International Council for
the Exploration of the Sea

PRELIMINARY REPORT OF THE INTERNATIONAL 0-GROUP FISH SURVEY IN THE BARENTS SEA AND ADJACENT WATERS IN AUGUST-SEPTEMBER 1987

The twenty-third annual International 0-group fish survey was made during the period 13 August - 3 September 1987 in the Barents Sea and adjacent waters. The following research vessels participated in the survey:

State	Name of vessel	Survey period	Research Institution
Norway	"Eldjarn"	17 August-3 September	Institute of Marine Research, Bergen
Norway	"G.O. Sars"	17 August-3 September	"
Norway	"Håkon Mosby"	20 August-3 September	"
USSR	"Artemida"	18 August-28 August	The Polar Research Institute of Marine Fisheries and Oceanography, Murmansk
USSR	"Vilnyus"	20 August-1 September	"

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

Preliminary analyses of the survey data were made 3-4 September in Hammerfest. Observations concerning the geographical distribution of 0-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 small mesh midwater trawl. The vessels participated in the survey in 1986 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 nautical miles sailed the trawl was towed in several depths in one haul. The standard procedure consisted of towings 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 hydrographic stations are given in Fig. 1. Trawl stations with and without catch are given on the distribution charts in Figs. 14 - 21, as filled and open symbols respectively. The density grading is based on catch in number per 1.0 nautical mile trawled.

HYDROGRAPHY

Hydrographic observations were made along all the survey tracks with 30 - 40 nautical miles between stations.

Horizontal temperature and salinity distribution are shown for 0, 50, 100 and 200 m depth (Figs. 2 - 9). Figs. 10 - 13 show the temperature and salinity conditions in the Kola, Cape Kanin - Bear Island and Bear Island - West sections. The mean temperature for parts of these sections are given in Table 1.

In 1987 the temperature decreased in all layers of the Barents Sea compared to 1986, most in the surface layer. This is clearly demonstrated with values from the Kola section (Table 1). The temperature decrease is therefore mainly due to less warming of the surface layer from the atmosphere, but the temperature of the inflowing current are also somewhat lower than last year. The most considerable negative anomalies compared to the long-term mean were found in the middle and eastern parts of the sea.

DISTRIBUTION AND ABUNDANCE OF 0-GROUP FISH

Geographical distributions of 0-group fish are shown as shaded areas in Figs. 14 - 21. 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. 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.

Herring (Fig. 14)

The overall density and the area of distribution of herring is about the same as last year, but far smaller than it has been for the 1983-1985 year classes. Only a few individuals are caught in the area covered by the five vessels. The estimated logarithmic index for 1987 is zero, indicating a weak year class compared to the strength of the year classes in the early seventies and early eighties.

Capelin (Fig. 15)

Although the results from the Barents Sea 0-group survey have not given a reliable index of year class strength of capelin, it is evident that the 1987 year class is very weak. This year, as last year, the western distribution was to the east of 30° E. No dense concentrations were observed and the density is much lower than it has been for any of the year classes in the period 1980-1985.

Cod (Fig. 16)

The 0-group cod is this year found further to the west (west of 36° E) and not as far north in the Barent Sea as last year. No dense concentrations is observed and the catch per nautical mile is lower than last year. The indices (Tables 2 and 3) indicate a poor year class. The logarithmic index indicates the strength to be of the same level as the poor 1980 - 1981 year classes, corresponding to about 1/10 of the average strength of the 1983 - 1986 year classes, classified as strong ones.

Haddock (Fig. 17)

As last year, haddock is only found in the central and western part of the area. The eastern and northern borders are further to the west and not as far north as observed in 1986. No dense concentrations are observed and the indices (Table 2 and 3) indicate about a poor year class, following a series of good year classes in 1982-1986. The logarithmic index indicates that the 1987 year class is about 1/4 of the 1986 year class.

Polar cod (Fig. 18)

Last year, polar cod was found as a continuous distribution from the east to the west in the northern part of the survey area. Even that year the total area of distribution was not covered. However, this year, the polar cod is found in two separate components, a western and an eastern. Dense concentrations is only found in the eastern area, and the abundance index for the 1987 year class in this component is close to 2/5 of those for the 1985-1986 year classes, which were indicated to be strong ones in the survey area. In the area to the west of 25° E, the density is estimated to be about 1/7 of the 1986 year class.

Redfish (Fig. 19)

The distribution of redfish resembles that of last year, although the eastern border is further to the west in 1987. The highest abundance is found in the western part of the central survey area. The index (Table 2) is high , although the index is somewhat less than for the previous year classes. The 1987 year class is indicated to be rich.

Greenland halibut (Fig. 20)

The distribution is similar to the distribution observed in 1986. The abundance index (Table 2) is at the same level as observed for the 1984-1986 year classes, indicating a good year class.

Long rough dab (Fig. 21)

Long rough dab is widely distributed as last year, although the eastern boarder is somewhat further to the west. Some dense concentrations is found in the central part of the survey area. The abundance index (Table 2) is about 1/4 of the 1986 year class, indicating an average year class.

Blue whiting

No 0-group blue whiting is found this year.

Sandeel

Few catches of 0-group sandeel is recorded in the southeastern part of the survey area. No high concentrations are observed and no abundance index is calculated.

Squid

Squid is widely distributed in the western part of the survey area, and few is caught east of 25^0 E. In 1987, the abundance of squid is at a much higher level than observed in previous years.

REFERENCES

ANON. 1980. Preliminary report of the International 0-group fish survey in the Barents 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 Barents 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.

Toresen, 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.]

Table 1. Mean water temperature during the International 0-group fish survey in the Barents Sea and adjacent waters in late August - early September 1987.

2-4 - Murmansk Current: Kola section (70°30'N - 72°30'N)

5 - Cape Kanin section (68°45'N - 70°05'N)

6 - Cape Kanin section (71°00'N - 72°00'N)

7 - North Cape Current: North Cape- Bear Island section (71°33'N; 25°02'E - 73°35'N; 20°46'E)

8 - West Spitsbergen Current: Bear Island - West section (06°34'E - 15°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
Average 1965-1987	7.2	3.6	4.5	4.1	3.3	5.6	4.4

Table 2. Abundance indices.

Species Year	Cod	Haddock	West	Polar cod	East	Redfish	Greenland halibut	Long rough dab
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		70	472	9	72
1978	106	61	107		144	460	35	76
1979	94	69	23		302	980	23	69
1980	49	54	79		247	651	12	108
1981	65	30	149		73	861	38	95
1982	114	90	14		50	694	17	150
1983	386	184	48		39	851	16	80
1984	486	255	115		16	732	40	70
1985	742	156	60		334	795	36	86
1986	434	160	111		366	702	55	755
1987	102	72	17		153	631	41	174

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	0.14	0.04	0.31	+			0.01	0.01	
1966	0.00	-	-	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	0.01	0.00	0.04	0.02	0.01	0.04	0.00	0.00	0.02
1969	0.00	-	-	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

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 East	Polar cod West	Redfish	Greenland halibut	Long rough dab	Sandeel
10-14							2.2			
15-19		+					9.3			
20-24		0.7				3.5	17.2		1.3	
25-29		11.2	0.1	0.1	0.6	9.2	18.7		11.0	
30-34		11.6	1.0	1.7	16.5	30.6	27.0	0.4	32.5	
35-39	9.1	19.8	1.6	3.3	37.5	29.6	16.0	0.9	35.0	
40-44	36.4	9.0	10.1	7.7	31.1	21.6	8.1	3.1	17.5	0.1
45-49	27.3	10.0	15.3	11.6	10.9	5.1	1.4	4.4	2.7	5.0
50-54	18.2	9.2	19.2	10.3	3.5	0.2	0.1	11.0	+	12.5
55-59	9.1	9.1	21.1	13.6				14.5		52.0
60-64		8.1	20.2	16.6				25.6		22.4
65-69		6.4	8.6	8.4		0.2	+	15.4	+	2.9
70-74		3.5	2.0	6.5				16.3		0.2
75-79		1.2	0.8	2.2				7.9		2.9
80-84		0.1		0.9				0.4		1.6
85-89				1.8						0.3
90-94				0.7						
95-99				0.6						
100-104				0.6						
105-109				0.6						
110-114				0.3						
115-119				0.1						
120-124										
125-129										
130-134										
135-139										
140-144										
Total numbers	11	4164	891	775	22558	487	118761	227	4784	858
Mean length (mm)	46.6	46.1	55.2	58.5	39.8	36.2	29.9	62.7	35.7	58.9

