

JOINT



REPORT

**REPORT OF THE INTERNATIONAL 0-GROUP  
FISH SURVEY IN THE BARENTS SEA  
AND ADJACENT WATERS  
IN AUGUST - SEPTEMBER 2001**



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**REPORT OF THE INTERNATIONAL 0-GROUP FISH SURVEY IN  
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The 37th annual international 0-group fish survey was conducted during the period 10 August – 8 September 2001 in the Barents Sea and adjacent waters. The following research vessels participated in the survey:

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<b>State</b>	<b>Name of vessel</b>	<b>Period</b>	<b>Research Institute</b>
Norway	“G. O. Sars”	16.08 – 08.09	Institute of Marine Research, Bergen
Norway	“Johan Hjort”	20.08 – 08.09	Institute of Marine Research, Bergen
Russia	“AtlantNIRO”	10.08 – 03.09	The Polar Research Inst. of Marine
Russia	“Fridtjof Nansen”	12.08 – 03.09	Fisheries and Oceanography, Murmansk

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Names of scientists and technicians who participated are given in the Appendix.

Preliminary analyses of the survey data were made on board “G. O. Sars” and “AtlantNIRO” and the final report was finished by correspondence. 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 survey area.

## MATERIAL AND METHODS

The geographical distributions of 0-group fish were estimated based on samples from a small mesh midwater trawl. All vessels that participated in the survey in 2001 used a type of midwater trawl recommended in 1980 (Anon. 1983). The standard procedure consisted of tows of 0.5 nautical mile at each of 3 depths with the headline of the trawl located at 0, 20 and 40m, respectively. Additional steps at 60 and 80m per 0.5 nautical mile were made when the 0-group fish layer was recorded deeper than 60m or 80m on the echo-sounder. Trawling procedures were standardized in accordance with the recommendations made in 1980.

Most of the stations were taken 35 nautical miles apart. Hydrographical observations were made at each trawl station and at several permanent hydrographical sections (Fig.1). Figs 2-5 show the temperature and salinity conditions along the hydrographical sections: Bear Island – West, Bear Island – North Cape, Kola and Cape Kanin – North. The mean temperatures in the main parts of these sections are presented in Table 1. Horizontal distributions of temperature and salinities are shown for 0, 50, 100, 200 m and at the bottom in Figs 6-15.

Trawl stations with and without catch are indicated on the distribution charts (Figs. 16 – 27) as filled and open symbols, respectively. The density grading is based on catch in numbers per 1.0 nautical mile trawling. 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 are given in Table 2. All area based abundance indices were estimated using standard computer programs (Fotland *et al.* 1995). Logarithmic transformed abundance indices are given for 0-group herring, cod and haddock (Table 3), calculated according to Randa (1984). These are based on the number of fish caught during a standard trawl haul of one nautical mile. Mean values of the abundance indices were only calculated for the period 1985 to 2001 (Table 2), since Nakken and Raknes (1996) show that previous surveys might not be comparable for methodological reasons. Estimated length frequency distributions for the main species are given in Table 4.

## HYDROGRAPHY

The following temperature deviations from the long term means were observed in 2001; +0.2°C in the Norwegian and Coastal Murmansk currents, +0.4°C in the central branch of the North Cape current, +0.8°C in the Novaja Zemlja current and +1.3°C in the Kanin current. The temperature in the upper layers of the Murmansk current was close to the long term mean. These temperature measurements are from the 0-200 m layer in the Bear Island – West, Kola section and in Cape Kanin section (Table 1).

However, a negative deviation (-0.1°C) was observed in the 0-200 m layer in the North Cape – Bear Island section (North Cape current) with extreme values of up to -1.3°C near the coast (Coastal North Cape current) and -1.6°C in the near surface layer (20-50 m, North Cape current), which penetrated into the Barents Sea from the Norwegian Sea. Negative deviations of up to -1.6°C were observed in the Spitsbergen current in the 0-100 m layer of the Bear Island – West section. Reduced temperatures were also observed in the central and eastern parts of the Barents Sea with deviations of -2.3°C in the 30-50 m layer of the Kola section (Central Branch of North Cape current) and up to -2.1°C in the 25-40 m layer in the

Kanin section (Novaya Zemlya current). The upper 20 m layer had positive deviations along all sections. The waters of the Bear Island current in the North Cape – Bear Island section had a significant positive deviation (up to +3.8°C).

Average water temperature differences between 2001 and 2000 were; -0.2°C (Norwegian current), 0.0°C (North Cape current), -0.3°C (Coastal Murmansk current), -0.6°C (Murmansk current), +0.3°C (Central Branch of North Cape current), -0.1°C (Novaja Zemlja current) and -0.2°C (Kanin current) in the 0-200 m layer in the Bear Island – West, North Cape – Bear Island, Kola and Cape Kanin sections.

The waters of the upper 100 m layer were saltier than usual, except for the currents with positive temperature anomalies, such as the Spitsbergen, North Cape, coastal and central Branches of North Cape, Murmask, coastal Murmansk and Novaja Zemlja currents, which had negative salinity deviations.

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

### **Herring (Fig.16)**

In the central area of the Barents Sea, 0-group herring had a smaller spatial distribution than in the previous 5 years, while west of Spitsbergen an increased spatial distribution was observed. No dense concentrations were found. The abundance index, 0.13, which is below the long-term average (Table 3), indicates a continuous decrease in abundance during the period 1998-2001. The year class can be characterized as weak. The estimated mean length of 0-group herring was 62.3 mm, which is similar to that observed in 2000.

### **Capelin (Fig.17)**

0-group capelin were mainly found in the central part of the sea, from the coast to 76°30'N and from Bear Island extending to the coast of Novaja Zemlja. The area index equaled 221, which is somewhat below the mean for the period 1985-2001 (Table 2). The year class can be characterized as medium. The abundance index may be biased due to incomplete coverage of the spatial distribution towards the north. The length distribution and mean length were slightly higher than last year.

### **Cod (Fig. 18)**

0-group cod were found in a smaller area than last year. Scattered concentrations were observed from 80°N northwest of Spitsbergen to 43°E. East of this area only small scattered patches were observed. Both the logarithmic (0.23) and the abundance index (212) are much lower than the long-term mean and close to what was observed in 1999 (Tables 2 and 3). This implies that the 2001 year-class is much smaller than average, and it can be characterized as weak. The estimated mean length of 0-group cod is 72.4 mm, which is about 3 mm less than in 2000.

### **Haddock** (Fig. 19)

Haddock is experiencing a continued period of high and stable recruitment. The spatial distribution of 0-group haddock was slightly smaller than in previous years. The abundance index equaled 394, which is the fourth largest observed. Only the indices for 1991, 1998 and 2000 were higher (Table 2). As was the case last year, dense concentrations were found over a large area in the central Barents Sea. The logarithmic index (0.67) is also significantly above the long-term mean (Table 3). The length distribution and mean length of 0-group haddock are given in Table 4. The estimated mean length was 99.9 mm, which is almost 20 mm greater than last year.

### **Polar cod** (Fig. 20)

As in previous years, two separate areas (components) of 0-group polar cod were found. To the west of Spitsbergen, dense concentrations were observed in a larger area than last year. The eastern component was smaller than in the last 2 years. The abundance indices for both polar cod components may be biased due to incomplete coverage of the northern part of the distribution. Nevertheless the abundance index of the eastern component seems to be lower than the long-term mean and lower than in 2000 (Table 2). The estimated mean length of polar cod is smaller than last year.

### **Saithe** (Fig. 21)

0-group saithe were found between Bear Island and 32°E. No abundance index was calculated, but based on the spatial distribution it seems that the component of the 2001 year-class in the Barents Sea might be somewhat smaller than in 2000.

### **Redfish** (Fig. 22)

The recruitment of redfish has continued to deteriorate. In 2001 only a small area of 0-group redfish was found, which was to the west of Spitsbergen. The abundance index of the 2001 year-class is at an all time low (Table 2). The estimated mean length was 32.9 mm, which is somewhat smaller than last year.

### **Greenland halibut** (Fig. 23)

There was a slight increase in the abundance of 0-group Greenland halibut, which were found in two areas – one to the south and one to the west of Spitsbergen. The abundance index is significantly higher than average and the highest since 1987 (Table 2). The estimated mean length of 0-group Greenland halibut was 63.3 mm, which is close to last year's mean.

### **Long rough dab** (Fig. 24)

0-group long rough dab were observed in scattered areas. Larger patches were found to the west and south of Spitsbergen and in the central Barents Sea. There was a slight increase from 2000 in areal extend, and the abundance index of 0-group long rough dab (Table 2) was slightly higher than last year. The estimated mean length was less than in 2000.

### **Sandeel** (Fig. 25)

A small area of 0-group sandeel was found in the southeastern part of the Barents Sea, but there was only one large catch. In the central Barents Sea there were only small catches. The total abundance and the spatial distribution seem to be much smaller than last year. No abundance index was calculated for this species.

### **Catfish** (Fig. 26)

The 0-group catfish were distributed in the northwestern Barents Sea, as was the case last year, and in patches to the west and south of Spitsbergen. In the central Barents Sea there were only a few insignificant catches. No abundance index was calculated for this species.

### **Gonatus** (Fig. 27)

The spatial distribution of 0-group *Gonatus fabricii* was similar to its distribution in previous years; that is in the western part of the survey area from the Norwegian coast to Spitsbergen. No abundance index was calculated for this species.

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Table 1. Mean water temperature<sup>1</sup> in selected subsections of standard sections in the Barents Sea and adjacent waters in August-September 1965-2001.

Year	Section <sup>2</sup> and layer (depth in meters)						
	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
1993	7.5	4.0	4.9	4.4	3.4	5.8	5.4
1994	7.7	3.9	4.8	4.6	3.4	6.4	5.3
1995	7.6	4.9	5.6	5.9	4.3	6.1	5.2
1996	7.6	3.7	4.7	5.2	2.9	5.8	4.7
1997	7.3	3.4	4.4	4.2	2.8	5.6	4.1
1998	8.4	3.4	4.7	2.1	1.9	6.0	<sup>3)</sup>
1999	7.4	3.8	4.7	3.8	3.1	6.2	5.3
2000	7.6	4.5	5.3	5.8	4.1	5.7	5.1
2001	6.9	4.0	4.7	5.6	4.0	5.7	4.9
1965-2001	7.4	3.8	4.7	4.3	3.3	5.8	4.7

<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). <sup>3)</sup> In 1998 only the central branch and the eastern branch of the West Spitsbergen Current were covered, and the temperatures were 5.4 and 4.5°C respectively.



Table 2. Abundance indices of 0-group fish in the Barents Sea and adjacent waters in 1965-01  
 \*)Assessment for 1965-1978 in Anon (1980) and for 1979-1993 in Ushakov and Shamray (1995).

\*\*) Indices for 1965-1985 adjusted according to Nakken and Raknes (1996).

Year	Capelin*	Cod**	Haddock**	Polar cod W	Polar cod E	Redfish	Greenland halibut	Long rough dab
1965	37	11	13	0		159		66
1966	119	2	2	129		236		97
1967	89	62	76	165		44		73
1968	99	45	14	60		21		17
1969	109	211	186	208		295		26
1970	51	1097	208	197		247	1	12
1971	151	356	166	181		172	1	81
1972	275	225	74	140		177	8	65
1973	125	1101	87	26		385	3	67
1974	359	82	237	227		468	13	93
1975	320	453	224	75		315	21	113
1976	281	57	148	131		447	16	96
1977	194	279	187	157	70	472	9	72
1978	40	192	110	107	144	460	35	76
1979	660	129	95	23	302	980	22	69
1980	502	61	68	79	247	651	12	108
1981	570	65	30	149	93	861	38	95
1982	393	136	107	14	50	694	17	150
1983	589	459	219	48	39	851	16	80
1984	320	559	293	115	16	732	40	70
1985	110	742	156	60	334	795	36	86
1986	125	434	160	111	366	702	55	755
1987	55	102	72	17	155	631	41	174
1988	187	133	86	144	120	949	8	72
1989	1300	202	112	206	41	698	5	92
1990	324	465	227	144	48	670	2	35
1991	241	766	472	90	239	200	1	28
1992	26	1159	313	195	118	150	3	32
1993	43	910	240	171	156	162	11	55
1994	58	899	282	50	448	414	20	272
1995	43	1069	148	6	0	220	15	66
1996	291	1142	196	59	484	19	5	10
1997	522	1077	150	129	453	50	13	42
1998	428	576	593	144	457	78	11	28
1999	722	194	184	116	696	27	13	66
2000	303	870	417	76	387	195	28	81
2001	221	212	394	148	146	11	32	86
1985-2001	294	644	247	110	273	351	18	116
1965-2001	278	447	182			396	17	95

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 1966-2001.

