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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 1982-2008

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. For golden redfish, American plaice and both wolffishes, stocks sizes have declined significantly until the early 1990s and remained at a low level since until 2000. Since then, abundances increased only slightly. For thorny skate, abundances increased in the early 1990s and for deep-sea redfish in the late 1990s. All upward trends observed until 2004-2007 have reversed since then. For thorny skate, the lowest biomass estimate for the whole times series was found. 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), the maximum of the time series was observed in 2003.

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, 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). 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. The conversion of catch-per-tow (C_{tow}) to catch per nautical square mile C_{sqnm} is:

$C_{sqnm}=C_{tow}$*30 minutes/trawled time*84.1616/2.25

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

Strata with less than five valid sets were rejected from the calculation. To account for missing strata, a further experimental 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.

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

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 of the mean. 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). A gamma model proved to be less sensitive (not shown).

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

Results

Fig. 1 displays the coverage of the survey area by the geographical haul distribution in 2007.

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. However, in 2008 all indices (abundance, biomass, GLM) showed a downward trend again. Thus, recovery back to historical levels does not appear. Compared to 2007, a strong decrease was found for specimens > 30 cm length (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, three further years with high abundances have been recorded including 2006. Since 2006, abundance declined.
In 2008, the length distribution was multi-modal with peaks at 17 cm, 22 cm, 27 cm, 31 cm, 35 cm. This indicates several year classes present, however at low abundances each (Fig. 5 and Table 6). 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 (Fig. 8 and Table 9). Since then, a decline is evident in survey index and GLM index. Compared to previous yeras (Figure 9 and listed in Table 10), the share of specimens > 30 cm decreased in 2007. 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 2004 (Fig. 10 and Table 11). Opposite to previous years, the length distribution for 2008 shows no prevailing size class (Figure 11). Table 12 shows that since 1998 the share of specimens larger than 40 cm has increased until 2005 but decreased since then.

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, but decreased in 2008. The size distribution is scattered as a result of low catch rates and high variation in body length (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). The GLM index indicates the lowest biomass value in the time series since 1982. As in previous years, size composition was dominated by small specimens below 25 cm body length, and the average size is further decreasing (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. They reveal that the warm conditions off West Greenland continued since 1996 with a maximum stratified mean temperature 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, 1982-2008. Strata 1.1 – 4.2 refer to West Greenland.

Summe -	1C		1D		1E		1F		East Greenland					
year	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	Total
1982	20	11	16	7	9	6	13	2	1	10	3	12	25	135
1983	26	11	25	11	17	5	18	4	3	19	10	36	18	203
1984	25	13	26	8	19	6	20	4	5	4	2	8	5	145
1985	10	8	26	10	17	5	21	4	5	21	14	50	28	219
1986	27	9	21	9	16	7	20	3	3	15	14	37	34	215
1987	25	19	21	4	18	4	21	5	19	16	13	40	18	223
1988	34	21	28	5	18	5	18	2	21	8	13	39	26	238
1989	26	14	30	9	8	3	25	3	16	17	13	30	11	205
1990	19	7	23	8	16	3	21	6	18	19	6	15	13	174
1991	19	11	23	7	12	6	14	5	8	11	10	27	17	170
1992	6	6	6	5	6	6	7	5					6	53
1993	9	6	9	6	10	8	7		9	6	6	18	14	108
1994	16	13	13	8	10	6	7	5					6	84
1995			3		10	7	10	5	8	6	6	17	12	84
1996	5	5	8	5	12	5	10	5	7	9	5	13	9	98
1997	5	6	5	5	6	5	8	5	5	5	4	8	8	75
1998	9	5	10	7	11	6	10	5	5	8	6	12	9	103
1999	8	7	14	8	13	6	9	3	5	6	6	13	6	104
2000	13	6	15	6	14	5	9	5	6	5	8	16	11	119
2001			15	7	15	5	11	6	5	6	9	18	15	112
2002			7	2	5	6	8	4	6	6	5	10	10	69
2003			7	6	7	7	7	5	5	5	5	9	14	77
2004	8	8	11	9	9	6	9	5	7	7	8	12	15	114
2005			9	7	8	6	6	5	6	7	8	11	15	88
2006	6	5	7	5	7	7	8	5	2	1	5	11	12	81
2007	5	5	7	5	6	5	9	5	4	5	6	10	13	85
2008	5		7	7	8	9	8	6	6	8	5	9	12	90

Table 3 *S. marinus* >= 17cm, abundance ('1000) and biomass indices (tons) for West Greenland by stratum and total, 1982-2008. 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	7016	6341	88792	5511	5736	14876	4088		132360	117
1983	4022	3186	3356	6523	4043	5886	1697		28713	82
1984	1327	3438	461	1209	10671	2776	4214		24096	101
1985	4661	10451	6157	1569	3221	14442	4974		45475	87
1986	6329	4324	2077	3483	21504	2883	2717		43317	58
1987	905	653	1328		9611		660		13157	77
1988	830	2238	343	2255	5938	1954	732		14290	60
1989	422	421	776	690	6490		362		9161	49
1990	122	433	280	710	1037		146	2270	4998	41
1991	225	256	96	691	236	528	21	1671	3724	68
1992	129	105	73	190	194	476	193	836	2196	69
1993	170	482	59	267	79	132	0		1189	55
1994	109	325	155	167	66	46	152	247	1267	45
1995					50	68	39	146	303	68
1996	150	267	21	243	380	383	28	298	1770	57
1997	252	609	16	175	120	311	36	552	2071	58
1998	116	141	45	142	19	106	126	254	949	57
1999	225	293	132	219	72	213	10		1164	37
2000	197	621	63	571	83	200	10	836	2581	53
2001			106	304	72	456	8	1557	2503	75
2002			101		333	536	13		983	75
2003			251	375	186	516	0	1998	3326	63
2004	143	331	56	373	209	453	64	2042	3671	61
2005			195	399	155	1041	159	5916	7866	97
2006	0	241	25	183	62	823	120	9642	11095	116
2007	343	2437	127	874	160	1693	214	10136	15984	87
2008	0 .		29	145	48	2940	70	8763	11995	103

Biomass

Year	Str1.1	Str1.2	Str2.1	Str2.2	Str3.1	Str3.2	Str4.1	Str4.2	Total	CI	GLM Biomass
1982	1797	1354	34439	2557	3205	9794	2532		55678	106	11654
1983	844	944	1572	3043	1874	4816	1084		14177	106	6309
1984	306	893	197	518	4934	2284	2088		11220	111	4941
1985	1021	1819	2968	472	1426	9210	2720		19636	121	5417
1986	1279	1215	752	1230	10122	1705	1762		18065	76	7901
1987	252	246	660		4954		439		6551	106	5827
1988	143	404	118	942	2570	1342	383		5902	55	3496
1989	184	137	273	249	2620		208		3671	55	3801
1990	41	149	75	275	479		80	1343	2442	58	4340
1991	41	83	24	226	120	272	3	1007	1776	93	1865
1992	20	36	21	61	52	241	69	447	947	83	1303
1993	48	111	19	114	39	55	0		386	54	632
1994	34	147	47	64	27	36	41	80	476	53	880
1995					19	19	21	43	102	60	224
1996	61	102	2	60	128	118	8	132	611	51	508
1997	41	261	5	61	35	188	10	246	847	70	424
1998	20	43	12	42	14	54	56	117	358	71	447
1999	54	71	35	68	17	82	8		335	53	554
2000	68	173	31	215	21	76	3	388	975	59	945
2001			24	113	54	228	3	776	1198	83	907
2002			24		157	230	13		424	75	1608
2003			96	174	83	284	0	966	1603	59	2308
2004	61	171	24	181	91	262	41	1235	2066	63	1978
2005			82	201	52	476	118	2986	3915	100	3253
2006	0	72	12	133	32	450	92	6226	7017	122	3419
2007	50	446	52	219	110	686	93	5205	6861	101	6561
2008	0 .		14	41	23	773	39	3532	4422	91	3318

Table 4 *S. marinus* >= 17 cm. Length composition by year ('1000), 1998-2008.

Length	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
15.5	0	12	0	0	0	0	0	0	0	0	0
16.5	0	0	0	0	0	0	0	0	0	0	0
17.5	0	0	30	28	26	27	64	49	19	512	435
18.5	0	22	65	6	26	69	45	123	11	903	696
19.5	6	31	95	85	44	51	77	219	57	974	621
20.5	34	41	127	30	34	32	55	371	151	521	480
21.5	5	100	78	52	32	120	61	501	166	483	613
22.5	68	51	113	97	96	93	88	290	125	516	723
23.5	33	103	84	63	18	97	95	456	278	414	926
24.5	76	51	150	74	68	109	153	437	426	626	620
25.5	71	64	179	134	31	95	207	485	249	858	696
26.5	121	109	199	166	22	85	202	443	276	721	755
27.5	103	86	115	175	74	160	266	434	289	716	735
28.5	36	66	184	219	35	150	256	478	439	653	634
29.5	66	75	142	143	32	280	124	431	817	703	656
30.5	53	91	138	143	54	199	189	374	835	644	413
31.5	19	109	124	145	13	227	127	219	755	598	305
32.5	16	10	86	137	60	244	103	229	607	722	228
33.5	10	21	115	129	47	199	179	240	602	573	155
34.5	82	19	84	77	27	214	172	319	360	473	199
35.5	14	26	95	107	31	107	112	178	321	404	227
36.5	5	25	84	107	47	144	181	130	309	274	218
37.5	43	5	76	63	32	96	153	214	359	336	127
38.5	11	5	60	94	36	75	114	199	200	382	155
39.5	27	21	24	63	46	52	103	155	520	426	223
40.5	7	0	37	24	4	132	129	148	627	389	183
41.5	6	0	32	52	4	86	64	188	730	350	236
42.5	0	5	29	40	13	30	127	146	502	346	214
43.5	5	0	27	18	13	37	57	133	381	323	175
44.5	5	0	0	18	9	34	91	76	286	465	86
45.5	15	0	0	6	0	6	7	48	150	211	100
46.5	5	0	0	0	0	27	31	83	113	178	77
47.5	0	5	0	0	0	14	7	20	15	125	14
48.5	0	0	0	6	9	29	0	15	81	22	8
49.5	0	0	7	0	0	0	17	15	38	68	22
50.5	0	0	0	0	0	8	0	15	7	15	0
51.5	0	0	0	0	0	0	0	0	0	15	15
52.5	0	0	0	0	0	0	0	0	0	7	8
53.5	0	0	0	0	0	0	7	0	0	7	0
54.5	0	0	0	0	0	0	4	0	7	7	0
55.5	0	0	0	0	0	0	0	0	0	0	0
56.5	0	0	0	0	0	0	0	0	0	7	8
57.5	0	0	0	0	0	0	0	0	0	7	4
58.5	0	0	0	0	0	0	0	0	0	7	0
59.5	0	0	0	0	0	0	0	0	0	7	0
60.5	0	0	0	0	0	0	0	0	0	0	0