+) Less than 0.1
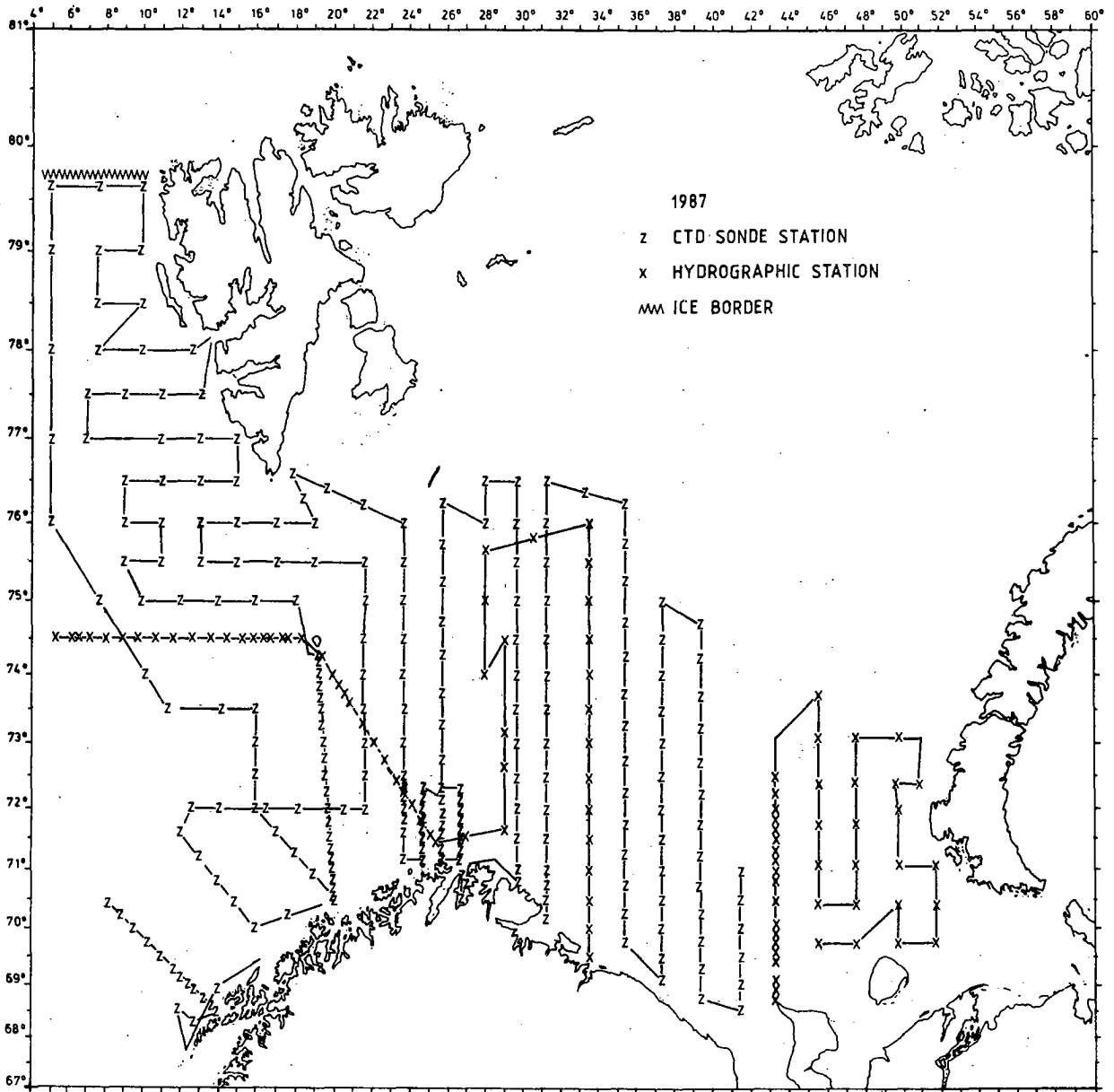
Fig. 1. Survey tracks of the ships and the grid of hydrographic stations.
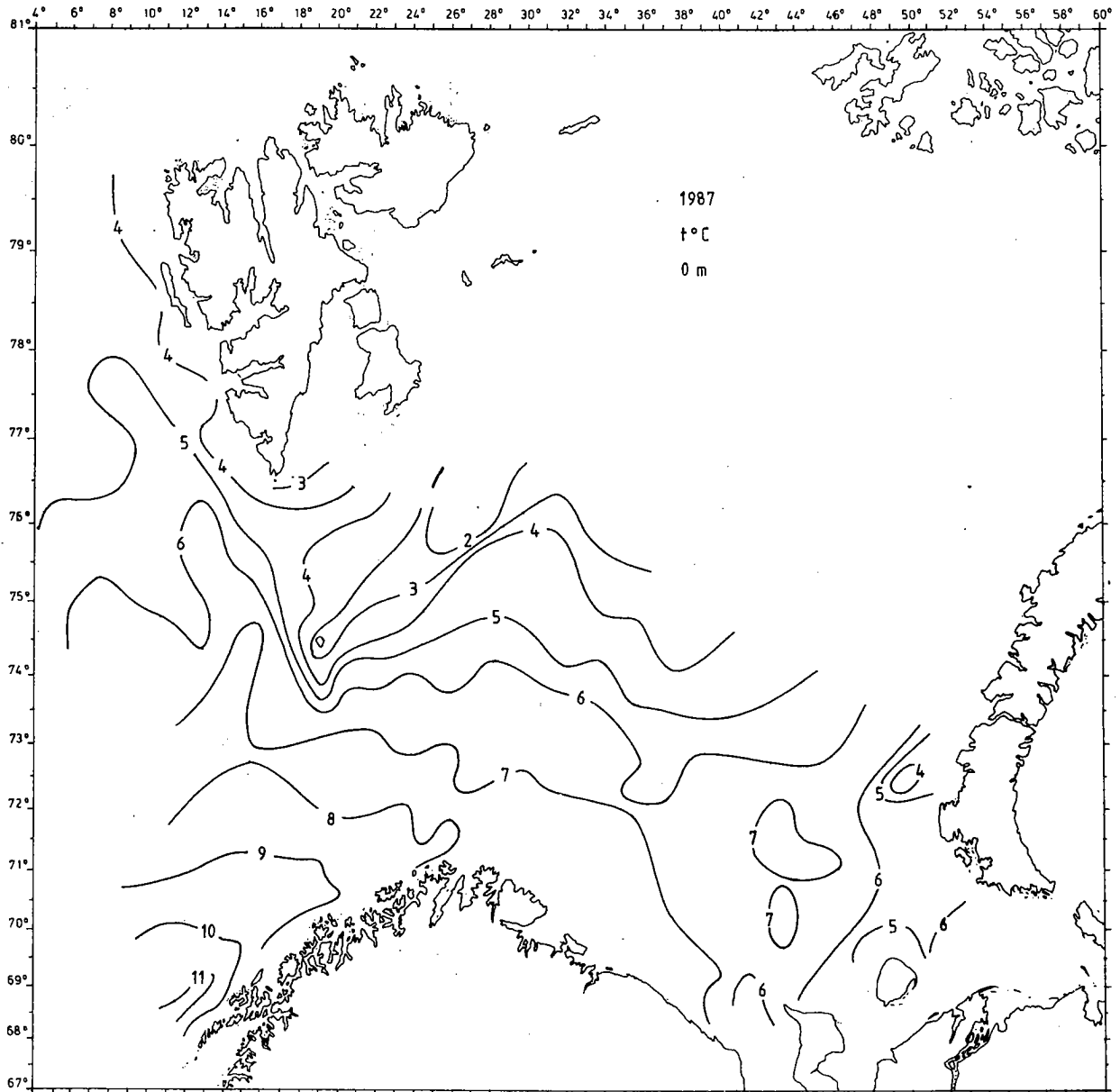
Fig. 2. Isotherms at 0 m.
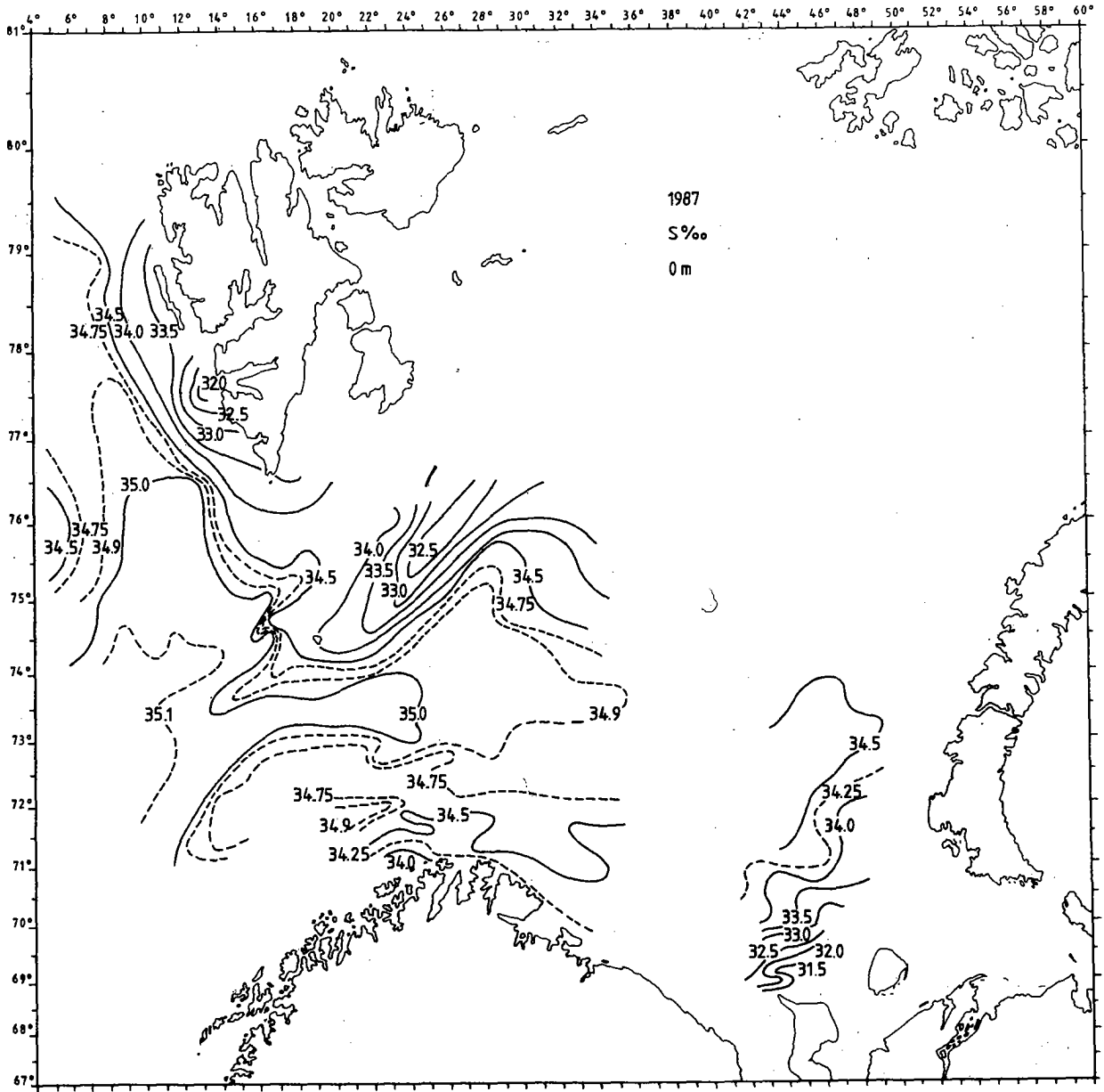
