



**PRELIMINARY REPORT OF THE INTERNATIONAL O-GROUP FISH SURVEY  
IN THE BARENTS SEA AND ADJACENT WATERS IN AUGUST-SEPTEMBER 1992**

The twenty-eighth annual International 0-group fish survey was made during the period 12 August - 8 September 1992 in the Barents Sea and adjacent waters. The following research vessels participated in the survey:

State	Name of vessel	Period	Research Institute
Norway	"Johan Hjort"	17.8 - 3.9	Institute of Marine
Norway	"G.O. Sars"	18.8 - 7.9	Research, Bergen
Norway	"Michael Sars"	13.8 - 7.9	--"--- --"---
Russia	"Professor Marty"	17.8 - 28.8	The Polar Research
Russia	"Fridtjof Nansen"	24.8 - 5.9	Institute of Marine
Russia	"Akhill"	13.8 - 15.8	Fisheries and Oce-
	- " -	5.9 - 6.9	anography, Murmansk

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

Preliminary analysis of the survey data were planned to take place during a meeting 8-9 September in Hammerfest. Since none of the Russian vessels were able to call at Hammerfest data were analysed at IMR, Bergen and PINRO, Murmansk and the results exchanged by correspondence (telefax and telemail).

Observations concerning the geographical distribution of 0-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 with a small mesh midwater trawl. The vessels which participated in the survey in 1992, 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 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 40m. An additional tow at 60 and 80m for 0.5 nautical mile was made when 0-group fish layer was recorded on the echosounder deeper than 60m.

Survey tracks and hydrographical stations are given in Fig. 1. Trawl stations with and without catch are indicated on the distribution charts in Figs. 14 - 23, as filled and open symbols respectively. The density grading is based on catch in number per 1.0 nautical mile trawling.

## HYDROGRAPHY

Observations were made along all the survey tracks with 5 to 40 nautical miles between stations. Horizontal distribution of temperatures and salinities is shown for 0, 50, 100 and 200m (Figs. 2-9). Figs. 10 - 13 show the temperature and salinity conditions along the Kola, Bear Island - North Cape, Bear Island - West and Cape Kanin sections. The mean temperatures in the main parts of these sections are presented in Table 1.

It appears that mean sea temperatures from 0 to 200m were high and well above ( $0.4^{\circ}\text{C}$  to  $0.7^{\circ}\text{C}$ ) the long term average in all parts of the surveyed area, and 1992 is the fourth "warm year" in succession. The positive anomalies were mainly caused by large contents of heat in intermediate and deep layers and thus associated with watermasses of Atlantic origin flowing into the Barents Sea from west. Surface layer temperatures (0-50m) in the central and southeastern parts of the area were significantly lower in 1992 than in 1991 and just slightly above the longterm average.

## DISTRIBUTION AND ABUNDANCE OF 0-GROUP FISH AND GONATUS FABRICII

Geographical distribution of 0-group fish are shown as shaded areas in Figs. 14 - 22, and of Gonatus fabricii in Fig. 23. Double shading indicates dense concentrations. The criteria for discriminating between dense and scattered concentrations 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.14)

The distribution of herring was similar to that of 1991 in the Barents Sea, but with fewer observations along West-Spitsbergen. The main concentrations were found in the Western Barents Sea along the edge of the shelf between the Norwegian coast and up to South Cape (76°N), and eastwards as far as 50°E. The logarithmic abundance index is estimated at 1.06, which is only slightly below the 1991 index (1.19) and indicates that the 1992 yearclass is relatively strong.

**Capelin** (Fig.15)

There were very few observations of 0-group capelin and dense concentrations were observed at one station only in the southeastern part of the Barents Sea. The overall catch in numbers is among the lowest ever recorded since the 0-group investigations started in 1965 and the 1992 yearclass seems to be very poor.

**Cod** (Fig.16)

0-group cod had one of the widest distributions ever observed, similar to that of 1991, extending from Norway and Murman coast to at least 80°30'N off West-Spitsbergen (into the drift ice) and to 77°N in central parts. In the east it was recorded north to 73°N and east to Novaya Zemlya (52°E). The abundance indices for the 1992 yearclass are the highest in the time-series and well above both the 1983, 1985 and 1991 yearclasses. At this stage the 1992 yearclass must be classified as a very strong one.

### **Haddock (Fig.17)**

Haddock was, as in 1991, mainly distributed in western areas from the Norwegian coast to 80° off West-Spitsbergen. The eastern limit in the Barents Sea was at about 42°E. Dense concentrations were found in a smaller area than in 1991, mainly north of Cape North to 74°N. The abundance indices is the second highest ever observed, and the 1992 yearclass may be classified as rich.

### **Saithe (Fig.18)**

Unlike in previous years, 0-group saithe occurred in many hauls in most of the survey area. This may indicate good saithe recruitment in 1992.

### **Polar cod (Fig.19)**

0-group polar cod is distributed in two separate areas, with one component west and southeast of Spitsbergen and one component in east along the western coast of Novaya Zemlya. During the 0-group survey the total area of distribution is not completely covered.

In the north-western area, the distribution was wider than in 1991, mainly off West-Spitsbergen, and the index about twice that of 1991. The 1992 yearclass of polar cod in this area seems to be at least of average abundance.

In the southeastern area along Novaya Zemlya the distribution was similar to that of 1991, but the area with dense concentrations was smaller and the index only half of that in 1991. The 1992 yearclass in this component of the polar cod stock may therefore be considered to be of average strength or slightly below average.

### **Redfish (Fig.20)**

The main distribution of redfish was along the western edge of the shelf, from 73°N to 80°30'N off West-Spitsbergen. The area of both scattered and dense concentrations were smaller than in 1991 and the index 25% lower, the lowest since 1968. The 1992 yearclass of redfish may therefore be considered as poor.

### **Greenland halibut (Fig.21)**

Only single fish occurred in hauls west and east of Spitsbergen and, as in the previous four years, the abundance index indicates that the yearclass is very poor.

### Long rough dab (Fig.22)

This species occurred mainly southeast of Spitsbergen. The abundance index is the lowest recorded since 1970 and the 1992 yearclass is considered to be poor

### Blue whiting, sandeel and catfish.

Only a few specimens of these species were caught this year.

### Gonatus (Fig.23)

Specimens of 0-group Gonatus fabricii were found over a larger area than in 1991. The distribution is westerly, from the Norwegian coast at 28°E and west into the Norwegian Ocean and north to about 80°N off Western Spitsbergen.

### 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. Pp. 189-209 in Godø, O.R. and Tilseth, H. (eds.): *Reproduction and recruitment of Arctic cod*. Proceedings of the first Soviet-Norwegian symposium, Leningrad, 26-30 September 1983. Institute of Marine Research, Bergen, Norway.
- Tereshchenko, V.V. 1992. Some results from long-term oceanographic observations during 0-group surveys in the Barents Sea. ICES CM 1992/C:18.
- Toresen, R. 1985. Recruitment indices of Norwegian spring-spawning herring for the period 1965-1984 based on the international 0-group fish surveys. ICES CM 1985/H: 54.

Table 1. Mean water temperature<sup>1</sup> in main parts of standard sections in the Barents Sea and adjacent waters in august-September 1965 - 1992.

Year	Section <sup>2</sup> and layer (deep in meter)						
	1	2	3	4	5	6	7
	0-50	50-200	0-200	0-bot.	0-bot.	0-200	0-200
1965	6.7	3.9	4.6	4.6	3.7	5.1	-
1966	6.7	2.6	3.6	1.9	2.2	5.5	3.6
1967	7.5	4.0	4.9	6.1	3.4	5.6	4.2
1968	6.4	3.7	4.4	4.7	2.8	5.4	4.0
1969	6.7	3.1	4.0	2.6	2.0	6.0	4.2
1970	7.8	3.7	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	5.3	5.7	4.2	5.9	5.0
1974	8.1	3.9	4.9	4.6	3.5	6.1	4.9
1975	7.0	4.6	5.2	5.6	3.6	5.7	4.9
1976	8.1	4.0	5.0	4.9	4.4	5.6	4.8
1977	6.9	3.4	4.3	4.1	2.9	4.9	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	1.4	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	2.2	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	4.5	3.6	5.9	5.0
1985	7.1	3.5	4.4	3.4	3.4	5.3	4.6
1986	7.5	3.5	4.5	3.9	3.2	5.8	4.4
1987	6.2	3.3	4.0	2.7	2.5	5.2	3.9
1988	7.0	3.7	4.5	3.8	2.9	5.5	4.2
1989	8.6	4.8	5.8	6.5	4.3	6.9	4.9
1990	8.1	4.4	5.3	5.0	3.9	6.3	5.7
1991	7.7	4.5	5.3	4.8	4.2	6.0	5.4
1992	7.5	4.6	5.3	5.0	4.0	6.1	5.0
Aver. 1965- 1992	7.3	3.7	4.6	4.1	3.2	5.7	4.5

<sup>1)</sup> Earlier presented temperatures have been slightly adjusted (Tereshchenko, 1992).

<sup>2)</sup> 1-3: Murmansk Current; Kola Section (70°30'N-72°30'N, 33°30'E)  
 4: Cape Kanin section (68°45'N - 70°05'N, 43°15'E)  
 5: Cape Kanin section (71°00'N - 72°00'N, 43°15'E)  
 6: North Cape Current; North Cape - Bear Island section (71°33'N, 25°02'E - 73°35'N, 20°46'E)  
 7: West Spitsbergen Current; Bear Island - West section (74°30'N, 06°34'E - 15°55'E)

Tabell 2. Abundance indices of 0-group fish in the Barents Sea and adjacent waters in 1965 - 1992.

Year	Cod	Had-dock	Polar cod		Red-fish	Green-land 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	70	472	9	72
1978	106	61	107	144	460	35	76
1979	94	69	23	302	980	22	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	155	631	41	174
1988	133	86	144	120	949	8	72
1989	202	112	206	41	698	5	92
1990	465	227	144	48	670	2	35
1991	766	472	90	239	200	1	28
1992	1159	313	195	118	150	3	32

Table 3. Estimated logarithmic indices with 90% confidence limits of year class abundance for 0-group herring, cod and haddock in the Barents Sea and adjacent waters 1965 - 1992.

Year	Herring <sup>1</sup>			Cod			Haddock		
	Index	Confidence limits		Index	Confidence limits		Index	Confidence limits	
1965				+					
1966	0.14	0.04	0.31	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	0.00	-	-	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
1990	0.31	0.16	0.50	1.23	1.04	1.34	0.61	0.48	0.75
1991	1.19	0.90	1.52	2.30	1.97	2.65	1.17	0.98	1.37
1992	1.06	0.69	1.50	2.94	2.53	3.39	0.87	0.71	1.06

<sup>1)</sup> Assessment for 1965-1984 made by Toresen (1985).



Table 4. Length distribution of 0-group fish<sup>1</sup> in percent in the Barents Sea and adjacent waters in August - September 1992.