Year	Herring			Cod			Haddock		
	Index	Confidence limits		Index	Confidence limits		Index	Confidence limits	
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	-	-	2.51	2.02	3.05	0.64	0.42	0.91
1971	0.00	-	-	0.77	0.48	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	0.61	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	2.37	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
1993	0.75	0.45	1.14	2.09	1.70	2.51	0.64	0.48	0.82
1994	0.28	0.17	0.42	2.27	1.83	2.76	0.64	0.49	0.81
1995	0.16	0.07	0.29	2.40	1.97	2.88	0.25	0.13	0.41
1996	0.65	0.47	0.85	2.87	2.53	3.24	0.39	0.25	0.56
1997	0.39	0.25	0.54	1.60	1.35	1.86	0.21	0.12	0.31
1998	0.59	0.40	0.82	0.68	0.48	0.91	0.59	0.44	0.76
1999	0.41	0.25	0.59	0.21	0.11	0.34	0.25	0.11	0.44
2000	0.30	0.17	0.46	1.49	1.21	1.78	0.64	0.46	0.84
2001	0.13	0.04	0.25	0.23	0.12	0.36	0.67	0.52	0.84
Mean 1985-2001	0.43			1.41			0.47		

Table 4. Length distribution of 0-group fish in percent in the Barents Sea and adjacent waters in August - September 2001.

Length (mm)	Herring	Capelin	Cod	Haddock	Polar cod	Redfish	Sandeel	Greenland halibut	Long rough dab
10- 14									
15- 19									2.45
20- 24	0.02	0.28			2.86	9.09			6.10
25- 29		3.13			12.19	18.18			27.40
30- 34	0.22	5.63		0.01	23.20	18.18	21.00	0.38	26.96
35- 39	0.45	23.16	0.15	0.11	33.87	54.55	30.50	1.24	27.42
40- 44	2.87	35.47	0.52	0.37	16.87		27.67	0.76	9.11
45- 49	3.62	17.89	3.26	0.77	5.44		13.79	11.09	0.56
50- 54	4.79	3.66	6.26	1.18	5.58		4.63	6.16	
55- 59	29.08	0.76	16.21	1.39	1.93		0.25	6.81	
60- 64	32.19	0.76	12.66	1.52	0.76		1.39	10.06	
65- 69	13.96	1.41	8.90	2.14	0.12		0.57	50.93	
70- 74	4.75	2.69	6.35	2.61				9.33	
75- 79	2.78	2.84	10.19	3.55				3.23	
80- 84	1.40	1.64	12.22	4.78			0.16		
85- 89	1.36	0.66	11.35	8.34					
90- 94	1.57		5.32	8.82			0.04		
95- 99	0.67		4.06	12.36					
100-104	0.13		2.03	11.52					
105-109	0.02		0.43	10.95					
110-114	0.02			8.43					
115-119				6.18					
120-124			0.02	5.90					
125-129	0.02		0.06	3.87					
130-134	0.02			4.50					
135-139	0.02			0.39					
140-144	0.02			0.32					
No. measured	1520	3990	1271	3828	1566	12	133	224	388
Total catch	4635	29569	4023	8605	95828	22	2443	264	451
Mean length, mm	62.3	44.9	72.4	99.9	36.9	32.9	40.6	63.2	32.5

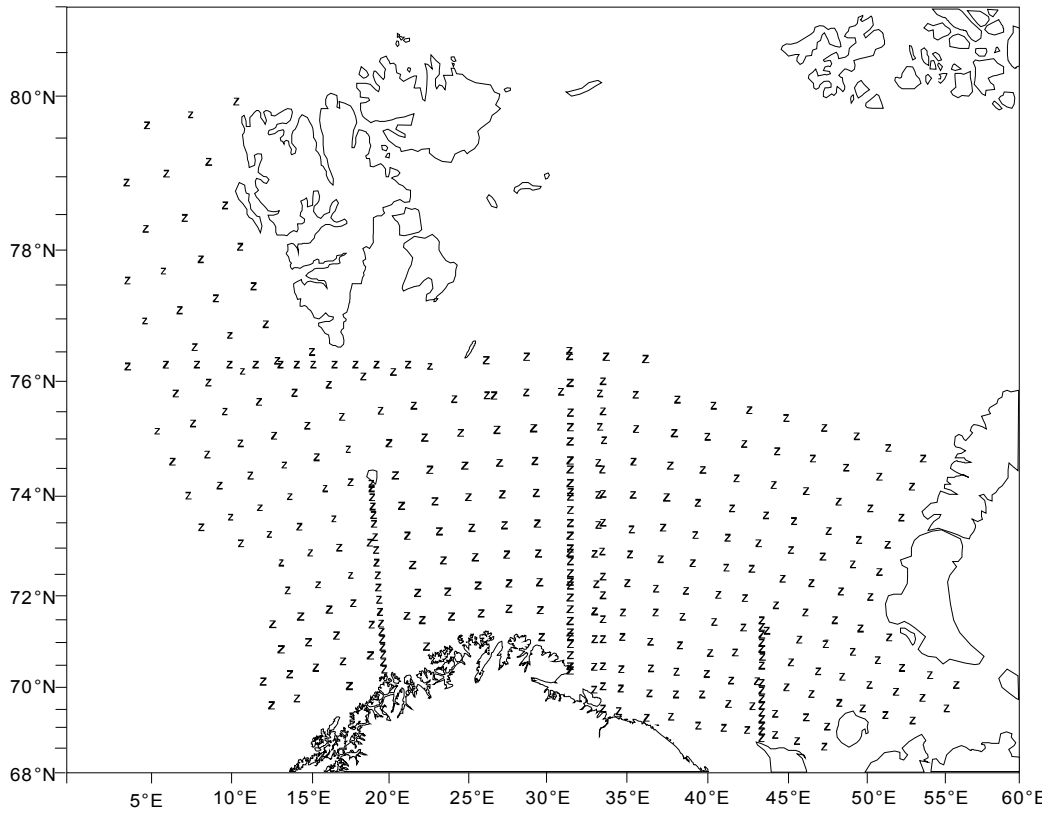


Fig.1. Ctd-stations taken by the four vessels in the Barents Sea during the period 10.08-08.09.01

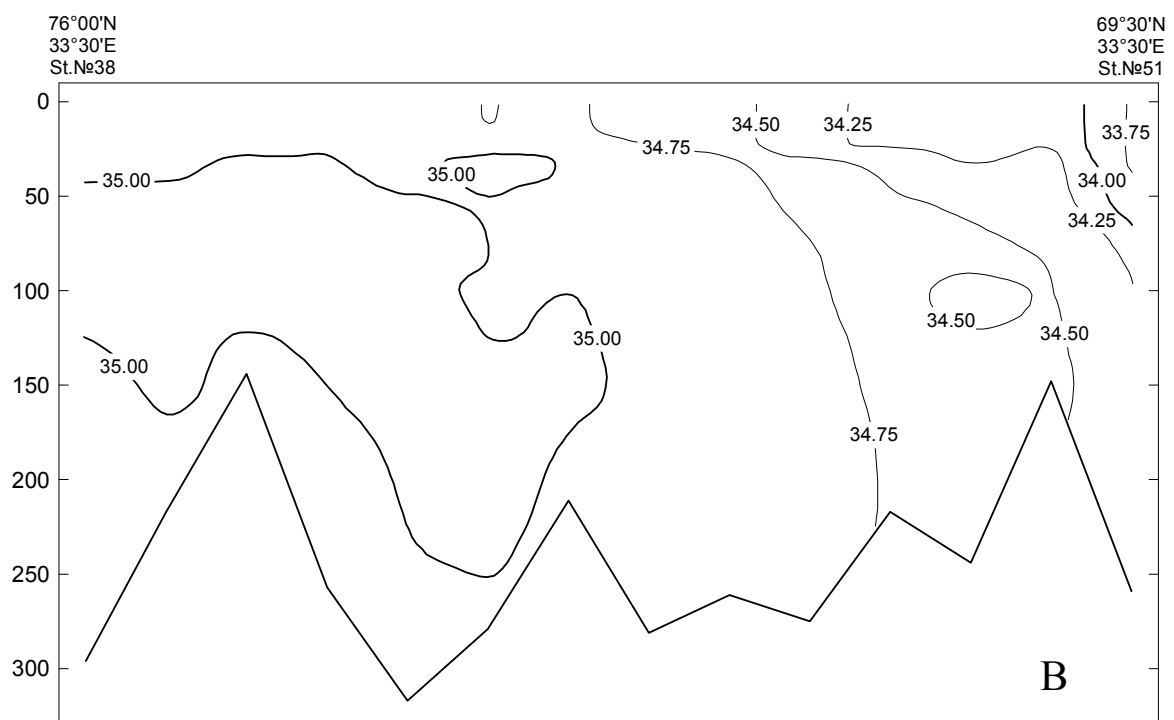
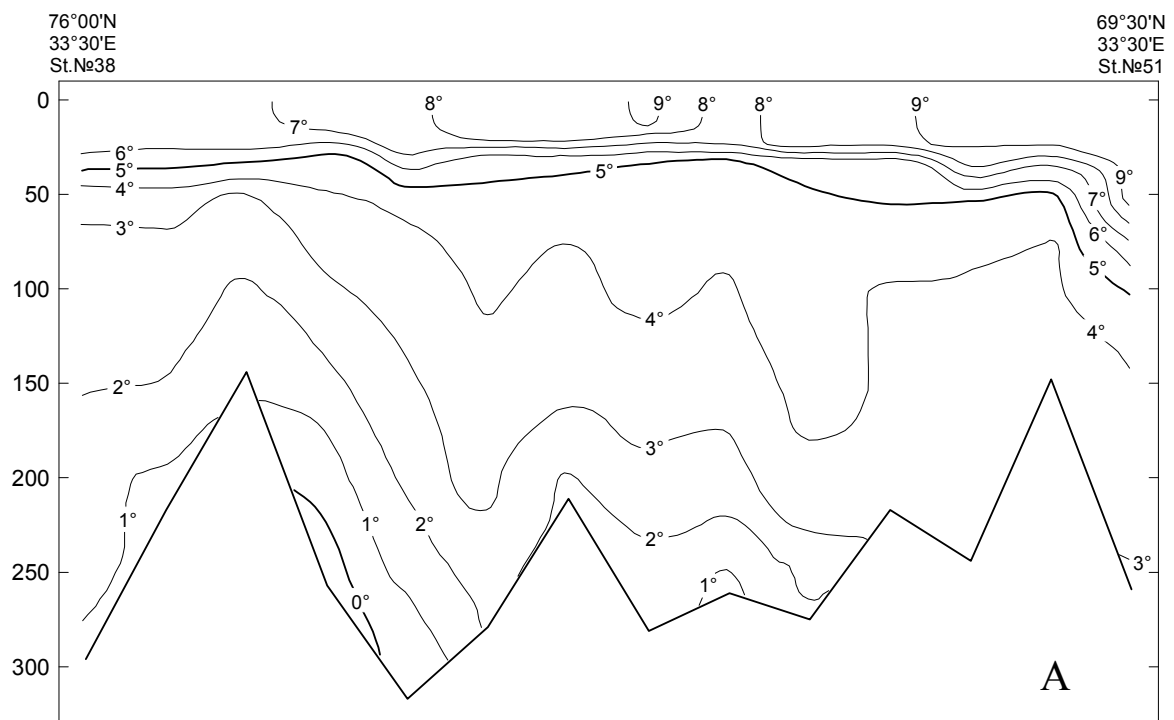


