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Stock Abundance Indices and Length Compositions of Demersal Redfish and Other Finfish in NAFO Sub-area 1 and near bottom water temperature derived from the German bottom trawl survey 1982-2013

by

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Abstract

Survey abundance, biomass estimates and length compositions for golden and deep sea redfish >= 17 cm (*Sebastes marinus* and *S. mentella*), juvenile redfish <17 cm, American plaice (*Hippoglossoides platessoides*), Atlantic and spotted wolfish (*Anarhichas lupus* and *A. minor*) and thorny skate (*Raja radiata*) in Division 1C to 1F are presented, based on a swept area approach for which parameters were revised in the 2012 report. For golden redfish, American plaice and Atlantic wolffish, stocks sizes have declined significantly until the early 1990s and increased since 2000 to a still low level. Indices are well below the average values from the 1980's. For thorny skate, abundances increased in the early 1990s and are stagnant since then. Deep-sea redfish and spotted wolfish increased significantly in 2013, for spotted wolfish this increase was associated with an unprecedented increase of large specimens. All stocks considered are presently composed of small and mainly juvenile specimens except for spotted wolffish. Near bottom water temperature continued to be high since 1996.

1 Introduction

This paper presents estimates of stock abundance and biomass indices disaggregated by length as derived from annual German groundfish surveys for golden and deep sea redfish >= 17 cm (*Sebastes marinus* and *S. mentella*), juvenile redfish <17 cm, American plaice (*Hippoglossoides platessoides*), Atlantic and spotted wolfish (*Anarhichas lupus* and *A. minor*) and thorny skate (*Raja radiata*). The surveys commenced in 1982 and represent the longest time series of quantitative information from the traditional fishing grounds off West Greenland south of 67° northern latitude. Environmental conditions are reflected as trends in near bottom water temperatures. The information is presented as an update of continued analyses of the survey results (Rätz, 1999; Rätz and Stransky, 2003.)

2 Materials and Methods

Abundance, biomass estimates and length structures were derived from annual groundfish surveys covering shelf areas and the continental slope off West Greenland. Surveys commenced in 1982 and were primarily designed for the assessment of cod. Because of favourable weather and ice conditions and to avoid spawning concentrations, autumn was chosen for the time of the surveys. These were carried out by the research vessel (R/V) WALTHER HERWIG (II) throughout most of the time period. In 1984 R/V ANTON DOHRN was used and she was replaced by the new R/V WALTHER HERWIG III since 1994, respectively.

The surveys were primarily designed for the assessment of cod. In order to reduce the error of abundance estimates, the subdivision of shelf areas and the continental slope into different geographic and depth strata was required due to a pronounced heterogeneity of cod distribution. The survey area was thus split into four geographic strata. Each stratum was itself subdivided into two depth strata covering the 0-200 m and 201-400 m zones. Figure 1 and Table 2 indicate the names of the 8 strata in West Greenland, their geographic boundaries, depth ranges and areas in nautical square miles (nm2). All strata were limited at the 3 mile offshore line.

The applied strategy was to distribute the sampling effort according both to the stratum areas and to cod abundance. Consequently, fifty percent of the hauls were allocated proportionally to strata by stratum area while the other fifty percent were apportioned on the basis of a review of the historical mean cod abundance/nm², all hauls being randomly distributed within trawlable areas of the various strata. Non-trawlable areas were mainly located inshore. During 1982-2002, 1 697 successful sets were carried out, the numbers of valid sets by year and stratum being listed in Table 3. In 1995 and since 2001, the survey area off West Greenland was incompletely covered due to technical problems. Only 75 % of the strata of West Greenland were covered in 2005. Figure 1 shows the positions of hauls conducted during the most recent survey.

The fishing gear used was a standardized 140-feet bottom trawl, its net frame rigged with heavy ground gear because of the rough nature of the fishing grounds. A small mesh liner (10mm) was used inside the cod end. The horizontal distance between wing-ends was 25 m at 300 m depth, the vertical net opening being 4 m. In 1994, smaller Polyvalent doors (4.5 m², 1,500 kg) were used for the first time to reduce net damages due to overspread caused by bigger doors (6 m², 1,700 kg), which have been used earlier. Fish were identified to species or lowest taxonomic level and the catch in number and weight was recorded. Total fish lengths were measured to cm below.

Hauls, which received net damage or became hang-up after less than 15 minutes, were rejected. Some hauls of the 1987 and 1988 surveys were also included although their towing time had been intentionally reduced to 10 minutes because of the expected large cod catches as observed from echo sounder traces. The coefficient of catchability was set arbitrarily at 1.0, implying that estimates are merely indices of abundance and biomass. The towing time was normally 30 min. at a speed of 4.5 knots (Table1). Stratified abundance estimates were calculated from catch-per-tow data using the stratum areas as weighting factor for the arithmetic means (Cochran, 1953; Saville, 1977).

Near bottom water temperature was measured directly before or after a trawl haul be means of a CTD sonde.

3 Changes in the 2012 survey index calculations

The purpose of changing index calculations for the NAFO assessment was to comply with changes undertaken in ICES NWWG 2013 with regard to index calculations for the German survey. Changes mean (1) to adopt trawl parameters, (2) to include all available data instead of excluding strata information with less than 5 hauls, and (3) to elaborate on the GLM method for standardisation. The restratification undertaken for the survey area was only applied to E-GLD.

3.1 Adoption of trawl parameters

Until 2012, all calculations of abundance and biomass indices were based on the 'swept area' method using 22 m horizontal net opening as trawl parameter, i. e. the constructional width specified by the manufacturer. This was based on the naïve assumption that doors and door spread do not add to catchability. This is corrected after in 2013 in ICES NWWG a revised calculation base was accepted. Now an effective opening of 41 m is considered, including sweeping by doors, and index time series are recalculated.

In previous years, the conversion of catch-per-tow (C_{tow}) to catch per nautical square mile C_{sqnm} was achieved by using towing time:

$C_{sqnm}=C_{tow}$*30 minutes/trawled time*48.1/2.25

Henceforth, catch is related to the actual distance trawled and thus directly linked to the area swept:

$C_{sqnm}=C_{tow}$/distance *48.1

Respective confidence intervals (CI) were set at the 95% level of significance of the stratified mean.

3.2 Utilization of all available data

Strata with less than five valid sets were rejected from the calculation of biomass and abundance indices before the 2012 year survey.
ICES NWWG concluded that omission of available data should not be undertaken, and that CIs should be adopted accordingly. This is compared to the GLM procedure which still applies the 5-haul-per-stratum-minimum rule.

3.3 Survey standardization

(1) To account for missing strata and those with less than 5 hauls, a General Linear Model (GLM) index was calculated for biomass assuming multiplicative effects of year and stratum on biomass, which implies log-transformation of the catch data C. As matter of fact, this mainly applies to the northern survey area, i.e. NAFO SA 1C (8 years in the survey period, see Table 2).

The GLM delivers standardized survey estimates by year and stratum:

$\log (C_{tow}+1) = \alpha + ß1\ year + ß2\ stratum + e \quad (=a)$

Accordingly, residuals are assumed log-normally distributed. Specific treatment of zero catches is required (here: unit value is added to every catch datum) and backtransformation to the stratum mean follows

$C_{stratum,year} = \exp(a + b/2)-1$

where a is the mean by stratum and year and b is the corresponding stratum variance. Using the stratum variance improved the performance of the GLM considerably as compared to cases when the variance of the mean was applied. The addition of b/2 accounts partly for negative bias due to log-transformation. Though the addition and subtraction of unit value to the catch prior to transformation is incorrect, for catch rates the application of the log-normal model is likely more realistic than the gamma model (Venables and Dichmont 2004).

GLM estimates depend on matrix decomposition procedures.
Let represent **X** the n x p design matrix (years by strata) and **Y** the vector of dependent variables (biomass in samples by years and strata). (See the section Parameterization for information about how is formed from your model specification.)

Then normal equations **X'Xß=X'Y** are solved in PROC GLM models using a modified sweep routine. Thus, GLM estimates change as the length of time series changes. This may be seen as retrospective pattern for this type of analysis. Figure A shows the respective figure *A. minor*. The pattern becomes weaker as the length of time series increases.

The conditions for standardization may not be valid, i.e. a systematic effect of year and stratum. In particular, with a strong overlying temporal trend the stratum effects may become negligible, and the GLM models becomes very similar to the swept area mean based on arithmetic means.

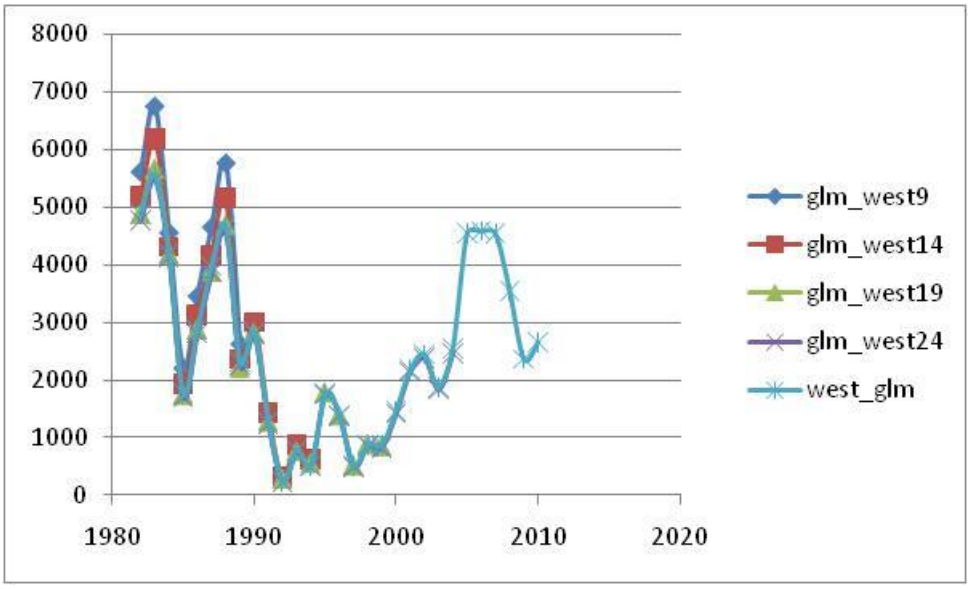

Fig. A GLM with different time series length indicate the degree of retrospective pattern, here for *Anarhichas minor*. Numbers indicate time series length in years.

(2) Three other models were tested. A gamma model proved to be less sensitive (not shown). The second model was based on the SAS SURVEYREG procedure using strata as class variables and year as variable defining unequally distributed subsamples to account for changing sample sizes between years with log+1 transformed data and subsequent backtransformation. Many SAS/STAT procedures, such as the MEANS and GLM procedures, can compute sample means and estimate regression relationships. However, in most of these procedures, statistical inference is based on the assumption that the sample is drawn from an infinite population by simple random sampling. If the sample is actually selected from a finite population using a complex design, these procedures generally do not calculate the estimates and their variances correctly. The SURVEYREG procedures does properly analyze survey data, taking into account the sample design. These procedures use the Taylor expansion method to estimate sampling errors of estimators based on complex sample designs. This method obtains a linear approximation for the estimator and then uses the variance estimate for this approximation to estimate the variance of the estimate itself. When the design is stratified, the procedures pool stratum variance estimates to compute the overall variance estimate (SAS 2010).

(3) Third model tested was a generalized linear model applying the negative binomial distribution as error distribution in conjunction with a log link function for the dependent variable.

Table A shows, that on average GLM had the closest fit to the traditional survey index thus providing the most conservative estimate of a standardized index.

Table A : Deviation statistics of three standardization models in relation to the survey index (Biomass, $*10^3$). Smaller values indicate a better fit.

Species	GLM	Negative binomial with log link function	SURVEYREG with TAYLOR expansion
Raja radiata	13.5	38.7	15.7
Sebastes marinus	73.4	70.6	116.5
Sebastes mentella	17.4	52.3	21.1
Hippoglossoides platessoides	40.1	63.6	47.4
Anarhichas lupus	36.3	60.0	44.6
Anarhichas minor	18.8	42.6	29.6

Results

Fig. 1 displays the coverage of the survey area by the geographical haul distribution in 2010.

The abundance and biomass indices by stratum of *S. marinus* >= 17 cm is given in Table 3 and illustrated in Figure 2. The stock is indicated to be depleted since the early 1990s. Since 2002 a slight increase was observed and appears stable since 2006. This increase appeared in the SW-Greenland area, i.e. NAFO SA 1E,1F. However, present abundance is still lower than in the period 1982-1986, and resembles condition in the period of stock decline 1987-1990. Thus, recovery back to historical levels does not occur. Incoming year classes (specimens > 20 cm) were more frequently encountered than in previous years (Table 4, Fig. 3).

Table 5 lists the abundance and biomass indices of *S. mentella* >= 17 cm by stratum, the values being presented in Figure 4. Abundance peaked in 1997. Since then, four further years with high abundances have been recorded including 2013. The index is fluctuating strongly, possibly due to the depth constraints of the survey which is limited by 400 m, whereas the habitat for *S. mentella* extends into much deeper waters.
In 2008, the length distribution was multi-modal with peaks at 18 cm, 26 cm, and 31 cm. This indicates several year classes present, however at low abundances each (Fig. 5 and Table 6). In 2010, peaks appeared at 19 cm, 24 cm, 28 cm and 35 cm. Assuming that the 2010 peaks correspond to those of 2008 indicates a slow growth of 1-2 cm per year. This is less than for *S. mentella* observed at Flemish Cap (Saborido-Rey et al. 2004) but comparable to VBGF results from the Irminger Sea(Stransky et al. 2005). In 2013, a strong peak at 26.5 cm was observed. It must be noted, that the survey design hardly covers the distribution area of deep sea redfish, and the survey results should be carefully interpreted. Larger fish are likely to replenish the pelagic stock of *S. mentella*.

The abundance of juvenile redfish <17 cm *Sebastes spp.* has varied over a wide range since 1982. The recent index is among the lowest observed since 1982 (Fig. 6 and Table 7). The length composition revealed no strong peaks, so that at present age classes 0, 1 and 2 are only weakly represented in the autumn survey (Fig. 7 and Table 8).

Abundance and biomass of American plaice *Hippoglossoides platessoides* significantly declined since the late 1980s but increased slightly since 2002 – 2004 and in 2010 (Fig. 8 and Table 9). Since then, a decline is evident in survey index and GLM index. In 2010, in particular small specimens (< 20 cm) were caught in the survey, resulting in an 1-year increase in survey abundance (Figure 9 and listed in Table 10). The catchability of flatfish by the survey gear is considered poor but the time series seems is deemed appropriate to indicate the trend of the stock.

With regard to biomass index, Atlantic wolfish *Anarhichas lupus* has recovered slightly after 2002 but still is below historical stock levels and is declining since 2006 (Fig. 10 and Table 11). In 2010, both biomass and abundance increased. Opposite to years 2009 and 2010, the length distributions for 2011 and 2012 revealed no strong presence of 0-group specimens at a length of 6-7 cm (Figure 11). In 2013, age 1 at sizes 10-14 cm was relatively strong. Table 12 shows that in 2012 the share of specimens larger than 40 cm has increased slightly as compared to 2008-2011.