Length (mm)	Her- ring	Cap- elin	Cod	Had- dock	Polar cod		Red- fish	Green land halib	Long roug dab	Sand- eel
					East	West				
15-19						0.1				
20-24						0.8	+		0.6	
25-29				+		6.3	0.3		1.7	
30-34					6.3	16.2	0.9		14.9	
35-39		33.3			6.3	31.5	12.2	7.3	40.5	2.3
40-44		45.5	+	+	22.6	32.0	53.1	7.3	39.3	29.3
45-49	+	9.1	0.1		25.0	8.8	30.1	12.5	3.1	36.1
50-54	+	3.0	0.7	0.1	31.3	3.7	3.1			27.1
55-59	0.1	3.0	2.0	0.4	7.8	0.6	0.3			4.5
60-64	0.7		5.1	1.0	0.9	0.2				
65-69	2.4		8.1	2.0		0.1		2.1		
70-74	6.1	3.0	11.3	5.2				35.4		
75-79	12.0		16.8	8.0						
80-84	14.5		20.4	12.1				17.7		
85-89	14.8		18.0	13.0				17.7		
90-94	13.7	3.0	9.8	11.5						
95-99	12.5		4.4	10.6						
100-104	10.7		2.0	9.8						0.8
105-109	6.7		0.8	10.1						
110-114	3.7		0.1	5.8						
115-119	2.0		0.2	4.4						
120-124	0.2			2.5						
125-129	0.1			1.7						
130-134				1.1						
135-139	+			0.6						
140-144	+			0.1						
Total numbers	162- 002	33	179- 354	3795	116	68- 621	80- 474	8	169	132
Mean length	90.0	44.0	80.2	94.3	46.8	38.7	43.1	68.5	38.3	47.5

<sup>1)</sup> Based on Norwegian observations only

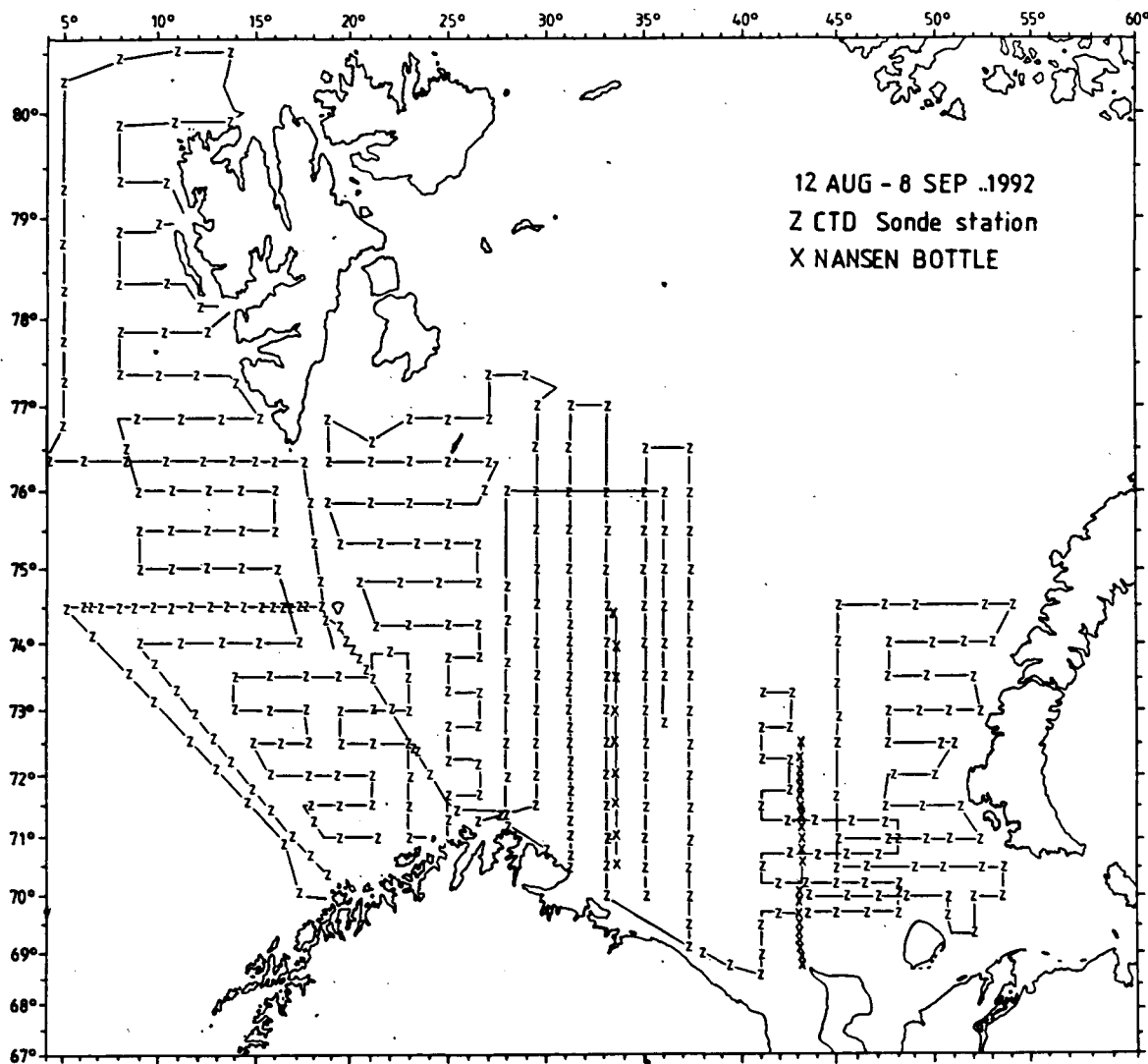


Fig. 1. Survey tracks and hydrographic stations.

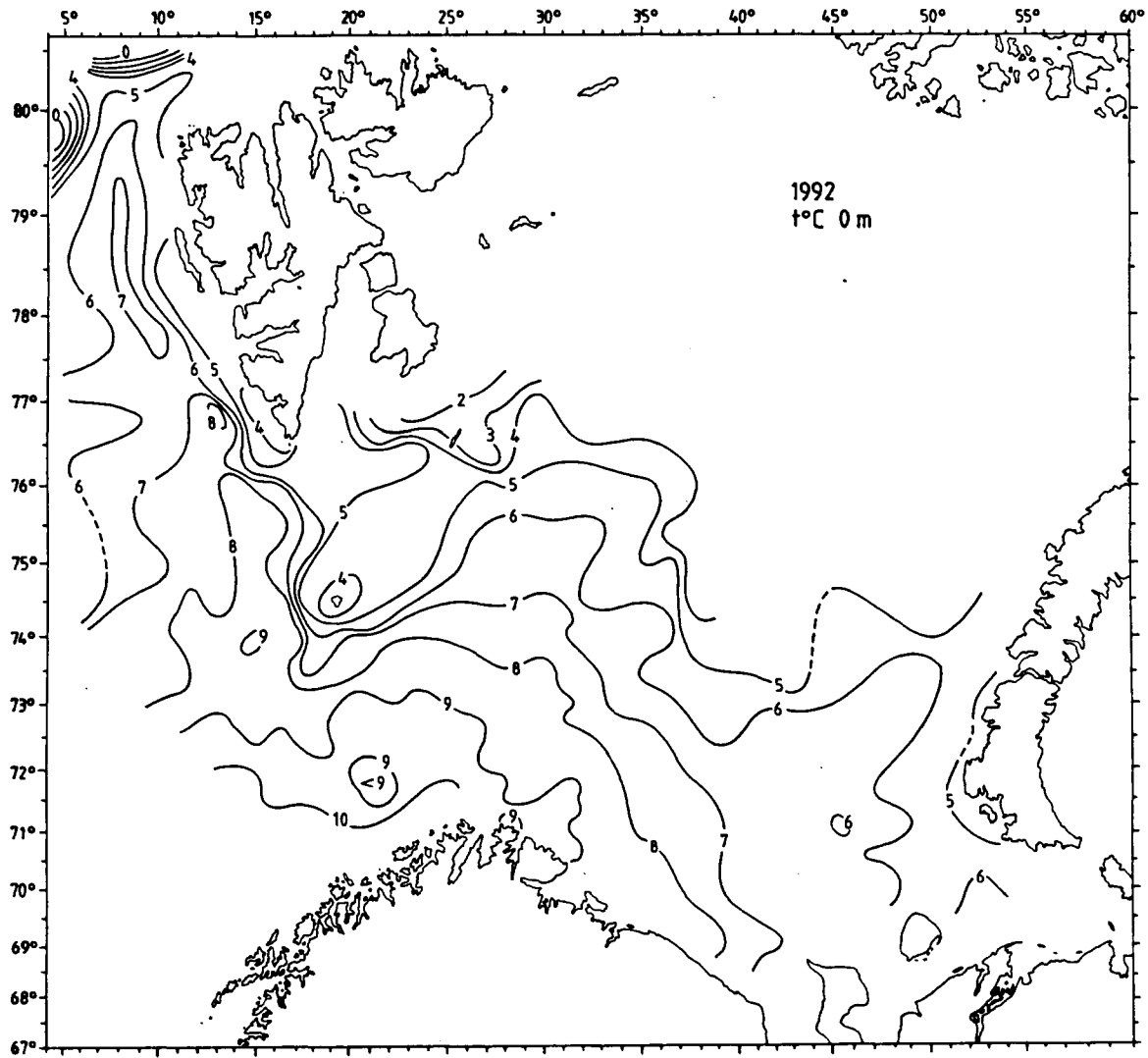


Fig. 2. Isotherms at 0 m.

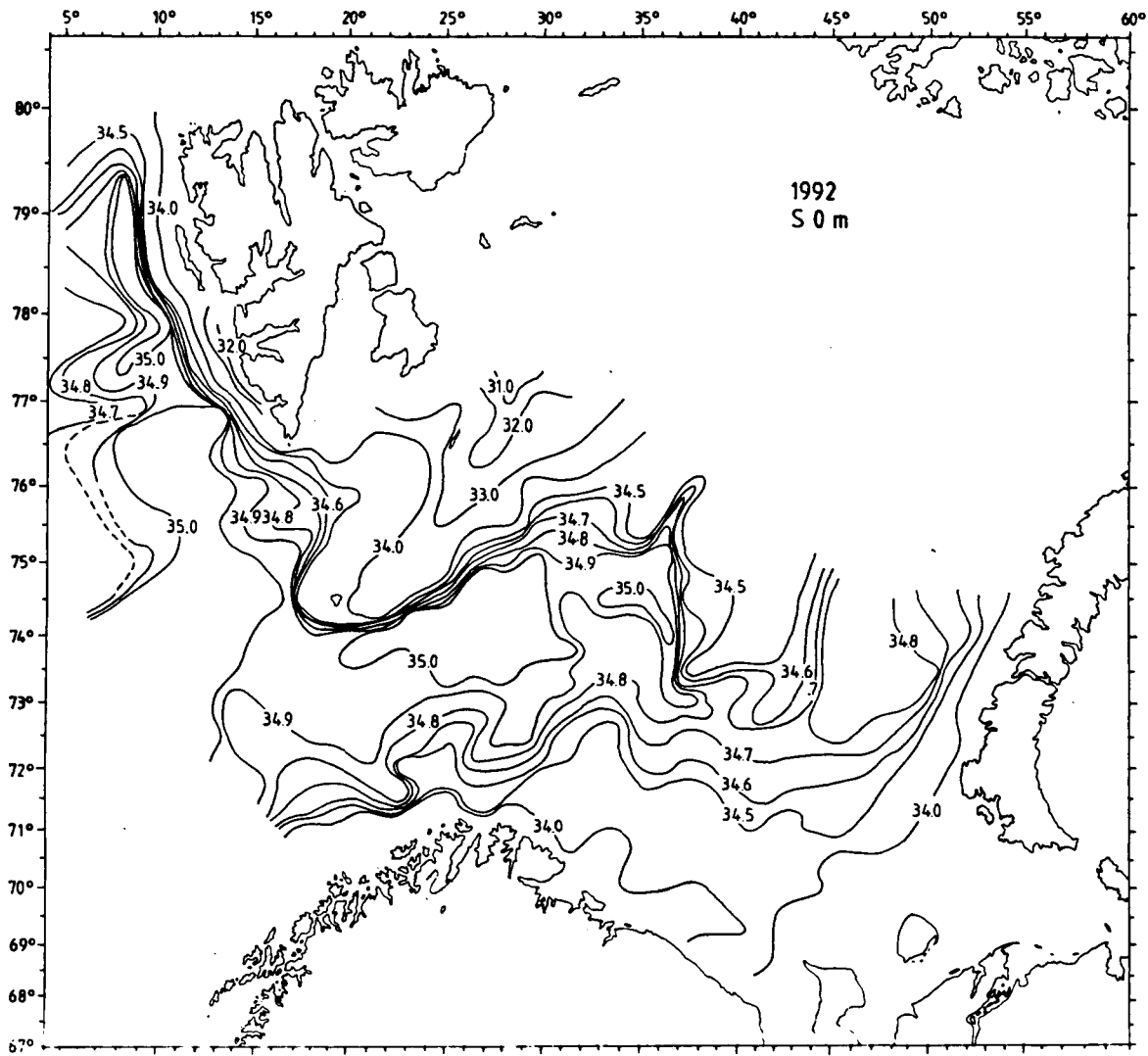


Fig. 3. Isohalines at 0 m.

