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On Reliability 4VWX Silver Hake Abundance and Biomass Estimates,  
Obtained by Canadian Scientists in 1985 and 1996

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INTRODUCTION

Significant differences in variability of silver hake stock estimates, obtained by means of SPA (Ad hoc and ADAPT, respectively, (Rikhter, 1994) before and after 200-mile zone implementation, make doubtful the reliability of retrospective analysis results, carried out by different authors in various years. In this paper the attempt is made to clarify partially the current situation by means of appropriate data analysis for the period prior and after 1977.

MATERIAL AND METHODS

Retrospective estimates of abundance and biomass, presented in Waldron and Fanning (1985) and Showell (1996), as well as commercial catch data for the period prior to 200-mile implementation were used as the input information. Comparison of absolute biomass estimates, ratio of the latter and total catch of hake in 1973 were the methodical basis of researches.

RESULTS AND DISCUSSION

Population biomasses and their ratio to the maximum value of the latter in 1973 (Table 1) were estimated on the basis of data by Waldron and Fanning.

According to Showell hake biomass in 1977, 1980, 1981, 1982 and 1983 amounted to 201, 180, 183, 243 and 238 thous. t respectively. Biomass dynamics by years based on the above-mentioned data is presented in Fig. 1.

The latter estimates, obtained by means of more advanced analytical model, seem preferable from statistical reliability point of view. Therefore, the following assumptions could be made:

- a) it is impossible to assess reliability of data by Waldron and Fanning;
- b) the above estimates of abundance and biomass should be interpreted as relative and rather reliably reflect hake stock variability during the period discussed (1970-1983);
- c) data by Showell are very close to actual hake biomass in 1979-1995.

Further considerations are as follows: if biomass values ratios (Table 1) and data by Showell are realistic, they may be used to obtain biomass estimate close to actual one in 1973. Calculation results are presented in Table 2.

The data presented show that:

- a) either biomass ratios are unrealistic,
- b) or biomass values, obtained by Showell do not comply with the actual ones.

Unfortunately, no reliable criterion is available to make appropriate selection. We consider the possibility to use the total hake catch during 1973 amounted to 300 thous. t. In that period the latter fishery was unregulated and the catch was actually determined exclusively by the state of the stock considered. Therefore hake biomass in 1973 may be assessed with high probability at the level of no less than 500 thous. t which comply to the estimate by Waldron and Fanning and seems to provide a rather true picture of the actual stock abundance in the year considered. On this basis we may assume that other estimates by the above-mentioned authors in general correspond to the actual situation. Let also consider data of Canadian surveys, carried out in March and July 1972-1981 (Waldron and Fanning, 1985). In spite of extremely high variability of abundance indices, stipulated probably by sharp interannual variations of hake availability, the latter allows to assume significant increase of hake abundance and biomass during the first half of 1980s which is compatible with VPA retrospective estimates, presented in the same paper.

Certainly, the above-mentioned presents no sufficient basis to select the second assumption, though in the light of the facts discussed the probability of underestimation of Showell's data (especially in 1981-1983) seems rather high. Besides, the stock underestimation, if any, should be most pronounced during the years of high abundance which had been mentioned in Rikhter (1994).

In conclusion it should be noted that the problem considered in the paper, in my opinion, requires serious attention both from practical and methodical point of view. Therefore, the researches should be continued to obtain a definite solution.

REFERENCES

1. Eikhter V.A. 1994. On variability of silver hake commercial catches and stocks within the Scotian shelf before and after the introduction of the 200-mile zone. NAFO SCR Doc.94/8, 5p.
2. Showell M.A. 1996. Assessment of the 4VWX silver hake population in 1995. NAFO SCR Doc.96/78, 24p.
3. Waldron D.E. and L.P.Fanning. 1985. Status of the Scotian shelf population in 1984. NAFO SCR Doc.85/68, 28p.

Table 1

Absolute (thous.t) and relative values of silver hake biomass in 1970-1983

Year	1970	1971	1972	1973	1974	1975	1976
Absolute value	500	400	507	520	314	360	305
Relative value	0.96	0.77	0.98	1.00	0.60	0.69	0.59
Year	1977	1978	1979	1980	1981	1982	1983
Absolute value	237	194	238	236	261	445	461
Relative value	0.46	0.37	0.46	0.45	0.50	0.86	0.89

Table 2

Assumed reliable estimates of silver hake biomass in 1973 (thous.t)

Year	Biomass (Showell, 1996)	Ratio to biomass in 1973	Biomass in 1973
1979	201	0.46	437
1980	180	0.45	400
1981	183	0.50	366
1982	248	0.86	288
1983	238	0.89	267

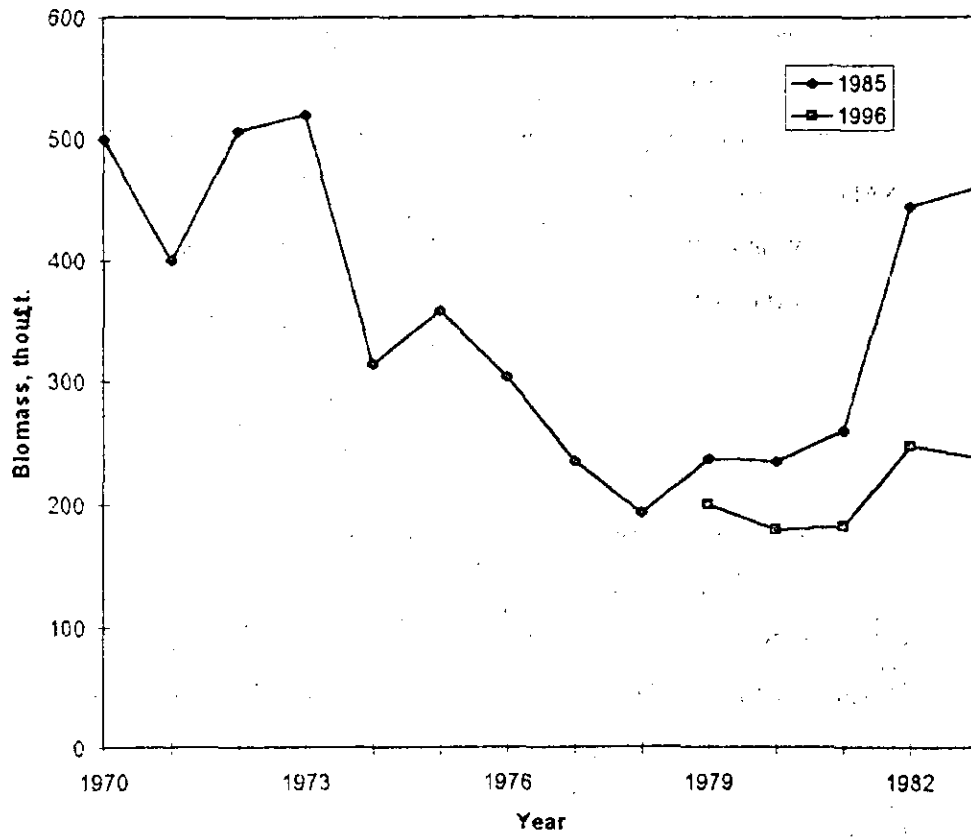


Fig. 1. Biomass of 4VWX silver hake population based on data by Waldron and Fanning (1985) and Showell (1996).