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Preliminary report of the International 0-group fish survey in the Barents Sea and adjacent waters in August - September 1980

The sixteenth annual International 0-group fish survey was made during the period 16 August - 8 September 1980 in the Barents Sea and adjacent waters. The following research vessels participated in the survey:

State	Name of vessel	Survey time	Research Institute
Norway	"Johan Hjort"	16 August - 7 September	Institute of Marine Research, Bergen
Norway	"G.O. Sars"	16 August - 7 September	" " "
Norway	"Michael Sars"	16 August - 8 September	" " "
USSR	"Poisk"	22 August - 8 September	The Polar Research Institute of Marine Fisheries and Oceanography, Murmansk
USSR	"Achil"	2 September - 4 September	" "

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

The survey data was analysed the 8-9 September in Hammerfest. Observations concerning the geographical distribution of 0-group fish and their abundance are given in this report together with a brief discription of the temperature condition in the area.

MATERIAL AND METHODS

The geographical distributions of 0-group fish have in earlier surveys been estimated by fishing with a small meshed midwater trawl at the depth of heaviest traces of 0-group fish on the echosounder, mainly between 0-50 m. At stations with no recordings of 0-group fish the trawl was towed in the surface for 1 nautical

mile. When some 0-group was recorded the trawl was towed in two steps, in the surface and at a depth of 25 m, 0.5 nautical mile in each depth. A higher standardized trawling procedure would be preferable. However, the trawling technic has made this difficult.

For fishing in the near surface layer, floats have to be used on the headline of the trawl. By trawling deeper than 20 m a depth metering device has to be used for accurate control of the depth of trawling. Some trawling experiments in the beginning of the survey showed that it is possible to control the trawling depth with both floats and a depth metering device on the trawl. This make it possible to cover the water column from 0-80 m in one haul. The Norwegian vessels which use trawls with a 20 m vertical opening cover this water column by trawling with the headline in 0, 20, 40 and 60 m in succession.

An examination of echo recordings from earlier surveys indicates that 0-group fish is observed only a few times deeper than 40-50 m. It would therefore be sufficient to make only one haul at each station with the Norwegian type of midwater trawl to cover the 0-group fish layer.

After the 28 August the described trawling procedure was followed by the Norwegian vessels on most of their trawl stations, and the trawling distance was 0.5 nautical mile at each of the depth; 0, 20 and 40 m. The USSR vessel which used a trawl with a 6 m vertical and 10 m horizontal opening operated the trawl according to the old procedure. Each vessel made one trawl haul about every 30 nautical mile sailed.

The participants in the Hammerfest meeting discussed the need for a further standardization of trawl gears and trawling procedure. They agreed to recommend that:

1. all vessels participating in the 0-group survey should use the same type of midwater trawl as the Norwegian vessels and it should be rigged as near as possible in the same way.

2. at each station the trawl should be towed 0.5 nautical mile at each of the depth; 0, 20 and 40 m, if necessary also at 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. 10-17, as filled and open symbols respectively. The density grading is based on catch in number per 1.0 nautical mile trawling.

RESULTS

Hydrography (Figs. 2-9, Tables 1-4)

Hydrographic observations were made along all the survey tracks, normally after each 30 nautical mile sailed. Horizontal temperature distributions are 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 Tables 1-4. Some general comments are given below:

1) Kola section

During the last two years the mean temperature in this section has been low, but the 1980 values are now close to the average for 1965-80 in all three layers.

2) Cape Kanin - North section

The mean temperature in this section was in 1980 higher than in the previous years 1978 and 1979, but it is still below the average value for 1965-80. The anomalies are -0.3°C in the northern part and -0.8°C in the southern part of the section.

3) North Cape - Bear Island section

The mean temperature in the section has gradually increased since 1977, the coldest year at the period 1965-80. The 1980 value is 0.1°C above the average 1965-80.

4) Bear Island - West section

The mean temperature of the 0 - 200 m layer was this year 0.6°C above the average value for the period 1965-80. The 1980 is therefore regarded as a rather varm year and similar to the conditions found during 1973 and 1976-77.

In general, the 1980-temperatures of the western Barents Sea are about normal, whereas the eastern part of the sea is still somewhat colder than the average 1965-80. The temperature conditions west of the Bear Island indicate a rather strong transport in the Spitsbergen current.

DISTRIBUTION AND ABUNDANCE OF 0-GROUP FISH

Geographical distribution of 0-group fish are shown by shaded areas in Figs. 10-17. Double shading indicates dense consentrations. Criteria used to discriminate between scattered and dense consentrations are the same as used in earlier reports (Ann.biol. 1978).

Abundance indices estimated as the area of distribution, areas of high densities weighted by 10, are given in Table 5. Length frequency distributions of the main species are given in Fig. 18.

Herring (Fig. 10)

0-group herring was found in few numbers and only on 14 trawl stations, mainly off the East Finnmark coast. The abundance of the 0-group herring is still low in the area covered by the survey.

Capelin (Fig. 11)

The distribution of 0-group capelin in 1980 is similar to that found in 1979. The highest concentrations were found off the Finnmark and the Murman coast.

Contrary to the other species described in the present report, 0-group capelin is mostly found entangled in the meshes in the

middle part of the trawl. This makes it difficult to sample 0-group capelin unbiased from year to year particulary because of variable weather conditions. An abundance index for capelin is therefore assumed to be of little value. However, Fig. 11 gives the impression that the 1980 year class is an abundant one.

Cod (Fig. 12)

0-group cod was found in two main areas off the coast of Finnmark and west of Spitsbergen. It is the fourth year in succession a westerly distribution of 0-group cod has been observed.

The area of distribution was found to be rather small, and no dense consentrations were observed. The estimated abundance index of the 1980 yearclass is about half of that for 1979, and is only 21% of the average 0-group index for the previous 10 years.

Haddock (Fig. 13)

0-group haddock has in 1980 a westerly distribution, and is similar to that found in 1978. No high concentrations were found. The abundance index is only about half of the average abundance index in the previous 10 years.

Saithe

Only a few numbers of 0-group saithe were caught. As in previous years no abundance index of any significanse can be estimated on the basis of the survey data.

Polar cod (Fig. 14)

The distribution of 0-group polar cod was similar to those found in the preceding three years, with a Spitsbergen and a Novaya Zemlja component. As in last years the area of distribution was not adequately covered because of limited research vessel time. The estimated abundance indices are therefore too low for both components.

Redfish (Fig. 15)

0-group redfish was found within a large area from Lofoten to the Murman coast, and continuously between Norway and the northern part of Spitsbergen. The abundance index indicate that the 1980 year class is nearly as strong as the 1979 year class.

Greenland halibut (Fig. 16)

As in previous years 0-group Greenland halibut was mostly found off Bear Island and Spitsbergen. The abundance index for the 1980 year class is close to the average abundance index from 1970 to 1979.

Long rough dab (Fig. 17)

As in the last years, except for 1979, 0-group long rough dab was common in the trawlcatches in the area west of Spitsbergen. Compared with 1979 it was also found further to the east in the Barents Sea. The abundance index is above the average in the previous 10 years.

