

Olav Rune Godt

C.M. 1989/G:40

International Council for
the Exploration of the Sea

Demersal Fish Committee
Ref.H. Pelagic Fish Committee

PRELIMINARY REPORT OF THE INTERNATIONAL O-GROUP FISH SURVEY IN THE BARENTS
SEA AND ADJACENT WATERS IN AUGUST-SEPTEMBER 1989

The twenty-fifth annual International O-group fish survey was made during the period 21 August-11 September 1989 in the Barents Sea and adjacent waters. The following research vessels participated in the survey:

State	Name of vessel	Survey period	Research Institute
Norway	"Eldjarn"	22 August - 11 September	Institute of Marine Research, Bergen
Norway	"G.O.Sars"	21 August - 11 September	"
Norway	"Michael Sars"	22 August - 11 September	"
USSR	"Professor Marty"	20 August - 8 September	The Polar Research Institute of Marine Fisheries and Oceanography, Murmansk
USSR	"Pinro"	20 August-9 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 11-12 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 hydrographical conditions in the area.

MATERIAL AND METHODS

The geographical distribution of 0-group fish were estimated by fishing with a small mesh midwater trawl. The vessels participated in the survey in 1989 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 recommendation made at the same meeting. At about every 30-40 nautical miles sailed the trawl was towed in several depths in one haul. 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 40 m. An additional tow at 60 m for 0.5 nautical mile was made 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. 16-28, as filled and open symbols respectively. The density grading is based on catch in number per 1.0 nautical mile trawling.

HYDROGRAPHY

Hydrographic observations were made along all the survey tracks with 5-40 nautical miles between stations.

Horizontal temperature and salinity distribution are shown for 0, 50, 100, 200 m and bottom (Figs. 2-11). Figs. 12-15 show the temperature and salinity conditions in the Kola, Cape Kanin, Bear Island-North Cape and Bear Island-West sections. The mean temperature for parts of these sections are listed in Table 1.

Mean water temperatures in the Barents Sea and adjacent waters during the 0-group survey have increased in all layers compared to 1988. Especially the surface temperature was high due to warming from the atmosphere during the warm summer 1989. The high temperature were most pronounced close to the Norwegian and Murman coast. Table 1. states a temperature increase of 0.5-2.6⁰C in all the sections compared to 1988, and all mean temperature were also above the long term mean, 1965-1989.

Blue whiting (Fig. 23)

Only a few catches of blue whiting were obtained and these are shown in the map. No index have been calculated.

Sandeel (Fig. 24)

The catches of sandeel were smaller this year than in 1988. Also the distribution area is smaller than last year. No index have been calculated.

Redfish (Fig. 25)

The area of dense distribution of redfish is considerably smaller this year than last. In 1988 the redfish distribution was extending far to the east with high concentrations and the redfish was dominant in the trawl catches in most of this area. This year redfish did not dominate the catches and the main concentrations are found in the currents going north along the western side of Spitzbergen and in the current going east along the Norwegian coast. The distribution index is about the level of 1986 indicating a somewhat above average yearclass.

Greenland halibut (Fig. 26)

Very few Greenland Halibut were caught and the index is very low indicating a very weak yearclass.

Long rough dab (Fig. 27)

Also this year the index of Long rough dab is very low, indicating a weak yearclass. The distribution is somewhat more to the north-west than in 1988.

Gonatus fabricii (Fig. 28)

Also this year concentrations of *Gonatus fabricii* with relatively high abundance are found in the western area. The distribution does not reach as far to the south-east as last year.

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. Proceedings of the Soviet-Norwegian symposium on Reproduction and recruitment of Arctic cod. Leningrad 26-30 Sept. 1983: 192-212.
- TORSEN, R., 1985. Recruitment indices of Norwegian spring-spawning herring for the period 1965-1984 based on the international 0-group fish surveys. Coun. Meet. int. Coun. Explor. Sea, 1985 (H:54): 1-9 [Mimeo.]

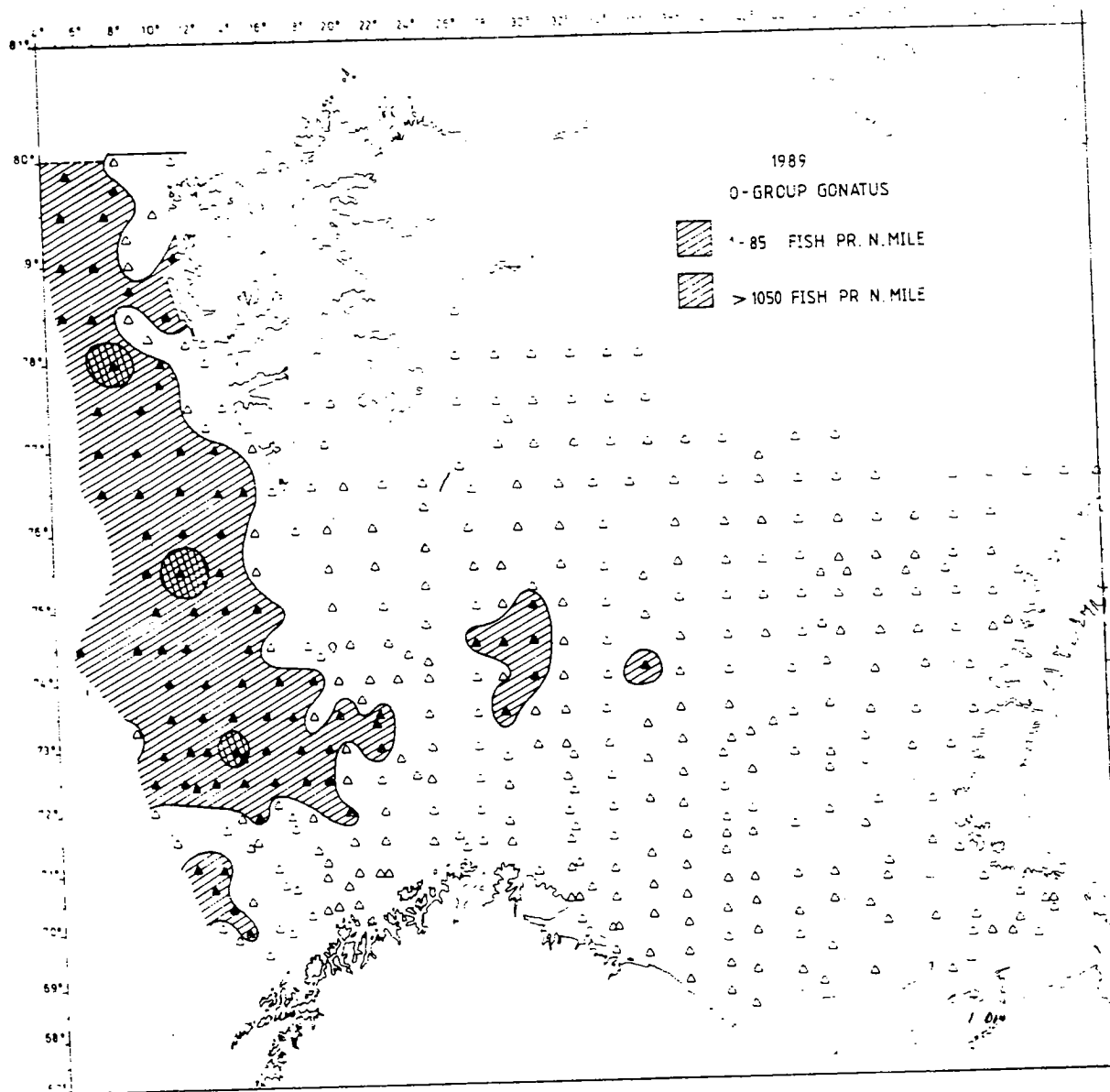


Fig. 28. Distribution of O-group Gonatus fabricii.

Appendix

<u>Survey period</u>	<u>Research vessel</u>	<u>Research Institute</u>	<u>Participants</u>
20 August - 8 September	"Professor Marti"	Polar Research Institute of Marine Fisheries and Oceanography, Murmansk	I. V. Borkin, B. Filoffov, I. Dolgolenko, Y. Perepechaev, A. Shvagzhdis, V. Ulanov, A. Pedchenko, A. Cheremovsky, K. Drevetnyak, V. Khvastov, A. Shatilov.
20 August - 9 September	"Pinro"		V. Komlichenko, A. Kusmichov, E. Shamraj, A. Doronin, A. Badigin, A. Dorchenkov, S. Lisovetq, S. Gotovtsev.
21 August - 11 September	"G.O. Sars"	Institute of Marine Research, Bergen	I. M. Beck, O. J. Gullaksen, H. Hammer, H. Loeng, L. Midthun, R. Pedersen, S. Rosseland, H. Sagen, R. Toresen,
22 August - 11 September	"Michael Sars"		B. Hofstad, B. Kvinge, A. M. Skorpen, S. Sundby, K. Sunnanå, P. Agotnes.
22 August - 11 September	"Eldjarn"		I. Byrkjedal, T. I. Halland, K. A. Hansen, K. Hansen, A. Høyen, K. Lauvås, L. Løvheim, M. Møggster.

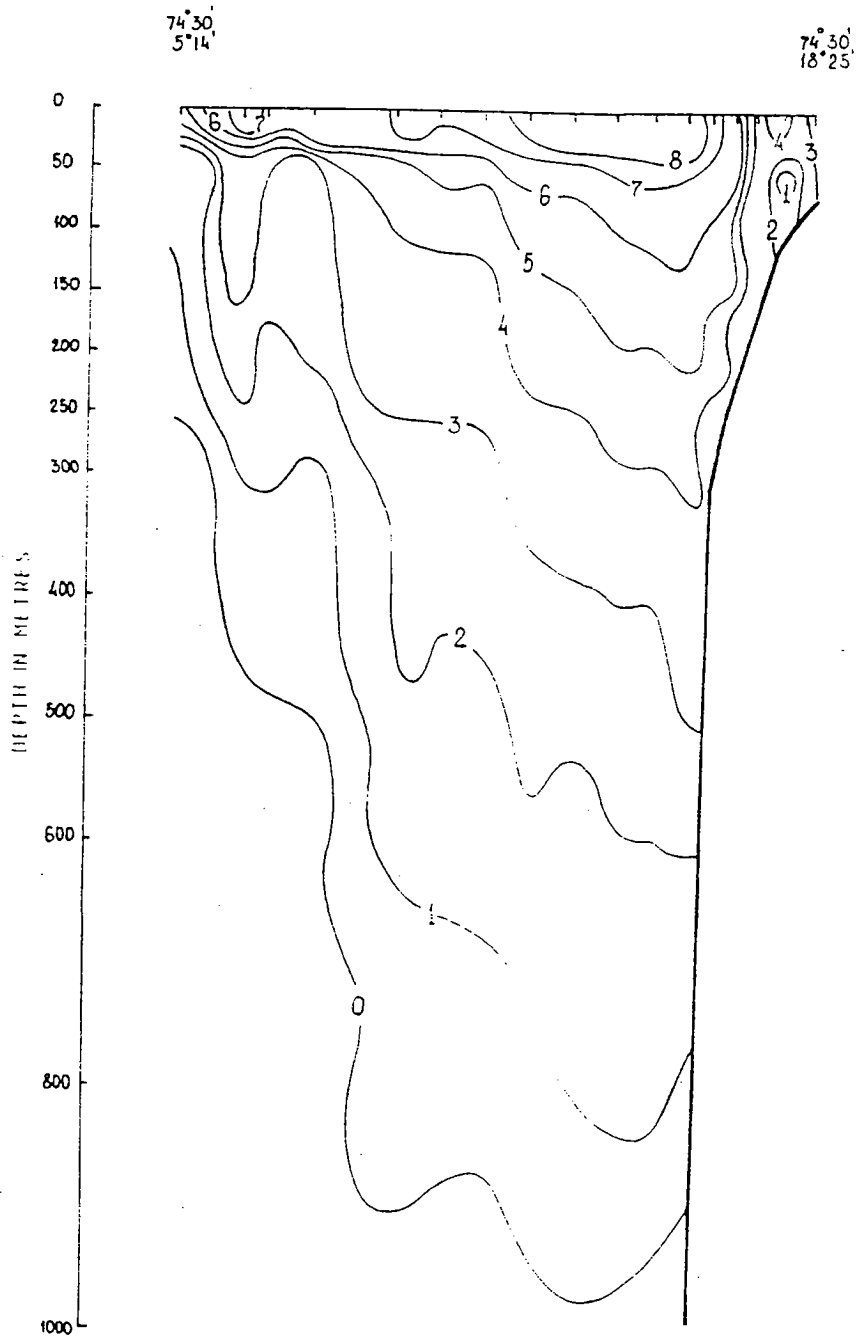


Fig. 15a. Hydrographic section Bear Island-West. Temperature.

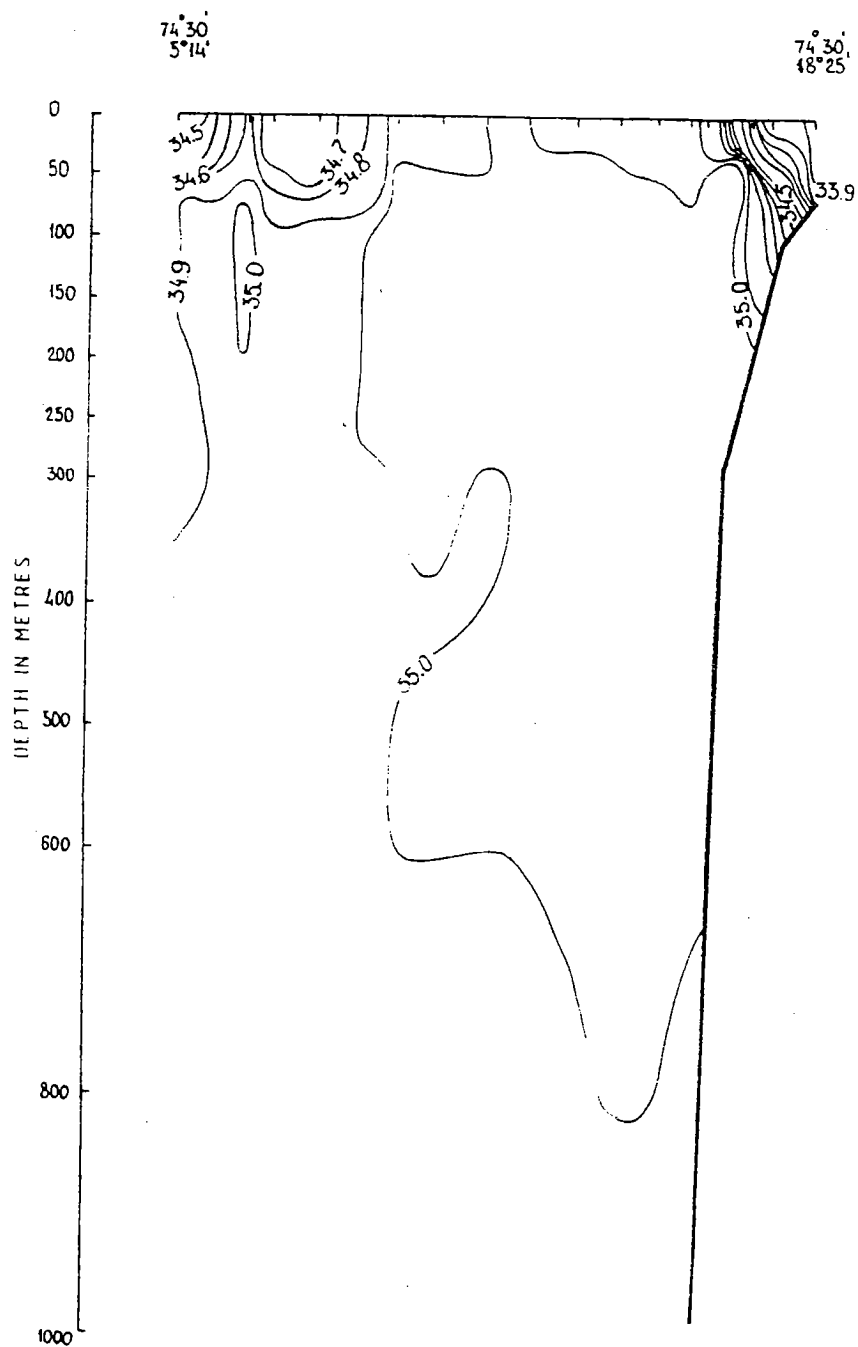


Fig. 15b. Hydrographic section Bear
Island-West. Salinity.

