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Stock Assessment of Redfish in Division 3M by the Data From 1992 Trawl-Acoustic Survey

by

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Abstract

Estimates for redfish abundance and biomass are given by results from trawl-acoustic survey conducted in April 1992. The paper presents data on redfish length composition and distribution.

According to the data from trawl-acoustic survey the biomass of redfish from the Flemish Cap Bank has made up 18.2 thou. t and abundance - 119.5 mill. spec. with total abundance to be 269.1 mill. spec. and biomass - 99.5 thou. t.

Introduction

Redfish is one of the main objects of fishery in the Northwest Atlantic. In this connection redfish abundance and biomass are estimated annually by NAFO Divisions on the basis of the data obtained in research cruises.

Stock assessment of redfish from the Flemish Cap Bank was done by the data from trawl-acoustic survey conducted by RV *Kapitan Shaitanov* in April 1992.

Materials and Methods

Trawl survey has been conducted by stratified random method (Doubleday, 1981; Bulatova and Chumakov, MS 1986). Methods for acoustic survey is described in the paper by V. S. Mamylov (Mamylov, MS 1987) and resembles that used in the investigations carried out earlier (Vaskov and Oganin, MS 1992).

Figure 1 presents echogram of redfish aggregations, recordings at 450-480 m depths. The echogram has been obtained during the vessel running with a bottom trawl. Echointegrating of redfish pelagic aggregations was done only to 4-meter bottom layer. Integrating of redfish aggregations was performed in a 4-meter bottom layer using specific channel in apparatus, which further was identified with a bottom trawl catch. In the upper part of the echogram this layer is in an expended form. Thus, total abundance and biomass of redfish was derived from pelagic component, obtained with acoustic apparatus used to 4-meter bottom layer and from a bottom one, calculated by bottom trawl catches in 4-meter bottom layer.

To compare the results from 1992 the Strata 4, 9, 13 and 17 have been excluded from retrospective data on trawl surveys for a period 1989-1991.

Results

In April redfish were distributed at 200-700 m depths on the Flemish Cap Bank. The densest aggregations and maximum catches of redfish were registered on the western and northwestern slopes. Minor catches were observed on the eastern and southeastern slopes.

Redfish above 15 cm long were mainly distributed at 400-500 and 600-700 m depths in the northern and northwestern parts of the bank when conducting the survey.

Young redfish (specimens below 15 cm long) were distributed on the western slope of the bank (Strata 10, 11) and partially on the northern (Stratum 7) and eastern (Stratum 8) slopes, with a range of depths being 250-350 m.

Maximum catches of large redfish have been obtain at 500 and 600 m depths on the northwestern slope of the bank in Strata 15 and 19. These catches by biomass and abundance made up 304 kg (753 spec.) and 241 kg (483 spec.), respectively.

In 1992, an essential amount of juvenile has been registered, and a portion of small fish constituted 38% by number. Redfish from 7 to 48 cm long occurred in catches taken by a sampling trawl on the Flemish Cap Bank in 1992 (Fig. 2). Specimens from the 1990, 1989 and 1985 abundant year-classes made up a bulk of catches with a main portion of fish being immature.

The stock (abundance is 119.5 mill. spec., biomass - 18.2 thou. t) estimated in 1992 was much lower than that in 1991 (Tables 1 and 2). However, this division has not been fully covered in 1992. Strata 4, 9, 13 and 17 occurred to be outside the survey on the southern slope of the bank, in which a considerable amount of redfish was distributed in previous years. If the survey were conducted over the whole Division 3M, the stock on the Flemish Cap Bank could be higher by 1.9-10.4% by abundance and by 2.3-11.3% by biomass, compared to retrospective data for 1989-1991 (Tables 3-8). Besides, in total 1 haul was done in each of the Strata 5, 14 and 18. In our opinion, redfish stock on the Flemish Cap Bank has been underestimated (especially in Stratum 14).

On the whole, a pattern of redfish distribution in 1992 is similar to that observed in 1990.

Conclusions

Results from the 1992 trawl-acoustic survey indicate a trend in the reduction of redfish stock on the Flemish Cap. Apparently, low estimate for the stock is mainly related to an overfishing of redfish in 1988-1990, as well as to an underestimation due to incomplete coverage of the area of distribution during the survey.

References

BULATOVA, A. Yu., and A. K. CHUMAKOV. MS 1986. USSR trawl surveys in NAFO Subareas 0, 2 and 3. *NAFO SCR Doc.*, No. 66, Serial No. N1183, 13 p.

