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Preliminary report of the international 0-group fish survey in  
The Barents sea and adjacent waters in August-September 1984

The twentieth annual International 0-group fish survey was made during the period 13 August - 5 September 1984 in the Barents Sea and adjacent waters. The following research vessels participated in the survey:

*Seven ships participated in the survey*

State	Name of vessel	Survey	Research Institute
Norway	"Eldjarn"	12 August - 5 September	Institute of Marine, Research, Bergen
Norway	"G.O. Sars"	19 August - 3 September	"
Norway	"Håkon Mosby"	19 August - 5 September	"
USSR	"Persey III"	20 August - 30 August	The Polar Research Institute of Marine Fisheries and Oceanography, Murmansk
USSR	"Poisk"	26 August - 29 August	"
USSR	"Alaid"	20 August - 27 August	"
USSR	"Kokshaisk"	27 August - 2 September	"

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 3 September in Hammerfest. Observations concerning the geographical distribution of 0-group fish and their abundance are given in

*Method and area coverage as in previous years*

this report together with a brief description of the temperature conditions in the area.

#### MATERIAL AND METHODS

The geographical distribution of 0-group fish were estimated by fishing with a small meshed midwater trawl. The vessels participating in the survey in 1984 (except "Poisk") used the type of midwater trawl recommended by the meeting held after the survey in 1980 (ANON., 1983). The trawling procedure was standardized in accordance with the recommendation made at the same meeting. At about every 30 nautical miles sailed the trawl was towed 0,5 nautical mile at each depth; the headline of the trawl at 0, 20, 40 and at 60 m when 0-group fish layer was recorded deeper than 60 m.

Survey tracks and hydrographical stations are given in Fig. 1. Trawl stations with and without catch are given on the distribution charts in Figs. 10-19, as filled and open symbols respectively. The density grading is based on catch in number per 1,0 nautical mile trawling.

#### HYDROGRAPHY

Hydrographical observations were made along all the survey tracks normally after each 30 nautical miles sailed. Horizontal temperature distribution is shown for 0, 50, 100 and 200 m depth (Figs. 2-5). Figs. 6-9 show the temperature conditions at four standard sections, and the mean temperature of these sections are given in Table 1. Some general comments are given below:

##### Kola section

In 1983 the temperature in the layers 0 - 50, 50 - 200 and 0 - 200 m turned out to be the highest during the whole period of the 0-group survey. The mean temperatures in 1984 are 0,1, 0,7 and 0,6<sup>o</sup>C lower than in the respective layers in 1983. However, they are all above the average for the period 1965-1984.

Cape Kanin - North section

An insignificant rise of water temperature was observed in the southern part of the section, as compared to 1983, and the temperature exceeded the long-term mean by  $1,2^{\circ}\text{C}$ . The temperature in the northern part of the section kept close to the 1983 level and exceeded the normal by  $0,9^{\circ}\text{C}$ .

North Cape - Bear Island section

In 1984 the mean temperature in the 0-200 m layer exceeded the long-term mean by  $0,2^{\circ}\text{C}$ . Compared with 1983, it decreased by  $0,4^{\circ}\text{C}$ .

Bear Island - West section (along  $74^{\circ}30'\text{N}$ )

The water temperatures in the West Spitsbergen Current remained close to the 1983 level and exceeded the normal by  $0,6^{\circ}\text{C}$ .

Thus, in late August - early September 1984 the water temperature was lower than the previous year, but above the average long-term value both in the eastern and western part of the survey area.

DISTRIBUTION AND ABUNDANCE OF 0-GROUP FISH

Geographical distributions of 0-group fish are shown by shaded areas in Figs. 10-18. Double shading indicates dense concentrations. The criteria for discriminations are the same as used in earlier reports (ANON., 1980). Abundance indices, estimated as the area of distribution with areas of high densities weighted by 10, are given in Table 2. A new set of abundance indices have been calculated for 0-group cod and haddock (Table 3) as described by 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. 10)

The distribution of 0-group herring was restricted in 1984 to the western part of the Barents Sea, and the overall density was lower in 1984 than in 1983. However, with the exception of 1983, the density and distribution area of 0-group herring in 1984 is the largest since the present investigations started in 1965.

Capelin (Fig. 11)

The area of distribution and the overall density is similar to that in 1983 which <sup>It is indicated</sup> indicate that the 1984 year class may be as abundant as both the 1982 and 1983 year classes. However according to the great variation in numbers of 0-group capelin in the catches, caused by weather conditions, it must be stressed that an index of year class strength of capelin is not as reliable as for other species.

Cod (Fig. 12)

The 0-group cod was distributed north of Finnmark and Murman coast and west of Spitsbergen. Both indices for year class strength (Table 3 and 4) indicate that the 1984 year class is a rich year class, even more abundant than the 1975 year class which has dominated the fishery in the recent years. It is only exceeded in abundance at the 0-group stage by the outstanding 1970 and 1973 year classes. The logarithmic index is only exceeded by the 1970 and 1983 year classes.

Haddock (Fig. 13)

The distribution was similar to that in 1983. Both indices of year class strength indicate that the 1984 year class is stronger than the 1975 year class which has dominated the fishery in the late seventies and early eighties. It is even stronger than the 1983 year class which was the most abundant year class recorded in the 0-group survey.

Polar cod (Fig. 14)

As in previous years, 0-group polar cod was found in two separated areas, off Spitsbergen and in the south-eastern part of the Barents Sea. The most dense concentrations were found off Spitsbergen. Sparse concentrations were recorded in the eastern part of the survey area. It is, however quite possible that 0-group polar cod is distributed outside the investigated area.

Redfish (Fig. 15)

The distribution of 0-group redfish is similar to the one found last year. The overall density indicate that the 1984 year class is another strong one, but somewhat less abundant than the 1983 year class.

Greenland Halibut (Fig. 16)

0-group Greenland halibut was as usually found in the Bear Island - West Spitsbergen area. The abundance index for the 1984 year class is higher than for the 1983 and 1982 year classes and above the long term average.

Long Rough Dab (Fig. 17)

0-group long rough dab was found in many patches all over the survey area. The abundance index for 1984 is lower than the very high 1982 index and close to the average for the period 1965 - 1984.

Saithe (Fig. 18)

0-group saithe was found in many patches in the survey area. The double shaded area in Fig. 18 represents more than 85 specimen per haul of 1,0 nautical mile. 0-group saithe has only been observed in such high numbers during the 0-group surveys in 1967 and 1983, and no abundance index has been calculated.

Blue Whiting (Fig. 19)

0-group blue whiting was recorded in the same area as in 1983, -south of N 75 and between E 20 and E 35. No index of abundance has been calculated.

REFERENCES

- ANON., 1980. Preliminary report of the International 0-group fish survey in the Barent Sea and adjacent waters in August/September 1978. Annls biol., Copenh., 35: 273-280.
- ANON., 1983. Preliminary report of the International 0-group fish survey in the Barent Sea and adjacent waters in August/September 1980. Annls biol., Copenh., 37: 259-266.
- RANDA, K., 1984. Abundance and distribution of 0-group Arcto-Norwegian cod and haddock 1965-1982. In The Proceedings of the Soviet-Norwegian on Reproduction and recruitment of Melic cod. Leningrad 26-30 Sept. 1983: 192-212.

Table 1. Mean water temperature during the International 0-group fish survey in the Barents Sea and adjacent waters in late August - early September 1984.

2-4 - Murmansk Current: Kola section ( $70^{\circ}30'N - 72^{\circ}30'N$ )

5 - Cape Kanin section ( $68^{\circ}45'N - 70^{\circ}05'N$ )

6 - Cape Kanin section ( $71^{\circ}00'N - 72^{\circ}00'N$ )

7 - North Cape Current: North Cape - Bear Island section ( $71^{\circ}33'N$ ;  $25^{\circ}02'E - 73^{\circ}35'N$ ;  $20^{\circ}46'E$ )

8 - West Spitsbergen Current: Bear Island - West section ( $06^{\circ}34'E - 15^{\circ}55'E$ )

Layer/ Year	0-50 m	50-200 m	0-200 m	0-bottom	0-bottom	0-200 m	0-200 m
1	2	3	4	5	6	7	8
1965	6.7	3.8	4.6	4.8	4.2	5.1	-
1966	6.7	2.6	3.6	2.0	2.5	5.5	3.3
1967	7.5	4.0	4.9	6.1	3.6	5.6	4.2
1968	6.4	3.7	4.4	4.7	3.1	5.4	3.6
1969	6.9	3.1	4.0	2.6	2.3	6.0	4.2
1970	7.8	3.6	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	5.5	5.7	4.5	5.9	5.0
1974	8.1	3.9	4.9	4.6	-	6.1	4.6
1975	7.0	4.6	5.2	5.6	4.3	5.7	4.9
1976	8.1	4.0	5.0	4.9	4.6	5.7	5.0
1977	6.9	3.4	4.3	4.1	3.3	4.8	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	1.8	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	2.5	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	5.4	4.1	5.9	5.0
Average							
1965-1984	7.3	3.6	4.6	4.2	3.3	5.7	4.4

Table 2. Abundance indices.

Year	Species	Cod	Haddock	Polar cod		Redfish	Greenland Halibut	Long rough dab
				West	East			
1965		6	7	0		159		66
1966		1	1	129		236		97
1967		34	42	165		44		73
1968		25	8	60		21		17
1969		93	82	208		295		26
1970		✓ 606	115	197		247	1	12
1971		157	73	181		172	1	81
1972		140	46	140		177	8.0	65
1973		✓ 684	54	(26)		385	3.2	67
1974		51	147	227		468	13.4	83
1975		✓ 343	170	75		315	21.1	113
1976		43	112	131		447	15.6	96
1977		173	116		70	472	9.0	72
1978		106	61		144	460	35.4	76
1979		94	69		302	980	22.5	69
1980		49	54		247	651	12.0	108
1981		65	30		73	861	38.0	95
1982		114	90		50	694	17.0	150
1983		✓ 386	184		39	851	15.8	80
1984		✓ 486	255		16	732	40.4	70



Table 3. Estimated indices with 90% confidence limits of year class abundance for 0-group cod and haddock in the total area.

