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PRELIMINARY REPORT OF THE NORWEGIAN GROUNDFISH SURVEY AT BEAR ISLAND AND WEST-SPITSBERGEN IN THE AUTUMN 1984

by

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ABSTRACT

This report describes the results from a stratified bottom trawl survey carried out in September/October 1984. The cod stock component was dominated by the 1982 and the 1983- year classes. The former most abundante 1979-yearclass was reduced with 44% compared to the 1983 results. Older haddock were scarce, but good recruitement of the 1983-year class 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 1981,1982,1983 (Randa and Smedstad 1982, 1983 and Godø, Randa and Smedstad 1984) and 1984 were carried out as stratified bottom trawl surveys.

MATERIAL AND METHODS

The survey was carried out by R/V "Eldjarn" and M/Tr "Stallo" in the period September 7 - October 3 1984. 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° 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 in 1984.

RESULTS

Hydrography

The temperature in 100 m and at the bottom are shown in Fig. 4 and 5. In the greater part of the surveyed area on the western side of Spitsbergen, the bottom temperature was between 3^0 C and 5^0 C, which is generally higher than in 1983. West, north and northeast of Bear Island the shallower areas (depth <300m) were covered by water between 2^0 C and 3^0 C. This is on the level of the previous years results, or a little lower. South and east of Bear Island the water was generally coulder than in 1983. T results indicate thus a more western and northern influx of the warm Atlantic water in 1984 compared to earlier years. A late could water influx from north east towards the Bear Island seems to have separated the warmer bottom water north of Bear Island from the southern warm water.

Cod

Cod were recorded in the trawl catches in all areas. In contrast to previous years, considerable quantities of cod were found on the western side of Spitsbergen north of 76^0 N (Fig. 6). The highest mean catch rate on numbers, 1685 specimens, was obtained in stratum 6 (Fig. 1). In all strata north of 76^0 N with depth less than 100 m, the mean catch exceeded 150 individuals per hour, while all the deeper strata in the northern area gave mean catches less than 100 individuals per hour.

In 8 of the 23 strata south of 76^0 N, the mean catches exceed 100 specimens per hour. These strata were in depths shallower than 300 meter. Maximum density was observed in stratum 39 in the 200-300 meter zone (385 spec. per hour). North and northeast of Bear Island in areas with depth less then 100 meter, the mean catches were above 100 spec. per hour in three out of four strata. Cod distribution is shown in Fig. 6.

Age compositions of cod are shown in Fig. 13. In the northern area (north of 76^0 N) the recorded cod almost exclusivly were made up by the 1983 year classe which was mainly distributed shallower than 100 meter. In the southern area the 1982 year classe dominated in the shallowest areas. In areas of 100 to 300 meters depth, the 1983 year classe was most numerous. The highest densities of older fish was also observed in the same depths (100-300 meter).

Stratified indices of cod on numbers and weight are presented in Table 1 and 2. They show that the main cod consentrations were south of 76^0 N. The indices on numbers were highest in the areas shallower than 300 m. The weight indices did not vary as much with depth 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) confirmed that the 1982 year classe is strong compared to the previous ones. It is further indicated that the 1983 year classe was the most numerous one and four times as abundant as the 1982 yearclasse at the same age (Table 4). Thus it is the stongest yearclasse recorded as one year olds since these investigations started. The two last year classes has completely changed the situation of the cod stock in the area. During the last year the indices on numbers increased with about 140 %. In Table 5 it is seen that the recruitment of the 1983 year classe has caused a drastic increase of the indices on numbers in the northern area where cod in previous years has been scarce. It has, however, to be stressed that the confidence limits are in many cases rather high.

The indices of the 1979 year classe, which was the strongest yearclass in 1981 and 1982, was reduced with almost 60% from 1982 to 1983 (Godø et al. 1984). The 1984 indices indicate a further decrease of this yearclasse which now only make up about 5 % of the stock in number. Recaptures of tagged cod indicate that spawning migration may have caused less availability of this yearclasse in the area of investigation.

The indices on weight also increased considerably, however, not comparably as much as the indices on numbers, which is a result of the strong recruitment of small fish.

The mean length of the 1982 yearclasse was 36 cm in September 1984. Much of the year classe will pass the minimum landing size of 42 cm in 1985, but under sized fish will probably make up a considerable proporsion of the commercial catches aspecially during the first part of the year. If the 1982 year classe to a considerable extent mix up with the 1983 year classe, the bycatch problem of undersized fish probably again will increase at the end of the year.

Haddock

The most dramatic change of the results from 1983 to 1984 was the enormous increase of the haddock indices on numbers (Table 5). North of 76^0 N only inconsiderable catches of haddock was caught during the previous cruises (Table 5-6). In this area a hundred fold increase is indicated compared to 1983, and the index on numbers is higher than for cod. The haddock distribution was, however, very patchy, which also is reflected by the high confidence limits. Also in the southern area the indices of haddock increased considerably. The 1982 year classe recruited to this area and made up most of the 1983 index of 3358. The corresponding figure is roughly ten times higher in 1984. Fig. 12 show that the catches were dominated by haddock from 15 to 25 cm in length. In the deeper areas (deeper than 300 m) haddock from 5- 15 cm dominated which indicate that the settling of the 1984 year classe of haddock has started.

Last year haddock was recorded only in about half of the strata. In 1984 haddock was distributed over a greater part of the ivestigated area, and only 7 of the 45 strata were without haddock catch. The higest mean catch (1800 specimens) was obtained in the strata 11 (north of 76^0 N). In the southern area

the maximum mean catch (573 specimens) was obtained in stratum 32.

Redfishes

Together with long rough dab, the redfishes were the dominant species in the area. Also in 1984 Sebastes mentella was the dominating redfish species in the Bear Island and West-Spitsbergen area. Sebastes marinus constituted about 10 % of the catches on nubers in the southern area (Table 1), while being insignificant in the northern area. The total indices (both species together) on numbers indicate an increase of about 70 % and a somewhat higher increase on weight.

S.mentella was most numerous in depths between 100 m and 300 m north of 76° N and deeper than 200 m south of 76° N (Table 1). The influence of larger fish increased with depth as observ during the previous cruises.

Geographic distribution and length distributions are presented in Figs. 7,14 and 15.

Greenland halibut

Greenland halibut was caught in most strata deeper than 100 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 Hornsund Bank and the Kings Bay (Fig. 8).

As in 1983 the influence of older fish in the catches increased in the deeper areas (depth >400), and the Greenland hallibut north of 76° was distinctly smaller than that further south (Fig.16). The stratified indices on numbers decreased in the northern area and increased in the southern area compared to previous year. A net increas of 38 % compared to the 1983 results was observed.

In the northern area the indices on numbers decreased while the indices on weight increased considerably. This may indicate a decrease in the recruitment of Greenland halibut in this area, which is supposed to be a major nursery area (Godø and Haug 1985).

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 in depths between 100 and 300 m around the Bear Island where the catchrates exceeded 1000 individuals per hour trawling (Fig.9). The stratified indices were almost doubled compared to the 1983 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.

11). The stratified indices showed an increase of about 100 % compared to the 1983 results.

Saithe

Saithe was found in consentrations off the Spitsbergen coast between the Hornsund Bank and the Kings Bay. Catches of several tons were obtained. The consentrations were easyly recorded on the echo sounders and the distribution was observed to be very patchy. Singel fish catches were also obtained in the shallower part of the southern area. The catches were 0-group saithe of 13-15 cm in length.

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 about 50% compared to the 1983 results (Table 6).

Catfishes

In all area small quantities of catfishes were caught. The indices of all the catfishes increased (Table 5-6).

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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	14 360	5 102	1 078	143	19	20 700	33 060	27 110	24 640	3 154	2 843	90 810	111 500
Haddock	29 000	9 271	149	52	13	38 490	837	22 990	5 258	157	912	30 160	68 640
S.Marinus	0	102	234	32	4	373	0	2 233	30 670	160	31	33 100	33 470
S.Mentella	84 107	900	151 800	8 788	10 040	278 600	106	9 701	72 430	127 700	63 540	273 500	552 500
Greenland halibut	0	238	5 521	2 115	4 804	12 680	0	155	4 516	8 953	10 330	23 960	36 630
Long rough dab	1 064	45 150	21 870	4 856	480	73 410	13 970	315 500	205 000	35 660	22 200	592 400	665 800
Blue whiting	77	0	46	145	155	422	0	41	46 970	14 380	5 726	67 110	67 530
Jelly cat	0	0	8	8	15	34	12	599	653	230	589	2 083	2 117
Catfish	51	1 033	784	237	62	2 167	60	425	685	92	96	1 358	3 525
Smaller catfish	13	364	498	397	247	1 518	67	2 964	848	306	6	4 190	5 709

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	2 585	1 557	1 069	444	49	5 704	14 580	12 980	22 430	7 134	9 387	66 510	72 210
Haddock	3 637	1 479	15	5	1	5 136	160	2 543	415	4	79	3 201	8 337
S.Marinus	0	9	107	7	3	127	0	395	2 785	53	30	3 262	3 389
S.Mentella	0	7 373	4 616	2 612	4 645	19 250	0	237	43 490	7 713	14 240	65 670	84 920
Greenland halibut	0	166	1 801	951	3 922	6 840	0	126	3 126	6 475	14 500	24 220	31 060
Long rough dab	115	3 063	1 514	360	79	5 132	3 737	49 820	21 630	3 837	3 131	82 160	87 290
Blue whiting	0	0	12	38	34	83	0	11	14 400	4 676	1 438	20 530	20 610
Jelly cat	0	18	57	0	122	196	0	6 673	5 379	2 282	4 924	19 260	19 450
Catfish	52	527	426	202	30	1 238	90	744	2 995	222	487	4 538	5 776
Smaller catfish	37	452	463	258	167	1 376	287	11 420	1 485	279	6	13 480	14 850
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 1984.