The abundance and biomass of spotted wolfish *Anarhichas minor* decreased significantly until 1992 (Fig. 12 and Table 13). From 2000 to 2007, stock size increased in terms of biomass, and increased further in 2013. The increase was associated with a strong and unprecedented increase of large specimens, in line with the tendency found in 2012, when a first increase of specimens < 50 cm was observed, whereas large specimens > 100 cm were not found then (Fig. 13 and Table 14).

Both abundance and biomass indices of thorny skate *Raja radiata* are recently very low compared to the values estimated during the 1980s and early 1990s (Fig. 14 and Table 15). For 2008 and 1995, the GLM index indicates the lowest biomass values in the time series since 1982. In 2009 a significant number of 0-group specimens at a size of ca 10 cm TL was indicated. Opposite to previous years, size composition was not dominated by a specific size group between 25 cm and 45 cm body length (Fig. 15 and Table 16).

Trends in near bottom temperature means by stratum and stratified mean temperature are listed in Table 17 and shown in Figure 16. Near bottom water temperature continued to increase since 1990 (since 1996). The maximum of the time series was observed in 2003. The stratum mean temperatures show a significant depth effect, with the colder temperatures measured in the shallow strata (<200 m). Deeper strata are generally warmer by about 1-2°C.

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Table 1 Trawl parameters of the German bottom trawl survey off West Greenland.

	German survey
Gear	140-feet bottom trawl
Horizontal net opening	22 m
Standard trawling speed	4.5 kn
Towing time	30 minutes
Coefficient of catchability	1.0

Tab. 2 Survey areas and effort (hauls) of the German bottom trawl survey off West Greenland by stratum and bottom water temperatures, 1982-2012. Strata 1.1 – 4.2 refer to West Greenland, corresponding NAFO SA's indicated.

NAFO SD	**1C**		**1D**		**1E**		**1F**			
Stratum	**1.1**	**1.2**	**2.1**	**2.2**	**3.1**	**3.2**	**4.1**	**4.2**	**Sum**	**YEAR**
Area (sqnm)	6805	1881	2350	1018	1938	742	2568	971		
N	20	11	16	7	9	6	13	2	84	1982
	26	11	25	11	17	5	18	4	117	1983
	25	13	26	8	18	6	21	4	121	1984
	10	8	26	10	17	5	21	4	101	1985
	27	9	21	9	16	7	18	3	112	1986
	25	11	21	4	18	3	21	3	117	1987
	34	21	28	5	18	5	18	2	131	1988
	26	14	30	9	8	3	25	3	118	1989
	19	7	23	8	16	3	21	6	103	1990
	19	11	23	7	12	6	14	5	98	1991
	6	6	6	5	6	6	7	5	47	1992
	9	6	9	6	10	8	7		56	1993
	16	13	13	8	10	6	7	5	78	1994
			3		10	7	10	5	35	1995
	5	5	8	5	12	5	10	5	55	1996
	5	6	5	5	6	5	8	5	45	1997
	9	5	10	7	11	6	10	5	63	1998
	8	6	14	8	13	6	9	3	68	1999
	13	6	14	7	14	5	9	5	73	2000
			15	7	15	5	11	6	59	2001
			7	2	5	6	8	4	32	2002
			7	6	7	7	6	5	39	2003
	9	7	11	9	9	6	9	5	65	2004
			9	7	8	6	6	5	41	2005
	6	5	7	5	7	7	8	5	50	2006
	5	5	7	5	6	5	9	6	47	2007
	5		7	7	8	9	8	6	50	2008
	2		5	5	6	6	5	5	34	2009
	5	5	10	5	7	9	10	6	57	2010
			5	5	5	5	6	6	32	2011
	5	5	10	8	9	7	10	6	60	2012
	6	6	8	6	10	7	9	6	58	2013

Table 3 *S. marinus* >= 17cm, abundance ('1000) and biomass indices (tons) for West Greenland by stratum and total, 1982-2013. Confidence intervals (CI) are given in per cent of the stratified mean at 95% level of significance for West Greenland.

Abundance

Year	Str1.1	Str1.2	Str2.1	Str2.2	Str3.1	Str3.2	Str4.1	Str4.2	Total	CI
1982	3742	4619	70666	2743	2708	9340	1985	21874	117677	117
1983	1705	1462	1434	2828	1726	3308	915	35874	49252	82
1984	728	1654	245	676	5295	1390	1946	32749	44683	101
1985	1973	3842	13391	844	1577	6890	2438	17784	48739	87
1986	2418	2214	880	1492	7825	1384	1032	8641	25886	58
1987	504	249	611	1901	4392	277	311	3518	11763	77
1988	333	2834	155	1025	3230	1104	376	1099	10156	60
1989	287	332	420	374	3052	1066	167	921	6619	49
1990	194	410	185	632	583	452	93	1155	3704	41
1991	147	146	46	439	109	367	12	729	1995	68
1992	73	72	43	184	82	274	233	397	1358	69
1993	96	351	34	164	45	83	0	.	773	55
1994	52	176	77	87	30	24	77	139	662	45
1995	.	.	16	.	28	34	17	114	209	68
1996	80	146	11	135	202	235	16	171	996	57
1997	122	320	8	88	63	182	17	283	1083	58
1998	61	75	29	76	10	105	65	132	553	57
1999	132	140	86	138	43	114	10	255	918	37
2000	110	358	37	358	54	122	6	497	1542	53
2001	.	.	58	171	39	257	5	982	1512	75
2002	.	.	58	103	177	316	7	1322	1983	75
2003	.	.	129	218	97	300	0	1203	1947	63
2004	88	162	31	208	120	279	36	1324	2248	61
2005	.	.	107	231	82	606	90	3579	4695	97
2006	0	142	15	109	37	524	67	5822	6716	116
2007	195	1529	73	477	98	1048	124	6135	9679	87
2008	0	.	14	72	21	1470	31	4381	5989	103
2009	143	.	0	232	36	1036	0	3804	5251	101
2010	90	1083	48	195	112	2319	35	5732	9614	86
2011	.	.	87	98	177	1825	344	6086	8617	82
2012	0	675	97	539	166	2817	140	6246	10680	88
2013	328	636	64	963	89	2658	174	15107	20019	115

Biomass

Year	Str1.1	Str1.2	Str2.1	Str2.2	Str3.1	Str3.2	Str4.1	Str4.2	Total	CI	GLM Biomass
1982	958	818	27109	1273	1529	6152	1232	22538	61609	106	33238
1983	353	425	668	1323	804	2744	566	26435	33318	106	8686
1984	171	435	111	294	2448	1147	975	20558	26139	111	6288
1985	453	765	6554	274	699	4331	1336	14579	28991	121	9851
1986	551	637	328	568	3610	825	673	6724	13916	76	8382
1987	136	139	302	675	2265	257	201	3115	7090	106	12213
1988	66	373	55	433	1387	764	196	708	3982	55	3529
1989	58	79	148	136	1235	525	98	530	2809	55	2251
1990	27	95	41	164	273	241	52	659	1552	58	1353
1991	32	48	12	142	53	202	2	439	930	93	989
1992	11	24	12	52	23	141	84	214	561	83	595
1993	28	81	11	75	23	33	0	.	251	54	268
1994	15	80	24	34	13	19	22	45	252	53	245
1995	.	.	1	.	10	10	10	30	61	60	62
1996	34	56	2	33	68	72	4	76	345	51	350
1997	19	138	2	31	18	110	5	126	449	70	464
1998	11	23	9	22	7	54	30	61	217	71	216
1999	30	34	20	40	9	44	7	148	332	53	188
2000	37	99	17	135	15	46	1	230	580	59	627
2001	.	.	13	64	14	129	1	470	691	83	872
2002	.	.	14	33	83	135	7	517	789	75	271
2003	.	.	49	100	44	165	0	591	949	59	1050
2004	37	83	13	102	51	163	23	785	1257	63	1317
2005	.	.	44	117	27	271	67	1816	2342	100	2684
2006	0	43	7	80	19	289	52	3753	4243	122	4634
2007	28	279	30	119	67	438	53	3704	4718	101	6950
2008	0	.	7	21	10	387	17	1766	2208	91	2436
2009	27	.	0	108	10	295	0	1988	2428	102	2843
2010	13	173	12	85	32	660	28	4467	5470	110	6677
2011	.	.	48	50	37	441	71	3410	4057	93	4522
2012	0	123	19	111	49	1206	55	3122	4685	87	5746
2013	48	234	26	356	42	1598	151	7829	10284	96	12200

Table 4 *S. marinus* >= 17 cm. Length composition by year ('1000), 2006-2013.

Length	2006	2007	2008	2009	2010	2011	2012	2013
15.5	0	0	0	0	0	0	0	17
16.5	0	0	0	0	0	0	0	24
17.5	11	300	218	132	678	167	110	59
18.5	6	551	348	221	546	485	211	133
19.5	34	593	310	158	297	654	300	168
20.5	91	314	240	230	397	631	456	203
21.5	99	293	307	272	418	536	621	301
22.5	73	308	361	278	435	342	925	362
23.5	168	250	462	212	489	389	1042	864
24.5	260	377	310	341	386	385	755	1464
25.5	150	513	349	295	403	592	597	2197
26.5	167	428	378	234	358	668	432	2437
27.5	174	433	367	257	314	476	467	2615
28.5	268	393	316	269	267	370	436	1530
29.5	495	424	328	144	245	340	457	875
30.5	506	390	207	171	227	232	351	701
31.5	457	363	153	153	196	197	334	433
32.5	369	439	113	113	205	219	277	590
33.5	366	348	77	136	134	102	172	497
34.5	218	290	98	139	138	34	129	411
35.5	194	245	112	139	109	69	147	263
36.5	187	169	108	141	119	57	117	308
37.5	218	209	62	179	130	41	98	233
38.5	121	232	78	142	171	56	162	201
39.5	314	260	112	201	185	102	157	209
40.5	380	237	91	178	221	101	180	124
41.5	441	213	118	158	249	108	191	231
42.5	302	212	107	102	268	134	239	205
43.5	230	198	87	72	383	158	180	307
44.5	172	283	43	55	387	209	179	323
45.5	90	128	51	58	351	139	197	431
46.5	68	108	39	32	315	185	130	282
47.5	8	75	7	17	181	154	139	214
48.5	49	13	4	7	124	112	61	142
49.5	23	41	11	3	104	68	21	162
50.5	4	9	0	9	93	30	11	125
51.5	0	9	7	5	34	20	51	71
52.5	0	4	4	6	35	20	34	22
53.5	0	5	0	0	0	0	12	5
54.5	4	4	0	0	4	8	0	17
55.5	0	0	0	0	4	11	3	14
56.5	0	4	4	0	0	4	4	0
57.5	0	4	2	0	0	0	0	13
58.5	0	5	0	0	4	3	0	0
59.5	0	5	0	0	0	12	4	0
60.5	0	0	0	0	0	0	4	41

Table 5 *S. mentella* >= 17cm, abundance ('1000) and biomass indices (tons) for West Greenland by stratum and total, 1982-2012. Confidence intervals (CI) are given in per cent of the stratified mean at 95% level of significance for West Greenland. GLM 1985-1989 subject to revision.

Abundance

Year	Str1.1	Str1.2	Str2.1	Str2.2	Str3.1	Str3.2	Str4.1	Str4.2	Total	CI
1982	0	171	7	177	0	1331	0	563	2249	158
1983	15	395	39	1105	0	3152	0	339	5045	110
1984	1107	1790	5	832	0	548	0	1198	5480	70
1985	0	150	15	16	24	167	0	505	877	103
1986	664	180	16	152	2	171	0	11	1196	53
1987	337	7385	18	603	28	3883	0	1175	13429	70
1988	70	5754	11	344	30	2670	0	798	9677	117
1989	0	315	5	55	0	37	4	0	416	81
1990	19	5893	2	1245	20	1034	0	2340	10553	87
1991	0	289	0	0	0	543	0	802	1634	107
1992	0	23	0	8	0	72	0	0	103	154
1993	0	15	0	142	4	0	0	.	161	212
1994	0	147	9	53	45	79	0	19	352	75
1995	.	.	0	.	16	128	43	951	1138	128
1996	822	347	0	130	0	1119	15	4102	6535	97
1997	127	933	0	185	20	1825	70	15700	18860	111
1998	0	168	0	114	84	426	5	1318	2115	117
1999	18	429	4	308	28	1144	90	5591	7612	104
2000	0	54	3	474	17	836	0	12517	13901	139
2001	.	.	12	362	63	3012	0	8704	12153	109
2002	.	.	0	10	0	808	15	5385	6218	97
2003	.	.	0	325	61	905	20	5964	7275	108
2004	86	629	21	632	119	678	77	3044	5286	75
2005	.	.	21	607	15	464	44	702	1853	76
2006	0	842	37	444	30	765	28	8039	10185	108
2007	399	1052	8	394	26	503	0	720	3102	57
2008	0	.	32	320	59	448	6	542	1407	84
2009	0	.	0	19	17	408	0	38	482	220
2010	58	127	5	252	18	251	0	406	1117	106
2011	.	.	19	324	32	82	0	44	501	117
2012	0	2517	0	281	16	1721	0	4	4539	113
2013	0	5389	0	828	0	2196	7	0	8420	110

Biomass

Year	Str1.1	Str1.2	Str2.1	Str2.2	Str3.1	Str3.2	Str4.1	Str4.2	Total	CI	GLM Bi
1982	0	42	2	57	0	512	0	233	846	175	938
1983	6	83	15	510	0	1746	0	108	2468	129	6772
1984	23	509	3	321	0	231	0	565	1652	95	927
1985	0	41	7	6	12	58	0	236	360	102	1889
1986	123	18	9	56	1	75	0	8	290	53	399
1987	33	1646	4	154	16	2032	0	476	4361	115	2382
1988	9	450	9	72	22	1074	0	175	1811	111	2920
1989	0	26	5	8	0	8	0	0	47	68	208
1990	1	162	1	62	3	187	0	321	737	105	657
1991	0	20	0	0	0	115	0	201	336	118	1910
1992	0	2	0	1	0	19	0	0	22	181	152
1993	0	3	0	19	1	0	0	.	23	176	1363
1994	0	17	1	6	6	13	0	2	45	73	654
1995	.	.	0	.	3	13	5	103	124	131	130
1996	3	31	0	10	0	137	2	398	581	111	1287
1997	10	75	0	18	2	183	9	1528	1825	111	2188
1998	0	14	0	9	10	38	2	168	241	135	677
1999	4	53	2	28	3	107	17	689	903	112	221
2000	0	6	0	40	1	73	0	1122	1242	132	2037
2001	.	.	1	38	6	261	0	895	1201	104	1966
2002	.	.	0	1	0	87	1	724	813	98	785
2003	.	.	0	38	7	130	2	979	1156	98	2134
2004	12	62	3	69	24	91	13	711	985	93	1135
2005	.	.	2	73	2	52	14	250	393	109	415
2006	0	89	4	48	6	163	14	2484	2808	120	4465
2007	40	123	1	41	8	161	0	315	689	80	914
2008	0	.	3	32	12	107	1	130	285	95	926
2009	0	.	0	3	5	136	0	17	161	228	335
2010	6	30	1	41	2	85	0	278	443	156	471
2011	.	.	1	47	4	10	0	19	81	116	147
2012	0	298	0	26	8	630	0	2	964	150	1561
2013	0	1510	0	181	0	1274	3	0	2968	137	3650

Table 6 *S. mentella* >= 17 cm. Length composition by year ('1000), 2006-2013.

