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Once More, and Evidently in the Last Time, on Assessment of Silver Hake Natural Mortality Rate in Scotian Area

by

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ABSTRACT

The estimate of Scotian silver hake natural mortality was obtained which seems to approach the level typical for a virgin population. The estimation was carried out based on the assumption, that fishery has no serious impact on the long-term recruitment level which is approximately similar to natural mortality rate on non-fished or poorely fished stock. The assumption is proposed that natural mortality coefficient of 0.40, used to assess abundance and biomass for many years, is underestimated at the present conditions when fishery intensity has been sharply decreased.

INTRODUCTION

At the first sight, no problem of silver hake natural mortality estimation still remains. ICNAF Standing Committee on Research and Statistics and later NAFO Scientific Council following the publication by Terre and Mari (1978) has adopted and used further without any corrections instantaneous natural mortality coefficient (M) equal to 0.40. However, the data, utilized in above mentioned work, covered the period of the most active hake fishery in Scotian shelf area, and it is known, that high exploitation results in removal of more fishes, which otherwise may be subjected to elimination due to natural reasons. Therefore, it may be assumed that during active fishery natural mortality rate will decrease as compared to that of non-fished population. At the same time, recruitment level is hardly directly related to fishing effort. The above mentioned considerations stimulate one more attempt to assess average M value similar to that of a virgin stock of the species discussed.

MATERIAL AND METHODS

Retrospective estimates of recruitment abundance (fishes of 1-year old) and total abundance (fishes of 1 year and older) for 1979-1993 inclusive were used as a basis of estimation (Showell and Boubonnais, 1995). This paper is based on the assumption, that fishery has no serious impact on the long-term average recruitment level, which is close to the natural mortality rate of non-fished or poorly fished stock. Recruitment level is estimated for each year of above-mentioned period as a ratio of one-year old abundance and total abundance of population.

RESULTS AND DISCUSSION

Recruitment estimates by years (%) are shown in Table 1. Average value of the latter is 45.5%, which according to the assumption made corresponds to M=0.61.

In Terre and Mari (1978) and Rikhter (1988) lower estimates of M are used (0.40 and 0.50 respectively), which is likely caused by natural mortality decrease under the impact of fishery in appropriate years. This idea seems to be proposed for the first time by Baranov (1925), while in Tyurin (1962) even schedule is presented to estimate natural mortality coefficient relative to fishery activity. Researches carried out by Tretiak (1984) allows to conclude that long-term active fishery of Arctic-Norvegian cod leads to natural mortality coefficient decrease in fishes of similar age. Therefore, fishery pressure decrease should have the opposite effect, i.e. mortality rate caused by natural reasons will increase till the level of non-fished stock is reached.

Concerning Scotian silver hake, it is known, that since 1994 fishing effort for the latter has sharply decreased, inspite of the trend of stock increase, occurred lately. Evidently, fishing mortality (F) rate has also decreased significantly and the population characteristics approached to those of a virgin stock. Therefore it is likely that natural mortality rate in 1996 will slightly increase as compared to the period of 1970s-1980-s. and M approached 0.60. On the basis of above said we may suppose that utilization of M=0.40 in Scotian silver hake stock estimation in present conditions will result in underestimated abundance and biomass of the latter.

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Table 1 Silver hake recruitment rate in Scotian area in 1979-93

Year	1979	1980	1981	1982	1983	1984	1985	1986
%	50,8	39,4	47,7	59,1	34,8	48,8	32,8	60,7

Year	1987	1988	1989	1990	1991	1992	1993	Average value
%	33,0	36,6	51,0	39,7	43,5	52,8	51,6	45,5