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Fishery and State of Capelin Stocks in the Barents Sea

by

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Abstract

Assessment of the size of the mature portion of the capeline stock according to method given by K.R.Allen shows that the stocks were not below 4.5 mln.tons in 1971-1973.

In 1953-1973 there were more strong year classes than poor ones. Begining since 1964-1965 the tendency for a decrease in the rate of growth of capelin was observed.

The main cause of intensification of the capelin fishery in the Barents Sea was deterioration of the state of herring stocks in the Norwegian Sea. Norwegian fleet, purse-seine one mainly, increased yield of capelin from 100 000 metric tons in the 50is up to 1.2-1.5 mln.tons in 1970-1974 (Ulltang, 1974). The Soviet fishery had a steady tendency for an increase in the yield in the 70is as well (Table 1).

When evaluating the state of the capelin stocks, which made it possible to increase drastically the intensity of the fishery, it should be noted that begining since the 50is conditions favourable for reproduction of the stock prevailed. Strong year classes originated in 1953, 1955-1957, 1961, 1962-1963, 1966-1968, 1970, 1973 (Bochkov, 1969, Olsen, 1968, Benko, Dragesund et al. 1970, Anon., 1969, 1969a, 1970

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1971,1973) and good year classes in 1964–1965 (Olsen,1968); relatively poor year classes originated in 1969,1972 (Anon.,1969, 1969a,1970,1971,1973). Begining since 1965 assessment of the relative abundance of year classes was carried out on the basis of the international surveys of O-group fishes in the Barents Sea with participation of England,Norway and the Soviet Union. However,assessment of the strength of year classes by the international surveys of O-group fishes doesn't give sufficiently reliable results. Therefore,members of the meeting on the young fish survey (Anon.,1974) correlating these data with the assessment of a relative abundance of year classes at later stages of development and catches of fishes of the same year classes,corrected data obtained in the O-group capelin surveys.

Begining since 1953 and to now strong year classes and those of moderate abundance predominate. There are reasons to believe that the stocks of capelin were in good state througout the period (Fig.1).

Assessment of the size of the capeline stock,that followed the method given by K.R.Allen (Allen,1968,1969,1970) was carried out under the assumption,that the coefficient of catchability(q) and the coefficient of natural motality(M) were constant during 3 years. Calculations showed,that under different catchability(q) of the fishing gears of two types of the vessels(SRT-r and RS) and calculated coefficient of natural motality(M_1=0.8;M_2=0.9) the size of capelin stocks was not below 4.5 mln.tons in the southern Barents Sea in the spring (Table2). It should be taken into account that the Soviet fishery fleet takes immature capelin only as occasional by-catch that is represented in biological samples. That is why the actual size of the stock of capeline at the age of 1-2 years could be considered to be significantly greater than that obtained by us.

In the paper presented at the ICNAF Session (Ulltang,1975)it is pointed out that the size of the spawning stock might be about 3–4 mln. tons in the spring of 1975,i.e.the stocks are in a very good state.

Assessments of the stocks, obtained by Norwegian scientists and by us are fairly close.

In the same paper it is pointed out that the rate of capelin growth significantly decreased for the last years and hypothesis of origination of extremely strong year classes as the reaction of the fish stock to the intensificstion of the fishery is made. At the same time the analysis of this phenomenon according to the Ricker's theory doesn't give the unambiguous answer (Ulltang, 1975).

Based on this, a conclusion of the neccesity of intensification of the immature capelin fishery to thin the population, that must lead to the increase in the rate of growth of immature fish and acceleration of its maturity, thus strengthening the recruitment of the spawning stock, was made.

Strong capelin year classes, comparable by indices of abundance, originated in the 50is and 60is (Fig.1). Sharp intensification of fishery started since 1970 (Table 1), while tendency for a decrease in the rate of growth of capelin was registered as early as 1964-1965 (Fig.2)

The cause of this phenomenon is not clear yet, but, appearently it should be not connected only with intensification of fishery and reciprocal reaction of the population that is increase in survival of the recruitment which led to an excessive increase in the capelin abundance and hence a decrease in the rate of growth. It is likely that better conditions for reproduction of arcto-boreal species, among these are capelin, in the conditions of the current cycle of the arctic cooling play an important role.

Therefore the suggested measure of regulation of the abundance, viz. intensification of the immature capelin fishery, is at least premature, untill data on the rate of spawning stock of the 1971-1973 year classes and on their rate of growth are obtained.

