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On Including Golden Redfish (*Sebastes marinus*) into the Calculations to
Estimate Redfish Stocks on the Flemish Cap

by

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Abstract

The paper presents data on distribution and biology of *Sebastes marinus*, *S. mentella* and *S. fasciatus* from fishing catches on the Flemish Cap in 2005. Biological data were collected by the observers being aboard Russian fishing vessels in October-November 2005.

Fishing was executed at 200-400 m depths. Fishing gears were bottom trawls with the mesh size of not less than 130 mm.

According to the preliminary data, in 2005, on the Flemish Cap, the catch of red fish species by Russian vessels was equal to 1 016 tons. Golden redfish (*S. marinus*) prevailed (more than 50%) in catch.

The results of bathymetric distribution researches showed that, at 200-299 m depths, *S. marinus* made up the bulk of catches. With the increase in fishing depth the portion of beaked red fish species (*S. mentella* and *S. fasciatus*) which amounted to 95.6% at 400-499 m depths rose.

In according to the results from the trawl surveys by EU, mean long-term biomass of *S. marinus* equaled to 20% of the total red fish stock. Increase or decrease in the total stock of red fish species was mainly connected with golden red fish stock growth and reduction.

At present, on the Flemish Cap the overall stock size is estimated and recommendations for their exploitation are developed based on fishing and biological data on two species – *S. mentella* and *S. fasciatus*. To obtain more comprehensive and correct data on red fish stock, golden redfish *S. marinus* should be included into the calculations.

Introduction

On the Flemish Cap, the total red fish stock is composed of three species from *Sebastes* genus: *S. marinus*, *S. mentella* and *S. fasciatus*. In recent years, two species (*S. mentella* and *S. fasciatus*) very often are integrated into the group of beaked red fish.

It is impossible to identify red fish species during fishing; therefore the statistical data of catch historically combine all the three species.

Since 1995 the international redfish fishery has been abruptly reduced and redfish species were mainly taken as a by-catch in the fishing of halibut. In 1997, the international catch was estimated at only 424 tons (Table 1). More probably, it was connected with the stock size, scattered distribution of concentrations and so forth. The catch started to increase since 2000 when Russian fleet resumed redfish harvesting in Division 3M. In 2005, redfish TAC of 5 000 tons was completely fished already in the middle of November.

According to the preliminary data, in 2005, on the Flemish Cap the catch of redfish species by Russian vessels amounted to 1 016 tons.

Previously it was noted, that in that area, fishery was mainly based on mixed aggregations of Acadian and deep-sea redfish (Avila de Melo *et al.*, 2000). However fishing data and the results from the research surveys indicate that the percentage of golden redfish (*S. marinus*) in catches is significantly higher as compared with the portion of *S. fasciatus*.

The paper gives data on distribution and biology of golden redfish (*S. marinus*) and beaked redfish species (*S. mentella* and *S. fasciatus*) from fishing catches on the Flemish Cap in 2005. Fishing and biological data were collected by the observers being aboard Russian fishing vessels.

Materials and Methods

The specific composition of each catch was determined. Round weight was calculated using the conversion factors by the product weight. Zoological length was measured with separation by sex.

Identification of *S. mentella* and *S. fasciatus* is the most complicated. The main characteristics to separate those species were:

- the number of rays in the anal fin (7 rays in *S. fasciatus*),
- coalescence of parietal and nuchal crests – spines (they are coalesced in *S. mentella*)
- number of vertebrae (in *S. fasciatus* – 30 or less, in *S. mentella* – 31 or more).

The statistical data on international catch of redfish species on the Flemish Cap were taken from STATLANT 21A on the NAFO website: www.nafo.int.

Results

Directed fishery of redfish species on the Flemish Cap was carried out in October-November, mainly, on the southern slope, at 200-480 m depths. Hauls were made by bottom trawls with the mesh size of not less than 130 mm. The duration of hauls was 2-4 hours. At the depths of over 700 m, the vessels conducted directed fishery of Greenland halibut with the by-catch of redfish species.

In October-November, redfish fishing efficiency was quite high and equaled to 37.9 ton per a fishing day for the vessel M-1008 "Maroanhoka" (Table 2).

