International Council for the Exploration of the Sea

C.M. 1984/G: 46
Demersal Fish Committ

PRELIMINARY REPORT OF THE NORWEGIAN GROUNDFISH SURVEY AT BEAR ISLAND AND WEST-SPITSBERGEN IN THE AUTUMN 1983

by

Olav R. Godø, Kjell Randa and Odd M. Smedstad
Institute of Marine Research
Box 1870, N-5011, Bergen, Norway

ABSTRACT

This report describes the results from a stratified bottom trawl survey carried out by R/V "Eldjarn" and M/Tr "Bøtrål 4" in the period 6 September to 1 October 1983. Cod were most abundant in the Bear Island area and most numerous was the 1982-yearclass. The former most abundante 1979-yearclass was redused with 60% compared to the 1982 results. Older haddock were scarce, but some recruitement of the 1982-yearclass was recorded. The most abundant species in the area were long rough dab and redfish.

INTRODUCTION

The investigations described are partly a supplement to the investigations carried out on cod and haddock in the Barents Sea during the winter and partly a monitoring of the demersal fish stocks in the area. During the first years of the Spitsbergen investigations, acoustic surveys were carried out

(Dalen, Rørvik and Smedstad 1977 and Dalen and Smedstad 1978). The drastic reduction of the cod stock in the area has, however, made it almost impossible to record the cod with acoustic equipment. Therefore the investigations in 1981,1982 (Randa and Smedstad 1982, 1983) and 1983 were carried out as stratified bottom trawl surveys.

MATERIAL AND METHODS

The survey was carried out by R/V "Eldjarn" and M/Tr "Bøtrål 4" in the period September 6 - October 1 1983. Both vessels were equipped with a Campelen 1800 meshes shrimp trawl with rubber bobbins and codend mesh size of 35 mm. Sweepwires were 80 m. During a standard haul, the trawl was towed for three n. miles at a speed of three knots. The trawl stations are shown in Fig.1. Hydrographical observations were obtained with CTD-sonde(Fig.2).

The survey was designed as a stratified random trawl survey. The investigated area was devided into 45 strata based on depth and geographic location (Fig.1). The following depth intervals were used: 0 -100 m, 100 - 200 m, 200 - 300 m, 300 - 400 m and >400 m. The total area was devided into two subareas. The area north of 76^0 consists of the stratas 1-22 and the southern area of the stratas 23-45. The allocation of trawl hauls and the statistical calculations are described by Randa and Smedstad (1982). Mean catch indices are presented in the cieted report, while swept area indices are calculated from the cruise results 1983.

RESULTS

Hydrography

The temperature in 100 m and at the bottom are shown in Fig. 4 and 5. The temperature in all surveyed area was generally higher than in 1982. The temperature around the

Bear Island was occasionally 2-5^{0}C above the 1982 results.

Cod

Cod was recorded in the trawl catches in all areas, but only in small quantities on the western side of Spitsbergen north of 76^0 N (Fig. 6). The highest catch rates were obtained east and south east of the Bear Island in the strata 31,39 and 40, and with a mean catch higher than 150 specimens per hour trawling. North of the Bear Island the mean catches were 52 and 62 cod in the strata 22 and 26. By weight the catches were highest in stratum 40 with a mean catch of 171 kg per hour trawling.

Age compositions of cod are shown in Fig. 13. In the areas shallower than 300 m, the 1982-yearclass was most numerous. The 1977-yearclass dominated in the deeper areas. The 1979-yearclass which totally was the most numerous yearclass during the 1981 and 1982 cruises, was most frequent in depths between 100 and 300 m.

Stratified indices of cod in numbers are presented in Table 1 and 2. They show that the main cod consentrations were south if 76^0 N. The indices on numbers were highest in the areas shallower than 200 m. The weight indices did not vary as much as the corresponding on numbers as the largest cod were found in the deeper areas.

The stratified indices on numbers for the different yearclasses (Table 3) indicate as well that the 1982-yearclass was most numerous. Compared to earlier years (Table 4), it was stronger than both the 1980- and 1981-yearclasses at the 1-group stage. If the indices increase as much during the three-four first years of life as it has done for the previous yearclasses, the 1982-yearclass will be the strongest yearclass recorded during these investigations (Table 4). It has, however, to be stressed that the confidence limits are almost $\pm$70%.

The indices of the 1979-yearclass, which was the strongest yearclass in 1981 and 1982, showed a reduction of almost 60%

from 1982 to 1983 (Table 4). The yearclass was probably exposed to intensive fishing as three - four year old fish which as well is indicated by the Arctic Fisheries Working Group (Anon 1983). The decrease may also partly be a result of migration out of the area.

Haddock

The haddock resources in the area were small. The stratified indices in numbers increased, however, from 984 in 1982 to 3720 in 1983. Mainly this was a result of relativly high recruitement of the 1982-yearclass. Fig. 11 show that the catches are dominated by haddock shorter than 25 cm. Haddock was recorded in about half of the strata. The mean catch was mainly less than 10 fish per hour trawling. The higest mean catch was obtained in the strata 6 (north of 76^0 N), 32 and 40 and was highest in stratum 39 with 28 haddock per hour trawling.

Redfishes

Sebastes mentella is the dominating redfish species at the Bear Island and West-Spitsbergen. The identification of the redfishes may be very difficult, especially between small S.marinus and S.mentella. In 1983 an unusual high proportion of the redfish north of 76^0 N was recorded as S.marinus compared with earlier years (Tabell 1). S. marinus made up 38% and 37% of the indices based on catch in numbers and weight respectivly, while the corresponding figures from the previous years were about 1%. Fig. 14 show that S.marinus caught north of 67^0 N was mainly smaller than 15 cm, while S.mentella was mostly larger than 15 cm. The results consequently indicate that species identification problemes of small redfish may have strongly influenced the results. The probleme may also have influenced the results from the southern area.

Compared with the results from 1982, the stratified indices

for redfish based on numbers increased while the corresponding weight indices decreased.

S.mentella was most numerous in depths between 200 m and 300 m north of 76^0 N and in depths between 200 m and 400 m south of 76^0 N (Table 1). The influence of larger fish increased with depth as observed during the previous cruises.

Greenland halibut

Greenland halibut was caught in most strata deeper than 200 m. Some small halibut were caught in the depths between 100 m and 200 m. The biggest catches were obtained in the area between the Storfjord Channel and the Kings Bay (Fig. 8).

As in 1982 the influence of older fish in the catches increased in the deeper areas (depth >400), and the Greenland hallibut north of 76^0 was distinctly smaller than that further south (Fig.16). The stratified indices did not change considerably compared to the 1982 results.

Long rough dab

Together with the redfishes long rough dab was the most numerous species in the area. Its distribution covered all the area investigated, but it was most abundant around the Bear Island and in the Storfjord Channel where the catchrates exceeded 1000 individuals per hour trawling (Fig.9). The stratified indices were roughly unchanged compared to the 1982 results.

Blue whiting

Blue whiting was mainly caught in the southern area. The catches were largest in 200-300 m depth (Table 1 and 2). The catches were mainly made up of fish between 30 and 40 cm (Fig. 12). The stratified indices showed a small increase compared to the 1982 results.

Shrimps

All catches in the strata deeper than 200 m contained shrimps. The largest catches were obtained in the Isfjord Channel, in the Storfjord channel and east-southeast of the Bear Island (Fig. 10). The stratified total indices were reduced with 20% compared to the 1982 results (Table 6). This was mainly caused by the considerable reduction (48%) of the catches north of 76^0 N, but also in the southern area the results indicate a decrease in the stock.

Catfishes

In all area small quantities of catfishes were caught. The indices of both jelly cat and smaller catfish increased, while a decrease in the catfish indices were observed.

REFERENCES

Dalen,J., Rørvik,C.J. and Smedstad, O.M. 1977. Bunnfisk-undersøkelser ved Bjørnøya og Vest-Spitsbergen høsten 1976. Investigations on demersal fish at Bear Island and West-Spitsbergen in autumn 1976. FiskenHav., 1977(3): 29-51.

Dalen,J. and Smedstad, O.M. 1977. Bunnfiskundersøkelser ved Bjørnøya og Vest-Spitsbergen høsten 1977. Investigations on demersal fish at Bear Island and West-Spitsbergen in autumn 1977. FiskenHav., 1978(3): 1-14.

Randa,K. and Smedstad,O.M. 1982. The Norwegian groundfish survey at Bear Island and West-Spitsbergen in the autumn 1981. Coun.Meet.int.Coun.Explor.Sea, 1982(G:42): 1-17. [Mimeo]

Randa,K. and Smedstad,O.M. 1983. Preliminary report of the Norwegian groundfish survey at Bear Island and West-Spitsbergen in the autumn 1982. Coun. Meet. int. Coun. Explor. Sea, 1983(G:34): 1-17. [Mimeo]

Table 1. Stratified indices on numbers for different depths and areas in 1983.