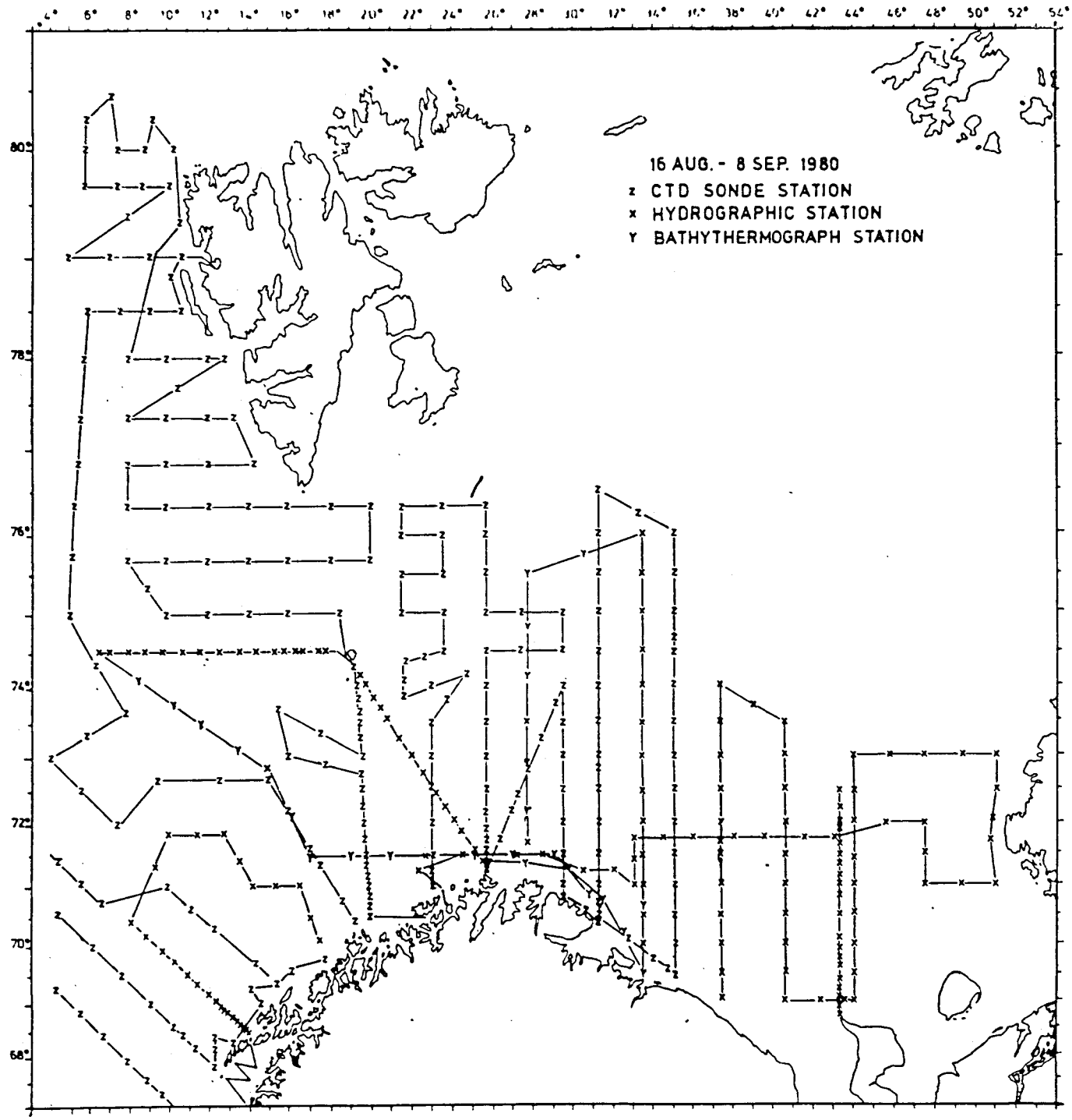

Fig. 1. Survey tracks of the ships and the grid of hydrographic stations.

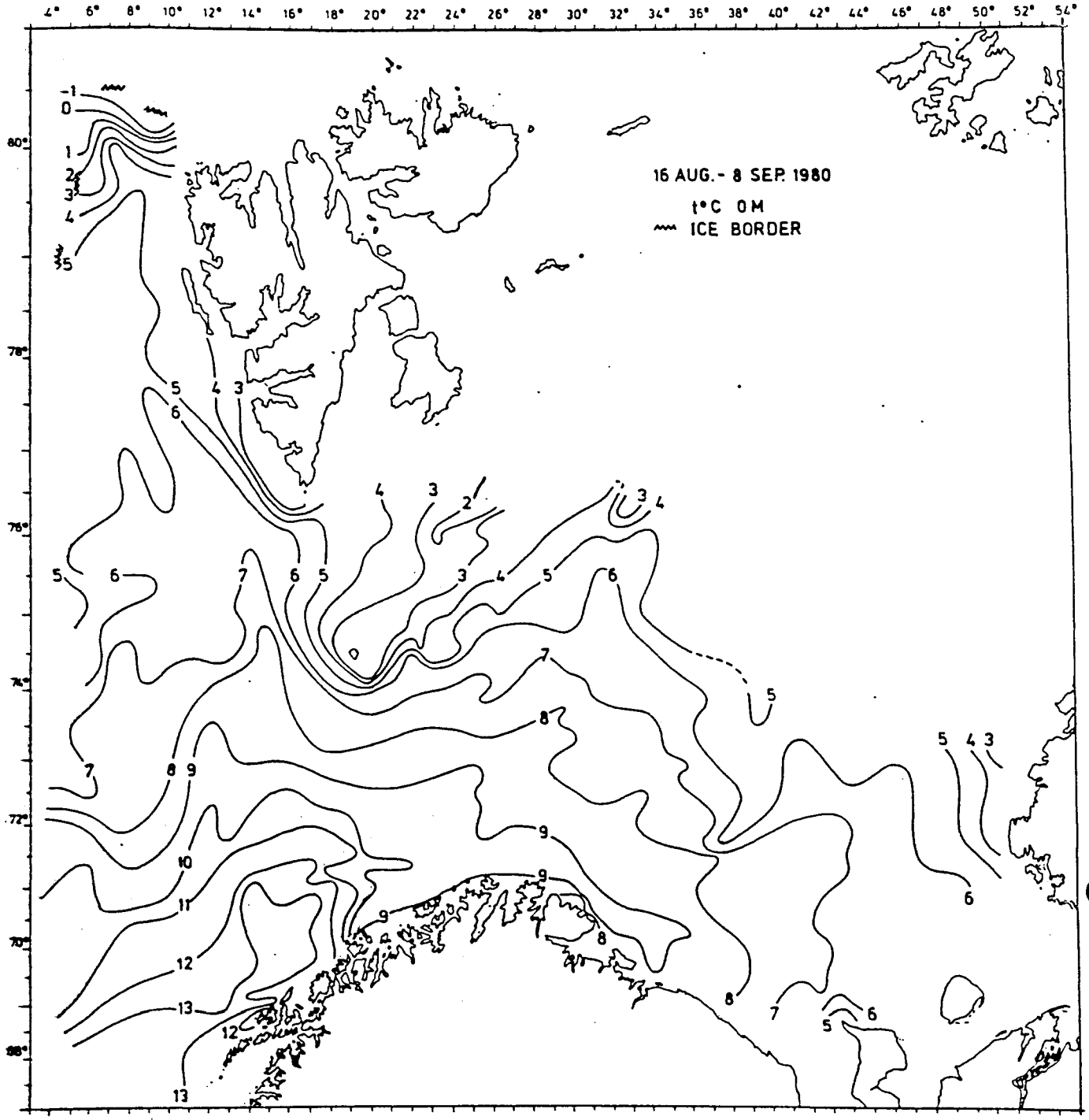

Fig. 2. Isotherms at 0 m.

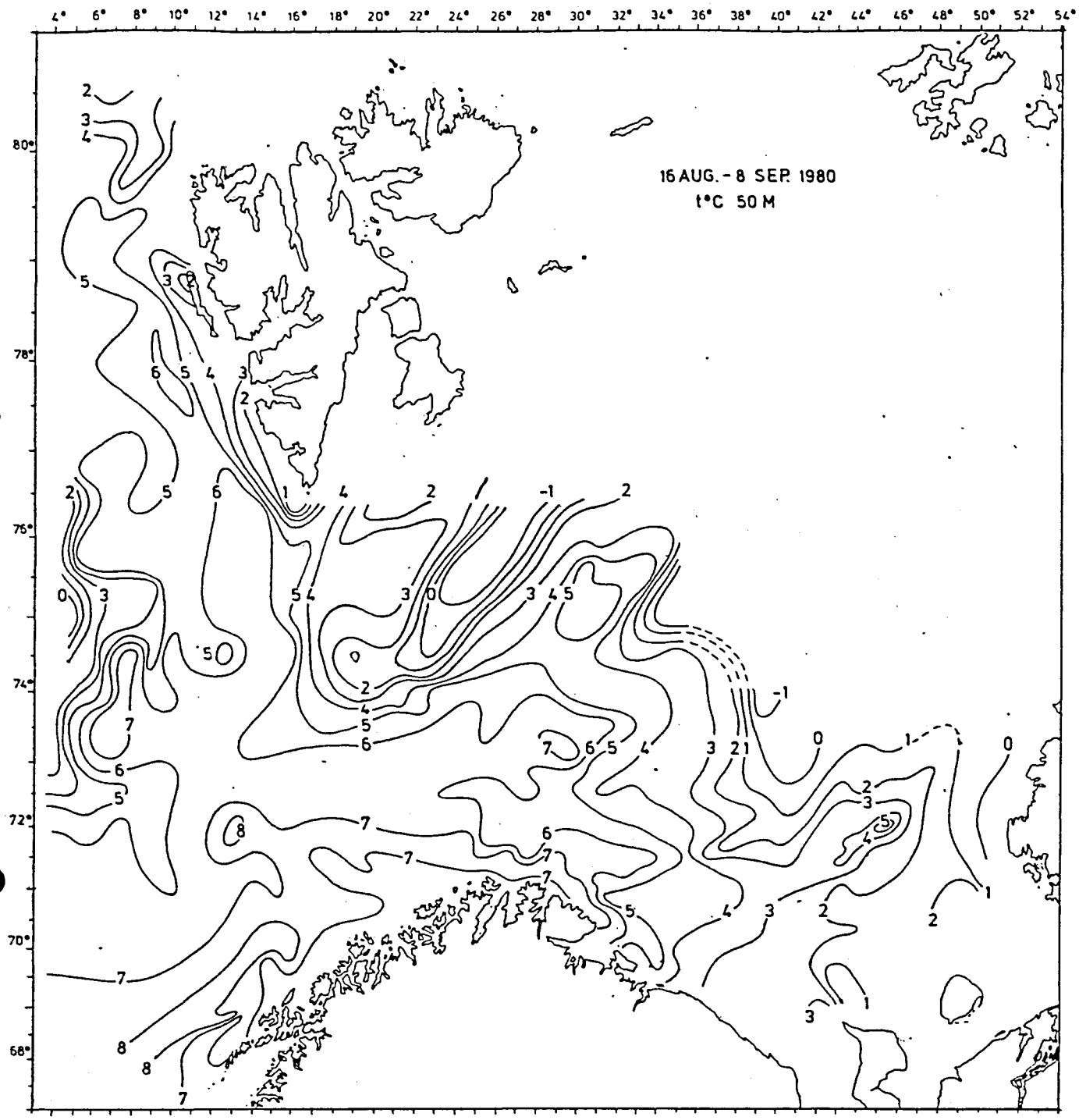

Fig. 3. Isotherms at 50 m.

