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Estimation of Stock and Allowable Catch of Silver Hake (*Merluccius bilinearis*)
off Nova Scotia in Divisions 4VWX for 1980

by

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This report is presented in addition to the paper on estimation of silver hake stock and allowable catch in 1966-80 submitted to the 1979 ICNAF annual meeting (ICNAF Res. Doc. 79/VI/99).

The calculations were based on 1979 data on actual catches and catches per fishing effort. The total 1979 catch was 49.7 thous. tons. The proportion of the USSR catch constituted 44.9 thous. tons or 90% of the total. The quota of 70 thous. t for 1979 was not taken by Canada and other countries except the USSR. The main season for silver hake fishery is the period from May to July.

The data on catches per hauling hour of BART in which silver hake constituted over 75% were used for estimation of total and fishing mortality. The catch in numbers by age group per hauling hour (Tables 1-2) and the total instantaneous mortality (Table 3) were calculated based on the mean weight and age composition. The total instantaneous mortality rates for four, five, six and seven year olds were 0.3, 1.0, 2.0 and 2.2 respectively. The natural mortality rate was assumed to be 0.5 as in previous papers. Therefore, the fishing mortality for five year olds was 0.5 and for six and seven year olds averaged 1.5. Based on the previous estimates obtained from the virtual population analysis the fishing mortality for age groups 2, 3 and 4 were assumed to be

0.02, 0.2 and 0.3 respectively. To assess the possible 1980 catch the fishing mortality rates ^{used} were similar to those assumed in 1979, i.e. for abundant age groups below than optimum fishing mortality of 0.7. The recruitment rate for 2 year olds in 1980 was taken as $20\ 000 \times 10^5$ sp. which is the average estimate for the previous years. The results are given in the table 4.

The estimate based on actual 1979 catches showed that by 1980 the stock increased due to abundant 1977 year class and constituted 737 thous. tons, and at fishing mortality similar to 1979 the total allowable catch may reach 150 thous. ton level, i.e. twice as much as was determined by quota for 1979.

Table 1. Silver hake catches per hauling hour of BMRT off Nova Scotia in 1978 and 1979

Years	Catch per hauling hour, t	Hauling hours		Catch per hauling hour (sp.)
(June-Aug.)				
1978	2.06	3 217	0.232	8 879
(June-Aug.)				
1979	1.98	598	0.208	9 519

Table 2. Age composition of catches per hauling hour of BMRT in 1978-79

Year		2	3	4	5	6	7	8
1978	mean weighted	2 196.28	3 202.20	2 192.75	847.02	184.80	78.07	30.42
	ln	7.69	8.07	7.69	6.74	5.22	4.36	3.42
1979	mean weighted	2 723.92	3 947.66	2 365.72	772.80	109.53	19.66	4.63
	ln	7.91	8.28	7.77	6.65	4.70	2.98	1.53

Table 3. Total instantaneous mortality of silver hake in 1979

Year	2-3	3-4	4-5	5-6	6-7	7-8
1978-79	0.59	0.30	1.04	2.04	2.24	2.83

Table 4. Silver hake catches and stock in 4 VWX in 1979-80

A G E	2	3	4	5	6	7+	Total 2+	
							10 ⁵ sp.	thous.t
N ₇₉	(20 000)	15 910	1 509	147	146	44	38 256	493
F ₇₉ ¹	0.02	0.28	0.46	0.64	0.64	0.64		
C ₇₉ ²	298	3 062	444	246	56	17	4 123	70
F ₇₉ ³	0.02	0.2	0.3	0.5	1.5	1.5		
C ₇₉ ⁴	520	799	575	215	34	9	2 264	50
N ₈₀	(20 000)	32 500	5 549	2 778	680	53	61 560	737
F ₈₀	0.02	0.2	0.3	0.5	1.5	1.5		
C ₈₀	320	4 680	1 149	878	440	34		150

1. Estimated fishing mortality for 1979
2. Estimated catch in 1979
3. Actual mortality in 1979
4. Actual catch in 1979