Species	North of 76°N						South of 76°N						Total
	0-100	100-200	200-300	300-400	>400	Total	0-100	100-200	200-300	300-400	>400	Total	
Cod	917	1 893	154	191	96	3 251	15 350	13 870	8 891	2 400	2 160	42 670	45 920
Haddock	77	218	10	0	0	362	235	1 780	1 073	164	14	3 358	3 720
S.Marinus	35	3 718	31 650	285	648	36 330	0	1 712	3 134	1 224	0	6 070	42 400
S.Mentella	44	4 462	46 070	4 514	3 278	58 360	87	7 616	94 720	103 500	42 170	248 100	306 500
Greenland halibut	21	1 905	6 479	2 246	3 711	14 360	0	50	2 280	2 255	7 742	12 330	26 690
Long rough dab	1 084	12 950	11 490	5 825	1 221	32 560	10 110	224 200	82 290	10 210	13 010	339 800	372 400
Blue whiting	0	0	0	44	83	128	0	157	19 630	9 423	1 270	30 480	30 610
Jelly cat	0	0	38	14	6	56	29	562	229	280	355	1 456	1 511
Catfish	24	244	212	191	19	690	59	339	411	40	111	960	1 650
Smaller catfish	14	457	187	192	124	975	117	1 497	318	172	52	2 155	3 130

Table 2. Stratified indices on weight for different depths and areas in 1983.

Species	North of 76°N						South of 76°N						Total
	0-100	100-200	200-300	300-400	>400	Total	0-100	100-200	200-300	300-400	>400	Total	
Cod	76	1 722	197	978	253	3 226	7 904	19 150	7 963	10 190	9 143	54 350	57 580
Haddock	3	16	16	0	0	35	7	381	70	12	2	474	509
S.Marinus	1	51	3 648	60	224	3 984	0	160	1 024	68	0	1 252	5 236
S.Mentella	1	311	4 544	1 158	883	6 896	1	1 012	11 120	12 400	10 920	35 450	42 350
Greenland halibut	8	642	677	1 286	2 355	4 967	0	134	1 820	3 291	12 920	18 170	23 130
Long rough dab	44	895	762	390	230	2 322	1 987	32 850	9 068	1 156	1 548	46 610	48 930
Blue whiting	0	0	0	14	24	38	0	50	5 928	2 908	463	9 349	9 387
Jelly cat	0	0	105	78	33	217	439	4 797	2 128	2 832	3 938	14 130	14 350
Catfish	36	182	169	62	16	462	47	337	1 089	108	755	2 335	2 797
Smaller catfish	30	678	166	179	50	1 104	387	5 499	236	166	21	6 309	7 412
Shrimps	0	2 548	2 807	4 277	3 606	13 240	0	10 780	18 460	11 700	20 160	61 090	74 330

Table 3. Stratified trawl indices on numbers for different ages of cod in 1983.

	Depth	Age 1	2	3	4	5	6	7	8	9	10+	Total
North of 76° N	0-100	0.8±0.7	0.2±0.2	+	0	0	0	0	0	0	0	0.9± 0.8
	100-200	0.9±1.6	0.2±0.3	0.1±0.2	0.6±1.1	0.1±0.1	+	+	+	+	+	1.8± 3.0
	200-300	0.1±0.2	+	+	+	+	+	+	+	+	+	0.1± 0.1
	300-400	0	0	+	+	+	0.1±0.1	+	+	+	+	0.2± 0.2
	>400	+	+	+	+	+	+	+	+	+	+	0.1± 0.1
	Total	1.7±1.7	0.4±0.3	0.1±0.1	0.6±0.9	0.1±0.1	0.1±0.1	0.1±0.1	0.1±0.1	+	+	3.3± 3.3
South of 76° N	0-100	3.9±4.6	2.9±4.7	4.2±5.9	2.7±2.0	0.2±0.2	+	+	0	0	0	15.4±16.6
	100-200	5.1±4.6	1.3±1.1	1.4±1.3	3.7±2.6	0.9±0.6	0.4±0.3	0.2±0.1	0.5±0.3	0.1±0.1	0.1±0.1	13.8± 7.7
	200-300	3.8±6.7	0.6±1.0	0.5±0.8	2.1±2.2	0.7±0.7	0.5±0.5	0.3±0.4	0.4±0.4	0.1±0.1	0.1±0.1	8.9±12.9
	300-400	+	+	+	0.2±0.1	0.6±0.4	0.7±0.6	0.3±0.2	0.3±0.1	0.1±0.1	+	2.4± 1.4
	>400	0	+	+	0.2±0.1	0.4±0.2	0.8±0.2	0.4±0.2	0.3±0.1	0.1±0.1	+	2.1± 0.6
	Total	12.9±9.5	4.8±4.9	6.1±6.2	8.9±4.0	2.8±1.1	2.4±0.9	1.2±0.4	1.6±0.7	0.4±0.2	0.2±0.1	42.7±22.5
Total all areas		14.6±9.6	5.1±4.8	6.2±6.2	9.5±4.0	3.0±1.1	2.5±0.8	1.3±0.5	1.6±0.5	0.4±0.3	0.2±0.1	45.9±22.5

Table 4. Stratified trawl indices on numbers for different year-classes of cod in 1981 - 1983.

Year of investigation	Year-class 1982	1981	1980	1979	1978	1977	1976	1975	1974	1973	1972	1971	Total
1981			0.1	22.2	9.0	5.5	1.3	6.1	3.8	0.7	0.4	0.4	49.8
1982		1.5	4.0	22.2	9.3	2.8	1.9	2.9	0.4	0.1	0.1		45.6
1983	14.6	5.1	6.2	9.5	3.0	2.5	1.3	1.6	0.4	0.2			44.4

Table 5. Stratified trawl indices on numbers in 1981 - 1983.

	Year	Number of hauls	Cod	Haddock	S.marinus	S.mentella	Greenland halibut	Long rough dab	Blue whiting	Jelly cat	Catfish	Smaller Catfish
North of 76° N	1981	66	1 467	327	3 415	45 680	13 600	48 720	1 821	35	621	1 209
	1982	70	4 140	56	204	59 190	12 940	34 190	537	30	1 527	279
	1983	70	3 251	362	36 330	58 360	14 360	32 560	128	56	690	975
South of 76° N	1981	119	48 310	481	58 250	133 800	6 492	287 500	26 650	1 235	790	1 242
	1982	121	41 460	928	11 790	218 500	13 070	336 100	27 230	1 360	1 082	1 452
	1983	117	42 670	3 358	6 070	248 100	12 330	339 800	30 480	1 456	960	2 155
Total	1981	185	49 770	808	61 670	179 500	20 100	336 300	28 470	1 270	1 411	2 450
	1982	192	45 600	984	11 990	277 600	26 000	370 300	27 760	1 391	2 609	1 730
	1983	187	45 920	3 720	42 400	306 500	26 690	372 400	30 610	1 511	1 650	3 130

Table 6. Stratified trawl indices on weight in 1981 - 1983.

	Year	Cod	Haddock	S.marinus	S.mentella	Greenland halibut	Long rough dab	Blue whiting	Jelly cat	Catfish	Smaller Catfish	Shrimps
North of 76° N	1981	3 156	942	453	11 030	3 645	4 125	400	30	1 032	343	17 060
	1982	3 348	5	63	9 804	6 550	2 858	158	130	1 359	363	24 810
	1983	3 226	35	3 984	6 869	4 967	2 322	38	217	462	1 104	13 240
South of 76° N	1981	73 270	988	10 230	31 510	5 794	40 770	4 968	9 427	1 054	3 764	50 650
	1982	61 180	469	4 325	49 830	15 660	45 510	7 741	12 590	1 849	6 425	68 780
	1983	54 350	474	1 252	35 350	18 170	46 610	9 349	14 130	2 335	6 309	60 090
Total	1981	76 430	1 930	10 680	42 530	9 439	44 890	5 368	9 457	2 086	4 407	67 710
	1982	64 530	502	4 388	59 640	22 221	48 370	7 899	12 720	3 209	6 788	93 590
	1983	57 580	509	5 236	42 350	23 130	48 930	9 387	14 350	2 797	7 412	74 330