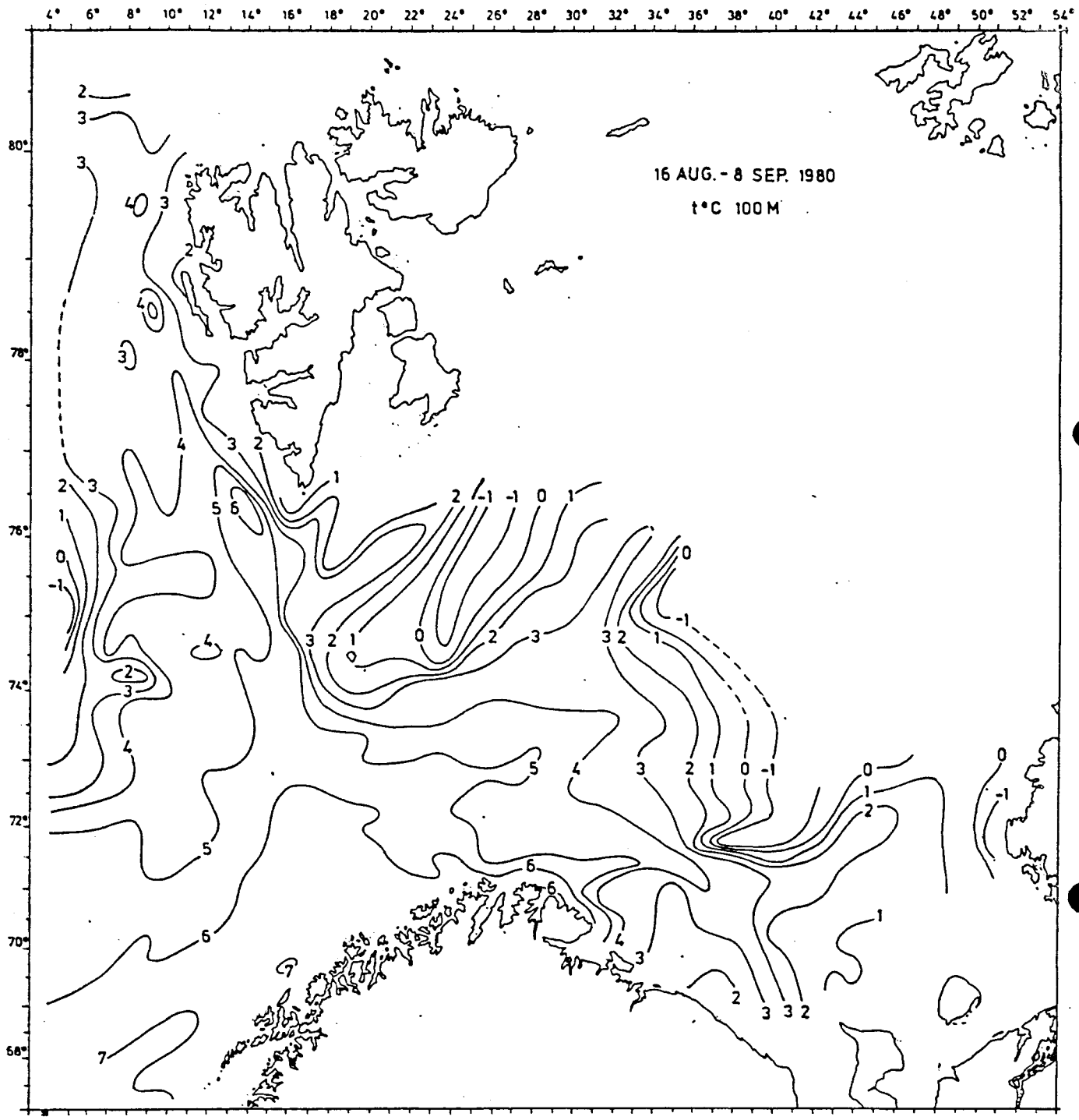

Fig. 4. Isotherms at 100 m.

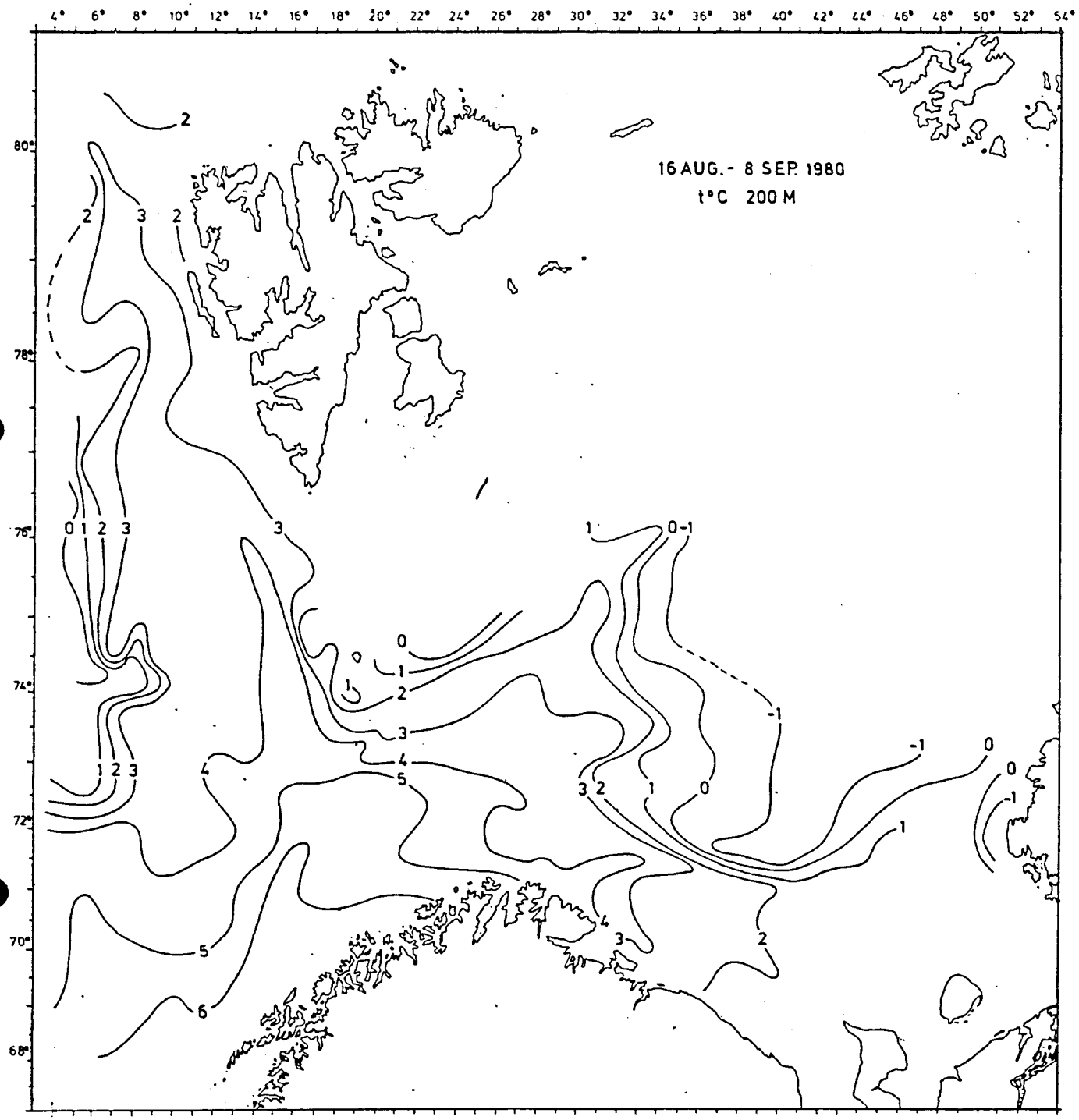

Fig. 5. Isotherms at 200 m.