Year-class	Logarithmic index	Cod		Haddock	
		Confidence limits (95%)	Confidence limits (95%)	Logarithmic index	Confidence limits (95%)
1965	+			0.01	0.00 0.04
1966	0.02	0.01	0.04	0.01	0.00 0.03
1967	0.04	0.02	0.08	0.08	0.03 0.13
1968	0.02	0.01	0.04	0.00	0.00 0.02
1969	0.25	0.17	0.34	0.29	0.20 0.41
1970	√ 2.51	2.02	3.05	0.64	0.42 0.91
1971	0.77	0.57	1.01	0.26	0.18 0.36
1972	0.52	0.35	0.72	0.16	0.09 0.27
1973	√ 1.48	1.18	1.82	0.26	0.15 0.40
1974	0.29	0.18	0.42	0.51	0.39 0.68
1975	0.90	0.66	1.17	0.60	0.40 0.85
1976	0.13	0.06	0.22	0.38	0.24 0.51
1977	0.49	0.36	0.65	0.33	0.21 0.48
1978	0.22	0.14	0.32	0.12	0.07 0.19
1979	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	0.10	0.06	0.18	0.03	0.00 0.05
1982	0.59	0.43	0.77	0.38	0.30 0.52
1983	√ 1.69	1.34	2.08	0.62	0.48 0.77
1984	√ 1.55	1.18	1.98	0.78	0.60 0.99

Table 4. Length distribution of 0-group fish in percent.

Length mm	Herring	Capelin	Cod	Haddock	Polar Cod		Redfish	Greenland Halibut	Long rough dab	Salche	Blue Whiting
					West	East					
10-14						0.3	0.3				
15-19				+		0.3	9.2				
20-24		+		+		0.7	21.9		0.3		
25-29		0.3				10.1	18.2		2.8		
30-34	+	3.4	+	+		28.8	12.1	1.8	21.3	+	5.3
35-39	+	7.7	0.1	0.1		21.2	11.0	2.5	32.7	+	3.2
40-44		12.1	0.3	0.5		19.3	10.5	7.9	28.7	+	9.5
45-49	0.3	16.9	0.8	1.1		12.1	10.8	6.5	12.2	+	11.6
50-54	0.6	18.7	2.4	2.4		5.4	4.3	10.1	1.4	+	10.5
55-59	1.4	18.0	4.7	4.6		1.7	1.2	7.9	0.3	+	23.2
60-64	3.1	17.0	8.5	6.9		0.3	0.3	10.1	+	+	9.5
65-69	5.1	5.2	13.6	8.4		+	+	13.7	0.3		8.4
70-74	7.3	0.7	18.1	9.0		0.1		14.1			11.6
75-79	15.5		21.9	7.6				14.4			1.1
80-84	20.5	+	16.0	9.7				7.2		+	
85-89	17.4		7.4	8.4				2.9			
90-94	15.9		4.1	9.1				1.0		+	
95-99	10.2		2.0	8.2							4.2
100-104	1.8		0.1	9.9						0.2	
105-109	0.8			6.1		+				0.4	
110-114	0.1			4.1		+				1.4	2.1
115-119		+		2.4						2.0	
120-124				1.1						3.8	
125-129				0.3						7.8	
130-134				+						11.2	
135-139				+						14.4	
140-144				+		+				14.3	
145-149						+				19.1	
150-154										10.1	
155-159										8.5	
160-164										3.8	
165-169										1.9	
170-174										0.9	
N	23876	337172	30719	8317	30537	317	317204	277	352	10423	95
Mean length mm	83.6	52.1	74.6	84.8	38.3	49.9	32.5	64.3	39.1	137.2	58.4

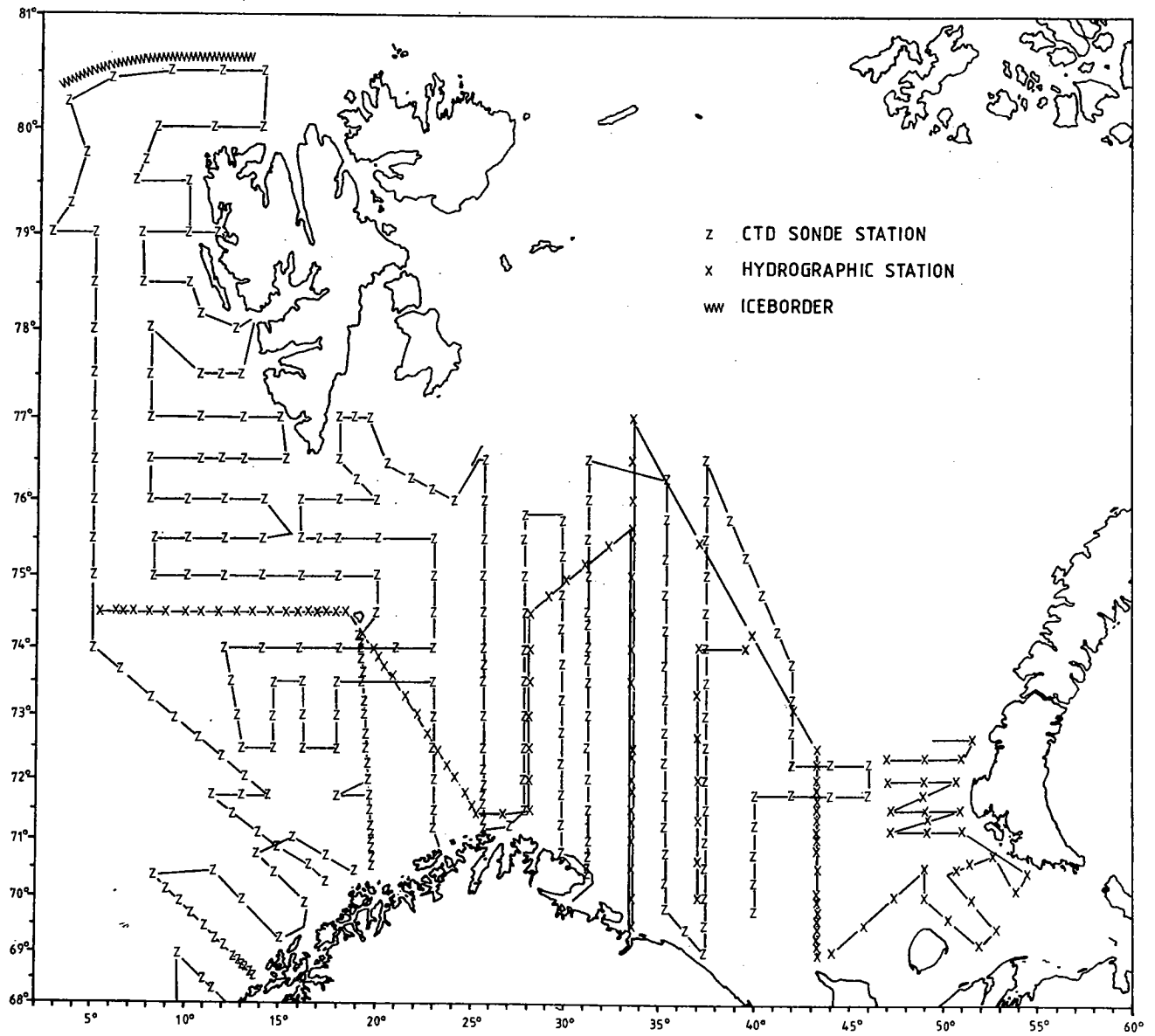


Fig. 1 Survey tracks of the ships and the grid of hydrographic stations.

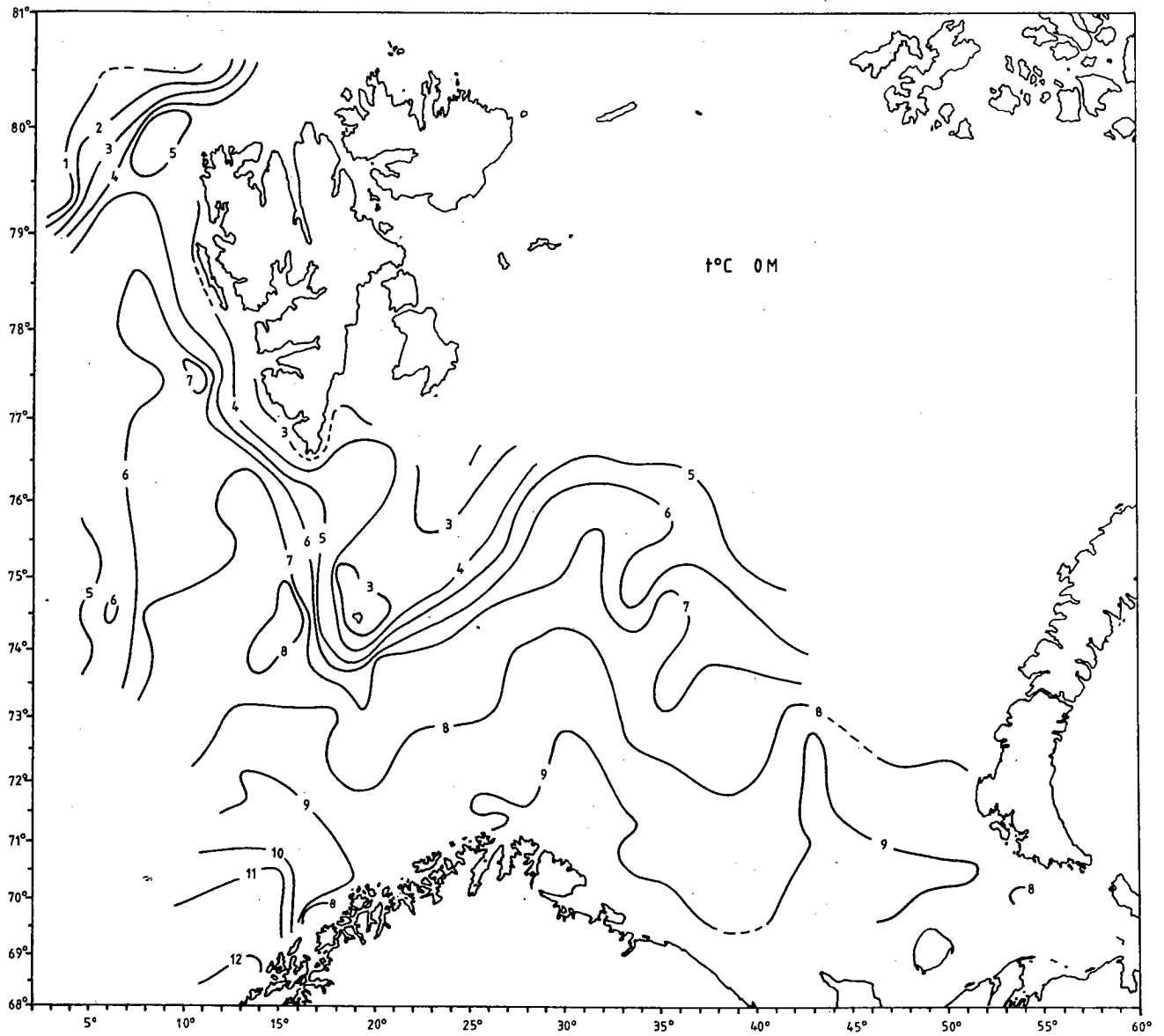


Fig. 2 Isotherms at 0 m.

