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The catches of the beaked redfish (*Sebastes mentella* Travin) with bottom and midwater trawls on the Flemish Cap Bank

by

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Since 1972 the USSR large-capacity commercial trawlers periodically carry out the fishing of the redfish with the midwater trawls in Subarea of Newfoundland. For instance, in 1974 the quantity of the redfish caught with midwater trawls on the Flemish Cap Bank was nearly the same as that taken with bottom trawls. A midwater trawl is used more rarely on the slopes of the Grand Bank (Table 1). An average catch per hour trawling taken with midwater trawls is usually greater than that with bottom trawls (Table 2).

There appears the problem: do the bottom and midwater trawls exploit the same commercial stock or, perhaps, in addition, an isolated pelagic population of the beaked redfish is also distributed on the Flemish Cap Bank? There is no any incredible idea in the latter supposition, because in the offshore waters, for example, in the area off Iceland and Greenland the pelagic populations are undoubtedly observed (Zakharov, 1963, 1964; Hendersen a. Jones, 1964; Templeman, 1967; Konstantinov, 1969; Jones, 1969, 1969a, 1970; Ernst, 1969). It is permissible to assume, that the Flemish Cap Bank, that is also situated in some distance from the continental shelf can be the area of inhabitance of the pelagic population of the beaked redfish.

The solving of the above mentioned problem can be made easier by comparison of biological characteristics of redfish caught with bottom and midwater trawls.

Table 1. The yield of redfish (in tons) taken by the USSR commercial fleet in the Flemish Cap area and on the slopes of the Grand Bank in 1974. (ICNAF Statistical Bulletin, Vol. 24 for 1974.)

Month	Division 3M		Division 3L		Division 3N		Division 3O	
	bottom trawl	midwater trawl	bottom trawl	midwat. trawl	bottom trawl	midwat. trawl	bottom trawl	midw. trawl
January	-	-	85	146	138	29	-	-
February	827	626	149	253	390	81	-	-
March	1874	1420	171	291	398	83	375	208
April	2561	1939	357	607	812	170	846	675
May	3805	2882	698	1190	1608	336	3187	190
June	4054	3070	899	1531	1991	417	709	927
July	782	593	528	898	1215	254	844	202
August	398	302	108	183	265	56	182	-
September	481	364	115	116	289	60	-	-
October	634	480	141	240	373	78	-	-
November	1084	821	223	379	512	106	-	-
December	649	493	241	411	556	114	4143	259
the whole year	17149	12990	3715	6325	8547	1784	10286	2461

Of course, in this case it should be meant, that a vertical distribution of the redfish is unequal on the space of the year. In winter, e.g. both near the bottom and in the bathypelagial the redfish was of rather similar length compositions and biological condition. As it is evident from Fig.1, in December and February the length compositions of the catches taken with bottom and midwater trawls were fairly similar; some tops and bends of length curves coincide. True, the small specimens of length less than 30 cm were more numerous in the catches taken with bottom trawls. The feeding and maturity of redfish taken both with bottom and midwater trawls (Fig. 2 and 3) were also rather similar during these months. For instance, in February both in the near-bottom and bathypelagic layers the females at the maturity stages V, VI, VII and VIII appear,

that is the evidence of approach of larvae extrusion period. It should be noted that the scale devised and published by V.P.Sorokin (1958,1960) has been applied for characteristic of maturity stages of redfish in this paper.

Table 2. Average catch per hour trawling (in tons) taken by the USSR large-capacity trawlers (displacement - over 2000 tons) in the Flemish Cap area in 1974. (ICNAF Statistical Bulletin, Vol. 24 for 1974.)

Month	Bottom trawls	Midwater trawls
February	2,08	2,63
March	1,23	2,70
April	1,18	2,85
May	2,42	2,79
June	2,26	2,80
July	1,21	2,55
August	0,65	1,94
September	1,22	2,04
October	1,74	2,36
November	2,25	2,64
December	1,54	2,27
the whole year	1,65	2,67

In March the mature females migrate from the near-bottom layers into the middle ones,where shedding the larvae they form the concentrations,available for effective fishing with midwater trawl. Naturally,that the redfish taken with bottom and midwater trawls in March do sufficiently differ due to their length compositions and maturity stages (Figs.1 and 3). During this period the redfish practically do not feed neither near the bottom nor in the middle layers (Fig.2).

