International Commission for





the Northwest Atlantic Fisheries

ICNAF Res. Doc. 78/VI/33

ANNUAL MEETING - JUNE 1978

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

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The traditional methods (Schumakher, 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 youngs-of-theyear 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:

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 youngs 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

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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_g for the 1963-1973 period) was chosen for the 2 year olds. A Fopt 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.)

				JOAF			C] B B B									
1960	#1961 #	1962:	1963:	1964	1965:	1966	1967#	19681	1969:	1970:	1971:	1972:	1973:	1974:	19751	1976
	-	-	62.8	24.1	23.1	2.3	0.9	0.1	10.4	27.7	13.7	8.4	45.0	44 2	0.5	
-		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	0.7	
-	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	2.1		
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	-			
8.7	3.8	2.1	0.1	-	1.4	12.4	6.1	2.3	2.5	2.0	0.2	_	-			
	1960 	• • • • • • • • • • • • • • • • • • •	1960 :1961: 1962: - 78.3 - 60.6 33.3 11.8 11.5 10.5 8.7 3.8 2.1	1960 1961 1962 1963 1960 - 62.8 - 78.3 56.7 - 60.6 33.3 31.0 11.8 11.5 10.5 3.7 8.7 3.8 2.1 0.1	*1960 *1961* 1962* 1963* 1964* 62.8 24.1 78.3 56.7 54.1 - 60.6 33.3 31.0 6.1 11.8 11.5 10.5 3.7 3.2 8.7 3.8 2.1 0.1 -	*1960 *1961 * 1962 * 1963 * 1964 * 1965 * 62.8 24.1 23.1 - 78.3 56.7 54.1 4.6 - 60.6 33.3 31.0 6.1 15.3 11.8 11.5 10.5 3.7 3.2 0.2 8.7 3.8 2.1 0.1 - 1.4	y e a \$1960 \$1961\$ 1962\$ 1963\$ 1964\$ 1965\$ 1966\$ - - 62.8 24.1 23.1 2.3 - - 62.8 24.1 23.1 2.3 - - 78.3 56.7 54.1 4.6 3.1 - 60.6 33.3 31.0 6.1 15.3 1.7 11.8 11.5 10.5 3.7 3.2 0.2 4.3 8.7 3.8 2.1 0.1 - 1.4 12.4	y e a r \$1960 :1961: 1962: 1963: 1964: 1965: 1966: 1967: - - 62.8 24.1 23.1 2.3 0.9 - - 62.8 24.1 23.1 2.3 0.9 - - 78.3 56.7 54.1 4.6 3.1 5.0 - 60.6 33.3 31.0 6.1 15.3 1.7 7.4 11.8 11.5 10.5 3.7 3.2 0.2 4.3 20.8 8.7 3.8 2.1 0.1 - 1.4 12.4 6.1	y e a r c 1 \$1960 \$1961\$ 1962\$ 1963\$ 1964\$ 1965\$ 1966\$ 1967\$ 1968\$ - - 62.8 24.1 23.1 2.3 0.9 0.1 - - 78.3 56.7 54.1 4.6 3.1 5.0 15.1 - 60.6 33.3 31.0 6.1 15.3 1.7 7.4 43.1 11.8 11.5 10.5 3.7 3.2 0.2 4.3 20.8 12.5 8.7 3.8 2.1 0.1 - 1.4 12.4 6.1 2.3	y e a r c l a s a \$1960 \$1961\$ 1962\$ 1963\$ 1965\$ 1966\$ 1967\$ 1968\$ 1969\$ - - 62.8 24.1 23.1 2.3 0.9 0.1 10.4 - - 78.3 56.7 54.1 4.6 3.1 5.0 15.1 38.3 - 60.6 33.3 31.0 6.1 15.3 1.7 7.4 43.1 28.6 11.8 11.5 10.5 3.7 3.2 0.2 4.3 20.8 12.5 5.6 8.7 3.8 2.1 0.1 - 1.4 12.4 6.1 2.3 2.5	J C A F C 1 A S B \$1960 \$1961\$ 1963\$ 1963\$ 1965\$ 1966\$ 1967\$ 1968\$ 1969\$ 1970\$ - - 62.8 24.1 23.1 2.3 0.9 0.1 10.4 27.7 - - 78.3 56.7 54.1 4.6 3.1 5.0 15.1 38.3 31.1 - 60.6 33.3 31.0 6.1 15.3 1.7 7.4 43.1 