Table 5 *S. mentella* >= 17cm, abundance ('1000) and biomass indices (tons) for West Greenland by stratum and total, 1982-2008. 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	389	16	348	0	2360	0		3113	158
1983	41	1010	71	2528	0	5236	0		8886	110
1984	41	2966	7	1276	0	1115	0		5405	70
1985	0	369	31	26	56	327	0		809	103
1986	2144	414	38	292	4	444	0		3336	53
1987	987	13679	42		56		0		14764	70
1988	150	3186	26	777	60	4620	0		8819	117
1989	0	186	9	102	0		8		305	81
1990	0	9	5	704	50		0	3881	4649	87
1991	0	0	0	0	0	652	0	1773	2425	107
1992	0	36	0	15	0	106	0	0	157	154
1993	0	23	0	159	8	0	0		190	212
1994	0	271	21	96	95	162	0	36	681	75
1995					29	234	95	1468	1826	128
1996	1524	619	0	236	0	1921	28	7135	11463	97
1997	252	1759	0	381	37	3204	144	30742	36519	111
1998	0	324	0	212	151	828	10	2543	4068	117
1999	34	235	7	281	39	1735	95		2426	104
2000	0	94	7	768	31	1422	0	21187	23509	139
2001			24	636	116	5419	0	13939	20134	109
2002			0		0	1351	23		1374	97
2003			0	571	114	1554	0	9365	11604	108
2004	225	1206	40	1122	242	1115	139	5021	9110	75
2005			40	1042	27	791	77	1123	3100	76
2006	0	1309	63	739	52	1239	48	13311	16761	108
2007	676	1679	13	689	42	777	0	1192	5068	57
2008	0 .		64	641	136	896	0	1083	2820	84

Biomass

Year	Str1.1	Str1.2	Str2.1	Str2.2	Str3.1	Str3.2	Str4.1	Str4.2	Total	CI	GLM Biomass
1982	0	96	7	114	0	893	0		1110	175	901
1983	14	213	26	1158	0	2857	0		4268	129	829
1984	7	798	5	491	0	472	0		1773	95	1269
1985	0	96	14	11	27	110	0		258	102	1510
1986	225	38	19	110	4	180	0		576	53	809
1987	82	1183	9		31		0		1305	115	612
1988	20	425	21	159	45	1878	0		2548	111	1562
1989	0	23	7	15	0		0		45	68	957
1990	0	6	2	87	8		0	542	645	105	610
1991	0	0	0	0	0	153	0	445	598	118	1611
1992	0	2	0	1	0	28	0	0	31	181	1224
1993	0	4	0	22	2	0	0		28	176	1930
1994	0	32	2	10	12	24	0	3	83	73	1090
1995					6	24	10	159	199	131	1883
1996	7	55	0	19	0	235	3	689	1008	111	3202
1997	20	141	0	38	2	320	18	2973	3512	111	3008
1998	0	26	0	17	17	88	3	326	477	135	2391
1999	7	21	5	36	6	188	21		284	112	1889
2000	0	9	0	65	2	122	0	1915	2113	132	1814
2001			2	66	10	469	0	1468	2015	104	2747
2002			0		0	145	3		148	98	1368
2003			0	66	12	223	0	1557	1858	98	4251
2004	34	117	7	122	50	149	23	1172	1674	93	2288
2005			5	125	4	89	23	403	649	109	1580
2006	0	138	7	80	10	260	24	4115	4633	120	4144
2007	67	196	1	71	14	245	0	520	1114	80	3100
2008	0 .		5	64	27	213	0	261	570	95	2021

Table 6 *S. mentella* >= 17 cm. Length composition by year ('1000), 1998-2008.

Length	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
15.5	0	0	0	0	0	0	0	0	0	0	0
16.5	0	0	0	0	0	0	0	0	0	0	0
17.5	0	0	10530	5250	263	874	1286	244	613	289	252
18.5	1341	987	4518	5763	157	1401	1232	416	720	1055	316
19.5	752	479	3353	3910	252	1104	771	363	709	848	215
20.5	543	380	1903	1827	316	1003	552	399	686	454	125
21.5	408	114	635	655	207	891	683	179	841	236	239
22.5	364	95	733	713	78	1516	510	217	1083	259	240
23.5	264	49	579	519	37	1613	343	59	1225	197	227
24.5	120	85	413	498	23	1230	503	76	1105	104	178
25.5	80	58	264	354	9	325	546	43	943	162	151
26.5	102	57	214	262	32	290	639	85	786	163	213
27.5	34	45	130	156	0	405	658	78	865	159	172
28.5	29	28	85	59	0	386	341	143	923	83	113
29.5	15	11	59	53	0	250	372	107	1406	119	72
30.5	20	9	29	35	0	142	276	283	1582	120	44
31.5	0	11	15	30	0	75	141	157	1051	140	83
32.5	0	0	29	11	0	55	103	68	866	181	26
33.5	0	5	7	23	0	15	66	102	569	103	12
34.5	0	0	7	12	0	19	31	47	261	108	22
35.5	0	0	0	6	0	4	32	9	108	98	61
36.5	0	12	0	0	0	0	7	17	139	47	14
37.5	0	0	6	0	0	7	7	9	66	35	0
38.5	0	5	0	0	0	0	10	0	65	28	15
39.5	0	0	0	0	0	0	0	0	106	13	16
40.5	0	0	0	0	0	0	0	0	7	13	0
41.5	0	0	0	0	0	0	0	0	38	0	7
42.5	0	0	0	0	0	0	0	0	0	15	0
43.5	0	0	0	0	0	0	0	0	0	33	0
44.5	0	0	0	0	0	0	0	0	0	0	0
45.5	0	0	0	0	0	0	0	0	0	0	0
46.5	0	0	0	0	0	0	0	0	0	0	7
47.5	0	0	0	0	0	0	0	0	0	0	0
48.5	0	0	0	0	0	0	0	0	0	0	0
49.5	0	0	0	0	0	0	0	0	0	6	0
50.5	0	0	0	0	0	0	0	0	0	0	0
51.5	0	0	0	0	0	0	0	0	0	0	0
52.5	0	0	0	0	0	0	0	0	0	0	0
53.5	0	0	0	0	0	0	0	0	0	0	
54.5	0	0	0	0	0	0	0	0	0	0	
55.5	0	0	0	0	0	0	0	0	0	0	
56.5	0	0	0	0	0	0	0	0	0	0	
57.5	0	0	0	0	0	0	0	0	0	0	
58.5	0	0	0	0	0	0	0	0	0	0	
59.5	0	0	0	0	0	0	0	0	0	0	
60.5	0	0	0	0	0	0	0	0	0	0	

Table 7 *Sebastes. spp.* < 17cm, abundance ('1000) and biomass indices (tons) for West Greenland by stratum and total, 1982-2008. 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	1055	357	120	27	8	42	23		1632	36
1983	3954	506	14	138	8	16	21		4657	47
1984	5022	3713	21	219	141	27	13		9156	61
1985	4886	9616	54	2712	47	67	54		17436	77
1986	10738	237636	113	1811	54	218	39		250609	179
1987	12453	113990	5		19		18		126485	117
1988	19680	42481	0	107	19	139	0		62426	46
1989	7717	13159	3071	5370	17		69		29403	43
1990	11255	35933	15416	1538	72		6199	848	71261	60
1991	51936	59846	34872	22668	13692	2508	891	1540	187953	32
1992	25716	19083	12690	17276	17463	13973	41	13718	119960	47
1993	5458	39035	665	11331	355	2773	13		59630	79
1994	3403	12003	9828	4014	1190	1730	10842	9867	52877	44
1995					399	10236	855	34695	46185	100
1996	456	14356	5210	9377	26961	11571	2488	107236	177655	115
1997	6519	47117	0	15852	43421	20194	444	68931	202478	72
1998	1558	25350	50177	30834	55983	13090	37049	13318	227359	61
1999	3886	54143	1067	8617	1105	7643	758		77219	94
2000	1293	9958	63	3052	393	8195	0	33103	56057	97
2001			1318	3559	110	2432	8	1484	8911	60
2002			1255		145	1523	23		2946	84
2003			390	7090	114	1674	15	1054	10337	76
2004	6676	12206	343	4706	112	1083	10	1089	26225	45
2005			118	2628	54	778	0	342	3920	82
2006	1697	26157	264	2186	73	962	168	603	32110	108
2007	2544	11361	139	896	26	1038	53	400	16457	71
2008	0 .		21	1277	50	900	23	1280	3551	76

Biomass

Year	Str1.1	Str1.2	Str2.1	Str2.2	Str3.1	Str3.2	Str4.1	Str4.2	Total	CI
1982	34	13	7	1	0	1	0		56	35
1983	102	21	0	6	0	1	0		130	44
1984	88	105	0	5	6	1	0		205	74
1985	82	367	2	58	2	3	0		514	95
1986	456	6646	2	77	2	6	0		7189	172
1987	265	5020	0		0		0		5285	132
1988	218	1492	0	3	0	5	0		1718	67
1989	109	271	21	49	0		0		450	46
1990	102	369	63	20	0		10	2	566	49
1991	197	798	73	242	29	24	3	15	1381	54
1992	150	386	49	111	74	220	0	64	1054	61
1993	75	512	16	265	6	76	0		950	88
1994	27	216	54	57	29	64	141	277	865	52
1995					6	330	10	348	694	101
1996	7	284	14	117	91	297	18	3300	4128	155
1997	61	344	0	214	163	544	15	2437	3778	110
1998	20	433	165	322	221	351	141	531	2184	53
1999	54	941	14	190	17	272	18		1506	84
2000	27	252	2	106	14	284	0	1414	2099	112
2001			7	65	6	90	0	71	239	69
2002			12		2	29	0		43	93
2003			9	138	2	40	0	26	215	73
2004	54	348	9	140	4	70	0	22	647	60
2005			2	69	0	19	0	3	93	94
2006	40	696	7	60	2	21	8	33	867	109
2007	83	435	2	25	0	16	1	59	621	78
2008	0 .		0	16	1	23	0	32	72	78

Table 8 *Sebastes spp.* < 17 cm. Length composition by year (1 000), 1998-2008.

