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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 1982-2006

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 1D 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. Both abundances decreased since then. 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.

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

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 log-transformed data. Though the addition and subtratction of unit value to the catch 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 is in preparation.

Near bottom water temperature was measured directly before or after a trawl haul be means of a CTD sonde. The annual stratified mean temperature was estimated in the same manner as applied for the fish abundance, i.e. through area weighting (Cochran, 1953; Saville, 1977).

Results

Fig. 1 displays the coverage of the survey area by the geographical haul distribution in 2005.

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. Substantial recovery is though not apparent. In 2006, the stock was mainly composed of two length groups of 25-35 cm and 40-45 cm in body length, which corresponds with the indication of stronger incoming year classes observed in 2005.

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. As in 2004 and opposite to 2005, the length distribution is trimodal with modes at 30 (about 9-10 yrs old), 22-25 and 17-20 cm. As for golden redfish, the latter indicates an incoming but less pronounced year class (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.

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 peaks at 6-7, 10-12 and 14-16 cm, an indication of sizes at ages 0, 1 and 2 in autumn (Fig. 7 and Table 8). The strong peak for age 0 in 2004 does not re-appear as age 1 in 2005, but is evident in 2006.

Abundance and biomass of American plaice *Hippoglossoides platessoides* significantly declined since the late 1980s but increased slightly since 2002 (Fig. 8 and Table 9). Opposite to previous years when the stock predominantly was composed of small fish below 20 cm as illustrated in Figure 9 and listed in Table 10, the share of specimens > 30 cm increased in 2005 and 2006. The catchability of flatfish by the survey gear is considered poor but the time series seems to represent the stock development.

Atlantic wolfish *Anarhichas lupus* does not show a decrease in survey abundance but in both biomass estimates, which were significantly lower in the 1990s (Fig. 10 and Table 11). That indicates that the stock then was mainly composed of small fish with low body weights. This indication is confirmed by the length distributions given in Figure 11 and Table 12 as fish below 35 cm are recently dominating the size composition of the stock.

The abundance and biomass of spotted wolfish *Anarhichas minor* decreased significantly until 1992 (Fig. 12 and Table 13). Since 1996, a clear upward trend in particular for the biomass estimates is evidenced in the survey series. 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). Siize composition was dominated by small fish below 25 cm body length until 2004 (Fig. 15 and Table 16). In 2005, the length distribution was more even. In 2006 again, a high share of small fishes had been caught.

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.

References

Cochran, W. G. 1953. Sampling techniques. John Wiley & Sons Inc., New York: 1-330

Rätz, H.-J. 1999. Structures and Changes of the Demersal Fish Assemblage off Greenland, 1982-96. NAFO Sci. Coun. Studies, 32: 1-15

Rätz, H.-J. and C. Stransky 2003. Stock Abundance Indices and Length Compositions of Demersal Redfish and Other Finfish in NAFO Sub-area 1 based on the German bottom trawl survey. NAFO SCR Doc. 03/15, Ser. No. N4821, 28 pp.

Saville, A. 1977. Survey methods of apprising fishery resources. FAO Fish. Tech. Pap. 171: 1-76

Venables W. N., Dichmont C. M. 2004. GLMs, GAMs and GLMMs: an overview of theory for applications in fisheries research. *Fisheries Research* 70:319-337

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, 1982-2005.

STRATUM	1.1	1.2	2.1	2.2	3.1	3.2	4.1	4.2	Sum
AREA nm²	6805	1881	2350	1018	1938	742	2568	971	18273
1982	20	11	16	7	9	6	13	2	84
1983	26	11	25	11	17	5	18	4	117
1984	25	13	26	8	18	6	21	4	121
1985	10	8	26	10	17	5	21	4	101
1986	27	9	21	9	16	7	18	3	110
1987	25	11	21	4	18	3	21	3	106
1988	34	21	28	5	18	5	18	2	131
1989	26	14	30	9	8	3	25	3	118
1990	19	7	23	8	16	3	21	6	103
1991	19	11	23	7	12	6	14	5	97
1992	6	6	6	5	6	6	7	5	47
1993	9	6	9	6	10	8	7	0	55
1994	16	13	13	8	10	6	7	5	78
1995	0	0	3	0	10	7	10	5	35
1996	5	5	8	5	12	5	10	5	55
1997	5	6	5	5	6	5	8	5	45
1998	9	5	10	7	11	6	10	5	63
1999	8	6	14	8	13	6	9	3	67
2000	13	6	14	7	14	5	9	5	73
2001	0	0	15	7	15	5	11	6	59
2002	0	0	7	2	5	6	8	4	32
2003	0	0	7	6	7	7	6	5	38
2004	9	7	11	9	9	6	9	5	65
2005	0	0	9	7	8	6	6	5	41
2006	6	5	7	5	7	7	8	5	50

Table 3 *S. marinus* >= 17cm, abundance (1 000) and biomass (tons) for West Greenland by stratum and total, 1982-2005. Confidence intervals (CI) are given in per cent of the stratified mean at 95% level of significance. GLM 1985-1989 subject to revision.

Abundance

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	55
1983	4022	3186	3356	6523	4043	5886	1697		28713	53
1984	1327	3438	461	1209	10671	2776	4214		24096	65
1985	4661	10451	6157	1569	3221	14442	4974		45475	52
1986	6329	4324	2077	3483	21504	2883	2717		43317	53
1987	905	653	1328		9611		660		13157	39
1988	830	2238	343	2255	5938	1954	732		14290	54
1989	422	421	776	690	6490		362		9161	60
1990	122	433	280	710	1037		146	2270	4998	75
1991	225	256	96	691	236	528	21	1671	3724	51
1992	129	105	73	190	194	476	193	836	2196	151
1993	170	482	59	267	79	132	0		1189	93
1994	109	325	155	167	66	46	152	247	1267	41
1995					50	68	39	146	303	97
1996	150	267	21	243	380	383	28	298	1770	47
1997	252	609	16	175	120	311	36	552	2071	40
1998	116	141	45	142	19	106	126	254	949	160
1999	225	293	132	219	72	213	10		1164	70
2000	197	621	63	571	83	200	10	836	2581	59
2001			106	304	72	456	8	1557	2503	124
2002			101		333	536	13		983	93
2003			251	375	186	516	0	1998	3326	50
2004	143	331	56	373	209	453	64	2042	3671	63
2005			195	399	155	1041	159	5916	7866	83
2006	0	241	25	183	62	823	120	9642	11095	106

Biomass

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	54	28816
1983	844	944	1572	3043	1874	4816	1084		14177	61	10987
1984	306	893	197	518	4934	2284	2088		11220	55	9375
1985	1021	1819	2968	472	1426	9210	2720		19636	34	
1986	1279	1215	752	1230	10122	1705	1762		18065	38	
1987	252	246	660		4954		439		6551	38	
1988	143	404	118	942	2570	1342	383		5902	60	
1989	184	137	273	249	2620		208		3671	47	
1990	41	149	75	275	479		80	1343	2442	45	3904
1991	41	83	24	226	120	272	3	1007	1776	98	2849
1992	20	36	21	61	52	241	69	447	947	130	2022
1993	48	111	19	114	39	55	0		386	68	1247
1994	34	147	47	64	27	36	41	80	476	38	1606
1995					19	19	21	43	102	38	942
1996	61	102	2	60	128	118	8	132	611	40	1421
1997	41	261	5	61	35	188	10	246	847	58	1475
1998	20	43	12	42	14	54	56	117	358	102	1372
1999	54	71	35	68	17	82	8		335	61	1380
2000	68	173	31	215	21	76	3	388	975	96	1856
2001			24	113	54	228	3	776	1198	67	2268
2002			24		157	230	13		424	82	2172
2003			96	174	83	284	0	966	1603	85	2375
2004	61	171	24	181	91	262	41	1235	2066	61	1838
2005			82	201	52	476	118	2986	3915	60	4064
2006	0	72	12	133	32	450	92	6226	7017	78	3932

Table 4 *S. marinus* >= 17 cm. Length composition by year (1 000), 1982-2005.

Length	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
15.5	1003	0	0	0	0	0	0	9	39	50	14	0	0	0	0	0	0	12	0	0	0	0	0	0	0
16.5	955	662	574	2381	1438	30	686	8	24	21	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17.5	1068	629	572	1918	1347	64	321	46	137	87	15	0	0	0	8	12	0	0	30	28	26	27	64	49	19
18.5	884	510	442	1372	1733	51	131	37	58	94	51	35	90	0	22	0	0	22	65	6	26	69	45	123	11
19.5	1170	435	397	1258	1241	76	351	90	45	53	5	95	89	33	16	30	6	31	95	85	44	51	77	219	57
20.5	1334	657	332	1434	1047	95	253	131	74	122	44	147	85	29	425	113	34	41	127	30	34	32	55	371	151
21.5	1701	614	378	1192	940	132	243	109	79	87	147	71	42	30	27	93	5	100	78	52	32	120	61	501	166
22.5	2031	770	418	1320	1155	187	303	140	143	135	80	22	48	15	34	81	68	51	113	97	96	93	88	290	125
23.5	3487	806	465	1285	1140	264	298	214	176	102	87	23	26	11	79	75	33	103	84	63	18	97	95	456	278
24.5	4690	808	532	1119	1787	449	464	320	187	131	148	45	70	11	27	158	76	51	150	74	68	109	153	437	426
25.5	6049	1231	690	1374	1611	381	640	343	251	160	106	110	68	4	63	143	71	64	179	134	31	95	207	485	249
26.5	9267	1408	833	1556	1717	631	765	561	218	186	140	41	91	7	152	124	121	109	199	166	22	85	202	443	276
27.5	####	1509	994	2049	1879	647	798	679	255	171	94	86	70	29	43	155	103	86	115	175	74	160	266	434	289
28.5	####	1690	1315	1781	2213	768	769	732	272	192	81	35	40	18	41	144	36	66	184	219	35	150	256	478	439
29.5	####	1992	1490	2358	2549	937	914	871	221	273	140	16	65	14	34	83	66	75	142	143	32	280	124	431	817
30.5	####	2524	2054	3193	3285	1024	1081	1071	410	141	144	75	44	15	39	120	53	91	138	143	54	199	189	374	835
31.5	####	1941	1978	2321	3090	1155	947	709	327	192	107	41	45	8	23	113	19	109	124	145	13	227	127	219	755
32.5	8118	1797	1928	2873	3224	1028	826	715	268	193	132	49	49	25	8	150	16	10	86	137	60	244	103	229	607
33.5	7888	1422	1684	2080	2926	1235	720	625	204	236	150	35	19	0	148	33	10	21	115	129	47	199	179	240	602
34.5	6925	1188	1424	2144	2505	946	645	430	260	134	129	40	52	0	78	57	82	19	84	77	27	214	172	319	360
35.5	5731	1247	1250	1765	2199	901	721	397	259	185	106	27	53	11	29	78	14	26	95	107	31	107	112	178	321
36.5	3801	980	1052	1446	1321	650	562	329	214	134	61	43	49	31	56	40	5	25	84	107	47	144	181	130	309
37.5	2149	668	683	1211	945	485	467	219	169	156	57	44	0	0	137	17	43	5	76	63	32	96	153	214	359
38.5	1566	650	635	1289	631	251	364	115	130	81	21	20	37	0	0	22	11	5	60	94	36	75	114	199	200
39.5	995	453	379	1091	413	252	252	120	82	114	9	37	39	0	0	38	27	21	24	63	46	52	103	155	520
40.5	472	310	320	1107	415	201	234	51	127	102	62	4	5	0	127	60	7	0	37	24	4	132	129	148	627
41.5	598	259	236	537	222	128	127	27	118	25	5	4	11	0	0	45	6	0	32	52	4	86	64	188	730
42.5	234	231	179	572	84	56	64	11	82	65	17	24	29	15	0	40	0	5	29	40	13	30	127	146	502
43.5	152	222	197	430	94	39	65	22	54	28	14	0	16	0	0	30	5	0	27	18	13	37	57	133	381
44.5	133	101	110	243	40	42	53	15	0	27	0	10	23	0	0	6	5	0	0	18	9	34	91	76	286
45.5	23	106	120	221	22	22	45	0	42	19	0	12	14	0	127	6	15	0	0	6	0	6	7	48	150
46.5	42	119	92	185	25	13	53	0	24	5	0	0	5	0	0	6	5	0	0	0	0	27	31	83	113
47.5	41	48	65	94	17	5	16	0	18	14	0	0	0	0	0	0	0	5	0	0	0	14	7	20	15
48.5	37	85	64	94	0	0	4	0	12	6	0	0	0	0	0	0	0	0	0	6	9	29	0	15	81
49.5	46	23	37	68	0	0	6	4	0	0	0	0	0	0	0	0	0	0	7	0	0	0	17	15	38
50.5	41	73	48	22	9	0	0	4	12	0	0	0	0	0	0	0	0	0	0	0	0	8	0	15	7
51.5	20	20	9	6	0	4	0	4	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0
52.5	9	71	14	11	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53.5	23	89	9	6	4	0	8	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0
54.5	9	50	10	22	8	4	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	7
55.5	18	39	5	17	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56.5	11	47	5	4	0	0	6	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0
57.5	32	16	14	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58.5	18	38	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59.5	5	28	5	6	5	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60.5	9	50	23	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 5 *S. mentella* >= 17cm, abundance (1 000) and biomass (tons) for West Greenland by stratum and total, 1982-2005. Confidence intervals (CI) are given in per cent of the stratified mean at 95% level of significance. GLM 1985-1989 subject to revision.

