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PRELIMINARY REPORT OF THE INTERNATIONAL O-GROUP FISH SURVEY IN THE
BARENTS SEA AND ADJACENT WATERS IN AUGUST-SEPTEMBER 1985.

The twentifirst annual International O-group fish survey was made during the period 17 August - 4 September 1985 in the Barents Sea and adjacent waters. The following research vessels participated in the survey:

State	Name of vessel	Survey	Research Institute
Norway	"Eldjarn"	19 August-4 September	Institute of Marine Research, Bergen
Norway	"G.O. Sars"	19 August-3 September	"
Norway	"Håkon Mosby"	20 August-2 September	"
Norway	"Michael Sars"	17 August-19 August	"
USSR	"Kokshaysk"	23 August-2 September	The Polar Research Institute of Marine Fisheries and Oceneanography, Murmansk
USSR	"Vilnyus"	25 August-1 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 4-6 September in Hammerfest. Observations concerning the geographical distribution of O-group fish and their abundance are given in 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 smallmeshed midwater trawl. The vessels participating in the survey in 1985 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 being at 0, 20 and 40 m and additionally at 60 m when 0-group fish layer was recorded deeper than 60 m on the echosounder.

Survey tracks and hydrographical stations are given in Fig. 1. Trawl stations with and without catch are given on the distribution charts in Figs. 8-16, 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. 6-7 show the temperature conditions at the Kola and Bear Island - West sections, and the mean temperature of these sections are given in Table 1 together with those at the Cape Kanin and North Cape - Bear Island sections.

In general there has been a cooling trend in the Atlantic inflow since 1983. This is demonstrated by the temperature distribution at 50, 100 and 200 m depth, with the clearest deviation at the 50 m level. Hence, in 1983 the temperatures at this level were above 7° C in the southwestern Barents Sea, south of 73° C, while in 1985 the temperature in the same area were mainly below 6° C. Similarly, temperatures above 6° C were in 1985 not observed north of the latitude of Sørkapp while there were temperatures between 6° and 7° C along the whole West Spitsbergen coast in 1983. This trend is also reflected in the mean temperatures of the sections (Table 1). The conditions in the various sections compared to the long-term mean

for the period 1965 - 1985 were:

Kola section

Water temperature decreased in all the layers compared to those of the previous year. The temperature in the 50-200 and 0-200 m was close to the normal, but below the long-term mean in the 0-50 m layer.

Cape Kanin - North section

Compared to 1984 the temperature in the layer 0 m to bottom decreased by $0,9^{\circ}$ C in the northern part of the section, and it was close to the long-term level. In the southern part a decrease of $2,1^{\circ}$ C from 1984 was observed and the temperature was reduced to $0,8^{\circ}$ C below the long-term level.

North Cape - Bear Island section

Water temperature in the 0-200 m layer decreased by $0,7^{\circ}$ C from 1984 to 1985 and it was somewhat below the long-term mean.

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

Water temperature in the 0-200 m layer decreased by $0,4^{\circ}$ C compared to that of 1984 and exceeded the long-term mean by $0,2^{\circ}$ C.

DISTRIBUTION AND ABUNDANCE OF 0-GROUP FISH

Geographical distributions of 0-group fish are shown by shaded areas in Figs. 8-16. 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 wighted by 10, are given in Table 2. Another set of abundance indices is given for 0-group herring, 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.

Norwegian spring spawning herring (Fig. 8)

The distribution of herring is in 1985, as in 1984, restricted to the areas west of 28⁰ E. The overall density is comparable to 1984. Both year classes are smaller than the 1983, but much higher than the average for the period 1965-1982.

Capelin (Fig. 9)

The area of distribution and the overall density is considerably smaller than the average for the years 1980-1984. This indicates a weak 1985 year class of Barents Sea capelin, although it must be stressed that the results from the Barents Sea 0-group survey have not given such a reliable index of year class strength of capelin as for other species.

Cod (Fig. 10)

The 0-group cod had a wide distribution with a high abundance north of Finnmark and Murman coast and west of Spitsbergen. Two different abundance indices are given in Table 2 and 3. The indices are among the highest ever recorded and point for a very strong yearclass. This indicate a series of strong yearclasses occuring in 1983, 1984 and 1985.

Haddock (Fig. 11)

The 0-group haddock was distributed in two separate areas, north of Finnmark and west of Spitsbergen. The indices given in Table 2 and 3 indicate a somewhat above and close to average strength of the yearclass, but smaller than the 1983 and 1984 yearclasses.

Polar cod (Fig. 12)

The distribution of 0-group polar cod was almost the same in the western area as in 1984, but the abundance index was less than in 1984 and also somewhat below the long term average 1977-84. The eastern

area of distribution including the area of dense concentrations was larger in 1985 compared with 1984. The abundance index was the greatest ever recorded and more than seven times greater than the average for 1981-84. A couple of extra stations in the north-eastern part of the investigated area this year may have minor influences on the comparison with previous years. As in previous years the eastern component of the 0-group polar cod was distributed north of the investigated area.

Redfish (Fig. 13)

The distribution of 0-group redfish is similar to those found in previous years with the highest densities west of Spitsbergen. The abundance index points to another good year class somewhat stronger than the 1984 year class but less than the 1983 year class.

Greenland Halibut (Fig. 14)

The Greenland Halibut was distributed from Bear Island to the area north-west of Spitsbergen, and the highest densities was observed west of Spitsbergen. The 1985 year class is indicated as the third best and well above the average for the last 5 years.

Long rough dab (Fig. 15)

Long rough dab was found in highest densities in the Bear Island area but patches were recorded in the whole survey area. The abundance index is at the same level as in 1983 and 1984 and very close to the average.

Saithe (Fig. 16)

It seems characteristic for the 0-group saithe to concentrate in patches in the survey area. Compared with 1984 a small number was caught and more than 1 specimen per haul of 1.0 nautical mile was only recorded on three trawlstations. No abundance index has been calculated.

Blue whiting

O-group blue whiting was only recorded on four stations within a small area south of N 70° 50' and between E 15° and E 19°. The catches and the area of distribution was smaller than in 1983 and 1984. No abundance index has been calculated.

Mackerel

O-group mackerel was recorded on four stations with some concentrations in the area around E 18° and between N 70° 30' and N 71°. No index of abundance has been calculated.

REFERENCES

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- ANON., 1983. Preliminary report of the International O-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 O-group Arcto-Norwegian cod and haddock 1965-1982. Proceedings of the Soviet-Norwegian symposium on Reproduction and recruitment of Arctic cod. Leningrad 26-30 Sept. 1983: 192-212.
- TORESEN, R., 1985. Recruitment/indices of Norwegian spring-spawning herring for the period 1965-1984 based on the international O-gr up fish surveys. Coun. Meet. int. Coun. Explor. Sea, 1985 (H:54): 1-9 [Mimeo.]

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

- 2-4 - Murmansk Current: Kola section (70⁰,30'N - 72⁰,30'N)
 5 - Cape Kanin section (68⁰,45'N - 70⁰,05'N)
 6 - Cape Kanin section (71⁰,00'N - 72⁰,00'N)
 7 - North Cape Current: North Cape - Bear Island section (71⁰,33'N;
 25⁰,02'E - 73⁰,35'N; 20⁰,46'E)
 8 - West Spitsbergen Current: Bear Island - West section (06⁰,34'E -
 15⁰,55'E)

Layer/ Year	0-50m	50-200m	0-200m	0- bottom	0- bottom	0-200m	0-200m
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
1985	6.6	3.5	4.3	3.3	3.2	5.2	4.6
Average 1965- 1985	7.2	3.6	4.2	4.1	3.3	5.6	4.4

Table 2. Abundance indices.

Species Year	Cod	Haddock	West	Polar cod		East	Redfish	Greenland	
				West	East			halibut	Long dab
1965	6	7		0			159		
1966	1	1		129			236		66
1967	34	42		165			44		97
1968	25	8		60			21		73
1969	93	82		208			295		17
1970	606	115		197			247		26
1971	157	73		181			172	1	12
1972	140	46		140			177	1	81
1973	684	54		(26)			385	8.0	65
1974	51	147		227			468	3.2	67
1975	343	170		75			315	13.4	83
1976	43	112		131			447	21.1	113
1977	173	116	157		70		472	15.6	96
1978	106	61	107		144		460	9.0	72
1979	94	69	23		302		980	35.4	76
1980	49	54	79		247		651	22.5	69
1981	65	30	149		73		861	12.0	108
1982	114	90	14		50		694	38.0	95
1983	386	184	48		39		851	17.0	150
1984	486	255	115		16		732	15.8	80
1985	742	156	60		334		795	40.4	70
								36.0	86

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

Year-class	Herring ¹⁾		Cod		Haddock	
	Logarithmic index	Confidence limits	Logarithmic index	Confidence limits	Logarithmic index	Confidence limits
1965	0.14	0.04	0.02	0.01	0.01	0.00
1966	0.00	0.31	0.04	0.02	0.08	0.03
1967	0.00	-	0.04	0.02	0.08	0.13
1968	0.00	-	0.02	0.01	0.04	0.00
1969	0.01	0.00	0.25	0.17	0.34	0.20
1970	0.00	0.04	2.51	2.02	3.05	0.42
1971	0.00	-	0.77	0.57	1.01	0.18
1972	0.00	-	0.52	0.35	0.72	0.09
1973	0.05	0.03	1.48	1.18	1.82	0.15
1974	0.01	0.01	0.29	0.18	0.42	0.39
1975	0.00	-	0.90	0.66	1.17	0.40
1976	0.00	-	0.13	0.06	0.22	0.24
1977	0.01	0.00	0.49	0.36	0.65	0.21
1978	0.02	0.01	0.22	0.14	0.32	0.07
1979	0.09	0.01	0.40	0.25	0.59	0.12
1980	-	-	0.13	0.08	0.18	0.10
1981	0.00	-	0.10	0.06	0.18	0.00
1982	0.00	-	0.59	0.43	0.77	0.30
1983	1.77	1.29	1.69	1.34	2.08	0.48
1984	0.34	0.20	1.55	1.18	1.98	0.60
1985	0.23	0.18	2.46	2.22	2.71	0.23

¹⁾ Assessments for 1965-1984 made by Toresen (1985).