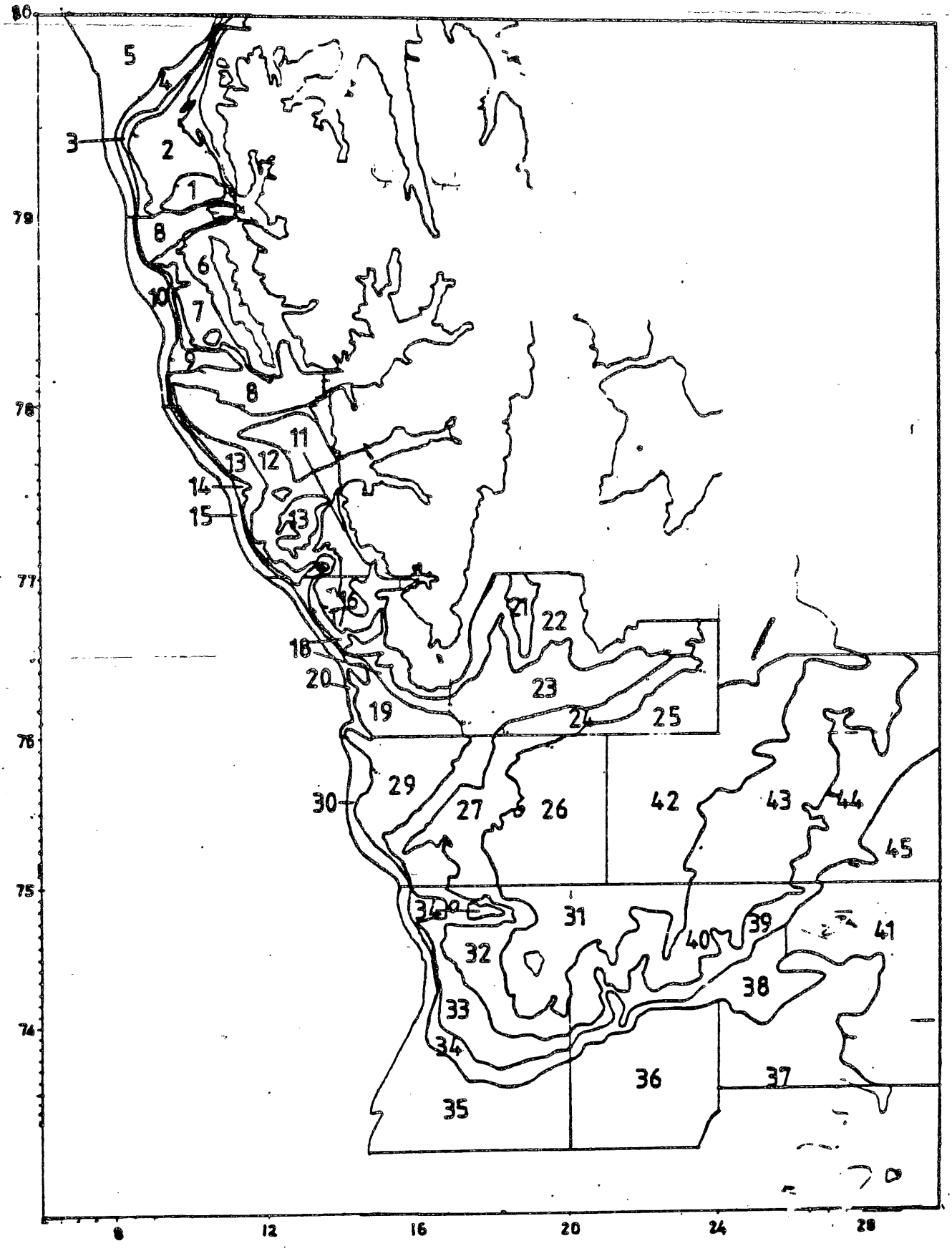


Fig. 1. The investigation area with the different strata.

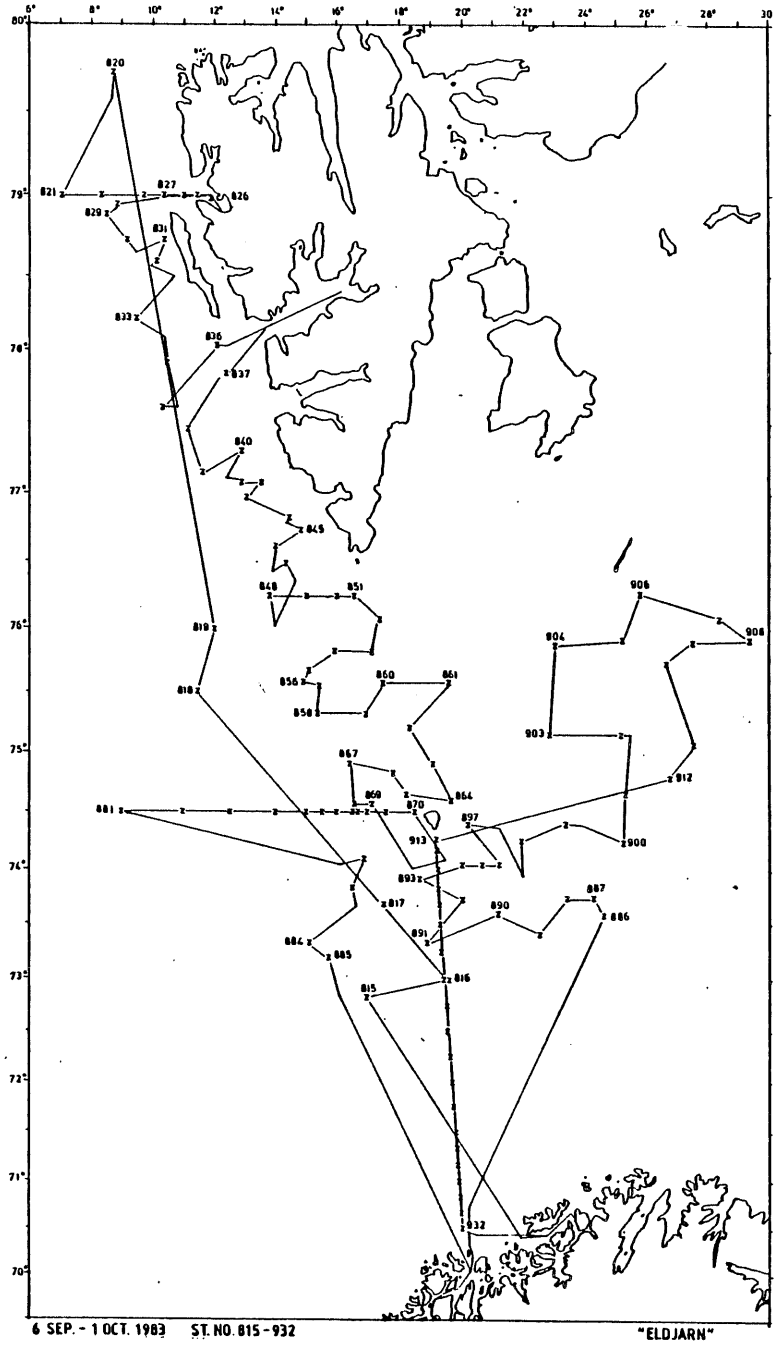


Fig. 2. Survey tracks and hydrographical stations taken by F/F "Eldjarn" in the period 7 September - 9 October 1982.

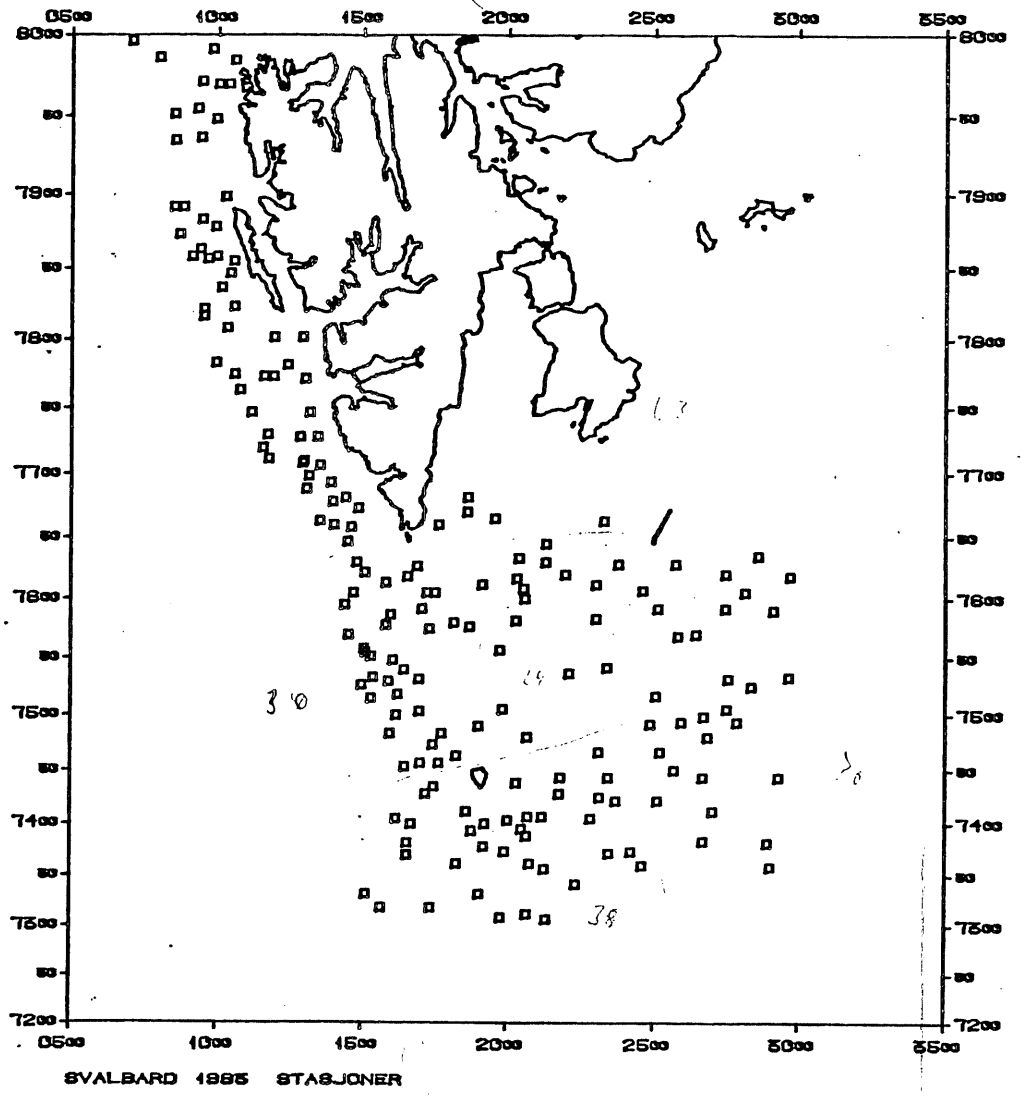


Fig. 3. Bottom trawl stations taken by F/F "ELdjarn" and M/T "Bøtrål" in the period 7 September - 9 October 1982.

