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Results from the Assessment of Roundnose Grenadier Stocks in NAFO Subareas 0 and 1 by the Data from the Russian Bottom Surveys in 1986-1992

by

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ABSTRACT

The assessments of roundnose grenadier abundance and biomass in Divisions 0B,1C,1D for 1986-1992 are presented in compliance with the recommendations of NAFO Scientific Council (Sci.Coun.Rep. June 1996 NAFO SCS Doc. 96/16. Ser.No.N2757). These assessments significantly varied by years, that was, mainly, caused by research fishing gear not covering the whole range of vertical roundnose grenadier distribution. It was noticed, that abundance, biomass and catches decreased in the period mentioned, that, by the data of Canadian investigators, matched changes in the souther areas (Subareas 2 and 3) in 1991-1995. It was indicated, that the mean fish length increased with fishing depth, that confirmed the results from the investigations in previous years.

MATERIAL AND METHODS

Trawl surveys for the assessment of bottom fish stocks in NAFO Regulatory Area have been being conducted by Russia since 1961. Survey methods changed. Since 1983 the surveys have been carried out by stratified-random method (Doubledey, 1981; Bulatova, Chumakov, 1986; Bulatova et al., 1996). Trawlings were made by the bottom trawl with a *small-meshed insertion* (mesh size - 12 mm) in the trawl bag codend. The duration of trawlings was 1 hour with a vessel speed of 3.5 knots. In this paper the results from roundnose grenadier surveys in Divs. 0B, 1C and 1D for 1986-1992 are presented. The mentioned surveys were, mainly, aimed at estimating the Greenland halibut stocks. The roundnose grenadier stocks were assessed in passing. The data on the surveys are given in Table 1.

RESULTS AND DISCUSSION

Assessments of roundnose grenadier abundance and biomass by years are presented in Tables 2-8. These assessments significantly vary in separate strata as well as in subareas, as a whole, from year to year, because of dissimilar number of trawlings in strata and the strata of the subareas being not completely covered. However, the main reason of sharp fluctuations of this deep-water fish abundance, biomass and catches, in our opinion, is not covering the whole range of roundnose grenadier vertical distribution by the research fishing gears.

It is known from the literary sources, that roundnose grenadier inhabit the depths from 180 m up to 2 000 m and more (Leim, Scott, 1966; Wheeler, 1969), and, by the recent data, - up to 2 500 m (Atkinson et al., 1981) and even up to 3 000 m (Sahrhage, 1986). During the surveys trawlings were performed at the depths of a little more than 1 000 m, so the presented assessments of roundnose grenadier stocks were insufficiently representative. Besides, the populational structure of roundnose grenadier has been poorly studied. It is unknown, if this fish form separate populations in the subareas investigated or during the trawl surveys stocks are only estimated in the part of the area.

To specify the changes of roundnose grenadier average catches in separate strata by years, Tables 9,10, which showed some reduction of this indicator practically in all the strata, i.e. from 500 up to 1 500 m, from 1986 to 1992, were made. The decrease in abundance and biomass of roundnose grenadier is more obvious when summarizing the data by Divs. 0B, 1C, 1D (Table 11). The similar changes, but expressed more distinctly, are observed in the souther areas near the coast of Canada (Table 12).

The analysis of length composition of roundnose grenadier catches indicated that the mean length of both males and females sharply increased when enlarging the fishing depth (Table 13). Increase in fish mean length with depth was noticed in the other divisions (Savvatimsky, 1992), and, probably, was regular for this species.

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Table 1 Information regarding trawl surveys conducted in 1986-1992 in Divs. 0B, 1D, 1C.

Year	Period	Div.	Vessel	Cruise No.
1986	Oct.-Nov.	0B	PST-1330 "Klintsi"	23
1987	Oct.	0B,1CD	PST-1366 "K.Shaitanov"	8
1988	Oct.	0B,1CD	PST-1366 "K.Shaitanov"	12
1989	Oct.	0B	PST-1366 "K.Shaitanov"	17
1990	Oct.-Nov.	0B,1CD	PST-1366 "K.Shaitanov"	23
1991	Nov.	0B	PST-1366 "K.Shaitanov"	25
1992	Nov.	0B	PST-1366 "K.Shaitanov"	28

Table 2. Results from the trawl survey for Roundnose grenadier in Div 0B, 1986.

