
20	405	401	36	687	371	52		27
21	384	266	37	1015	231	53		49
22	323	398	38	1363	357	54		10
23	625	520	39	1491	384			
24	490	597	40	1516	525			
25	465	430	41	1586	341			
26	614	354	42	1126	601			
27	265	172	43	334	790			
28	162	175	44	290	1076	Total	17165	16074

Table 18a. *Sebastes norvegicus*: frequency at age ('000) by strata in the 2019 survey.

age	Strata															Mean	
	1	2	3	4	5	6	7	8	9	10	11	12	14	15	total	Weight	Length
1																	
2																	
3	7	7	25		1	11	52	16	1	30	61				210	80	17
4		7	45		11	20	218	66	5	129	192	44			738	106	18
5		17	178	4	32	83	523	231	17	170	603	22			1880	151	21
6		5	91	3	8	45	223	73	25	80	228				780	206	23
7			24		4	38	65	16	29	46	158				379	289	26
8		7	17		4	44	126	42	71	51	184		5	3	554	352	28
9			4		7	8	54	21	67	297	64				523	464	30
10			15		7	21	50	29	80	129	101		14	8	454	524	31
11			10		7	14	51	43	60	423	90		5	7	710	719	35
12			9		6	13	41	46	59	703	69		5	3	952	846	37
13			8		6	21	109	64	108	1366	117		9	15	1824	913	38
14		3	13		6	27	138	101	181	2584	204		18	7	3282	987	39
15		1	6		6	13	116	80	94	2585	152	8		10	3072	1050	40
16		1	5		6	14	87	85	45	1433	117	8	4	4	1808	1108	41
17			4		25	10	77	75	53	1968	114	32	4	16	2378	1157	41
18			4		10	12	65	27	41	1340	90	24	4	12	1627	1289	42
19		1	3		1	10	68	62	31	974	101	42	13	7	1312	1261	42
20		2	4		10	12	75	22	19	1802	90	21	6	11	2075	1406	44
21					2	4	20	16	5	396	31	13	6	7	500	1434	44
22			1		1	2	11	8	6	348	32	5	2		414	1247	42
23			2		2	2	5	7	8	10	5				40	1212	42
24																	
25+							1			35	6	5	2		49	2005	50
Sets	1	3	6	1	4	5	9	7	3	11	9	2	3	2	66	922	
n	7	52	469	8	163	422	2176	1129	1003	16898	2807	224	98	108	25564	23577	36.7

Table 18b. *Sebastes norvegicus*: frequency at age ('000) by strata in the 2020 survey.

age	Strata															Mean	
	1	2	3	4	5	6	7	8	9	10	11	12	14	15	total	Weight	Length
1																	
2	4	7	32	4	24	77	11		6	47	94				305	67	16
3	29	43	133	30	114	395	39	19	40	420	420			10	1691	86	17
4	19	10	26	7	30	49	70	19	11	139	136				516	107	18
5	29	8	30	9	46	100	821	50	21	147	213			8	1482	147	20
6	16	23	51	26	31	162	657	84	17	576	658			24	2324	211	23
7	3	19	19	8	16	47	693	29	42	466	356			36	1734	342	27
8	1	11	14	6	6	21	900	19	48	294	195			43	1557	401	29
9	4	9	6		10	35	1225	12	58	302	265			5	1929	533	32
10	2		10		8	15	1773		209	743	222		2		2984	644	34
11		3	6	1	8	16	2498	4	122	423	111		2	13	3205	786	36
12		1	9		11	10	2429	30	236	818	174		2		3720	763	36
13		4	2	5	14	7	3245	48	160	879	175		5	3	4547	797	36
14	1	4	8	5	18	11	4813	87	265	1086	157		3	3	6461	957	39
15		1	8	5	17	8	4849	149	240	995	125	12			6409	1241	42
16		1	5	8	34	3	3582	123	319	1148	155	12	3		5394	925	38
17	1	2	7	9	21	10	3188	111	263	1100	104				4817	1136	41
18			1	3	15	7	4199	106	149	803	132		2		5418	1081	40
19			3	6	21	4	2485	125	202	829	96	12			3783	1212	42
20			6	4	30	11	4738	155	271	1216	95	12			6538	1289	43
21	1	2	10	14	30	8	4513	128	256	1002	82				6046	1449	44
22		1	3	6	13	2	1954	44	106	361	42				2532	1619	46
23			3	3	21	3	1171	54	93	351	42				1741	1252	42
24			1		4		392	12	28	50	5				492	1439	45
25+					11					22					33	2120	51
Sets	1	3	6	2	7	6	9	6	2	11	8	1	1	2	65	970	
n	110	144	393	158	554	1003	-1529	1409	3163	14217	4056	49	17	144	75661	73379	37.7

Table 18c. *Sebastes norvegicus*: frequency at age ('000) by strata in the 2021 survey.

age	Strata															Mean	
	1	2	3	4	5	6	7	8	9	10	11	12	14	15	total	Weight	Length
1																	
2		3	18		1	9	9	12		1	2				55	71	16
3		84	259		37	299	159	73		32	130				1074	89	17
4		147	664	14	142	758	431	105		112	458				2830	112	19
5	4	65	452	10	99	442	635	90		178	486				2460	151	21
6	3	28	256	12	27	274	748	90		175	331				1944	205	23
7		33	237	22	48	120	686	96		288	457				1987	297	26
8		20	155	13	27	57	243	47		172	232				966	392	29
9		22	127	10	19	40	100	40	13	168	228				766	557	32
10		8	67	4	13	44	52	36	2	106	93				424	567	32
11		9	62	5	8	37	31	19	7	111	89				378	602	33
12		9	29	3	6	25	1	37	31	164	150				455	893	38
13		8	42	4	3	15	3	10	17	127	251				480	966	39
14		9	38	3	3	6	10	38	102	121	296	1			628	1241	42
15		12	21	2	7	11	14	51	78	200	457	1	5		861	1255	42
16		14	44	6	7	28	11	79	116	205	433	7	3		954	1133	41
17		19	44	4	9	45	43	91	99	380	699	3	5		1441	1246	42
18		10	21	3	7	12	8	75	77	142	334	5	3	1	698	1277	43
19		10	33	3	5	25	18	83	88	221	536	6		1	1028	1419	44
20		12	24	2	10	38	45	96	78	192	442	4	16	1	958	1473	45
21		15	17	2	5	41	41	74	56	209	471	22	5	1	959	1587	46
22		10	35	2	9	29	29	88	102	173	336	2	3	1	818	1200	42
23		21	7		6	18	14	55	15	56	68	3	10	1	273	1260	42
24		11	9		2	5	5	19	5	58	68	21	7		211	1196	42
25+		28	15	1	4	13	29	27	8	51	107	3	7		293	1201	41
Sets	1	8	6	3	6	6	9	7	3	10	8	2	2	1	72	692	
n	7	606	2675	125	503	2390	3365	1432	894	3643	7154	79	63	7	22942	15870	31.5

Table 18d. *Sebastes norvegicus*: frequency at age (‘000) by strata in the 2022 survey.

age	Strata														Mean	
	1	2	3	4	5	6	7	8	9	10	11	14	15	total	Weight	Length
1																
2	2				2	2					11			16	69	16
3	5	1	8		31	24	14	1		32	55			170	80	17
4		6	16	1	16	53	61	7		134	139			433	110	19
5		5	59	5	107	260	298	54		638	1109		2	2536	155	21
6	2	2	53	6	121	270	405	108		551	1521		10	3050	226	24
7	3	3	26	2	26	70	144	25		202	390		1	892	263	25
8	5	2	29		22	68	320	37		234	573			1289	366	28
9			19		10	38	333	45	12	603	885			1945	496	31
10	1		7		5	22	280	51	24	610	747			1747	546	32
11	1		7		3	21	168	41	24	587	712			1564	703	35
12			2		2	4	112	32	51	465	526			1195	864	38
13			2		4	5	65	21	47	362	433			939	792	37
14	1	1	4		1	9	82	34	24	533	495			1183	916	38
15	1		1		5	13	95	50	71	856	1075			2166	1078	41
16			9		13	18	217	103	177	1016	950	1	1	2505	1074	41
17			4		10	10	116	66	79	934	944			2163	1179	42
18			3		8	8	56	18	32	472	495			1092	1179	42
19			5		9	10	129	84	69	507	683	1	1	1498	1090	41
20			2		8	7	162	45	112	305	304	6	3	953	1212	42
21			9		23	21	238	88	169	673	659	4	2	1887	1255	43
22			8		26	15	348	109	185	569	577	7	4	1849	1297	43
23			4		18	8	141	30	30	358	298	3	2	892	1365	44
24			3		8	9	53	30	50	285	301			738	1358	44
25+			1		8	5	77	31	76	141	146	1	1	487	1126	41
Sets	2	1	5	2	4	6	9	7	2	11	9	1	1	60	811	
n	19	20	281	14	483	971	3915	1111	1229	11067	14027	24	27	33188	26909	35.4

Table 19. Redfish (*Sebastes mentella*) mean catch per haul and the estimated biomass by stratum, and their standard error in the 2022 survey.

	area	tow	catch (kg)		Biomass (t.)	
stratum	sq. miles	number	mean	s. e.	value	s.e.
1	342	4				
2	838	10				
3	628	7	0.04	0.04	2	1
4	348	4				
5	703	8	0.05	0.05	3	3
6	496	6	0.09	0.09	3	3
7	822	9	91.23	47.30	5713	2962
8	646	7	91.26	56.84	4492	2798
9	314	3	12.51	2.38	299	57
10	951	11	45.31	20.86	3283	1512
11	806	9	20.00	12.83	1228	788
12	670	8	153.48	39.24	7835	2002
13	249	3	465.90	204.09	8839	3872
14	602	7	426.83	115.17	19577	5282
15	666	9	779.19	366.84	39538	18614
16	634	7	4.53	3.43	219	165
17	216	2	39.38	36.56	648	602
18	210	2	2.91	2.91	46	46
19	414	5	69.39	29.23	2189	922
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	0.60	0.60	4	4
34	486	5				
Total < 1460 m.	16070	182	76.70	16.63	93919	20351
Total <730 m.	10555	121	116.78	25.31	93914	20351

Table 20a. *Sebastes mentella*: age-length key in the 2021 survey.

Male

Length	age																								total
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25+	
16	2	8	1																						11
17		8	9	1																					18
18		5	14	1																					20
19		1	14	5																					20
20			9	13																					22
21			3	17																					20
22			1	17	2																				20
23				15	5																				20
24				3	10																				13
25					5	2																			7
26						4	2																		6
27						6	7			1			1	1			2		1						19
28						6	4	4		2		2			2										20
29							2	4	1	1	1	1		3	2	1	3	3							22
30							1	1		1		1	2	1	3	5	5				1				21
31									2			1	2	1	5	8	1	3	4		2				29
32													1	2	3	2	6	3	2			1			20
33													2		4	9	1		1		1		1		19
34												2	1		4	2	5	3	3			1	1		22
35												2		1	2	3	3	3		1					15
36																1	1				1			1	4
37																	1								1
38															1										1
39																									0
40														1											1
41																									0
42																									0
43																				1					1
total	2	22	51	72	22	18	16	9	3	5	1	9	9	10	26	31	28	15	11	2	5	2	2	1	372

Table 20a (cont.) *Sebastes mentella*: age-length key in the 2021 survey.

Female

Length	age																								total
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25+	
16		10	1																						11
17		9	7	1																					17
18		5	12	2																					19
19			12	9																					21
20			4	15																					19
21			3	17																					20
22				19	1																				20
23				11	10																				21
24				1	10																				11
25				1	7	1																			9
26						5	1			1															7
27						11	1		1																13
28						3	6	7		1	1														18
29							6	4	1					1											12
30							5	3	4						1	2	1			1					17
31							1		4		2			1	3	4	1	4	1						21
32									2		1	2		2	4	5	4								20
33										1		1			7	5	5		1						20
34										1	1		1	1	7	5	3	1							20
35											1		1	2	4	5	5	1				1			20
36										1		1		4	7	3	2	3							21
37												1	1	2	2	5	5	1	2	1	1				21
38														2	1	4	5	2	2		4				20
39															3	4	1	2	5					1	16
40													1		1	1	1	1	4		1				10
41																		1							1
42																							1		1
total		24	39	76	28	20	20	14	12	5	6	5	4	15	40	43	33	16	15	2	6	1	1	1	426

Table 20b. *Sebastes mentella*: age-length key in the 2022 survey.

Male

Length	age																								total
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25+	
16	2	4																							6
17		8	5																						13
18		1	7	2																					10
19			4	8																					12
20			1	12	4																				17
21			1	14	8																				23
22				8	18																				26
23				7	16	1																			24
24					16	3																			19
25				1	16	4																			21
26					5	11	1														1				18
27						3	1		1						1			1	2						9
28							3	3	1					1			1	1							10
29							3	1	1	1				1			1			3					11
30								2				1	1	1		2	5	2	1						15
31								1		1		1		2	2	3	5	1		1	2				19
32											1				3	6	3	2	1			1	1		18
33									1			1	1			2	6		1			1	1	1	15
34													1	2		2	2	3				1	1		12
35												2	2		2		1	1	1		1	1			11
36																	1		2		1				4
37											1	1					1		1						4
38																								1	1
39																	1								1
40															1				1				1		3
total	2	13	18	52	83	22	8	7	4	2	2	6	5	7	9	15	27	11	10	4	5	4	4	2	322

Table 20b (**cont.**) *Sebastes mentella*: age-length key in the 2022 survey.

Female

Length	age																								total
	2	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		8	2																						10
18			7	3																					10
19			5	7																					12
20			2	11	1																				14
21				11	8																				19
22				9	12																				21
23				2	22																				24
24				1	21	1																			23
25				1	15	2																			18
26					10	6																			16
27						9	1	1																	11
28							2	1	1																4
29							3	2		1															6
30							1	1	4	2		1						1							10
31							1	2	2	2							1								8
32								5	2								1	3							11
33										2	1		1	1	1	3	1	1	1						12
34										1		3	1		1	1	3	2	3						15
35											1			1	2	3	3		3	3		1			17
36													1		3	5	2	3						1	15
37									1				1			3	5	1		1		1			13
38											1		1		2	2	4	1		1	1				13
39															1	3	2	1			1				8
40															1	3				1				2	7
41																1				1				1	3
42																				1	1	1			3
43																					1				1
44																					1				1
45																									0
46																		1							1
total		14	16	45	89	18	8	12	10	8	3	4	5	2	11	24	22	14	7	8	5	3		4	332

Table 21. Redfish (*Sebastes mentella*) length frequency ('000) in the 2022 survey.

length	male	female	length	male	female	length	male	female
16	390	350	27	1560	760	38	90	1720
17	840	550	28	2500	390	39	100	1030
18	800	560	29	2410	420	40	50	720
19	1240	1820	30	4890	1130	41		270
20	5630	5050	31	6080	840	42		100
21	17840	21410	32	5740	1720	43		100
22	41890	41200	33	4160	1650	44		90
23	52370	52640	34	2460	2250	45		90
24	43490	40080	35	1420	1860	46		110
25	17500	14070	36	940	2250			
26	3420	2720	37	520	1810	Total	218330	199760

Table 22a. *Sebastes mentella*: frequency at age ('000) by strata in the 2021 survey.

age	strata																		mean	
	3	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	total	Weight	Length
1																				
2				100				100										200	62	16
3	400	100	200	5700	2500		3500	4100	200			100						16700	85	18
4	2500	300	800	44500	16100	600	40400	41900	1000		1100	1700						150800	110	19
5	3600	400	1600	64100	20800	2900	90500	74000	800	100	5600	2900						267200	131	21
6				800	400	300	2800	1200	100		700	200						6400	181	23
7				300			200	300	100		1100	400			100			2600	296	27
8				200			600	200	100		1500	500			200			3400	343	28
9				100			400	100	100		1300	400			200			2800	353	29
10							100		100		700	300			200			1600	418	30
11							100	100	100		600	300			200			1300	425	30
12											300	200			100			800	470	32
13								100	100	100	800	300		100	300			1700	469	32
14								100	200	200	900	400		100	300	100		2300	484	32
15							200	100	200	200	1400	600		200	400	100		3300	508	32
16				100			200	300	500	500	3800	1900		400	1200	300		9300	519	33
17							200	300	600	700	4200	2000		600	1300	300		10400	514	33
18							200	200	500	500	3500	1600		400	1100	300		8300	513	33
19							100	100	200	200	1700	700		200	400	100		3800	514	33
20							100	100	200	200	1200	500		200	300	100		2900	533	33
21											100							200	624	35
22									100	100	600	200		100	100	100		1300	528	33
23											200	100						500	533	33
24										100	100			100				300	631	35
25+											100							100	738	37
Sets	4	1	4	9	7	1	11	9	8	3	7	8	3	1	2	4	1	83	163	
n	6500	700	2600	116100	39900	3900	139700	123400	5100	3100	31300	15300	100	2500	6500	1500	0	498300	815	21.4

Table 22b. *Sebastes mentella*: frequency at age ('000) by strata in the 2022 survey.

age	strata																	mean		
	3	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**33**	total	Weight	Length
1																				
2				100	100													100	62	16
3				600	300		100	200	200	200		100						1600	71	17
4				900	200		300	400	800	200		1400						4400	108	19
5				7900	4100	200	2900	1800	12100	6700	2900	48000	100			400		87000	156	22
6				20000	16400	700	9900	4300	24900	24500	18500	133400	200			1000		253600	187	23
7				1300	1900	100	1000	300	1500	1900	2800	9100				100		19900	223	25
8				100	100				300	100	900	800						2500	337	28
9				100			100		300	200	1500	1000				100		3400	399	30
10							100		200	200	900	600				100		2100	429	31
11									100	200	700	400				100		1500	448	31
12										100	400	100				100		800	600	34
13									100	200	1000	300				100		1900	522	33
14									100	200	900	300		100		200		1800	578	34
15									200	300	900	500				200		2100	453	31
16									200	400	1700	600		100		300		3500	569	34
17							100		500	900	3700	1400	100	200		700		7600	577	34
18				100			100		600	1100	5000	2000	100	300		900		10300	538	33
19							100		300	500	2300	1000		100		400		4800	541	33
20									100	200	1600	600				200		2900	540	33
21									100	200	1000	300				100		1800	562	33
22									100	200	1000	200				100		1700	624	34
23									100	100	600	200		100		100		1200	583	34
24										100	300	100				100		800	531	33
25+										100	500	100				100		800	740	37
Sets	1	3	7	5	2	11	9	7	3	7	8	3	2	2	3	2	1	79	223	
n				31200	23200	1200	14700	7200	42900	38600	49200	202600	500	1200	100	5400		418000	931	24.1

Table 23. Redfish (*Sebastes fasciatus*) mean catch per haul and the estimated biomass by stratum, and their standard error in the 2022 survey.

	area	tow	catch (kg)		Biomass (t.)	
stratum	sq. miles	number	mean	s. e.	value	s.e.
1	342	4				
2	838	10	0.02	0.02	1	1
3	628	7	1.24	0.60	60	29
4	348	4	0.09	0.09	2	2
5	703	8	6.42	5.71	344	306
6	496	6	5.72	2.98	216	113
7	822	9	271.43	128.12	16999	8024
8	646	7	87.05	49.44	4284	2433
9	314	3	408.92	263.20	9783	6297
10	951	11	124.71	40.34	9036	2922
11	806	9	176.59	68.86	10845	4228
12	670	8	137.78	54.37	7034	2776
13	249	3	182.42	73.57	3461	1396
14	602	7	119.35	52.50	5474	2408
15	666	9	117.30	63.68	5953	3232
16	634	7	0.89	0.51	43	25
17	216	2	1.09	0.40	18	7
18	210	2	6.60	4.04	106	65
19	414	5	3.24	1.03	102	32
20	525	6				
21	517	6				
22	533	6				
23	284	3				
24	253	3				
25	226	3				
28	530	6	0.09	0.07	4	2
29	488	6				
30	1134	11				
31	203	2				
32	238	2				
33	98	2	0.58	0.58	4	4
34	486	5				
Total < 1460 m.	16070	**182**	**60.25**	**10.41**	**73769**	**12743**
Total <730 m.	10555	**121**	**91.72**	**15.84**	**73761**	**12743**

Table 24a. *Sebastes fasciatus*: age-length key in the 2021 survey.