	Depth	Age 1	2	3	4	5	6	7	8	9	10+	Total
North of 76°N	0-100	10.2±12.6	3.5±3.5	0.3±0.4	+	0	0	0	0	0	0	14.4±14.2
	100-200	3.4±2.2	1.1±0.6	0.1±0.1	0.1±0.0	0.1±0.0	0	0	0	0	0	5.1± 2.9
	200-300	0.7±0.6	0.1±0.1	+	+	0.1±0.1	0.1±0.1	+	+	0	0	1.1± 0.7
	300-400	0	+	+	+	0.1±0.1	+	0	+	0	0	0.1± 0.1
	>400	+	+	+	+	+	+	0	0	0	0	+
	Total	14.4±12.8	4.6±3.6	0.5±0.5	0.2±0.1	0.2±0.1	0.1±0.1	+	+	0	0	20.7±14.0
South of 76°N	0-100	7.1±7.2	21.7±14.3	2.9±2.5	1.7±1.6	0.5±0.4	0.1±0.1	0	0	0	0	33.1±17.1
	100-200	17.4±7.2	7.3±3.0	0.8±0.4	0.9±0.4	1.0±0.6	0.4±0.1	0.1±0.1	0.1±0.0	0.1±0.1	0.1±0.1	27.1± 9.9
	200-300	12.5±7.9	8.0±5.1	1.0±0.8	1.1±0.6	1.9±0.9	0.5±0.3	0.1±0.1	0.1±0.1	0.1±0.1	0.1±0.1	24.6±10.4
	300-400	0.5±0.5	0.7±0.3	0.2±0.1	0.3±0.2	0.7±0.3	0.5±0.3	0.1±0.1	0.1±0.1	0.1±0.1	+	3.1± 1.1
	>400	0.2±0.2	0.4±0.2	0.2±0.1	0.2±0.1	0.9±0.4	0.6±0.2	0.1±0.1	0.1±0.1	0.1±0.1	+	2.8± 1.0
	Total	37.8±13.0	38.1±15.2	5.1±2.7	4.1±1.8	5.0±1.3	2.1±0.7	0.5±0.2	0.5±0.3	0.4±0.2	0.2±0.1	90.8±22.3
Total all areas		52.2±18.2	42.7±15.5	5.6±2.7	4.2±1.6	5.3±1.4	2.2±0.6	0.5±0.3	0.5±0.3	0.4±0.3	0.2±0.1	111.5±26.6

Table 4. Stratified trawl indices on numbers for different year-classes of cod in 1981 - 1984.

Year of investigation	Year-class 1983	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
1984	52.2	42.7	5.6	4.2	5.3	2.2	0.5	0.5	0.4	0.2				113.8

Table 5. Stratified trawl indices on numbers in 1981 -1984.

	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
	1984	72	20 700	38 490	373	278 600	12 680	73 410	422	34	2 167	1 518
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
	1984	122	90 810	30 160	33 100	273 500	23 960	592 400	67 110	2 083	1 358	4 190
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
	1984	194	111 500	68 640	33 470	552 100	36 630	665 800	67 530	2 117	3 525	5 709

Table 6. Stratified trawl indices on weight in 1981 - 1984.

	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
	1984	5 704	5 136	127	19 250	6 840	5 132	83	197	1 238	1 376	6 901
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
	1984	66 510	3 201	3 262	65 670	24 222	82 160	20 530	19 260	4 538	13 480	31 740
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
	1984	72 210	8 337	3 389	84 920	31 060	87 290	20 610	19 450	5 776	14 850	38 640

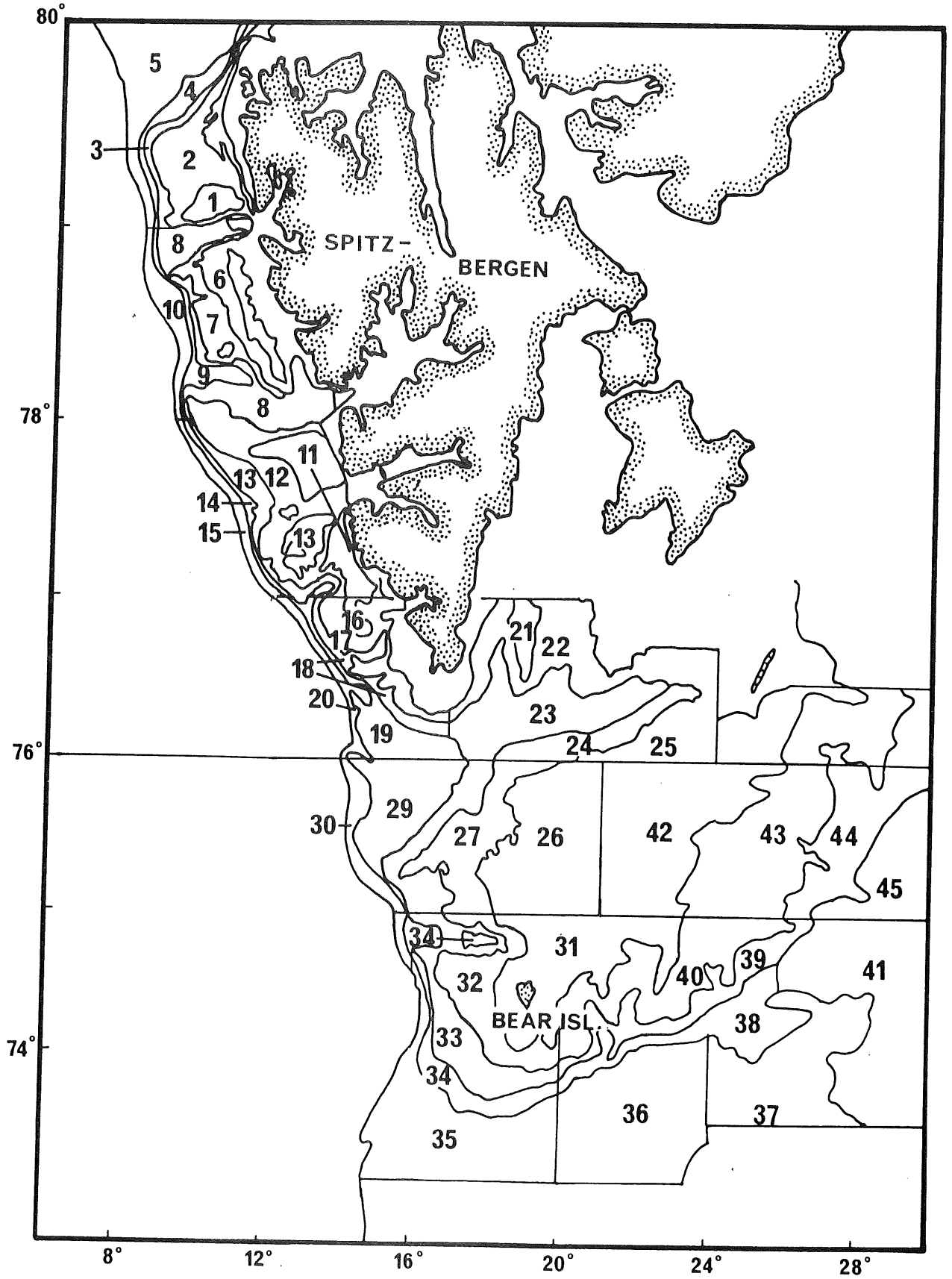

Fig.1. The area of investigation with the different strata.