Stratum	Depth, m	Area, mile sq.	Nos of tows	Mean catch/ 1 valid tow fish	kg	Abundance, '000	Biomass, tons
5	751-1000	2070	5	40,2	18,5	3618,0	1661,6
6	1001-1250	1975	5	6,0	3,4	515,2	295,0
Total	751-1250	4045	10	23,5	11,1	4133,2	1956,6

Table 3. Results from the trawl survey for Roundnose grenadier in 1987.

Stratum	Depth, m	Area, mile sq.	Nos of tows	Mean catch/ 1 valid tow fish	kg	Abundance, '000	Biomass, tons
			Div.0B				
11	501- 750	2311	2	8,5	1,5	854,1	155,7
5	751-1000	2070	6	26,2	9,5	2355,0	856,5
12	- ''-	943	5	14,6	6,1	598,6	248,2
6	1001-1250	1975	5	67,6	39,8	5804,8	3419,3
13	- ''-	343	3	86,0	24,4	1282,5	363,6
Total	501-1250	7642	21	32,8	15,2	10895,0	5043,3
			Div.1D				
19	401- 500	45	1	49,0	16,6	95,9	32,5
18	501- 750	170	2	55,5	24,4	410,2	180,3
12	751-1000	797	3	28,7	5,0	993,4	171,6
17	- '' -	283	2	2082,5	455,8	25623,8	5607,7
13	1001-1250	1049	5	969,8	354,1	44231,3	16149,1
16	- ,, -	2110	5	1198,8	536,9	109976,9	49256,6
Total	401-1250	4454	18	936,4	368,7	181331,5	71397,8
			Div.1C				
18	501- 750	482	1	47,0	13,2	985,0	275,8
17	751-1000	1411	2	953,0	146,3	58464,5	8975,5
Total	501-1000	1893	3	722,3	112,4	59449,5	9251,3

Table 4. Results from the trawl survey for Roundnose grenadier in 1988.

Stratum	Depth, m	Area, mile sq.	Nos of tows	Mean catch/ 1 valid tow fish	Mean catch/ 1 valid tow kg	Abundance, '000	Biomass, tons
			Div.0B				
5	751-1000	2070	7	135,4	38,3	12188,6	3448,8
6	1001-1250	1975	5	542,4	268,1	46575,7	23025,1
Total	751-1250	4045	12	334,1	150,5	58764,3	26473,9
			Div.1D				
17	751-1000	283	4	414,5	97,9	5100,2	1204,6
13	1001-1250	1049	4	379,5	79,4	17308,5	3623,6
16	- '' -	2110	4	969,5	308,0	88941,1	28260,2
Total	751-1250	3442	12	744,1	221,1	111349,8	33088,4
			Div.1C				
17	751-1000	1411	5	400,6	59,8	24575,9	3669,8

Table 5. Results from the trawl survey for Roundnose grenadier in 1989.

Stratum	Depth, m	Area, mile sq.	Nos of tows	Mean catch/ 1 valid tow fish	Mean catch/ 1 valid tow kg	Abundance, '000	Biomass, tons
			Div.0B				
11	501- 750	2311	4	14,5	1,1	1456,9	112,8
5	751-1000	2070	6	62,3	17,4	5610,0	1565,7
12	-''-	943	4	30,3	2,6	1240,3	107,6
6	1001-1250	1975	6	71,0	22,9	6096,7	1965,0
13	-''-	343	3	20,3	7,8	303,2	116,8
7	1251-1500	1641	4	152,8	81,9	10898,4	5845,2
Total	501-1500	9283	27	63,4	24,1	25605,5	9713,1

Table 6. Results from the trawl survey for Roundnose grenadier in 1990.

