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Age and Growth of Silver Hake (Merluccius bilinearis)

on the Scotian Shelf

by

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Introduction

Silver hake is one of the most important demersal species fished on the Scotian Shelf (Div. 4VWX). Silver hake fisheries began in 1958, reaching its peak in 1973 with 299,000 tons. At present, with the aim of conserving the resource, a catch quota of 100,000 tons has been established.

Age and growth parameters have great importance to marine resource assessments. In the present work, an age-length key and growth parameters obtained from samples collected in 1986 are reported.

Materials and Methods

Samplings were carried out on board Cuban commercial ships between June and July, 1986 in Div. 4W. Taking 10 specimens of each sex per length-class (1-cm interval), 233 pairs of otoliths were collected for age studies. The otoliths were kept in paper envelopes with corresponding length data recorded. Before age readings were carried out on the otoliths, they were placed in salt water for 48 hours in order to clarify them.

To estimate Von Bertalanffy's growth equation parameters for each sex, the average lengths in each age were used. Differences between equations were determined by means of a covariance analysis.

Results

Of the 233 pairs of otoliths collected, 135 were females and 98 were males which represented 58% and 42% respectively. The specimen lengths in this work ranged between 19 and 49 cm; of these, males were between 19 and 36 cm and females between 19 and 49 cm.

The age-length key for the two sexes is shown in Table 1. Age groups 1 and 2 are the best represented, both for females and males, mainly due to the fact that they are found in a wide range of lengths (age 1: males and females 19-26 cm; age 2: males 25-33 cm and females 24-34 cm). For males, age group 3 is found in a lower percentage (18%) than groups 1 and 2, while group 4 is relatively poor (6%). Males over 4 years were not encountered in the samples. For females, age groups 3 and 4 are relatively well represented (19% and 16% respectively), while for the 5 year group only 9% was recorded.

Since ages of 5 years and over are poorly represented in the catches, growth equations are adjusted to the species first years of life from the average lengths of each age; similar to the method used by Hunt (1978). In general, it was evident that the mean lengths for each age group in females are higher than the values obtained for males. The covariance analysis showed that regression lines were significantly different ($F_{\text{theor.}} 9.55$; $F_{\text{calculated}} = 6.79$ for a 5% of significance) and can not be combined in a single relation for both sexes.

Growth parameters for each sex are presented in Table 2. When comparing these results with those presented by Mari (1980) and Mari and Valdes (1981) for silver hake growth on the Scotian Shelf during the years 1977, 1978, 1979 and 1980, important similarities are observed. However, there are differences with regard to the one obtained by Hunt (1979), especially in females. The asymptotic length mentioned in his work seems to be an underestimation because bigger specimens have been found in the catches.

References

- HUNT, J. J. 1978. Age, growth and distribution of silver hake (Merluccius bilinearis) on the Scotian Shelf. ICNAF Sel. Papers, No. 3: 33-44.
1979. Back-calculation of length-at-age from otoliths for silver hake of the Scotian Shelf.
- MARI, A. 1980. Distribution, age and growth of silver hake (Merluccius bilinearis) on the Scotian Shelf. NAFO SCR Doc., No. 117 (Revised), Serial No. N186, 11 p.
- MARI, A., and E. VALDES. 1981. Age and growth of silver hake (Merluccius bilinearis) on the Scotian Shelf. NAFO SCR Doc., No. 85, Serial No. N378, 7 p.

Table 1. Length-at-age key for silver hake in Div. 4W from otolith samples, 1986.

Length (cm)	Age Group										Total M	Total F	Total M+F
	I		II		III		IV		V				
	M	F	M	F	M	F	M	F	M	F			
19	5	4	-	-	-	-	-	-	-	-	5	4	9
20	6	5	-	-	-	-	-	-	-	-	6	5	11
21	6	5	-	-	-	-	-	-	-	-	6	5	11
22	5	7	-	-	-	-	-	-	-	-	5	7	12
23	6	7	-	-	-	-	-	-	-	-	6	7	13
24	5	4	-	1	-	-	-	-	-	-	5	5	10
25	-	4	5	1	-	-	-	-	-	-	5	5	10
26	1	1	5	3	-	-	-	-	-	-	6	4	10
27	-	-	5	5	-	-	-	-	-	-	5	5	10
28	-	-	6	7	-	-	-	-	-	-	6	7	13
29	-	-	4	5	1	1	-	-	-	-	5	6	11
30	-	-	5	6	-	-	-	-	-	-	5	6	11
31	-	-	4	5	2	1	-	-	-	-	6	6	12
32	-	-	4	3	1	3	1	-	-	-	6	6	12
33	-	-	2	2	4	4	-	-	-	-	6	6	12
34	-	-	-	1	5	5	-	-	-	-	5	6	11
35	-	-	-	-	2	5	4	1	-	-	6	6	12
36	-	-	-	-	3	1	1	3	-	-	4	4	8
37	-	-	-	-	-	4	-	-	-	-	-	4	4
38	-	-	-	-	-	-	-	5	-	-	-	5	5
39	-	-	-	-	-	-	-	5	-	-	-	5	5
40	-	-	-	-	-	-	-	3	-	2	-	5	5
41	-	-	-	-	-	-	-	3	-	1	-	4	4
42	-	-	-	-	-	-	-	1	-	1	-	2	2
43	-	-	-	-	-	1	-	1	-	1	-	3	3
44	-	-	-	-	-	-	-	-	-	2	-	2	2
45	-	-	-	-	-	-	-	-	-	-	-	-	-
46	-	-	-	-	-	-	-	-	-	1	-	1	1
47	-	-	-	-	-	-	-	-	-	-	-	-	-
48	-	-	-	-	-	-	-	-	-	2	-	2	2
49	-	-	-	-	-	-	-	-	-	2	-	2	2
Total	34	37	40	39	18	25	6	22	-	12	98	135	233
Mean (mm)	216	221	286	291	335	344	347	389	-	445	-	-	-
%	35	27	41	29	18	19	6	16	-	9	100	100	-
% TOTAL	31		34		18		12		5	100			-

Table 2. Growth parameters for silver hake, 1986.

	Males	Females
k	0.6394	0.1035
t ₀	0.1058	-1.2757
L _∞	37.1	88.1