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International Council for  
the Exploration of the Sea

C.M. 1996/G:xx Ref.H  
Demersal Fish Committee

**PRELIMINARY REPORT OF THE INTERNATIONAL 0-GROUP FISH SURVEY  
IN THE BARENTS SEA AND ADJACENT WATERS IN AUGUST-SEPTEMBER 1995**

The thirty first annual International 0-group fish survey was made during the period 16 August - 11 September 1995 in the Barents Sea and adjacent waters. The following research vessels participated in the survey:

<b>State</b>	<b>Name of vessel</b>	<b>Period</b>	<b>Research Institute</b>
Norway	"Michael Sars"	22.08 - 09.09	Institute of Marine
Norway	"Johan Hjort"	25.08 - 10.09	Research,
Norway	"G.O. Sars"	16.08 - 10.09	Bergen
Russia	"Professor Marty"	05.09 - 11.09	The Polar Research Inst.
Russia	"Fridtjof Nansen"	26.08 - 11.09	of Marine Fisheries and Oceanography, Murmansk

Names of scientists and technicians who took part on the different vessels are given in the Appendix.

Preliminary analysis of the survey data were made on board "G.O.Sars" during the survey, and the final report was finished by correspondance. Observations concerning the geographical distribution of 0-group fish and their abundance are given in this report together with a brief description of the hydrographical conditions in the area.

## MATERIAL AND METHODS

The geographical distribution of 0-group fish were estimated with a small mesh midwater trawl. Four of the five vessels which participated in the survey in 1995, used the type of midwater trawl recommended in 1980 (Anon. 1983). The standard procedure consisted of tows of 0.5 nautical mile in each of 3 depths with the headline of the trawl located at 0, 20 and 40m. Additional tows at 60 and 80m for 0.5 nautical mile were made when 0-group fish layer was recorded deeper on the echosounder. Trawling procedure was standardized in accordance with the recommendation made in 1980. However, the Russian research vessel "Professor Marty" used a trawl with 30m vertical opening and a wingspread of 50m. Since this trawl was operated in the three standard depth, all catch figures were excluded from the analysis.

West of 20°E most of the stations were taken by R/V "G.O.Sars" and R/V "Johan Hjort" at a distance of 30 nautical miles. This was a too ambitious program, and the distance between stations was increased to 35 nautical miles east of 20°E for the Norwegian research vessels.. This design differed from earlier surveys in which the stations were taken at about each 30 nautical miles sailed.

Hydrographical observations were made along all the survey tracks with 5 to 40 nautical miles between stations (Fig. 1). Horizontal distributions of temperatures and salinities are shown for 0, 50, 100, 200m and bottom (Figs. 2-11). Figs. 12-15 show the temperature and salinity conditions along the hydrographical sections: Bear Island - West, Bear Island - North Cape, Kola and Cape Kanin-North. The mean temperatures in the main parts of these sections are presented in Table 1.

Trawl stations with and without catch are indicated on the distribution charts in Figs. 16 - 27, as filled and open symbols respectively. The density grading is based on catch as number per 1.0 nautical mile trawling.

## HYDROGRAPHY

According to temperature condition, 1995 is the seventh "warm year" in succession since 1989. The mean water temperatures at 0-200m in the Barents Sea in 1995 were 0.2 - 1.0°C above the long-term average (1965-1995). Compared to 1994, the anomalies of water temperatures ranged from 0.4 below to 1.2°C above. From 1994 to 1995 the highest increase in water temperatures was recorded in the Kola meridian (50-200m) and Cape Kanin - North sections, where the anomalies of water temperature constituted 1.1 and 1.6°C respectively. On the North Cape - Bear Island section (0-200m) the anomaly of water temperature decreased with 0.3°C. In the west Spitsbergen current (0-200m) the temperature was 0.6°C above the long-term average, but 0.1°C lower than last year. The overall decrease in water temperatures in the upper layers in the west and south areas of the Barents Sea were determined by low insolation compared to last year. The vertical gradients of water temperatures in the standard sections were scattered and lower than last year. The bottom layer of the coastal current has increased the inflow of Atlantic water at least eastward to the Cape Kanin - North section, where the anomaly of water temperature was 3.0°C above the long-term average (0°C). It was an effect of extra high level of atmospheric activity with powerful and prolonged air transport from west and south-west during the previous spring. The observed temperature conditions in the Barents Sea seem to be close to those observed in 1983 and 1991.

## DISTRIBUTION AND ABUNDANCE OF 0-GROUP FISH AND GONATUS FABRICII

Geographical distribution of 0-group fish are shown as shaded areas in Figs. 16 - 26, and of *Gonatus fabricii* in Fig. 27. Double shading indicates dense concentrations. The criteria for discriminating between dense and scattered concentrations are the same as used in earlier reports (Anon. 1980). Abundance indices, estimated as the area of distribution with areas of high densities weighed by 10, are given in Table 2. All area based abundance indices were estimated by using standard computer programs (Fotland *et al.* 1995). Another set of abundance indices are given for 0-group herring, cod and haddock (Table 3), calculated according to Randa (1984). These are based on the number caught during a standard trawl haul of one nautical mile. Length frequency distributions of the main species are given in Table 4.

### Herring (Fig. 16)

The present survey did not cover the 0-group distribution in the northwestern corner of the survey area. Two main concentrations were observed west of northern Spitsbergen and from south of Bear Island and eastwards to about 43°E. Only scattered concentrations were observed, indicating a poor to below average 1995-year-class strength.

### Capelin (Fig. 17)

As in 1993 and 1994, 0-group Capelin had a patchy distribution in the eastern Barents Sea, mainly with scattered concentrations. However, the survey did not cover the eastern and northeastern part of the distribution. The area based 0-group abundance index indicates that the 1995-year-class is the fourth consecutive poor year-class.

### Cod (Fig. 18)

The 0-group cod was distributed along Spitsbergen to the Norwegian coast and eastwards, close to Novaya Zemlya. However, the survey did not cover the total distribution of 0-group cod in the northwestern and eastern part of the distribution area. During the survey, 0-group cod was observed a little deeper than in most of the previous years, and four and even five trawling steps had to be made on some stations. Even so, 0-group cod was recorded on the echo-sounder deeper than 100m. Both factors have caused an underestimation of the abundance index. The area based abundance and the logarithmic abundance indices are classifying the 1995-year-class as very strong and the fifth strong year-class in succession.

### Haddock (Fig. 19)

The present survey covered to a great extent the distribution area along Spitsbergen and in the western and central Barents Sea. Only two small patches of dense concentrations were observed inside the area of scattered concentrations. The abundance index indicates that the 1995-year-class is about average.

**Polar cod (Fig. 20)**

A continuous distribution was only recorded along the west coast of Spitsbergen. The total area of distribution was not covered, which would affect the abundances indices of both the western and the eastern component. Compared to 1994, the abundance was much less in the area north of Bear Island, and the year-class strength in the eastern component was recorded as the poorest in the period 1977-1995. No indication of the year-class abundance of the eastern component can be given, caused by the lack of area coverage.

**Saithe (Fig.21)**

A continuous area of distribution, with low abundance, was observed in the central Barents Sea and in the western part of the survey area, northwards to about 78°N. Single hauls with one or two specimens were observed in the more eastern part of the Barents Sea. 0-group saithe is at this time of the year to a great extent living inside the Norwegian coastal waters, and the observations in open sea give no indication of the year-class strength.

**Redfish (Fig. 22)**

The observed distribution of redfish is an almost complete coverage of the 0-group. In general, the distribution pattern was similar to those after 1990. Dense concentrations were only recorded in five small patches within the distribution area from north of Spitsbergen to the area between Bear Island and the Norway coast. The abundance index indicates a year-class strength far below the average, but close to the average of the poor 1991-1995-year-classes.

**Greenland halibut (Fig. 23)**

A continuous distribution of 0-group Greenland halibut was observed along Spitsbergen, only with low abundance. In addition, three small patches of low abundance were observed in the northeastern Barents Sea. The abundance index of the 1995-year-class is close to the abundance level of the 1993-1994-year-classes and a little higher than the five preceding ones. However, the 1995-year-class is recorded as poor.

**Long rough dab (Fig. 24)**

0-group long rough dab was mainly observed in the eastern part of the Barents Sea, only with low abundance. However, the area of distribution was not covered in the eastern Barents Sea. Only two positive hauls were made close to the southern part of Spitsbergen. The abundance index indicates a poor 1995-year-class.

**Sandeel (Fig. 25)**

As in 1994, the 0-group sandeel was mainly observed in the southeastern Barents Sea, but the distribution area was incompletely covered in the east.

**Catfish (Fig. 26)**

0-group catfish was distributed in a narrow area north of Bear Island and along Spitsbergen to at least 80°N. Two small patches were recorded in the central Barents Sea, and only a small number were caught in each haul.

**Gonatus (Fig. 27)**

As in earlier years, 0-group *Gonatus fabricii* was distributed in the western part of the survey area. However, the area of distribution was not completely covered to the west. The level of survey catches were at a lower level than in the 1994 survey.

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Table 1. Mean water temperature<sup>1</sup> in main parts of standard sections in the Barents Sea and adjacent waters in August-September 1965 - 1995.

Year	Section <sup>2</sup> and layer (deep in meter)						
	1	2	3	4	5	6	7
	0-50	50-200	0-200	0-bot.	0-bot.	0-200	0-200
1965	6.7	3.9	4.6	4.6	3.7	5.1	-
1966	6.7	2.6	3.6	1.9	2.2	5.5	3.6
1967	7.5	4.0	4.9	6.1	3.4	5.6	4.2
1968	6.4	3.7	4.4	4.7	2.8	5.4	4.0
1969	6.7	3.1	4.0	2.6	2.0	6.0	4.2
1970	7.8	3.7	4.7	4.0	3.3	6.1	-
1971	7.1	3.2	4.2	4.0	3.2	5.7	4.2
1972	8.7	4.0	5.2	5.1	4.1	6.3	3.9
1973	7.7	4.5	5.3	5.7	4.2	5.9	5.0
1974	8.1	3.9	4.9	4.6	3.5	6.1	4.9
1975	7.0	4.6	5.2	5.6	3.6	5.7	4.9
1976	8.1	4.0	5.0	4.9	4.4	5.6	4.8
1977	6.9	3.4	4.3	4.1	2.9	4.9	4.0
1978	6.6	2.5	3.6	2.4	1.7	5.0	4.1
1979	6.5	2.9	3.8	2.0	1.4	5.3	4.4
1980	7.4	3.5	4.5	3.3	3.0	5.7	4.9
1981	6.6	2.7	3.7	2.7	2.2	5.3	4.4
1982	7.1	4.0	4.8	4.5	2.8	5.8	4.9
1983	8.1	4.8	5.6	5.1	4.2	6.3	5.1
1984	7.7	4.1	5.0	4.5	3.6	5.9	5.0
1985	7.1	3.5	4.4	3.4	3.4	5.3	4.6
1986	7.5	3.5	4.5	3.9	3.2	5.8	4.4
1987	6.2	3.3	4.0	2.7	2.5	5.2	3.9
1988	7.0	3.7	4.5	3.8	2.9	5.5	4.2
1989	8.6	4.8	5.8	6.5	4.3	6.9	4.9
1990	8.1	4.4	5.3	5.0	3.9	6.3	5.7
1991	7.7	4.5	5.3	4.8	4.2	6.0	5.4
1992	7.5	4.6	5.3	5.0	4.0	6.1	5.0
1993	7.5	4.0	4.9	4.4	3.4	5.8	5.4
1994	7.7	3.9	4.8	4.6	3.4	6.4	5.3
1995	7.6	4.9	5.6	5.9	4.3	6.1	5.2
Aver. 1965- 1995	7.3	3.8	4.7	4.3	3.3	5.8	4.6

<sup>1)</sup> Earlier presented temperatures have been slightly adjusted (Tereshchenko, 1992).

- <sup>2)</sup> 1-3: Murmansk Current; Kola Section (70°30'N-72°30'N,33°30'E)  
 4: Cape Kanin section (68°45'N - 70°05'N, 43°15'E)  
 5: Cape Kanin section (71°00'N - 72°00'N, 43°15'E)  
 6: North Cape Current; North Cape - Bear Island section (71°33'N,25°02'E - 73°35'N,20°46'E)  
 7: West Spitsbergen Current; Bear Island - West section (74°30'N, 06°34'E - 15°55'E)

Table 2. Abundance indices of 0-group fish in the Barents Sea and adjacent waters in 1965 - 1995.

Year	Capelin <sup>1</sup>	Cod	Had-dock	Polar cod		Red-fish	Green-land halibut	Long rough dab
				West	East			
1965	37	6	7		0	159		66
1966	119	1	1		129	236		97
1967	89	34	42		165	44		73
1968	99	25	8		60	21	1	17
1969	109	93	82		208	295	1	26
1970	51	606	115		197	247	8	12
1971	151	157	73		181	172	3	81
1972	275	140	46		140	177	13	65
1973	125	684	54		(26)	385	21	67
1974	359	51	147		227	468	16	83
1975	320	343	170		75	315	9	113
1976	281	43	112		131	447	35	96
1977	194	173	116	157	70	472	22	72
1978	40	106	61	107	144	460	12	76
1979	660	94	69	23	302	980	38	69
1980	502	49	54	79	247	651	17	108
1981	570	65	30	149	73	861	16	95
1982	393	114	90	14	50	694	40	150
1983	589	386	184	48	39	851	36	80
1984	320	486	255	115	16	732	55	70
1985	110	742	156	60	334	795	41	86
1986	125	434	160	111	366	702	8	755
1987	55	102	72	17	155	631	5	174
1988	187	133	86	144	120	949	2	72
1989	1300	202	112	206	41	698	1	92
1990	324	465	227	144	48	670	3	35
1991	241	766	472	90	239	200	11	28
1992	26	1159	313	195	118	150	20	32
1993	43	910	240	171	156	162	15	55
1994	58	899	282	50	448	414		272
1995	43	1069	148	6	-	220		66

<sup>1)</sup> Assessment for 1965-1978 in Anon. 1980 and for 1979-1993 in Ushakov and Shamray 1995.

Table 3. Estimated logarithmic indices with 90% confidence limits of year class abundance for 0-group herring, cod and haddock in the Barents Sea and adjacent waters 1965-1995.

