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Results From the Assessment of Roundnose Grenadier Stocks in NAFO Divisions 2G and 2H
By the Data From Russian Trawl Surveys in 1987-1992

by

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ABSTRACT

The paper presents estimates for abundance and biomass of roundnose grenadier for each year for the period 1987-1992. The estimates essentially varied by years due to the fact that research fishing gears did not cover a whole range of grenadier vertical distribution and its vertical migrations were not considered. During 1987-1998 hauls were performed to 1250m depth and to 1500m during 1989-1992. The abundance, biomass and catch have been noted to reduce in the periods mentioned, that agreed with similar variations in Subareas 2 and 3 in 1991-1995 by the data from Canadian surveys and by the data from Russian surveys in Subareas 0 and 1 in 1986-1992. Mean length increases with a fishing depth that confirms the results from the investigations during previous years.

MATERIAL AND METHODS

Trawl surveys on assessment of groundfish stocks in the NAFO regulated area have been conducted by Russia since 1961. Methods for surveys varied. Since 1983 the surveys have been carried out according to stratified-random method (Doubleday, 1981; Bulatova, Chumakov, 1986; Bulatova et al., 1996). In Divs. 2G and 2H, hauls were done to 1250m depth during 1987-1989 and to 1500m depth during 1989-1992. In 1990, no trawl survey was conducted in Div. 2H. Hauls were performed by a bottom trawl with a small-meshed insertion (12mm mesh-size) in a bag codend. A duration of haul was 1 hour at the vessel's speed 3.5 knots.

The major aim of the surveys mentioned was to assess Greenland halibut stocks. Grenadier stocks were assessed at the same time. Information about the surveys is given in Table 1.

RESULTS AND DISCUSSION

Estimates for abundance and biomass of roundnose grenadier in Divs. 2G and 2H are given by strata in Tables 2-8. These estimates for both, specific strata and on the whole for divisions, essentially vary from year to year due to the different number of hauls in strata and incomplete coverage of all strata in divisions. However, the major reason for sharp fluctuations in abundance, biomass and catches of this deep sea fish is in our opinion that the research fishing gears do not cover an entire range of grenadier vertical distribution.

It is known from literature that roundnose grenadier inhabit the depth from 180 to 2000m and below (Leim, Scott, 1966; Wheeler, 1969), and according to other data - to 2500m (Atkinson et al., 1981) and even to 3000m depth (Sahrhage, 1986). During the surveys hauls were performed to 1500m and in the restricted area, so the estimates given for grenadier stocks are insufficiently representative. Besides, population structure of roundnose grenadier has not been properly studied. It is unknown whether this fish form isolated populations in the divisions surveyed or the stocks are assessed only in a part of the area during trawl survey.

Besides a reduction in the abundance in the divisions mentioned a somewhat decrease in grenadier mean catch occurred from 1987 to 1992 (Tables 9-12). Similar variations were registered by us in Subareas 0 and 1 in 1986-1992 (Savvatimsky, 1997) and by Canadian investigators in Divs.3KLMN in 1991-1995 (Atkinson, 1995). A reduction in the abundance and biomass of grenadier when pooling the data on Divs.2G and 2H is still more evident (Table 13).

Analysis for length composition of grenadier catch has indicated the mean length in both, males and females, to grow sharply with an increase in fishing depth (Table 14), as it was mentioned previously. Increase in mean length of fish with a depth was also noted in other areas (Atkinson, Power, 1987; Savvatimsky, 1987, 1992 and 1997) and is probably regular for this species.

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Table 1. Information regarding trawl surveys conducted
in 1987-1992 in Div. 2G,2H.