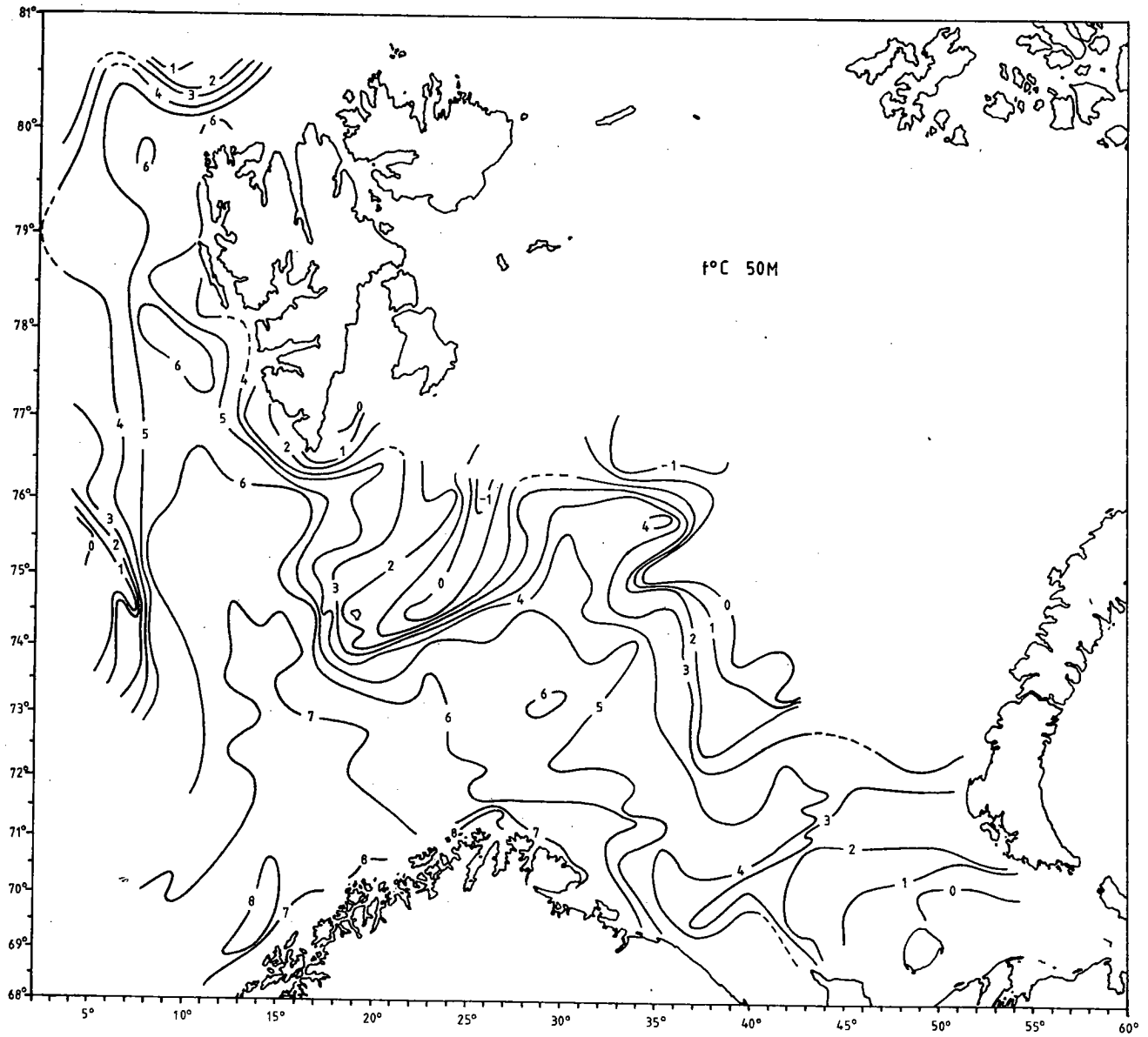


Fig. 3 Isotherms at 50 m.

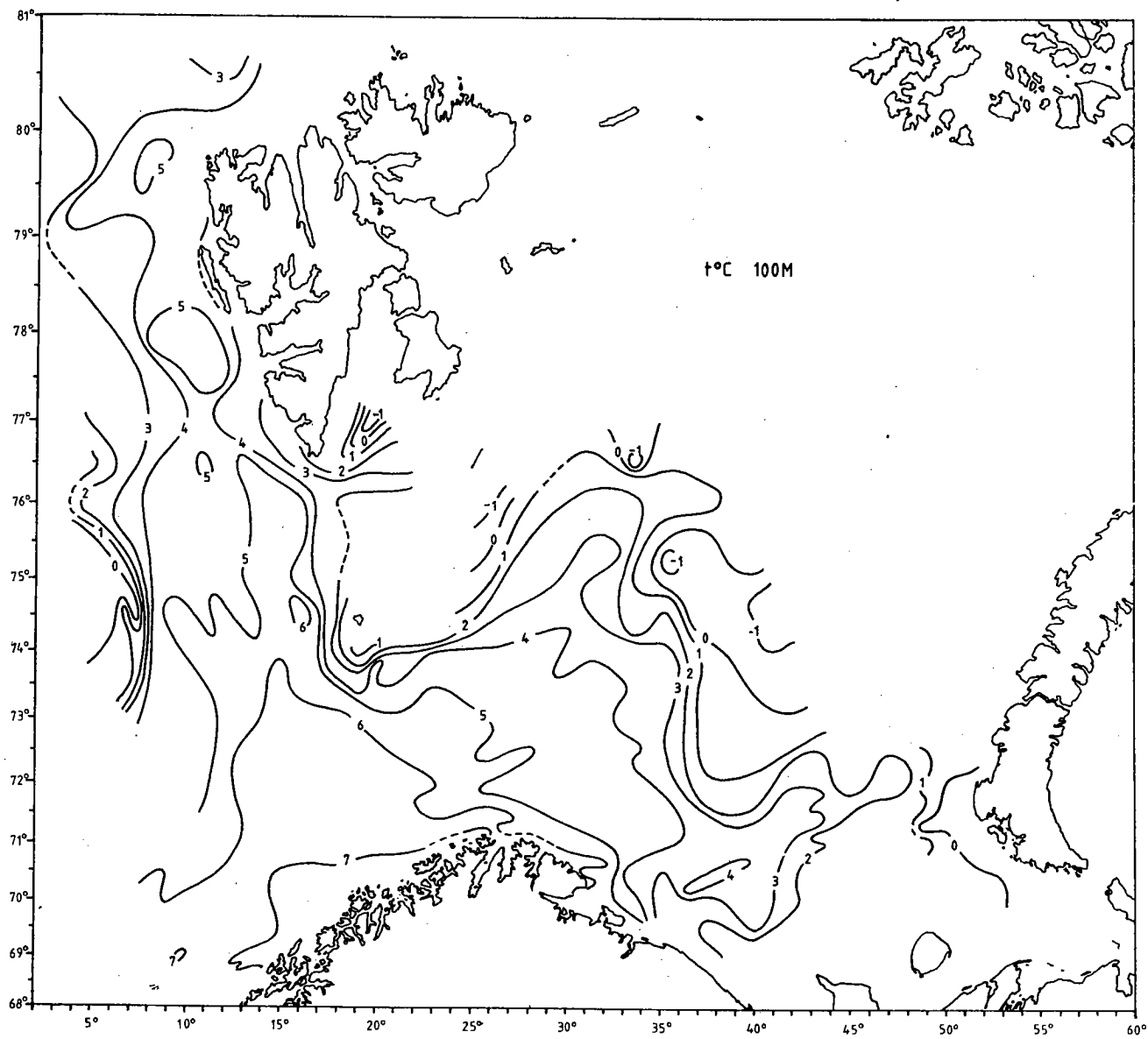


Fig. 4 Isotherms at 100 m.