Fig. 3. Isohalines at 0 m.
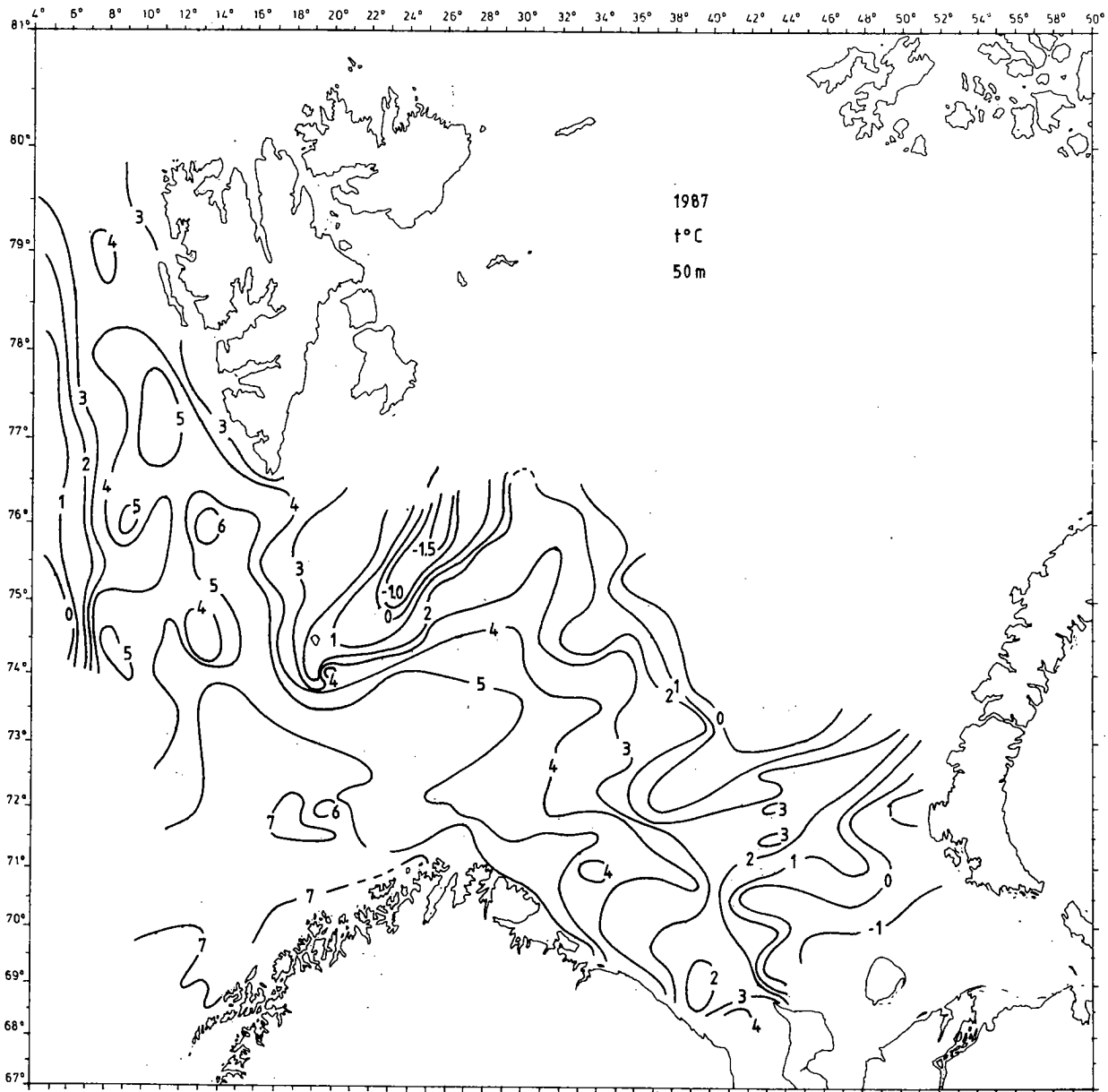
Fig. 4. Isotherms at 50 m.
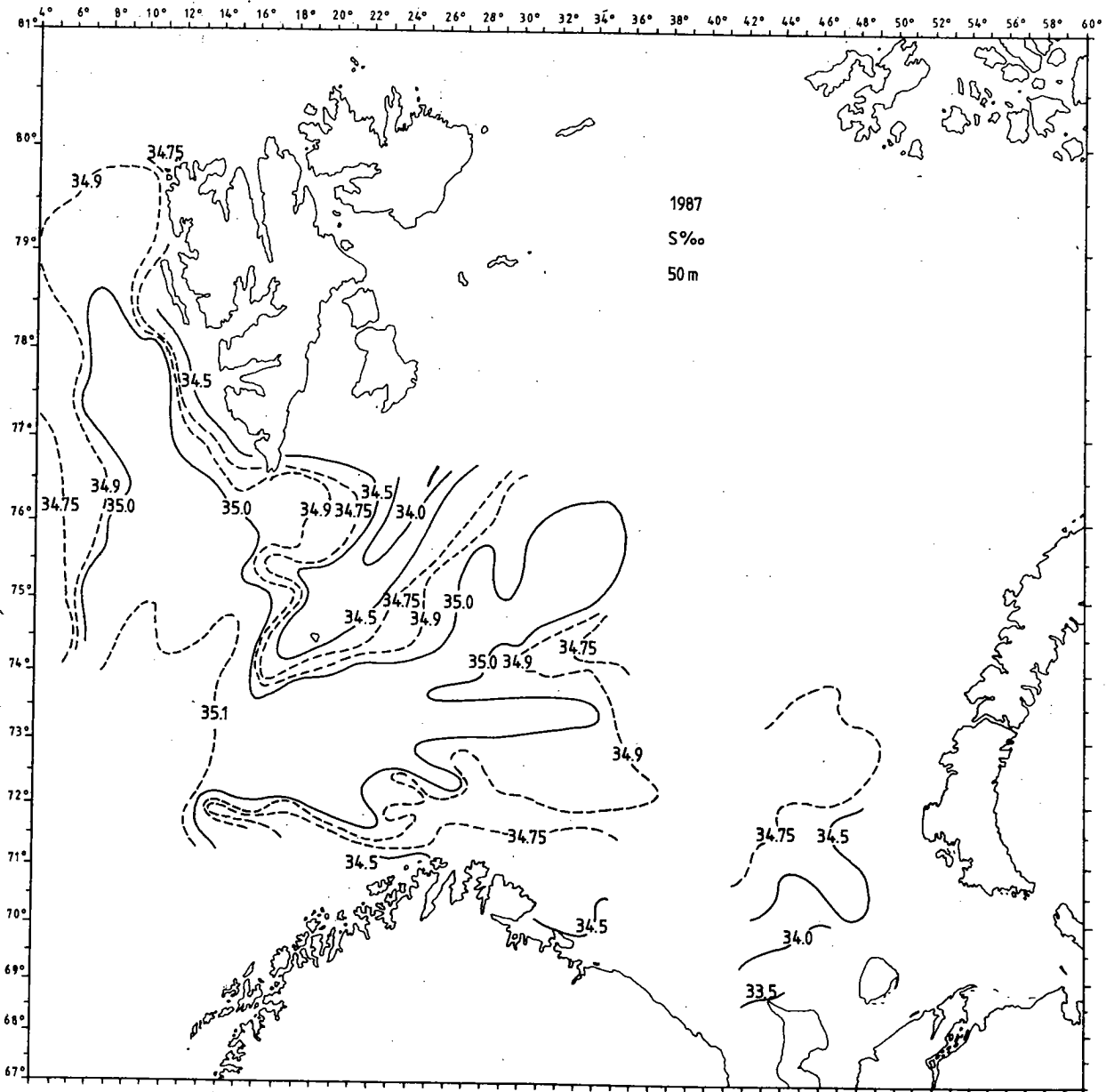
Fig. 5. Isohalines at 50 m.
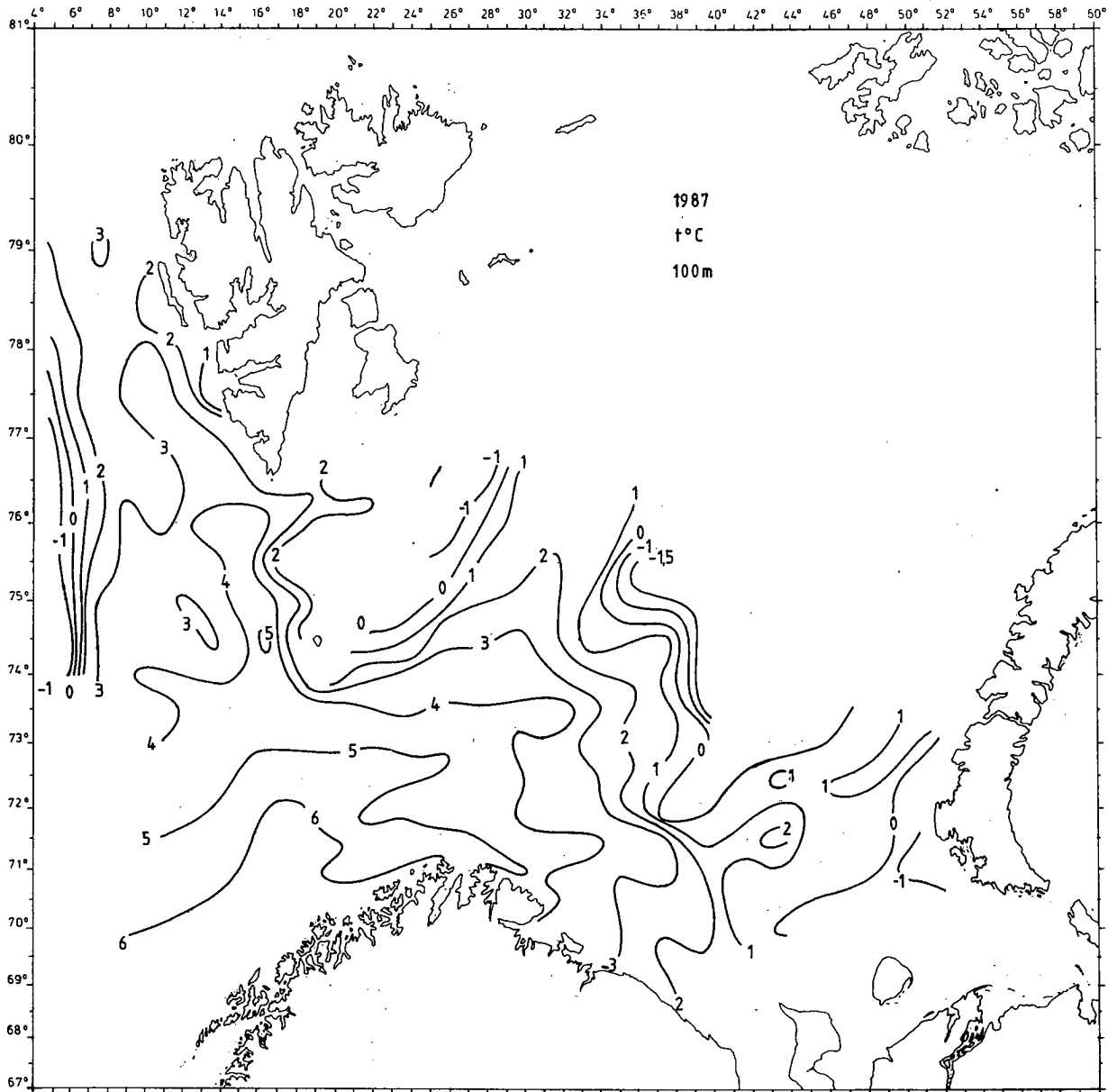
Fig. 6. Isotherms at 100 m.