Length	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
0.5	0	0	0	0	0	0	0	0	0	0	0
1.5	0	0	0	0	0	0	0	0	0	0	0
2.5	0	0	0	0	0	0	0	0	0	0	0
3.5	0	0	0	0	0	0	0	0	0	0	0
4.5	0	0	0	6	0	0	0	0	4	0	0
5.5	182	1235	186	146	65	243	329	28	251	13	106
6.5	44724	3401	639	1202	699	1344	4039	178	1590	463	473
7.5	124965	232	411	1564	791	1115	7585	683	996	1801	479
8.5	4670	126	87	58	97	60	1041	161	89	455	449
9.5	3927	3177	1114	123	117	120	98	18	1288	114	211
10.5	10533	27661	1800	502	308	1007	403	168	4769	258	328
11.5	4294	23335	566	582	162	2030	1023	692	6865	828	367
12.5	2104	3134	4074	356	82	1614	612	604	3432	508	125
13.5	6322	4979	13437	729	105	628	476	215	1042	679	215
14.5	10205	4558	14810	824	214	802	2450	390	4212	2989	296
15.5	5645	1482	9324	955	188	780	5131	451	4931	5847	226
16.5	5203	1764	9607	1864	124	593	3040	332	2640	2504	275
17.5	4585	2139	0	0	0	0	0	0	0	0	0
18.5	0	0	0	0	0	0	0	0	0	0	0
19.5	0	0	0	0	0	0	0	0	0	0	
20.5	0	0	0	0	0	0	0	0	0	0	

Table 9 *Hippoglossoides platessoides*, abundance ('1000) and biomass indices (tons) for West Greenland by stratum and total, 1982-2008. 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	31582	5092	29598	5735	2843	2133	1043		78026	31
1983	46601	6482	55493	2871	2725	461	811		115444	44
1984	18251	6258	53766	4366	2928	2244	1792		89605	52
1985	21388	5974	22819	6185	2632	239	3161		62398	28
1986	22035	11393	58741	9556	2936	2388	4463		111512	47
1987	23321	3314	26226		2357		1030		56248	30
1988	10963	3476	8025	5698	3566	800	1035		33563	21
1989	9370	4454	11362	3775	8764		1446		39171	24
1990	8615	6465	8227	2614	1083		1492	606	29102	30
1991	7826	4537	5168	1899	1517	639	1248	952	23786	21
1992	8527	4996	3020	2704	1233	1707	1744	175	24106	24
1993	5859	3284	1201	1212	632	694	398		13280	20
1994	2212	3525	1488	1514	624	282	1661	189	11495	28
1995					891	1189	1019	785	3884	44
1996	3716	1337	956	1424	1946	772	1566	472	12189	21
1997	8656	3262	2585	3543	2973	1288	2427	109	24843	24
1998	6254	3956	5654	2873	1767	865	2296	204	23869	27
1999	5410	2675	5013	2904	1835	389	1356		19582	25
2000	2273	3929	1953	3302	1016	361	1197	36	14067	28
2001			11195	3831	1275	394	3616	182	20493	41
2002			6820		1203	2138	1718		11879	47
2003			20675	9700	1140	2170	1633	15	35333	46
2004	23681	7048	18111	6319	998	1120	1741	50	59068	29
2005			16344	8276	1459	1087	950	606	28722	43
2006	4579	4563	9006	7031	1139	1156	1189	44	28707	34
2007	8696	4921	3505	2692	574	355	192	36	20971	32
2008	5520	.	3181	4773	367	868	493	37	15239	45

Biomass

Year	Str1.1	Str1.2	Str2.1	Str2.2	Str3.1	Str3.2	Str4.1	Str4.2	Total	CI	GLM Biomass
1982	6050	946	7797	1151	919	376	157		17396	34	5002
1983	7451	1155	11771	607	1008	88	167		22247	41	4670
1984	1701	762	8662	807	607	387	365		13291	58	5171
1985	1939	600	3861	1062	519	49	321		8351	33	3909
1986	2150	1147	8429	1385	703	452	460		14726	47	5402
1987	3130	339	5471		645		229		9814	37	4342
1988	919	293	1699	807	814	137	236		4905	31	3166
1989	517	297	1476	371	2120		288		5069	35	2750
1990	395	397	1220	314	213		288	221	3048	42	3144
1991	347	399	486	260	266	125	187	173	2243	26	3134
1992	578	419	228	183	151	250	152	25	1986	27	2624
1993	327	222	82	102	66	70	26		895	22	2395
1994	143	416	134	143	64	34	108	28	1070	41	1212
1995					70	154	123	58	405	52	3990
1996	211	100	66	164	159	78	149	38	965	27	3046
1997	490	265	209	343	353	168	185	7	2020	30	2902
1998	306	252	355	244	186	122	185	19	1669	26	2397
1999	245	160	331	268	180	35	85		1304	25	1931
2000	122	331	136	309	105	38	49	6	1096	34	1844
2001			637	297	109	45	149	12	1249	36	2727
2002			390		122	200	113		825	49	2885
2003			1462	922	124	258	126	3	2895	40	3242
2004	1613	581	1629	753	136	175	221	4	5112	28	3623
2005			2115	1398	238	134	149	79	4113	45	3507
2006	256	429	975	1036	136	114	218	9	3171	45	2698
2007	524	430	608	369	77	53	47	7	2115	41	1697
2008	366	.	404	528	37	98	62	6	1501	51	1433

Table 10 *Hippoglossoides platessoides*. Length composition by year ('1000), 1998-2008.

Length	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
0.5	0	0	0	0	0	0	0	0	0	0	0
1.5	0	0	0	0	0	0	0	0	0	0	0
2.5	0	0	0	0	0	0	0	0	0	0	0
3.5	0	6	0	0	0	0	0	0	0	0	0
4.5	14	87	6	44	18	0	198	0	18	0	0
5.5	0	43	0	6	0	0	141	0	0	0	0
6.5	51	95	71	0	13	0	0	0	0	0	0
7.5	506	546	183	134	53	0	28	19	42	0	0
8.5	353	334	148	203	80	0	36	29	6	14	126
9.5	194	435	147	241	143	107	194	31	182	14	0
10.5	139	635	183	533	245	151	203	32	401	108	25
11.5	278	1106	414	768	334	233	278	0	661	140	20
12.5	406	1281	604	989	537	315	1720	9	914	469	196
13.5	761	796	932	1582	1036	1352	3931	355	934	1227	778
14.5	1164	1053	1003	2031	1711	1804	4534	739	1147	1328	832
15.5	2329	1269	1273	2161	2470	3390	4324	986	1889	1640	955
16.5	2540	1183	1227	2057	2344	4059	4679	2051	1527	1427	775
17.5	3044	1089	965	1700	2571	3489	4258	2180	1957	1493	1460
18.5	2233	1180	816	1644	1940	2658	4689	2256	1440	1345	1284
19.5	1817	1165	625	1039	1845	2898	3563	1792	1771	1015	948
20.5	1309	1272	647	1159	1333	1868	3374	1239	1984	1014	1145
21.5	966	1365	494	876	929	2047	3086	1240	1351	999	940
22.5	816	810	562	421	1146	1442	2105	999	1513	1332	798
23.5	701	679	634	430	741	1534	2354	847	1451	1109	781
24.5	759	729	534	329	736	1302	2414	1038	1066	1040	460
25.5	674	429	579	211	692	1446	2548	1304	874	1227	441
26.5	757	433	402	402	637	1061	2030	1694	889	706	474
27.5	535	536	360	352	406	1122	1770	1279	934	524	635
28.5	530	366	371	384	442	648	1867	1455	1124	421	337
29.5	366	232	206	253	299	925	1947	1504	891	537	478
30.5	339	270	246	210	471	511	1080	1391	999	268	315
31.5	211	132	178	115	136	401	434	982	744	365	419
32.5	123	146	232	119	211	240	460	771	766	361	77
33.5	58	50	84	77	145	141	180	647	417	219	148
34.5	44	48	79	50	77	61	297	599	219	207	89
35.5	10	40	26	22	55	34	139	370	312	108	59
36.5	24	30	42	0	33	73	69	298	161	112	61
37.5	27	10	26	0	5	8	62	359	67	125	24
38.5	5	0	0	0	5	13	63	66	35	21	31
39.5	10	0	0	11	13	0	9	104	0	36	0
40.5	0	0	6	0	0	0	0	45	21	8	0
43.5	0	0	0	0	0	0	0	16	0	13	4

Table 11 *Anarhichas lupus*, abundance ('1000) and biomass indices (tons) for West Greenland by stratum and total, 1982-2008. 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	11113	2955	3457	2313	1822	458	945		23063	19
1983	7567	3186	1720	485	1471	211	786		15426	20
1984	5777	1277	1542	185	1382	111	750		11024	17
1985	5369	2718	1419	370	955	999	907		12737	19
1986	4961	1704	1967	635	1500	511	811		12089	25
1987	5328	1644	888		1023		691		9574	19
1988	4927	1834	895	449	1136	555	758		10554	25
1989	3675	673	1669	516	2901		1130		10564	21
1990	3511	1076	1981	295	1899		1066	612	10440	22
1991	2838	1010	968	756	2593	639	562	494	9860	27
1992	3015	376	1509	937	3360	916	948	2107	13168	31
1993	4723	1712	703	426	574	326	385		8849	29
1994	1545	1196	1725	567	1225	153	4515	1047	11973	46
1995					1349	563	529	705	3146	31
1996	715	942	254	381	2574	622	799	1075	7362	33
1997	3001	1279	1126	335	3771	1149	1538	2863	15062	36
1998	3083	957	783	653	1990	620	1009	1047	10142	28
1999	4457	1138	1941	653	6287	1337	801		16614	46
2000	1980	1725	402	413	2072	1116	480	2652	10840	34
2001			973	1110	3800	1160	724	1774	9541	34
2002			3001		3351	403	552		7307	40
2003			1307	1714	7345	511	575	1468	12920	46
2004	8234	2071	1718	826	3238	953	1271	1744	20055	23
2005			3565	462	6264	1138	2517	625	14571	41
2006	1759	1304	1529	769	1481	1019	1477	1301	10640	32
2007	2423	556	1107	724	1883	822	384	952	8851	34
2008	1411 .		691	365	575	358	231	887	4518	27

Biomass

Year	Str1.1	Str1.2	Str2.1	Str2.2	Str3.1	Str3.2	Str4.1	Str4.2	Total	CI	GLM Biomass
1982	9908	2974	5203	3926	2273	475	1240		25999	26	6269
1983	3661	3442	2084	471	1769	271	1086		12784	27	4099
1984	3089	673	1283	189	820	71	871		6996	18	4617
1985	1837	1134	1020	200	581	557	632		5961	19	3547
1986	1783	912	1441	434	973	458	768		6769	23	4042
1987	2191	521	573		1048		616		4949	20	4310
1988	1102	384	797	298	882	341	696		4500	20	3650
1989	687	222	620	246	1750		1037		4562	27	3267
1990	708	177	496	111	655		660	320	3127	22	3049
1991	456	166	160	161	674	148	249	214	2228	30	2141
1992	436	79	322	237	831	200	231	630	2966	33	3068
1993	646	314	101	80	130	67	108		1446	24	2199
1994	218	209	376	97	285	26	865	171	2247	45	1687
1995					248	68	131	114	561	29	2877
1996	61	261	42	68	486	114	169	238	1439	33	3418
1997	306	239	89	77	665	164	352	372	2264	39	2756
1998	361	194	125	146	287	97	175	266	1651	25	2375
1999	327	273	322	146	1039	230	136		2473	45	2946
2000	231	297	63	88	349	168	172	560	1928	39	2160
2001			209	263	1006	218	185	579	2460	37	3989
2002			578		859	91	146		1674	38	3624
2003			486	438	2475	141	200	646	4386	47	4754
2004	1327	389	550	242	971	299	758	652	5188	22	4812
2005			1372	165	1812	299	1284	384	5316	28	4983
2006	279	306	682	302	614	196	1110	821	4311	32	3996
2007	576	137	475	266	705	192	306	683	3340	35	2601
2008	160 .		368	79	260	102	133	378	1480	37	1410

Table 12 *Anarhichas lupus*. Length composition by year ('1000), 1998-2008.