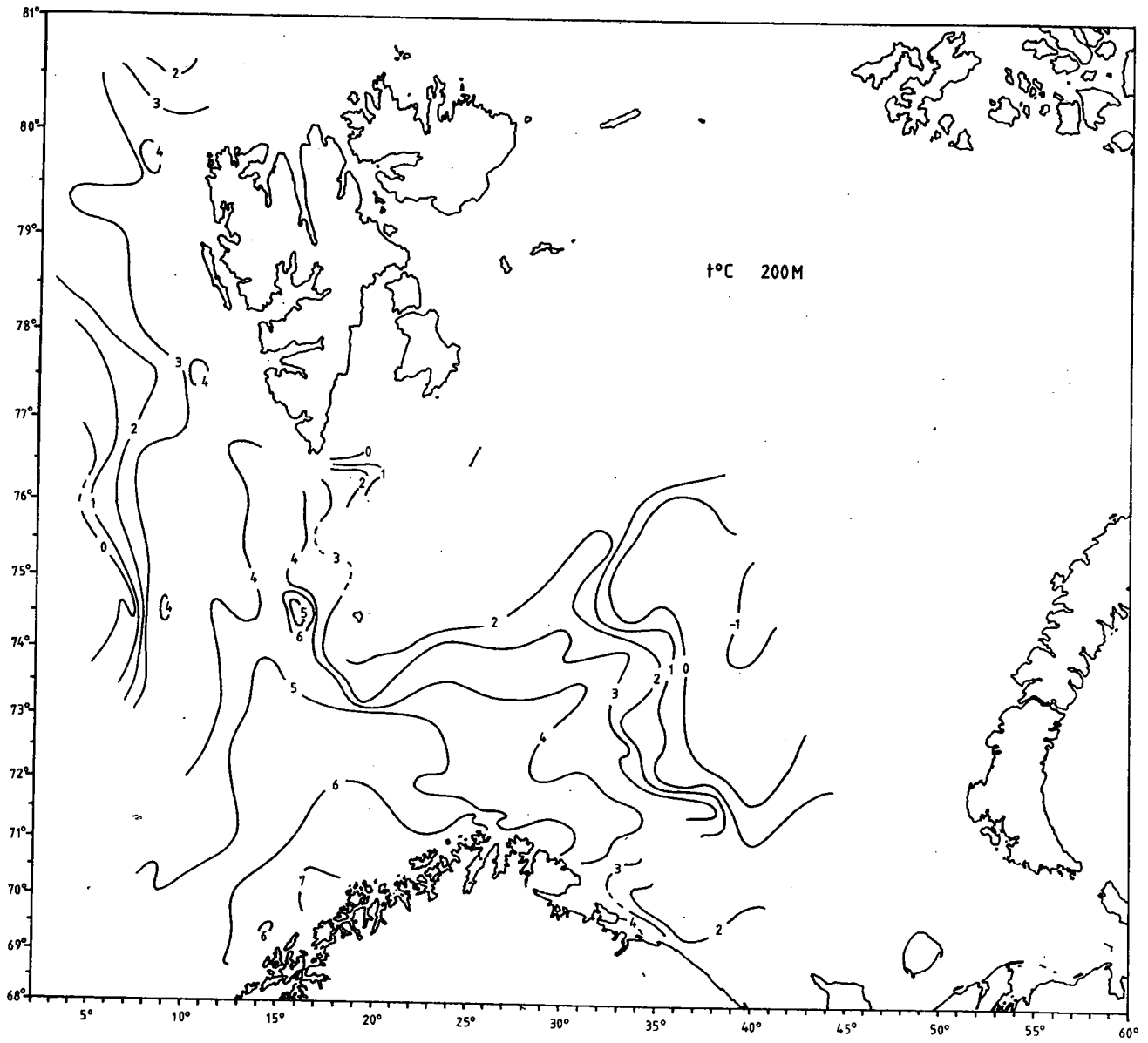


Fig. 5 Isotherms at 200 m.

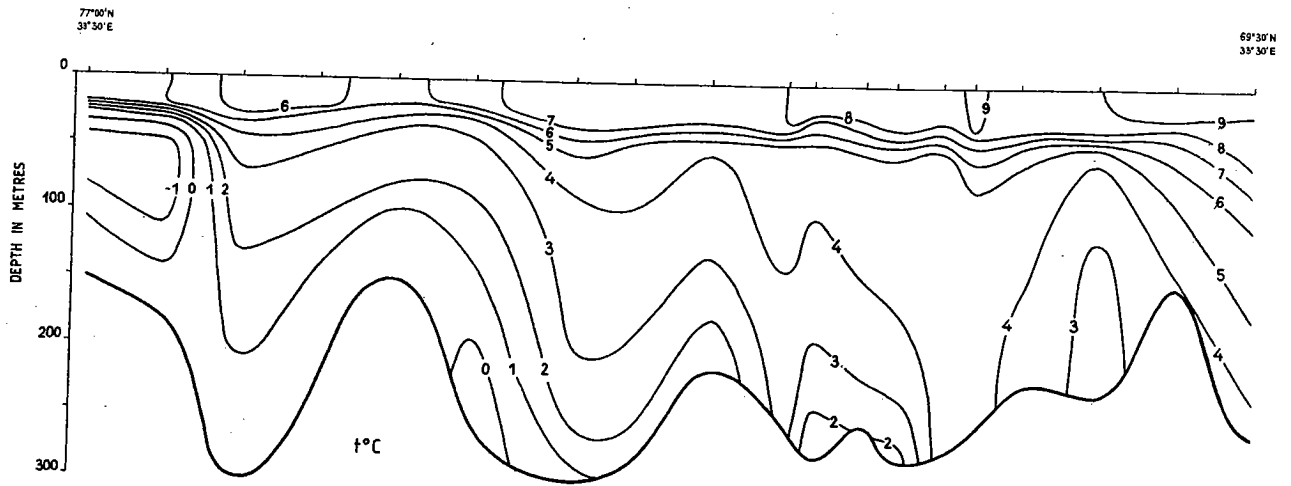


Fig. 6 Temperature section along the Kola meridian.

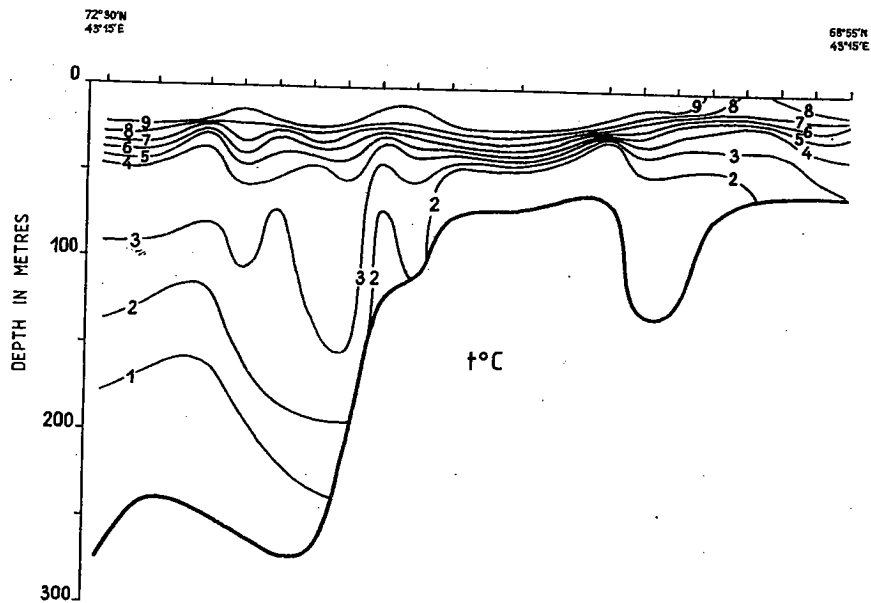


Fig. 7 Temperature section Cape Kanin - North.



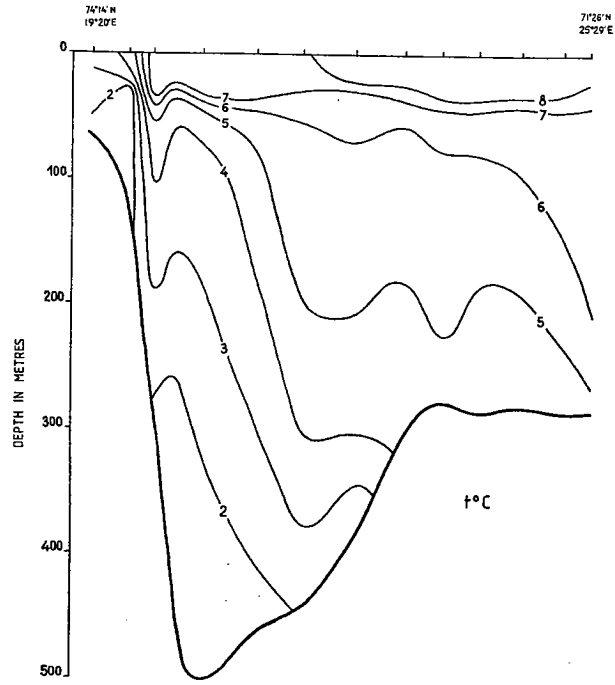


Fig. 8 Temperature section Bear Island - North Cape.

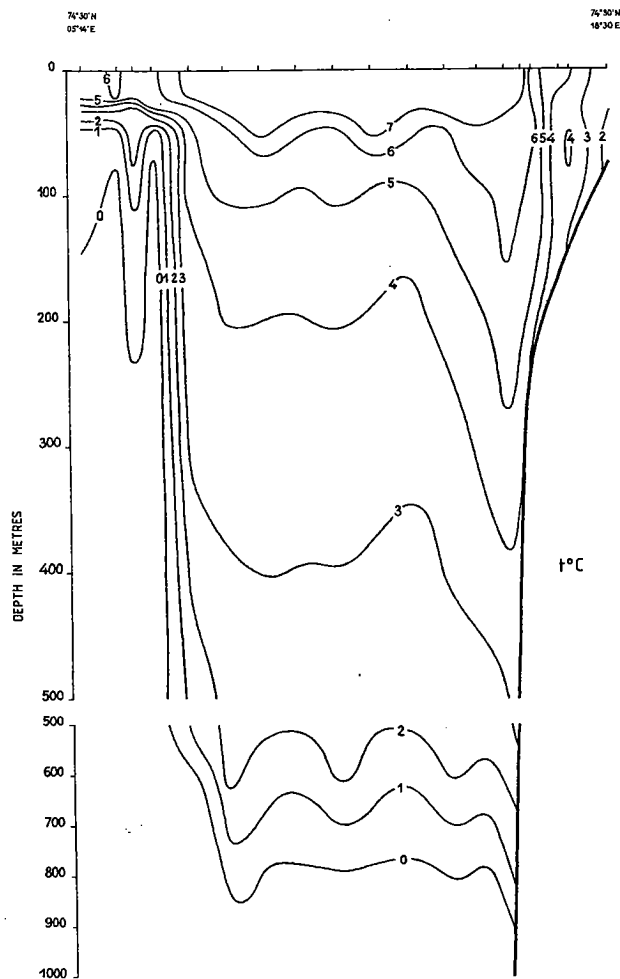


Fig. 9 Temperature section Bear Island - West.