Year	Period	Div.	Vessel	Cruise No.	Valid tows
1987	Sept.-Nov.	2G,2H	PST-1366 "K.Shaitanov"	8	46
1988	Oct.-Nov.	2G,2H	PST-1366 "K.Shaitanov"	12	44
1989	Sept.-Dec.	2G,2H	PST-1366 "K.Shaitanov"	17	43
1990	Nov.	2G	PST-1366 "K.Shaitanov"	23	14
1991	Sept.-Dec.	2G,2H	PST-1366 "K.Shaitanov"	25	113
1992	Sept.-Dec.	2G,2H	PST-1366 "K.Shaitanov"	28	48

Table 2. Results from the trawl survey for Roundnose
grenadier in Divs. 2G,2H 1987.

Stratum	Depth, m	Area, mile sq.	Nos of tows	Mean catch/ 1 valid tow fish		Abundance, '000	Biomass, tons
				kg			
2G							
904	501-750	153	3	48,7	10,5	323,7	69,7
914	- " -	113	3	38,7	8,2	190,0	40,2
921	- " -	142	3	5,0	1,4	30,9	9,0
905	751-1000	164	3	1019,7	236,2	7270,7	1684,5
915	- " -	96	3	170,7	71,0	712,3	296,3
920	- " -	172	3	240,7	73,6	1799,8	550,1
906	1001-1250	229	3	857,3	393,0	8536,1	3913,0
916	- " -	146	3	1187,0	342,1	7534,9	2171,8
919	- " -	316	4	1951,0	594,1	26805,0	8162,1
Total	501-1250	1531	28	799,3	253,8	53203,1	16896,6
2H							
935	751-1000	96	3	569,0	173,8	2375,0	725,5
940	- " -	97	3	474,7	190,1	2001,9	801,6
962	- " -	242	3	40,7	17,2	427,9	181,0
936	1001-1250	78	3	35,3	15,1	119,8	51,3
939	- " -	130	3	129,7	62,3	732,9	325,1
963	- " -	265	3	71,7	31,9	825,7	368,0
Total	751-1250	908	18	164,2	62,8	6483,1	2479,5

Table 3. Results from the trawl survey for Roundnose grenadier in 1988 in Divs. 2G,2H.

Stratum	Depth, m	Area, mile sq.	Nos of tows	Mean catch/ 1 valid tow		Abundance, 000	Biomass, tons
				fish	kg		
2G							
904	501-750	153	3	142,7	5,1	949,0	34,1
915	751-1250	96	3	357,4	65,4	1491,5	272,9
920	- " -	172	4	152,3	12,0	1138,6	89,4
906	1001-1250	229	3	552,0	190,6	5496,0	1898,1
916	- " -	146	3	673,7	273,0	4276,3	1732,9
919	- " -	316	4	298,5	130,9	4101,1	1798,6
Total	501-1250	1112	20	361,0	120,5	17452,5	5825,9
2H							
941	501-750	89	3	225,3	30,0	871,9	115,9
934	- " -	78	3	12,0	1,3	40,7	4,3
935	751-1000	96	3	205,7	54,3	858,4	226,8
962	- " -	242	3	78,7	10,0	827,7	105,5
940	- " -	97	3	357,3	68,7	1507,0	289,9
963	1001-1250	265	3	189,3	83,6	2181,4	962,9
939	- " -	130	3	703,0	355,2	3973,5	2007,4
936	- " -	78	3	202,3	100,3	686,2	340,2
Total	501-1250	1075	24	234,2	86,7	10946,9	4053,1

Table 4. Results from the trawl survey for Roundnose grenadier in 1989 in Divs.2G,2H.