28.6 10.9 11.8 11.5 10.5 3.7 3.2 0.2 4.3 20.8 12.5 5.6 15.0 8.7 3.8 2.1 0.1 - 1.4 12.4 6.1 2.3 2.5 2.0	Tear class \$1960 \$1961\$ 1962\$ 1963\$ 1964\$ 1965\$ 1966\$ 1967\$ 1968\$ 1969\$ 1970\$ 1971\$ - - 62.8 24.1 23.1 2.3 0.9 0.1 10.4 27.7 13.7 - - 78.3 56.7 54.1 4.6 3.1 5.0 15.1 38.3 31.1 13.8 - 60.6 33.3 31.0 6.1 15.3 1.7 7.4 43.1 28.6 10.9 19.4 11.8 11.5 10.5 3.7 3.2 0.2 4.3 20.8 12.5 5.6 15.0 11.4 8.7 3.8 2.1 0.1 - 1.4 12.4 6.1 2.3 2.5 2.0 0.2	y e a r c 1 a s s s1960 s1961s 1962s 1963s 1964s 1965s 1966s 1967s 1968s 1969s 1970s 1971s 1972s - - 62.8 24.1 23.1 2.3 0.9 0.1 10.4 27.7 13.7 8.4 - - 78.3 56.7 54.1 4.6 3.1 5.0 15.1 38.3 31.1 13.8 16.8 - 60.6 33.3 31.0 6.1 15.3 1.7 7.4 43.1 28.6 10.9 19.4 24.7 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 8.7 3.8 2.1 0.1 - 1.4 12.4 6.1 2.3 2.5 2.0 0.2 -	y e & r c 1 & s s s1960 s1961s 1962s 1963s 1964s 1965s 1966s 1967s 1968s 1969s 1970s 1971s 1972s 1973s - - 62.8 24.1 23.1 2.3 0.9 0.1 10.4 27.7 13.7 8.4 15.9 - - 62.8 24.1 23.1 2.3 0.9 0.1 10.4 27.7 13.7 8.4 15.9 - - 62.8 24.1 23.1 2.3 0.9 0.1 10.4 27.7 13.7 8.4 15.9 - - 62.8 35.7 54.1 4.6 3.1 5.0 15.1 38.3 31.1 13.8 16.8 31.0 - - 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 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 - 8.7 3.8 2.1 0.1 - 1.4 12.4 6.1 2.3 2.5 2.0 0.2 - - -	Jear class \$1960 \$1961\$ 1963\$ 1964\$ 1965\$ 1966\$ 1967\$ 1968\$ 1969\$ 1970\$ 1971\$ 1972\$ 1973\$ 1974\$ - - 62.8 24.1 23.1 2.3 0.9 0.1 10.4 27.7 13.7 8.4 15.9 14.3 - - 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 - 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 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 - 8.7 3.8 2.1 0.1 - 1.4 12.4 6.1 2.3 2.5 2.0 0.2 - -	y e a r c 1 a s s s1960 s1961s 1962s 1963s 1964s 1965s 1966s 1967s 1968s 1969s 1970s 1971s 1972s 1973s 1974s 1975s - - 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 - - 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 - 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 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 - 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 (5Ze).

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
1 97 6	-	-	4.3

1			Åge		: Total			
ices	2	# # 3	2 2 2 4 2 2 2	5 1	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	
¥ 1977	0.004	0.04	0.7	0.7	0.7			
^N 1978	208	114	100	3	2	427.0	74•7	
¥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 3. Estimation of the stock and TAC of red hake from Georges Bank for 1979 by virtual population analyses.

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

Age 1	Age group ratio in the catches	SCatch for sation peri	exploit- od	: Catch by age : in 1979	group Numbers (10 ⁶)	
Year class	(%)	: Weight : sthous.tons	Numbers (10 ⁶)	: Weight : :thous.tons :		
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	
TOTA	L: 100.0			21.8	100.5	
	•		<u></u>	<u></u>		