Northwest Atlantic Fisheries Organization

Serial No. N4621 **NAFO SCR Doc. 02/19**

SCIENTIFIC COUNCIL MEETING – JUNE 2002

Russian Investigations and Fishery of Beaked Redfish *Sebastes mentella* in the Labrador and Irminger Seas

by

A. Vaskov, S. Melnikov and V. Shibanov

Polar Research Institute of Marine Fisheries and Oceanography (PINRO),
6 Knipovich Street, Murmansk, 183763, Russia
E-mail: inter@pinro.murmansk.ru

Abstract

The data on redfish fishing and biological status, hydrography of the Labrador (Div. 1F, 2GHJ) and Irminger Seas were analysed. Those data were collected during 26 Russian research scouting and research fishing expeditions, as well as in the course of 3 international trawl-acoustic surveys. It was established that the pelagic redfish from Div. 1F, 2GHJ was a component of the total commercial stock of the beaked redfish from the Irminger Sea with the same reproductive and feeding areas, life and migration cycles, the lack of spatial and temporal isolation. The development of essential fishing aggregations of the pelagic redfish in the Labrador Sea is seasonal and irregular and is conditioned by the redistribution of redfish aggregations from the traditional feeding area to the Irminger Sea. The reason of redistribution is the change of hydrographic conditions caused by advection strengthening of the Atlantic waters by the Irminger Sea and the increase in heat content in the upper sea layer.

In 2000 the international catch of the pelagic redfish in Div. 1F of NAFO Regulatory Area amounted to above 10 x 10^3 t. Extending the scales of beaked redfish pelagic fishing in NAFO Regulatory Area, from Div. 1F to Div. 2J, the obscurity of status and the lack of common measures for the management of the stock as a result of it dictate the necessity to solve this problem within NAFO/NEAFC framework. Proceeding from the criterion of single stock in the Labrador and Irminger Seas, the application of uniform measures on the management and regulation developed by NEAFC in relation to pelagic beaked redfish stock in the Irminger Sea seems to be biologically substantiated. Based on the results obtained, some recommendations on the regulation of pelagic redfish fishery in the Labrador Sea (Div. 1F, 2GHJ) were worked out.

Introduction

The Labrador Sea is a part of NAFO Convention Area including Div. 1F, 2GHJ in the Northwest Atlantic. This area is adjacent to the Irminger Sea, which is located both in the open international waters of the north-western Atlantic Ocean and in the 200-mile zones of Greenland and Iceland. Of the divisions mentioned, Div. 1F is the most important with respect to fishery and, recently, Div. 2GHJ have acquired fishery significance. In the following two decades, there were 26 Russian complex research and research and scouting expeditions, as well as three international trawl-acoustic surveys conducted in Div. 1F. In the course of the investigations, a lot of data on redfish distribution and hydrographic conditions of the area were collected.

Extending the scales of beaked redfish fishery in the Labrador Sea, the obscurity of uniform measures of management associated with it stipulate solving this problem within the framework of NAFO/NEAFC Agreement.

Results and Discussion

In 1960-1998, the redfish from Div. 1F was, mainly, caught by bottom trawls on the shelf of Greenland. According to the statistical data from STATLANT 21A form, in 1960-1969, the total annual catch of the redfish gradually decreased to its maximum in 1961 and in 1969, amounting to 1.5 x 10^3 t (Table 1). The reduction in international catch had been noted before 1974. Since 1975 annual catches began growing and reached maximum in 1977 (14 x 10^3 t). In 1990-1998, in this area, bottom fishery was carried out by all the countries occasionally.