The results of research on bathymetric distribution showed that, at the depths of 200-299 m, golden redfish (*S. marinus*) made up the bulk of catches (82.4%) (Table 3). With the increase in the catch depth the portion of beaked redfishes (*S. mentella* and *S. fasciatus*) rose and was equal to 95.6% at the depths of 400-499 m. In accordance with the investigations into the bathymetric distribution of the redfish species on the Cap having been carried out before, at the depths of over 550 m, deep-sea redfish predominated in catches (Barsukov *et al.*, 1990; Vaskov, 2001). Therefore, at the depths of over 800 m where the directed fishery of Greenland halibut was executed deep-sea redfish made up the bulk of by-catch.

Despite a wide range of depths where deep-sea redfish were distributed, in 2005 Russian catch was mainly composed of golden redfish (more than 50%). This fact may be indicative of the increase in stock size of this species.

Trawl research surveys with red fish separation by species (*S. mentella* and *S. fasciatus*) were initiated by EU in 1991. According to the results from those surveys, in 1991-2004, deep-sea red fish predominated in the total red fish stock (Table 4) (Casas and Troncoso, 2005). In some years, that species portion was more than 70%. In 1997 and 2003, the biomass of *S. marinus* exceeded 40% and the average portion of the species for the period of observations equaled to 20% (Table 4).

Russian trawl surveys in 1983-1993 showed that in some years *S. marinus* biomass accounted for over 20% of the total redfish stock (Igashov and Vaskov, 1997).

According to the results from the trawl surveys by EU in 1988-2004, *S. marinus* biomass varied from 5.95 to 106.17 x 10³ tons and, by 2004, has tended to increase gradually that has been corroborated by small linear trend (Fig. 1). At that, it should be noted that redfish stock size rise or reduction are mainly affected by the increase or decrease in *S. marinus* stock.

As it was mentioned above, mixed concentrations of deep-sea redfish and Acadian redfish had been before considered as making up the bulk of catches on the Cap. However, in the surveys by EU in 1991-2004, long-term mean biomass of Acadian red fish (*S. fasciatus*) was estimated at about 11%.

At present, the total red fish stock size on the Flemish Cap is estimated and the recommendations to exploit red fish are developed using fishing and biological data on the two species *S. mentella* and *S. fasciatus*. But the portion of the latter in the total stock is the smallest. Therefore, in our opinion, to obtain more comprehensive and correct data on red fish species stock, golden red fish (*S. marinus*) should be included into the calculations.

References

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TABLE 1. Nominal catches by country (tons) of redfish in Div. 3M, 1995-2004. STATLANT 21A.

Country	Year									
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Canada	0	0	0	0	0	5	0	0	0	0
Cuba	0	0	0	0	2	0	0	0	0	0
Faroe Is.	15	1	0	0	0	0	0	6	0	6
Greenland	4	2	0	2	0	11	0	0	0	0
France	0	0	0	2	0	0	0	0	0	0
Poland	0	0	0	0	0	0	4	0	0	0
Japan	553	678	212	439	320	31	80	67	98	209
Ukraine	0	0	0	0	0	0	0	0	5	3
Portugal	1284	281	83	259	97	925	1590	1513	1113	2574
Spain	165	113	129	262	268	348	272	220	633	266
Russia	3560	52	0	7	108	1864	1281	1155	115	6
U. Kingdom	0	0	0	1	0	0	0	0	0	0
Lithuania	0	0	0	0	0	0	0	10	1	0
Estonia	863	13	0	0	0	631	158	5	23	60
Latvia	304	0	0	0	0	13	11	0	0	2
Total	6748	1140	424	972	795	3828	3396	2976	1988	3126

TABLE 2. Fishing results of the vessel M-1008 "Maroanhoka" in NAFO Div. 3M in October-November 2005