DOUBLEDAY, W. G. Editor. 1981. Manual on groundfish survey in the Northwest Atlantic. *NAFO Sci. Coun. Studies*, No. 2, 55 p.

MAMYLOV, V. S. MS 1988. Experimental trawl-acoustic surveys in NAFO Subarea 3 from March to July 1987. *NAFO SCR Doc.*, No. 24, Serial No. N1460, 27 p.

VASKOV, A. A., and I. A. OGANIN. MS 1992. Evaluation of redfish stocks in Divisions 3LN and 3M by the trawl acoustic survey in 1991. *NAFO SCR Doc.*, No. 12, Serial No. N2054, 12 p.

Table 1. Estimates provided by the trawl-acoustic survey for redfish in Divs. 3M for 1983-1992.

Year	Trawl survey		Acoustic survey		Total	
	Numbers, fish 10^{-6}	Biomass, thou. t	Numbers, fish 10^{-6}	Biomass, thou. t	Numbers, fish 10^{-6}	Biomass, thou. t
1983	544.0	154.9				
1984	376.7	132.3				
1985	177.3	51.9				
1986	1200.2	309.5				
1987	463.2	106.4				
1988	183.1	47.0	1632.1	332.0	1815.2	379.0
1989	283.8	83.3	1947.3	282.6	2231.1	365.9
1990	74.7	17.7	1331.4	228.7	1406.1	246.4
1991	2006.1	45.4	1850.0	62.3	3856.1	107.7
1992	119.5	18.2	149.6	81.3	269.1	99.5

Table 2. Results from the trawl survey for Redfish in Div 3M in April, 1992.

Stratum	Depth, m	Area, mile sq.	Nos of tows	Mean catch/ 1 valid tow		Abundance, '000	Biomass, tons
				fish	kg		
3	184-255	628	5	25.2	1.7	1172.3	78.2
5	-"-	703	1	4.0	0.1	208.3	20.8
6	-"-	496	4	35.5	2.3	1304.3	84.5
7	256-364	822	5	108.6	7.7	6612.5	468.8
8	-"-	646	2	50.0	10.3	2392.6	490.5
10	-"-	951	5	721.2	19.1	50804.5	1342.7
11	-"-	806	5	217.4	8.3	12979.6	497.9
12	365-546	570	3	122.7	35.2	6087.9	1748.6
14	-"-	602	1	54.0	14.0	2408.0	624.3
15	-"-	666	5	299.2	91.6	14760.5	4520.9
16	547-728	634	4	114.5	59.5	5377.3	2794.3
18	-"-	210	1	83.0	20.5	1291.1	318.9
19	-"-	414	6	459.3	171.1	14086.2	5246.0
Total			47			119485.1	18236.4

Table 3. Results from the trawl survey for Redfish in Div 3M in June-July, 1989.

Stratum	Depth, m	Area, mile sq.	Nos of tows	Mean catch/ 1 valid tow		Abundance, '000	Biomass, tons
				fish	kg		
1	127-146	342	6	-	-	-	-
2	147-183	838	9	-	-	-	-
3	184-255	628	7	246.9	84.9	11483.4	3947.4
4	-"-	348	4	4.0	0.5	103.1	11.6
5	-"-	703	9	2.8	0.4	144.6	18.5
6	-"-	496	6	13.0	0.9	477.6	34.3
7	256-364	822	9	151.1	45.1	9201.0	2744.7
8	-"-	646	8	1032.1	259.1	49389.1	12397.8
9	-"-	314	5	718.4	191.6	16709.4	4457.4
10	-"-	951	10	486.6	112.7	34278.3	7937.0
11	-"-	806	8	1303.4	363.3	77816.3	21691.1
12	365-546	670	8	895.9	286.3	44461.9	14208.3
13	-"-	249	3	149.7	68.2	2760.5	1257.9
14	-"-	602	8	244.1	70.2	10886.2	3129.3
15	-"-	666	9	272.6	83.5	13446.1	4121.0
16	547-728	634	8	132.1	75.5	6205.0	3543.9
17	-"-	216	3	163.3	88.0	2613.3	1407.5
18	-"-	210	4	38.0	23.6	591.1	367.5
19	-"-	414	5	104.2	65.7	3195.5	2015.4
Total			114			283762.4	83290.6