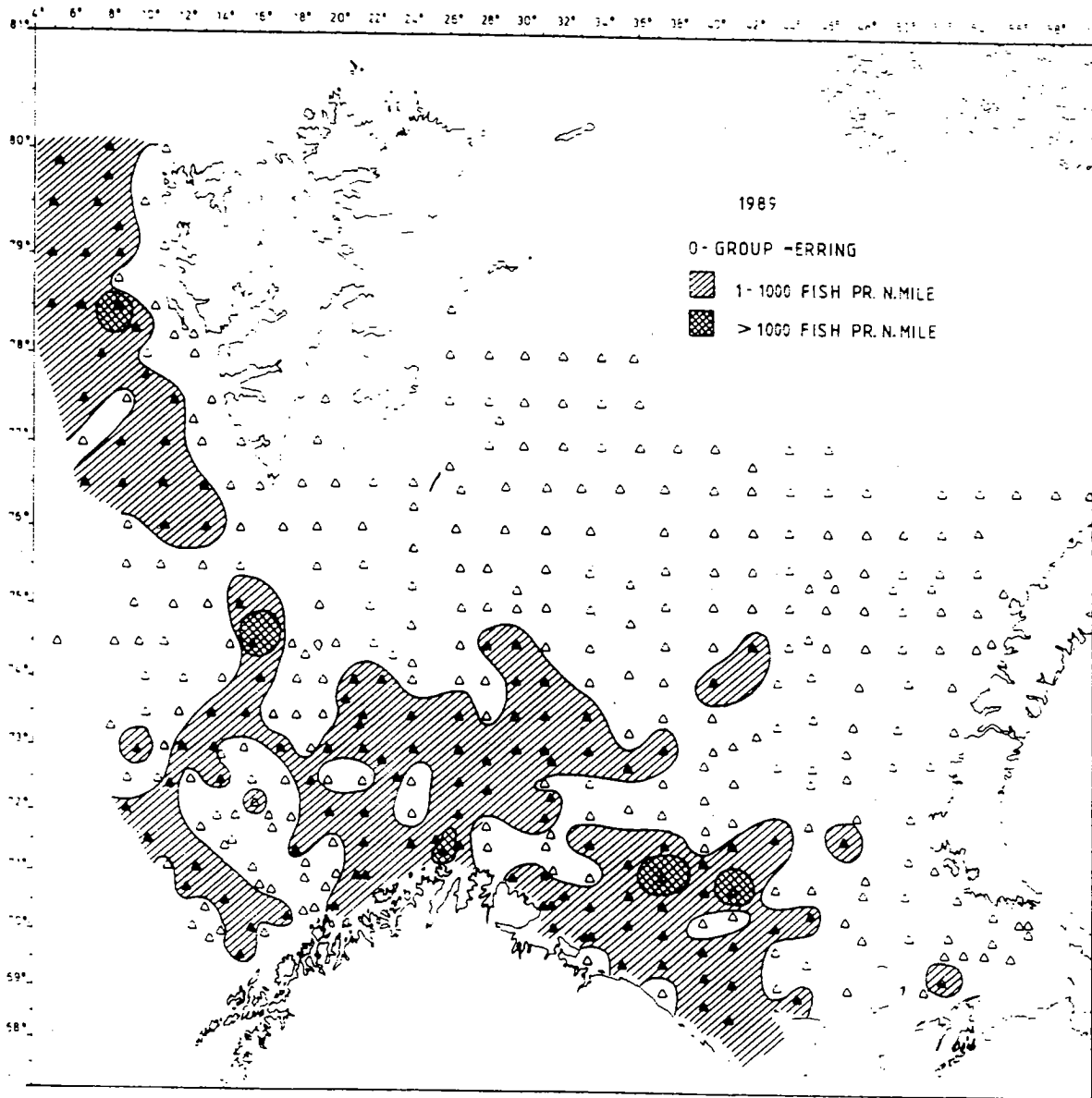


Fig. 16. Distribution of O-group herring.

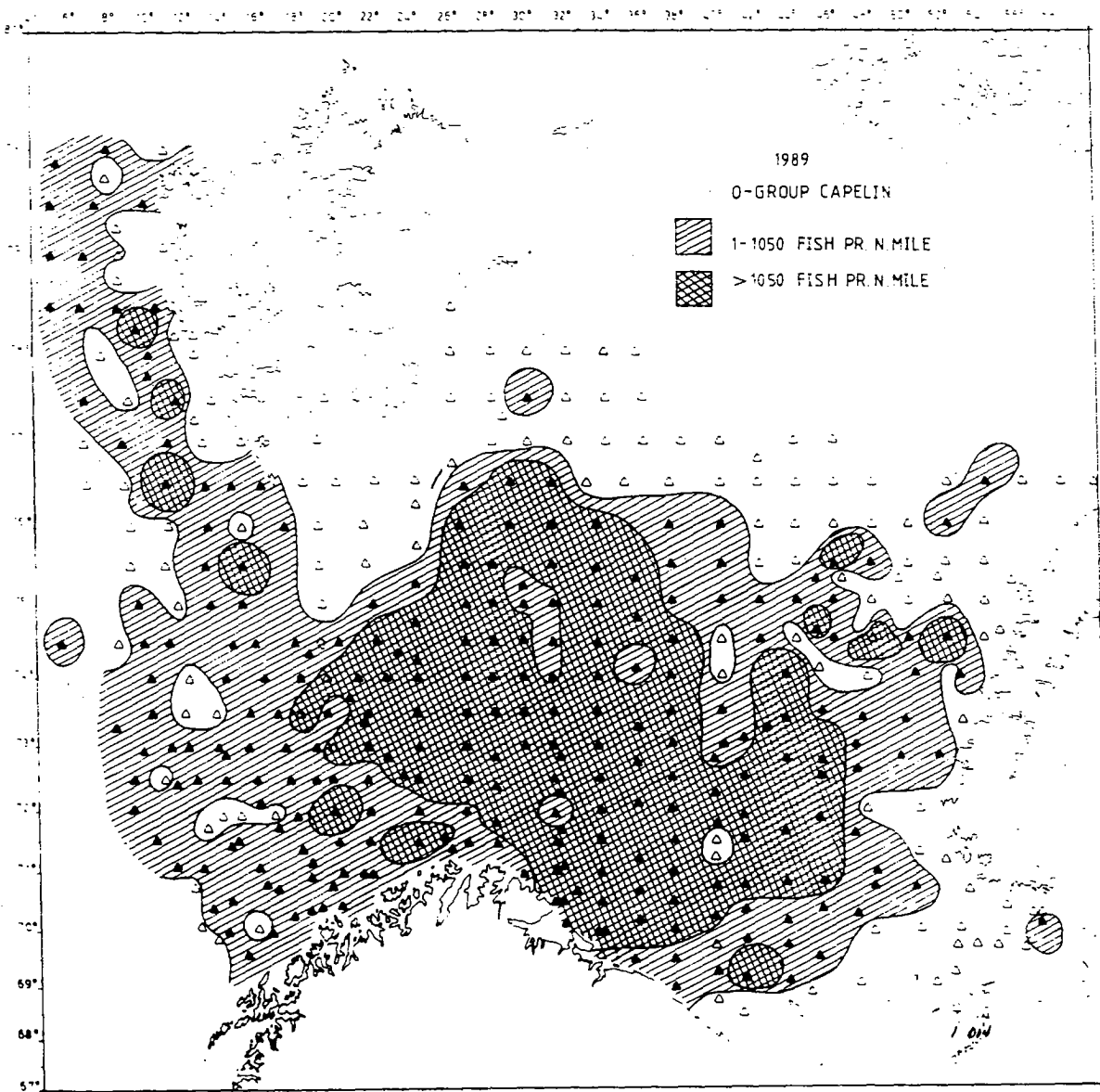


Fig. 17. Distribution of O-group capelin.

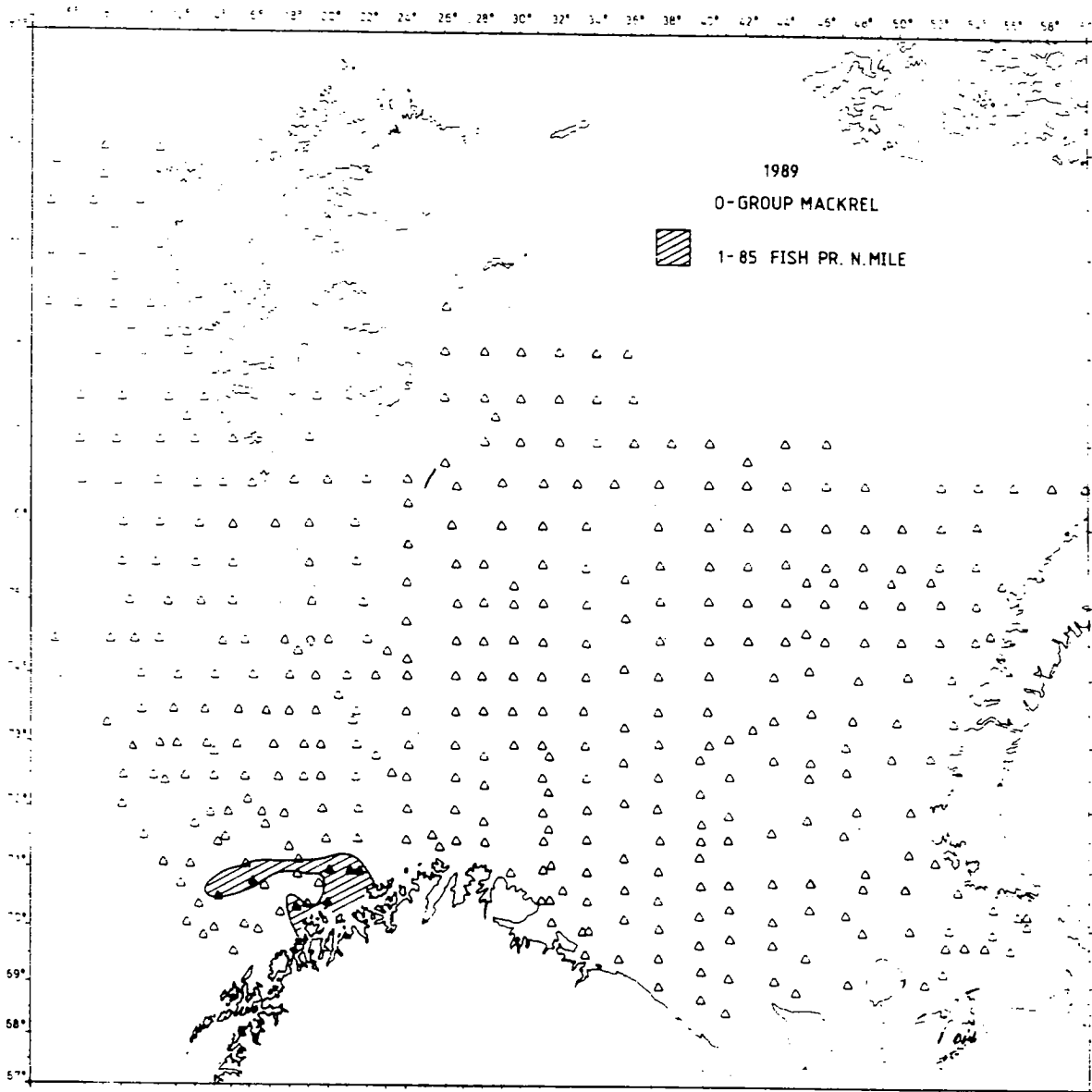


Fig. 18. Distribution of 0-group mackerel.

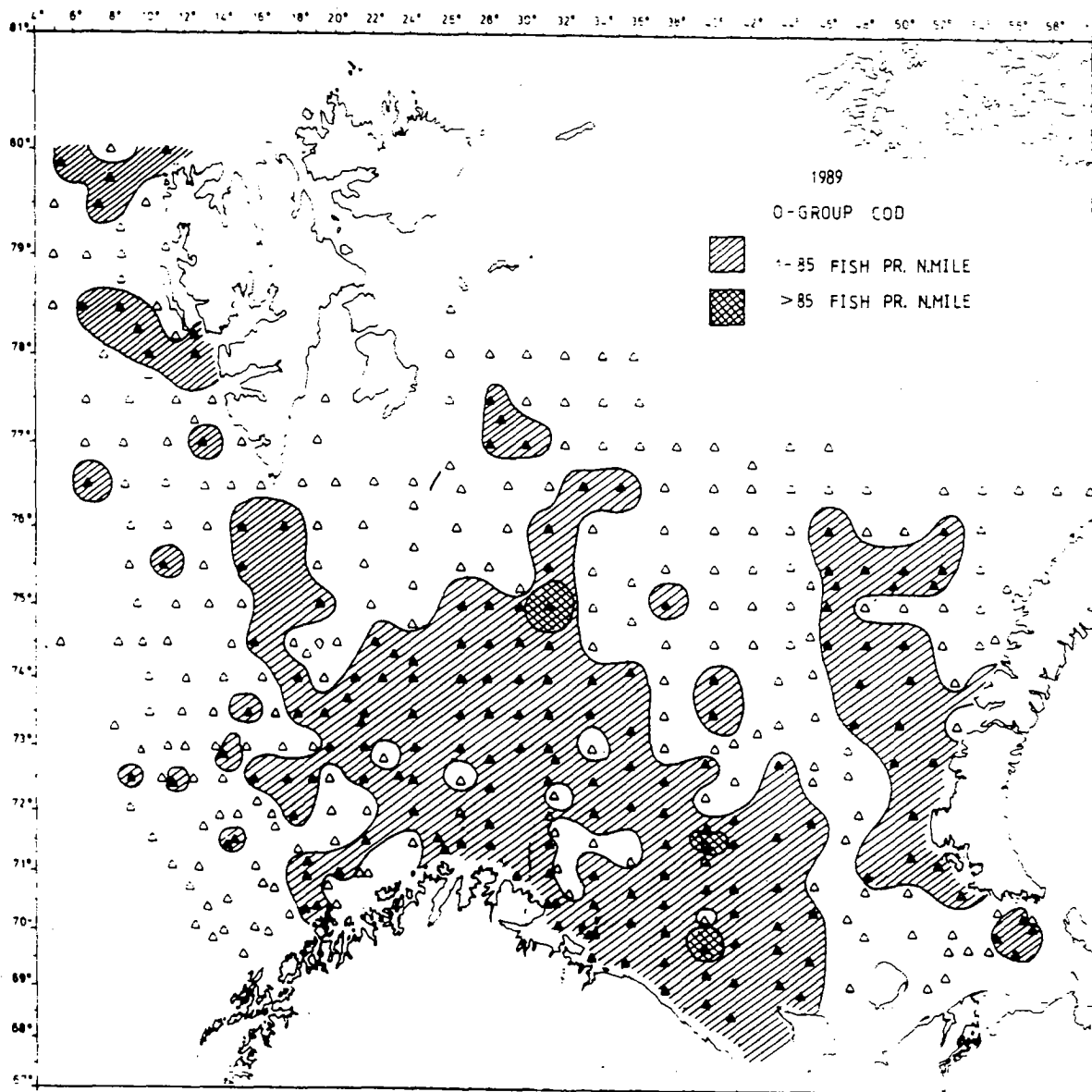


Fig. 19. Distribution of O-group cod.