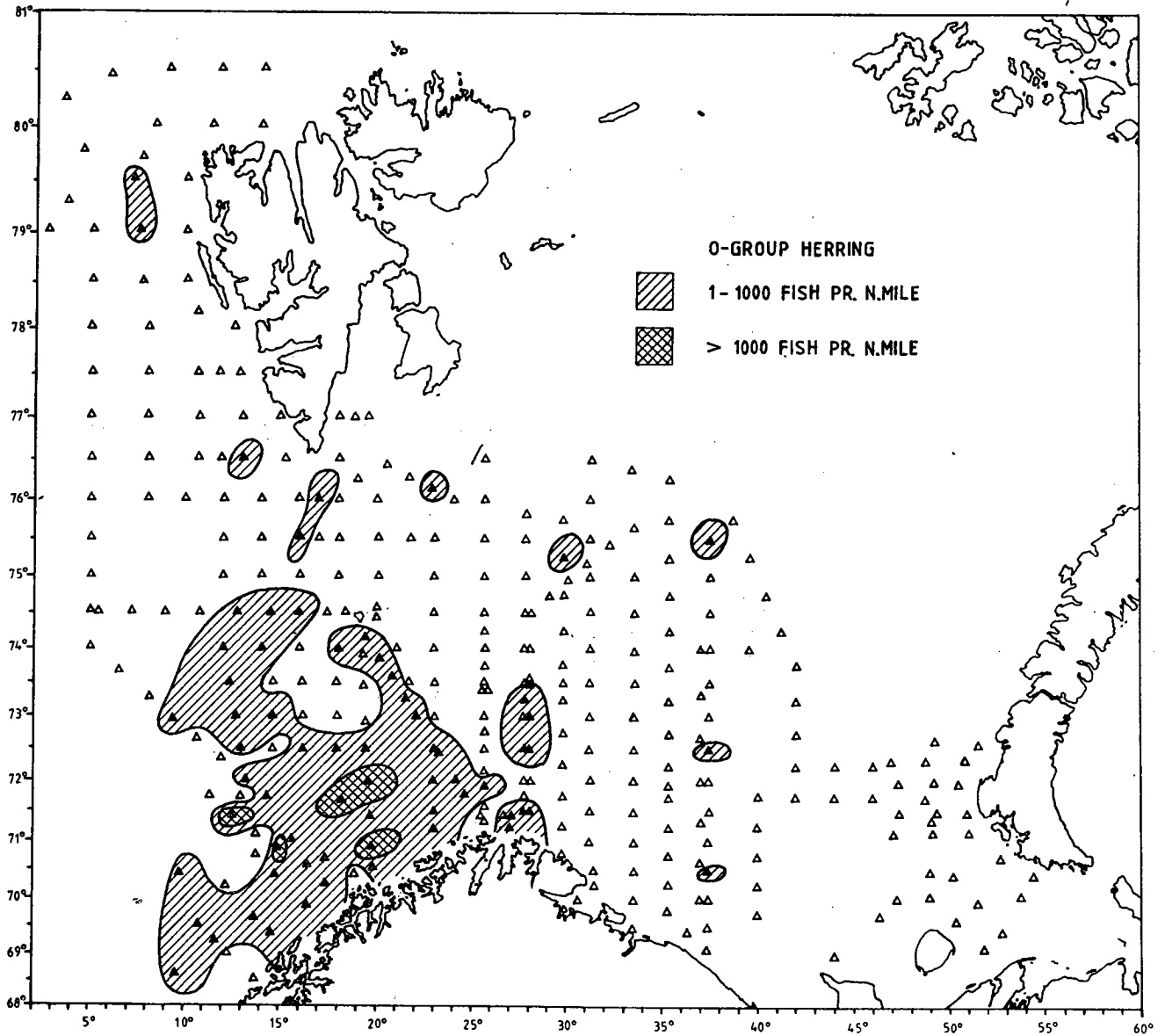


Fig. 10 Distribution of 0-group herring.

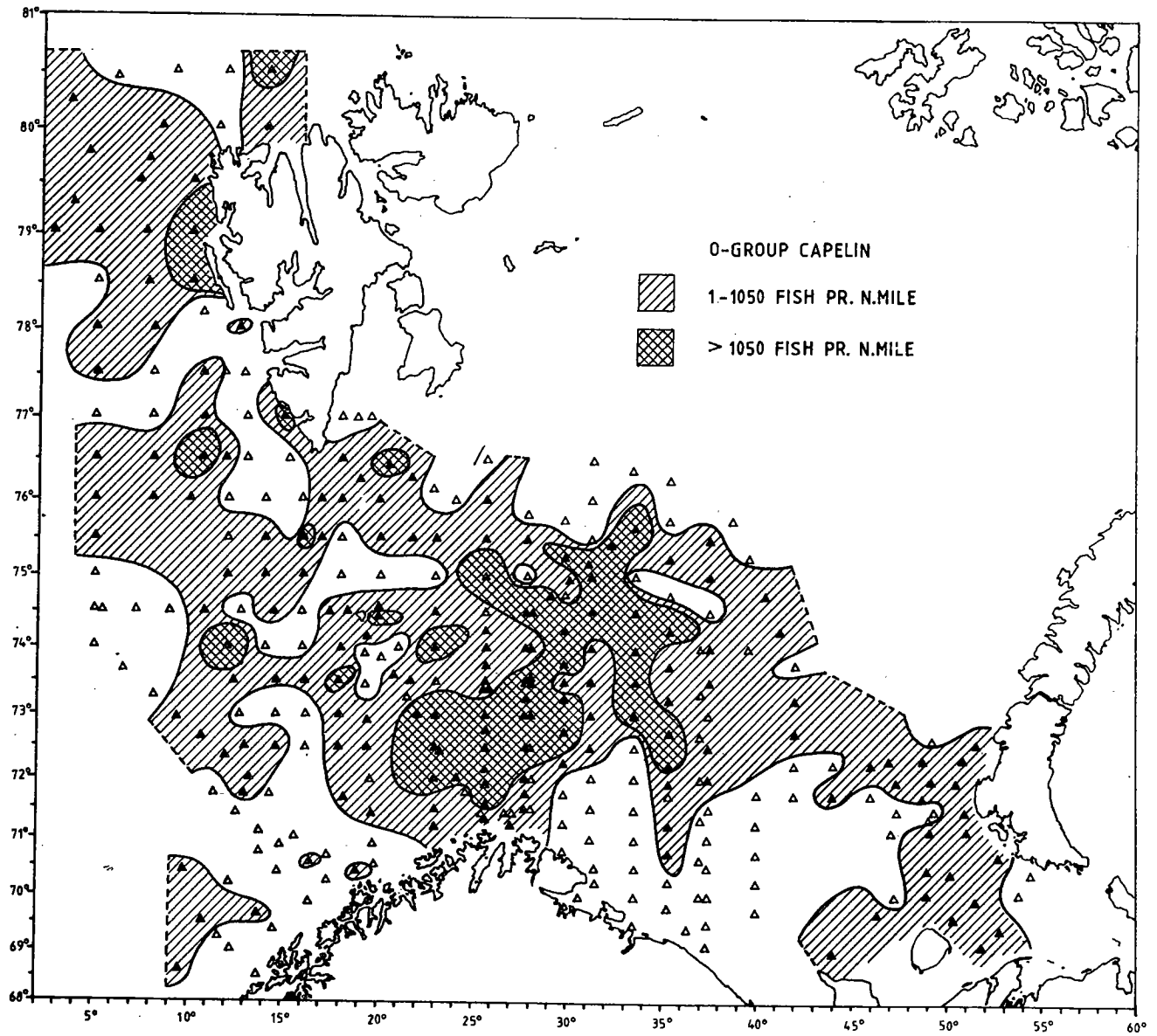


Fig. 11 Distribution of 0-group capelin.