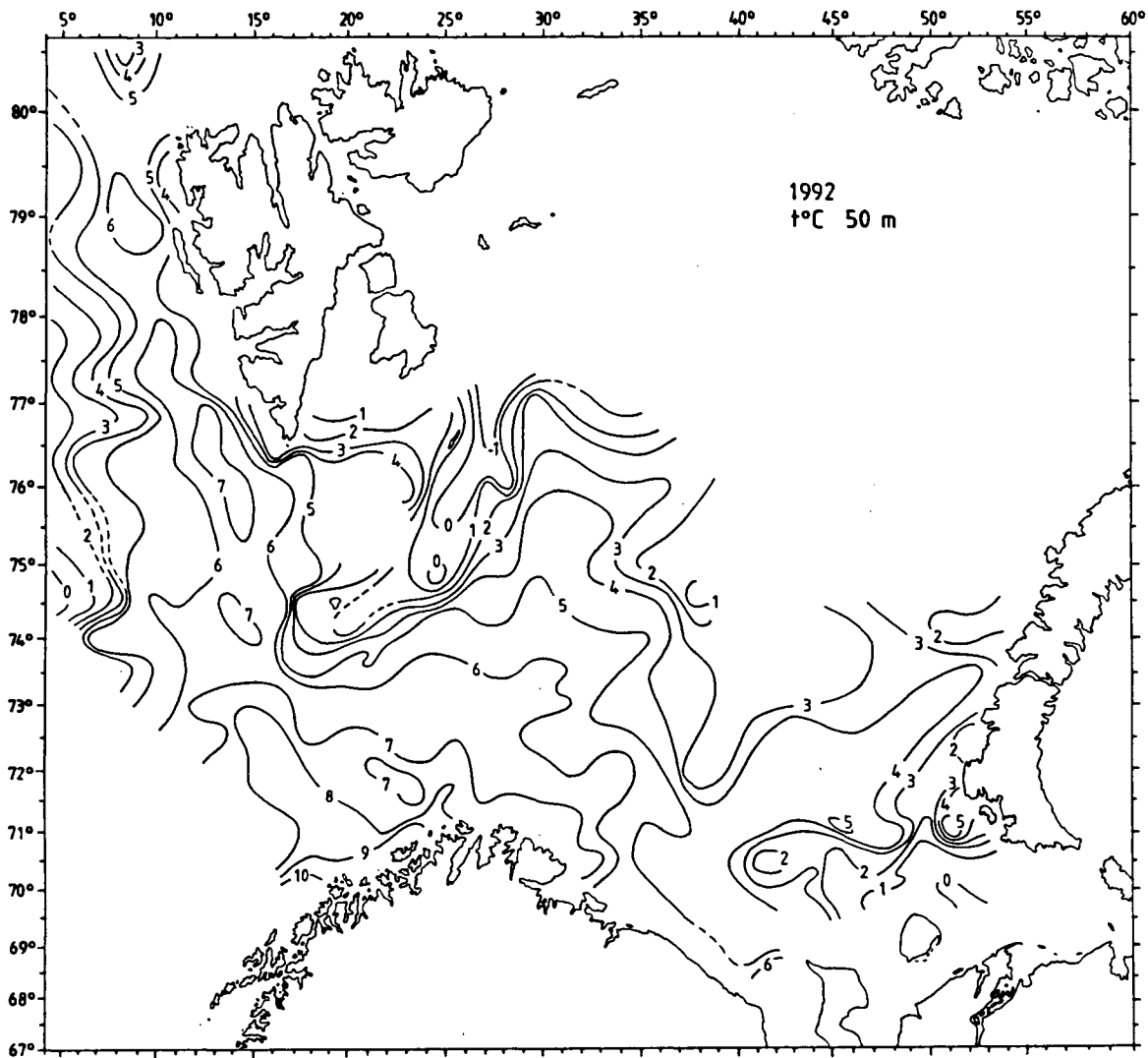


Fig. 4. Isotherms at 50 m.

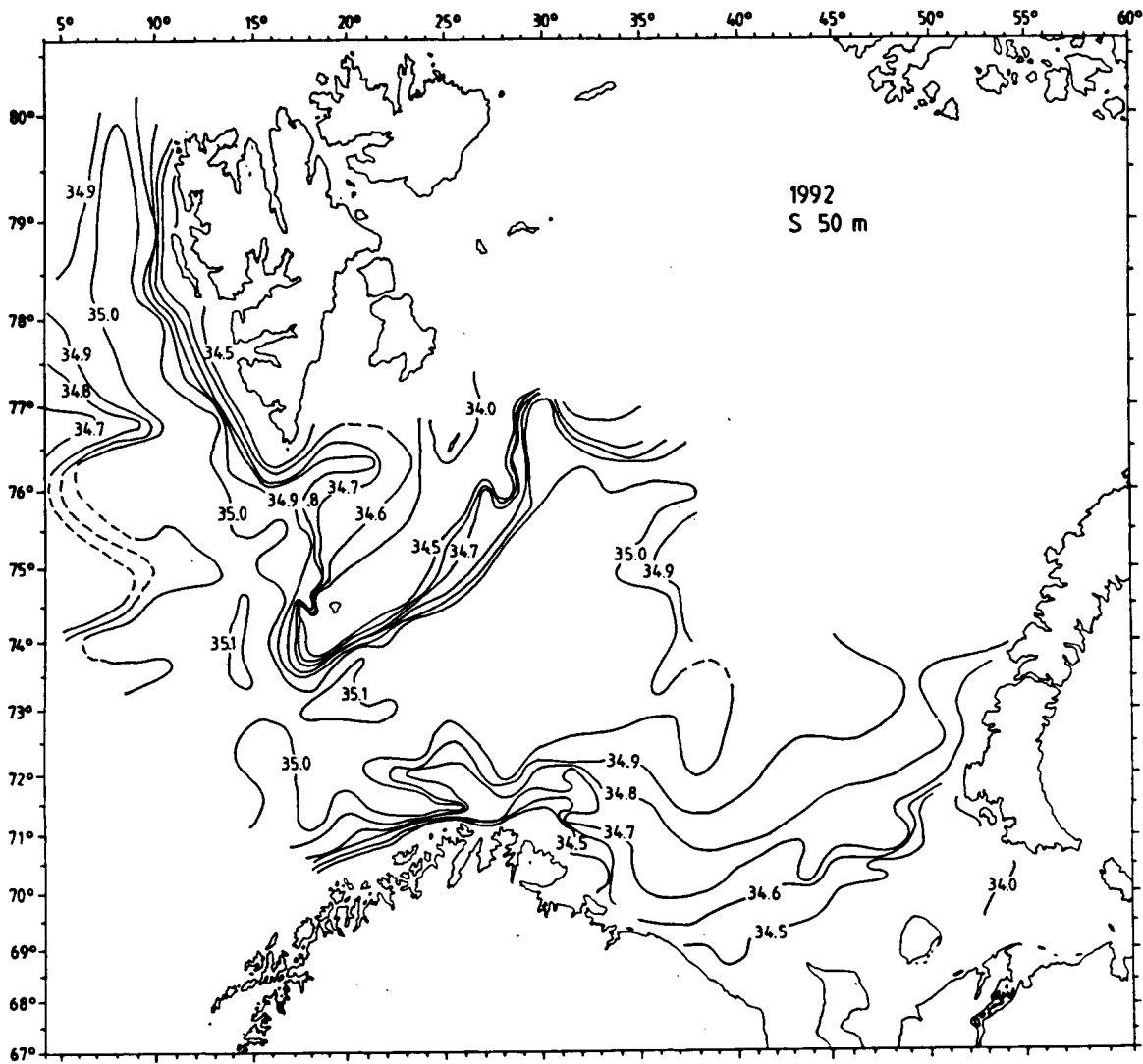


Fig. 5. Isohalines at 50 m.

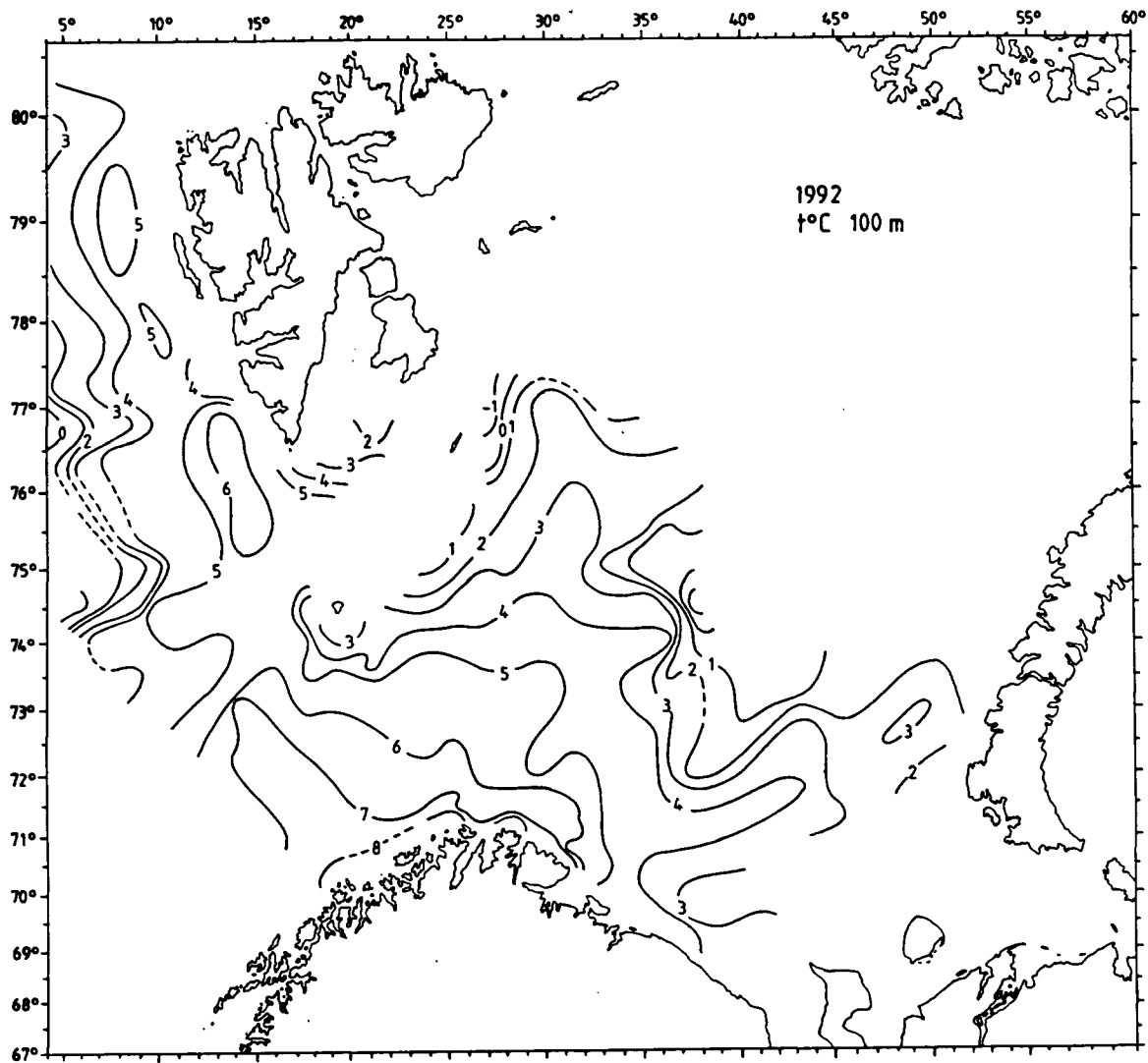


Fig. 6. Isotherms at 100 m.

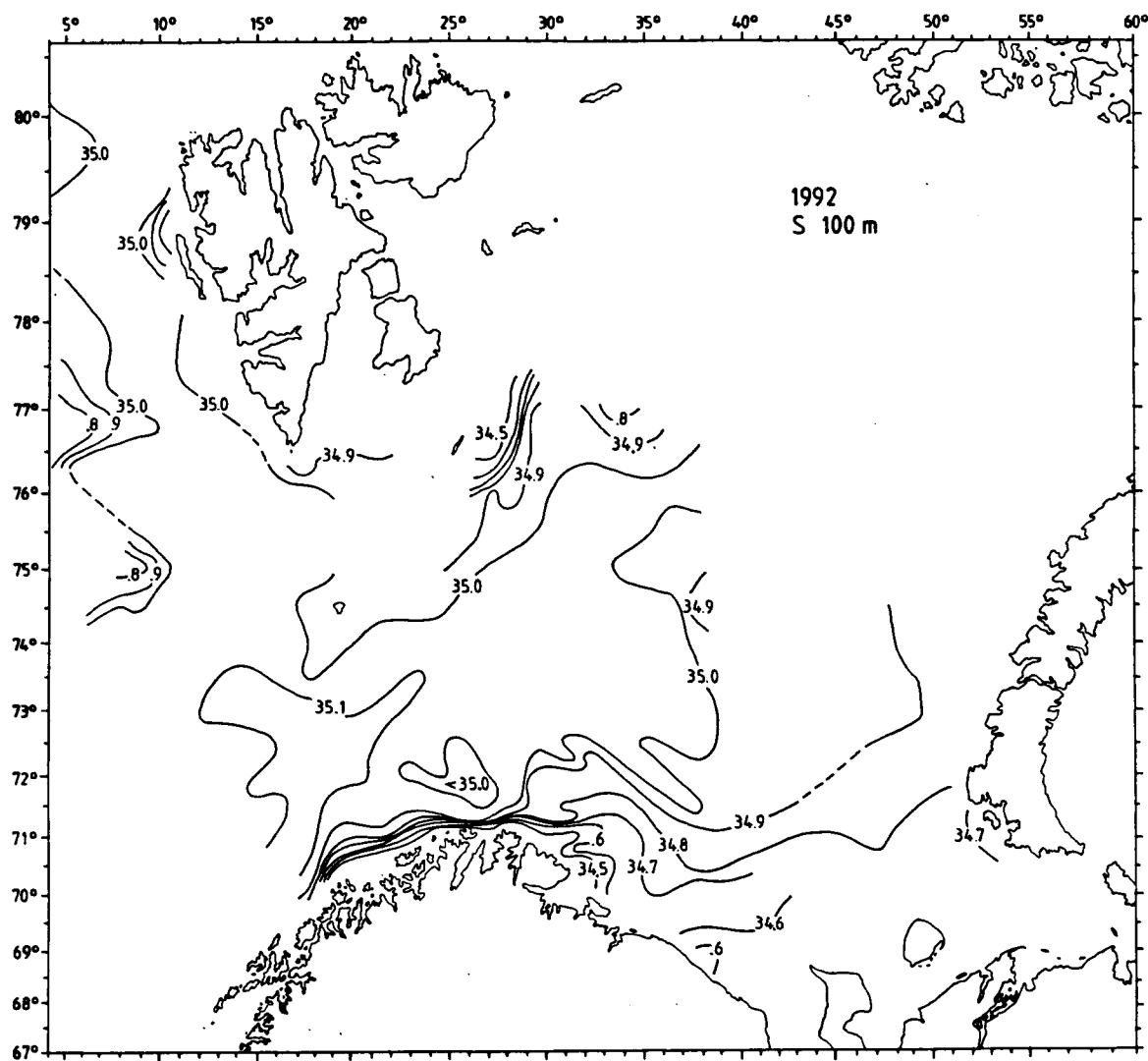


Fig. 7. Isohalines at 100 m.