Stratum	Depth, m	Area, mile sq.	Nos of tows	Mean catch/ 1 valid tow		Abundance, '000	Biomass, tons
				fish	kg		
2G							
921	501- 750	142	3	218,7	47,0	1350,0	290,4
905	751-1000	164	3	23,7	6,3	168,8	45,2
920	- " -	172	4	1616,8	535,7	12090,5	4005,8
906	1001-1250	229	3	898,0	435,9	8941,0	4339,9
919	- " -	316	3	4239,3	1702,2	58244,8	23387,3
907	1251-1500	360	3	1365,3	801,9	21370,4	12551,9
918	- " -	515	3	2312,3	1012,0	51776,2	22660,8
Total	501-1500	1898	22	1865,5	815,3	153941,6	67281,3
2H							
941	501- 750	89	3	362,7	89,7	1403,4	347,0
940	751-1000	97	3	1020,3	252,4	4303,1	1064,6
962	- " -	242	3	19,0	5,2	199,9	54,6
939	1001-1250	130	3	1258,3	687,3	7112,3	3884,9
963	- " -	265	3	207,0	86,6	2385,0	998,3
938	1251-1500	191	3	372,3	199,5	3092,0	1656,6
964	- " -	342	3	626,0	406,8	9308,3	6049,2
Total	501-1500	1356	21	471,6	238,4	27804,1	14055,2

Table 5. Results from the trawl survey for Roundnose grenadier in 1990 in Div.2G.

Stratum	Depth, m	Area, mile sq.	Nos of tows	Mean catch/ 1 valid tow		Abundance, '000	Biomass, tons
				fish	kg		
915	751-1000	96	3	95,3	52,7	397,9	220,0
916	1001-1250	146	4	358,3	129,7	2274,1	823,3
919	- " -	316	3	152,0	149,4	2088,3	2052,9
917	1250-1500	165	1	57,0	26,3	408,9	188,4
918	- " -	515	3	1042,7	404,4	23346,7	9055,9
Total	751-1500	2338	14	529,8	229,3	28516,0	12340,5

Table 6. Results from the trawl survey for Roundnose grenadier in 1991 in Div.2G.

Stratum	Depth, m	Area, mile sq.	Nos of tows	Mean catch/ 1 valid tow		Abundance, '000	Biomass, tons
				fish	kg		
902	301- 400	120	5	1,4	0,4	7,3	2,2
922	401- 500	186	5	1,8	0,2	14,6	1,6
921	501- 750	142	7	62,1	8,3	383,7	51,1
914	- " -	113	5	11,4	1,2	56,0	5,7
904	- " -	153	5	7,8	0,5	51,9	3,2
920	751-1000	172	7	165,3	16,3	1236,1	121,9
915	- " -	96	5	48,4	7,2	202,0	30,0
905	- " -	164	5	12,0	3,0	85,6	21,4
919	1001-1250	316	7	738,9	288,5	10151,3	3963,6
916	- " -	146	5	582,6	244,9	3698,2	1554,9
906	- " -	229	5	276,6	111,9	2754,0	1114,0
918	1250-1500	515	6	515,3	262,8	11494,0	5885,5
917	- " -	165	5	290,6	163,6	2084,8	1173,9
907	- " -	360	5	323,4	168,2	5061,9	2632,0
Total	301-1500	2877	77	298,0	132,4	37281,4	16561,0

Table 7. Results from the trawl survey for Roundnose grenadier in 1991 in Div.2H.

Stratum	Depth, m	Area, mile sq.	Nos of tows	Mean catch/ 1 valid tow		Abundance, '000	Biomass, tons
				fish	kg		
944	301- 400	860	3	19,3	5,7	722,9	212,8
933	401- 500	50	3	20,3	4,1	44,2	8,8
941	501- 750	89	3	48,7	8,8	188,3	34,0
961	- " -	211	3	16,7	1,7	152,9	15,6
935	751-1000	96	3	231,0	47,7	964,2	199,2
940	- " -	97	3	213,0	66,7	898,3	281,1
962	- " -	242	3	30,0	4,9	315,7	51,5
936	1001-1250	78	3	333,0	97,3	1129,3	329,8
939	- " -	130	3	51,0	22,3	288,3	125,8
963	- " -	265	3	25,7	7,5	295,7	86,8
938	1251-1500	191	3	81,0	54,4	672,7	452,2
964	- " -	342	3	12,0	5,3	178,4	78,4
Total	301-1500	2651	36	50,8	16,3	5850,8	1876,2

Table 8. Results from the trawl survey for Roundnose grenadier in 1992 in Divs.2G,2H.