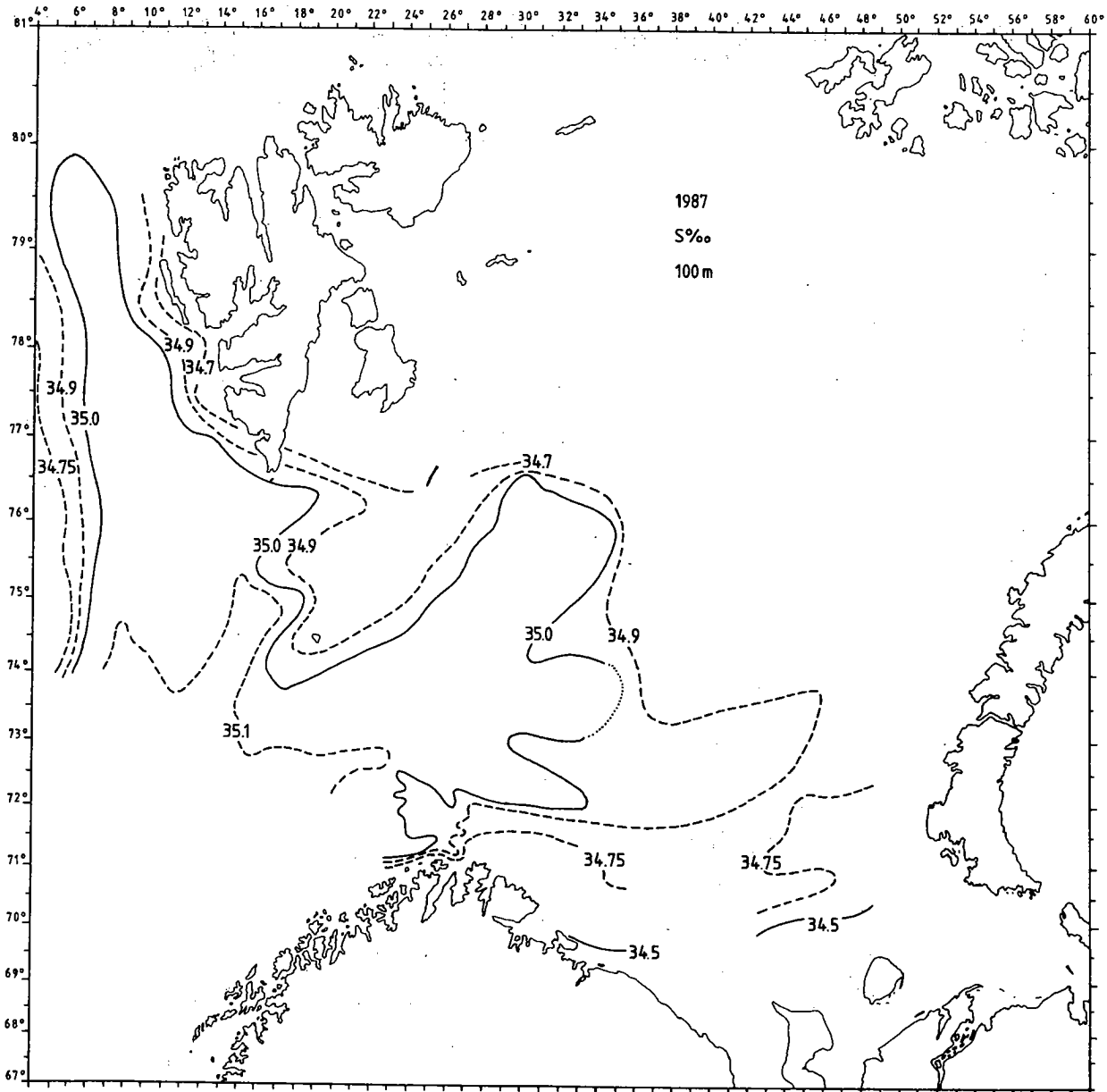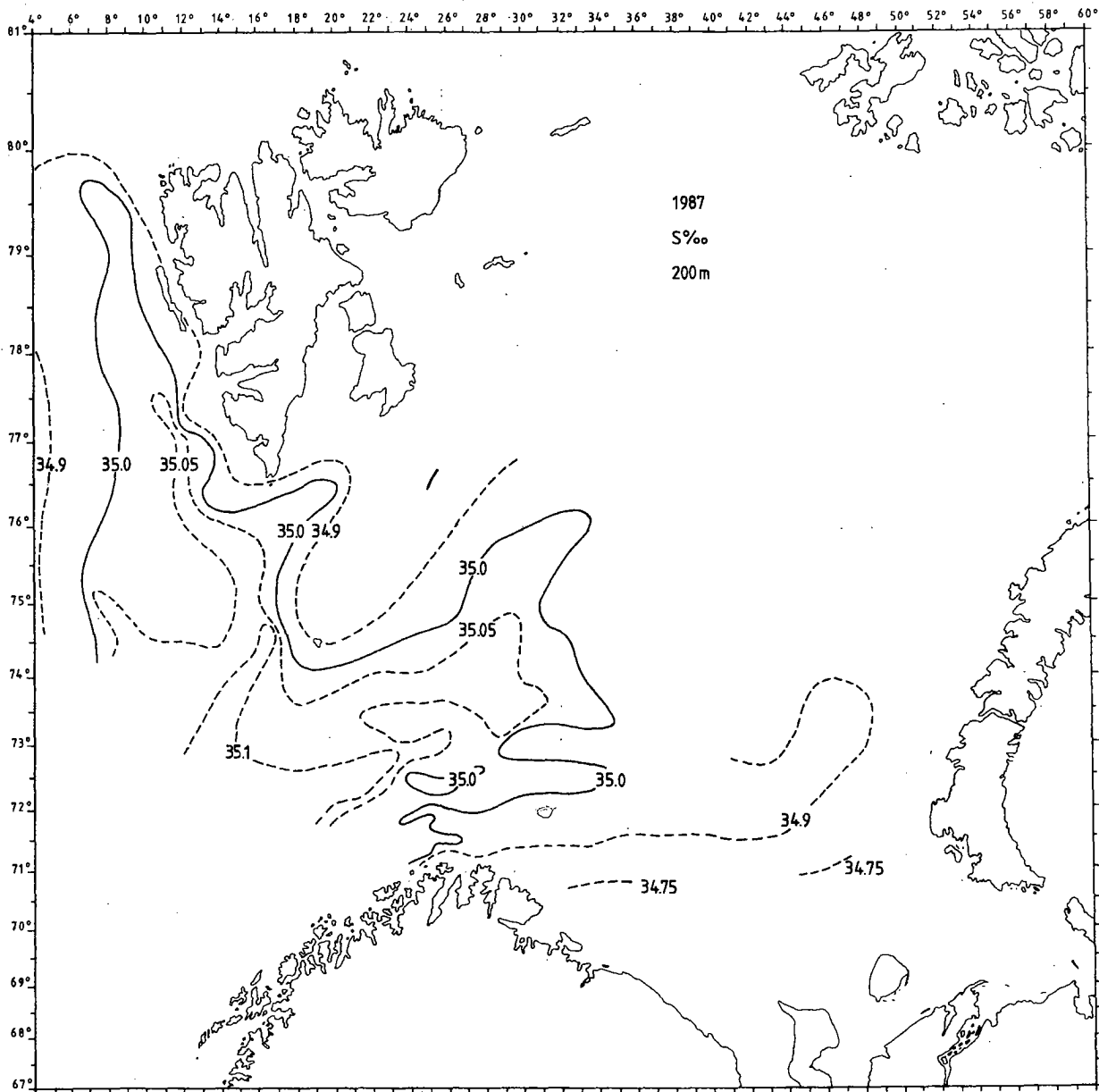
Fig. 7. Isohalines at 100 m.
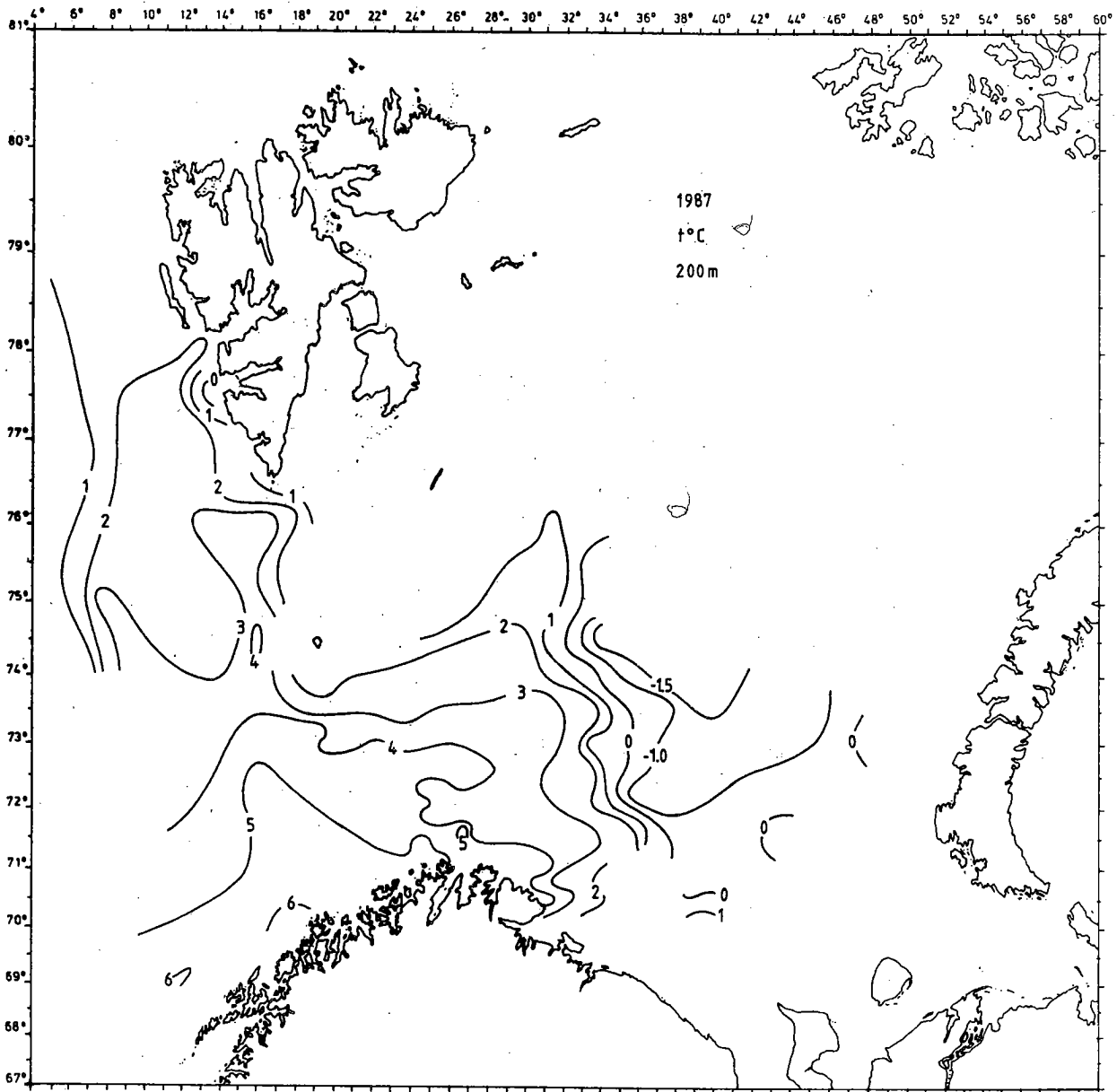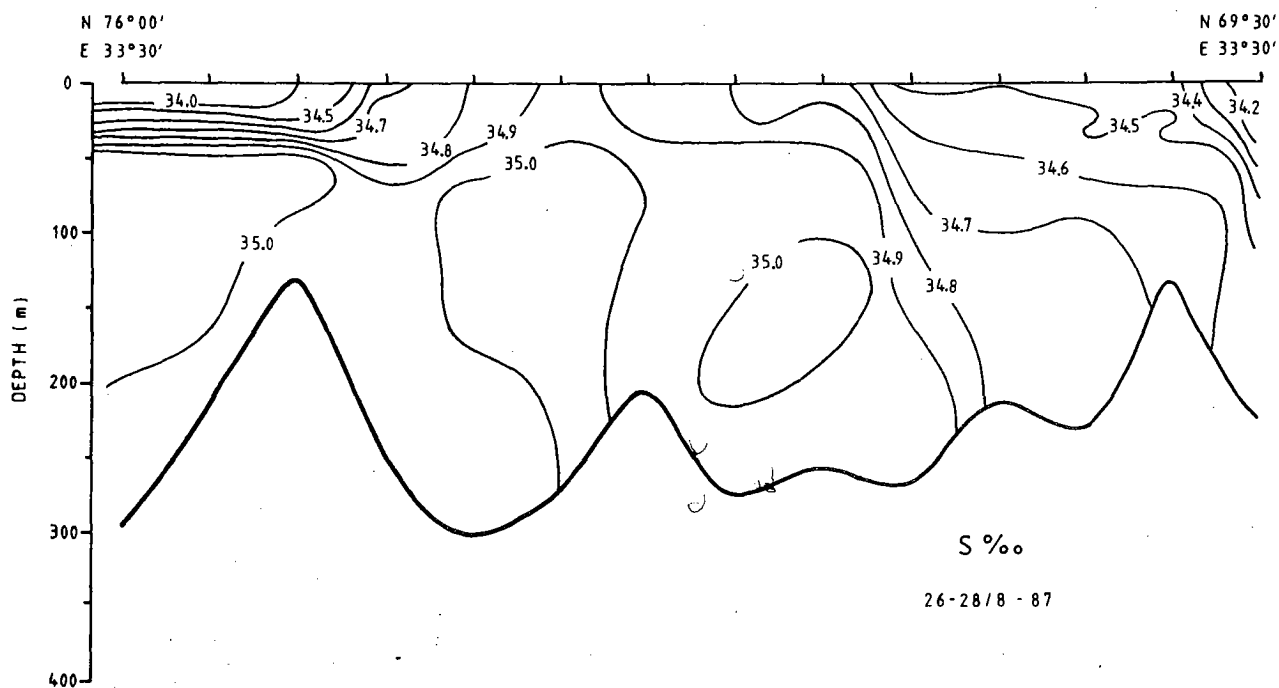
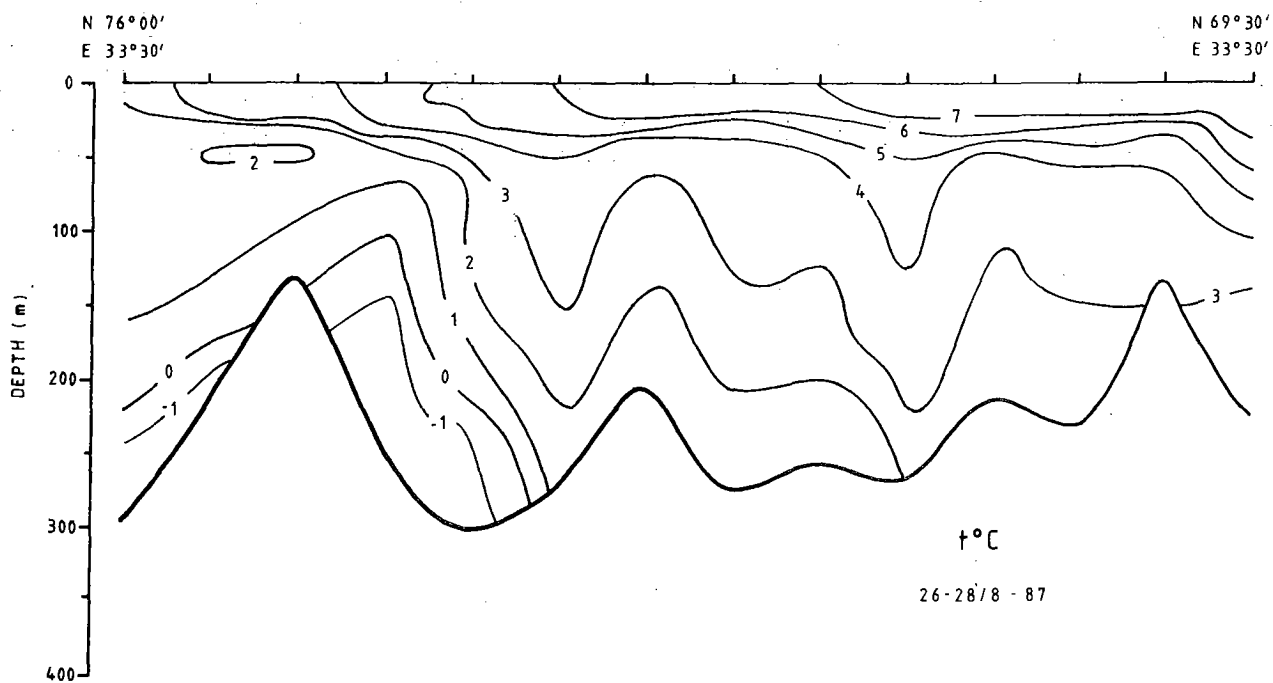Fig. 8. Isotherms at 200 m.