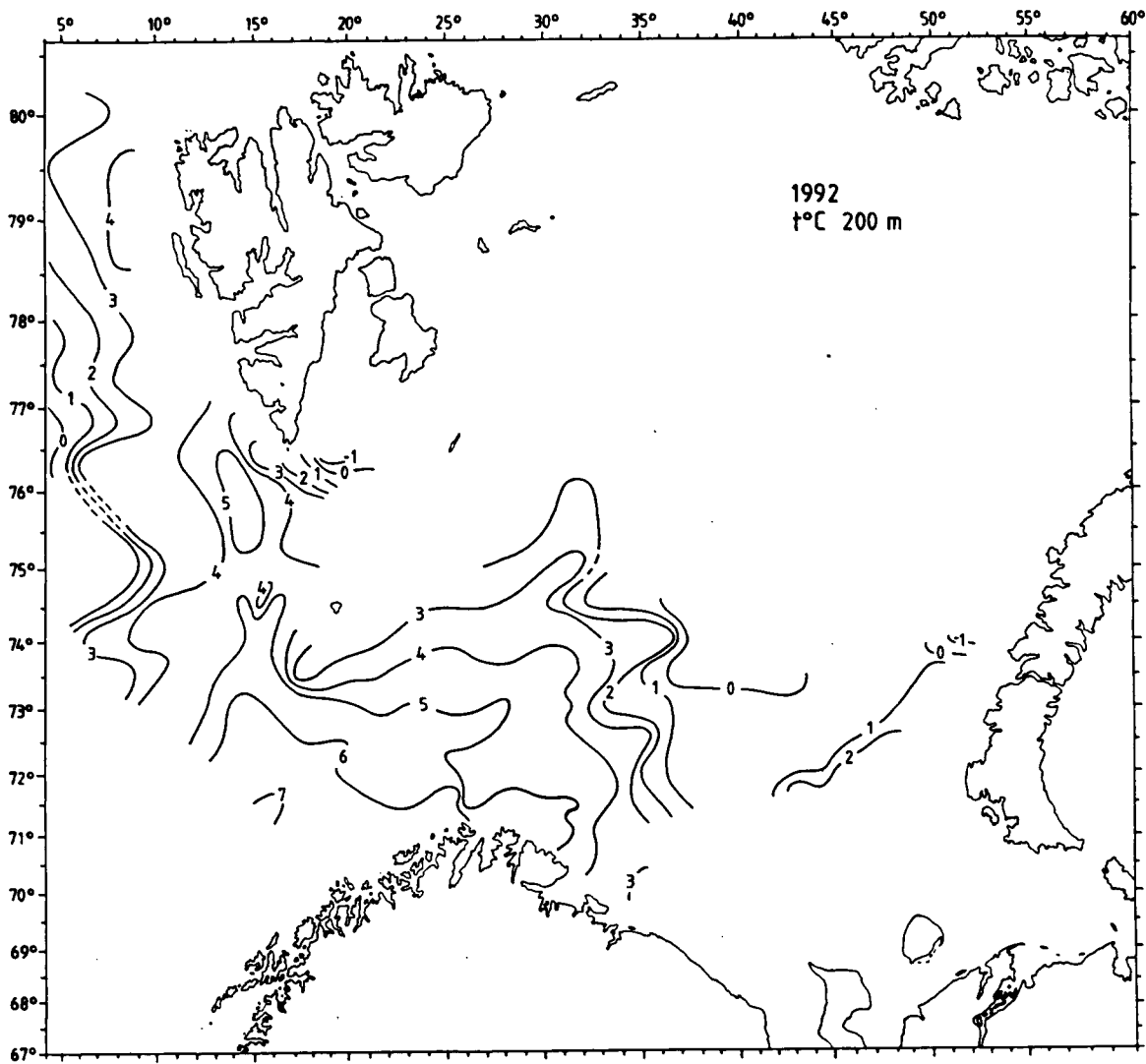


Fig. 8. Isotherms at 200 m.

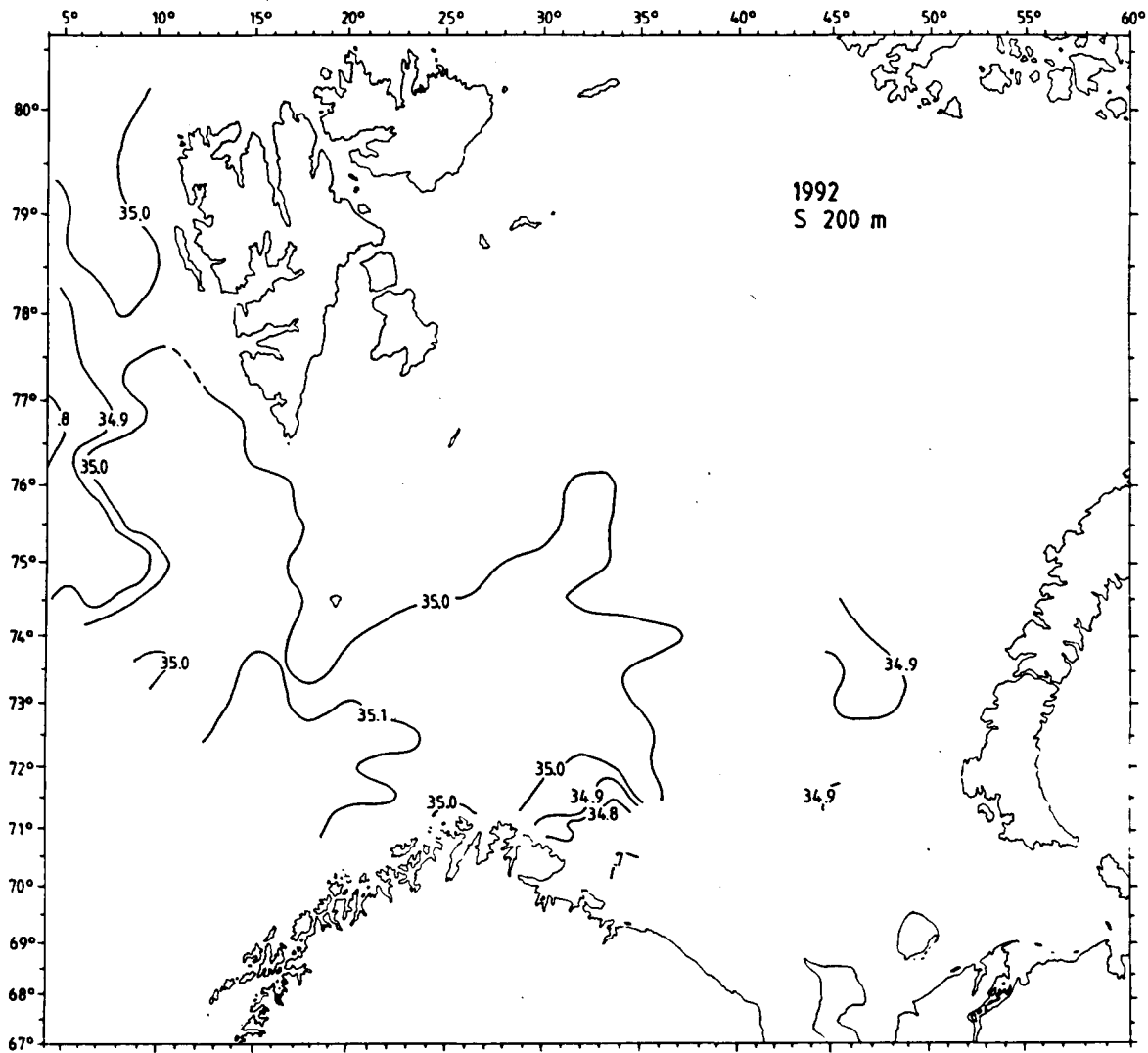


Fig. 9. Isohalines at 200 m.

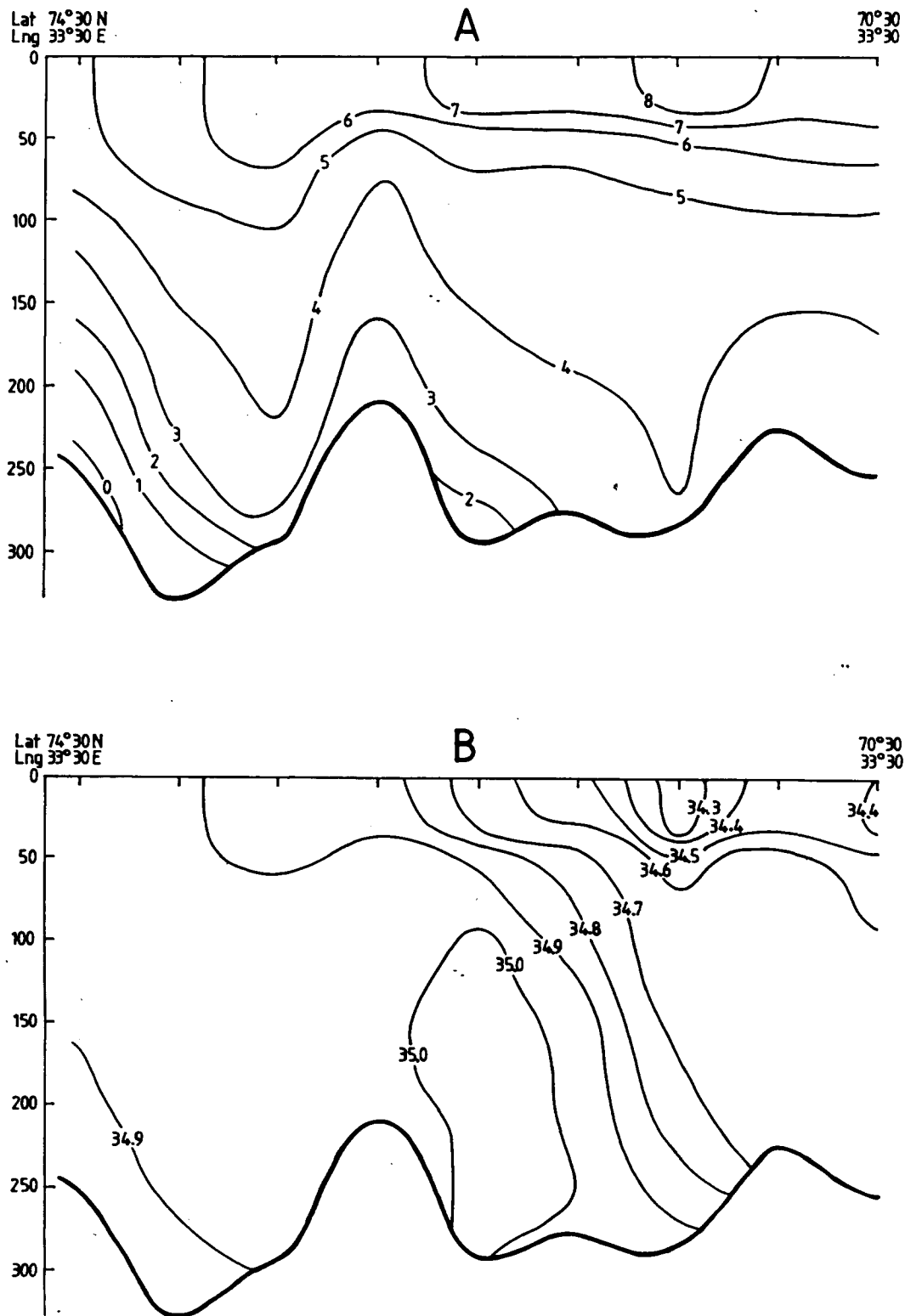


Fig. 10. Hydrographic section along the Kola meridian.  
Temperature (A) and salinity (B).