Male

Length	age																								total
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25+	
15			1																						1
16	1	14	4																						19
17		9	11																						20
18		5	8	7																					20
19		1	9	9																					19
20			7	10	3																				20
21				18	3																				21
22				10	10																				20
23				4	16	4		1																	25
24					10	8		1	1																20
25					5	9	5		2																21
26						11	6	1										1							19
27						7	3	1	3				3				2			1					20
28						1	2	4	2	4		2	1				1	1	1		1				20
29								3				2	1	1	1		2	4		3	1			2	20
30								3			2		4				4	1	3		2		1		20
31												1	2	1	1	1	1	4	2	4		1		1	19
32										1		1	1	1		1	3	1	1	2	1			2	15
33																		2		1	1		1	1	6
34															1		1								2
35																		1	1	1		1			4
36																	1								1
37																				1				1	2
38																		1							1
total	1	29	40	58	47	40	16	14	8	5	2	6	12	3	3	2	15	16	8	13	6	2	2	7	355

Table 24a (cont.) *Sebastes fasciatus*: age-length key in the 2021 survey.

Female

Length	age																								total
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25+	
16	3	16	1																						20
17		9	11																						20
18		5	12	3																					20
19			10	10																					20
20			6	13	2																				21
21			3	14	3																				20
22				5	14																				19
23				2	13	5																			20
24				1	15	3			1																20
25					6	9	5											1							21
26					1	15	4																		20
27						8	8	2		1	1														20
28						4	11	4	2																21
29							5	4	5		2			1					2	1					20
30							2	2	9	1	1	2	2	1					1						21
31							1	5	1	2	5	3		1	1	1	2		1						23
32								2	2	2	2	3	1		1	1	2	2	2						20
33								3	2		2	3	1	1		2	2	2	1				1		20
34									1			3	4	1	1	1	3	1	1	4				1	21
35											1	4	1	2	1	1	3	3	1	2	2				21
36											1	1	1		1	3	3	5	3	2				1	21
37											1	1	2	1	2	2	1	4	2	2	2				20
38													1	3		2	1		3	1	1	2		2	16
39															2		2	1		1	1		1	1	9
40																		2	1			1	1		5
41																1		1			1				3
42																		1	1						2
43																		1							1
total	3	30	43	48	54	44	36	22	23	6	16	20	13	11	9	14	19	24	19	13	7	3	3	5	485

Table 24b. *Sebastes fasciatus*: age-length key in the 2022 survey.

Male

Length	age																								total
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25+	
15		1																							1
16	2	19																							21
17		10	12																						22
18		6	14	5																					25
19			9	11																					20
20			3	15	5																				23
21			1	15	11																				27
22				4	22	1																			27
23				2	22	4			1																29
24					20	8																			28
25					5	12	4	2				1		1											25
26					1	9	10	4					1	1											26
27						4	4	5	1	1	1	1		1		1		2	1						22
28							2	1	4	3			2	1	1		1	4	3	3		1			26
29								1	2	1		1	2	1	2	5	1	2	3	2	1		1	1	26
30								1	1	1	2	2				1	1	1	2	4		2	2		20
31													2	1	1	1		2	1	2	2	1	1		14
32																2		3	2	1	1	1			10
33													1				1			1					3
34															1										1
total	2	36	39	52	86	38	20	14	9	6	3	5	8	6	5	10	4	14	12	13	4	5	4	1	396

Table 24b (**cont.**) *Sebastes fasciatus*: age-length key in the 2022 survey.

Female

Length	age																								total
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25+	
16	2	17	2																						21
17		10	10	1																					21
18		7	15	1																					23
19		1	13	9																					23
20			3	15	3																				21
21			3	18	4																				25
22				10	12																				22
23				6	17	1	1																		25
24					17	9																			26
25					10	14	1																		25
26					1	14	12																		27
27						10	11	3	1																25
28						4	11	4	3	1	1				1							1			26
29							10	6	3	2			1										1		23
30							1	4	1	3	2	2	1	1					1						16
31								2	6	3	1	3		1					1						17
32								5	3	1		3	3	1			1	2	1						20
33								1	2			5	3	2			1	3	2	1					20
34										1	1	3	1		2	3	2	2	2	3	2				22
35										1	2	1	1	1	1	2	1	3	2	1	1	3		1	21
36												3	1				1		3	1	1	1	2		13
37														1		1	2	2	1	1	1	3	1	1	14
38														1	1	2	1		1	1		1			8
39													1						1					1	3
40																			1			1	1	1	4
41																					1				1
42																									0
43																			1						1
total	2	35	46	60	64	52	47	25	19	12	7	20	12	8	5	8	9	12	17	8	6	10	5	4	493

Table 25. Redfish (*Sebastes fasciatus*) length frequencies ('000) in the 2022 survey.

length	male	female	length	male	female	length	male	female
14		30	26	10350	4230	38	10	260
15	20	210	27	12150	5000	39		250
16	7510	5800	28	17460	3680	40		120
17	8720	7460	29	10790	5330	41		150
18	7860	8120	30	8270	4950	42		110
19	6290	6630	31	3140	3620	43		50
20	8510	7450	32	1090	5290	44		
21	9010	7200	33	230	5280	45		
22	9400	8990	34	40	4550	46		
23	8600	7010	35	30	3510	47		80
24	9280	6830	36		2540			
25	8750	5920	37	10	1720	Total	147520	122370

Table 26a. *Sebastes fasciatus*: frequency at age ('000) by strata in the 2021 survey.

age	Strata																			mean	
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	18	19	20	29	total	Weight	Length
1																						
2		40		30	140	70	40	10	170	120												
3	40	900	10	460	2340	1790	920	140	3740	3270	20	10	30	10						630	63	16
4	40	1390	10	600	3650	3600	1410	240	6800	6020	60	30	130	40		10				13700	75	17
5	10	1160	10	450	3460	4600	2000	430	8030	6500	130	80	480	120	10	30	10			24040	97	18
6		430	10	260	1310	3240	1890	1210	4790	3640	190	180	1360	260	10	40	20			27510	130	20
7		170		120	340	2320	2500	2400	3900	2360	1070	700	1360	370	10	10	10			18830	189	23
8		80		40	140	1140	1480	1590	2390	1080	730	490	650	210	10					17660	272	26
9		40		10	50	840	1250	1530	1950	510	950	770	580	170						10020	313	27
10		40		10	50	650	950	1370	2040	560	600	370	390	130						8680	399	29
11		20			10	300	500	620	730	150	430	310	210	70						7160	393	29
12		10			20	280	460	790	860	130	210	160	160	70						3370	399	29
13		10			10	440	760	1280	1640	250	760	480	360	180						3140	510	31
14		10		10	10	530	650	990	1430	300	790	570	360	200						6160	515	32
15					10	150	230	420	510	80	260	180	160	100						5860	468	30
16						130	180	360	410	60	260	170	270	110						2110	556	32
17						140	250	430	570	60	270	120	130	140						1960	584	33
18		10		10	10	580	780	1150	1530	280	890	640	600	290						2100	642	34
19		10		10	20	550	690	890	1300	270	980	680	680	360						6780	507	31
20		10			10	340	430	650	890	130	470	350	380	190						6430	533	32
21					10	350	420	700	1050	180	680	510	460	240						3850	547	32
22		10				190	210	260	320	60	350	260	180	150						4600	532	32
23						20	10	30	10		40	50	120	50						2000	520	31
24						40	50	80	100	10	60	60	40	60						320	695	35
25+						130	160	200	320	60	250	240	220	130						520	596	33
Sets	3	6	2	6	5	9	7	3	11	9	8	3	7	8	2	2	3	1	1	1710	534	32
n	100	4340	60	2030	11570	22410	18230	17740	45500	26090	10480	7420	9300	3660	40	100	60	10	10	96	286	

Table 26b. *Sebastes fasciatus*: frequency at age ('000) by strata in the 2022 survey.

age	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	28	33	total	Weight	Length
1																							
2			0	20	30	50	40	80	740	260	10	10		10	0								
3		110	10	320	520	1440	1300	1710	11570	5730	110	270		260	10						1270	63	16
4	0		10	390	450	2800	2360	2700	10220	7500	170	610		560	10			0			23660	73	17
5			0	490	320	4930	3070	5400	9250	8580	320	1590		1410	0		20	20	0		28500	95	18
6			0	420	270	7510	4010	8670	7550	9430	1060	2350	2910	2880	0		100	100	0		37150	136	20
7			0	130	80	4390	1850	5140	2990	3640	1340	1360	1810	1960	10		100	50	0		47360	189	23
8			0		30	3400	1080	3550	1930	2330	1350	1140	1440	1240	20	10	70	40			24910	259	25
9						2800	540	2090	1330	1680	1130	660	1120	920	10		30	10			17720	313	27
10						2210	420	1030	800	1340	1000	520	900	740	10			10			12360	372	28
11						1570	290	790	580	780	730	350	640	450	0						9010	404	29
12						910	100	370	290	290	330	130	250	210	0						6210	411	29
13						1930	240	830	620	860	840	290	540	710	0						2890	456	30
14						1570	280	570	380	750	800	320	560	620	0						6890	508	31
15						1020	200	530	370	550	540	230	400	380	0						5870	468	30
16						640	150	190	100	280	440	210	260	240	0						4250	426	29
17						1450	220	300	190	380	840	330	460	440	0						2520	458	30
18							150	250	150	330	540	190	260	330	0						4630	471	31
19						2280	420	800	440	920	1280	520	780	810	10						3160	531	32
20							360	710	450	820	1360	490	740	780	10						8290	451	30
21							340	470	210	550	1020	410	630	680	10						8050	482	31
22							100	120	70	140	400	110	180	220	0						6540	461	30
23							150	200	120	270	560	160	220	320	0						2020	612	33
24							80		80	150	360	120	190	250	0						3100	540	32
25+							40	20	30	80	210	50	60	70	0						2240	513	31
Sets	2	6	1	6	6	9	7	3	11	9	8	3	7	9	4	2	2	5	2	1	820	602	33
n	10	390	20	1970	1710	49250	17800	36660	50450	47650	16710	12440	16980	16470	110	50	380	320	20	20	1030	263	

Table 27. Juvenile redfish (*Sebastes sp.*) mean catch per haul and the estimated biomass by stratum, and their standard error in the 2022 survey.

	area	tow	catch (kg)		Biomass (t.)	
stratum	sq. miles	number	mean	s. e.	value	s.e.
1	342	4	0.12	0.07	3	2
2	838	10	0.11	0.05	7	3
3	628	7	1.51	0.75	72	36
4	348	4	0.14	0.05	4	1
5	703	8	0.96	0.40	52	21
6	496	6	7.58	3.10	287	117
7	822	9	16.91	5.62	1059	352
8	646	7	6.39	2.12	314	104
9	314	3	9.94	7.96	238	190
10	951	11	32.85	15.38	2380	1115
11	806	9	31.83	12.08	1954	742
12	670	8	4.74	1.66	242	85
13	249	3	11.11	10.15	211	193
14	602	7	0.30	0.12	14	6
15	666	9	0.72	0.40	36	20
16	634	7	0.04	0.04	2	1
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	**182**	**5.62**	**1.16**	**6876**	**1423**
Total <730 m.	10555	**121**	**8.56**	**1.77**	**6876**	**1423**

Table 28. Juvenile redfish (*Sebastes sp*.) length frequency ('000) in the 2022 survey.

length	Ind	Males	length	Ind	Males
5	10		12	17500	
6	90		13	46430	
7	100		14	44890	40
8	2700		15	28960	40
9	29200		16	6340	40
10	46180				
11	16290		Total	238690	120

Table 29. Greenland halibut (*Reinhardtius hippoglossoides*) mean catch per haul by strata and the estimated biomass with their standard errors in the 2022 survey.

	Area	tow	catch (Kg)		Biomass (t.)	
stratum	sq. miles	number	mean	s.e	value	s.e.
1	342	4				
2	838	10				
3	628	7	0.18	0.18	8	8
4	348	4				
5	703	8				
6	496	6	0.12	0.12	5	5
7	822	9				
8	646	7				
9	314	3	0.40	0.40	9	9
10	951	11				
11	806	9	0.23	0.23	14	14
12	670	8	3.34	1.70	171	87
13	249	3	2.64	2.64	50	50
14	602	7	2.59	1.42	119	65
15	666	9	5.99	2.56	303	130
16	634	7	39.15	7.18	1891	347
17	216	2	28.88	2.59	475	43
18	210	2	25.55	12.69	409	203
19	414	5	24.45	4.73	771	149
20	525	6	20.81	3.83	833	153
21	517	6	22.21	3.89	875	153
22	533	6	19.06	3.69	774	150
23	284	3	13.34	0.51	289	11
24	253	3	31.75	19.78	612	381
25	226	3	21.65	0.86	373	15
28	530	6	30.82	4.22	1245	170
29	488	6	34.30	5.30	1276	197
30	1134	11	41.76	9.45	3608	817
31	203	2	31.19	5.95	482	92
32	238	2	46.41	1.96	842	36
33	98	2	18.95	14.96	142	112
34	486	5	25.76	6.55	954	242
Total < 1460 m.	16070	182	5.25	0.58	4226	466
Total < 730 m.	10555	182	13.49	0.91	16527	1117

Table 30. Greenland halibut (*Reinhardtius hippoglossoides*) biomass (t.) by strata in 1988-2022 surveys.

Strata	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		2
2	0	3	6	0	0	0	0	121	0	2	6	3	0	15	10	0	14
3	26	31	8	8	18	3	0	21	108	90	367	347	244	384	140	55	852
4	144	20	0	15	27	10	0	5	0	23	41	197	207	157	58	105	348
5	74	98	0	28	42	1	2	21	36	98	173	409	307	268	66	92	253
6	31	18	15	12	8	15	0	31	106	228	361	301	178	265	104	21	466
7	85	63	58	189	246	94	214	904	1148	1423	2607	2356	1570	982	429	414	1032
8	151	222	62	180	379	140	46	333	359	1065	989	1993	1317	1124	878	507	811
9	180	165	53	76	323	30	43	178	160	254	471	354	245	355	138	140	464
10	108	82	58	172	362	31	235	526	716	862	1369	1528	1602	1743	744	286	754
11	45	61	22	106	229	234	236	492	671	627	1227	1320	1088	1021	338	277	631
12	405	647	288	761	619	933	1219	1147	2124	2248	3077	3661	2174	1582	1086	673	902
13	64	124	218	44	24	143	152	127	298	484	554	978	382	291	521	61	447
14	368	302	284	787	847	0	620	410	902	1589	1461	1080	491	877	1081	885	1659
15	435	169	525	973	643	1378	1492	1768	1448	2689	4055	2987	2687	1616	1233	607	1084
16	1374	1363	2543	2527	1827	2175	1524	1861	2098	1770	3356	1143	2016	1328	2182	633	1166
17	266	120	127	415	40	0	742	742	258	525	737	603	498	170	204	148	223
18	106	50	506	354	58	0	386	958	191	557	775	932	179	574	694	1062	578
19	3064	934	1026	1522	3036	1342	1126	1230	971	1564	2603	1015	1774	1120	2194	248	608
20																	1647
21																	906
22																	607
23																	407
24																	208
25																	2377
28																	1614
29																	2300
30																	2025
31																	546
32																	598
33																	358
34																	2675
Total (1-19)	6926	4472	5799	8169	8728	6529	8037	10875	11594	16098	24229	21207	16959	13872	12100	6214	12288
s.e. (1-19)	768	392	809	817	1389	956	678	1226	882	1136	1348	1520	923	776	662	611	796
Total (1-34)																	
s.e. total (1-34)																	

Table 30 (cont.) Greenland halibut (*Reinhardtius hippoglossoides*) biomass (t.) by strata in 1988-2022 surveys.