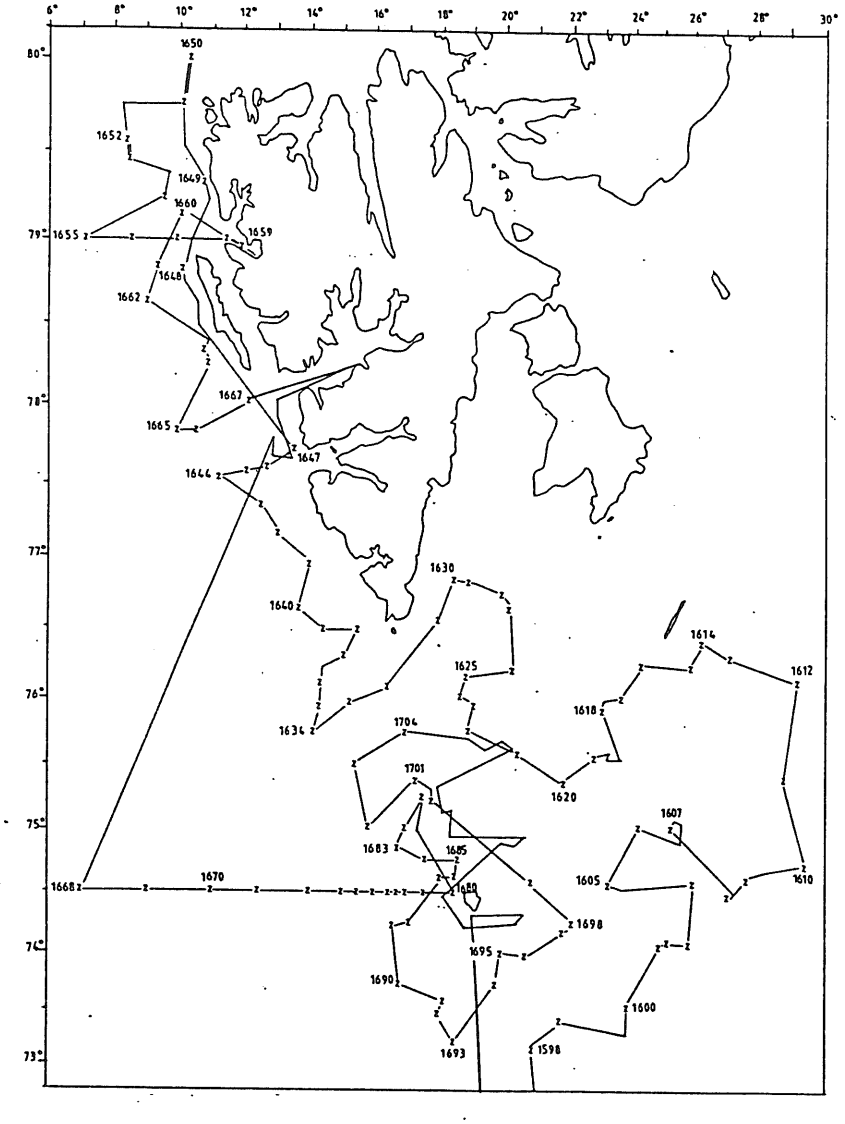

Fig.2. Survey tracks and hydrographic station taken by R/V"Eldjarn" in the period 7 September-3 October 1984.

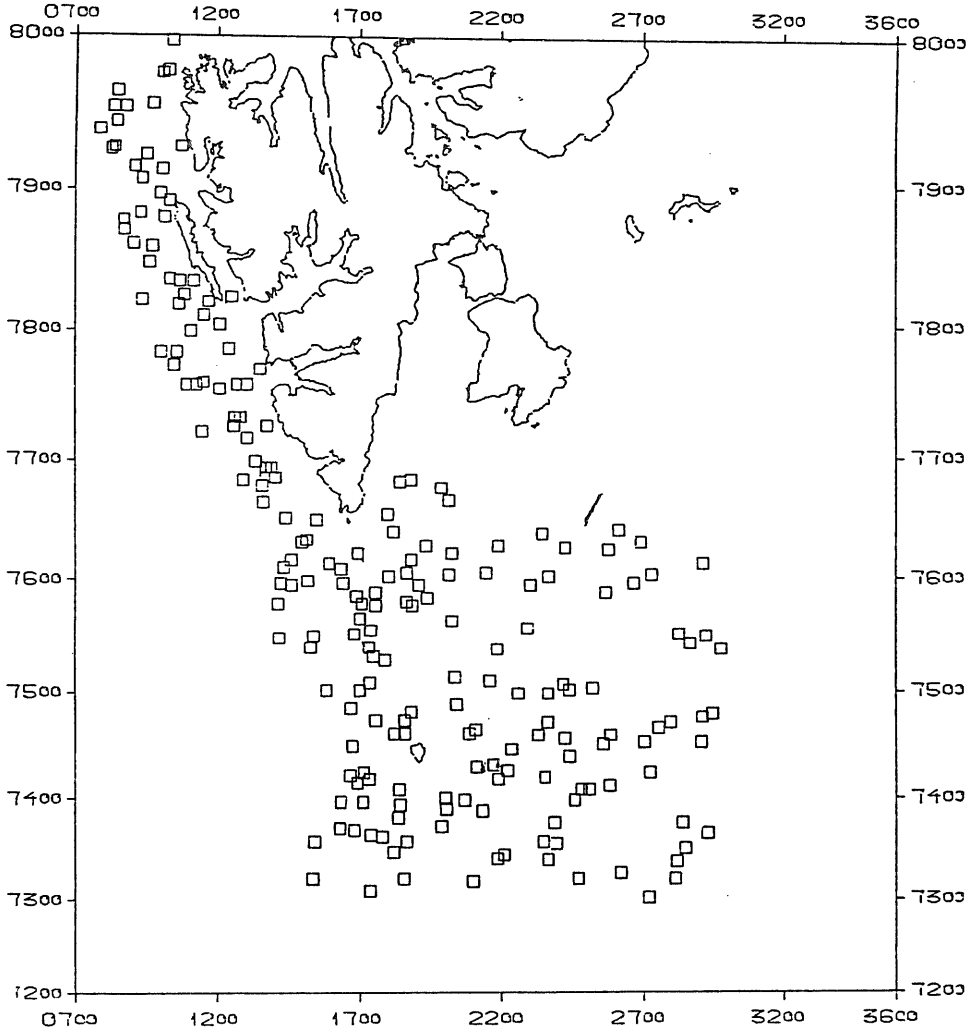

Fig.3. Bottom trawl stations taken by R/V"Eldjarn and M/Tr"Stallo" 7 September -3 October 1984.

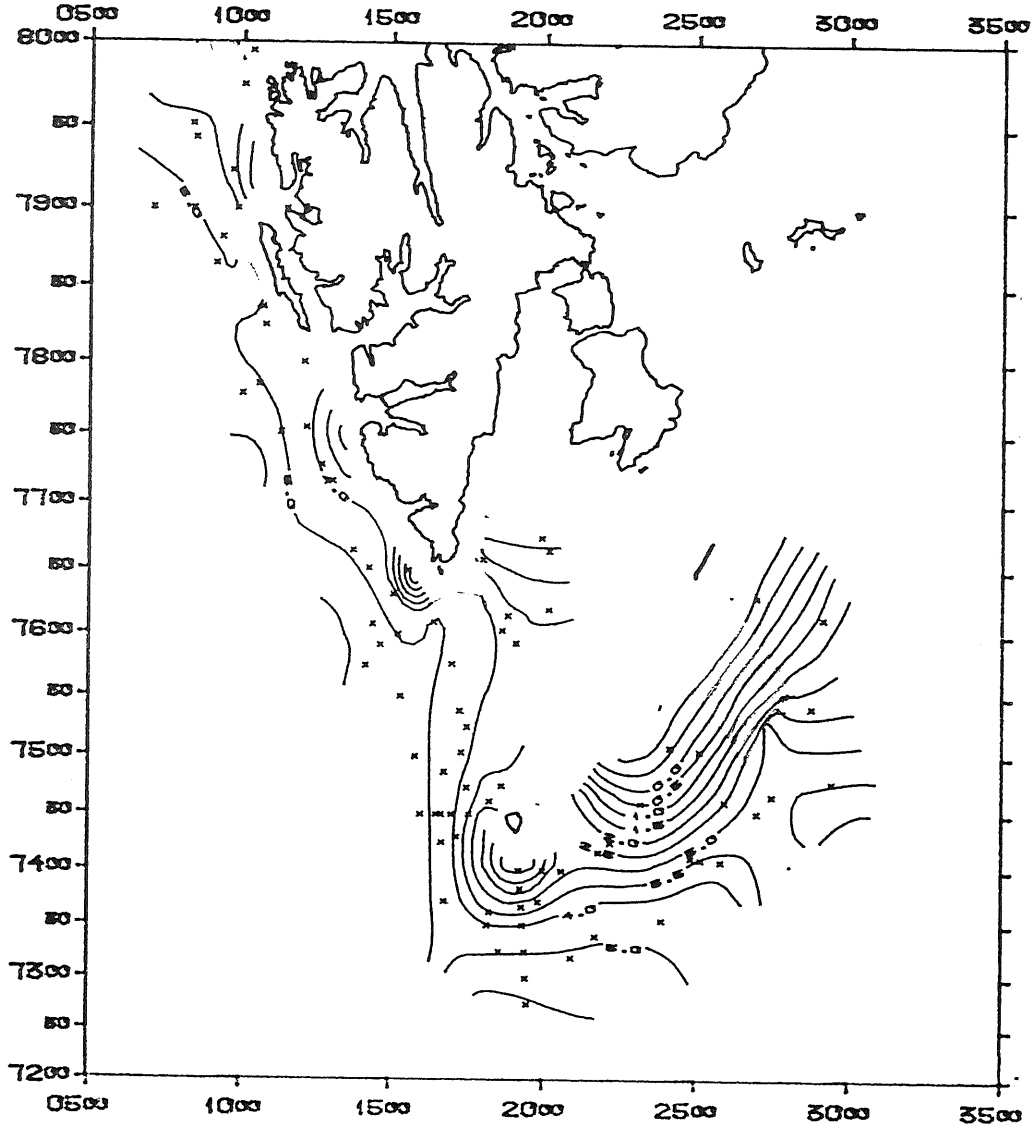

Fig.4. Temperature in 100 meters depth.