Fig. 2. Temperature (A) and salinity (B) in the Kola Section

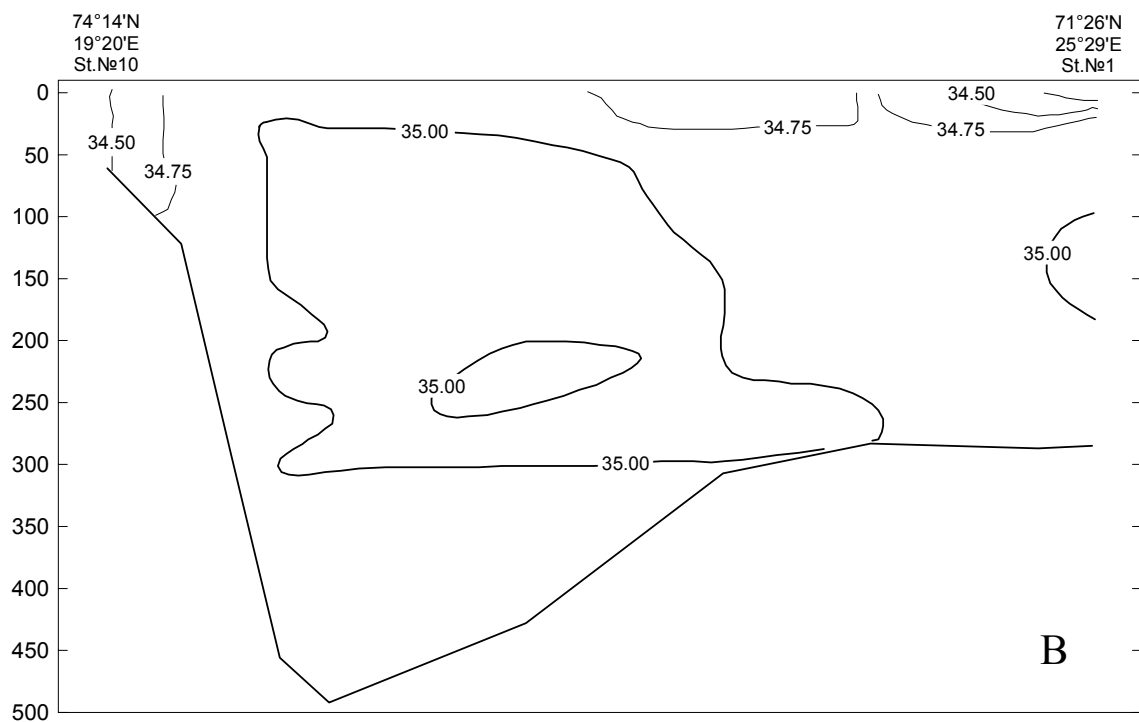
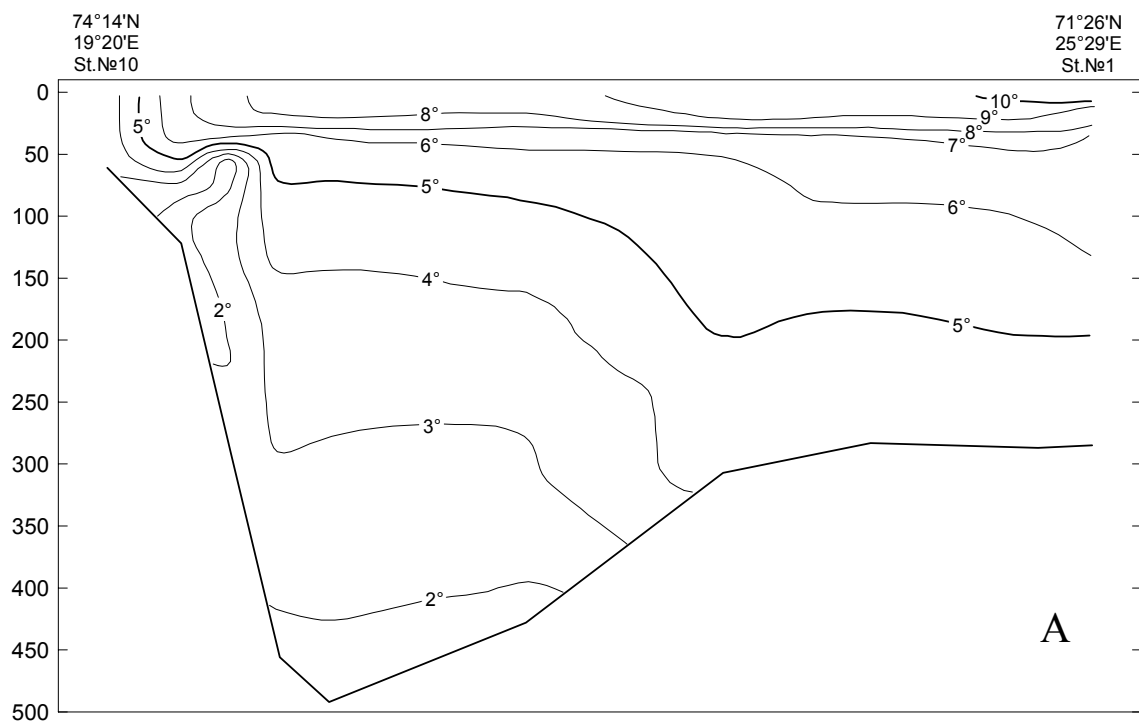


Fig. 3. Temperature (A) and salinity (B) in the North Cape - Bear Island Section

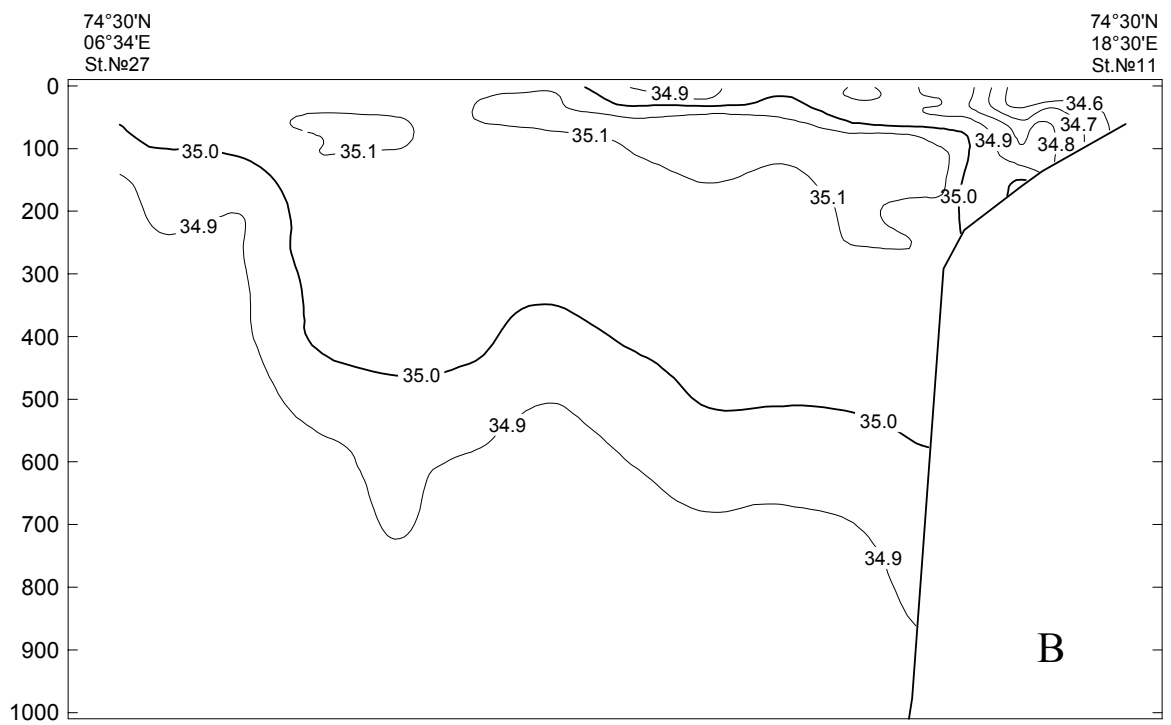
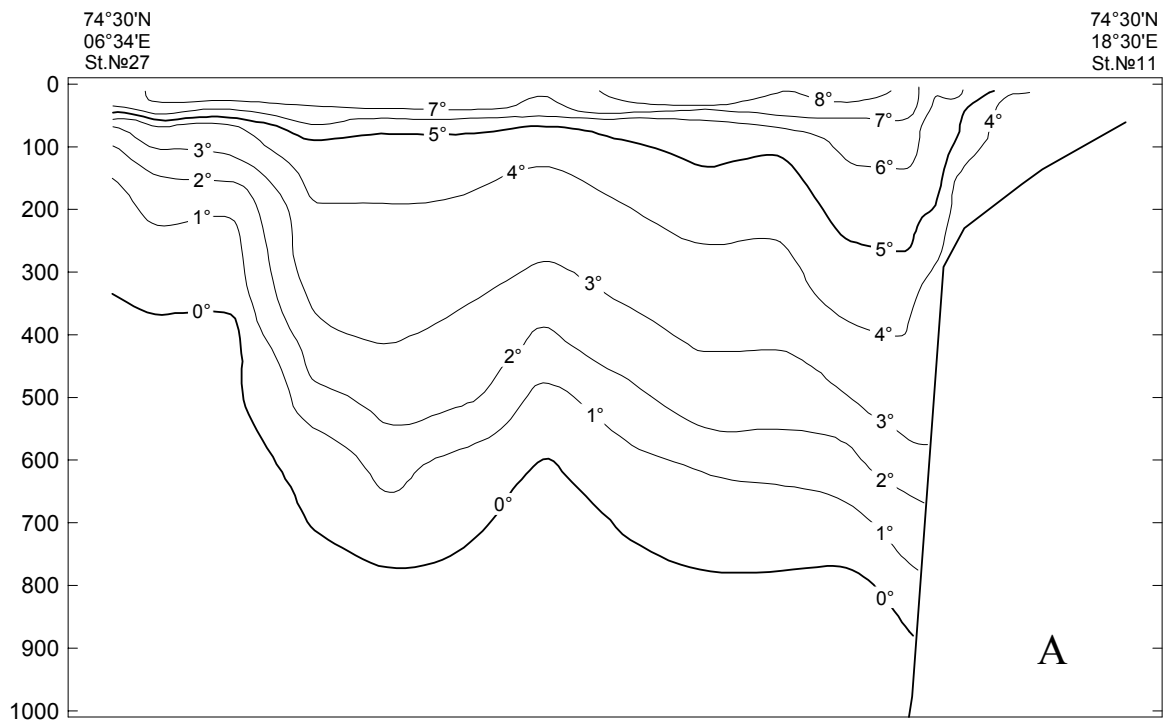


Fig. 4. Temperature (A) and salinity (B) in the Bear Island - West Section

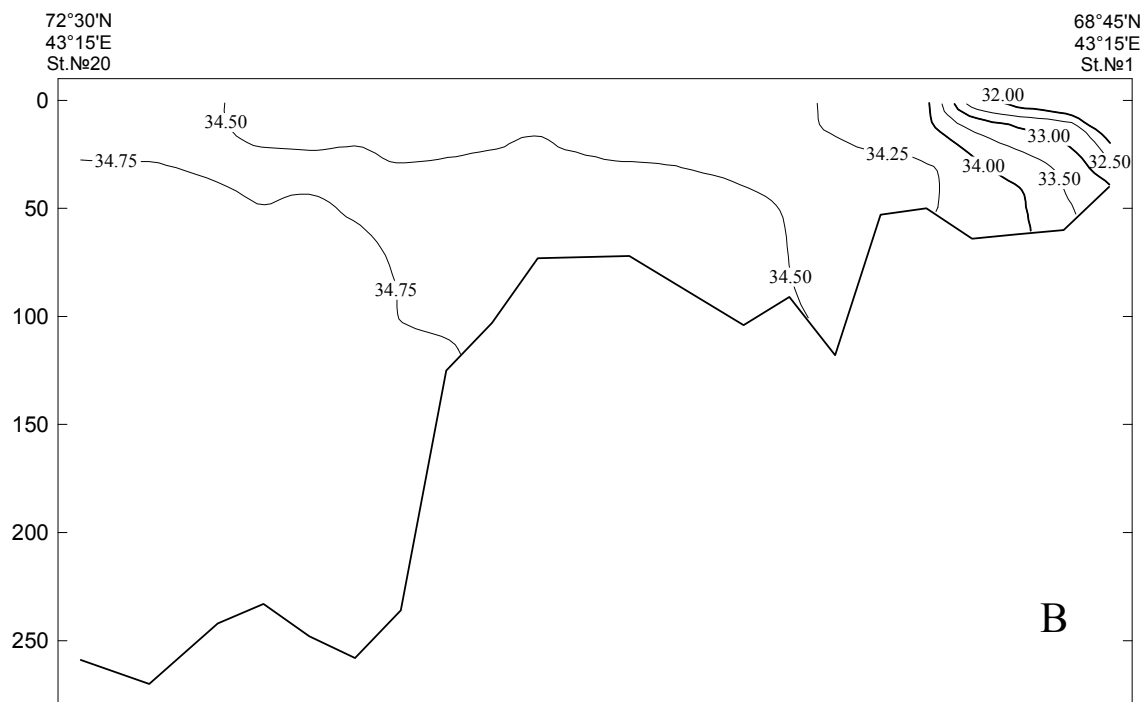
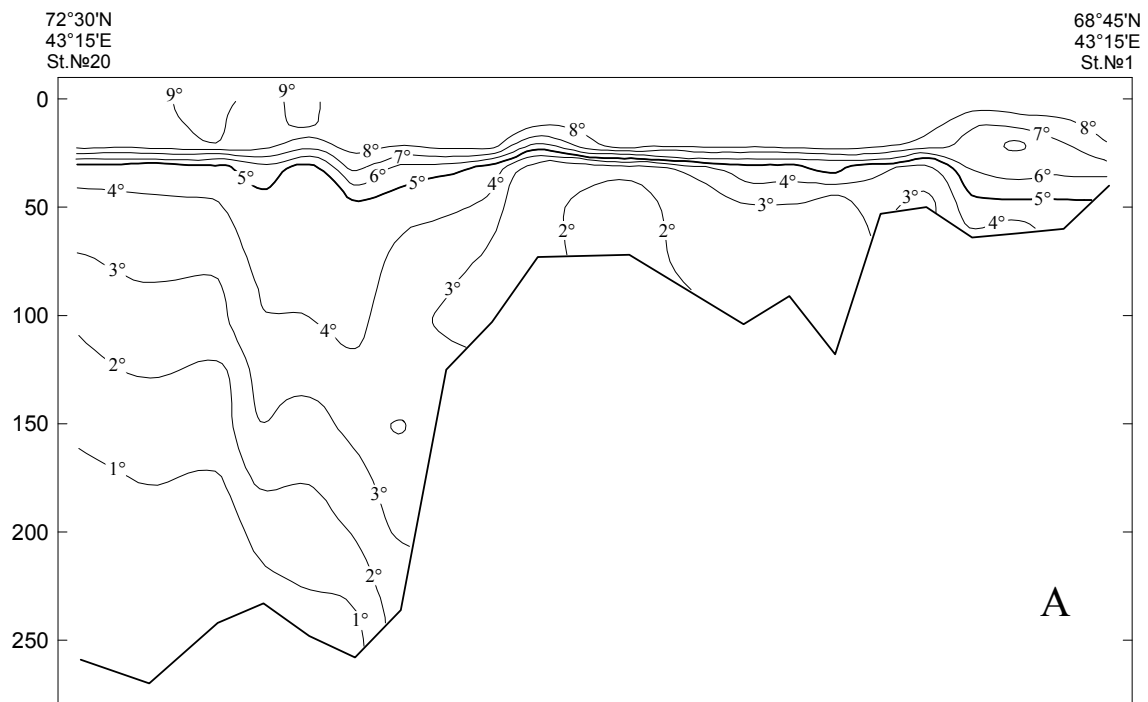