Table 4. Results from the trawl survey for Redfish in Div 3M in June-July, 1989. Strata 4, 9, 13 and 17 are not included to facilitate comparison with results for 1992

Stratum	Depth, m	Area, mile sq.	Nos of tows	Mean catch/ 1 valid tow		Abundance, '000	Biomass, tons
				fish	kg		
3	184-255	628	7	246.9	84.9	11483.4	3947.4
5	-"-	703	9	2.8	0.4	144.6	18.5
6	-"-	496	6	13.0	0.9	477.6	34.3
7	256-364	822	9	151.1	45.1	9201.0	2744.7
8	-"-	646	8	1032.1	259.1	49389.1	12397.8
10	-"-	951	10	486.6	112.7	34278.3	7937.0
11	-"-	806	8	1303.4	363.3	77816.3	21691.1
12	365-546	670	8	895.9	286.3	44461.9	14208.3
14	-"-	602	8	244.1	70.2	10886.2	3129.3
15	-"-	666	9	272.6	83.5	13446.1	4121.0
16	547-728	634	8	132.1	75.5	6205.0	3543.9
18	-"-	210	4	38.0	23.6	591.1	367.5
19	-"-	414	5	104.2	65.7	3195.5	2015.4
Total			99			261576.1	76156.2

Table 5. Results from the trawl survey for Redfish in Div 3M in June-July, 1990.

Stratum	Depth, m	Area, mile sq.	Nos of tows	Mean catch/ 1 valid tow fish	Kg	Abundance, '000	Biomass, tons
1	127-146	342	4		-	-	-
2	147-183	838	8	-	-	-	-
3	184-255	628	8	-	-	-	-
4	-"-	348	4	0,5	0,0	12,9	0,6
5	-"-	703	6	-	-	-	-
6	-"-	496	6	3,0	0,2	110,2	6,1
7	256-364	822	7	11,7	3,8	713,3	228,8
8	-"-	646	9	6,9	1,9	329,6	91,5
9	-"-	314	4	234,5	44,9	5454,3	1044,3
10	-"-	951	9	412,4	94,2	29054,4	6634,3
11	-"-	806	9	233,6	42,2	13944,1	2518,2
12	365-546	670	7	151,1	39,9	7501,2	1979,5
13	-"-	249	4	80,5	25,0	1484,8	460,7
14	-"-	602	8	129,6	32,1	5780,3	1433,1
15	-"-	666	8	144,9	29,7	7147,2	1464,6
16	547-728	634	7	31,3	18,7	1469,3	876,2
17	"	216	3	51,0	33,0	816,0	528,0
18	-"-	210	3	26,0	12,9	404,4	200,1
19	-"-	414	5	13,0	7,6	398,7	232,5
Total			93			74620,7	17698,5

Table 6. Results from the trawl survey for Redfish in Div 3M in June-July, 1990. Strata 4, 9, 13 and 17 are not included to facilitate comparison with results for 1992

Stratum	Depth, m	Area, mile sq.	Nos of tows	Mean catch/ 1 valid tow fish	Kg	Abundance, '000	Biomass, tons
3	184-255	628	8	-	-	-	-
5	-"-	703	6	-	-	-	-
6	-"-	496	6	3,0	0,2	110,2	6,1
7	256-364	822	7	11,7	3,8	713,3	228,8
8	-"-	646	9	6,9	1,7	329,6	91,5
10	-"-	951	9	412,4	94,2	29054,4	6634,3
11	-"-	806	9	233,6	42,2	13944,1	2518,2
12	365-546	670	7	151,1	39,9	7501,2	1979,5
14	-"-	602	8	129,6	32,1	5780,3	1433,1
15	-"-	666	8	144,9	29,7	7147,2	1464,6
16	547-728	634	7	31,3	18,7	1469,3	876,2
18	-"-	210	3	26,0	12,9	404,4	200,1
19	-"-	414	5	13,0	7,6	398,7	232,5
Total			78			66852,7	15664,9