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

Length mm	Herring	Capelin	Cod	Polar cod		Redfish	Greenland halibut	Long rough dab	Saithe	
				East	West					
10-14										
15-19										
20-24										
25-29										
30-34		0.2				0.2			1.7	
35-39		1.7				8.0			16.6	
40-44		5.5				35.5			29.0	
45-49	+	17.8				28.0			34.5	
50-54	0.1	17.8	0.2			17.6			14.1	
55-59	0.4	39.9	1.8			7.1			0.7	
60-64	0.1	29.3	4.8			2.7			0.1	
65-69	0.3	4.9	9.4			0.8			0.1	
70-74	1.6	0.2	17.1			0.1			2.1	
75-79	4.1	0.2	21.9			+			1.1	
80-84	9.5	0.1	20.9			+			11.1	
85-89	13.8	+	13.9						14.6	
90-94	20.6	0.1	6.1						2.3	
95-99	23.0	0.1	2.2						6.0	
100-104	9.1	+	0.8						25.5	
105-109	10.8	+	0.1						11.7	
110-114	3.6	+							24.4	
115-119	3.0								14.6	
120-124	+								2.3	
125-129									14.6	
130-134									1.6	
135-139									28.5	
140-144									11.1	
									3.2	
									3.2	
									4.7	
									6.3	
									3.2	
									3.2	
									14.3	
									1.6	
									28.5	
									11.1	
									3.2	
									1.6	
Mean length mm	170360	121288	71030	3524	5401	73698	1838899	349	1501	63
	89.7	52.9	73.4	85.6	38.1	45.7	42.0	64.5	35.8	107.1

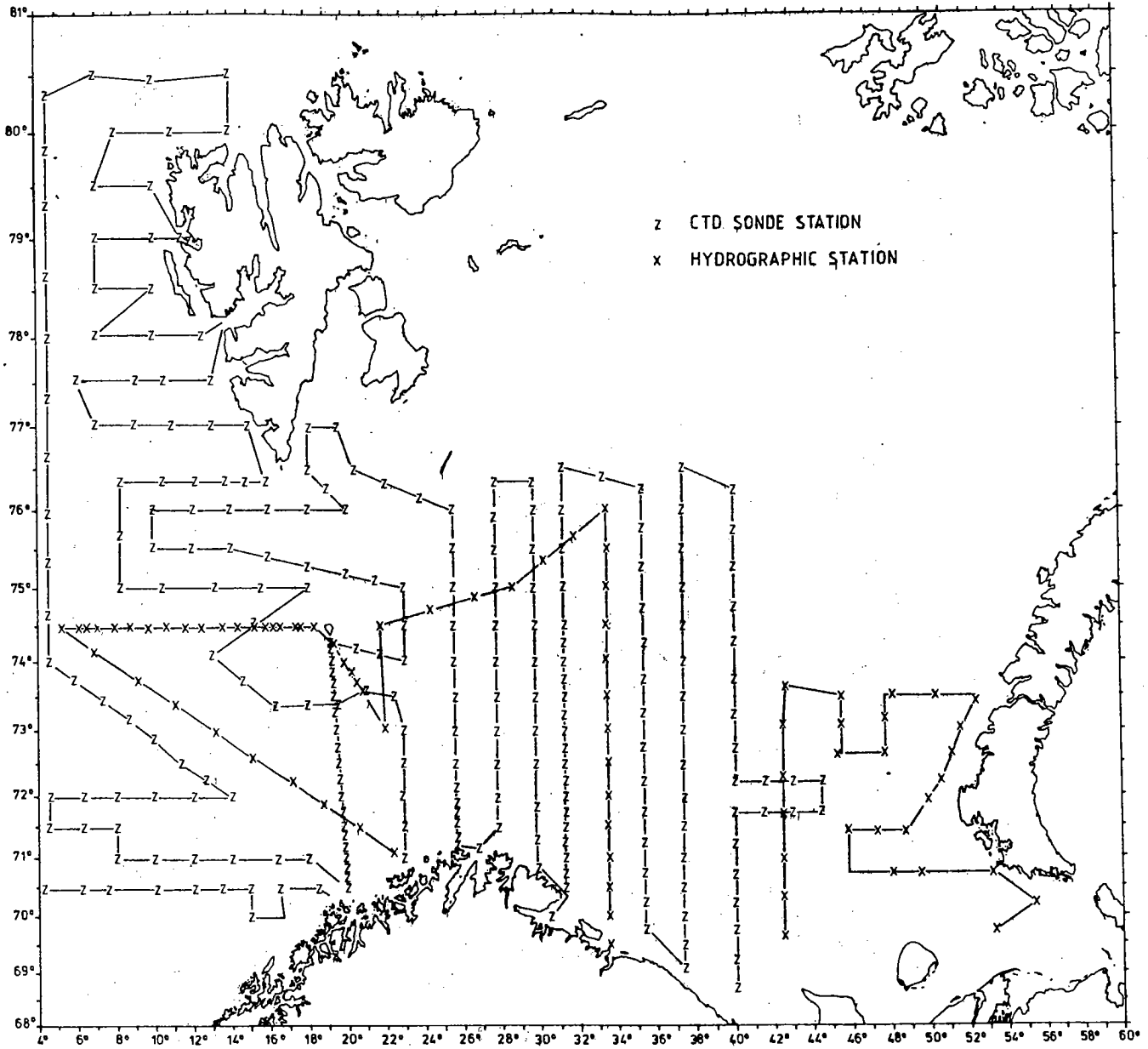


Fig. 1 Survey tracks of the ships and the grid of hydrographic stations.

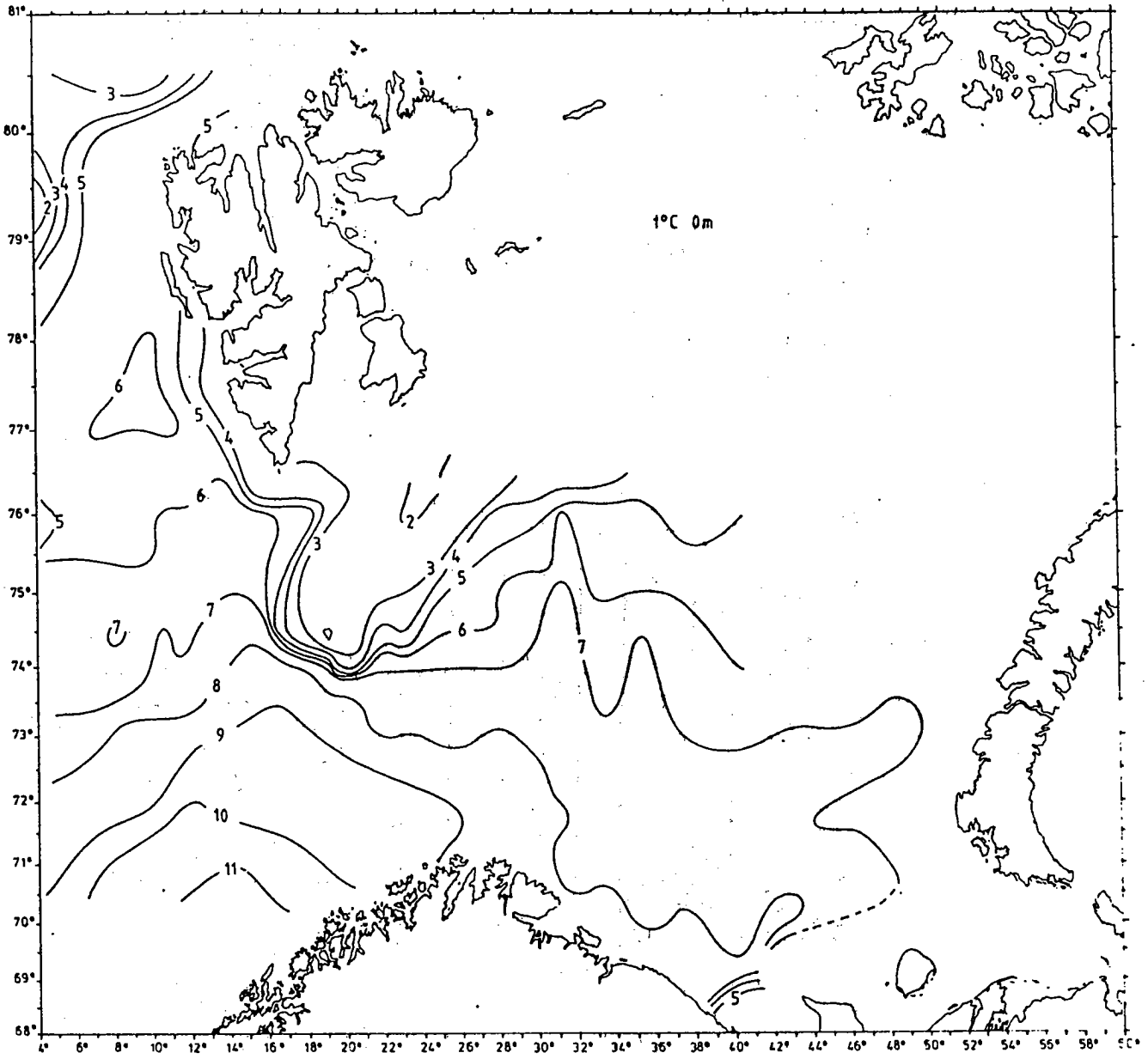


Fig. 2. Isotherms at 0 m.