Fig.5. Temperature (A) and salinity (B) in the Kanin Section



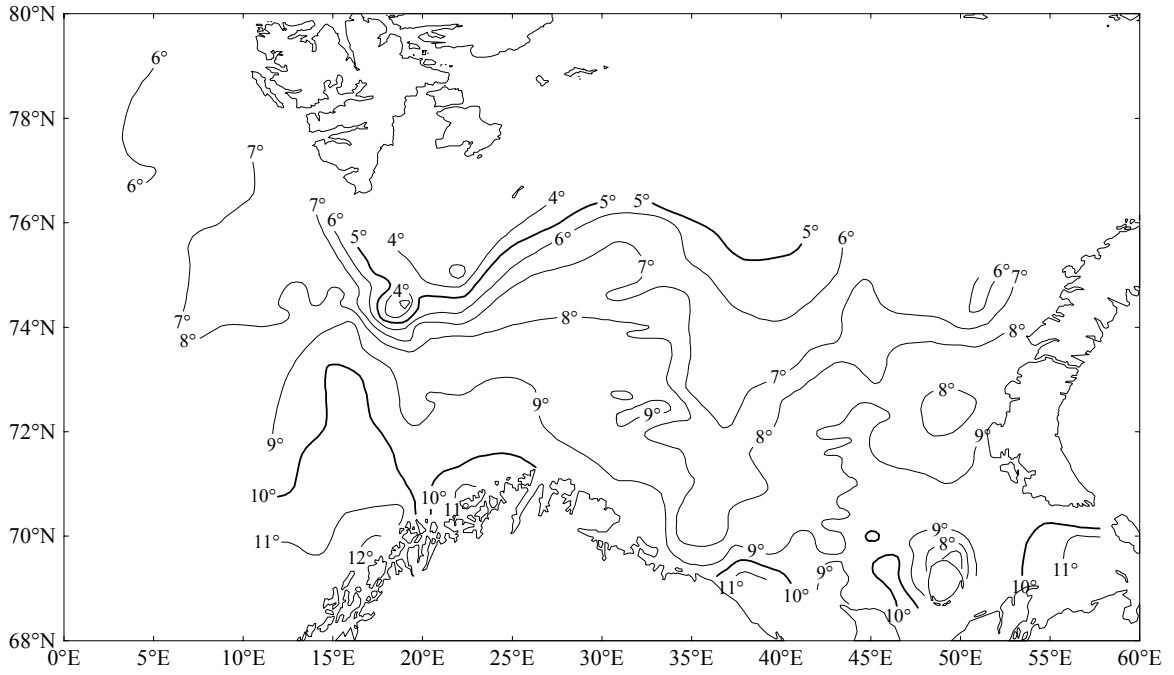


Fig. 6. Distribution of surface temperature (°C)