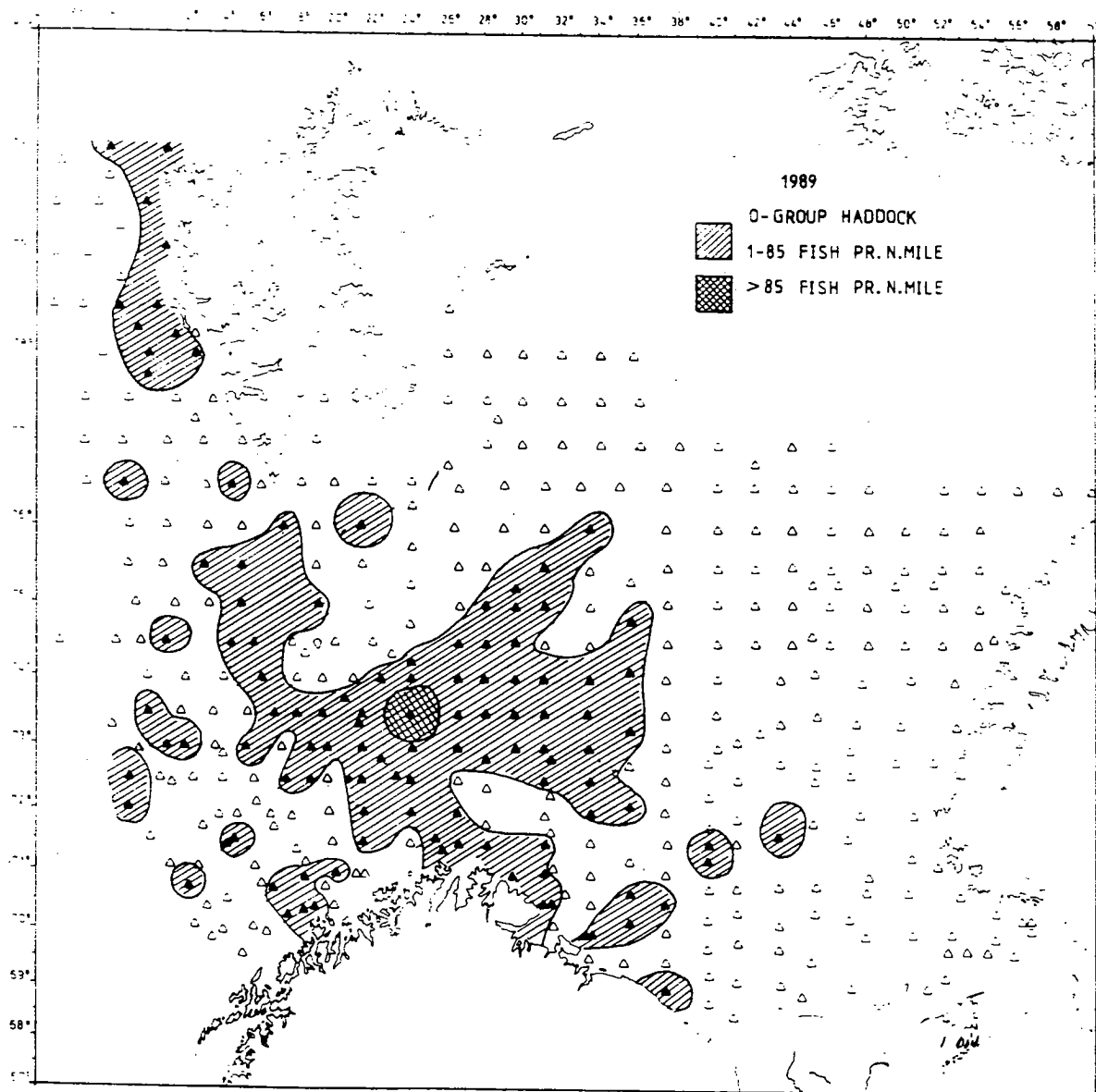


Fig. 20. Distribution of 0-group haddock.

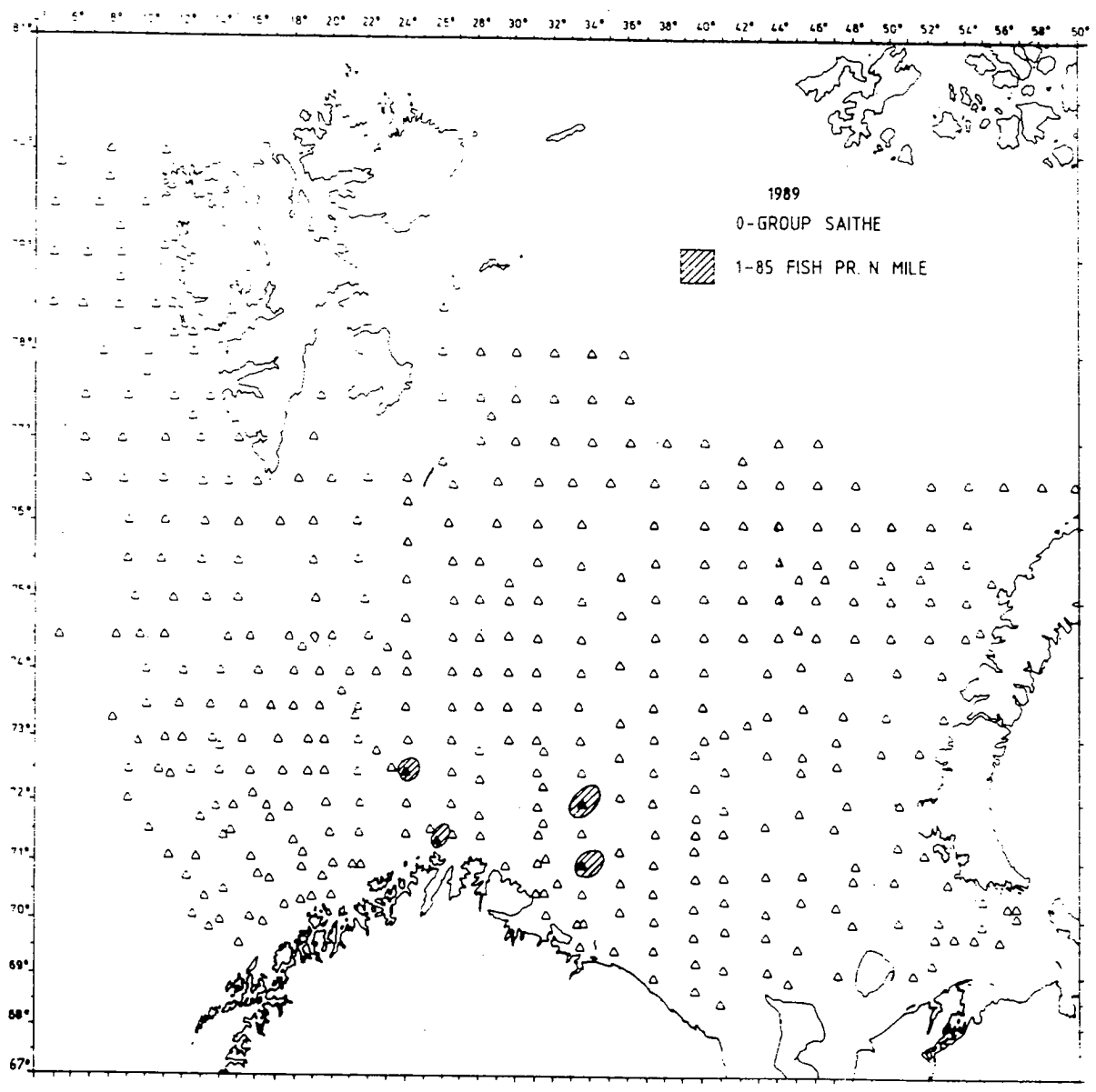


Fig. 21. Distribution of 0-group saithe.

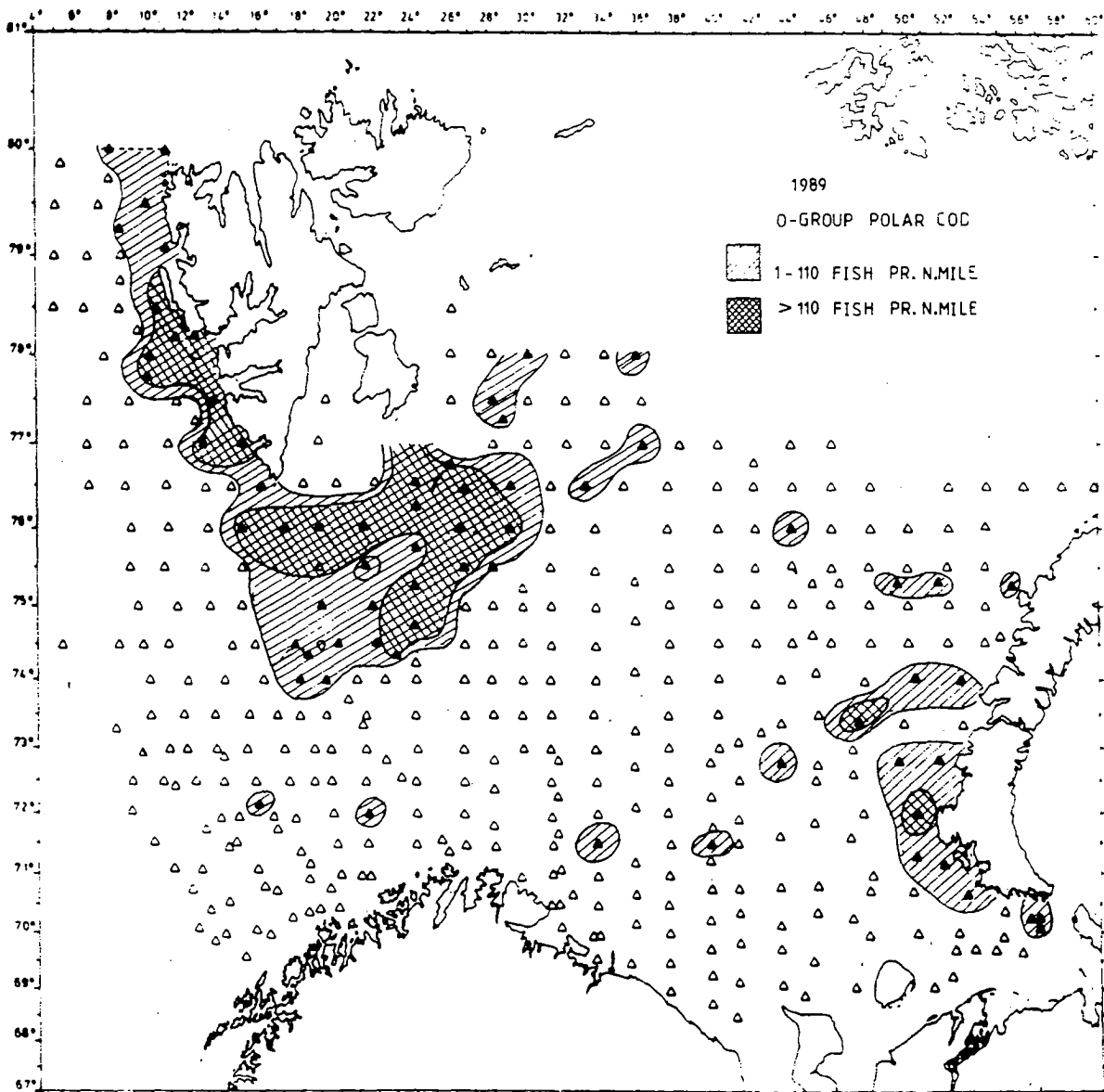


Fig. 22. Distribution of O-group polar cod.

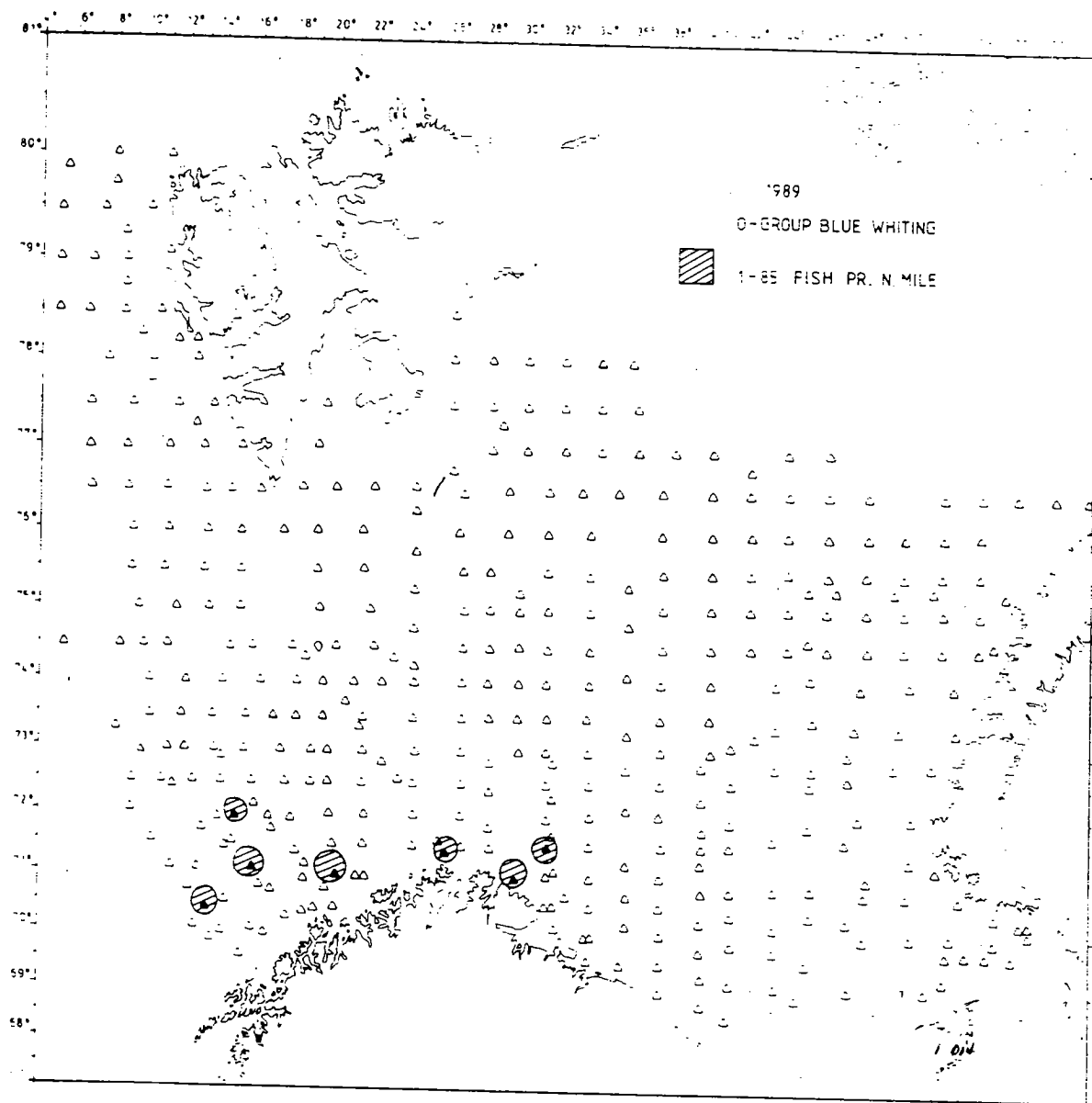


Fig. 23. Distribution of O-group blue whiting.