Strata	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
1																		
2	7	9													1			
3	416	324	22		4	7						0	1	4	5	0	3	8
4	91	182	8									0		12				
5	280	231	92	14	7		6			0	6		2	4	0			
6	332	61	75	8					0	2	1	8		3	6	12	8	5
7	596	778	729	524	11	15	3		4	9	12	21	9	18	39	47	4	
8	934	910	432	226	31	0		0				15	2	20	12	16		
9	91	550	487	401	31	0			10						6	47		9
10	1059	851	559	777	25	19	5				1	1	23	11	26	15	0	
11	1063	290	504	563	21	32	1	9	2	3		17	8	17	11	18	6	14
12	1020	978	1246	1393	1217	743	126	332	140	239	522	133	282	218	363	999	491	171
13	311	219	392	431	217	273	33	19			80	26	9	98	129	378	4	50
14	618	573	878	1023	742	62	35	256	28	22	22	89	121	131	169	285	190	119
15	1747	1783	3041	1621	771	1224	112	111	89	119	241	49	171	81	476	1136	167	303
16	1357	1752	2264	1623	2186	2079	1892	1911	1038	2165	3049	2188	3921	1772	2179	1762	2773	1891
17	429	639	407	411	558	446		401	170	298	395	682	562	369	208	625	788	475
18	434	606	864	944	540	526	563	325	395	696	687	277	74	308	249	497	171	409
19	915	971	1042	2035	1414	1231	3700	927	924	1615	1560	2633	2447	2510	1617	812	1268	771
20	1061	666	2041	4119	1856	1490	2471	2381	1858	3556	2536	1904	4109	3498	1490	1081	1027	833
21	345	359	742	2161	1569	1366	1257	1496	1952	1210	4577	1058	3080	1809	714	796	784	875
22	510	845	551	883	1971	2411	1226	714	1220	1201	4707	1901	3530	1741	730	188	859	774
23	42	130	495	1144	474	715	464	281	534	576	1623	677	1579	956	392	294	361	289
24	328	555	588	1082	1185	460	1749	652	379	540	846	1082	796	430	813	455	476	612
25	993	322	436	441	732	473	593	459	392	968	450	506	1127	380	352	478	396	373
28	1162	1239	2857	3920	3153	1994	4188	2244	2150	1955	5627	2920	7414	4914	1629	890	1703	1245
29	1330	674	1487	3335	2618	2091	2044	2238	2060	4603	7198	3038	6525	4561	1956	684	2260	1276
30	602	2771	4719	5067	7692	5381	5061	4737	4684	3916	14974	5662	8756	7340	3933	2438	2418	3608
31	186	354	347	385	944	319	414	82	461	754	1631	659	1393	563	374	32	279	482
32	596	1357	1040	1755	2391	1539	1916	1097	1244	2610	4308	2588	2597	2101	1375	1208	2102	842
33	147	607	166	698	309	408	707	320	594	474	542	678	597	250	333	425	248	142
34	1461	1886	2222	2627	3377	1790	3454	2514	3063	1756	2585	5831	3101	2362	1085	575	1185	954
Total (1-19)	11701	11709	13044	11990	7777	6659	6475	4291	2801	5168	6576	6139	7633	5578	5496	6649	5872	4226
s.e. (1-19)	627	611	1576	1182	724	812	2744	338	352	542	1246	802	812	691	398	790	553	466
Total (1-34)	20459	23471	30732	39609	36046	27096	32019	23506	23398	29288	58180	34642	52237	36482	20673	16194	19969	16527
s.e. total (1-34)	918	1237	2510	2620	3073	1788	3857	1414	1843	16736	4046	3454	3263	2152	1266	1145	1036	1117
total_700-1400	8761	11765	17690	27615	28270	20438	25545	19214	20589	24121	51604	28503	44604	30904	15177	9545	14097	12302
s.e._700-1400	664	1080	1958	2349	2988	1597	2721	1375	1816	1802	3849	3360	3161	2038	1201	829	877	1015

Table 31. Greenland halibut (*Reinhardtius hippoglossoides*) age-length key in the 2022 survey.

MALE

Length	age																total
cm	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	
24-25			1														1
26-27																	0
28-29			2	1													3
30-31			2	4													6
32-33				6	1												7
34-35				1	8												9
36-37				2	18	2											22
38-39					14	9											23
40-41					11	10											21
42-43					5	16											21
44-45					2	18											20
46-47					2	19	3										24
48-49					1	10	13										24
50-51						2	17	3									22
52-53						1	14	6	3								24
54-55							9	10	2								21
56-57							1	8	1								10
58-59								1	1	2							4
60-61									2	1							3
62-63										1							1
total:			5	14	62	87	57	28	9	4							266

Table 31 (**cont.**) Greenland halibut (*Reinhardtius hippoglossoides*) age-length key in the 2022 survey.

FEMALE

length	age																
cm	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	total
14-15	1																1
16-17																	0
18-19																	0
20-21																	0
22-23																	0
24-25			1														1
26-27																	0
28-29				1													1
30-31				2													2
32-33				4													4
34-35				3	3	1											7
36-37				2	12												14
38-39					17	5											22
40-41					10	11											21
42-43					5	15											20
44-45						22	1										23
46-47						18	3										21
48-49						13	13										26
50-51						4	16	1									21
52-53							17	6									23
54-55							8	12	4								24
56-57							6	6	8	2							22
58-59								7	6	6	2						21
60-61									6	10	4	1	1				22
62-63									1	7	11	3					22
64-65										11	4	5					20
66-67										2	6	5	6				19
68-69											6	6	5	3			20
70-71											1	1	4	4			10
72-73												2	1	1	2		6
74-75												1	2	1	2	1	7
76-77														1	2		3
78-79														1	1	3	5
80-81																1	1
82-83																2	2
84-85																	0
86-87																2	2
88-89																1	1
total:	1		1	12	47	89	64	32	25	38	34	24	19	11	7	10	414

Table 32. Greenland halibut (*Reinhardtius hippoglossoides*) length frequency ('000) in the 2022 survey.

depths < 730 m

length	male	female	length	male	female	length	male	female
14-15		7	34-35	60	38	54-55	62	148
16-17			36-37	167	95	56-57	28	87
18-19			38-39	231	176	58-59	15	45
20-21			40-41	326	310	60-61		24
22-23			42-43	244	402	62-63		24
24-25	8		44-45	353	461	64-65		8
26-27		8	46-47	231	511	66-67		
28-29	14	8	48-49	197	360	68-69		8
30-31	30	17	50-51	168	285			
32-33	38	24	52-53	68	179	total	2239	3221

depths < 1460 m

length	male	female	length	male	female	length	male	female
14-15		7	42-43	578	904	70-71		96
16-17			44-45	792	1086	72-73		51
18-19			46-47	854	1264	74-75		78
20-21			48-49	530	1093	76-77		25
22-23			50-51	409	869	78-79		38
24-25	8	11	52-53	287	651	80-81		10
26-27		8	54-55	265	615	82-83		16
28-29	24	7	56-57	87	489	84-85		
30-31	66	17	58-59	60	487	86-87		17
32-33	57	40	60-61	23	376	88-89		8
34-35	80	52	62-63	8	327			
36-37	286	165	64-65		281			
38-39	361	340	66-67		222			
40-41	587	595	68-69		202	total	5362	10447

Table 33. Greenland halibut (*Reinhardtius hippoglossoides*) frequency at age ('000) and strata in the 2022 survey.

	Stratum																											Mean	
age	3	6	9	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	28	29	30	31	32	33	34	total	Weight (g)	Length (cm)
1				7																						7	22	15
2																												
3								4	20			2	3								6		21			57	174	28
4					1	1	3	7	97	14	10	25	6		1		4		2	8	34		28		5	246	283	33
5					30	9	41	112	526	80	58	252	62	52	38	6	74	9	109	92	291	14	124	13	93	2086	517	40
6	4	6		7	93	19	63	228	1162	300	237	552	280	206	175	77	242	63	479	382	904	94	285	60	536	6455	743	45
7	4		4	3	54	18	22	58	445	131	97	200	207	128	113	33	164	68	317	251	534	84	121	30	176	3261	1085	51
8			4	4	14	8	5	21	118	39	23	34	90	72	50	11	70	43	115	93	215	27	43	12	42	1154	1381	55
9			1	1	2	1	1	6	51	17	11	8	54	43	29	13	35	23	65	56	142	13	27	6	36	637	1591	57
10								2	37	6	6	1	41	57	39	20	18	25	55	62	213	22	46	3	29	682	1960	61
11								1	17	2	5		23	44	20	14	8	16	38	48	169	23	35	2	12	475	2214	64
12									7		1		8	24	13	10	1	6	20	31	116	10	25	1	13	289	2520	66
13									3				8	16	13	5	1	3	9	29	82	10	20	1	8	207	2776	68
14									1				3	4	10	1		3	3	18	40	3	11	1	7	104	3198	72
15													5		5			3			27	6	3	1	14	63	3682	75
16+														8	27	8		8			19	13	2	1		85	4814	81
Sets	1	1	1	2	5	1	5	8	7	2	2	5	6	6	6	3	3	3	6	6	11	2	2	2	5	101	1061	
n	7	7	8	21	194	55	136	436	2483	588	449	1075	789	655	535	201	618	268	1211	1069	2792	319	789	131	970	15807	16768	48.8

Table 34. Greenland halibut (*Reinhardtius hippoglossoides*) abundance at age ('000) in the 1991-2022 surveys.

<730 m. strata (1-19)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
1	1302	1677	1423	1429	9978	4699	2674	2200	852	3014	6459	3282	1768	1762	437
2	207	1260	1245	996	2045	6408	3036	1716	563	235	1153	2364	804	2644	652
3	348	447	777	1365	1793	1942	4822	6180	2419	479	1456	2248	489	3517	2554
4	1054	1023	692	1435	1535	2442	5225	8843	8419	1741	799	1342	1217	1585	2007
5	2307	1852	1021	1545	2136	3380	5714	9919	10787	5703	2242	3045	1991	5601	5537
6	1291	2249	1545	2385	4099	4680	6800	9085	10119	11336	6262	4498	2362	6271	6105
7	2212	1947	1627	2139	3029	2001	4014	6304	4467	4346	5328	4610	1552	2040	2345
8	534	1054	1266	1180	1706	1299	1731	2108	1466	1865	2584	1025	375	518	491
9	462	468	776	631	1052	341	528	600	280	361	147	104	105	233	89
10	352	273	213	219	209	70	177	157	82	92	36	48	79	107	97
11	141	138	104	90	53	21	23	27	6	44	5	16	15	63	44
12	12	67	38	47	18	31	17	6	3	0	0	6	4	38	15
13	0	25	21	18	0	0	17	16	3	0	0	0	0	5	3
14	0	12	9	0	5	4	0	0	5	0	0	0	0	3	3
15	15	0	0	0	0	5	6	0	0	0	0	0	0	3	3
16+	8	0	0	0	0	0	9	0	0	0	0	0	0	3	3
Total	10245	12490	10757	13479	27659	27323	34792	47160	39470	29216	26471	22587	10762	24390	20374
Freq 10+	528	515	385	374	285	131	249	206	99	136	41	70	98	222	168

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
1	550	301	157	61	38			6	20	40	211	924	369	458	60	22	7
2	312	64	78	7	9		8			13	15	41	221	287	147		
3	525	455	121	30	29		36	4	3		7	21	255	226	372	28	27
4	949	275	155	81	47	60	87	112	97	48	3	78	84	381	528	391	156
5	4800	2765	1203	606	894	880	822	643	1089	719	264	1067	1136	1655	2295	1807	1108
6	6002	5928	4586	2905	2469	2930	1827	1733	2315	3440	1826	3071	2705	2346	3307	3430	2671
7	2665	4632	4950	3255	2365	2850	1406	718	1566	2091	2256	2867	1687	1440	1323	1279	1036
8	623	1217	909	713	715	570	349	158	283	493	733	735	502	413	305	305	269
9	180	247	283	153	259	160	112	39	63	120	219	225	149	205	238	157	98
10	143	165	210	215	137	110	83	44	66	115	123	160	147	102	175	90	51
11	103	62	100	62	50		54	12	22	50	64	56	47	40	59	42	24
12	45	38	43	47	22	10	15	10	9	12	27	18	16	10	38	24	9
13	10	5	18	35	10		10	6	12	2	17	18	5	7	11	9	3
14		2	10	12	2		10	2	6		5	4	6	1	5	3	1
15			4	0			3	4	3		3			1			
16+			1	0			6	1	2		2			1			
Total	16907	16156	12825	8182	7046	7420	4823	3492	5156	7143	5775	9284	7330	7573	8863	7587	5460
Freq 10+	301	272	386	371	221	120	181	79	54	179	241	256	221	162	288	168	88

Table 34 (cont.) Greenland halibut (*Reinhardtius hippoglossoides*) abundance at age ('000) in the 1991-2022 surveys.

< 1460 m. strata (1-34)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
1	1710	438	550	310	160	60	38			6	20	40	210	926	369	458	66	22	7
2	2680	652	320	60	80	10	9		8			10	20	41	232	287	151		
3	3580	2561	540	480	120	40	29	10	46	15	8	10	10	28	259	240	380	31	57
4	1880	2117	1110	360	200	100	137	110	200	393	200	150	10	363	152	758	621	482	246
5	8330	6470	7160	4700	2480	1380	2447	2270	2964	2583	3405	3110	710	5134	2610	3738	3393	3126	2086
6	11210	8314	10480	11130	11020	8330	7356	8200	7073	8608	9839	18180	5970	14080	7333	5408	5764	7344	6455
7	6060	4182	5730	10490	15340	13990	9587	10390	6124	5538	8415	17190	11310	15536	8776	4204	2835	3809	3261
8	1790	1206	1700	3530	3890	4340	3063	3140	2349	2005	1989	5650	4820	5902	3787	1611	887	1267	1154
9	890	318	510	880	1400	1140	1200	1360	920	643	548	2040	1800	2586	1933	1105	815	829	637
10	450	500	440	720	1060	1260	1019	1490	906	1026	780	1730	1300	2158	2671	1057	729	850	682
11	320	282	370	370	540	440	383	560	587	412	406	960	660	845	1129	620	387	485	475
12	200	161	180	210	300	340	213	320	233	349	182	360	280	333	647	252	248	326	289
13	180	74	60	80	160	310	151	270	126	153	235	210	190	382	364	121	201	217	207
14	70	47	30	60	120	170	114	140	114	73	131	230	100	115	232	98	140	169	104
15	80	9	10	20	80	50	59	50	75	103	55	150	80	152	122	93	46	68	63
16+	60	9	10	10	70	70	55	40	140	94	81	120	90	194	101	118	64	83	85
Total	39490	27340	29200	33410	37020	32030	25860	28350	21865	22002	26294	50140	27560	48774	30717	20168	16727	19108	15808
Freq 10+	1360	1082	1100	1470	2330	2640	1994	2870	2181	2210	1870	3760	2700	4178	5266	2359	1815	2198	1905

Table 35. Roughhead grenadier (*Macrourus berglax*) mean catch per haul by strata and the estimated biomass with their standard errors in the 2022 survey.

stratum	Area sq. miles	tow number	catch per tow (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				
11	806	9				
12	670	8	0.33	0.18	17	8
13	249	3	0.40	0.30	8	6
14	602	7	1.10	0.63	50	29
15	666	9	0.26	0.14	14	7
16	634	7	3.62	0.96	175	47
17	216	2	4.90	1.07	81	18
18	210	2	8.14	4.97	130	79
19	414	5	2.28	0.96	72	30
20	525	6	1.28	0.70	51	28
21	517	6	6.39	2.78	251	109
22	533	6	7.54	1.91	306	78
23	284	3	8.98	2.57	194	56
24	253	3	2.26	0.39	44	8
25	226	3	30.89	25.62	532	441
28	530	6	1.75	0.72	70	29
29	488	6	6.90	2.78	256	104
30	1134	11	9.96	1.96	860	169
31	203	2	13.53	4.88	209	76
32	238	2	4.10	0.91	74	17
33	98	2	3.80	2.92	28	22
34	486	5	8.02	3.13	297	116
Total < 1460 m.	16070	**182**	**3.05**	**0.44**	**3720**	**536**
Total <740 m.	10555	**121**	**0.68**	**0.12**	**546**	**103**

Table 36. Roughhead grenadier (*Macrourus berglax*) biomass by strata in 1988-2022 surveys.

Stratum	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1																	
2								8									
3																	10
4																9	
5																	
6									22								
7					0								3	0		0	10
8		10		1					11	3		7		16	2	13	28
9	47	4		5	28	21	3	21	153	18	40	45	29	29		30	282
10	1								6	1		18	68	18		0	48
11												3	8	6			3
12	112	103	40	108	100	413	55	126	46	137	55	191	81	236	154	165	292
13	21	64	18	18	60	18	32	75	5	18	78	92	50	116	121	123	299
14	200	145	107	85	139		73	67	270	77	194	135	103	292	124	346	877
15	92	5	29	64	52	321	82	180	84	69	101	72	103	60	16	87	259
16	349	140	212	229	432	1333	523	256	397	211	405	150	225	338	272	352	594
17	134	45	31	180	123		98	129	27	116	204	96	67	370	380	101	244
18	311	128	143	356	215		756	414	154	224	189	313	219	383	27	877	423
19	743	227	273	289	429	915	352	282	187	322	424	129	92	216	116	245	228
20																	419
21																	1432
22																	1095
23																	897
24																	137
25																	344
28																	425
29																	3113
30																	3553
31																	650
32																	274
33																	118
34																	1131
total (1-19)	2009	871	852	1335	1577	3021	1975	1558	1362	1197	1691	1250	1047	2079	1211	2348	3597
s.e. (1-19)	264	142	149	250	270	487	169	223	277	169	243	338	196	284	176	611	362
total																	17184
s.e. total (1-34)																	1616

Table 36 (cont.) Roughhead grenadier (*Macrourus berglax*) biomass by strata in 1988-2022 surveys.

