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Results from Bottom Trawl Survey on Flemish Cap of July 2013

by

Mónica Mandado

Instituto de Investigaciones Marinas (CSIC), Eduardo Cabello 6, 36208 Vigo, Spain  
mandado@iim.csic.es

### Abstract

A stratified random bottom trawl survey on Flemish Cap was carried out from 26<sup>th</sup> June to 23<sup>th</sup> July 2013, covering the bank up to 1460 m depth (800 fathoms). The survey was carried out on board R/V *Vizconde de Eza*, using a Lofoten bottom trawl gear, and 181 haul were done, 120 of them in the region with less than 730 m depth. Survey results are presented and compared with results of previous surveys in the series since 1988. Biomass and abundance indices are provided for main commercial species, as well as age composition for cod, American plaice, redfish, Greenland halibut, roughhead grenadier and shrimp.

KEYWORDS: Survey, Flemish Cap, Cod, American plaice, Redfish, Greenland halibut, roughhead grenadier.

### Introduction

The survey on Flemish Cap was carried out on board R/V *Vizconde de Eza*. A total of 181 valid bottom trawls were made up to a depth of 1460 m (800 fathoms) (Figure 1). The survey covered adequately all of the 32 selected strata of the bank 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, all of them were excluded due to previous records that indicate they were unsuitable for trawling. A synoptic sheet of the survey with vessel and gear characteristics is shown in Table 1. This was the 26<sup>rd</sup> survey of the series initiated by the EU in 1988. All surveys had a stratified random design following NAFO specifications (Doubleday, 1981). Dates of the surveys were:

Year	Vessel	Valid tows	Dates	Year	Vessel	Valid tows	Dates
1988	Cornide de Saavedra	115	8/7 – 22/7	2001	Cornide de Saavedra	120	3/7 – 20/7
1989	Cryos	116	12/7 – 1/8	2002	Cornide de Saavedra	120	30/6 – 17/7
1990	Ignat Pavlyuchenkov	113	18/7 – 6/8	2003	Vizconde de Eza	114	2/6 – 2/7
1991	Cornide de Saavedra	117	24/6 – 11/7	2004	Vizconde de Eza	177 (124)	25/6 – 2/8
1992	Cornide de Saavedra	117	29/6 – 18/7	2005	Vizconde de Eza	176 (117)	1/7 – 21/8
1993	Cornide de Saavedra	101	23/6 – 8/7	2006	Vizconde de Eza	179 (115)	1/7-26/7
1994	Cornide de Saavedra	116	6/7 – 23/7	2007	Vizconde de Eza	174 (117)	23/6-19/7
1995	Cornide de Saavedra	121	2/7 – 19/7	2008	Vizconde de Eza	167 (111)	23/6-19/7
1996	Cornide de Saavedra	117	28/6 – 14/7	2009	Vizconde de Eza	178 (119)	23/6-20/7
1997	Cornide de Saavedra	117	16/7 – 1/8	2010	Vizconde de Eza	153 (97)	23/6-19/7
1998	Cornide de Saavedra	119	17/7 – 2/8	2011	Vizconde de Eza	128 (79)	29/6-9/8
1999	Cornide de Saavedra	117	2/7 – 20/7	2012	Vizconde de Eza	174(118)	26/6-24/7
2000	Cornide de Saavedra	120	10/7 – 28/7	2013	Vizconde de Eza	181(120)	26/6-23/7

Up to 1460 m deep (800 fathoms) ( ) up to 730 m deep (400 fathoms)

Previous survey report was presented by Casas and González Troncoso (2013).

## Material and Methods

The survey followed the established protocols (Vázquez *et al.* 2013). The only mentioning circumstance was the simultaneous occurrence of a seismic vessel making a geological survey, their effect on the distribution of fish population is unknown.

## Results

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

year	cod	American plaice	redfish	Greenland halibut	roughhead grenadier	Shrimp
Strata 1-19 120-730 m	1988	40839	16046	188331	6926	2009
	1989	114050	14047	162535	4472	871
	1990	59362	11983	126757	5799	852
	1991	40248	10087	76955	8169	1335
	1992	26719	8656	130209	8728	1577
	1993	60963	7861	72608	6529	3021
	1994	26463	8227	162525	8037	1975
	1995	9695	6785	87644	10875	1558
	1996	9013	4098	119662	11594	1362
	1997	9966	3026	165816	16098	1197
	1998	4986	3437	70832	24229	1691
	1999	2854	2585	98651	21207	1250
	2000	3062	1606	177990	16959	1047
	2001	2695	2404	77345	13872	2079
	2002	2496	2049	121312	12100	1211
	2003	1593	2286	93816	6214	2348
	2004	4071	3525	250605	12292	3597
	2005	5242	2760	451215	11698	2387
	2006	12505	1691	766922	11708	3933
32 strata 120-1460 m	2007	23886	1053	464628	13040	1367
	2008	43675	1766	566126	11997	2961
	2009	75228	1442	358479	7777	782
	2010	69295	2446	212211	6657	1402
	2011	106151	4084	197031	6765	888
	2012	113227	4491	305946	4291	612
	2013	72289	3698	219737	2799	807
	2004	4071	3525	250638	28676	17184
	2005	5242	2760	453086	20460	14253
	2006	12505	1691	766952	23475	12109
	2007	23886	1053	464660	30731	7807
	2008	43675	1766	566647	39614	12139
	2009	75228	1442	358521	36047	7304
	2010	69295	2446	212282	27096	9091
	2011	106151	4084	196574	32309	8997
	2012	113227	4491	305974	23505	5476
	2013	72289	3698	219767	23391	4298

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.

## Cod

Mean catch per towed mile by strata and its standard error are presented in Table 2. Survey biomass, as calculated by the swept area method, is compared with results of previous years by stratum in Table 3. Survey biomass is compared with Russian survey results in the following table:

Year	EU (1)	Russia: (2)	(3)	Year	EU (1)	Russia: (2)	(3)
1983		23070		1999	2854	-	-
1984		31210		2000	3062	-	-
1985		28070		2001	2695	784	-
1986		26060		2002	2496	694	-
1987		10150	21600	2003	1593	-	-
1988	40839	7720	34200	2004	4071		
1989	114050	36520	78300	2005	5242		
1990	59362	3920	15200	2006	12505		
1991	40248	6740	8200	2007	23886		
1992	26719	2490	2400	2008	43675		
1993	60963	8990	9700	2009	75228		
1994	26463	-	-	2010	69295		
1995	9695	8260	-	2011	106151		
1996	9013	730	-	2012	113227		
1997	9966	-	-	2013	72289		
1998	4986	-	-				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).

Tables 4, 6, and 7 show abundance at age by stratum, length distribution and the age-length key respectively. Distribution of survey catches is presented in Figure 2. Evolution of biomass and abundance are illustrated in Figure 3.

The abundance at age along the series is shown in Table 5. The 1992 to 2003 year-classes failed almost completely. The abundances of 2004-2008 year classes are higher than in previous 12 years. The abundance of the 2009 year-class was the highest of those in previous recent years, and the 2010 and 2011 ones were also high. The 2012 year-class seems to have failed according to current results at age 1.

Figure 4 shows length distribution over the years in which it can be appreciated as it is the age 2 the dominant in the stock.

## American plaice

Mean catch per towed mile by strata is presented in Table 8. Survey biomass, as calculated by the swept area method, is compared with results of previous surveys in Table 9. This biomass is compared with Russian survey results in the following table:

year	EU	Russia <sup>1</sup>	Year	EU	Russia <sup>1</sup>
1983		8900	1999	2585	
1984		7500	2000	1606	
1985		7800	2001	2404	
1986		20200	2002	2049	548
1987		9300	2003	2286	1398
1988	16046	6500	2004	3525	
1989	14047	5000	2005	2760	
1990	11983	1200	2006	1691	
1991	10087	14400	2007	1053	
1992	8656	1200	2008	1766	
1993	7861	2700	2009	1442	
1994	8227		2010	2446	
1995	6785		2011	4084	
1996	4098		2012	4491	
1997	3026		2013	3698	
1998	3437				tons

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

Tables 10, 11 and 13 show abundance at age by stratum, length distribution and the age-length key respectively. Distribution of survey catches along the series is presented in Figure 5. Biomass and abundance evolution are illustrated in Figure 6.

The abundance at age along the series is shown in Table 12. Fish aged 6 or more roughly correspond with fishable biomass. Results indicate two periods for recruitment, and a change from an upper abundance level to a lower one. The 1991 year-class was the first weak cohort. The 2006 year-class is the more abundant since 1991, but its abundance is only intermediate. Recruitment for later year-classes seems to be weaker; too weak for a quick recovery of the stock.

Figure 7 shows length distribution over the years. It illustrates the lack of recruitment that occurred for many years, and how most recent year-classes are weaker than those at the beginning of the series.

## Redfish

All redfish catches were classified by species. The group named *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 was never used as a criterion. The skill required to identify the species increased over the years, so the group *juvenile* was not uniform, but it is maintained for practical reasons.

Survey biomass by strata of *Sebastes marinus*, *S. mentella*, *S. fasciatus* and the *juvenile* group are presented in Table 14. Table 15 shows the total survey biomass by year in the strata up to 730 m deep (400 fathoms) and up to 1460 m, even differences are at a minimum.

Mean catch per towed mile by strata of each species are presented in tables 16, 20, 24 and 28.

Abundance at age by stratum is presented in tables 17, 21, 25 for each species.

For the whole bank, tables 18, 22, 26 and 29 show length distribution for the four groups. Catches per haul distribution for the three species and juveniles are presented in Figure 8. Evolution of biomass is shown in Figure 9, which illustrates the highest level since 2004 and the decline after the 2006-2008 high.

Age-length keys of each species are presented in tables 19, 23 and 27. In the case of *Sebastes marinus* the only age-length key presented it corresponded to females, because the only is available at the moment.

### **Greenland halibut**

Mean catch per towed mile by strata and its standard error are presented in Table 30. Survey biomass is compared with results of previous surveys in Table 31. Catch per haul distribution is presented in Figure 10. Evolution of biomass and abundance is shown in Figure 11.

For the whole bank, length distribution, abundance at age and age-length keys are presented in Tables 32, 33 and 35, respectively. Abundance at age along the series is presented in Table 34.

### **Roughhead grenadier (*Macrourus berglax*)**

Mean catch per towed mile by strata and its standard error are presented in Table 36. Survey biomass, as calculated by the swept area method, is compared with results of previous years by stratum in Table 37.

Tables 38, 40 and 41 show abundance at age by stratum, length distribution and the age-length key respectively. Abundance at age along the series is presented in Table 39.

Distribution of survey catches is presented in Figure 12. Evolution of biomass and abundances is illustrated in Figure 13.

Survey biomass along this series for the 19 shallowest strata and the whole 32 strata were:

year	1-19	year	1-19	1-32
1988	2009	2001	2079	
1989	871	2002	1211	
1990	852	2003	2348	
1991	1335	2004	3597	17184
1992	1577	2005	2387	15246
1993	3021	2006	3933	12537
1994	1975	2007	1367	6749
1995	1558	2008	2961	14999
1996	1362	2009	782	7306
1997	1197	2010	1403	9092
1998	1691	2011	888	8997
1999	1250	2012	612	5476
2000	1047	2013	807	4298
				tons

### **Shrimp**

Casas (2013) presented detailed results.

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**Table 1** – Technical data of the 2013 survey.

Procedure	Specification
Vessel	R/V Vizconde de Eza
GT	1 400 t
Power	1 800 HP
Mean trawling speed	3.5 knots (3.0 knots in more than 1000 m depth)
Trawling time	30 minutes effective time
Fishing gear	type Lofoten
footrope / handrope	31.20 / 17.70 m
footgear	27 steel bobbins of 30 cm
vertical opening	3.0 m (SCANMAR)
warps	100 meters, 45 mm, 200 Kg/100m
trawl doors	polyvalent, 850 Kg
wire length	2 × depth echo sounder (m.) + 250.
mesh size in cod-end	35 mm
Type of survey	Stratified sampling
Station selection procedure	Random
Criterion to change position of a selected tow	- Unsuitable bottom for trawling according to ecosounder register. - Information on gear damage from previous surveys.
Criterion to reject data from tow	- tears in cod-end - severe tears in the gear - less than 20 minutes tow - bad behaviour of the gear
Daily period for fishing	6.00 to 22.00 hours
Species for sampling	All fish, squid, shrimp, and other invertebrates
Species for age determination	Cod, American plaice, redfish ( <i>Sebastes mentella</i> , <i>S. fasciatus</i> , <i>S. marinus</i> ), Greenland halibut and Roughhead grenadier ( <i>Macrourus berglax</i> ).