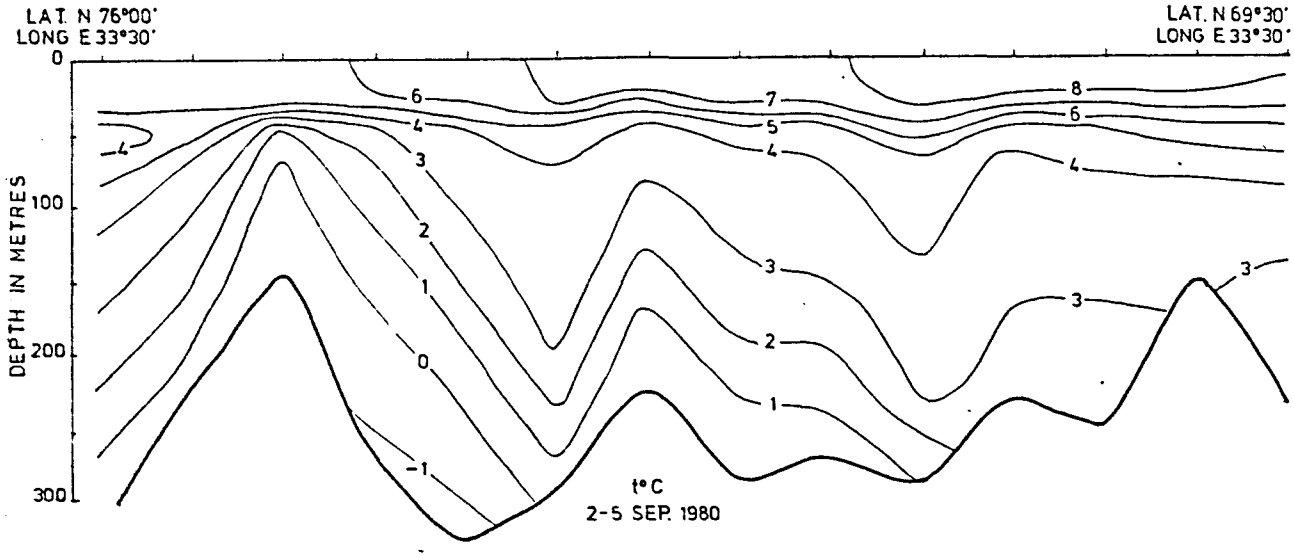

Fig. 6. Temperature section along the Kola meridian.

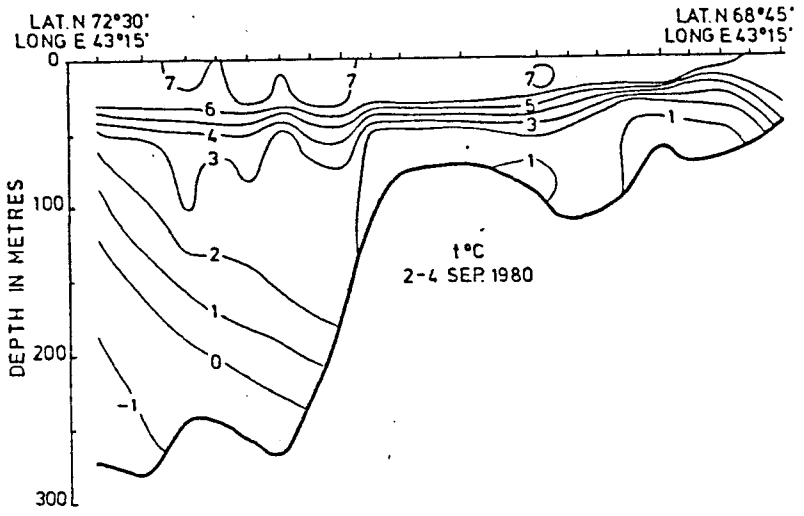

Fig. 7. Temperature section Cape Kanin - North.

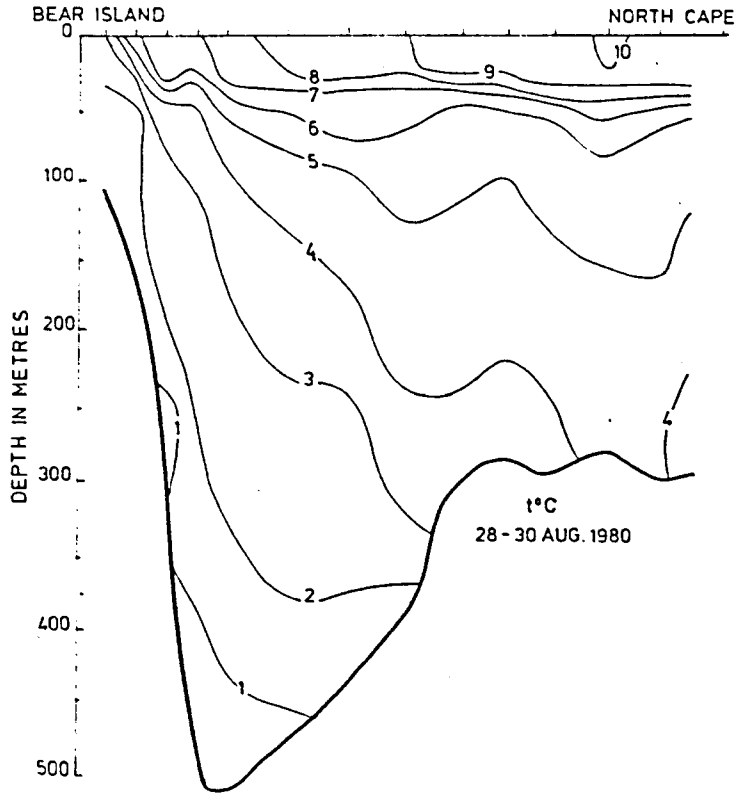

Fig. 8. Temperature section Bear Island - North Cape.

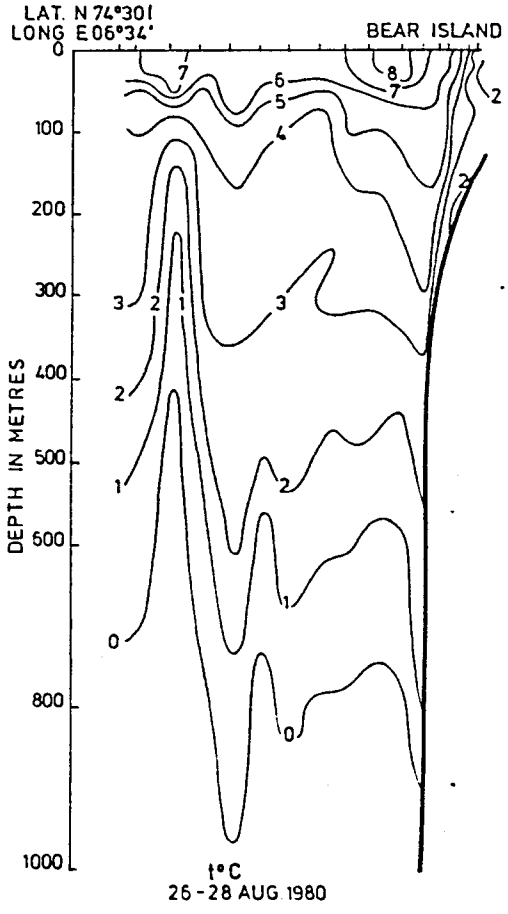

Fig. 9. Temperature section Bear Island - West.