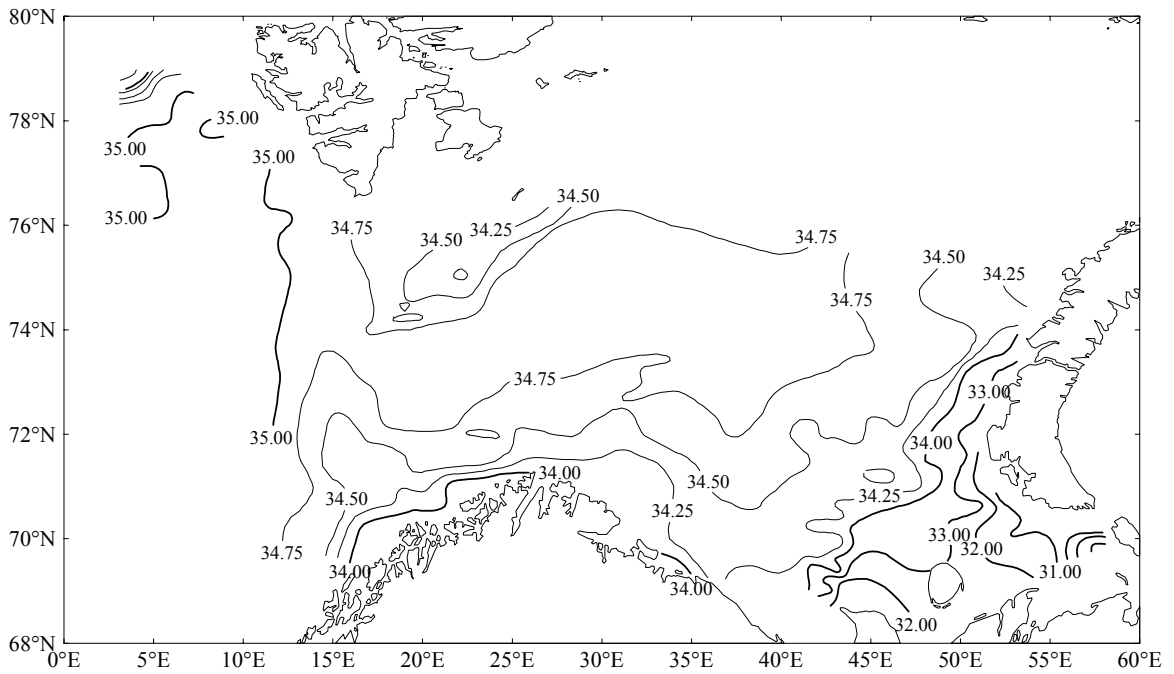


Fig. 7. Distribution of surface salinity

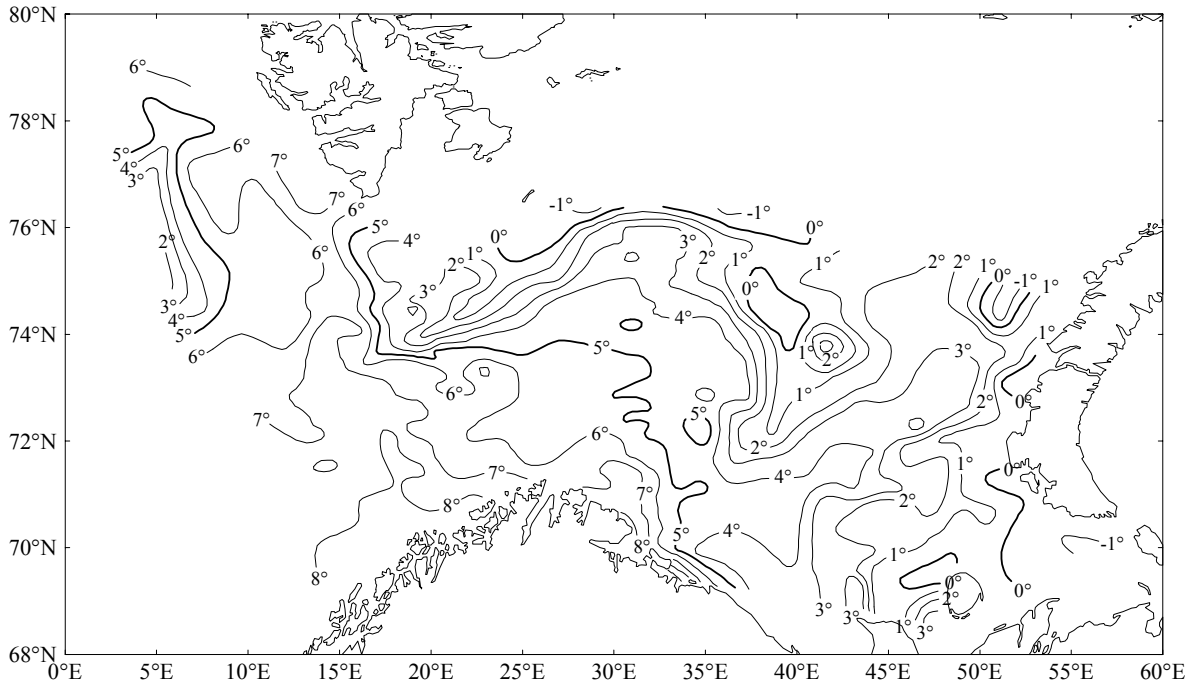


Fig. 8. Distribution of temperature (°C) at the 50 m depth

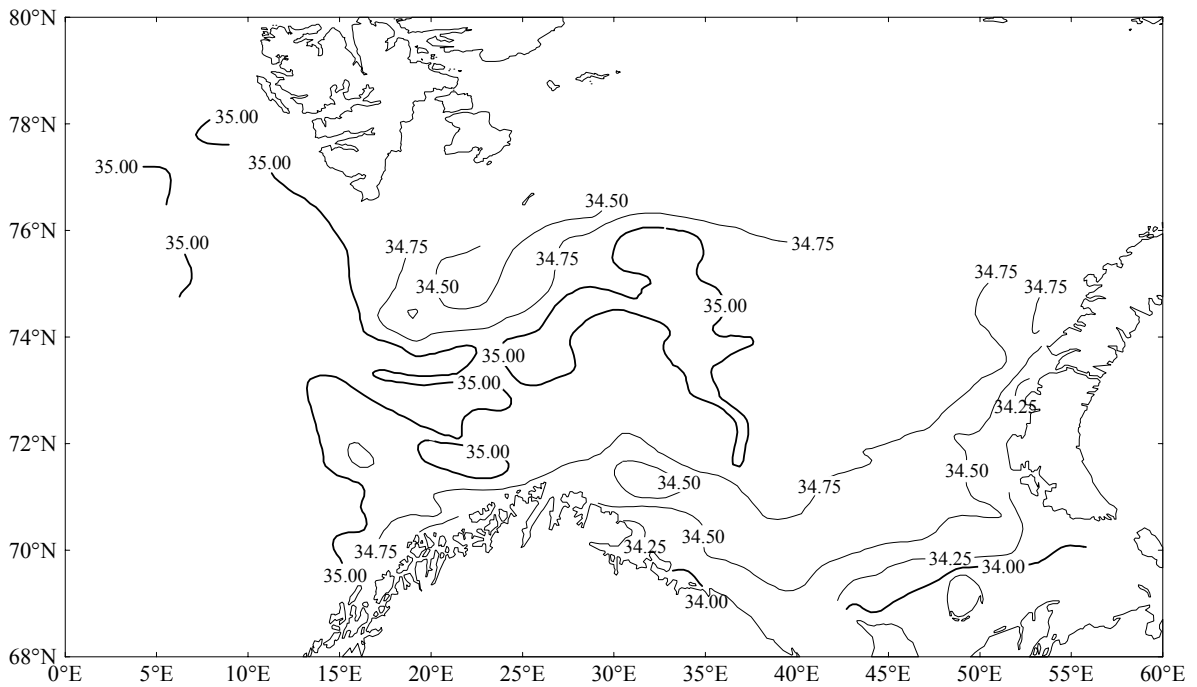


Fig. 9. Distribution of salinity at the 50 m depth

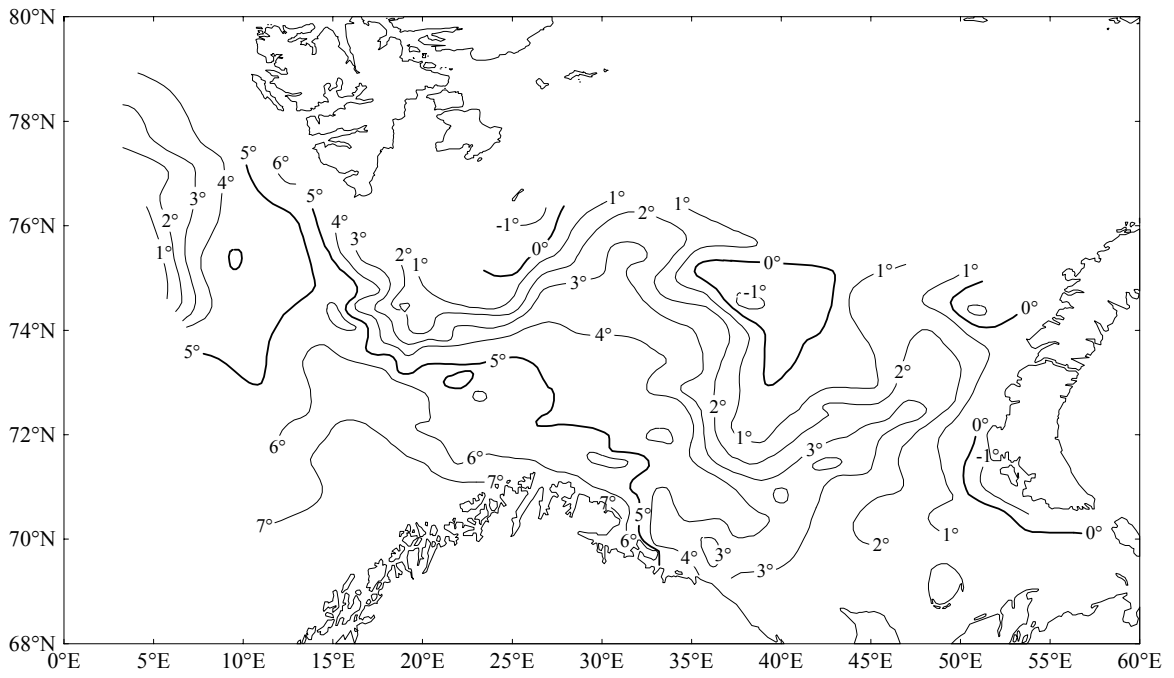


Fig. 10. Distribution of temperature (°C) at the 100 m depth

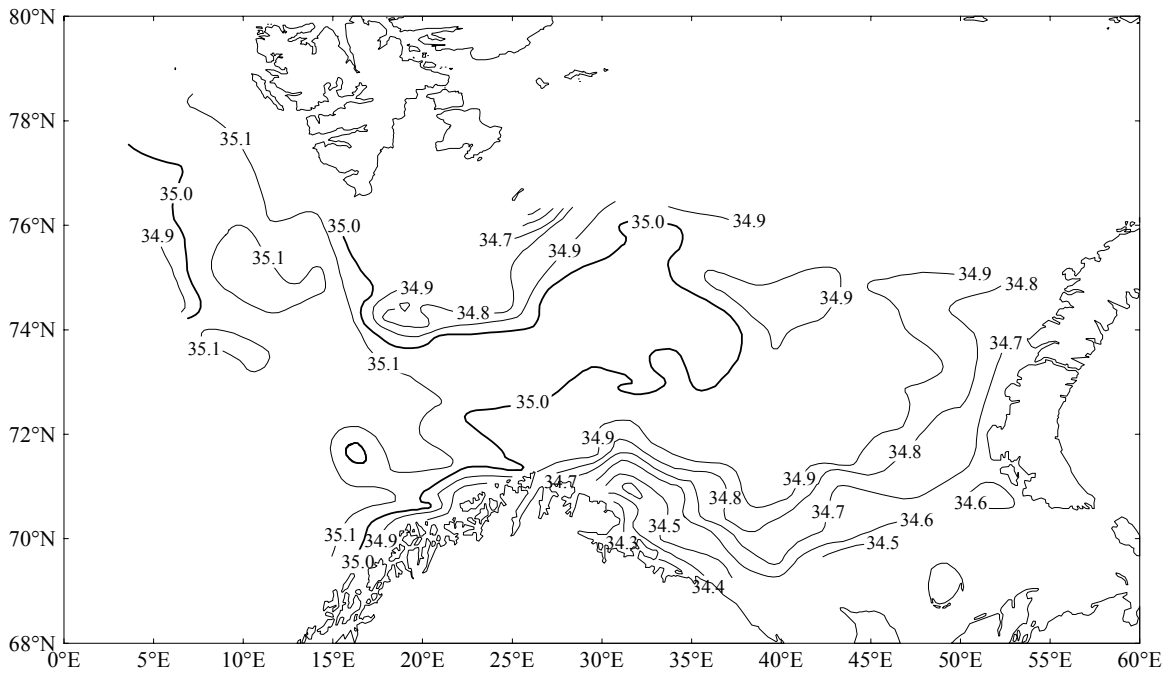


Fig. 11. Distribution of salinity at the 100 m depth

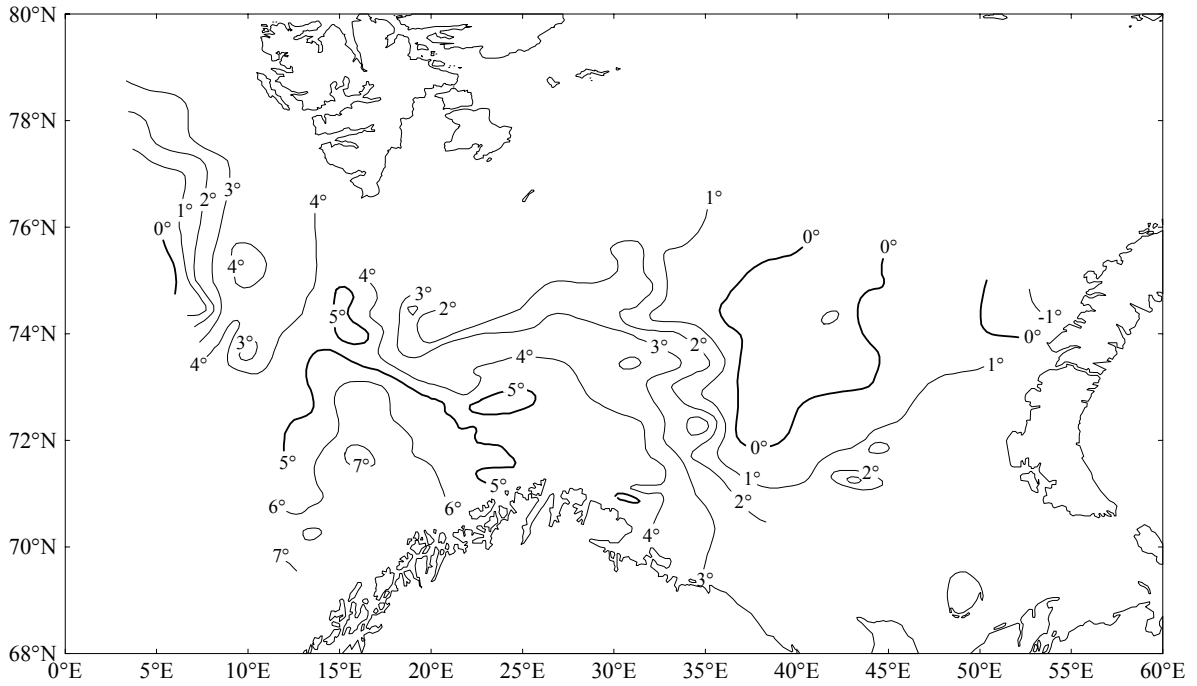


Fig. 12. Distribution of temperature ( $^{\circ}\text{C}$ ) at the 200 m depth

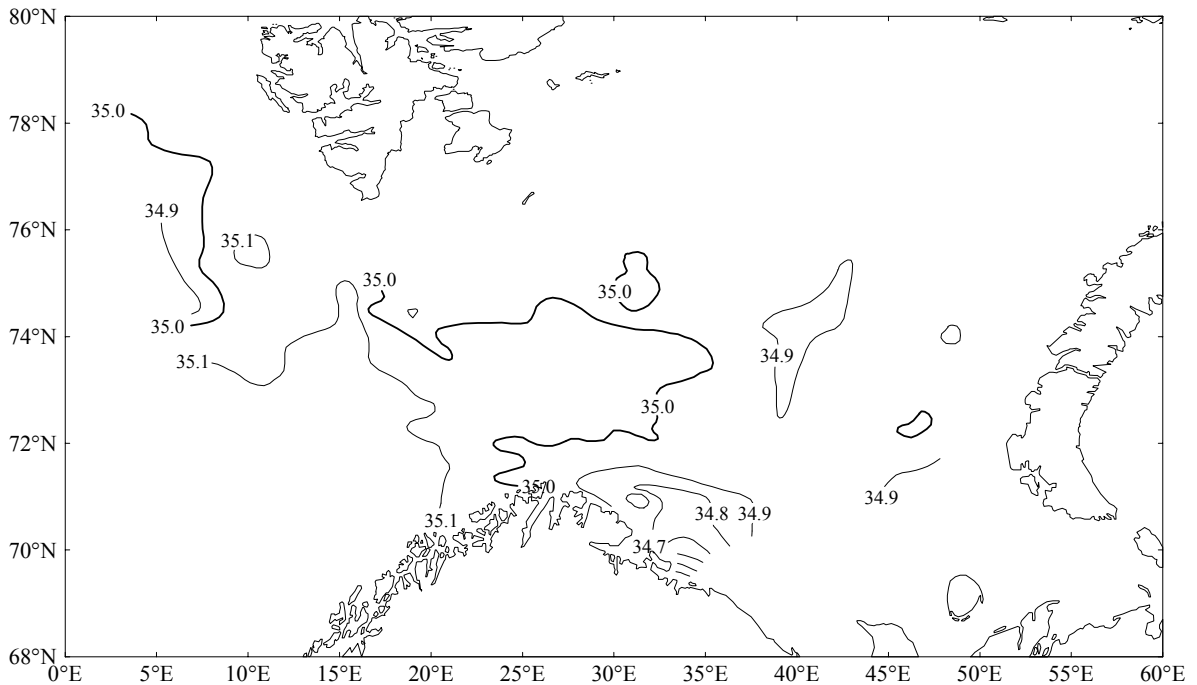


Fig. 13. Distribution of salinity at the 200 m depth

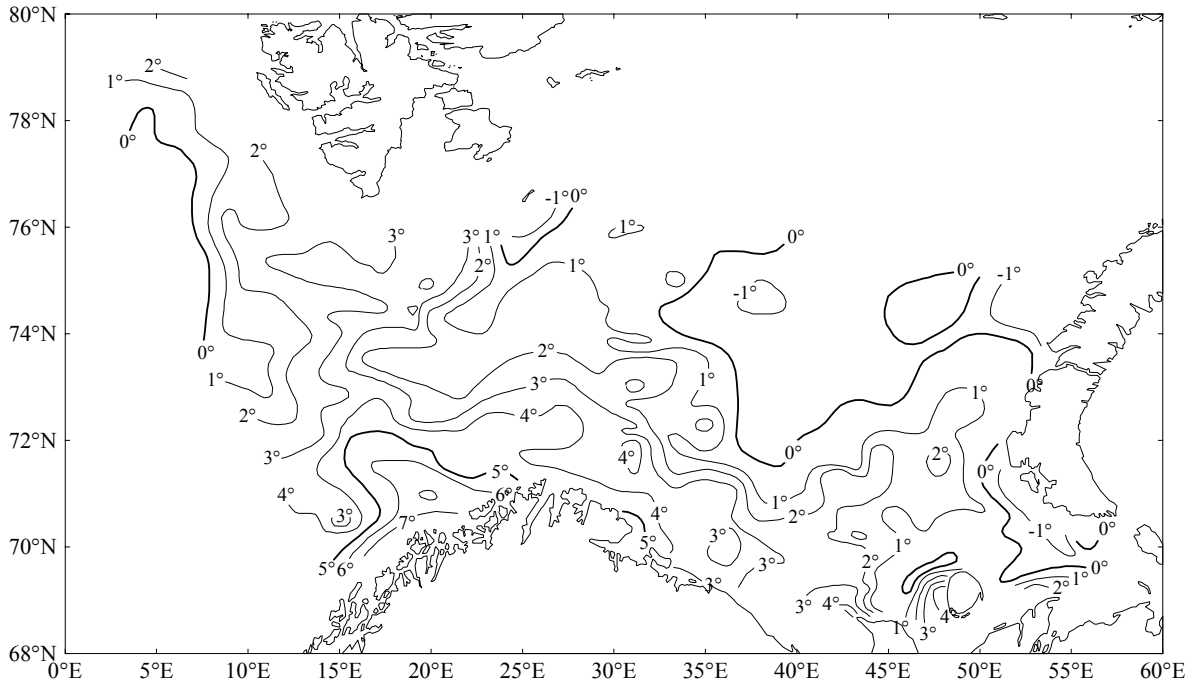


Fig. 14. Distribution of bottom temperature ( $^{\circ}\text{C}$ )