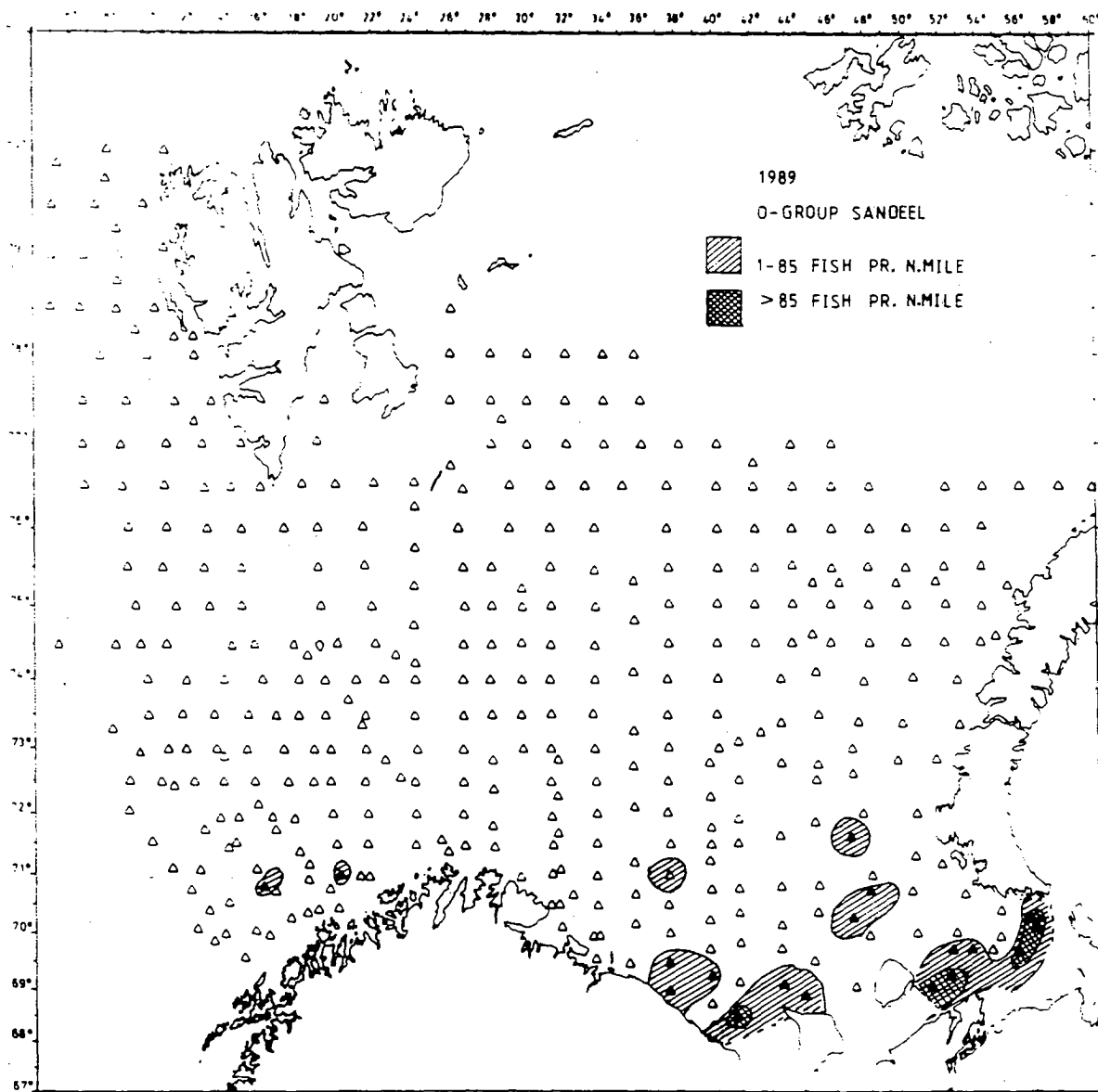


Fig. 24. Distribution of O-group sandeel.

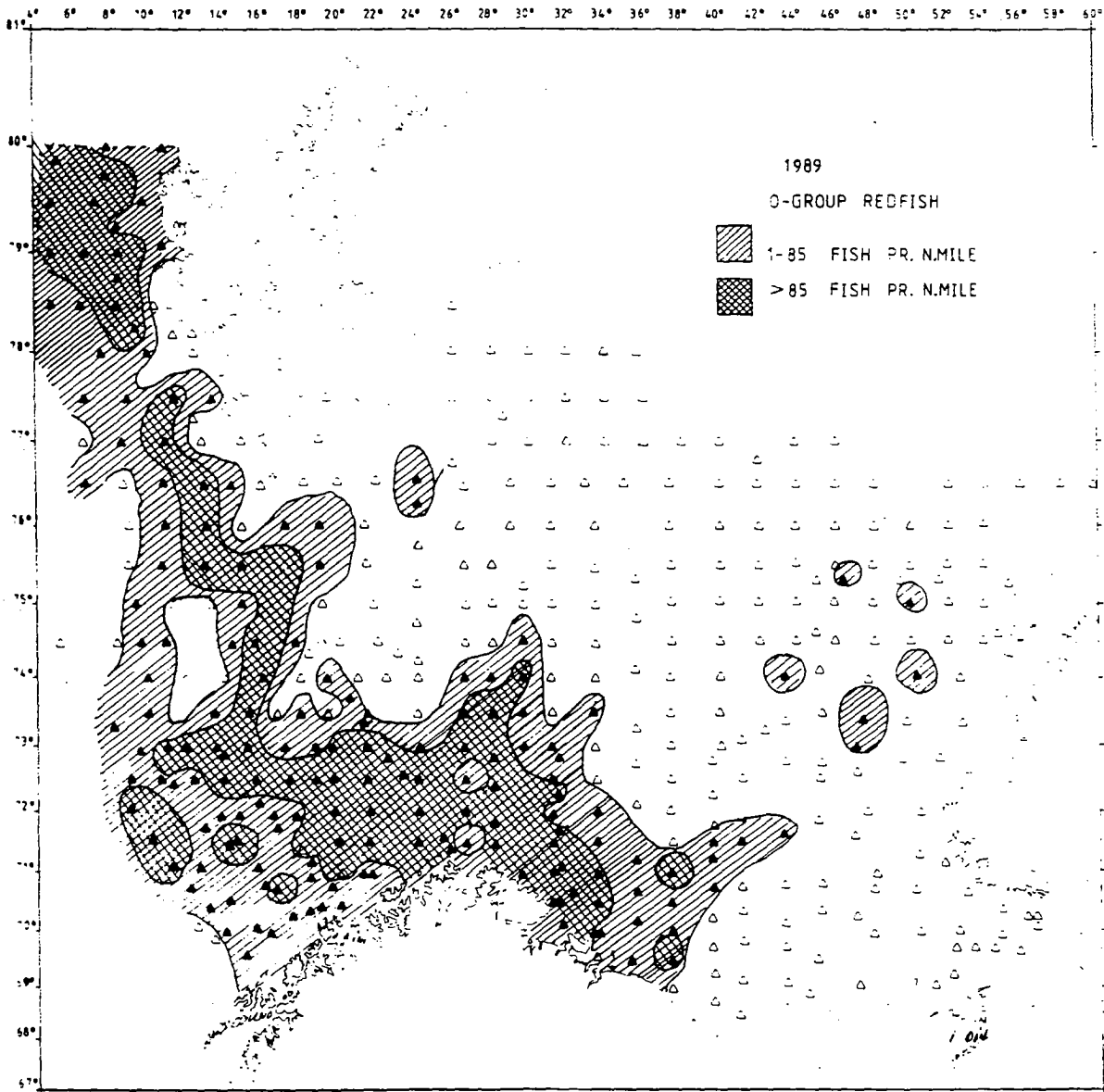


Fig. 25: Distribution of O-group redfish.

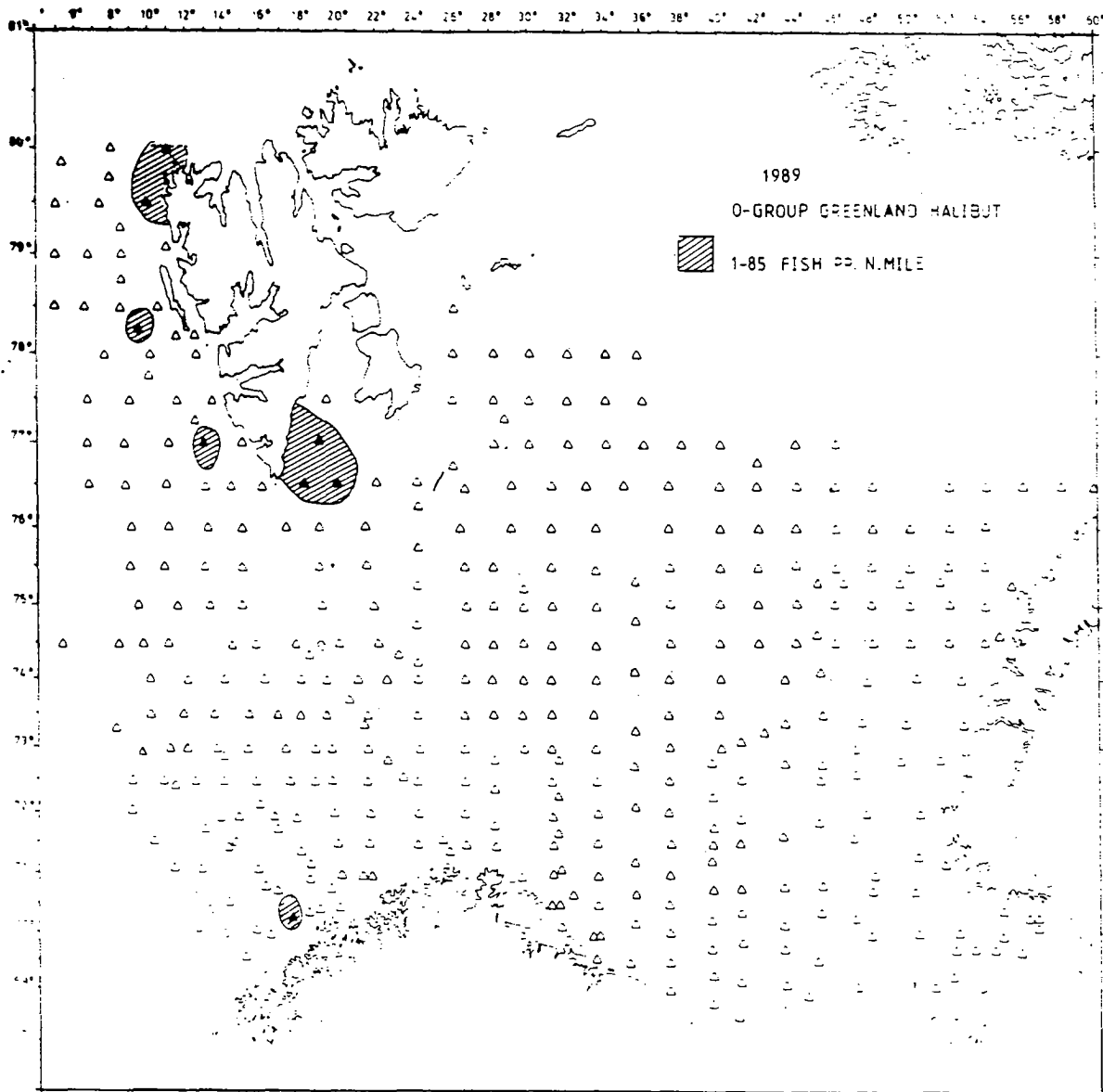


Fig. 26. Distribution of O-group Greenland halibut.

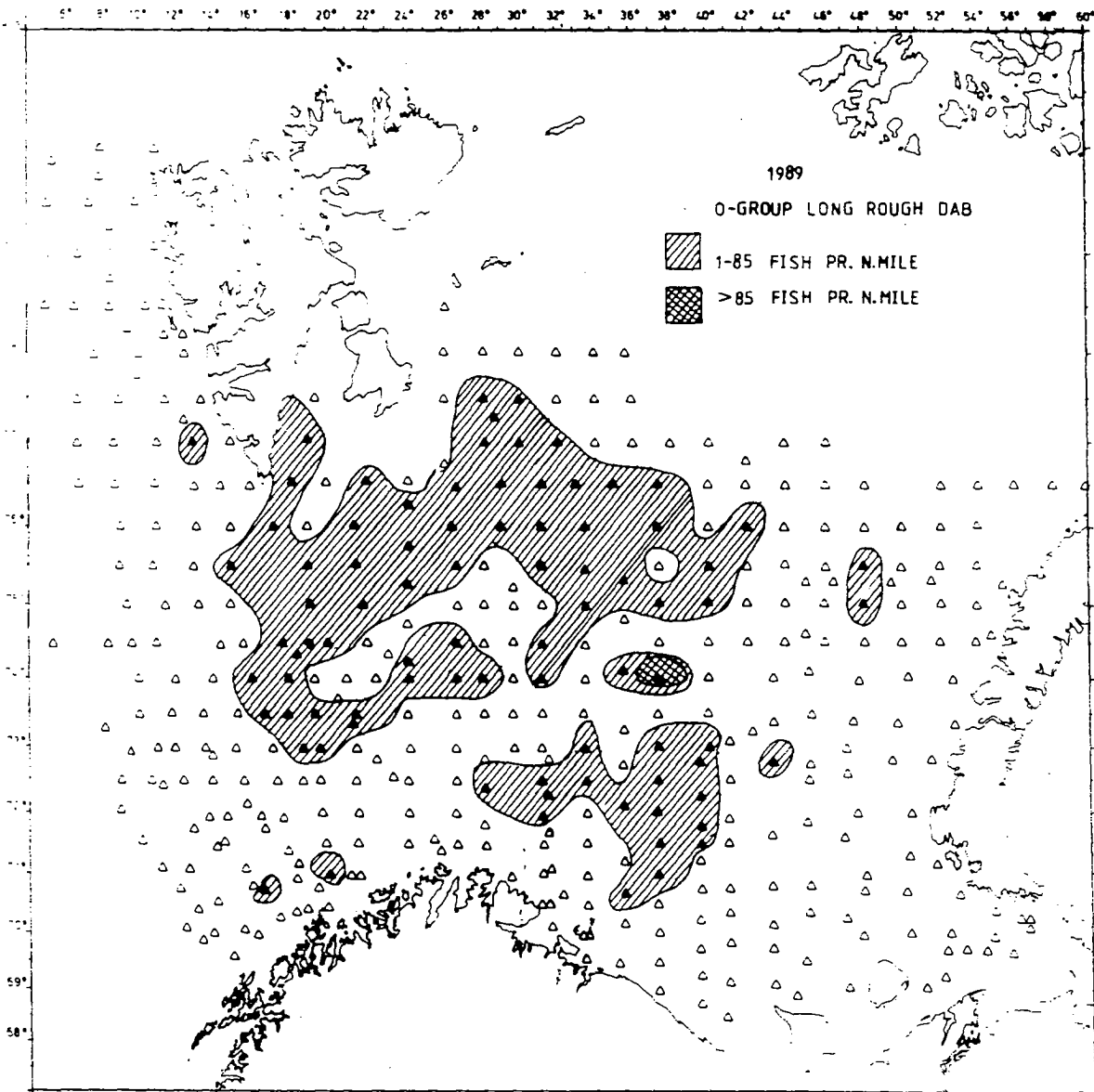


Fig. 27. Distribution of O-group long rough dab.