In 1990-1991, 1999, Russian fishing trawlers fished redfish pelagic aggregations in Div. 1F, in the area, adjacent to the Irminger Sea, in those years, the catch varied from 0.4 to 0.5 x 10^3 t. Redfish fishing by mid-water trawls started, in essence, in 2000 and was, mainly, conditioned by the work of Russian (5.1 x 10^3t) and German (4.5 x 10^3t) vessels. In 2001, Russian vessels did not fish in Div. 1F, since the quota had been realized in the international waters of the Irminger Sea. The pelagic fishery of redfish by Russian vessels was executed in Div. 2HJ, in which the catch was equal to 1.4 x 10^3 t.

The distribution of redfish aggregations in the Labrador and Irminger Seas was studied during the Russian summer TASs for pelagic redfish stock. In some years (1992, 1995-1997 and 1999) the surveys covered the area up to 53°N, 48°W (Magnusson *et al*., 1992; Pedchenko *et al*., 1995; Magnusson *et al*., 1996; Melnikov *et al*., 1998; Sigurdsson *et al*., 1999).

According to the data from the surveys in 1982-1991, the maximal densities of feeding redfish were related to 200-mile zone of the West Greenland and recorded to the east of 42°W (Shibanov *et al*., 1996; Pedchenko *et al*., 1996).

Since 1994, the shift of main redfish aggregations westward, to the Labrador Sea area (Fig. 1b-f) was registered. When conducting TAS, it was impossible to reach redfish zero densities in the south-west of feeding area. The change of hydrographic conditions in the Irminger Sea, in the traditional feeding area, starting in mid-1990s is assumed to be the main reason of it (Fig. 1a). The results from the surveys showed, that strengthening of advection in the Atlantic waters and the increase in heat content in the upper 200 m layer of the sea caused significant redistribution of fish aggregations by area and depth in 1994-1999 (Magnusson *et al*., 1994; Pedchenko *et al*., 1995; Magnusson *et al*., 1996; Melnikov *et al*., 1998; Sigurdsson *et al*., 1999). Further development of anomalous conditions in the surface sea layer in 1997-1999 resulted in redistribution of water masses over the area and essential shift of primary fish aggregations to the south-west of traditional feeding area in 2001 (Fig. 2).

The analysis of work of Russian commercial vessels in the Irminger and Labrador Seas in 2000-2001 showed seasonality and the similar character of distribution of beaked-redfish concentrations. The beginning of migrations southwestward was registered in June-July. In July 2000, Russian vessels going after fishing concentrations of beaked redfish moved to Div. 1F, where they fished till October (Fig. 3). In 2001, dense fishing concentrations were recorded in Div. 2J in August-September (Fig. 4). Later on, those concentrations started to migrate in the north and north-east direction to the area of Div. 1F and open part of the Irminger Sea, as well as to the 200-mile zone of Greenland.

The results from Russian and international TASs give us the reason to draw the conclusion that the pelagic redfish from the Labrador Sea is a component of the total beaked redfish commercial stock in the Irminger Sea that is corroborated by the similarity of length composition (Table 2). Besides, the investigations conducted on the Flemish Cap Bank, in the Labrador and Irminger Seas showed the differences in the parasitic fauna of the redfish from the Flemish Cap Bank and the two latter areas (Bakay, 1988). At the same time, the parasitic fauna of the redfish from the Labrador and Irminger Seas has the similar composition (Bakay, 2001). In particular, the analogous trend was also noticed while infesting redfish with the copepod *Sphyrion lumpi*. The available differences in the parasitic fauna of the redfish from the Flemish Cap Bank and the Irminger Sea in the level of the invasion with many common species including "parasitic" tags indicate the essential isolation of these groupings of which everyone was related to the certain area.

Thus, the commercial stock of the Labrador and Irminger Seas has a single reproductive and feeding area, common life and migration cycle and the lack of spatial and time isolation. Fishing concentrations of the pelagic redfish in the Labrador Sea are formed irregularly, by seasons and due to the redistribution of redfish concentrations from the traditional feeding area to the Irminger Sea (Melnikov *et al*., 2001). At present, the question on the relationship

between redfish pelagic concentrations in the Irminger and Labrador Seas in the upper 500-m layer and the redfish occurring on the shelf of Div. 2GHJ, within 200-mile fishing zone of Canada, remains to be obscure. But, starting from the period of redistribution of pelagic concentrations in these divisions, it may be assumed that this area cannot be the spawning part of the population habitat.