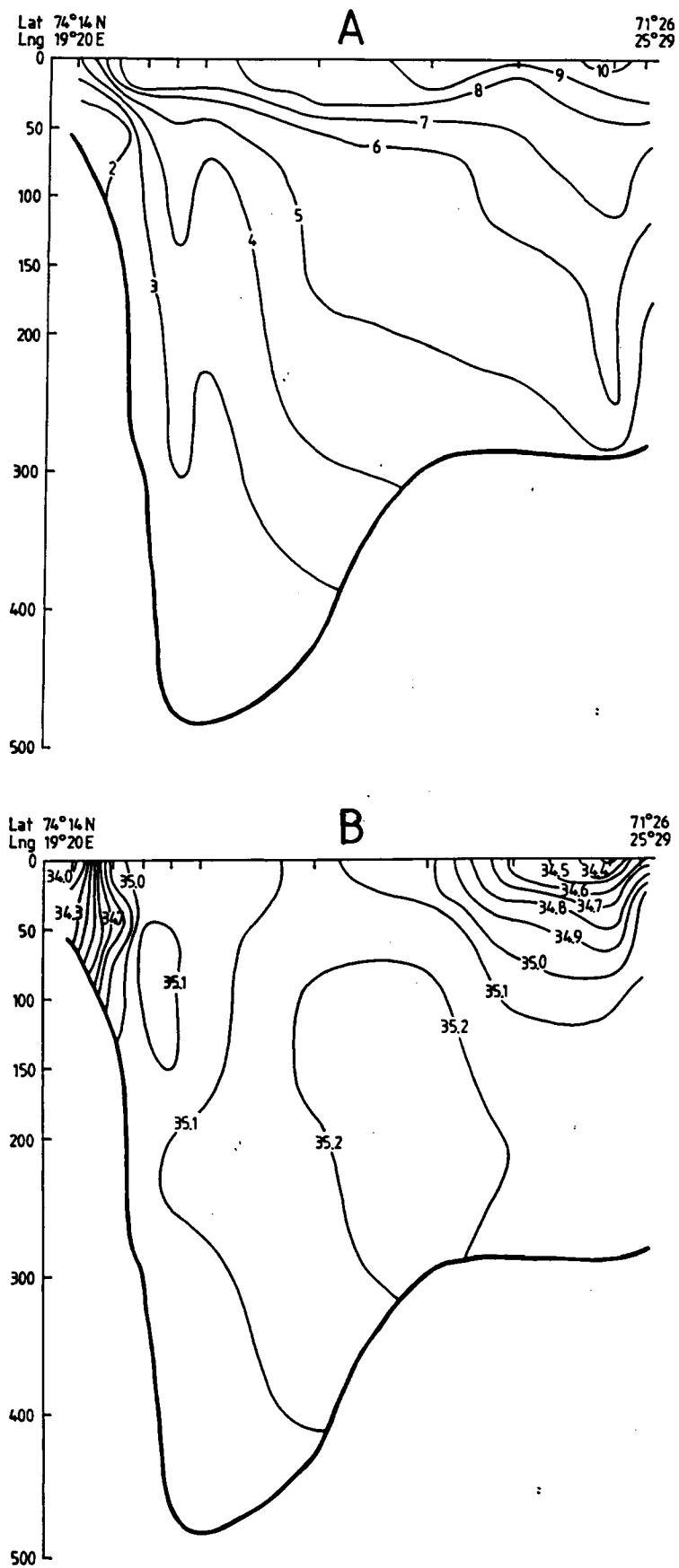


Fig. 11. Hydrographic section North Cape - Bear Island.  
Temperature (A) and salinity (B).

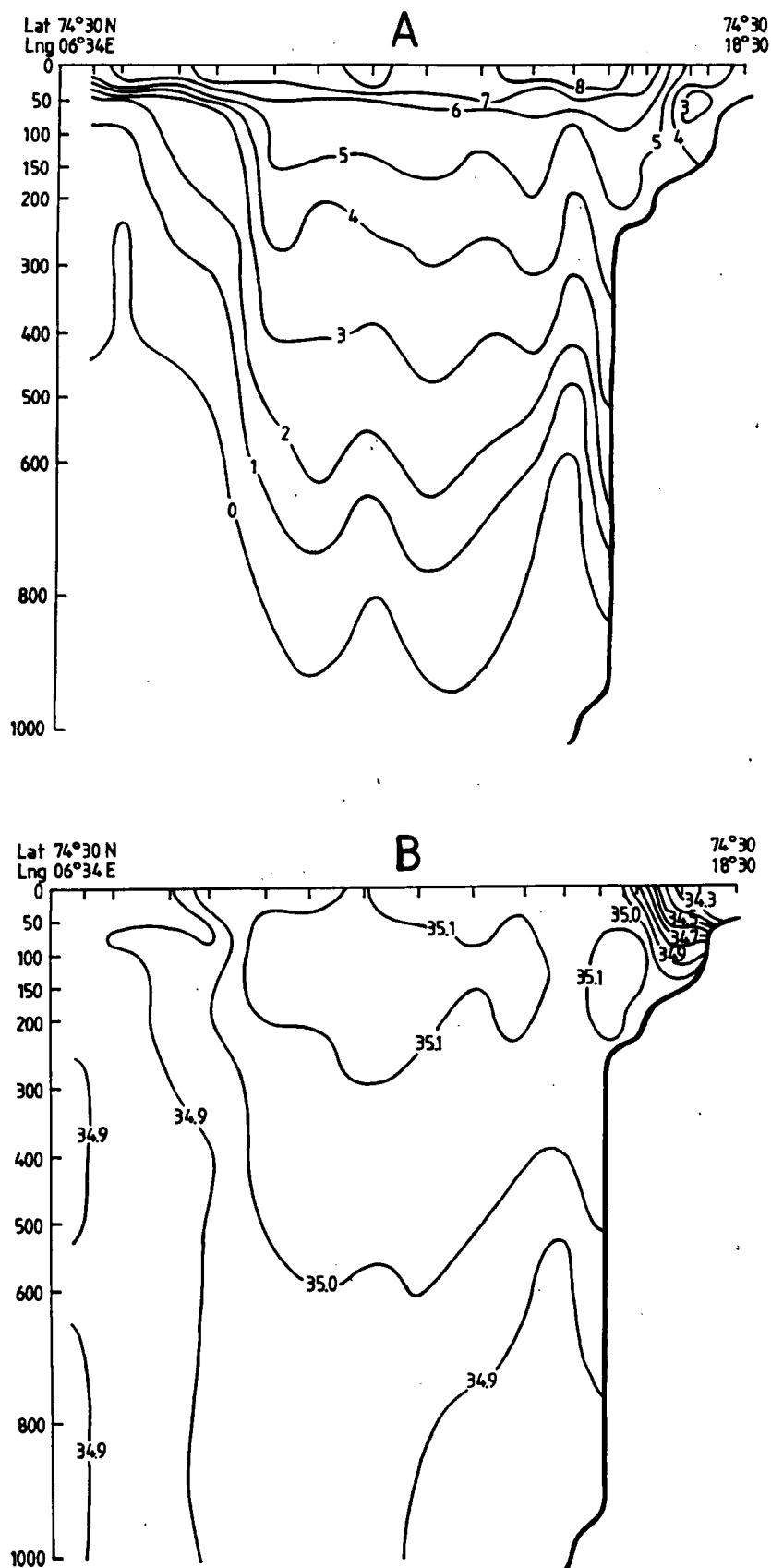


Fig. 12. Hydrographic section Bear Island - West.  
Temperature (A) and salinity (B).

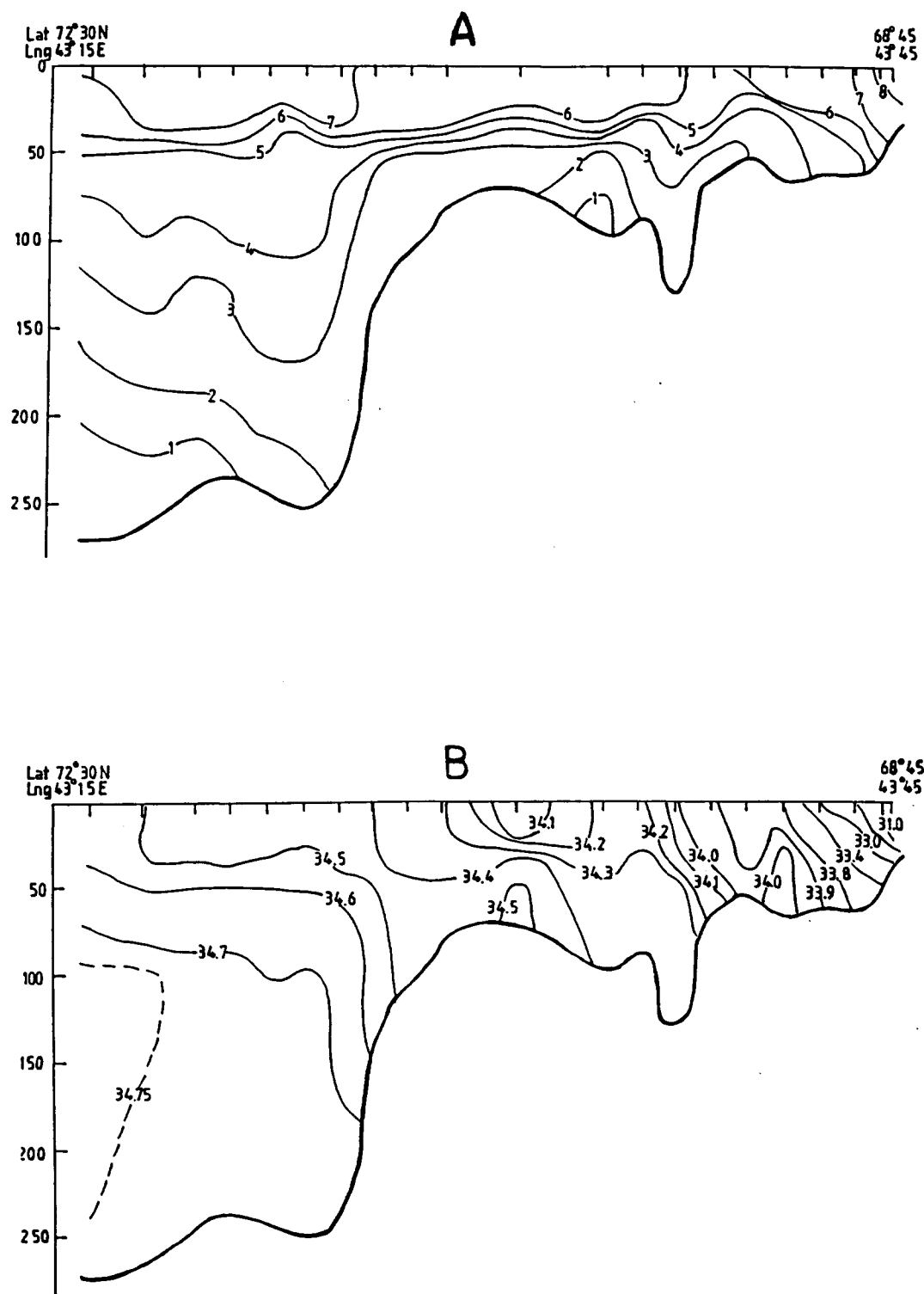


Fig. 13. Hydrographic section Cape Kanin - North.  
Temperature (A) and salinity (B).