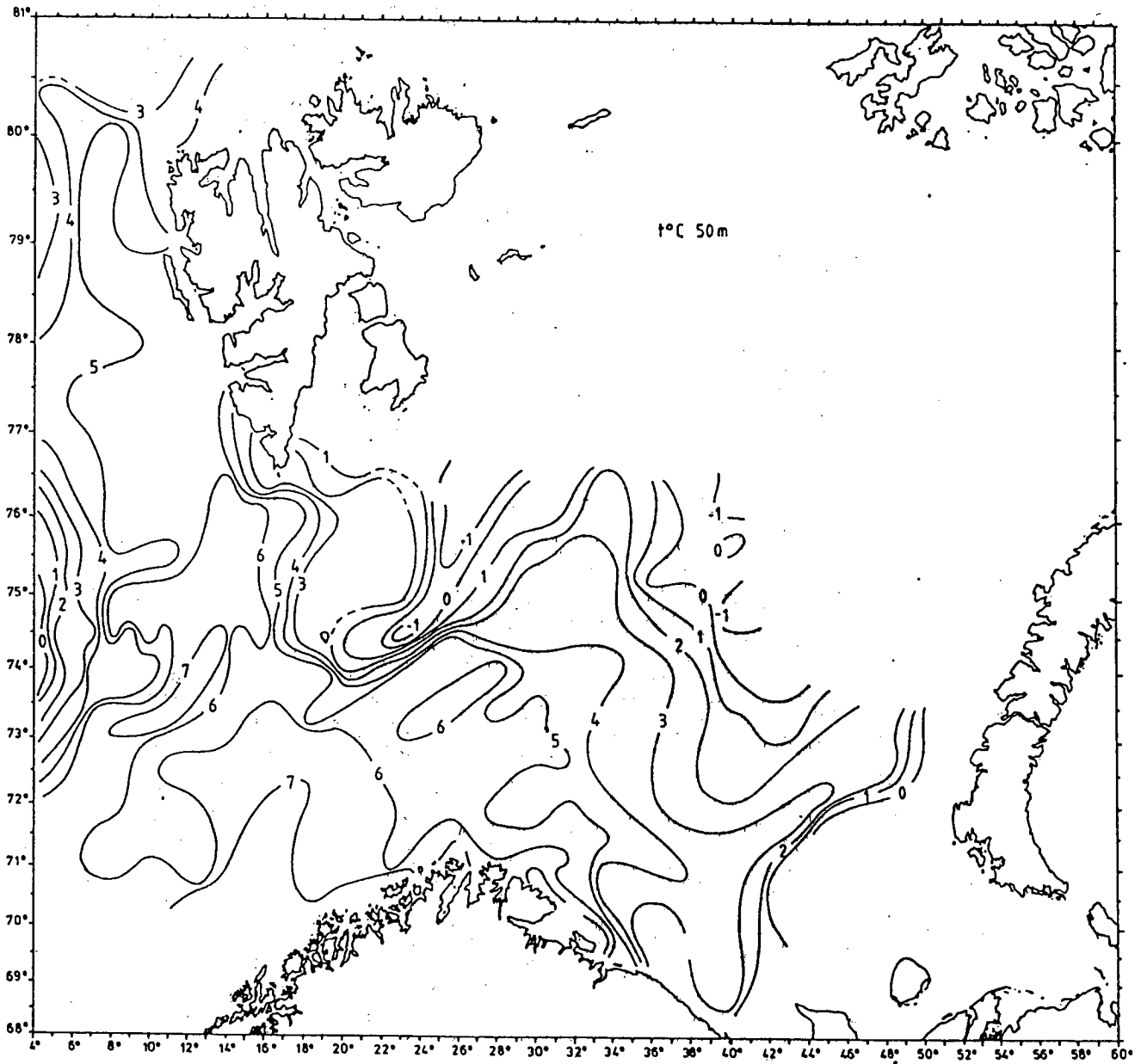


Fig. 3 Isotherms at 50 m.

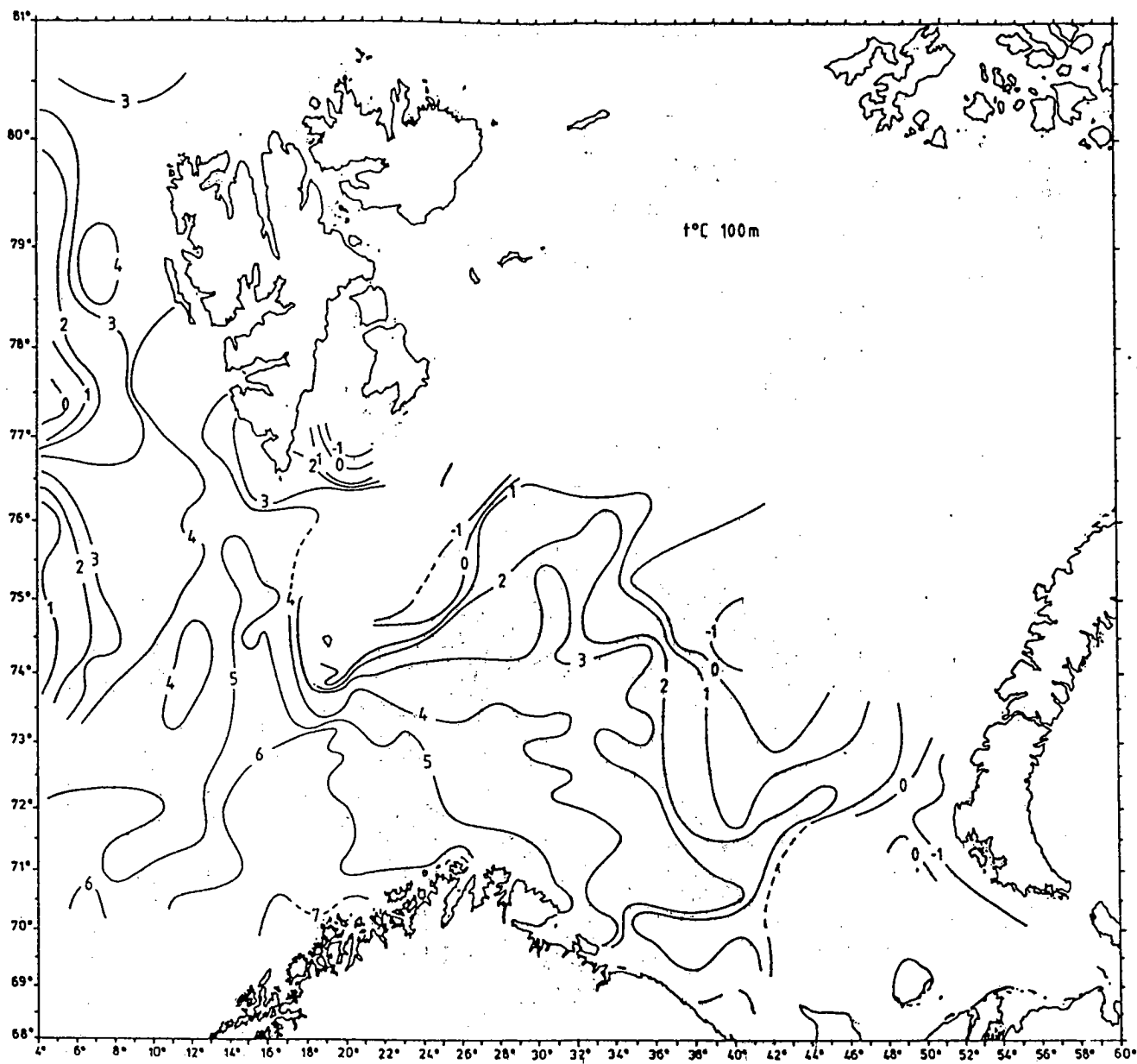


Fig. 4 Isotherms at 100 m.