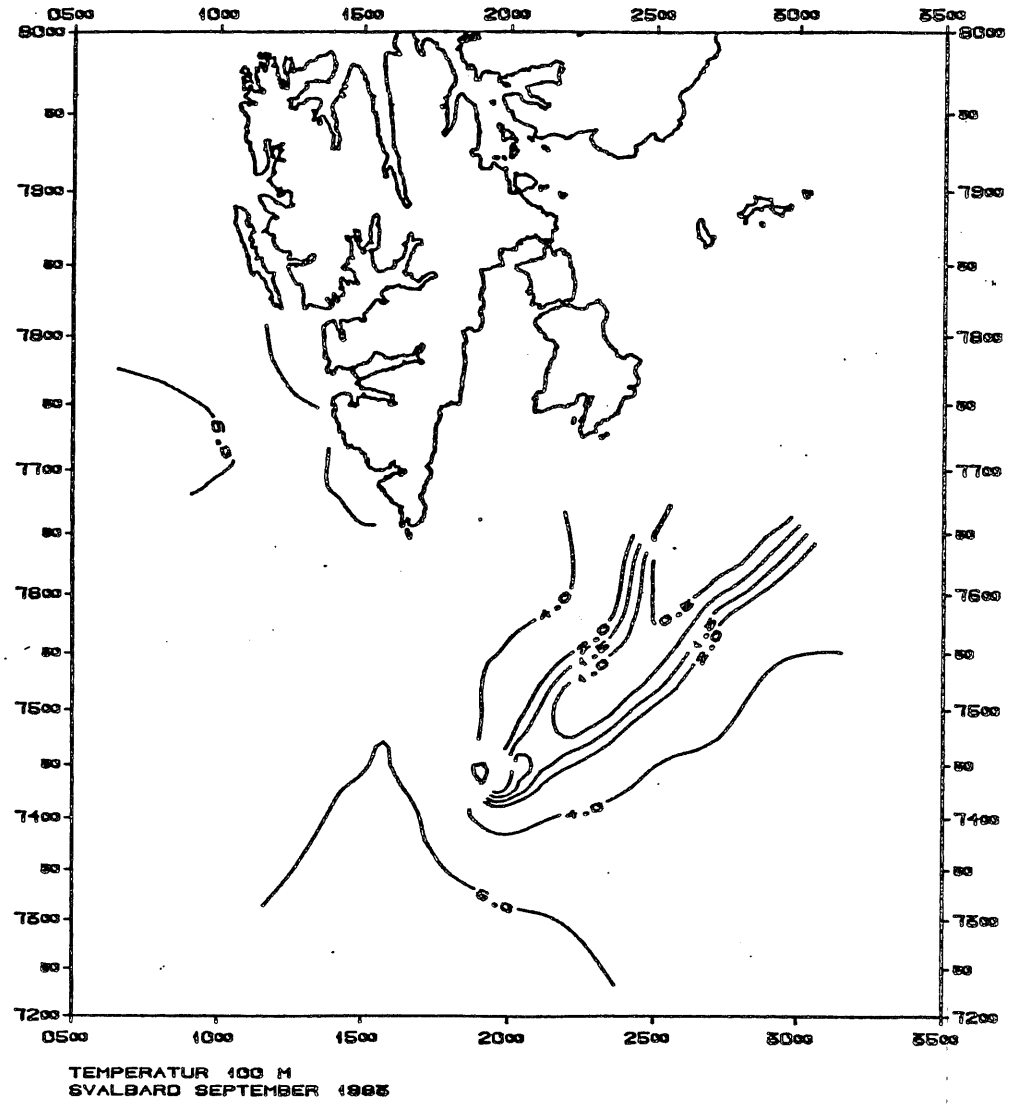


Fig. 4. Temperature distribution in 100 m depth.

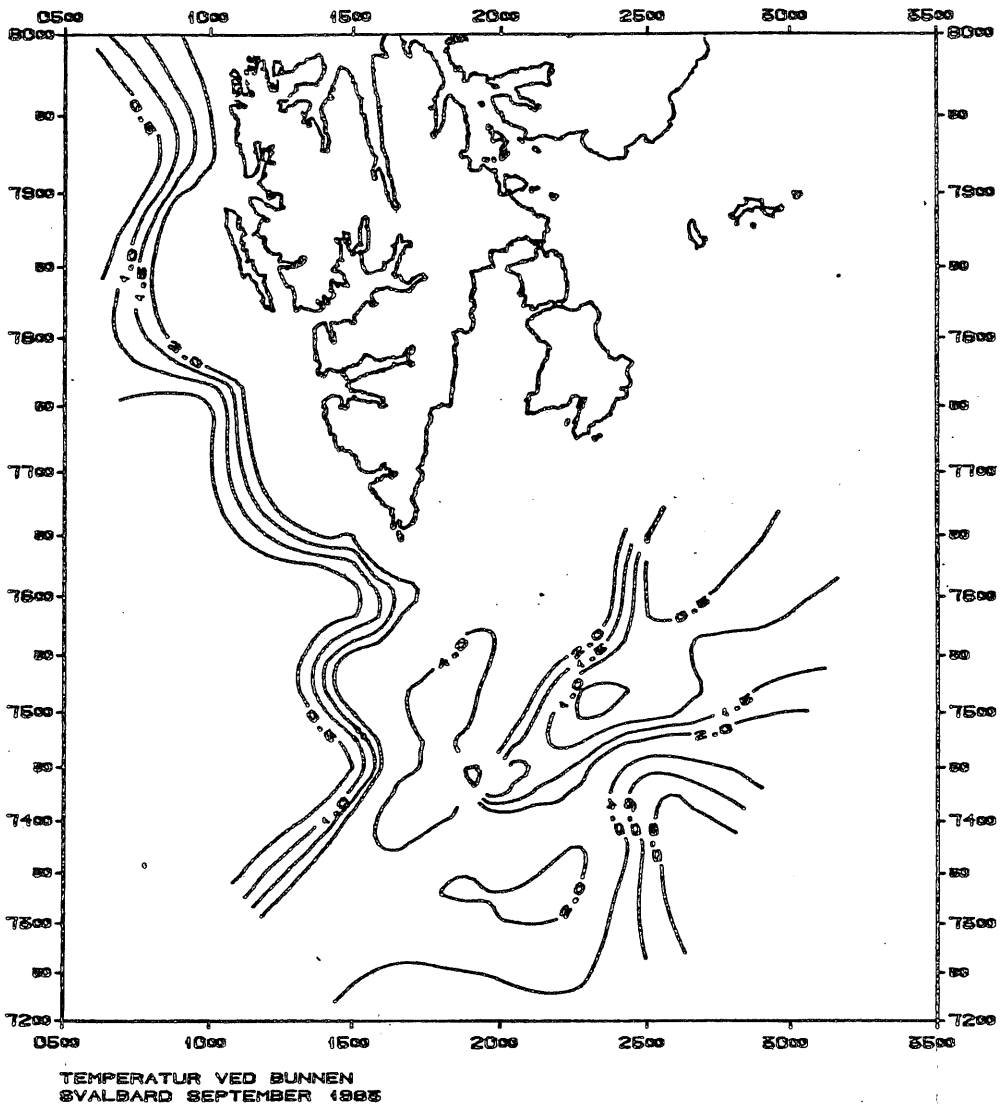


Fig. 5. Temperature distribution at the bottom.