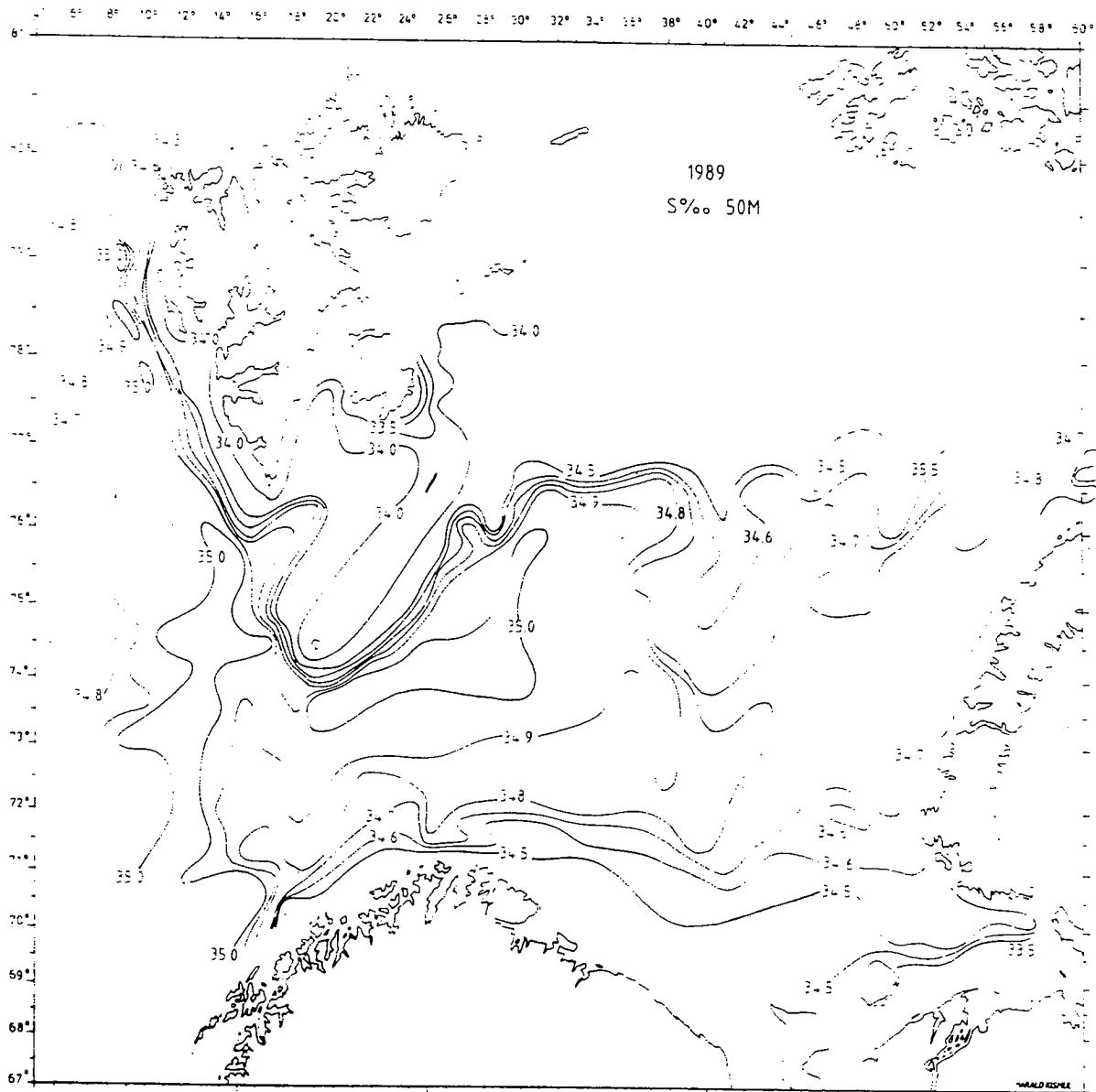


Fig. 5. Isohalines at 50 m.

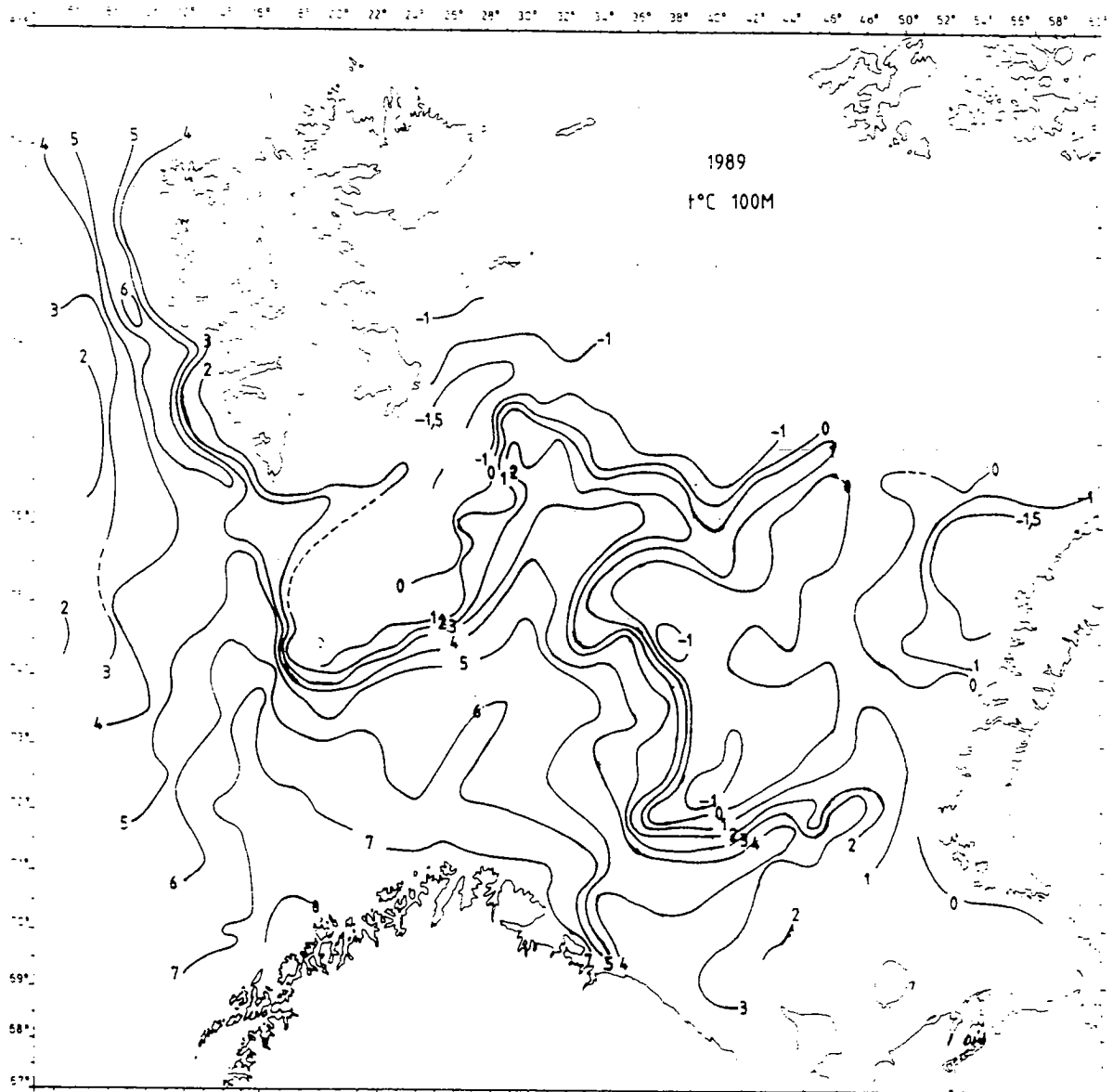
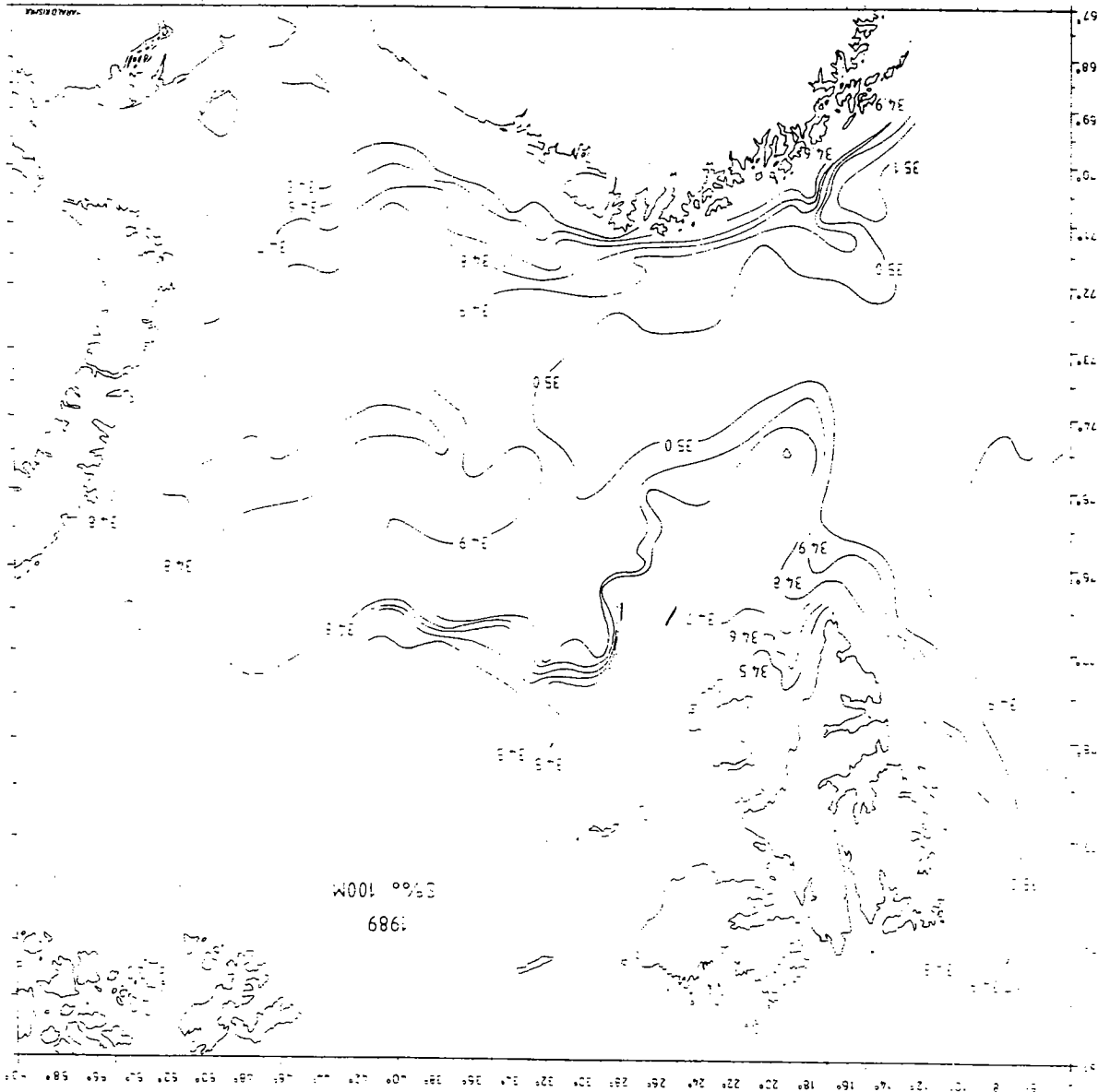


Fig. 6. Isotherms at 100 m.

Fig. 7. Isohalines at 100 m.



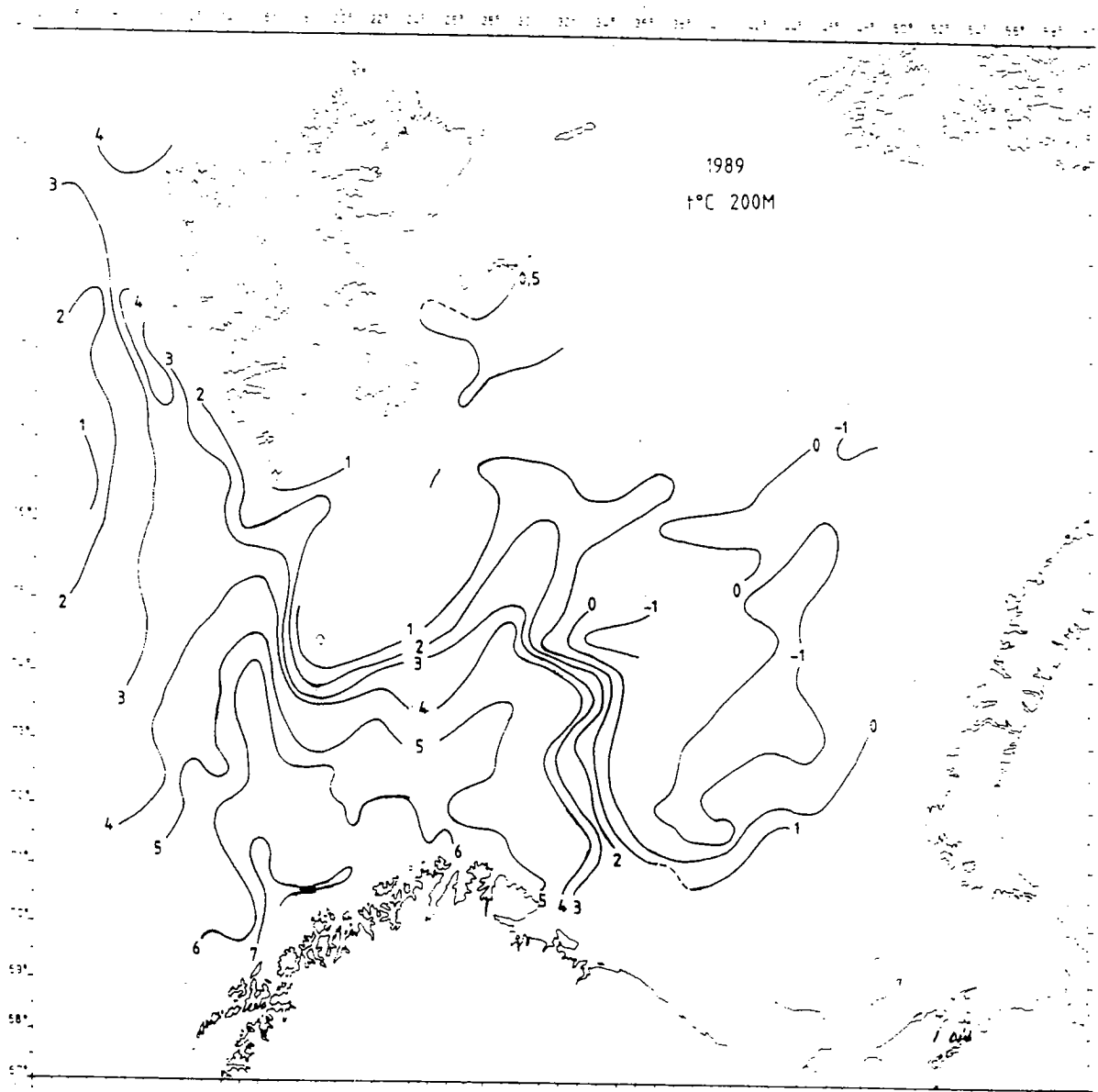


Fig. 8. Isotherms at 200 m.