Abundance

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	65
1983	41	1010	71	2528	0	5236	0		8886	42
1984	41	2966	7	1276	0	1115	0		5405	93
1985	0	369	31	26	56	327	0		809	47
1986	2144	414	38	292	4	444	0		3336	36
1987	987	13679	42		56		0		14764	45
1988	150	3186	26	777	60	4620	0		8819	58
1989	0	186	9	102	0		8		305	60
1990	0	9	5	704	50		0	3881	4649	43
1991	0	0	0	0	0	652	0	1773	2425	81
1992	0	36	0	15	0	106	0	0	157	165
1993	0	23	0	159	8	0	0		190	86
1994	0	271	21	96	95	162	0	36	681	168
1995					29	234	95	1468	1826	55
1996	1524	619	0	236	0	1921	28	7135	11463	64
1997	252	1759	0	381	37	3204	144	30742	36519	62
1998	0	324	0	212	151	828	10	2543	4068	67
1999	34	235	7	281	39	1735	95		2426	43
2000	0	94	7	768	31	1422	0	21187	23509	65
2001			24	636	116	5419	0	13939	20134	66
2002			0		0	1351	23		1374	95
2003			0	571	114	1554	0	9365	11604	116
2004	225	1206	40	1122	242	1115	139	5021	9110	89
2005			40	1042	27	791	77	1123	3100	110
2006	0	1309	63	739	52	1239	48	13311	16761	66

Biomass

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	68	1387
1983	14	213	26	1158	0	2857	0		4268	47	3005
1984	7	798	5	491	0	472	0		1773	97	1728
1985	0	96	14	11	27	110	0		258	35	
1986	225	38	19	110	4	180	0		576	36	
1987	82	1183	9		31		0		1305	46	
1988	20	425	21	159	45	1878	0		2548	56	
1989	0	23	7	15	0		0		45	63	
1990	0	6	2	87	8		0	542	645	44	1830
1991	0	0	0	0	0	153	0	445	598	80	2099
1992	0	2	0	1	0	28	0	0	31	160	1258
1993	0	4	0	22	2	0	0		28	61	2047
1994	0	32	2	10	12	24	0	3	83	128	1306
1995					6	24	10	159	199	52	2067
1996	7	55	0	19	0	235	3	689	1008	59	3793
1997	20	141	0	38	2	320	18	2973	3512	59	3207
1998	0	26	0	17	17	88	3	326	477	73	2636
1999	7	21	5	36	6	188	21		284	52	1077
2000	0	9	0	65	2	122	0	1915	2113	57	2248
2001			2	66	10	469	0	1468	2015	74	3640
2002			0		0	145	3		148	102	1344
2003			0	66	12	223	0	1557	1858	120	4814
2004	34	117	7	122	50	149	23	1172	1674	74	2516
2005			5	125	4	89	23	403	649	109	2173
2006	0	138	7	80	10	260	24	4115	4633	76	4361

Table 6 *S. mentella* >= 17 cm. Length composition by year (1 000), 1982-2005.

Lengtl	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
15.5	0	0	0	0	0	6	0	5	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16.5	0	23	95	29	0	5220	230	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17.5	9	58	140	6	1303	2178	217	14	72	0	0	0	0	0	0	6345	0	0	####	5250	263	874	1286	244	613
18.5	29	51	102	9	442	2794	99	19	83	9	17	6	267	701	3188	9988	1341	987	4518	5763	157	1401	1232	416	720
19.5	6	79	164	41	199	1721	965	64	240	31	25	6	163	366	2675	####	752	479	3353	3910	252	1104	771	363	709
20.5	28	89	149	26	117	1922	748	92	636	9	0	12	76	251	1853	4345	543	380	1903	1827	316	1003	552	399	686
21.5	40	96	155	26	54	272	532	30	1077	71	20	6	30	349	935	1446	408	114	635	655	207	891	683	179	841
22.5	18	143	130	13	98	131	722	25	1544	300	5	19	62	44	721	1034	364	95	733	713	78	1516	510	217	1083
23.5	41	124	194	35	88	84	409	9	640	389	18	6	25	15	328	658	264	49	579	519	37	1613	343	59	1225
24.5	38	184	160	85	106	137	346	0	191	649	28	13	22	39	168	721	120	85	413	498	23	1230	503	76	1105
25.5	105	265	98	76	35	36	355	19	76	607	9	19	0	29	42	262	80	58	264	354	9	325	546	43	943
26.5	83	362	182	52	49	18	320	0	58	165	18	14	5	29	29	111	102	57	214	262	32	290	639	85	786
27.5	231	548	184	37	43	47	319	0	18	93	5	25	0	0	0	151	34	45	130	156	0	405	658	78	865
28.5	181	559	329	46	81	43	265	5	0	38	0	25	12	0	0	28	29	28	85	59	0	386	341	143	923
29.5	315	776	457	38	71	0	296	0	5	19	0	0	5	0	0	6	15	11	59	53	0	250	372	107	1406
30.5	571	1452	742	55	81	52	454	0	0	29	0	12	0	7	0	6	20	9	29	35	0	142	276	283	1582
31.5	391	1179	664	44	61	36	324	0	0	0	0	0	0	0	0	0	0	11	15	30	0	75	141	157	1051
32.5	380	928	522	48	106	24	397	0	0	0	0	6	0	0	0	22	0	0	29	11	0	55	103	68	866
33.5	247	744	440	40	58	6	397	0	0	0	0	0	0	0	0	0	0	5	7	23	0	15	66	102	569
34.5	125	563	245	32	117	6	421	0	0	0	0	0	0	0	0	0	0	0	7	12	0	19	31	47	261
35.5	93	358	139	26	71	0	482	5	0	5	5	13	0	0	0	22	0	0	0	6	0	4	32	9	108
36.5	69	137	51	15	46	6	228	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	7	17	139
37.5	28	71	10	4	27	0	130	6	0	0	0	0	5	0	0	0	0	0	6	0	0	7	7	9	66
38.5	5	28	24	0	36	4	38	0	0	0	5	0	0	0	0	0	0	5	0	0	0	0	10	0	65
39.5	19	10	11	9	13	0	50	5	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	106
40.5	19	6	8	7	0	7	18	0	0	0	0	6	5	0	0	0	0	0	0	0	0	0	0	0	7
41.5	9	14	5	9	14	11	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38
42.5	14	0	0	0	0	4	17	8	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0
43.5	9	6	0	0	9	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44.5	5	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45.5	0	0	5	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46.5	5	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47.5	5	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
49.5	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 7 *Sebastes. spp.* < 17cm, abundance (1 000) and biomass (tons) for West Greenland by stratum and total, 1982-2005. Confidence intervals (CI) are given in per cent of the stratified mean at 95% level of significance.

Abundance

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	44
1983	3954	506	14	138	8	16	21		4657	56
1984	5022	3713	21	219	141	27	13		9156	67
1985	4886	9616	54	2712	47	67	54		17436	164
1986	10738	237636	113	1811	54	218	39		250609	168
1987	12453	113990	5		19		18		126485	87
1988	19680	42481	0	107	19	139	0		62426	41
1989	7717	13159	3071	5370	17		69		29403	35
1990	11255	35933	15416	1538	72		6199	848	71261	52
1991	51936	59846	34872	22668	13692	2508	891	1540	187953	38
1992	25716	19083	12690	17276	17463	13973	41	13718	119960	54
1993	5458	39035	665	11331	355	2773	13		59630	111
1994	3403	12003	9828	4014	1190	1730	10842	9867	52877	95
1995					399	10236	855	34695	46185	106
1996	456	14356	5210	9377	26961	11571	2488	107236	177655	98
1997	6519	47117	0	15852	43421	20194	444	68931	202478	62
1998	1558	25350	50177	30834	55983	13090	37049	13318	227359	100
1999	3886	54143	1067	8617	1105	7643	758		77219	48
2000	1293	9958	63	3052	393	8195	0	33103	56057	62
2001			1318	3559	110	2432	8	1484	8911	24
2002			1255		145	1523	23		2946	85
2003			390	7090	114	1674	15	1054	10337	79
2004	6676	12206	343	4706	112	1083	10	1089	26225	154
2005			118	2628	54	778	0	342	3920	176
2006	1697	26157	264	2186	73	962	168	603	32110	72

Biomass

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	41
1983	102	21	0	6	0	1	0		130	52
1984	88	105	0	5	6	1	0		205	73
1985	82	367	2	58	2	3	0		514	142
1986	456	6646	2	77	2	6	0		7189	168
1987	265	5020	0		0		0		5285	93
1988	218	1492	0	3	0	5	0		1718	56
1989	109	271	21	49	0		0		450	42
1990	102	369	63	20	0		10	2	566	58
1991	197	798	73	242	29	24	3	15	1381	46
1992	150	386	49	111	74	220	0	64	1054	54
1993	75	512	16	265	6	76	0		950	90
1994	27	216	54	57	29	64	141	277	865	132
1995					6	330	10	348	694	97
1996	7	284	14	117	91	297	18	3300	4128	96
1997	61	344	0	214	163	544	15	2437	3778	81
1998	20	433	165	322	221	351	141	531	2184	120
1999	54	941	14	190	17	272	18		1506	47
2000	27	252	2	106	14	284	0	1414	2099	61
2001			7	65	6	90	0	71	239	29
2002			12		2	29	0		43	83
2003			9	138	2	40	0	26	215	53
2004	54	348	9	140	4	70	0	22	647	160
2005			2	69	0	19	0	3	93	179
2006	40	696	7	60	2	21	8	33	867	72

Table 8 *Sebastes spp.* < 17 cm. Length composition by year (1 000), 1982-2005.

Length	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
0.5	0	0	0	0	0	0	0	0	0	0	0	0	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	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	0	0	0	0	0	0	0	0	0	0	0	0
3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.5	0	0	0	0	6	0	7	0	14	59	0	0	0	0	0	0	0	0	0	6	0	0	0	0	4
5.5	0	6	255	25	36	121	97	39	3468	15519	2396	0	2392	26	236	622	182	1235	186	146	65	243	329	28	251
6.5	6	78	584	111	97	850	486	1814	5708	59602	30723	117	9939	193	7127	32049	44724	3401	639	1202	699	1344	4039	178	1590
7.5	0	219	179	185	460	1393	1940	2111	2758	11107	27896	200	1053	142	28816	54642	1E+05	232	411	1564	791	1115	7585	683	996
8.5	70	518	425	326	1913	902	9815	2176	8484	15958	5799	1935	4092	540	7089	2405	4670	126	87	58	97	60	1041	161	89
9.5	57	579	835	2161	4221	658	7404	4284	11835	23919	11346	9480	9035	616	7908	4589	3927	3177	1114	123	117	120	98	18	1288
10.5	96	359	1432	4165	8595	941	3378	5703	6994	36922	8922	8916	5238	935	28169	13241	10533	27661	1800	502	308	1007	403	168	4769
11.5	259	594	2151	1470	19713	2445	1453	4835	7050	16197	5788	5980	2909	5090	17615	11127	4294	23335	566	582	162	2030	1023	692	6865
12.5	188	719	1284	508	1E+05	7017	1560	3156	7575	2388	7518	9527	6043	9656	12200	6785	2104	3134	4074	356	82	1614	612	604	3432
13.5	114	511	679	1599	76491	8666	3244	2148	6284	1648	11461	5614	4357	4247	17440	20084	6322	4979	13437	729	105	628	476	215	1042
14.5	384	464	681	2716	14063	18412	8866	1020	4611	1196	6078	6021	2686	7343	11415	26222	10205	4558	14810	824	214	802	2450	390	4212
15.5	460	609	650	4173	4189	47210	13645	709	3556	1549	1220	5822	2401	8718	11658	16131	5645	1482	9324	955	188	780	5131	451	4931
16.5	0	0	0	0	5121	31716	4826	572	944	1005	391	3914	1329	5090	16748	14577	5203	1764	9607	1864	124	593	3040	332	2640
17.5	0	0	0	0	6513	6136	2998	505	654	591	379	2105	1241	3545	11162	0	4585	2139	0	0	0	0	0	0	0
18.5	0	0	0	0	1400	0	2514	307	824	218	46	0	68	44	58	0	0	0	0	0	0	0	0	0	0
19.5	0	0	0	0	930	0	194	24	133	32	0	0	47	0	15	0	0	0	0	0	0	0	0	0	0
20.5	0	0	0	0	0	0	0	0	133	13	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0

Table 9 *Hippoglossoides platessoides*, abundance (1 000) and biomass (tons) for West Greenland by stratum and total, 1982-2005. Confidence intervals (CI) are given in per cent of the stratified mean at 95% level of significance.