Fig. 9. Isohalines at 200 m.

N 76°00'
E 33°30'

N 69°30'
E 33°30'

0

100

DEPTH (m)

200

300

400

2

3

2

1

0

-1

0

-1

0

7

6

5

4

3

t°C

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N 76°00'
E 33°30'

N 69°30'
E 33°30'

0

100

DEPTH (m)

200

300

400

34.0

34.5

34.7

34.8

34.9

35.0

35.0

35.0

34.9

34.8

34.7

34.6

34.5

34.4

34.2

S ‰

26-28/8 - 87

Fig. 10. Hydrographic section along the Kola meredian.
         Temperature and salinity.

N 72°30'
E 43°15'

N 68°45'
E 43°15'

DEPTH (m)

0

100

200

300

7

7

5

4

3

2

1

1

0

1

0

t°C

21-23/8-87

N 72°30'
E 43°15'

N 68°45'
E 43°15'

DEPTH (m)

0

100

200

300

34.75

34.9

34.5

34.25

34.0

33.0

32.0

S ‰

21-23/8-87
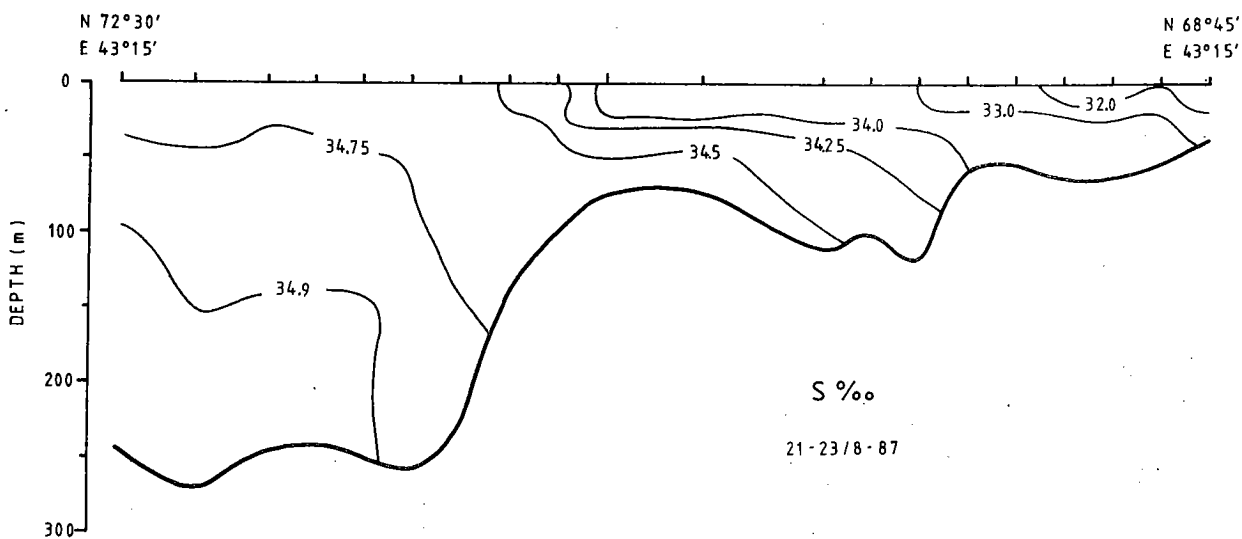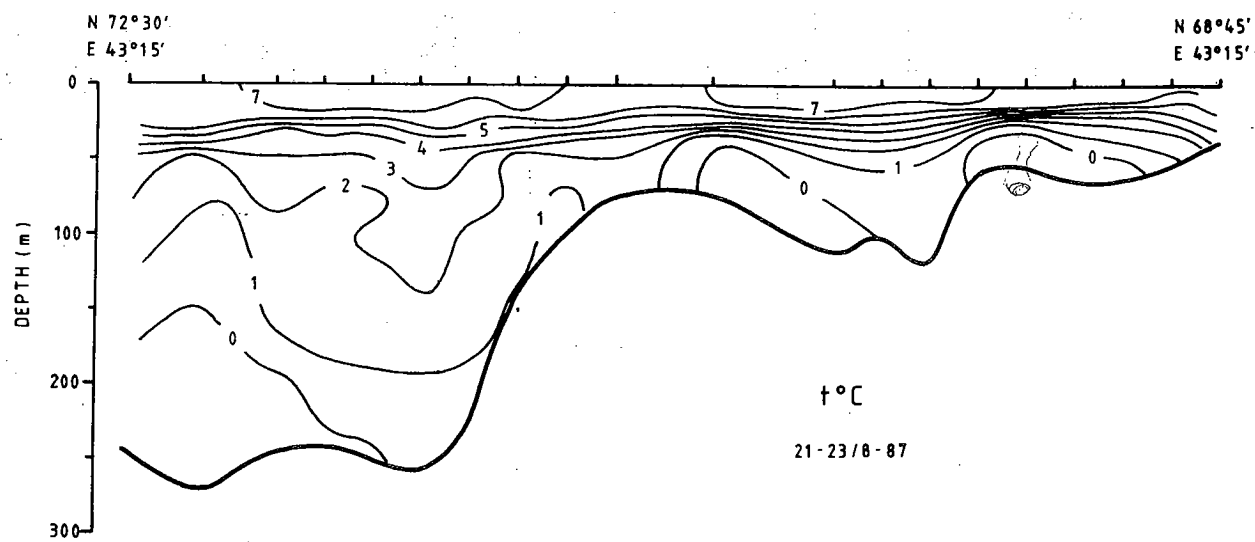