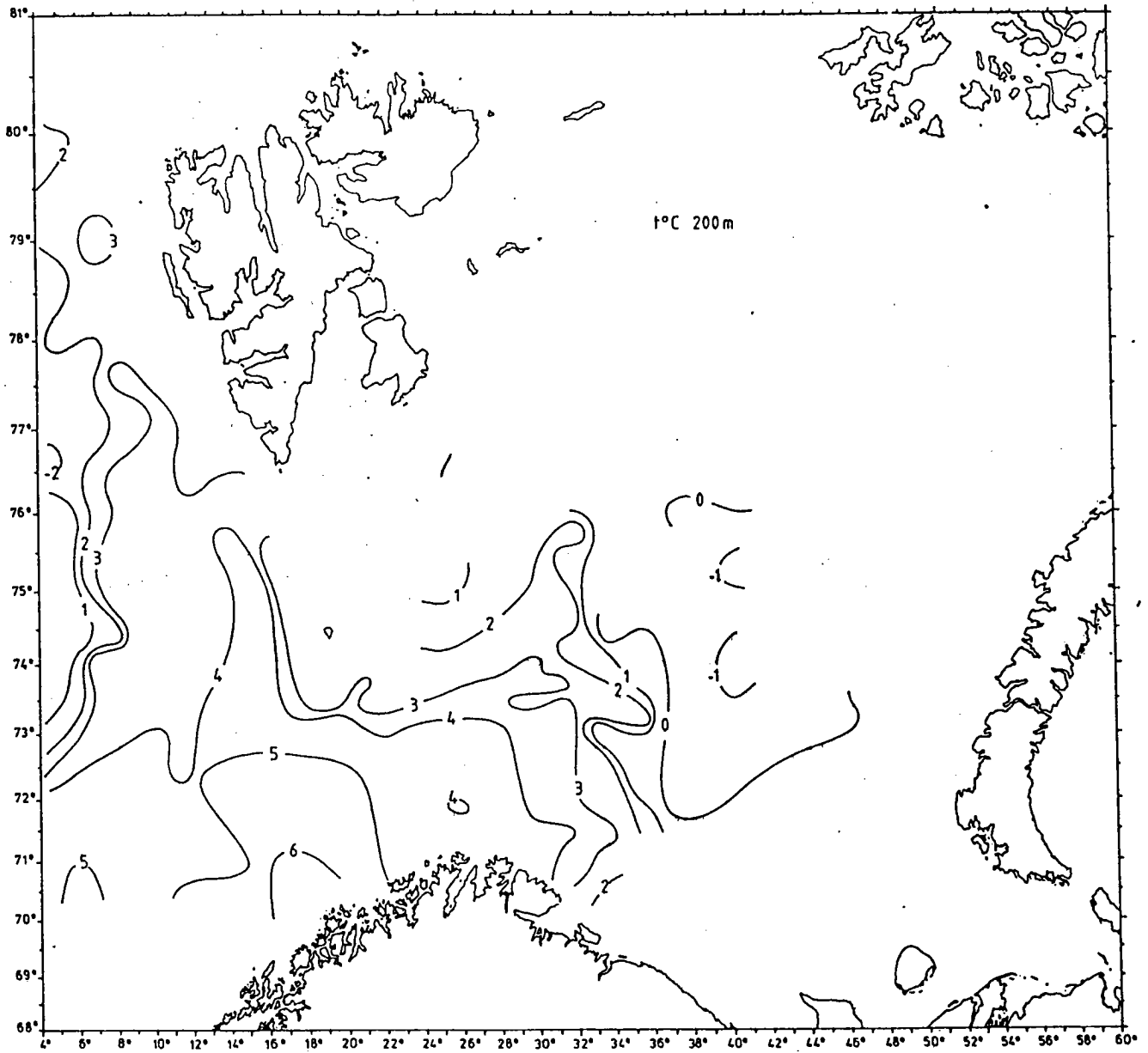


Fig. 5 Isotherms at 200 m.

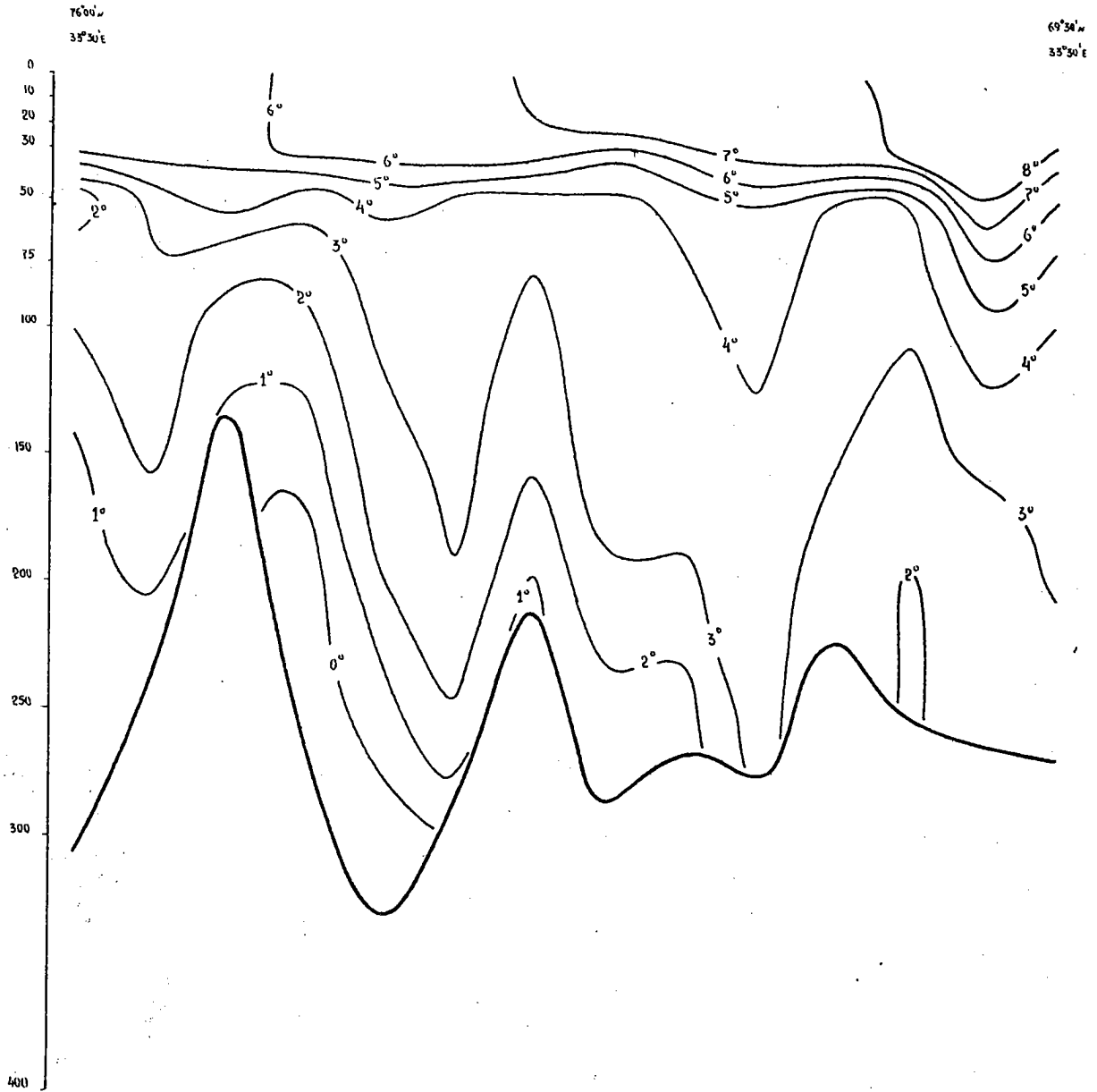


Fig. 6 Temperature section along the Kola meridian.

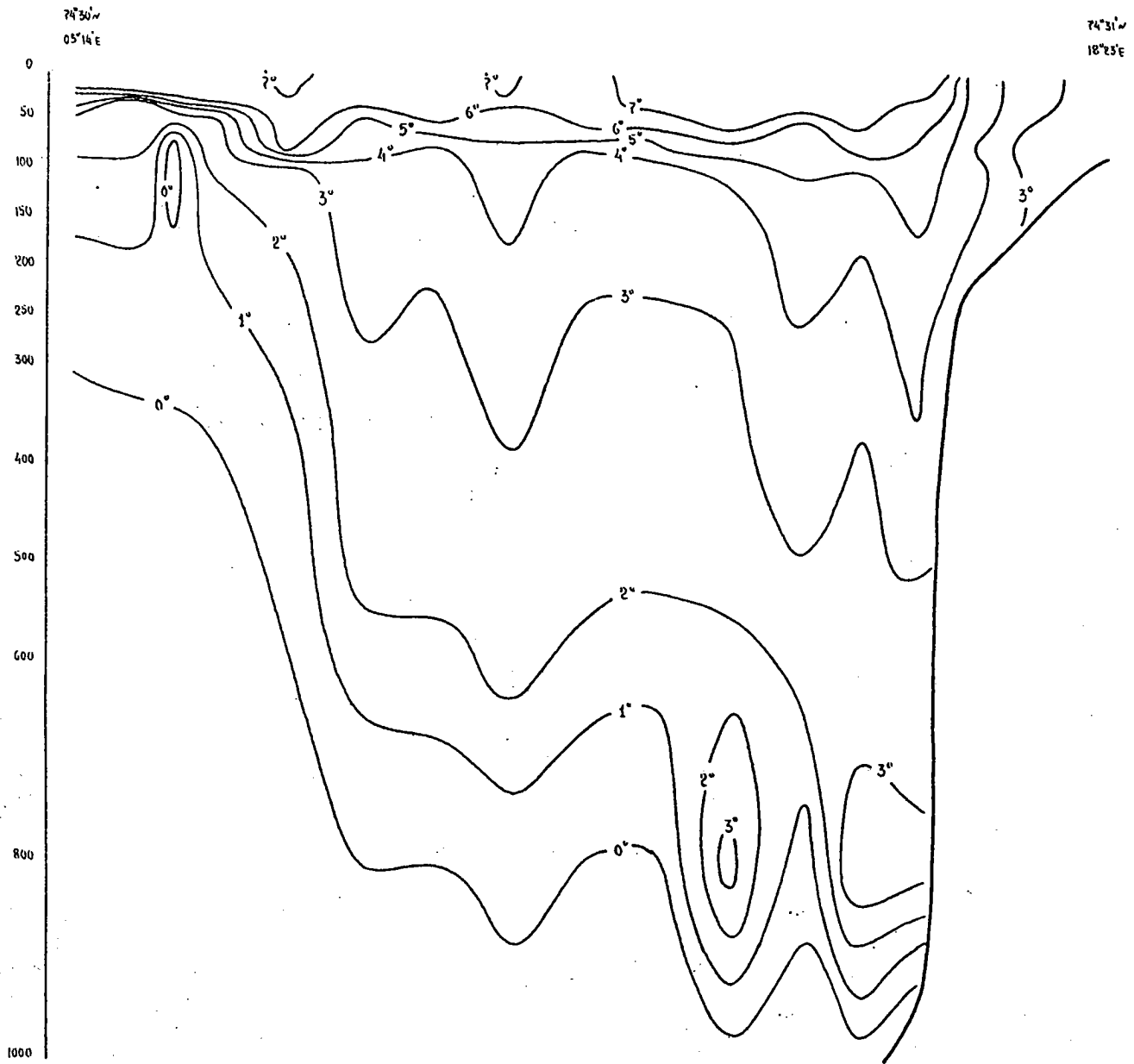


Fig. 7 Temperature section Bear Island - West.