Length	2006	2007	2008	2009	2010	2011	2012	2013
15.5	0	0	0	0	0	0	0	14
16.5	0	0	0	0	0	0	0	34
17.5	372	173	126	8	53	35	308	115
18.5	445	636	164	12	63	70	555	113
19.5	432	518	106	6	93	41	421	108
20.5	421	274	63	16	28	73	193	133
21.5	521	146	118	3	12	59	163	105
22.5	664	158	119	3	44	93	193	103
23.5	746	119	112	6	45	33	171	178
24.5	672	64	87	9	50	4	183	326
25.5	573	101	75	20	47	9	262	662
26.5	477	101	106	53	40	4	149	1032
27.5	526	98	85	58	57	21	177	956
28.5	559	52	57	61	85	17	139	673
29.5	849	73	35	46	34	9	193	807
30.5	956	75	22	54	41	4	239	628
31.5	634	88	41	24	27	0	221	459
32.5	521	112	13	15	14	0	235	320
33.5	345	65	6	31	41	0	117	327
34.5	156	68	12	20	70	7	83	281
35.5	65	62	31	17	85	4	62	227
36.5	84	29	7	12	45	13	50	181
37.5	40	21	0	3	20	0	26	147
38.5	40	17	7	0	27	0	25	182
39.5	64	8	8	0	38	0	10	98
40.5	4	8	0	3	42	0	3	110
41.5	23	0	4	3	4	0	3	49
42.5	0	9	0	0	7	0	5	24
43.5	0	20	0	0	0	0	0	15
44.5	0	0	0	0	0	0	0	5
45.5	0	0	0	0	0	0	0	0

Table 7 *Sebastes. spp.* < 17cm, abundance ('1000) for West Greenland by stratum and total, 1982-2013. Confidence intervals (CI) are given in per cent of the stratified mean at 95% level of significance for West Greenland. Only total values available in 2012, all specimens < 17 cm were determined, but re-aggregated afterwards for the index *Sebastes* spp.

Abundance Year	Str1.1	Str1.2	Str2.1	Str2.2	Str3.1	Str3.2	Str4.1	Str4.2	Total	CI
1982	519	284	102	13	3	21	11	0	953	36
1983	1678	230	6	67	4	9	8	15	2017	47
1984	1629	1744	11	121	70	13	5	11	3604	61
1985	2174	5776	37	1416	22	42	33	71	9571	77
1986	5652	128601	68	960	30	125	20	23	135479	179
1987	5993	29522	2	321	12	63	0	32	35945	117
1988	8507	16773	0	53	11	72	0	9	25425	46
1989	4140	6444	1562	3004	9	366	32	535	16092	43
1990	6284	14793	7405	103	28	167	3394	318	32492	60
1991	32017	31001	17219	12013	6779	1499	595	675	101798	32
1992	15236	12244	7341	9726	9948	8912	37	1951	65395	47
1993	3162	21140	417	7184	196	1603	9	.	33711	79
1994	1616	6303	4812	1985	580	842	5342	5770	27250	44
1995	.	.	0	.	197	5301	465	9349	15312	100
1996	263	7946	2946	5153	13891	7100	1406	59752	98457	115
1997	3325	23765	0	7840	22136	11007	214	34394	102681	72
1998	848	13400	26645	16750	29606	9803	20366	6971	124389	61
1999	2012	25437	561	4531	577	4460	362	4706	42646	94
2000	715	5665	40	1860	228	4705	0	19880	33093	97
2001	.	.	698	2001	60	1336	5	984	5084	60
2002	.	.	679	6913	72	892	14	1394	9964	84
2003	.	.	215	4298	62	913	15	664	6167	76
2004	2578	6447	188	2653	59	634	6	667	13232	45
2005	.	.	64	1537	29	451	0	215	2296	82
2006	924	15524	157	1327	43	566	98	365	19004	108
2007	1468	6919	79	495	16	631	31	240	9879	71
2008	0	.	11	639	22	450	16	640	1778	76
2009	2151	.	100	280	79	446	33	830	3919	68
2010	201	1122	467	307	296	807	32	1256	4488	53
2011	.	.	29	100	17	105	0	122	373	65
2012									645	
2013									160	

Table 8 *Sebastes spp.* < 17 cm. Length composition by year (1 000), 2008-2013. Aggregated from *S. mentella*, *S. marinus* and *S.* spp since 2012.

Length	2008	2009	2010	2011	2012	2013
0.5	0	0	0	0	0	0
1.5	0	0	0	0	0	0
2.5	0	0	0	0	0	0
3.5	0	0	0	0	0	0
4.5	0	0	0	0	0	0
5.5	53	1315	89	0	6	0
6.5	236.5	900	523.5	26.5	43	0
7.5	239.5	65.5	178	0	0	0
8.5	224.5	5.5	24	0	3	0
9.5	105.5	86.5	100.5	5.5	4	11
10.5	164	136	146.5	8	3	15
11.5	183.5	284.5	154.5	10	6	9
12.5	62.5	419	173	3.5	3	11
13.5	107.5	229.5	313.5	33.5	60	21
14.5	148	174.5	624.5	53.5	192	4
15.5	113	125.5	1020	98.5	177	31
16.5	137.5	177	1105	135	167	58
17.5	0	0	75	0	0	0

Table 9 *Hippoglossoides platessoides*, abundance ('1000) and biomass indices (tons) for West Greenland by stratum and total, 1982-2013. Confidence intervals (CI) are given in per cent of the stratified mean at 95% level of significance for West Greenland.

Abundance											
Year	Str1.1	Str1.2	Str2.1	Str2.2	Str3.1	Str3.2	Str4.1	Str4.2	Total	CI	
1982	15949	2756	15277	2874	1283	1250	494	112	39995	31	
1983	18948	3015	23106	1251	3753	229	803	292	51397	44	
1984	9741	2989	28310	2309	1792	1133	693	210	47177	52	
1985	9616	2627	11253	3560	1289	118	1425	1078	30966	28	
1986	10024	6178	26557	4647	1336	1131	2036	401	52310	47	
1987	12368	1505	13387	5853	1200	552	496	245	35606	30	
1988	5267	1746	4260	2799	1870	436	540	635	17553	21	
1989	4433	2406	6386	1993	4384	630	639	328	21199	24	
1990	4811	4143	4467	1674	635	1016	888	336	17970	30	
1991	4327	2503	2625	1086	782	404	737	424	12888	21	
1992	4284	2938	1835	1731	817	1136	873	86	13700	24	
1993	3471	1930	799	867	380	463	219	.	8129	20	
1994	1035	1787	725	725	307	137	819	103	5638	28	
1995	.	.	468	.	452	581	526	654	2681	44	
1996	2010	744	526	770	1033	448	840	277	6648	21	
1997	4272	1649	1303	1747	1508	700	1268	57	12504	24	
1998	3276	2106	3124	1517	929	598	1210	106	12866	27	
1999	2845	1258	2692	1570	959	221	733	188	10466	25	
2000	1235	2161	1073	1924	567	198	682	21	7861	28	
2001	.	.	6224	2139	614	211	2011	213	11412	41	
2002	.	.	3841	6360	618	1191	882	272	13164	47	
2003	.	.	10804	6371	601	1131	1124	10	20041	46	
2004	10326	4647	9932	3541	524	657	940	35	30602	29	
2005	.	.	9080	4663	780	621	542	436	16122	43	
2006	2649	2733	5325	4182	614	643	649	27	16822	34	
2007	4981	2876	2005	1563	340	224	112	21	12122	32	
2008	2760	.	1591	2386	248	434	227	19	7665	45	
2009	4087	.	1425	1614	410	320	424	29	8309	38	
2010	11875	3051	2618	4037	319	258	428	0	22586	34	
2011	.	.	1569	3871	276	485	268	15	6484	63	
2012	1549	1933	1890	2261	84	309	341	0	8367	34	
2013	3370	2101	1367	1905	44	375	32	4	9198	35	
Biomass											
Year	Str1.1	Str1.2	Str2.1	Str2.2	Str3.1	Str3.2	Str4.1	Str4.2	Total	CI	GLM Biomass
1982	3102	504	3888	582	405	225	74	42	8822	34	9386
1983	3035	544	4962	263	1609	44	140	57	10654	41	9769
1984	888	366	4514	425	357	197	129	48	6924	58	6948
1985	878	266	1889	602	252	24	149	280	4340	33	4475
1986	987	609	3827	676	324	214	205	129	6971	47	7238
1987	1669	156	2832	703	319	82	107	60	5928	37	5067
1988	443	150	875	396	426	73	117	220	2700	31	2426
1989	253	161	837	195	1051	97	128	75	2797	35	2614
1990	236	262	661	200	123	174	186	124	1966	42	1734
1991	188	218	252	152	145	79	111	76	1221	26	1202
1992	308	232	136	131	106	165	79	13	1170	27	1240
1993	193	147	53	72	41	48	14	.	568	22	574
1994	70	215	65	69	32	16	55	15	537	41	531
1995	.	.	44	.	36	74	64	48	266	52	228
1996	116	56	37	89	84	45	81	22	530	27	536
1997	242	134	105	169	179	92	98	3	1022	30	1055
1998	160	135	193	130	97	83	98	10	906	26	930
1999	127	75	178	145	95	20	48	12	700	25	696
2000	68	184	77	180	58	20	30	3	620	34	637
2001	.	.	357	166	52	24	82	12	693	36	695
2002	.	.	218	474	63	112	59	14	940	49	480
2003	.	.	768	587	65	136	93	2	1651	40	1960
2004	639	383	897	426	71	98	119	3	2636	28	2728
2005	.	.	1175	780	128	76	85	56	2300	45	2503
2006	148	256	574	612	70	64	118	5	1847	45	2021
2007	300	250	347	216	45	33	27	4	1222	41	1271
2008	183	.	202	264	30	49	29	3	760	51	803
2009	247	.	155	128	46	39	26	5	646	37	409
2010	819	202	204	347	46	31	40	0	1689	34	1879
2011	.	.	172	343	38	59	36	2	650	63	702
2012	208	245	257	252	14	54	35	0	1065	33	1190
2013	274	252	170	215	7	72	5	0	995	35	1057

Table 10 *Hippoglossoides platessoides*. Length composition by year ('1000), 2005-2013.

Length	2005	2006	2007	2008	2009	2010	2011	2012	2013
0.5	0	0	0	0	0	0	0	0	0
1.5	0	0	0	0	0	0	0	0	0
2.5	2	0	0	0	0	1	0	0	0
3.5	1	10	0	1	0	0	2	0	0
4.5	4	3	3	3	8	61	4	4	0
5.5	11	45	6	5	457	134	12	8	0
6.5	46	245	37	41	291	408	38	38	0
7.5	164	124	218	34	147	397	9	14	0
8.5	78	58	50	25	87	266	6	17	0
9.5	103	194	30	26	209	252	27	38	0
10.5	211	538	58	138	313	220	102	74	23
11.5	467	655	157	142	411	426	135	75	33
12.5	386	643	183	160	383	453	88	116	114
13.5	342	520	395	223	338	931	132	192	224
14.5	474	609	599	244	362	1466	244	210	435
15.5	554	1087	914	267	387	1825	409	210	418
16.5	696	763	642	299	441	1879	475	294	522
17.5	679	864	544	481	496	1842	449	400	786
18.5	759	790	576	486	481	1461	490	444	849
19.5	704	864	554	390	279	1585	292	428	771
20.5	754	841	533	539	453	1293	305	294	496
21.5	695	733	445	345	288	727	279	374	589
22.5	698	667	557	274	220	803	336	299	362
23.5	796	629	408	306	274	693	219	371	362
24.5	963	542	525	286	282	479	165	324	573
25.5	774	426	487	292	298	571	226	300	386
26.5	681	316	357	255	208	281	192	288	438
27.5	520	268	383	163	186	286	221	234	425
28.5	490	299	377	139	117	370	198	196	272
29.5	492	367	463	181	96	226	161	211	214
30.5	559	330	414	157	118	277	164	246	370
31.5	442	282	401	188	80	175	105	235	178
32.5	434	339	372	165	87	156	138	221	57
33.5	350	285	197	145	66	200	132	145	97
34.5	311	296	234	259	31	138	80	167	71
35.5	213	251	118	132	51	262	85	166	36
36.5	192	257	103	115	35	187	54	183	39
37.5	150	191	58	61	23	190	29	159	52
38.5	89	231	71	70	28	147	41	187	4
39.5	106	174	34	26	10	190	18	154	0
40.5	77	198	37	87	22	196	19	173	10
43.5	56	163	46	52	32	107	32	131	0
44.1	80	108	39	100	22	170	24	103	0
45.5	67	89	43	23	17	131	20	100	0
46.9	51	83	50	16	16	79	26	62	0
48.3	82	52	22	50	17	52	23	87	0
49.7	36	40	27	20	8	48	22	47	0

Table 11 *Anarhichas lupus*, abundance ('1000) and biomass indices (tons) for West Greenland by stratum and total, 1982-2013. Confidence intervals (CI) are given in per cent of the stratified mean at 95% level of significance for West Greenland.