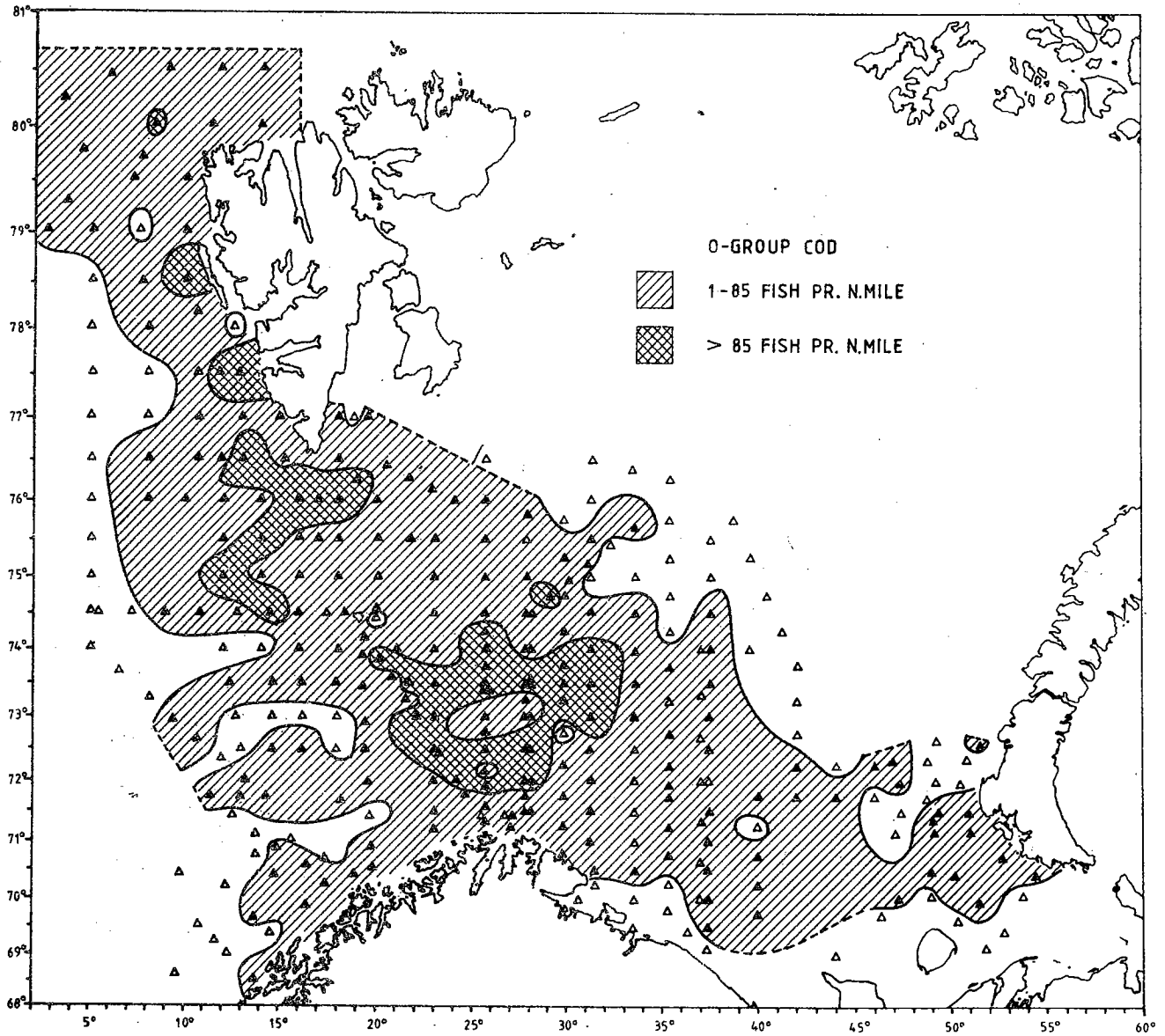


Fig. 12 Distribution of 0-group cod.

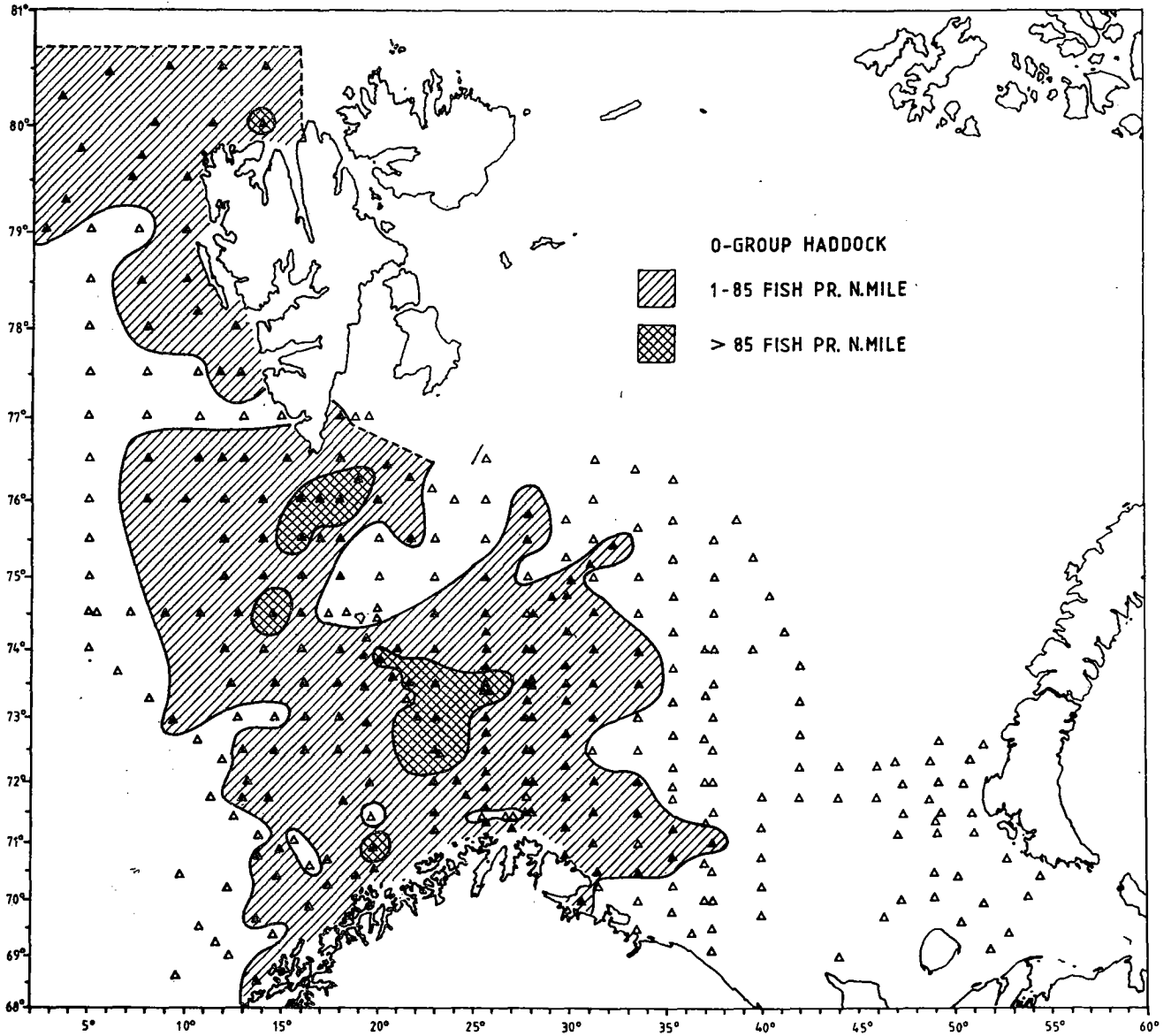


Fig 13 Distribution of 0-group haddock.

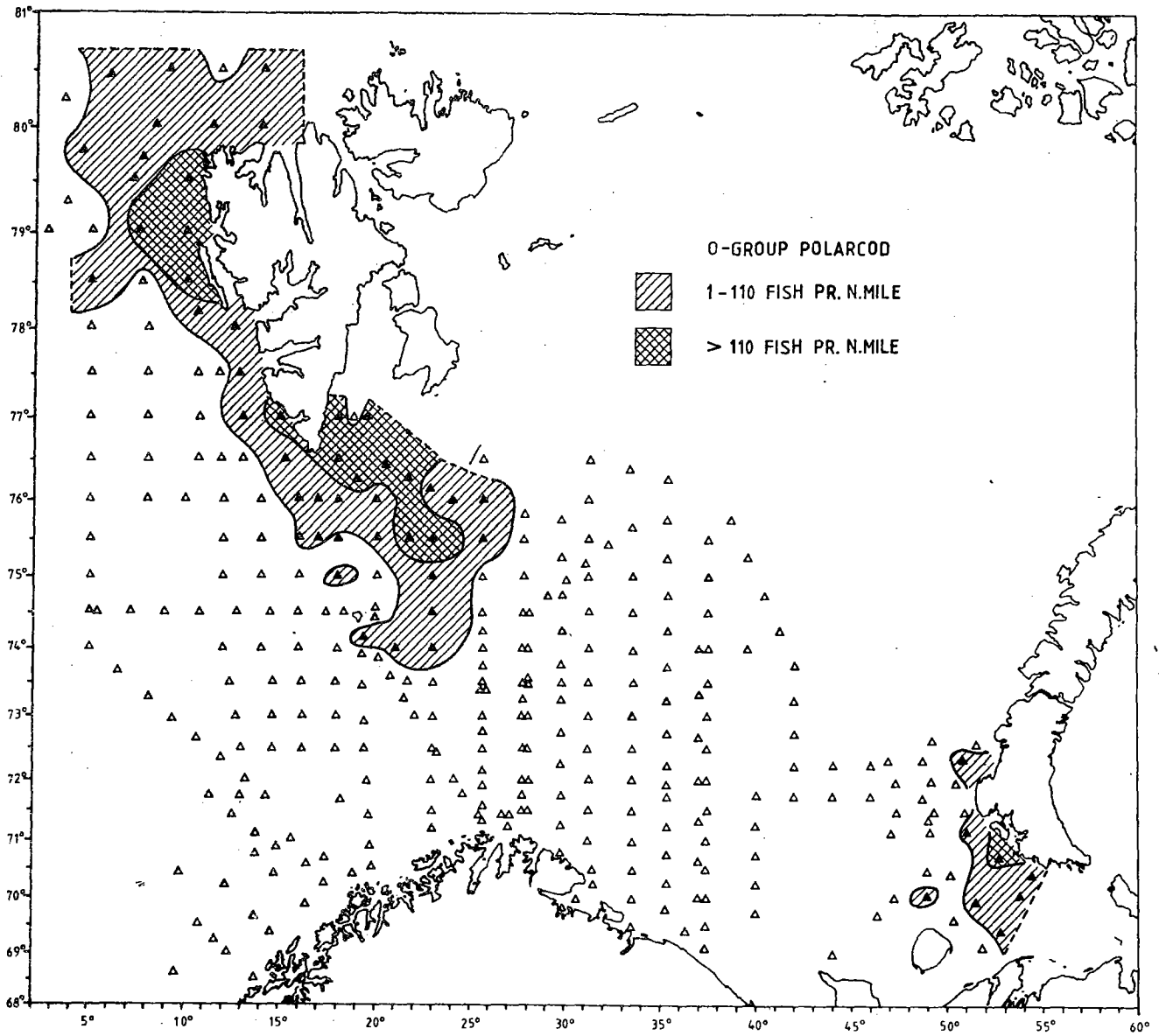


Fig. 14 Distribution of 0-group polarcod.