Length	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
0.5	0	0	0	0	0	0	0		0	0	0
1.5	0	0	0	0	0	0	0		0	0	0
2.5	0	0	0	0	0	0	0		0	0	0
3.5	0	0	0	0	0	0	0		0	0	0
4.5	0	0	0	0	0	0	0		0	0	0
5.5	0	0	0	0	13	0	0		0	0	0
6.5	85	134	0	0	88	0	104	13	22	0	6
7.5	186	567	25	44	241	23	164	406	88	28	25
8.5	186	389	36	89	179	43	112	94	64	14	248
9.5	201	480	105	70	38	18	128	0	86	11	20
10.5	231	475	110	39	115	68	205	57	181	53	246
11.5	110	432	96	58	156	13	258	81	106	130	172
12.5	280	396	177	129	253	60	220	158	159	70	42
13.5	435	670	124	145	212	87	433	137	88	40	119
14.5	517	666	146	108	132	214	550	84	48	82	88
15.5	350	623	143	112	192	164	475	179	65	35	75
16.5	343	671	410	163	170	107	561	303	55	172	69
17.5	410	595	584	275	124	171	574	369	167	74	60
18.5	543	855	584	447	186	268	647	438	381	231	113
19.5	435	808	766	340	266	355	758	311	345	126	113
20.5	712	842	780	414	172	401	886	475	221	323	287
21.5	462	879	775	380	251	435	1128	509	519	349	80
22.5	409	607	635	409	454	331	1167	479	341	303	24
23.5	386	708	778	530	304	643	1059	384	400	239	179
24.5	350	513	488	360	317	635	1144	634	501	416	221
25.5	438	580	509	472	383	620	872	425	379	342	146
26.5	329	588	474	442	205	363	874	716	453	575	215
27.5	338	465	419	458	196	590	714	575	348	413	67
28.5	168	436	346	373	312	528	778	492	453	401	97
29.5	200	461	251	391	288	390	515	475	385	336	123
30.5	277	379	242	310	214	527	432	441	331	345	46
31.5	162	272	163	325	159	411	452	466	331	329	193
32.5	109	282	131	329	113	480	547	492	307	332	109
33.5	230	240	195	307	208	507	291	446	310	235	60
34.5	64	200	158	286	161	559	469	405	237	306	56
35.5	209	178	64	197	171	425	499	387	214	287	54
36.5	166	176	147	158	92	343	288	357	281	167	11
37.5	94	107	131	181	121	413	254	339	172	172	0
38.5	85	116	128	155	95	300	294	317	200	126	195
39.5	133	145	91	144	84	372	316	447	186	98	42
40.5	58	133	69	127	101	396	301	422	200	116	36
41.5	87	115	44	122	54	224	132	169	186	127	83
42.5	40	84	64	147	51	393	133	282	120	106	60
43.5	23	34	81	76	28	250	178	301	173	165	91
44.5	27	63	86	59	57	228	290	196	229	148	42
45.5	57	80	33	69	28	176	143	170	79	61	53
46.5	62	26	42	63	41	63	82	127	181	118	86
47.5	7	11	20	25	37	127	170	106	144	102	48
48.5	24	12	61	22	37	76	110	156	73	140	59
49.5	35	64	33	47	32	15	58	223	174	47	34
50.5	12	6	17	55	28	7	59	193	77	182	0
51.5	0	11	39	30	42	12	59	83	127	51	57
52.5	0	0	12	26	42	65	18	53	113	21	7
53.5	14	17	0	5	28	0	56	65	102	87	21
54.5	9	12	11	17	4	0	13	62	41	29	21
55.5	14	9	0	11	15	0	41	31	81	59	22
56.5	0	6	21	0	13	31	7	0	19	20	7
57.5	0	0	0	0	15	0	0	8	38	38	26
58.5	5	0	0	6	0	8	0	0	12	7	14
59.5	0	0	0	0	0	0	7	0	21	29	0
60.5	28	0	0	6	0	0	0	19	7	15	27
61.5								6	0	8	0
62.5								0		26	0

Table 13 *Anarhichas minor*, abundance ('1000) and biomass (tons) for West Greenland by stratum and total, 1982-2008. 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	381	154	353	153	130	14	326		1511	28
1983	184	38	148	3	89	39	367		868	35
1984	184	60	176	14	89	23	241		787	24
1985	204	115	106	4	29	61	110		629	28
1986	483	203	108	38	68	16	118		1034	21
1987	306	211	63		130		239		949	29
1988	231	150	45	15	145	33	316		935	29
1989	245	130	49	25	281		110		840	32
1990	109	201	38	19	99		152	6	624	32
1991	333	141	26	33	54	4	74	50	715	26
1992	41	47	14	107	37	23	13	29	311	61
1993	82	222	49	51	37	17	69		527	43
1994	61	109	61	62	21	9	28	7	358	36
1995					14	4	18	0	36	72
1996	0	56	54	38	17	11	0	7	183	59
1997	102	58	16	38	60	16	49	73	412	39
1998	116	28	26	11	27	23	39	44	314	36
1999	34	83	56	38	50	19	21		301	37
2000	218	164	26	88	37	11	44	44	632	22
2001			47	27	87	5	44	12	222	30
2002			101		72	23	0		196	40
2003			63	32	31	8	15	7	156	49
2004	143	60	63	80	64	23	108	80	621	29
2005			118	70	37	14	270	29	538	39
2006	437	14	88	46	166	36	132	94	1013	35
2007	197	28	151	15	135	17	101	58	702	31
2008	224	.	35	6	48	29	150	56	548	43

Biomass

Year	Str1.1	Str1.2	Str2.1	Str2.2	Str3.1	Str3.2	Str4.1	Str4.2	Total	CI	GLM Biomass
1982	2198	470	1896	827	531	42	1988		7952	37	2399
1983	1674	256	656	5	562	183	2357		5693	36	1767
1984	851	196	1036	15	448	55	1358		3959	27	2267
1985	14	119	569	0	134	307	681		1824	36	1035
1986	1157	307	566	63	370	36	1004		3503	29	1542
1987	653	126	334		1029		2034		4176	38	1674
1988	136	85	195	87	1141	101	3010		4755	66	1501
1989	374	32	167	40	1382		847		2842	41	1033
1990	82	83	200	7	667		1217	3	2259	50	1326
1991	27	30	2	9	252	5	724	179	1228	73	765
1992	7	6	0	7	29	4	36	35	124	85	281
1993	68	40	16	33	35	16	211		419	68	570
1994	27	24	75	25	10	1	141	3	306	73	489
1995					66	40	218	0	324	91	713
1996	0	137	33	42	39	7	0	10	268	71	1452
1997	75	9	26	38	37	2	23	57	267	51	517
1998	20	2	103	26	118	3	252	49	573	65	660
1999	34	43	141	30	109	13	113		483	44	670
2000	218	96	108	167	225	86	198	177	1275	40	949
2001			157	65	516	38	229	56	1061	35	1093
2002			197		535	99	0		831	55	1434
2003			247	73	91	53	56	113	633	53	871
2004	116	40	289	186	455	188	557	539	2370	40	1457
2005			416	324	347	152	1487	205	2931	41	1981
2006	1237	16	254	188	808	192	415	537	3647	36	2629
2007	1537	208	831	13	992	78	1108	467	5234	35	1834
2008	752	.	49	1	369	265	1294	513	3243	48	1698

Table 14 *Anarhichas minor*. Length composition by year ('1000), 1998-2008.

Length	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
10.5	0	0	12	0	0	0	0	0	0	0	0
11.5	0	6	0	0	0	0	0	0	42	0	0
12.5	0	0	20	0	0	0	0	0	0	0	0
13.5	0	0	52	0	0	0	0	0	0	0	0
14.5	43	0	69	0	0	0	0	0	0	13	0
15.5	0	12	20	0	0	0	0	0	0	0	0
16.5	0	0	12	0	0	0	0	0	0	0	6
17.5	0	0	27	0	5	0	0	0	0	0	21
18.5	0	6	0	0	0	0	0	0	0	0	0
19.5	5	6	0	0	0	0	0	0	0	0	0
20.5	11	0	0	0	0	0	0	0	0	0	0
21.5	7	5	0	0	13	0	29	0	0	0	0
22.5	0	0	0	0	0	0	4	0	0	0	0
23.5	5	0	6	0	0	6	0	0	42	8	0
24.5	12	0	0	9	0	0	0	0	85	0	0
25.5	7	0	35	0	0	0	39	0	42	0	112
26.5	0	0	11	5	13	0	7	0	0	0	0
27.5	0	0	6	0	0	8	10	0	0	0	0
28.5	14	12	35	0	0	0	4	0	0	0	0
29.5	0	12	0	0	0	0	8	11	0	0	0
30.5	5	0	0	6	0	0	4	0	0	0	0
31.5	0	12	0	0	0	0	4	0	42	0	0
32.5	0	5	6	0	13	0	0	0	0	0	0
33.5	0	11	0	0	0	0	6	0	0	0	0
34.5	0	0	0	0	0	0	0	0	0	0	0
35.5	0	5	0	0	0	0	0	0	0	0	0
36.5	0	0	0	0	13	0	0	7	13	0	0
37.5	0	5	0	0	0	0	10	0	8	0	0
38.5	0	0	0	0	0	0	0	0	0	0	0
39.5	0	5	6	0	0	0	0	0	0	0	0
40.5	0	6	7	0	0	0	18	0	0	0	0
41.5	0	12	0	0	0	0	33	0	0	0	0
42.5	15	0	0	5	13	0	4	0	0	0	0
43.5	29	0	6	0	0	0	0	0	12	0	0
44.5	0	0	0	6	0	6	0	0	0	0	0
45.5	0	0	0	0	0	6	4	10	0	0	0
46.5	0	12	0	0	0	0	0	20	10	0	0
47.5	0	6	0	0	0	0	0	10	27	7	0
48.5	0	12	0	0	0	0	0	34	0	0	0
49.5	0	45	0	0	0	13	51	0	21	0	0
50.5	0	0	12	0	13	0	14	34	0	0	0
51.5	0	5	0	0	0	0	10	16	12	0	0
52.5	0	0	0	0	0	0	19	0	13	0	0
53.5	0	5	0	0	0	10	0	0	4	13	0
54.5	0	0	0	0	0	0	0	0	19	8	0
55.5	0	0	21	0	0	0	0	0	37	82	7
56.5	9	12	6	0	0	0	44	10	0	0	0
57.5	0	5	6	0	0	10	8	0	13	0	0
58.5	0	5	0	5	0	0	4	0	0	0	0
59.5	10	6	0	12	0	0	6	0	0	0	0
60.5	7	0	0	12	0	0	0	0	0	0	0
61.5	15	0	0	0	0	0	8	25	19	13	4
62.5	7	5	6	0	0	13	8	0	0	0	0
63.5	0	0	6	0	0	0	8	0	26	6	0
64.5	0	0	0	0	0	0	4	0	8	12	0
65.5	9	0	0	6	0	0	0	17	4	19	0
66.5	0	12	0	6	0	13	0	0	21	14	0
67.5	0	0	5	0	0	0	0	5	0	0	0
68.5	0	6	0	11	0	0	0	10	10	0	14
69.5	10	0	12	6	14	0	0	0	36	11	14
70.5	0	0	12	12	0	0	0	25	24	12	0
71.5	0	0	0	6	0	15	11	15	4	25	0
72.5	0	6	29	0	0	0	0	10	10	0	23
73.5	0	6	0	6	0	0	0	25	0	12	0
74.5	0	0	12	9	9	0	4	30	13	0	0
75.5	0	0	7	6	0	10	4	10	0	13	10
76.5	0	0	11	0	0	0	0	10	7	0	0
77.5	0	11	42	9	13	0	15	0	18	0	0
78.5	0	6	0	6	0	13	21	5	0	12	0
79.5	0	0	0	0	0	0	11	10	10	0	0
80.5	6	6	0	6	0	0	7	0	27	12	30
81.5	0	0	0	6	0	0	11	49	11	0	0
82.5	0	0	5	0	0	0	0	5	42	0	34
83.5	0	6	26	0	0	0	19	25	0	0	112
84.5	0	0	0	0	0	0	0	0	11	17	0
85.5	10	0	6	0	0	4	0	0	10	0	0
86.5	0	0	0	6	0	0	0	5	0	11	0
87.5	0	0	0	17	0	0	10	0	24	0	15
88.5	0	0	6	5	0	4	8	0	17	24	0
89.5	0	0	0	6	0	0	0	0	8	6	0
90.5	0	11	0	0	14	0	8	0	10	13	0
91.5	0	0	7	0	14	6	7	10	21	91	0
92.5	0	0	12	0	0	0	4	7	0	11	0
93.5	0	0	6	0	0	0	6	25	7	12	0
94.5	9	0	6	23	19	0	27	25	0	7	7
95.5	0	0	0	12	0	13	19	0	105	25	8
96.5	0	0	0	0	0	0	10	15	10	18	0
97.5	0	0	0	0	14	0	8	0	0	7	0
98.5	0	0	0	0	5	0	8	0	7	0	37
99.5	0	0	0	0	0	0	4	0	0	15	0
100.5	0	0	0	0	0	0	0	0	0	0	7
101.5	0	0	0	0	0	0	0	0	0	13	7
102.5	0	0	0	0	0	0	0	0	0	12	4
103.5	0	0	0	0	0	0	0	0	8	13	23
104.5	0	0	0	0	0	0	0	0	0	0	0
105.5	0	0	0	0	0	0	0	0	0	0	7
106.5	0	0	0	0	0	0	0	0	0	12	0
107.5	0	0	0	0	0	0	0	0	0	0	7
108.5	0	0	0	0	0	0	0	0	0	0	0
109.5	0	0	0	0	0	0	0	0	0	0	0
110.5	0	0	0	0	0	0	0	7	0	0	0
111.5	0	0	0	0	0	0	0	0	0	0	8
112.5	0	0	0	0	0	0	0	0	0	0	0
113.5	0	0	0	0	0	0	0	5	0	51	0
114.5	0	0	0	0	0	0	0	0	0	14	0
115.5							0	0	0	11	0
116.5							0	9	0	0	15
117.5							0	0	0	7	
118.5								0	0	11	
119.5								0	0	0	
120.5										0	

