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Results of Silver Hake Otolith Exchange Between Cuba, Canada and USSR

by

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Introduction

Since 1982 Cuban scientists have been conducting biological sampling from the commercial fishery of silver hake off Nova Scotia. In 1985 a massive sampling of silver hake was conducted from April to June (Cuban National Research Report 1986) that included otolith collection for age determination.

Considering the fact that catches of silver hake from USSR and Cuba constitutes the bulk of the commercial fishery for that species, it is considered to be important to achieve an acceptable degree of co-ordination in the design of sampling programs as well as in the application of standardized techniques in the processing of biological samples, specially in ageing techniques to be used for assessment purposes. Along that line Cuban scientists coordinated the exchange of a sample of 100 otoliths with scientists from Canada and USSR, with the main purpose of assessing the degree of concordance for Cuban age readers in respect of age determinations made by more skillful readers from Canada and the USSR.

Materials and Methods

A random stratified sample of 100 pair of otoliths was collected from the Cuban silver hake fishery on board two fishing vessels during April-May 1985. The otoliths were stored dry in special envelopes and then transferred to glass vials in a solution of 60:40 water and glycerin by Mr. J. Hunt of Canada, who kindly agreed to do the age determinations for Canada and then mail the samples back to Cuba for submission to the Soviet scientists. The sample consisted of 58 females ranging in length from 16 to 42 cm and 42 males ranging in length from 18 to 37 cm.

Age determinations were made using accepted conventions and following established guidelines. Age readings were made independently by one Canadian, one Soviet and three Cuban readers.

It should be stated that Cuban readers were the last ones to work out the sample and due to the time elapsed from its collection many of the otoliths were damaged by that time and the age determination became difficult because of the deterioration of some of the otolith pairs.

A Personal Appraisal Error model was applied to the results of the three Cuban readers with eleven run outs to find the APE, variation coefficient, precision index and percents of error of every reader against the others. Among the three Cuban readers was selected the one with the minimum personal error to establish the degree of coincidence with the Canadian and the Soviet readers.

Results

Estimated age of the females ranged between 1 and 8 years and between 1 and 8 years for the males. The overall level of agreement for the Cuban reader was 83% relative to the Canadian reader with 9 differences in females and 8 in males and of 72% relative to the Soviet reader with 14 differences in females and 14 differences in males. The differences in the readings with the ones done by the Soviet reader were of ± 1 year in 20 cases and +2 years in two cases with a tendency of readings to be higher in one year. The differences of the readings in regard to Canada indicates a bias for Cuban readings to be lesser in one year.

Individual readings are shown in Tables 1 and 2 and are summarized below:

Cuban Readings Relative to the USSR and Canada

Difference	-1	0	+1	+2
Percent Differences with USSR	8	72	18	2
Percent Differences with Canada	13	83	4	

Conclusions

From the results Cuban readers appear to have a greater degree of coincidence with the Canadian reader than with the Soviet reader. The lack of consistency of the tendency of assessing a higher or lesser age by the Cuban readers suggest difficulties in interpreting true or false rings in some cases.

It is important that the otolith exchange be repeated in 1986 and also that a workshop on silver hake ageing techniques be convened with the participation of Canada, Cuba, USSR and any other interested Contracting Party.

Table 1. Comparison of Cuban, Canadian and Soviet estimates of age for silver hake.

Fish	Length (cm)	Sex	USSR	Age CAN	CUB		Fish	Length (cm)	Sex	USSR	Age CAN	CUB	
1	16	F	1	1	1		51	35	F	6	6	6	
2	17	F	1	1	1		52	35	F	5	5	5	
3	18	F	1	1	1		53	35	F	6	6	6	
4	19	F	1	1	1		54	36	F	6	4	5	*
5	20	F	1	1	1		55	36	F	6	8	8	*
6	20	F	1	1	1		56	36	F	5	4	4	*
7	21	F	1	1	1		57	37	F	5	5	5	
8	22	F	1	1	1		58	42	F	7	7	6	*
9	22	F	1	1	1		59	18	M	2	1	1	*
10	23	F	1	2	1	*	60	19	M	1	1	1	
11	23	F	2	2	2		61	19	M	1	1	1	
12	24	F	2	2	2		62	20	M	1	1	1	
13	25	F	2	2	2		63	21	M	1	1	1	
14	25	F	2	2	2		64	22	M	2	2	2	
15	25	F	2	3	3	*	65	25	M	2	2	2	
16	26	F	2	2	2		66	25	M	2	2	2	
17	26	F	2	2	2		67	26	M	2	2	2	
18	27	F	2	2	2		68	26	M	2	2	2	
19	27	F	3	2	2	*	69	27	M	3	4	4	*
20	28	F	2	3	2	*	70	27	M	4	4	4	
21	28	F	3	3	2	*	71	27	M	2	2	3	*
22	28	F	3	3	3		72	28	M	3	4	3	*
23	29	F	2	3	3	*	73	28	M	4	4	4	
24	29	F	4	5	5	*	74	28	M	4	4	4	
25	29	F	4	4	4		75	28	M	3	4	3	*
26	30	F	3	3	3		76	28	M	3	4	4	*
27	30	F	3	3	4	*	77	29	M	4	4	4	
28	30	F	4	4	4		78	29	M	3	4	3	*
29	30	F	4	4	4		79	29	M	4	4	4	
30	30	F	4	4	4		80	29	M	4	4	4	
31	31	F	4	4	3	*	81	30	M	4	5	5	*
32	31	F	4	4	4		82	30	M	4	5	4	*
33	31	F	4	4	4		83	30	M	4	4	4	
34	31	F	4	4	4		84	30	M	3	4	4	*
35	32	F	4	5	5	*	85	30	M	3	4	4	*
36	32	F	5	5	5		86	31	M	4	5	5	*
37	32	F	4	5	5	*	87	31	M	5	4	5	*
38	32	F	4	4	4		88	31	M	4	6	6	*
39	33	F	5	5	5		89	31	M	4	4	4	
40	33	F	4	4	4		90	31	M	3	4	4	*
41	33	F	4	5	4	*	91	32	M	5	6	5	*
42	33	F	4	4	4		92	32	M	4	4	4	
43	33	F	4	4	4		93	32	M	5	5	5	
44	34	F	5	5	5		94	32	M	4	5	5	*
45	34	F	4	4	4		95	32	M	5	5	5	
46	34	F	5	5	5		96	33	M	5	6	6	*
47	34	F	5	5	5		97	33	M	4	5	5	*
48	34	F	5	5	5		98	33	M	5	6	5	*
49	34	F	5	5	4	*	99	34	M	5	5	5	
50	35	F	6	6	6		100	37	M	6	7	7	*

* Ageing difference.

Table 2. Summary of silver hake ages.

										AGE									
	TOTAL	8	7	6	5	4	3	2	1		1	2	3	4	5	6	7	8	TOTAL	
C	15							1	14	1	14	1							15	
u	15						2	13		2		13	2						15	C u
b a	10				1	6	3			3		1	5	4					10	b a
n	30				2	22	6			4			1	26	3				30	n
R e	22			1	14	7				5				2	18	2			22	R e
a d	6		1	3	1	1				6						5	1		6	a d
e r	1			1						7							1		1	e r
	1			1						8								1	1	
	100		1	6	17	31	10	17	14		14	15	8	32	21	7	2	1	100	

USSR Reader   Canadian Reader