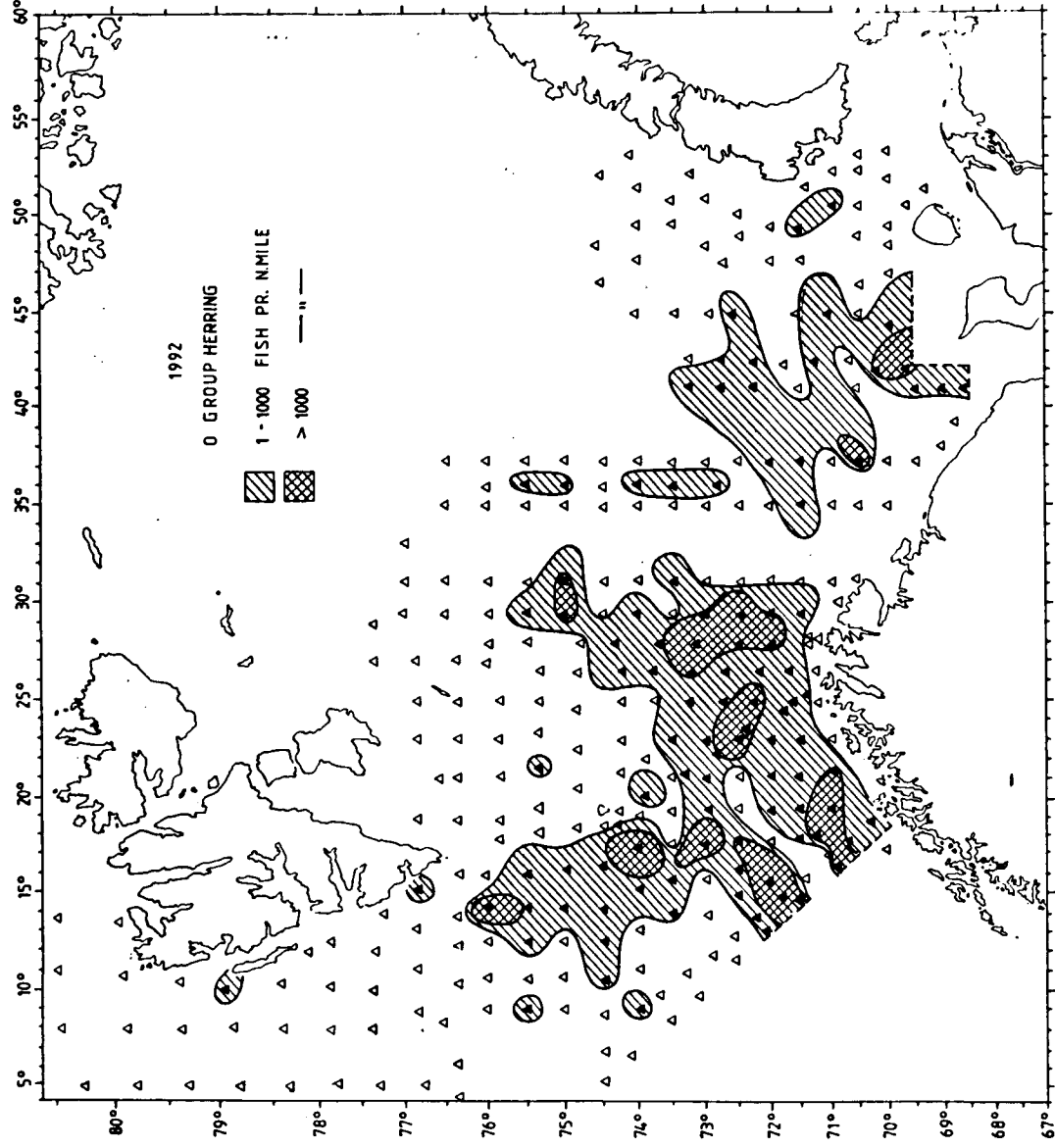


Fig. 14. Distribution of 0-group herring.

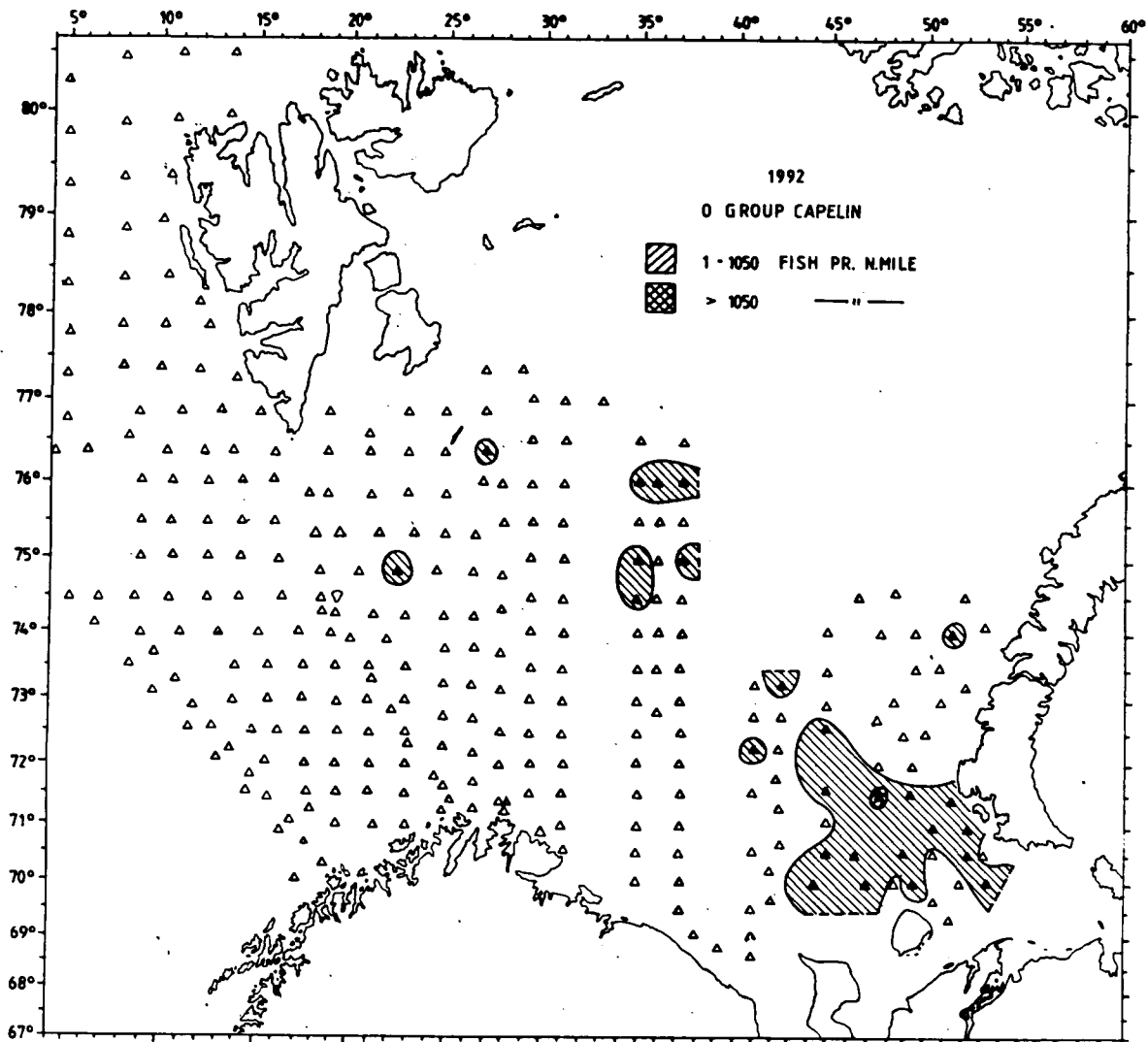


Fig. 15. Distribution of 0-group capelin.



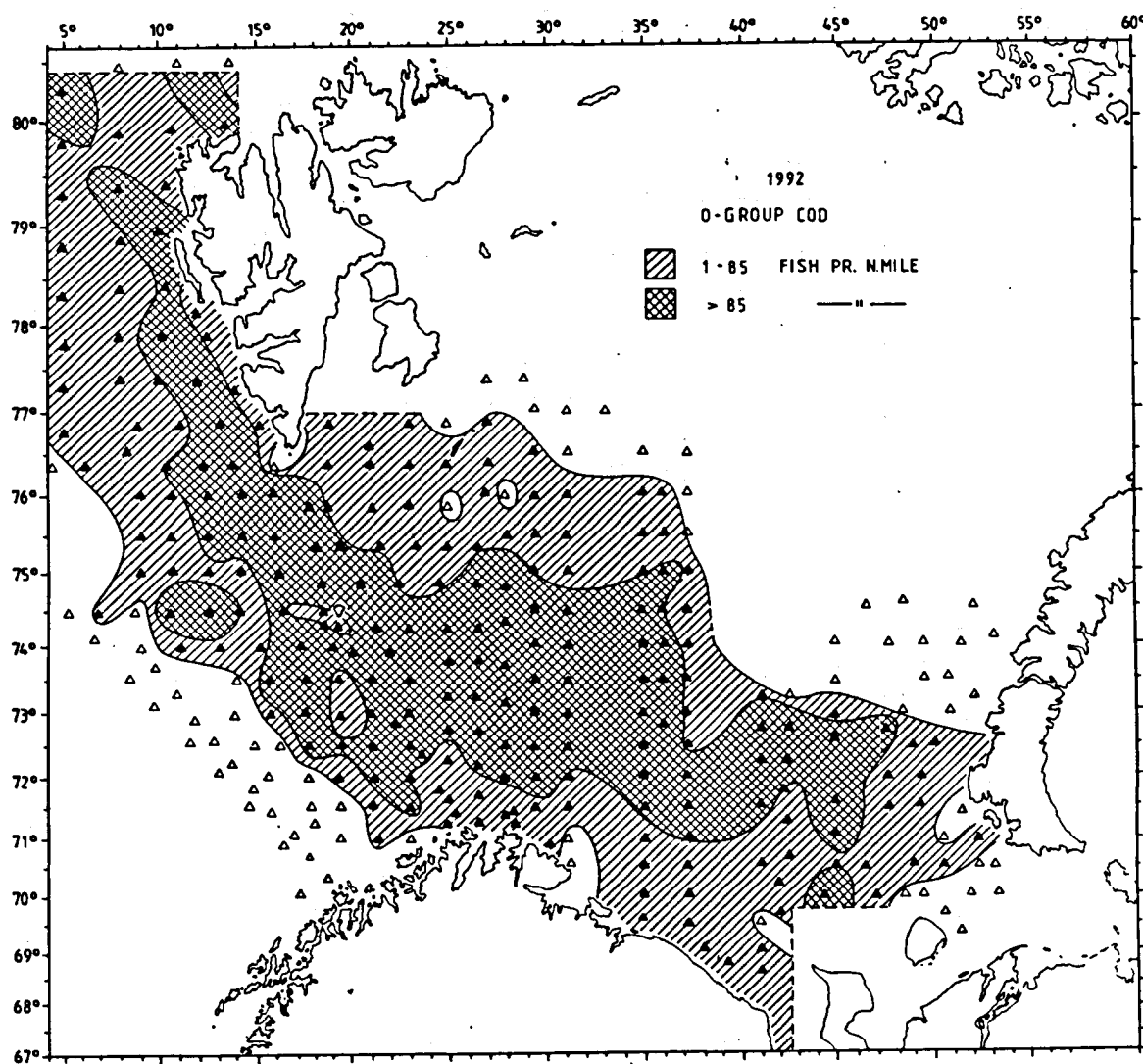
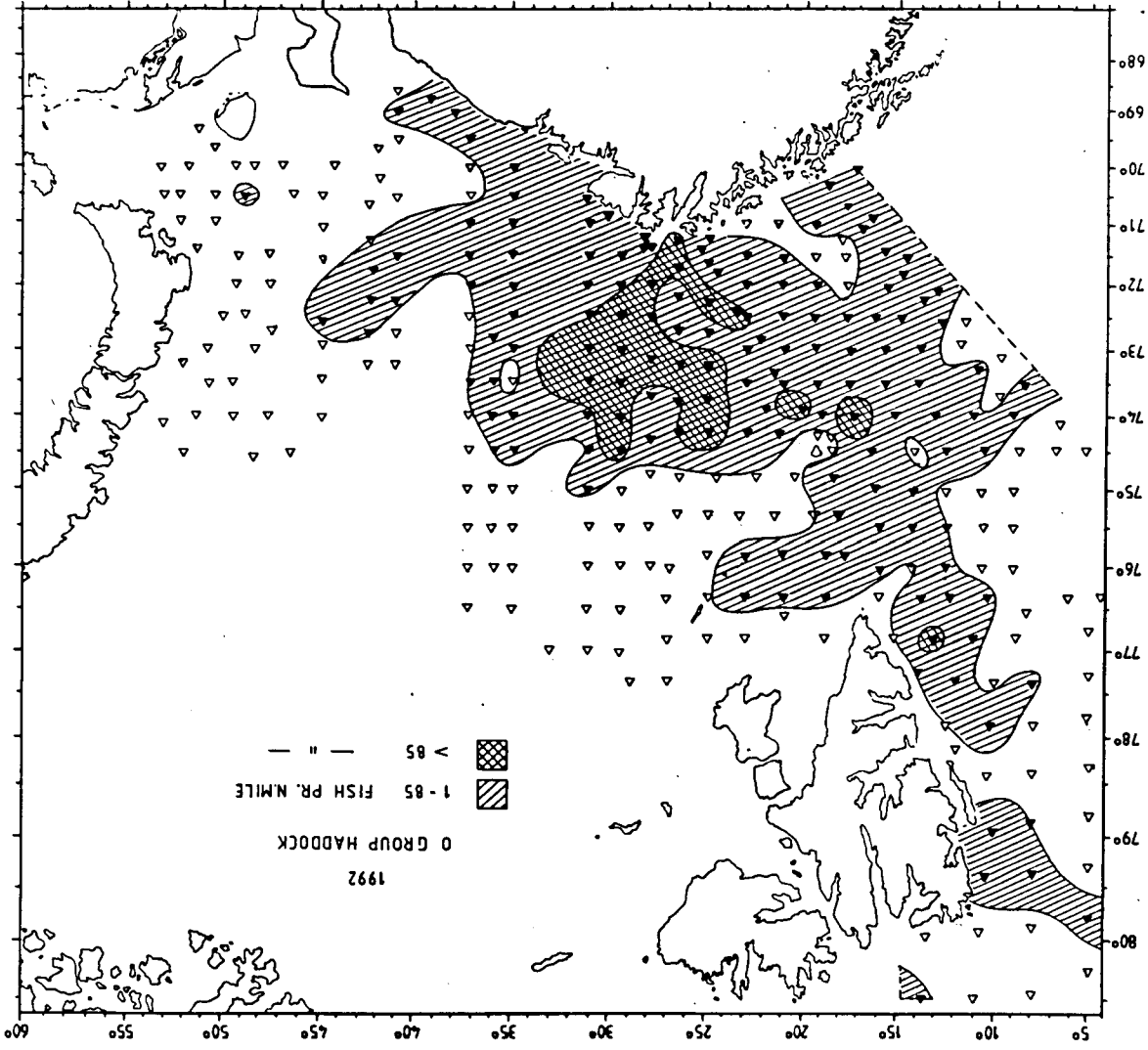


Fig. 16. Distribution of 0-group cod.