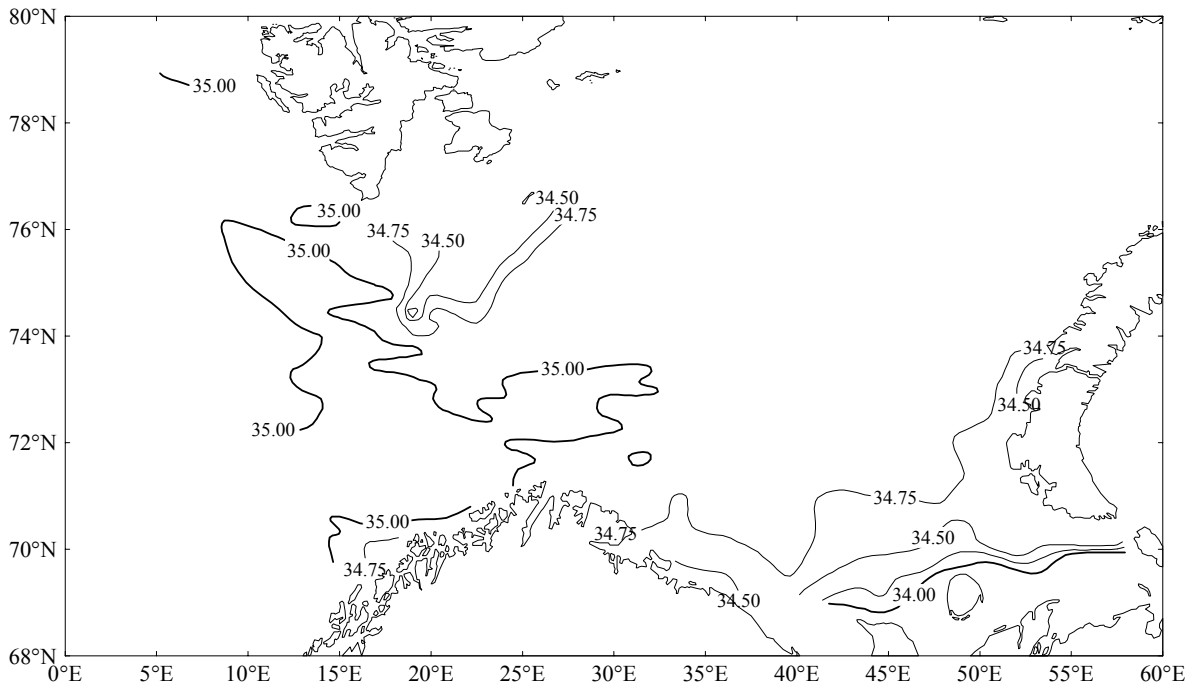


Fig. 15. Distribution of bottom salinity

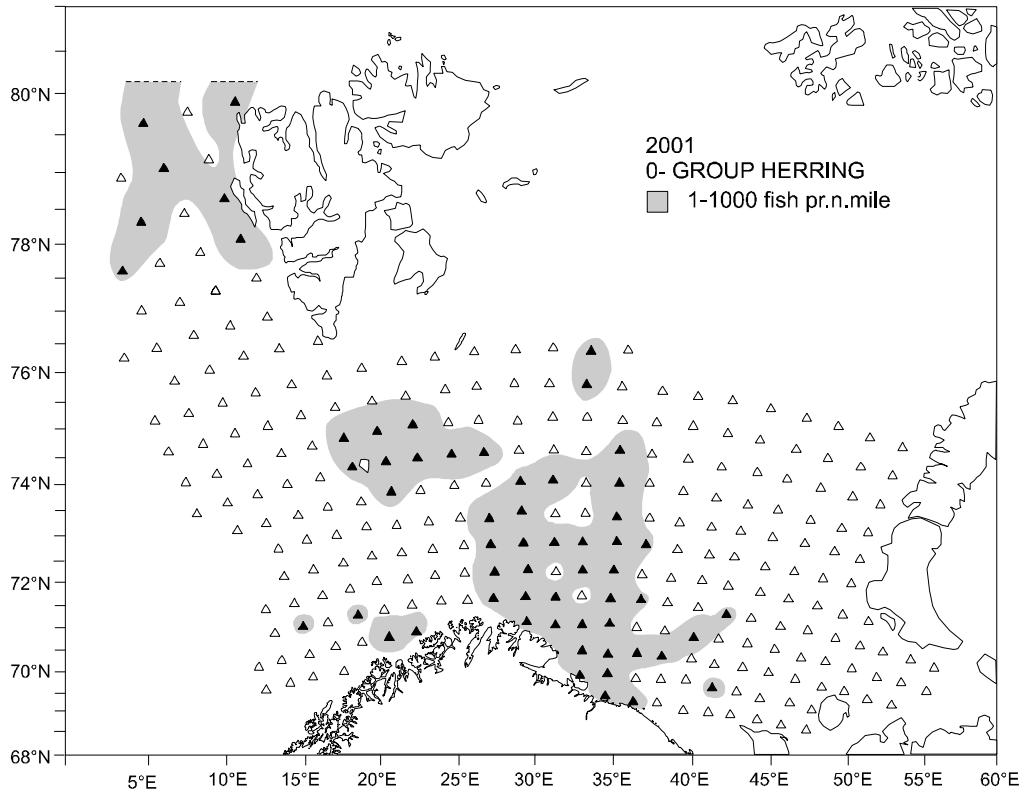


Fig. 16. Distribution of 0-group herring

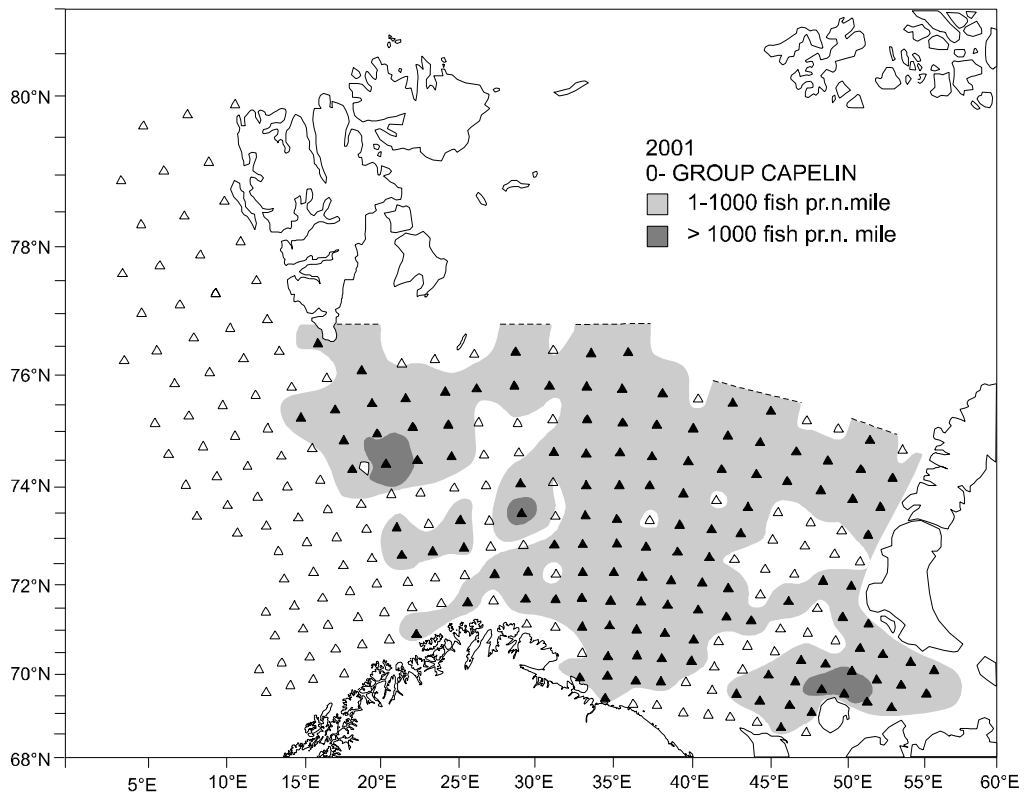


Fig. 17. Distribution of 0-group capelin.

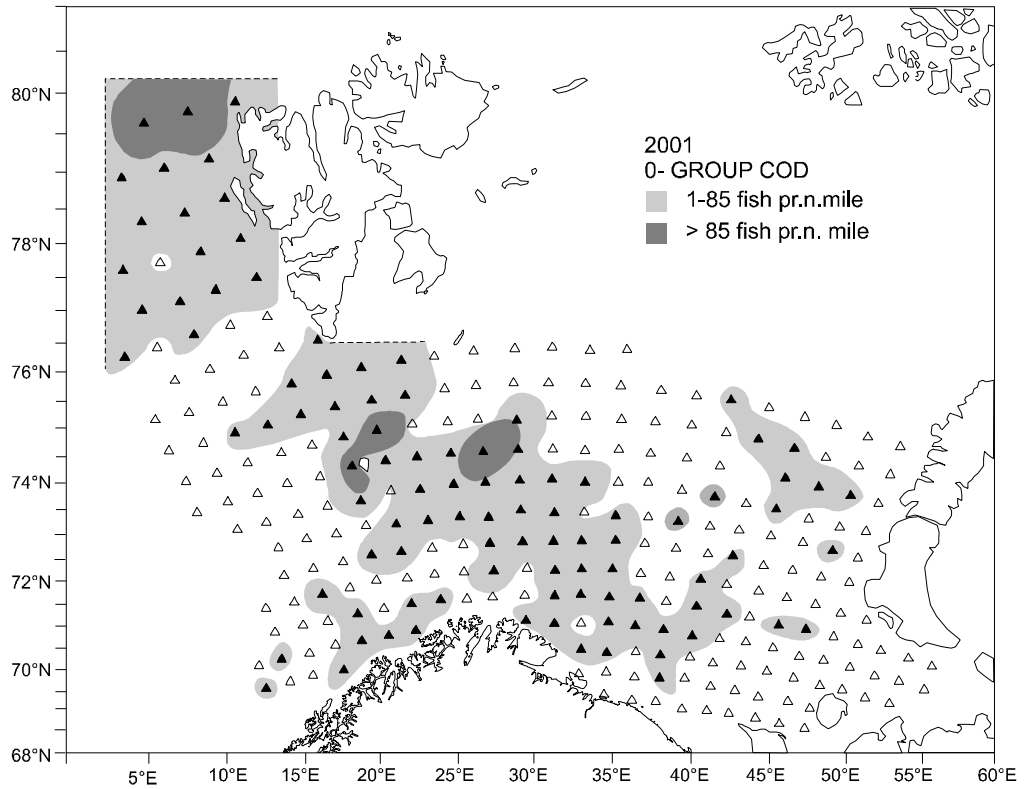


Fig. 18. Distribution of 0-group cod.