By July a mass larvae extrusion is over, but the most females after this cycle have stayed yet in the middle layers, owing to that somewhat larger redfish is taken with midwater trawls compared to that with bottom ones (Fig.1). However, the majority of females after extrusion in July have already descented into the near-bottom layers; the specimens at the maturity stages IX-II, i.e. already after extrusion (Fig.3) were predominant among the females, caught both with bottom and midwater trawls.

The feeding of the specimens, inhabited in the middle layers becomes rather intensive in July (Fig.2). In August-September the redfish of all sizes and maturity stages are mainly observed in the near-bottom layers and feed intensively; in October the mature males and females lift into the middle layers and copulate. By November the coupling is mainly over, but the most mature specimens have stayed yet in the middle layers, owing to this the larger specimens are taken with midwater trawls compared to those with bottom ones (Fig.1).

From the above mentioned it follows, that during the seasons of larvae extrusion and coupling significant differences in length compositions and maturity stages of redfish inhabited in the near-bottom layers and middle ones and taken with bottom and midwater trawls have been observed. In winter, when the redfish of all sizes and maturity stages is registered approximately at the same depth, the catches taken with bottom and midwater trawls are fairly similar due to their length compositions and biological indexes.

This similarity admits to suppose, that on the Flemish Cap Bank an indivisible population of redfish, that separates into the near-bottom and pelagic concentrations with different biological features has been observed only in definite periods. Certainly, the biochemical analysis on the redfish taken with bottom and midwater trawls would be useful for confirmation of this conclusion.