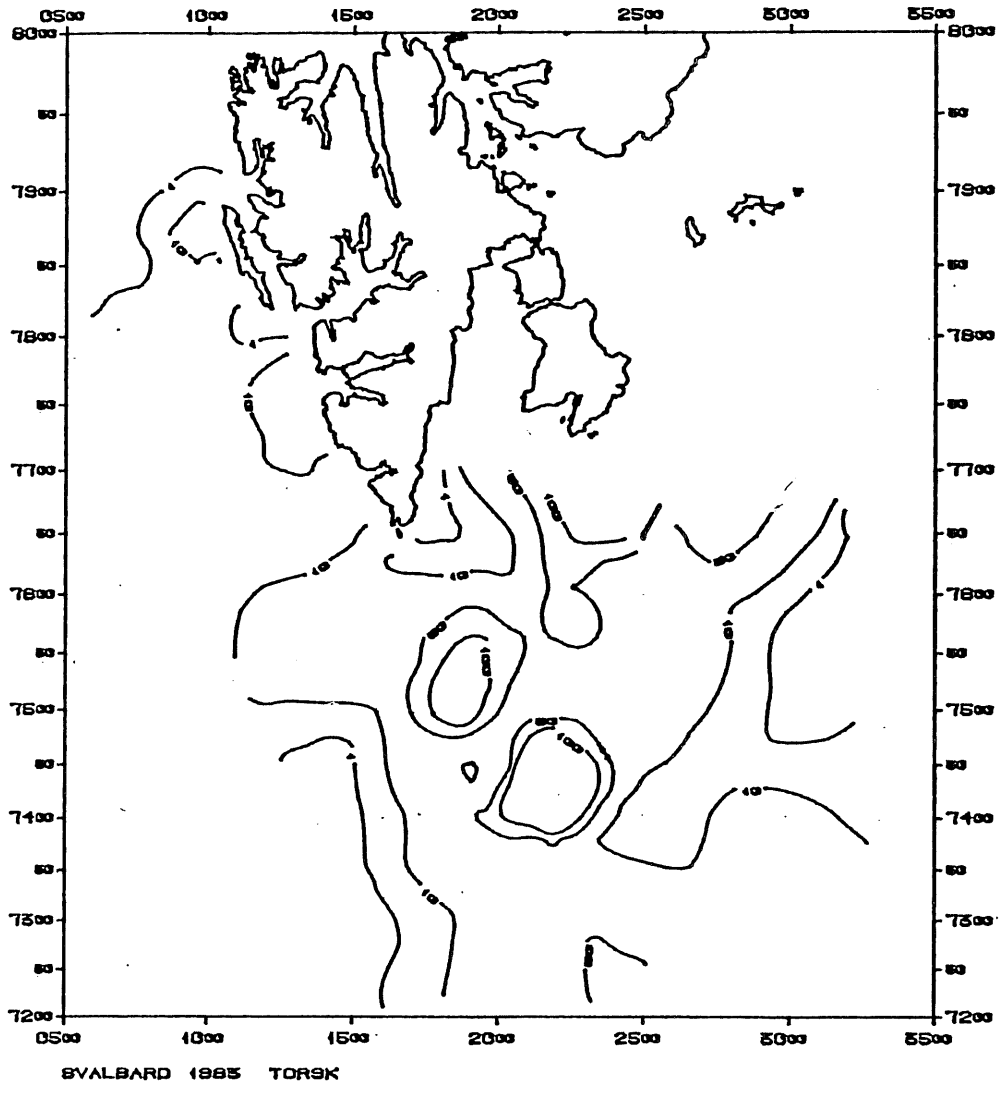


Fig. 6. Distribution of cod in the trawl catches (numbers per hour).

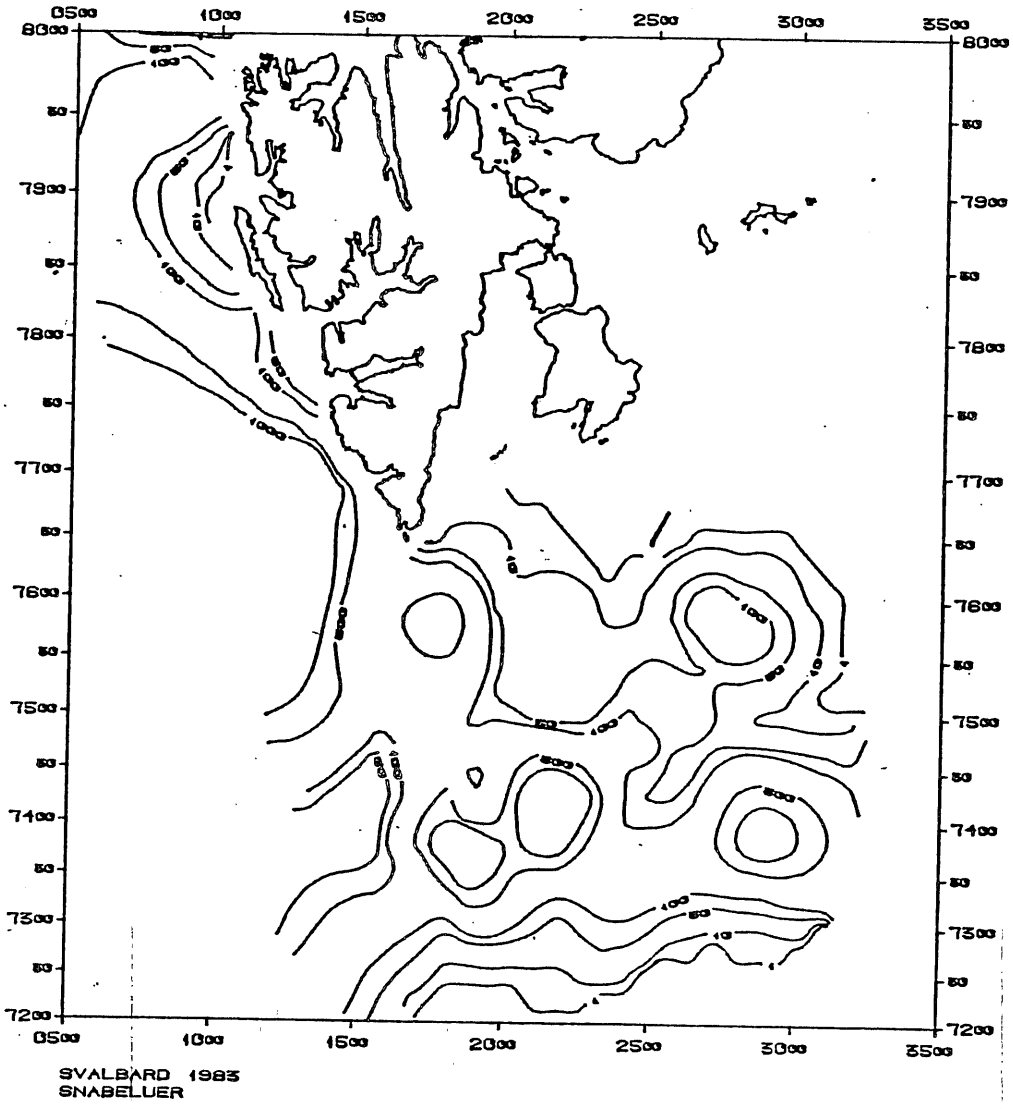


Fig. 7. Distribution of Sebastes mentella in the trawl catches (numbers per hour).

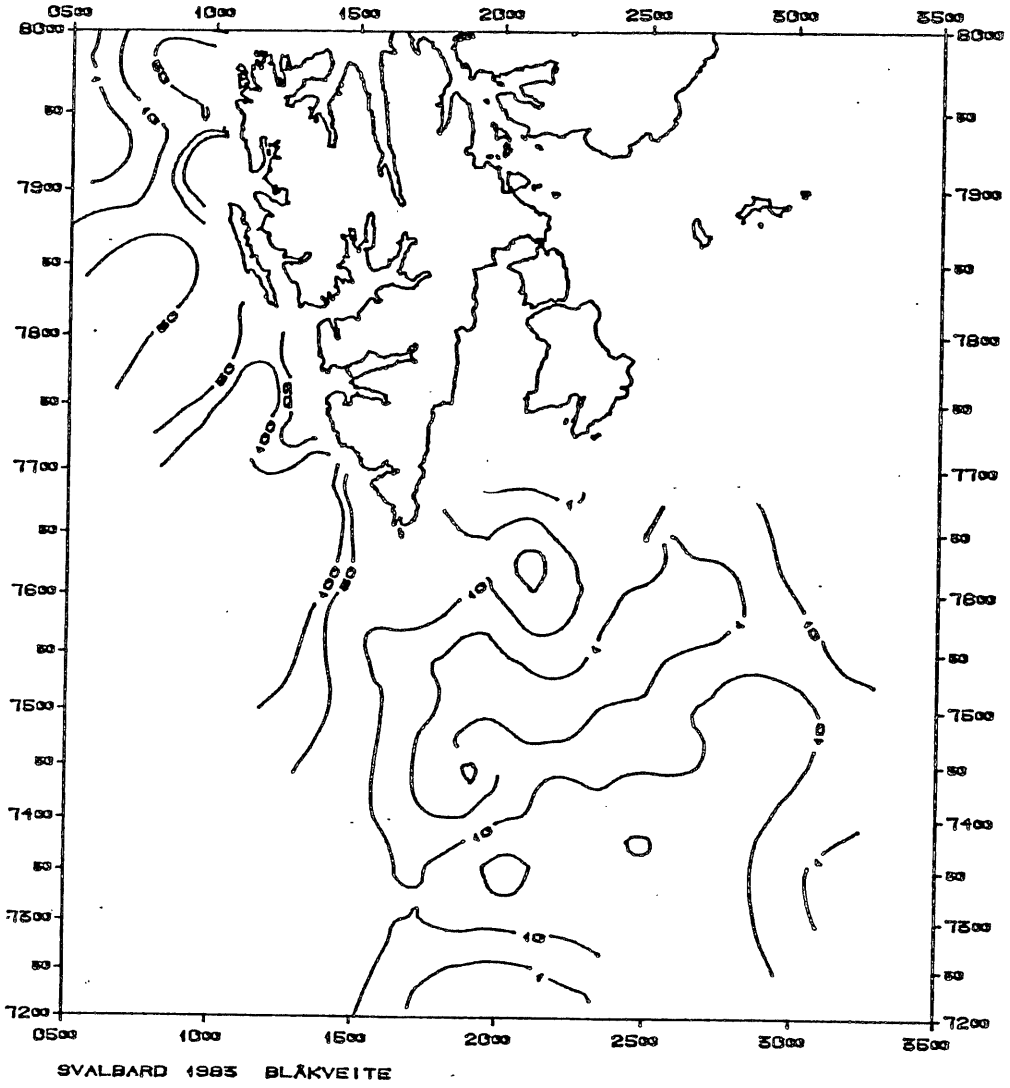


Fig. 8. Distribution og Greenland halibut in the trawl catches (numbers per hour).