Fig. 17. Distribution of O-group haddock.



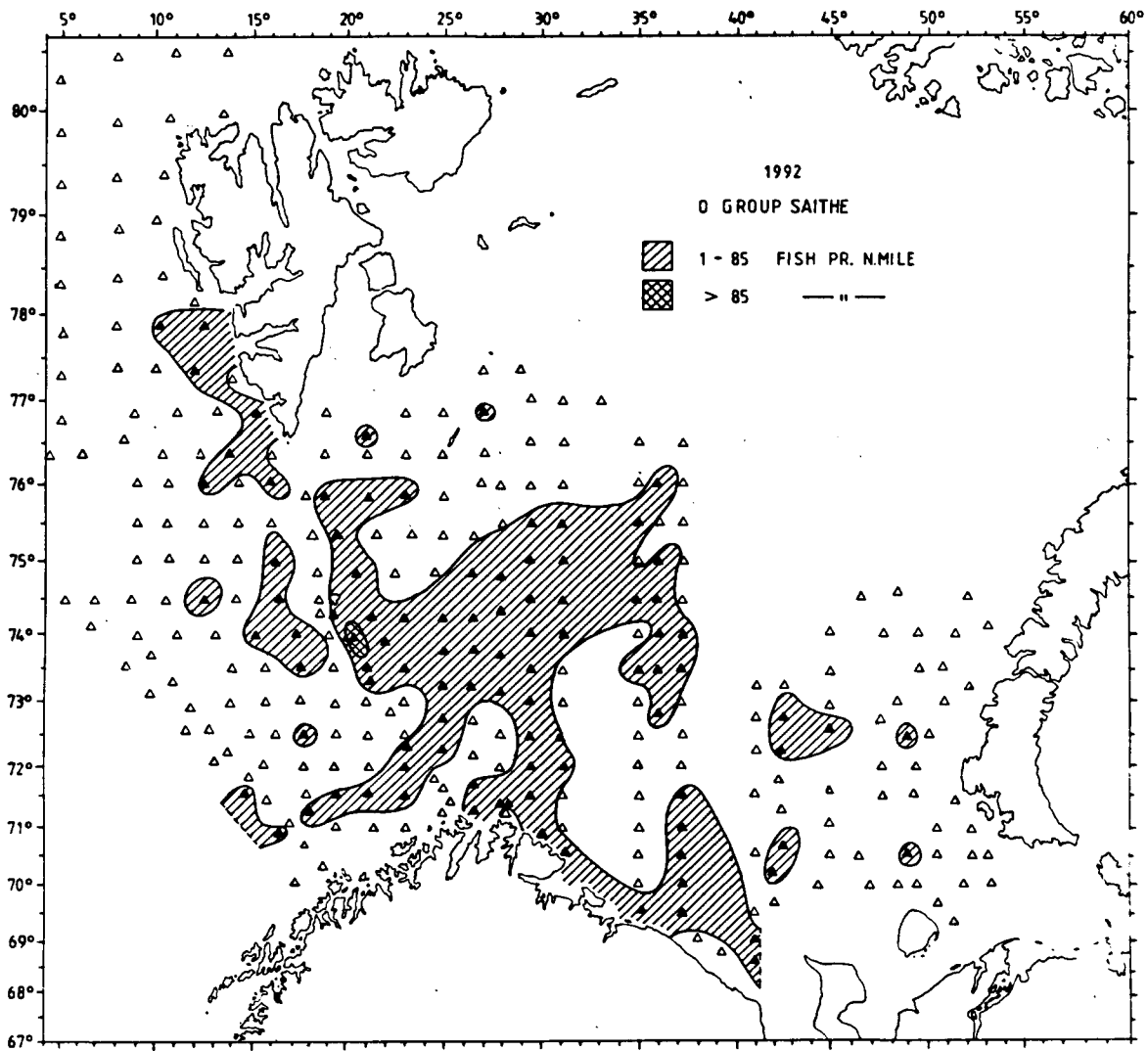
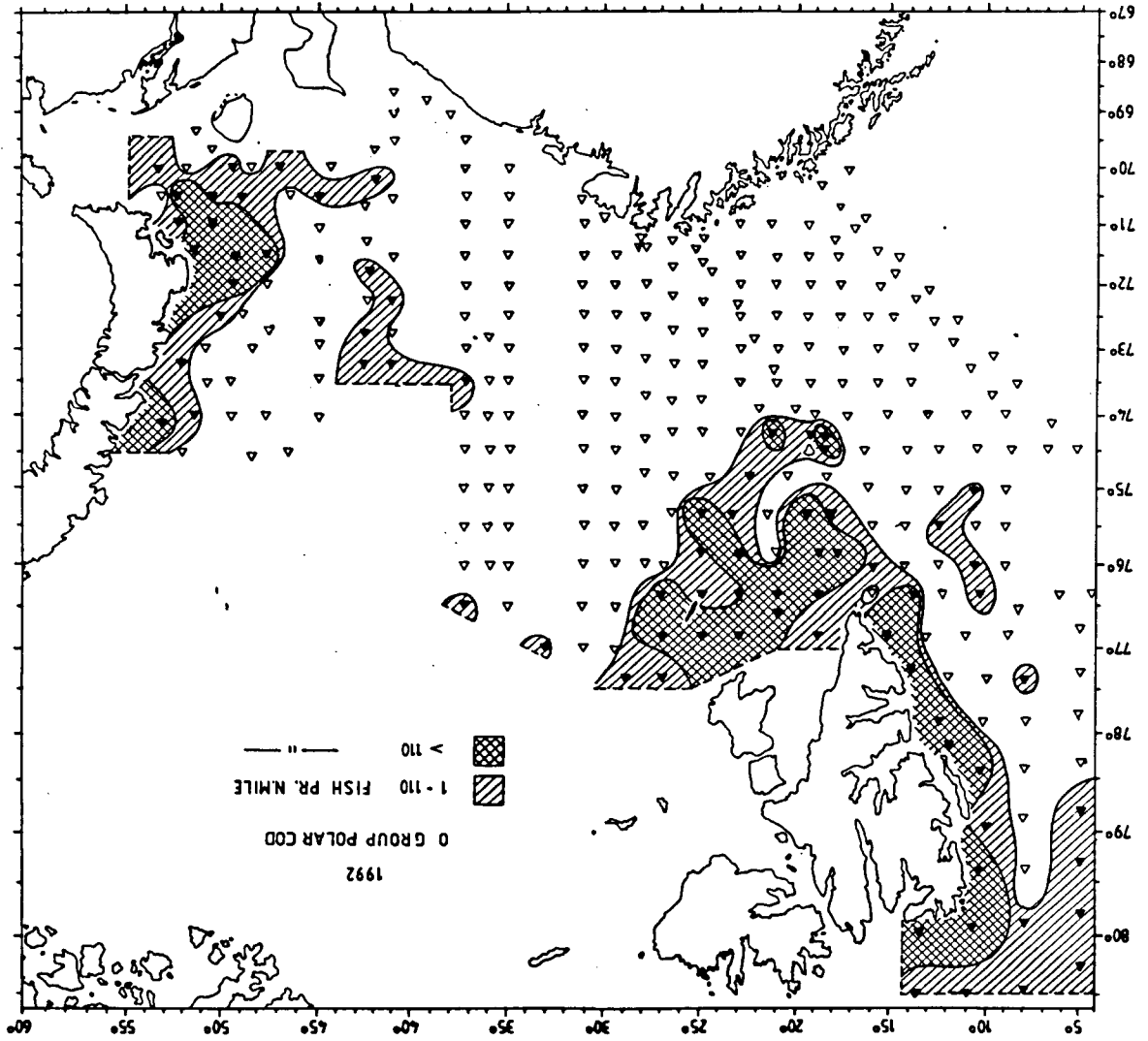


Fig. 18. Distribution of 0-group saithe.

Fig. 19. Distribution of 0-group polar cod.