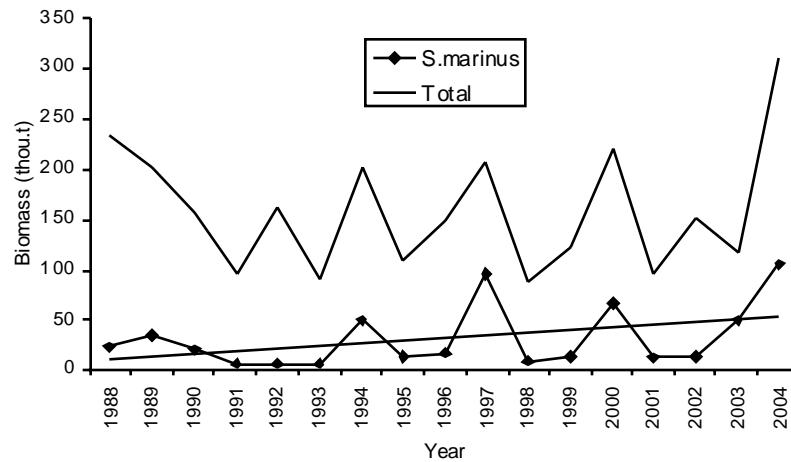
Period	Catch, tons		Catch composition, %				
	Total	per fishing day	Redfish species	Skates	Greenland halibut	Witch flounder	Others
17-19.10.06 06-12.11.06	303.1	37.9	97.8	0.2	1.1	0.4	0.5

TABLE 3. Bathymetric distribution of redfish species in Russian commercial catches taken on the Flemish Cap in 2005.

Depth range, m	Number of hauls	<i>S. marinus</i>		<i>S. mentella</i> + <i>S. fasciatus</i>		Other species	
		tons	%	tons	%	tons	%
200-299	92	685.51	82.38	139.05	16.71	7.55	0.91
300-399	29	39.82	33.83	76.09	64.65	1.79	1.52
400-499	31			81.24	95.59	3.75	4.41
500-599	0						
600-699	0						
700-799	15					14.94	100.00
800-899	13			0.09	0.93	9.61	99.07
900-999	7			0.23	1.97	11.42	98.03
1000-1099	15			1.78	8.33	19.59	91.67
1100-1199	17					20.34	100.00
1200-1299	1					2.10	100.00

TABLE 4. Stock estimation of redfish species on the Flemish Cap according to data from research surveys by EU in 1988-2004.

Year	<i>Sebastes marinus</i>		<i>Sebastes</i>						Total thou. t
	thou. t	%	<i>mentella</i>		<i>fasciatus</i>		juvenile		
			thou. t	%	thou. t	%	thou. t	%	
1988	22.67	9.68			211.52				234.09
1989	33.96	16.80			168.15				202.11
1990	20.83	13.22		107.80			28.99	18.39	157.62
1991	6.05	6.32	74.05	77.39	8.40	8.78	7.19	7.51	95.69
1992	6.10	3.77	106.20	65.59	7.85	4.85	41.75	25.79	161.91
1993	5.96	6.60	26.41	29.25	6.44	7.13	51.49	57.03	90.29
1994	49.14	24.31	52.84	26.15	11.57	5.72	88.55	43.81	202.10
1995	13.37	12.27	87.75	80.52	7.44	6.83	0.42	0.39	108.98
1996	16.70	11.22	115.21	77.43	16.30	10.95	0.59	0.40	148.80
1997	95.90	46.51	82.95	40.23	25.84	12.53	1.49	0.72	206.19
1998	9.50	10.79	67.08	76.16	9.52	10.81	1.98	2.25	88.08
1999	13.95	11.37	96.51	78.67	11.76	9.59	0.46	0.37	122.67
2000	66.39	30.00	132.16	59.71	19.10	8.63	3.67	1.66	221.33
2001	12.74	13.25	57.11	59.38	17.05	17.73	9.27	9.64	96.18
2002	14.49	9.61	60.63	40.19	34.27	22.72	41.46	27.48	150.85
2003	49.88	42.76	35.79	30.68	18.69	16.02	12.30	10.54	116.66
2004	106.17	34.07	57.24	18.37	94.71	30.39	53.54	17.18	311.62
Total	543.8	20.03	1051.9	37.74	288.94	10.64	343.15	12.64	2715.2

Fig.1. Trend of change in the total stock of redfish species and *S. marinus* stock according to the data from surveys by EU on the Flemish Cap in 1988-2004.