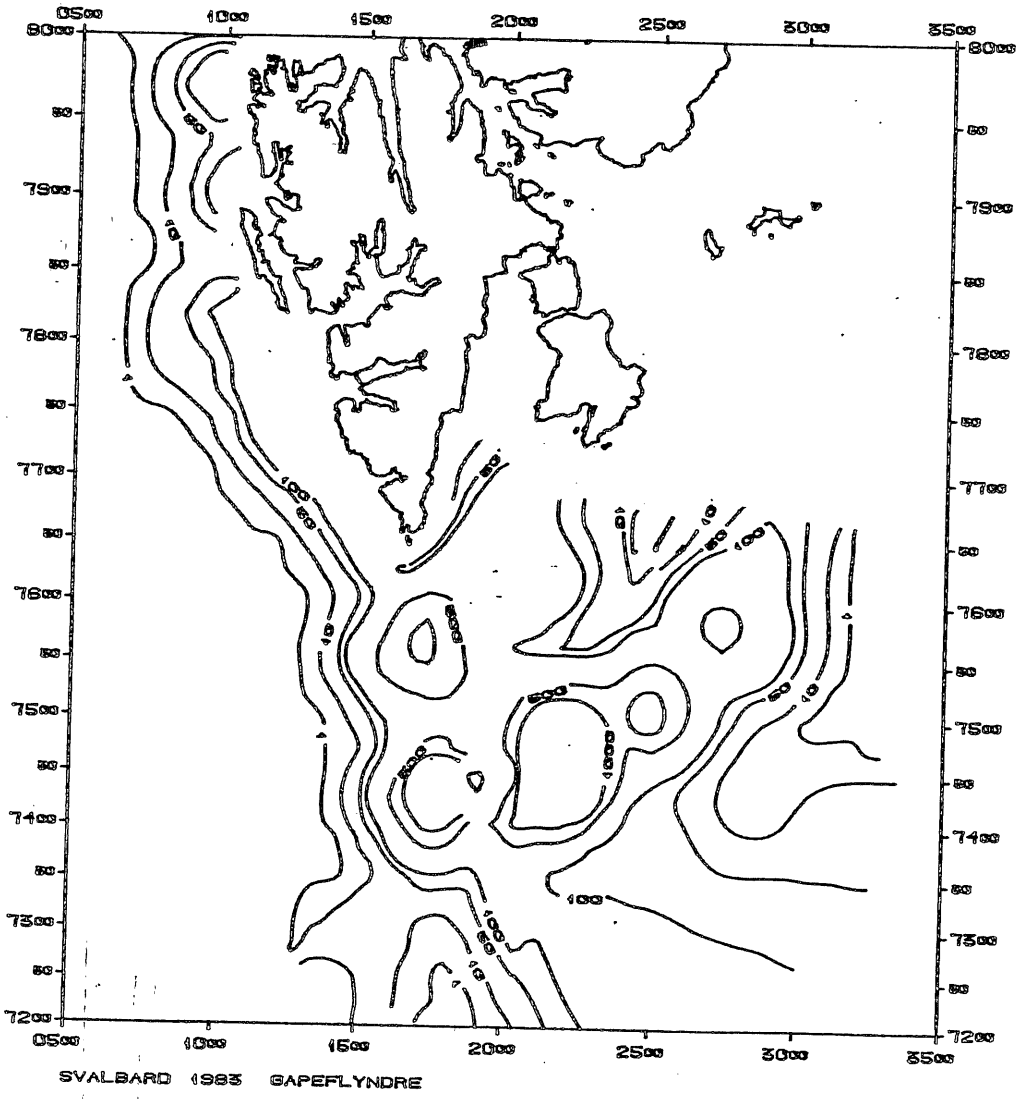


Fig 9. Distribution of long rough dab in the trawl catches (numers per hour).

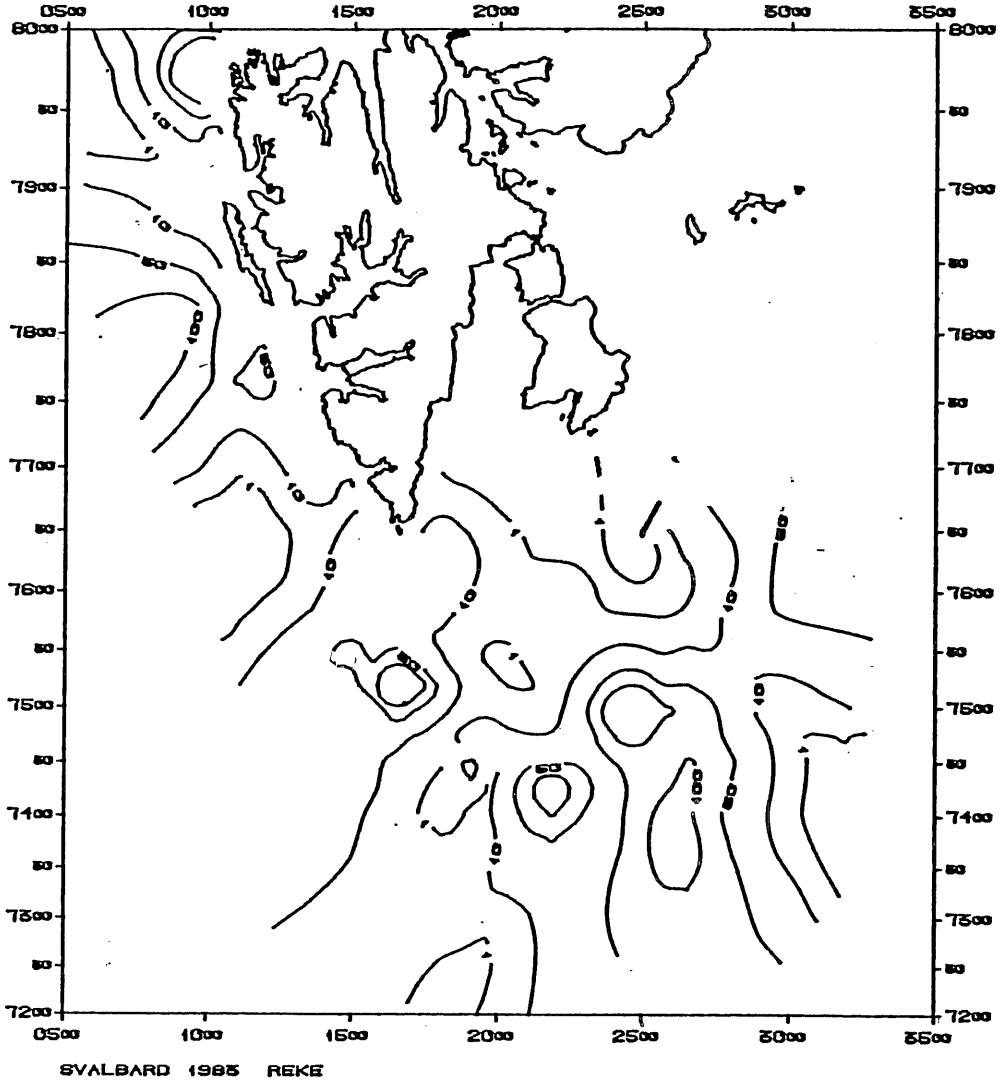
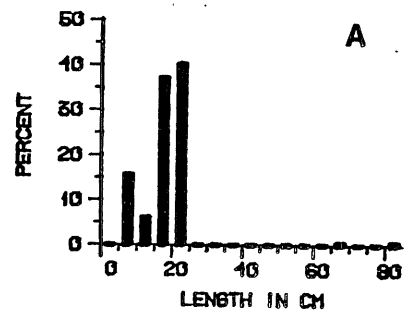
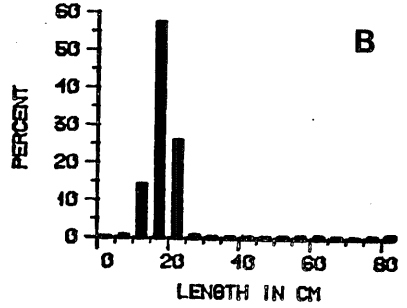


Fig. 10. Distribution of shrimps in the trawl catches (kg per hour).





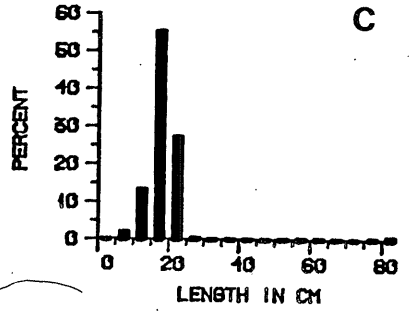


Fig. 11. Length distribution of haddock.

A: Northern area,
B: Southern area,
C: The total area.