Year	Herring <sup>1</sup>			Cod			Haddock		
	Index	Confidence limits		Index	Confidence limits		Index	Confidence limits	
1965				+					
1966	0.14	0.04	0.31	0.02	0.01	0.04	0.01	0.00	0.03
1967	0.00	-	-	0.04	0.02	0.08	0.08	0.03	0.13
1968	0.00	-	-	0.02	0.01	0.04	0.00	0.00	0.02
1969	0.01	0.00	0.04	0.25	0.17	0.34	0.29	0.20	0.41
1970	0.00	-	-	2.51	2.02	3.05	0.64	0.42	0.91
1971	0.00	-	-	0.77	0.57	1.01	0.26	0.18	0.36
1972	0.00	-	-	0.52	0.35	0.72	0.16	0.09	0.27
1973	0.05	0.03	0.08	1.48	1.18	1.82	0.26	0.15	0.40
1974	0.01	0.01	0.01	0.29	0.18	0.42	0.51	0.39	0.68
1975	0.00	-	-	0.90	0.66	1.17	0.60	0.40	0.85
1976	0.00	-	-	0.13	0.06	0.22	0.38	0.24	0.51
1977	0.01	0.00	0.03	0.49	0.36	0.65	0.33	0.21	0.48
1978	0.02	0.01	0.05	0.22	0.14	0.32	0.12	0.07	0.19
1979	0.09	0.01	0.20	0.40	0.25	0.59	0.20	0.12	0.28
1980	-	-	-	0.13	0.08	0.18	0.15	0.10	0.20
1981	0.00	-	-	0.10	0.06	0.18	0.03	0.00	0.05
1982	0.00	-	-	0.59	0.43	0.77	0.38	0.30	0.52
1983	1.77	1.29	2.33	1.69	1.34	2.08	0.62	0.48	0.77
1984	0.34	0.20	0.52	1.55	1.18	1.98	0.78	0.60	0.99
1985	0.23	0.18	0.28	2.46	2.22	2.71	0.27	0.23	0.31
1986	0.00	-	-	1.37	1.06	1.70	0.39	0.28	0.52
1987	0.00	0.00	0.03	0.17	0.01	0.40	0.10	0.00	0.25
1988	0.32	0.16	0.53	0.33	0.22	0.47	0.13	0.05	0.34
1989	0.59	0.49	0.76	0.38	0.30	0.48	0.14	0.10	0.20
1990	0.31	0.16	0.50	1.23	1.04	1.34	0.61	0.48	0.75
1991	1.19	0.90	1.52	2.30	1.97	2.65	1.17	0.98	1.37
1992	1.06	0.69	1.50	2.94	2.53	3.39	0.87	0.71	1.06
1993	0.75	0.45	1.14	2.09	1.70	2.51	0.64	0.48	0.82
1994	0.28	0.17	0.42	2.27	1.83	2.76	0.64	0.49	0.81
1995	0.16	0.07	0.29	2.40	1.97	2.88	0.25	0.13	0.40

<sup>1)</sup> Assessment for 1965-1984 made by Toresen (1985).



Table 4. Length distribution of 0-group fish in percent in the Barents Sea and adjacent waters in August - September 1995.

Length (mm)	Herring	Caplin	Cod	Haddock	Polar cod West	Redfish	Greenland halibut	Long rough dab	Sandeel
10-14						+			
15-19						0,2			
20-24						0,9			
25-29		0,1			1,0	2,2		0,5	
30-34	+	0,9			10,3	12,5		14,8	
35-39	0,6	2,5		+	39,2	21,7		45,5	1,3
40-44	0,7	16,0	+	0,5	27,5	24,2	3,5	31,3	8,2
45-49	2,7	45,7	+	0,4	8,3	24,8	0,9	7,6	22,5
50-54	5,1	32,3	+	0,4	1,5	10,7	11,6	0,1	33,7
55-59	15,5	2,2	0,1	0,6	1,0	2,4	10,1		9,1
60-64	24,4	0,2	0,3	0,3	2,0	0,4	22,8		4,2
65-69	33,7	0,2	1,1	1,7	3,4		33,0		4,0
70-74	15,0		3,3	1,3	2,5		4,7		7,5
75-79	2,2		8,1	2,8	2,9		11,3	0,1	5,6
80-84	0,1		16,8	3,9	0,5		0,9		3,0
85-89			20,6	5,3				0,1	1,0
90-94			20,2	11,2			0,9		0,1
95-99			15,7	14,6					
100-104			9,2	14,7					
105-109			3,6	12,0					
110-114			0,7	10,2					
115-119			0,3	9,9					
120-124			+	4,8					
125-129				4,5					
130-134				1,0					
135-139				+					
140-144									
No. measured	1563	843	11025	1090	159	2420	44	541	818
Total numbers	6763	7307	393-497	2563	204	66128	106	1108	19968
Mean length	64,1	48,2	90,0	101,8	43,3	42,4	63,8	38,6	55,5

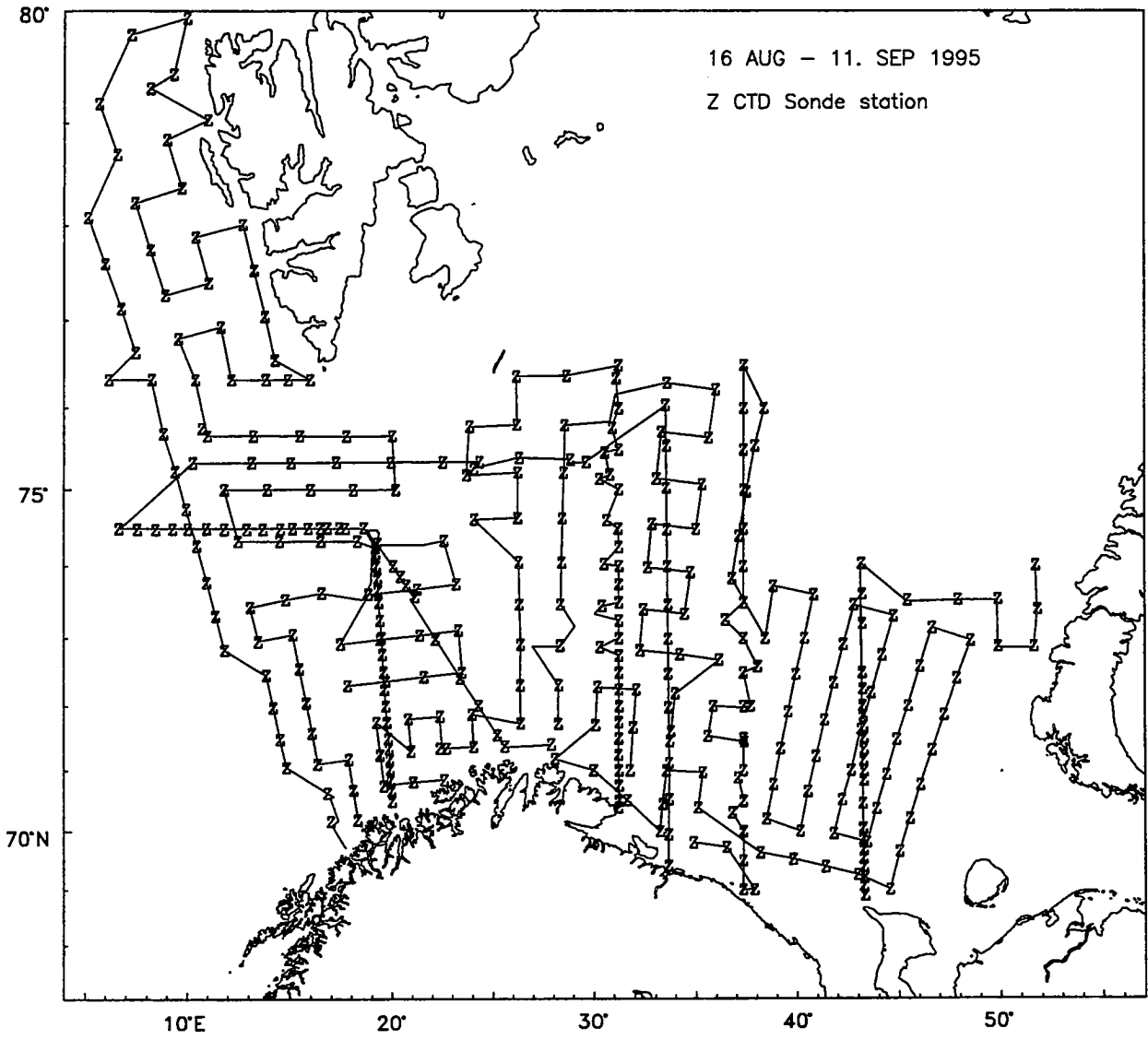


Fig.1. Survey tracks and hydrographic stations.

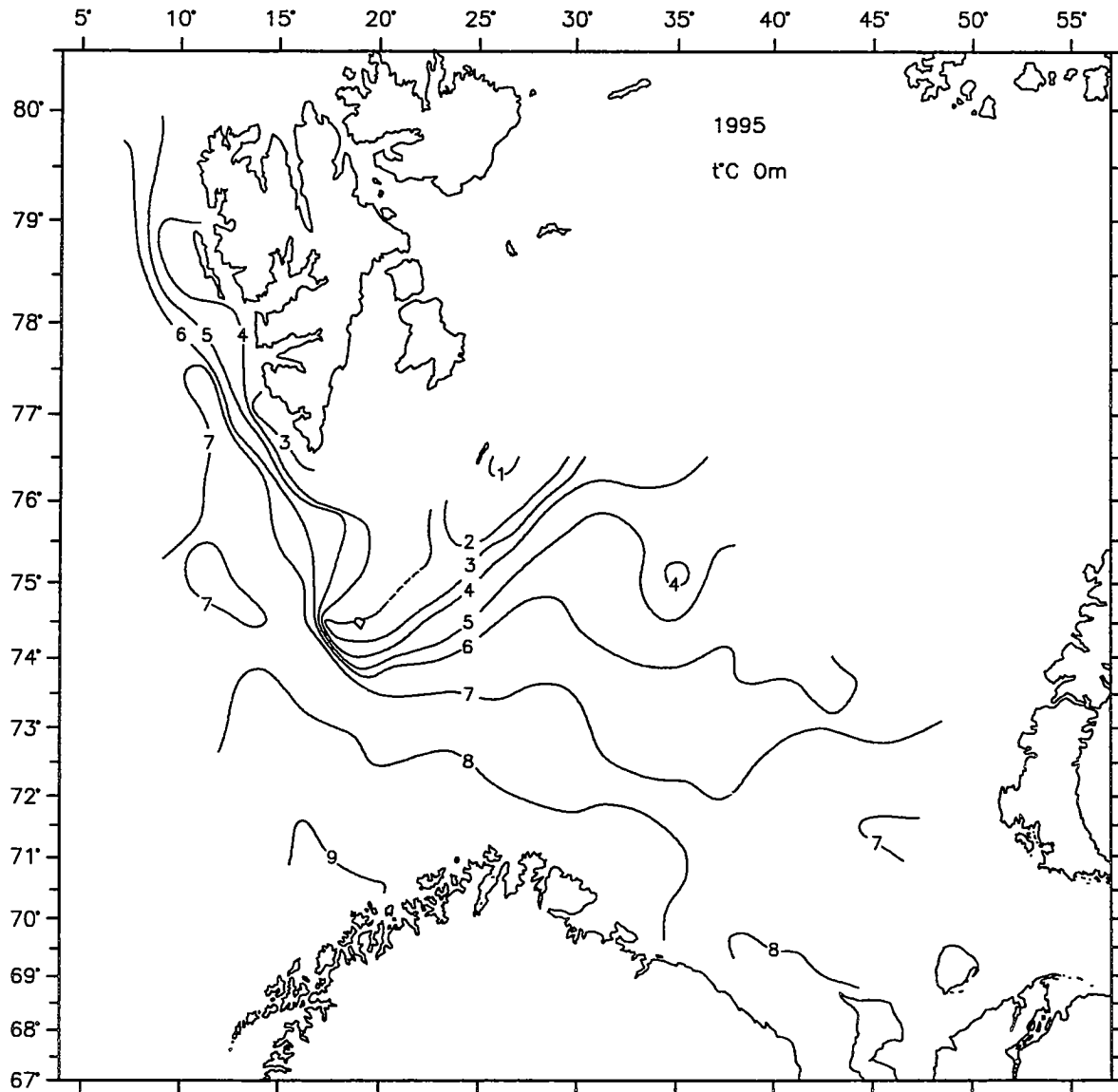


Fig.2. Isotherms at 0m.

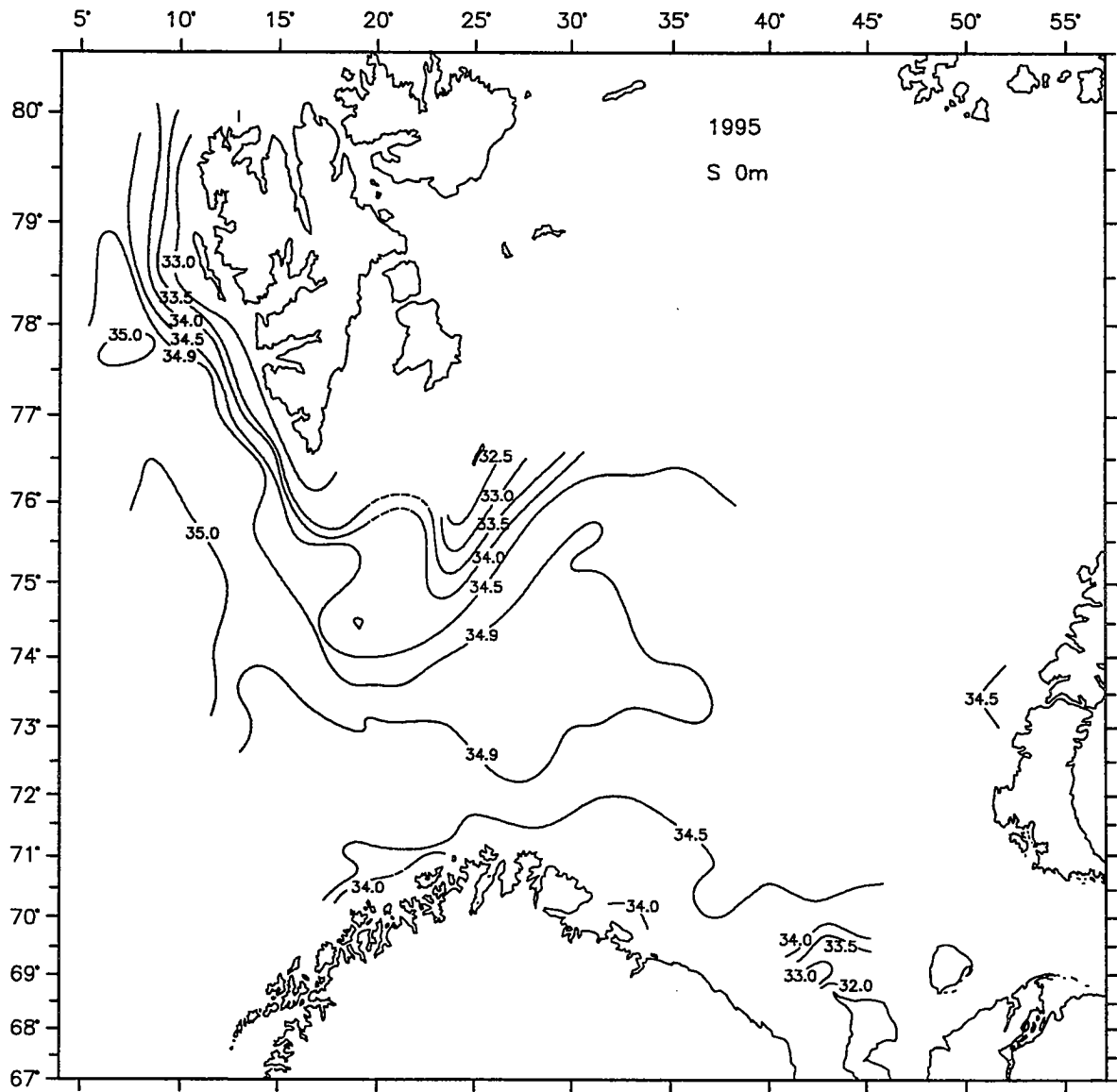


Fig.3. Isohalines at 0m.