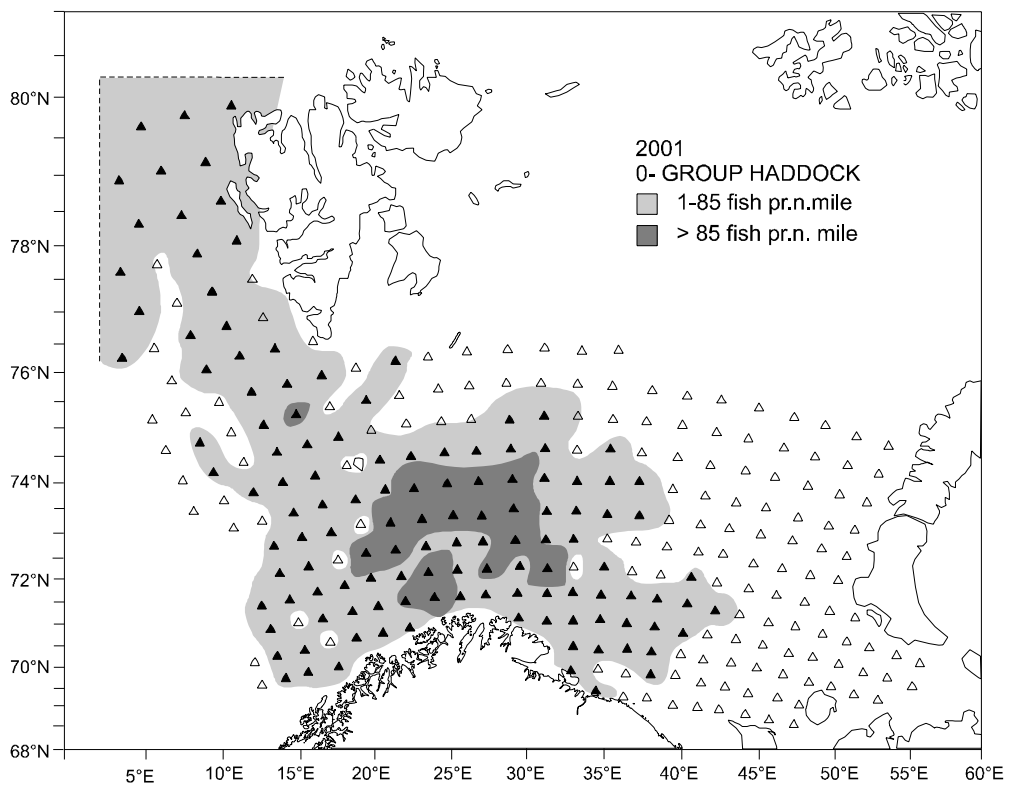


Fig. 19. Distribution of 0-group haddock.

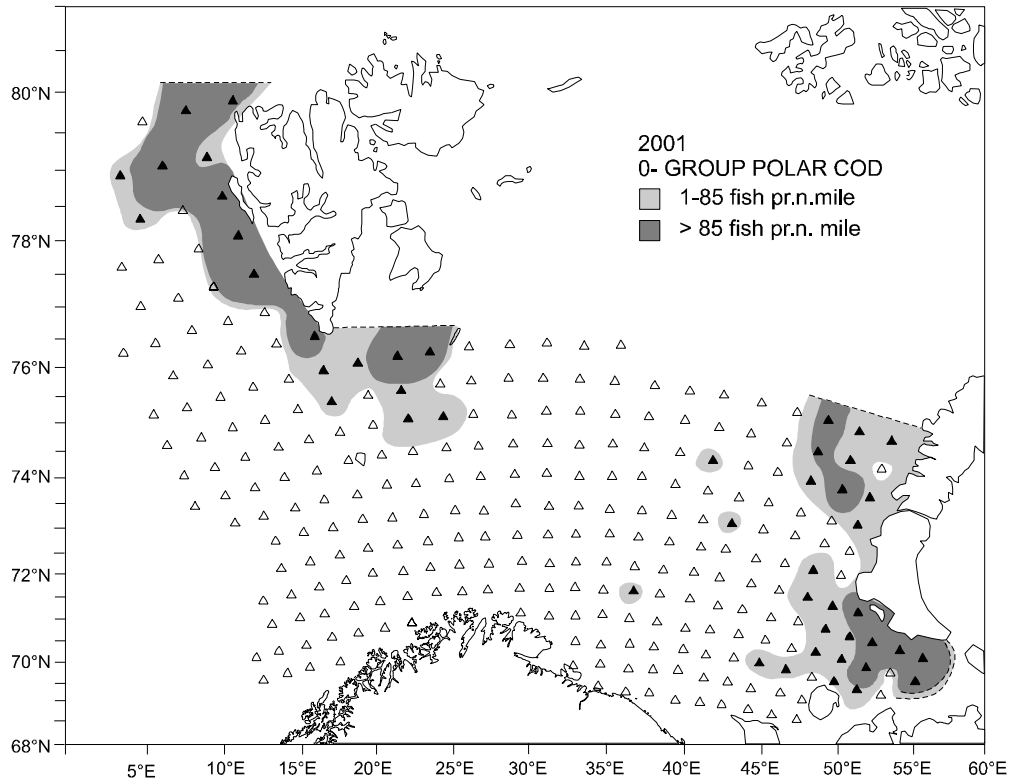


Fig. 20. Distribution of 0-group polar cod.

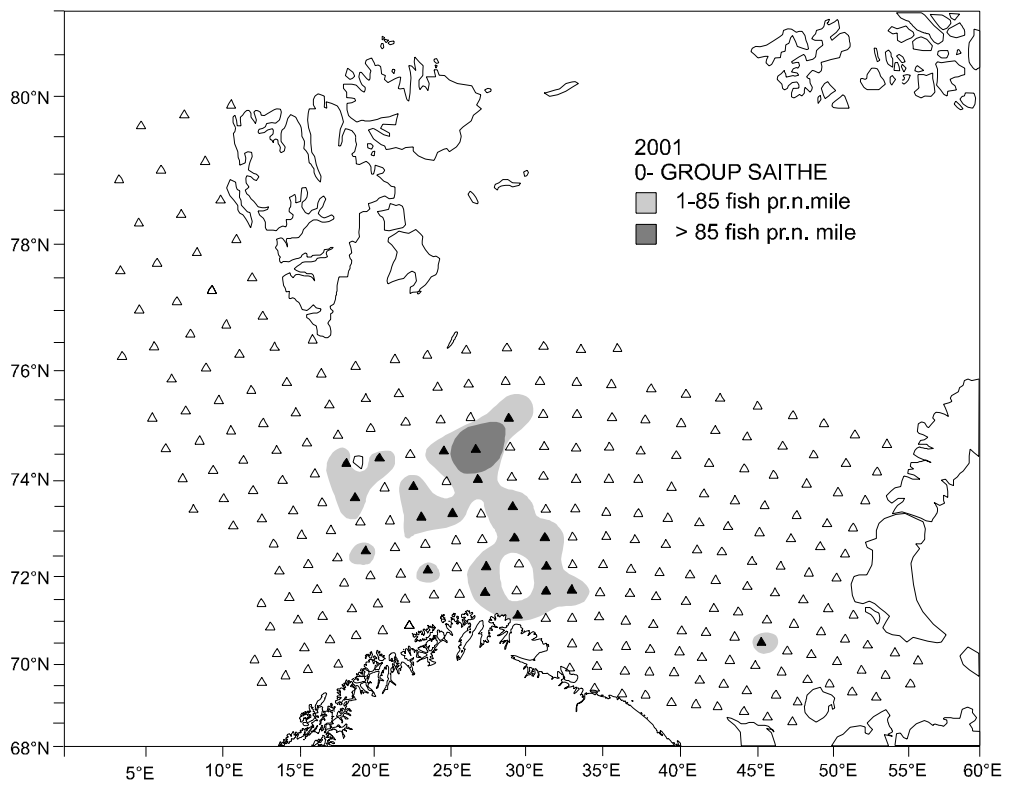


Fig. 21. Distribution of 0-group saithe.



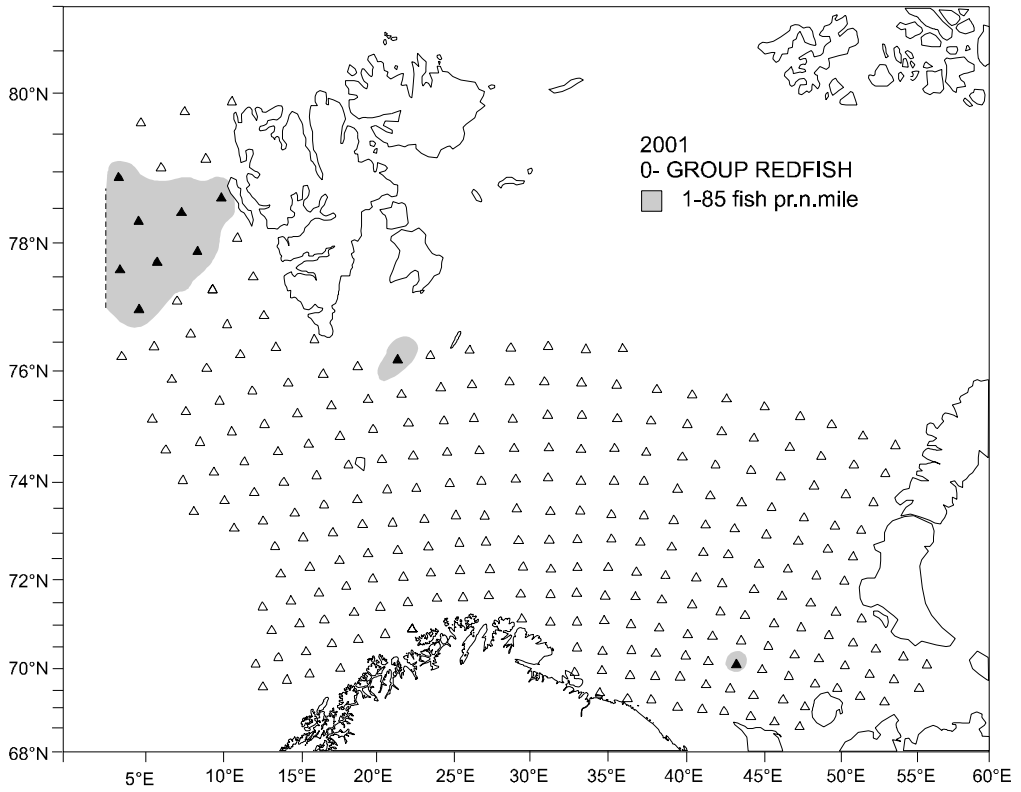


Fig. 22. Distribution of 0-group redfish.

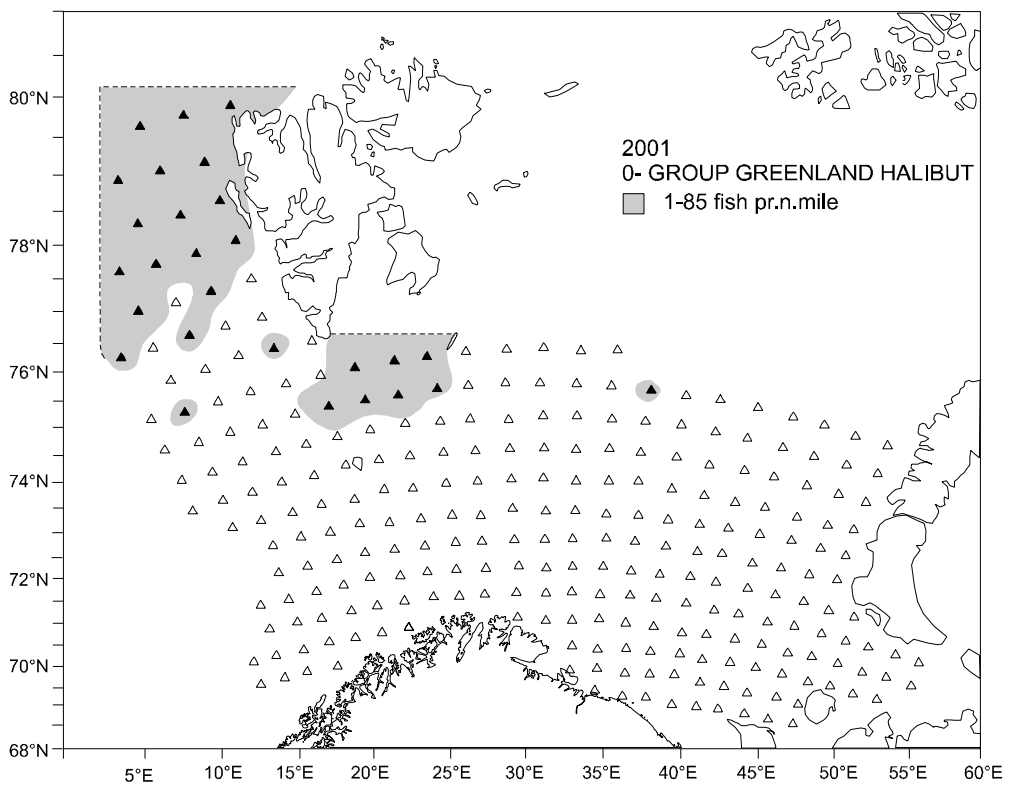


Fig. 23. Distribution of 0-group Greenland halibut.