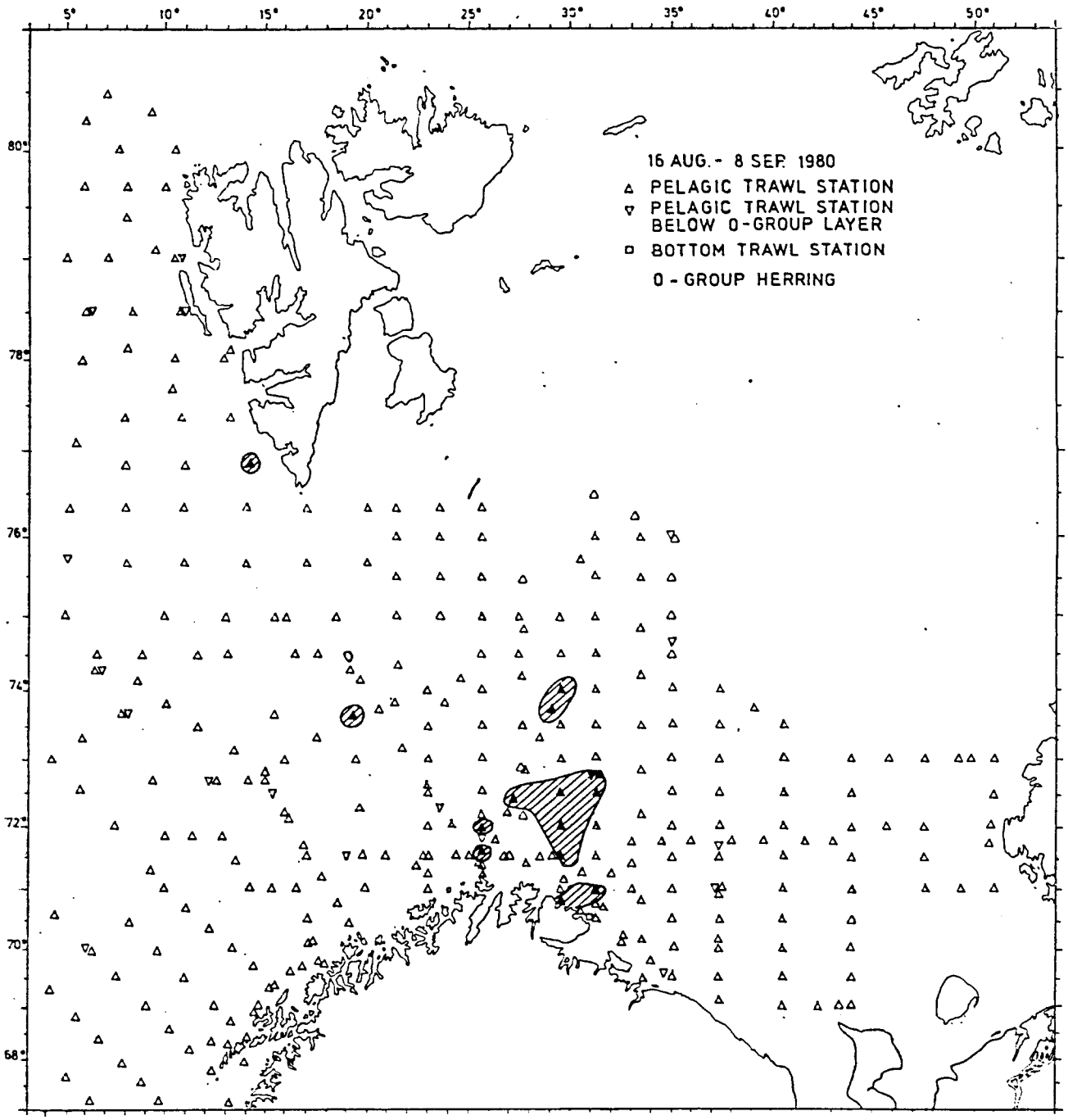

Fig. 10. Distribution of 0-group herring.

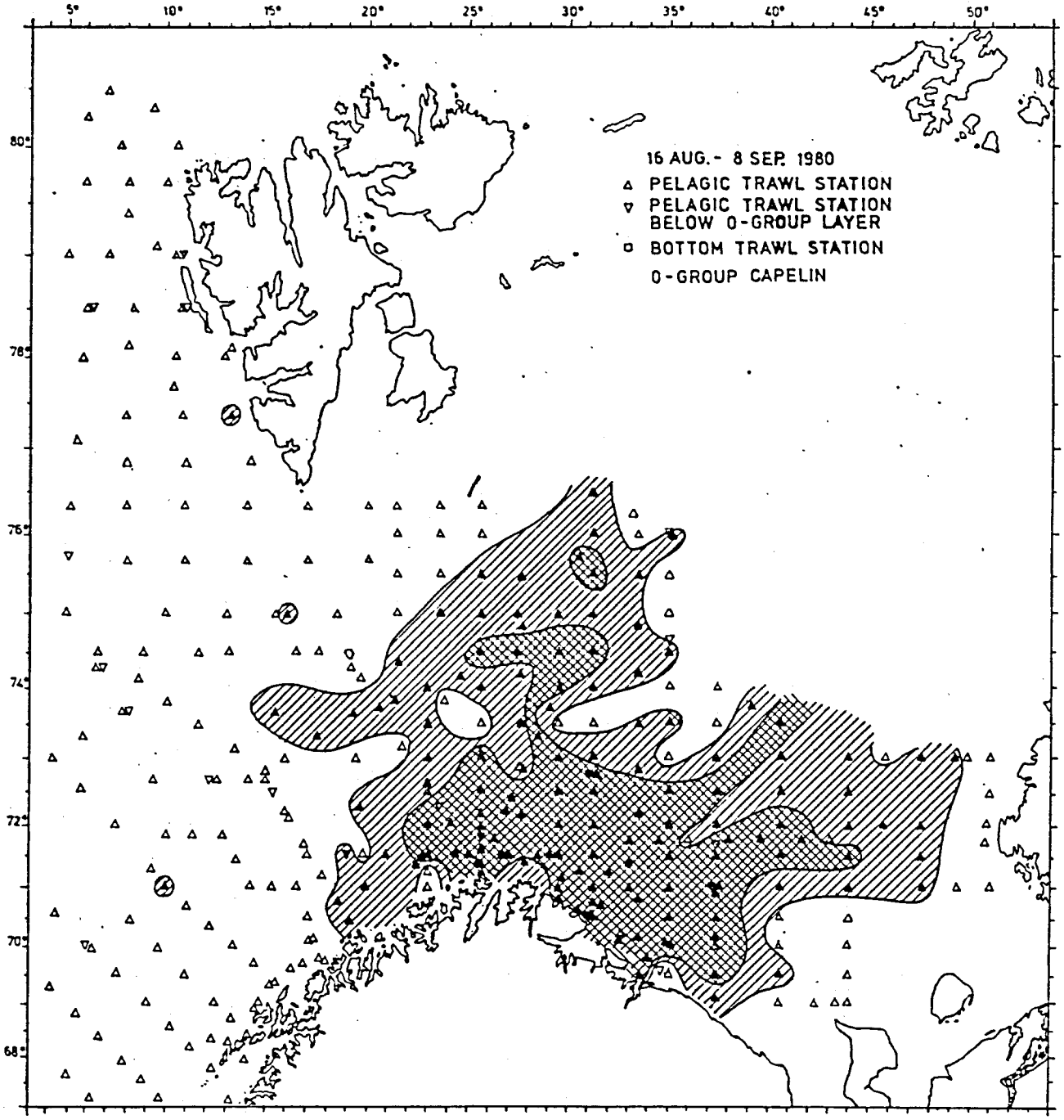

Fig. 11. Distribution of 0-group capelin.

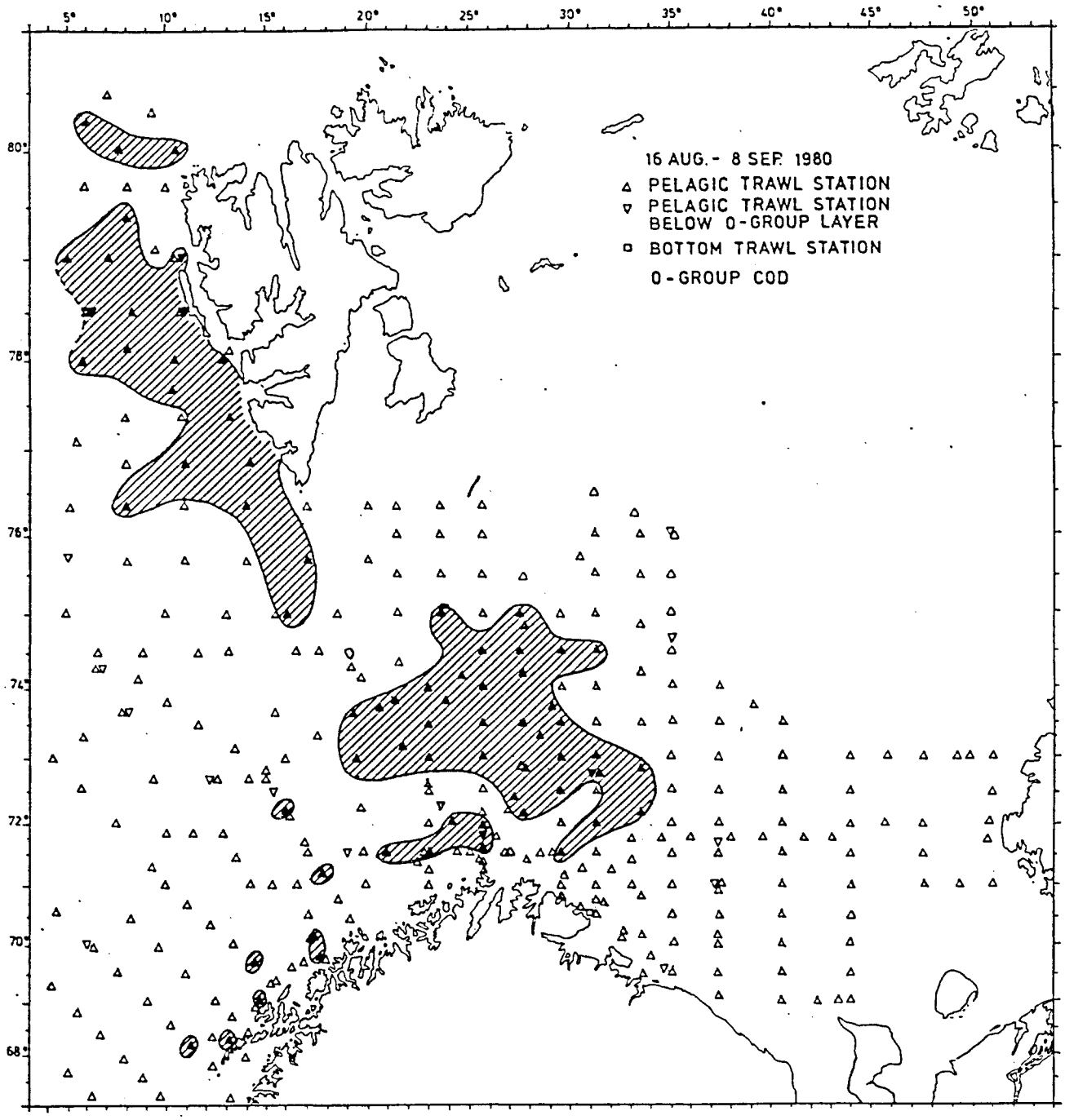

Fig. 12. Distribution of 0-group cod.