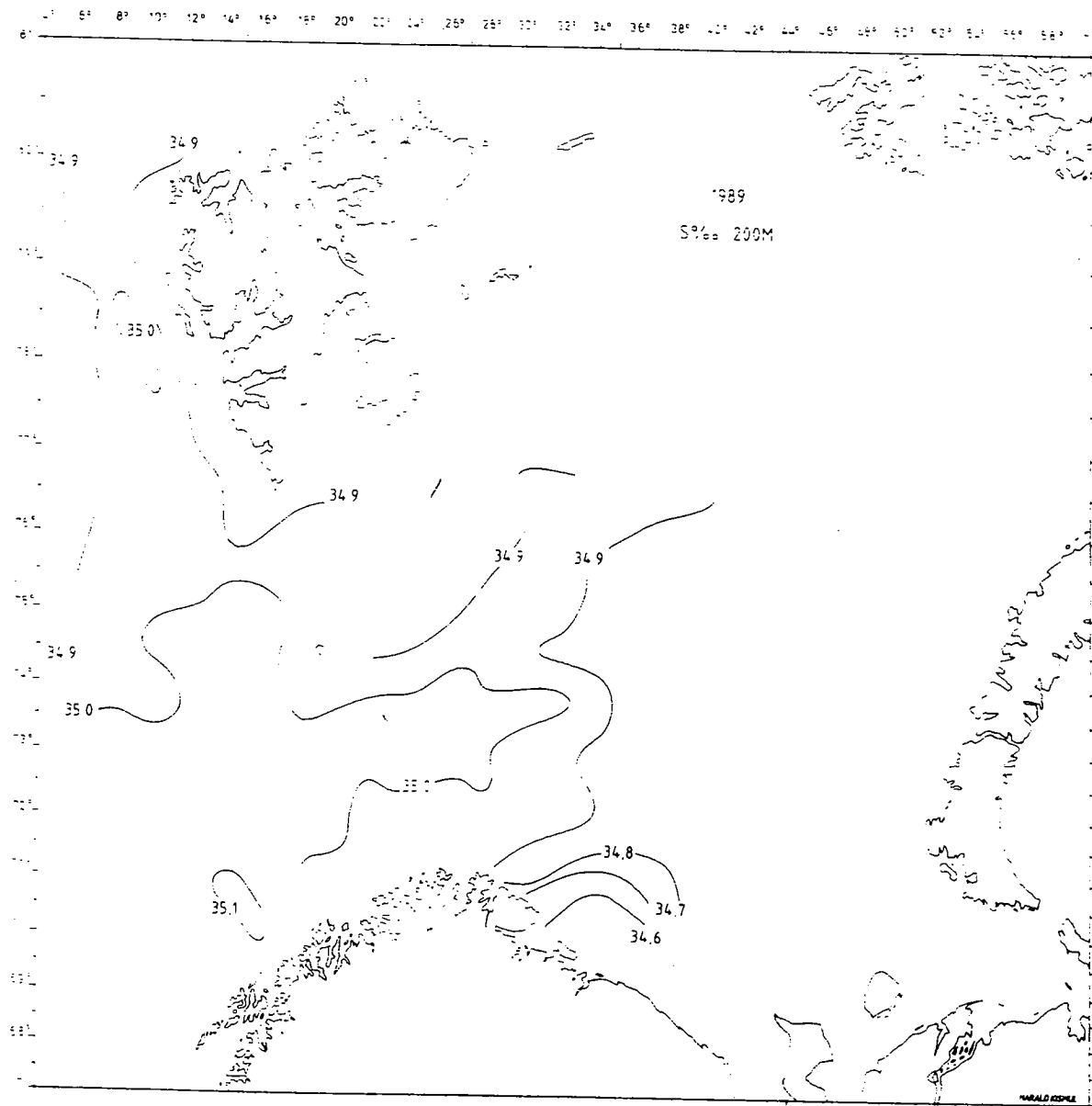


Fig. 9. Isohalines at 200 m.

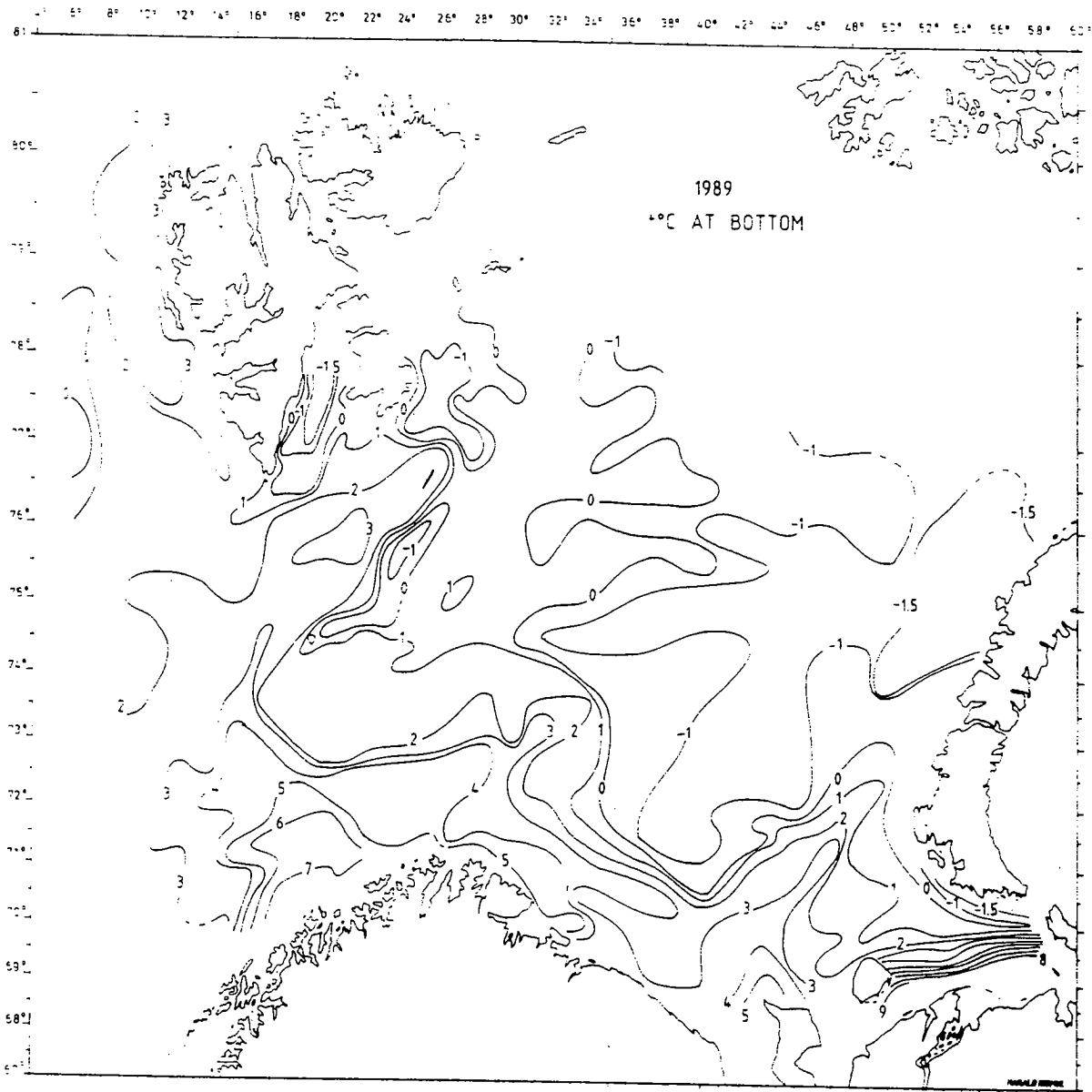


Fig. 10. Isotherms at bottom.

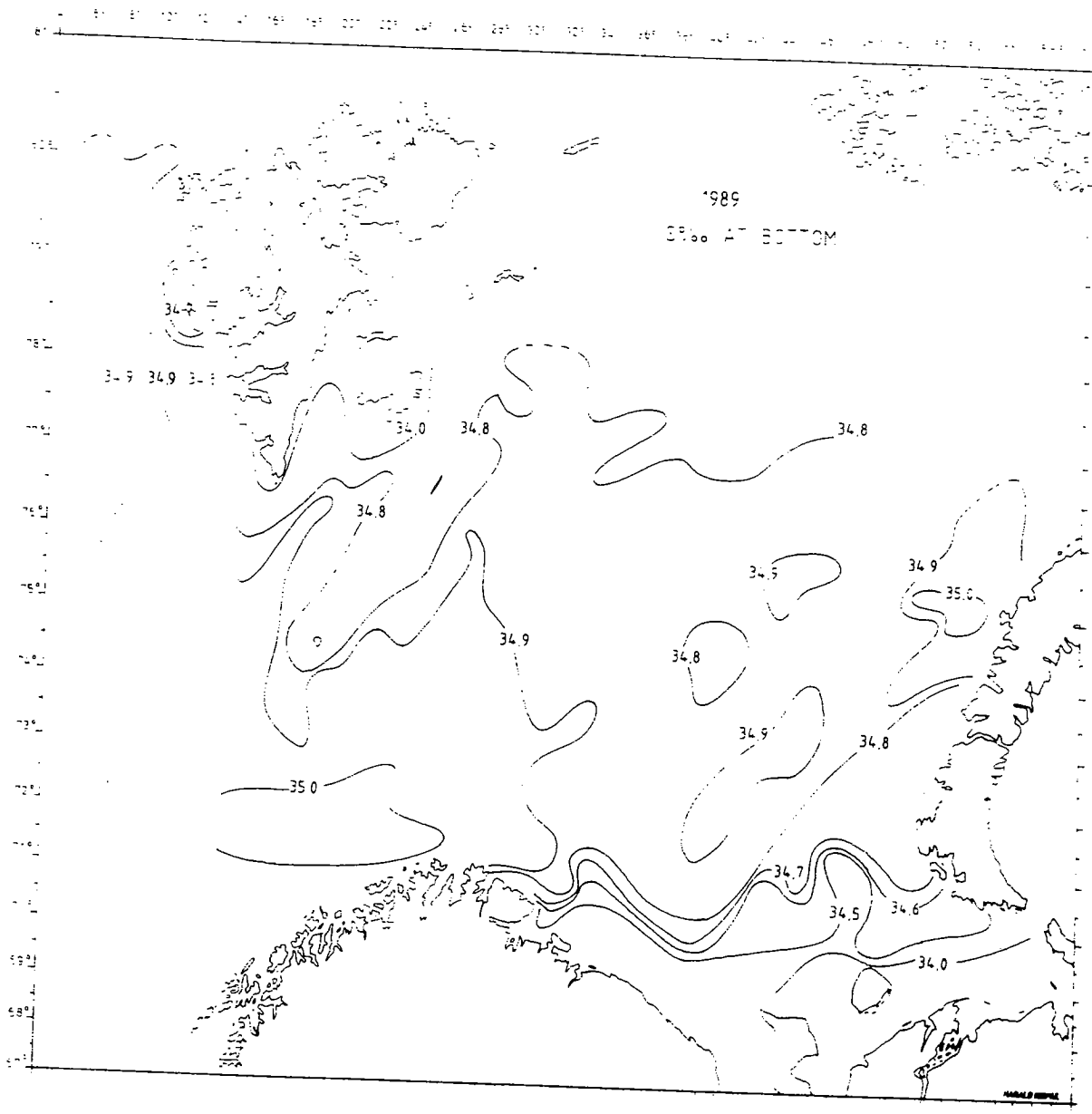


Fig. 11. Isohalines at bottom.

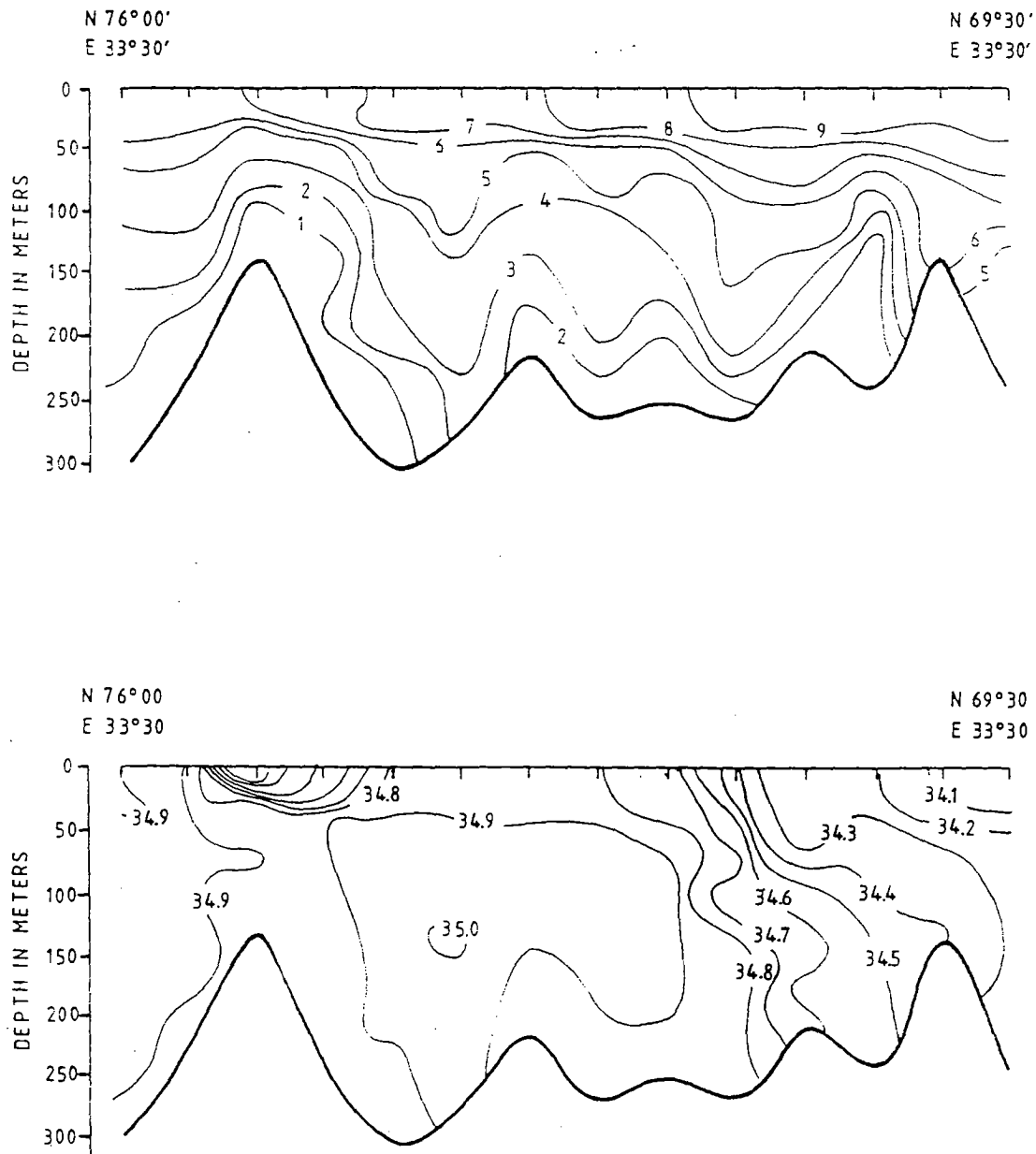


Fig. 12. Hydrographic section along the Kola meridian.
Temperature and salinity.