Abundance											
Year	Str1.1	Str1.2	Str2.1	Str2.2	Str3.1	Str3.2	Str4.1	Str4.2	Total	CI	
1982	5656	1992	1852	1188	892	350	433	248	12611	19	
1983	3250	1442	751	206	1399	131	495	448	8122	20	
1984	3162	612	766	103	673	52	434	237	6039	17	
1985	2304	1206	785	172	449	505	440	701	6562	19	
1986	2185	843	922	291	641	243	359	330	5814	25	
1987	2543	503	410	305	478	28	333	530	5130	19	
1988	2366	1030	428	202	582	308	386	322	5624	25	
1989	1829	356	1031	268	1236	218	521	142	5601	21	
1990	2175	639	1059	179	956	74	659	328	6069	22	
1991	1694	544	489	513	1293	342	362	223	5460	27	
1992	1625	235	857	915	1688	475	803	994	7592	31	
1993	2704	932	471	243	337	232	224	.	5143	29	
1994	733	632	811	284	598	78	2237	607	5980	46	
1995	.	.	489	.	686	308	273	479	2235	31	
1996	406	533	136	209	1408	390	421	632	4135	33	
1997	1532	640	535	168	1924	647	837	1440	7723	36	
1998	1686	505	427	359	1038	410	538	550	5513	28	
1999	2346	525	1033	370	3227	712	572	446	9231	46	
2000	1038	964	228	230	1160	642	260	1587	6109	34	
2001	.	.	560	624	1981	650	394	1029	5238	34	
2002	.	.	1606	418	1807	231	278	2224	6564	40	
2003	.	.	703	1014	3894	304	323	874	7112	46	
2004	4452	1218	953	467	1711	570	690	1044	11105	23	
2005	.	.	1977	261	3299	687	1424	374	8022	41	
2006	1062	805	904	454	839	626	787	787	6264	32	
2007	1388	330	634	420	1135	497	214	577	5195	34	
2008	706	.	345	183	339	179	107	444	2303	27	
2009	933	.	517	95	549	230	69	350	2743	39	
2010	1412	234	717	64	641	307	199	551	4125	37	
2011	.	.	504	186	791	224	297	423	2425	37	
2012	250	186	439	152	386	80	323	775	2591	38	
2013	534	211	333	178	262	81	216	591	2406	24	
Biomass											
Year	Str1.1	Str1.2	Str2.1	Str2.2	Str3.1	Str3.2	Str4.1	Str4.2	Total	CI	GLM Bioma
1982	5090	1764	2701	2052	1086	361	565	339	13958	26	17065
1983	1611	1537	914	199	2110	171	689	634	7865	27	6472
1984	1653	332	648	104	401	35	519	197	3889	18	3727
1985	804	499	513	95	267	278	308	572	3336	19	2975
1986	793	448	668	196	427	213	342	360	3447	23	3194
1987	1064	158	269	119	496	17	311	511	2945	20	3070
1988	534	215	381	135	454	194	351	281	2545	20	2236
1989	370	116	366	137	786	99	482	85	2441	27	2209
1990	452	102	267	63	350	34	428	170	1866	22	1821
1991	272	87	81	105	338	81	185	97	1246	30	1213
1992	243	52	173	261	450	103	198	303	1783	33	1852
1993	392	171	66	50	78	48	65	.	870	24	892
1994	102	111	176	49	141	13	429	99	1120	45	1070
1995	.	.	100	.	127	38	69	74	408	29	311
1996	36	149	23	38	266	71	89	139	811	33	830
1997	154	122	43	39	345	93	193	189	1178	39	1250
1998	194	102	68	79	150	68	92	139	892	25	905
1999	173	127	171	83	536	123	93	130	1436	45	1333
2000	123	167	38	47	200	97	94	334	1100	39	1125
2001	.	.	117	148	516	122	99	325	1327	37	1404
2002	.	.	315	76	459	53	74	475	1452	38	926
2003	.	.	261	258	1308	83	107	384	2401	47	2701
2004	696	229	304	137	515	180	305	390	2756	22	2954
2005	.	.	766	94	946	181	721	232	2940	28	3096
2006	168	189	402	180	350	121	590	495	2495	32	2729
2007	329	82	273	151	423	116	166	415	1955	35	2169
2008	80	.	184	39	166	51	60	189	769	37	792
2009	84	.	187	29	128	54	21	196	699	43	630
2010	246	63	105	20	234	96	117	499	1380	66	1460
2011	.	.	134	61	234	76	104	232	841	36	916
2012	101	55	172	37	155	33	243	359	1155	38	1163
2013	197	93	147	81	166	28	166	439	1317	31	1368

Table 12 *Anarhichas lupus*. Length composition by year ('1000), 1998-2011.

Length	2005	2006	2007	2008	2009	2010	2011	2012	2013
0.5	0	0	0	0	0	0	0	0	0
1.5	0	0	0	0	0	0	0	0	0
2.5	0	0	0	0	0	0	0	0	0
3.5	9	8	0	1	0	0	2	0	0
4.5	15	9	3	7	4	31	5	6	0
5.5	49	35	26	12	98	54	9	12	0
6.5	80	135	53	24	77	198	20	26	11
7.5	159	122	119	43	59	209	23	18	0
8.5	90	62	63	62	27	117	12	22	37
9.5	87	105	25	30	45	66	11	6	41
10.5	117	217	52	46	92	106	17	12	35
11.5	165	184	73	57	141	147	31	23	66
12.5	164	228	95	66	145	182	42	38	20
13.5	99	147	123	71	102	164	23	35	24
14.5	116	225	145	76	111	164	38	33	30
15.5	113	229	181	93	106	206	50	31	41
16.5	158	197	165	77	108	182	55	31	65
17.5	163	220	122	96	132	160	88	43	55
18.5	212	209	192	103	134	123	123	55	89
19.5	196	211	226	67	77	122	122	62	20
20.5	214	222	258	103	121	100	78	62	93
21.5	225	175	209	70	89	103	73	91	112
22.5	211	189	193	51	73	103	61	81	83
23.5	214	218	182	74	93	95	74	91	70
24.5	271	177	198	55	114	90	65	85	79
25.5	228	137	195	53	103	88	121	74	54
26.5	350	129	176	63	86	82	90	66	75
27.5	368	123	153	57	69	70	86	58	55
28.5	415	128	181	49	62	69	97	62	60
29.5	492	141	151	56	52	67	88	73	72
30.5	502	166	170	53	65	52	83	71	12
31.5	417	125	150	63	36	47	68	60	51
32.5	375	156	130	48	37	62	83	73	62
33.5	320	143	88	51	24	63	59	56	61
34.5	237	136	85	61	17	44	31	63	57
35.5	168	128	86	49	21	68	47	66	46
36.5	147	150	51	34	18	60	23	62	65
37.5	111	124	43	22	15	65	29	79	7
38.5	65	115	46	31	15	48	25	72	10
39.5	64	117	45	31	12	59	30	64	25
40.5	67	100	55	31	19	44	16	65	32
41.5	40	80	64	26	21	49	23	68	58
42.5	49	66	70	41	12	46	23	62	25
43.5	63	64	78	21	12	36	27	51	46
44.5	36	65	64	10	9	36	39	60	47
45.5	54	41	37	16	9	27	37	53	44
46.5	34	32	49	11	3	22	31	48	44
47.5	26	29	37	9	10	19	22	31	21
48.5	36	25	36	12	5	12	32	26	60
49.5	37	28	26	8	6	17	27	19	19
50.5	24	15	30	7	5	10	7	17	46
51.5	27	14	16	6	8	7	16	19	25
52.5	11	13	18	6	4	6	15	12	6
53.5	7	13	16	5	3	6	12	21	15
54.5	16	6	13	7	3	4	5	9	16
55.5	5	12	13	12	1	4	13	15	19
56.5	6	6	8	4	2	5	4	5	52
57.5	4	7	8	6	1	4	5	18	13
58.5	2	4	4	6	3	3	7	13	32
59.5	6	5	5	5	2	3	3	13	4
60.5	5	2	5	4	2	4	2	7	0
61.5	3	1	5	3	0	5	3	7	26
62.5	2	3	4	5	1	4	5	10	6
63.5	1	6	2	2	2	5	3	7	17

Table 13 *Anarhichas minor*, abundance ('1000) and biomass (tons) for West Greenland by stratum and total, 1982-2013. Confidence intervals (CI) are given in per cent of the stratified mean at 95% level of significance for West Greenland.

Abundance										
Year	Str1.1	Str1.2	Str2.1	Str2.2	Str3.1	Str3.2	Str4.1	Str4.2	Total	CI
1982	188	106	196	77	58	7	154	88	874	28
1983	98	16	62	2	57	24	615	76	950	35
1984	101	30	97	9	47	11	154	18	467	24
1985	100	51	54	2	13	31	52	20	323	28
1986	206	98	51	19	32	8	56	10	480	21
1987	152	68	29	0	61	13	119	30	472	29
1988	115	83	24	7	75	19	179	22	524	29
1989	209	66	29	13	127	0	50	5	499	32
1990	60	123	20	11	53	0	102	3	372	32
1991	178	82	16	20	27	4	44	24	395	26
1992	19	32	7	75	16	11	7	14	181	61
1993	46	118	30	31	20	11	35	.	291	43
1994	30	56	28	30	9	5	14	4	176	36
1995	.	.	78	.	9	2	9	0	98	72
1996	0	34	30	22	9	7	0	4	106	59
1997	56	31	8	19	30	10	20	37	211	39
1998	62	15	14	6	14	16	21	23	171	36
1999	16	44	30	21	26	9	15	27	188	37
2000	120	94	15	52	19	6	29	28	363	22
2001	.	.	26	15	42	3	23	7	116	30
2002	.	.	57	10	40	13	0	12	132	40
2003	.	.	34	19	16	5	7	4	85	49
2004	69	34	35	46	35	16	71	50	356	29
2005	.	.	64	39	19	8	155	18	303	39
2006	243	8	52	27	98	22	73	57	580	35
2007	113	17	86	9	79	10	55	35	404	31
2008	112	.	18	3	53	15	66	28	295	43
2009	0	.	71	9	44	11	16	11	162	47
2010	59	10	27	4	40	6	56	26	228	38
2011	.	.	0	29	50	0	26	21	126	52
2012	92	17	29	14	47	12	45	54	310	30
2013	49	16	170	8	135	20	49	115	562	38

Biomass											
Year	Str1.1	Str1.2	Str2.1	Str2.2	Str3.1	Str3.2	Str4.1	Str4.2	Total	CI	GLM Biomass
1982	1086	333	1149	438	242	21	946	925	5140	37	3974
1983	895	105	283	3	380	103	4106	564	6439	36	4171
1984	451	107	571	10	229	25	901	119	2413	27	2336
1985	6	51	254	0	59	155	336	118	979	36	866
1986	524	157	268	29	169	20	467	118	1752	29	1518
1987	337	54	150	0	491	59	1033	186	2310	38	2342
1988	-39	43	105	38	585	59	1711	45	2547	66	2530
1989	276	17	92	22	625	0	388	20	1440	41	1504
1990	53	47	106	4	361	0	821	1	1393	50	1301
1991	13	17	1	5	134	4	391	78	643	73	609
1992	3	5	0	5	12	2	18	17	62	85	63
1993	28	22	8	20	21	11	120	.	230	68	220
1994	14	13	34	13	5	1	79	2	161	73	147
1995	.	.	68	.	35	24	101	0	228	91	1421
1996	0	73	18	23	20	5	0	5	144	71	2260
1997	38	5	12	19	19	1	12	30	136	51	140
1998	12	1	56	15	61	2	137	25	309	65	285
1999	17	25	75	16	56	6	83	76	354	44	270
2000	133	56	51	104	120	49	139	117	769	40	757
2001	.	.	86	35	250	21	121	30	543	35	557
2002	.	.	109	1	306	64	0	83	563	55	1253
2003	.	.	131	39	46	30	25	62	333	53	332
2004	57	23	153	106	245	117	410	324	1435	40	1650
2005	.	.	224	179	186	84	855	125	1653	41	1992
2006	736	9	152	111	473	122	225	323	2151	36	2293
2007	876	118	476	8	579	47	608	284	2996	35	3540
2008	376	.	25	0	298	132	566	256	1653	48	1809
2009	0	.	201	88	257	62	131	64	803	54	872
2010	390	10	73	5	321	35	531	244	1609	50	1698
2011	.	.	0	123	421	0	250	192	986	48	1523
2012	372	138	144	70	357	44	488	343	1956	43	1965
2013	177	39	1207	29	1121	134	696	1016	4419	41	5104

Table 14 *Anarhichas minor*. Length composition by year ('1000), 2002-2013.

Length	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
10.5	9	2	4	3	12	2	7	3	2	1	1	0
11.5	9	3	7	5	29	1	12	4	2	0	1	0
12.5	6	4	8	4	17	4	10	3	5	2	2	0
13.5	7	5	10	2	15	7	13	3	6	2	0	0
14.5	5	5	19	3	10	8	11	5	9	2	0	0
15.5	5	5	17	3	35	10	23	4	8	3	2	0
16.5	6	5	14	6	25	9	14	5	9	4	2	0
17.5	6	4	17	5	17	7	8	4	8	4	4	0
18.5	4	4	20	7	17	13	7	5	6	6	8	0
19.5	6	3	17	8	15	12	4	3	9	4	8	0
20.5	6	3	18	10	12	17	4	5	6	3	5	0
21.5	5	2	18	9	9	13	4	3	3	5	10	0
22.5	4	2	17	8	11	15	3	3	5	1	7	0
23.5	2	3	15	8	19	11	3	4	5	2	11	0
24.5	3	2	13	8	21	14	2	9	5	2	6	0
25.5	3	2	11	7	16	11	5	9	5	8	6	0
26.5	3	2	12	11	11	11	2	11	2	3	6	0
27.5	3	1	9	12	6	12	3	6	3	4	7	0
28.5	2	1	7	14	8	10	2	8	4	3	2	0
29.5	2	0	7	16	16	12	2	4	3	5	3	0
30.5	2	1	7	21	12	14	1	4	3	5	4	0
31.5	1	0	4	20	17	10	2	3	4	3	5	0
32.5	1	0	5	17	12	9	1	5	5	5	7	0
33.5	2	0	4	14	17	6	2	3	3	3	6	0
34.5	1	0	3	11	13	10	2	1	2	1	8	0
35.5	2	0	5	6	9	7	4	2	4	1	9	0
36.5	1	0	3	5	10	4	2	2	4	2	8	0
37.5	0	0	2	5	9	4	3	2	5	1	10	0
38.5	1	0	2	3	9	4	5	1	4	0	10	0
39.5	1	0	1	3	8	4	6	1	5	1	11	0
40.5	0	0	2	1	8	6	4	2	4	0	10	0
41.5	0	0	0	1	20	7	3	1	3	1	10	0
42.5	0	0	1	1	7	9	4	0	3	1	9	0
43.5	0	0	0	1	5	7	3	3	4	0	9	0
44.5	0	0	1	1	5	10	2	1	4	1	7	0
45.5	0	0	0	3	3	6	2	1	3	1	8	0
46.5	0	0	1	0	3	8	2	0	2	0	7	0
47.5	0	0	1	1	1	7	2	1	1	0	4	0
48.5	0	0	0	2	2	5	4	0	2	1	4	0
49.5	0	0	0	2	3	6	4	0	2	2	3	0
50.5	0	0	1	1	0	4	4	0	2	1	2	0
51.5	0	0	0	1	1	3	2	1	1	0	3	7
52.5	0	0	1	0	1	4	2	0	1	0	3	10
53.5	0	0	0	0	1	3	3	0	2	0	3	0
54.5	0	0	0	1	0	2	3	0	2	0	2	23
55.5	0	0	0	0	0	2	3	1	1	0	1	0
56.5	0	0	0	0	0	2	3	0	1	0	2	8
57.5	0	0	0	0	0	1	3	0	0	0	3	3
58.5	0	0	0	0	0	0	2	0	0	0	2	0
59.5	0	0	0	0	0	1	3	0	1	0	2	0
60.5	0	0	0	0	0	1	2	0	1	0	1	3
61.5	0	0	0	0	0	0	2	2	0	0	1	10
62.5	0	0	0	0	0	1	2	1	0	0	2	4
63.5	0	0	0	0	0	0	1	0	0	0	0	5
64.5	0	0	0	0	0	0	1	0	1	0	0	0
65.5	0	0	0	0	0	0	1	0	0	0	0	9
66.5	0	0	0	0	0	0	1	0	0	0	2	0
67.5	0	0	0	0	0	0	1	0	0	0	0	11
68.5	0	0	0	0	0	0	0	0	0	0	0	0
69.5	0	0	0	0	1	0	0	0	0	0	0	0
70.5	0	0	0	0	0	0	0	1	0	0	0	16
71.5	0	0	0	0	0	0	0	0	0	0	0	6
72.5	0	0	0	0	0	0	0	0	1	0	0	0
73.5	0	0	0	0	0	0	0	0	1	0	0	6
74.5	0	0	0	0	0	0	0	0	1	0	0	30
75.5	0	0	0	0	0	0	0	0	0	0	0	0
76.5	0	0	0	0	0	0	0	0	1	0	0	25
77.5	0	0	0	0	0	0	0	0	0	0	0	0
78.5	0	0	0	0	0	0	0	0	0	1	0	6
79.5	0	0	0	0	1	0	0	1	0	0	0	7
80.5	0	0	0	0	0	0	0	0	0	0	0	0
81.5	0	0	0	1	0	0	0	0	1	0	0	16
82.5	0	0	0	0	0	0	0	0	0	0	0	38
83.5	0	0	0	0	0	0	3	0	0	0	0	16
84.5	0	0	0	0	0	0	0	1	1	0	0	12
85.5	0	0	0	0	0	0	0	0	0	0	0	4
86.5	0	0	0	0	0	0	0	0	0	1	0	7
87.5	0	0	0	0	0	0	0	0	0	0	0	16
88.5	0	0	0	0	0	0	0	0	0	0	0	9
89.5	0	0	0	0	0	0	0	0	0	1	0	4
90.5	0	0	0	0	0	0	0	0	0	0	0	27
91.5	0	0	0	0	0	1	0	1	0	2	0	21
92.5	0	0	0	0	0	0	0	0	0	5	0	26
93.5	0	0	0	0	0	0	0	0	0	0	0	9
94.5	0	0	0	0	0	0	0	0	0	0	0	11
95.5	0	0	0	0	1	0	0	0	1	0	0	8
96.5	0	0	0	0	0	0	0	0	0	0	0	0
97.5	0	0	0	0	0	0	0	0	0	0	0	14
98.5	0	0	0	0	0	0	0	0	0	0	0	9
99.5	0	0	0	0	0	0	0	0	0	0	0	0
100.5	0	0	0	0	0	0	0	0	0	0	0	3
101.5	0	0	0	0	0	0	0	0	0	0	0	22

Table 15 *Raja radiata*, abundance (1 000) and biomass (tons) for West Greenland by stratum and total, 1982-2013. Confidence intervals (CI) are given in per cent of the stratified mean at 95% level of significance.