Stratum	Depth, m	Area, mile sq.	Nos of tows	Mean catch/ 1 valid tow		Abundance, '000	Biomass, tons
				fish	kg		
2G							
904	501- 750	153	3	51,7	11,5	343,7	76,7
905	751-1000	164	5	222,2	19,5	1584,4	139,0
920	- " -	172	4	155,0	25,9	1159,1	193,7
906	1001-1250	229	4	204,3	64,3	2033,6	640,1
919	- " -	316	4	605,0	127,6	8312,2	1752,5
907	1251-1500	360	3	227,7	94,5	3563,5	1478,6
918	- " -	515	3	335,0	71,8	7501,1	1608,4
Total	501-1500	1909	26	295,2	71,0	24497,6	5889,1
2H							
961	501- 750	211	3	18,3	2,0	168,2	18,0
940	751-1000	97	3	103,0	32,0	434,4	135,1
962	- " -	242	3	57,0	5,5	599,7	57,7
939	1001-1250	130	3	181,3	52,1	1024,9	294,6
963	- " -	265	4	75,0	20,0	864,1	231,1
938	1251-1500	191	3	75,7	25,5	628,4	212,1
964	- " -	342	3	80,7	38,3	1199,5	570,2
Total	501-1500	1478	22	76,6	23,6	4919,2	1518,8

Table 9 . Data on average catches (spes.) per one valid tow from the Russian trawl surveys for Roundnose grenadier in Div. 2G by stratum in 1987-1992.

Stratum	Depth,	Area,	1987	1988	1989	1990	1991	1992
	m	nm ²						
902	301-400	120	-	-	-	-	1,4	-
922	401-500	186	-	-	-	-	1,8	-
904	501-750	153	48,7	142,7	-	-	7,8	51,7
914	- " -	113	38,7	-	-	-	11,4	-
921	- " -	142	5,0	-	218,7	-	62,1	-
905	751-1000	164	1019,7	-	23,7	-	12,0	222,2
915	- " -	96	170,7	357,4	-	95,3	48,4	-
920	- " -	172	240,7	152,3	1616,8	-	165,3	155,0
906	1001-1250	229	857,3	552,0	898,0	-	276,6	204,3
916	- " -	146	1187,0	673,7	-	358,3	582,6	-
919	- " -	316	1951,0	298,5	4239,3	152,0	738,9	605,0
918	1250-1500	515	-	-	2312,3	1042,7	515,3	335,0
917	- " -	165	-	-	-	57,0	290,6	-
907	- " -	360	-	-	1365,3	-	323,4	227,7

Table 10 . Data on average catches (spes.) per one valid tow from the Russian trawl surveys for Roundnose grenadier in Div. 2H by stratum in 1987-1992.

Stratum	Depth,	Area,	1987	1988	1989	1990	1991	1992
	m	nm ²						
944	301- 400	860	-	-	-	-	19,3	-
933	401- 500	50	-	-	-	-	20,3	-
941	501- 750	89	-	225,3	362,7	-	48,7	-
934	- " -	78	-	12,0	-	-	-	-
961	- " -	211	-	-	-	-	16,7	18,3
935	751-1000	96	569,0	205,0	-	-	231,0	-
940	- " -	97	474,7	357,3	1020,3	-	213,0	103,0
962	- " -	242	40,7	78,7	19,0	-	30,0	57,0
936	1001-1250	78	35,3	202,3	-	-	333,0	-
939	- " -	130	129,7	703,0	1258,3	-	51,0	181,3
963	- " -	265	71,7	189,3	207,0	-	25,7	75,0
938	1251-1500	191	-	-	372,3	-	81,0	75,7
964	- " -	342	-	-	626,0	-	12,0	80,7

Table 11. Data on average catches (kg.) per one valid tow from the Russian trawl surveys for Roundnose grenadier in Div. 2G by stratum in 1987-1992.