**Table 2** – Cod (*Gadus morhua*) mean catch per towed mile and the estimated biomass by stratum, and their standard error in the 2013 survey. No catches were done in strata deeper than 730m.

stratum	square miles	hauls	catch (kg)		biomass (t)	
			mean	s.e.	value	s.e.
1	342	4	42.34	18.51	1931	844
2	838	10	91.55	27.11	10230	3029
3	628	7	146.79	80.58	12291	6747
4	348	4	153.15	22.87	7106	1061
5	703	8	58.98	16.33	5528	1530
6	496	6	58.21	8.83	3849	584
7	822	9	53.57	4.62	5872	506
8	646	7	53.88	8.92	4641	768
9	314	3	23.17	14.78	970	619
10	951	11	40.64	7.13	5153	904
11	806	9	39.13	5.03	4205	540
12	670	8	14.81	2.25	1323	201
13	249	3	28.31	12.86	940	427
14	602	7	75.93	51.94	6094	4169
15	666	8	22.08	3.69	1961	327
16	634	7	0.97	0.84	82	71
17	216	2				
18	210	2				
19	414	5	2.04	2.04	113	113
total<730 m.	10555	120	51.37	6.33	72289	8904

**Table 3** – Cod (*Gadus morhua*) survey biomass (t) by strata in 1988-2013 surveys.

stratum	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013		
1	1345	649	767	5585	76	516	2165	1563	1006	243	125	99	250	86	477	173	1996	1091	2433	4420	4224	2253	11815	4694	1567	1931		
2	10150	10323	2065	5486	5150	9044	8186	3040	3991	2049	1899	1502	740	491	736	102	1668	1888	4145	1775	5346	6627	23368	22989	13861	10230		
3	4471	10276	2391	2459	8473	8435	6092	1146	1054	1132	703	145	360	230	451	90	9	1791	1948	11466	4129	7630	4512	16922	17743	12291		
4	3130	4843	2446	2900	3443	14171	1885	746	1068	857	140	25	443	488	66	136	168	152	466	1132	771	5190	1716	10114	2903	7106		
5	2130	10702	8447	10651	4570	6824	924	1274	936	1149	976	256	425	260	146	303	19	30	644	548	1129	6947	3600	10947	11639	5528		
6	3230	6789	3286	1531	952	4220	1412	1310	620	1074	613	375	511	749	525	24	155	206	1224	3214	12487	10734	2303	9510	9991	3849		
7	2224	16025	4385	2538	945	6153	857	122	55	1067	78	52	5	12	24	107	18		473	140	4692	12659	4667	2586	6824	5872		
8	8931	16434	15973	5107	2349	7964	3615	349	93	1610	77	23	74	123	37	111	5		347	475	3471	2814	4204	10921	7739	4641		
9	184	5261	6340	188	143	998	239	9	103	174		20	41		14	376			64	151	81	503	2048	1997	5963	970		
10	1338	4898	4193	1558	327	936	506	58	46	301	199	102	107	81	2	24		28	304	246	2625	5071	4275	5247	16988	5153		
11	2505	13219	3859	1787	224	1678	582	78	41	310	176	255	106	175	18	58	33	56	381	272	3699	4336	4458	4557	5701	4205		
12	335	2469	1587	126		24										71					42	339		588	1135	2538	1323	
13	9	2534	734	93																		15	135		124	419	875	940
14	107	1121	545	131	67																76		160	9795	1056	3186	3663	6094
15	748	8436	2344	108												18					47	805	195	475	926	5133	1961	
16		66																								82		
17		5																										
18		2																								100		
19																										88		113
total	40839	114050	59362	40248	26719	60963	26463	9695	9013	9966	4986	2854	3062	2695	2496	1593	4071	5242	12505	23886	43675	75228	69295	106151	113227	72289		
s.e.	5784	12205	8225	6704	5837	17397	7367	2070	1459	1725	646	451	593	380	398	273	780	813	980	4526	5507	8109	16269	11805	12293	8904		

s.e.: standard error

**Table 4** – Cod (*Gadus morhua*) abundance ('0000) at age by strata in the 2013 survey.

age	strata																total	mean weight (g)	mean length (cm)	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	19			
1	21	100	82	117	129	59	17	6	13	8	1						550	68	19	
2	26	943	1159	861	1154	836	411	314	98	636	229	5	41	38	6		6756	172	27	
3	58	586	860	191	258	156	287	303	3	211	124	29	27	118	12		3223	692	42	
4	8	82	124	73	31	10	36	33	31	11	2	2	45	1		490	1171	50		
5	14	56	72	77	24	10	25	19	2	30	15	9	2	57	3	2	417	2055	60	
6	7	35	36	33	14	8	17	13	4	19	19	20	2	40	9	1	278	2826	67	
7	5	19	13	11	8	6	14	9	4	10	18	21	4	23	14	1	180	4329	77	
8	3	9	4	5	4	4	12	5	4	6	10	8	2	12	10		97	7013	90	
9	2	2	1	1	1	2	4	2	2	2	3	1	1	3	2		29	9188	99	
10									1								4	10163	103	
11									1								3	12621	110	
12	1			1								1					3	14295	114	
13																	1	16796	121	
14																				
15																				
16+																				
sets	4	10	7	4	8	6	9	7	3	11	9	8	3	7	8	2	1	107	623	
n	146	1831	2351	1370	1623	1091	824	704	115	958	437	96	82	338	57	4	3	12031	7499	34.9

**Table 5** – Cod (*Gadus morhua*) abundance ('000) at age in 1988-2013 surveys.

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

age	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1	473		684	13	8069	19710	3912	6095	5130	66500	347781	103530	5500
2	1990	1330	54	3380	16	3880	11625	16681	7480	27760	143061	127920	67560
3	13	641	628	26	1118	60	5021	12419	16170	8640	16918	10980	32230
4	122	29	134	601	78	1472	21	4545	14300	7660	6325	11720	4900
5	79	70	22	168	708	90	1138	73	4150	5000	7787	4960	4170
6	15	33	42	5	136	590	58	928	20	1800	3150	4870	2780
7	142	26	7	10		120	425	58	1090	10	1159	1630	1800
8	99	96	8	3	17	10	74	230		460		820	970
9	6	30	39	5	8		13	80	340	50	192	20	290
10	6		24	15	8	10	20			260		90	40
11	6	5				10		15		30	88	30	30
12									10			80	30
13						10							10
14												10	
total	2951	2261	1642	4226	10157	25960	22307	41125	48690	118180	526461	266660	120310

**Table 6** – Cod (*Gadus morhua*) length distribution ('0000) total and by strata in the 2013 survey.

length (cm)	stratum															total	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	19
09-11			1														1
12-14	4	7	4	2							1						16
15-17	15	60	14	37	42	6		1									174
18-20	3	15	9	16	23	8	1	1			1		1				78
21-23	4	68	187	200	223	149	55	14		42	21						964
24-26	5	304	630	424	592	392	173	109	27	310	98	1	10	7	1		3082
27-29	10	400	286	255	312	227	112	109	56	220	84	1	19	12	3		2104
30-32	6	156	67	39	76	86	55	55	14	56	25	1	8	15	2		661
33-35	3	65	69	7	26	54	59	57	2	38	16	4	9	8	1		419
36-38	11	104	170	9	49	47	73	72	2	45	26	9	6	6	4		633
39-41	9	128	186	15	61	34	60	76		44	28	10	10	8	4		674
42-44	22	157	248	50	70	33	61	58		50	35	1	2	29	2		819
45-47	12	117	167	67	51	11	45	56		38	21	9	4	44			640
48-50	6	92	125	63	29	6	33	28		26	15			34	2		459
51-53	3	30	48	44	16	6	18	18		16	1		2	29			231
54-56	1	19	32	30	6	4	11	5		11	3	1	1	19	1		144
57-59	8	19	23	30	8	4	8	6		9	4		1	17		1	138
60-62	7	13	25	28	7	2	8	8		8	5	2		19		1	134
63-65	3	22	23	18	7	2	8	5	2	15	7	3	1	21	2	1	139
66-68	2	20	17	9	6	6	7	5	2	6	7	3		15	3	1	107
69-71	2	11	10	7	5	3	6	1	1	4	5	12	1	10	3	1	84
72-74	4	2	4	2	1	2	4	3	3	10	9	1	13	4		2	65
75-77	1	4	2	1	2	2	6	1		4	4	11	2	5	4	1	49
78-80	1	2	2	2	2	2	1	3		1	4	3	2	4	5		33
81-83	1	3	1	2	2	2	3	1	1	1	4	1	1	2	2		27
84-86	1	3	1	2	1		2	2	1		4	8	1	4	4		33
87-89	2	1					1		2	3	5		2	4	2		21
90-92	1	1	1	1	2	1	6	4		1	1	1	1	5	4		28
93-95	1	3	1	1	1	1	1		1	2	2	1		2	2		17
96-98	2	2		1		2	4	1	1	2	1			1	1		16
99-101	1	1			1	2	4		1			1		1	1		12
102-104	1	1	2	1	1	1	1	1		1	3	1		1	2		15
105-107	1			1			1	2		2	1		1	1			9
108-110	1	1							1	1							4
111-113													1	1			2
114-116					1												1
117-119																	
120-122							1	1									1
123-125																	
126-128													1				1
tows	4	10	7	4	8	6	9	7	3	11	9	8	3	7	8	7	
n	148	1834	2354	1367	1623	1095	826	703	117	960	441	93	87	337	60	5	12035

**Table 7** – Cod (*Gadus morhua*) age-length key in 2013.

TOTAL		age														total		
length cm		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	
9-11		1																1
12-14		20																20
15-17		67																67
18-20		47																47
21-23		18	43															61
24-26			60															60
27-29			62															62
30-32			65															65
33-35		27	36															63
36-38		5	61															66
39-41			62	1														63
42-44			62	1														63
45-47			53	8														61
48-50			39	21														60
51-53		18	31	10	1													60
54-56		7	26	27	2													62
57-59			10	44	7													61
60-62			3	36	21													60
63-65				32	26	4												62
66-68				23	25	13												61
69-71				16	28	17	1											62
72-74				3	33	24												60
75-77					19	25	4											48
78-80					11	25	7											43
81-83					4	27	11											42
84-86					1	20	17											38
87-89						8	20	2										30
90-92						11	23	7										41
93-95						7	16	4										27
96-98						5	13	5										23
99-101							8	6	2	1								17
102-104							10	9	3									22
105-107							2	7	1	1	1							12
108-110							2	2		1	1							6
111-113							1			1								2
114-116												1						1
117-119																		
120-122											1		1					2
123-125																		
126-128														1				1
total		153	262	338	101	191	178	186	135	42	6	5	4	1				1602

**Table 8** – American plaice (*Hippoglossoides platessoides*) mean catch per towed mile and the estimated biomass by stratum, and their standard error in the 2013 survey.

stratum	square miles	hauls	catch (kg)		biomass (t)	
			mean	s.e.	value	s.e.
1	342	4	7.23	4.98	329	227
2	838	10	10.76	2.21	1202	247
3	628	7	3.17	0.78	266	65
4	348	4	14.46	4.50	671	209
5	703	8	2.85	0.95	267	89
6	496	6	5.16	1.92	341	127
7	822	9	1.52	0.41	166	45
8	646	7	1.81	0.67	156	58
9	314	3	0.60	0.60	25	25
10	951	11	1.21	0.26	153	33
11	806	9	1.12	0.33	121	36
12	670	8	0.00	0.00	0	0
13	249	3				
14	602	7				
15	666	8				
16	634	7				
17	216	2				
18	210	2				
19	414	5				
total<730 m.	10555	120	2.63	0.31	3698	439
total<1460m.	16070	181	1.73	0.21	3698	439

**Table 9** – American plaice (*Hippoglossoides platessoides*) survey biomass (t) by strata in 1988-2013.

stratum	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1	1306	1000	505	1078	709	1079	661	2230	1462	381	156	372	345	1043	141	1292	1507	1038	714	284	144	548	716	693	462	329
2	2845	3602	1375	2663	1714	1267	1199	1335	943	740	1587	1810	976	835	1262	713	768	796	354	209	513	370	1084	1141	1272	1202
3	1367	1118	1668	1247	631	444	325	252	168	495	284	97	21	93	75	17	427	101	74	101	147	74	103	364	468	266
4	2199	461	817	320	557	572	853	489	268	203	343	53	100	85	128		395	359	109	153	440	36	91	1201	749	671
5	2599	3093	1830	1407	837	1291	1230	549	500	619	744	73	56	112	189	82	72	45	63	81	88	72	200	190	716	267
6	479	1130	954	501	601	305	808	123	32	13	35	40	25	37	63	29	26	71	61	99	37	57	34	160	185	341
7	1174	531	837	389	639	319	316	249	72	83	47	19	15	28	52	30	84	31	37	20	47	32	28	160	156	166
8	417	164	263	251	727	487	171	132	56	123	165	3		45	43	14	55	175	163	58	128	47	49	65	187	156
9	103	163	343		373	205	20	500	55	36					1	9	77	18				77		30	25	
10	2323	1491	2000	1308	1406	1459	2236	708	415	287	36	72	45	95	36	54	45	87	97	24	163	54	115	35	123	153
11	1186	1168	1316	401	372	292	303	109	68	32	29	37	23	27	59	29	69	35	19	22	50	64	26	33	121	121
12	9	19	45	17	11	15	33	12	32	7				4		11						11		11	0	
13	3		20					3																		
14	8	8	7	389	29			24	15	4		4	9												32	
15	23	99	3	97	37	109	40	68	23	7	7						6		4		3	7	1		10	13
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	2760	1691	1053	1766	1442	2446	4084	4491	3698
s.e.	1845	2048	1276	1180	954	1040	1373	1083	912	708	751	869	332	429	729	748	740	684	342	159	300	327	526	780	534	439

s.e.: standard error

**Table 10** – American plaice (*Hippoglossoides platessoides*) abundance ('000) at age by strata in the 2013 survey, strata 1-19.

age	stratum												total	mean weight (g)	mean length (cm)
	1	2	3	4	5	6	7	8	9	10	11	12			
1	6	14			6								27	12	11
2	57	28	20	14	51	7	7			7	7		198	78	20
3	3	14		1	6	2	37			5	9		76	291	31
4	14	74	45	25	8	41	54			30	20		311	441	35
5	58	296	69	33	55	91	52	2	4	35	23		718	529	37
6	72	353	73	71	79	97	42	11	6	36	25		866	684	40
7	191	618	125	187	124	144	50	32	13	67	46		1596	814	43
8	15	45	10	32	11	9	5	4	1	4	3		138	1010	45
9	12	24	3	10	3	3	1	2		3	2		64	909	44
10	16	25	3	28	6	4	2	3		3	3		94	1163	47
11	15	28	4	35	7	6	3	4		3	4		109	1240	48
12	22	37	2	24	5	4	5	3		3	2		108	1060	46
13	17	15		15	1	1		1		3	1		55	1101	46
14	11	13		15	3	4	2	11		1			61	1414	50
15	12	14	2	15	3	3	3	2		2	1		54	1116	47
16	10	19	1	25	3	2	3	2		2	1		67	1349	50
17	6	4		2	1	1							14	853	44
18	1	4	2	8		3	1	11		2	2		34	1846	55
19	5	12		2						1			20	1098	46
20	1	1		6	1	2		2					13	1972	57
21	5	6		4	1	1	1	1		1			20	1007	45
22	1	1		4	1								7	1748	55
23															
24+	1	3	1	8		1	1	2		1	2		20	1630	53
sets	3	10	7	4	7	6	8	4	1	10	7	1	68	747	
n	487	1671	381	572	329	477	270	101	25	207	144	7	4670	3489	40.4

**Table 11** – American plaice (*Hippoglossoides platessoides*) length distribution ('00) in the 2013 survey.

length	ind.	male	female	length	ind.	male	female	length	ind.	male	female
10-11	69	64		28-29		135		46-47		467	4860
12-13	133			30-31		400		48-49		67	1260
14-15				32-33		1049	350	50-51		131	728
16-17		67	69	34-35		2890	609	52-53			1214
18-19		273		36-37		5672	955	54-55		64	864
20-21	69	522	459	38-39		4588	1456	56-57			477
22-23	69	322	127	40-41		3318	2324	58-59			203
24-25			71	42-43		1638	3906	60-61			144
26-27				44-45		1115	3503	total	340	22782	23579

