



ANNUAL MEETING - JUNE 1978

Estimation of stock size and allowable catch of silver hake
off Nova Scotia (Divisions 4VWX) for 1979

by

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Summary

Based on the total catch and age composition data, on fishing mortality rates calculated from the catch data per hauling hour by the ship of a BMRT class, and on the optimal fishing mortality value an estimate of the total silver hake stock size in Div. 4 vwx of 307 thous. tons is given and the allowable catch of around 70-80 thous. tons recommended for 1979.

Material and Methods

In estimating the stock size and total allowable catch of silver hake at Nova Scotia the catch data by countries and age composition of the Soviet catches for 1976 and 1977 have been used. The total catch by all countries accounted for 97.2 thous. tons in 1976 and to 32.9 thous. tons in 1977; the USSR catches were accordingly 81.2 thous. tons (84%) and 31.7 thous. tons (96%) of the total. The value of natural mortality rate of 0.5 was taken for all age groups, while that of the optimum fishing mortality ($F_{0.1}$) of 0.7 was taken for four year old and older fish (Res.Doc. 76/VI/57). The quotas set for 1976, 1977 and 1978 were 100, 70 and 80 thous. tons respectively. To estimate the stock size in 1976, the data on the fishing mortality rate for age groups 3 and older were used from the silver hake catches per hauling hour by the ships of a BMRT class in 1975-1976. It averaged to 1.060 (Res.Doc. 76/XII/1571). The fishing mortality

rate of 0.191 was taken for age group 2 according to Working Paper 76/XII/144. The recruitment of 2 year olds was estimated to be 10×10^8 fish in 1977, 1978 and 1979. This estimate is somewhat lower than the mean abundance of two year olds for the 1970 to 1976 period. The abundance of two year olds fluctuated from 7.5×10^8 to 30×10^8 fish in 1970-1976, which gave the mean value of 13×10^8 fish. So, the recruitment abundance seems to be rather underestimated than overestimated. The mean weights by age groups were taken from the previous reports (Res.Doc. 76/VI/57).

Age, years	Weight, kg
1	0.063
2	0.095
3	0.151
4	0.214
5	0.319
6	0.478
7	0.590

Results

The estimates of the stock and catch size and the values of fishing mortality rates are given in table 1. As is evident from the table, the stock size amounted to 27.138×10^5 fish or 306.2 thous. tons at the beginning of 1977, which allowed to catch about 80 thous. tons in 1977 at the optimum value of F. However, only about 32.9 thous. tons were taken in 1977. From the stock and catch size in 1977 the fishing mortality rates for 1977 were calculated amounting to 0.017 for two year olds, 0.075 ^{for} three year olds, 1.810 for four year olds and 0.740 for five year old fish. Lower mortality on three year olds and rather high mortality on four- and five year old fish may be attributed to increased mesh size in the trawl codends from 40 mm to 60 mm in 1977, and also to a ban imposed on bottom fishery over the greater shelf part inhabited both by small and larger silver hake. It seems possible that the assessment results were erron-

eous due to underestimation of the four- and five year old fish abundance, their stock size being in fact considerably higher. Based on the stock size in 1977 and the fishing mortality rate at the level of $F_{0.1} = 0.7$ for the four year old and older fish, of 0.02 for two year olds and of 0.3 for three year olds the allowable yield of 80.4 thous. tons is recommended for 1978. Similarly, the stock size and allowable catch have been calculated for 1979. If the total stock size is 307.0 thous. tons, then the catch of 70 thous. tons or about 80 thous. tons may be taken, since the abundance of two year olds in 1977-1979 has been estimated to be at the level below average. However, it may be also expected to be higher. Besides, it is possible that the quota applied to the silver hake fishery will not be taken in 1978, like that in 1977. Consequently, the allowable catch of 80 thous. tons may be recommended for 1979.

References

1. NOSKOV A.S., 1976. Estimation of stock size and allowable catch of silver hake on the Nov.Scotia Shelf in ICNAF Division 4W, Res.Doc. 76/VI/57.
2. NOSKOV A.S., 1976. The assessment of the silver hake stocks at Nova Scotia in Div. 4VW, Res.Doc. 76/XII/157.
3. ICNAF Working Paper 76/XII/144.

Table 1. Silver hake catch and size (in 10^5 sp., in thous. tons)
in Div. 4 wx in 1976-1978

Age	1	2	3	4	5	6	7+	Total 2+
	:	:	:	:	:	:	:	: :10 ⁵ sp.: : thous. tons
C ₇₆	454	2988	1935	637	233	38	19	5850
F ₇₆	-	0.191	1.060	1.060	1.060	1.060	1.060	
N ₇₆	-	21810	3603	1186	433	71	35	27138
N ₇₇	+	(10000)	11559	757	249	91	22	22678
C ₇₇	40	132	655	532	106	14	4	1443
F ₇₇	-	0.017	0.075	1.810	0.740	0.215	0.260	
N ₇₈	-	(10000)	5970	6508	75	72	45	22670
F ₇₈	-	0.020	0.300	0.700	0.700	0.700	0.700	
C ₇₈	-	160	1236	2655	31	29	18	4129
N ₇₉	-	(10000)	5950	2680	1959	23	21	20633
F ₇₉	-	0.020	0.300	0.700	0.700	0.700	0.700	
C ₇₉	-	160	1232	1093	799	9	8	3301
								70.0

C - catch
N - stock
F - fishing mortality