Based upon the criterion of unity of the redfish stock in the area of the Labrador and Irminger Seas, it is necessary to develop and apply the uniform measures on management and regulation of this stock for NAFO and NEAFC. Primarily, it concerns establishing TAC, dividing it into quotas and regulations of allowable mesh size in fishing gears.

According to fishing regulations adopted in NAFO (Conservation and Enforcement Measures, 2001), observers must be sent to all fishing vessels. The conservation of this position in the Uniform Regulation Measures of NAFO/NEAFC is considered to be reasonable, since besides the performance of control over the observance of fishing regulations by NAFO observers a lot of fishing and biological data are collected.

Notification of their vessels by NEAFC Contracting Parties in NAFO Secretariat with further exemption from notifications of the area change for the vessels having satellite tracking instrumentation might simplify the procedure of frequent and repeated crossing the border between NAFO and NEAFC Convention Areas by vessels during the fishing. At the present time, in NAFO, this regulation is applied for the vessels crossing the borders of the adjacent areas.

In accordance with Fishing Regulations adopted in NAFO, the mesh of 130 mm size is allowed to be used when bottom and pelagic fishery for all fish species, except capelin. This regulation measure is directed to the decrease in by-catch of fish with the length of less than established minimum commercial size and small immature fish. Russian investigations into the optimum mesh size when fishing beaked redfish in the Irminger Sea showed that 3%, 28% and 42% of catch biomass were selected when using 104 mm, 130 mm and 140 mm mesh size in the codend, respectively (Kondratyuk *et al*., 1998). With the mesh size of more than 100 mm more fish as long as 28-34 cm prevailing in the stock were selected. Starting from this and the fact that the portion of immature fish in 500 m layer is not great (less than 15-20%) applying 100 mm mesh is the most expedient when fishing beaked redfish pelagic concentrations in the Labrador Sea.

References

ANON., 2001. Conservation and Enforcement Measures. NAFO/FC Doc.01/1, Serial No.N4349

BAKAY, Yu. I. 1988. Application of results from parasitological investigations in redfish (*Sebastes mentella* Travin) population structure studies. ICES C.M. 1988/G:35, 14 p.

KONDRATYUK, YU.A., S.F. LISOVSKY, and A.K.CHUMAKOV. 1998. On the optimal mesh size in trawl codend in the directed beaked redfish fisheries in the Irminger Sea. ICES C.M. 1998/B:47, 24 p.

MAGNUSSON, J., J.V. MAGNUSSON, P. REYNISSON, I. HALLGRIMSSON, A. DORCHENKOV, A. PEDCHENKO, and Yu. BAKAY. 1992. Report on the Icelandic and Russian acoustic survey on oceanic redfish in the Irminger Sea and adjacent waters, in May/July 1992. ICES CM 1992/G:51, 14 p.

MAGNUSSON, J., K.H. NEDREAAS, J.V. MAGNUSSON, P. REYNISSON, and T. SIGURDSSON. 1994. Report on the joint Icelandic/Norwegian survey on oceanic redfish in the Irminger Sea and adjacent waters in June/July 1994. ICES CM 1994/G:44. 29 p.

MAGNUSSON, J., J.V. MAGNUSSON, T. SIGURDSSON, P. REYNISSON, C. HAMMER, E. BETHKE, A. PEDCHENKO, E. GAVRILOV, S. MELNIKOV, M. ANTSIFEROV, and V. KISELEVA. 1996. Report on the Joint Icelandic/German/Russian Acoustic Survey on Oceanic Redfish in the Irminger Sea and Adjacent Waters in June-July 1996. ICES CM 1996/G:8, p.1-27

MELNIKOV, S.P., V.S. MAMYLOV, V.N. SHIBANOV, and A.P. PEDCHENKO. 1998. Results from Russian trawl-acoustic survey on *Sebastes mentella* stock of the Irminger Sea in 1997. ICES C.M. 1998/O:12, 8 p.