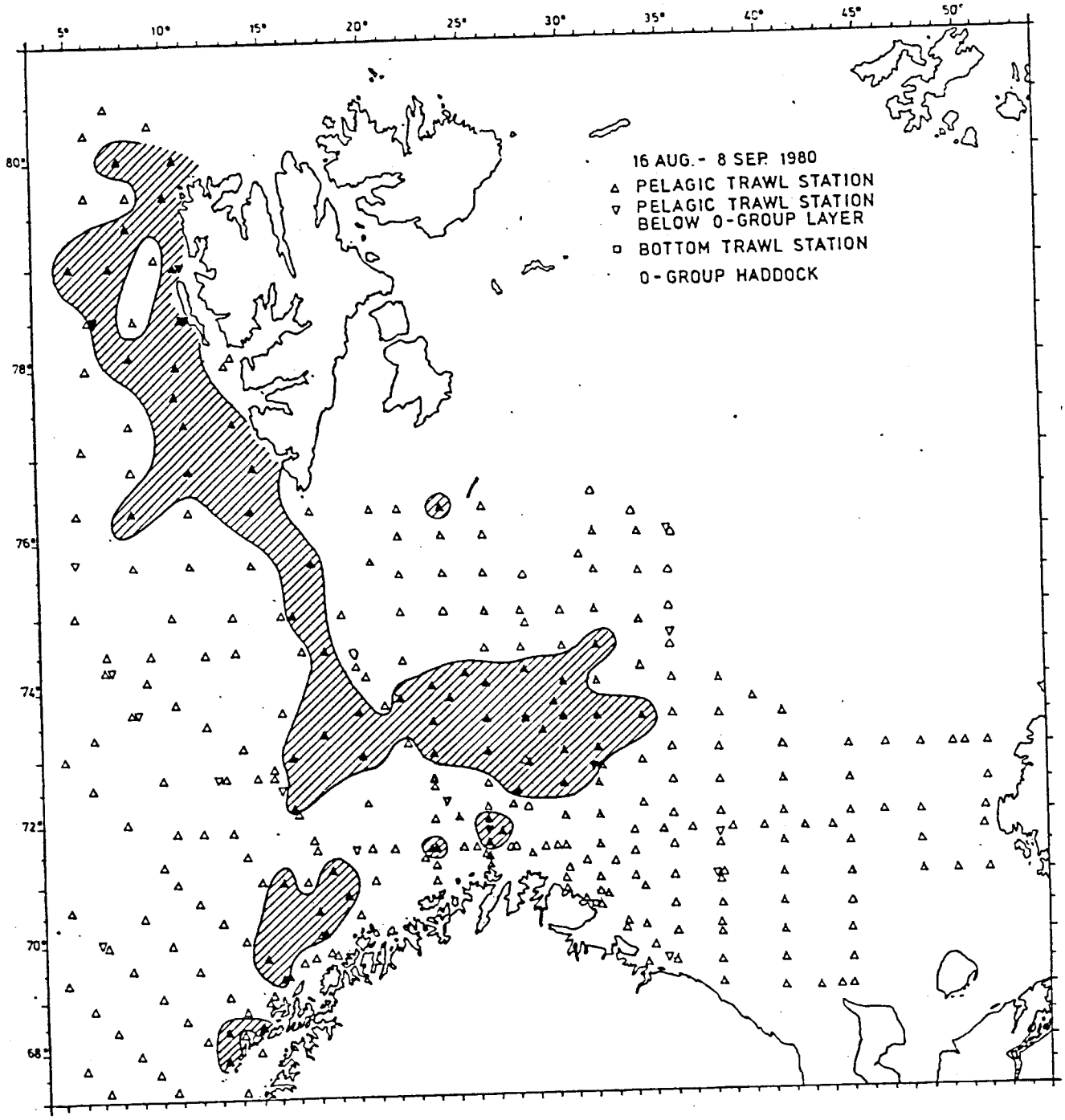

Fig. 13. Distribution of 0-group haddock.

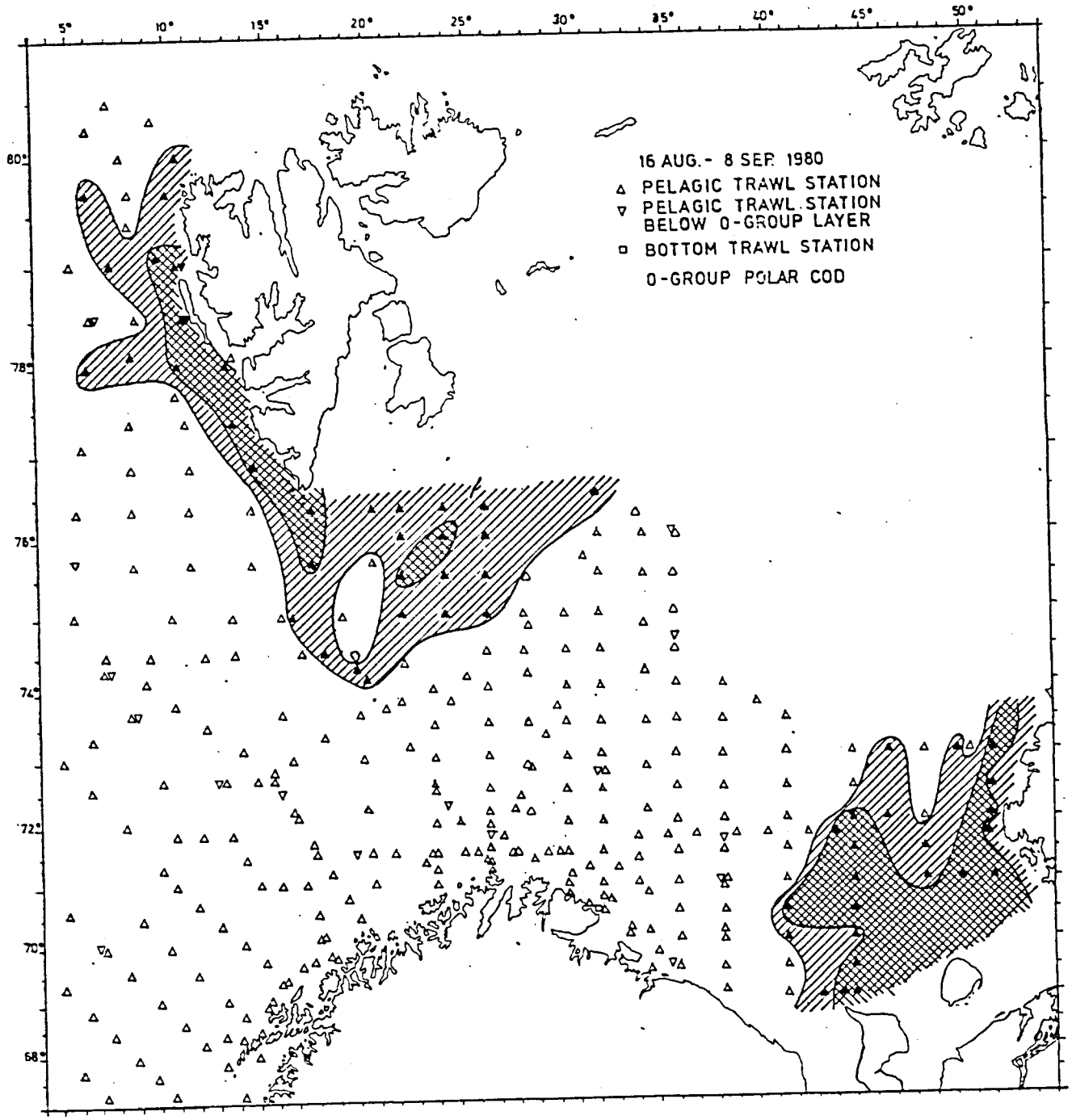

Fig. 14. Distribution of 0-group polar cod.