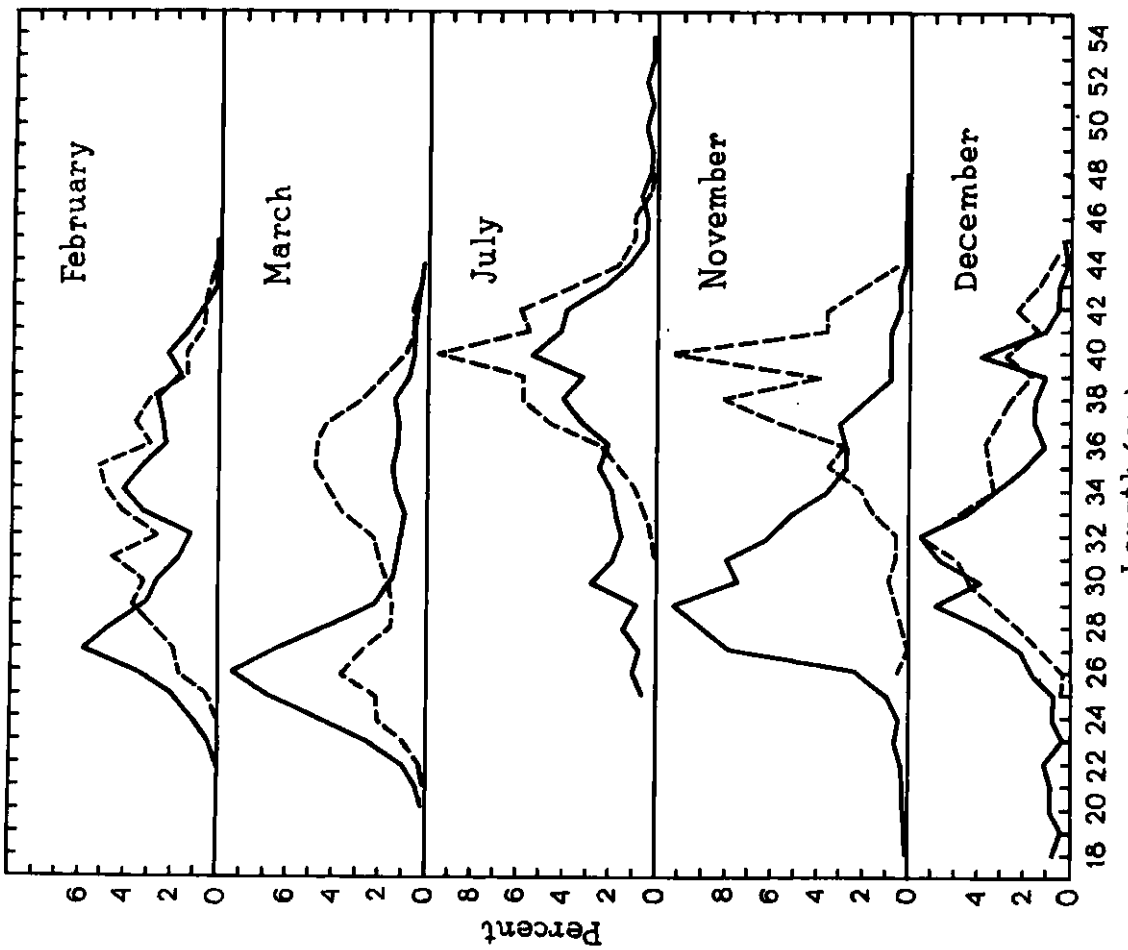

Fig. 1. Length composition of the beaked redfish, taken with bottom trawls (solid line) and midwater trawls (broken line) on the Flemish Cap Bank in 1972-1974.

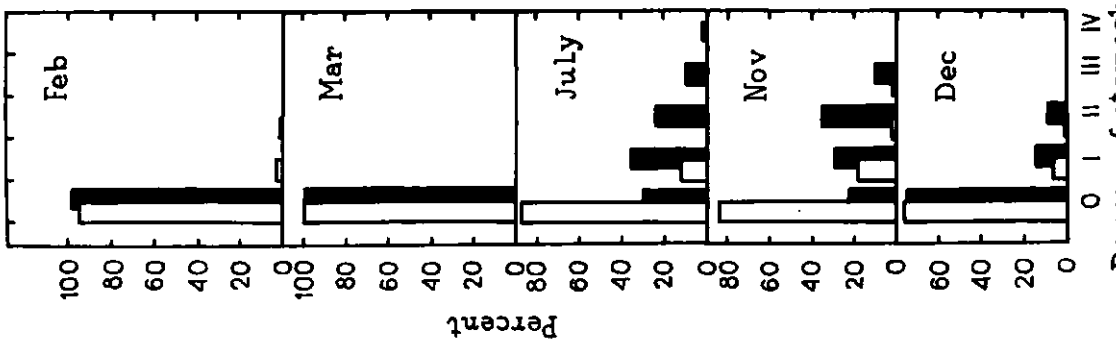

Fig. 2. Stomach content of the beaked redfish taken with the bottom trawls (white columns) and midwater trawls (black columns) on the Flemish Cap Bank in 1972-1974.

