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An estimate of total allowable catch of
red hake from Georges Bank, 1976

by

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The estimation of possible catch of red hake in 1976 was
made according to a scheme suggested and practised by the
author of the present report (Rikhter, 1974). The estimates
were based upon the data on age-composition of commercial
catches for 1965-1974 including, as well as upon the abundance
indices of the youngs of the year, which were obtained
during the groundfish survey (Anderson, 1974). Preliminary
treatment of the 1974 survey results carried out in Atlant-
NIRO, made it possible to utilize an abundance index of
the youngs of the year for the last year of the studies.
Catch distribution by age-groups was made with regard for
the fact that total quota for 1974 (20 thous. tons) was
filled, which is nearly the truth judging from preliminary
statistical data. The catch per recruitment value estimated
earlier (Rikhter, 1974) according to Kutty (1968) was taken
for calculations without any change, since from the very
first sample it was clear that the estimated value (110.5)
provided rather reliable results if there existed reliable
abundance indices of relevant year-classes. The data on
mean percentage of exemption of each age group of total
number of fish caught during the whole exploitation period
were also utilized without changes. The abundance of two-
year-old fish (recruitment) from 1970-1974 year-classes was

determined by means of virtual population analyses (Schuma-
cher, 1970) and abundance indices.

The data of age-composition of 1974 catch used in
estimation, contributed, indeed, to higher precision of
recruitment values for different years (table 1).

Table 1

The estimation of red hake abundance
from Georges Bank by virtual popula-
tion analyses (in millions)

$$M_2 = 0.6; \quad M_{3-6} = 0.4$$

Age	Year-classes										
	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
2*	–	–	319.5	182.0	101.5	140.0	189.6	270.1	267.0	206.3	192.0
3	–	167.2	129.5	81.9	39.6	75.5	102.3	148.6	138.8	92.7	68.5
4	112.9	64.7	42.0	12.9	22.9	51.3	63.7	90.2	62.4	57.2	–
5	22.3	17.1	4.4	3.8	3.1	33.0	38.6	26.6	29.2	–	–
6	9.0	4.9	0.2	0.2	3.3	29.2	14.4	12.0	–	–	–

* Abundance indices of two-year-old fish were determined
according to the following formula:

$$N_i = \frac{N_i + 1}{e^{-z}}$$

Below the abundance indices of one-year-olds (table 2) are given
which were used for estimating the tentative values of 1972-
1974 year-classes sizes.

Table 2

The abundance indices of one-year-old red hake
from Georges Bank (mean catch per hauling, in numbers)

Years	1969	1970	1971	1972	1973	1974
Indices	6.2	1.8	5.4	1.9	8.5	20.6

The information available at present does not allow to insist on the presence of direct correlation between the abundance indices of O-group fish and their abundance at the age of 2. However, rather stable and high level of red hake stock from Georges Bank area observed recently together with abundant one-year old fish (according to groundfish survey data) are good reasons enough to feel optimistic. The assumption concerning the existence of the above dependance seems quite real and can be used in future estimating.

In 1976 the bulk of the catch will be represented by 1970-1974 year-classes (2-6 year olds). The abundance of 1970-1971 year-classes is approximately 206 and 192 mill. specimens, accordingly (table 1). 1972 and 1973 year-classes equate in abundance with those of 1970 and 1969, which gives 206 and 267 mill. specimens, accordingly. 1974 year-class can, evidently, be equated with 1963 year-class, the richest year-class during the whole observational period (table 1), its abundance being 320 mill. specimens. Now, when all the necessary information is gained the possible catch of red hake from Georges Bank for 1976 can be estimated (table 3).

Table 3

An approximate estimate of total allowable catch
of red hake from Georges Bank, 1976.

Age, years	2	3	4	5	6	Total
Total catch of exploited red hake year-classes (thous. tons)	35.4	29.5	22.8	21.2	22.8	
Contribution of each age group ($)	13.3	30.0	35.6	13.2	7.9	
Catch of each age-group (thous. tons)	4.7	8.8	8.1	2.8	1.8	26.2

As it was expected, the size of possible 1976 catch exceeded the 1975 level as a result of a trend towards the increase in red hake stock from Georges Bank, which was stipulated by appearance of a number of strong year-classes during the recent years. Therefore, though the initial data are approximate and

somewhat contradictory the increase of total allowable catch
to 26 thous. tons is recommended.

SUMMARY

At present a trend towards the increase in red hake
stock from Georges Bank is observed as a result of appearance
a number of strong year-classes during the recent years. The
calculations made on the basis of the latest information gave
the estimate of total allowable catch for 1976, exceeding the
1975 level.

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