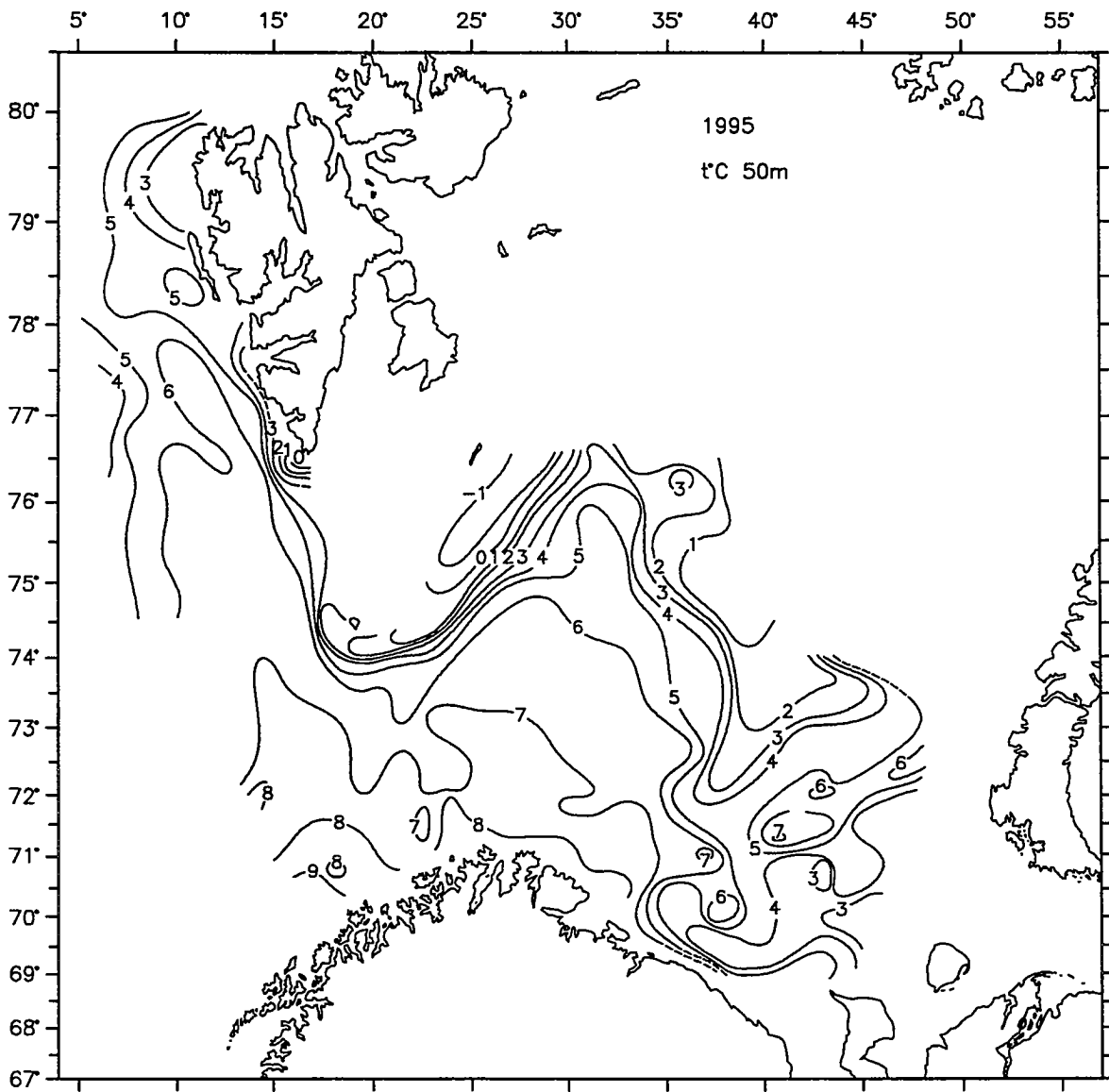


Fig.4. Isotherms at 50m.

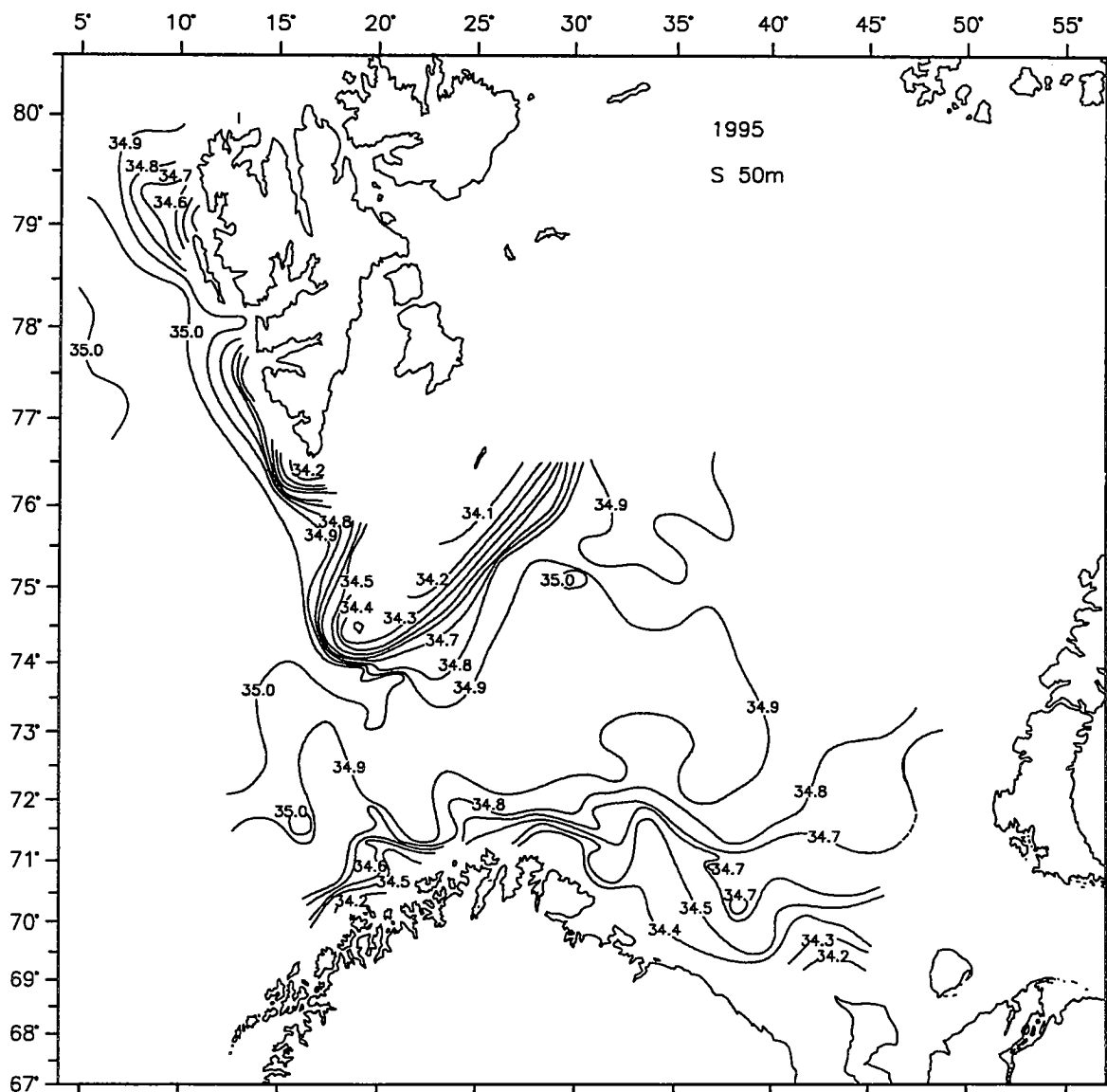


Fig.5. Isohalines at 50m.

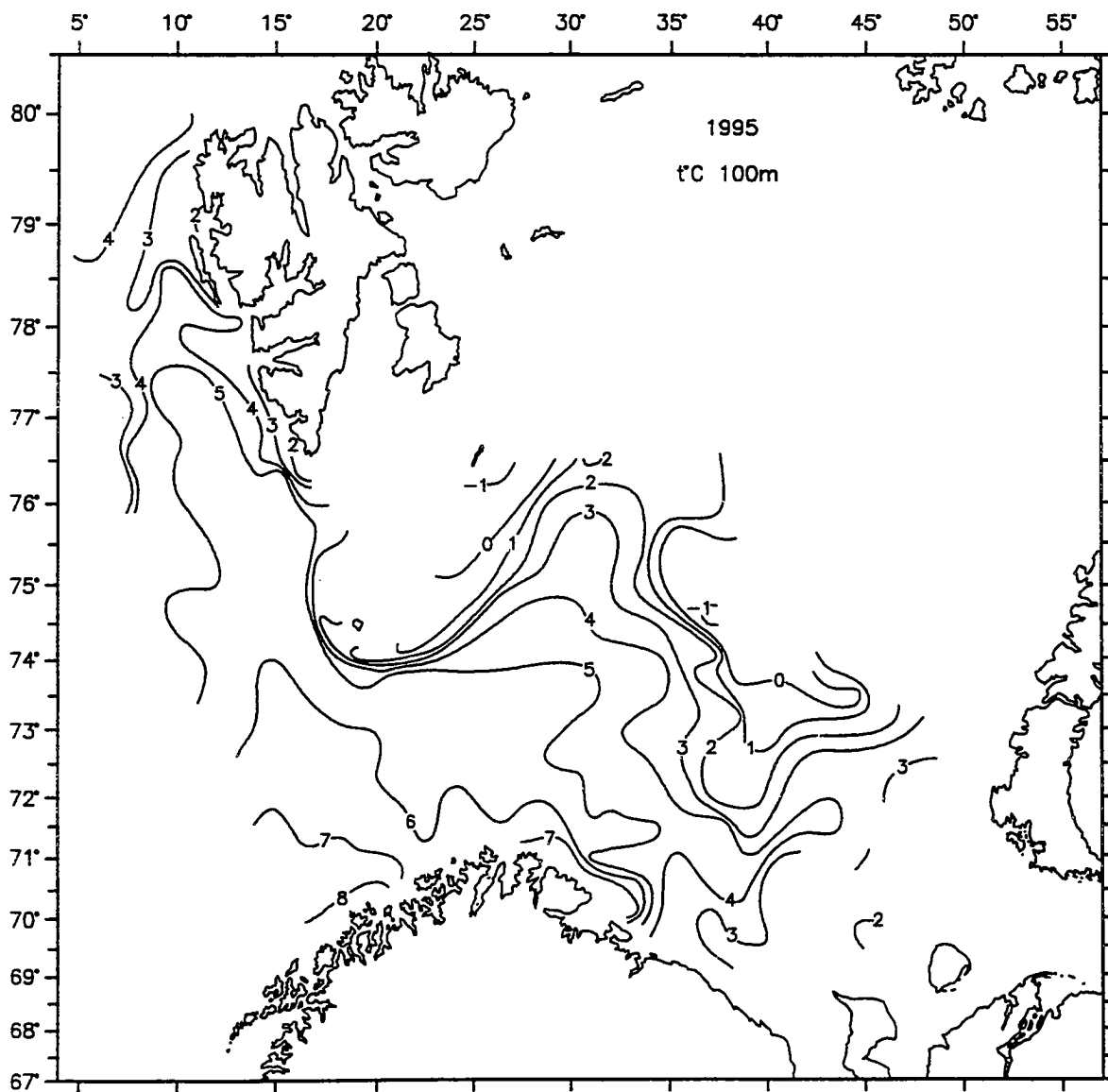


Fig.6. Isotherms at 100m.

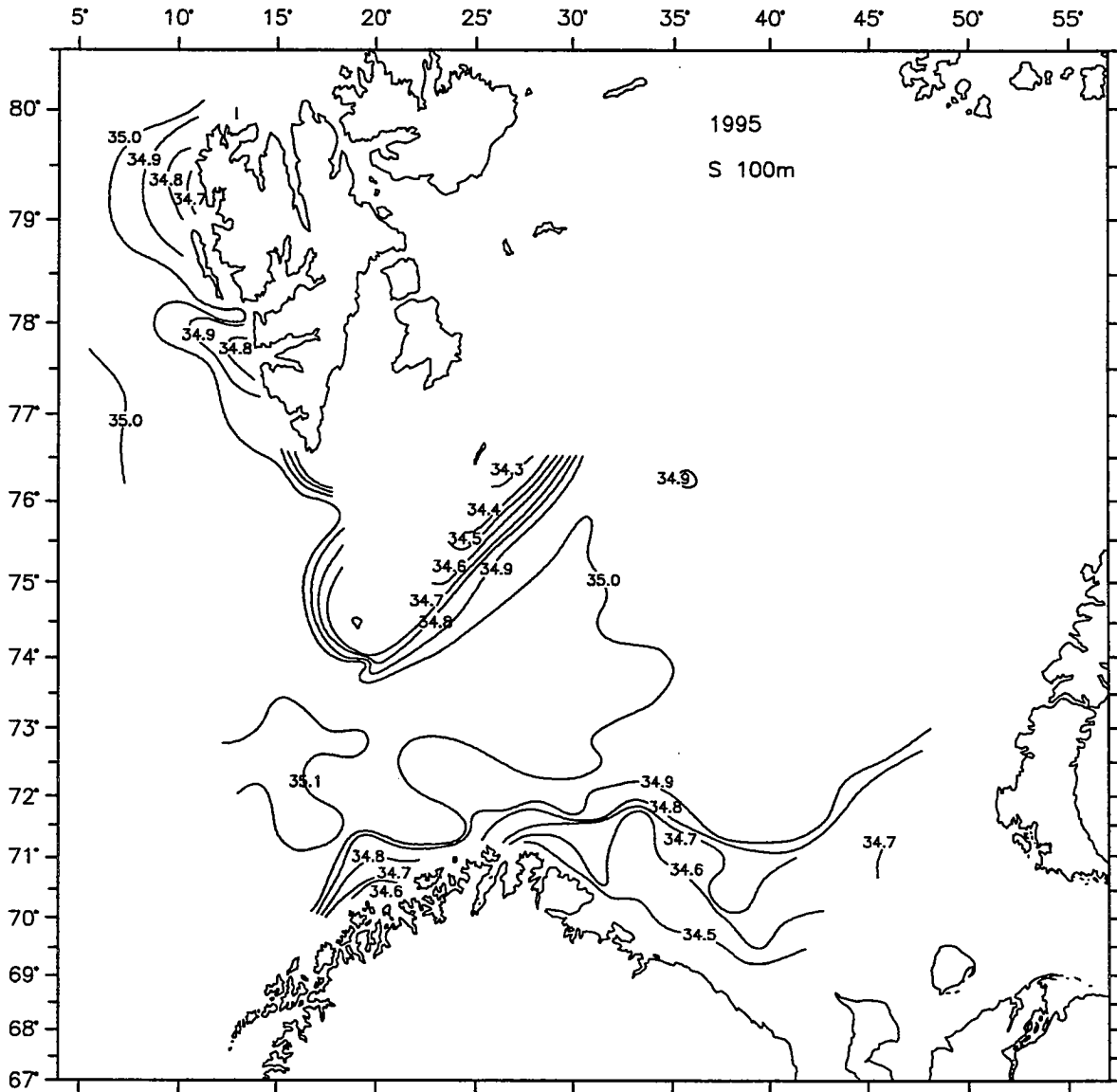


Fig.7. Isohalines at 100m.