Abundance

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	30
1983	46601	6482	55493	2871	2725	461	811		115444	49
1984	18251	6258	53766	4366	2928	2244	1792		89605	43
1985	21388	5974	22819	6185	2632	239	3161		62398	23
1986	22035	11393	58741	9556	2936	2388	4463		111512	39
1987	23321	3314	26226		2357		1030		56248	26
1988	10963	3476	8025	5698	3566	800	1035		33563	18
1989	9370	4454	11362	3775	8764		1446		39171	28
1990	8615	6465	8227	2614	1083		1492	606	29102	25
1991	7826	4537	5168	1899	1517	639	1248	952	23786	17
1992	8527	4996	3020	2704	1233	1707	1744	175	24106	28
1993	5859	3284	1201	1212	632	694	398		13280	17
1994	2212	3525	1488	1514	624	282	1661	189	11495	21
1995					891	1189	1019	785	3884	18
1996	3716	1337	956	1424	1946	772	1566	472	12189	17
1997	8656	3262	2585	3543	2973	1288	2427	109	24843	21
1998	6254	3956	5654	2873	1767	865	2296	204	23869	17
1999	5410	2675	5013	2904	1835	389	1356		19582	20
2000	2273	3929	1953	3302	1016	361	1197	36	14067	18
2001			11195	3831	1275	394	3616	182	20493	23
2002			6820		1203	2138	1718		11879	23
2003			20675	9700	1140	2170	1633	15	35333	34
2004	23681	7048	18111	6319	998	1120	1741	50	59068	24
2005			16344	8276	1459	1087	950	606	28722	32
2006	4579	4563	9006	7031	1139	1156	1189	44	28707	25

Biomass

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	32	8425
1983	7451	1155	11771	607	1008	88	167		22247	41	9855
1984	1701	762	8662	807	607	387	365		13291	45	10482
1985	1939	600	3861	1062	519	49	321		8351	22	7497
1986	2150	1147	8429	1385	703	452	460		14726	30	11900
1987	3130	339	5471		645		229		9814	30	8077
1988	919	293	1699	807	814	137	236		4905	19	4468
1989	517	297	1476	371	2120		288		5069	40	3710
1990	395	397	1220	314	213		288	221	3048	22	3541
1991	347	399	486	260	266	125	187	173	2243	18	3790
1992	578	419	228	183	151	250	152	25	1986	26	2655
1993	327	222	82	102	66	70	26		895	17	2185
1994	143	416	134	143	64	34	108	28	1070	25	1567
1995					70	154	123	58	405	20	4061
1996	211	100	66	164	159	78	149	38	965	22	2973
1997	490	265	209	343	353	168	185	7	2020	27	3273
1998	306	252	355	244	186	122	185	19	1669	20	2615
1999	245	160	331	268	180	35	85		1304	26	2057
2000	122	331	136	309	105	38	49	6	1096	22	1903
2001			637	297	109	45	149	12	1249	22	2937
2002			390		122	200	113		825	22	2832
2003			1462	922	124	258	126	3	2895	35	3908
2004	1613	581	1629	753	136	175	221	4	5112	22	4529
2005			2115	1398	238	134	149	79	4113	32	4623
2006	256	429	975	1036	136	114	218	9	3171	37	3261

Table 10 *Hippoglossoides platessoides*. Length composition by year (1 000), 1982-2005.

Length	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
0.5	0	0	0	0	0	0	0	0	0	0	0	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	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	0	0	0	0	0	0	0	0	0	0		0
3.5	0	0	0	0	0	10	0	0	0	0	0	0	0	0	11	73	0	6	0	0	0	0	0		0
4.5	0	0	0	0	0	10	7	0	5	10	0	0	7	0	0	108	14	87	5	44	17	0	198		18
5.5	0	0	0	127	19	0	22	0	0	27	0	0	0	0	0	0	0	43	0	6	0	0	141		0
6.5	0	0	0	9	19	41	33	10	0	87	14	0	0	0	0	0	51	94	71	0	13	0	0	0	0
7.5	13	0	10	74	9	58	52	19	32	251	68	0	14	0	21	20	506	546	182	134	52	0	28	40	42
8.5	7	20	36	57	43	84	103	43	44	170	123	7	93	0	29	20	353	336	146	196	50	0	36	63	6
9.5	20	14	53	142	64	90	181	36	161	253	163	136	34	9	39	71	194	435	146	234	99	107	194	40	182
10.5	20	29	86	403	154	359	235	212	370	273	505	251	57	27	318	155	139	635	177	525	200	151	203	58	401
11.5	59	46	148	364	333	367	473	514	569	620	618	430	74	19	115	189	278	1059	413	757	198	233	278	0	661
12.5	150	228	368	381	751	540	749	813	1060	1087	846	913	353	88	181	842	406	1226	602	979	290	315	1719	9	914
13.5	302	404	940	610	1187	668	873	1275	1875	1106	731	904	576	34	362	1238	757	798	919	1585	571	1352	3930	418	934
14.5	420	978	1283	1067	2197	1142	1060	1742	2629	1291	1024	654	835	31	606	1692	1163	1055	997	2027	768	1804	4533	1007	1147
15.5	793	1976	2023	1674	3597	1177	1130	2215	2556	1399	1627	977	1276	142	981	2604	2321	1275	1260	2161	1059	3389	4322	1330	1889
16.5	814	2232	2567	2443	6220	1047	1365	2093	2259	1863	1663	1110	1204	241	1481	2180	2527	1169	1205	2061	1394	4056	4679	2205	1527
17.5	1340	3336	3768	3631	7906	1625	1159	2007	1883	1771	1901	1109	882	287	996	1789	3035	1076	945	1690	1363	3488	4258	2089	1957
18.5	1661	3934	4833	4281	8122	2132	1715	1778	1658	1593	1788	1079	634	338	1078	1663	2205	1178	812	1647	1113	2658	4689	2045	1440
19.5	2054	5257	4170	3890	8619	2716	1658	1905	1407	1320	1851	705	488	360	715	1556	1794	1141	601	1042	867	2898	3564	1719	1771
20.5	2839	8731	5896	4259	9066	3088	1984	2012	1414	1317	1254	827	587	379	580	1572	1286	1250	636	1161	723	1867	3374	1214	1984
21.5	2737	8334	5740	3752	9715	3140	1802	1866	1008	1218	1292	593	463	308	712	1043	966	1329	488	878	607	2047	3086	1362	1351
22.5	3541	7697	5159	3992	9279	3253	1803	1537	937	942	1342	476	439	217	649	1112	798	783	541	416	284	1440	2106	861	1513
23.5	2976	7502	7171	3398	7120	3593	1654	1685	900	1052	1217	442	428	290	654	932	692	643	625	423	330	1534	2354	1008	1451
24.5	3802	6773	4220	3281	6310	3085	1431	1878	807	934	857	409	415	110	451	1091	741	707	528	331	302	1301	2414	1116	1066
25.5	4532	6553	4913	3029	4428	2976	1711	2005	811	919	1086	481	566	119	434	785	665	429	562	209	360	1445	2548	1291	874
26.5	4872	8563	4609	2408	3495	2580	1722	1886	889	735	1050	335	430	198	485	826	754	419	386	404	209	1060	2030	1652	889
27.5	5366	7078	5200	2450	3485	3308	1233	2129	1035	687	552	324	367	117	217	668	526	538	353	347	163	1121	1770	1416	934
28.5	5300	6700	6410	2546	2934	2547	1189	1386	914	600	671	335	247	70	394	770	521	367	365	380	86	648	1869	1305	1124
29.5	5035	4102	4824	2949	3145	2868	1342	1866	1238	454	597	206	259	119	221	502	348	232	198	257	143	926	1946	1372	891
30.5	5532	5194	4645	2974	3235	3332	1687	1644	967	484	427	199	237	73	184	510	330	271	249	211	180	511	1081	1291	999
31.5	4302	3381	2769	2243	2910	2714	1369	1251	479	365	215	113	231	106	83	379	206	132	177	114	91	401	433	923	744
32.5	3799	3120	2114	1580	2173	2298	1306	1042	285	312	337	141	133	87	34	156	118	152	223	118	100	241	460	739	766
33.5	2655	2328	2099	1669	1803	1993	841	770	447	182	119	9	60	44	97	116	58	50	81	77	78	141	180	608	417
34.5	2421	2278	1176	1093	1307	1158	592	628	202	167	67	77	60	19	31	65	44	49	76	50	77	61	297	505	219
35.5	2516	2012	749	552	781	851	410	325	121	144	86	17	32	31	20	23	10	40	25	22	32	34	139	332	312
36.5	2043	1818	500	355	358	637	318	200	67	57	21	12	11	11	12	47	24	30	39	0	32	73	69	229	161
37.5	1655	1352	375	244	264	351	198	195	32	19	0	12	5	7	0	0	27	9	24	0	5	8	62	267	67
38.5	1143	1051	291	135	184	135	67	77	37	31	5	0	5	4	0	51	5	0	0	0	5	13	63	85	35
39.5	915	512	210	128	101	132	61	46	5	18	0	0	0	0	0	0	10	0	0	5	13	0	9	63	0
40.5	940	754	84	79	55	73	4	49	4	5	0	0	0	4	0	0	0	0	5	0	0	0	0	44	21
43.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	0

Table 11 *Anarhichas lupus*, abundance (1 000) and biomass (tons) for West Greenland by stratum and total, 1982-2005. Confidence intervals (CI) are given in per cent of the stratified mean at 95% level of significance.

Abundance

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	23
1983	7567	3186	1720	485	1471	211	786		15426	24
1984	5777	1277	1542	185	1382	111	750		11024	26
1985	5369	2718	1419	370	955	999	907		12737	19
1986	4961	1704	1967	635	1500	511	811		12089	19
1987	5328	1644	888		1023		691		9574	15
1988	4927	1834	895	449	1136	555	758		10554	21
1989	3675	673	1669	516	2901		1130		10564	21
1990	3511	1076	1981	295	1899		1066	612	10440	17
1991	2838	1010	968	756	2593	639	562	494	9860	21
1992	3015	376	1509	937	3360	916	948	2107	13168	26
1993	4723	1712	703	426	574	326	385		8849	28
1994	1545	1196	1725	567	1225	153	4515	1047	11973	48
1995					1349	563	529	705	3146	26
1996	715	942	254	381	2574	622	799	1075	7362	21
1997	3001	1279	1126	335	3771	1149	1538	2863	15062	30
1998	3083	957	783	653	1990	620	1009	1047	10142	21
1999	4457	1138	1941	653	6287	1337	801		16614	29
2000	1980	1725	402	413	2072	1116	480	2652	10840	21
2001			973	1110	3800	1160	724	1774	9541	28
2002			3001		3351	403	552		7307	22
2003			1307	1714	7345	511	575	1468	12920	27
2004	8234	2071	1718	826	3238	953	1271	1744	20055	20
2005			3565	462	6264	1138	2517	625	14571	27
2006	1759	1304	1529	769	1481	1019	1477	1301	10640	24

Biomass

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	31	12879
1983	3661	3442	2084	471	1769	271	1086		12784	31	7516
1984	3089	673	1283	189	820	71	871		6996	24	6293
1985	1837	1134	1020	200	581	557	632		5961	16	5524
1986	1783	912	1441	434	973	458	768		6769	16	7160
1987	2191	521	573		1048		616		4949	16	6407
1988	1102	384	797	298	882	341	696		4500	16	4649
1989	687	222	620	246	1750		1037		4562	19	3994
1990	708	177	496	111	655		660	320	3127	16	3467
1991	456	166	160	161	674	148	249	214	2228	20	2494
1992	436	79	322	237	831	200	231	630	2966	27	3129
1993	646	314	101	80	130	67	108		1446	22	2123
1994	218	209	376	97	285	26	865	171	2247	42	2102
1995					248	68	131	114	561	25	2915
1996	61	261	42	68	486	114	169	238	1439	19	3489
1997	306	239	89	77	665	164	352	372	2264	24	3471
1998	361	194	125	146	287	97	175	266	1651	16	2565
1999	327	273	322	146	1039	230	136		2473	23	3509
2000	231	297	63	88	349	168	172	560	1928	22	2300
2001			209	263	1006	218	185	579	2460	25	4943
2002			578		859	91	146		1674	21	3623
2003			486	438	2475	141	200	646	4386	26	6000
2004	1327	389	550	242	971	299	758	652	5188		5888
2005			1372	165	1812	299	1284	384	5316	27	6037
2006	279	306	682	302	614	196	1110	821	4311	23	4825

Table 12 *Anarhichas lupus*. Length composition by year (1 000), 1982-2005.