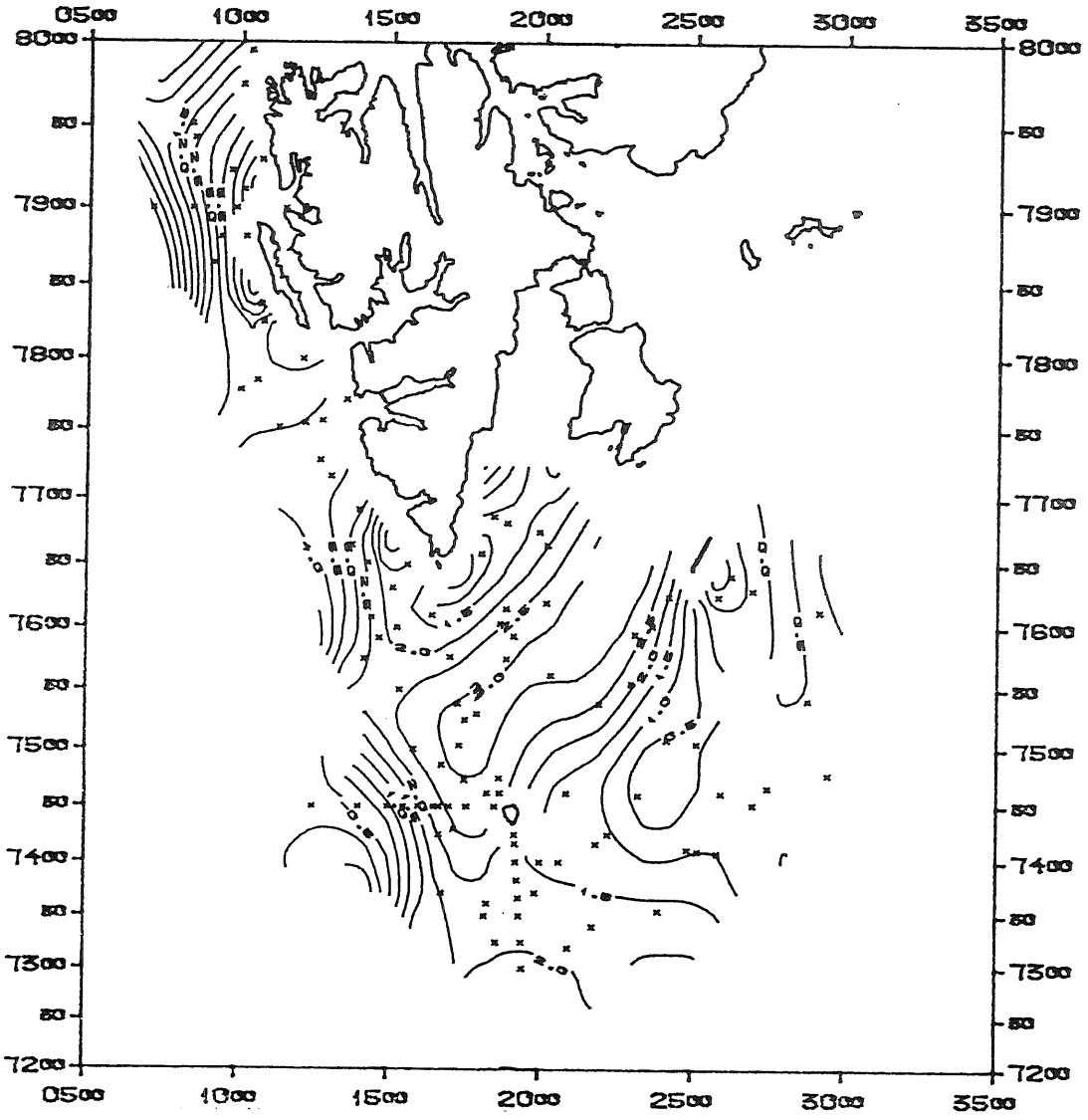

Fig.5. Temperature at the bottom.

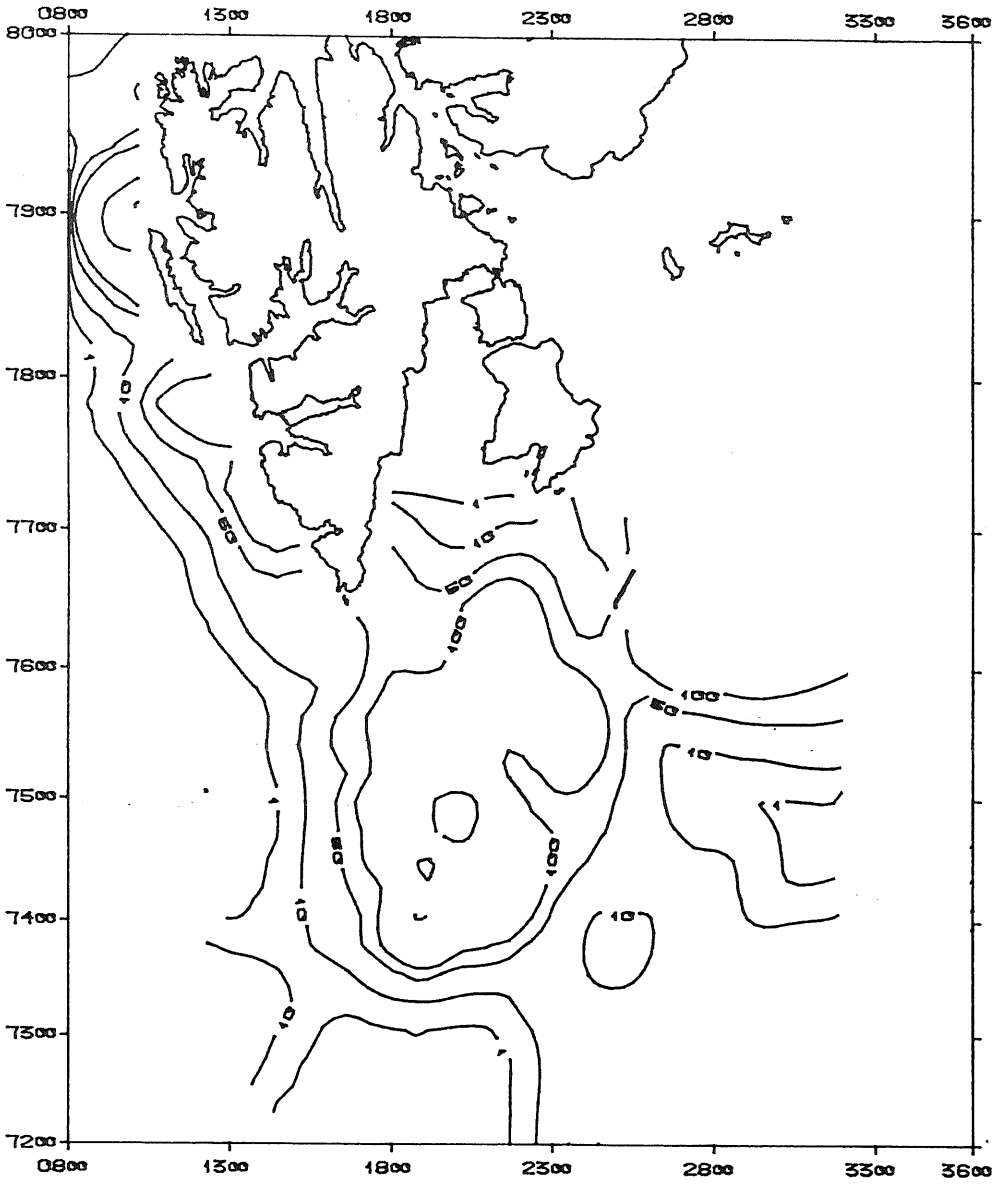

Fig.6. Distribution of cod in the trawl catches (numbers per hour trawling).