**Table 12** – American plaice (*Hippoglossoides platessoides*) abundance ('000) at age in 1988-2013 surveys.

age	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1	0	40	8	40	0	0	0	0	8	8	0	8	16	0	0	8	0	0	7	207	51	26	20	7	27	
2	402	563	426	354	852	8	40	32	32	16	24	0	24	40	0	8	113	32	28	7	1492	293	341	394	60	198
3	1882	8364	917	1206	796	1544	48	113	121	113	32	24	8	48	32	32	281	113	37	13	69	1107	608	601	447	76
4	1311	1874	8372	2171	1070	1086	2131	740	257	24	48	64	80	56	64	97	72	290	106	35		147	2000	1384	629	311
5	4230	4367	1126	5348	1938	780	1037	2131	587	121	72	80	105	105	16	80	80	105	133	106	32	29	301	2467	980	718
6	6385	4359	3370	2445	4769	418	877	1367	1665	418	265	80	153	56	88	56	105	105	139	119	127	22	187	454	2833	866
7	5010	4142	2340	2686	1279	4134	973	1375	893	1206	619	241	121	113	64	48	105	129	72	49	120	80	72	94	447	1596
8	5460	2429	2228	2067	1504	450	3426	909	547	273	901	474	153	265	129	137	129	105	57	49	108	57	139	49	84	138
9	1753	804	1351	852	828	780	322	1536	402	410	523	507	394	434	161	290	249	225	123	35	104	94	122	90	111	64
10	458	346	627	298	378	370	651	161	627	290	354	257	426	579	193	233	314	201	163	47	111	90	70	176	143	94
11	97	40	113	8	177	257	225	177	145	491	298	338	225	483	298	426	281	225	200	76	63	132	56	144	125	109
12	161	16	16	56	97	306	225	145	80	129	290	209	185	418	225	483	595	249	193	122	47	121	176	55	115	108
13	129	0	32	0	16	362	249	145	80	24	88	121	72	193	249	281	426	354	192	143	118	63	125	107	45	55
14	48	0	16	0	0	1070	523	290	105	97	113	121	56	161	145	265	402	394	213	82	110	104	114	148	133	61
15	56	0	0	0	0	32	491	217	72	48	56	56	48	113	129	145	330	257	201	75	150	121	134	82	130	54
16+	40	0	0	0	0	40	8	32	24	113	105	97	56	97	185	161	523	547	323	236	561	353	497	672	323	195
total	27415	27351	20949	17523	13711	11637	11226	9377	5645	3772	3804	2670	2131	3169	1970	2766	4013	3329	2188	1401	3262	2838	4952	6917	6614	4670
N6+	19598	12135	10093	8412	9047	8219	7970	6353	4640	3498	3611	2501	1890	2911	1866	2525	3458	2791	1877	1033	1619	1237	1692	2072	4489	3340
SOP	16041	14008	11982	10007	8623	7859	8229	6815	4073	3025	3437	2589	1596	2402	2047	2486	3524	2673	1743	1053	1817		4176	4428	3485	
biomass	16043	14044	11983	10088	8657	7861	8228	6785	4097	3024	3436	2587	1606	2404	2048	2286	3525	2760	1691	1053	1766	1442	2446	4084	4491	3698

**Table 13** – American plaice (*Hippoglossoides platessoides*) age-length key in 2013.**MALE**

length cm	age																			total	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
10-11	1																				1
12-13																					
14-15																					
16-17	1																				1
18-19	4																				4
20-21	8																				8
22-23	5																				5
24-25																					
26-27																					
28-29		2																			2
30-31		2	4																		6
32-33	1	6	6	3																	16
34-35		5	22	10	6																43
36-37	3	25	18	18				1													65
38-39		5	19	34	3				1	2											64
40-41		1	3	28	1	3	2	1	4	1	1					2		1	1		49
42-43			1	8			4	3	2	1	2	2				1			1		25
44-45				2	2	1			1	4	1	2	1	1				1			16
46-47				1	2		2	1				1									7
48-49					1																1
50-51							1		1												2
52-53																					
54-55																	1				1
total	1	18	5	18	59	54	98	8	5	9	6	10	6	4	5	3	2	3	2		316

**FEMALE**

length cm	age																			total					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
16-17	1																								1
18-19																									
20-21		7																							7
22-23		2																							2
24-25			1																						1
26-27																									
28-29																									
30-31																									
32-33		5	1																						6
34-35	1	7	1																						9
36-37		10	3																						13
38-39	8	10	2																						20
40-41		17	9	9																					35
42-43		7	29	19	1																				56
44-45		1	18	32	3																				54
46-47		8	48	4	2	1	3																		66
48-49		1	16		1													1							19
50-51			4	1				1	1							1	1	1					1	11	
52-53				2	1	1	1	4			2	2	3						1			1	18		
54-55				1		1	3	1	1	1	3							1	1					13	
56-57				2	2		1									1							1	7	
58-59									1				1			1								3	
60-61									1			1												2	
total	10	7	26	39	67	128	12	4	5	10	6	2	5	3	7		5	2	1	1		3	343		

**Table 14** – Redfish biomass (t) estimated by strata in the 2013 survey.

stratum	Square miles	hauls	<i>S.marinus</i>	<i>S.mentella</i>	<i>S.fasciatus</i>	juvenile	total
1	342	4	34			5	39
2	838	10	482		5	11	498
3	628	7	190	9	178	19	396
4	348	4	10			2	12
5	703	8	1967	21	282	32	2302
6	496	6	1204	27	316	28	1575
7	822	9	11934	3178	18562	68	33742
8	646	7	1098	6531	14138	32	21799
9	314	3	2142	1083	1525	33	4783
10	951	11	6482	6658	5038	119	18297
11	806	9	5222	3803	13265	60	22350
12	670	8	29	25239	4100		29368
13	249	3	768	5436	13719		19923
14	602	7	175	14296	1896	9	16376
15	666	8	279	31027	11718		43024
16	634	7		82	9		91
17	216	2		4			4
18	210	2		3130	1		3131
19	414	5		1978	49		2027
20	525	6		12	1		13
21	517	6					
22	533	6					
23	284	3					
24	253	3		5			5
25	226	3					
28	530	6		11			11
29	488	6					
30	1134	11					
31	203	2					
32	238	2					
33	98	2					
34	486	5			1		1
total<730 m.	10555	120	32016	102500	84801	420	219737
total<1460m.	16070	181	32016	102528	84803	420	219767

**Table 15** – Redfish biomass (t) estimated in the traditional strata in the survey series.

year	<i>Sebastes marinus</i>	<i>Sebastes spp.,</i>			total	
		<i>mentella</i>	<i>fasciatus</i>	juveniles		
1988	18229		170102		188331	
1989	27312		135223		162535	
1990	16751	86695		23311	126757	
1991	4864	59552	6755	5784	76955	
1992	4909	85408	6314	33578	130209	
1993	4789	21235	5175	41409	72608	
1994	39516	42495	9303	71211	162525	
1995	10754	70567	5986	337	87644	
1996	13431	92647	13112	472	119662	
1997	77125	66710	20780	1201	165816	
1998	7640	53946	7656	1590	70832	
1999	11215	77610	9460	366	98651	
2000	53388	106283	15364	2955	177990	
2001	10244	45931	13715	7455	77345	
2002	11651	48760	27556	33345	121312	
2003	40110	28785	15031	9890	93816	
2004	85383	45999	76164	43059	250605	
2005	147688	105110	123326	75762	451215	
2006	298290	105849	319387	43396	766922	
2007	88071	51191	261790	63576	464628	
2008	240777	42570	202288	80491	566126	
2009	72211	111787	171676	2804	358479	
2010	47377	62683	97068	5085	212211	
2011	29056	103678	59753	4543	197030	
2012	55410	166693	82539	1304	305946	
2013	32016	102500	84801	420	219737	
150-1460 m	2004	85383	46030	76166	43059	250638
	2005	147688	105153	123336	75762	451268
	2006	298290	105877	319389	43396	766952
	2007	88071	51207	261806	63576	464660
	2008	240777	42621	202307	80492	566718
	2009	72211	111801	171705	2804	358521
	2010	47377	62746	97074	5085	212282
	2011	29056	103718	59763	4543	197080
	2012	55410	166705	82576	1304	306080
	2013	32016	102528	84803	420	219767

**Table 16** – Redfish (*Sebastodes marinus*) mean catch per towed mile and the estimated biomass by stratum, and their standard error in the 2013 survey.

stratum	square miles	hauls	catch (kg)		biomass (t)	
			mean	s.e.	mean	s.e.
1	342	4	0.74	0.74	34	34
2	838	10	4.31	3.44	482	385
3	628	7	2.27	0.93	190	78
4	348	4	0.22	0.11	10	5
5	703	8	20.98	9.87	1967	925
6	496	6	18.21	9.61	1204	636
7	822	9	108.89	45.44	11934	4981
8	646	7	12.74	6.39	1098	550
9	314	3	51.17	36.19	2142	1515
10	951	11	51.12	26.36	6482	3342
11	806	9	48.59	12.80	5222	1376
12	670	8	0.33	0.33	29	29
13	249	3	23.12	21.42	768	711
14	602	7	2.18	0.85	175	69
15	666	8	3.14	1.68	279	149
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<730 m.	10555	120	22.75	4.63	32016	6513
total<1460m.	16070	181	14.94	3.04	32016	6513

**Table 17** – Redfish (*Sebastes marinus*) abundance ('0000) at age by strata in the 2013 survey.

age	strata															total	average	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		weight (g)	length (cm)
1																		
2		2	1		10	4	35	4	12	26	20			1	1	115	455	30
3	11	28	20	2	156	54	523	59	175	388	298	3	5	8	11	1741	449	30
4	10	23	19	2	94	40	308	37	111	228	180	2	3	4	6	1067	430	29
5	4	8	7		32	13	39	10	38	58	64			1	1	276	278	25
6	1	3	3		24	8	40	9	51	50	55			3		248	291	26
7		2	4		45	7	57	9	81	91	74			2		373	281	26
8		2	3		54	9	111	6	48	127	93					454	366	29
9		2	1		27	6	81	2	24	80	58					280	441	30
10		2	1		22	8	89	2	20	78	51			1	1	274	513	32
11		2			8	10	94	3	14	65	53			1	5	254	665	35
12		2	1		11	10	95	7	9	59	47		4	3	4	250	725	36
13		3	1		12	12	111	9	11	67	56		8	3	4	295	772	36
14		5	1		9	13	100	9	6	48	45		13	3	5	256	927	39
15		1			4	3	36	2	3	15	18			1	2	86	905	39
16		1				1	3			1	2					9	1147	42
17						1	1				1		5			9	1526	46
18						1	2	1					2			6	1319	44
19																1	1395	45
20		1				1							5			7	1665	48
21													5			6	1678	48
22						1	39	6								46	1994	51
23							13									13	1813	49
24		1				1	2	6					7			17	1664	48
25+						1										2	2097	51
sets	1	8	7	3	7	6	9	4	3	11	9	1	3	4	3	79	505	
n	27	89	61	5	508	202	1781	180	603	1383	1114	5	60	29	39	6086	3074	30.8

**Table 18** – Redfish (*Sebastes marinus*) length distribution ('000) in the 2013 survey.

length	male	female	length	male	female	length	male	female
14		21	29	1553	2007	44	13	693
15	72	62	30	2193	1641	45	13	19
16	156	158	31	1740	1358	46		51
17	175	119	32	2653	1592	47		45
18	167	95	33	3031	1372	48		270
19	386	252	34	2162	2530	49	6	256
20	523	416	35	2447	1236	50		19
21	570	606	36	1438	1260	51		111
22	729	899	37	763	836	52		256
23	679	700	38	381	1358	53		
24	1365	983	39	559	590	54		6
25	1840	981	40	250	574	55		6
26	1547	1522	41	97	881			
27	1284	2140	42	13	456			
28	1494	1971	43	13	196		total	30312 30544

**Table 19** – Redfish (*Sebastodes marinus*) age-length key of females in 2013.

length	age																									total		
	1	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																									1	
17			1																								1	
18		3	4	3																							10	
19		1	9	4																							14	
20			6	8																							14	
21		2	11	3																							16	
22			10	4																							14	
23		4	6	5																							15	
24			9	7																							16	
25		2	9	1																							12	
26		1	11	4	1																						17	
27		2	6	9																							17	
28		3	8	4	1																						16	
29		1	9	3	4													1									18	
30		3	5	3	1													1									13	
31		1	5	5													3	2									17	
32		2	3	2	3												1	2									13	
33		1	1	3	3	4											1										13	
34		1	1	3	3	3										3	1										15	
35			2	3	4	2											3										14	
36				4	3	4											2	1									14	
37				1	5	5											5	1									17	
38			2	3	3	2											6	2									18	
39				2	6	7											1										16	
40				1	1	3											7	4	1								17	
41				4	4	6											6	1									21	
42				3		2											2	1									8	
43				1	2	2											5	1									14	
44				2	4	4											1										12	
45					2												1										3	
46				1	2	3										1	1	1		1		1					11	
47				1	1											1		1	1			1		1		7		
48					1											1		1		1		1		1		5		
49																				1	1						2	
50					1												1				1						3	
51																				1		1					2	
52																				1								1
53																												0
54																												1
55																				1		1						2
total	5	22	40	27	43	39	25	25	27	36	46	55	18	5	4	2	1	3	2	6	2	4	3	440				

**Table 20** – Redfish (*Sebastodes mentella*) mean catch per towed mile and the estimated biomass by stratum, and their standard error in the 2013 survey.

stratum	square miles	hauls	catch (kg)		biomass (t)	
			mean	s.e.	mean	s.e.
1	342	4				
2	838	10				
3	628	7	0.11	0.11	9	9
4	348	4				
5	703	8	0.22	0.22	21	21
6	496	6	0.40	0.35	27	23
7	822	9	29.00	13.56	3178	1486
8	646	7	75.82	36.83	6531	3172
9	314	3	25.87	24.80	1083	1038
10	951	11	52.51	21.71	6658	2753
11	806	9	35.39	24.09	3803	2589
12	670	8	282.53	79.06	25239	7063
13	249	3	163.73	81.98	5436	2722
14	602	7	178.10	42.13	14296	3382
15	666	8	349.40	25.95	31027	2304
16	634	7	0.97	0.69	82	59
17	216	2	0.14	0.14	4	4
18	210	2	111.78	107.93	3130	3022
19	414	5	35.83	35.58	1978	1964
20	525	6	0.17	0.11	12	8
21	517	6				
22	533	6				
23	284	3				
24	253	3	0.16	0.16	5	5
25	226	3				
28	530	6	0.16	0.11	11	8
29	488	6				
30	1134	11				
31	203	2				
32	238	2				
33	98	2				
34	486	5				
total<730 m.	10555	120	72.83	7.61	102500	10708
total<1460m.	16070	181	47.85	5.00	102528	10708