Length	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
0.5	0	0	0	0	0	0	0	0	0	0	0	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	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	0	0	0	0	0	0	0	0	0	0		0
3.5	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0
4.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0
5.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0	0		0
6.5	0	0	0	0	19	10	3	0	33	86	0	29	20	0	0	0	85	134	0	0	88	0	104	13	22
7.5	0	0	0	76	19	92	7	22	74	241	8	61	37	0	77	330	186	567	25	44	241	23	164	406	88
8.5	13	0	3	32	39	26	52	31	62	214	75	0	14	0	81	180	186	389	36	89	179	43	112	94	64
9.5	0	0	0	4	20	70	120	45	35	245	97	20	28	0	81	223	201	480	105	70	38	18	128	0	86
10.5	0	0	15	34	50	102	134	64	159	199	112	251	43	15	15	388	231	475	110	39	115	68	205	57	181
11.5	0	6	0	26	125	186	103	97	173	112	194	267	163	51	91	242	110	432	96	58	156	13	258	81	106
12.5	18	0	3	46	138	69	199	100	241	212	252	172	28	82	69	405	280	396	177	129	253	60	220	158	159
13.5	0	0	4	36	59	96	134	71	325	231	346	271	245	88	153	561	435	670	124	145	212	87	433	137	88
14.5	52	29	55	34	49	226	243	187	321	188	396	305	322	70	130	716	517	666	146	108	132	214	550	84	48
15.5	41	14	44	71	239	179	190	237	289	292	333	659	404	24	143	583	350	623	143	112	192	164	475	179	65
16.5	50	41	71	22	195	247	199	300	448	286	243	522	631	116	140	543	343	671	410	163	170	107	561	303	55
17.5	88	97	85	89	299	404	273	313	426	376	512	492	867	158	252	638	410	595	584	275	124	171	574	369	167
18.5	72	146	154	92	312	255	324	257	480	278	770	631	656	188	429	834	543	855	584	447	186	268	647	438	381
19.5	84	156	261	167	199	221	566	371	367	339	556	345	678	171	419	827	435	808	766	340	266	355	758	311	345
20.5	202	306	252	110	200	259	545	388	498	559	659	408	889	216	444	771	712	842	780	414	172	401	886	475	221
21.5	134	273	251	231	151	309	616	396	420	604	566	462	714	198	316	701	462	879	775	380	251	435	1128	509	519
22.5	208	291	388	183	172	295	530	279	358	336	785	392	574	236	361	831	409	607	635	409	454	331	1167	479	341
23.5	151	321	384	244	126	131	315	334	247	407	650	232	532	295	402	787	386	708	778	530	304	643	1059	384	400
24.5	406	220	362	315	170	176	326	512	294	374	514	176	585	155	363	621	350	513	488	360	317	635	1144	634	501
25.5	348	318	436	367	232	144	336	470	416	413	950	317	714	98	379	557	438	580	509	472	383	620	872	425	379
26.5	311	375	362	335	289	253	257	438	251	352	563	345	375	137	311	345	329	588	474	442	205	363	874	716	453
27.5	357	416	336	408	275	142	182	317	295	338	496	155	270	55	305	321	338	465	419	458	196	590	714	575	348
28.5	382	519	354	441	359	90	107	343	282	370	457	198	450	157	302	409	168	436	346	373	312	528	778	492	453
29.5	404	381	291	494	386	157	166	330	300	253	469	271	272	37	248	405	200	461	251	391	288	390	515	475	385
30.5	343	553	283	549	371	247	197	210	364	267	332	302	348	62	286	377	277	379	242	310	214	527	432	441	331
31.5	381	361	382	525	457	218	103	147	311	207	338	268	212	48	181	312	162	272	163	325	159	411	452	466	331
32.5	396	513	277	518	431	294	173	323	187	258	270	150	208	108	134	375	109	282	131	329	113	480	547	492	307
33.5	404	499	269	716	499	244	127	110	189	165	191	208	141	15	167	344	230	240	195	307	208	507	291	446	310
34.5	454	333	326	496	439	274	125	141	108	228	261	187	188	33	152	258	64	200	158	286	161	559	469	405	237
35.5	449	452	354	531	475	287	137	262	201	200	339	88	280	29	73	96	209	178	64	197	171	425	499	387	214
36.5	335	447	321	505	394	170	210	174	140	64	183	107	192	28	103	155	166	176	147	158	92	343	288	357	281
37.5	453	314	319	443	411	305	134	216	165	138	142	75	111	22	113	74	94	107	131	181	121	413	254	339	172
38.5	307	245	295	609	388	173	145	230	134	189	184	61	142	29	99	113	85	116	128	155	95	300	294	317	200
39.5	447	310	163	402	403	201	190	135	139	65	91	128	138	14	82	170	133	145	91	144	84	372	316	447	186
40.5	377	507	302	467	405	210	254	218	224	155	181	22	111	33	113	90	58	133	69	127	101	396	301	422	200
41.5	398	306	174	448	403	239	300	161	177	78	79	22	64	52	77	103	87	115	44	122	54	224	132	169	186
42.5	480	321	192	373	338	280	271	163	131	82	147	0	27	7	53	67	40	84	64	147	51	393	133	282	120
43.5	442	263	215	178	296	214	152	212	143	82	86	72	62	33	76	73	23	34	81	76	28	250	178	301	173
44.5	444	295	158	265	290	166	224	275	104	70	70	41	31	15	36	79	27	63	86	59	57	228	290	196	229
45.5	562	365	248	292	312	207	249	236	155	57	70	66	67	15	21	18	57	80	33	69	28	176	143	170	79
46.5	527	275	229	190	316	206	296	195	131	6	61	23	38	0	22	25	62	26	42	63	41	63	82	127	181
47.5	569	299	143	149	221	290	169	166	80	53	33	3	34	25	15	19	7	11	20	25	37	127	170	106	144
48.5	645	295	189	220	166	213	189	143	159	45	41	9	16	0	0	25	24	12	61	22	37	76	110	156	73
49.5	680	263	178	110	107	198	196	131	61	19	0	6	20	0	16	0	35	64	33	47	32	15	58	223	174
50.5	864	320	190	154	158	165	189	107	95	33	0	0	7	24	6	27	12	6	17	55	28	7	59	193	77
51.5	830	380	208	101	108	97	153	63	62	14	32	0	0	0	0	30	0	11	39	30	42	12	59	83	127
52.5	855	338	173	78	133	107	54	198	27	19	25	0	5	0	0	0	0	0	12	26	42	65	18	53	113
53.5	580	362	118	97	87	115	95	111	41	33	12	17	28	0	21	12	14	17	0	5	28	0	56	65	102
54.5	662	383	125	66	75	64	56	41	6	7	0	0	0	0	0	0	9	12	11	17	4	0	13	62	41
55.5	846	347	141	77	21	66	65	56	23	12	0	0	0	0	0	0	14	9	0	11	15	0	41	31	81
56.5	712	343	144	39	34	31	52	35	11	0	0	7	0	7	15	0	0	6	21	0	13	31	7	0	19
57.5	818	289	71	39	55	22	15	68	13	6	0	0	0	0	0	0	0	0	0	0	15	0	0	8	38
58.5	587	299	114	23	17	34	37	33	13	0	0	0	0	0	0	0	5	0	0	6	0	8	0	0	12
59.5	606	231	95	78	31	0	10	4	6	0	0	14	0	0	0	8	0	0	0	0	0	0	7	0	21
60.5	552	207	60	16	21	45	14	37	15	18	0	0	0	0	0	0	28	0	0	6	0	0	0	19	7

Table 13 *Anarhichas minor*, abundance (1 000) and biomass (tons) for West Greenland by stratum and total, 1982-2005. Confidence intervals (CI) are given in per cent of the stratified mean at 95% level of significance.

Abundance

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	29
1983	184	38	148	3	89	39	367		868	32
1984	184	60	176	14	89	23	241		787	30
1985	204	115	106	4	29	61	110		629	33
1986	483	203	108	38	68	16	118		1034	22
1987	306	211	63		130		239		949	28
1988	231	150	45	15	145	33	316		935	25
1989	245	130	49	25	281		110		840	34
1990	109	201	38	19	99		152	6	624	27
1991	333	141	26	33	54	4	74	50	715	27
1992	41	47	14	107	37	23	13	29	311	63
1993	82	222	49	51	37	17	69		527	35
1994	61	109	61	62	21	9	28	7	358	79
1995					14	4	18	0	36	73
1996	0	56	54	38	17	11	0	7	183	45
1997	102	58	16	38	60	16	49	73	412	46
1998	116	28	26	11	27	23	39	44	314	55
1999	34	83	56	38	50	19	21		301	56
2000	218	164	26	88	37	11	44	44	632	28
2001			47	27	87	5	44	12	222	49
2002			101		72	23	0		196	32
2003			63	32	31	8	15	7	156	52
2004	143	60	63	80	64	23	108	80	621	32
2005			118	70	37	14	270	29	538	42
2006	437	14	88	46	166	36	132	94	1013	73

Biomass

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	43	4533
1983	1674	256	656	5	562	183	2357		5693	37	4030
1984	851	196	1036	15	448	55	1358		3959	34	3649
1985	14	119	569	0	134	307	681		1824	44	1674
1986	1157	307	566	63	370	36	1004		3503	27	2856
1987	653	126	334		1029		2034		4176	29	3707
1988	136	85	195	87	1141	101	3010		4755	38	4222
1989	374	32	167	40	1382		847		2842	36	2115
1990	82	83	200	7	667		1217	3	2259	31	2278
1991	27	30	2	9	252	5	724	179	1228	41	1134
1992	7	6	0	7	29	4	36	35	124	104	1003
1993	68	40	16	33	35	16	211		419	42	599
1994	27	24	75	25	10	1	141	3	306	76	1079
1995					66	40	218	0	324	64	840
1996	0	137	33	42	39	7	0	10	268	68	1431
1997	75	9	26	38	37	2	23	57	267	69	489
1998	20	2	103	26	118	3	252	49	573	61	807
1999	34	43	141	30	109	13	113		483	61	678
2000	218	96	108	167	225	86	198	177	1275	38	1270
2001			157	65	516	38	229	56	1061	42	1455
2002			197		535	99	0		831	55	1533
2003			247	73	91	53	56	113	633	45	1095
2004	116	40	289	186	455	188	557	539	2370	33	2228
2005			416	324	347	152	1487	205	2931	41	3569
2006	1237	16	254	188	808	192	415	537	3647	58	3875

Table 14 *Anarhichas minor*. Length composition by year (1 000), 1982-2005.