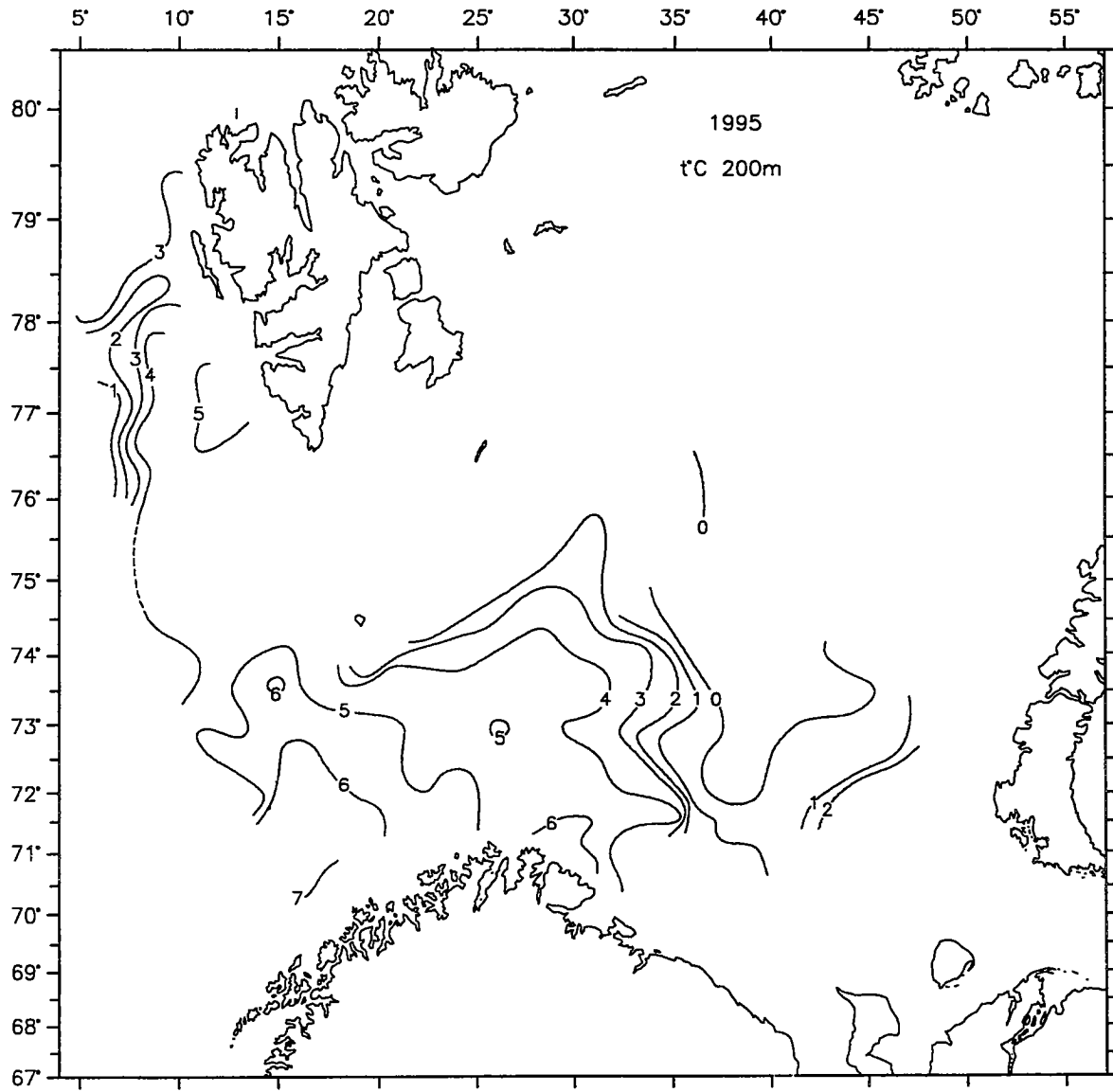


Fig.8. Isotherms at 200m.

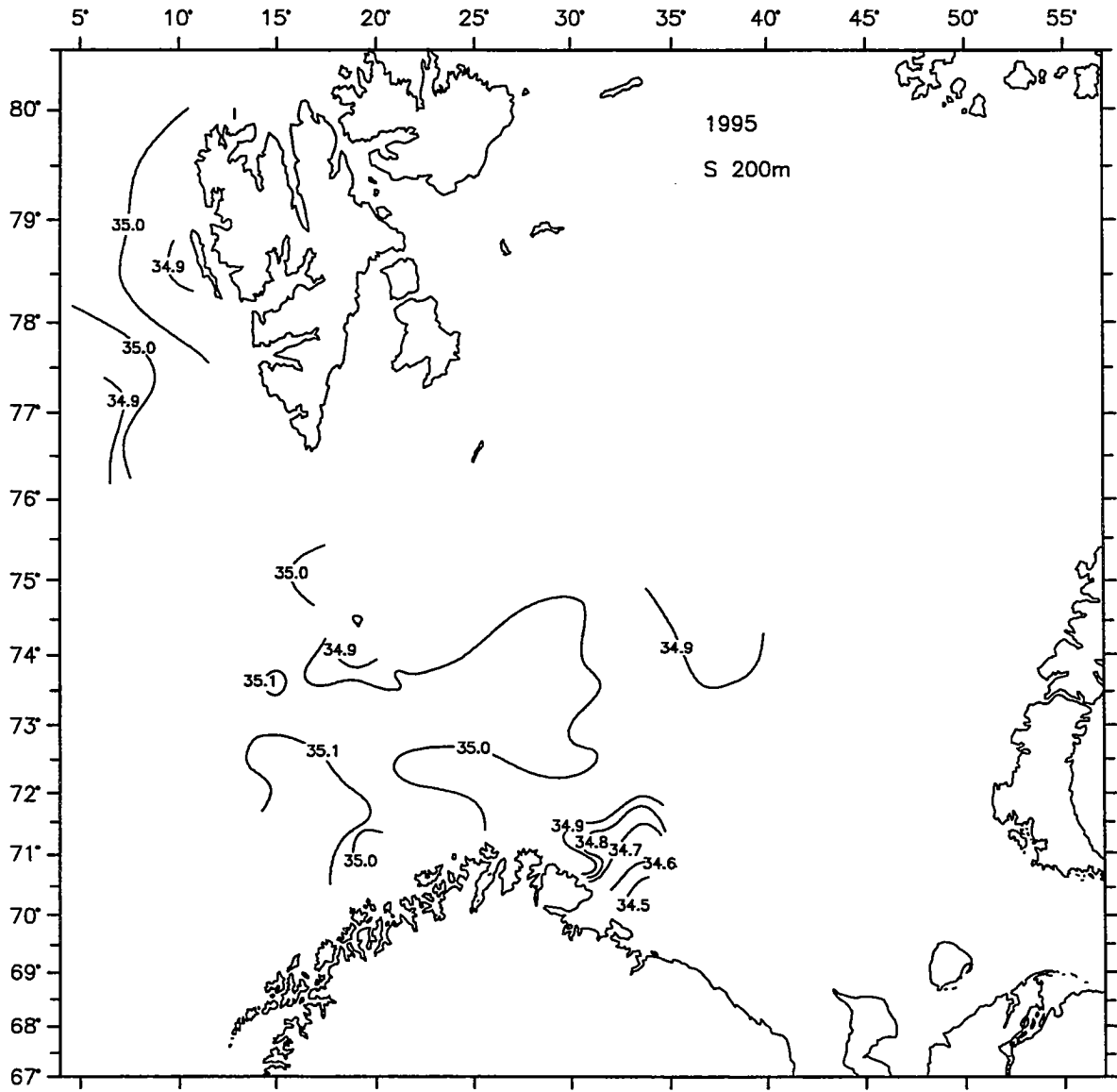


Fig.9. Isohalines at 200m.

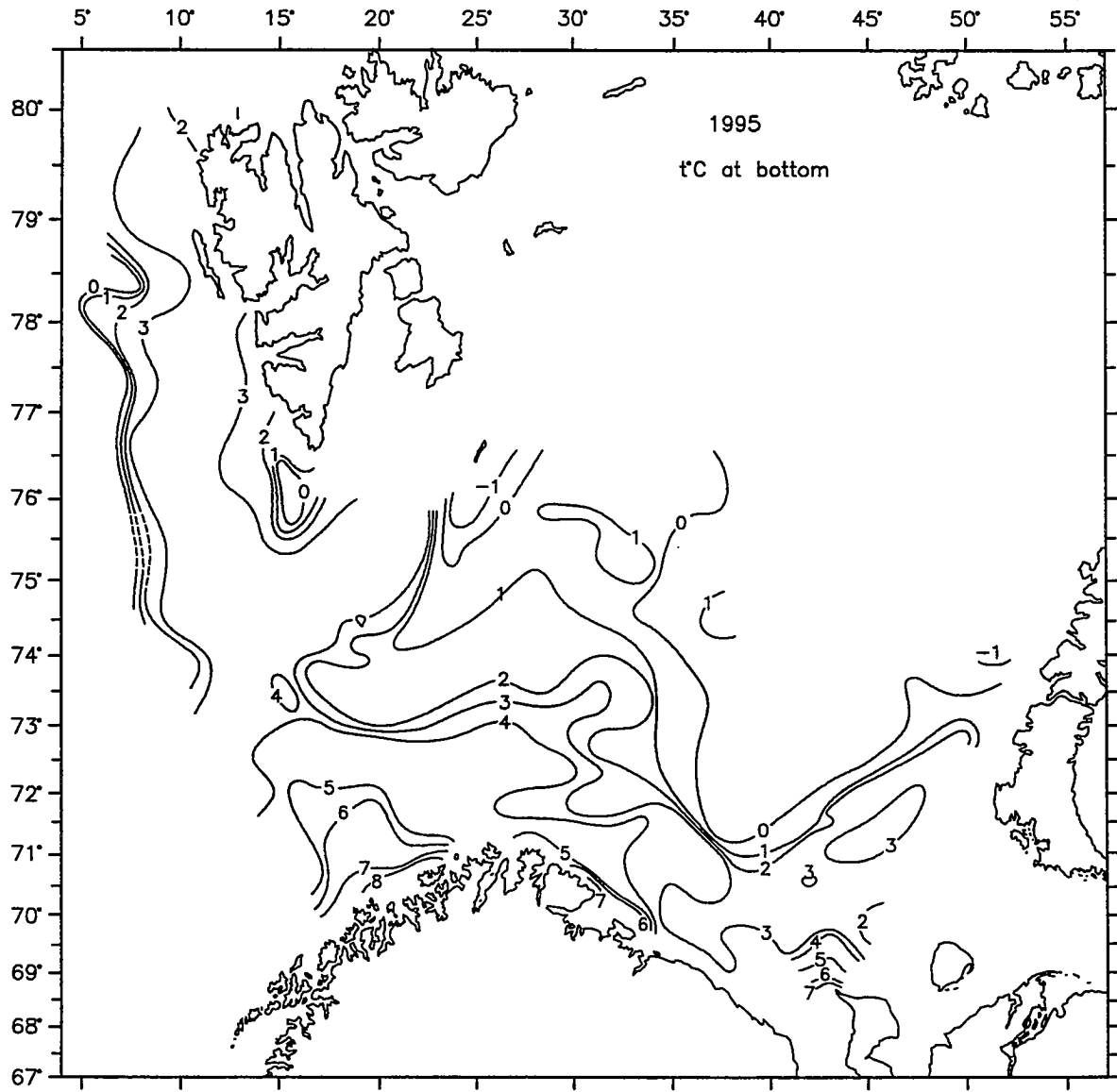


Fig.10. Isotherms at the bottom.

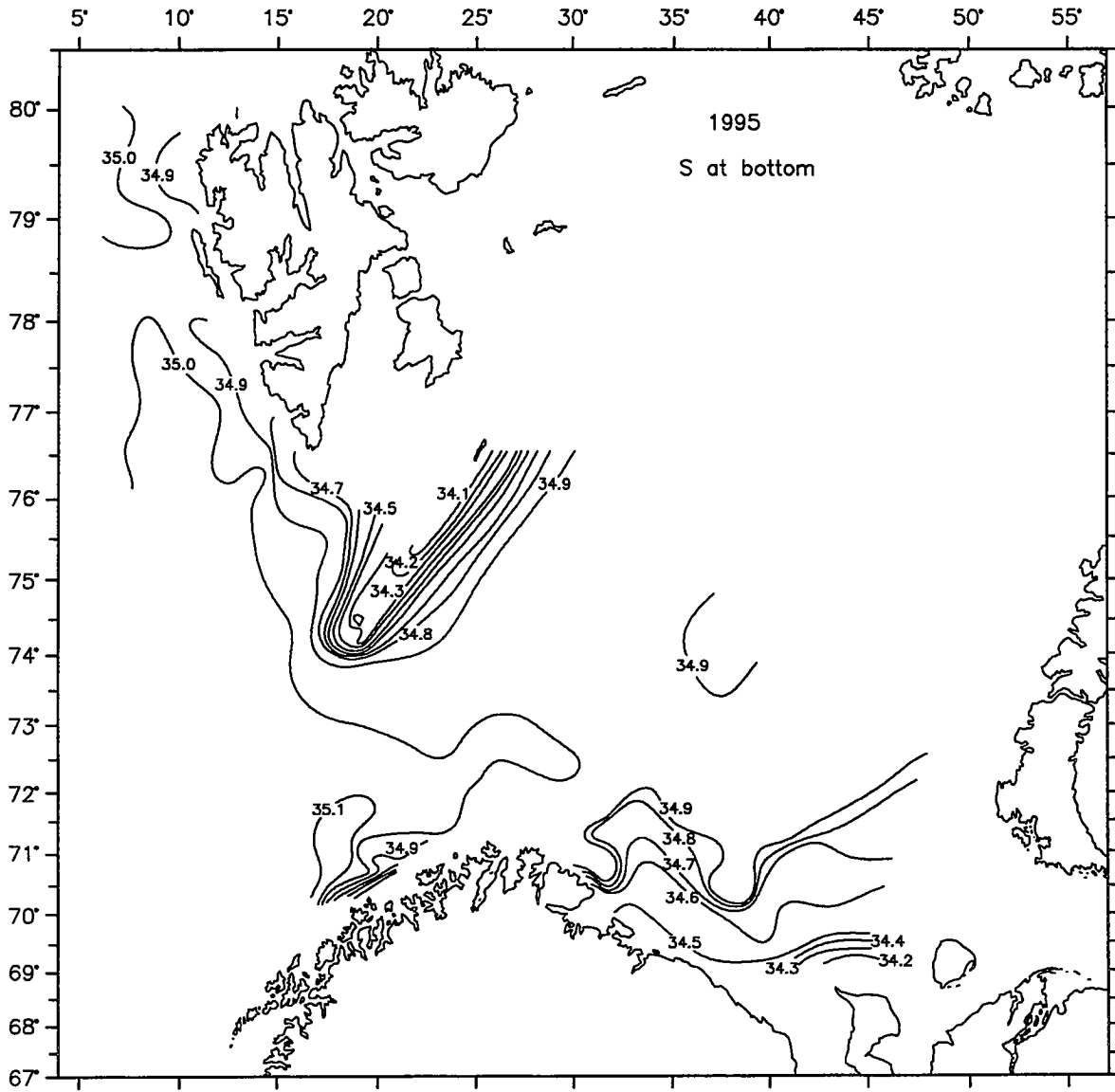


Fig.11. Isohalines at the bottom.

