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Estimation of Stock Size and Allowable Catch of Silver Hake

(*Merluccius Bilinearis*) on the Scotian Shelf

by

A. S. Noskov

Atlantic Research Institute of Marine Fisheries and Oceanography (AtlantNIRO)
5 Dmitry Donskoy Street, Kaliningrad, 236000 USSR

Abstract

The total yield of silver hake in 1981 constituted 38.4 thous. tons at a TAC of 75 thous. tons. Using the virtual population analysis the stock size was estimated at 644 thous. tons for 1981 and at 887 thous. tons for 1983 which may provide a total allowable catch of 135 thous. tons at optimum fishing mortality.

Material and Methods

To assess the silver hake stock from the virtual population analysis the age composition of commercial catches was studied by means of massive measurements and otoliths sampling for ageing by observers aboard commercial vessels.

The total instantaneous fishing mortality rate in 1981 was estimated from the data on abundance of some year classes per hauling hour of large freezer trawlers (BMRT-class) for 1980 and 1981.

To estimate the recruitment abundance the fingerling abundance indices were used based on the data on silver hake abundance surveys in 1978-1980.

The instantaneous natural mortality rate was assumed to be 0.5 as noted early (ICNAF Res.Doc. 76/VI/57; ICNAF Res.Doc. 76/XII/157). In 1981 the mean weight of silver hake catches was obtained by means of sample weighing during massive measurements of fish. Mean weight of some age groups was early determined on the long-term mean data basis.

Results

The 1981 total catch of silver hake in NAFO area 4 was only 38.4 thous. tons of the established allowable catch of 75 thous. tons.

The USSR catch constituted 37.4 thous. tons (97%) of the total catch. The silver hake was caught by the USSR trawlers on the shelf slopes in the areas of Emerald and Sable Banks mostly from May to July. A quota of 48.4 thous. tons was allocated for the USSR. However, this quota could not be taken since a short-fin squid quota of only 5 thous. tons was taken but the shortfin squid was always found in great numbers in the silver hake catches and the vessels left the area early in August.

The catches were represented by the silver hake at age 1 to 10. However, the bulk of the catches was prevalent by 3, 4 and 5 year-olds. The 1978 year class predominated and averaged 43.5% by number of specimens in the catches.

The data on trawl surveys on young hake abundance conducted by the USSR vessels since 1978 also indicate that the 1978 year class abundance is relatively high. The catch of silver hake fingerlings per 30-min. tow of a fry trawl averaged 41 specimens, 12 sp., 14 sp., 53 sp. for 1978, 1979, 1980 and 1981, respectively. The data on catches by Canadian trawl converted to a fry trawl of 13.6 m were used for 1981. From the data on catches per hauling hour the total mortality rate was 0.75 for the fully recruited silver hake at age 5 and older and averaged 0.9 for the 6 and 7 year-olds. Based on the natural mortality rate of 0.5 the fishing mortality rate was 0.25 for the 1981 five year-olds and 0.40 for 6 and 7 year-olds. According to the data on intra-population analysis the fishing mortality was assumed to be 0.15, 0.05 and 0.002 for 4, 3 and 2 year-olds, respectively. The 2 year-olds abundance for 1981 and 1982 was assumed to average 20 x 10^8 specimens. From the results of trawl surveys on fingerling abundance the 1981 year class abundance at age 2 in 1983 was estimated to be above average at 30 x 10^8 specimens. The fishing

mortality rate for 1982 was assumed to be at the 1981 level and
at the optimum level of 0.6 for the 5 year-olds and older.in 1983.
The basic data are presented in Table 1.

Thus, the stock size was estimated at 730 thous. tons in
early 1982 and at 887 thous. tons in early 1983. A total allow-
able catch of 135 thous. tons can be recommended for 1983.

References

1. Noskov A.S. Estimation of stock size and allowable catch of
   silver hake on the Nova Scotia Shelf in ICNAF Di-
   vision 4X. ICNAF Res.Doc. 76/VI/57.
2. Noskov A.S. The assessment of the silver hake stocks at Nova
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- 4 -

Table 1.   Silver hake catches and stock sizes in Nova Scotia area in 1981-1983

	Age, years						Total 2+	
	2	3	4	5	6	7+	10^3 sp.	thous. tons
C_{81}	135	742	588	178	50	16	1711	38.4
F_{81}	0.002	0.050	0.150	0.250	0.400	0.400		
N_{81}	(20.000)	19.513	5.351	1.015	190	61	46132	644
N_{82}	(20.000)	12100	11260	2793	479	77	46709	730
F_{82}	0.002	0.050	0.150	0.250	0.400	0.400		
C_{82}	40	40.0	1239	492	127	20	2318	57
N_{83}	(30000)	12100	6982	5878	1318	194	56472	887
F_{83}	0.003	0.070	0.200	0.600	0.600	0.600		
C_{83}	60	641	1005	2400	480	71	4657	135
$\bar{W}$	0.095	0.151	0.214	0.314	0.478	0.590		

Note: C - catch in i-year
       N - abundance in i-year
       F - instantaneous fishing mortality
       W - mean weight of age group