Abundance											
Year	Str1.1	Str1.2	Str2.1	Str2.2	Str3.1	Str3.2	Str4.1	Str4.2	Total	CI	
1982	2709	965	773	234	258	61	76	47	5123	28	
1983	1882	293	371	151	345	14	29	96	3181	54	
1984	1617	931	401	271	76	241	81	32	3650	34	
1985	1041	1066	900	361	186	29	122	70	3775	32	
1986	945	1302	358	158	133	60	93	5	3054	36	
1987	859	171	298	174	137	30	30	14	1713	22	
1988	1953	523	572	380	170	21	39	0	3658	30	
1989	6411	1099	2071	364	272	57	66	81	10421	26	
1990	4872	1491	1337	345	166	92	334	193	8830	36	
1991	1087	251	637	145	329	81	77	32	2639	22	
1992	2068	332	1707	826	304	342	102	28	5709	38	
1993	1374	251	399	191	122	176	58	.	2571	27	
1994	1163	192	411	127	113	38	197	8	2249	31	
1995	.	.	872	.	90	141	53	13	1169	74	
1996	680	77	232	43	61	62	30	17	1202	24	
1997	2431	253	426	23	62	68	93	0	3356	31	
1998	894	290	251	106	135	27	26	8	1737	24	
1999	1134	107	365	105	151	108	118	22	2110	27	
2000	383	107	265	507	135	72	125	9	1603	42	
2001	.	.	262	53	46	71	351	16	799	39	
2002	.	.	353	95	60	109	66	12	695	40	
2003	.	.	224	200	33	154	112	0	723	52	
2004	501	50	339	125	60	539	105	13	1732	28	
2005	.	.	415	121	113	196	132	0	977	39	
2006	193	44	350	242	20	212	271	21	1353	43	
2007	298	72	190	106	42	35	63	0	806	28	
2008	116	.	311	110	86	111	76	4	814	43	
2009	1434	.	865	133	66	116	93	0	2707	51	
2010	553	40	412	134	18	91	15	0	1263	37	
2011	.	.	254	117	42	53	16	0	482	55	
2012	276	8	278	59	27	349	15	20	1032	88	
2013	172	28	135	120	4	81	18	0	558	40	
Biomass											
Year	Str1.1	Str1.2	Str2.1	Str2.2	Str3.1	Str3.2	Str4.1	Str4.2	Total	CI	GLM Bi
1982	1548	496	733	168	194	43	73	33	3288	28	3267
1983	405	92	326	58	333	14	27	72	1327	25	1090
1984	412	178	217	52	67	64	69	41	1100	27	975
1985	224	189	395	104	73	25	26	43	1079	27	1048
1986	226	272	193	40	56	29	17	3	836	27	844
1987	199	54	141	25	68	12	-84	15	430	39	479
1988	320	49	282	121	45	9	16	0	842	27	873
1989	1081	217	542	55	129	17	40	73	2154	24	2072
1990	705	204	280	38	55	11	68	116	1477	34	1296
1991	148	41	94	22	127	26	10	16	484	28	473
1992	167	55	84	85	128	55	13	13	600	30	621
1993	194	86	47	20	19	19	2	.	387	23	389
1994	108	37	67	15	45	7	28	6	313	22	312
1995	.	.	124	.	35	17	20	0	196	49	72
1996	51	14	20	13	11	9	4	7	129	26	131
1997	173	49	87	3	8	16	18	0	354	31	421
1998	93	49	50	24	29	7	5	8	265	29	267
1999	79	31	76	35	34	14	30	13	312	30	298
2000	59	27	71	177	55	7	15	7	418	54	441
2001	.	.	45	18	22	13	72	10	180	40	173
2002	.	.	75	30	13	18	7	11	154	35	114
2003	.	.	40	31	14	28	51	0	164	43	257
2004	40	11	78	26	19	93	18	6	291	34	283
2005	.	.	84	31	40	34	39	0	228	32	300
2006	14	8	84	76	4	39	82	6	313	46	319
2007	42	12	39	12	14	2	9	0	130	35	186
2008	5	.	23	10	15	14	4	3	74	56	75
2009	30	.	37	21	8	13	2	0	111	59	131
2010	32	17	68	20	3	9	4	0	153	45	195
2011	.	.	45	14	5	9	6	0	79	59	134
2012	30	2	49	9	3	45	6	11	155	78	148
2013	26	3	35	29	0	12	1	0	106	44	163

Table 16 *Raja radiata*. Length composition by year (1 000), 1998-2011.

Length	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
0.5	0	0	0	0	0	0	0	0	0	0	0	0	0
1.5	0	0	0	0	0	0	0	0	0	0	0	0	0
2.5	0	0	0	0	0	0	0	0	0	0	0	0	0
3.5	1	0	0	0	0	1	0	0	0	0	0	0	0
4.5	5	2	1	4	1	0	0	0	1	2	3	0	0
5.5	11	4	3	4	2	1	2	1	148	12	5	1	0
6.5	17	24	9	24	3	11	3	4	89	21	11	6	0
7.5	29	41	7	33	12	9	15	8	39	16	6	3	0
8.5	30	8	3	10	5	4	2	10	29	12	3	0	0
9.5	24	13	6	13	4	8	4	7	66	19	4	7	0
10.5	38	52	33	31	8	25	6	15	106	19	11	10	29
11.5	60	53	46	48	15	34	10	26	145	36	17	10	48
12.5	70	27	38	47	18	36	16	25	156	41	14	19	15
13.5	68	33	38	63	15	40	22	28	125	52	11	24	18
14.5	44	32	46	91	23	38	30	36	115	69	15	21	25
15.5	41	34	52	82	29	75	40	35	131	99	27	20	15
16.5	38	40	47	89	33	49	29	47	165	109	24	37	16
17.5	35	33	36	101	36	62	24	67	179	85	43	35	20
18.5	34	30	30	119	47	62	37	44	193	77	33	22	5
19.5	26	32	30	99	39	69	43	50	124	86	21	25	44
20.5	26	26	25	96	36	62	50	46	173	59	17	20	38
21.5	18	22	25	82	34	61	33	30	100	34	13	23	42
22.5	17	16	24	68	34	44	35	19	70	48	19	22	6
23.5	14	11	24	75	40	39	29	20	71	35	12	24	29
24.5	11	12	20	61	53	36	29	14	77	30	9	17	35
25.5	11	12	23	56	37	20	26	18	90	27	13	20	5
26.5	10	12	19	50	37	19	22	15	53	15	12	15	24
27.5	13	11	16	42	30	19	23	13	45	12	13	19	16
28.5	11	10	10	44	33	22	26	11	15	19	14	12	7
29.5	11	8	15	28	39	28	28	20	16	13	14	11	7
30.5	11	10	10	37	38	32	23	10	36	14	9	20	2
31.5	9	6	8	28	31	22	26	16	17	14	8	21	14
32.5	7	5	8	26	30	33	18	16	24	15	9	32	0
33.5	6	8	9	25	28	38	13	13	8	14	9	28	15
34.5	5	7	5	21	31	43	15	18	7	11	7	38	0
35.5	3	9	4	15	22	37	8	19	15	20	4	47	4
36.5	3	9	5	16	23	37	10	8	10	15	3	47	0
37.5	3	3	2	13	16	31	4	10	7	15	0	47	7
38.5	0	3	3	8	8	26	6	8	7	9	4	50	2
39.5	3	4	3	8	9	28	6	7	3	17	1	35	25
40.5	3	7	4	1	6	26	6	9	4	11	2	40	0
41.5	5	4	4	4	4	24	6	6	13	8	5	24	10
42.5	3	3	4	5	6	19	8	6	1	8	0	25	0
43.5	2	2	2	7	8	11	10	4	3	4	1	22	18
44.5	3	2	1	8	6	14	9	3	4	4	2	14	4
45.5	1	1	3	2	7	8	5	5	0	1	3	18	11
46.5	0	2	2	2	4	6	5	4	2	1	1	14	4
47.5	1	0	3	1	4	3	7	5	1	0	0	7	0
48.5	1	0	1	4	6	5	6	3	4	2	1	3	0
49.5	0	0	1	3	5	3	4	3	3	1	3	9	0
50.5	1	0	1	3	3	1	3	3	0	0	0	8	0
51.5	0	0	1	2	3	1	3	3	0	2	0	4	0
52.5	0	1	1	1	1	3	3	2	3	0	2	4	0
53.5	0	0	1	2	0	1	1	2	0	0	1	4	0
54.5	0	0	0	1	1	1	1	2	0	0	1	3	0
55.5	0	0	1	2	0	2	2	2	0	0	1	3	0
56.5	0	0	0	1	0	1	2	1	1	0	0	4	0
57.5	0	0	0	1	0	0	0	0	0	0	0	3	0
58.5	0	0	0	1	0	0	0	1	0	0	0	2	0
59.5	0	0	0	1	0	0	0	0	0	0	0	1	0
60.5	1	0	0	0	0	0	0	0	1	0	0	1	0

Table 17 Stratum means of near bottom temperature (°C), 1982-2008.

2

Bottem temperature - Mean by stratum year	1C	1D		1E		1F			East Greenland				
	1.1	1.2	2.1	2.2	3.1	3.2	4.1	4.2	5.1	5.2	6.1	6.2	7.2
1981	2.5	2.7	1.4	4.7	3.0	3.9	4.2	4.0	3.4	4.3	4.4	4.1	3.2
1982	2.5	4.2	2.1	4.2	3.3	4.4	2.6	5.4				4.3	4.6
1983	2.0	3.7	1.4	3.8	2.1	4.7	2.2	5.0	3.7	4.2	3.6	4.0	4.0
1984	1.4	2.8	1.6	3.9	2.6	4.7	2.4	3.8	4.5	4.8	4.2	4.1	5.0
1985	4.2	5.2	3.1	4.6	2.6	4.3	4.4	5.3	5.0	5.2	4.4	4.3	3.3
1986	3.7	4.4	4.0	5.1	4.2	5.1	4.0	4.6	4.6	4.8	4.0	4.5	3.3
1987	3.1	4.8	3.4	4.5	3.5	5.3	3.5	4.6	3.3	4.5	3.7	4.4	3.3
1988	2.7	4.3	3.0	5.0	4.2	5.2	4.3	5.3	4.5	4.6	4.3	4.6	3.8
1989									3.3	3.7	3.7	4.1	5.6
1990	2.5	3.9	3.0	4.8	3.4	4.8	2.5	4.6	4.4	4.6	3.3	4.0	3.0
1992	3.9	4.4	2.9	4.5	3.0	4.7	1.9	3.5					3.6
1993	3.0	4.3	2.5	3.4	4.7	5.0	2.8		3.8	4.1	4.3	4.4	2.8
1994	2.9	4.4	3.7	4.6	3.9	5.1	3.8	5.2					3.6
1995			3.8		4.2	4.6	3.5	4.2	2.6	3.6	3.7	4.3	3.8
1996	4.6	5.5	4.3	5.7	5.6	5.7	4.9	5.7	4.5	5.1	5.3	5.0	2.9
1997	3.3	4.9	4.0	5.2	4.6	5.5	4.6	5.5	4.6	4.7	4.6	4.3	3.5
1998	4.1	5.3	4.6	5.8	6.4	6.4	5.4	6.0	6.0	5.8	5.5	5.2	4.7
1999	4.9	5.7	4.4	5.7	4.8	5.8	4.1	5.7	5.2	5.3	4.8	4.1	3.0
2000	3.1	4.6	4.3	5.0	4.6	5.3		5.2					
2001			5.0	5.4	5.1	6.0	4.3	5.9	5.7	5.2	4.9	4.2	4.3
2002			4.5	5.7	5.8	6.0	4.9	6.0	4.8	5.3	4.8	4.9	4.3
2003			6.9	6.5	6.5	6.6	5.5	6.5	6.1	5.8	5.0	5.1	3.9
2004	4.8	5.6	5.1	5.8	5.6	6.2	5.9	6.0	5.9	5.7	5.8	4.4	4.6
2005			5.0	5.6	4.6	5.8	4.7	5.5	3.8	5.3	4.6	4.4	3.9
2006	3.3	5.8	4.0	4.9	4.1	5.0	2.7	5.8	5.6	6.3	5.0	4.8	4.1
2007	4.8	5.8	4.4	5.8	4.7	6.0	4.0	6.0	5.2	5.8	5.1	4.8	3.6
2008	4.4		3.8	4.8	4.4	5.4	4.0	5.5	5.6	5.5	4.9	4.7	3.7

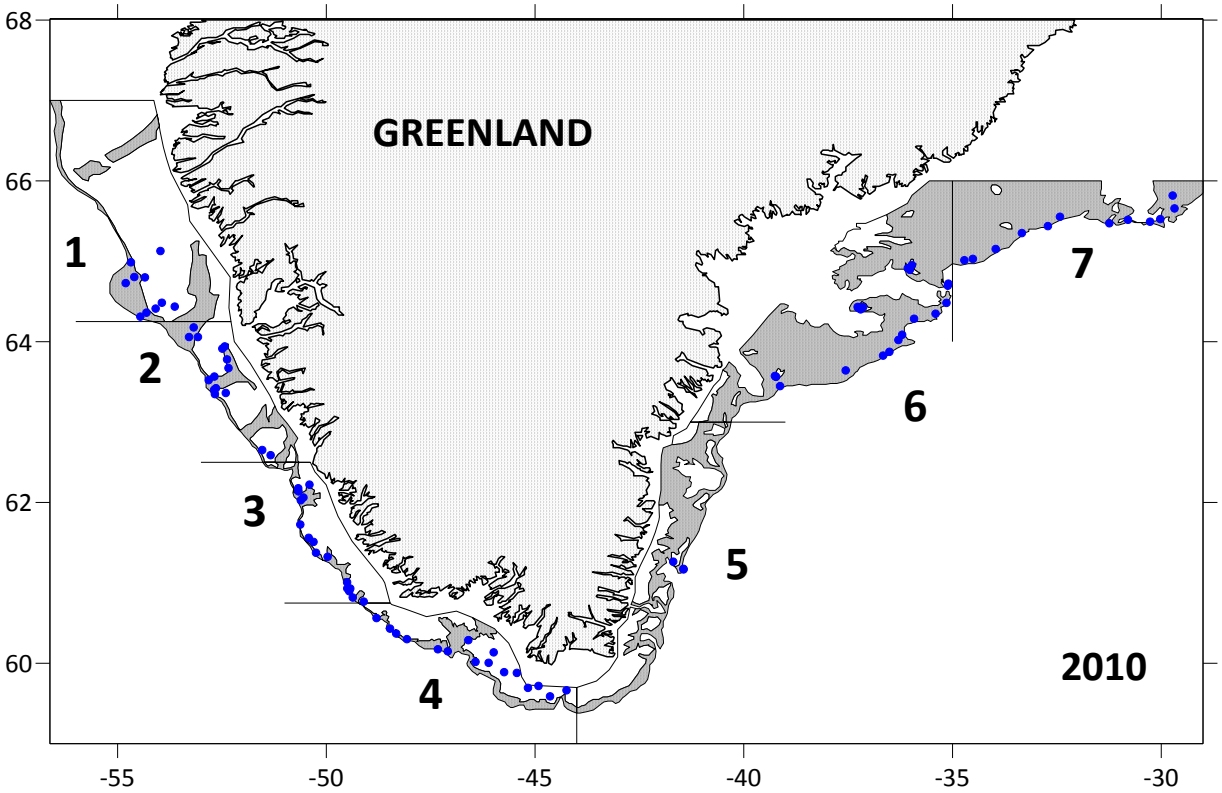

Fig. 1 Stratification of the survey area in 2010 as specified in Table 2, positions of hauls carried out off West Greenland refer to strata 1 to 4.