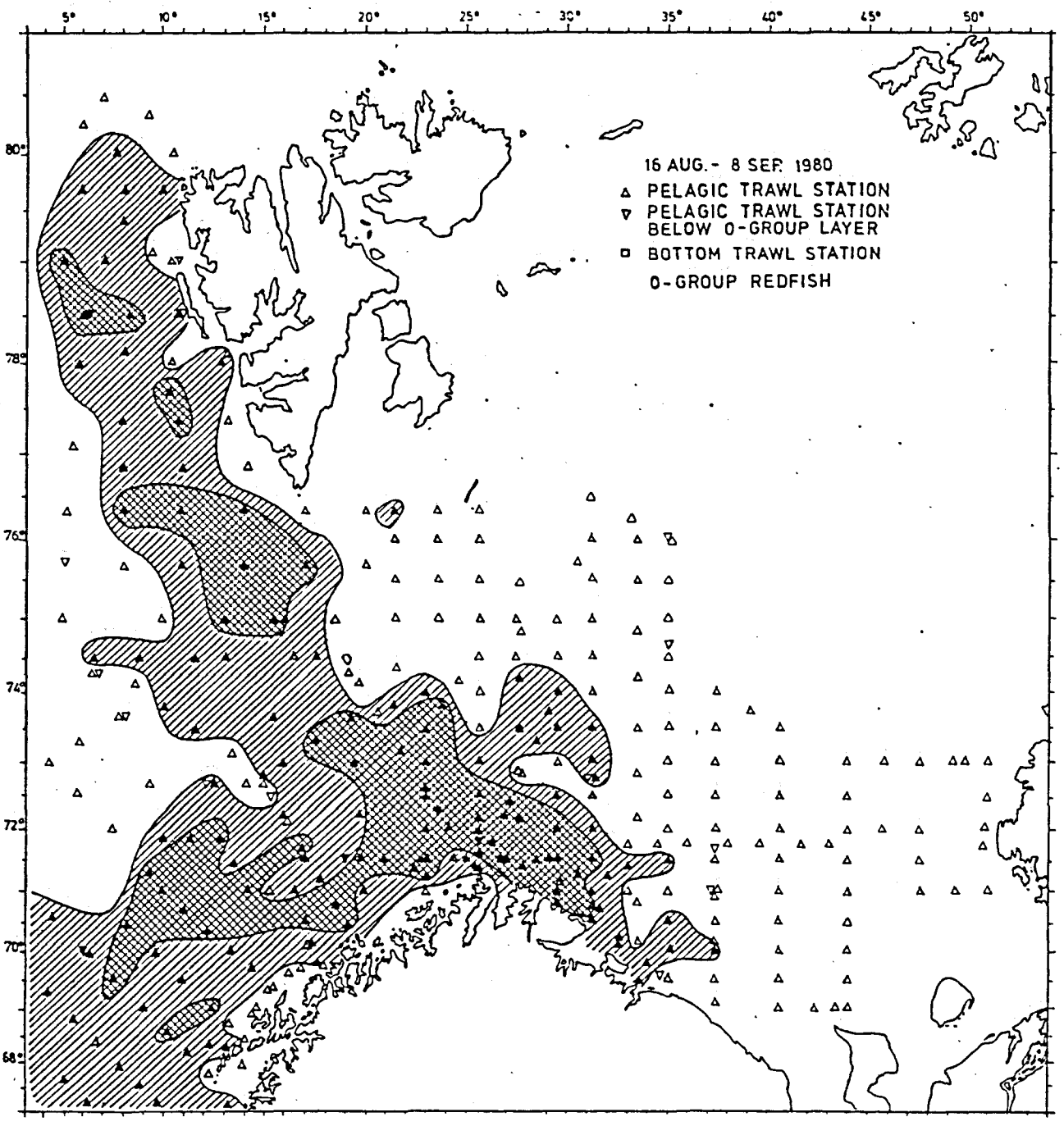

Fig. 15. Distribution of 0-group redfish.

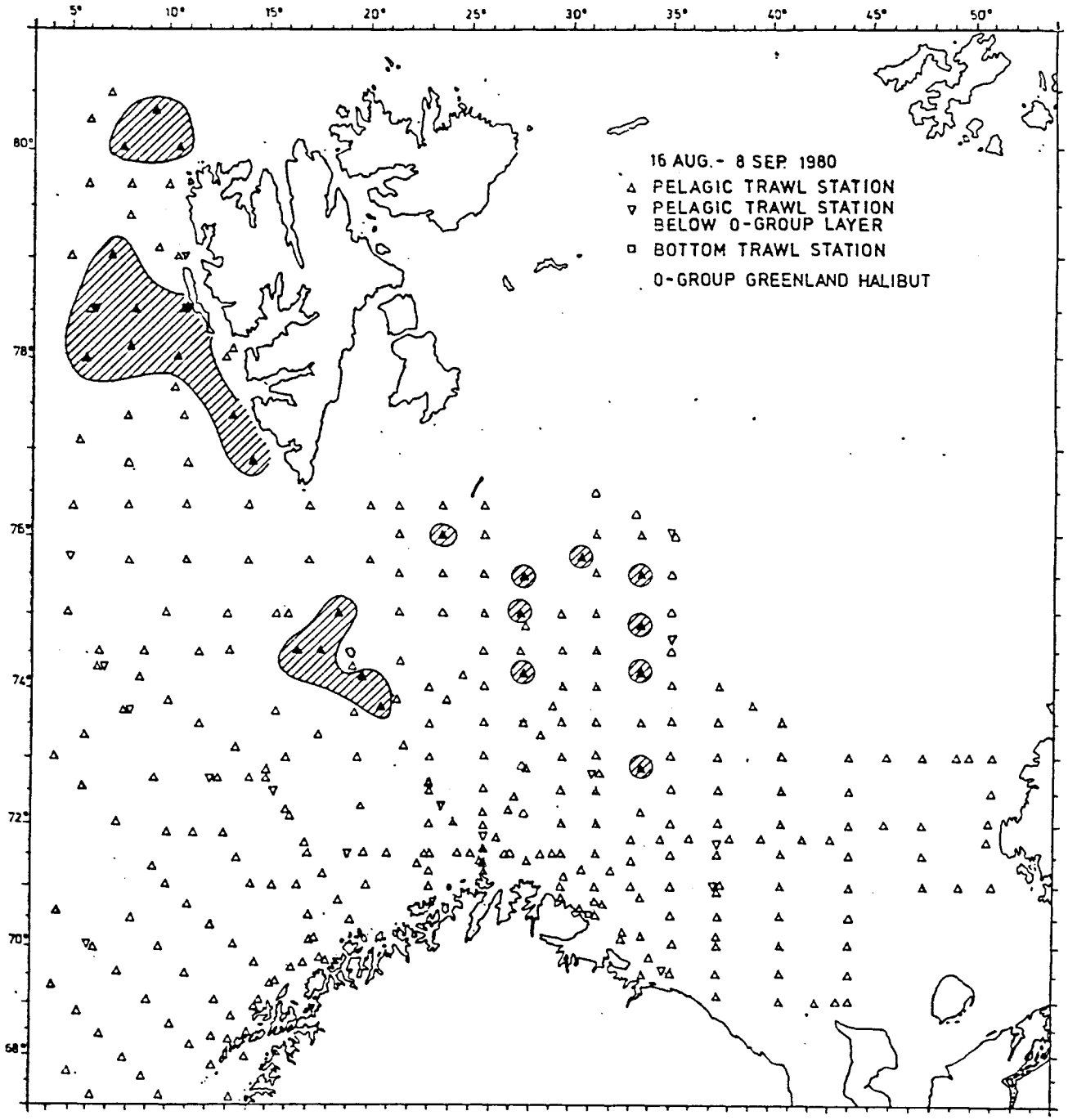

Fig. 16. Distribution of 0-group Greenland halibut.