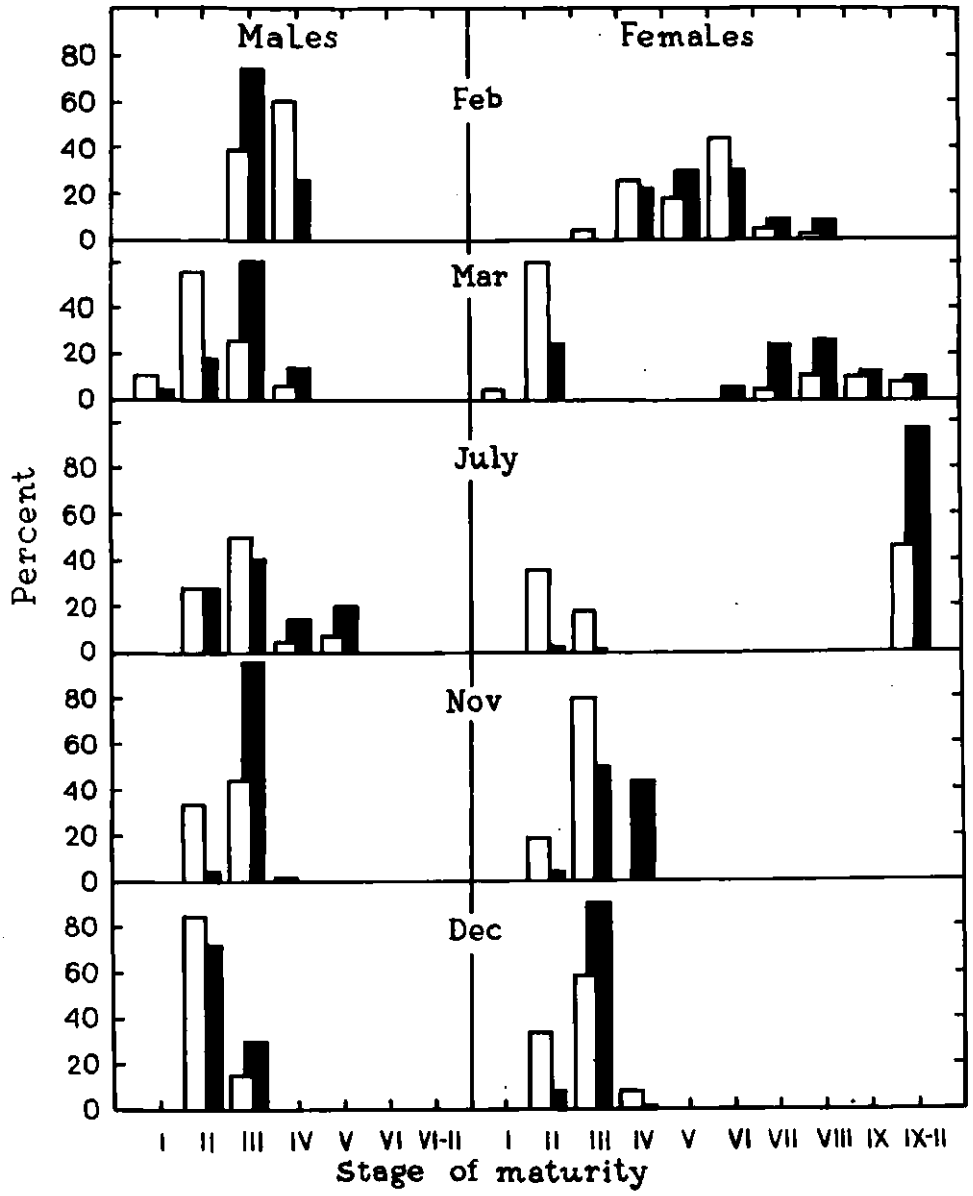

Fig. 3. Maturity stages of the beaked redfish taken with bottom trawls (white columns) and midwater trawls (black columns) on the Flemish Cap Bank in 1972-1974.

It should be noted, that while sampling for any kind of analysis (on length composition, feeding, maturity, biochemical indexes) it is necessary to take into account by all means the time of the day. Diurnal vertical migrations of redfish have been studied fairly substantially (Konstantinov and Shcherbino, 1958; Templeman, 1959; Kelly a. Barker, 1961, 1963; Chekhova, 1976). In some cases it was possible to follow that diurnal vertical migrations of large and small specimens were unequal.

Hence, the volume of the catch and also the length composition and other biological characteristics of redfish can be different while exploiting the same concentration in the day-time and at night. For example, in March-April 1974 in the north of the Flemish Cap Bank a series of commercial trawlings with bottom and midwater trawls (in total 356 trawlings) we carried out. In the day-time hours, when the redfish concentrated near the ground, an average catch per hour trawling with bottom trawl was greater than that with midwater trawl for the same period; in the morning and evening hours, when the redfish lift over the ground, the midwater trawls took greater catches than the bottom ones (Fig.4).

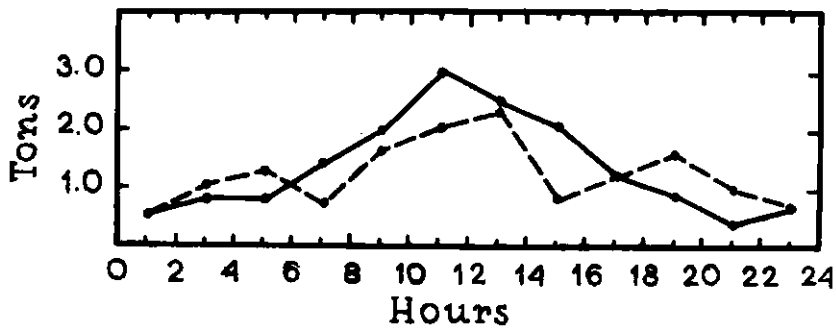

Fig. 4. An average catch of the beaked redfish per hour trawling taken by the USSR large-capacity trawlers with the bottom trawls (solid line) and with the midwater trawls (broken line) in different time of the day in the Flemish Cap Bank area in March-April 1974.

All the biological data, showed in Figs.1,2 and 3, have been collected so, that a number of samples taken in the day-time and at night was approximately equal.

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