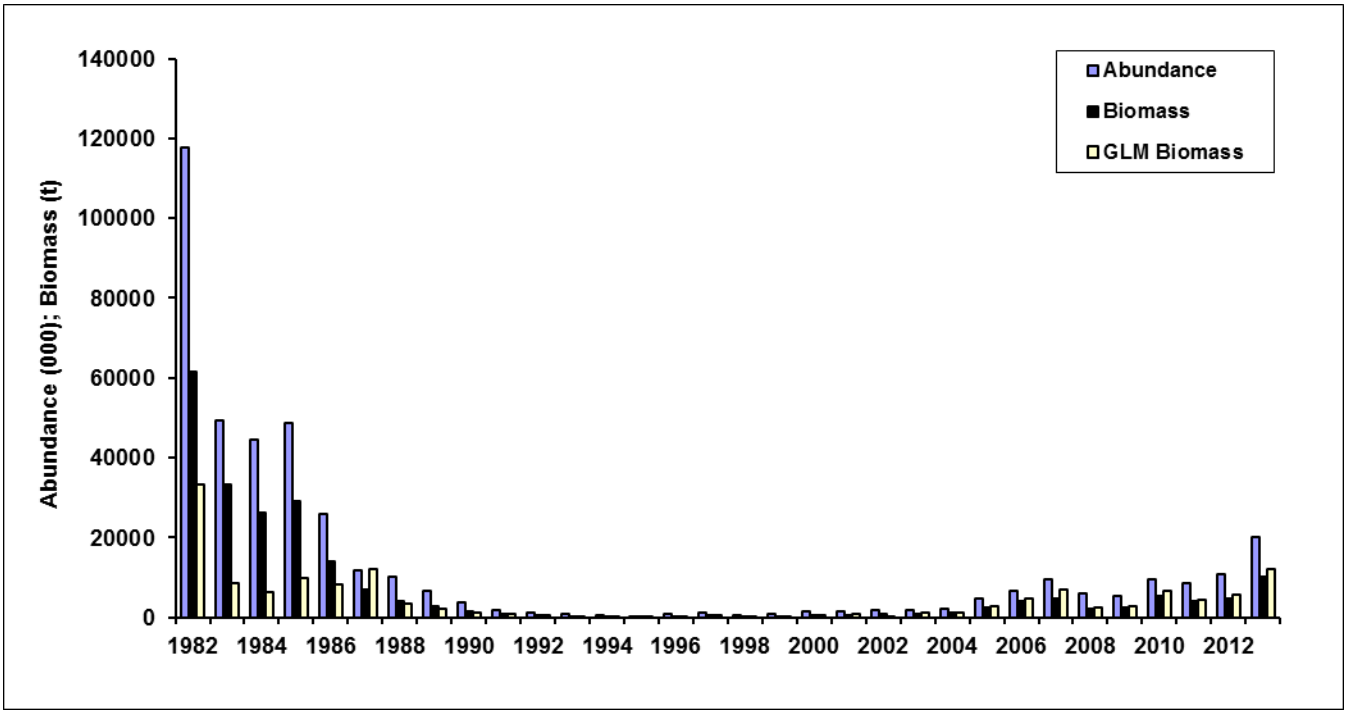

Fig. 2 Abundance and biomass indices for *S. marinus* >=17 cm off West Greenland, 1982-2013. Respective values are listed in Table 3. GLM 1985-1989 subject to revision.

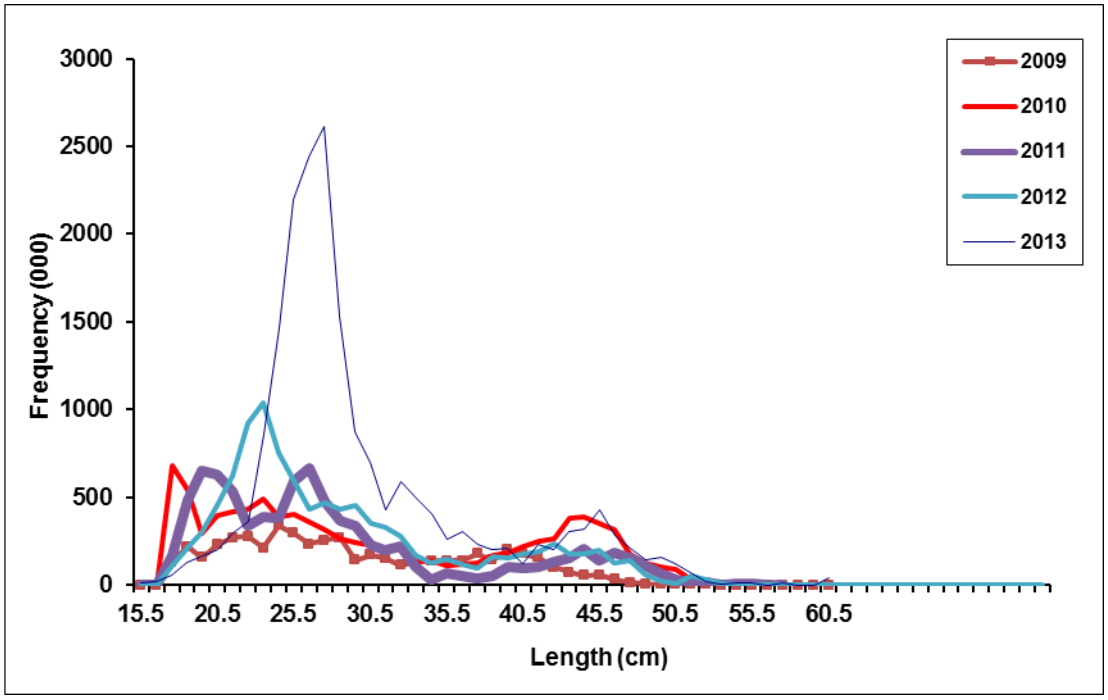

Fig. 3 Length disaggregated abundance indices for *S. marinus* >=17 cm off West Greenland, 2009-2013. Respective values are listed in Table 4.

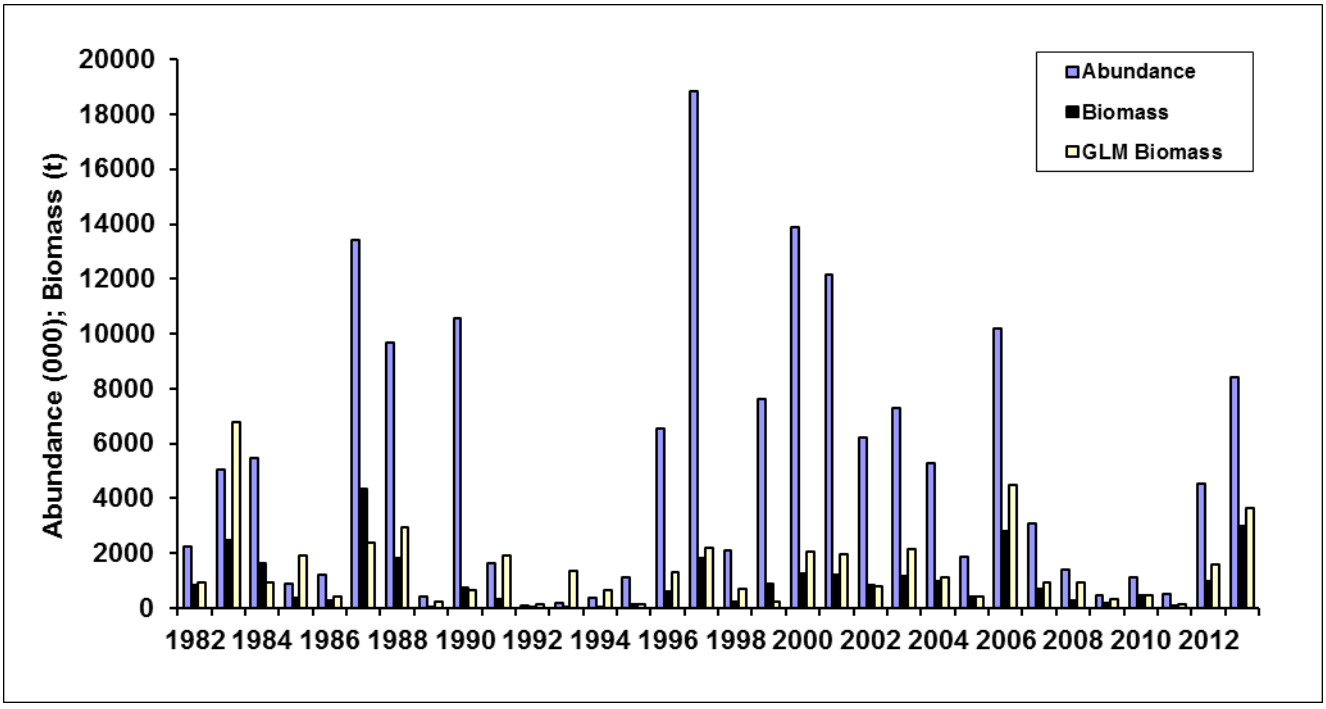

Fig. 4 Abundance and biomass indices for *S. mentella* >=17 cm off West Greenland, 1982-2013. Respective values are listed in Table 5.

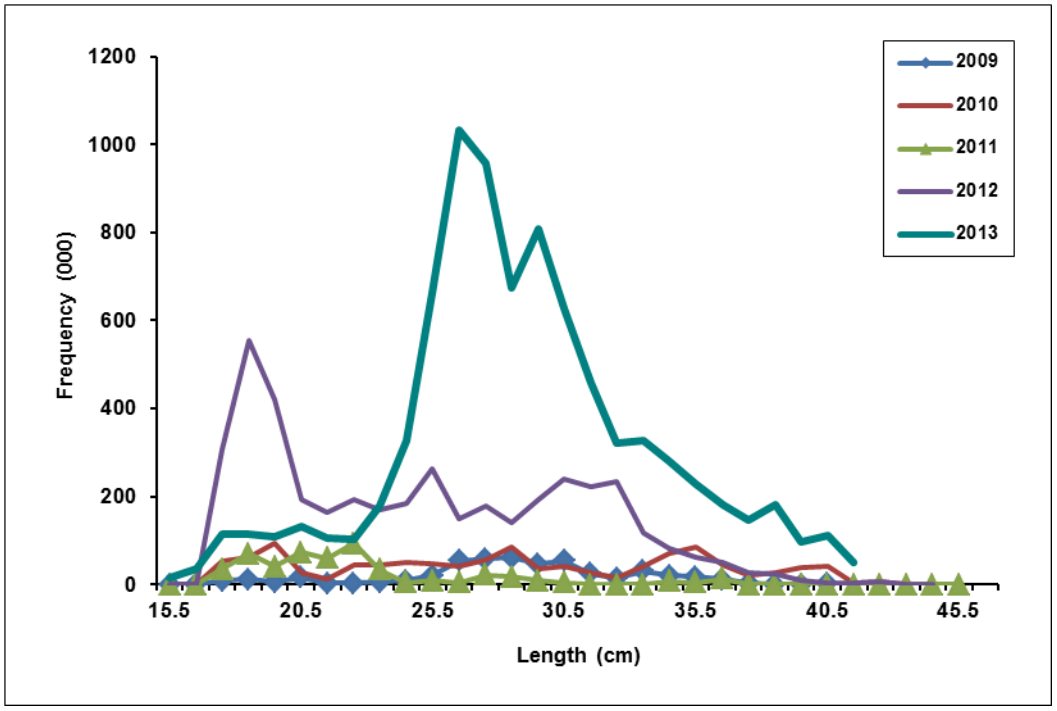

Fig. 5 Length disaggregated abundance indices for *S. mentella* >=17 cm off West Greenland, 2009-2013. Respective values are listed in Table 6.

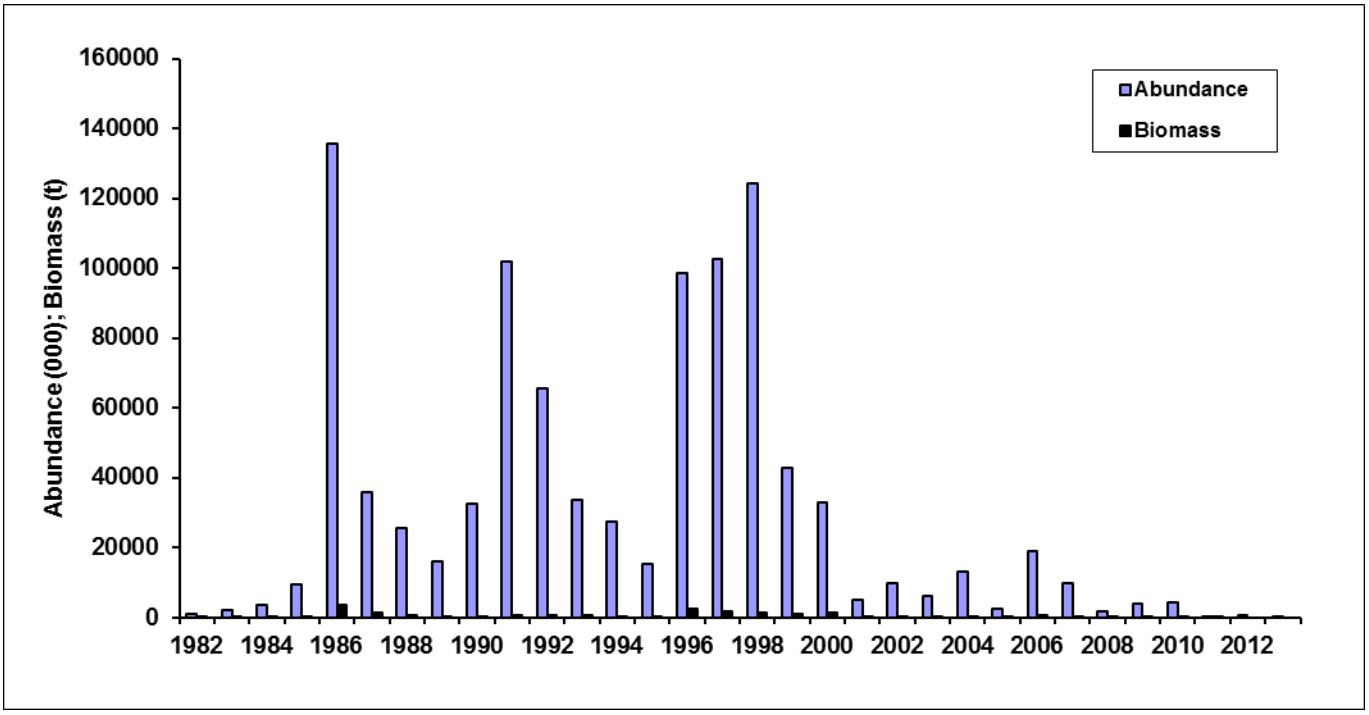

Fig. 6 Abundance and biomass indices for *Sebastes spp.* <17 cm off West Greenland, 1982-2013. Respective values are listed in Table 7. Biomass only until 2011. 2012 onward aggregated information for *S. marinus*, *S. mentella* and *S.* spp., resp.