**Table 21** – Redfish (*Sebastes mentella*) abundance ('00000) at age by strata in the 2013 survey.

age	strata															total	average					
	3	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	24	28	weight	length	
1																				39	14	
2				15	4	1	37	5			7	1							71	59	16	
3	1	1	33	11	1	102	20	6			14	1								190	72	17
4	1	1	50	23	2	112	24	23			17	5								258	96	19
5			44	46	4	70	25	105	7	37	63								405	145	22	
6			47	82	12	70	45	364	43	132	285				3	11			1095	182	23	
7			28	110	19	64	56	514	101	250	602	1		15	36			1796	225	25		
8			12	48	8	28	26	183	52	115	292	1		17	21			803	259	26		
9			3	7	2	4	5	32	14	28	64			13	6			178	306	28		
10				3	1	2	1	12	5	12	29			8	2			76	332	29		
11					1	1	1	5	3	5	11			5	1			33	364	29		
12						1		3	2	3	5			5	1			19	386	30		
13							2			2	2			4	1			12	473	32		
14								2	2	3	5			7	1			20	472	32		
15									1	4	2			2				9	467	32		
16											1			1				3	467	32		
17																			557	34		
18																		1	658	36		
19																			508	33		
20																			605	35		
21															1			1	507	33		
22																			755	38		
23											1							1	687	37		
24																			771	38		
25+											3							4	721	37		
sets	1	1	3	9	6	2	11	9	8	3	7	8	5	1	2	2	1	2	83	208		
n	1	3	3	232	337	51	492	207	1252	230	632	1369	3	1	81	83	2	1	4975	1037	24.2	

**Table 22** – Redfish (*Sebastes mentella*) length distribution ('0000) in the 2013 survey.

length	male	female	length	male	female	length	male	female		
14	1	9	24	4789	3111	34	6	35		
15	112	78	25	5149	4173	35	6	23		
16	434	353	26	3663	4426	36	1	31		
17	769	624	27	1859	2639	37	1	19		
18	640	516	28	773	1351	38		11		
19	547	357	29	237	679	39		23		
20	725	757	30	126	263	40				
21	1195	867	31	35	183	41		1		
22	1483	1242	32	27	90					
23	2739	2445	33	7	122					
						total	25324	24428		

**Table 23** – Redfish (*Sebastodes mentella*) age-length key in 2013.

length	age																			total				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
15	3	1																						4
16	2	4																						6
17	1	2	3																					6
18		3	3																					6
19			6																					6
20		4	4																					8
21		1	4	3																				8
22		3	7																					10
23			12	1																				13
24		1	4	8																				13
25			2	9	3																			14
26			9	6																				15
27			3	10																				13
28		1	4	6																				11
29			1	4	1												1							7
30				2	3	1	1																	7
31				2		1																	1	4
32					3																			3
33					1													1						2
34					1																			1
35																								0
36																								0
37																								0
total	6	10	17	12	28	31	23	7	4	3	5	1	4	4				1					1	157

**Table 23** – (Continuation).

length	age																				total			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20				
14	1																				1			
15	3	1																			4			
16	4	3																			7			
17	1	6	1																		8			
18		7	5	2																	14			
19		5	9	2																	16			
20			6	6	3																15			
21			1	14	4																19			
22			10	9	2																21			
23			4	12	5																21			
24			1	5	13	1															20			
25			9	10	6																25			
26			1	19	2	2															24			
27			7	14	1	2															24			
28			2	9	7	2	1														21			
29			3	8	4	3	2														20			
30			8	5	2	1	1	1													18			
31			3	5	1	2	3														15			
32			1	2	3	4	2														12			
33			1				6												1		9			
34					4	1	2														8			
35						3	1											1	1		6			
36						2	2												2		6			
37				1				1										1	1	1	5			
38							1												1	1		3		
39																				1		1		
40																						0		
41																			1			1		
total	9	22	22	39	43	58	35	27	19	12	7	14	16	6	2	1	2	1	1	2	3	1	2	344

**Table 24** – Redfish (*Sebastodes fasciatus*) mean catch per towed mile and the estimated biomass by stratum, and their standard error in the 2013 survey.

stratum	square miles	hauls	catch (kg)		biomass (t)	
			mean	s.e.	mean	s.e.
1	342	4				
2	838	10	0.05	0.03	5	4
3	628	7	2.13	1.91	178	160
4	348	4				
5	703	8	3.01	1.56	282	146
6	496	6	4.78	3.80	316	251
7	822	9	169.36	114.75	18562	12577
8	646	7	164.14	59.54	14138	5129
9	314	3	36.42	6.61	1525	277
10	951	11	39.73	12.46	5038	1581
11	806	9	123.44	54.07	13265	5810
12	670	8	45.89	15.74	4100	1406
13	249	3	413.22	266.01	13719	8832
14	602	7	23.62	7.45	1896	598
15	666	8	131.96	32.54	11718	2889
16	634	7	0.11	0.07	9	6
17	216	2				
18	210	2	0.03	0.03	1	1
19	414	5	0.89	0.81	49	45
20	525	6	0.02	0.02	1	1
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	0.01	0.01	1	1
total<730 m.	10555	120	60.26	12.50	84801	17596
total<1460m.	16070	181	39.58	8.21	84803	17596

**Table 25** – Redfish (*Sebastes fasciatus*) abundance ('0000) at age by strata in the 2013 survey.

age	strata																	total	average		
	2	3	5	6	7	8	9	10	11	12	13	14	15	16	18	19	20	34	weight	length	
1					5	2	3	2	5		1								18	54	15
2	6	20	58	231	106	98	148	177	7		30								881	61	16
3	1	48	44	117	1092	643	175	767	891	14	4	83	23						3903	83	17
4		54	46	86	1289	1547	112	930	1227	29	53	95	68		1	1			5538	110	19
5		31	34	32	1034	1656	75	588	957	160	182	87	296	1		4			5139	139	21
6		12	17	5	1016	1168	66	293	760	321	436	95	609	1		6			4806	187	23
7		4	15	1	2584	1576	151	472	1487	668	1412	204	1325	3		5			9907	225	24
8		1	6		768	459	52	124	484	215	634	66	609		1				3417	275	26
9		3			349	160	29	48	242	101	343	38	306		2				1621	332	28
10		2			236	122	22	40	191	78	265	37	216		1				1210	376	29
11		2			230	110	23	29	156	71	278	29	210		1				1140	374	29
12		1			156	58	12	15	108	43	218	13	130		1				756	400	30
13		1			93	66	13	17	86	30	162	14	137						620	381	29
14		2			158	97	14	26	120	44	245	21	177		1				905	408	30
15		1			63	40	7	9	51	18	112	8	90						399	414	30
16					22	6	1	4	20	7	36	3	22						121	446	31
17					20	5	1	2	19	6	40	2	20						114	461	31
18					7		4	1	9	3	2	3	30						58	376	29
19					3	6	1	1	5	1	12	1	10						39	417	30
20																					
21									5	1	18		10						35	644	35
22																					
23					11	3	1	2	13	3	17	2	11						62	478	31
24																					
25+																					
sets	3	4	6	6	9	7	3	11	9	8	3	7	8	3	1	3	1	1	93	208	
n	2	155	194	301	9369	7831	859	3520	7012	1818	4466	832	4300	5	1	23	1	1	40689	8452	23.0

**Table 26** – Redfish (*Sebastes fasciatus*) length distribution ('0000) in the 2013 survey.

length	male	female	length	male	female	length	male	female
12	1		22	2236	709	32	4	421
13	7		23	3384	636	33	1	173
14	33	11	24	3408	703	34		178
15	210	271	25	2398	1014	35		33
16	580	520	26	1397	1529	36		25
17	1100	916	27	711	1812	37		45
18	1582	1424	28	102	1967			
19	1633	1515	29	73	1395			
20	1405	1307	30	19	1038			
21	1427	874	31	20	442			
						total	21731	18958

**Table 27** – Redfish (*Sebastodes fasciatus*) age-length key in 2013.

length	age															total									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25+
12	1																							1	
13	2																							2	
14	4	2																						6	
15	5	3																						8	
16	4	3																						7	
17		8	3																					11	
18		5	4	2																				11	
19			6	5																				11	
20			5	5	1																			11	
21		2	7	3																				12	
22			4	6	2																			12	
23			1	3	8																			12	
24				1	9																			10	
25				1	4	5																		10	
26					5	3	1										1							10	
27					1	2	1										2	1						7	
28																	1	1							4
29																	1								4
30																									0
31																	1								1
total	16	21	20	24	15	29	10	2	2	1			3	2	2			2	1					150	

**Table 27** – (Continuation).

length	age																				total		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20			
14		3																			3		
15	1	9	5																		15		
16		7	10																		17		
17		12	4																		16		
18		9	12	1																	22		
19		5	11	4																	20		
20		13	8	2																	23		
21		8	8	6																	22		
22		8	13	4																	25		
23		5	9	7																	21		
24		3	8	9	3																23		
25		6	8	5																	19		
26		3	13	1	2	1															21		
27			5	7	2	2	2														19		
28				5	6	1	4	4													20		
29					5	5	4	1	1	3	1										20		
30						2	7	1	1		5	1	2	1						1	21		
31							3	5	4	2	4	2									1	21	
32								1	1	3	2	2	2								2	13	
33									1	3	2	2	3	1								12	
34										1	1	1	2	1	1						1	8	
35											1						2			1	1	9	
36												2										2	
37												1		1	1					1	1	5	
38													1				1	1				2	
39														1			1	1				2	
40															1					1	1	2	
41																						0	
42																						0	
43																						0	
44															1							1	
total	1	19	41	48	37	47	46	21	17	21	22	17	16	21	9	3	4	2	2	4	3	1	404

**Table 28** – Juvenile redfish (*Sebastodes sp.*) mean catch per towed mile and the estimated biomass by stratum, and their standard error in the 2013 survey.

stratum	square miles	hauls	catch (kg)		biomass (t)	
			mean	s.e.	mean	s.e.
1	342	4	0.12	0.11	5	5
2	838	10	0.10	0.05	11	5
3	628	7	0.23	0.07	19	6
4	348	4	0.05	0.02	2	1
5	703	8	0.34	0.13	32	12
6	496	6	0.42	0.14	28	9
7	822	9	0.62	0.19	68	21
8	646	7	0.37	0.18	32	16
9	314	3	0.80	0.31	33	13
10	951	11	0.93	0.31	119	39
11	806	9	0.56	0.17	60	18
12	670	8				
13	249	3				
14	602	7	0.12	0.08	9	6
15	666	8				
16	634	7				
17	216	2				
18	210	2				
19	414	5				
total<730 m.	10555	120	0.30	0.04	420	55
total<1460m.	16070	181	0.20	0.03	420	55

**Table 29** – Juvenile redfish (*Sebastodes sp.*) length distribution ('000) in the 2013 survey.

length		length	
6	178	16	32
7	360	17	16
8	743		
9	1427		
10	1563		
11	1735		
12	2140		
13	3688		
14	3612		
15	273	total	15767

**Table 30** – Greenland halibut (*Reinhardtius hippoglossoides*) mean catch per towed mile and the estimated biomass by stratum, and their standard error in the 2013 survey.

stratum	square miles	hauls	catch (kg)		biomass (t)	
			mean	s.e.	mean	s.e.
1	342	4				
2	838	10				
3	628	7				
4	348	4				
5	703	8				
6	496	6	0.00	0.00	0	0
7	822	9	0.04	0.04	4	4
8	646	7				
9	314	3	0.23	0.23	9	9
10	951	11				
11	806	9	0.02	0.02	2	2
12	670	8	1.57	0.67	140	60
13	249	3				
14	602	7	0.35	0.35	28	28
15	666	8	1.00	0.35	89	31
16	634	7	12.28	1.72	1038	146
171	216	2	5.89	1.51	170	43
18	210	2	14.10	7.97	395	223
19	414	5	16.74	3.66	924	202
20	525	6	26.54	3.71	1858	259
21	517	6	28.31	7.63	1952	526
22	533	6	17.17	3.98	1220	283
23	284	3	14.09	4.28	534	162
24	253	3	11.24	1.16	379	39
25	226	3	13.00	1.13	392	34
28	530	6	30.43	5.65	2150	399
29	488	6	31.66	9.07	2060	590
30	1134	11	30.98	6.53	4685	987
31	203	2	17.03	2.83	461	77
32	238	2	39.20	13.49	1244	428
33	98	2	45.43	22.05	594	288
34	486	5	47.27	16.07	3063	1041
total<730 m.	10555	120	1.99	0.25	2799	345
total<1460m.	16070	181	10.92	0.86	23391	1847

**Table 31** – Greenland halibut (*Reinhardtius hippoglossoides*) survey biomass (t) by strata in 1988–2013.

**Table 31 – (continuation)**

stratum	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1				2									
2	15	10		12	7	9							
3	384	140	55	852	416	325	22		4	6			
4	157	58	105	347	91	182	8						
5	268	66	92	254	280	231	92	15	7		6		
6	265	104	21	466	332	61	75	8				0	
7	982	429	414	1032	596	778	729	524	11	15	4		4
8	1124	878	507	811	934	910	432	226	31			0	
9	355	138	140	464	91	550	487	401	31				9
10	1743	744	286	753	1058	850	560	777	25	19	5		
11	1021	338	277	631	1063	290	503	563	21	32	2	8	2
12	1582	1086	673	902	1020	978	1246	1393	1217	743	126	332	140
13	291	521	61	447	310	219	392	431	217	273	33	19	
14	877	1081	885	1658	618	573	878	1023	742	62	35	256	28
15	1616	1233	607	1084	1747	1783	3041	1621	771	1224	112	111	89
16	1328	2182	633	1166	1357	1752	2263	1623	2186	2079	1892	1911	1038
17	170	204	148	223	429	639	407	411	558	446	236	401	170
18	574	694	1062	578	434	606	865	944	540	526	562	325	395
19	1120	2194	248	608	915	971	1042	2035	1414	1231	3700	927	924
20				1647	1061	666	2041	4119	1855	1490	2471	2381	1858
21				729	345	359	742	2161	1569	1367	1258	1496	1952
22				454	510	845	551	883	1970	2410	1226	714	1220
23				407	42	130	495	1144	475	715	464	280	534
24				208	328	555	588	1082	1185	461	1749	652	379
25				2377	993	322	436	441	732	473	593	459	392
28				1728	1162	1239	2857	3920	3153	1994	4188	2244	2150
29				2300	1330	674	1488	3335	2618	2091	2044	2237	2060
30				2024	602	2772	4719	5066	7692	5381	5060	4738	4685
31				546	186	354	347	385	944	319	414	82	461
32				599	596	1357	1040	1755	2391	1539	1916	1097	1244
33				358	147	608	166	698	309	408	707	320	594
34				2675	1460	1886	2222	2627	3377	1790	3454	2514	3063
total (1-19)	13872	12100	6214	12292	11698	11708	13040	11997	7777	6656	6713	4291	2799
s.e. (1-19)	776	662	611	400	630	609	786	583	363	814	2728	338	345
Total				28343	20460	23475	30731	39614	36047	27096	32257	23505	23391
s.e. Total				1335	933	1263	1270	1312	1538	1791	3862	1416	1847

