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An estimate of total allowable catch of red hake
from Georges Bank (Subdiv. 5Ze) for 1979

by

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The traditional methods (Schumaker, 1970; Rikhter, 1974) were applied to calculate the TAC for 1979; the preliminary monthly data regularly submitted to the ICNAF were used for division of the 1977 catches by age group. According to these data the total red hake catch in Div. 5Ze amounted to about 3 thous. tons in 1977.

The recruitment was estimated from the data on abundance of 2 year olds calculated by means of the virtual population analyses, as well as on the abundance indices of the young-of-the-year including 1976 (table 2). For the first time the data of ichthyoplankton surveys, that have been carried out by the AtlantNIRO on Georges Bank since 1965, were used in VPA. The relationship between the abundance of larva in August and the numbers of 2 year olds is expressed by means of the following equation of linear regression:

$$y = 6.58 \cdot 10^{-6} \cdot x + 188.1$$

where y is the number of 2 year olds (10^6), x is the larvae abundance (10^{12}), $r = 0.45$.

A certain correlation, though rather obscure, is evident between the given values. No marked correlation exists between the abundance indices of the young of the year and the larva abundance, except for in 1974. The 1974 year class was evidently a strong one, and an extremely low catch in 1977 is most likely related to severe limitations on the fishery introduced that year. Therefore, the 1974 year class was again equalled to the 1963 year class, the one most numerous in the whole observation

period (321 mill. sp.). The 1975, 1976 and 1977 year classes were estimated as the arithmetical means of the 1968-1973 year class abundance (208 mill. sp.).

We believe, that the direct usage of the information on the larvae numbers for forecasting the size of the red hake year classes entering the fishery is premature yet. Some time will be needed to use the accumulated data in the future.

From the calculations based on the VPA it was admitted that the total catch for 1978 would amount to 16 thous. tons. The same values of M as before were applied (Rikhter, 1977). In the estimation of the TAC for 1979 an F of 0.13 (the arithmetical mean of the F_2 for the 1963-1973 period) was chosen for the 2 year olds. A F_{opt} of 0.7 was applied for the rest age groups (Rikhter, 1970). The calculation results are given in table 3. The resulting TAC for 1979 from Georges Bank red hake stock will be 22 thous. tons.

The forecast of the possible catch for 1979 calculated from the scheme developed by the author was also based on the above estimates of the 1973-1977 year class abundance (table 4). The resulting estimate of the TAC coincided completely with the previous one.

On assumption that the 1977 year class may turn out to be a poor one (a preliminary estimate will be calculated after the processing of the material collected during the 1977 autumn trawling survey), the TAC of 20 thous. tons is recommended for 1979.

References

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Table 1. Total catches of red hake in Div. 52e by age group (mill. sp.)

Age	Year class																
	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
2	-	-	-	62.8	24.1	23.1	2.3	0.9	0.1	10.4	27.7	13.7	8.4	15.9	14.3	0.5	
3	-	-	78.3	56.7	54.1	4.6	3.1	5.0	15.1	38.3	31.1	13.8	16.8	31.0	5.7		
4	-	60.6	33.3	31.0	6.1	15.3	1.7	7.4	43.1	28.6	10.9	19.4	24.7	4.0			
5	11.8	11.5	10.5	3.7	3.2	0.2	4.3	20.8	12.5	5.6	15.0	11.4	2.4	-			
6	8.7	3.8	2.1	0.1	-	1.4	12.4	6.1	2.3	2.5	2.0	0.2	-	-			

Table 2. Data used for estimating the abundance of red hake from Georges Bank (52e).

Year classes	2 year olds abundance (10 ⁶)	Larvae abundance (10 ¹²)	Abundance indices for the youngs of the year
1963	321	-	-
1964	188	-	-
1965	110	0.56	-
1966	214	0.58	-
1967	222	0.19	
1968	266	15.41	0.02
1969	250	-	6.2
1970	241	2.17	1.8
1971	233	0.92	5.4
1972	147	1.11	1.9
1973	112	0.29	8.5
1974	-	5.07	20.6
1975	-	0.37	3.0
1976	-	-	4.3

Table 3. Estimation of the stock and TAC of red hake from Georges Bank for 1979 by virtual population analyses.

Indices	Age					Total	
	2	3	4	5	6	Abundance mill. sp.	Weight thous. tons
N ₁₉₇₇	208	155	10	6	0.5	379.5	58.7
C ₁₉₇₇	0.5	5.7	4.0	2.4	0.2	12.8	3.0
F ₁₉₇₇	0.004	0.04	0.7	0.7	0.7		
N ₁₉₇₈	208	114	100	3	2	427.0	74.7
F ₁₉₇₈	0.13	0.44	0.44	0.44	0.44		
N ₁₉₇₉	208	100	49	43	1	401.0	71.4
F ₁₉₇₉	0.13	0.7	0.7	0.7	0.7		
C ₁₉₇₉	19	42	21	18	0.6	100.6	22.0

Table 4. An approximate estimate of total allowable catch of red hake from Georges Bank for 1979 (2-nd method).

Age Year class	Age group ratio in the catches (%)	Catch for exploit- ation period		Catch by age group in 1979	
		Weight thous. tons	Numbers (10 ⁶)	Weight thous. tons	Numbers (10 ⁶)
2/1977	24.3	22.7	97.4	2.9	23.7
3/1976	34.7	22.7	97.4	6.2	33.8
4/1975	26.2	22.7	97.4	6.8	25.5
5/1974	9.9	35.0	150.2	4.9	14.9
6/1973	4.9	12.2	52.4	1.0	2.6
TOTAL:	100.0			21.8	100.5