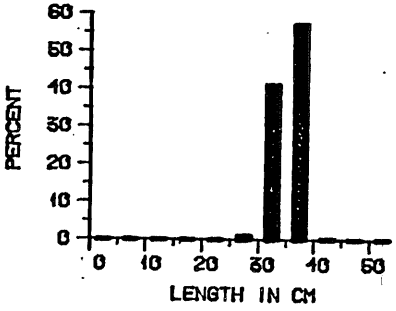


Fig. 12. Length distribution of blue whiting.

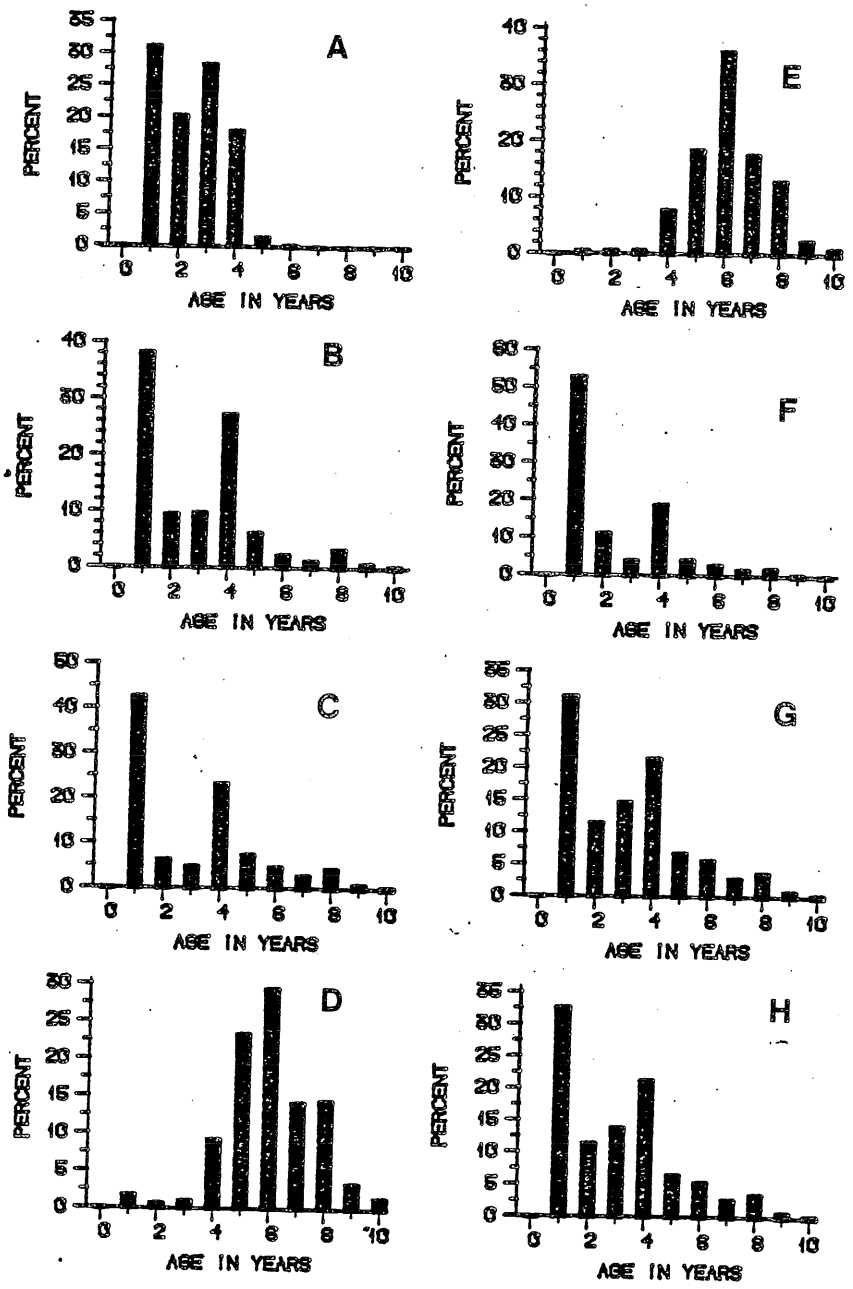


Fig. 13. Age distribution of cod: A: 0 m-100 m depth, B: 100 m-200 m depth, D: 300 m-400 m depth, E: Deeper than 400m, F: Northern area, G: Sothern area, H: Total area.

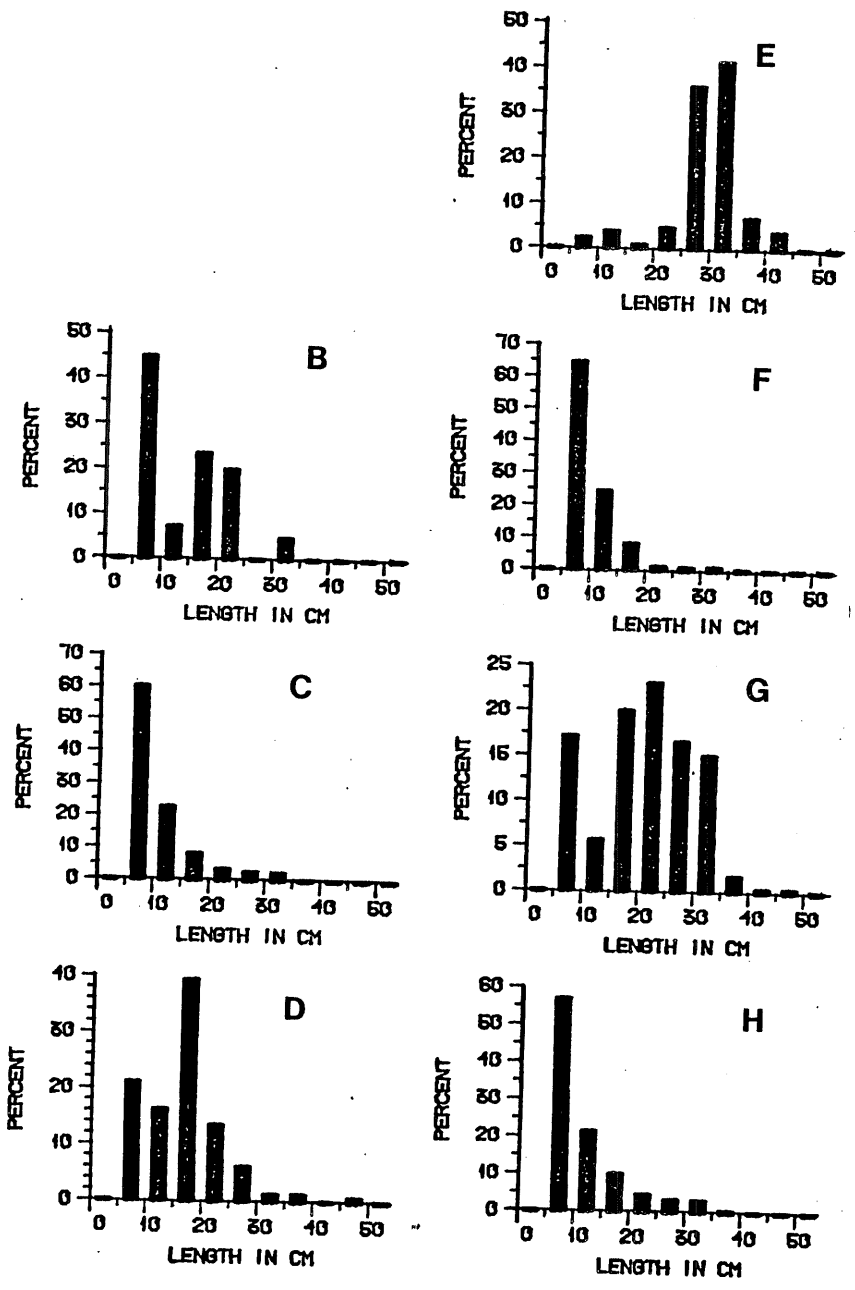


Fig. 14. Length distribution of Sebastes marinus. (Legends as in Fig. 13).