Length	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
10.5	0	0	0	0	0	13	22	0	5	32	0	0	0	0	11	0	0	0	12	0	0	0	0	0	0
11.5	0	0	0	26	9	0	3	4	0	0	0	15	0	0	0	0	0	6	0	0	0	0	0	0	42
12.5	0	0	0	33	0	0	0	0	10	28	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0
13.5	0	0	0	29	0	10	22	0	24	61	0	57	5	0	0	0	0	0	52	0	0	0	0	0	0
14.5	0	0	10	66	19	0	7	12	0	82	14	23	20	0	0	0	43	0	69	0	0	0	0	0	0
15.5	0	0	0	21	54	10	15	0	10	67	8	17	37	0	0	0	0	12	20	0	0	0	0	0	0
16.5	0	0	0	0	19	10	7	33	0	6	20	32	12	0	0	19	0	0	12	0	0	0	0	0	0
17.5	0	0	0	40	4	16	14	3	0	19	27	36	12	0	11	26	0	0	27	0	5	0	0	0	0
18.5	0	0	10	26	0	6	14	9	18	33	20	28	0	0	0	0	0	6	0	0	0	0	0	0	0
19.5	0	0	0	0	0	0	7	0	10	4	0	12	12	0	0	12	5	6	0	0	0	0	0	0	0
20.5	0	0	0	26	17	6	7	0	10	0	5	15	7	0	0	24	11	0	0	0	0	0	0	0	0
21.5	0	0	0	0	0	13	15	13	24	14	0	12	11	0	0	0	7	5	0	0	13	0	29	0	0
22.5	19	0	0	40	19	13	14	23	40	20	12	35	5	0	0	0	0	0	0	0	0	0	4	0	0
23.5	0	0	5	4	27	6	10	4	0	6	0	25	26	0	0	7	5	0	6	0	0	6	0	0	42
24.5	0	0	4	0	40	6	3	33	4	6	49	12	26	0	14	5	12	0	0	9	0	0	0	0	85
25.5	0	0	0	0	44	6	22	0	0	20	0	0	5	0	0	5	7	0	35	0	0	0	39	0	42
26.5	6	0	0	0	73	0	7	13	0	0	27	6	0	0	0	7	0	0	11	5	13	0	7	0	0
27.5	0	0	0	7	28	10	0	0	5	4	8	12	0	0	0	5	0	0	6	0	0	8	10	0	0
28.5	0	0	0	4	37	16	3	3	0	26	13	0	0	0	0	0	14	12	35	0	0	0	4	0	0
29.5	0	0	0	7	0	19	0	0	0	13	0	3	0	0	0	0	0	12	0	0	0	0	8	11	0
30.5	0	0	0	0	27	0	7	10	14	0	24	6	0	0	0	0	5	0	0	6	0	0	4	0	0
31.5	0	0	5	0	20	13	25	13	10	0	0	23	16	0	0	12	0	12	0	0	0	0	4	0	42
32.5	0	0	0	0	33	26	10	0	0	6	0	6	7	0	0	0	0	5	6	0	13	0	0	0	0
33.5	0	0	10	0	0	16	10	0	0	0	0	0	0	0	8	0	0	11	0	0	0	0	6	0	0
34.5	6	0	10	0	8	6	3	0	0	20	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0
35.5	19	0	0	0	0	0	17	9	0	6	7	0	15	0	0	54	0	5	0	0	0	0	0	0	0
36.5	0	0	5	0	0	6	3	9	10	13	19	0	0	0	0	27	0	0	0	0	13	0	0	7	13
37.5	0	0	5	0	0	0	22	0	6	6	0	0	7	0	0	0	0	5	0	0	0	0	10	0	8
38.5	0	0	0	0	5	16	17	0	0	6	8	0	5	0	0	21	0	0	0	0	0	0	0	0	0
39.5	6	0	21	0	0	13	7	0	0	0	0	0	0	0	0	0	0	5	6	0	0	0	0	0	0
40.5	0	0	0	7	19	10	9	24	0	14	0	0	5	0	6	0	0	6	7	0	0	0	18	0	0
41.5	0	1	0	0	4	6	0	0	0	0	0	0	0	0	19	12	0	12	0	0	0	0	33	0	0
42.5	25	0	0	0	0	0	3	0	10	0	0	0	12	0	11	0	15	0	0	5	13	0	4	0	0
43.5	13	0	14	0	17	10	10	0	0	0	0	0	19	0	0	22	29	0	6	0	0	0	0	0	12
44.5	6	0	10	4	13	0	0	4	10	0	0	0	7	0	0	0	0	0	0	6	0	6	0	0	0
45.5	25	0	0	7	0	0	0	29	0	0	0	0	24	0	14	64	0	0	0	0	0	6	4	10	0
46.5	0	0	11	7	0	20	0	0	5	0	8	0	0	0	0	29	0	12	0	0	0	0	0	20	10
47.5	17	1	20	4	0	0	0	0	15	0	0	0	0	0	0	0	0	6	0	0	0	0	0	10	27
48.5	0	0	0	0	0	0	7	41	10	0	0	3	0	0	25	0	0	12	0	0	0	0	0	34	0
49.5	19	0	5	0	16	20	0	29	0	4	0	9	5	7	0	0	0	45	0	0	0	13	51	0	21
50.5	0	0	5	0	12	0	3	0	4	0	25	0	10	0	0	0	0	0	12	0	13	0	14	34	0
51.5	10	10	0	7	12	0	3	10	0	6	0	0	0	0	11	0	0	5	0	0	0	0	10	16	12
52.5	21	0	4	31	4	0	7	20	14	0	0	0	0	0	7	0	0	0	0	0	0	0	19	0	13
53.5	18	0	0	4	0	4	4	0	0	0	0	10	0	0	0	0	0	5	0	0	0	10	0	0	4
54.5	16	7	4	0	0	0	3	9	0	7	0	12	0	0	8	28	0	0	0	0	0	0	0	0	19
55.5	28	1	13	0	16	4	14	18	5	0	0	0	15	0	0	0	0	0	21	0	0	0	0	0	37
56.5	10	1	0	4	12	0	0	0	0	0	0	0	0	0	0	0	9	12	6	0	0	0	44	10	0
57.5	11	0	19	10	8	0	11	9	4	0	0	0	0	0	0	0	0	5	6	0	0	10	8	0	13
58.5	44	3	12	4	0	0	0	0	0	0	0	0	0	0	0	8	0	5	0	5	0	0	4	0	0
59.5	19	25	0	0	0	0	10	0	0	0	0	30	0	0	0	15	10	6	0	12	0	0	6	0	0
60.5	19	6	8	0	13	4	10	36	0	0	0	0	0	0	8	0	7	0	0	12	0	0	0	0	0
61.5	22	25	20	6	16	24	0	3	0	0	0	0	0	0	0	0	15	0	0	0	0	0	8	25	19
62.5	30	17	16	4	4	20	4	3	5	7	0	6	0	0	0	0	7	5	6	0	0	13	8	0	0
63.5	13	1	15	4	4	20	14	4	0	0	0	0	0	0	0	0	0	0	6	0	0	0	8	0	26
64.5	29	21	4	0	4	0	14	9	27	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	8
65.5	59	26	13	8	0	4	0	20	9	0	0	0	0	0	14	0	9	0	0	6	0	0	0	17	4
66.5	35	12	23	4	4	6	0	4	9	0	0	0	0	0	0	0	0	12	0	6	0	13	0	0	21
67.5	14	5	12	0	0	6	0	3	0	12	0	0	0	0	0	0	0	0	5	0	0	0	0	5	0
68.5	40	25	14	0	8	5	4	0	15	6	0	0	0	0	0	0	0	6	0	11	0	0	0	10	10
69.5	18	21	13	4	5	0	11	0	10	0	13	0	0	0	0	0	10	0	12	6	14	0	0	0	36
70.5	21	8	22	10	4	24	3	13	5	0	7	14	0	0	0	0	0	0	12	12	0	0	0	25	24
71.5	37	21	7	8	15	9	6	0	5	7	0	0	0	0	0	0	0	0	0	6	0	15	11	15	4
72.5	25	31	32	4	14	20	4	7	9	7	0	0	0	0	0	0	0	6	29	0	0	0	0	10	10
73.5	39	20	25	6	17	21	0	0	0	0	0	0	0	0	0	0	0	6	0	6	0	0	0	25	0
74.5	28	20	8	4	21	0	11	77	4	6	0	0	0	0	0	0	0	0	12	9	9	0	4	30	13
75.5	17	18	9	8	9	5	8	31	10	0	0	0	0	0	0	0	0	0	7	6	0	10	4	10	0
76.5	19	7	4	8	4	10	3	27	5	0	0	0	0	0	6	0	0	0	11	0	0	0	0	10	7
77.5	17	27	36	7	5	0	4	8	0	0	0	0	0	0	0	0	0	11	42	9	13	0	15	0	18
78.5	24	25	27	4	0	28	0	22	10	0	0	7	0	0	0	0	0	6	0	6	0	13	21	5	0
79.5	13	40	5	4	14	9	4	0	9	7	0	0	0	0	14	0	0	0	0	0	0	0	11	10	10
80.5	40	15	14	31	10	9	4	0	10	0	0	0	0	7	0	0	6	6	0	6	0	0	7	0	27
81.5	26	15	14	4	13	13	4	8	0	7	0	0	0	0	0	0	0	0	0	6	0	0	11	49	11
82.5	24	10	9	8	5	9	4	4	10	0	0	0	0	0	0	0	0	0	5	0	0	0	0	5	42
83.5	31	14	15	4	9	0	8	9	0	0	0	0	0	0	0	0	0	6	26	0	0	0	19	25	0
84.5	40	22	5	4	16	37	12	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11
85.5	45	30	13	4	15	18	8	9	10	7	0	0	0	0	0	0	10	0	6	0	0	4	0	0	10
86.5	0	27	14	0	16	9	19	0	14	0	0	0	0	0	0	0	0	0	0	6	0	0	0	5	0
87.5	13	35	5	12	0	55	16	4	5	0	0	0	0	0	0	0	0	0	0	17	0	0	10	0	24
88.5	22	27	4	4	9	9	23	13	0	0	0	0	0	0	0	0	0	0	6	5	0	4	8	0	17
89.5	6	41	0	4	13	37	19	9	5	7	0	0	0	0	0	0	0	0	0	6	0	0	0	0	8
90.5	26	30	29	13	8	0	42	8	14	6	0	0	0	0	0	0	0	11	0	0	14	0	8	0	10
91.5	45	20	9	0	4	5	35	11	0	7	0	0	0	0	0	0	0	0	7	0	14	6	7	10	21
92.5	20	11	24	4	0	28	8	9	5	13	0	0	0	10	0	0	0	0	12	0	0	0	4	7	0
93.5	32	40	0	0	15	18	15	4	5	0	0	0	0	0	0	0	0	0	6	0	0	0	6	25	7
94.5	7	5	0	0	5	0	4	8	5	7	0	0	14	0	0	0	9	0	6	23	19	0	27	25	0
95.5	79	5	5	4	9	18	15	4	5	0	0	0	0	0	0	0	0	0	0	12	0	13	19	0	105
96.5	6	5	4	7	5	34	45	9	14	0	0	0	7	4	0	0	0	0	0	0	0	0	10	15	10
97.5	14	10	25	0	14	0	0	9	9	6	0	0	0	0	0	0	0	0	0	0	14	0	8	0	0
98.5	5	5	7	0	0	9	12	4	5	0	0	0	0	0	0	0	0	0	0	0	5	0	8	0	7
99.5	20	21	13	0	0	14	11	4	9	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0
100.5	21	17	15	4	0	15	15	4	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
101.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
102.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
103.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
104.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
105.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
106.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
107.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
108.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
109.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
110.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0
111.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
112.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
113.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0
114.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 15 *Raja radiata*, abundance (1 000) and biomass (tons) for West Greenland by stratum and total, 1982-2005. Confidence intervals (CI) are given in per cent of the stratified mean at 95% level of significance.

Abundance

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	38
1983	4798	589	815	360	349	27	59		6997	87
1984	2742	1672	653	505	149	482	116		6319	42
1985	2239	2393	1847	689	397	56	257		7878	44
1986	2178	2806	766	326	295	131	203		6705	46
1987	1790	538	653		291		64		3336	30
1988	3879	1046	996	770	335	39	85		7150	39
1989	11963	2141	3859	694	607		149		19413	38
1990	7145	1981	2489	548	271		550	345	13329	51
1991	1967	480	1220	262	610	130	95	65	4829	26
1992	4457	598	2844	1531	496	523	205	58	10712	50
1993	2266	352	684	279	188	263	95		4127	39
1994	2531	378	872	272	233	79	398	15	4778	43
1995					182	301	116	15	614	59
1996	1273	126	428	76	114	111	56	29	2213	29
1997	4886	493	879	46	120	122	180	0	6726	41
1998	1694	534	439	202	258	46	49	15	3237	31
1999	2164	235	684	195	297	194	213		3982	36
2000	721	188	503	870	248	134	234	15	2913	37
2001			435	88	116	134	629	30	1432	41
2002			642		116	194	121		1073	35
2003			428	292	62	286	208	0	1276	40
2004	878	81	623	228	120	888	193	21	3032	46
2005			743	218	217	342	223	0	1743	36
2006	339	70	593	411	41	375	504	36	2372	36

Biomass

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	36	4085
1983	966	192	703	132	331	27	56		2407	34	1878
1984	728	333	404	96	136	126	95		1918	31	1867
1985	497	427	804	181	159	46	56		2170	22	1804
1986	517	527	421	83	122	65	39		1774	28	1626
1987	415	149	306		184		13		1067	29	1295
1988	653	122	503	238	174	19	33		1742	28	1499
1989	2076	429	980	107	314		90		3996	31	2878
1990	980	263	526	56	91		113	201	2230	45	1840
1991	279	81	181	36	246	42	10	33	908	28	981
1992	327	94	139	134	221	89	23	27	1054	49	1180
1993	340	88	82	31	29	24	3		597	28	783
1994	231	71	143	30	91	14	54	11	645	61	758
1995					70	37	41	0	148	75	1085
1996	95	23	38	23	21	16	8	13	237	44	859
1997	354	96	181	6	16	29	33	0	715	35	879
1998	143	90	89	47	56	13	8	15	461	33	721
1999	150	68	143	65	68	26	54		574	56	983
2000	116	47	141	298	103	12	28	13	758	42	1063
2001			75	30	58	24	131	18	336	49	1129
2002			136		21	32	15		204	35	952
2003			73	55	25	51	90	0	294	45	1202
2004	82	17	143	47	39	152	33	10	523	42	887
2005			148	55	78	59	67	0	407	40	1201
2006	25	13	145	130	8	66	151	10	548	36	989

Table 16 *Raja radiata*. Length composition by year (1 000), 1982-2005.