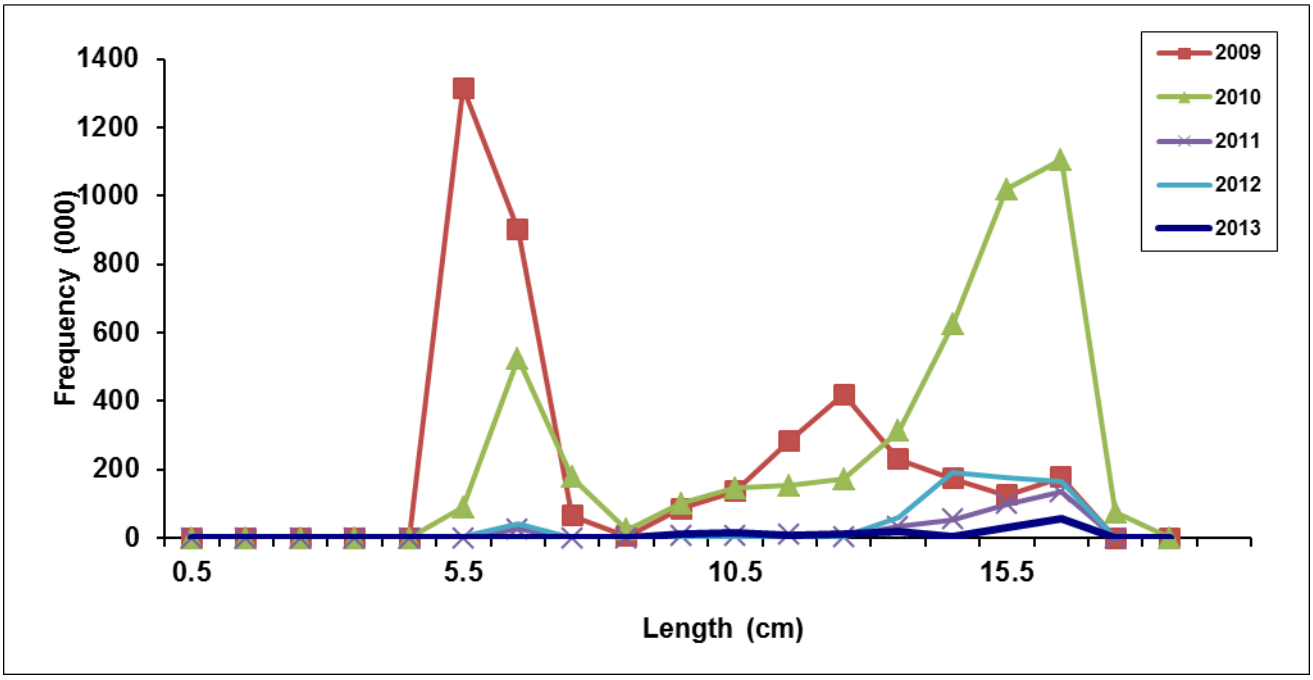

Fig. 7 Length disaggregated abundance indices for *Sebastes spp.* <17 cm off West Greenland, 2009-2013. Respective values are listed in Table 8.

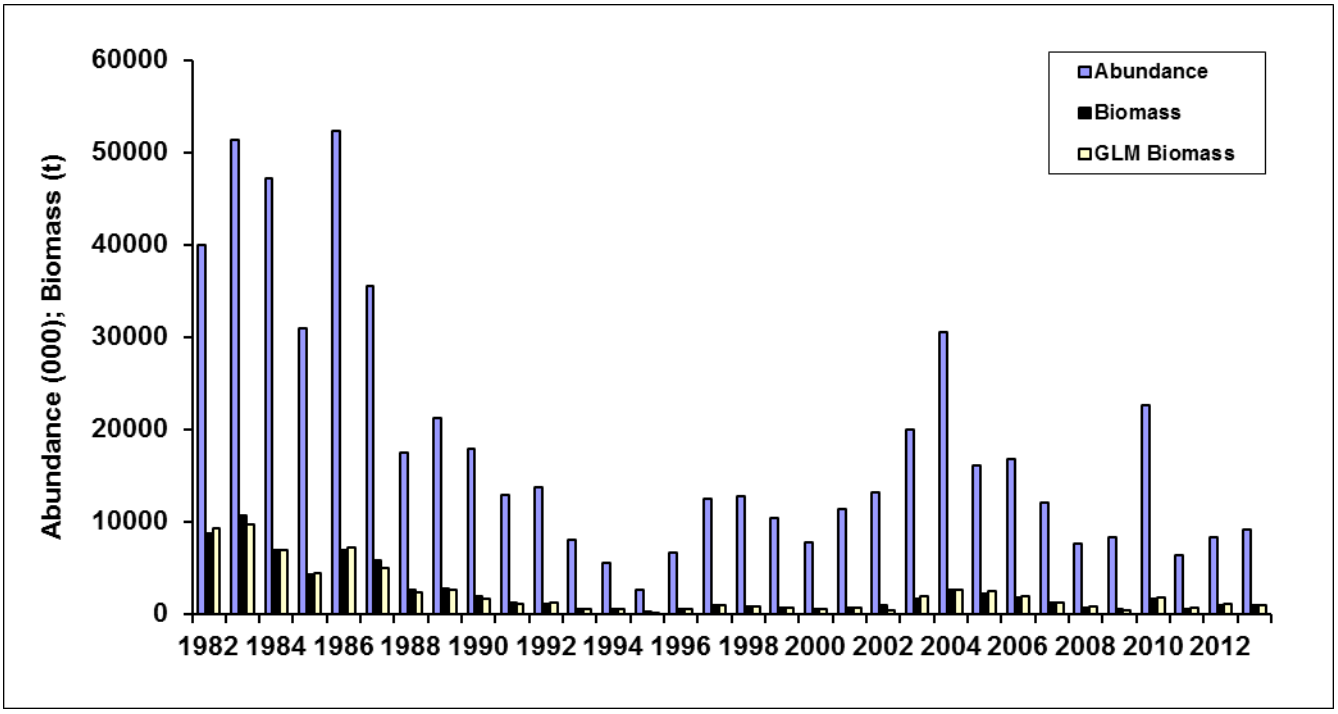

Fig. 8 Abundance and biomass indices for *Hippoglossoides platessoides* off West Greenland, 1982-2013. Respective values are listed in Table 9.

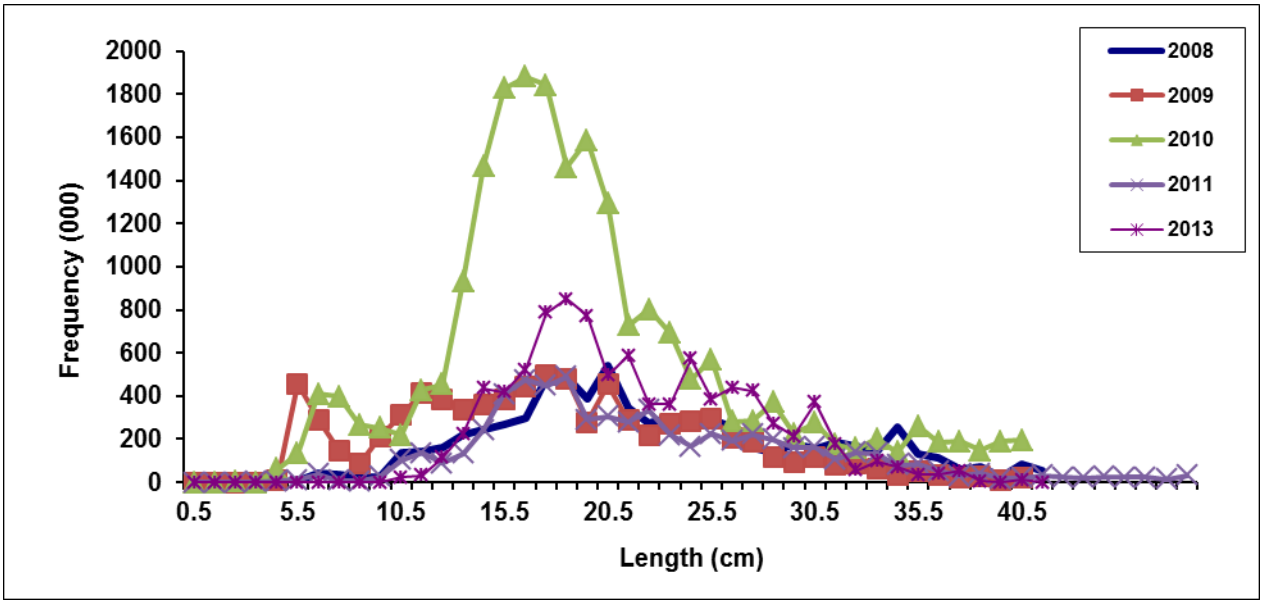

Fig. 9 Length disaggregated abundance indices for *Hippoglossoides platessoides* off West Greenland, 2008-2013. Respective values are listed in Table 10.

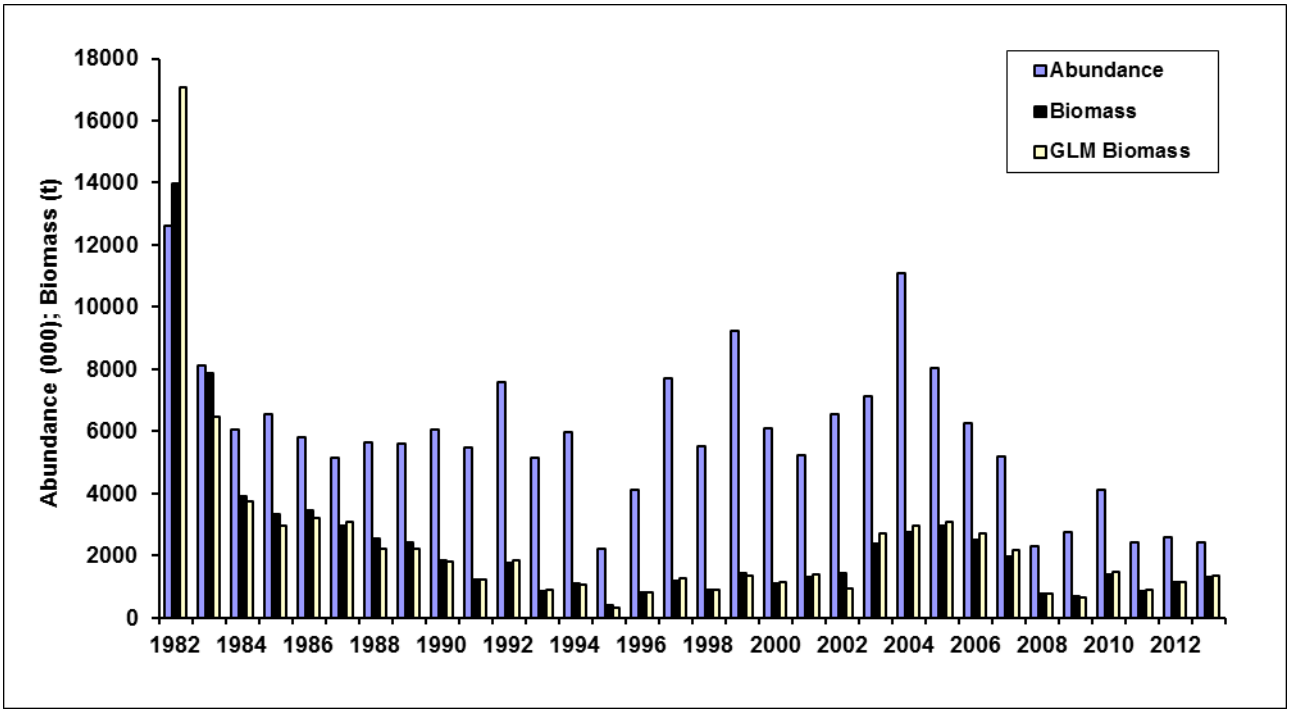

Fig. 10 Abundance and biomass indices for *Anarhichas lupus* off West Greenland, 1982-2013. Respective values are listed in Table 11.

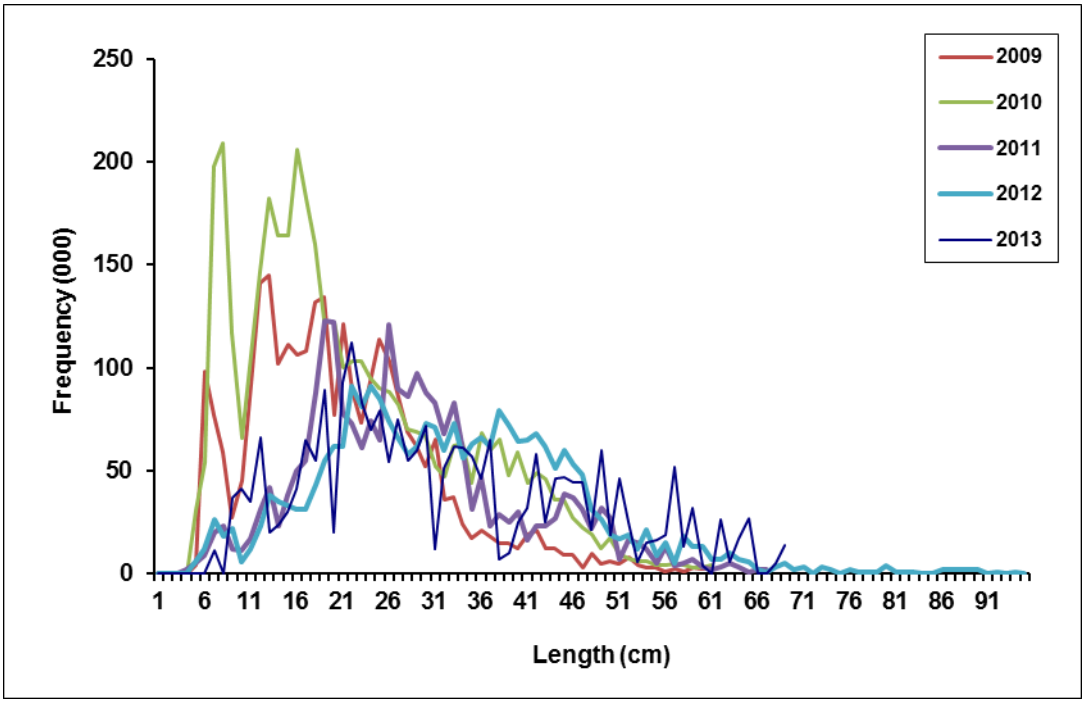

Fig. 11 Length disaggregated abundance indices for *Anarhichas lupus* off West Greenland, 2009-2013. Respective values are listed in Table 12.