MELNIKOV, S.P., A.P. PEDCHENKO, and V.N. SHIBANOV. 2001. Results from the Russian Investigations on Pelagic Redfish (*Sebastes mentella Travin*) in the Irminger Sea and in NAFO Division 1F. Serial No. N4388 NAFO SCR Doc. 01/20.

PEDCHENKO, A.P., V.S. MAMYLOV, V.S. ZENKIN, V.N. SHIBANOV, and S.P. MELNIKOV. 1995. Results of Russian investigations in the Irminger Sea and adjacent waters in 1995. NEAFC. Working Group on Oceanic Redfish. London 1995. 18 p.

PEDCHENKO, A.P., S.P. MELNIKOV, and V.N. SHIBANOV. 1996. Regularities of Feeding Concentrations of Redfish (*Sebastes mentella*) formation in the Irminger Sea. ICES CM 1996/G:45. 17 p.

SHIBANOV, V.N., S.P. MELNIKOV, and A.P. PEDCHENKO. 1996. Dynamics of commercial stock of oceanic-type redfish *Sebastes mentella* in the Irminger Sea in 1989-1995 from results of Russian summer trawl-acoustic surveys. ICES C.M. 1996/G:46. 19 p.

SIGURDSSON, T., H-J. RATZ, A. PEDCHENKO, V. MAMYLOV, J. MORTENSEN, E. BETHKE, C. STRANSKY, S. MELNIKOV, Yu. BAKAY, and K. DREVETNYAK. 1999. Report on the Joint Icelandic/German/ Russian Trawl-Acoustic Survey on Pelagic Redfish in the Irminger Sea and Adjacent Waters in June/July 1999/ACFM: 17. p.1-38.

TABLE 1. Nominal catches by country (tons) of redfish in Div. 1F, 1960-2000. STATLANT 21A.

Country	Year									
	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969
Greenland	154	148	122	139	142	192	183	65	30	10
Germany	5772	12909	8339	7183	4116	4971	5795	2817	3619	1541
DDR						31	145		5	2
Iceland	3772	601	684		134		100	40		
Russia									68	
U. Kingdom	138	27	74	81	108	22	93	1	3	
Total	**9836**	**13685**	**9219**	**7403**	**4500**	**5216**	**6316**	**2923**	**3712**	**1553**

Country	Year									
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Faroe Is.			5							30
Greenland	3	6	1	134	232	123	65	5	23	26
France										1
Germany	2156	1574	841	829	401	1847	2227	14039	3152	2058
DDR	44									
Norway		1		4	3	3	21	17		
Russia	53				9		2875			
U. Kingdom	42	106	1	10	16	8				
Total	**2298**	**1687**	**848**	**977**	**661**	**1981**	**5188**	**14061**	**3175**	**2215**

Country	Year									
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Greenland	22	10	11	10	22	632	25		8	7
Germany	3183	3391	2314	2525	1912	426	324	277	591	331
Japan					182	698	603	386	51	
Total	**3205**	**3401**	**2325**	**2535**	**2116**	**1756**	**952**	**663**	**650**	**338**

Country	Year										
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Canada						608		111			
Greenland	30	12	8	32	13	12	19	16	39	61	
Germany	104	7			74					154	4475
Iceland						751					
Norway			114								113
Spain											32
Russia											5130
Estonia											140
Lithuania											430
Total	**134**	**19**	**122**	**32**	**87**	**1371**	**19**	**127**	**39**	**215**	**10320**

TABLE 2. Size distribution of *Sebastes mentella* in the NAFO and NEAFC Convention areas as provided by the international trawl-acoustic survey in 2001.