**Table 32** – Greenland halibut (*Reinhardtius hippoglossoides*) length distribution ('000) in the 2013 survey.

**Table 33** – Greenland halibut (*Reinhardtius hippoglossoides*) abundance at age ('000) by strata in the 2013 survey.

age	strata																				total	average							
	6	7	9	11	12	14	15	16	17	18	19	20	21	22	23	24	25	28	29	30	31	32	33	34	weight (g)	length cm)			
1	6																								6	8	11		
2																													
3																										3	15	205	29
4																										401	36		
5	1	4	14		12	232	64	86	230	209	167	84	17	65	36	290	183	386	19	96	82	306	2583	555	40				
6	6		58		27	620	90	211	716	744	518	332	118	170	144	982	585	1145	66	486	279	1310	8608	769	45				
7		5	30		25	295	28	121	217	511	382	184	101	102	80	614	528	892	101	286	147	891	5538	1094	51				
8	2		7		8	65	10	29	35	173	169	86	62	28	29	177	224	413	58	107	37	285	2005	1389	55				
9			1		2	16	5	8	6	47	61	34	22	9	11	49	69	154	22	42	7	76	643	1553	57				
10			4		4	12	8	10	7	66	121	91	27	16	15	66	105	263	36	65	12	100	1026	1866	60				
11			2		3	3		4		31	58	42	12	5	4	21	30	121	12	44	8	12	412	2323	65				
12		3	2		2		3		19	57	35	14	3	5	20	30	111	10	21	7	8	349	2519	66					
13		2	3							7	26	18	4	1	3	6	17	44	9	5	3	3	153	2846	69				
14			2							5	10	7	4		2	3	9	23	5	1		2	73	3178	72				
15			1	3						3	14	10	3		7	2	13	35	6	1	3	1	103	3695	75				
16+				1						15	12	8				9	31	1			16	94	5260	84					
Sets	1	1	1	1	7	1	5	7	2	2	5	6	6	6	3	3	6	6	11	2	2	2	5	94	1061				
n	6	7	8	7	125	7	86	1300	216	480	1249	1845	1621	946	395	408	343	2270	1842	3678	352	1165	593	3053	22002	23350	49.0		

**Table 34** – Greenland halibut (*Reinhardtius hippoglossoides*) abundance ('000) at age in 1991-2013 surveys.

## Depth &lt; 730 m

age	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1	1302	1677	1423	1429	9978	4699	2674	2200	852	3014	6459	3282	1768	1762	437	550	301	157	61	38			6
2	207	1260	1245	996	2045	6408	3036	1716	563	235	1153	2364	804	2644	652	312	64	78	7	9			8
3	348	447	777	1365	1793	1942	4822	6180	2419	479	1456	2248	489	3517	2554	525	455	121	30	29		36	4
4	1054	1023	692	1435	1535	2442	5225	8843	8419	1741	799	1342	1217	1585	2007	949	275	155	81	47	60	87	112
5	2307	1852	1021	1545	2136	3380	5714	9919	10787	5703	2242	3045	1991	5601	5537	4800	2765	1203	606	894	880	822	643
6	1291	2249	1545	2385	4099	4680	6800	9085	10119	11336	6262	4498	2362	6271	6105	6002	5928	4586	2905	2469	2930	1827	1733
7	2212	1947	1627	2139	3029	2001	4014	6304	4467	4346	5328	4610	1552	2040	2345	2665	4632	4950	3255	2365	2850	1406	718
8	534	1054	1266	1180	1706	1299	1731	2108	1466	1865	2584	1025	375	518	491	623	1217	909	713	715	570	349	158
9	462	468	776	631	1052	341	528	600	280	361	147	104	105	233	89	180	247	283	153	259	160	112	39
10	352	273	213	219	209	70	177	157	82	92	36	48	79	107	97	143	165	210	215	137	110	83	44
11	141	138	104	90	53	21	23	27	6	44	5	16	15	63	44	103	62	100	62	50		54	12
12	12	67	38	47	18	31	17	6	3			6	4	38	15	45	38	43	47	22	10	15	10
13		25	21	18			17	16	3					5	3	10	5	18	35	10		10	6
14		12	9		5	4			5					3	3		2	10	12	2		10	2
15		15				5	6							3	3			4				3	4
16+		8						9						3	3			1				6	1
total	10245	12490	10757	13479	27659	27323	34792	47160	39470	29216	26471	22587	10762	24390	20374	16907	16156	12825	8182	7047	7420	4823	3492

**Table 34** – (Continuation).

Depth < 1460 m																							
age	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1														1710	438	550	310	160	60	38			6
2														2680	652	320	60	80	10	9			8
3														3580	2561	540	480	120	40	29	10	46	15
4														1880	2117	1110	360	200	100	137	110	200	393
5														8330	6470	7160	4700	2480	1380	2447	2280	2964	2583
6														11210	8314	10480	11130	11020	8330	7356	8260	7073	8608
7														6060	4182	5730	10490	15340	13990	9587	10460	6124	5538
8														1790	1206	1700	3530	3890	4340	3063	3160	2349	2005
9														890	318	510	880	1400	1140	1200	1370	920	643
10														450	500	440	720	1060	1260	1019	1500	906	1026
11														320	282	370	370	540	440	383	560	587	412
12														200	161	180	210	300	340	213	330	233	349
13														180	74	60	80	160	310	151	270	126	153
14														70	47	30	60	120	170	114	140	114	73
15														80	9	10	20	80	50	59	50	75	103
16+														60	9	10	10	70	70	55	40	140	94
total														39490	27340	29200	33410	37030	32030	25860	28539	21864	22002

**Table 35** – Greenland halibut (*Reinhardtius hippoglossoides*) age-length key in the 2013 survey.

**MALE**

length	age														total	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
28-29		1	2													3
30-31		1	2	1												4
32-33			4	5												9
34-35			6	10												16
36-37		2	14	1												17
38-39		1	16	5												22
40-41			15	6												21
42-43			4	19												23
44-45		2	16	2												20
46-47			25	2												27
48-49			10	12												22
50-51		2	14	4												20
52-53			14	4	2											20
54-55			8	10	3											21
56-57			4	6	1	1										12
58-59			3	7	3	2										15
60-61				4	7											11
62-63					3	2										5
64-65							1									1
66-67							1									1
68-69								1								1
total	2	17	67	84	59	31	13	14	4							291

**Table 35** – (Continuation).

length	age														total	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
10-11	1															1
12-13																
14-15																
16-17																
18-19																
20-21																
22-23																
24-25																
26-27																
28-29		1														1
30-31		2														2
32-33		2	1													3
34-35		5	8													13
36-37		4	16	1												21
38-39		2	13	5												20
40-41		1	11	10												22
42-43		1	5	14												20
44-45		2	18													20
46-47		1	14	5												20
48-49		1	12	9												22
50-51			4	20												24
52-53				13	6	1										20
54-55				10	11	2										23
56-57				3	10	2	5									20
58-59				2	9	6	4									21
60-61					4	15	1									20
62-63						11	6	3	1							21
64-65						6	8	6	1							21
66-67						1	8	9	3							21
68-69							4	7	2	1	1					15
70-71							1	4	4	4	2					15
72-73								2	1	3	2					8
74-75									3		3	1				7
76-77										2	1	1				4
78-79										1		4				5
80-81													2			2
82-83													4			4
84-85												1				1
86-87																
88-89													1			1
90-91													1			1
92-93													2			2
total	1	18	58	78	62	36	15	42	28	31	16	10	14	12	421	

**Table 36** – Roughhead grenadier (*Macrourus berglax*) mean catch per towed mile and the estimated biomass by stratum, and their standard error in the 2013 survey

stratum	square miles	hauls	catch (kg)		biomass (t)	
			mean	s.e.	mean	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	0.43	0.23	39	20
13	249	3				
14	602	7	0.35	0.26	28	21
15	666	8	0.38	0.30	34	27
16	634	7	1.44	0.65	122	55
17	216	2	4.66	4.27	134	123
18	210	2	15.06	0.28	422	8
19	414	5	0.52	0.16	29	9
20	525	6	0.67	0.28	47	19
21	517	6	4.34	1.96	299	135
22	533	6	7.56	1.55	537	110
23	284	3	10.09	7.01	382	265
24	253	3	2.89	2.02	97	68
25	226	3	8.62	4.62	260	139
28	530	6	0.99	0.37	70	26
29	488	6	3.07	0.69	200	45
30	1134	11	8.10	1.60	1224	241
31	203	2	2.21	0.34	60	9
32	238	2	3.16	1.50	100	47
33	98	2	1.71	1.09	22	14
34	486	5	2.95	2.03	191	132
total<730 m.	10555	120	0.57	0.10	807	141
total<1460m.	16070	181	2.01	0.22	4298	475

**Table 37** – Roughhead grenadier (*Macrourus berglax*) survey biomass (t) by strata in 1988-2013.

**Table 37** – (continuation)

stratum	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1													
2													
3				10									
4			9										
5													
6													
7	0		0	10									
8	16	2	13	28	65	13							
9	29		30	282	82	181	17	39					
10	18		0	48	38	21							
11	6			3	2								
12	236	154	165	292	207	97	22	92	73	60	0	27	39
13	116	121	123	299	94	154	80	108	25	97	43	6	
14	292	124	346	877	379	362	223	539	1	3	10	67	28
15	60	16	87	259	16	85	55	12		132	8		34
16	338	272	352	594	426	1391	242	493	213	79	112	134	122
17	370	380	101	244	124	603	70	385	40	278	38	111	134
18	383	27	877	423	588	435	491	610	194	685	445	235	422
19	216	116	245	228	366	592	167	683	235	69	73	32	29
20				419	182	353	144	269	130	355	78	88	47
21				1432	996	763	755	1114	528	1135	1606	768	299
22				1095	1115	1545	608	1735	1216	967	1610	945	537
23				897	463	342	332	399	305	388	506	325	382
24				137	1030	419	165	152	146	207	222	218	97
25				344	870	817	197	391	362	149	98	146	260
28				425	695	610	299	360	273	338	137	68	70
29				3113	1012	445	527	555	424	509	163	309	200
30				3553	2869	1108	2139	3356	2560	2816	2965	1582	1224
31				650	327	235	242	176	225	107	295	137	60
32				274	267	132	86	222	197	242	172	63	100
33				118	17	122	105	38	12	57	112	54	22
34				1131	330	511	305	410	144	419	145	162	191
total (1-19)	2079	1211	2348	3597	2387	3933	1367	2961	782	1403	729	612	807
s.e.(1-19)	284	176	611	362	281	700	314	611	209	201	409	258	141
total				17184	1256	11336	7270	12139	7304	9091	8838	5476	4298
s.e. total				1616	1420	1167	808	659	478	930	1212	678	475

**Table 38** – Roughhead grenadier (*Macrourus berglax*) abundance ('00) at age by strata in the 2013 survey.

age	strata																		total	average				
	12	14	15	16	17	18	19	20	21	22	23	24	25	28	29	30	31	32	33	34	weight (g)	length cm)		
1	68			73					71	150	82	69			201					714	3	3		
2				45	263			264	18	136	202	437	88	77	209					20	20	1779		
3				27	147	40	43	380	235	537	135	285	327	94	96	197	34	8	37	171	2794	45		
4				27		7	105	106	26	289	332	387	237	179	379	36	156	661	54	49	60	110	3200	
5				39		51	73	60		263	478	422	134	190	257	32	239	554	35	50	86	193	3156	
6	4	66	3	15	17	45			339	675	441	186	90	422	91	279	975	164	76	68	393	4351	173	
7	56	109	38	12	25	80			154	450	485	330	60	347	140	357	1626	146	204	15	695	5328	243	
8	197	352	103	103	249	176			34	390	890	683	58	764	120	260	2713	326	330	53	555	8357	333	
9	31	69	200	116	403	439			11	214	1028	556	37	518	57	270	1394	126	122	20	486	6099	444	
10	100	56	131	148	585	922	91		86	287	797	416	150	447	99	219	1311	80	42	17	393	6375	584	
11	121	29	53	407	286	1270	159		73	574	482	309	244	233	101	186	950	59		42	253	5831	806	
12	42			297	92	631	88		30	306	246	163	148	219	82	209	496	28	24	18	51	3171	1021	
13	4				65	5	175	4		21	100	146	53	45	76	21	61	344	5	37	2		1162	1323
14					40	5	271			48	120	370	166	68	169	56	122	965		46	12	7	2465	1562
15					22	19	78			7	64	306	115	22	67	27	77	511		27	12	22	1376	1816
16+					29	63	89			11	327	610	593	60	190	57	205	1722	88	160	16	214	4432	2352
Sets	3	3	3	7	2	2	5	6	6	6	3	3	3	6	6	11	2	2	5	86	632			
n	554	816	528	1456	2338	4384	410	2010	4642	7433	4361	2142	4503	1088	3148	14417	1143	1175	478	3563	60590	38287	17.5	