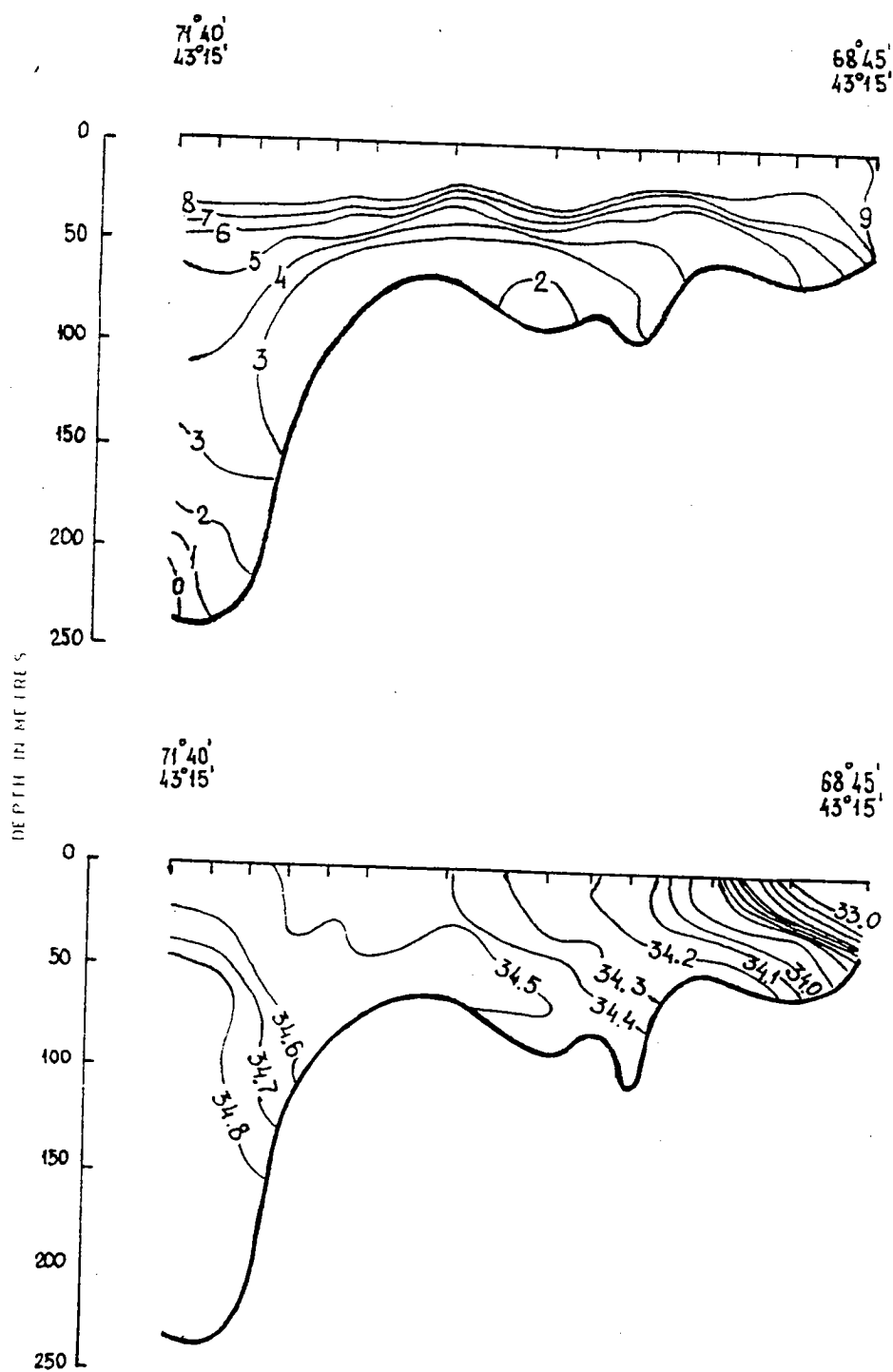


Fig. 13. Hydrographic section Cape Kanin-North.
Temperature and salinity.

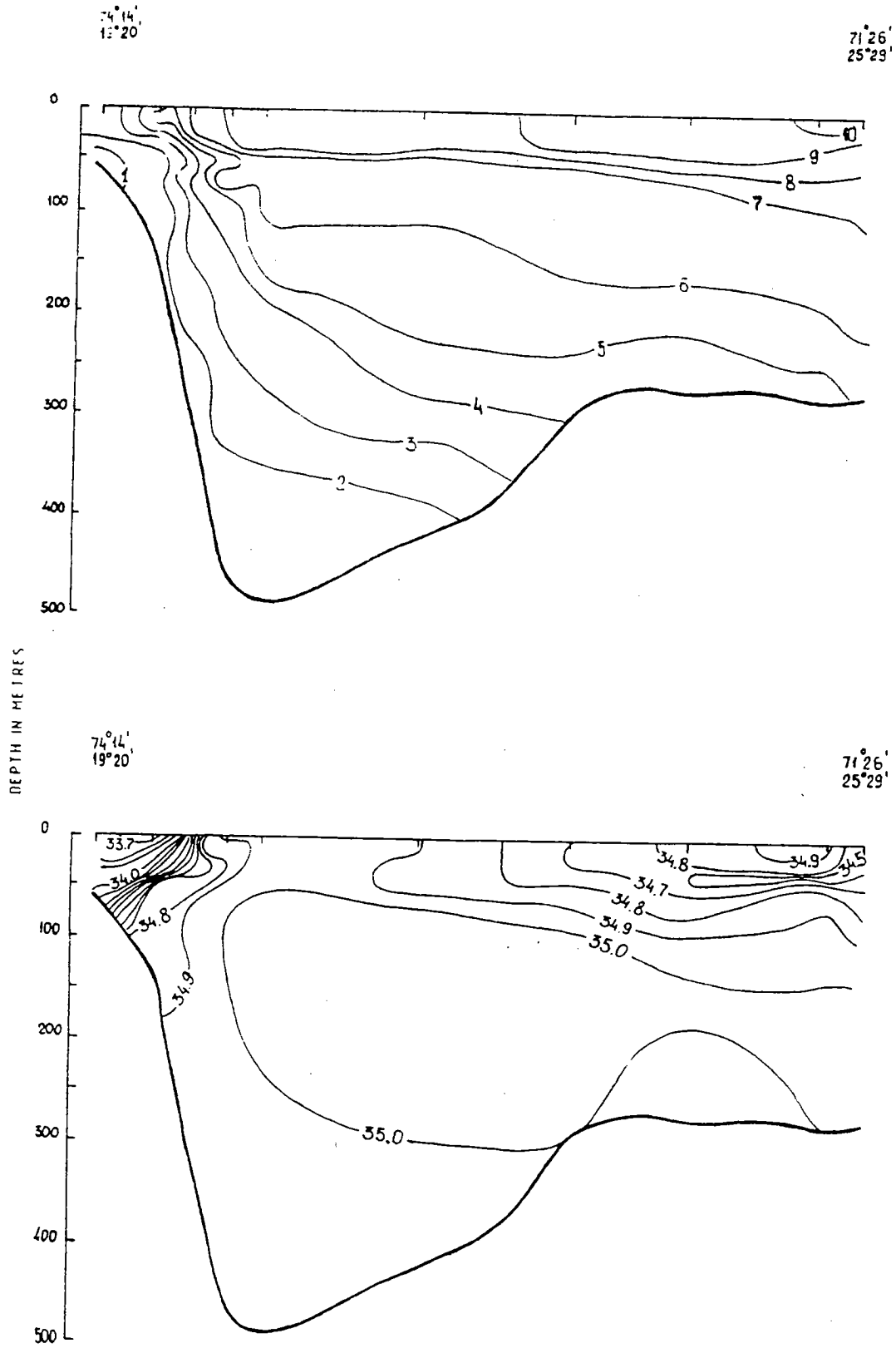


Fig. 14. Hydrographic section Bear Island - North Cape. Temperature and salinity.

The salinity, however, seems to have decreased. A decrease was observed in the layer 0-500 m west of Bear Island, and in all layers between surface and bottom in the Kola and Cape Kanin sections.

DISTRIBUTION AND ABUNDANCE OF 0-GROUP FISH AND GONATUS FABRICII

Geographical distributions of 0-group fish are shown as shaded areas in Fig. 16-27, and of *Gonatus fabricii* in fig. 28. 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 weighed by 10, are given in Table 2. Another set of abundance indices are 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.

Herring (Fig. 16)

0-group herring was caught on a far larger number of stations than has been observed during these surveys since 1983. However, the number of specimens caught at each station was low leading to a logarithmic index of 0.59. This value is slightly higher than for the 1984 and 1985 year-classes, but is considerable lower than the index of the 1983 year-class, estimated to 1.77.

Capelin (Fig. 17)

The area of distribution and the overall density is similar to what was recorded in 1983 and 1984, indicating that the 1989 year-class may be as abundant as the year-classes in the mid-eighties. However, according to the great variation in numbers of 0-group capelin in the catches, it must be stressed that an index of the year-class strength of capelin is not as reliable as for other species.

Mackerel (Fig. 18)

Some 0-group mackerel were caught in the south-western part of the survey area. No abundance index has been calculated.

Cod (Fig. 19)

The distribution of cod this year follows the same pattern as last year in the western and central part of the area. In the eastern part there is a separate distribution of cod close to Novaya Zemlja, and the main distribution also extends more to the south-east. The largest concentrations are found in this extension, but the indices calculated this year are only just above the indices of 1988. The logarithmic index is almost the same as in 1988 but the distribution index is about the average of the 1983 index and those found in 1987 and 1988. The yearclass is estimated as close to average.

Haddock (Fig. 20)

The distribution of haddock is somewhat different this year than last. Haddock is found to be distributed more to the north-east and there is practically no haddock in the south-western waters. The indices show the same picture as for cod, the logarithmic index being almost equal to that of 1988 and the distribution index slightly above that of 1987 and 1988. The yearclass is estimated as weak.

Saithe (Fig. 21)

Only a few catches of single fishes of saithe were obtained and these are given in the map. No index have been calculated.

Polar cod (Fig. 22)

As observed earlier, 0-group polar cod was observed in two separated areas, off Spitsbergen and in the south-eastern part of the Barents Sea. However, the concentrations this year were very sparse indicating the 1989 year-class to be a weak one.

Table 1. Mean water temperature during the International O-group fish survey in the Barents Sea and adjacent waters in late August - early September 1989.

- 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
1986	7.5	3.4	4.4	3.9	3.2	5.8	4.4
1987	6.2	3.3	3.9	2.6	2.5	5.2	3.9
1988	7.1	3.7	4.5	3.9	2.9	5.5	4.2
1989	8.6	4.8	5.8	6.5	3.4	6.9	4.9
Average							
1965-							
1989	7.3	3.7	4.6	4.2	3.3	5.7	4.4

Table 2. Abundance indices.

Species Year	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	65
1973	684	54		(26)	385	3	67
1974	51	147		227	468	13	83
1975	343	170		75	315	21	113
1976	43	112		131	447	16	96
1977	173	116	157		472	9	72
1978	106	61	107	70	460	35	76
1979	94	69	23	144	980	2	69
1980	49	54	79	302	651	12	108
1981	65	30	149	247	861	3	95
1982	114	90	14	73	694	17	150
1983	386	184	48	50	851	16	80
1984	486	255	115	39	732	40	70
1985	742	156	60	16	795	36	86
1986	434	160	111	334	702	55	755
1987	102	72	17	366	631	41	174
1988	133	86	144	155	949	8	72
1989	202	112	206	120	698	5	92

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

Year-class	Herring 1) Logarithmic index	Confidence limits	cod Logarithmic index	Confidence limits	Haddock Logarithmic index	Confidence limits
1965			+			
1966	0.14	0.04 0.31	0.02	0.01 0.04	0.01	0.01 0.03
1967	0.00	-	0.04	0.02 0.08	0.08	0.00 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	-	2.15	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

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

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

Length (mm)	Herring		Capelin		Cod		Haddock		Polar cod		Redfish	Greenland halibut	Long rough dab	Sandeel
	+		+		+		+		East	West				
10-14											0.2			
15-19			+								1.5			
20-24			0.4							3.7	4.8		3.4	+
25-29			3.3							34.5	6.6		6.4	-
30-34		+	7.3		0.3			0.1		30.0	10.9	+	25.4	-
35-39		+	7.7		0.9			0.7		19.8	16.3	+	43.6	-
40-44		+	14.6		1.5			1.7		7.7	18.5	-	18.5	+
45-49			19.5		1.6			2.7		3.4	14.9	-	2.7	+
50-54			20.4		2.1			3.8		0.5	17.0	+		+
55-59			12.4		2.1			4.1		0.3	8.4	-		0.1
60-64			6.7		3.8			6.5		+	0.7	+		0.1
65-69			11.4		6.7			5.9		-	0.2	-		0.1
70-74			18.3		11.7			8.1		-	+	-		0.8
75-79			19.9		15.8			8.6		-	+	+		2.9
80-84			18.2		20.2			11.2		-	+	-		0.1
85-89			14.3		15.4			8.9		0.1	+	-		8.9
90-94			8.6		10.4			9.2		-	+	-		5.8
95-99			3.6		4.3			7.0		0.1		+		26.1
100-104			0.7		1.9			7.5		-		-		24.2
105-109					0.8			4.9		-		-		7.5
110-114					0.1			5.0		-		-		4.0
115-119					+			1.9		-		-		6.3
120-124					+			0.5		-		-		2.1
125-129					+			0.6		-		-		4.1
130-134					+			0.3		-		-		3.4
135-139								0.1		-		-		1.4
140-144								0.1		-		-		0.7
														1.4
Total numbers	26277	1118197	3887	1093	961	124577	157990	9	953	33715				
Mean length (mm)	7.9	4.9	7.8	8.7	4.9	3.3	4.2	6.2	3.6	9.9				