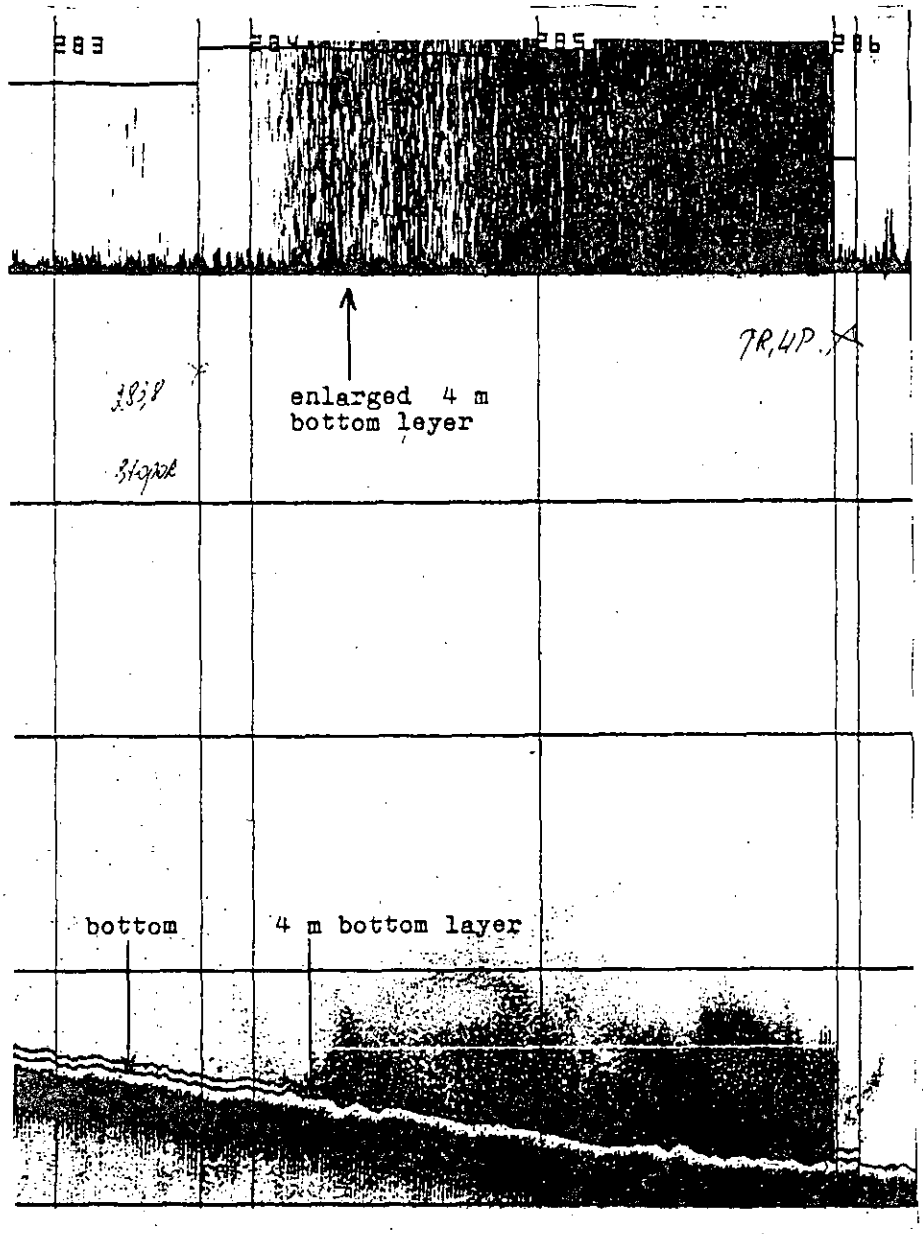

Fig. 1 Echogram with recordings of redfish on the Flemish Cap.