**Table 39** – Roughhead grenadier (*Macrourus berglax*) abundance ('000) at age in 1994-2013 surveys.

Depth < 730 m																					
age		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1				129		51	15	3	63	39	467	216	109	10	12	5	3	30	18	9	14
2		46	107	56	46	128	36	77	208	189	2139	466	267	353	23	79	15	73	48	49	31
3		136	209	110	186	227	49	108	271	220	1077	3119	362	438	59	228	31	232	76	79	26
4		487	467	224	153	236	216	50	120	57	672	1009	762	392	35	219	42	107	69	14	27
5		507	861	351	157	138	199	283	283	108	618	877	628	501	87	170	25	81	39	25	22
6		570	592	586	450	346	247	277	445	189	635	1105	544	561	202	285	96	66	54	24	15
7		566	351	613	725	445	218	540	290	843	810	499	719	268	458	94	128	63	40		32
8		493	458	338	162	907	616	231	505	283	901	955	593	519	298	743	168	446	119	98	118
9		379	263	216	158	250	422	339	510	241	535	962	413	487	178	536	87	492	199	124	126
10		181	113	264	98	226	197	338	666	266	474	896	579	577	345	471	48	347	251	129	203
11		109	35	254	151	135	109	72	231	203	472	465	371	727	172	431	82	224	122	154	233
12		82	23	93	164	182	80	95	131	244	236	392	167	396	108	162	56	113	70	84	115
13		40	19	38	124	152	55	57	80	75	88	147	227	293	95	318	56	62	43	44	25
14		15	5	34	42	76	61	55	104	63	31	89	191	211	77	79	49	61	33	23	32
15		27	15	4	42	48	33	23	55	19	18	18	21	195	39	179	43	21	18	14	12
16+		9		10	18	34	3	33	76	64	73	60	33	215	72	116	94	19	25	3	18
total		3647	3685	3060	2564	3862	2783	2259	4288	2550	9278	11584	5765	6593	2069	4479	988	2501	1247	911	1049

**Table 39 – (Continuation).**

Depth < 1460 m																				
age	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1											461	391	34	51	52	19	37	39	52	71
2											856	719	602	81	549	143	125	172	177	178
3											6380	1420	855	222	1086	306	622	395	405	279
4											2989	2303	1532	321	1268	419	616	509	349	320
5											2576	2425	1399	543	1269	253	755	587	409	316
6											3062	2695	2316	1063	1578	954	1084	775	348	435
7											2552	2069	2351	1209	1954	936	1054	1009	572	533
8											3215	2418	1184	1285	2010	1680	2392	1466	1052	836
9											2670	1442	1737	770	1649	866	1451	1241	919	610
10											2282	1666	1643	1109	1454	476	911	1160	517	638
11											1863	1123	1409	697	1333	824	685	652	650	583
12											1374	676	739	473	626	564	565	660	491	317
13											670	1090	823	412	1170	563	461	516	429	116
14											416	1007	566	432	348	490	510	570	307	247
15											178	298	478	272	718	434	255	460	215	138
16+											1130	1113	1069	944	887	959	692	1044	373	443
total											32674	22855	18737	9884	17951	9886	12215	11255	7265	6059

**Table 40** – Roughhead grenadier (*Macrourus berglax*) length distribution ('00) in the 2013 survey.

Depth < 730 m

Length (mm)				Length (mm)				Length (mm)				
length	ind.	male	female	length	ind.	male	female	length	ind.	male	female	
3	141			13		172	68	23			759	
4				14				24			427	
5	87	87		15		568	135	25			458	
6	87		159	16		412	139	26			104	
7				17		495	177	27			209	
8		191	68	18		534	225	28			104	
9		87		19		604	437	29			177	
10			172	20		1092	155	30			87	
11			159	21		214	557					
12				22		68	872		total	315	4524	5648

Depth < 1460 m

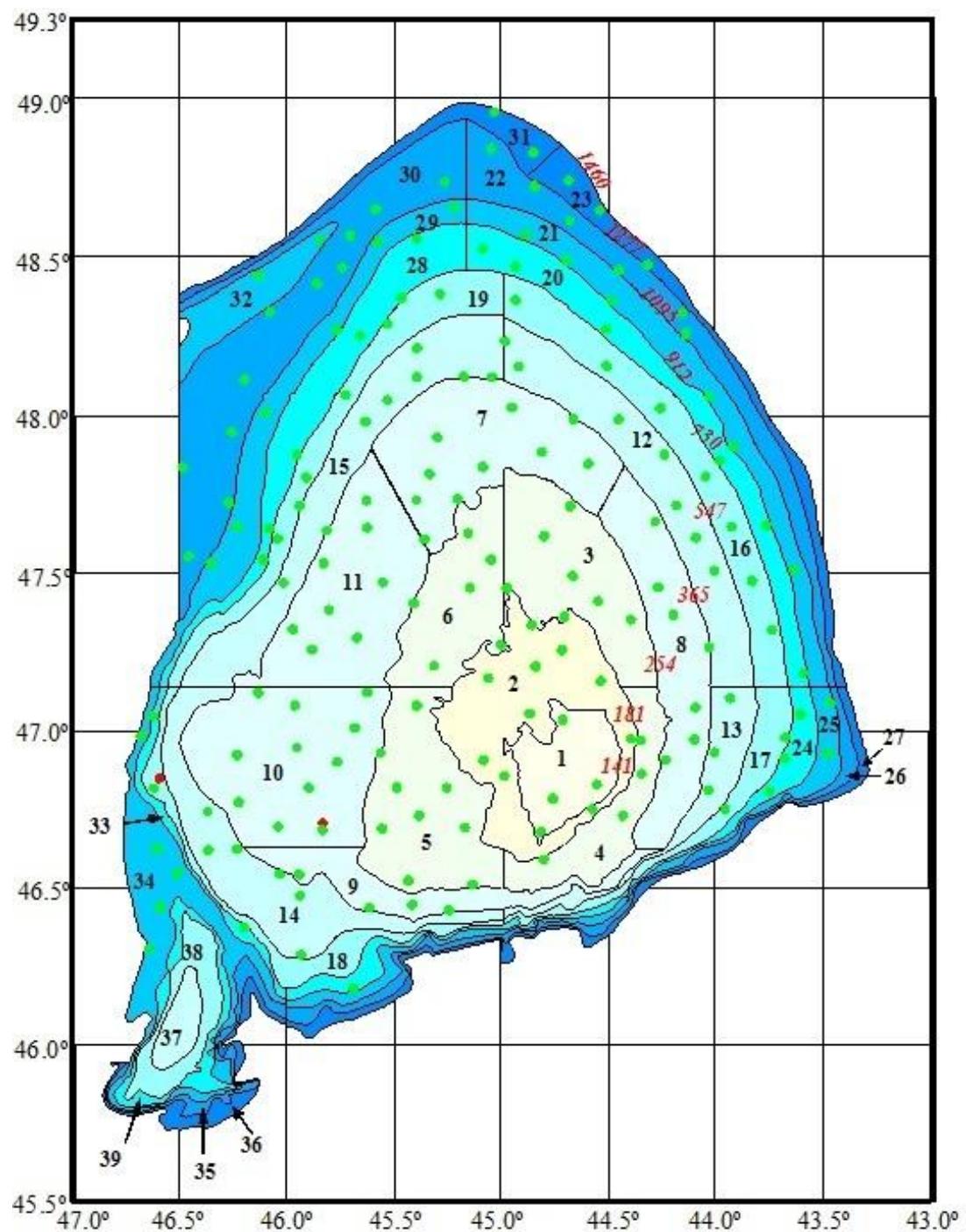
Japan (< 1700 m)				North America				South America				
length	ind.	male	female	length	ind.	male	female	length	ind.	male	female	
3	714			17		3099	1003	31			833	
4				18		2742	696	32			474	
5	87	376	424	19		2083	838	33			414	
6	268	702	600	20		2292	1082	34			371	
7		442	286	21		801	1109	35			246	
8		1054	563	22		445	1374	36			277	
9		1082	1023	23		71	1546	37			67	
10		892	1096	24		67	1464	38			81	
11		1353	730	25			1288	39				
12		1424	1466	26			680	40				
13		2340	773	27			1650	41			82	
14		1860	543	28			1644					
15		2980	1493	29			811					
16		4268	638	30			1484		total	1069	30373	29149

**Table 41** – Roughhead grenadier (*Macrourus berglax*) age-length key in the 2013 survey.

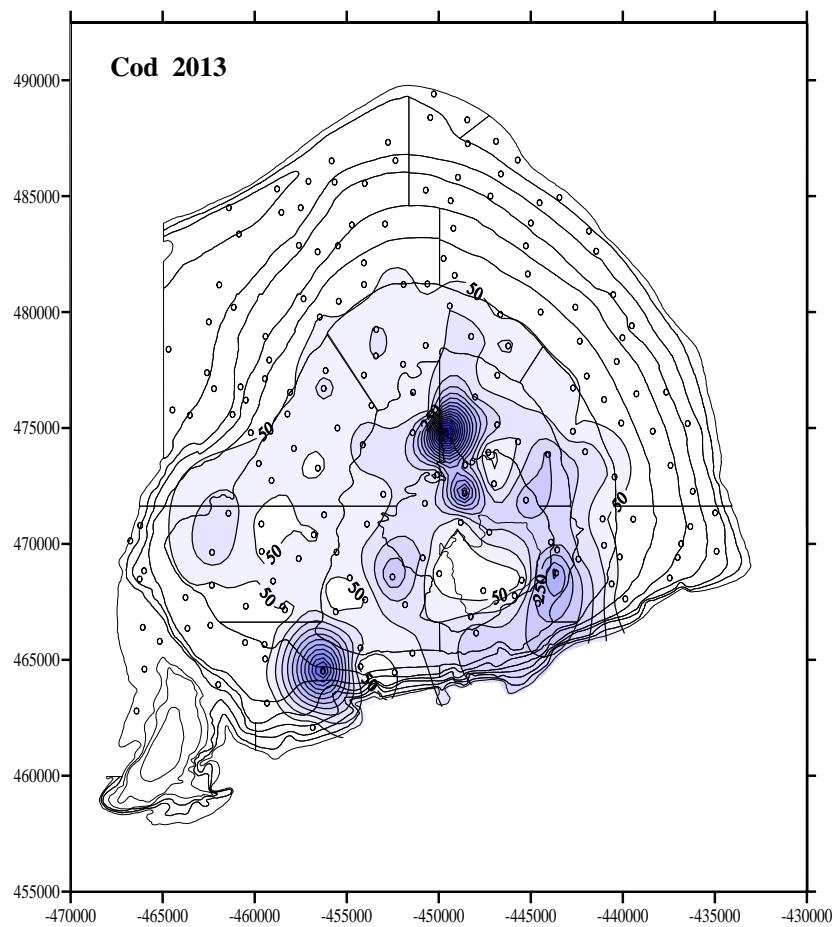
length	age															total	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	
5		5															5
6		5	4														9
7			6														6
8			5	8													13
9			5	7	2												14
10			1	6	5												12
11				1	11	5	1										18
12					2	17											19
13					1	8	13										22
14					2	16	4										22
15						2	19	1									22
16						3	21	6									30
17							4	14	5	1							24
18							1	11	9								21
19								3	11	5							19
20								2	10	10							22
21									3	5	1						9
22									1	2	4						7
23										1							1
24											1						1
total	10	21	22	21	32	35	49	37	39	24	6						296

**Table 41** – (continued)

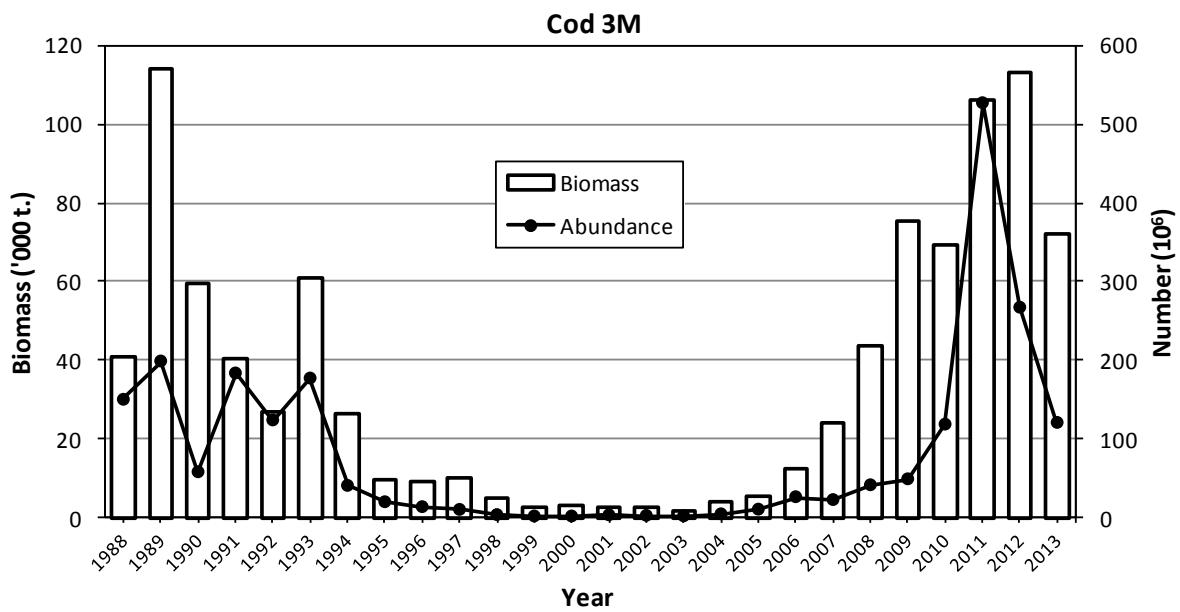
length	age															total	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16+	
5		5	1														6
6		5	3														8
7		1	3														4
8		5	3														8
9		2	9	1													12
10			6	8	1												15
11			1	7	2												10
12			5	11	4												20
13				6	5												11
14				2	4	1											7
15				1	9	9											19
16				1	6	1											8
17				1	6	6											13
18					8	1											9
19				1	2	7											10
20					8	5											13
21						6	6	2									14
22					2	8	6										16
23						12	6	1									19
24						5	10	2									17
25						6	5	3	2								16
26							2	3	3								8
27							2	2	11	2	3						20
28							3	9	5	3							20
29								3	3	4							10
30								1	4	13							18
31								1	3	7							11
32											6						6
33											5						5
34											4						4
35											3						3
36											3						3
37											1						1
38											1						1
39																	
40																	
41															1	1	
total	11	14	19	21	23	24	23	17	24	42	33	14	30	17	54	366	