Stratum	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
1																		
2																		
3																		
4																		
5																		
6																		
7																		
8	65	13																
9	82	181	17	39												3		
10	38	21											0	0				
11	2																	
12	207	97	22	92	73	60	0	27	39	17	14	29	34	35	35	50	37	17
13	94	154	80	108	25	97	43	6			0	2	15	12	20	57	39	8
14	379	362	223	539	1	3	10	67	28	14	27	42	70	19	4	30	79	50
15	16	85	55	12		132	8		34	4	14	20	15	38	85	40	28	14
16	426	1391	242	493	213	79	112	134	122	102	26	80	108	125	62	90	46	175
17	124	603	70	385	40	278	38	111	134	52	142	62	77	110	123	89	129	81
18	588	435	491	610	194	685	445	235	422	173	202	100	227	195	178	139	172	130
19	366	592	167	683	235	69	73	32	29	36	51	37	70	91	84	126	169	72
20	182	353	144	269	130	355	78	88	47	101	25	120	94	55	263	199	73	51
21	996	763	755	1114	528	1135	1606	768	299	375	198	394	349	399	405	439	319	251
22	1115	1545	608	1735	1216	967	1610	945	537	747	658	669	548	376	906	712	490	306
23	463	342	332	399	305	388	506	325	382	168	251	259	113	264	229	141	175	194
24	1030	419	165	152	146	207	222	218	97	160	87	53	158	278	135	97	164	44
25	870	817	197	391	362	149	98	146	260	326	226	100	1093	276	668	125	280	532
28	695	610	299	360	273	338	137	68	70	29	57	89	184	141	57	90	62	70
29	1012	445	527	555	424	509	163	309	200	437	265	154	275	340	347	615	204	256
30	2869	1108	2139	3356	2560	2816	2965	1582	1224	836	887	1137	1023	1217	2313	717	883	860
31	327	235	242	176	225	107	295	137	60	199	270	153	113	123	127	35	168	209
32	267	132	86	222	197	242	172	63	100	80	117	92	361	94	264	100	98	74
33	17	122	105	38	12	57	112	54	22	42	39	89	43	28	40	27	72	28
34	330	511	305	410	144	419	145	162	191	212	146	154	171	159	155	115	278	297
total (1-19)	2387	3933	1367	2961	782	1403	729	612	807	399	478	373	616	625	590	624	699	546
s.e. (1-19)	281	700	314	611	209	201	409	258	141	113	147	86	143	142	201	187	131	103
total	12560	11336	7270	12139	7304	9091	8838	5476	4298	4111	3702	3836	5141	4375	6500	4037	3964	3720
s.e. total (1-34)	1420	1167	808	659	478	930	1212	678	475	407	300	403	914	356	1318	1318	395	536

Table 37. Roughhead grenadier (*Macrourus berglax*) age-length key in the 2022 survey.

MALE

Length	age																total
cm	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	
3	4	1															5
4	1	3															4
5		1	1														2
6		5	3														8
7		4	4														8
8			13														13
9			6	3													9
10			1	9	1												11
11			1	5	6												12
12				5	16	3											24
13				1	13	7											21
14					3	14	3										20
15					1	13	9	1									24
16							13	9									22
17							7	16	3								26
18								8	11	4							23
19								3	11	6	1						21
20									4	6							10
21										4	6	1					11
22										1	5	3					9
23												3	3	1	1		8
24													1				1
25													1	1		1	3
26																	0
27																	0
28																	0
29																	0
30																	0
31																	0
32																	0
33																	0
34																1	1
total	5	14	29	23	40	37	32	37	29	21	12	7	5	2	1	2	296

Table 37 (cont.) Roughhead grenadier (*Macrourus berglax*) age-length key in the 2022 survey.

FEMALE

Length	age																total
cm	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	
3		1															1
4		2															2
5		1															1
6		3															3
7		1	6														7
8			14														14
9			8	3													11
10			1	3	1												5
11				9	2												11
12				1	7	1											9
13					13	3											16
14					11	9	2	1									23
15					1	10	12	1									24
16						2	7	9									18
17							3	8	2	1							14
18							2	10	6	2							20
19								1	9	4							14
20									7	12	2						21
21										4	6	1					11
22										2	13						15
23										1	3	5	1				10
24											1	5	5	1			12
25												1	8	3	1	1	14
26												1	6	3	5		15
27													1	5	4	2	12
28														1	1	5	7
29															2	4	6
30															3	5	8
31																5	5
32																6	6
33																2	2
34																2	2
35																3	3
36																2	2
37																	0
38																	0
39																	0
40																	0
41																	0
42																	0
43																2	2
total	0	8	29	16	35	25	26	30	24	26	25	13	21	13	16	39	346

Table 38. Roughhead grenadier (*Macrourus berglax*) length frequency ('000) in the 2022 survey.

depths < 730 m. strata (1-19)

length	indet.	male	female	length	indet.	male	female	length	indet.	male	female
3		24	7	15		17	23	27			24
4				16		49	22	28			8
5		17	6	17		25	15	29			15
6				18		31	38	30			
7		9	17	19		46	49	31			
8		9	18	20		21	18	32			
9		9	9	21		22	34	33			
10		9		22		36	9	34			
11		9	9	23		7	8	35			8
12		40		24		9					
13		41	25	25			34				
14		41	8	26			24	Total	0	470	426

depths < 1460 m. strata (1-34)

length	indet.	male	female	length	indet.	male	female	length	indet.	male	female
3	28	40	7	18		376	175	33			23
4	22	34	16	19		253	143	34		8	21
5		17	6	20		87	171	35			22
6		69	24	21		93	94	36			16
7		65	57	22		70	125	37			
8		107	116	23		57	69	38			
9		70	95	24		15	91	39			
10		91	49	25		19	113	40			
11		97	84	26		6	100	41			
12		260	72	27			75	42			
13		185	130	28			64	43			18
14		213	205	29			48				
15		334	293	30			50				
16		368	245	31			46				
17		376	118	32			50	Total	50	3311	3028

Table 39. Roughhead grenadier (*Macrourus berglax*) frequency ('000) at age and strata in the 2022 survey.

Age	strata																						total	mean	
	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					12		7			2	10		1			4	4		12		7		59	4	3
2			7	6	8		12		15	37	32		6	12		11	39	6	10		10		210	16	5
3					10	1	57		29	82	62	7	23	20		13	102	16	11	1	49		481	51	8
4		0	2		3	7	22		3	51	27	22	7	34		8	63	14	2	8	61		334	112	11
5		4	10	1	14	1	54	7	13	67	56	17	13	34	8	42	143	57	23	3	122		688	185	13
6		2	11	4	10		42	7	11	70	60	19	4	45	19	68	124	66	21		104		686	258	14
7			20	2	7		34	13	6	57	66	52	2	57	22	62	155	91	42	0	89		778	341	16
8	3		23	4	11	1	34	20	1	46	99	79	7	70	15	52	189	99	49	3	68		871	423	17
9	7		20	8	15	14	27	9	3	40	62	54	3	51	4	41	149	57	16	6	24		609	548	19
10	4	1	17	6	12	18	19	10	4	35	46	50	4	35	1	25	95	35	10	3	24		453	646	20
11	4	4	4	0	15	18	7	12	1	35	35	33	6	29		9	62	12	7	0	14		306	841	22
12	2	2	3		11	3	2	4	1	19	19	3	4	34	1	9	11	11	1	0	8		149	1030	23
13			3		12	18	11	1	5	11	11	7	3	59	7	7	22	11		3	10		199	1245	25
14			1		9	4	8	3	6	3	4	3	2	30	3	5	13	4		4	3		105	1418	26
15			1		12	4	4	5	4	1	5	6	3	26	3	10	22	2		3	7		117	1649	27
16+					20	1	3	6	7	13	24	8	5	65	8	31	110	8		2	30		339	2612	32
Sets	3	2	4	4	7	2	2	5	4	6	6	3	3	3	5	6	11	2	2	2	5		87	551	16.6
n	21	14	122	31	181	89	341	97	107	570	615	360	91	600	92	396	1303	489	203	36	628		6383.6	35150	

Table 40. Roughhead grenadier (*Macrourus berglax*) abundance at age ('000) in the 1994 - 2022 surveys.

<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	2019	2020	2021	2022
1			129		51	15	3	63	39	467	216	109	10	12	5	3	30	18	9	14	16	18	15	34	37		17	8	19
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	95	34	86	79
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	157	49	62	273
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	136	47	50	157
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	138	95	110	361
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	104	65	145	318
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	85	99	124	351
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	73	154	170	362
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	26	127	147	268
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	48	130	80	265
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	46	74	115	238
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	41	46	43	112
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	41	46	40	167
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	35	22	41	93
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	22	4	8	111
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	55	26	18	324
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	1104	1035	1246	3533

Table 40 (cont.). Roughhead grenadier (*Macrourus berglax*) abundance at age ('000) in the 1994 – 2022 surveys.

< 1460 m. strata (1-34)

Age	Year																		
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
1	461	391	34	51	52	19	37	39	52	71	103	70	36	34	49	51	40	57	50
2	856	719	602	81	549	143	125	172	177	178	244	501	648	494	304	316	167	379	219
3	6380	1420	855	222	1086	306	622	395	405	279	221	482	575	863	648	793	402	329	481
4	2989	2303	1532	321	1268	419	616	509	349	320	298	531	818	902	767	1685	489	505	334
5	2576	2425	1399	543	1269	253	755	587	409	316	232	503	697	1303	1181	2023	1136	992	688
6	3062	2695	2316	1063	1578	954	1084	775	348	435	346	657	733	545	879	1487	855	1019	686
7	2552	2069	2351	1209	1954	936	1054	1009	572	533	344	688	713	791	873	1059	719	858	778
8	3215	2418	1184	1285	2010	1680	2392	1466	1052	836	507	593	602	717	1003	963	831	1036	871
9	2670	1442	1737	770	1649	866	1451	1241	919	610	436	449	405	365	554	386	517	756	609
10	2282	1666	1643	1109	1454	476	911	1160	517	638	300	442	347	698	382	451	423	315	453
11	1863	1123	1409	697	1333	824	685	652	650	583	350	295	294	409	234	387	208	338	305
12	1374	676	739	473	626	564	565	660	491	317	441	219	204	299	254	275	149	117	149
13	670	1090	823	412	1170	563	461	516	429	116	350	316	200	357	252	332	142	153	199
14	416	1007	566	432	348	490	510	570	307	247	259	125	214	420	160	271	180	190	112
15	178	298	478	272	718	434	255	460	215	138	237	280	228	256	193	167	125	69	117
16+	1130	1113	1069	944	887	959	692	1044	373	443	372	338	352	468	457	746	464	292	339
total	32674	22855	18737	9884	17951	9886	12215	11255	7265	6059	5039	6487	7066	8920	8190	11391	6846	7405	6390

Table 41. Squid (*Illex illecebrosus*) biomass (t.) by strata and total abundance ('000) in 1988-2022 surveys.

Strata	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
1			15	0	0		17		0		8					5
2	1	0	120	18	12		19		6	8	17	3		0	0	29
3			9	93	1		6		12	3	5	1		1	0	8
4			3	3	4		8		3	1	3	0			0	2
5	1	4	1090	4	20		58	0	26	9	12	3		0	0	81
6		0	468	472	4		10	0	6	8	6	1			0	5
7	1		22	130	1	0	8		5	3	1	1		0	0	22
8			1	29	3	0	8		13	3	8	1		0	0	8
9		1	24	4	3		6		3	4	1				0	2
10	3	4	216	646	17	0	81		28	18	20	3		1	1	25
11			128	40	12		27	0	3	13	4	3		1	0	12
12				1				0	3	1	1	1	1	1	1	6
13				1			8			1	0	0	0		0	0
14			4	22	4		5	0	4	6	4	1		1		10
15			5	13	3		4		1	1	0	1	0	1	1	6
16				4					0	1	1	1	1	1	1	1
17					0		1			0		0	0		1	0
18		0	1		1		4			0	0			0		1
19				3	0		0	0	1	1	1	1	0	1	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	222
s.e. (1-19)	4	4	604	395	18	1	33	1	15	12	12	4	1	3	3	60
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	3898
Abundance (1-34)																

Table 41 (cont.) Squid (*Illex illecebrosus*) biomass (t.) by strata and total abundance ('000) in 1988-2022 surveys.

Strata	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
1	42	2	385	1	7	13	0	1	1					18	0	10			1
2	36	7	1181	10	1736	296	6	14	11				0	383	4	86	4	10	
3	19	2	8	62	66	158	1	1	1		0		0	630	1	33	2	63	
4	51	2	130	0	6	17			1		0		0	31	3	41		1	
5	89	5	1457	40	357	285	3	2	8		0			114	15	22	14		
6	26	4	222	58	37	21	3	3	0					259	2	37	28	16	
7	39	6	28	38	48	34	3	1	1		0		1	294	2	1	10	89	
8	8	1	7	24	38	36	2	4	0		1		0	19	1	43	2	29	
9	25		1	22	16	345		5						10	8	8	1		
10	52	17	26	56	2560	359	16	24	8		0			323	5	28	19	26	1
11	36	13	86	88	104	41	3	28	5		0		1	227	5	20	57	50	0
12	11	1	3	2	2	23			0					0	1	16	1	30	
13	9	1				0								1		5			
14	15	4	1	6	106	52	5	5			0			17	1	5	1	3	
15	3	6	4	3	49	2		0						18	0	5	2	5	2
16	4	4			2	0									0	2		6	0
17	1	2			0		0							4			0		
18	1	0			1	3			1					1					
19	3	2	1		0	1								1		0		1	
20	1	3	0			0									1			6	
21	0		0		1	0												3	
22	0	0	0					0							1			9	
23	1		0																
24	1	1				1									0				
25			1		1	0								0		0			
28	1	0	5			0								2		0		1	
29			2			0			1					3					
30	1		3		1	1			0				1	9				2	
31	1					2													
32			0						0									1	
33	2																		
34	2				4	1			2					2	1	1			0
Total (1-19)	470	79	3541	411	5137	1688	43	89	38		3		3	2350	49	363	142	329	4
s.e. (1-19)	55	8	1244	64	2392	346	7	19	8		1		1	490	6	50	22	41	2
Total (1-34)	479	83	3551	411	5144	1694	43	90	41		3		4	2366	52	365	142	351	4
s.e (1-34)	55	8	1244	64	2392	346	7	19	8		1		1	490	7	50	22	42	2
Abundance (1-19)	4675	1463	28614	5793	48476	23029	616	699	695		83				683	3093	1679	2589	
Abundance (1-34)	4944	1711	28953	5793	48563	23112	616	707	765		83				712	3105	1679	2751	

Table 42. Shrimp (*Pandalus borealis*) total and female biomass by strata (t.) in the 1988 – 2022 surveys.

	Total		Female	
Year	Biomass (t)	Catch per tow (kg)	Biomass (t)	Catch per tow (kg)
1988	5615	6.98	4525	5.63
1989	2252	2.80	1359	1.69
1990	3405	4.23	1363	1.69
1991	11352	14.12	6365	7.91
1992	24508	30.48	15472	19.24
1993	11673	14.52	6923	8.61
1994	3879	4.82	2945	3.66
1995	7276	9.05	4857	6.04
1996	10461	13.01	5132	6.38
1997	7449	9.26	4885	6.07
1998	39367	48.95	11444	14.23
1999	24692	30.70	13669	17.00
2000	19003	23.63	10172	12.65
2001	27204	33.83	13336	16.58
2002	36510	45.40	17091	21.25
2003	21087	26.22	11589	14.41
2004	20182	25.10	12081	15.02
2005	30675	38.14	14381	17.88
2006	16235	20.19	11359	14.27
2007	17046	21.20	12843	15.97
2008	11092	13.79	8630	10.73
2009	2797	3.48	1764	2.19
2010	4894	6.09	3819	4.75
2011	1621	2.02	1132	1.41
2012	1055	1.31	791	0.98
2013	844	1.05	691	0.86
2014	900	1.12	716	0.89
2015	1551	1.93	1079	1.34
2016	2521	3.13	1982	2.46
2017	2885	3.59	2304	2.86
2018	4394	5.31	4051	4.90
2019	9273	11.53	8486	10.60
2020	6734	8.37	6048	7.52
2021	2101	2.61	1792	2.23
2022	862	1.07	705	0.88

Table 43. Shrimp (*Pandalus borealis*) abundance at age ('00000) in the 1988 – 2022 surveys.

Year/Age	1	2	3	4	5	6	7	8	9	10	Total
1988			1363	548	1815	1635	126				5487
1989		8	816	692	193	738	131				2579
1990			3647	389	910	273	10				5229
1991		435	2651	4677	3882	1000	318				12964
1992			3043	4751	13728	1282					22804
1993		7878	3760	2052	4458	492					18640
1994		427	875	726	1806	75					3909
1995		2359	2682	1278	2146	1217					9682
1996		3424	9557	1828	1523	571	437				17339
1997		695	3372	5078	980	258	77	0			10461
1998	1220	56080	38922	13786	5341	2006	145				117501
1999	13	4735	23924	14962	6008	2043	81				51766
2000	94	1148	17135	12744	5342	1651	669				38783
2001	27	3711	18668	17331	13880	3875	7				57500
2002	1806	11004	44684	7167	12874	8003	545				86082
2003	146	13869	16468	5589	9089	2306	49				47516
2004		27415	9603	6425	7831	1330	206				52810
2005		1792	69026	5240	10500	7576	1407				95541
2006		809	18127	10561	7449	3698	616				41260
2007		301	3866	12213	12758	5882	1287				36306
2008		473	4708	5027	6865	4013	282				21367
2009	6	1506	1783	1236	1004	241	70				5846
2010	77	1106	4185	2747	243	0	0				8358
2011	2	611	893	1063	330	3					2903
2012		216	889	536	148	5					1795
2013	10	63	186	606	377	42					1284
2014	0	15	338	180	689	179					1401
2015		1090	393	916	151	159					2710
2016	2	230	1089	2141	492	61					4014
2017		662	1100	2018	612	25					4418
2018		1048	2479	1939	1558	37					7061
2019	9	1010	5923	5445	1439	42	21	8	0	14	13911
2020		1449	2598	5723	1746	152	0				11666
2021		125	1702	1620	707	39					4193
2022	0	61	552	1055	218	60					1945

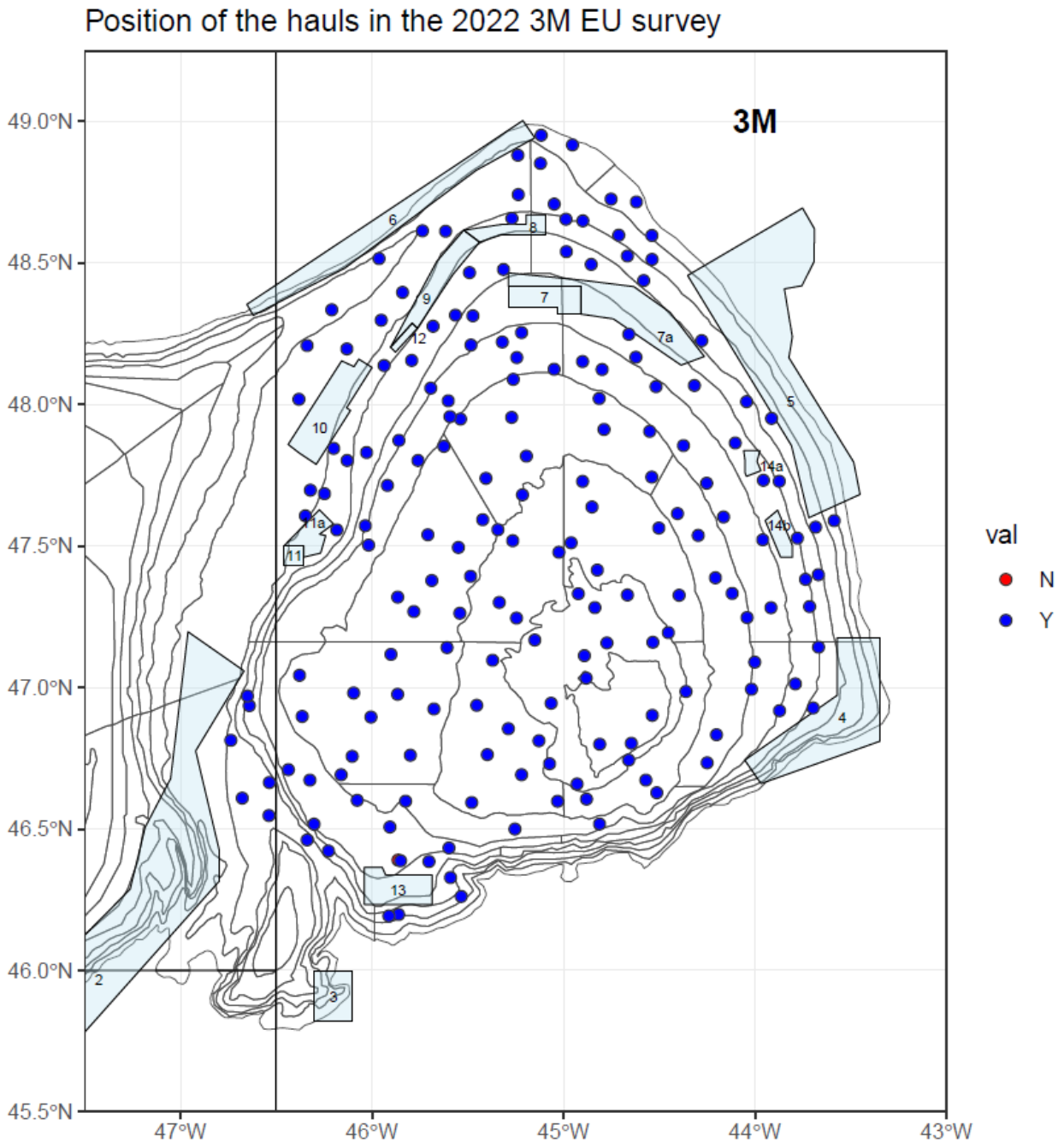

Figure 1. Haul positions in the Flemish Cap survey 2022. Coral and sponge protection areas (blue shaded) are displayed in the map.