Fig. 11. Hydrographic section Cape Kanin-North. Temperature
and salinity.
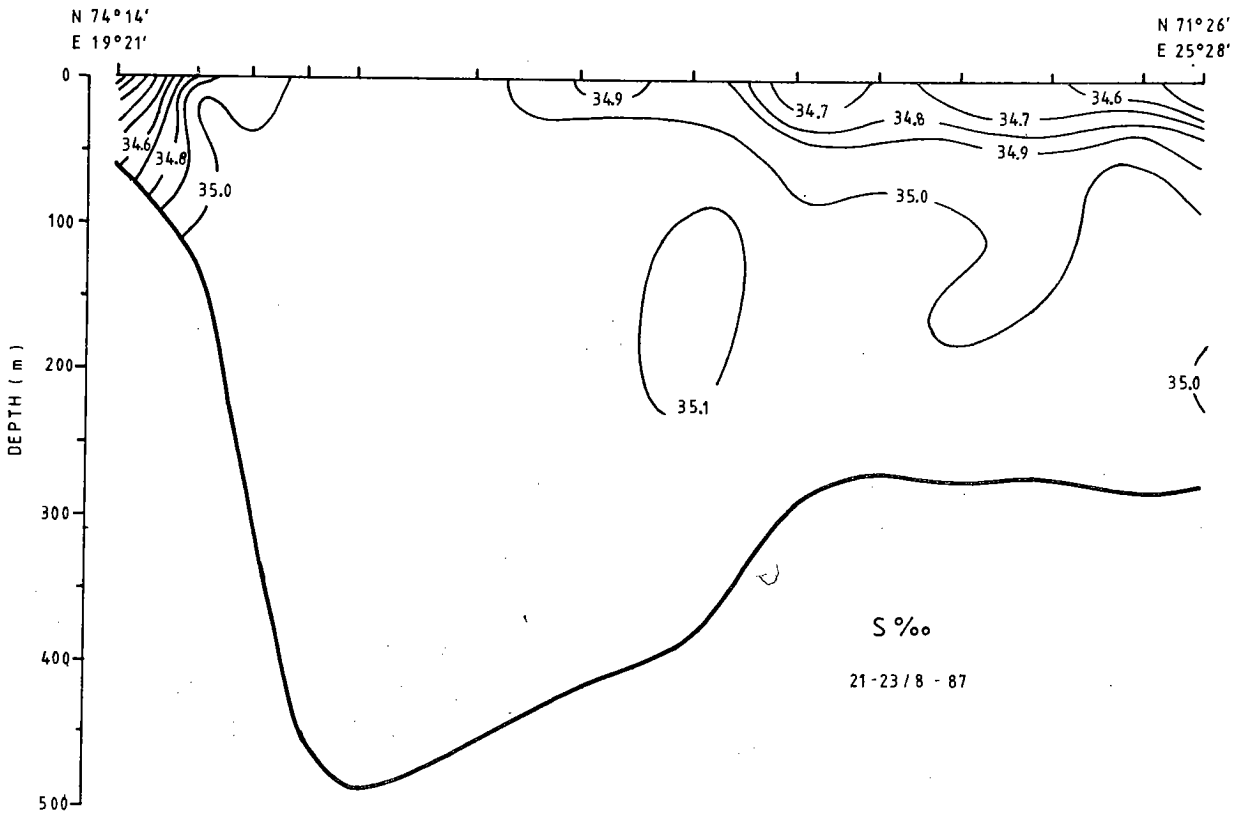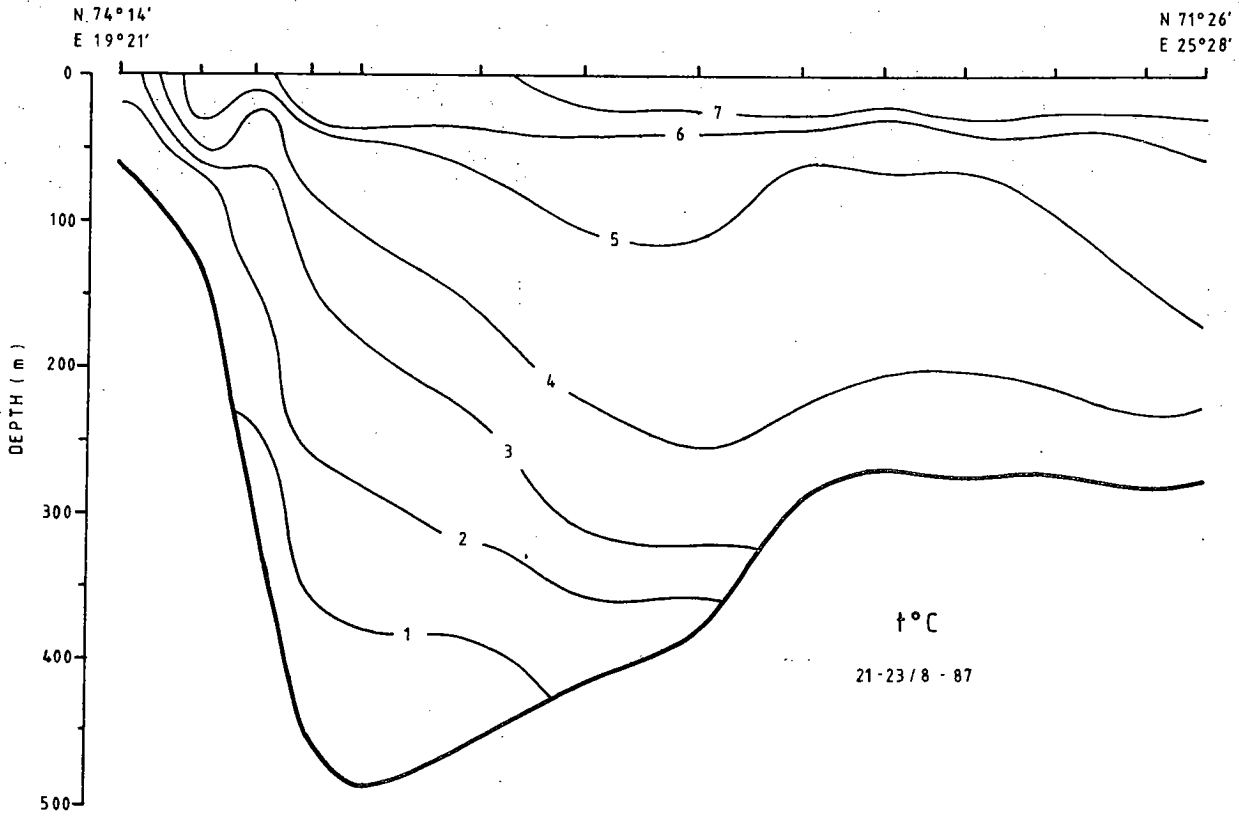
Fig. 12. Hydrographic section Bear Island - North Cape.
Temperature and salinity.
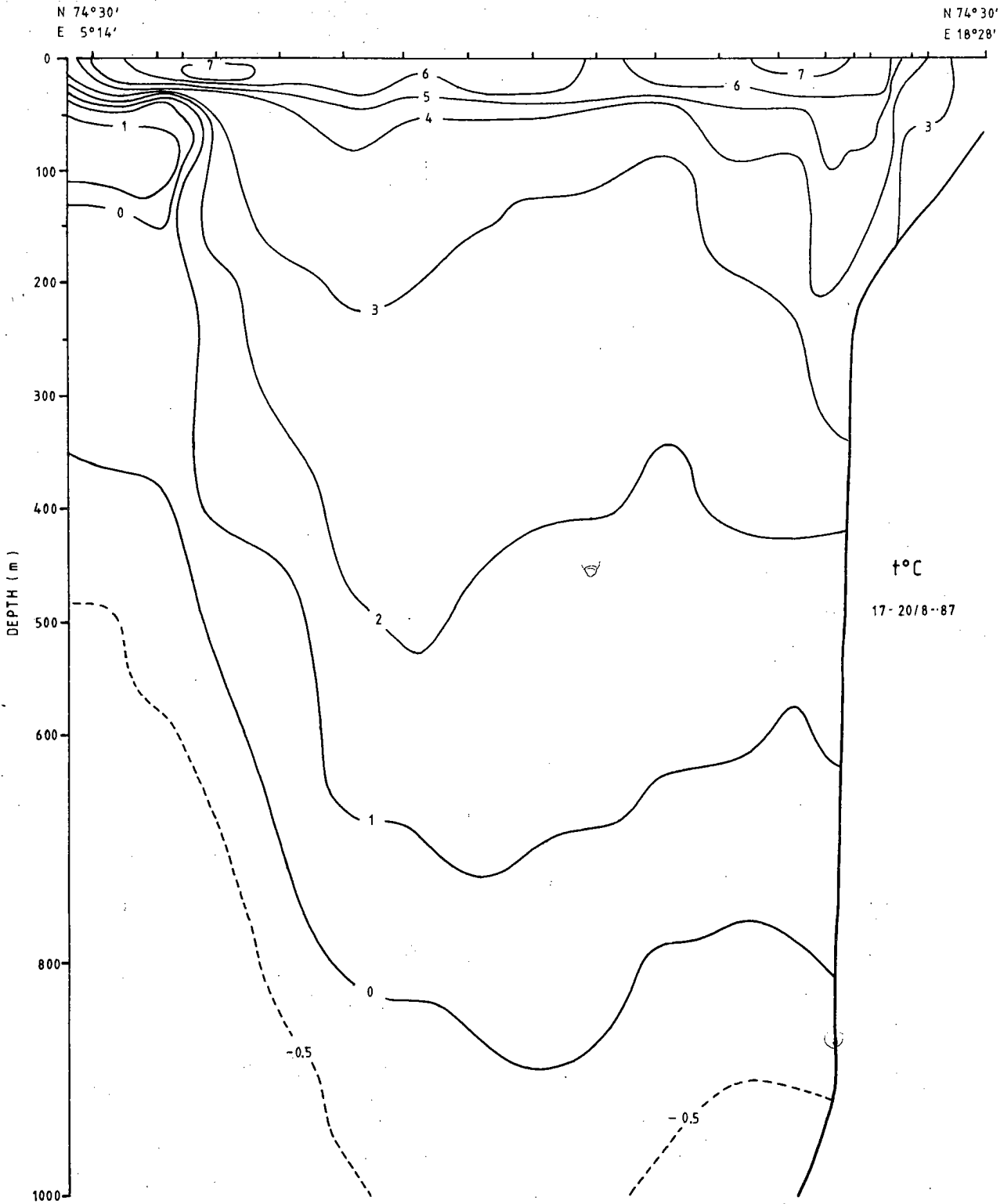
Fig. 13a. Hydrographic section Bear Island-West. Temperature.
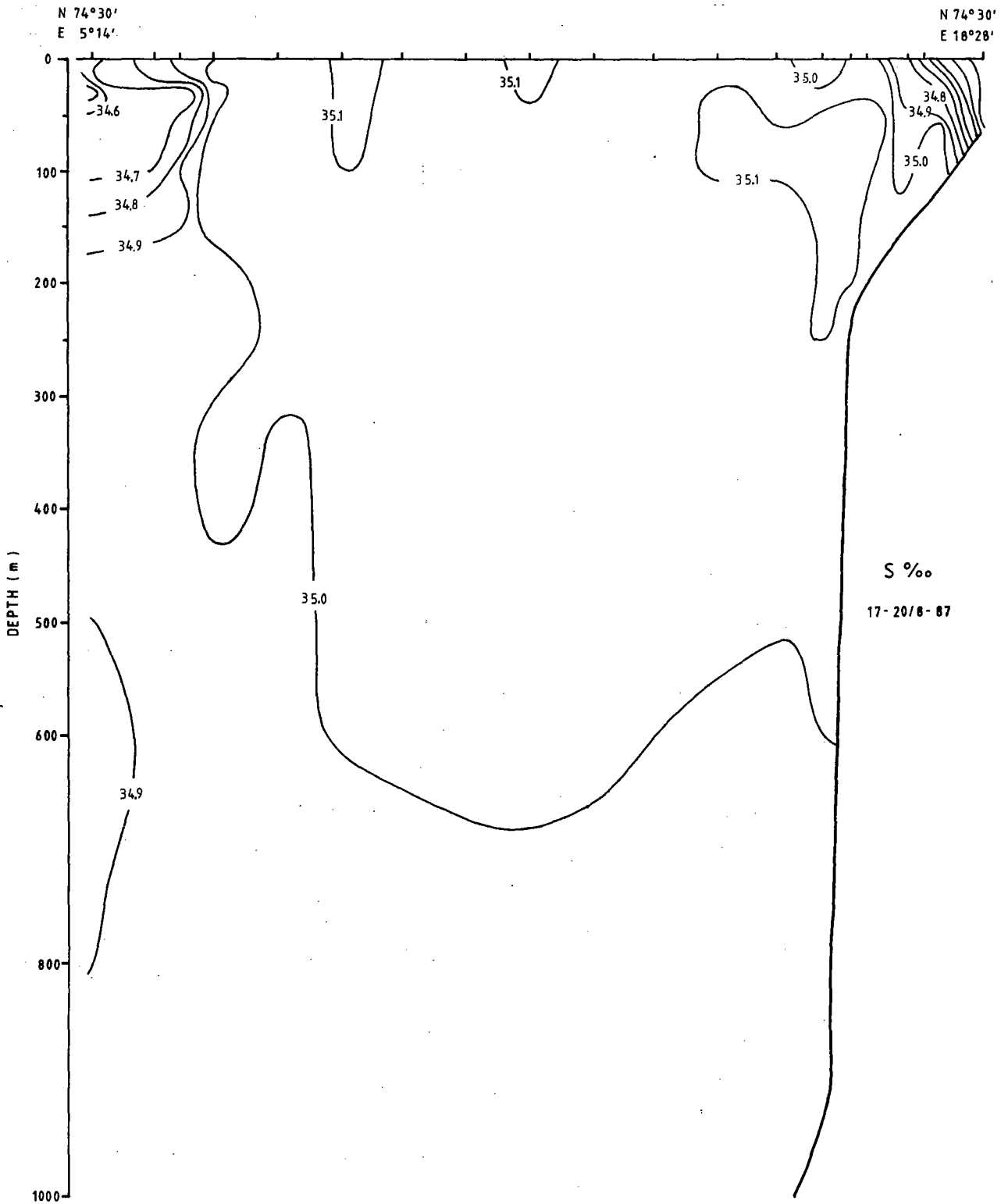
Fig. 13b. Hydrographic section Bear Island-West. Salinity.
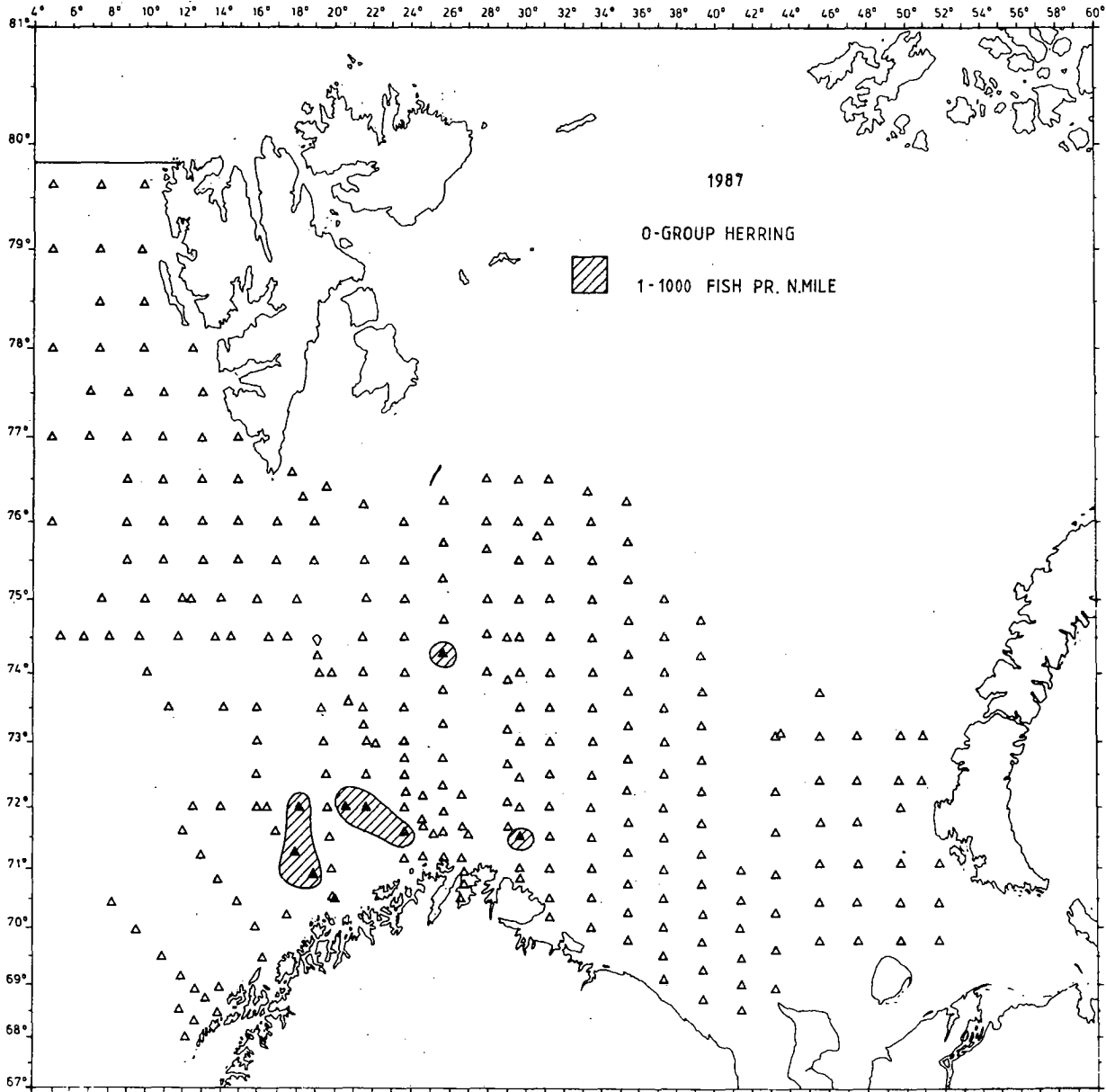
Fig. 14. Distribution of 0-group herring.
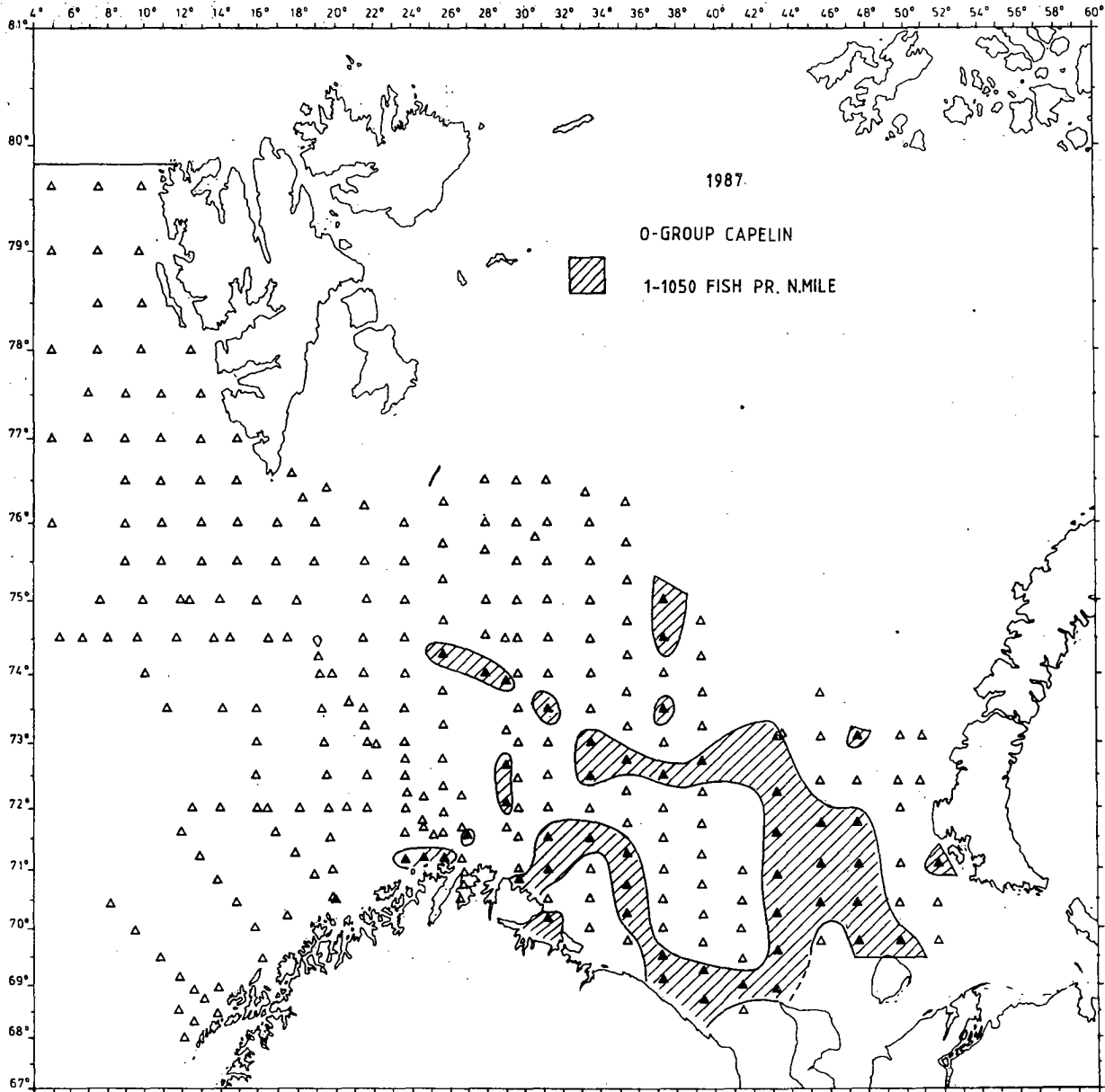
Fig. 15. Distribution of 0-group capelin.
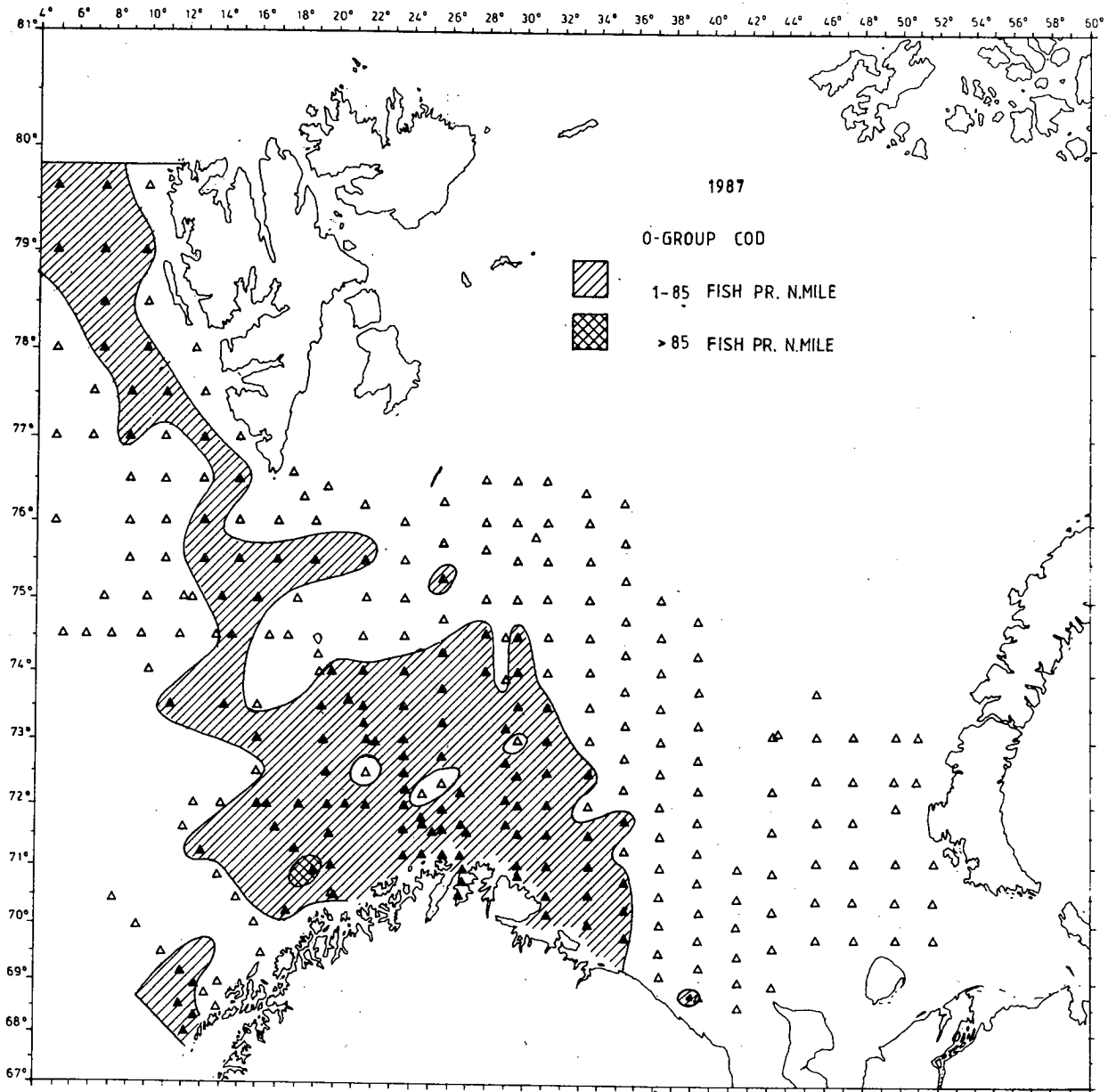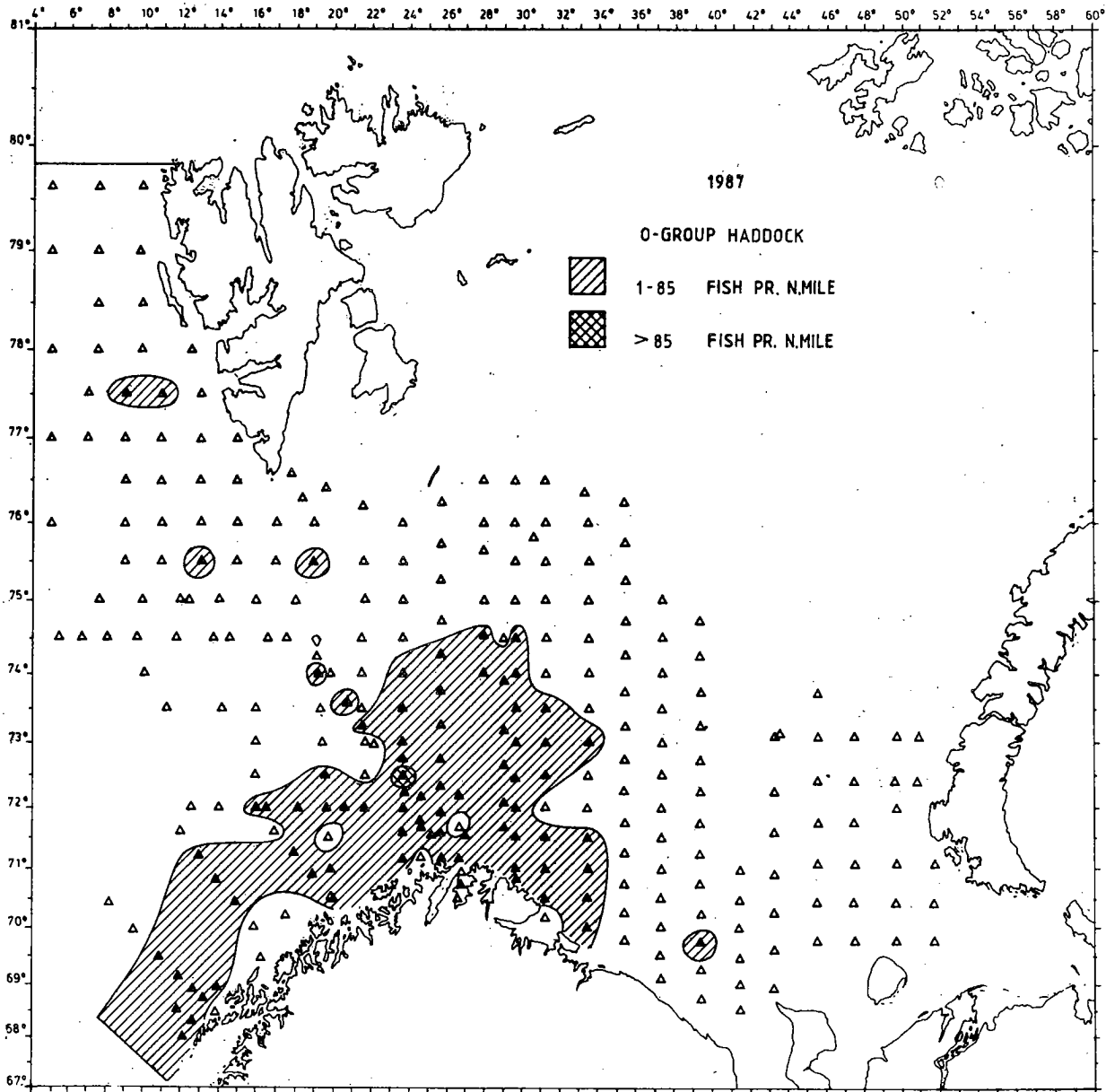
Fig. 16. Distribution of 0-group cod.