Length, cm	NEAFC		NAFO	
	Males	Females	Males	Females
22	0.2	-	-	-
23	0.2	0.3	0.2	0.3
24	0.3	-	0.3	0.7
25	0.7	1.7	0.3	0.4
26	0.5	0.3	0.5	1.1
27	0.8	4.0	1.1	1.7
28	1.9	2.3	1.2	1.6
29	2.4	2.6	2.6	3.8
30	3.4	4.5	2.9	5.4
31	4.7	4.0	4.4	5.7
32	5.6	5.1	7.2	3.9
33	5.1	4.3	14.0	5.8
34	17.3	5.4	19.5	10.9
35	15.4	8.2	17.9	14.6
36	16.6	12.5	13.1	16.5
37	10.3	13.9	7.5	12.6
38	7.5	12.2	4.7	7.4
39	3.7	9.9	1.7	4.7
40	1.5	6.5	0.7	2.2
41	0.8	1.4	0.1	0.5
42	0.3	0.3	-	-
43	-	0.6	-	-
44	0.3	-	-	-
45	0.2	-	-	-
Length, av. cm	34.6	35.1	34.0	34.4

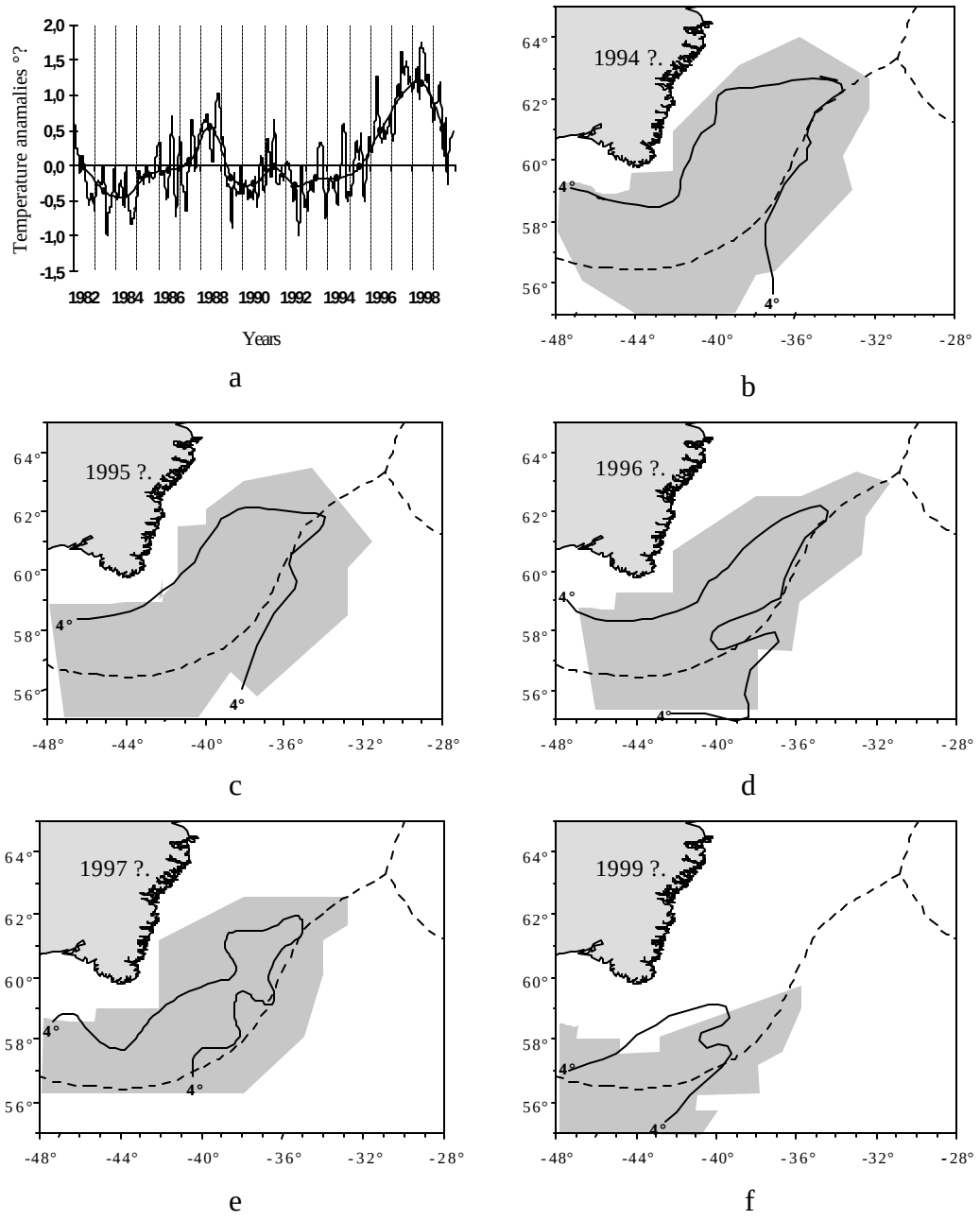

Fig. 1. Mean monthly and mean yearly (marked) anomalies of the sea surface temperatures over the feeding area (a). Aggregations of feeding redfish Sa>10m^2/nm^2 at 0-500 m (shading) and 4°C isotherms at 200 m in the Irminger Sea, June-July 1994-1999 (b-f).

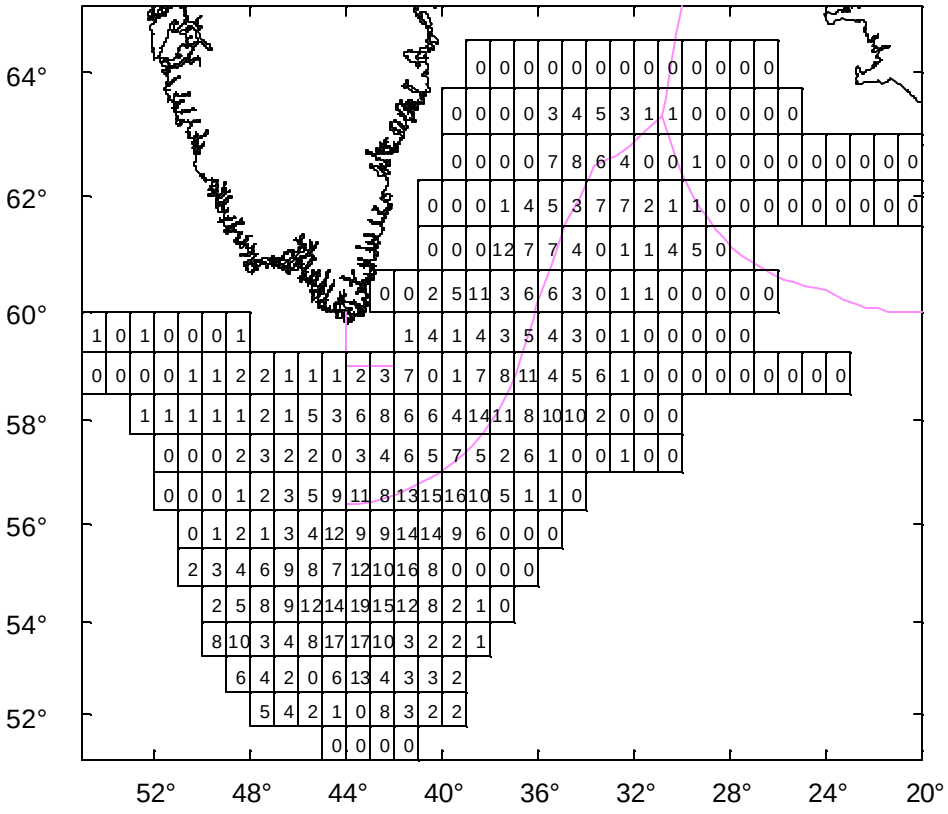

Fig. 2. Mean values of area back scattering strength (m^2/nm^2) in June/July 2001 at depths between 0-500 m within statistical rectangles.