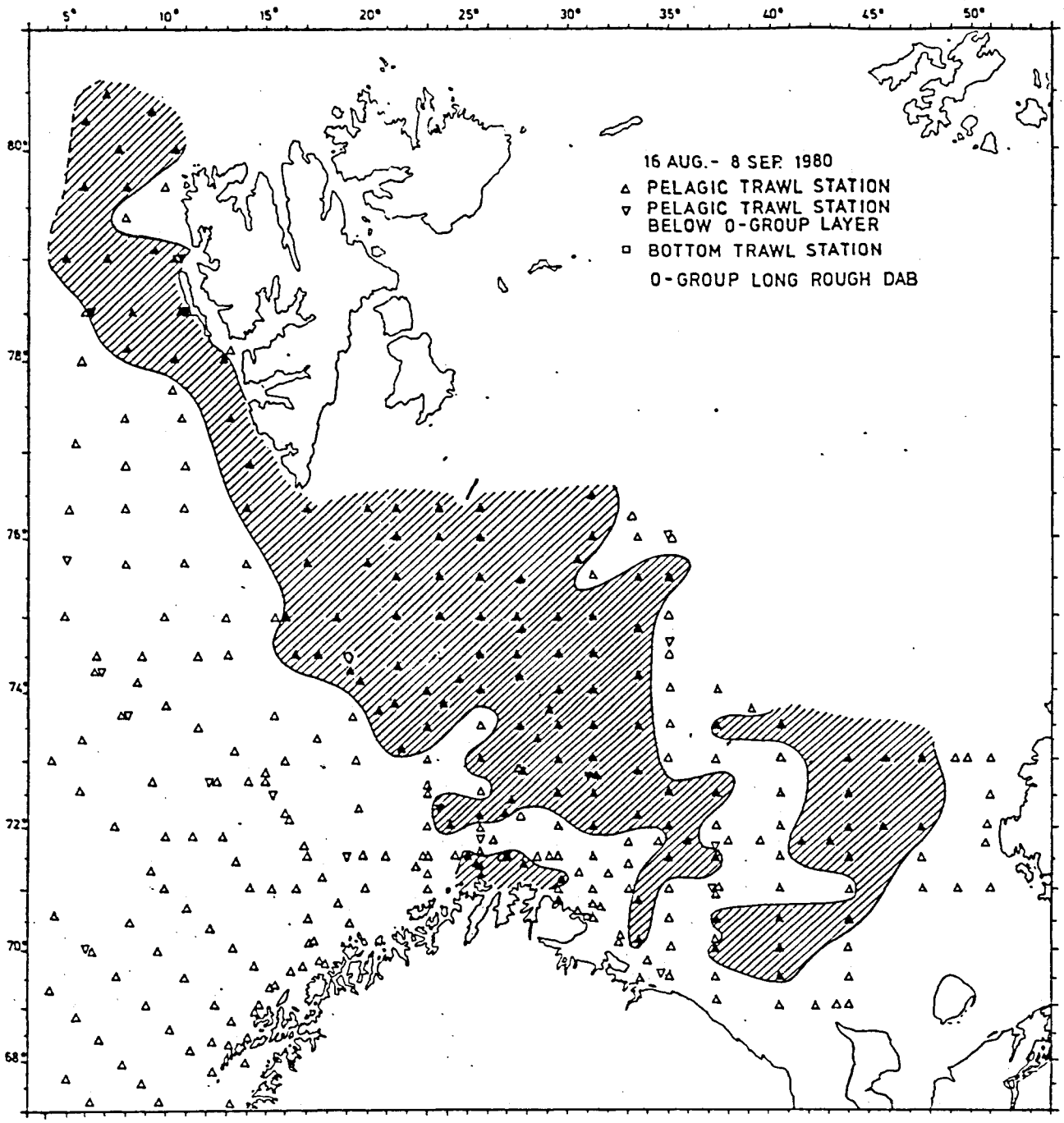

Fig. 17. Distribution of 0-group long rough dab.

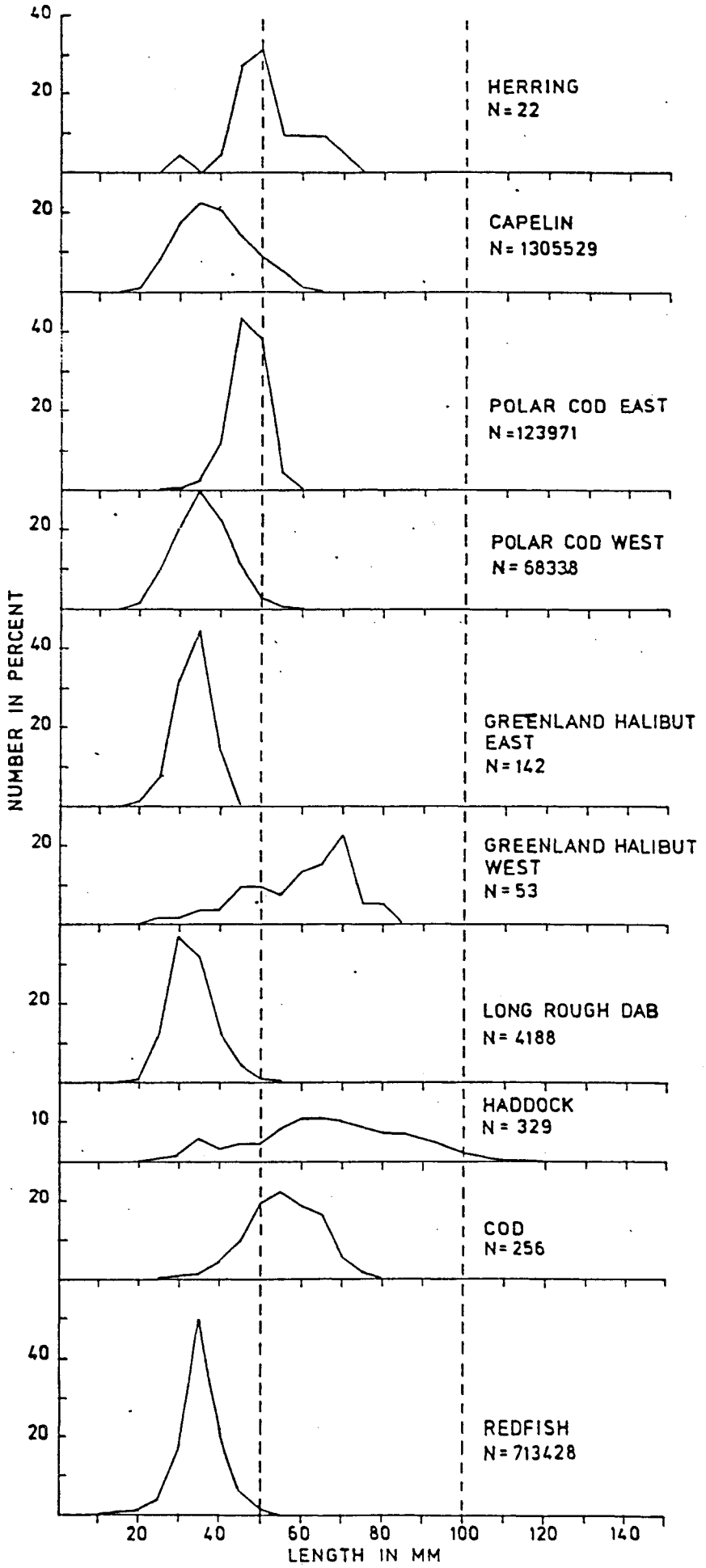

Fig. 18. Length distribution of 0-group fish.

Table 1. Mean water temperature in the Murmansk current, the Kola section (between 70°30'N and 69°30'N) at the end of August (t°C).

Year / Layer	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	Average 1965-1980
0-50 m	6.7	6.7	7.5	6.4	6.7	7.8	7.1	8.7	7.7	8.1	7.0	8.1	6.9	6.6	6.5	7.4	7.2
50-200 m	3.8	2.6	4.0	3.7	3.1	3.6	3.2	4.0	4.5	3.9	4.6	4.0	3.4	2.5	2.9	3.5	3.6
0-200 m	4.6	3.6	4.9	4.4	4.0	4.7	4.2	5.2	5.5	4.9	5.2	5.0	4.3	3.6	3.8	4.5	4.5

Table 2. Mean water temperature in the Cape Kanin - North section (between 68°45'N and 72°00'N) from surface to bottom at the beginning of September (t°C).

Year	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	Average 1965-1980
68°45'N 70°05'N	4.8	2.0	6.1	4.7	2.6	4.0	4.0	5.1	5.7	4.6	5.6	4.9	4.1	2.4	2.0	3.3	4.1
71°00'N 72°00'N	4.2	2.5	3.6	3.1	2.3	3.3	3.2	4.1	4.5	-	4.3	4.6	3.3	1.7	1.8	3.0	3.3

Table 3. Mean water temperature in the North Cape current, the North Cape to Bear Island section (between 71°33', 25°02'E and 73°35'N, 20°46'E) at the end of August and at the beginning of September (t°C).

Year / Layer	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	Average 1965-1980
0-200 m	5.1	5.5	5.6	5.4	6.0	6.1	5.7	6.3	5.9	6.1	5.7	5.7	4.8	5.0	5.3	5.7	5.6

Table 4. Mean water temperature in the West Spitsbergen current along the Bear Island West section (between 06°34'E and 15°55'E) in early September (t°C).

Year	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	Average 1966-1980
Layer																
0-200m	3.3	4.2	3.6	4.2	-	4.2	3.9	5.0	4.6	4.9	5.0	4.0	4.1	4.4	4.9	4.3

Table 5. Abundance indices.

Year \ Species	Cod	Haddock	Polar cod 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	8.0	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	157	70	472	9.0	72
1978	106	61	107	144	460	35.4	76
1979	94	69	23	302	980	22.5	69
1980	49	54	79	247	651	12.0	108

APPENDIX

Survey period	Research vessel	Research Institute	Participants
22 August - 8 September	"Poisk"	Polar Research Institute of Marine Fisheries and Oceanography, Murmansk	A.V. Averchenko, V.D. Boitsov, O.J. Gavrilina, A.V. Iljina, V.N. Kochedykov, L.N. Korol', V.S. Mamylov, V.N. Nenko, N.G.Ushakov, V.P. Vorontsov.
2 September - 4 September	"Akhil"	Polar Research Institute of Marine Fisheries and Oceanography, Murmansk	
16 August - 8 September	"Michael Sars"	Institute of Marine Research, Bergen	S. Brattås, R. Johannessen, J.Monstad, T. Monstad, J.H. Nilsen, T.H. Sangolt, S. Torheim.
16 August - 7 September	"G.O. Sars"	Institute of Marine Research, Bergen	G. Farstad, K. Gjertsen, K. Hansen, A. Hylen, H. Kismul, E. Lifjell, L. Midttun, E. Molvær, K. Randa, I. Svellingen, Ø. Tangen.
16 August - 7 September	"Johan Hjort"	Institute of Marine Research, Bergen	C. Aranda, J. Blindheim, K.A. Larsen, O. Martinsen, C.J. Rørvik, J. Rørvik, J. Sortland, A. Thomassen, Ø. Torgersen.