Fig. 17. Distribution of 0-group haddock.

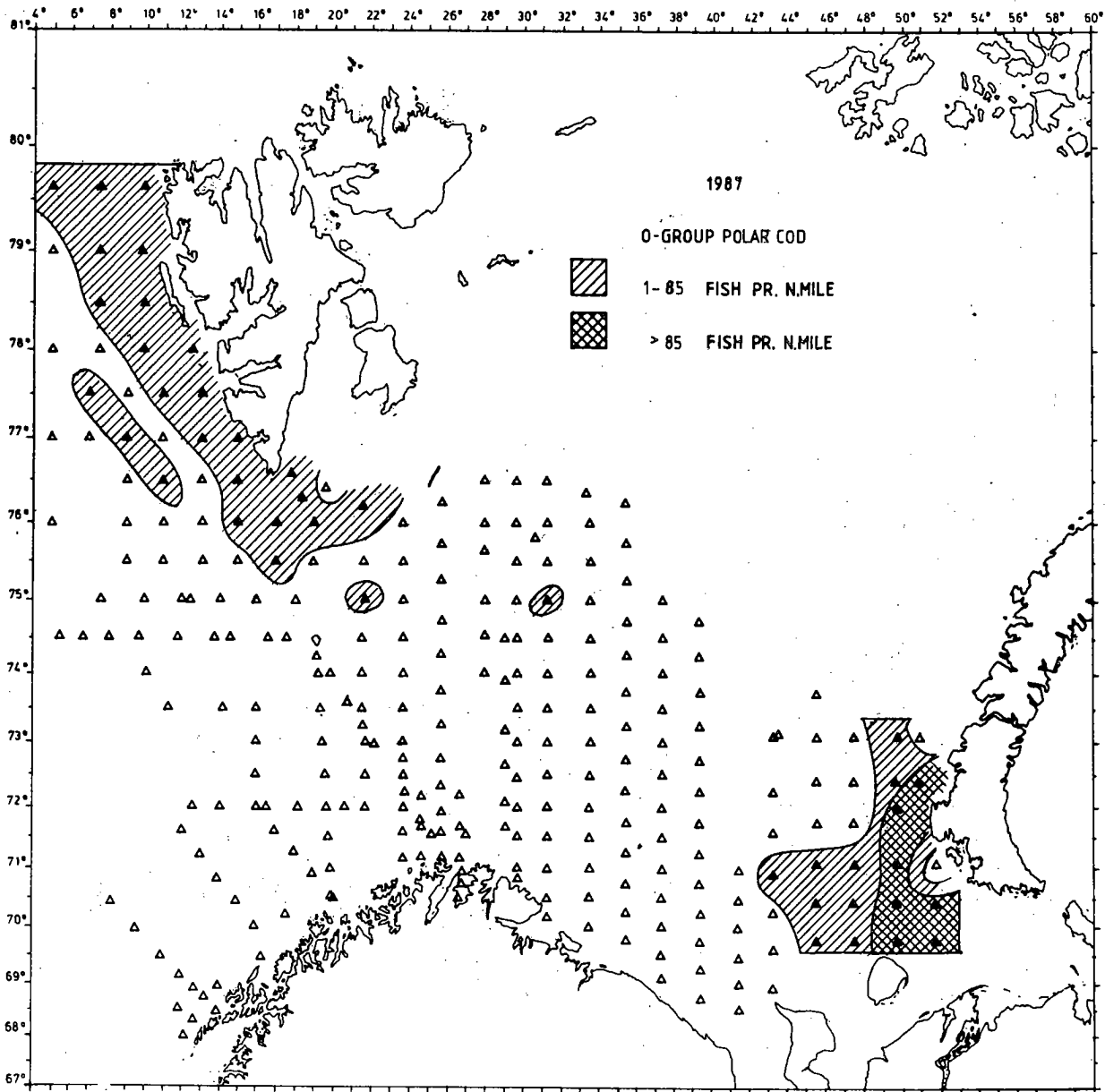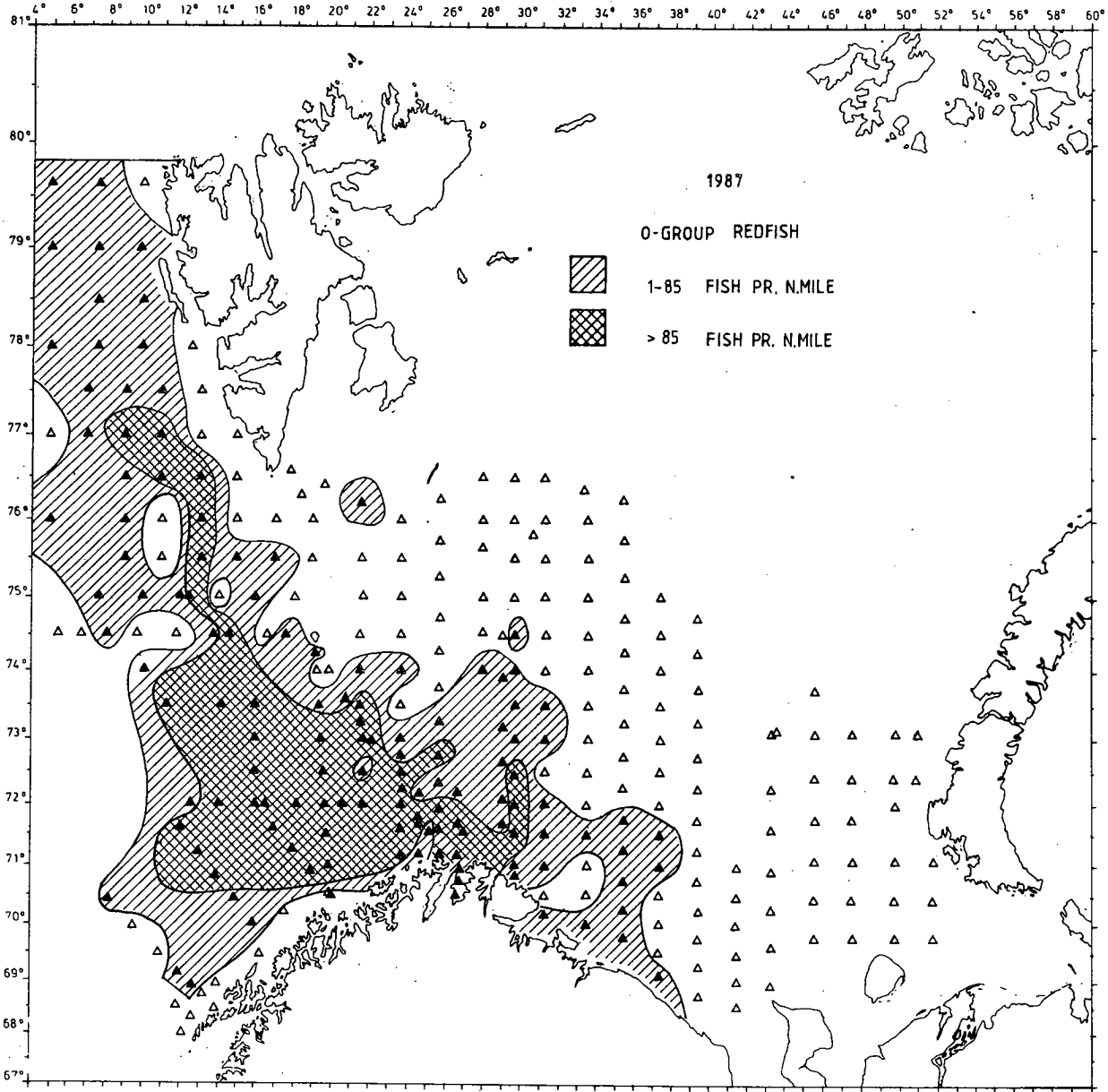Fig. 18. Distribution of 0-group polar cod.