Table 15 *Raja radiata*, abundance (1 000) and biomass (tons) for West Greenland by stratum and total, 1982-2008. 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	5383	1625	1412	473	556	83	162		9694	28
1983	4798	589	815	360	349	27	59		6997	54
1984	2742	1672	653	505	149	482	116		6319	34
1985	2239	2393	1847	689	397	56	257		7878	32
1986	2178	2806	766	326	295	131	203		6705	36
1987	1790	538	653		291		64		3336	22
1988	3879	1046	996	770	335	39	85		7150	30
1989	11963	2141	3859	694	607		149		19413	26
1990	7145	1981	2489	548	271		550	345	13329	36
1991	1967	480	1220	262	610	130	95	65	4829	22
1992	4457	598	2844	1531	496	523	205	58	10712	38
1993	2266	352	684	279	188	263	95		4127	27
1994	2531	378	872	272	233	79	398	15	4778	31
1995					182	301	116	15	614	74
1996	1273	126	428	76	114	111	56	29	2213	24
1997	4886	493	879	46	120	122	180	0	6726	31
1998	1694	534	439	202	258	46	49	15	3237	24
1999	2164	235	684	195	297	194	213		3982	27
2000	721	188	503	870	248	134	234	15	2913	42
2001			435	88	116	134	629	30	1432	39
2002			642		116	194	121		1073	40
2003			428	292	62	286	208	0	1276	52
2004	878	81	623	228	120	888	193	21	3032	28
2005			743	218	217	342	223	0	1743	39
2006	339	70	593	411	41	375	504	36	2372	43
2007	514	120	331	184	68	56	107	0	1380	28
2008	233 .		622	221	178	223	106	7	1590	43

Biomass

Year	Str1.1	Str1.2	Str2.1	Str2.2	Str3.1	Str3.2	Str4.1	Str4.2	Total	CI	GLM Biomass
1982	2994	811	1328	340	409	59	154		6095	28	2149
1983	966	192	703	132	331	27	56		2407	25	1198
1984	728	333	404	96	136	126	95		1918	27	1359
1985	497	427	804	181	159	46	56		2170	27	1394
1986	517	527	421	83	122	65	39		1774	27	1073
1987	415	149	306		184		13		1067	39	976
1988	653	122	503	238	174	19	33		1742	27	1107
1989	2076	429	980	107	314		90		3996	24	1593
1990	980	263	526	56	91		113	201	2230	34	1320
1991	279	81	181	36	246	42	10	33	908	28	844
1992	327	94	139	134	221	89	23	27	1054	30	1192
1993	340	88	82	31	29	24	3		597	23	781
1994	231	71	143	30	91	14	54	11	645	22	720
1995					70	37	41	0	148	49	1045
1996	95	23	38	23	21	16	8	13	237	26	625
1997	354	96	181	6	16	29	33	0	715	31	793
1998	143	90	89	47	56	13	8	15	461	29	675
1999	150	68	143	65	68	26	54		574	30	886
2000	116	47	141	298	103	12	28	13	758	54	876
2001			75	30	58	24	131	18	336	40	1063
2002			136		21	32	15		204	35	958
2003			73	55	25	51	90	0	294	43	1147
2004	82	17	143	47	39	152	33	10	523	34	761
2005			148	55	78	59	67	0	407	32	1134
2006	25	13	145	130	8	66	151	10	548	46	977
2007	71	19	69	21	23	4	15	0	222	35	693
2008	10 .		45	21	35	28	5	5	149	56	540

Table 16 *Raja radiata*. Length composition by year (1 000), 1982-2008.

Length	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
0.5	0	0	0	0	0	0	0	0	0	0	0
1.5	0	0	0	0	0	0	0	0	0	0	0
2.5	0	0	0	0	0	0	0	6	0	0	0
3.5	0	0	0	0	0	0	0	0	0	0	0
4.5	0	0	0	0	0	0	0	0	0	0	0
5.5	0	0	0	0	0	0	0	0	0	0	0
6.5	0	0	0	0	0	0	11	0	0	0	0
7.5	0	0	0	0	0	0	0	0	0	0	0
8.5	0	38	12	0	0	0	0	0	0	25	0
9.5	82	364	89	9	13	0	61	11	27	21	62
10.5	435	681	62	84	93	63	155	23	74	69	162
11.5	225	369	124	82	80	49	179	85	110	126	185
12.5	196	249	131	82	5	76	242	75	105	190	86
13.5	121	277	93	81	36	50	116	61	141	64	175
14.5	165	152	56	98	72	107	85	143	83	13	31
15.5	92	88	137	90	68	80	100	68	37	107	22
16.5	116	43	127	52	84	38	126	102	33	40	202
17.5	162	125	96	72	9	91	249	58	106	76	96
18.5	125	133	109	50	14	88	198	42	223	51	77
19.5	93	40	63	41	22	26	69	54	43	73	31
20.5	63	44	58	35	64	39	70	47	90	72	69
21.5	97	18	86	58	50	51	91	33	108	33	21
22.5	49	89	77	24	55	37	167	32	83	53	62
23.5	95	63	112	35	15	37	101	98	165	8	27
24.5	79	40	47	11	33	35	94	68	28	32	55
25.5	73	41	80	17	13	30	73	84	24	14	24
26.5	103	71	77	15	38	4	127	81	56	27	4
27.5	151	85	16	44	15	8	33	59	27	11	7
28.5	54	58	144	17	25	0	69	27	27	51	30
29.5	74	126	47	9	13	46	68	14	82	11	6
30.5	91	46	30	20	25	6	29	30	59	8	14
31.5	54	142	90	12	13	16	44	5	45	14	6
32.5	9	77	71	20	28	20	62	29	45	0	16
33.5	58	90	121	20	0	14	40	15	45	0	0
34.5	59	45	72	36	13	4	12	26	25	0	0
35.5	40	34	68	21	18	8	79	23	50	0	18
36.5	59	74	40	29	0	0	20	28	60	0	0
37.5	33	30	92	24	13	0	0	5	65	0	0
38.5	42	130	93	19	37	29	22	27	34	38	10
39.5	34	33	79	43	13	17	24	22	25	23	10
40.5	49	33	60	30	14	20	12	47	33	8	18
41.5	0	29	91	60	13	25	12	6	20	69	17
42.5	7	35	57	11	18	49	48	45	67	0	0
43.5	0	0	38	19	49	30	21	73	24	0	0
44.5	5	11	34	44	0	13	64	53	64	39	4
45.5	14	0	33	12	0	20	16	11	20	0	0
46.5	20	0	0	0	13	17	8	0	15	0	0
47.5	5	0	0	9	0	18	9	0	8	25	4
48.5	0	0	0	0	0	0	4	26	0	0	0
49.5	0	0	0	0	0	16	4	0	0	0	0
50.5	5	0	0	0	0	0	13	0	0	0	0
51.5	0	0	0	0	0	0	4	0	0	0	0
52.5	0	0	0	0	0	0	0	0	0	0	0
53.5	0	0	0	0	0	0	0	0	0	0	0