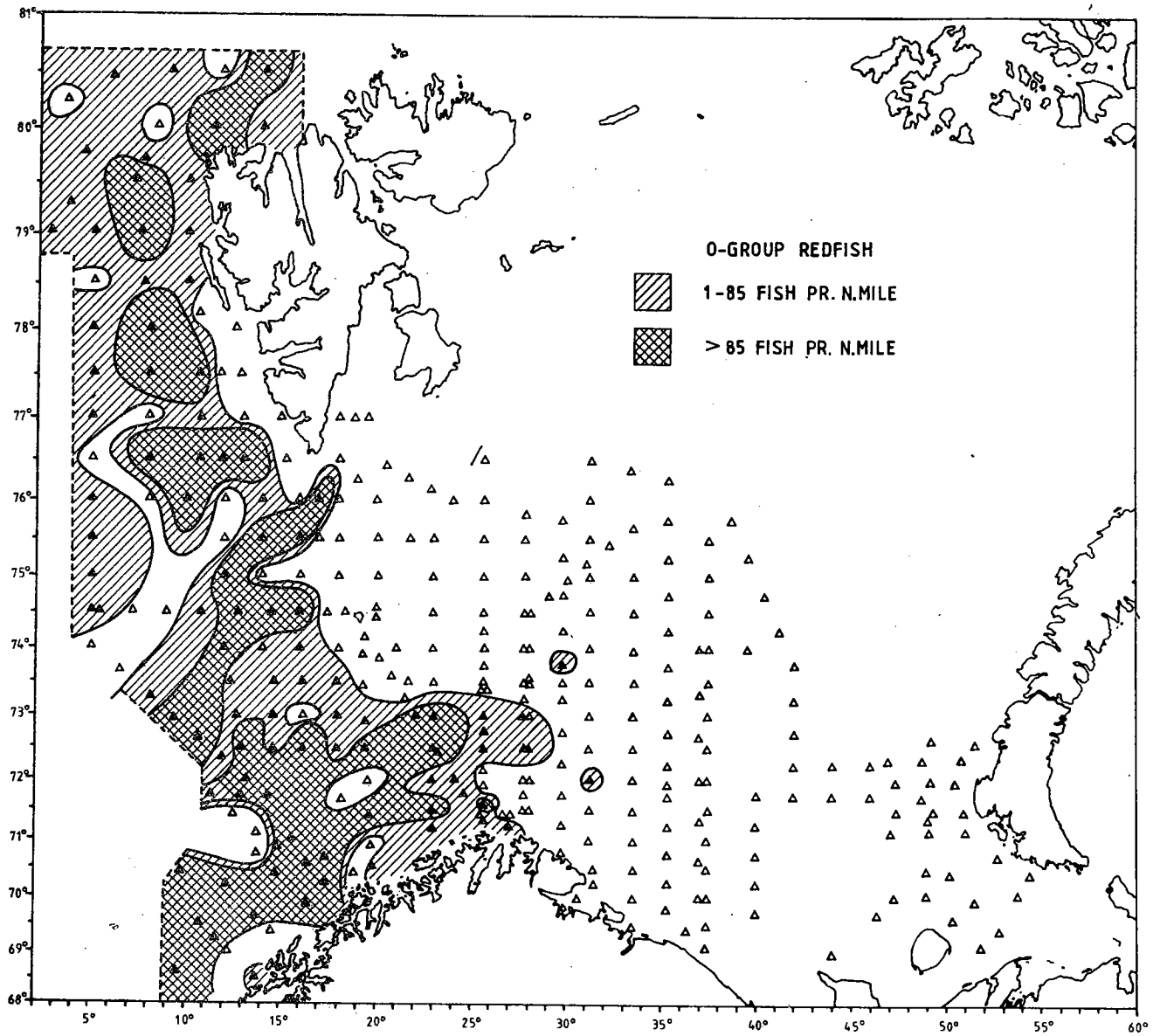


Fig. 15 Distribution of 0-group redfish.

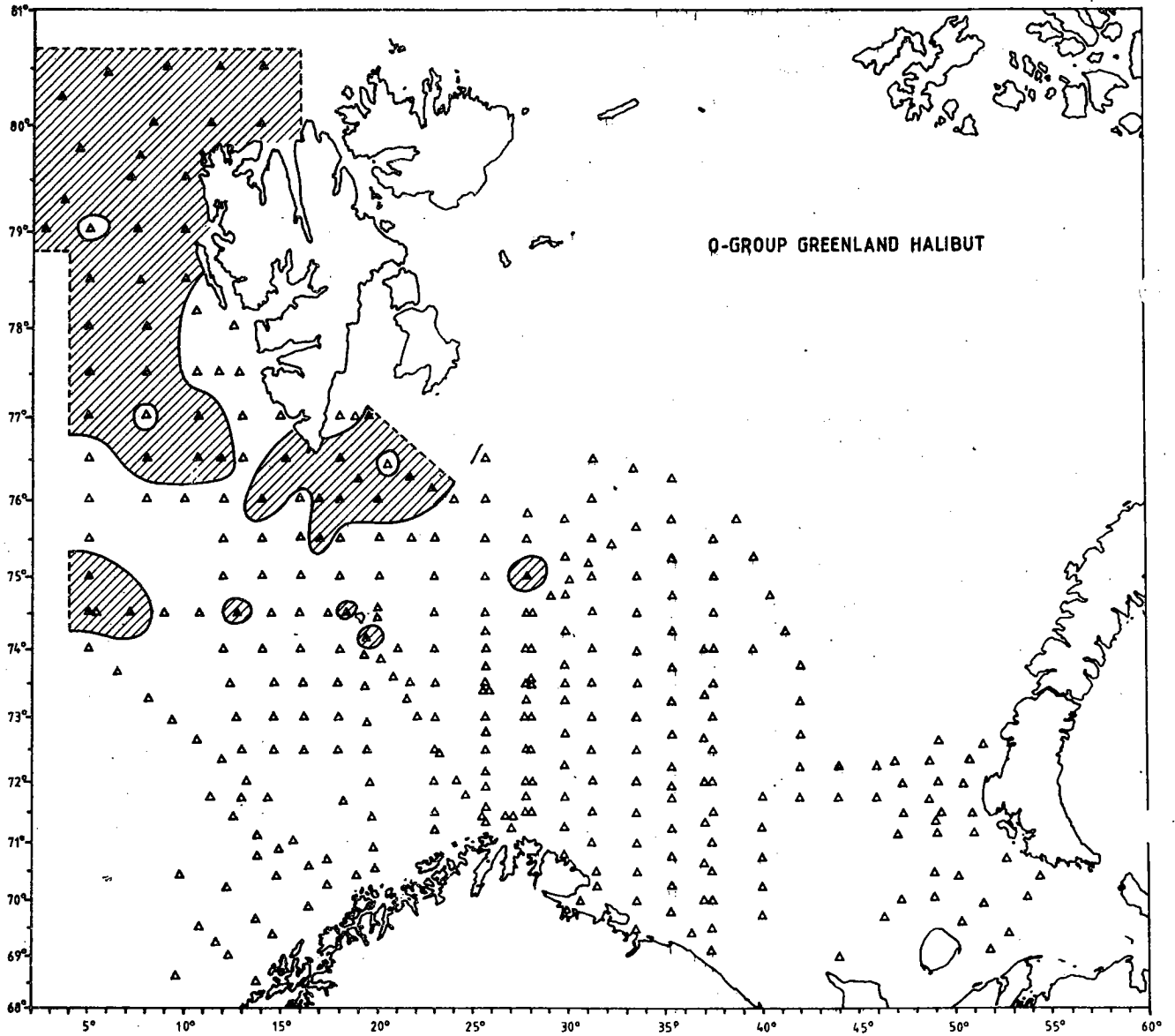


Fig. 16 Distribution of 0-group Greenland halibut.



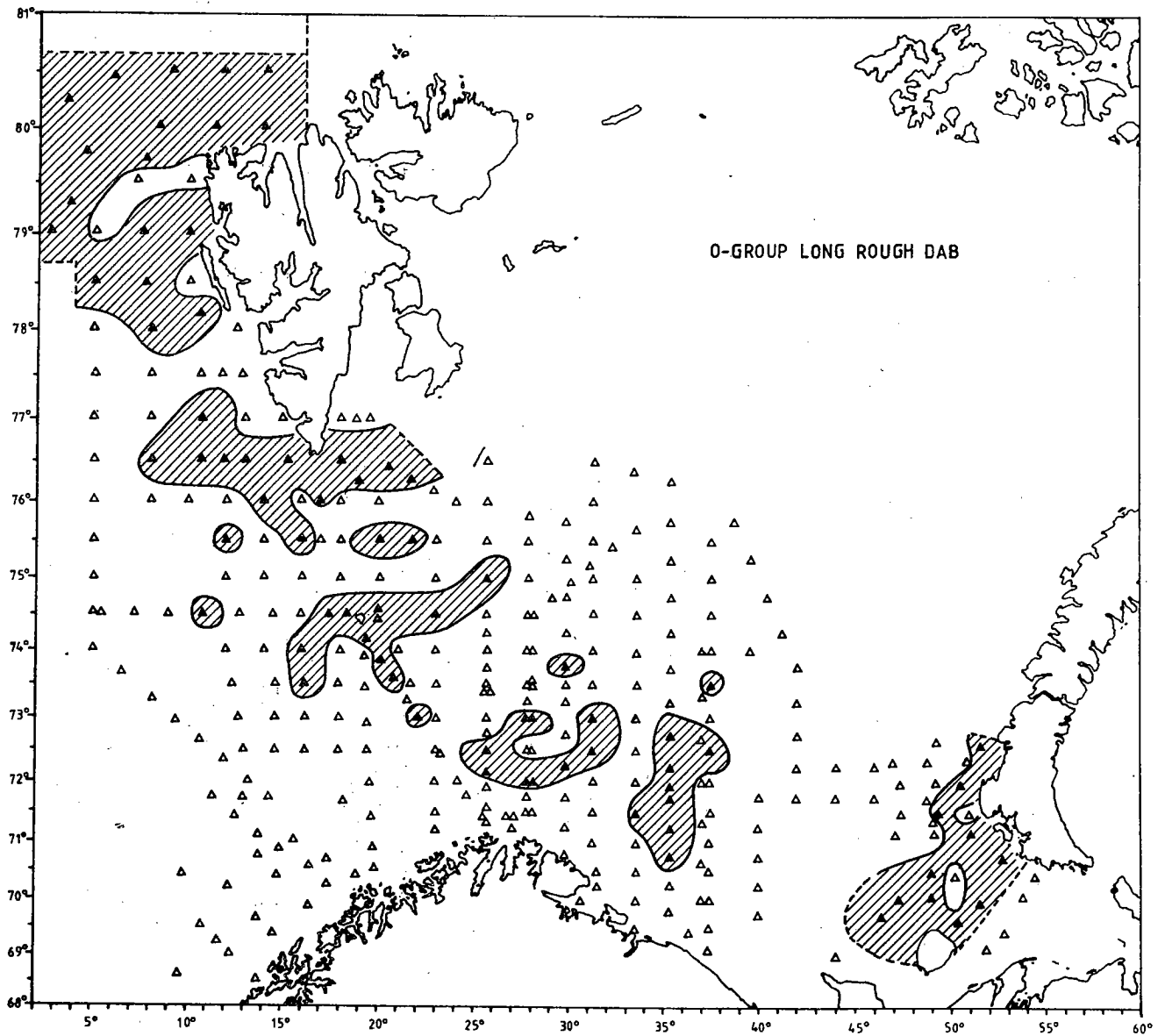


Fig. 17 Distribution of 0-group long rough dab.