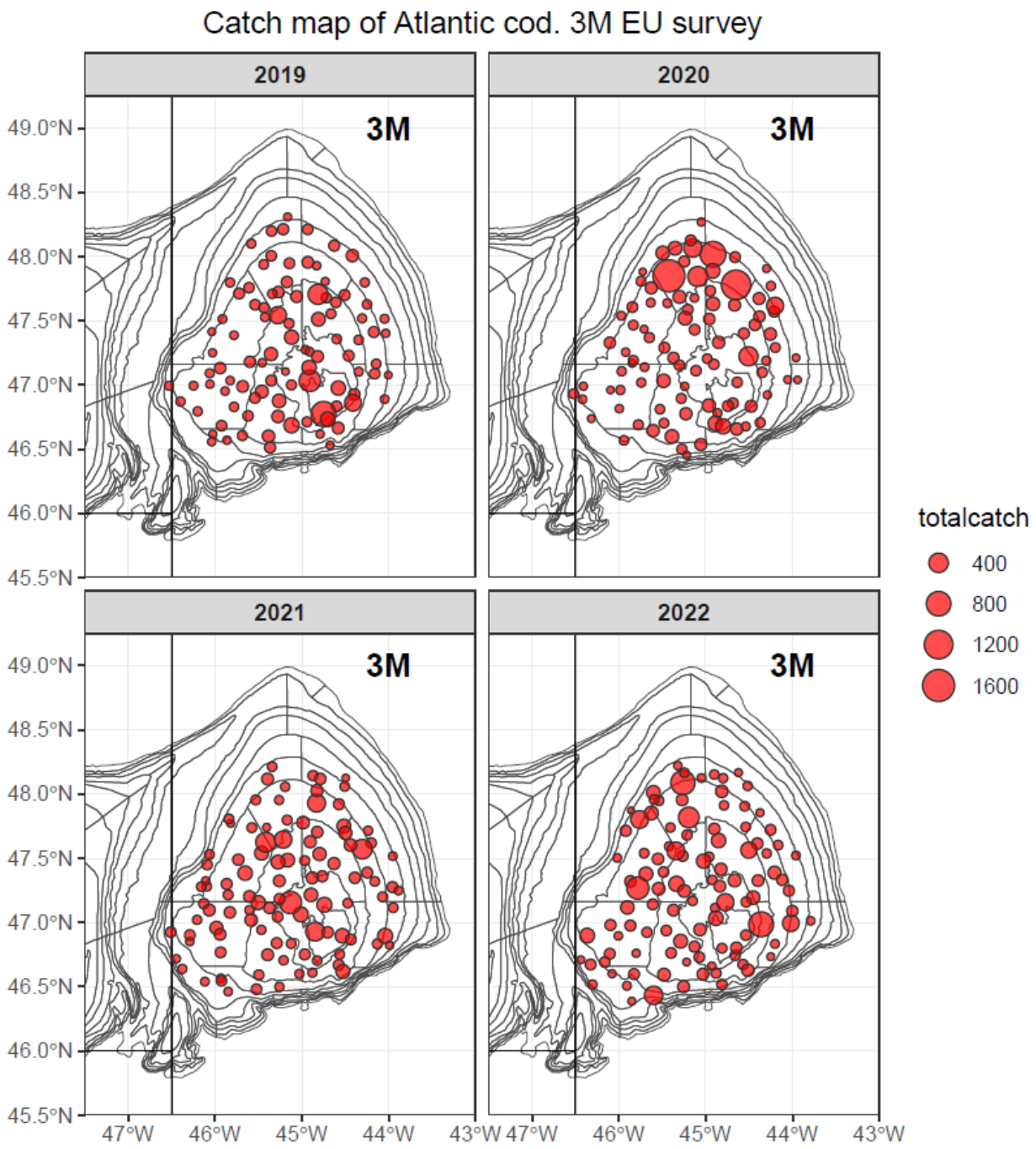

Figure 2. Cod (*Gadus morhua*) catch (kg.) distribution in the last four surveys.

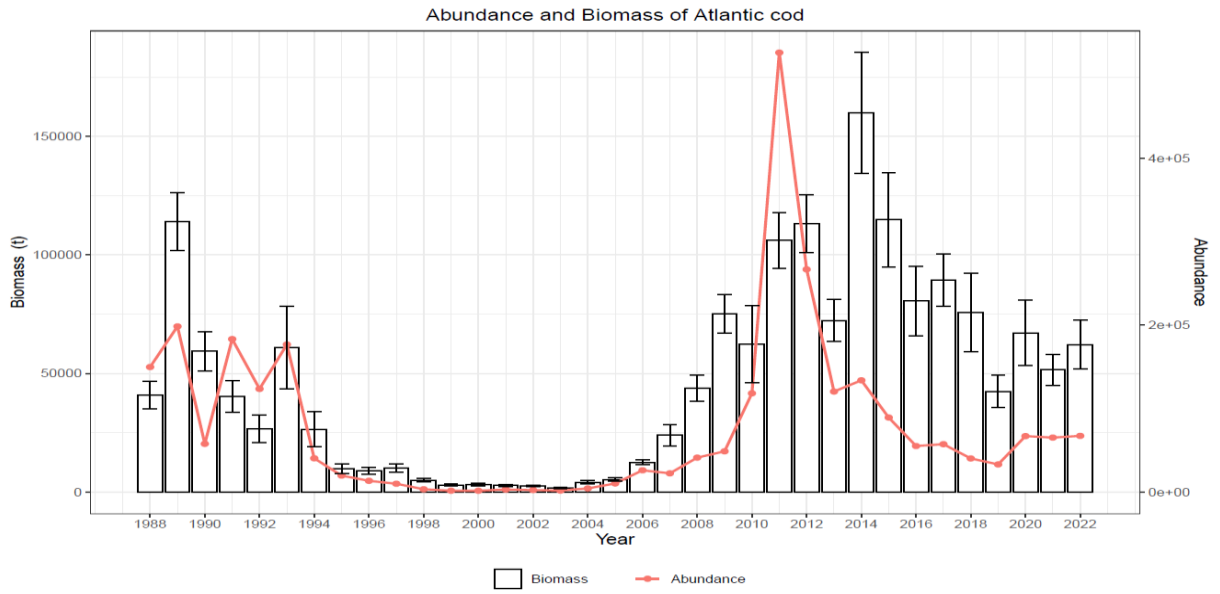

Figure 3. Cod biomass (t.) ± S.E. and abundance 1988-2022.

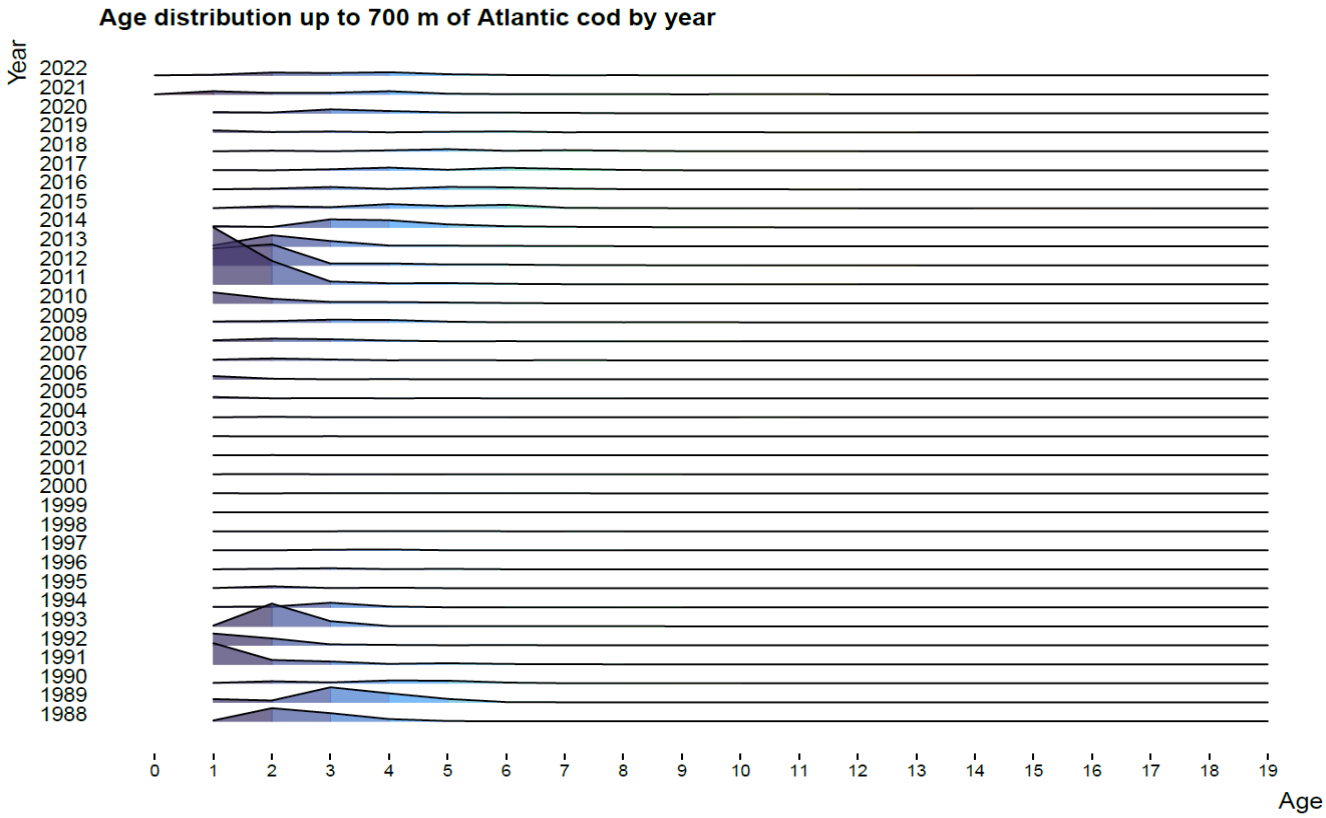

Figure 4. Cod age distribution in Flemish Cap NAFO 3M 1988-2022.

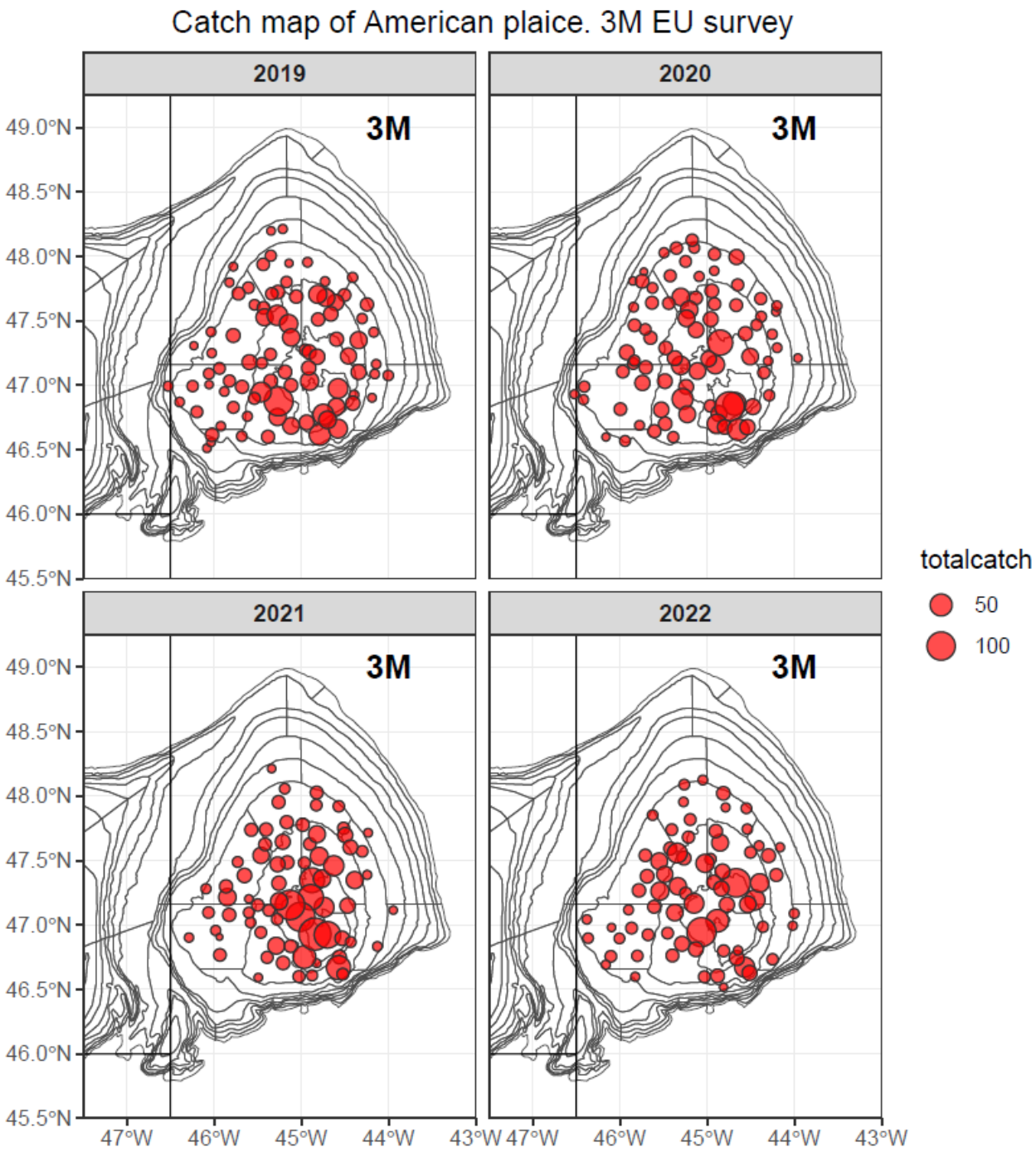

Figure 5. American plaice (*Hippoglossoides platessoides*) catch (kg) distribution in the last four surveys.

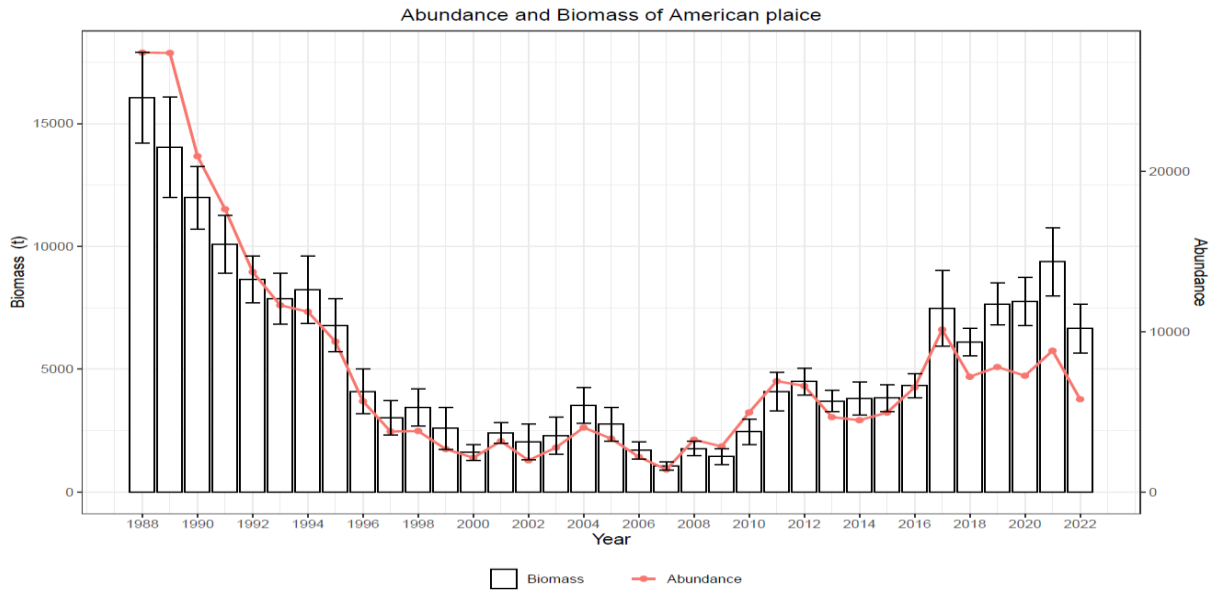

Figure 6. American plaice (*Hippoglossoides platessoides*) biomass (t.) ± S.E. and abundance 1988-2022.