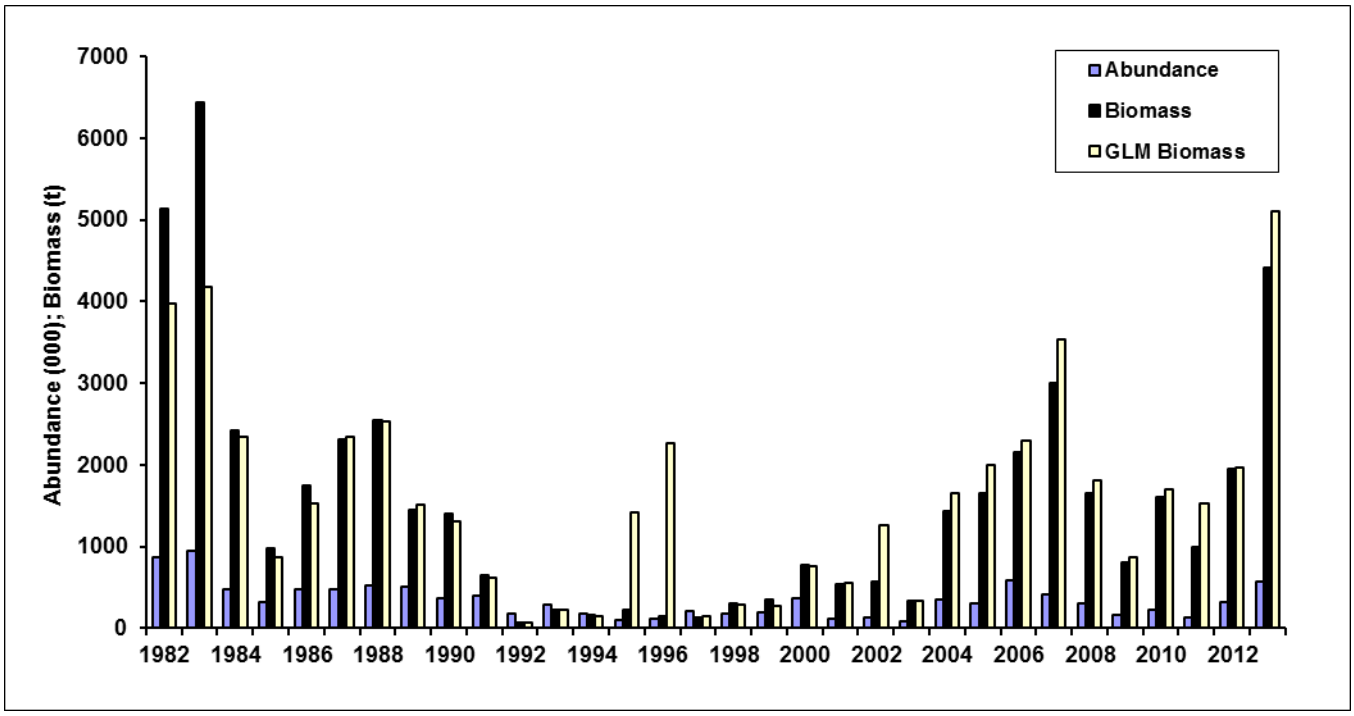

Fig. 12 Abundance and biomass indices for *Anarhichas minor* off West Greenland, 1982-2013. Respective values are listed in Table 13.

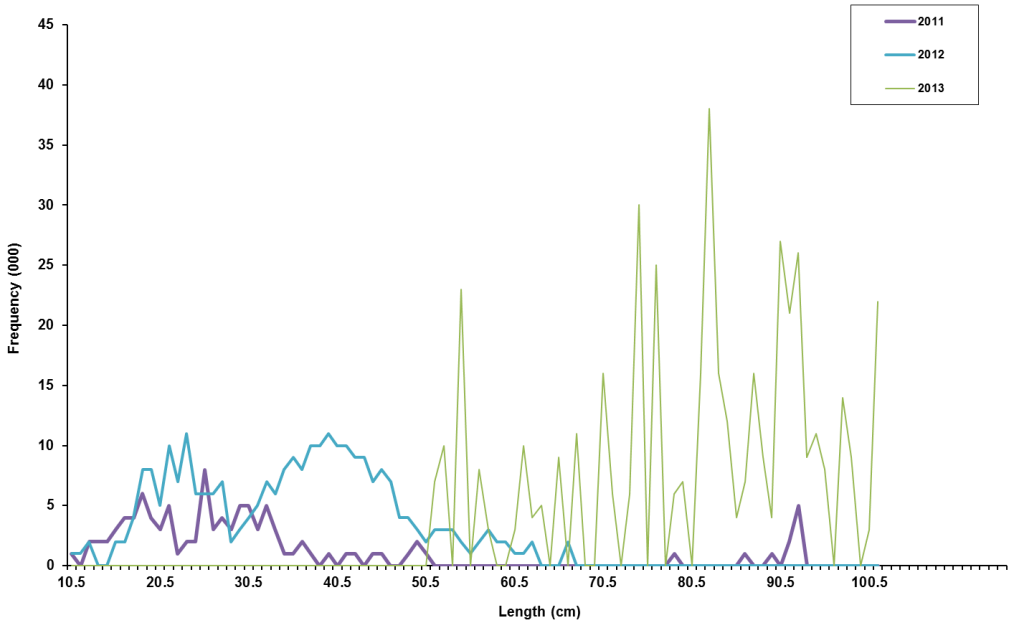

Fig. 13 Length disaggregated abundance indices for *Anarhichas minor* off West Greenland, 2011-2013. Respective values are listed in Table 14.

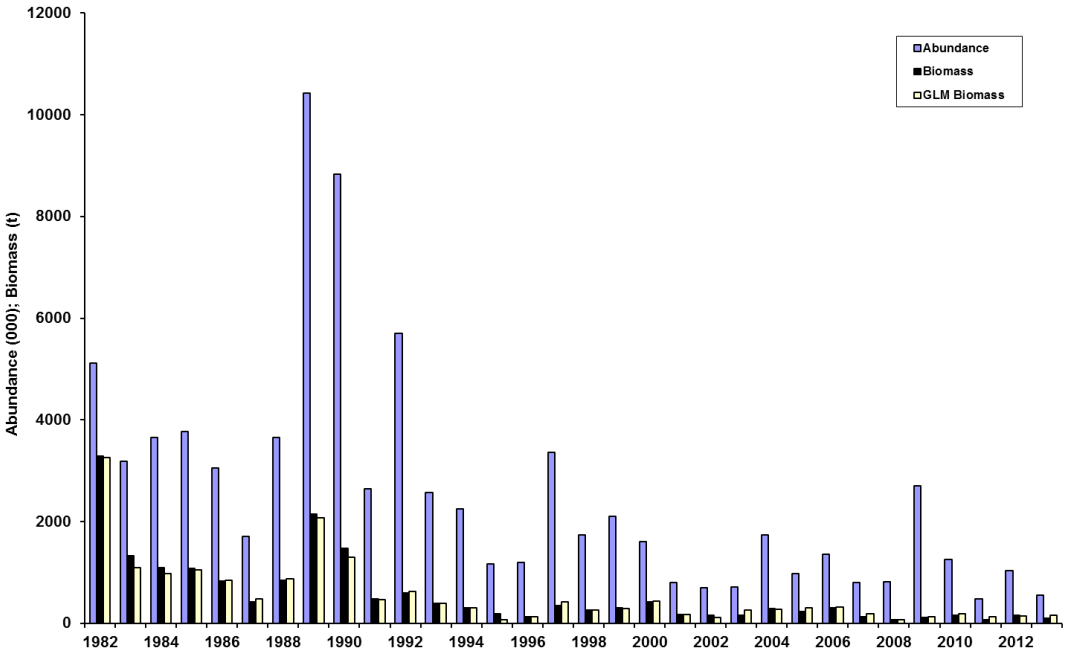

Fig. 14 Abundance and biomass indices for *Raja radiata* off West Greenland, 1982-2013. Respective values are listed in Table 15.

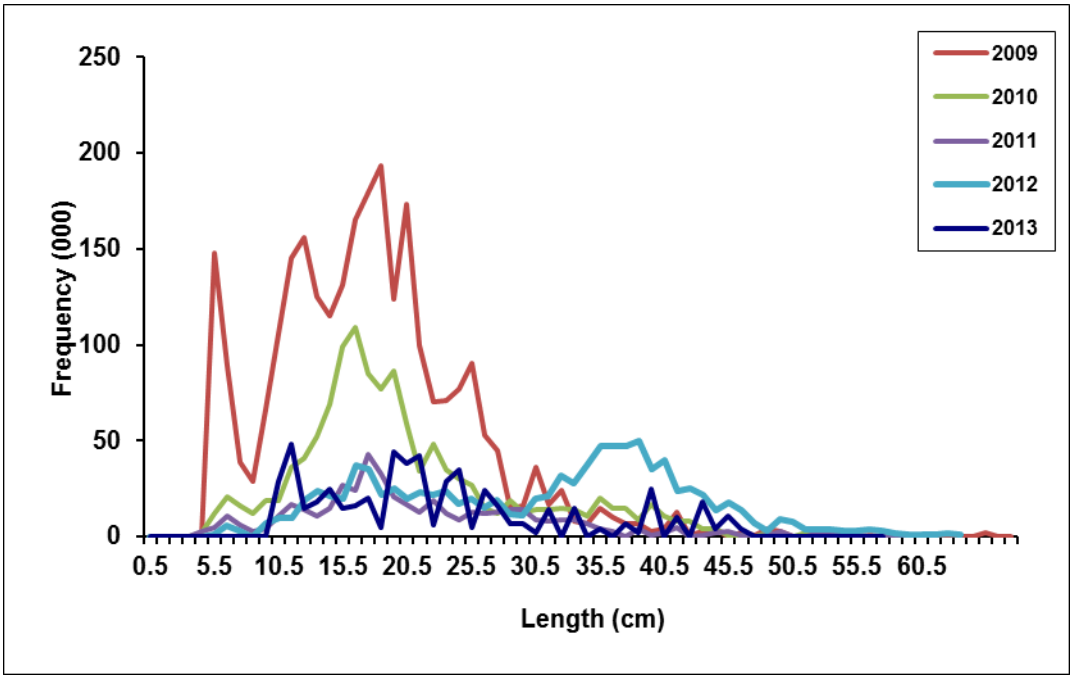

Fig. 15 Length disaggregated abundance indices for *Raja radiata* off West Greenland, 2009-2013. Respective values are listed in Table 16. Year 2009 includes samples from stratum 1 (NAFO SA 1C) which were not included in the abnundance and biomass indices since they did not satisfy the minimum of 5 valid per stratum.

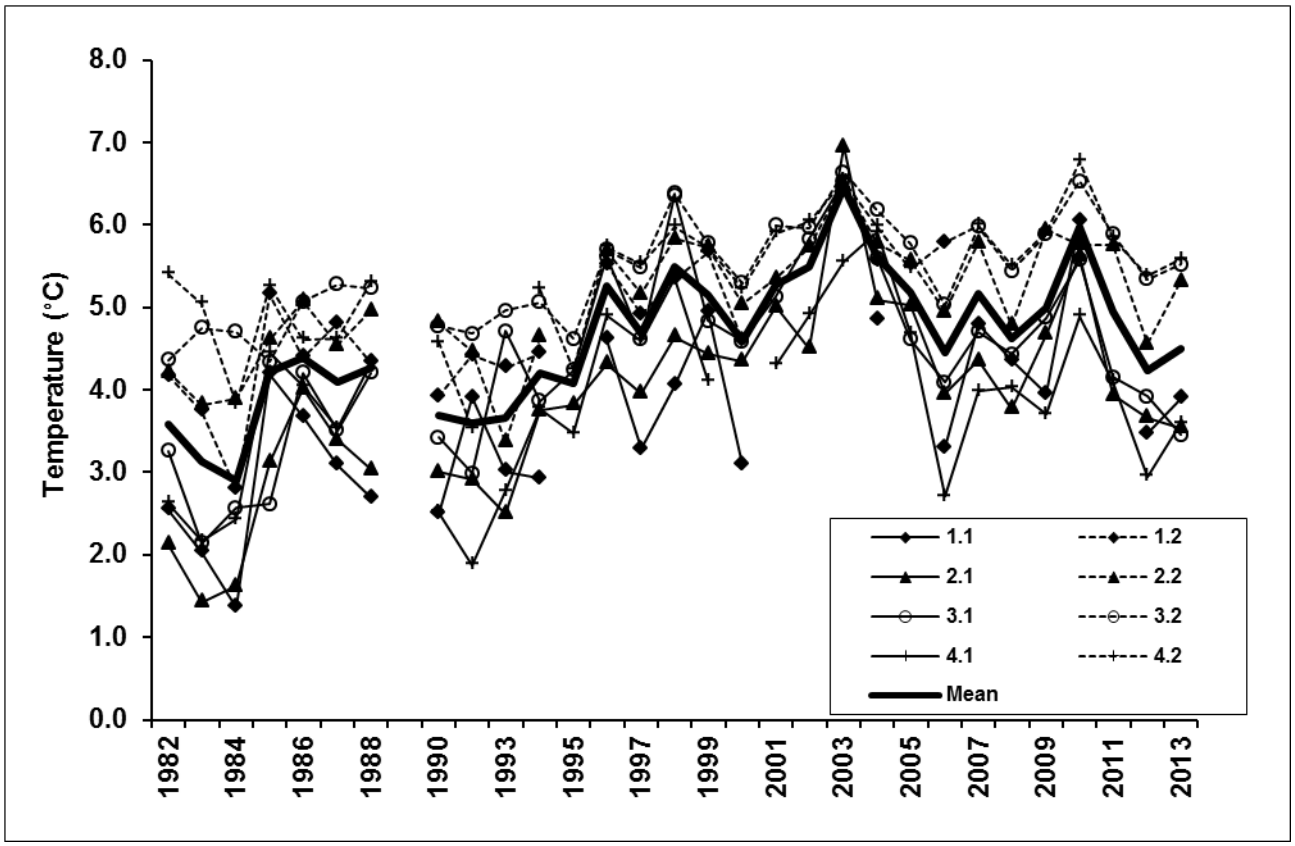

Fig. 16 Stratum means of near bottom temperature (°C) and stratified mean, 1982-2013. Respective values are listed in Table 17. Solid lines display trends in shallow strata (<200 m), dashed lines display trends in deep strata (>200 m),