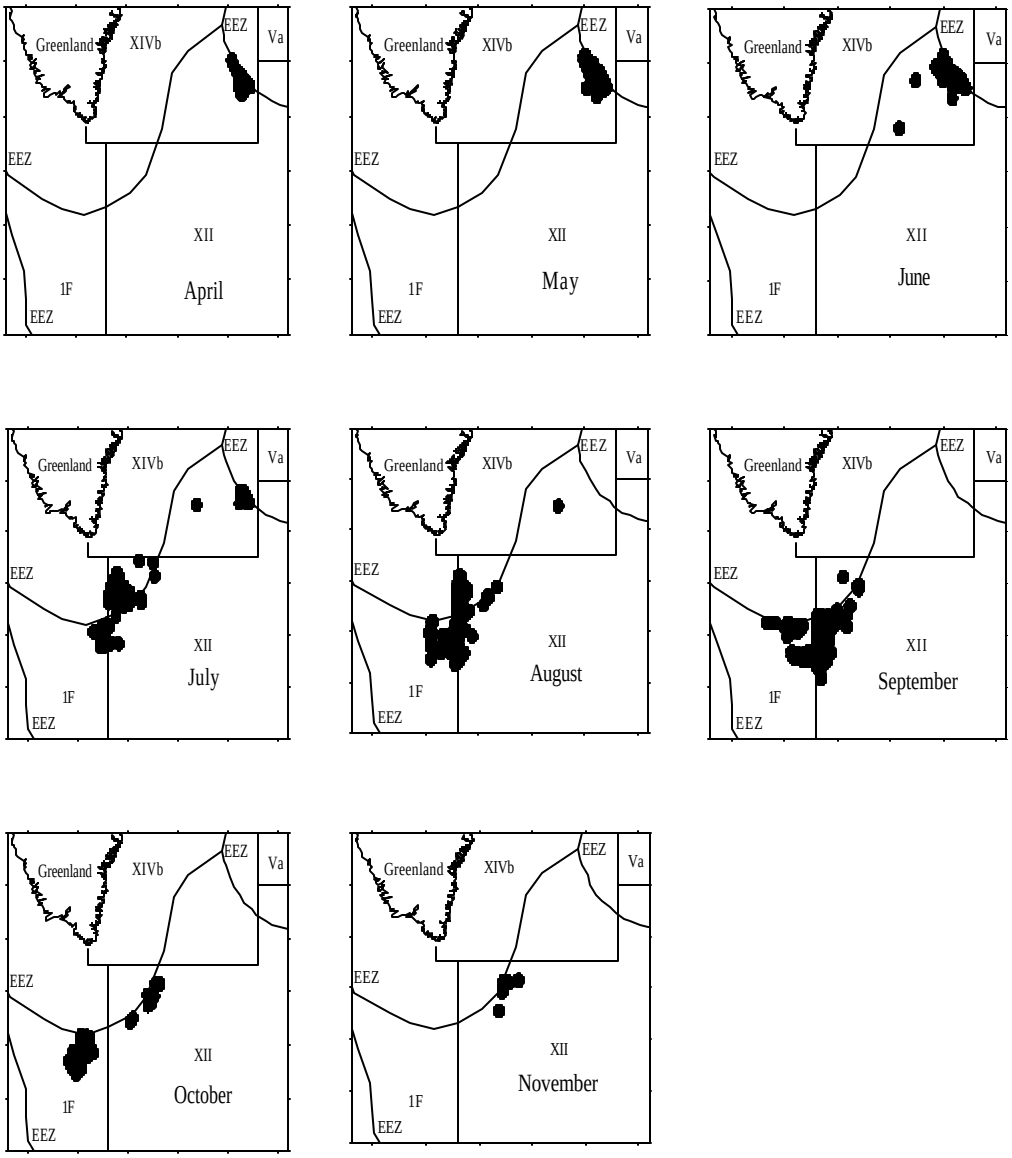

Fig. 3. Russian fleet monthly position in the Irminger and Labrador Sea in 2000, by months.