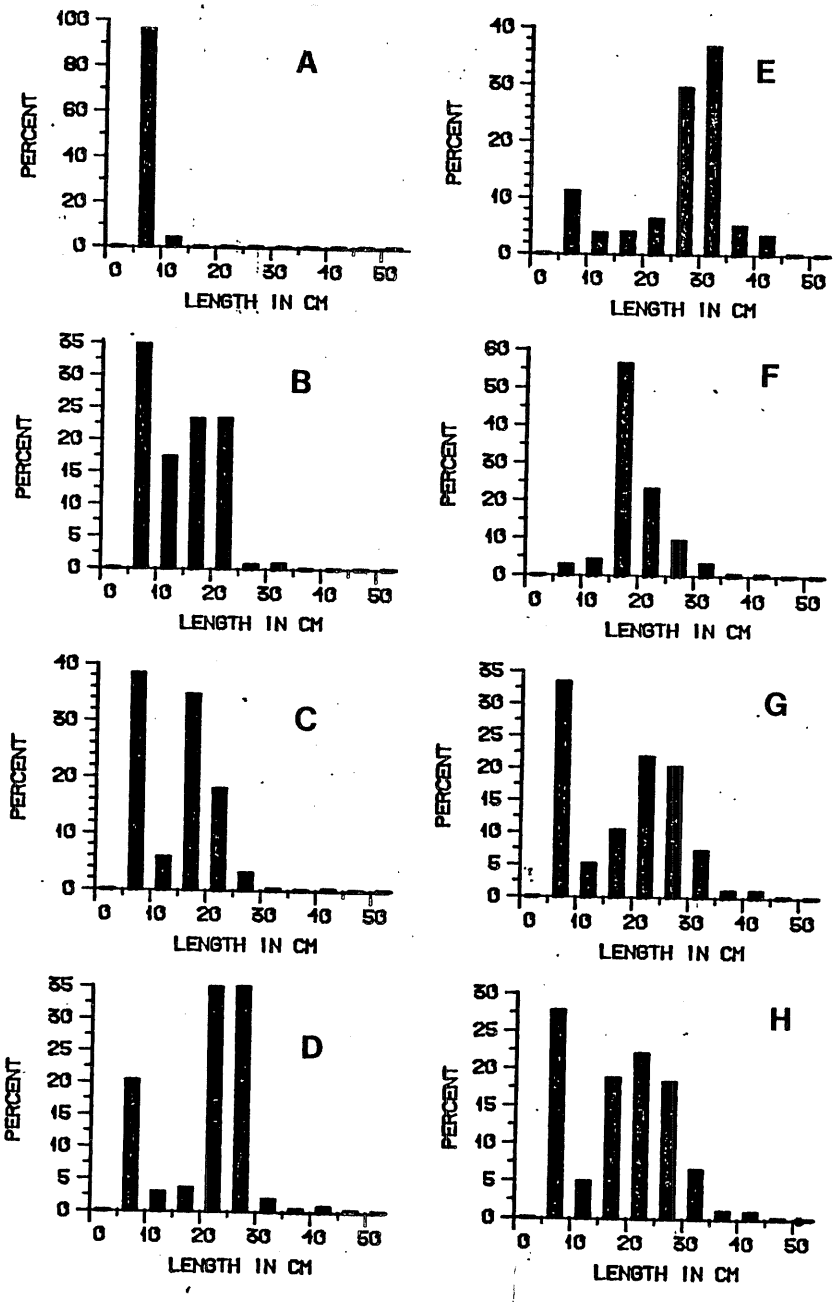


Fig. 15. Length distribution of Sebastes mentella. (Legends as in Fig. 13)

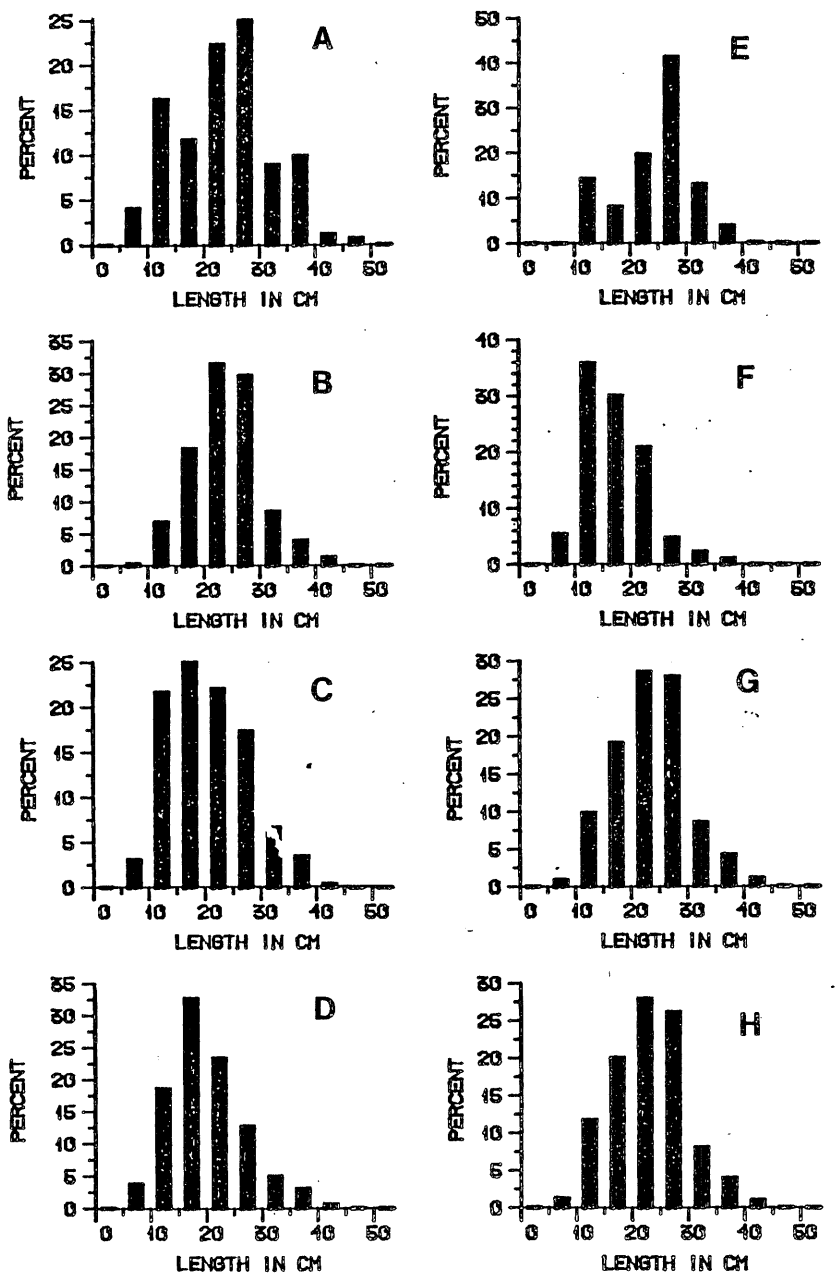


Fig. 16. Length distribution of long rough dab. (Legends as in Fig. 13).

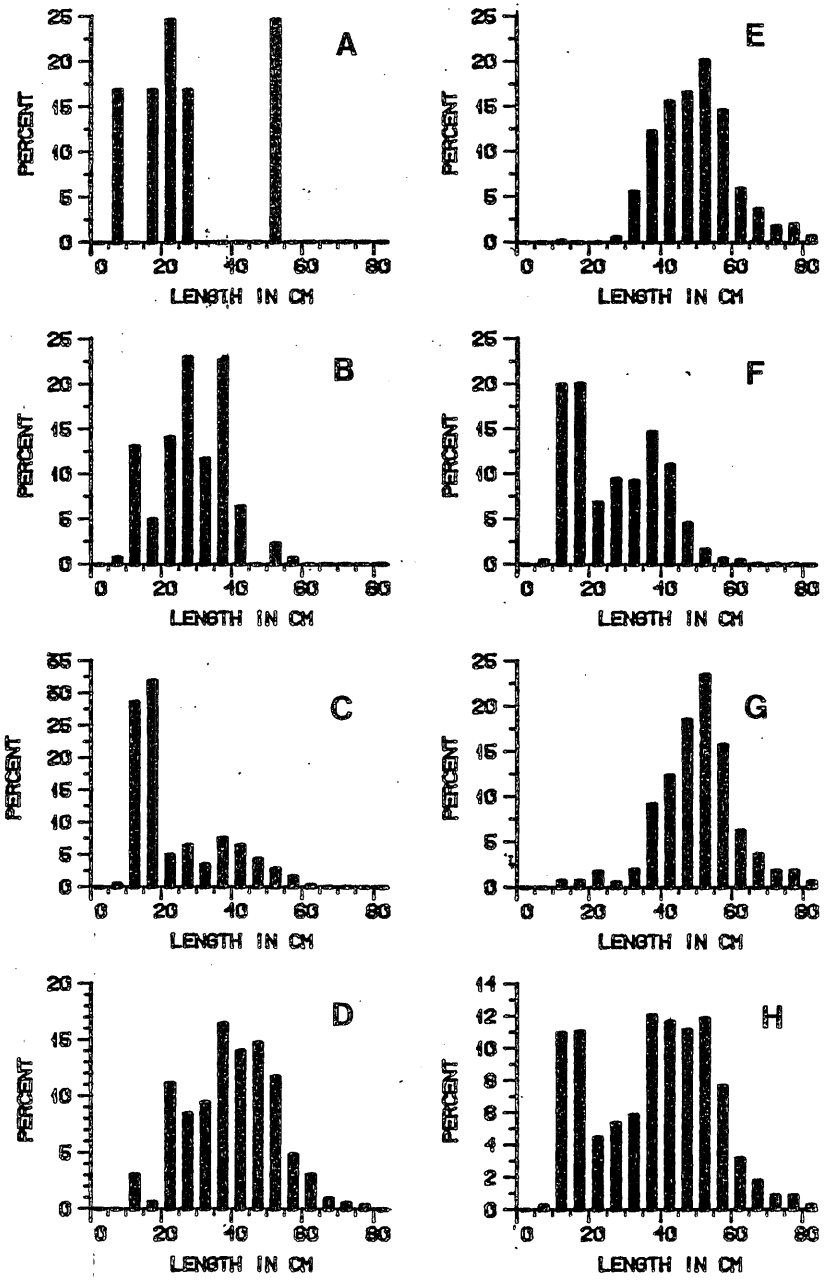


Fig. 17. Length distribution of Greenland halibut. (Legends as in Fig. 13).