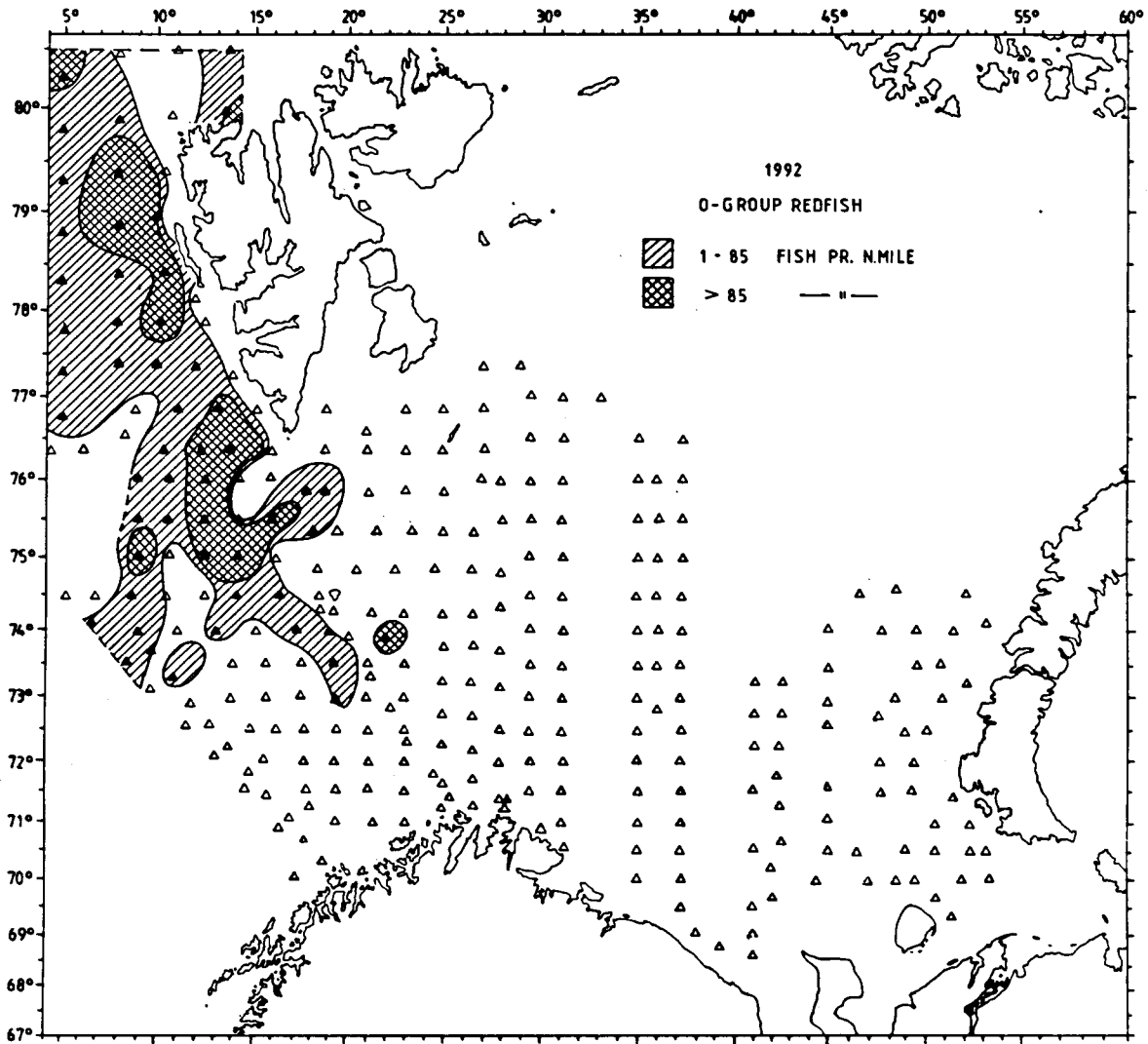
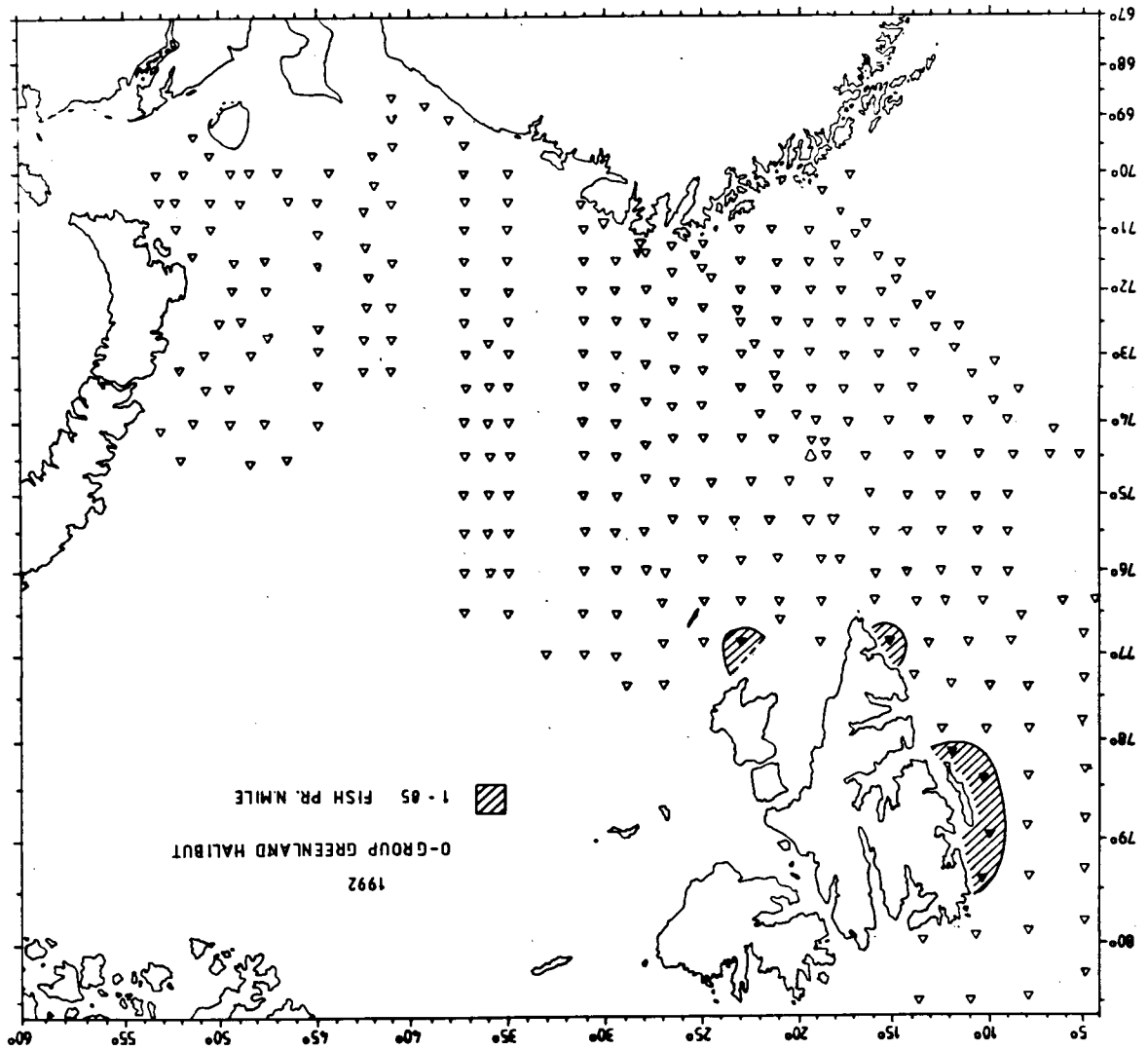


Fig. 20. Distribution of 0-group redfish.

Fig. 21. Distribution of 0-group Greenland halibut.



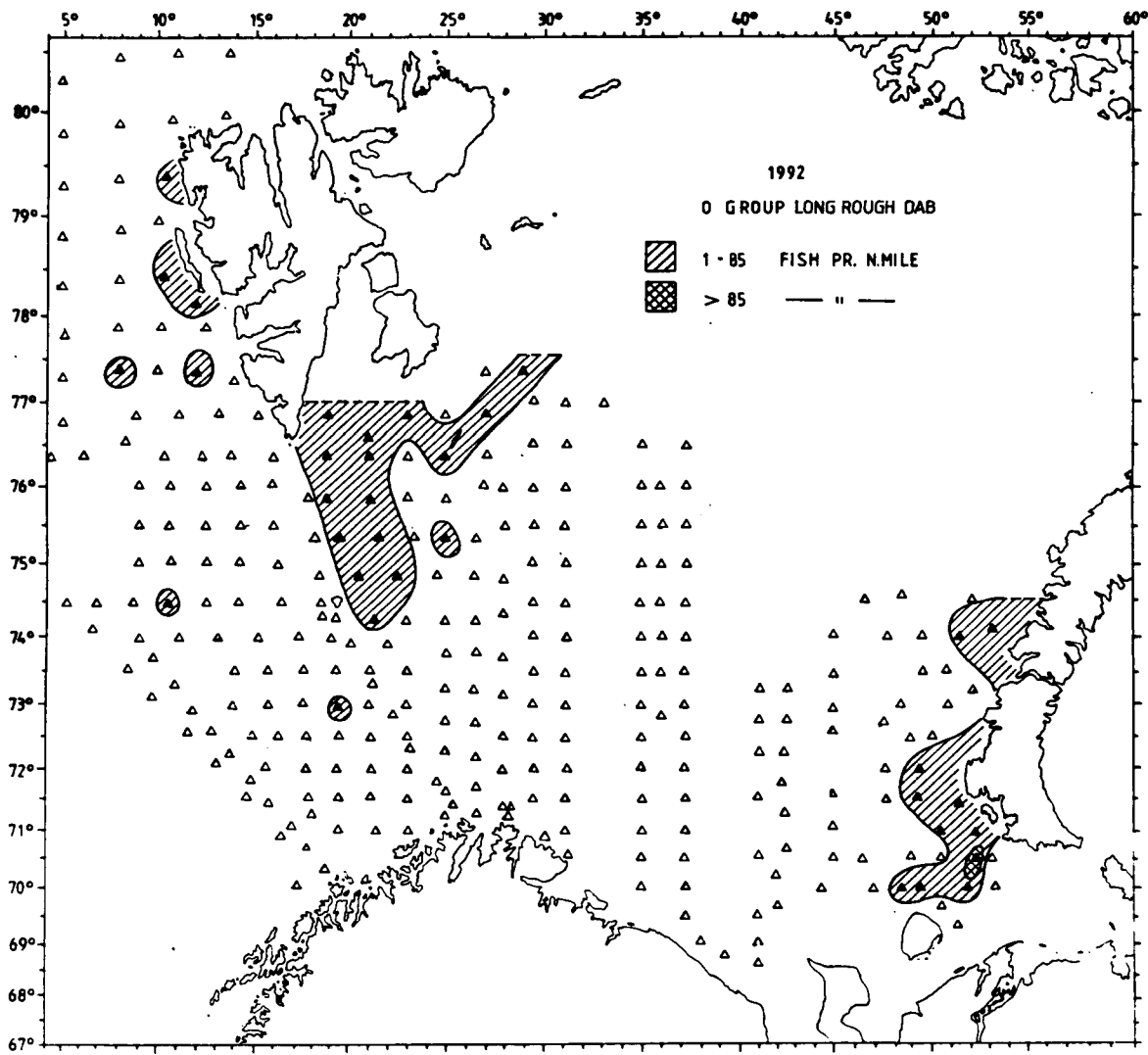


Fig. 22. Distribution of 0-group long rough dab.

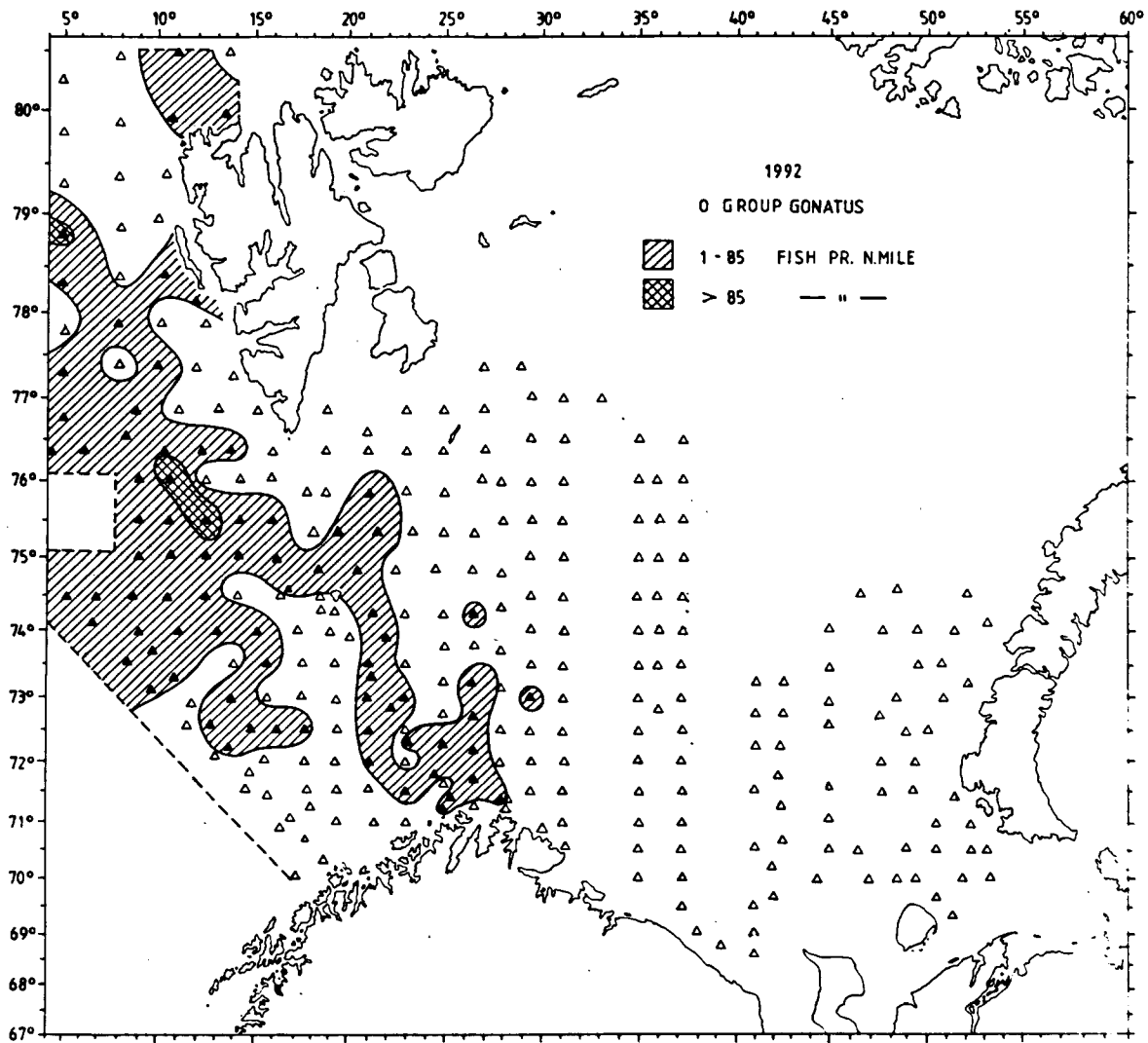


Fig. 23. Distribution of 0-group *Gonatus fabricii*.



## APPENDIX

Research vessel	Participants
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G.O. Sars	J.Erices, H.Hammer, A.Hylen, R.Johannessen, L.Kalvenes, H.Larsen, K.Lauvås, M.Møgster, O.Nakken, A.Raknes, S.Wilhelmsen, V.Serebryakov
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