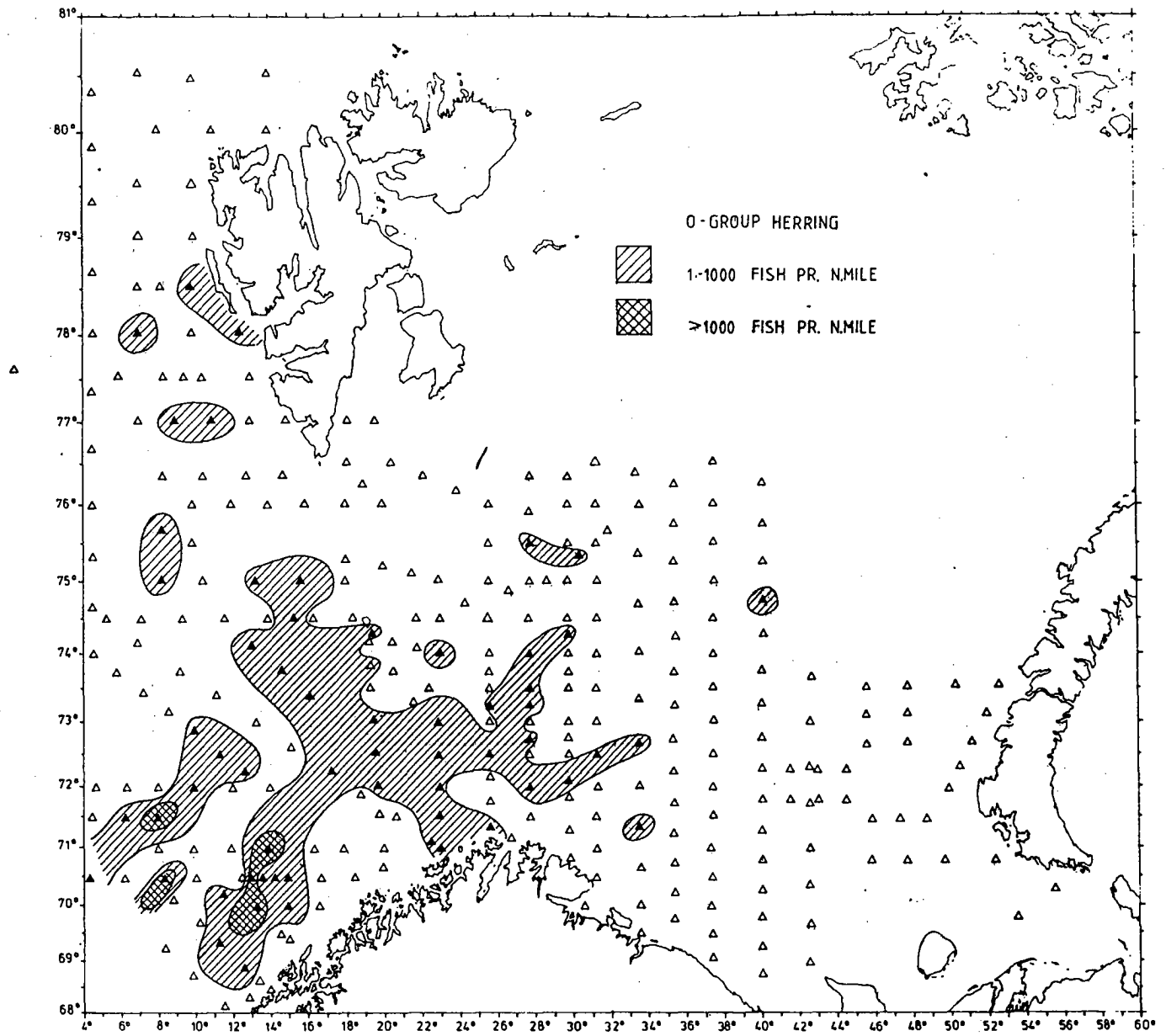


Fig. 8 Distribution of 0-group herring.

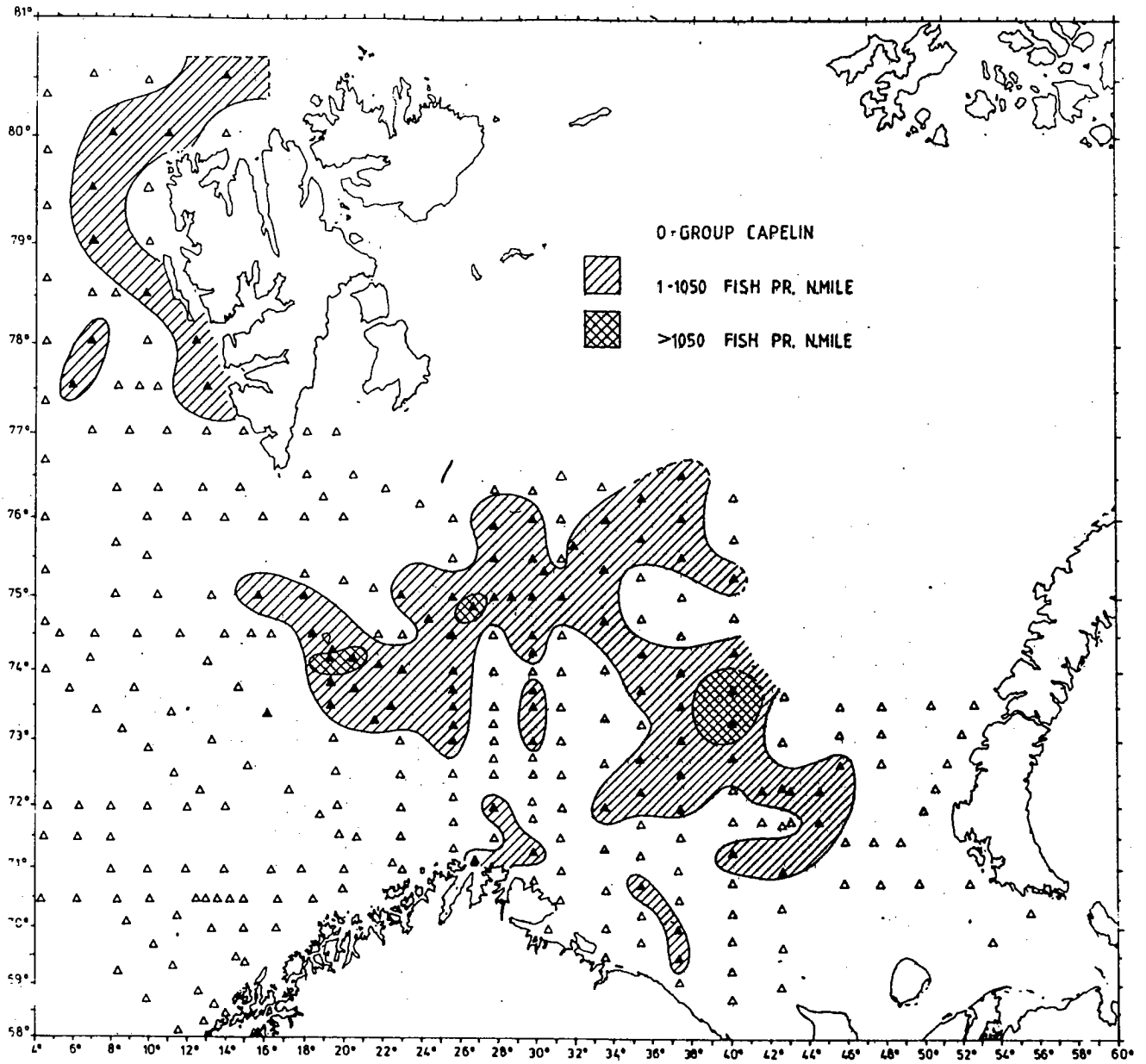


Fig. 9 Distribution of 0-group capelin.