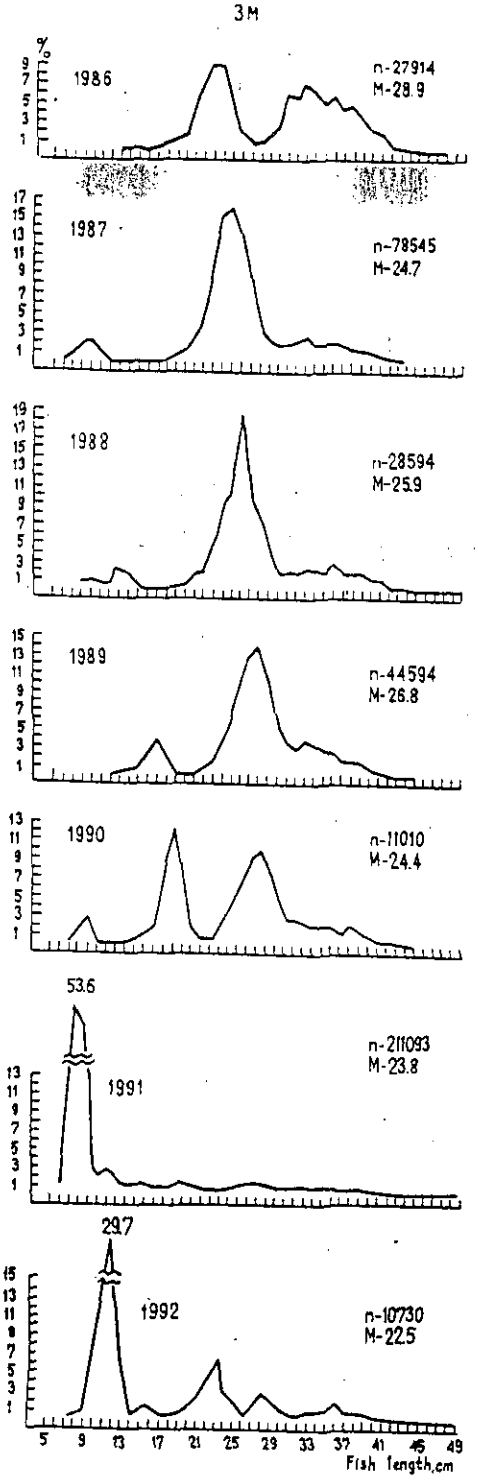

Fig. 2. Size composition of redfish in catches taken with a small-meshed trawl in Div. 3M in 1986-1992.

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ADDENDUM

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Table 7. Results from the trawl survey for Redfish in Div 3M in April-May, 1991.

Stratum	Depth, m	Area, mile sq.	Nos of tows	Mean catch/ 1 valid tow fish	kg	Abundance, '000	Biomass, tons
1	127-146	342	3	4,0	0,04	101,3	1,1
2	147-183	838	7	11,0	0,4	682,8	22,4
3	184-255	628	5	25,2	0,4	1172,3	19,5
4	-"-	348	3	7,0	0,6	180,4	14,2
5	-"-	703	6	83,0	1,0	4322,1	54,2
6	-"-	496	5	56,0	1,2	2057,5	43,9
7	256-364	822	6	2590,5	23,7	157732,7	1444,0
8	-"-	646	6	6,5	1,0	311,0	45,4
9	-"-	314	4	1512,0	12,0	35168,0	279,8
10	-"-	951	7	3247,4	25,3	228763,3	1783,7
11	-"-	806	6	24826,5	190,8	1482233,9	11393,3
12	365-546	670	5	162,8	32,4	8079,7	1609,4
13	-"-	249	4	48,3	22,1	889,9	408,1
14	-"-	602	8	238,9	61,9	10652,1	2758,1
15	-"-	666	7	367,1	88,8	18112,4	4382,0
16	547-728	634	6	105,3	50,4	4946,8	2364,4
17	-"-	216	3	28,0	18,6	448,0	296,9
18	-"-	210	4	1654,0	533,1	25728,9	8292,8
19	-"-	414	5	800,8	333,7	24557,9	10234,2
Total			100			2006141,0	45447,4

Table 8. Results from the trawl survey for Redfish in Div 3M in April-May, 1991. Strata 4, 9, 13 and 17 are not included to facilitate comparison with results for 1992

Stratum	Depth, m	Area, mile sq.	Nos of tows	Mean catch/ 1 valid tow		Abundance, '000	Biomass, tons
				fish	kg		
3	184-255	628	5	25,2	0,4	1172,3	19,5
5	-"-	703	6	83,0	1,0	4322,1	54,2
6	-"-	496	5	56,0	1,2	2057,5	43,9
7	256-364	822	6	2590,5	23,7	157732,7	1444,0
8	-"-	646	6	6,5	1,0	311,0	45,4
10	-"-	951	7	3247,4	25,3	228763,3	1783,7
11	-"-	806	6	24826,5	190,8	1482233,9	11393,3
12	365-546	670	5	162,8	32,4	8079,7	1609,4
14	-"-	602	8	238,9	61,9	10652,1	2758,1
15	-"-	666	7	367,1	88,8	18112,4	4382,0
16	547-728	634	6	105,3	50,4	4946,8	2364,4
18	-"-	210	4	1654,0	533,1	25728,9	8292,8
19	-"-	414	5	800,8	333,7	24557,9	10234,2
Total			76			1968670,6	44424,9