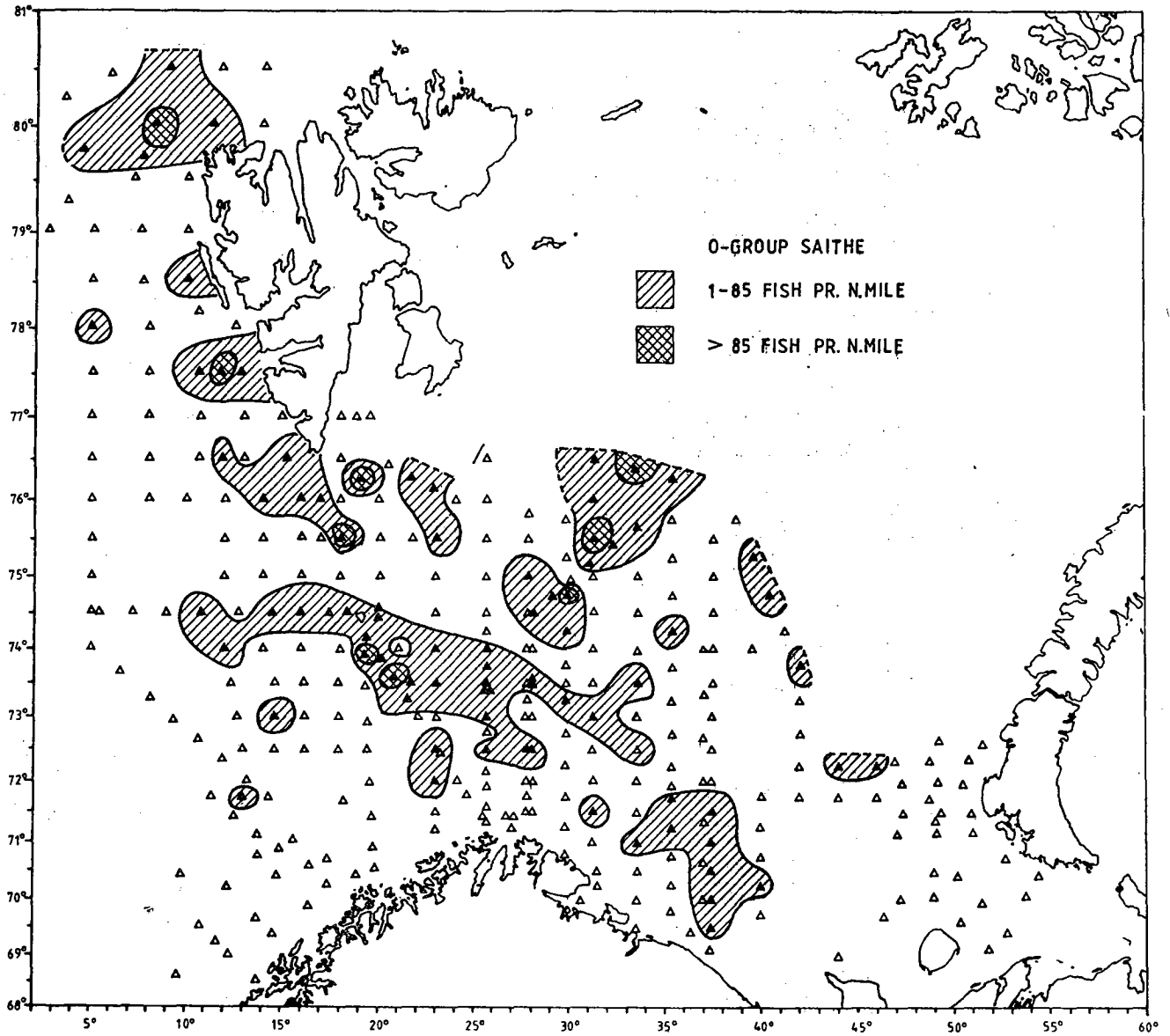


Fig. 18 Distribution of 0-group saithe.

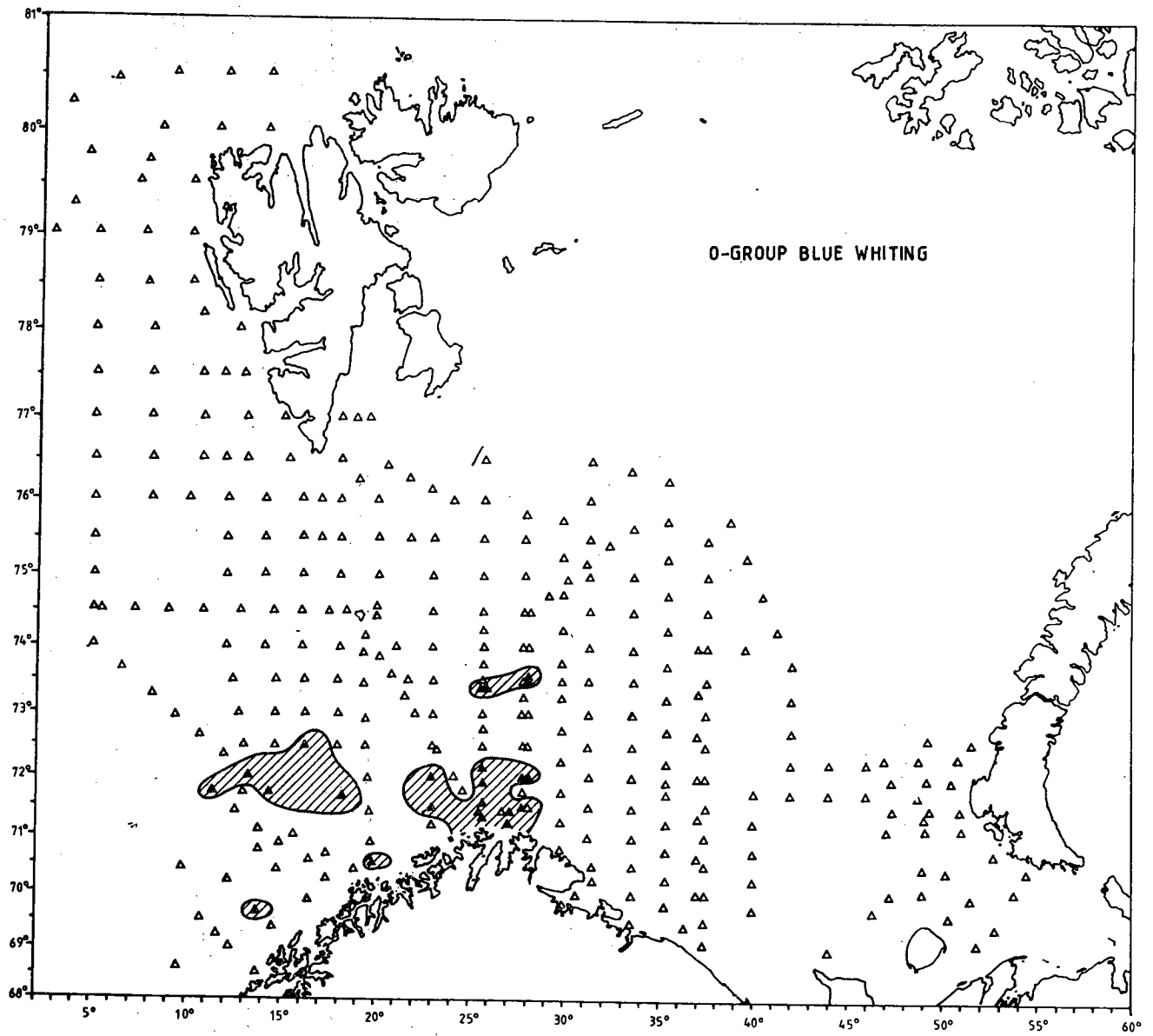


Fig. 19 Distribution of 0-group blue whiting.

## Appendix

Survey period	Research vessel	Research Institute	Participants
20. august - 30. august	"Persey III"	Polar Research Institute of Marine Fisheries and Oceanography, Murmansk	A.S. Galkin, V.K. Ozhigin, L.N. Korol, A.E. Dorchenkov, I.N. Konforkin, A.A. Mukhin, V.V. Vlasov, N.V. Miss Vanukhina, I.V. Novikov, A.A. Gavrukhov
27. august - 2. september	"Kokshatsk"	"	V.N. Kaikov, V. Kaponilrov, E.P. Loparev, L.D. Panassenko S.S. Drobysheva, D.N. Klochkov, A.L. Lovchikov
26. august - 29. august	"Poisk"	"	A.I. Kurbatov, M.D. Kleopin, K. Lysunets, I.I. Prokopovich
20. august - 27. august	"Alaid"	"	B.P. Shein
19. august - 3. september	"G.O. Sars"	Institute of Marine Research, Bergen	B. Brynildsen, A. Hysten, H. Ludvigsen, E. Nilsen, B. Reppe, A. Raknes, I. Swellingen, Ø. Tanken, E. Øvretvedt.
13. august - 5. september	"Eldfarn"	"	I. M. Beck, B. Hoffstad, B. Kvinge, K. Lauvås, L. Løvheim T. Monstad, A. Romslo, E. Sælen, R. Tøresen, A. Valantline
19. august - 5. september	"Håkon Mosby"	"	G. Hysten, T. Mørk, R. Pedersen, O. Rossebø, A.M. Skorpen, K. Sunnanå