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

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

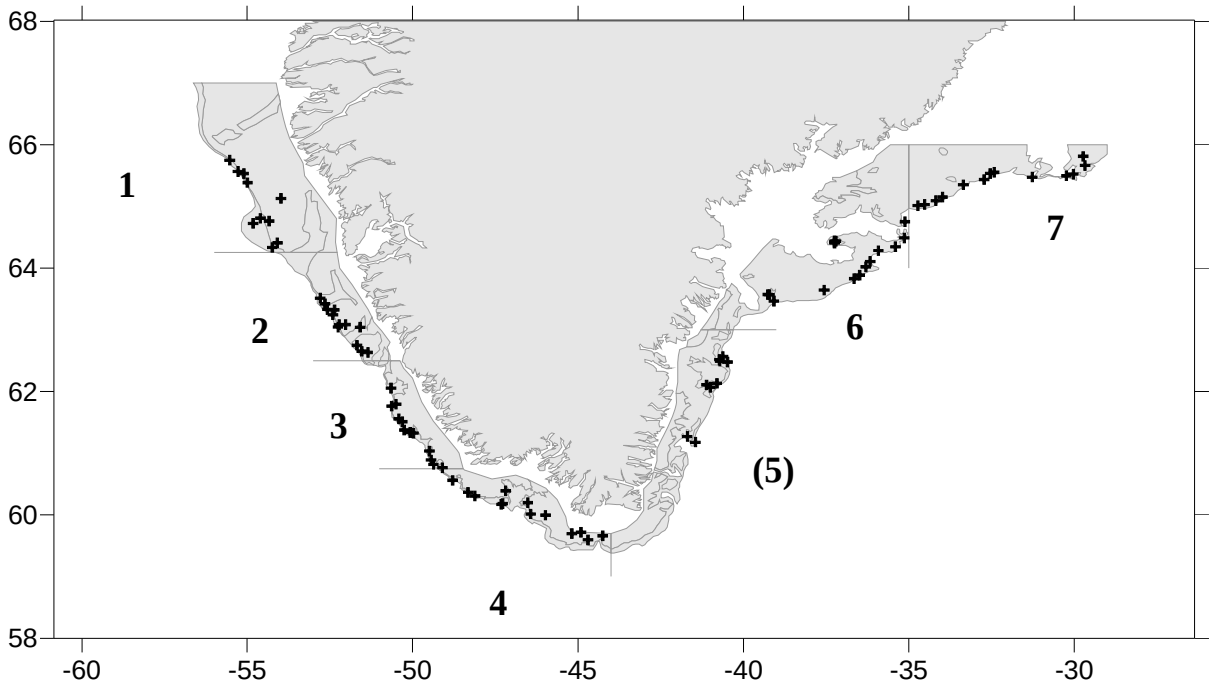

Fig. 1 Stratification of the survey area in 2007 as specified in Table 2, positions of hauls carried out off West Greenland refer to strata 1 to 4.

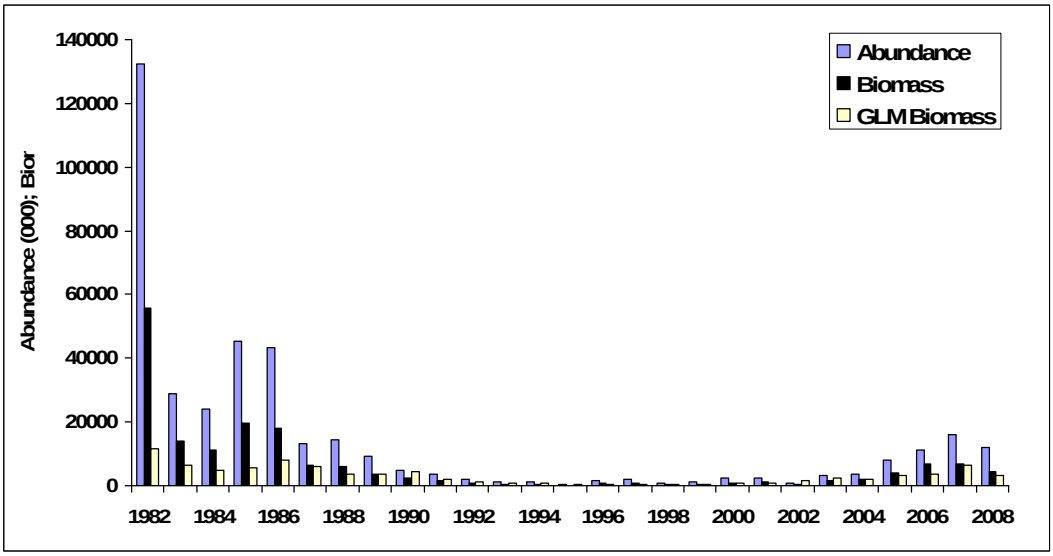

Fig. 2 Abundance and biomass indices for *S. marinus* >=17 cm off West Greenland, 1982-2008. Respective values are listed in Table 3. GLM 1985-1989 subject to revision.

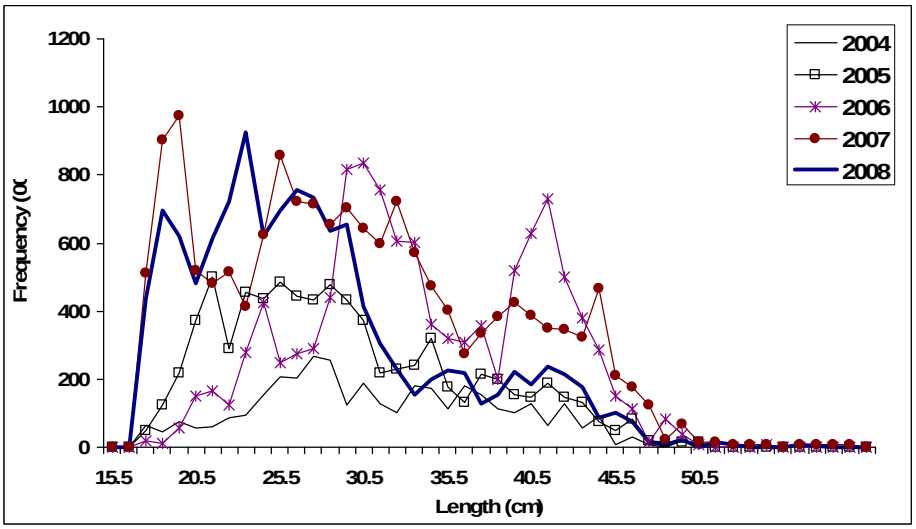

Fig. 3 Length disaggregated abundance indices for *S. marinus* >=17 cm off West Greenland, 2004-2008. Respective values are listed in Table 4.

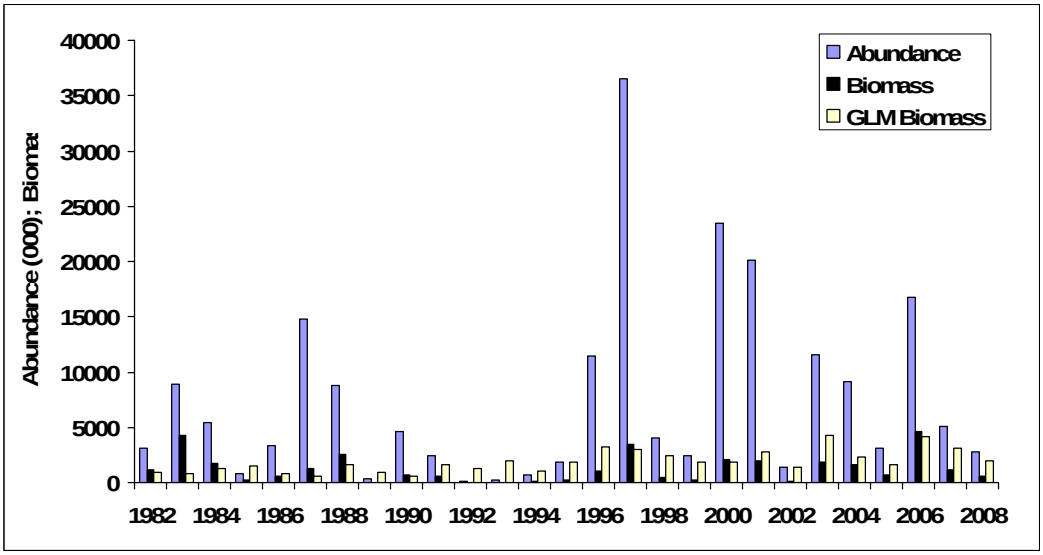

Fig. 4 Abundance and biomass indices for *S. mentella* >=17 cm off West Greenland, 1982-2008. Respective values are listed in Table 5. GLM 1985-1989 subject to revision.

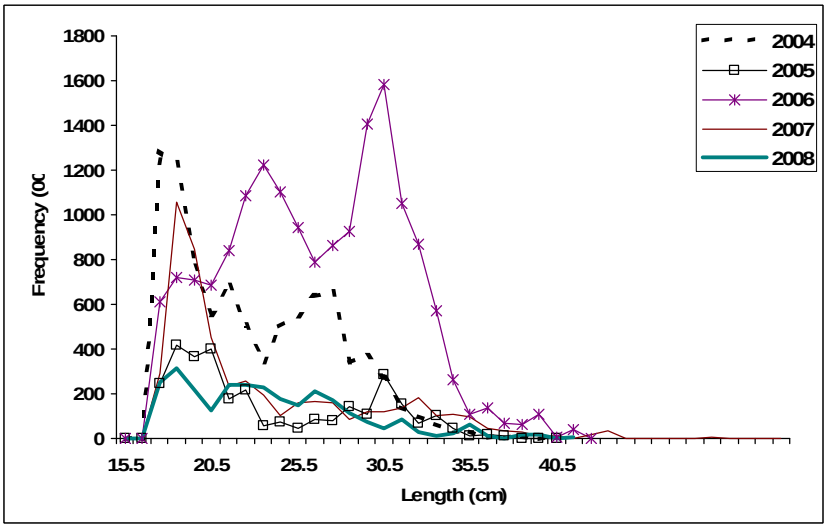

Fig. 5 Length disaggregated abundance indices for *S. mentella* >=17 cm off West Greenland, 2004-2008. Respective values are listed in Table 6.

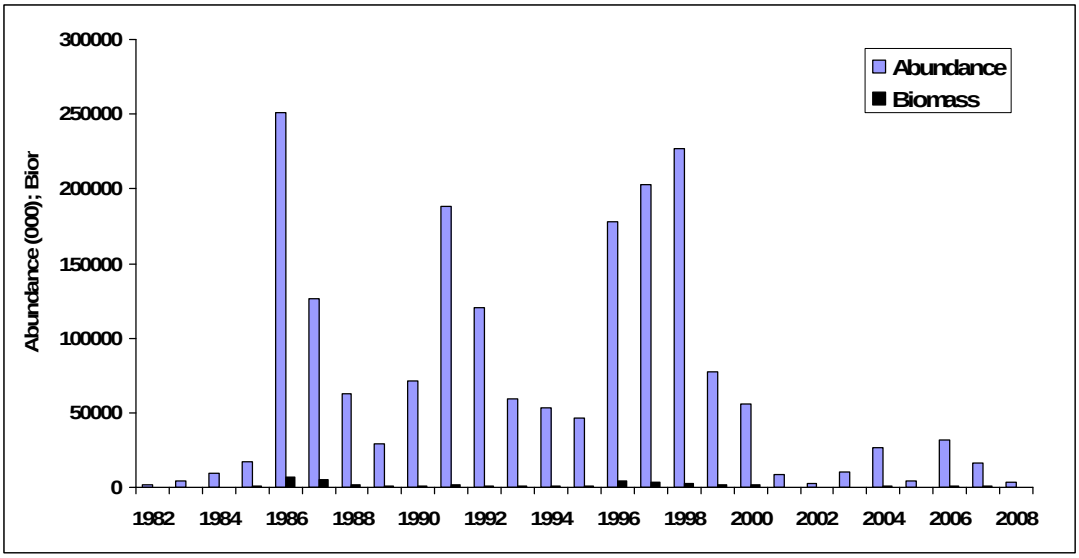

Fig. 6 Abundance and biomass indices for *Sebastes spp.* <17 cm off West Greenland, 1982-2008. Respective values are listed in Table 7.