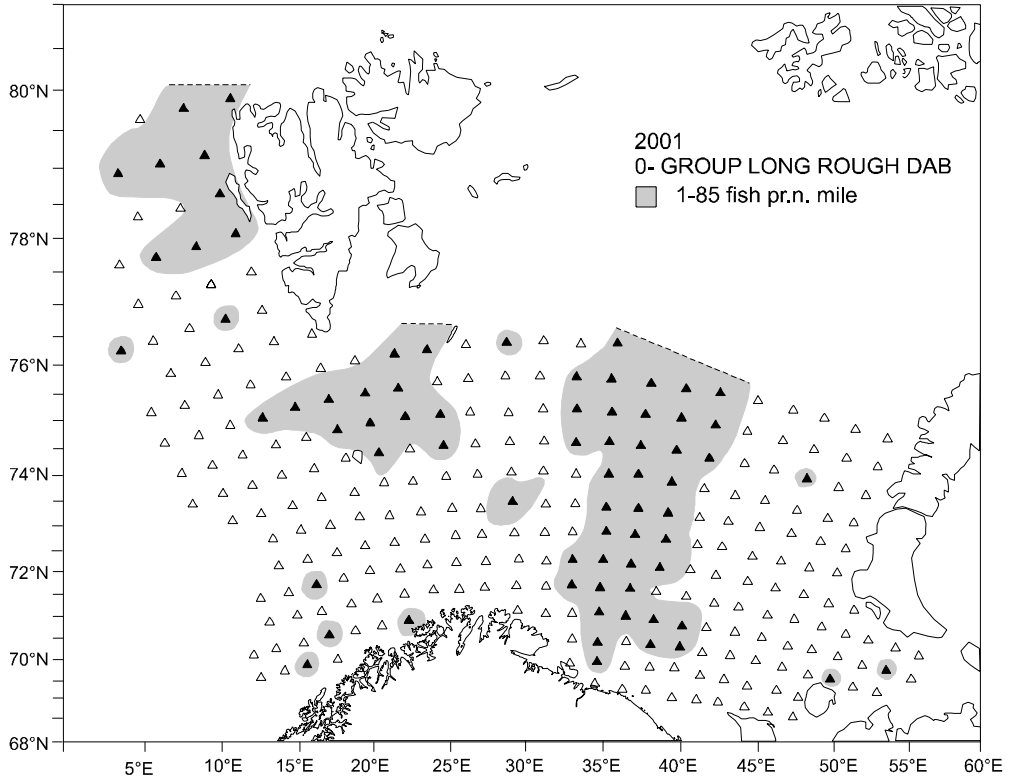


Fig. 24. Distribution of 0-group long rough dab.

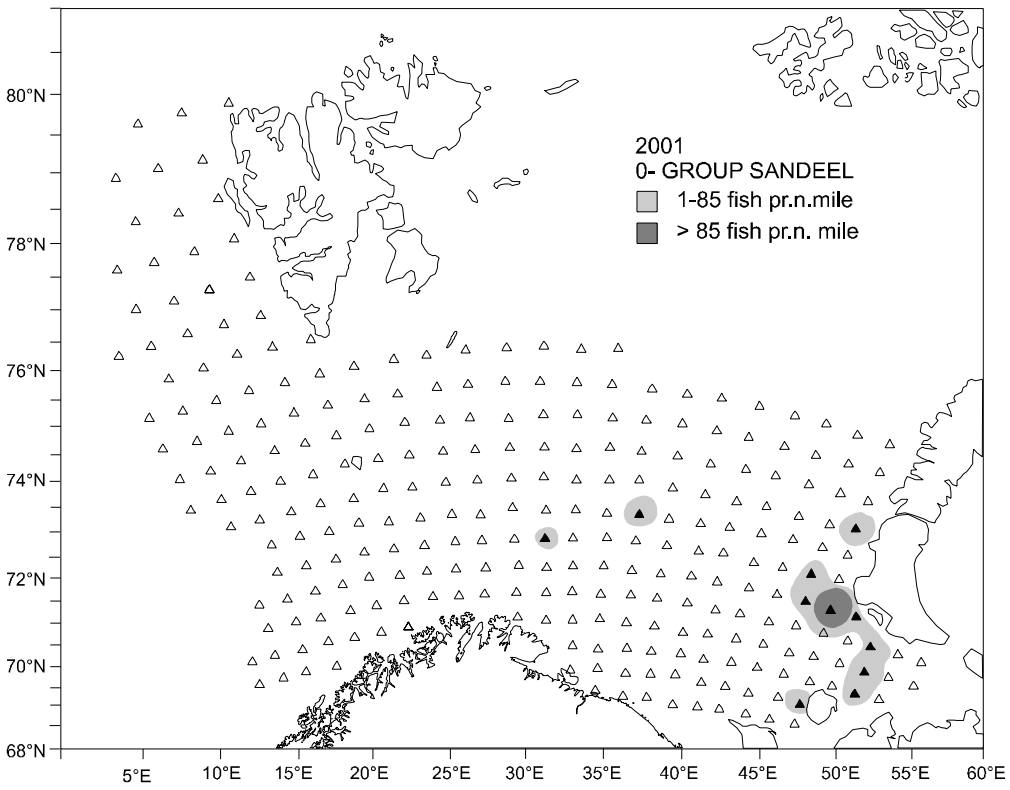


Fig. 25. Distribution of 0-group sandeel.

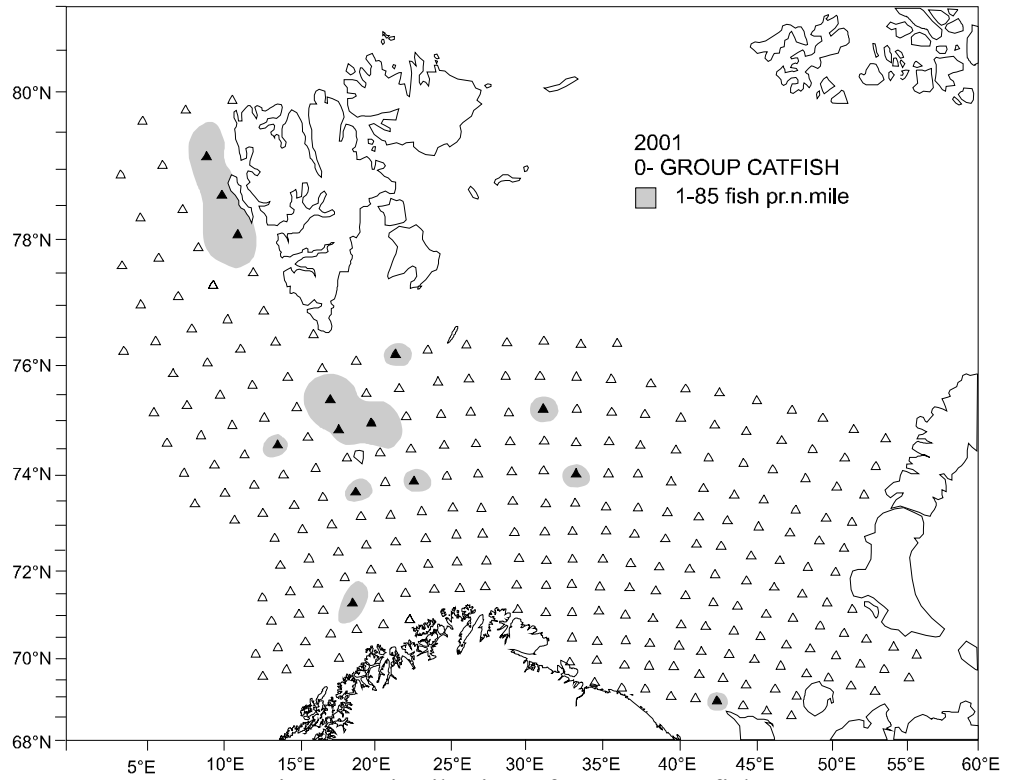


Fig. 26. Distribution of 0-group catfish.

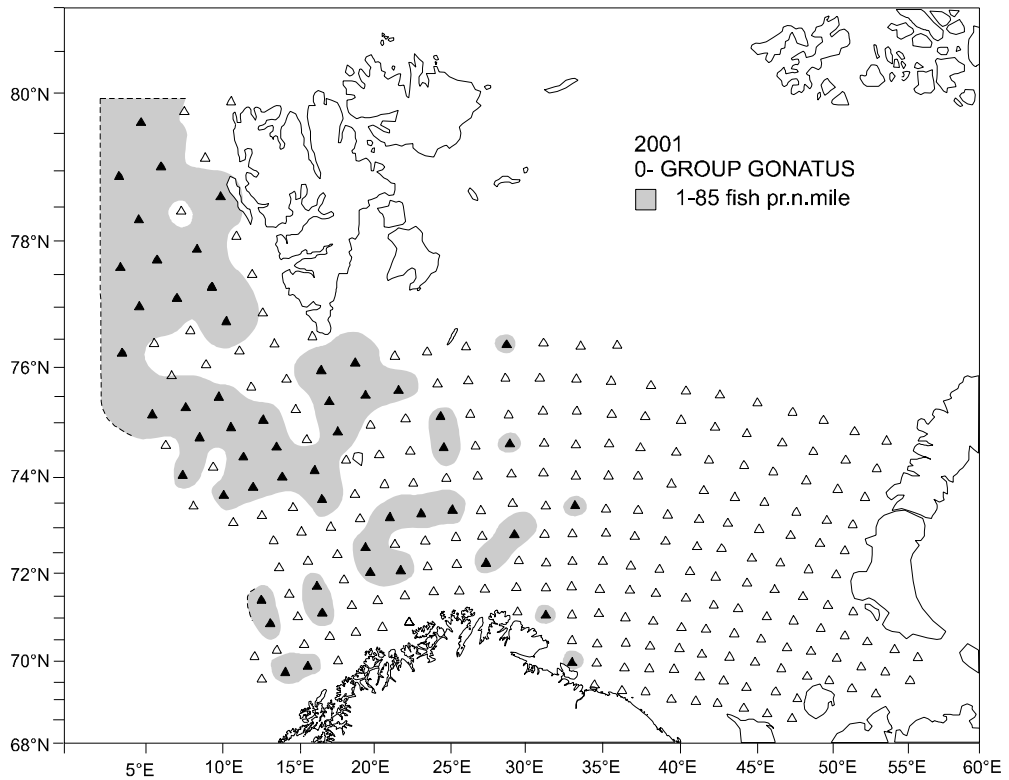


Fig. 27. Distribution of *Gonatus fabricii*.

## APPENDIX

<b>Research vessel</b>	<b>Participants</b>
<b>“AtlantNIRO”</b>	A. Bendik, O. Dolgaja, T. Gavrilik, S. Ivanov, V. Kapralov, V. Mamylov, T. Prokhorova, D. Prozorkevich (cruise leader), S. Ratushny, M. Rybakov, T. Sergeeva
<b>“F. Nansen”</b>	A. Astakhov, I. Dolgolenko (cruise leader), J. Garbut, V. Guzenko, V. Kapralov, S. Kharlin, S. Rusyaev, V. Sergeev, I. Shevelev, O. Vavilova
<b>“G. O. Sars”</b>	P. Fossum (cruise leader), H. Gill, A. Hassel, T. Haugland, K. Helle, J. Horne, Ø. Leikvin, A. Sæther, J. Træland, N.Ushakov
<b>“J. Hjort”</b>	J.R. Andersen, M. Dahl, K. Gjertsen, H. Græsdal (cruise leader), R. Ingvaldsen, E. Sælen Meland, M. Mjanger, H. Sagen, H.J. Skaug

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### **No. 5**

Aglen, A., Drevetnyak, K., Jakobsen, T., Korsbrekke, K., Lepesevich, Y., Mehl, S., Nakken, O., and Nedreaas, K. H. 2001. Investigations on demersal fish in the Barents Sea winter 2000. Detailed report. Botnfiskundersøkingar i Barentshavet vinteren 2000. Detaljert rapport. IMR/PINRO Joint Report Series. No. 5/2001. ISSN 1502-8828. 74 pp.

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Shevelev, M., and Lisovsky, S. 2001. Technical regulations and by-catch criteria in the Barents Sea fisheries. Proceedings of the 9<sup>th</sup> PINRO-IMR Symposium, Murmansk, 14-15 August 2001. IMR/PINRO Joint Report Series. No. 6/2001. ISSN 1502-8828, ISBN 5-86349-099-3.

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