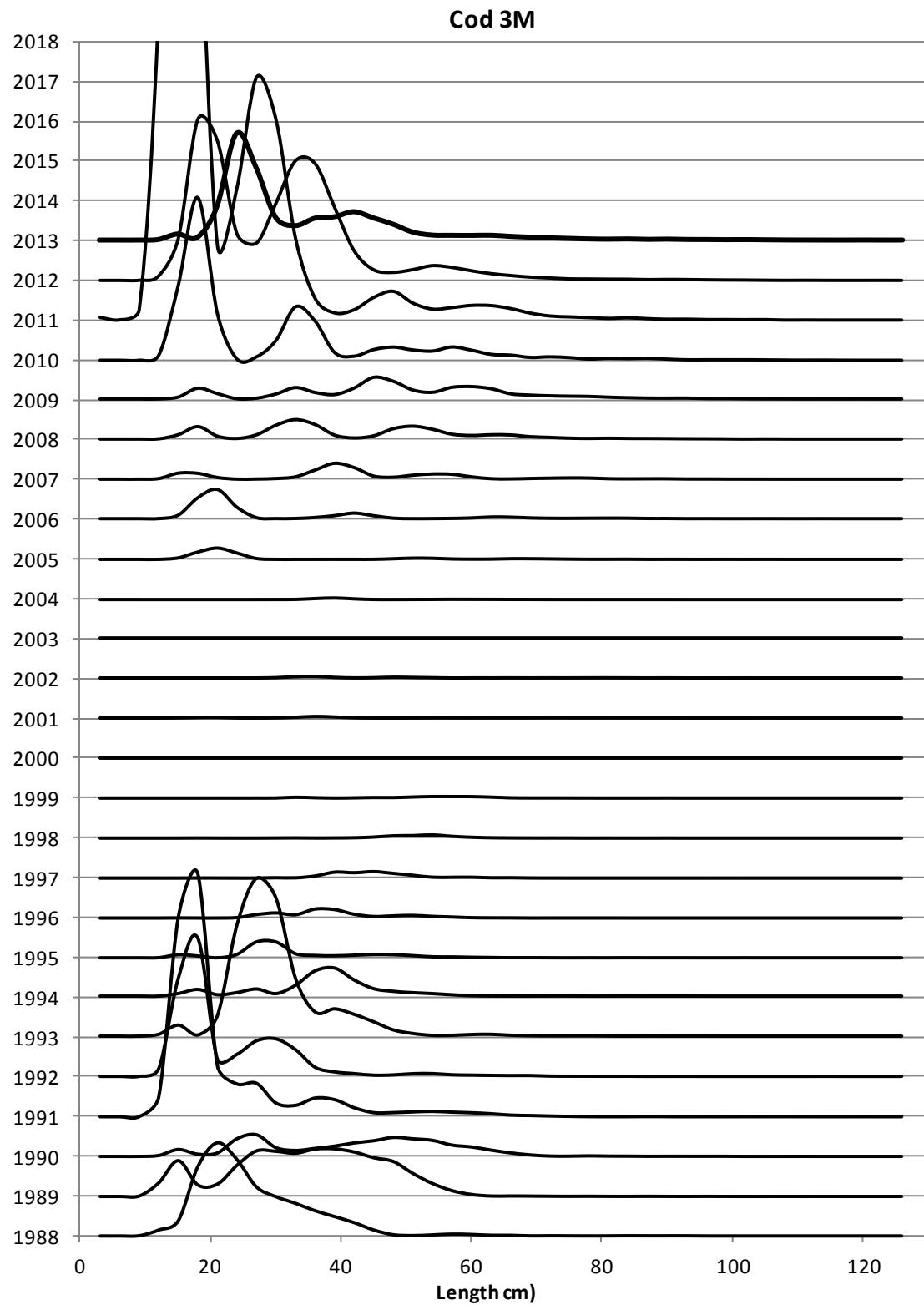
**Figure 1** – Haul positions for the Flemish Cap survey 2013.



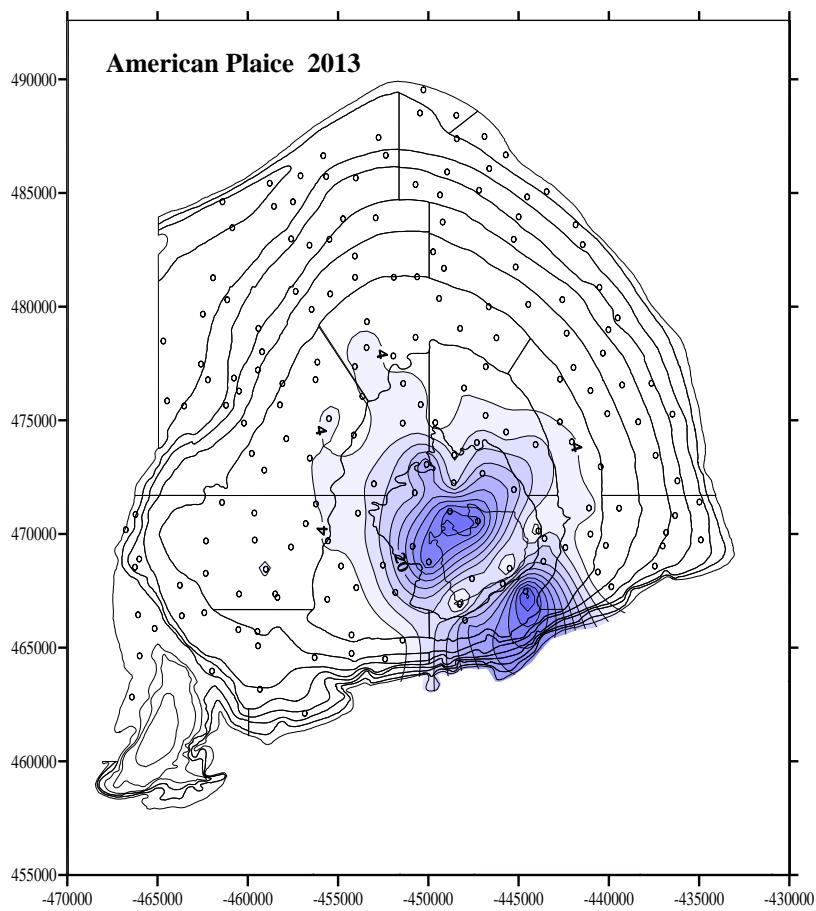
**Figure 2** – Cod (*Gadus morhua*) catch distribution in the 2013 survey in kg.



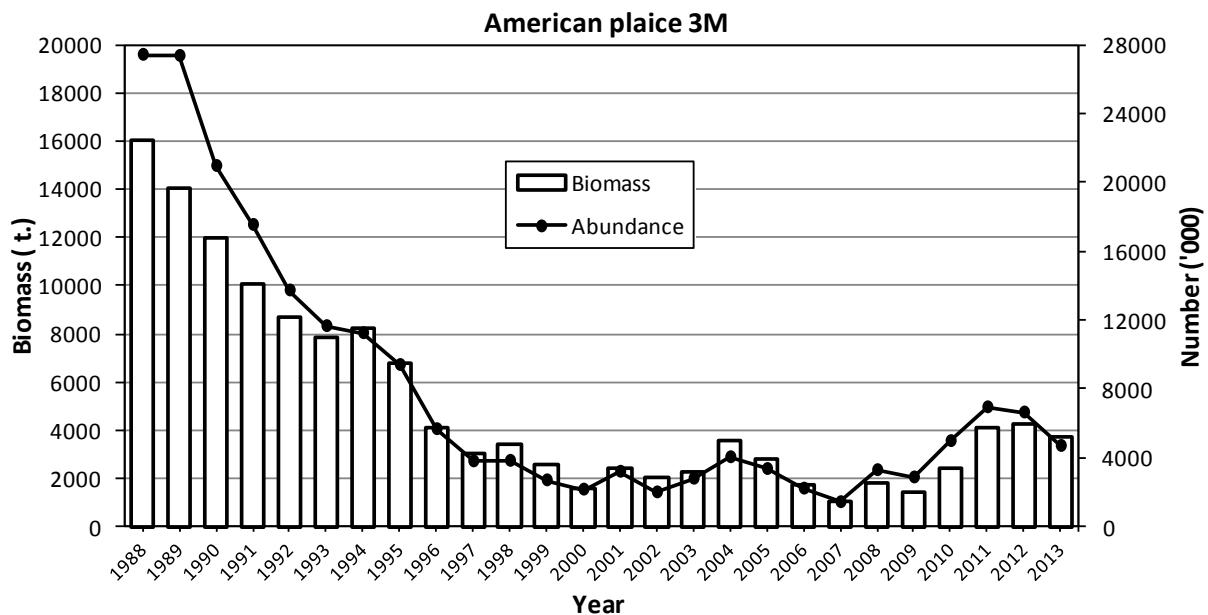
**Figure 3** – Cod (*Gadus morhua*) biomass and abundance since 1988 to 2013.



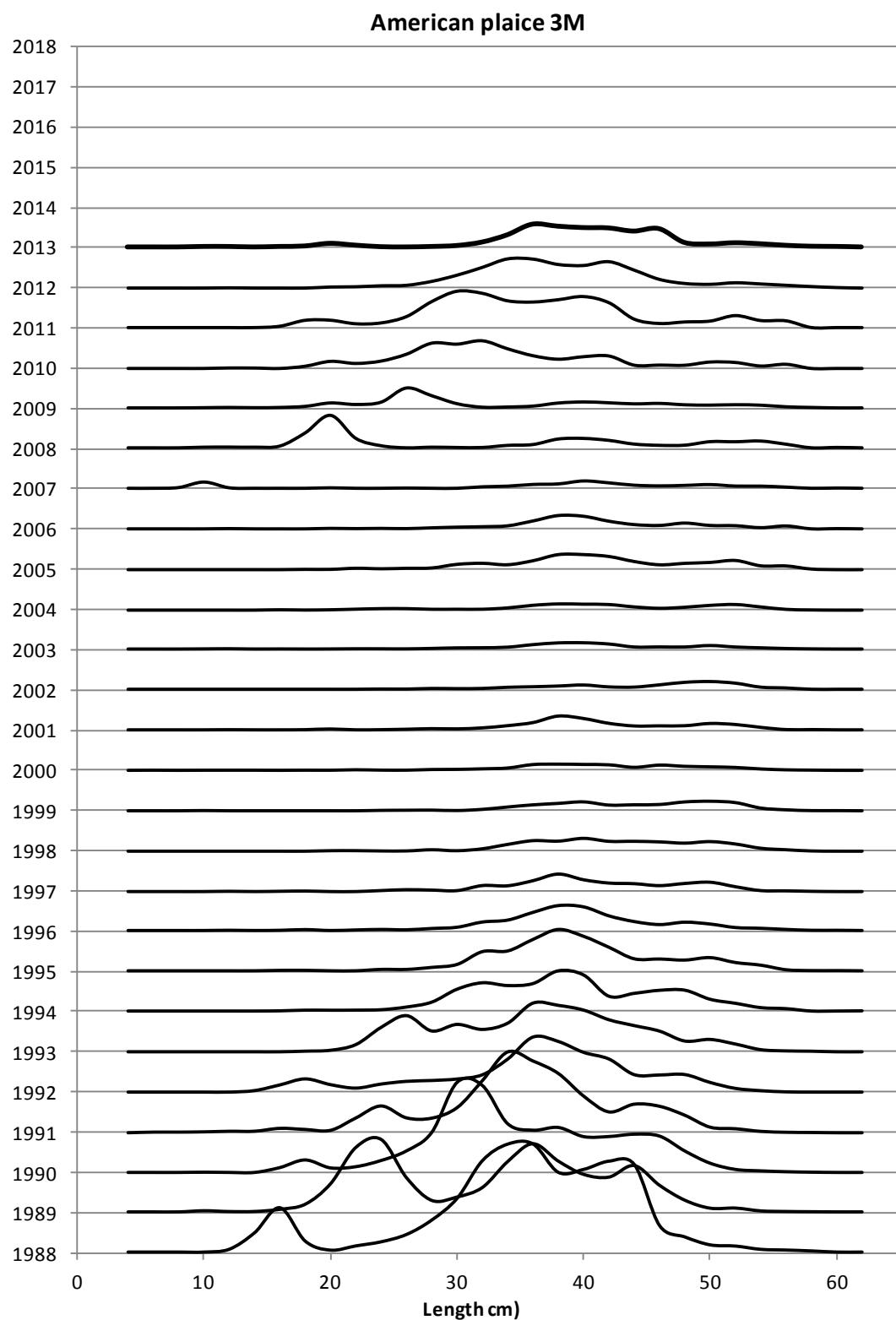
**Figure 4** – Cod: length distribution along the survey series. Stock in 2013 is dominated by age 2, while age 1 failed almost completely.



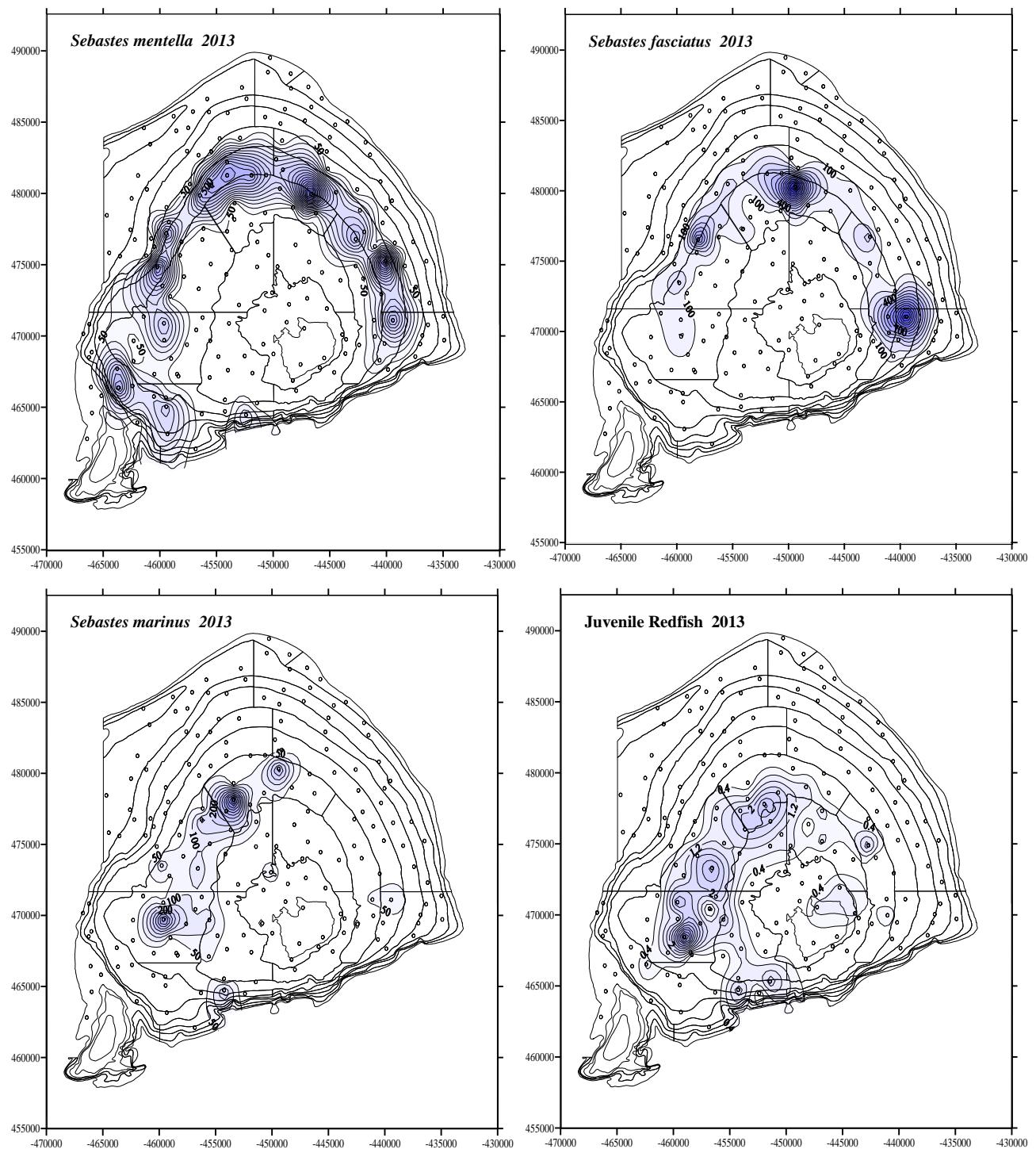
**Figure 5** – American plaice (*Hippoglossoides platessoides*) catch distribution in the 2013 survey in kg.