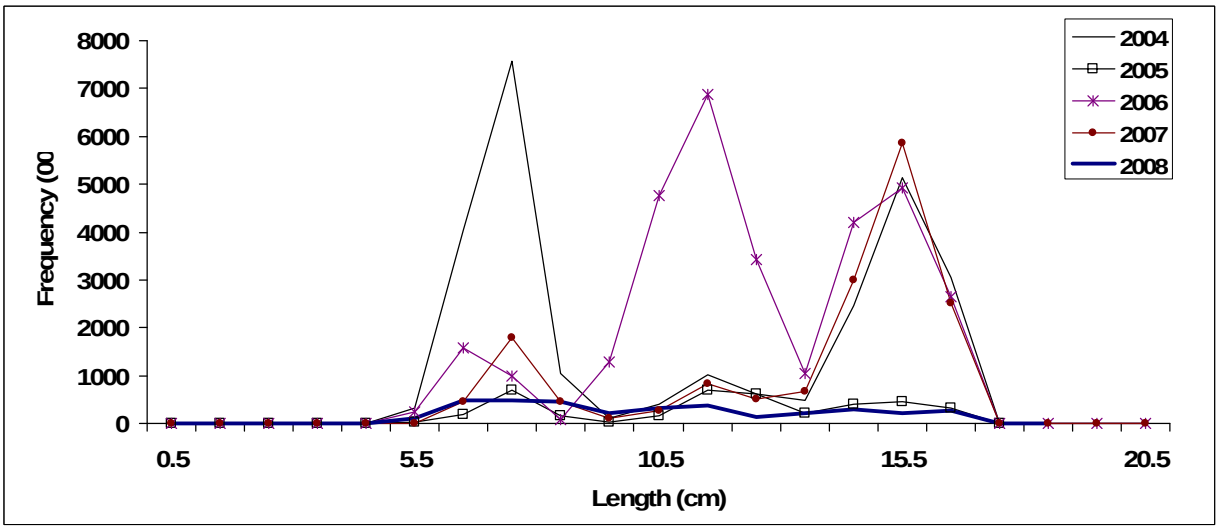

Fig. 7 Length disaggregated abundance indices for *Sebastes spp.* <17 cm off West Greenland, 2004-2008. Respective values are listed in Table 8.

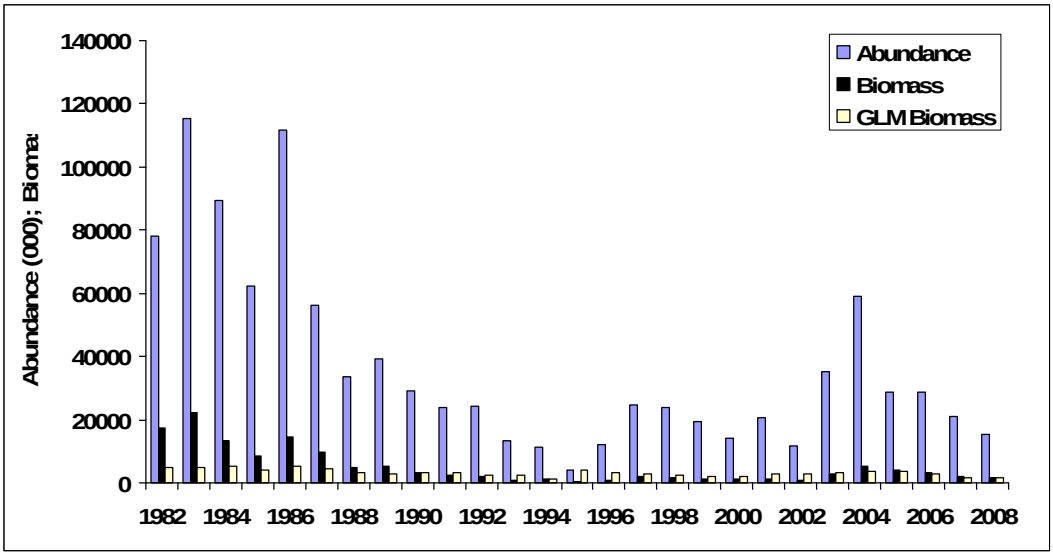

Fig. 8 Abundance and biomass indices for *Hippoglossoides platessoides* off West Greenland, 1982-2008. Respective values are listed in Table 9.

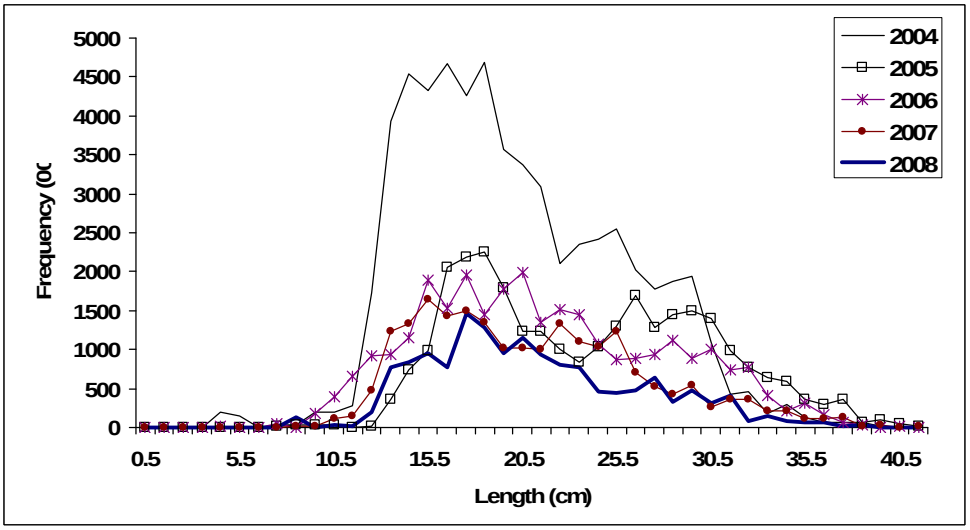

Fig. 9 Length disaggregated abundance indices for *Hippoglossoides platessoides* off West Greenland, 2004-2008. Respective values are listed in Table 10.

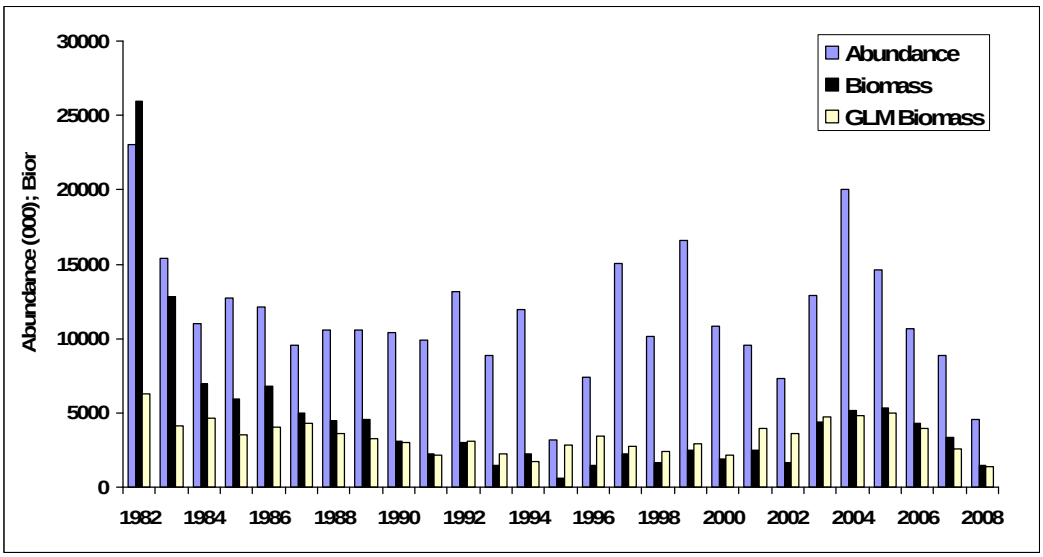

Fig. 10 Abundance and biomass indices for *Anarhichas lupus* off West Greenland, 1982-2008. Respective values are listed in Table 11.

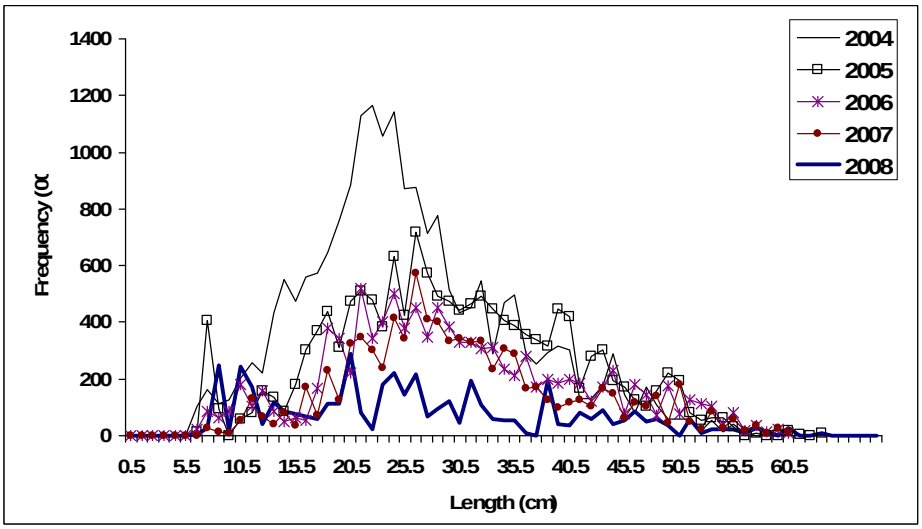

Fig. 11 Length disaggregated abundance indices for *Anarhichas lupus* off West Greenland, 2004-2008. Respective values are listed in Table 12.

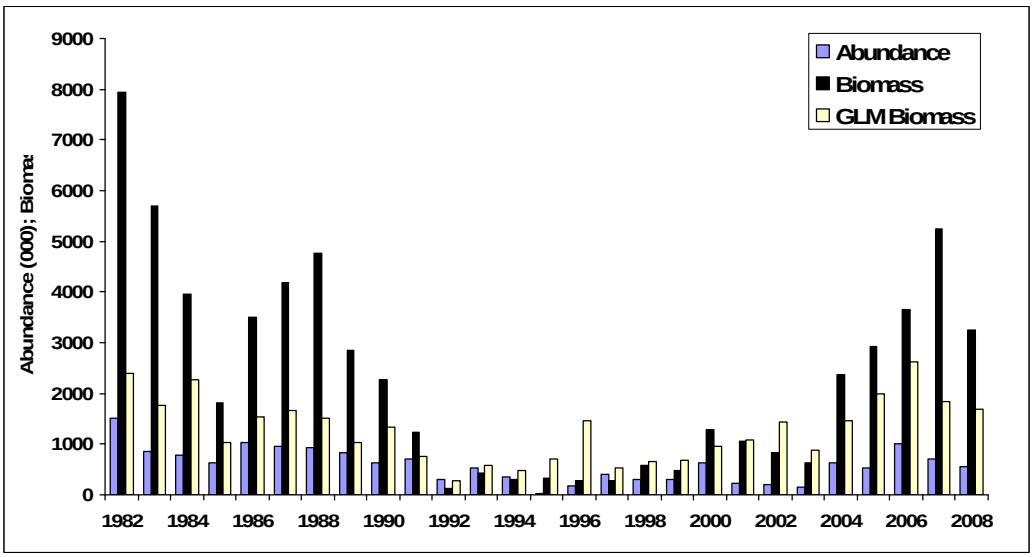

Fig. 12 Abundance and biomass indices for *Anarhichas minor* off West Greenland, 1982-2008. Respective values are listed in Table 13.