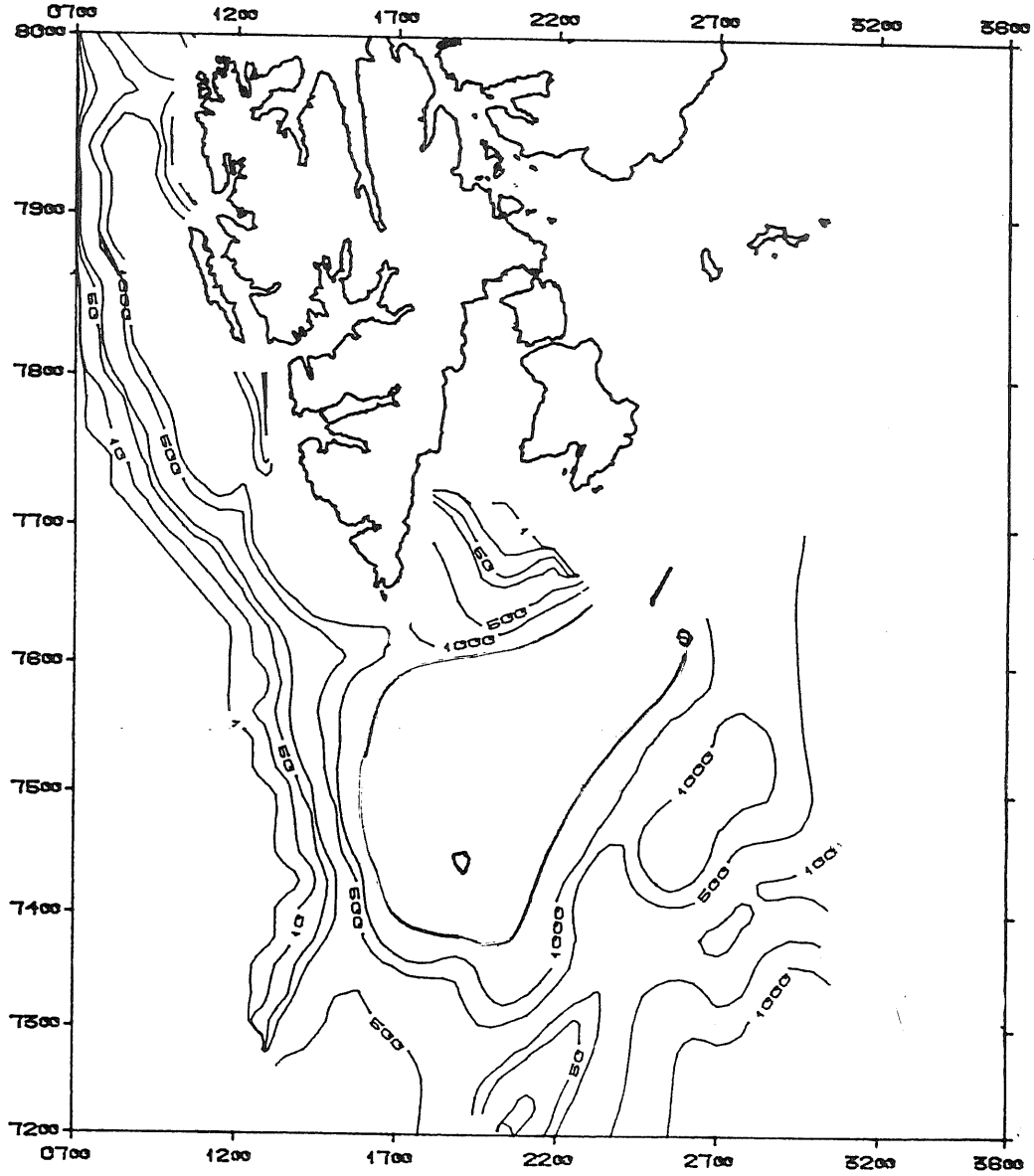

Fig.7. Distribution of Sebastes mentella in the trawl catches (numbers per hour trawling).

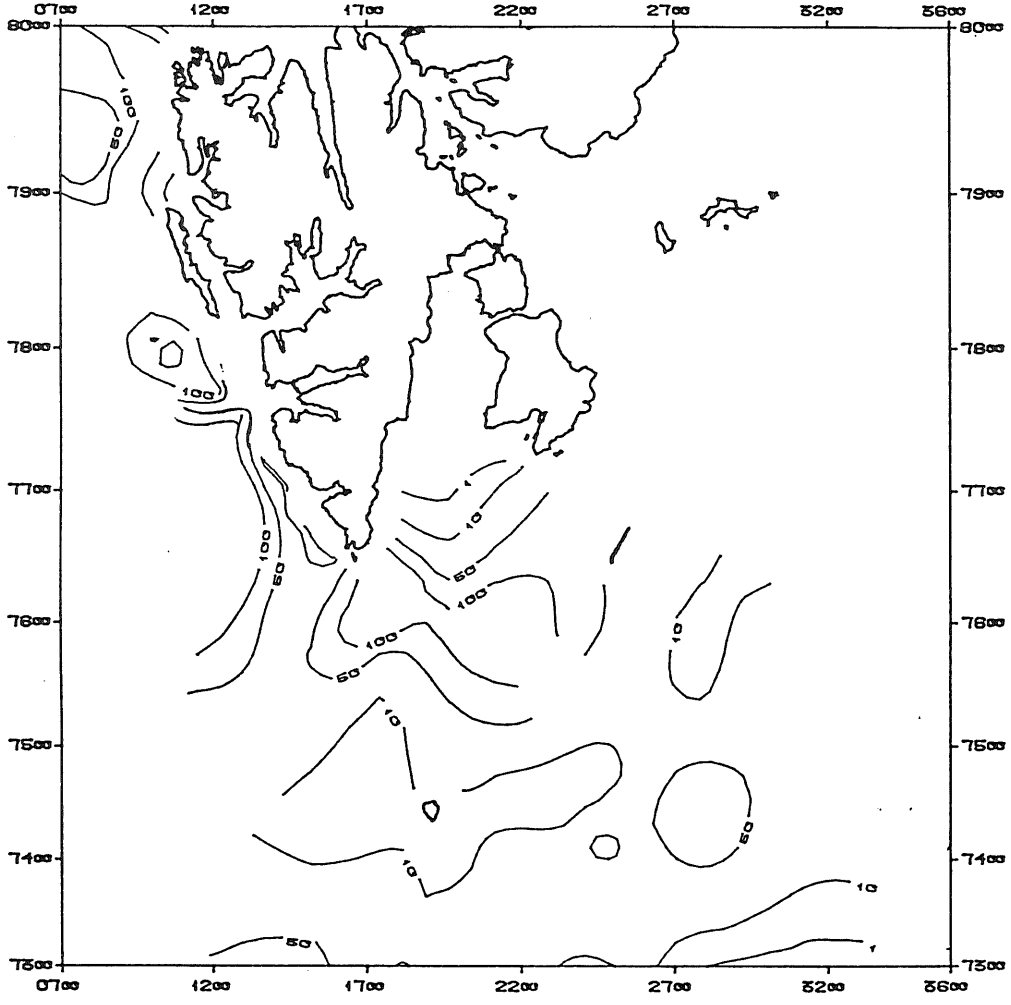

Fig.8. Distribution of Greenland halibut in the trawl catches (numbers per hour trawling).

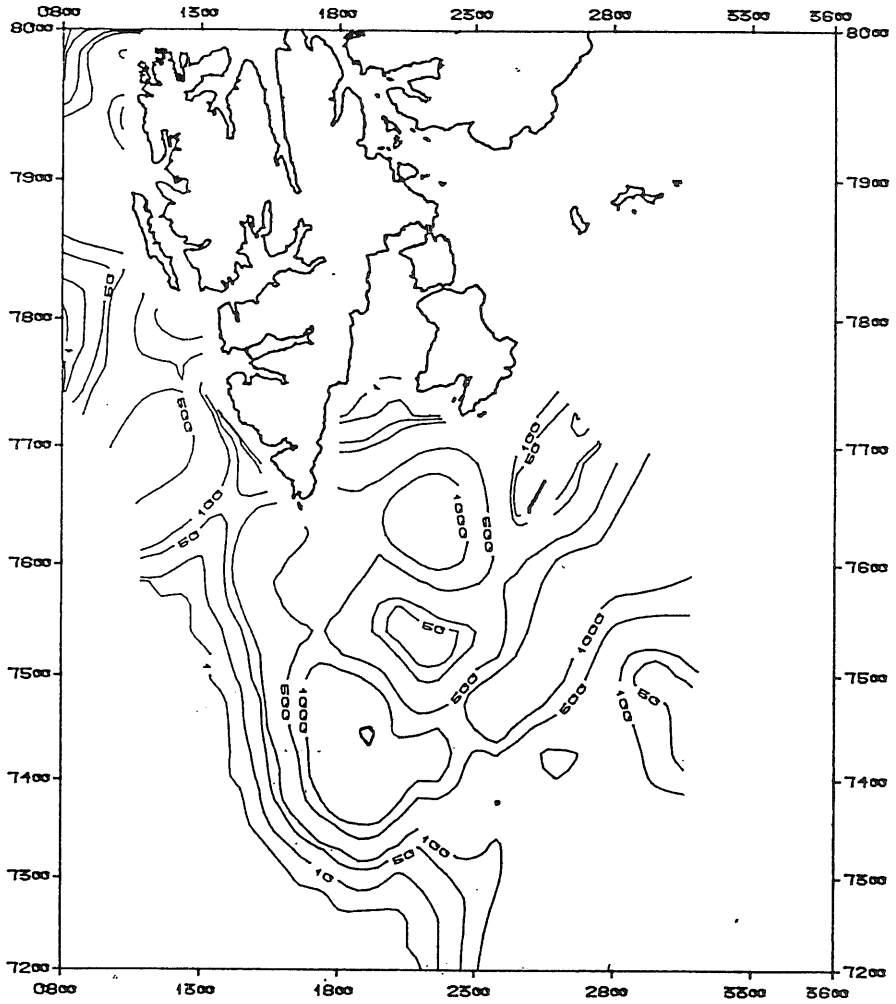

Fig.9. Distribution of long rough dab in the trawl catches (numbers per hour trawling).

