Northwest Atlantic   Fisheries Organization

On the Change of Total and Fishing Mortality Rate for Older Silver Hake

Age-groups in Div. 4VWX by Fishing Period

by

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INTRODUCTION

According to V.P.A. values (Waldron et al., 1988), beginning
in 1979, the rate of the fishing and, therefore, total mortality
for older silver hake age groups, as a rule, considerably exceeds
that observed in the previous fishing period.

Meanwhile reduction of the fishing effort beginning in 1977,
and a marked increase of the hake abundance in the eighties
should have rather led to opposite results. So doubts as to reli-
ability of the above-mentioned values are not without reason.

In the present report an attempt is made to examine the es-
tablished situation using independent values of the total morta-
lity rate for the hake in the same fishing periods.

MATERIALS AND METHODS

The analysis was based on the 6, 7, 8 and 9 year old silver
hake catch statistics per unit effort and abundance indices for
the same ages (table 1) from the data obtained during the July
Canadian surveys (Waldron et al., 1988). The total mortality rate
(Z) is calculated from the difference of natural logarithms of
abundance (table 2). Unreal values (negative and zero) were also
taken into account. The mean values of $\bar{Z}$ were derived for the
1971-1978 and 1979-1986 periods (indices of commercial catches)
and for the 1972-1978 and 1979-1986 periods (research indices).
The periods were identified with regard for the fact that the

Soviet fleet had been still allowed to carry out limited hake fishery northward of the regions officially open for the foreign small mesh fishery (SMGL) in 1971-1978. The increase of the mesh size from 40 to 60 mm was not considered to be a significant factor governing the accessibility of the large size hake to fishing gears.

RESULTS AND DISCUSSION

Differences in $\bar{Z}$ values calculated from the commercial and research data appeared to be quite significant (table 3). If $\bar{Z}$ values derived *from the survey data were almost similar by period in average, the commercial* $\bar{Z}$ *values sharply increased during the period that followed the introduction of the 200-mile zone. This circumstance seems to be a puzzle on the face of it. However remembering that all the surveys were carried out under the same conditions over the investigated period (beginning in 1972), and the fishing conditions (particularly so beginning in 1979) suffered radical changes, the solution suggests itself. Indeed, the greater mobility of the hake compared with that of the fleet resulting from a considerable limitation of the fishing ground might cause a seeming sharp increase of $\bar{Z}$ and, consequently, of F beginning in 1979. A hypothesis of the actual and quite significant increase of the fishing mortality rate on the older age groups runs counter to the data on the rise of the hake abundance in the eighties, and on smaller, than before, the fishing effort amount.

Thus, a supposition suggests itself that high values of fishing mortality rates on the older age groups can be rather attributed to reduced accessibility of the larger size hake, possibly caused by less frequent occurrence of the latter in the fishing ground, than to increased loss due to exemption as a result of the* fishery.

REFERENCES

1 WALDRON D.E., L.P.FANNING, M.C.BOURBONNAIS and M.A.SHOWELL, 1988. Size of the Scotian shelf silver hake population in 1987. NAFO SCR Doc. 88/51, 34 p.

Table 1.

Commercial and research indices of abundance of

older silver hake age groups

Year	Commercial, sp.				Research, sp.x 10^3			
	6	7	8	9	6	7	8	9
1970	181	68	36		-	-	-	-
1971	31	88	24	36	-	-	-	-
1972	158	24	8	12	1769	274	642	-
1973	210	155	58	4	6231	2171	1339	120
1974	-	-	-	-	3871	713	409	0
1975	81	5	5	6	812	253	398	37
1976	76	15	3	11	1955	448	145	195
1977	163	39	46	43	1371	867	338	288
1978	433	159	101	22	2861	1178	455	920
1979	882	238	92	60	5511	3064	975	253
1980	267	73	14	4	3130	1511	874	370
1981	310	38	7	3	5187	2829	856	499
1982	884	278	101	13	7966	4846	6512	317
1983	384	98	40	6	3133	831	415	364
1984	358	66	11	0	7537	2934	1077	564
1985	628	228	46	26	4193	2645	893	119
1986	780	159	64	6	4699	1609	692	293
1987	751	55	28	32	4480	1039	595	464

Table 2.

Difference between natural logarithms of abundance
of older silver hake age groups

Year	Commercial data			Research data		
	6-7	7-8	8-9	6-7	7-8	8-9
1970	0.7212	1.0415	0	-	-	-
1971	0.2560	2.3979	0.6931[1]	-	-	-
1972	0.0192	-0.8824	0.6931	-0.2047	-1.5866	1.6771
1973	-	-	-	2.1678	1.6792	-
1974	-	-	-	2.7279	0.5831	2.4028
1975	1.6864	0.5108	0.6061	0.6660	0.5567	0.7134
1976	0.6671	-1.1206	-2.6626	0.8131	0.2818	-0.6863
1977	0.0249	-0.9515	0.7376	0.1517	0.6447	-1.0014
1978	0.5984	0.5471	0.5208	-0.0686	0.1892	0.5869
1979	2.4918	2.8333	3.1355	1.3048	1.2544	0.9689
1980	1.9496	2.3445	1.5404	0.1011	0.5682	0.5605
1981	0.109	-0.9775	-0.6190	0.0680	-0.8337	0.9934
1982	2.1994	1.9387	2.8233	2.2603	2.4576	2.8842
1983	1.7610	2.1871	-	0.0656	-0.2593	-0.3067
1984	0.4512	0.3610	-0.8602	1.0472	1.1895	2.2028
1985	1.3736	1.2704	2.0368	0.9578	1.3408	1.1144
1986	2.6520	1.7367	0.6932	1.5090	0.9948	0.3997

Table 3.

Mean values of total mortality rate for age
groups 6, 7 and 8

Period	Commercial data				Research data			
	6	7	8	6-8	6	7	8	6-8
1970-1978 (1972-1978 for surveys)	0.57	1.12	0.66	0.78	1.30	0.66	1.34	1.10
1979-1986	1.62	1.81	2.05	1.83	0.91	1.30	1.30	1.17