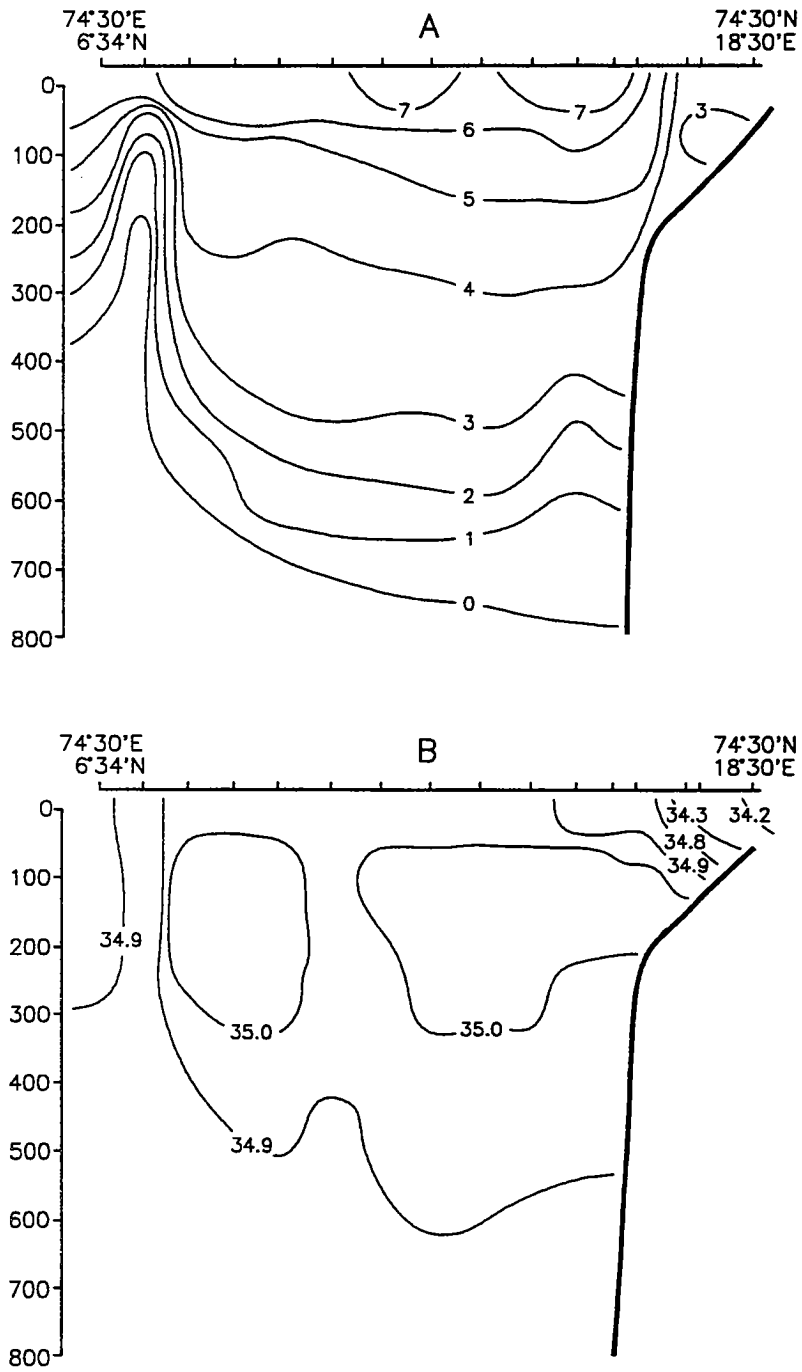


Fig.12. Hydrographic section  
 Bear Island - West  
 Temperature (A) and salinity (B).

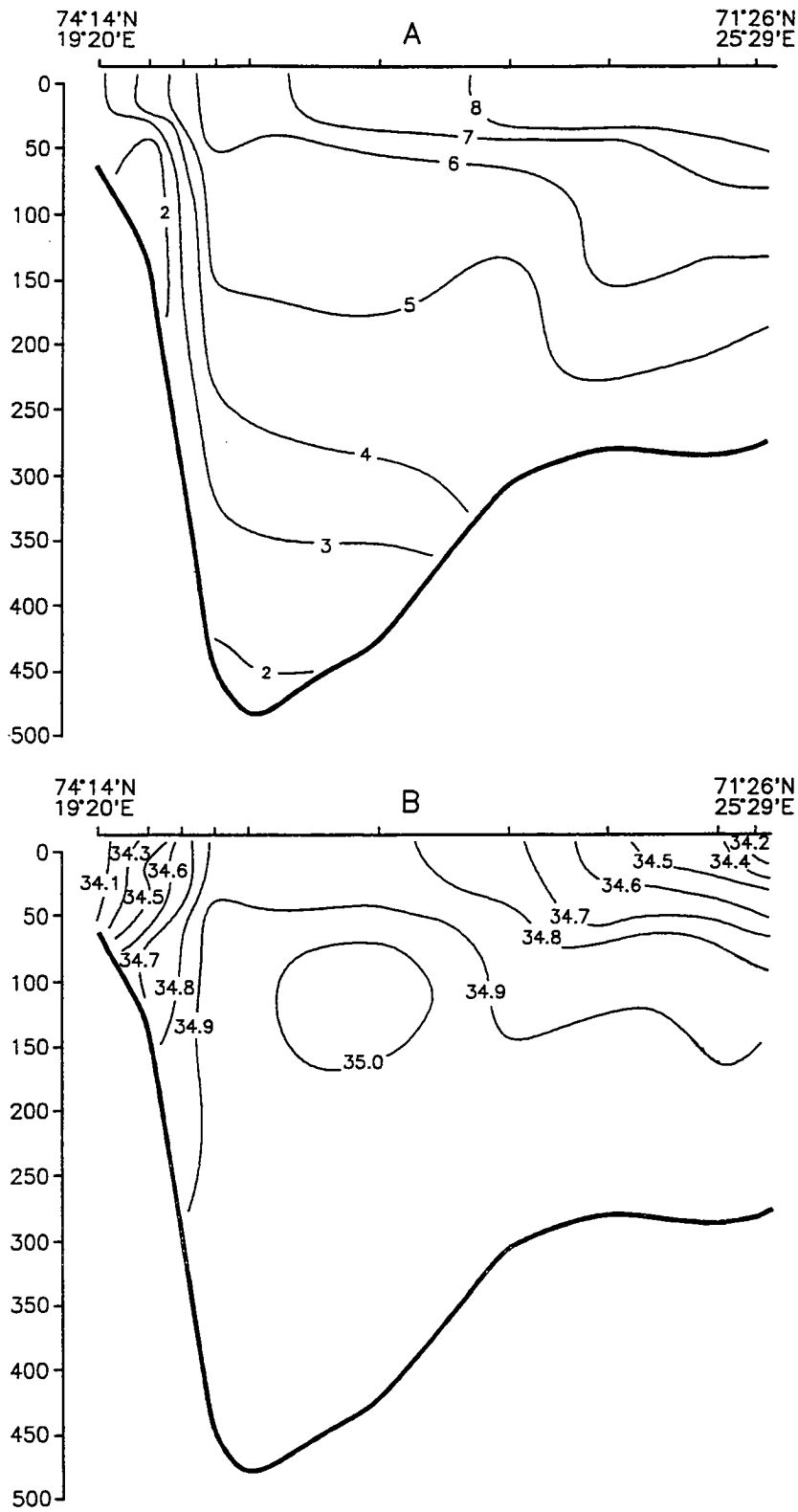


Fig.13. Hydrographic section  
North Cape - Bear Island.  
Temperature (A) and salinity (B).

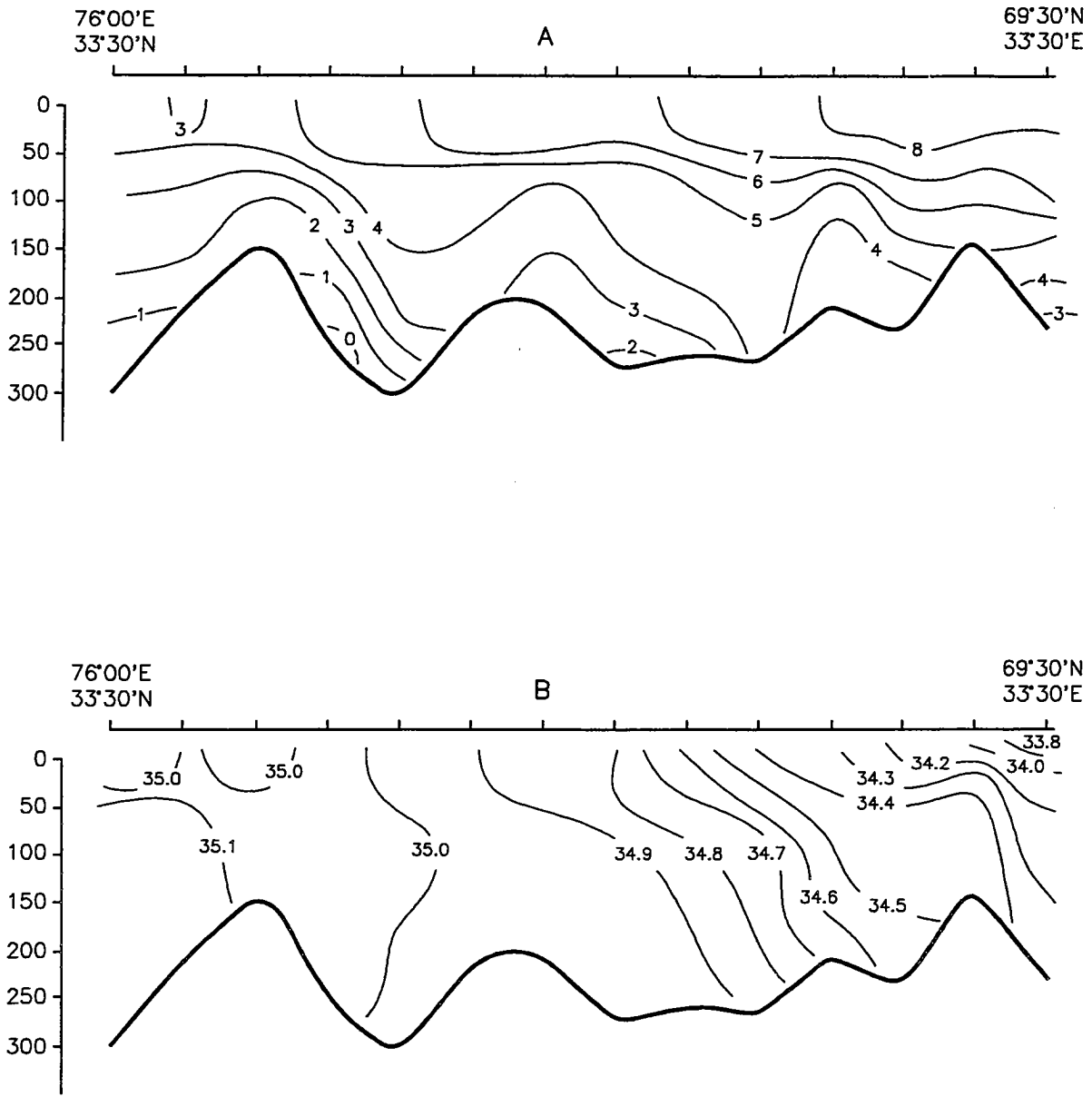


Fig. 14. Hydrographic section along the Kola meridian. Temperature (A) and salinity (B).

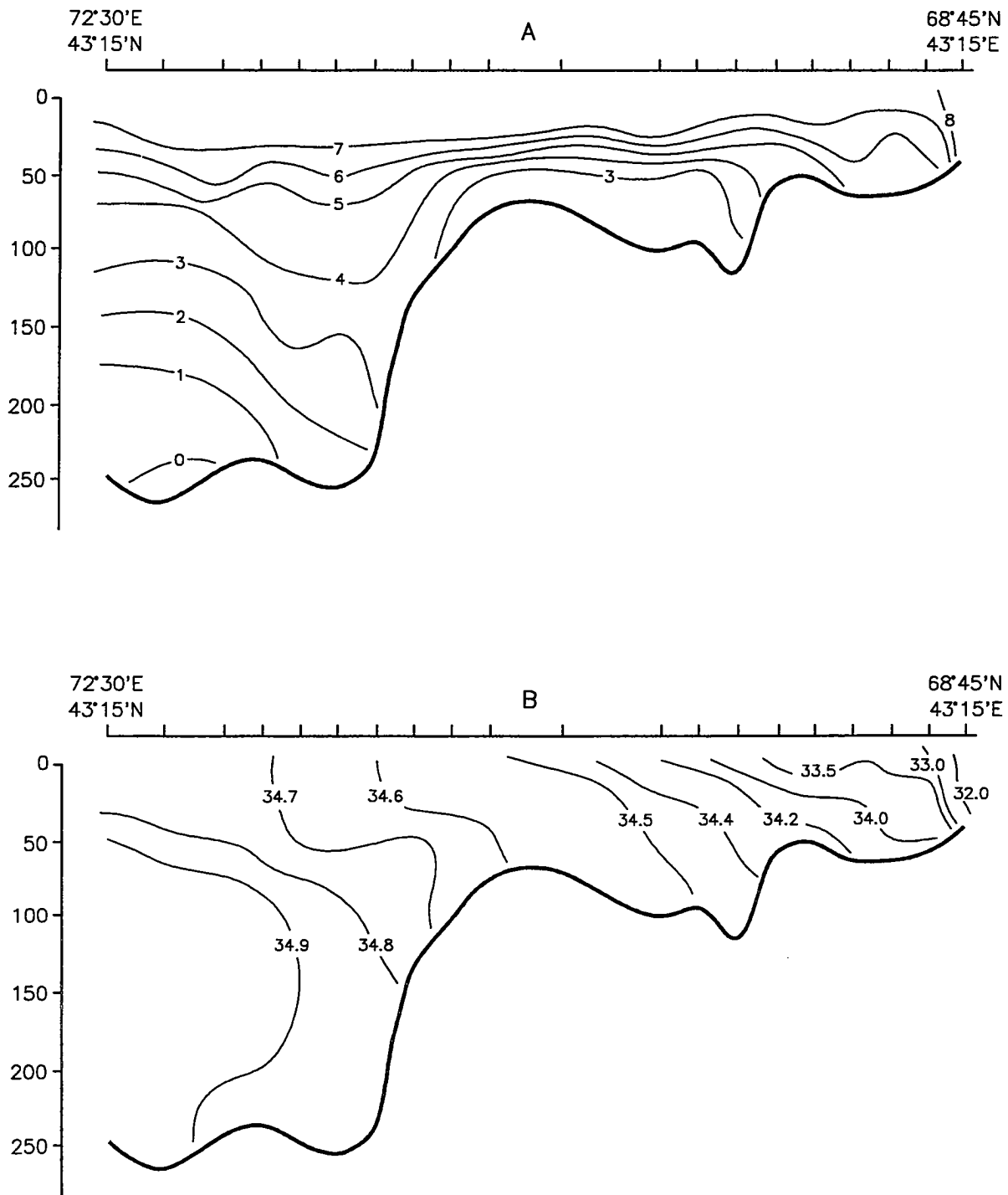


Fig. 15. Hydrographic section Cape Kanin - North.  
Temperature (A) and salinity (B).



