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An estimate of total allowable catch of red hake
from Georges Bank for 1977

by

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An estimate of allowable catch for 1977 was calculated using all the information available for 1975 including the preliminary catch statistics, the data on age composition of the fish from commercial catches and abundance indices obtained as a result of fulfillment of the autumn groundfish survey. A distribution of catches by age groups was made with regard for the fact, that a quota allocated for the USSR for 1975 (14thous. t) was taken out almost completely while red hake catches by other countries were negligible. Hence a total catch of 14 thous. tons was accepted for that year which was not far from the truth judging from the preliminary statistics data. Due to processing of the recent survey material in the AtlantNIRO, the application of the youngs-of-the-year abundance indices for 1975 has become possible. An estimate of total allowable catch was made according to a scheme suggested by the author of the present paper (Rikhter, 1974), and by means of virtual population analysis in case of incomplete entering of any year-class age groups the exploited stage (Schumacher, 1970). To estimate the recruitment rate, the data on the abundance of two-year-old fish obtained by means of virtual population analysis were used, as well as the youngs-of-the-year abundance indices (table 1).

Table 1. The indices used for estimation of red Hake recruitment rate on Georges Bank

Year : classes:	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	75
Two year old fish abund- ance, mill sp.	377.5	175.1	107.5	154.3	171.5	272.0	236.8	262.5	160.2	79.6	-	-	-
The youngs- of-the- year indices						0.02	6.2	1.8	5.4	1.9	8.5	20.6	3.0

Like before (Rikhter, 1975), a 1974 year class was equalled to a 1963 year class, the richest for the whole observational period (320 mill sp.). Mean arithmetical abundance of the 1968-1972 year classes (202 mill sp.) was taken as the abundance of 1973 and 1975 year classes. The abundance indices of the young-of-the-year in those years have not revealed the satisfactory correlation with the abundance estimates of the two year old fish according to virtual population analysis. Neither the indices of the 1973 and 1975 year classes offered any possibility for equaling of the latter to a definite year class with the known abundance. Simultaneously, in the period from 1968 to 1972 the abundance of all year classes with the exception of the latter one maintained, at least, at the average level. It seems likely, that the abundance of 1973 and 1975 year classes as well has not considerably deviated from this level.

In calculations according to virtual population analysis it was admitted that the total catch for 1976 would comprise approximately 19 thous.t (the USSR quota). Natural mortality rate (M) was supposed to be 0.6 for 2 year old fish and 0.4 for subsequent age groups. In estimating the total allowable catch for 1977 the values of 0.2 for the second age group and 0.7 for subsequent age groups were taken for fishing mortality rate (F). The results of calculations are given in Table 2.

Table 2. Red hake stocks and catches in sub-division

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Stock size (mill sp.)							
		A G E				: Age 2 and older	
Years :	2 :	3 :	4 :	5 :	6 :	Abundance (10 ⁶ sp.) :	Weight (thous.t)
1971	237	140	73	46	3	499	110
1972	262	129	84	46	29	550	90
1973	160	129	56	23	14	382	67
1974	80	84	64	15	5	248	41
1975	202	40	46	35	6	329	45
1976	320	91	13	15	12	451	66
1977	202	153	27	4	5	391	55
Catches in numbers by age groups (mill sp.)							
1971	10.4	15.1	7.4	4.3	1.4	38.6	8.9
1972	27.7	38.3	43.1	20.8	12.4	142.3	32.4
1973	13.7	31.1	28.6	12.5	6.1	92.0	24.6
1974	8.4	13.8	10.9	5.6	2.3	41.0	9.5
1975	15.9	16.8	19.4	15.0	2.5	69.6	14.0
1976 ¹⁾	44.0	42.3	6.2	7.2	5.5	98.6	19.3
1977 ²⁾	27.8	65.1	11.6	1.7	2.0	106.4	19.9

- 1) In estimating of the catch for 1976 the value of F was taken as 0.2 for two year olds and 0.8 for subsequent age groups.
- 2) In estimating of the catch for 1977 the value of F was taken as 0.2 for the second age group and 0.7 for subsequent age groups.

From the data presented here it is evident that in 1977 the commercial stock will be somewhat decreased compared with the 1976 level, but it will exceed the 1974-1975 stock size. According to calculations, the total allowable catch of red hake for 1977 will be 20 thous.t .

Another approach to the forecasting of allowable 1977 catch was also based on the above abundance values for the 1973-1975 year classes. The results of calculations are presented in Table 3

Table 3. An approximate estimate of total allowable catch of red hake from Georges Bank for 1977.

A G E	2	3	4	5	6	T O T A L
Yield from year classes during the whole exploitation period (thous.t)	22.3	35.4	22.3	8.8	17.7	
Percentage of each age group in catches (%)	22.1	29.6	24.0	14.7	9.6	
Catch of each age group (thous.t)	3.9	10.5	5.4	1.3	1.7	23.8

The estimates of 1971, 1973 year classes abundance, and especially that of the 1972 year class have somewhat changed compared with similar estimates calculated last year (Rikhter, 1975). A certain clarity has been also introduced relative to mean percentage of exemption of each year-class ~~year~~ age group. As a result of these calculations made according to the scheme given, the sought for estimate of allowable 1977 catch appeared to be 24thous. tons.

Assuming that virtual population analysis is a somewhat more precise method, which makes it possible to take into account the influence of the catch taken in the last observational year upon the stock size, a total allowable catch of 20 thous.t from this stock is recommended for 1977.

Summary

The stock size and the total allowable catch of red hake from Georges Bank (5Ze) for 1977 have been estimated. Two methods were used for calculations. It can be concluded from the results that the commercial stock abundance will not be changed considerably compared with the 1975-1976 level. A total allowable catch at 1975 level is recommended for 1977.

References

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