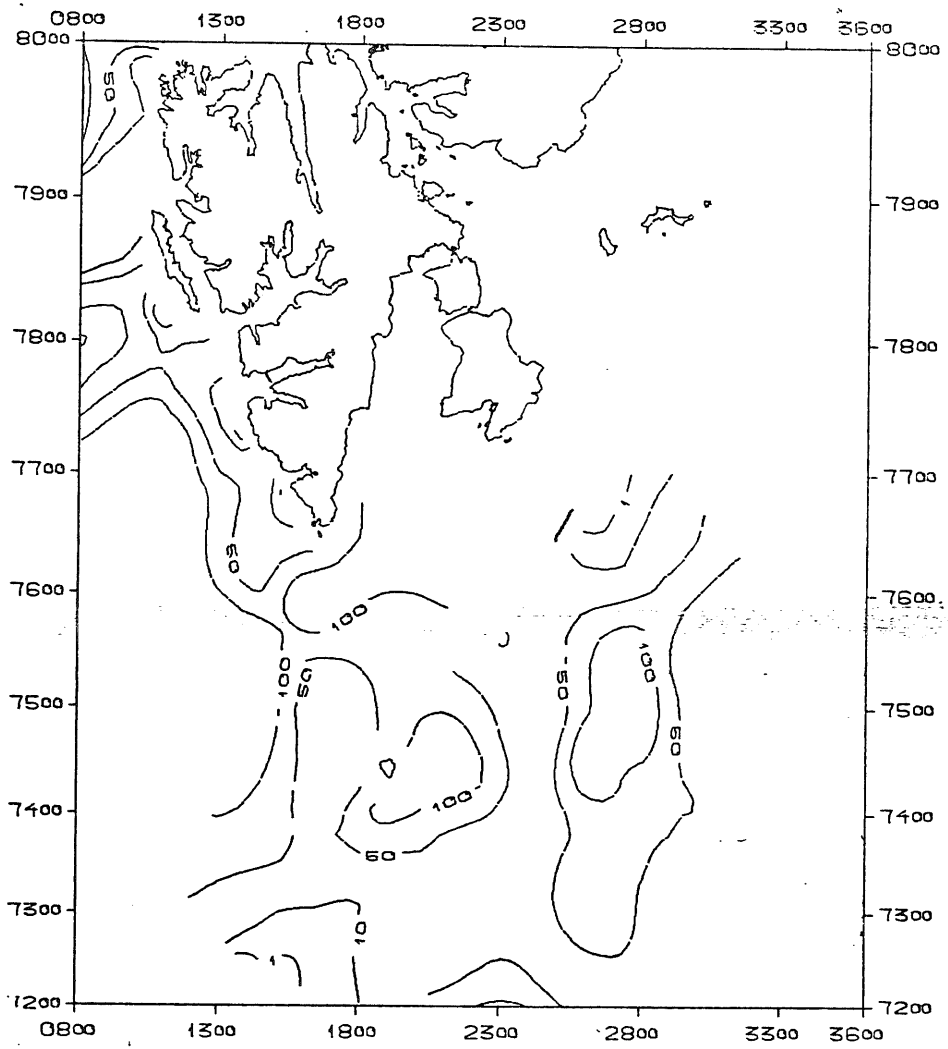

Fig.10. Distribution of shrimps in the trawl catches (Kg per hour trawling).

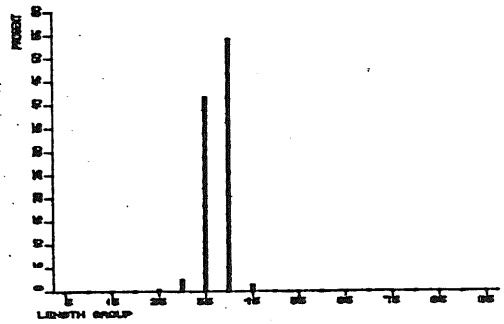

Fig.11. Length distribution of blue whiting

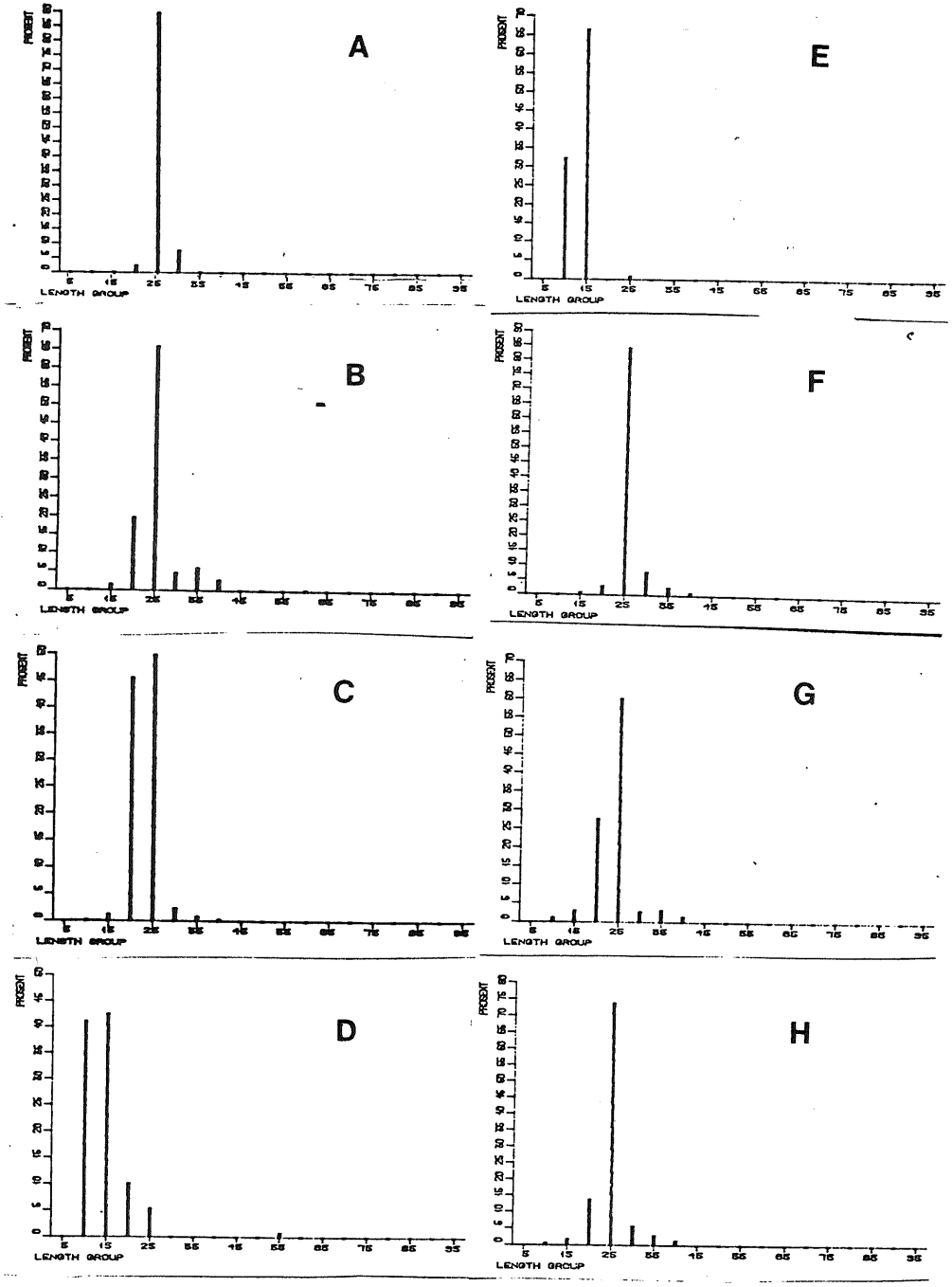

Fig.12. Length distribution of haddock. A:0-100m, B:100-200m, C:200-300m, D:300-400m, E:deeper than 400m, F: Northern area, G:Southern area, H:Total area.