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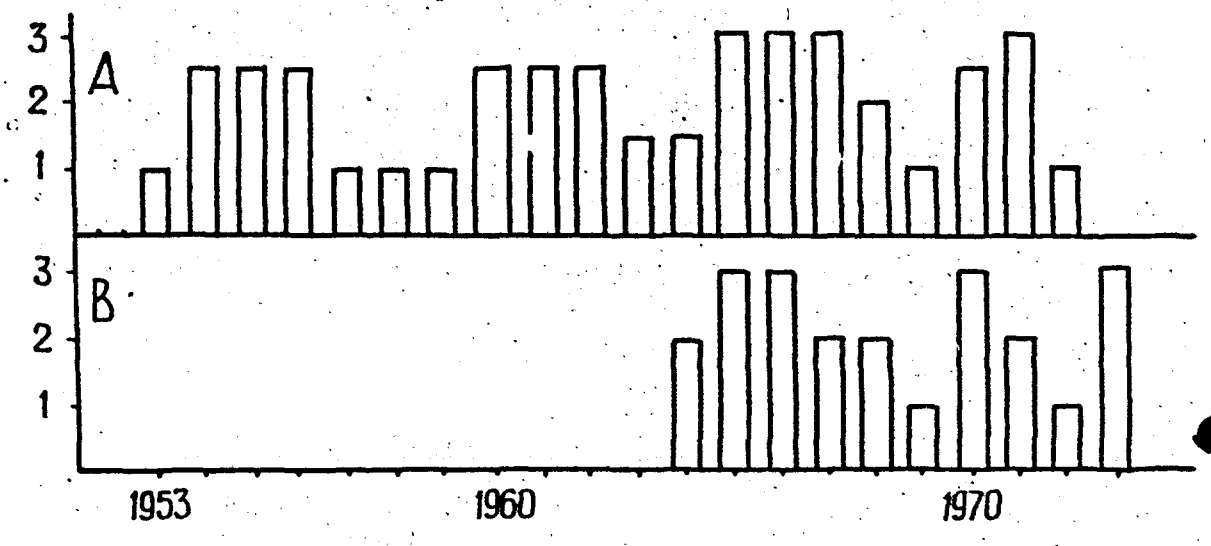
Headings for Figures
to the paper by Seliverstov A.S.
"Fishery and State of Capelin Stocks in the Barents Sea"

Fig.1 Relative strength of capelin year classes.
A.Original assessment
B.Corrected assessment(the 1971-1974 year classes are an exception)
1.(poor),2(moderate),3(strong year classes).

Fig.2Average length of capelin by the 1963-1973 year classes (l_1-l_6).


A
B
3
2
1
1953
1960
1970

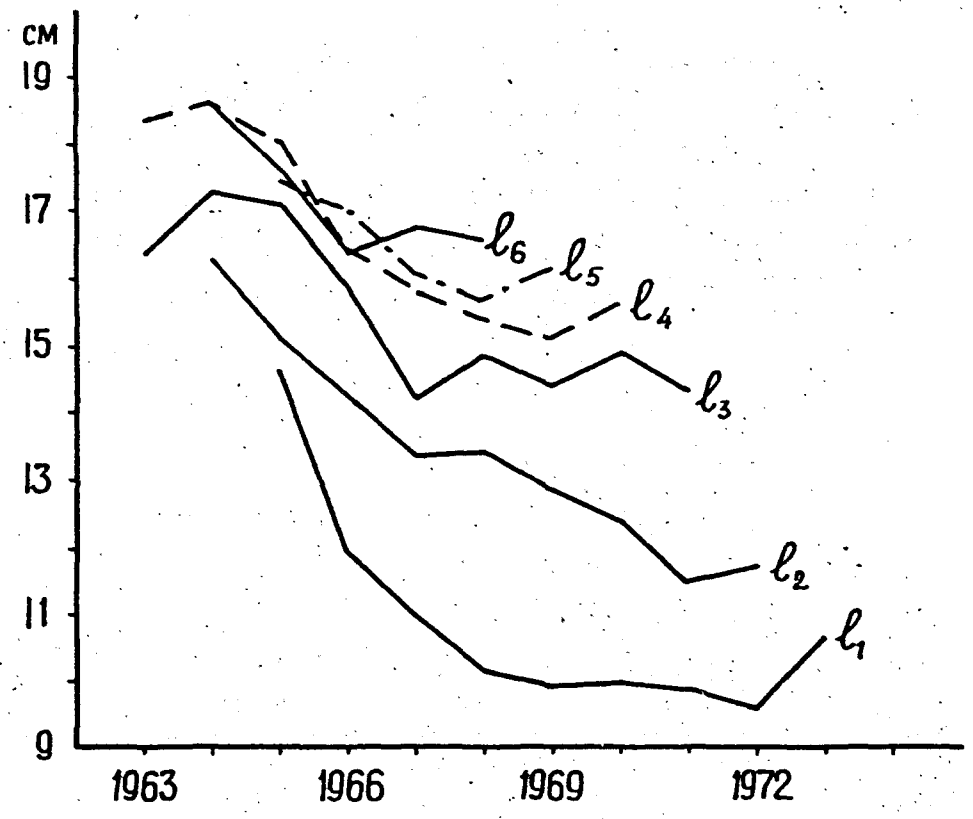

см
19
17
15
13
11
9
1963
1966
1969
1972
ℓ_6
ℓ_5
ℓ_4
ℓ_3
ℓ_2
ℓ_1

Table I

Yield of capelin taken by USSR and Norway in 1953–1974 (thou.tons).

Year	USSR	Norway	Year	USSR	Norway
1953	10,76	18,73	1964	0,05	19,63
1954	15,34	30,44	1965	7,19	195,69
1955	12,34	41,50	1966	9,36	270,61
1956	2,87	55,90	1967	5,55	311,41
1957	4,96	56,38	1968	15,43	464,84
1958	1,40	74,00	1969	0,38	402,33
1959	0,87	47,52	1970	12,73	715,25
1960	3,18	79,26	1971	20,82	1371,15
1961	1,56	106,17	1972	35,62	1556,47
1962	3,41	0,10	1973	44,70	1095,50

Note; Catch statistics for fishing areas of north-eastern Atlantic /1965–1970/., 1973, Moscow

Table 2

Size of capelin stocks calculated by the method given by Allen.

Type of vessel	SRT-r	RS	
Coefficient of natural motality	0,8	0,8	0,9
Year	Size of stocks, mln. tons.		
1971	7,2	5,7	8,8
1972	8,2	6,2	9,3
1973	6,4	4,5	6,7

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