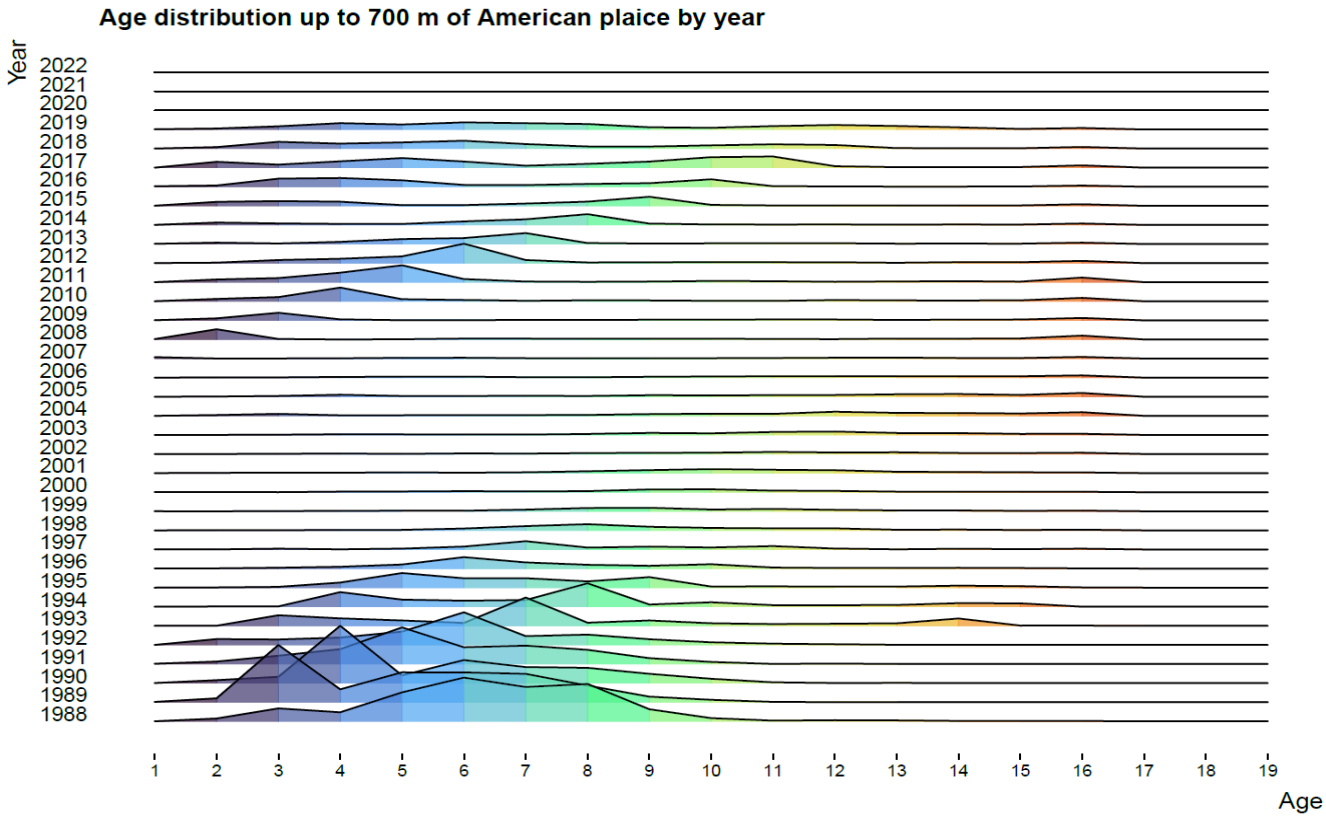

Figure 7. American plaice age distribution on Flemish Cap, NAFO Div. 3M: 1988-2022. 2020, 2021 AND 2022 NOT YET AVAILABLE.

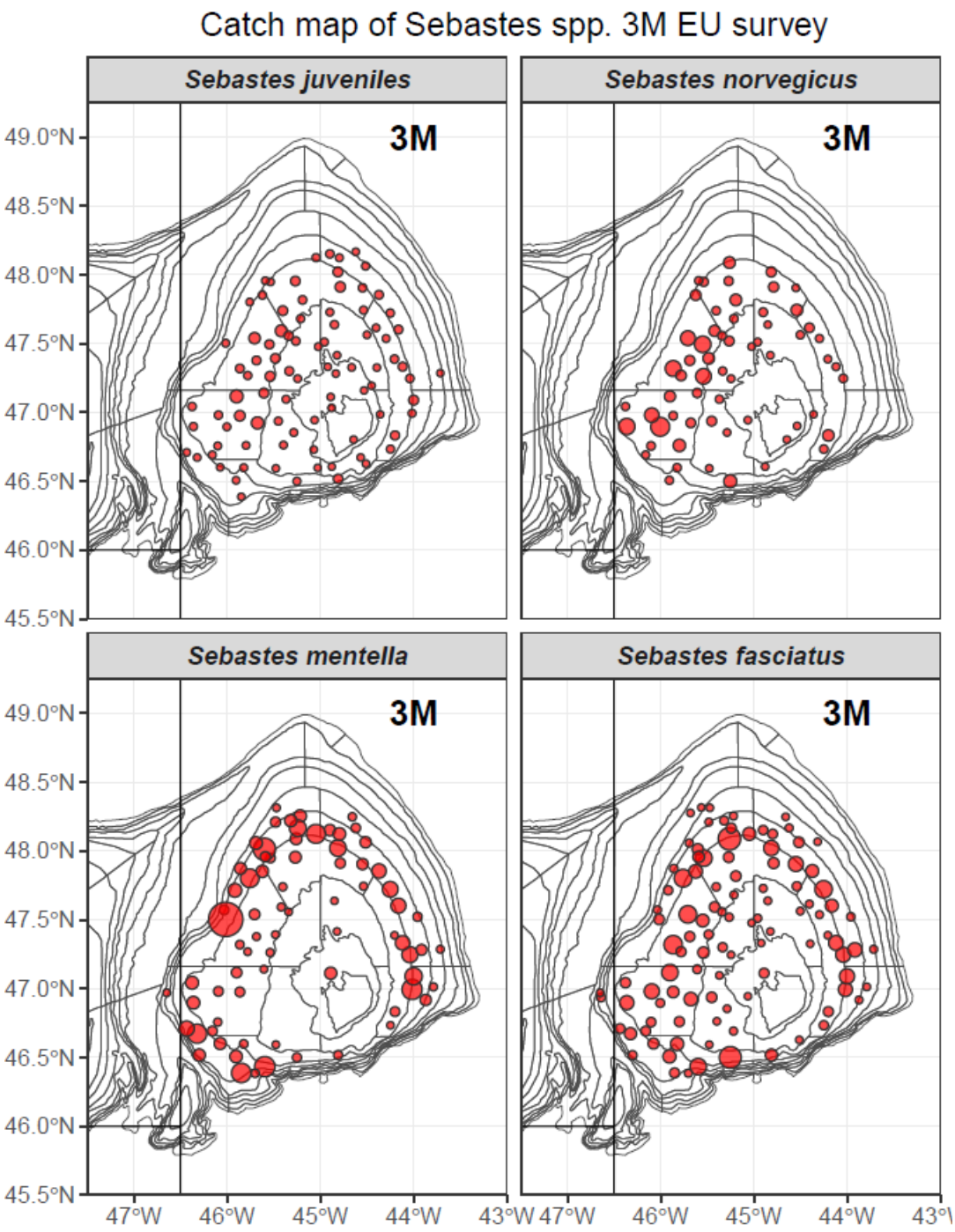

Figure 8. Catch distribution (kg) of *S. norvegicus, S. mentella, S. fasciatus* and *S. juvenile* in 2022 survey.

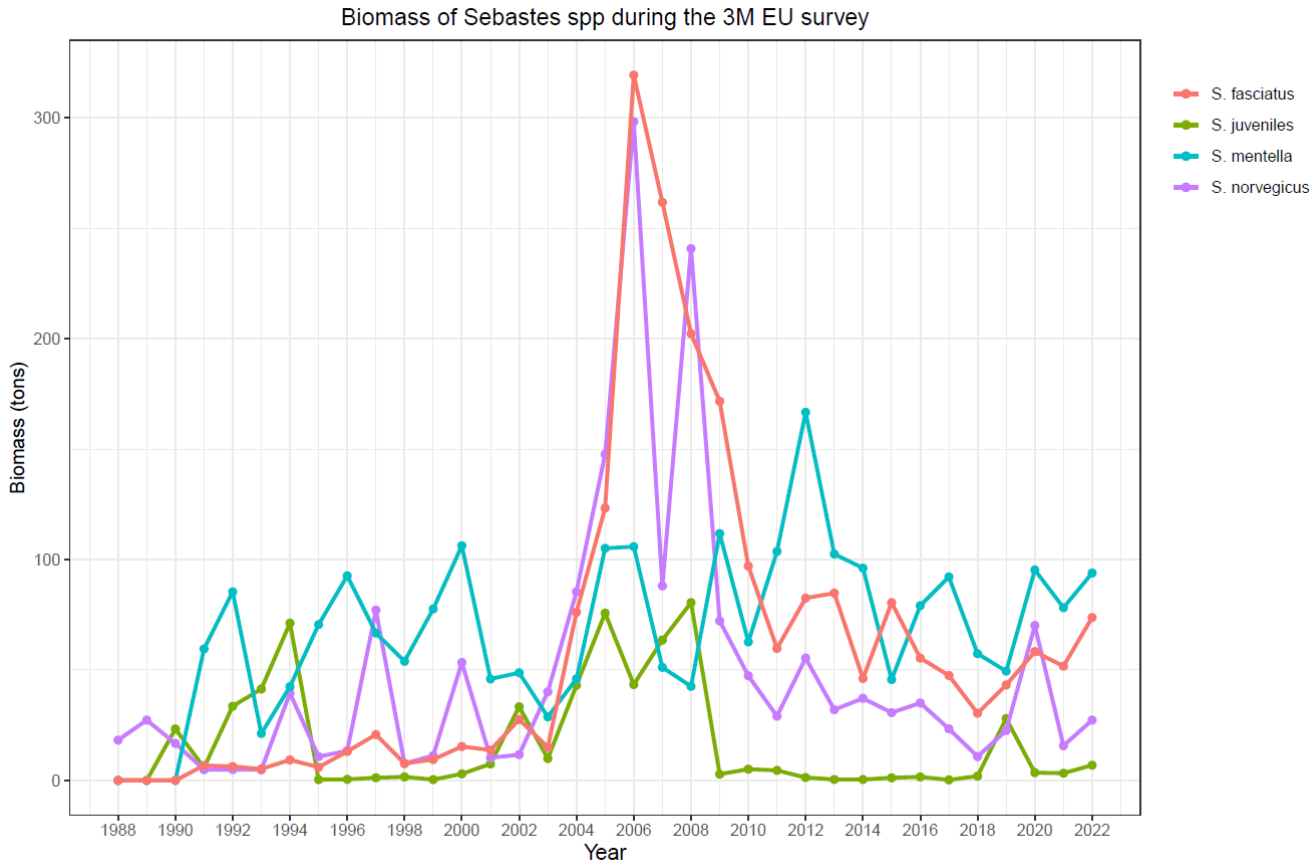

Figure 9. Redfish species biomass (t.) 1988-2022.

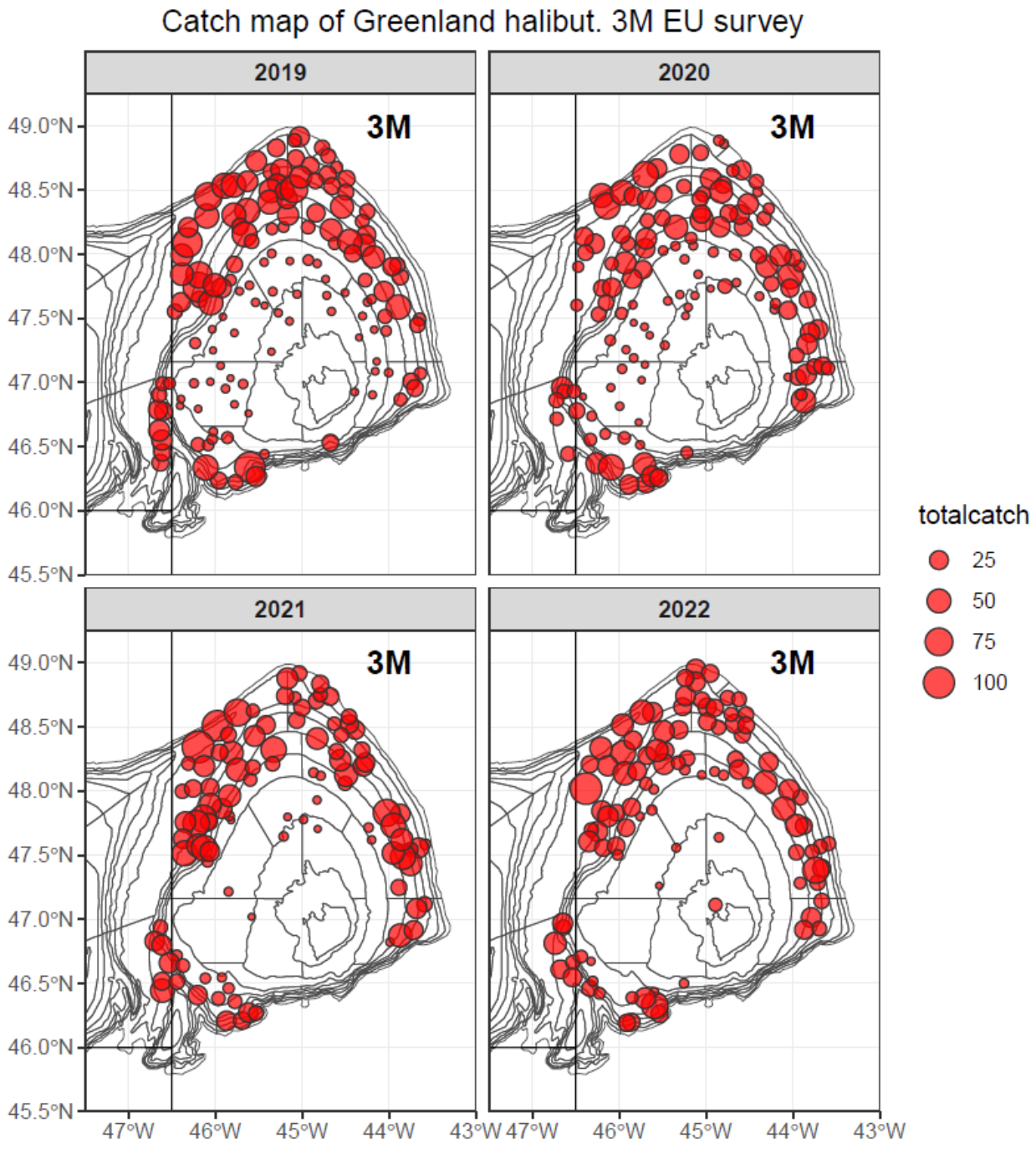

Figure 10. Greenland halibut (*Reinhardtius hippoglossoides*) catch distribution (kg) in the last four surveys.

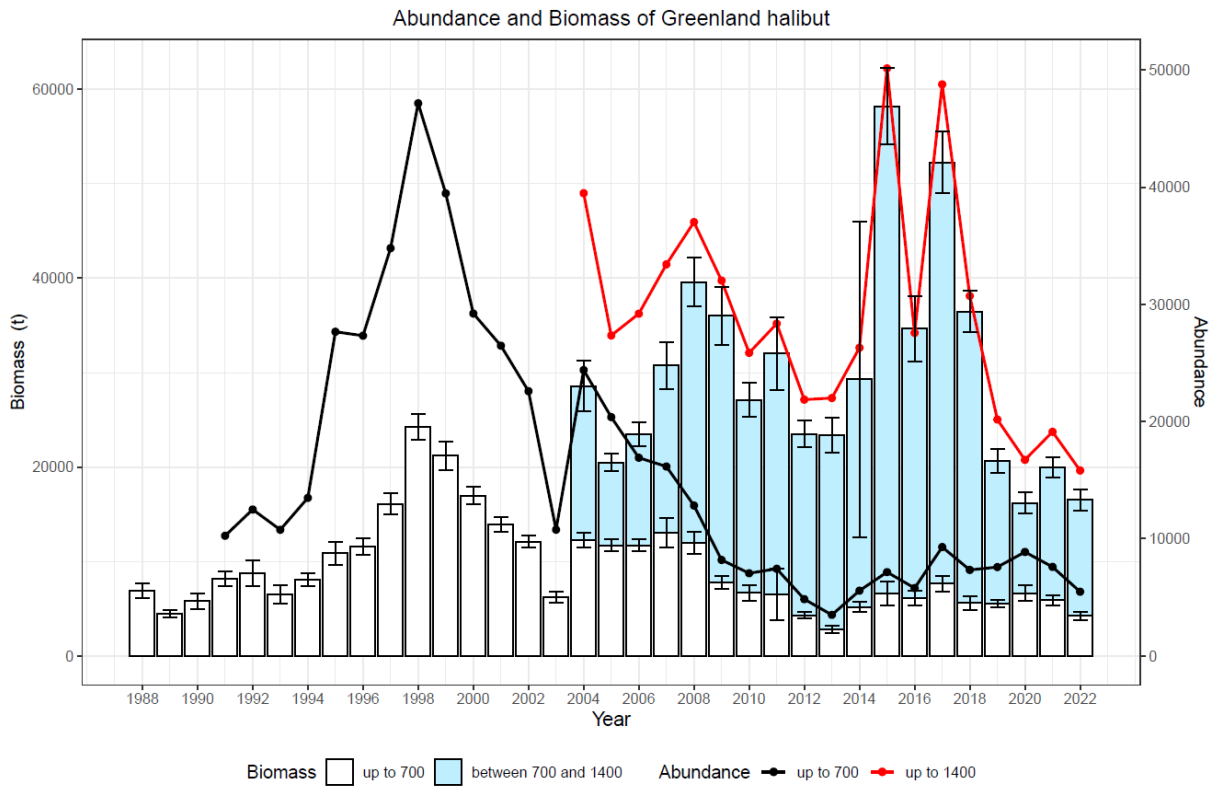

Figure 11. Greenland halibut (*Reinhardtius hippoglossoides*) biomass (t.) ± S.E. and abundance 1988-2022.