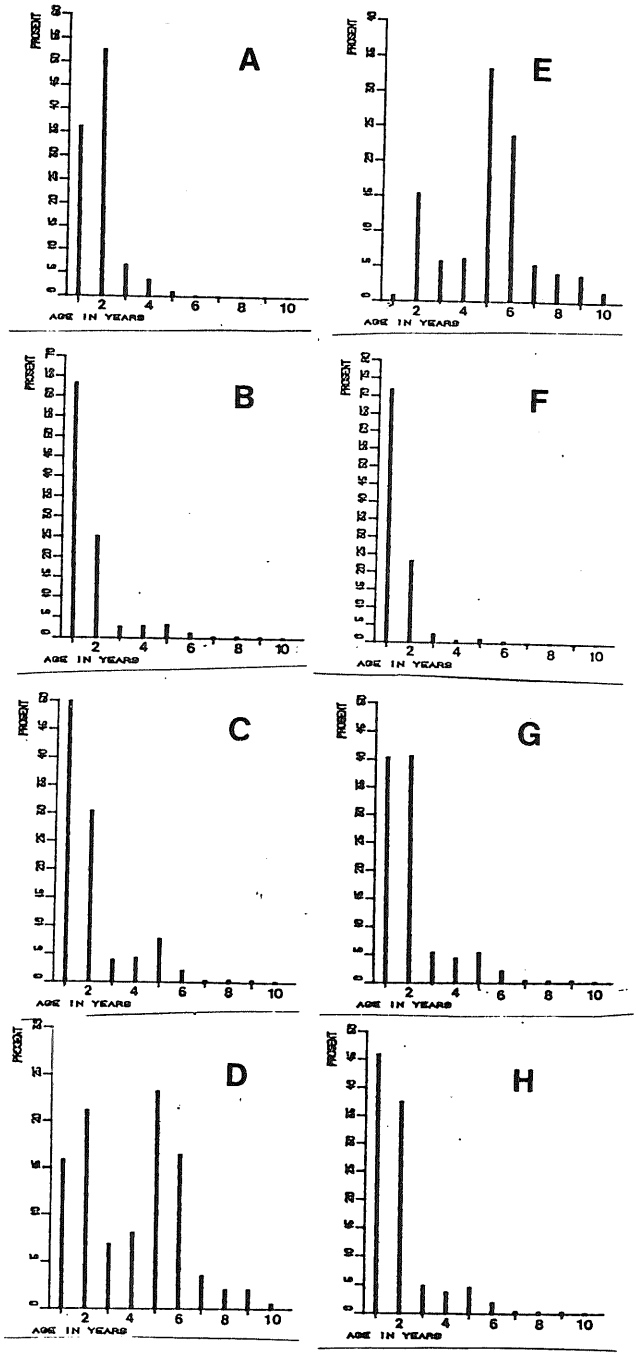

Fig.13. Age distribution of cod. A:0-100m, B:100-200m, C:200-300m, D:300-400m, E:deeper than 400m, F:N area, G:Southern area, H:Total are a.

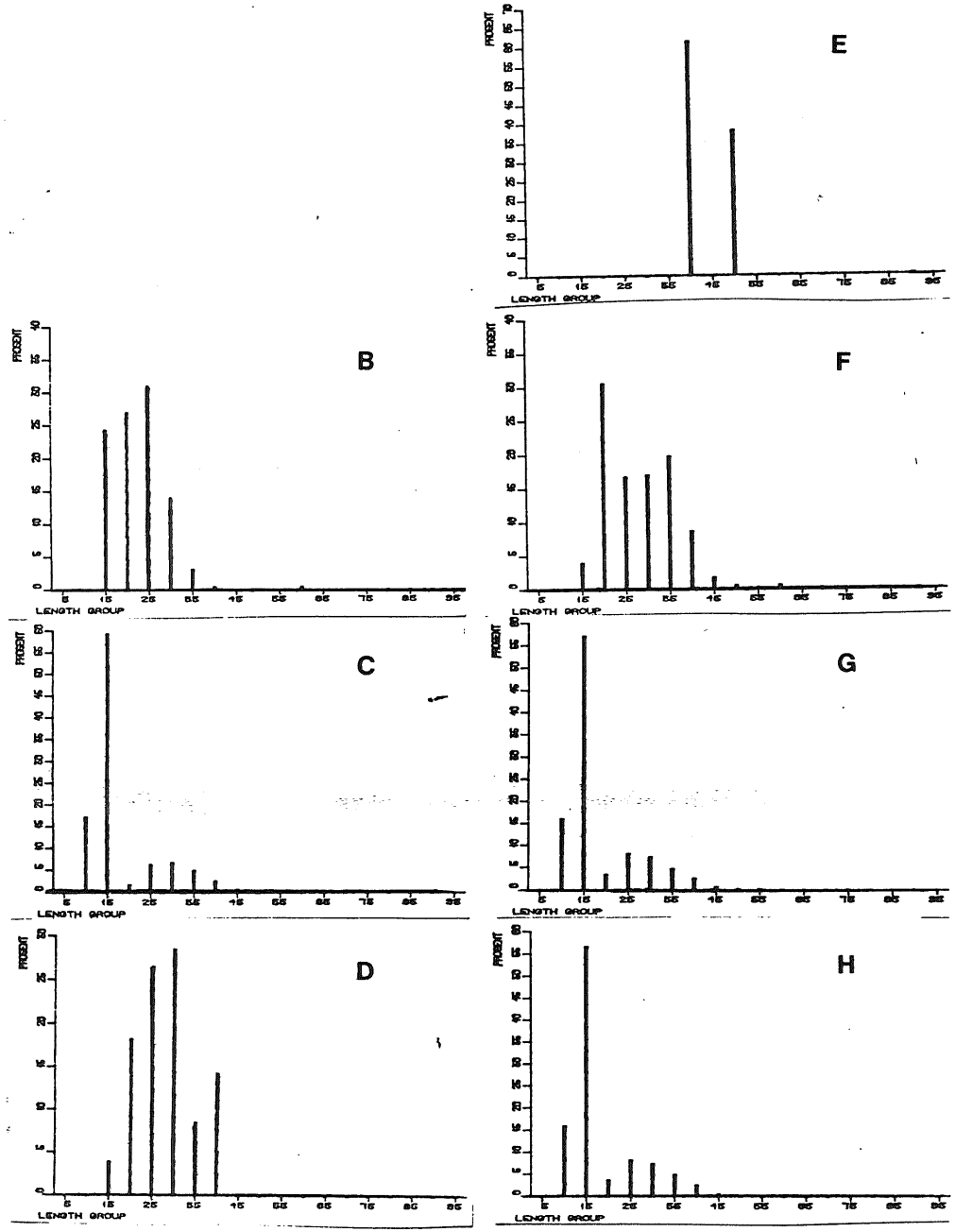

Fig.14. Length distribution of S.marinus A:0-100m, B:100-200m, C:200-300m, D:300-400m, E:deeper than 400m, F:Northern area, G:Southern area, H:Total area.

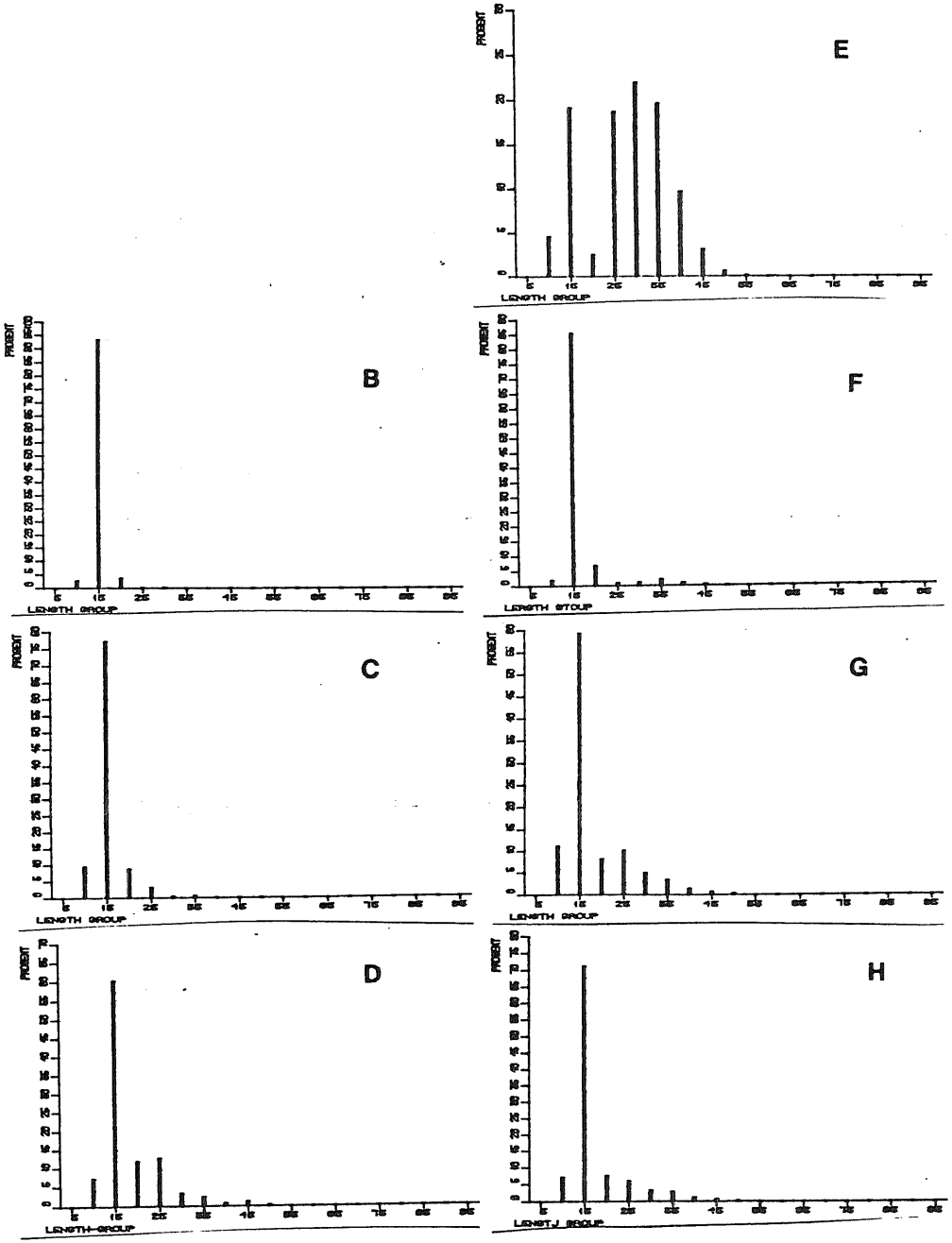

Fig.15. Length distribution of S.mentella A:0-100 200m, C:200-300m, D:300-400m, E:deeper than 400m, F:N area, G:Southern ar , H:Total area.