Length	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.5	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.5	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0
3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.5	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0
7.5	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.5	0	0	0	25	0	0	0	0	0	0	0	29	16	0	51	0	0	38	12	0	0	0	0	0	0
9.5	0	10	11	12	5	0	11	5	87	18	0	41	31	0	62	162	82	364	89	9	13	0	61	11	27
10.5	64	127	100	177	487	94	158	271	630	143	350	121	300	12	136	660	435	681	62	84	93	63	155	23	74
11.5	89	394	422	416	70	188	279	602	741	216	881	376	418	4	187	684	225	369	124	82	80	49	179	85	110
12.5	128	526	317	492	117	204	450	704	860	357	1568	338	267	8	221	681	196	249	131	82	5	76	242	75	105
13.5	135	740	237	329	154	153	363	650	586	263	1180	272	179	34	192	343	121	277	93	81	36	50	116	61	141
14.5	164	373	271	502	269	195	404	855	583	252	1180	351	224	39	93	392	165	152	56	98	72	107	85	143	83
15.5	222	352	301	385	260	156	386	873	781	249	781	195	221	66	146	189	92	88	137	90	68	80	100	68	37
16.5	134	411	179	385	94	103	431	996	718	333	462	149	175	46	39	277	116	43	127	52	84	38	126	102	33
17.5	238	347	203	447	182	59	273	1221	779	257	479	146	123	26	104	201	162	125	96	72	9	91	249	58	106
18.5	247	244	302	323	166	104	232	1010	887	231	363	141	220	39	115	441	125	133	109	50	14	88	198	42	223
19.5	166	175	249	263	165	123	276	1025	989	211	406	81	139	23	22	213	93	40	63	41	22	26	69	54	43
20.5	213	127	255	269	159	117	419	1108	419	137	245	96	303	20	86	165	63	44	58	35	64	39	70	47	90
21.5	322	182	239	273	256	106	352	817	493	159	284	161	205	4	100	405	97	18	86	58	50	51	91	33	108
22.5	221	90	182	261	155	103	263	896	488	189	432	119	171	35	31	53	49	89	77	24	55	37	167	32	83
23.5	189	99	123	244	113	50	209	949	523	180	198	172	245	31	11	273	95	63	112	35	15	37	101	98	165
24.5	209	129	167	212	376	46	246	787	422	87	164	77	219	16	149	152	79	40	47	11	33	35	94	68	28
25.5	246	114	203	184	85	98	256	761	472	168	340	149	188	8	105	240	73	41	80	17	13	30	73	84	24
26.5	373	174	216	165	72	83	188	550	441	102	155	152	66	12	42	199	103	71	77	15	38	4	127	81	56
27.5	226	72	240	174	375	37	157	575	235	110	73	89	161	8	24	128	151	85	16	44	15	8	33	59	27
28.5	181	145	138	204	43	76	135	453	229	81	109	78	156	29	30	289	54	58	144	17	25	0	69	27	27
29.5	224	89	97	124	34	100	77	490	176	123	102	68	49	4	69	83	74	126	47	9	13	46	68	14	82
30.5	303	83	144	186	89	96	128	531	275	122	115	141	132	0	32	83	91	46	30	20	25	6	29	30	59
31.5	146	94	175	85	299	67	149	332	138	89	136	41	53	0	11	55	54	142	90	12	13	16	44	5	45
32.5	230	172	120	32	52	73	103	313	186	120	43	13	55	10	20	58	9	77	71	20	28	20	62	29	45
33.5	193	78	87	71	83	99	40	199	135	80	146	29	53	19	6	42	58	90	121	20	0	14	40	15	45
34.5	192	43	106	86	17	27	62	215	85	42	116	144	35	8	43	6	59	45	72	36	13	4	12	26	25
35.5	126	93	75	102	10	17	97	179	116	48	86	100	43	8	51	31	40	34	68	21	18	8	79	23	50
36.5	181	63	78	65	285	36	56	253	127	86	24	130	33	4	0	30	59	74	40	29	0	0	20	28	60
37.5	166	60	51	121	321	39	85	241	86	46	32	41	31	12	11	18	33	30	92	24	13	0	0	5	65
38.5	107	89	56	128	27	45	25	117	66	47	17	0	39	14	6	69	42	130	93	19	37	29	22	27	34
39.5	138	53	49	66	47	52	29	138	135	30	92	22	43	15	0	0	34	33	79	43	13	17	24	22	25
40.5	152	81	74	78	364	86	47	262	56	15	7	10	40	0	0	12	49	33	60	30	14	20	12	47	33
41.5	136	44	73	56	24	36	32	143	58	58	40	7	10	10	6	58	0	29	91	60	13	25	12	6	20
42.5	144	33	38	50	68	33	48	174	37	6	12	3	38	27	0	0	7	35	57	11	18	49	48	45	67
43.5	127	105	47	61	83	9	57	135	52	33	13	0	53	8	0	24	0	0	38	19	49	30	21	73	24
44.5	125	54	47	76	889	56	61	93	54	4	0	12	7	0	15	0	5	11	34	44	0	13	64	53	64
45.5	199	42	57	53	72	56	89	86	19	29	13	0	0	0	0	0	14	0	33	12	0	20	16	11	20
46.5	178	57	40	77	31	37	61	71	65	19	0	0	0	8	0	18	20	0	0	0	13	17	8	0	15
47.5	270	87	63	75	29	31	103	29	9	0	12	0	7	0	0	0	5	0	0	9	0	18	9	0	8
48.5	277	50	47	38	29	31	76	39	19	11	0	29	0	0	0	0	0	0	0	0	0	0	4	26	0
49.5	253	55	47	56	32	73	56	61	10	12	24	0	36	4	8	0	0	0	0	0	0	16	4	0	0
50.5	369	154	66	78	50	33	44	77	15	19	24	0	0	0	0	0	5	0	0	0	0	0	13	0	0
51.5	276	71	58	42	53	0	32	27	15	4	8	0	0	0	0	0	0	0	0	0	0	0	4	0	0
52.5	292	86	93	110	58	24	17	30	19	0	5	0	0	4	0	0	0	0	0	0	0	0	0	0	0
53.5	254	54	33	63	11	0	7	29	0	11	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0
54.5	168	88	49	21	5	20	30	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0
55.5	286	37	28	44	10	14	3	20	13	12	0	0	0	0	0	0	0	0	0	0	0	0	0		0
56.5	114	56	31	49	6	24	16	6	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0		0
57.5	130	23	16	18	18	14	4	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0
58.5	54	41	3	11	6	4	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0
59.5	27	19	10	17	0	4	6	11	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0
60.5	45	0	7	3	0	4	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0

Table 17 Stratum means of near bottom temperature (°C) and stratified mean, 1982-2005.

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	7.1	7.2	Mean
1982	2.540	3.627	1.953	3.100	3.256	3.633	2.623							4.600	3.139
1983	2.028	3.713	1.420	3.819	2.139	4.808	2.160			4.117		4.000		2.943	3.012
1984	1.365	2.790	1.617	3.886	2.462		2.519					4.129			2.698
1985	4.190	5.154	3.116	4.612	2.614	4.336	4.444		5.040	5.190	4.421	4.300		3.300	4.181
1986	3.669	4.393	4.014	5.073	4.203	5.066	4.102			4.796	4.042	4.516		3.347	4.136
1987	3.086	4.890	3.393		3.504		3.530			4.467		4.400		3.300	3.783
1988	2.548	4.328	3.034	4.956	4.228	5.234	4.332		4.479	4.559	4.298	4.578		3.792	3.959
1989	2.323	3.953	2.718	4.525			2.579		3.392	3.743	3.648	4.064		3.146	3.295
1990	2.497	3.922	3.000	4.809	3.421		2.516		4.395	4.570	3.252	4.019		3.025	3.461
1991	3.533	4.726	3.477	4.204	3.016		2.997								3.558
1992	3.900	4.418	2.911	4.457	2.985	4.691	1.938							3.472	3.489
1993	3.007	4.003	2.360	3.360	4.711	4.959	2.773		3.771	4.056	4.327	4.394		2.820	3.597
1994	2.914	4.436	3.747	4.641	3.847	5.109	3.773								3.620
1995					4.229	4.614	3.469	4.242	2.601	3.623	3.683	4.318		3.834	3.862
1996	4.614	5.506	4.414	5.688	5.610	5.700	5.057	5.732	4.505	5.129	5.320	4.903		2.848	4.709
1997	3.304	4.938	4.022	5.180	4.570	5.478	4.606	5.540	4.578	4.742		4.266		3.464	4.189
1998	4.059	5.336	4.686	5.840	6.400	6.382	5.359	5.978	6.021	5.820	5.583	5.346		4.641	5.181
1999	4.941	5.051	4.429	5.729	4.834	5.773	4.104		5.225	5.315	4.777	4.087		2.435	4.435
2000	3.085	4.583	4.377	5.033	4.645										3.860
2001			5.007	5.350	5.133	5.992	4.429		5.620						5.128
2002			4.503		5.832	5.961	4.906		4.820	5.298		4.924		4.278	4.904
2003			6.948	6.515	6.529	6.633	5.406	6.539	6.124	5.821	4.970	5.093		4.021	5.500
2004	4.979	5.4914	5.0883	5.7722	5.5936	6.1778	5.91	5.976	5.9304	5.6729	5.7543	4.414		4.562	5.142
2005			5.020	5.564	4.611	5.774	4.681	5.461	3.839	5.335	4.552	4.359		3.9499	4.565

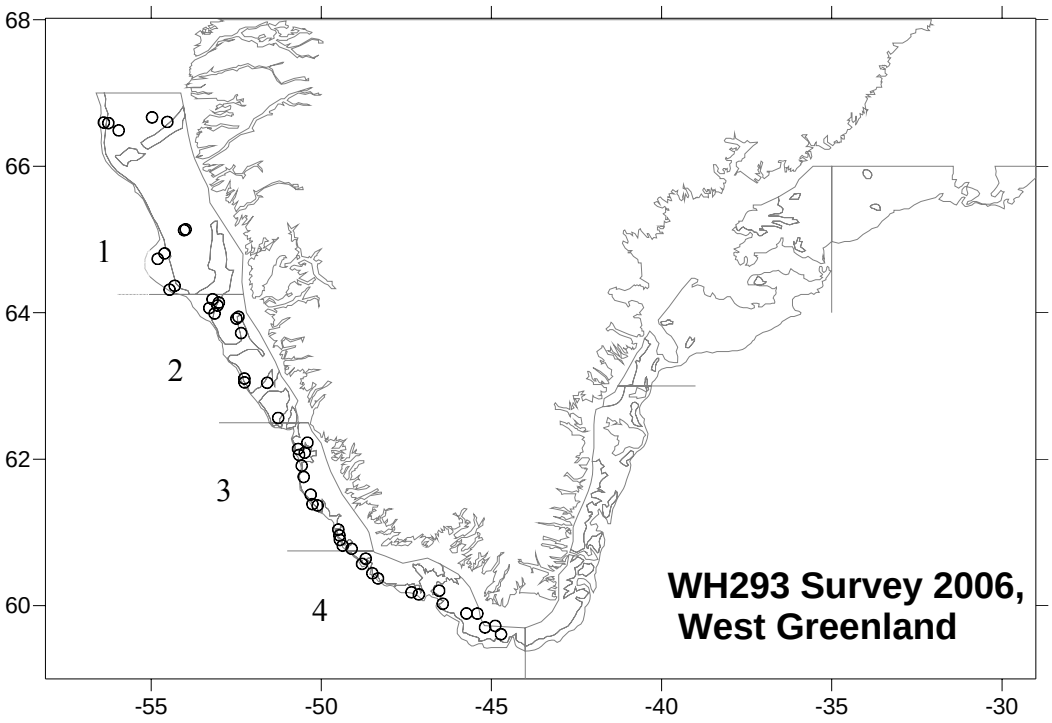

Fig. 1 Stratification of the survey area as specified in Table 2, positions of hauls carried out off West Greenland in 2006.

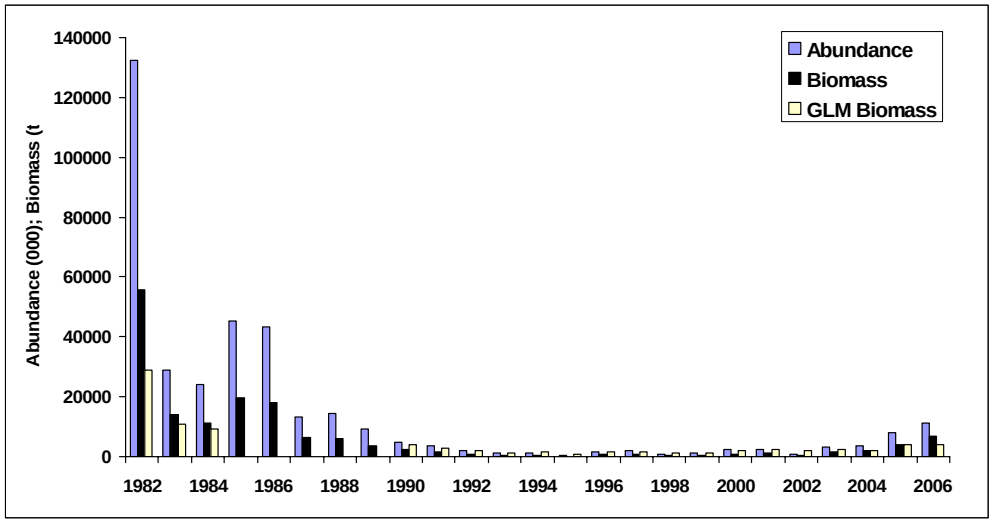

Fig. 2 Abundance and biomass indices for *S. marinus* >=17 cm off West Greenland, 1982-2005. Respective values are listed in Table 3. GLM 1985-1989 subject to revision.