Stratum	Depth,	Area,	1987	1988	1989	1990	1991	1992
	m	nm ²						
902	301-400	120	-	-	-	-	0,4	-
922	401-500	186	-	-	-	-	0,2	-
904	501-750	153	10,5	5,1	-	-	0,5	11,5
914	- " -	113	8,2	-	-	-	1,2	-
921	- " -	142	1,4	-	47,0	-	8,3	-
905	751-1000	164	236,2	-	6,3	-	3,0	19,5
915	- " -	96	71,0	65,4	-	52,7	7,2	-
920	- " -	172	73,6	12,0	535,7	-	16,3	25,9
906	1001-1250	229	393,0	190,6	435,9	-	111,9	64,3
916	- " -	146	342,1	273,0	-	129,7	244,9	-
919	- " -	316	594,1	130,9	1702,2	149,4	288,5	127,6
918	1250-1500	515	-	-	1012,0	404,4	262,8	71,8
917	- " -	165	-	-	-	26,3	163,6	-
907	- " -	360	-	-	801,9	-	168,2	94,5

Table 12. Data on average catches (kg.) per one valid tow from the Russian trawl surveys for Roundnose grenadier in Div. 2H by stratum in 1987-1992.

Stratum	Depth,	Area,	1987	1988	1989	1990	1991	1992
	m	nm ²						
944	301- 400	860	-	-	-	-	5,7	-
933	401- 500	50	-	-	-	-	4,1	-
941	501- 750	89	-	30,0	89,7	-	8,8	-
934	- " -	78	-	1,3	-	-	-	-
961	- " -	211	-	-	-	-	1,7	2,0
935	751-1000	96	173,8	54,3	-	-	47,7	-
940	- " -	97	190,1	68,7	252,4	-	66,7	32,0
962	- " -	242	17,2	10,0	5,2	-	4,9	5,5
936	1001-1250	78	15,1	100,3	-	-	97,3	-
939	- " -	130	62,3	355,2	687,3	-	22,3	52,1
963	- " -	265	31,9	83,6	86,6	-	7,5	20,0
938	1251-1500	191	-	-	199,5	-	54,4	25,5
964	- " -	342	-	-	406,8	-	5,3	38,3

Table 13. Stratified-random estimates of abundance and biomass of Roundnose grenadier in 1987-92 from Russian deepwater surveys in Div. 2G,2H.

Div.	1987		1988		1989		1990		1991		1992	
	Abun. th.sp.	Biom. t	Abun. th.sp.	Biom. t	Abun. th.sp.	Biom. t	Abun. th.sp.	Biom. t	Abun. th.sp.	Biom. t	Abun. th.sp.	Biom. t
2G	53203	16896	17453	5826	153942	67281	28516	12341	37281	16561	24498	5889
2H	6483	2480	10947	4053	27804	14055	-	-	5851	1876	4919	1519
Total	59686	19376	28400	9879	181746	81336	28516	12341	43132	18437	29417	7408

Table 14. Mean length (cm) of males and females of Roundnose grenadier in Divisions 2G and 2H in 1987-1992.

Depth,m	Div.2G				Div.2H			
	males		females		males		females	
	L.av.	N	L.av.	N	L.av.	N	L.av.	N
301- 400	39,4	5	59,5	2	50,0	23	44,3	35
401- 500	29,0	5	37,0	4	40,2	36	40,2	25
501- 750	37,8	691	40,6	504	39,1	488	38,6	313
751-1000	43,8	5049	45,3	2699	41,0	2812	47,3	1783
1001-1250	52,1	15961	53,5	9143	53,8	4490	55,6	2876
1251-1500	53,3	5482	56,6	3211	59,2	2045	62,3	1501