Stratum	Depth, m	Area, mile sq.	Nos of tows	Mean catch/ 1 valid tow fish	Mean catch/ 1 valid tow kg	Abundance, '000	Biomass, tons
			Div.0B				
11	501- 750	2311	6	5,2	0,4	519,1	38,5
5	751-1000	2070	5	7,2	1,4	648,0	124,2
6	1001-1250	1975	6	62,2	18,5	5838,2	1591,4
7	1251-1500	1641	3	130,3	66,4	9299,0	4737,5
Total	501-1500	7997	20	45,5	18,7	15804,3	6491,6
			Div.1D				
18	501- 750	170	1	257,0	37,0	1899,6	273,6
12	751-1000	797	2	19,0	2,3	658,4	81,4
17	-''-	283	2	2797,0	357,4	34415,3	4397,6
13	1001-1250	1049	3	334,0	117,3	15233,3	5349,9
16	-''-	2110	4	1359,0	345,2	124673,5	31670,4
14	1251-1500	904	3	97,0	52,9	3812,5	2079,2
15	-''-	775	3	271,7	114,6	9154,0	3860,4
Total	501-1500	6088	18	717,2	180,3	189846,6	47712,5
			Div.1C				
18	501- 750	482	2	75,5	3,4	1582,2	71,3
17	751-1000	1411	3	68,0	6,0	4171,7	366,0
Total	501-1000	1893	5	69,9	5,3	5793,9	437,3

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

Stratum	Depth, m	Area, mile sq.	Nos of tows	Mean catch/ 1 valid tow fish	Mean catch/ 1 valid tow kg	Abundance, '000	Biomass, tons
			Div.0B				
11	501- 750	2311	6	0,2	0,0	16,7	0,8
5	751-1000	2070	4	1,8	0,3	157,5	29,9
12	-''-	943	3	0,3	0,0	13,7	0,8
6	1001-1250	1975	4	2,5	0,8	214,7	68,7
7	1250-1500	1641	4	16,0	7,4	1141,6	526,7
Total	501-1500	8940	21	4,0	1,6	1544,2	626,9

Table 8. Results from the trawl survey for Roundnose grenadier in 1992.

Stratum	Depth, m	Area, mile sq.	Nos of tows	Mean catch/ 1 valid tow fish	kg	Abundance, '000	Biomass, tons
			Div.0B				
5	751-1000	2070	4	1,8	0,2	157,5	21,8
6	1000-1250	1975	6	48,2	9,7	4136,0	834,3
13	-''-	343	3	5,0	0,3	74,6	4,2
7	1251-1500	1641	3	24,7	7,5	1759,9	534,9
Total	751-1500	6029	16	23,4	5,3	6128,0	1395,2

Table 9 . Data on average catches (spes.) per one valid tow from the Russian trawl surveys for Coryphaenoides rupestris in Div. 0B, 1CD by stratum in 1986-1992.

Div.	Stratum	Depth, m	Area, nm^2	1986	1987	1988	1989	1990	1991	1992
	11	501-750	2311	-	8.5	-	14.5	5.2	0.2	-
	5	751-1000	2070	40.2	26.2	135.4	62.3	7.2	1.8	1.8
0B	12	-"-	943	-	14.6	-	30.3	-	0.3	-
	6	1001-1250	1975	6.0	67.6	542.4	71.0	62.2	2.5	48.2
	13	-"-	343	-	86.0	-	20.3	-	-	5.0
	7	1251-1500	1641	-	-	-	152.8	130.3	16.0	24 7
	19	401-500	45	-	49.0	-	-	-	-	-
	18	501-750	170	-	55.5	-	-	257.0	-	-
	12	751-1000	797	-	28.7	-	-	19.0	-	-
1D	17	-"-	283	-	2082.5	414.5	-	2797.0	-	-
	13	1001-1250	1049	-	969.8	379.5	-	334.0	-	-
	16	-"-	2110	-	1198.8	969.5	-	1359.0	-	-
	14	1251-1500	904	-	-	-		97.0	-	-
	15	-"-	775	-	-	-	-	271.7	-	-
1C	18	501-750	482	-	47.0	-	-	75.0	-	-
	17	751-1000	1411	-	953.0	400.6	-	68.0	-	-

Table 10. Data on average catches (kg.) per one valid tow from the Russian trawl surveys for Coryphaenoides rupestris in Div. 0B, 1CD by stratum in 1986-1992.