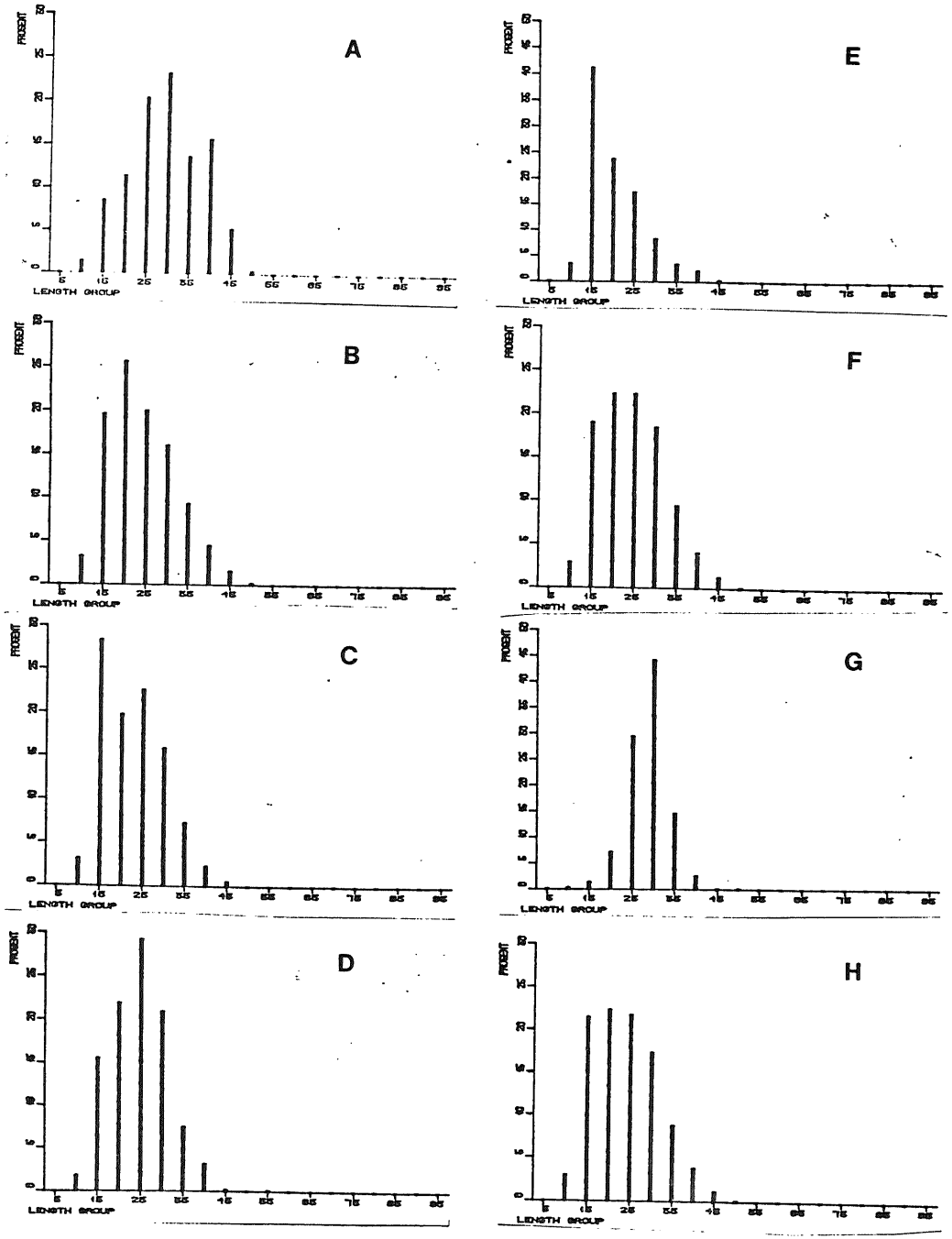

Fig.16. Length distribution of long rough dab.A:0-100m
B100-200m,C:200-300m,D:300-400m,E:deeper than 400m.

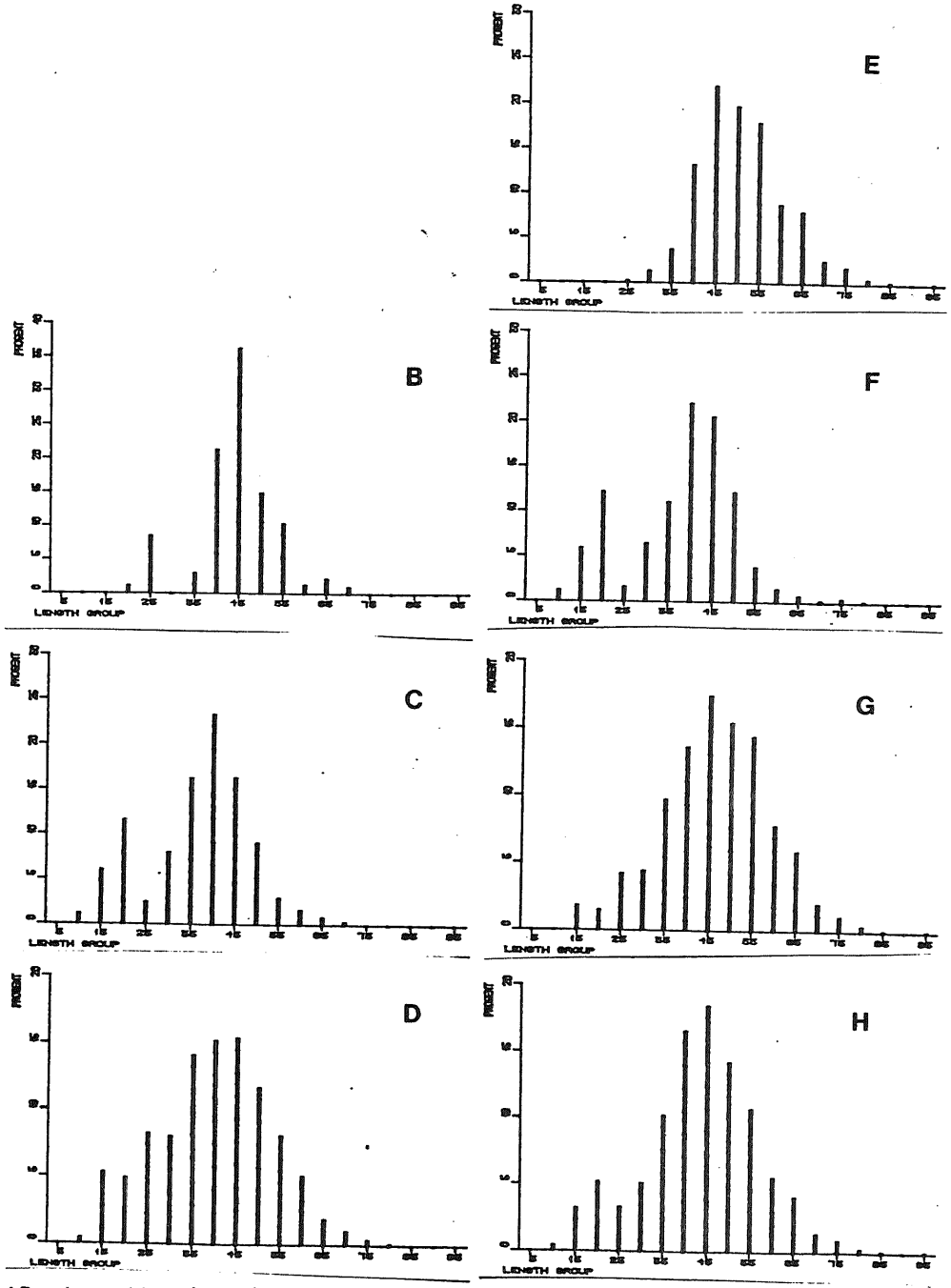

Fig.17. Length distribution of Greenland halibut.
B:100-200m,C:200-300m,D:300-400m,E:deeper than 40