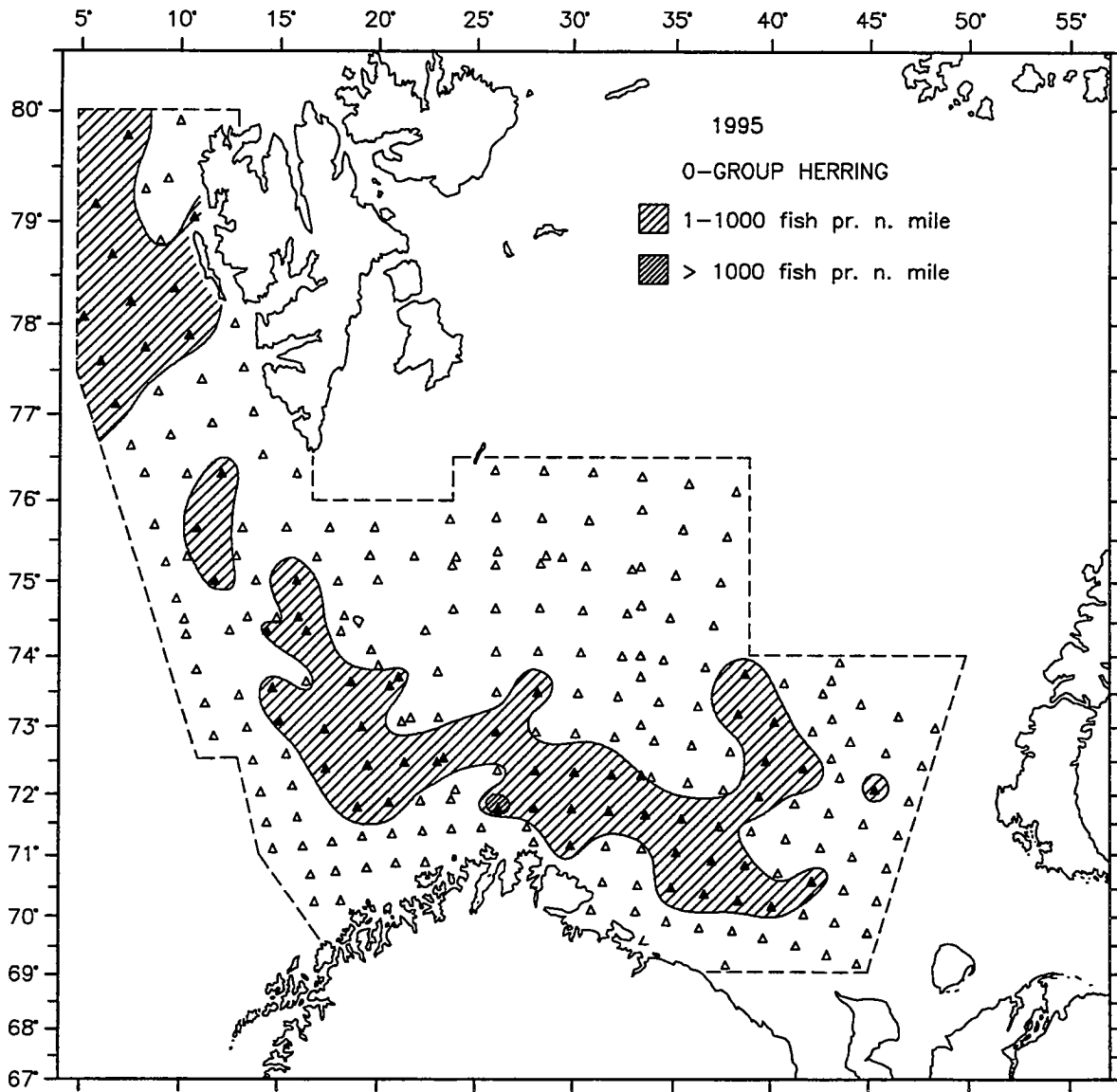


Fig.16. Distribution of 0-group herring.

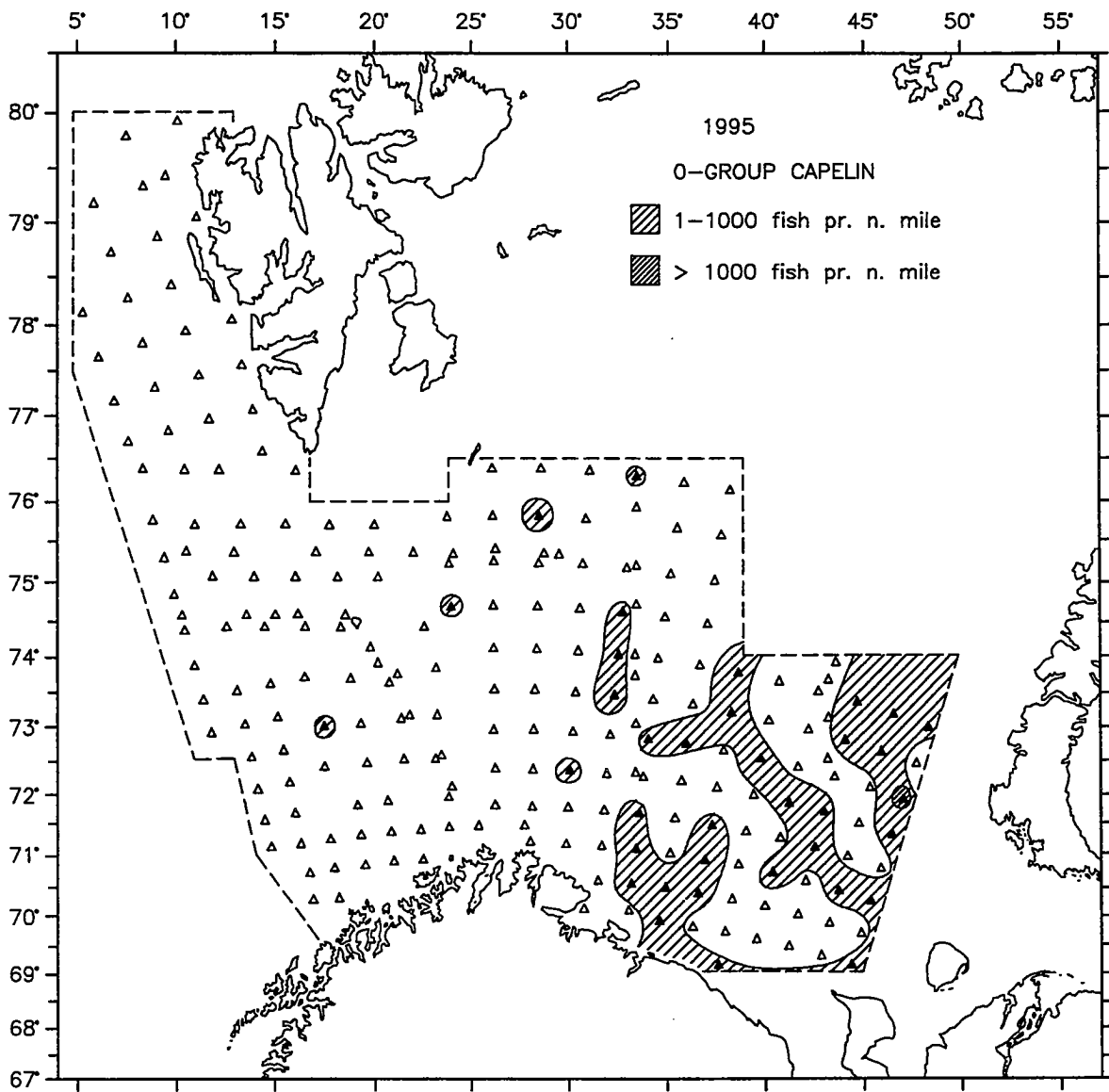


Fig.17. Distribution of 0-group capelin.

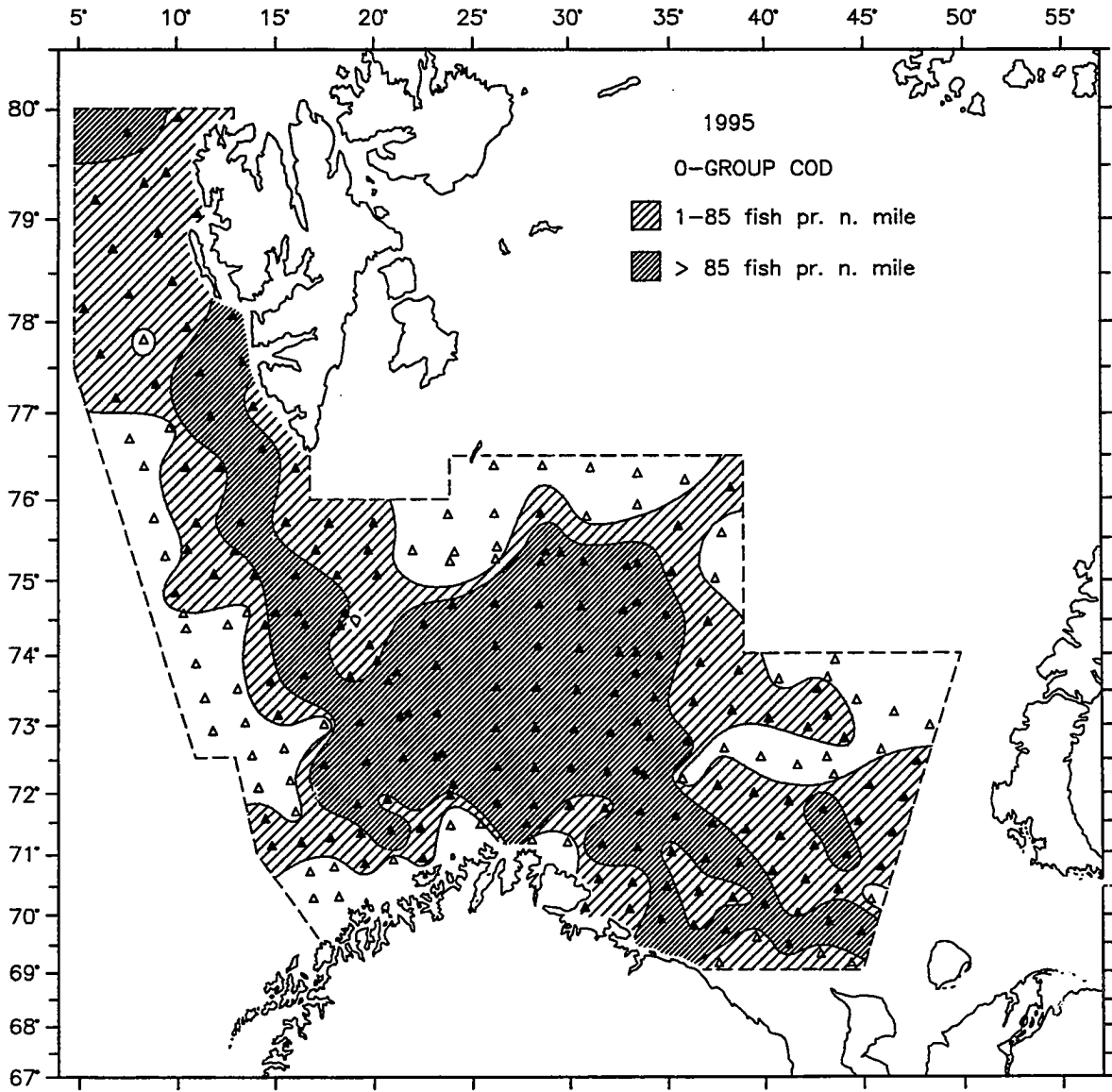


Fig.18. Distribution of 0-group cod.