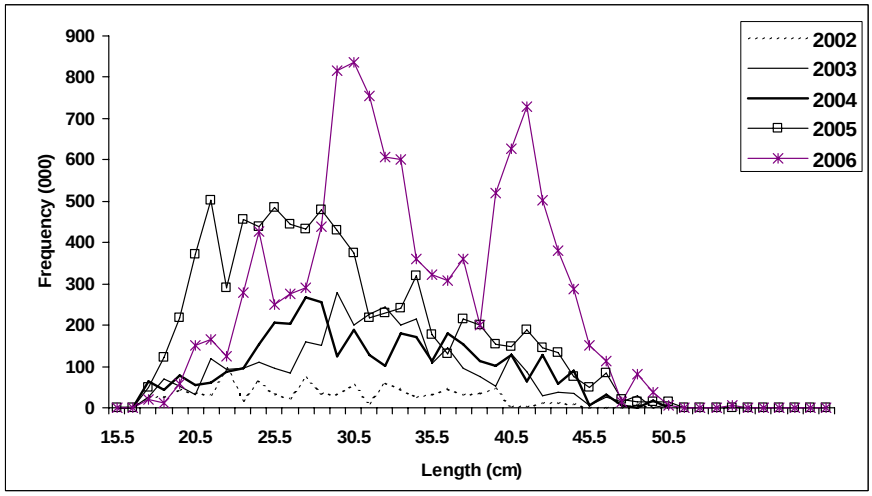

Fig. 3 Length disaggregated abundance indices for *S. marinus* >=17 cm off West Greenland, 2002-2005. Respective values are listed in Table 4.

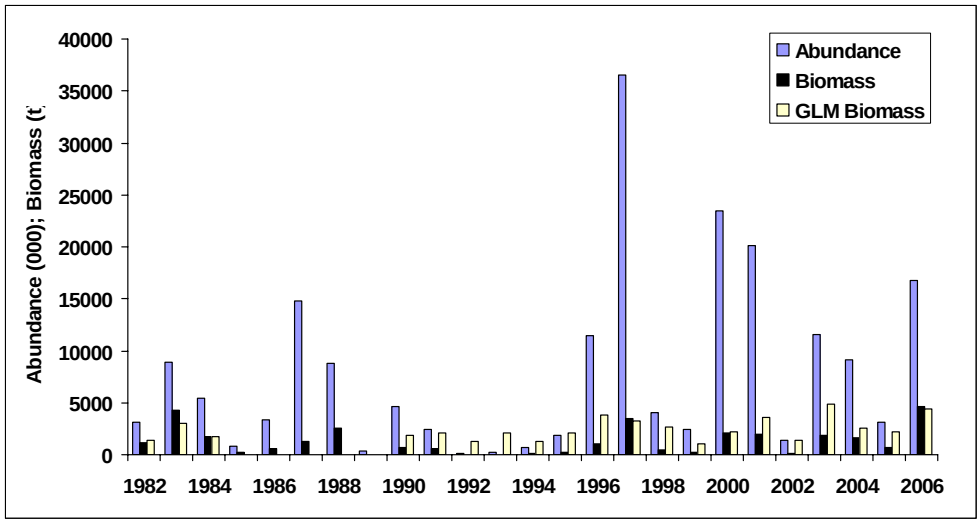

Fig. 4 Abundance and biomass indices for *S. mentella* >=17 cm off West Greenland, 1982-2005. Respective values are listed in Table 5. GLM 1985-1989 subject to revision.

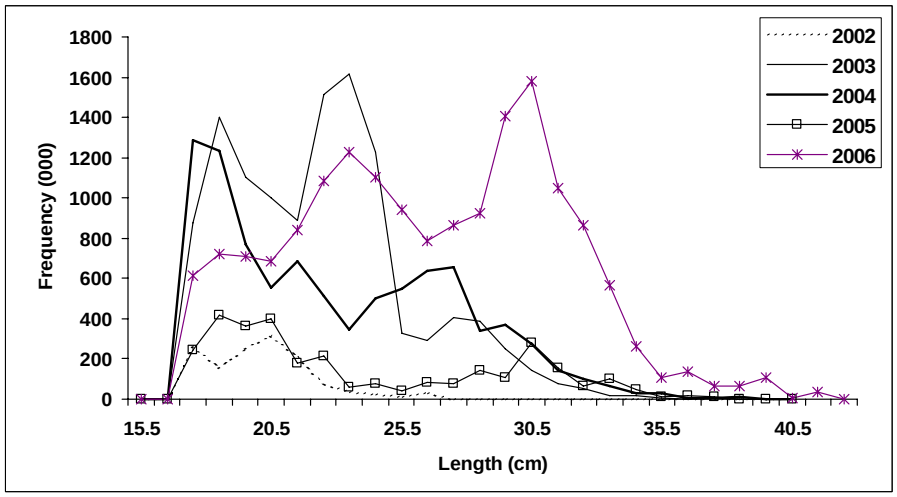

Fig. 5 Length disaggregated abundance indices for *S. mentella* >=17 cm off West Greenland, 2002-2005. Respective values are listed in Table 6.

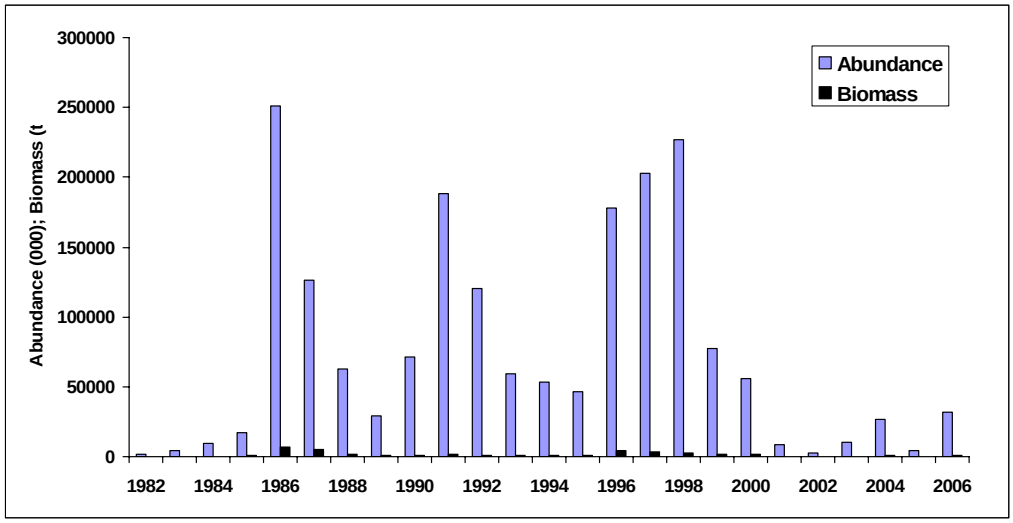

Fig. 6 Abundance and biomass indices for *Sebastes spp.* <17 cm off West Greenland, 1982-2005. Respective values are listed in Table 7.

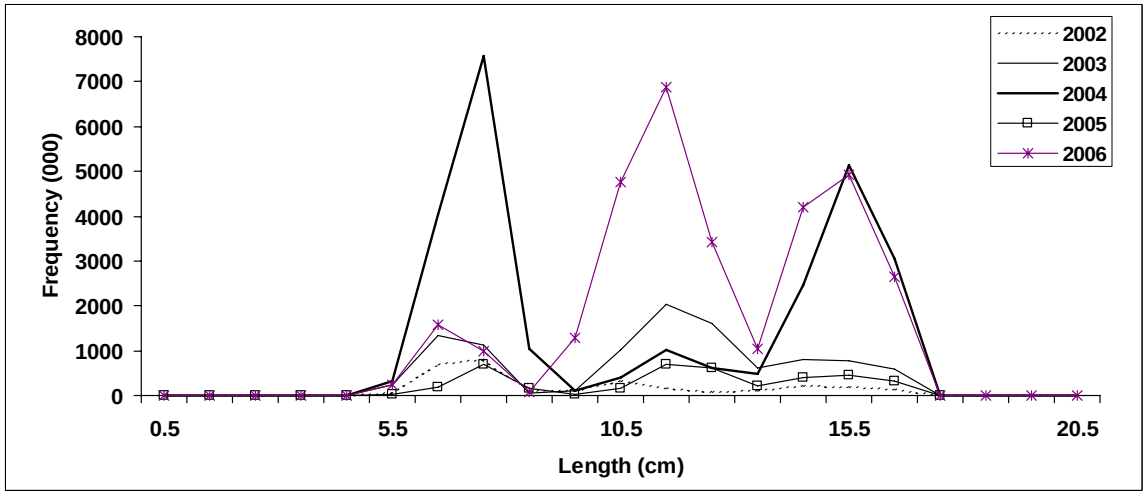

Fig. 7 Length disaggregated abundance indices for *Sebastes spp.* <17 cm off West Greenland, 2002-2005. Respective values are listed in Table 8.

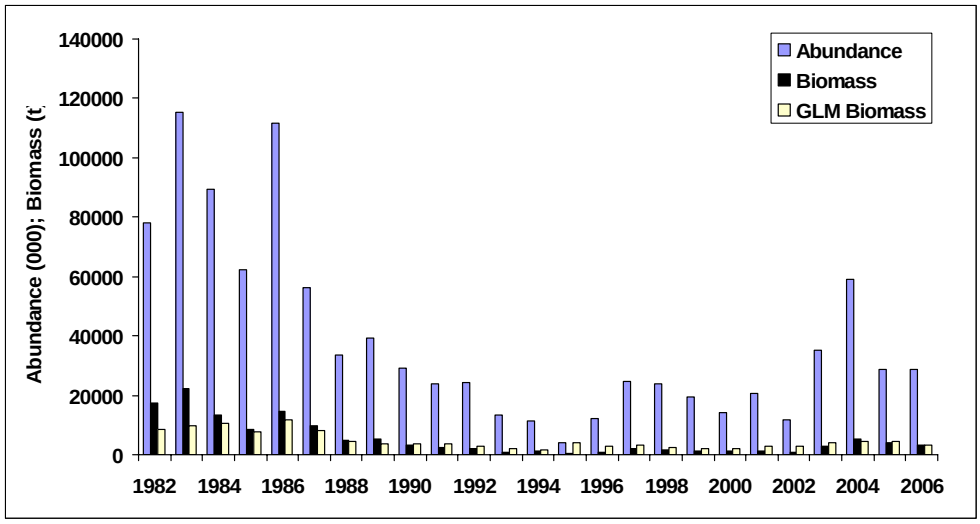

Fig. 8 Abundance and biomass indices for *Hippoglossoides platessoides* off West Greenland, 1982-2005. Respective values are listed in Table 9.

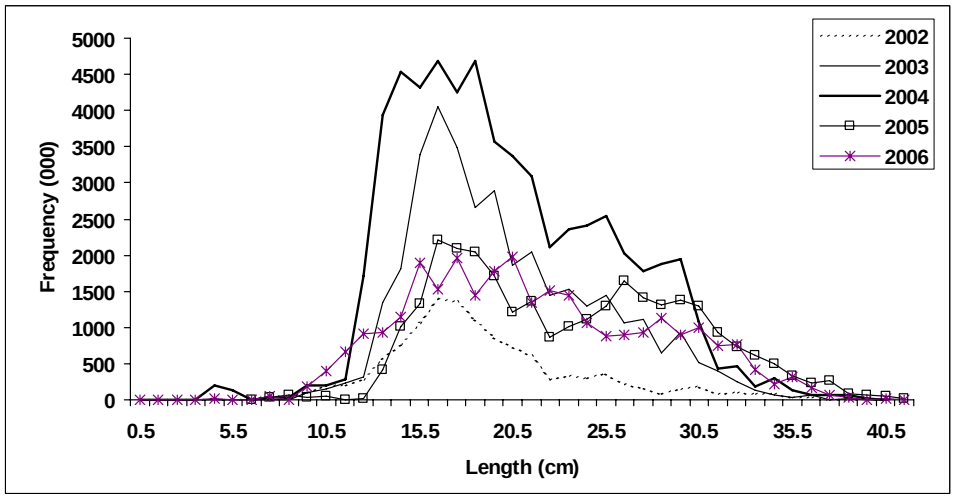

Fig. 9 Length disaggregated abundance indices for *Hippoglossoides platessoides* off West Greenland, 2002-2005. Respective values are listed in Table 10.

