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Assessment of Stock Size and Allowable Catch of Nova Scotian Silver Hake (*Merluccius bilinearis*) for 1984

by

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In 1982, the silver hake catch off Nova Scotia amounted to 52.7 thous.tons, the total allowable catch fixed at the Regular Session of NAFO in 1981 being 80 thous.tons. As in the recent years, the bulk of the catch was taken by the USSR (47,3 thous. tons, 89,8%). Using V.P.A. the silver hake stock size for the beginning of 1984 is estimated at 885 thous.tons, so at the optimal fishing mortality the TAC of 145 thous.tons can be recommended.

Materials and Methods

The silver hake stock size in NAFO Subarea 4 was calculated using V.P.A. based on the age composition data from the Soviet catches, which constituted 87.0% of the total catch by all countries. To gain the age composition of the catches the massive measurements were made and otoliths collected for age reading by the observers working on board commercial vessels. The mean weight of the silver hake was determined by weighting samples at massive measurements of the fish. The data of massive measurements were averaged by month. The mean weights of the hake were 236 g in May, 249 g in June and 230 g in July. Based on the mean weight data the catches in tons by month were converted to specimens and to age groups using age keys. As in the previous reports, the natural mortality of 0.5 was taken (ICNAF Res. Doc. 76/VI/57, ICNAF Res. Doc. 76/XII/157). The mean weight by age group was

determined earlier from the averaged long-term data. The 1982 catch converted to age groups using mean weight appeared to be smaller than the actual catch (45.1 compared with 52.7 thous.tons), therefore the estimates of the stock size and the allowable catch for 1984 were increased 1.17 times.

The total instantaneous mortality rates were calculated from the 1980-81 catches per hauling hour, as the 1982 data could not be used. The anomalous conditions observed in 1982 were favourable for hake fishery. Its aggregations were extraordinarily dense and stable. So, in April 1981 the catch per fishing day with the vessels of BMRT class was 13.5 tons while in 1982 it constituted 49.7 tons. Respectively, in May the catches were 28.0 and 37.9 tons, and in June - 22.9 and 37.4 tons. That was the reason why in 1982 the catches per hauling hour by all age groups from the same year classes appeared to be higher than in 1981. It means that these materials are not adequate for calculation of total mortality rates. We believe that the utilization of the 1981 total mortality rates would be reasonable, as the fishing intensity in 1981 and 1982 differed insignificantly, and the hake stocks had been relatively stable in the recent years.

Results

In 1982 the total silver hake catch amounted to 52.7 thous. tons against the fixed allowable catch of 80 thous.tons. Of the total catch, the proportion of the Soviet catches constituted 47,3 thous.tons (89,8%), while the quota alloted to the USSR was 48.4 thous.tons. The Soviet silver hake catches were taken with the vessels of BMRT class from the second half of April to June inclusive on the Nova Scotia shelf slopes. Large catches taken in 1982 resulted in reduction of the total fishing effort. The bulk of the hake catches was represented by the specimens of 3 to 5 year old. A strong 1978 year class was most numerous, and at the age of 4 it constituted on the average 43% in numbers.

The data obtained during trawling surveys show the abundance of separate year classes. So, for 30 minutes of trawling with a fry trawl for silver hake fry the catches were 41 sp. in 1978, 12 sp. in 1979, 14 sp. in 1980 and 33 sp. in 1981 (The 1981 data are converted catches from Canadian trawl to fry trawl of AtlantNIRO). In 1982, the conditions for spawning and survival of the young silver hake were unfavourable due to low temperatures of the water, and the young hake abundance was found to be 60 times as low as in 1981.

For all age groups the natural mortality rate of 0.5 was taken. Natural mortality rates adopted in 1981 were used. They were: 0.002 for two year olds, 0.050 for three year olds, 0.150 for four year olds, 0.250 for five year olds, and 0.400 for six and seven year olds. The mean abundance of two year olds of the 1980 year class in 1982 was estimated at 20×10^8 sp., of two year olds of the strong 1981 year class in 1983 - at 30×10^8 sp., and of two year olds of the poor 1982 in 1984 - at 10×10^8 sp. The fishing mortality in 1983 maintained at the 1981 and 1982 level, and in 1984, for five year olds and older specimens, it will be at the optimal level of 0.6.

The initial data and sequence of calculations are given in table 1. The calculated commercial stock size for the beginning of 1984 is 756 thous.tons and the allowable catch is 123 thous. tons. With regard for corrected difference between calculations by mean weight of all age groups and by separate age groups the total stock size was estimated at 885 thous.tons, and the allowable catch at 145 thous.tons.

References

1. Noskov A.S. Estimation of stock size and allowable catch of Silver Hake on the Nova Scotia shelf in ICNAF Division 4W . ICNAF Res. Doc. 76/VI/57.

2. Noskov A.S. The assessment of the Silver Hake stocks at Nova Scotia in Div. 4VWX. ICNAF Res. Doc. 76/XII/157.

Table 1 Silver hake catches and stock size in the Nova Scotia area in 1982 - 1984

	Age, years						Total 2+	
	2	3	4	5	6	7+	10^5 sp.	thous. tons
C 82	267	497	889	286	104	35	2078	52.7
F 82	0.002	0.050	0.150	0.250	0.400	0.400		
N 82	(20000)	13078	8082	1625	394	132	43311	638
N 83	(30000)	12100	7546	4219	767	160	54792	809
F 83	0.002	0.050	0.150	0.250	0.400	0.400		
C 83	66	460	830	743	202	42	2337	61
N 84	(10000)	18150	6982	3939	1991	312	41374	756
F 84	0.003	0.070	0.200	0.600	0.600	0.600		
C 84	20	962	1005	1434	724	114	4259	123
$\bar{W}$	0.095	0.151	0.214	0.314	0.478	0.590		

Definitions: C - catches in i-th year

N - stock size in i-th year

F - fishing mortality

$\bar{W}$ - mean weight of age group