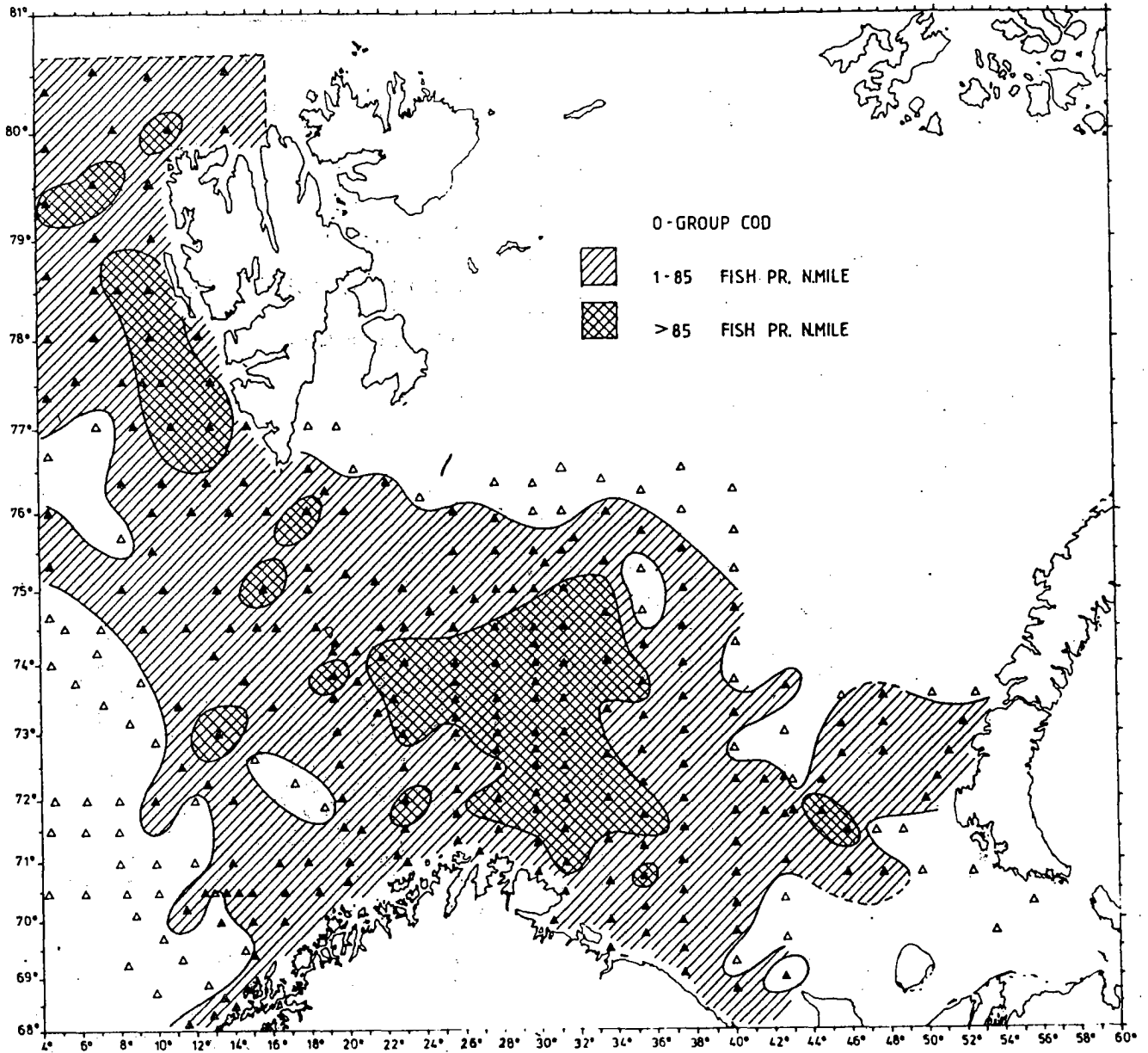


Fig. 10 Distribution of 0-group cod.

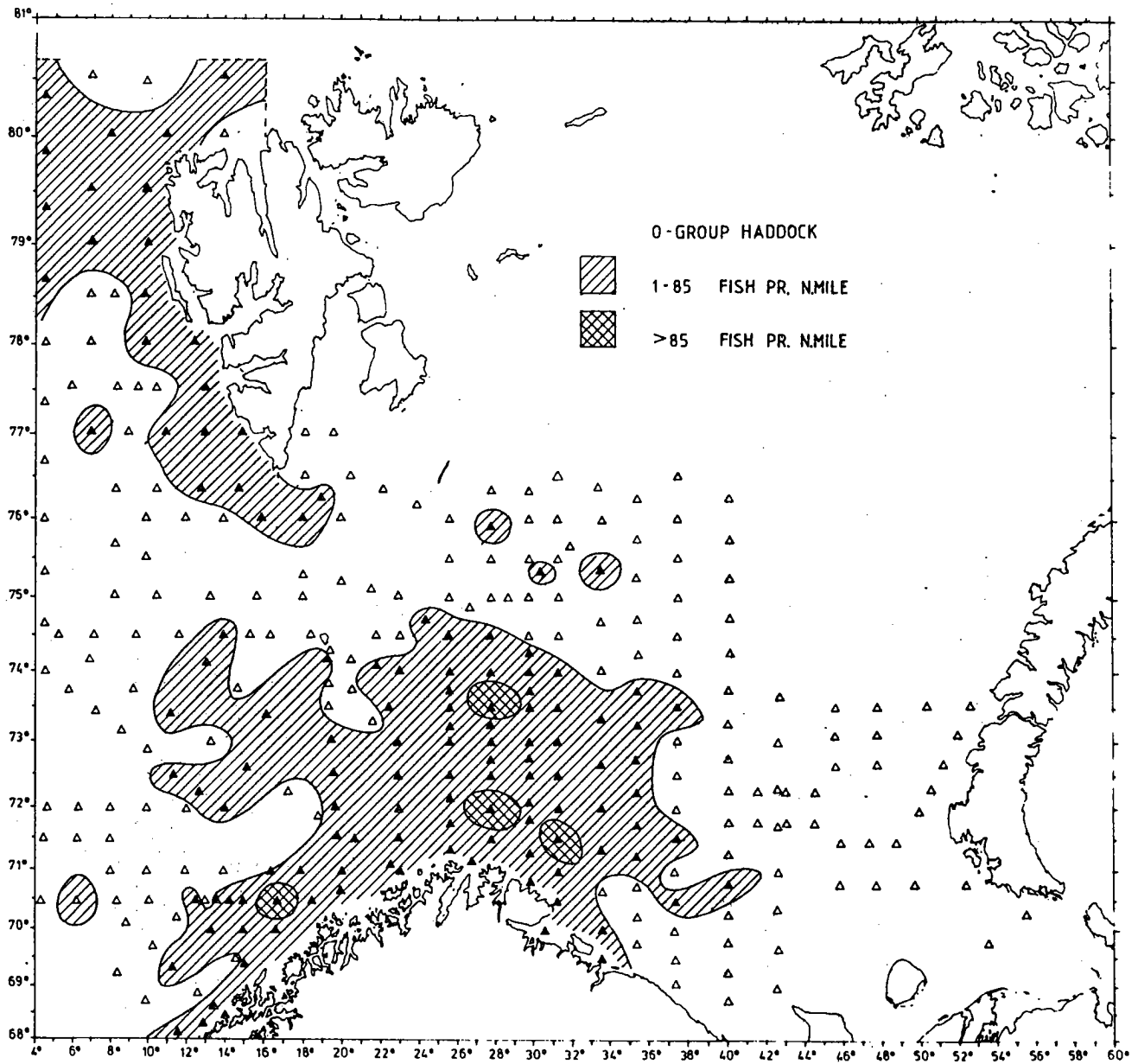


Fig. 11 Distribution of 0-group haddock.