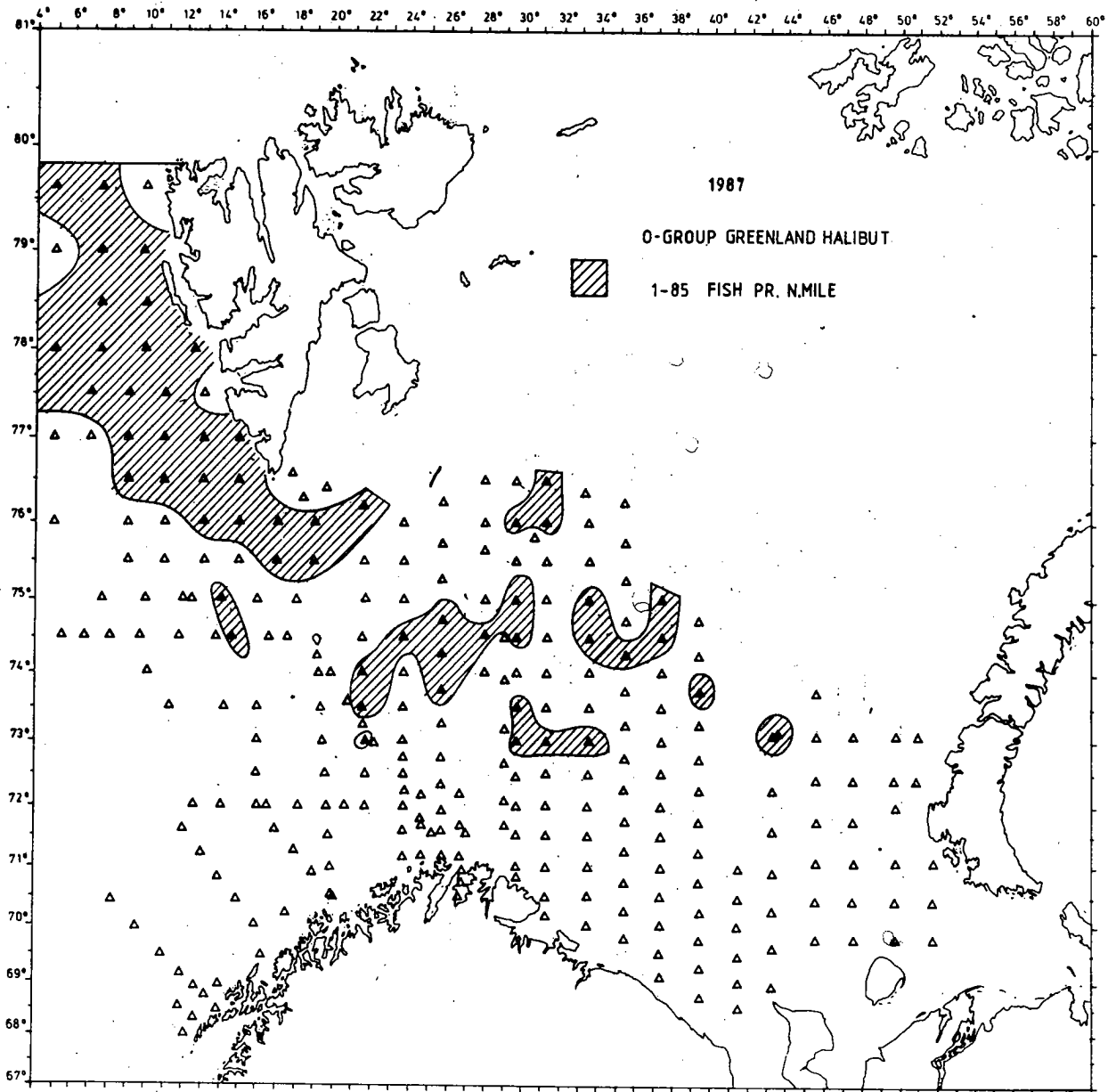Fig. 19. Distribution of 0-group redfish.
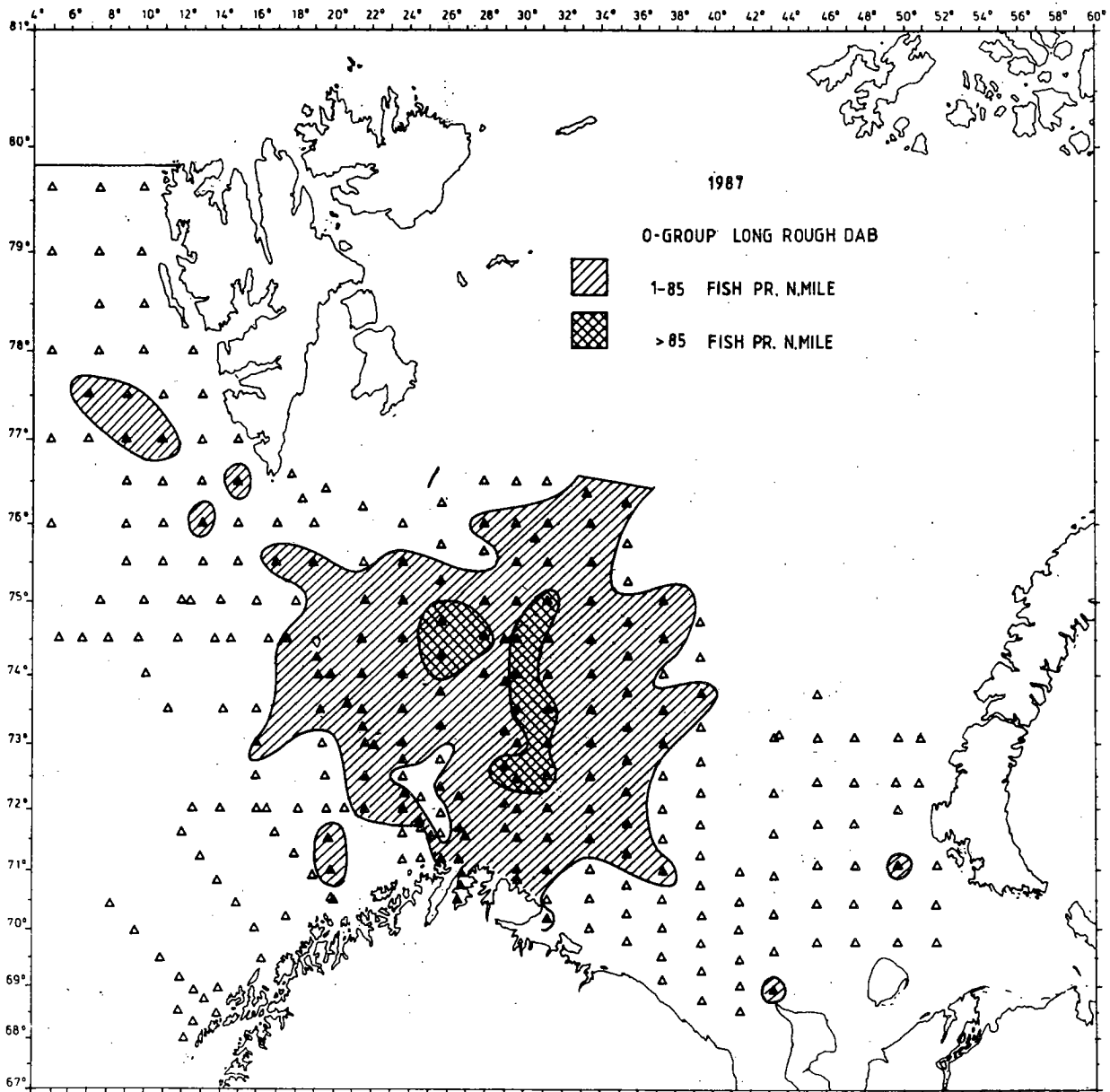
Fig. 20. Distribution of 0-group Greenland halibut.

Fig. 21. Distribution of 0-group long rough dab.

Appendix

Survey period	Research vessel	Research Institute	Participants
18 August - 28 August	"Artemida"	Polar Research Institute of Marine Fisheries and Oceanography, Murmansk	A.S. Galkin, S.D. Melnikov, V.I. Shapovalo Yu.A. Perepechaev, A.G. Korneev, V.A. Tararoshchenko, V.V. Kryukov, V.I. Zubov, M.D. Kleopin, S.V. Lisovets, I.S. Shafran, V.M. Ulanov.
20 August - 1 September	"Vilnyus"	"	S.A. Baranov, I.V. Borkin, V.V. Ilyin, V.M. Kapralov, O.P. Garbut, A.E. Stepurin K.A. Trostin, Yu.E. Zhak.
17 August - 3 September	"G.O.Sars"	Institute of Marine Research, Bergen	A. Hylen, K.H. Hansen, A. Raknes, A.M. Skorpen, I.M. Beck, Ø. Tangen R. Johannessen.
20 August - 3 September	"Håkon Mosby"	"	K. Sunnanå, H. Senneset, V. Anthonypillai E. Skoglund, I. Hoff.
17 August - 3 September	"Eldjarn"	"	O. Nakken, A. Romslo, T. Mørk, T.I. Hallar J.H. Nilsen, K. Hansen.