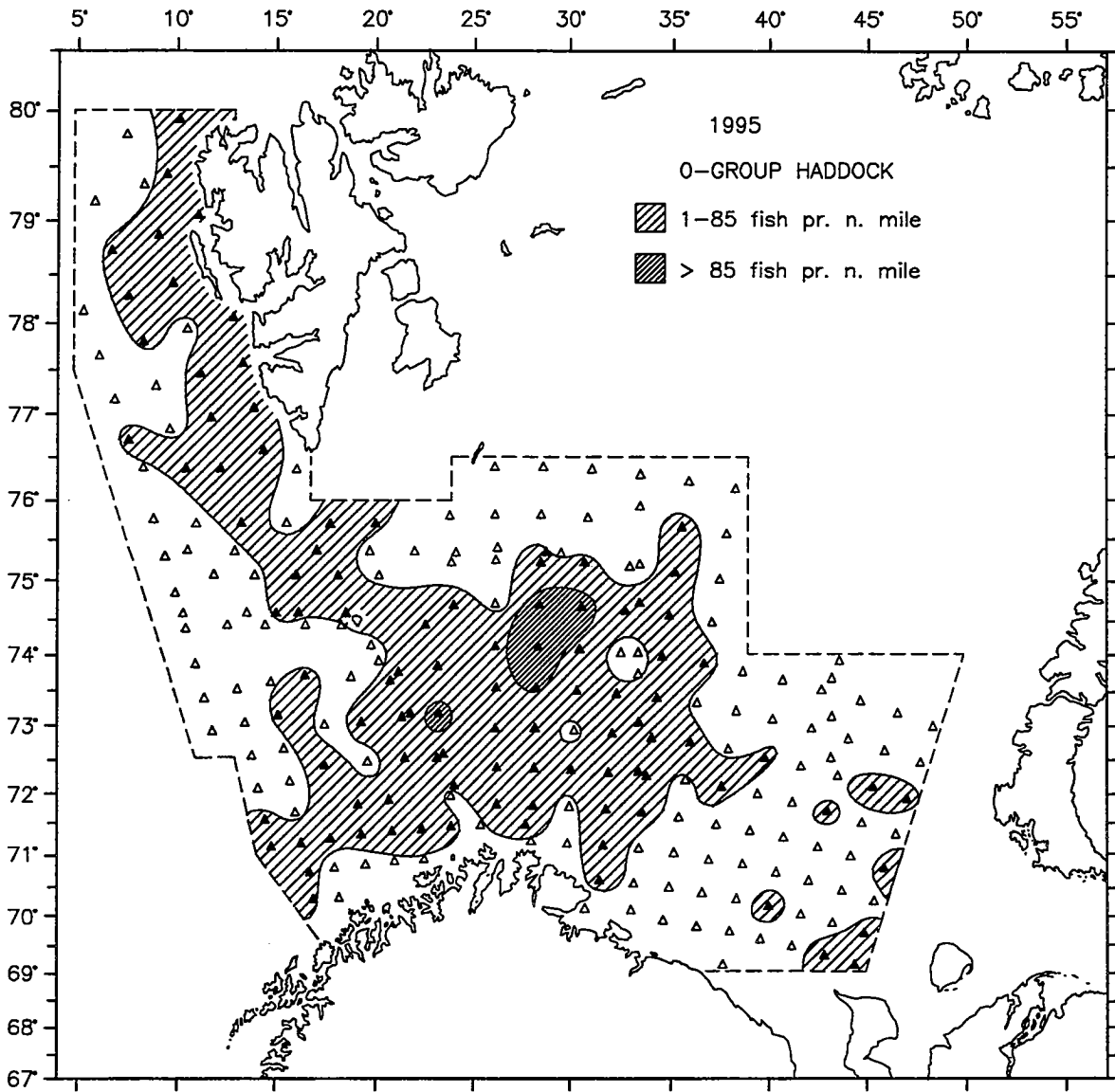


Fig.19. Distribution of 0-group haddock.

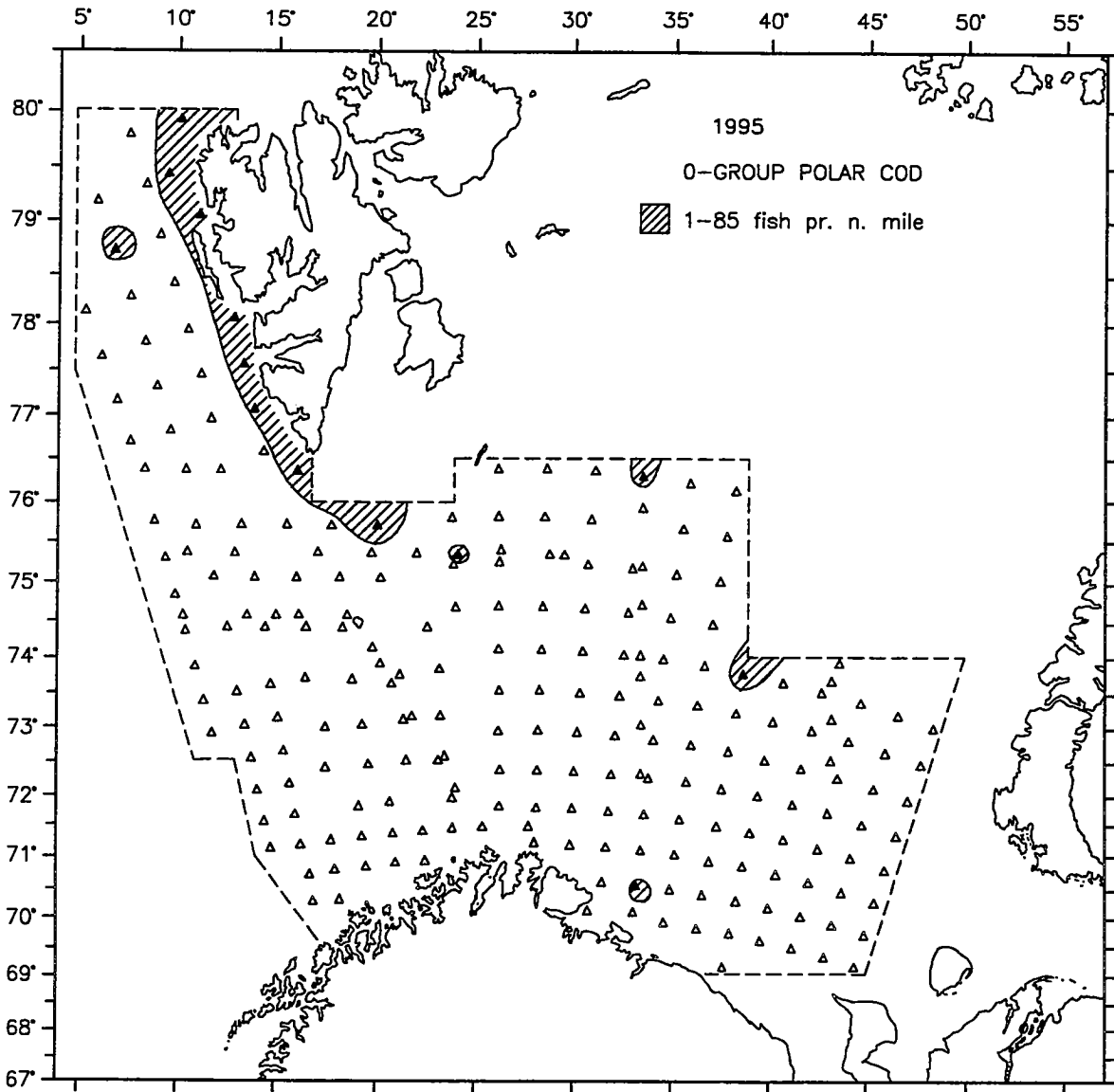


Fig.20. Distribution of 0-group polar cod

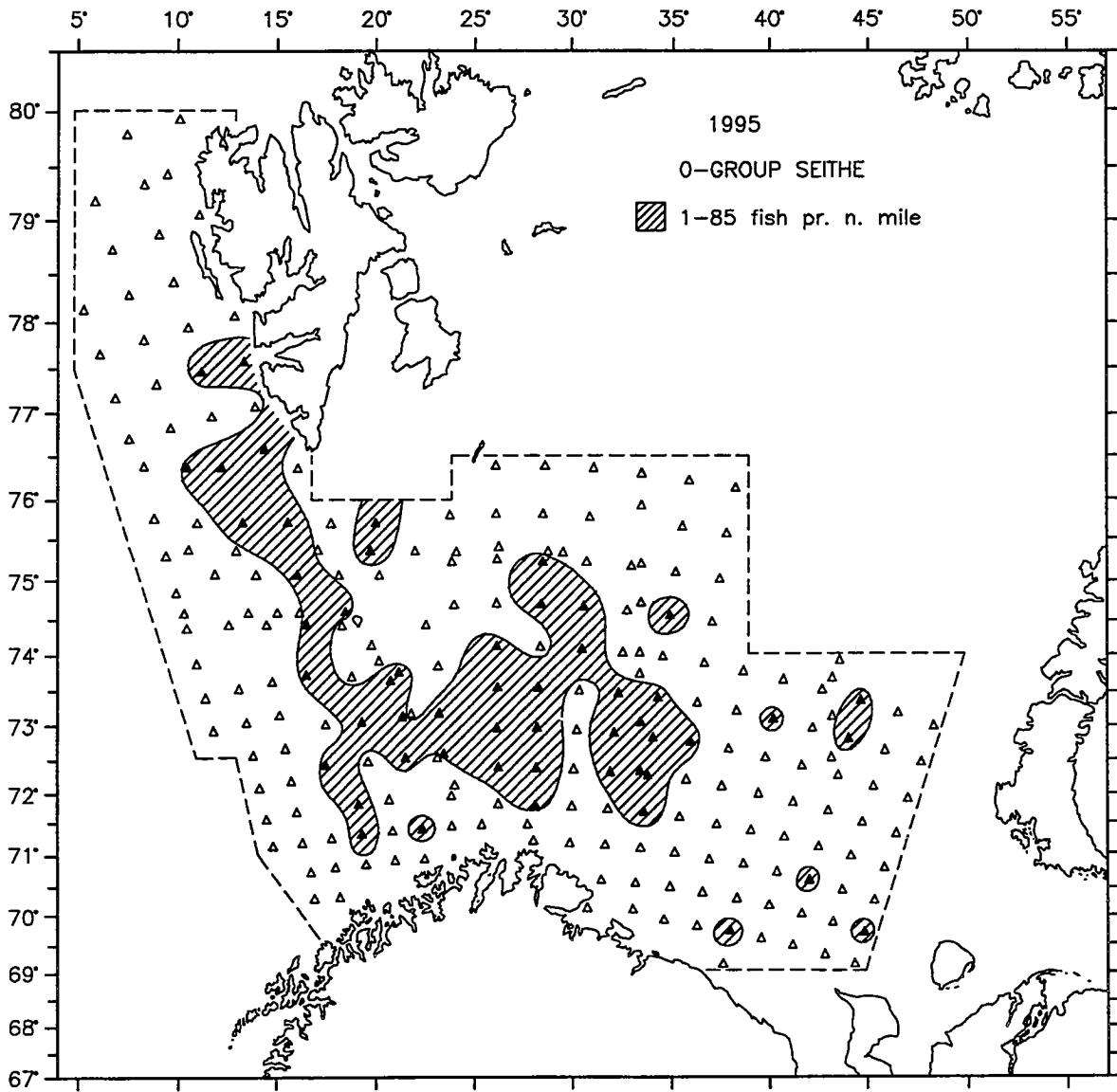


Fig.21. Distribution of 0-group saithe.

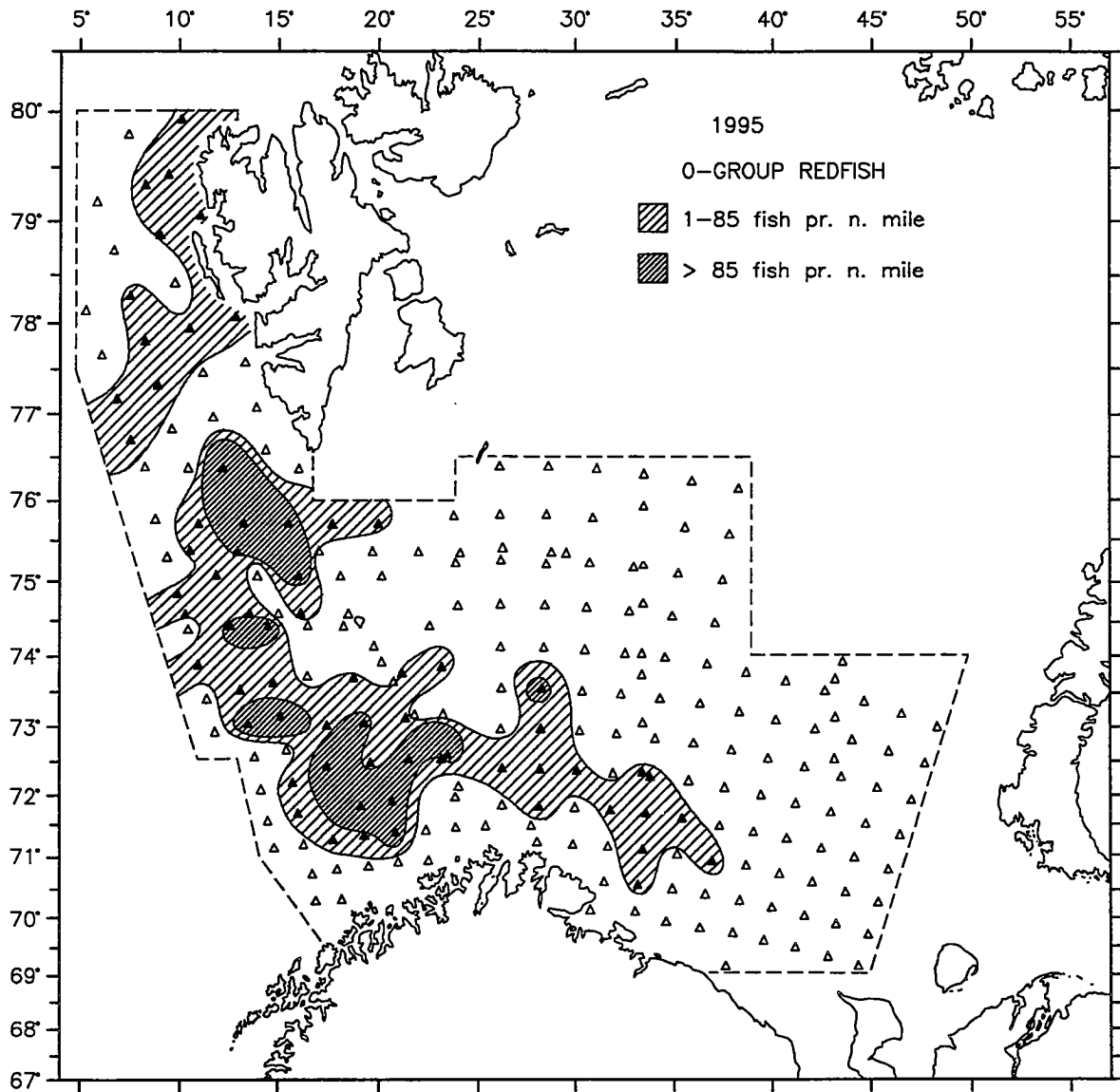


Fig.22. Distribution of 0-group redfish.