**Figure 6** – American plaice (*Hippoglossoides platessoides*) biomass and abundance since 1988 to 2013.



**Figure 7** – American plaice: length distribution along the survey series.



**Figure 8 –** Redfish catch distribution in the 2013 survey in kg.

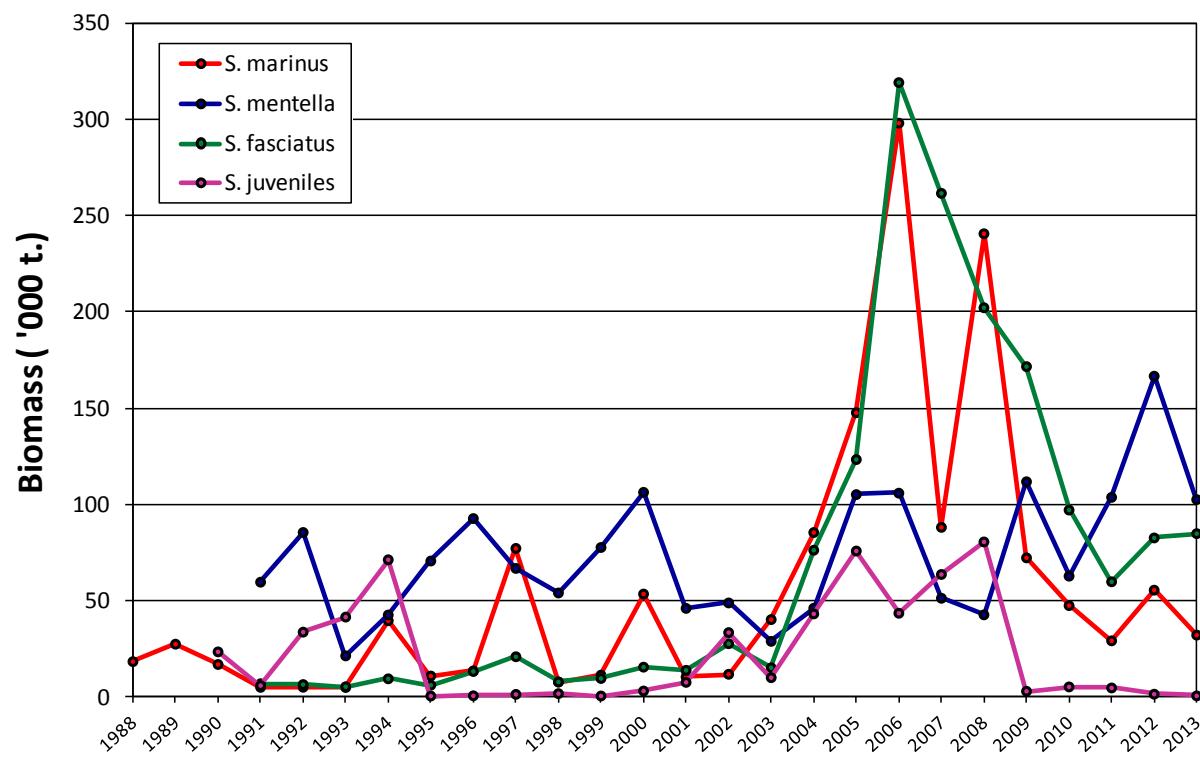
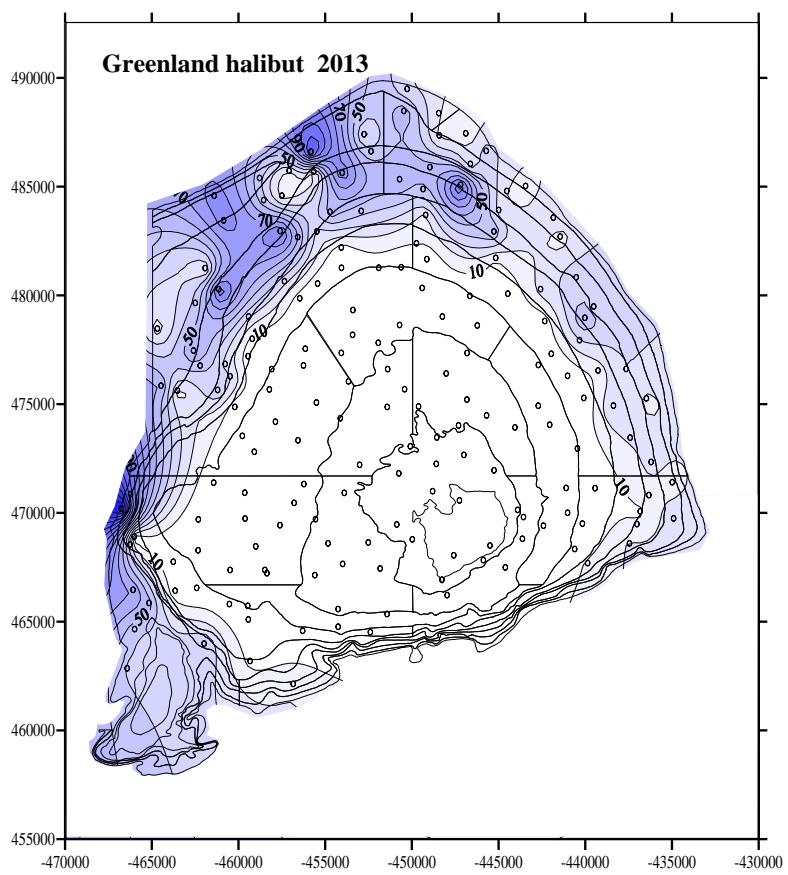
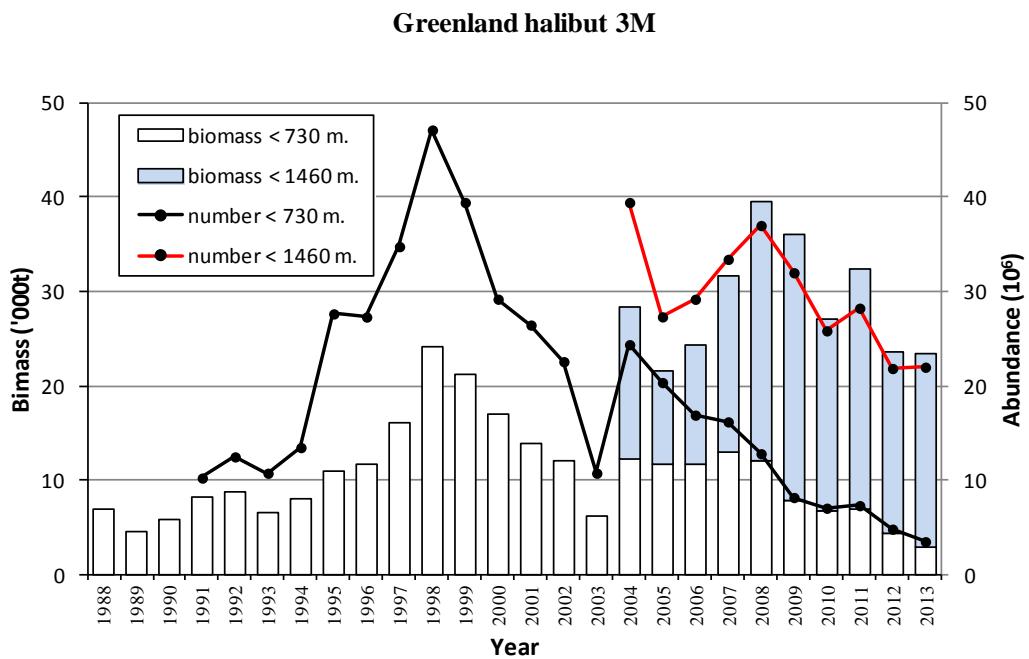


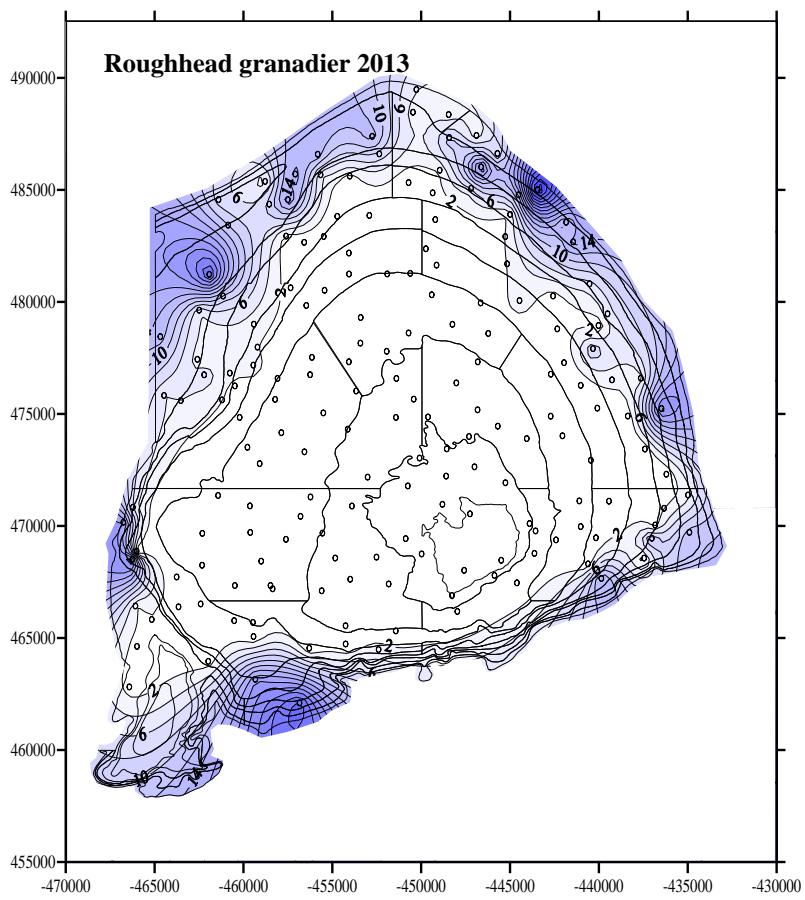
Figure 9 – Redfish species biomass.



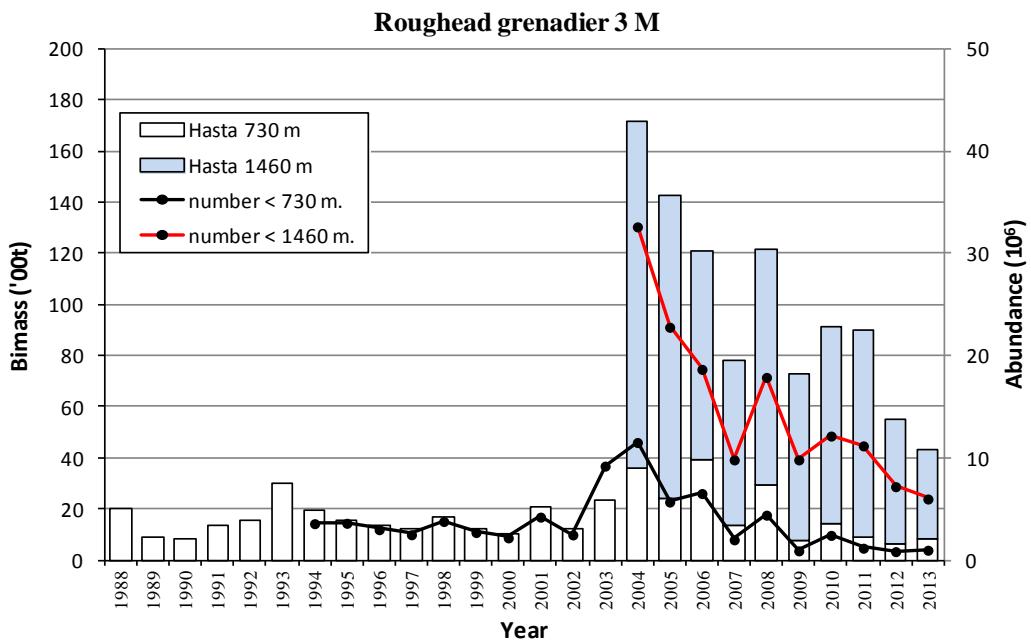
**Figure 10** – Greenland halibut (*Reinhardtius hippoglossoides*) catch distribution in the 2013 survey in kg.



**Figure 11** – Greenland halibut (*Reinhardtius hippoglossoides*) biomass and abundance 1988-2013.



**Figure 12** – Roughhead grenadier (*Macrourus berglax*) catch distribution in the 2013 survey in kg.



**Figure 13** – Roughhead grenadier (*Macrourus berglax*) biomass and number.