Div.	Stratum	Depth, m	Area, nm^2	1986	1987	1988	1989	1990	1991	1992
	11	501-750	2311	-	1.5	-	1.1	0.4	0.001	-
	5	751-1000	2070	18.5	9.5	38.3	17.4	1.4	0.3	0.2
0B	12	-"-	943	-	6.1	-	2.6	-	0.01	-
	6	1001-1250	1975	3.4	39.8	268.1	22.9	18.5	0.8	9.7
	13	-"-	343	-	24.4	-	7.8	-	-	0.3
	7	1251-1500	1641	-	-	-	81.9	66.4	7.4	7.5
	19	401-500	45	-	16.6	-	-	-	-	-
	18	501-750	170	-	24.4	-	-	37.0	-	-
	12	751-1000	797	-	5.0	-	-	2.3	-	-
1D	17	-"-	283	-	455.8	97.9	-	357.4	-	-
	13	1001-1250	1049	-	354.1	79.4	-	117.3	-	-
	16	-"-	2110	-	536.9	308.0	-	345.2	-	-
	14	1251-1500	904	-	-	-		52.9	-	-
	15	-"-	775	-	-	-	-	114.6	-	-
1C	18	501-750	482	-	13.2	-	-	3.4	-	-
	17	751-1000	1411	-	146.3	59.8	-	6.0	-	-

Table 11 Stratified-random estimates of biomass and abundance of Roundnose grenadier in 1986-92 from Russian deepwater surveys in Div. 0B, 1D, 1C

Div.	1986		1987		1988		1989		1990		1991		1992	
	Num. th.sp.	Weigh. t	Num. th.sp.	Weigh. t	Num. th.sp.	Weigh. t	Num. th.sp.	Weigh. t	Num. th.sp.	Weigh. t	Num. th.sp.	Weigh. t	Num. th.sp.	Weigh. t
0B	4133	1957	10895	5043	58764	26474	25606	9713	15804	6492	1544	627	6128	1395
1D	-	-	181332	71398	111350	33088	-	-	189847	47713	-	-	-	-
1C	-	-	59450	9251	24576	3670	-	-	5794	437	-	-	-	-

Tabl.12 Stratified-random estimate of biomass and abundance of Roundnose grenadier in 1991-1995 from Canadian deepwater surveys in Div. 3KLMN, (Atkinson, NAFO SCR DOC. 95/61)

Div.	1991		1994		1995	
	Numbers, th. spec.	Weights, t	Numbers, th. spec.	Weights, t	Numbers, th. spec.	Weights, t
3K	48253	19822	70551	21397	32811	6630
3L	17066	4394	8495	1546	5453	888
3M	38655	11576	33031	8475	21939	4415
3N	-	-	2212	516	1942	479
Total	103974	35791	114288	31935	62145	12412

Table 13. Mean length (cm) of males and females of Roundnose grenadier in Divisions 0B and 1 in 1986-1992.

Depth,m	Div.0B				Div.1CD			
	males		females		males		females	
	$L_{av.}$	n	$L_{av.}$	n	$L_{av.}$	n	$L_{av.}$	n
401- 500	-	-	-	-	50,3±2,54	12	49,7±1,48	37
501- 750	30,6±1,24	53	29,8±1,40	29	36,3±0,62	375	39,2±0,83	265
751-1000	46,5±0,36	943	49,0±0,59	422	37,7±0,23	1311	37,8±0,31	686
1001-1250	50,5±0,31	1369	52,2±0,47	739	47,6±0,17	4263	50,1±0,26	2198
1251-1500	57,8±0,43	572	61,4±0,51	497	53,4±0,47	521	55,9±0,55	431