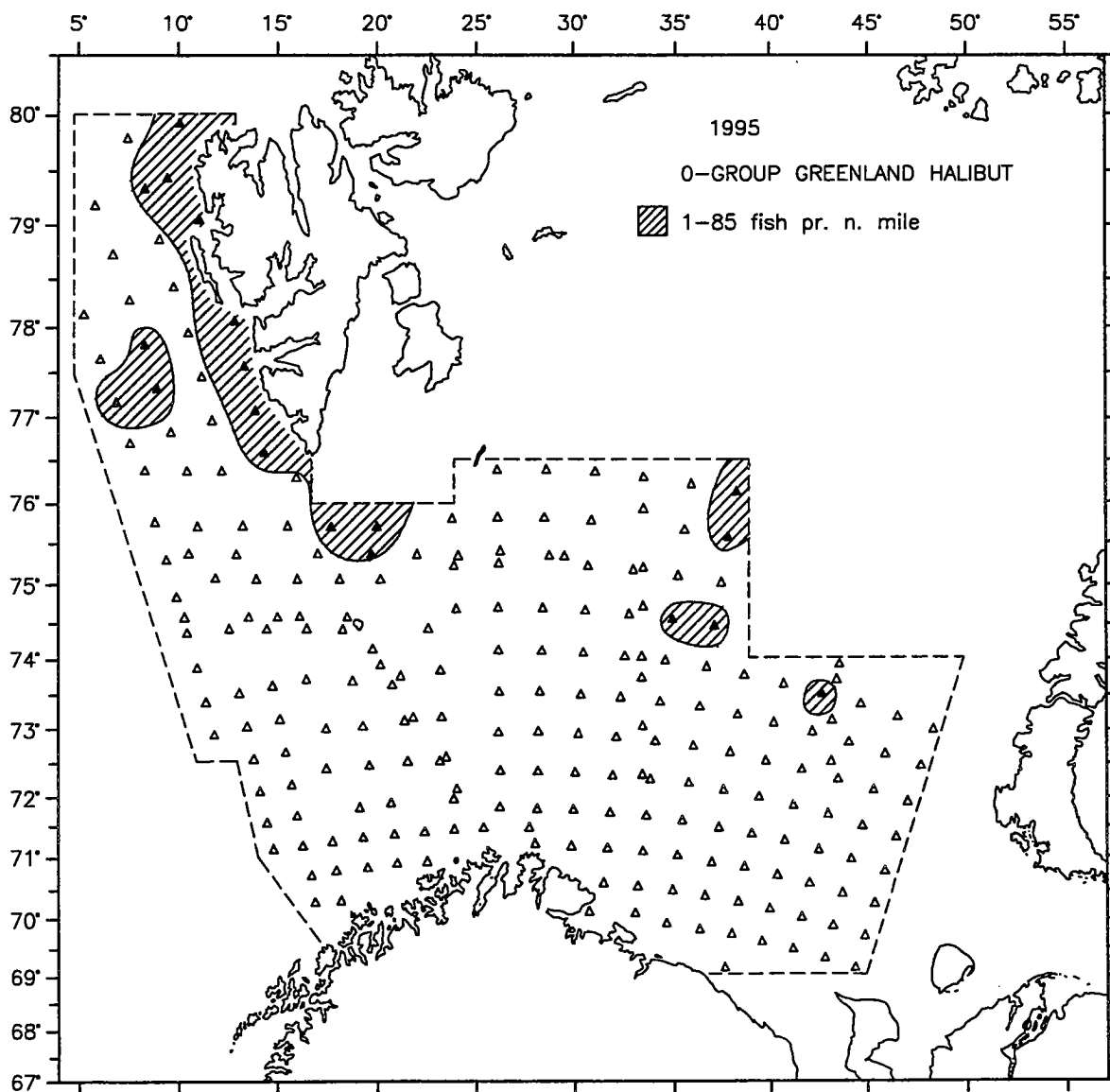


Fig.23. Distribution of 0-group Greenland halibut.



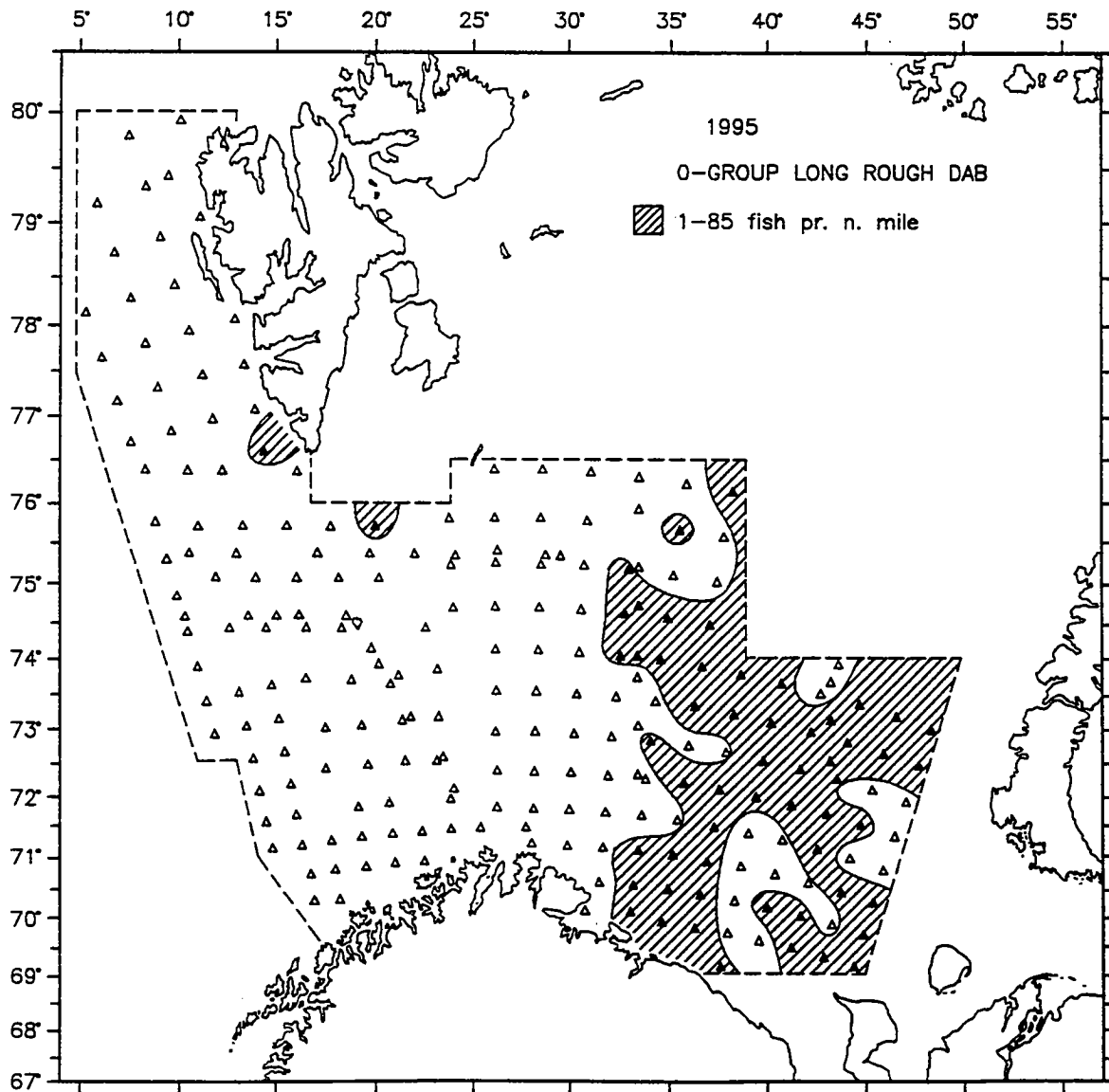


Fig.24. Distribution of 0-group long rough dab.

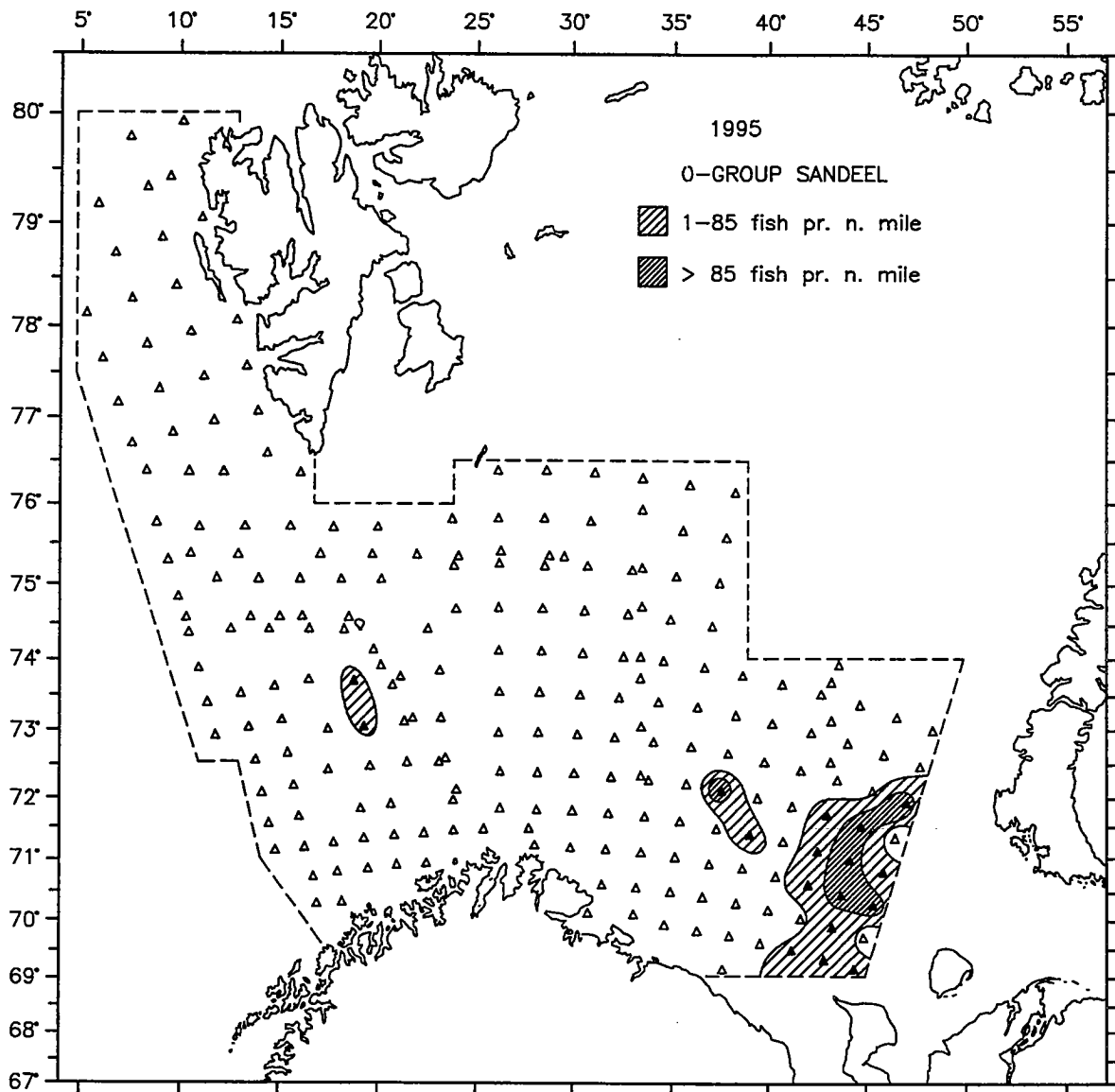


Fig.25. Distribution of 0-group sandeel.

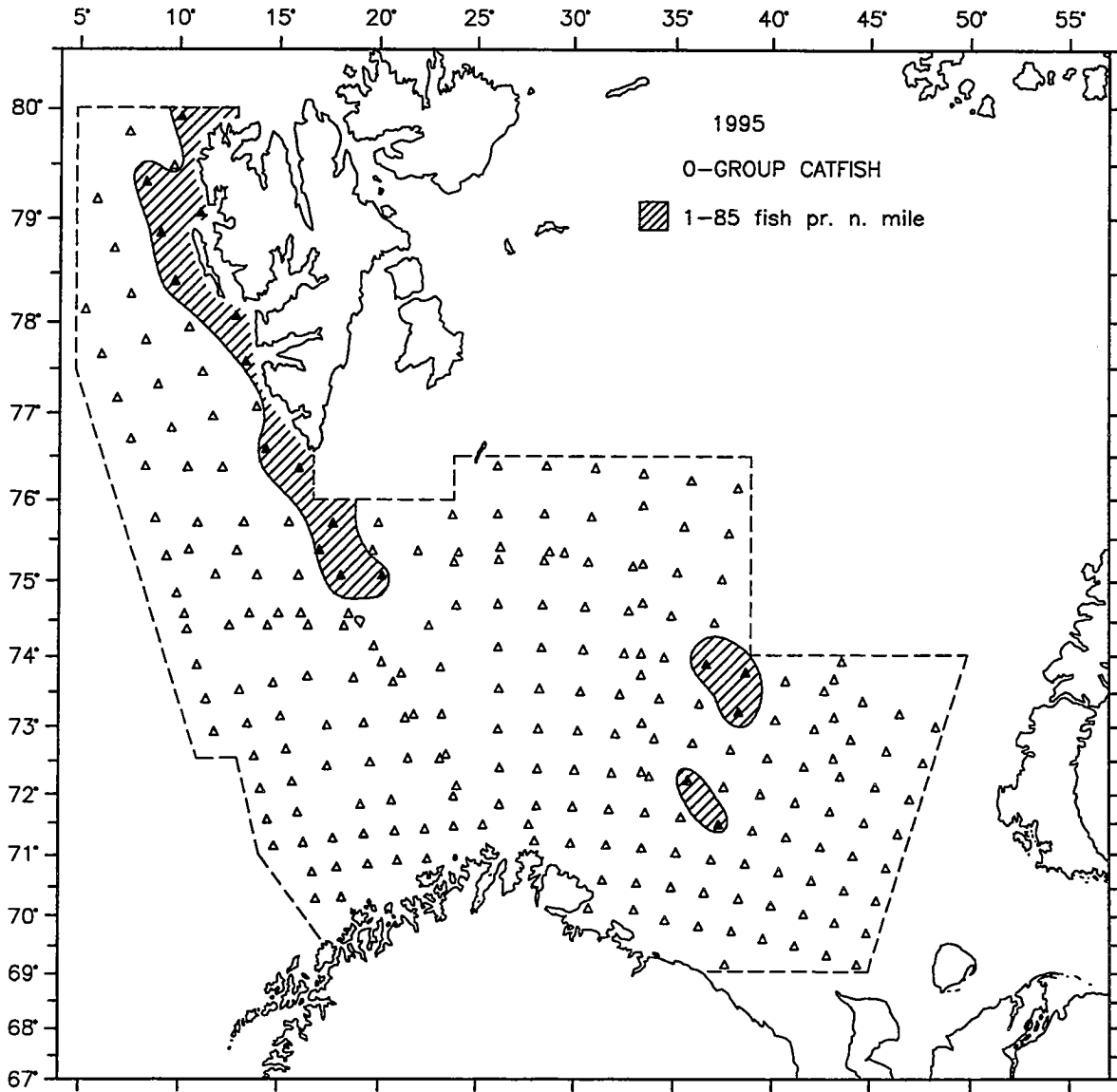


Fig.26. Distribution of 0-group catfish.

**APPENDIX**

Research vessel	Participants
"G.O. Sars"	R.Espelid, H.Græsdal (til 30/8), K.A.Hansen, A.Hylen, L.Kalvenes, H.Mjanger (fra 30/8), E. Molvær, A.Raknes, Ø.Tangen, Gjest: N.Ushakov (Russia), A.Hassel
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"Johan Hjort"	B. Anthonypillai, J.Enrices, K.Gjertsen, K.Korsbrekke, M.Møgster, I.Svellingen, Ø.Torgersen
"Professor Marty"	A.Badigin, M.Dobrynin, I.Dolgolenko, S.Harlin, D.Rubbo, S.Sergeev, B.Shein, T.Yusupov
"Fridtjof Nansen"	V.Guzenko, A.Karpechko, E.Kuznetsova, A.Nikiforov, D.Prozorkevitch, S.Ratushniy, T.Sergeeva, E.Tereshchenko