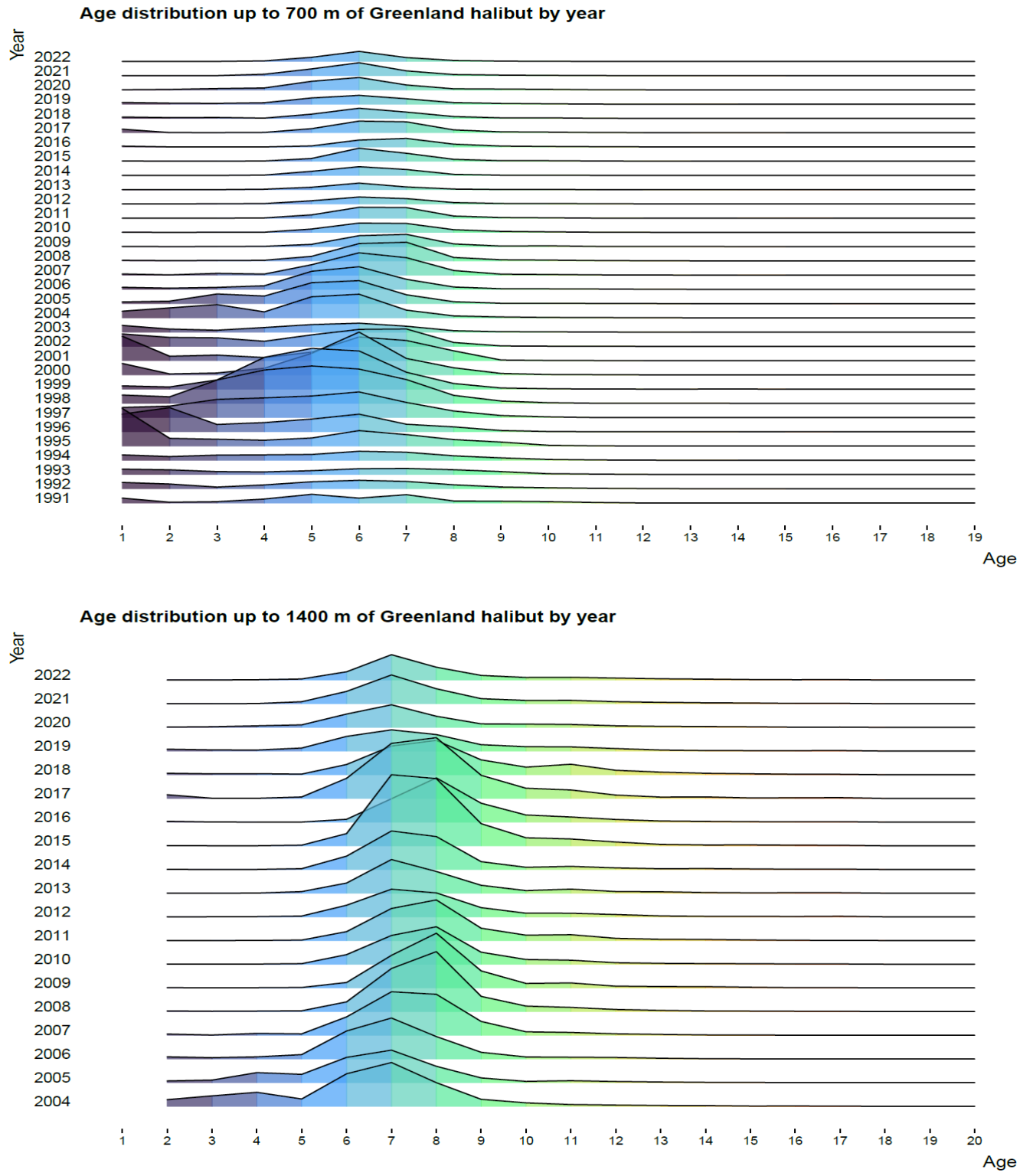

Figure 12. Greenland halibut (*Reinhardtius hippoglossoides*) age distribution on Flemish Cap in depths < 730 m (up, 1988-2022) and until 1440 m (bottom, 2004-2022), NAFO Div. 3M.

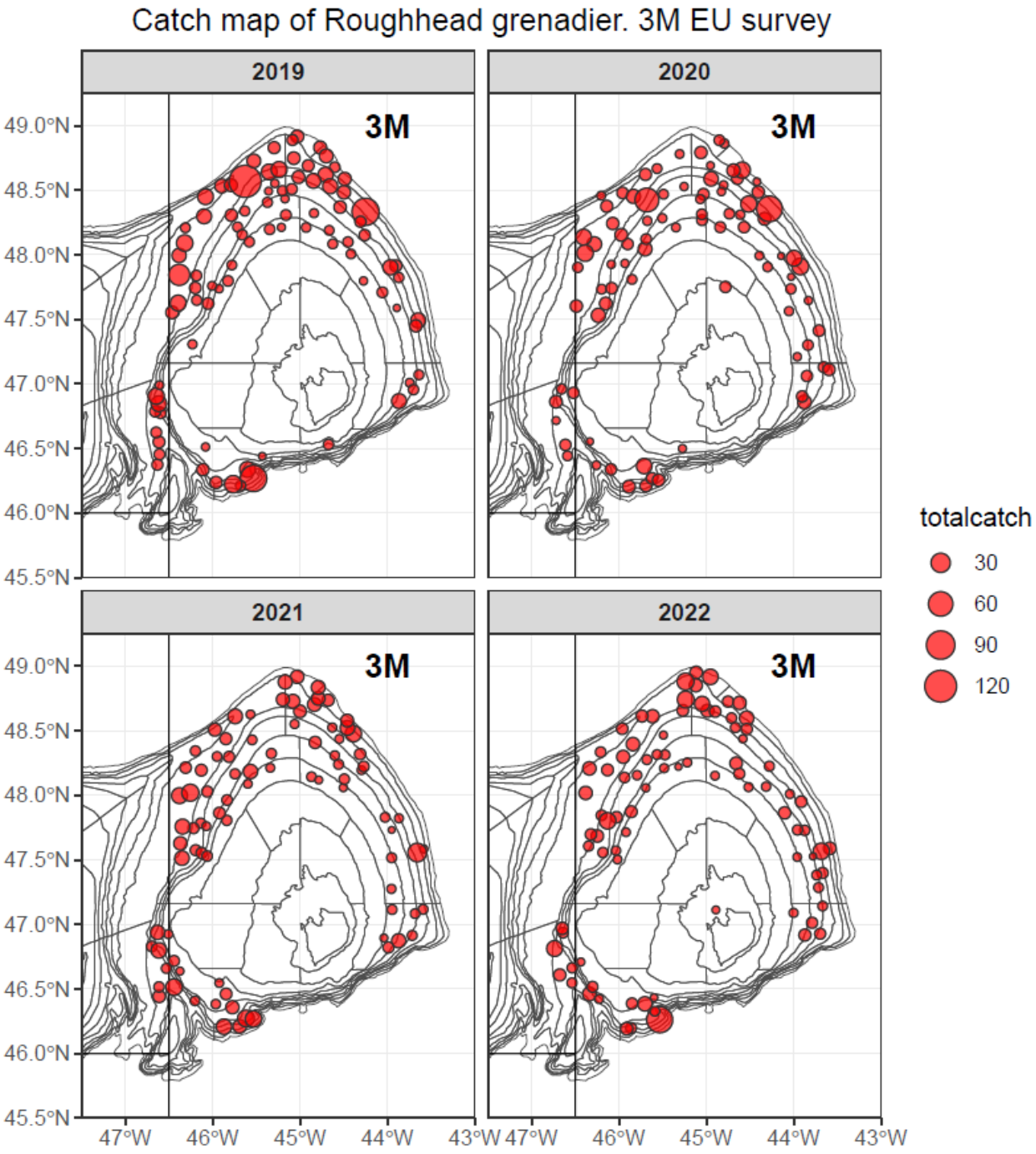

Figure 13. Roughhead grenadier (*Macrourus berglax*) catch distribution (kg) in the last four surveys.

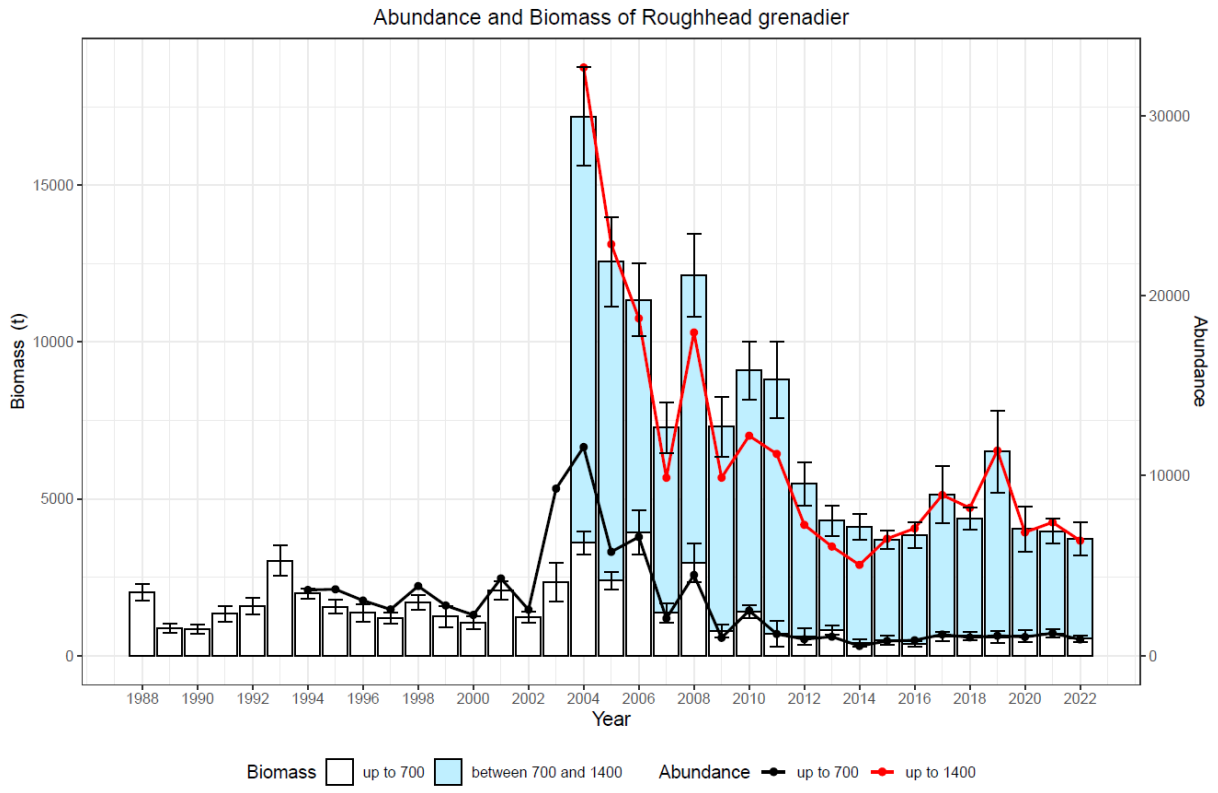

Figure 14. Roughhead grenadier (*Macrourus berglax*) biomass (t.) ± S.E. and number ('000) 1988-2022.

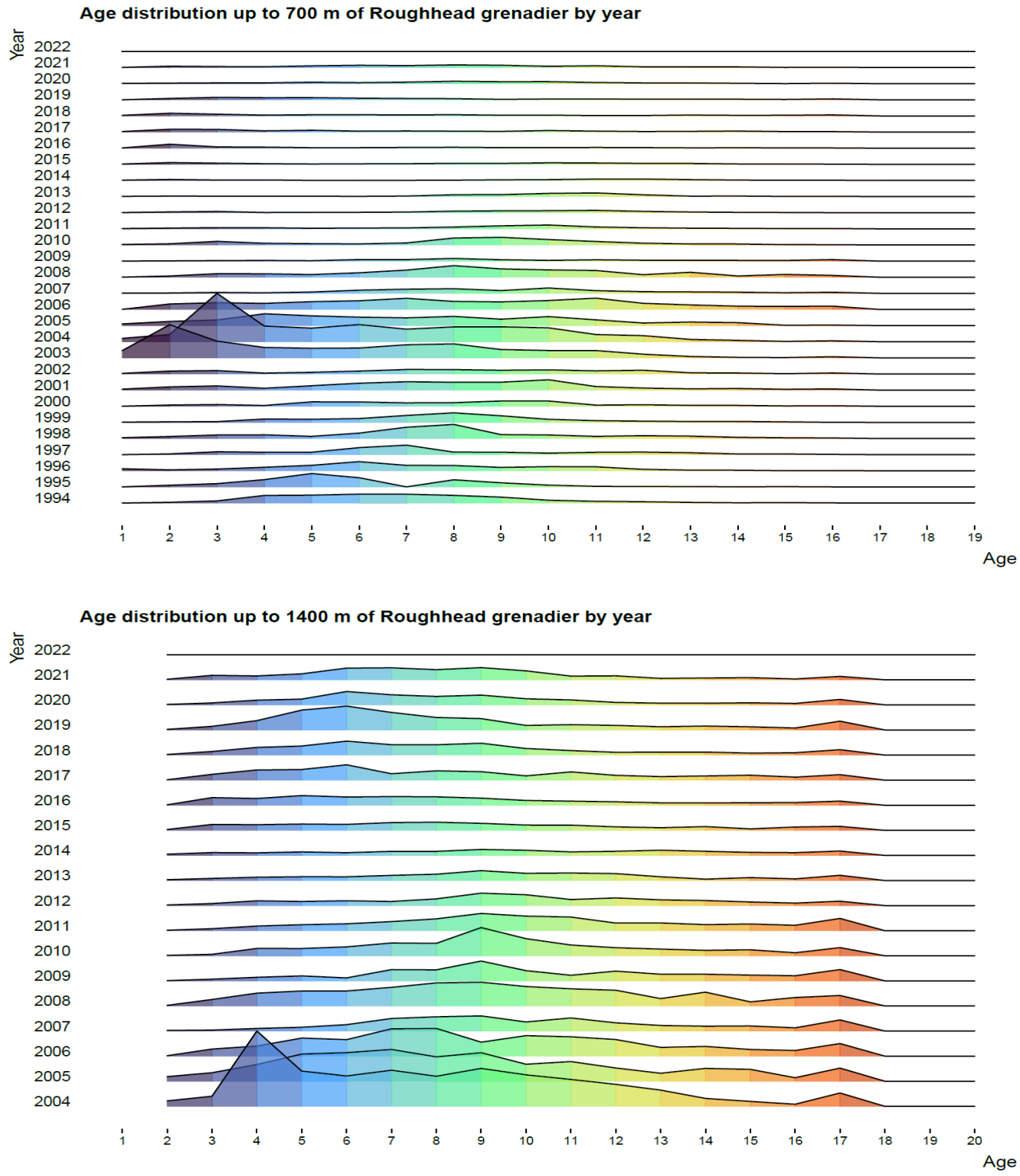

Figure 15. Roughhead grenadier (*Macrourus berglax*) age distribution on Flemish Cap in depths < 730 m (up, 1988-2022) and until 1440 m (bottom, 2004-2022), NAFO Div. 3M.

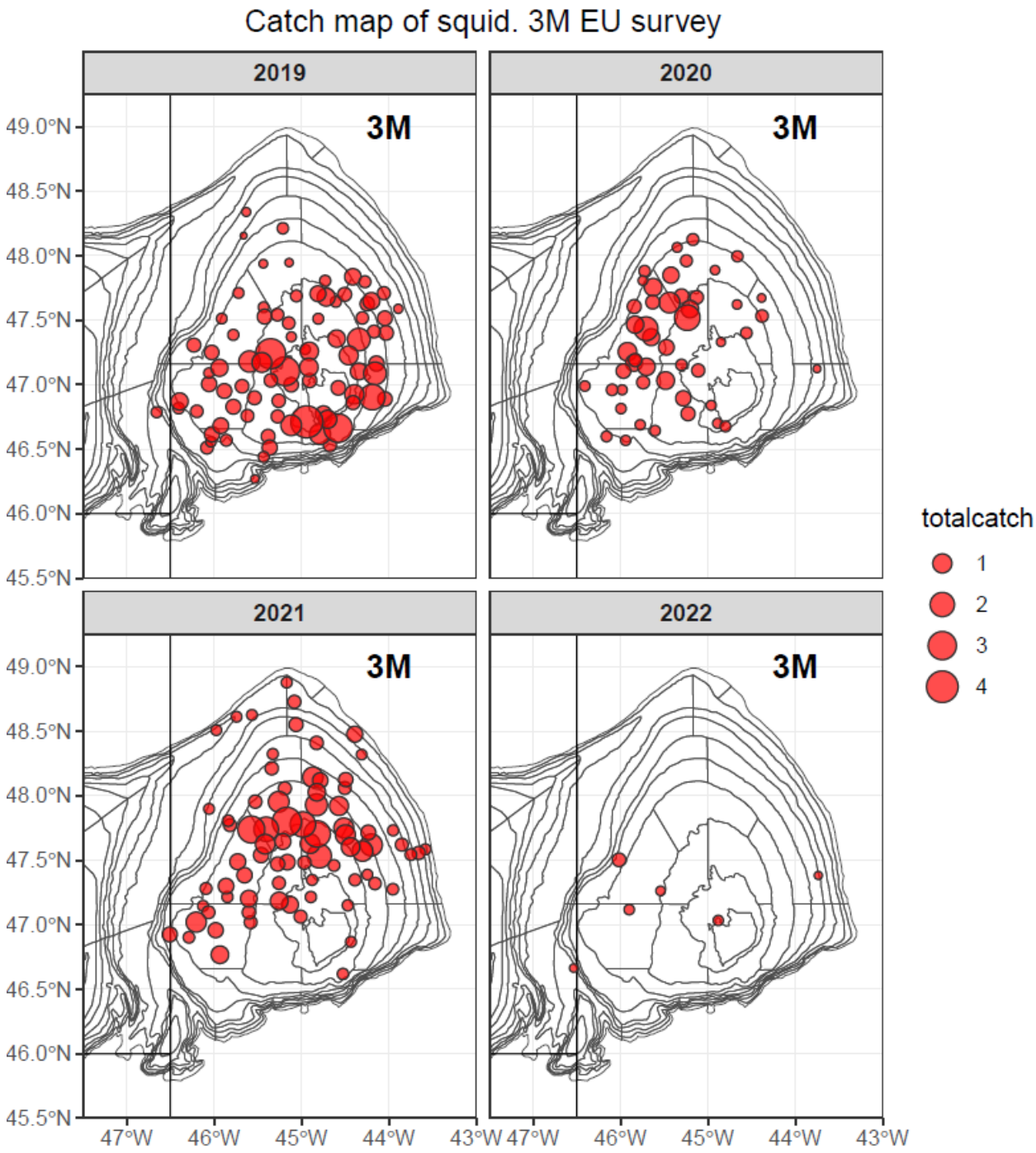

Figure 16. Squid (*Illex illecebrosus*) catch distribution (kg) in the last four surveys.