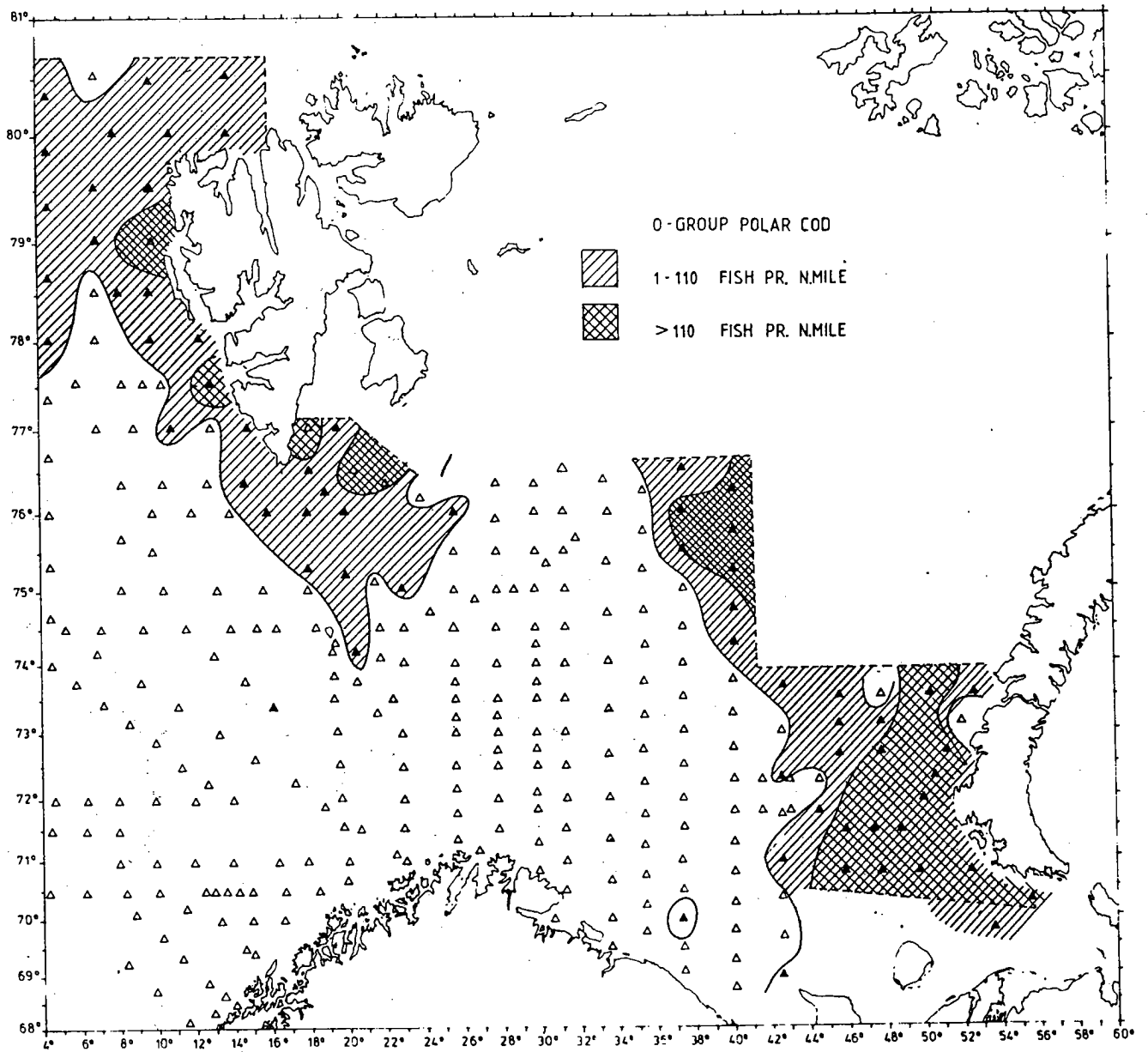


Fig. 12 Distribution of 0-group polar cod.

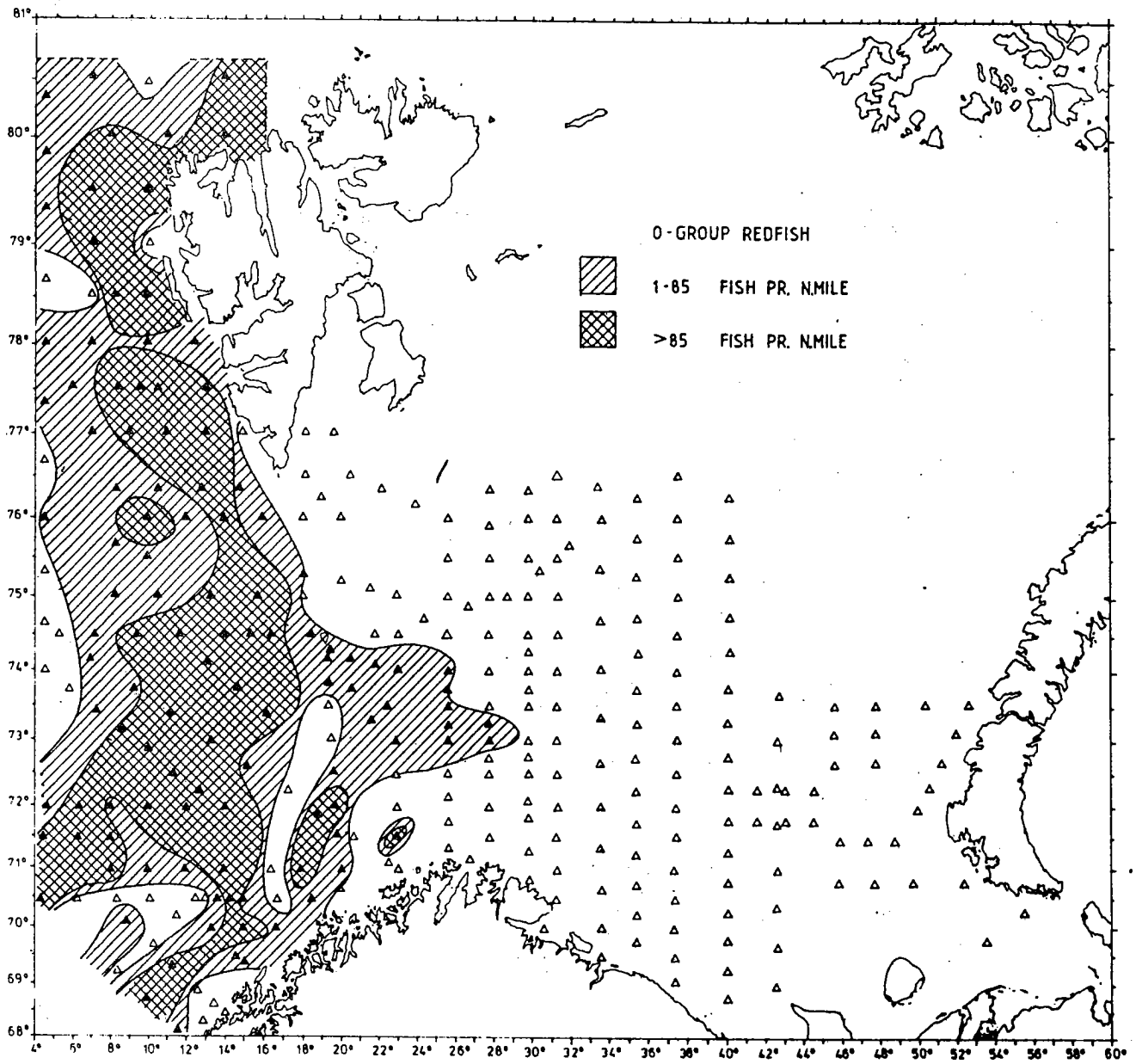


Fig. 13 Distribution of 0-group redfish.

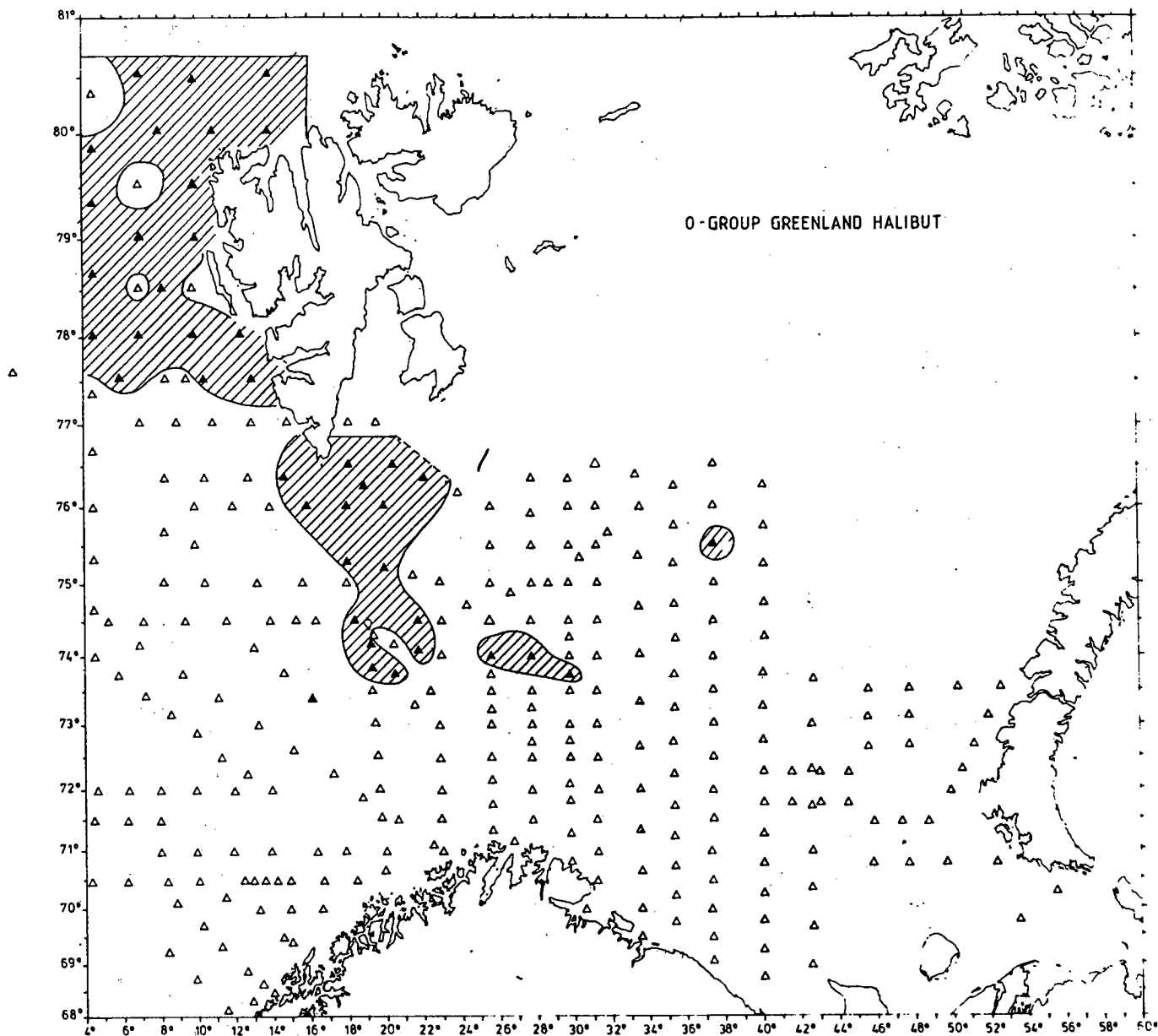


Fig. 14 Distribution of 0-group greenland halibut.