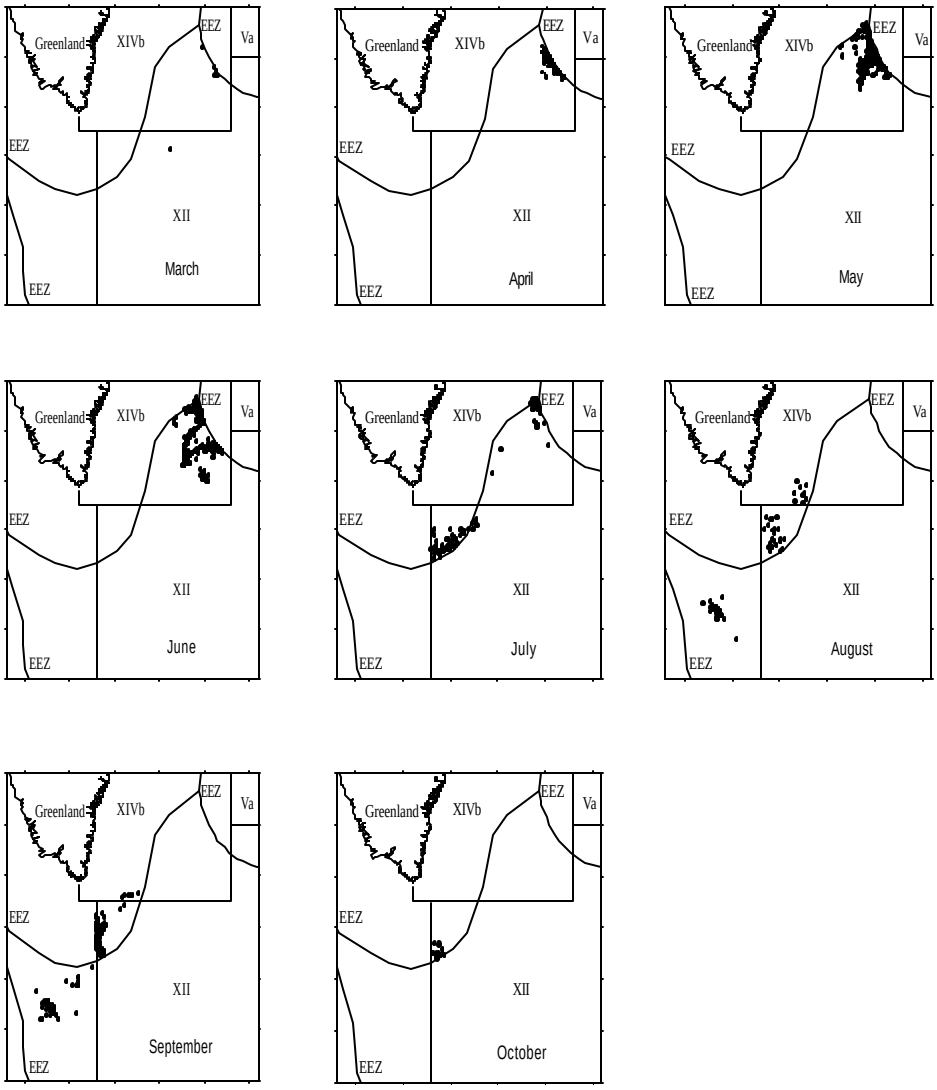

Fig. 4. Russian fleet position in the Irminger and Labrador Sea in 2001, by months.