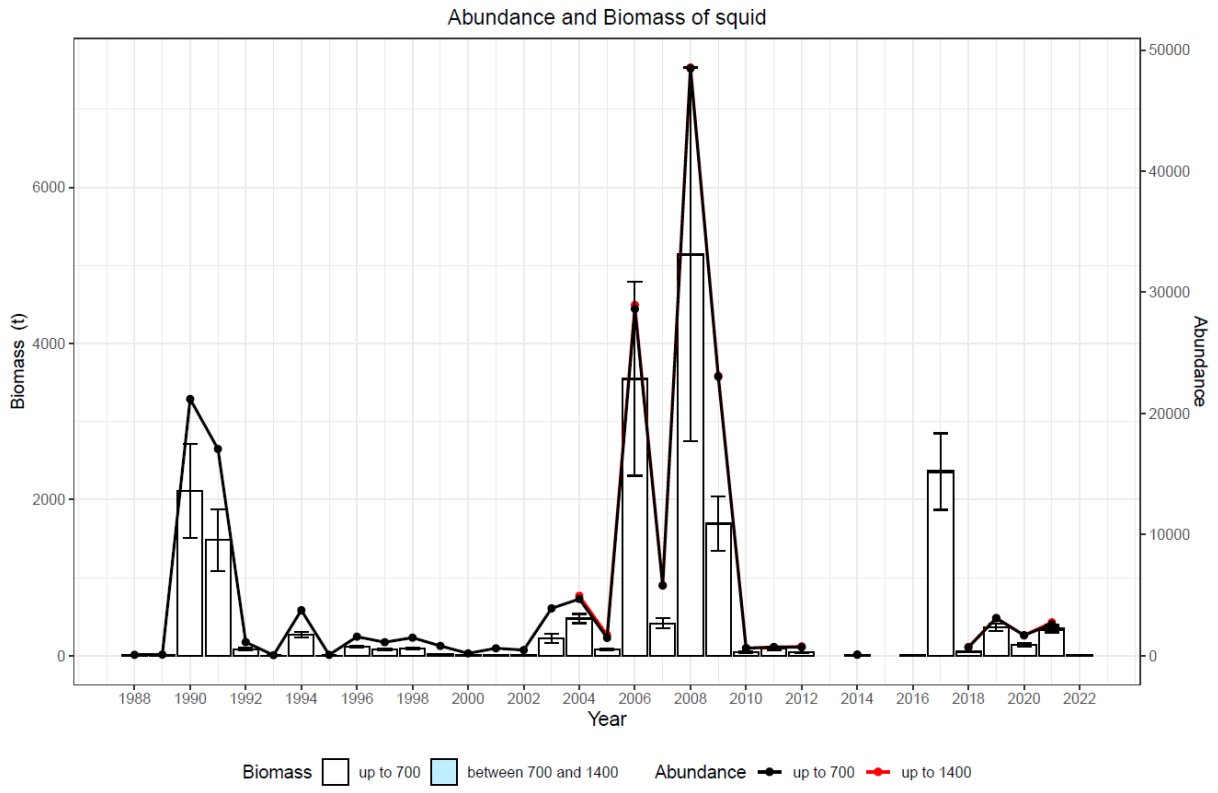

Figure 17. Squid (*Illex illecebrosus*) biomass (t.) ± S.E. and number ('000) 1988-2022.

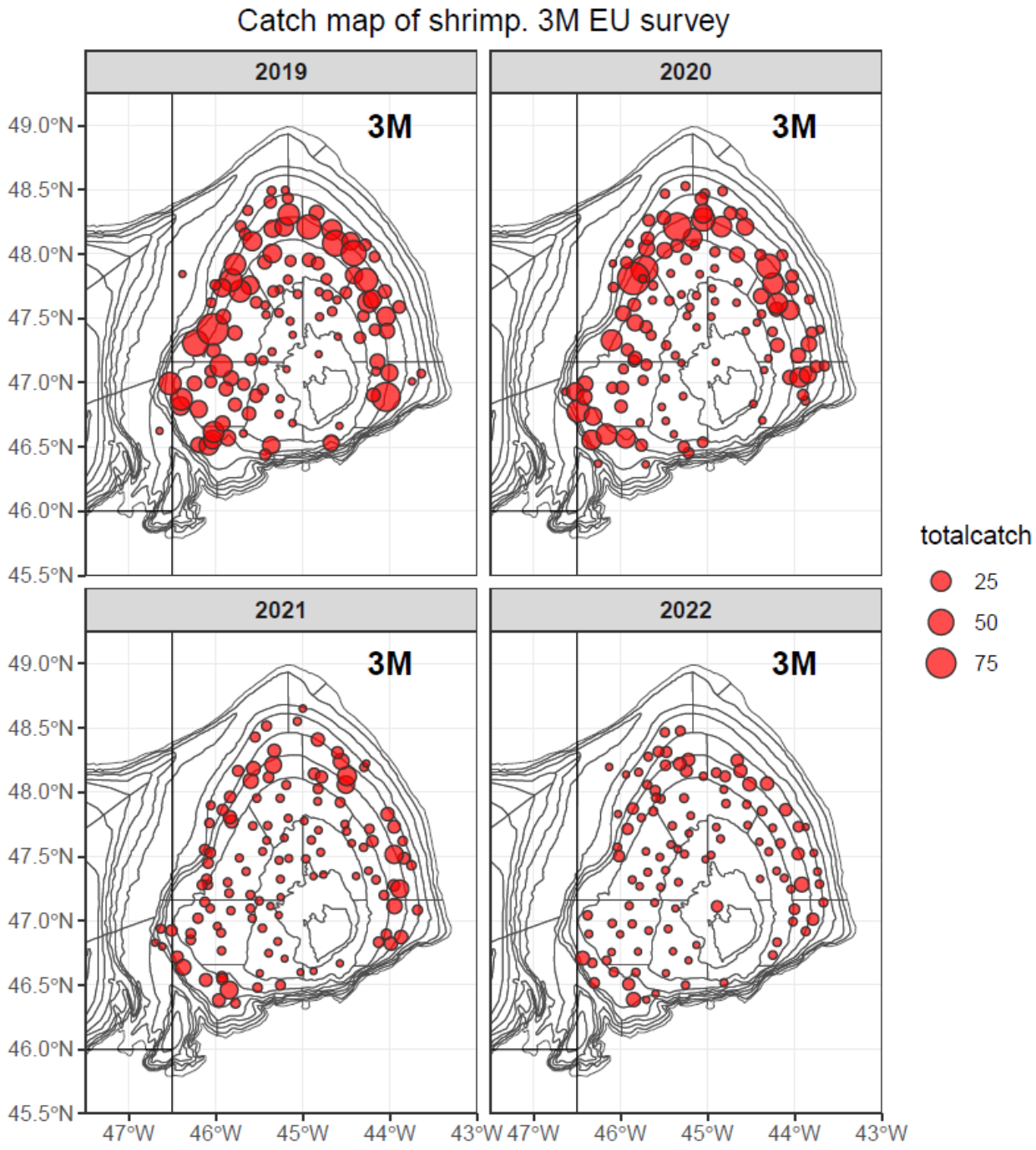

Figure 18. Shrimp (*Pandalus bolearis*) catch distribution (kg) in the last four surveys.

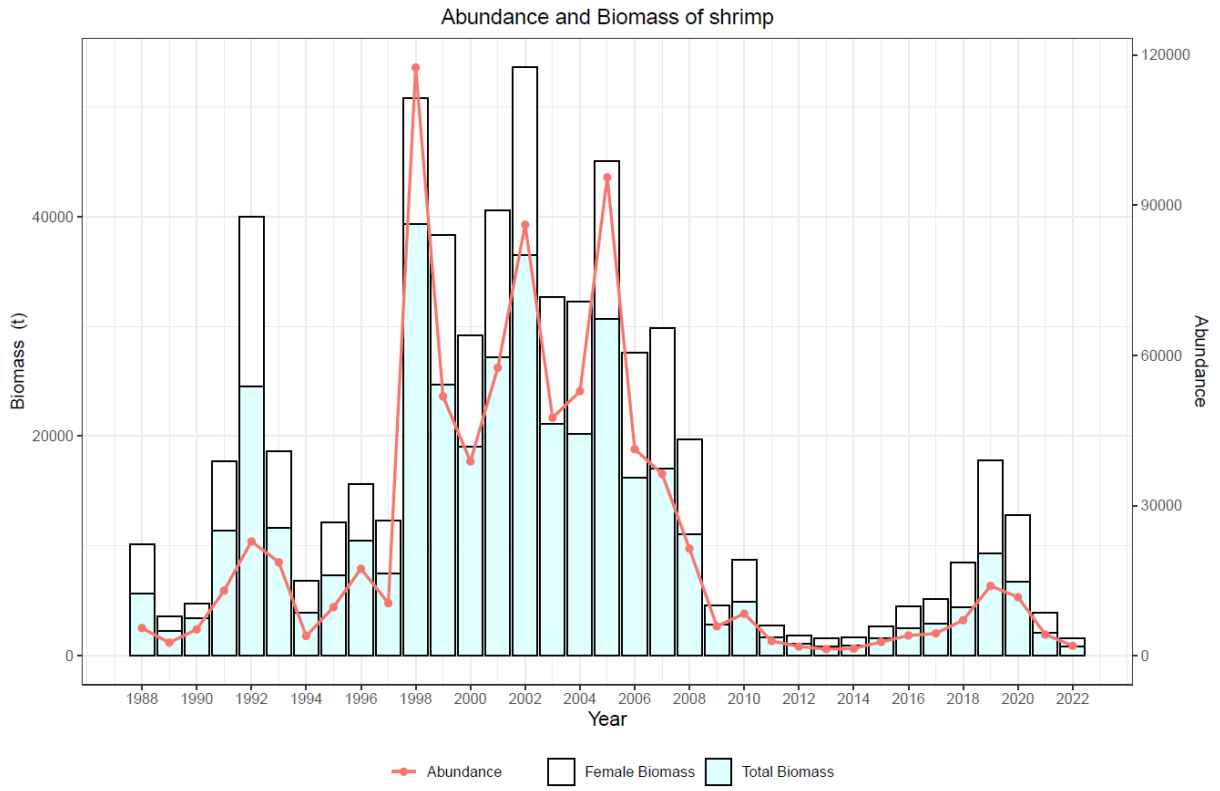

Figure 19. Shrimp (*Pandalus borealis*) biomass and female biomass (t.) and number ('00000) 1988-2022.

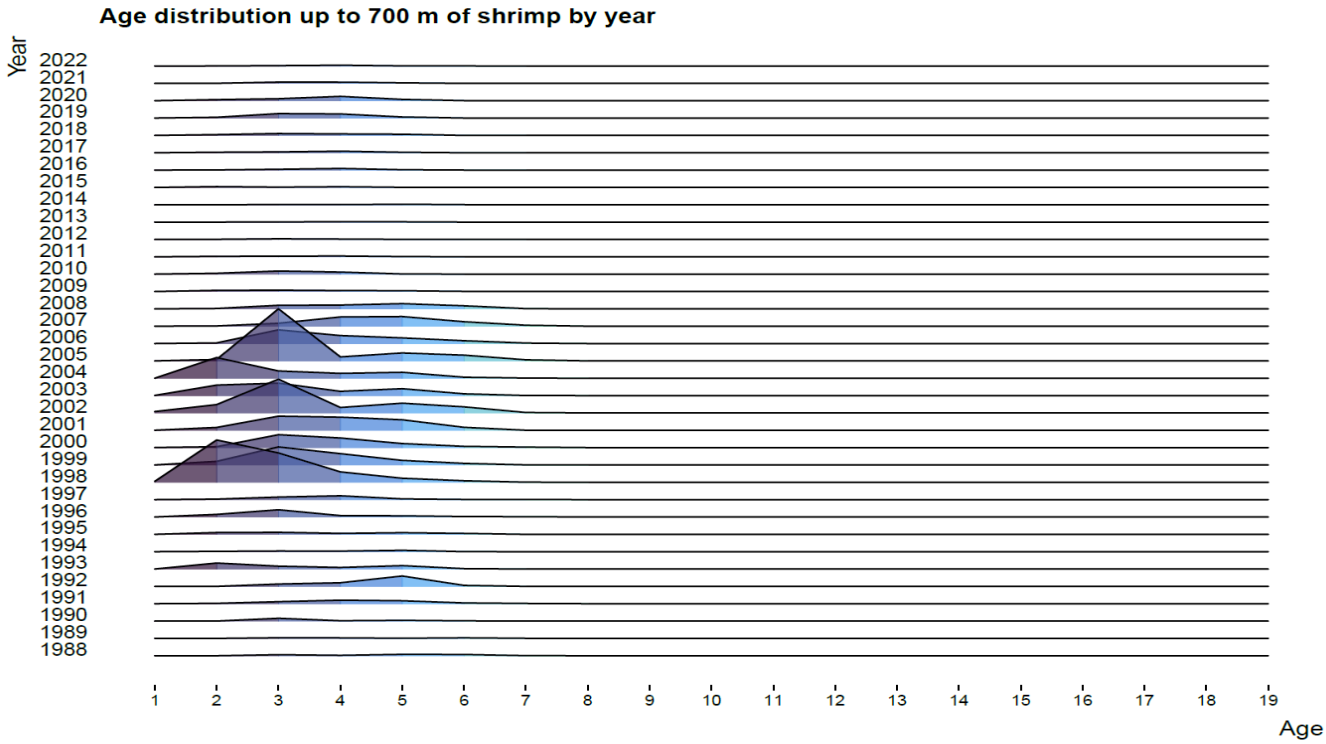

Figure 20. Shrimp age distribution on Flemish Cap, NAFO Div. 3M: 1988-2022.

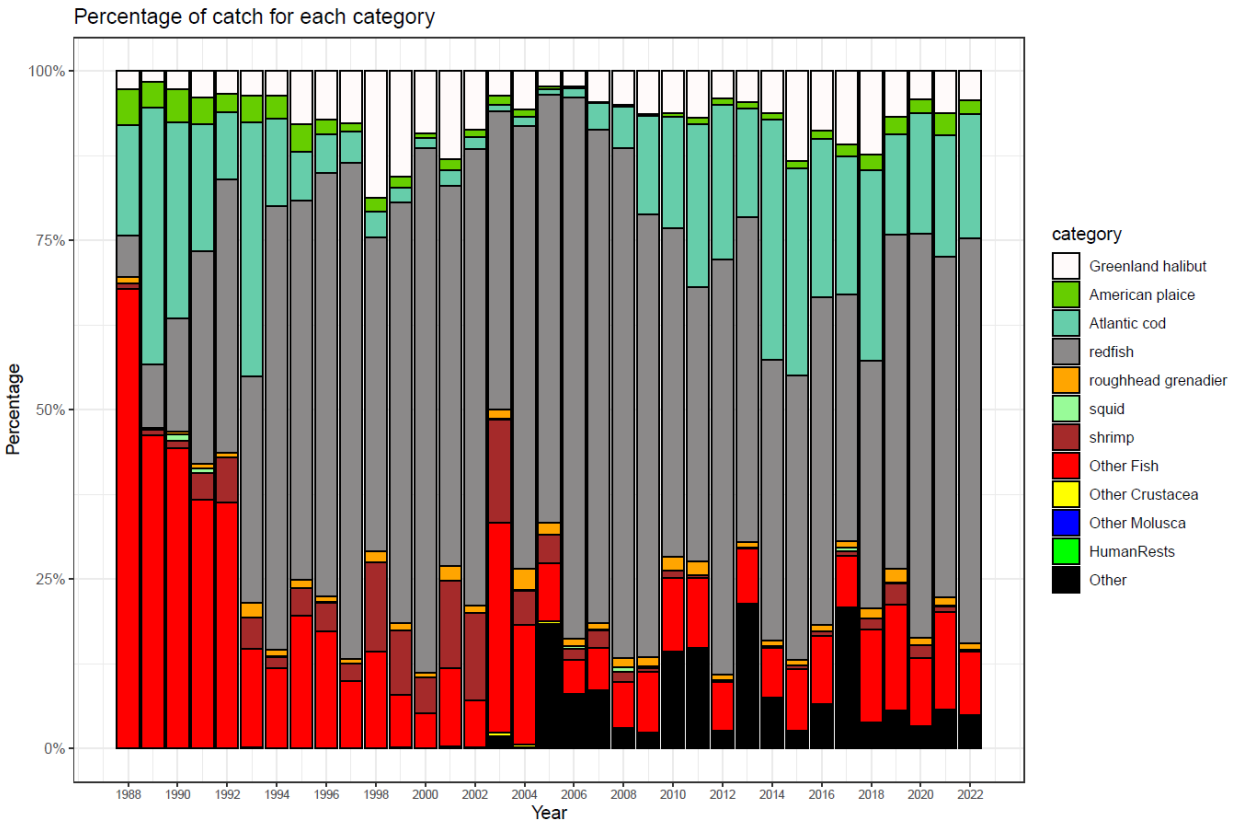

Figure 21. Biodiversity during the 2022 survey.