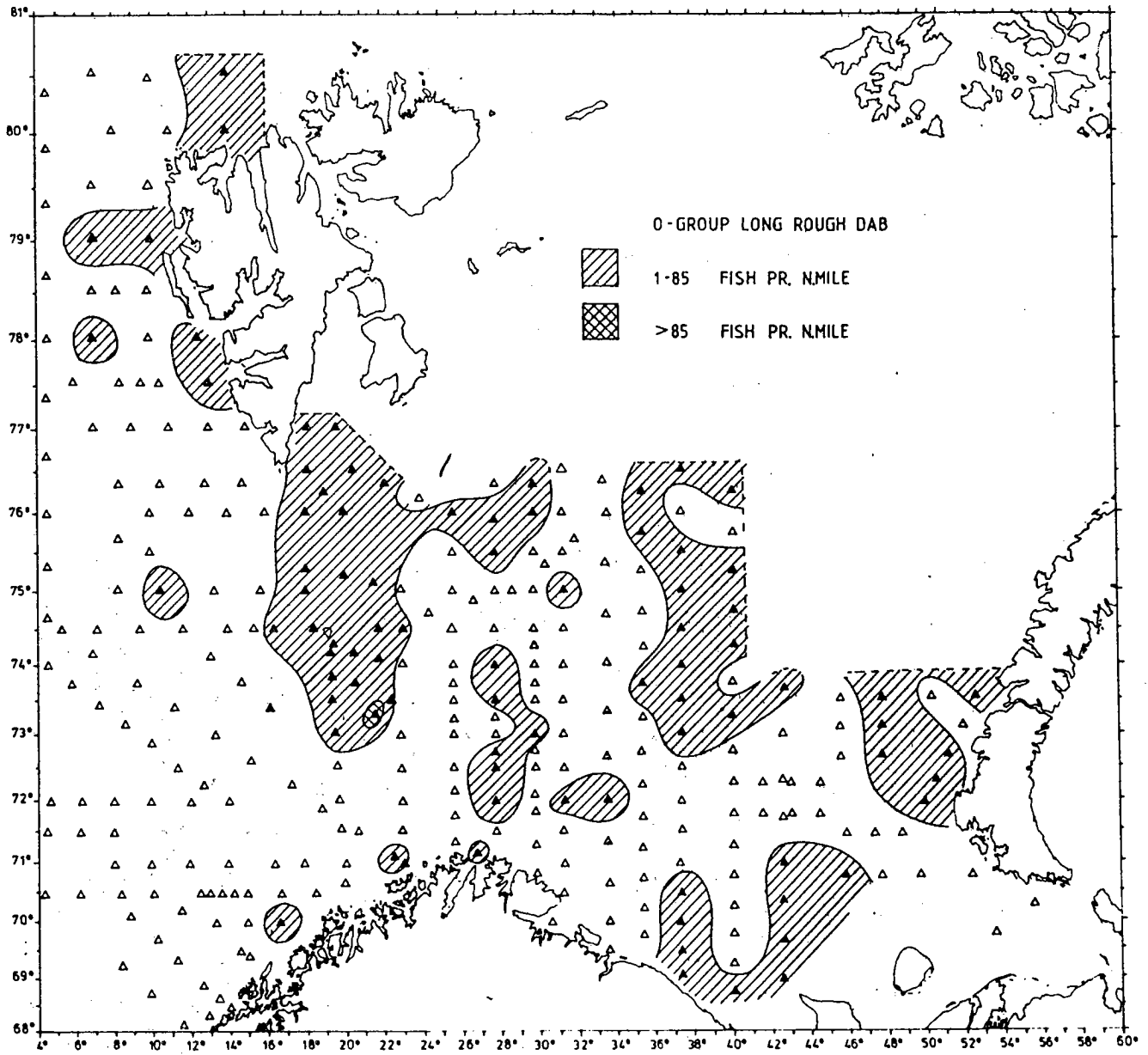


Fig. 15 Distribution of 0-group long rough dab.

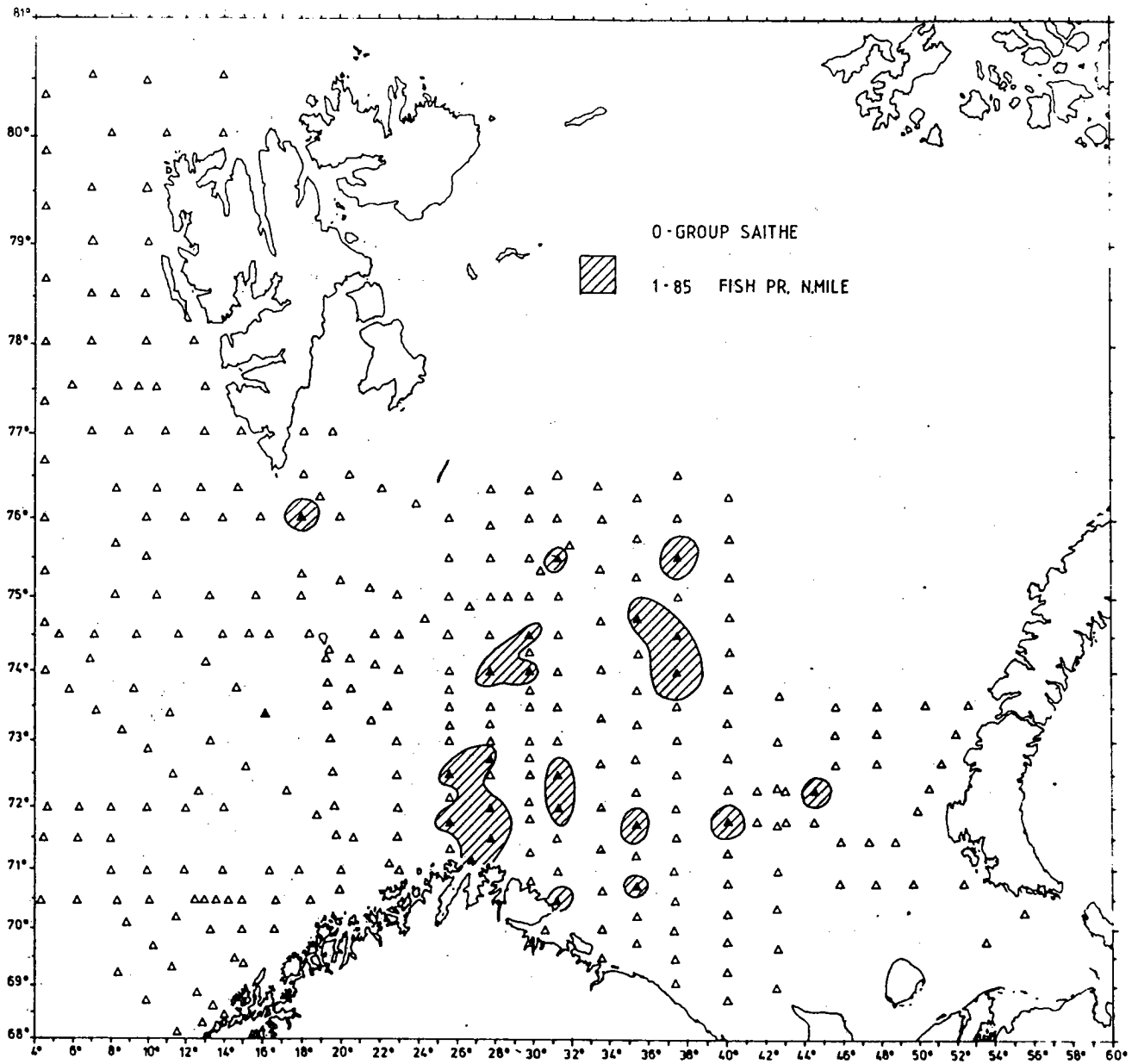


Fig. 16 Distribution of 0-group saithe.

Appendix

Survey period	Research vessel	Research Institute	Participants
23 August - 2 September	"Kokshaysk"	Polar Research Institute of Marine Fisheries and Oceanography, Murmansk	N.A. Isaev, V.I. Zubov, N.G. Ushakov, S.D. Melnikov, V.I. Shapovalov, V.L. Kaponirov, N.V. Antropov, A.V. Mukhin, Yu.G. Ignatyev
25 August - 2 September	"Vilnyus"	"	A.I. Krysov, I.V. Borkin, A.V. Bezdenezhnykh, O.V. Solovyova, S.N. Ashikhmin, A.E. Dorchenkov, S.Yu. Annenkov, S.G. Isapu
19 August - 3 September	"G.O. Sars"	Institute of Marine Research, Bergen	H. Bjørke, A. Høyen, H.P. Knudsen, E. Moksness, J. Monkan, A. Raknes, A.M. Skorpen
19 August - 4 September	"Eldjarn"	"	J. Blindheim, M. Haukås, A. Nødtvedt, R. Pedersen, I. Røttingen, Ø. Torgersen
20 August - 2 September	"Håkon Mosby"	"	I. Hoff, H. Ludvigsen, K. Nedreaas, K. Nythun, K. Sunnanå, E. Sæthre
17 August - 19 August	"Michael Sars"	"	S. Kolbeinson, B. Kvinge, T. Monstad, J.H. Nilsen, Ø. Tangen