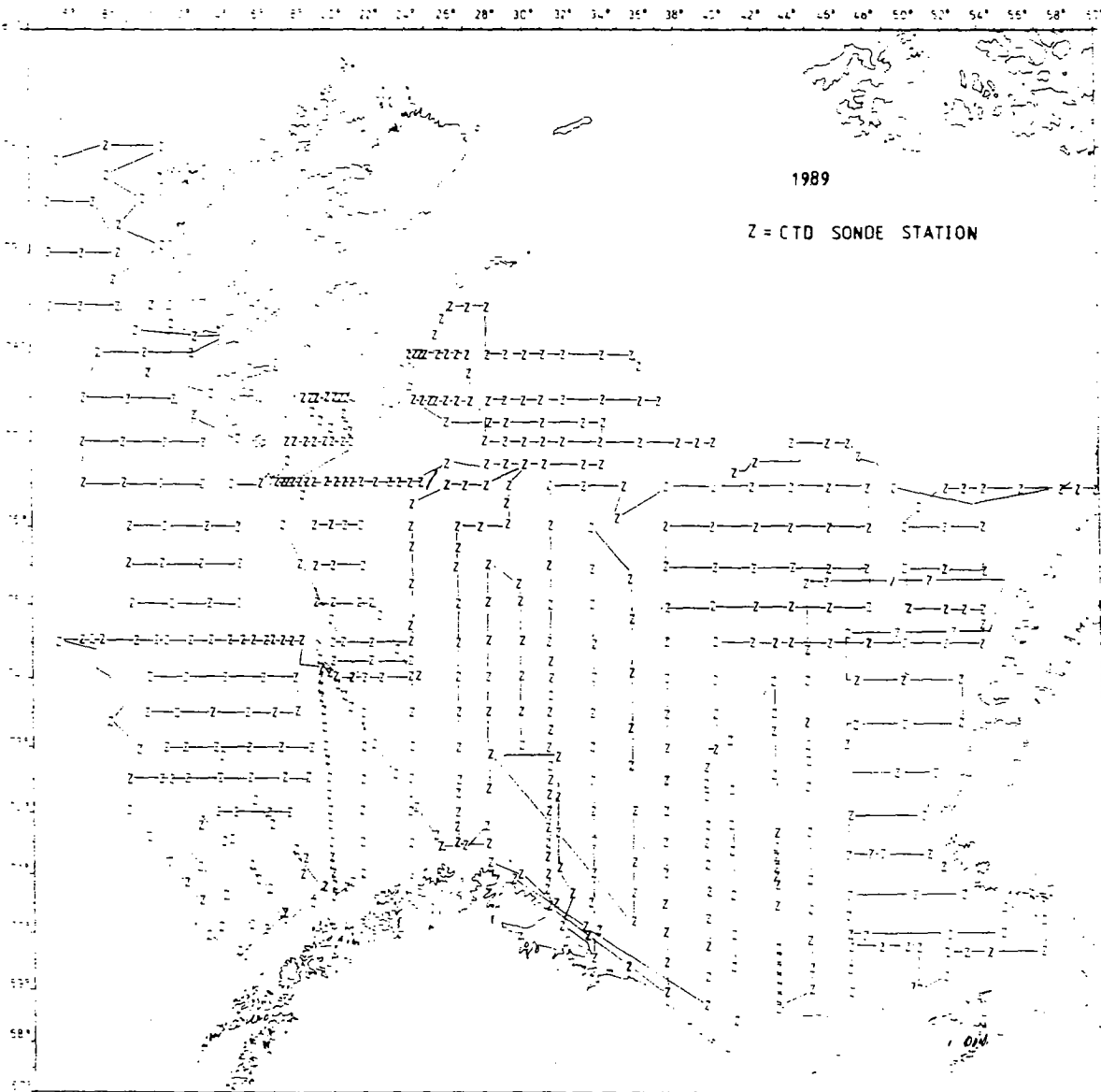


Fig. 1. Survey tracks of the ships and the grid of hydrographic stations.

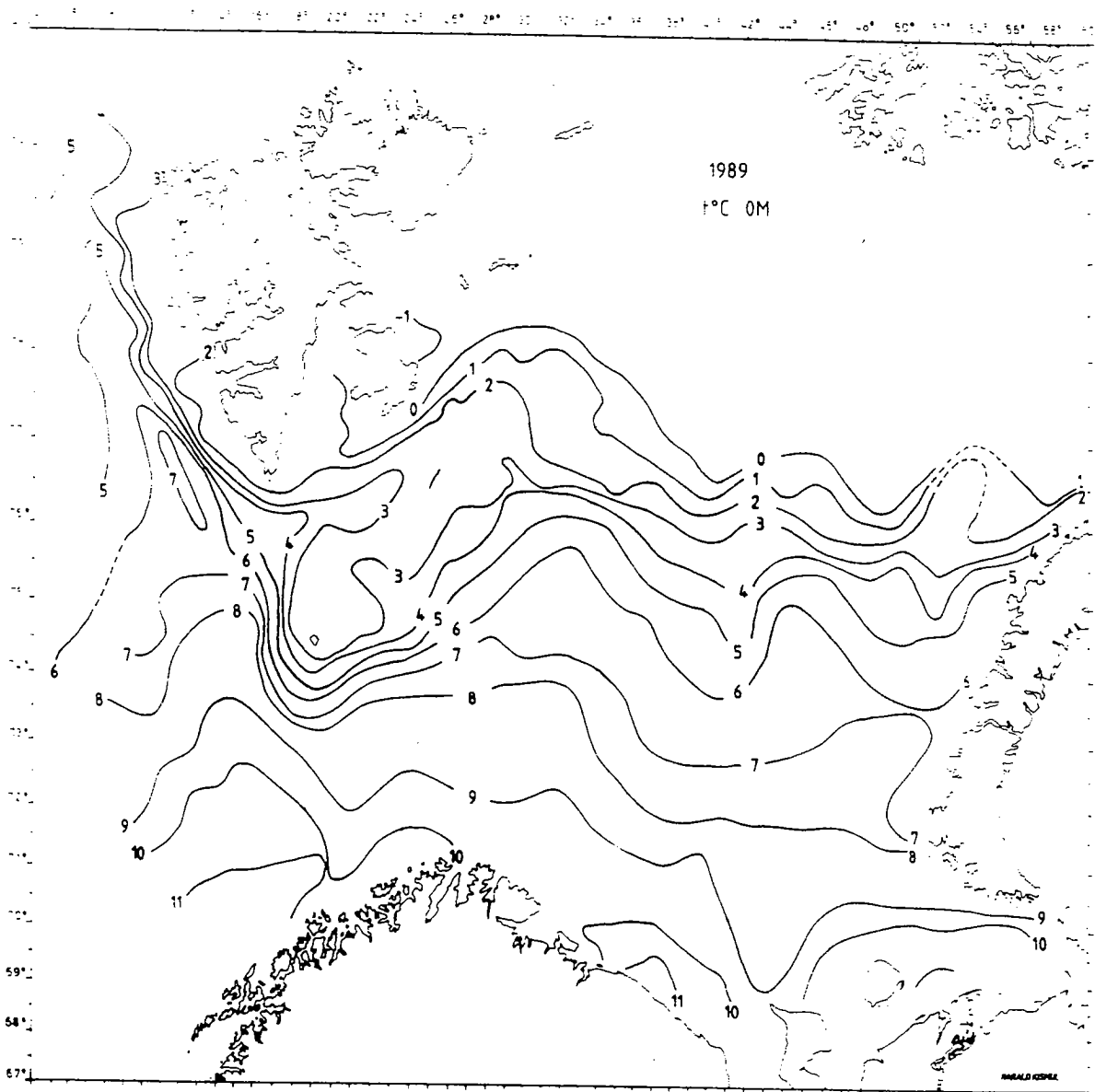


Fig. 2. Isotherms at 0 m.

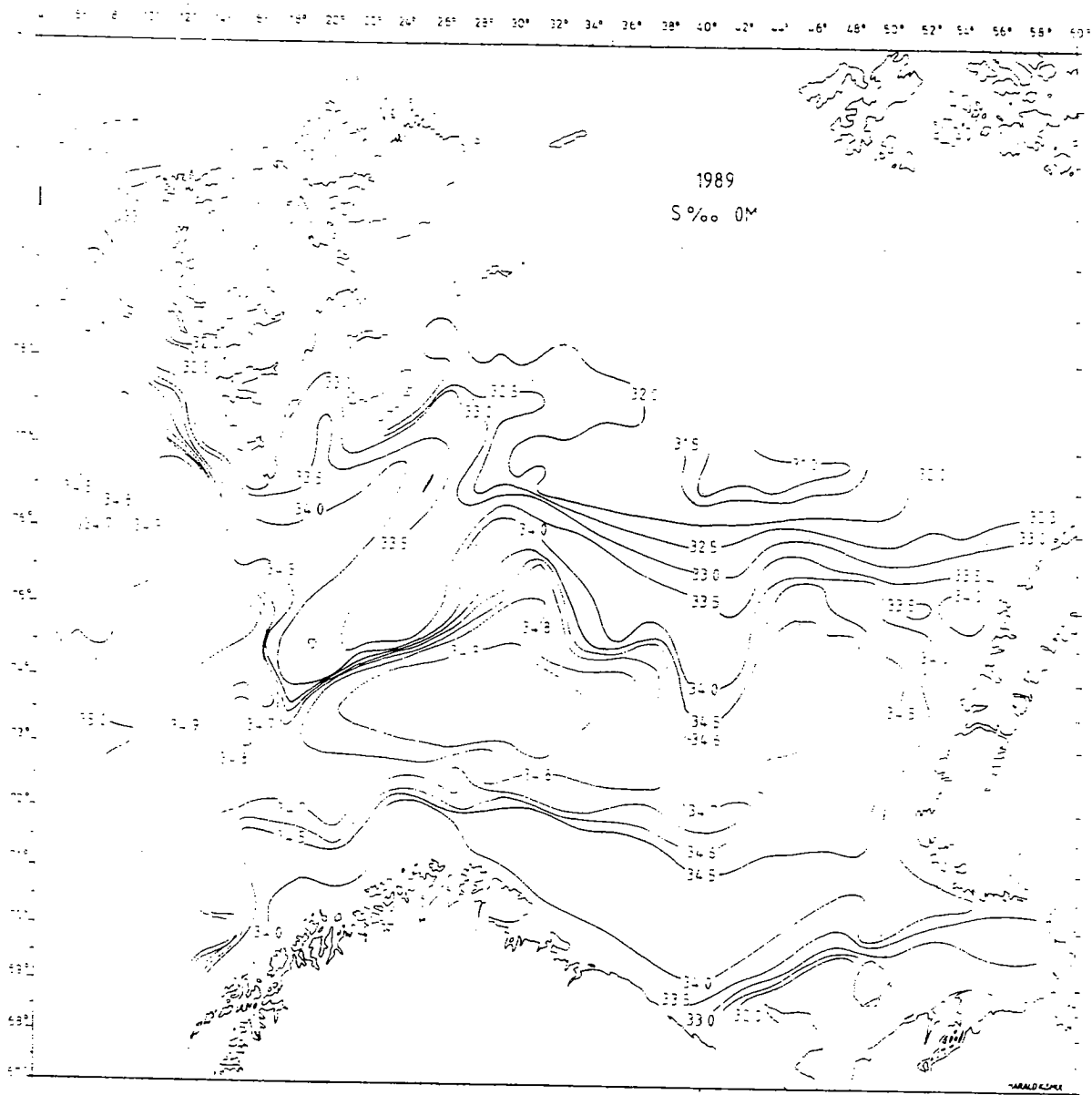


Fig. 3. Isohalines at 0 m.

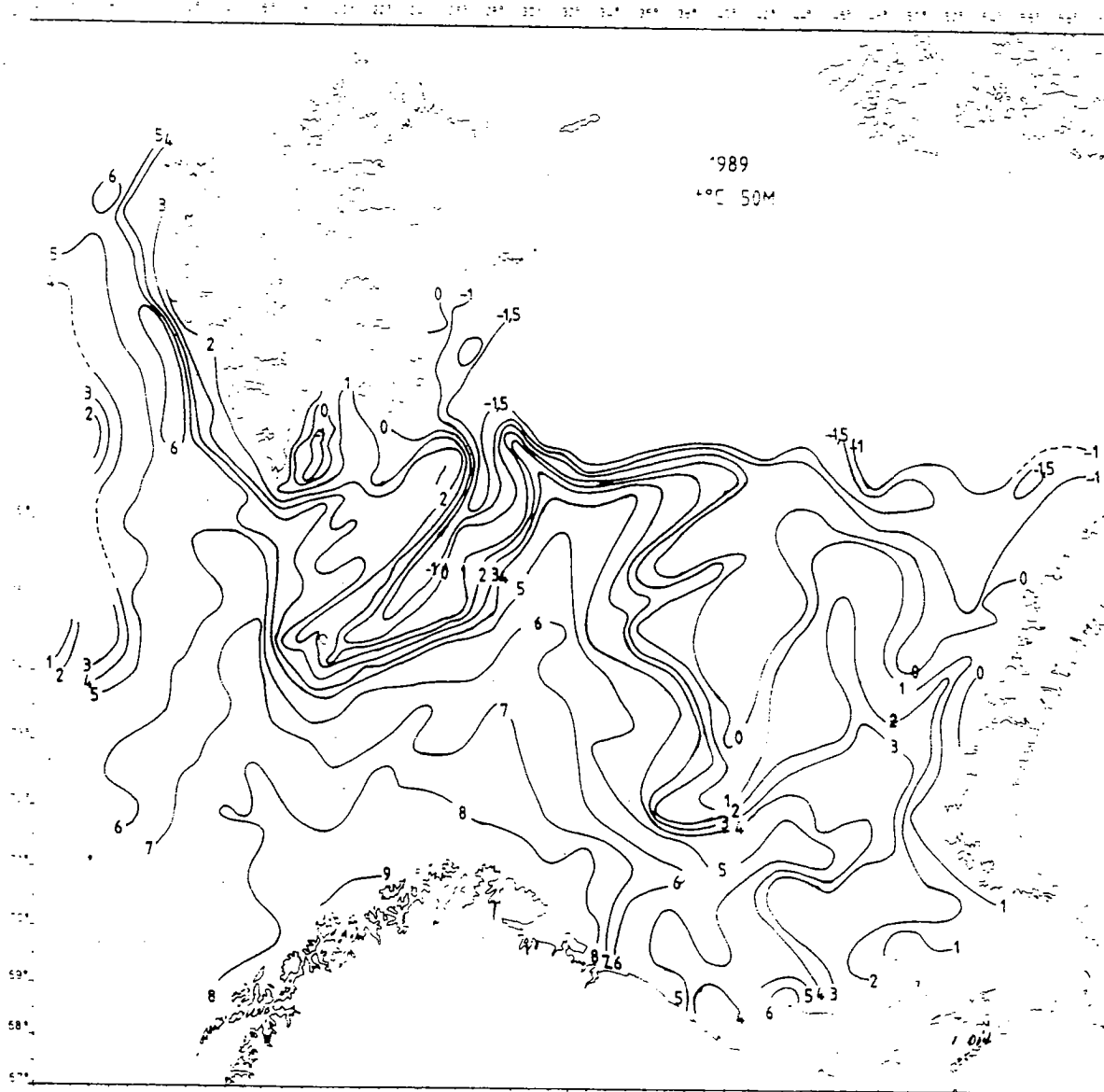


Fig. 4. Isotherms at 50 m.