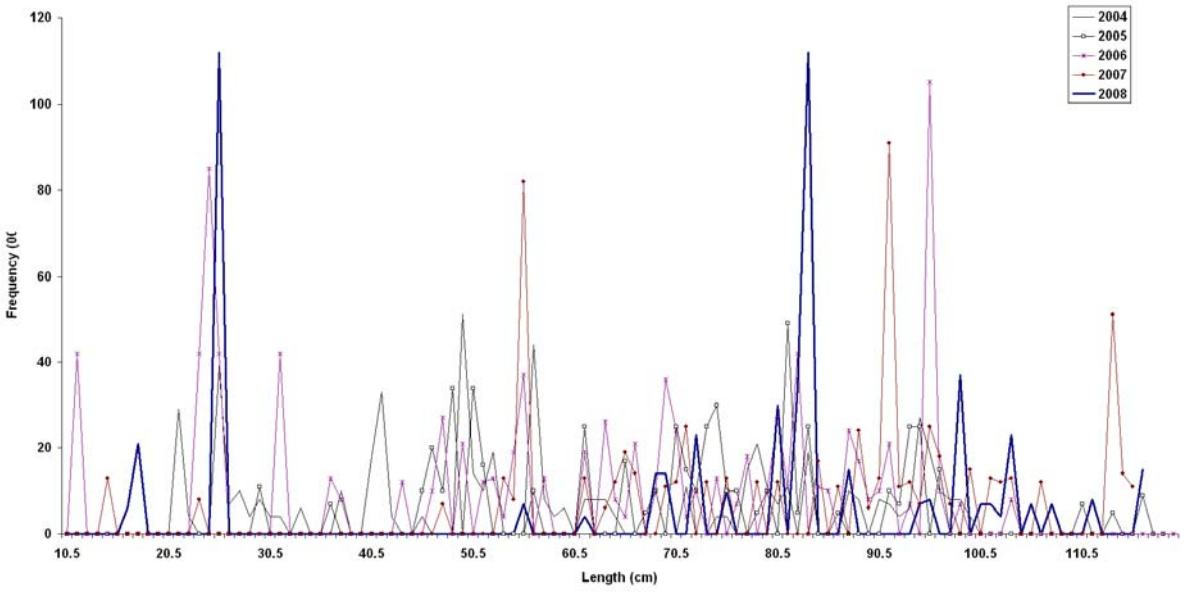

Fig. 13 Length disaggregated abundance indices for *Anarhichas minor* off West Greenland, 2004-2008. Respective values are listed in Table 14.

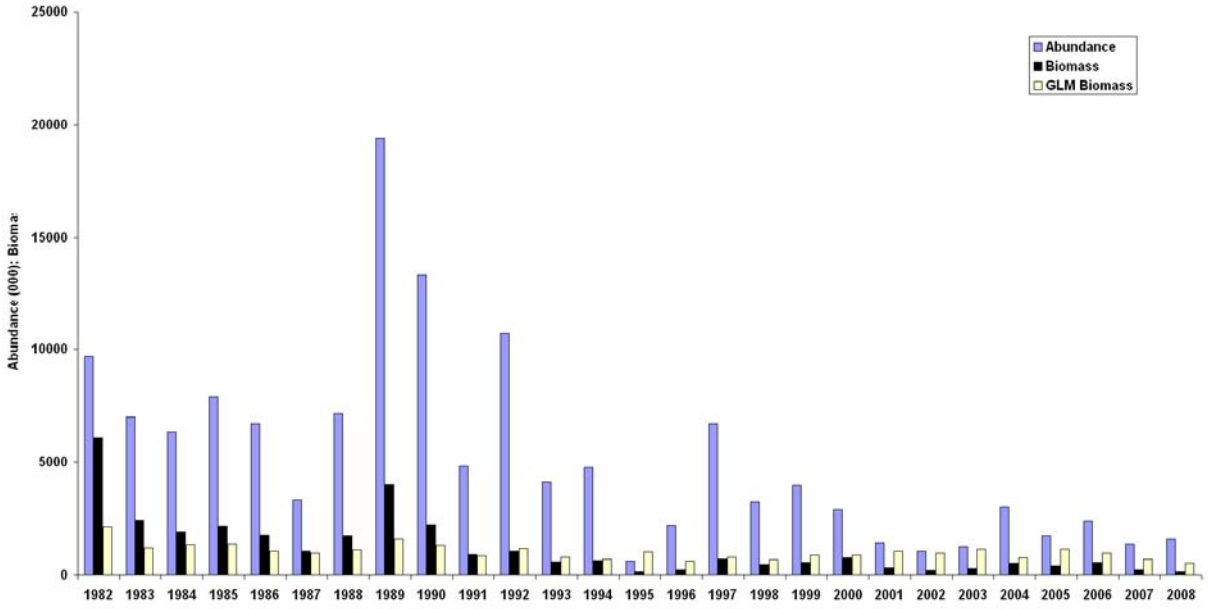

Fig. 14 Abundance and biomass indices for *Raja radiata* off West Greenland, 1982-2008. Respective values are listed in Table 15.

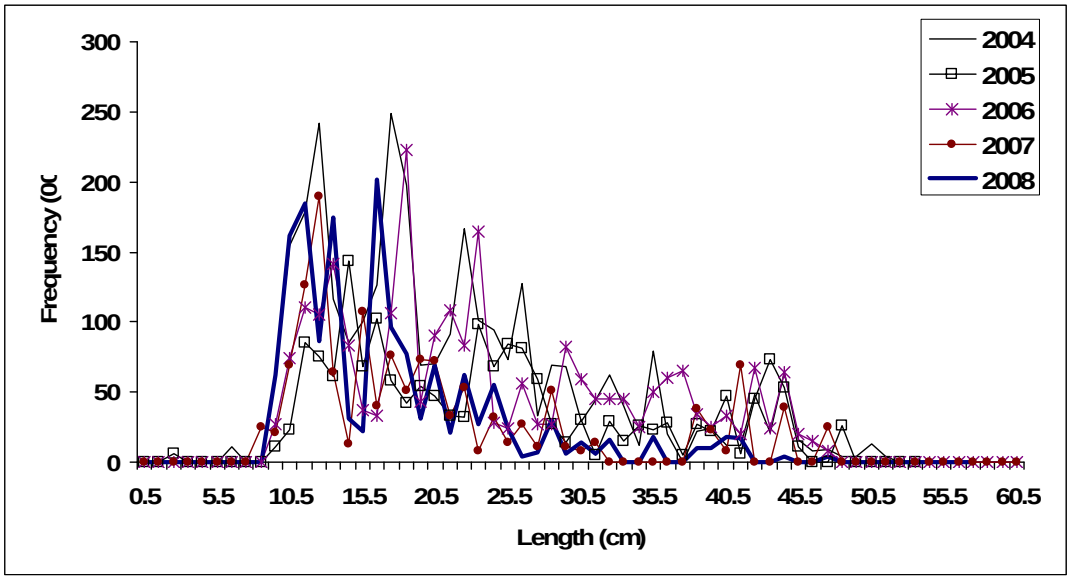

Fig. 15 Length disaggregated abundance indices for *Raja radiata* off West Greenland, 2004-2008. Respective values are listed in Table 16.

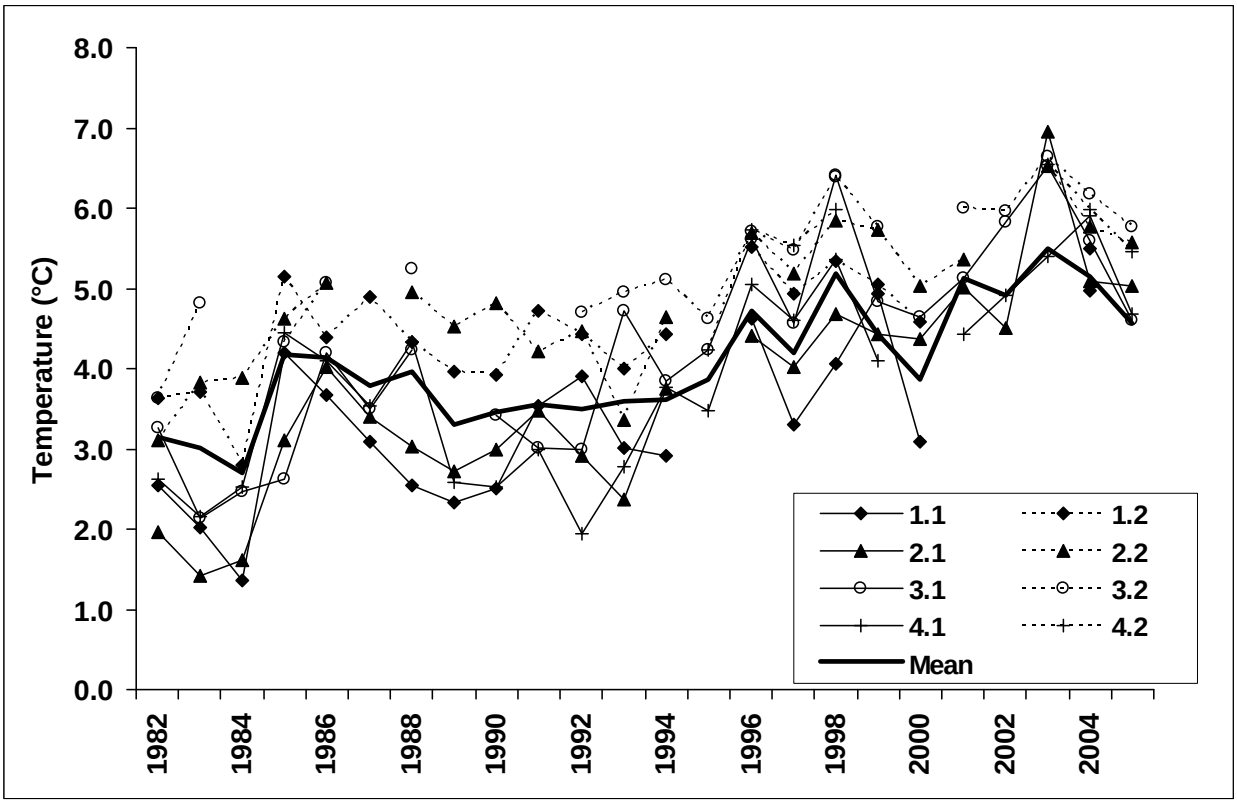

Fig. 16 Stratum means of near bottom temperature (°C) and stratified mean, 1982-2008. Respective values are listed in Table 17. Solid lines display trends in shallow strata (<200 m), dashed lines display trends in deep strata (>200 m),