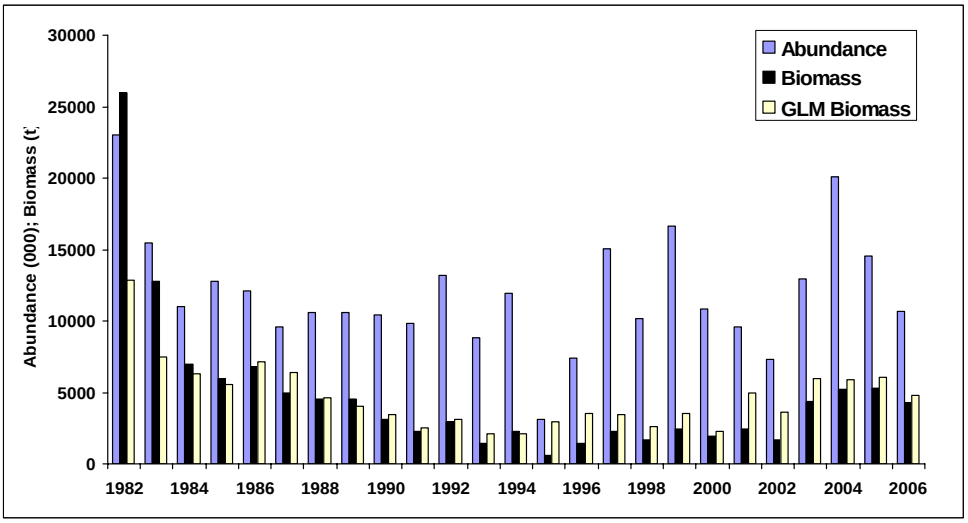

Fig. 10 Abundance and biomass indices for *Anarhichas lupus* off West Greenland, 1982-2005. Respective values are listed in Table 11.

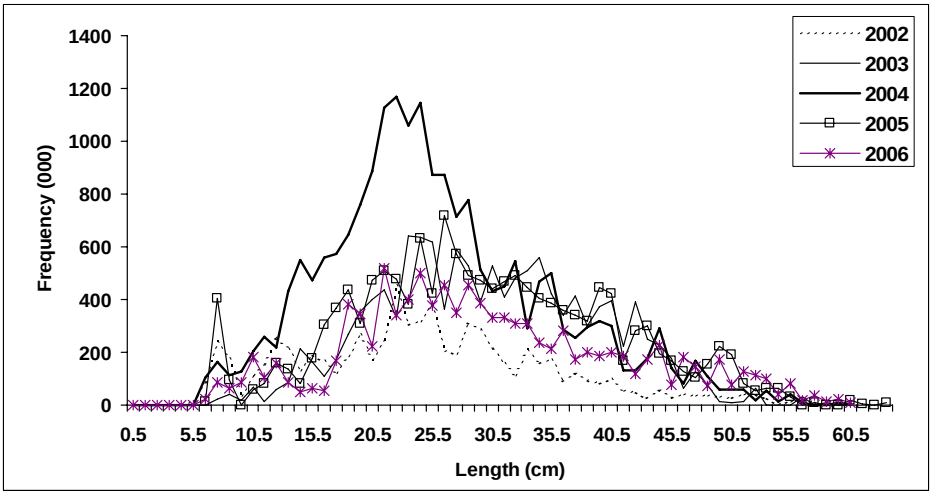

Fig. 11 Length disaggregated abundance indices for *Anarhichas lupus* off West Greenland, 2002-2005. Respective values are listed in Table 12.

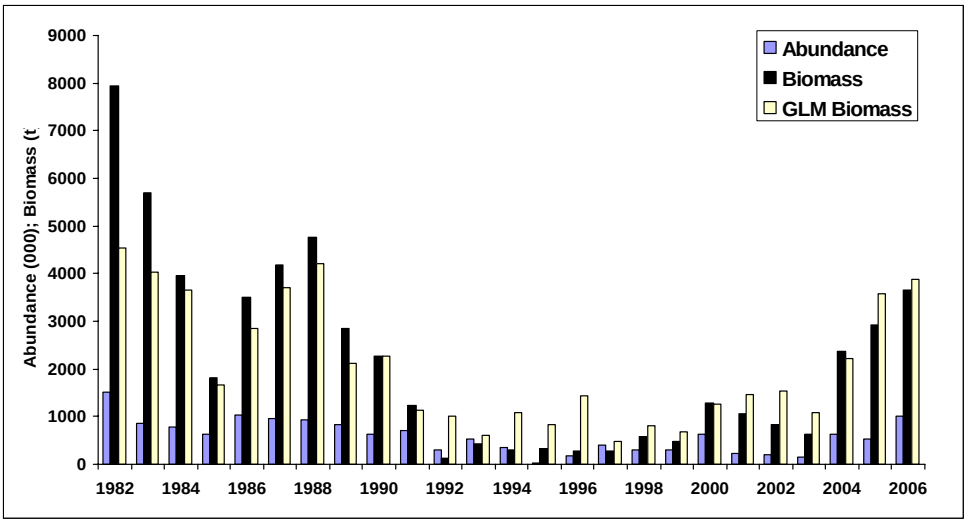

Fig. 12 Abundance and biomass indices for *Anarhichas minor* off West Greenland, 1982-2005. Respective values are listed in Table 13.

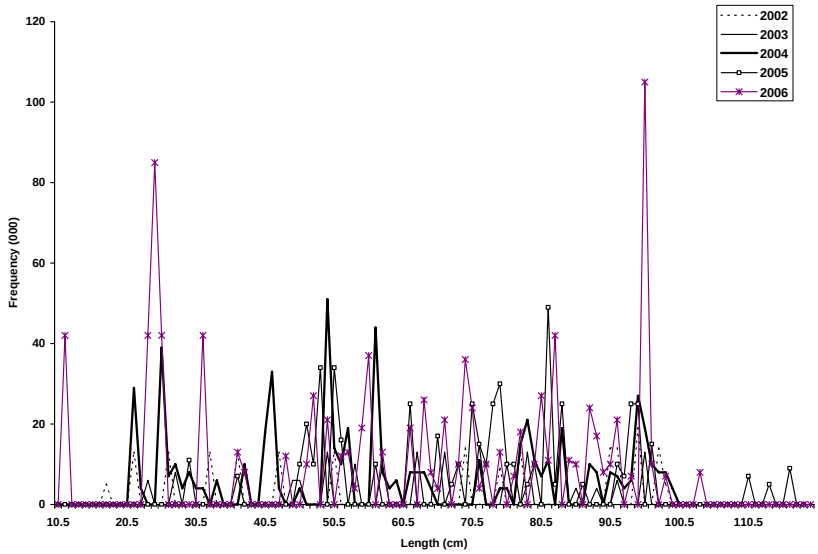

Fig. 13 Length disaggregated abundance indices for *Anarhichas minor* off West Greenland, 2002-2005. Respective values are listed in Table 14.

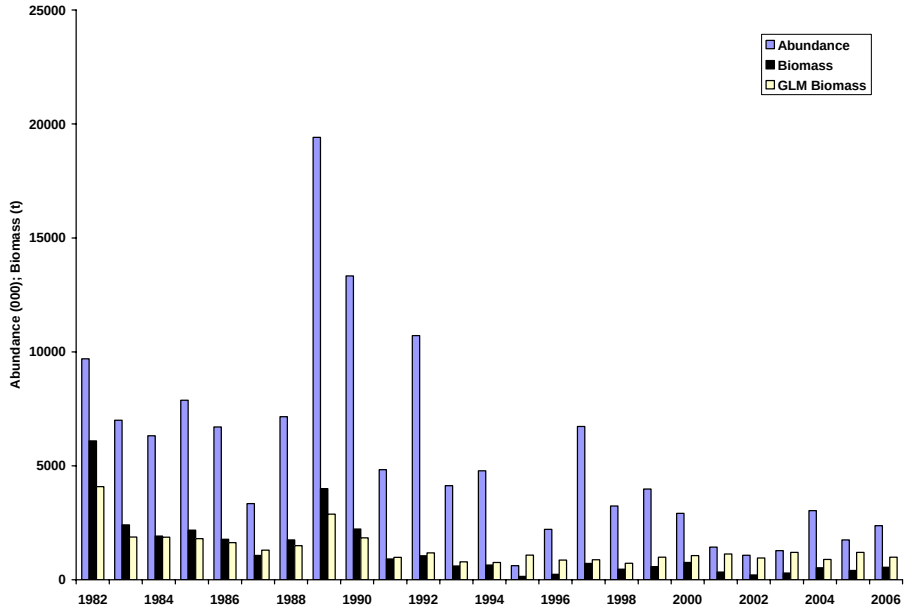

Fig. 14 Abundance and biomass indices for *Raja radiata* off West Greenland, 1982-2005. Respective values are listed in Table 15.

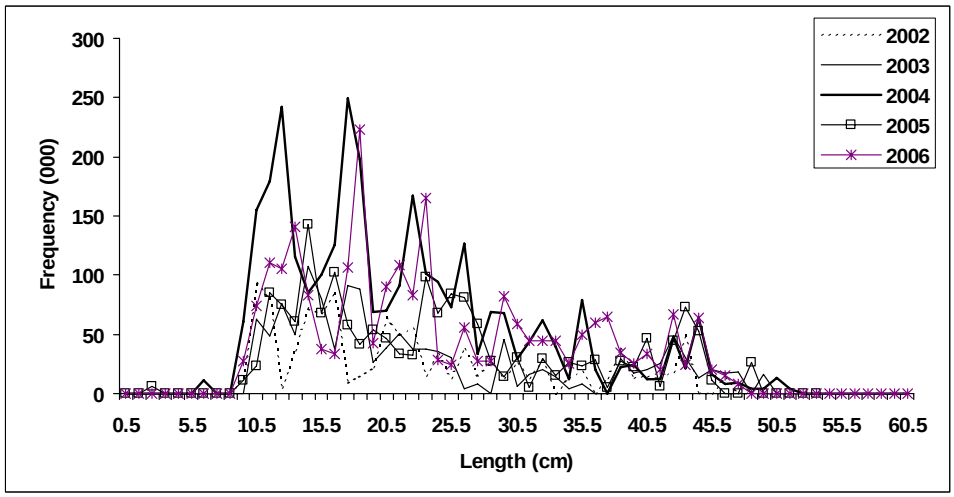

Fig. 15 Length disaggregated abundance indices for *Raja radiata* off West Greenland, 2002-2005. Respective values are listed in Table 16.

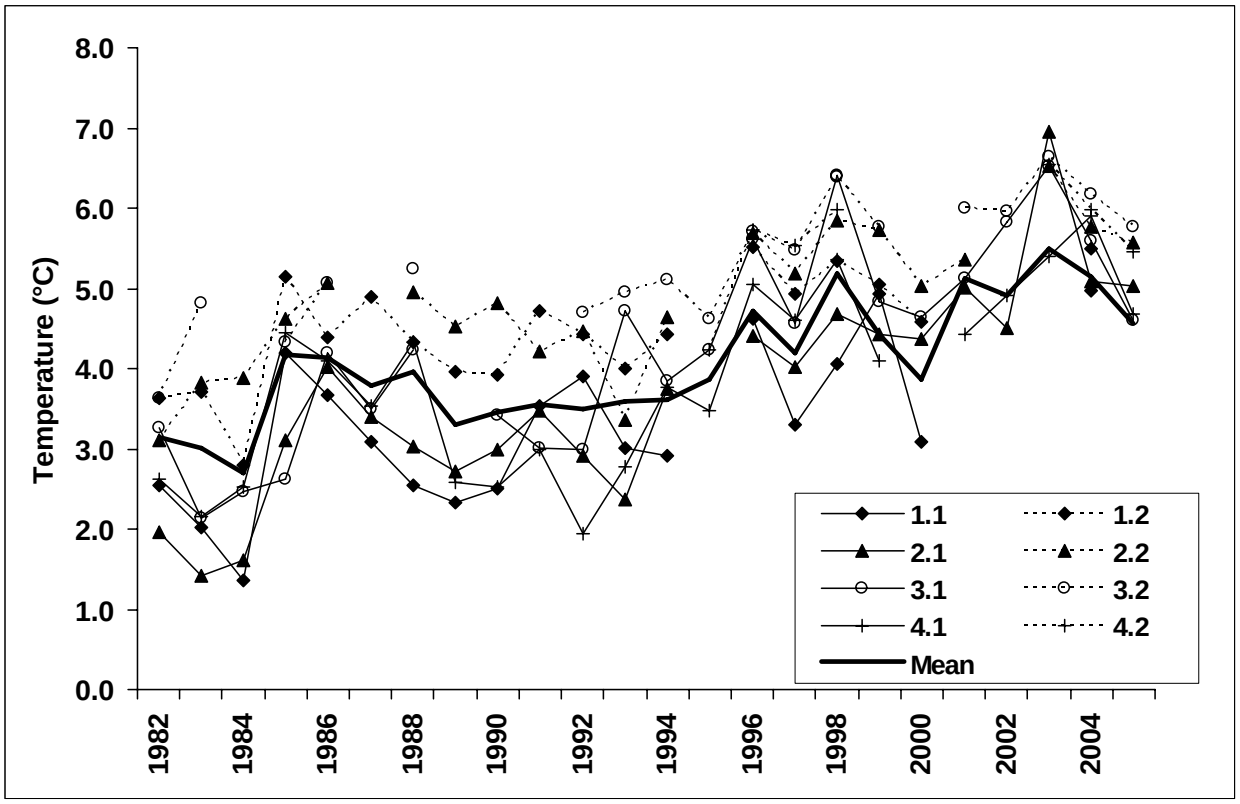

Fig. 16 Stratum means of near bottom temperature (°C) and stratified mean, 1982-2005. Respective values are listed in Table 17. Solid lines display trends in shallow strata (<200 m), dashed lines display trends in deep strata (>200 m),