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Results of the 1986 and 1987 Canada-USSR

Silver Hake Otolith Exchange

by

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Introduction

As part of a continuing project to monitor the level of Canadian and USSR inter-reader agreement in age determination of silver hake, otoliths have been exchanged between the two countries. This report summarizes results of the 1986 and 1987 comparison age readings.

Materials and Methods

Two samples of 100 otoliths, one in 1985 and the other in 1986, were collected by the USSR during July in NAFO Division 4W and delivered to the Canadian age reader. Otoliths were stored in glass vials in a 60:40 glycerin solution.

Only the otoliths were available to the Canadian age reader at the time ages were assigned. It is not known if the USSR age reader had information on individual fish length, sex and maturity stage at the time ages were estimated. This is in contrast to earlier exchanges in which the Canadian reader had access to individual fish data and was intended to reduce possible bias associated with expected size at age.

Results

Comparison of ages assigned to the 1985 sample indicates an overall level of agreement of 82% between the two readers. Of the 18 differences, eleven of the USSR ages were one more than the Canadian, six were one less and one was two less. Results are shown in Table 1 and summarized below:

Canadian reading relative to USSR

Difference	-1	0	+1	+2
Percent	11	82	6	1

Results of comparison of ages assigned to the 1986 sample indicate a 70% level of agreement between the two readers. Of the 30 differences, 24 of the USSR ages were one less than the Canadian and six were one more. Results are shown in Table 2 and summarized below:

Canadian reading relative to USSR

Difference	-1	0	+1
Percent	6	70	24

Comparison of the level of inter-reader agreements for 1984-87 otolith exchanges are given in Table 3 and indicate 68-85% correspondence in ages. Prior to the 1987 sample, USSR ages tended to be higher relative to the

Canadian age. However, in 1987 most differences resulted from a USSR age which was less than the Canadian age and the overall level of agreement was low. The fact that the Canadian reader did not have access to individual fish data would not appear be significant since the 1986 exchange was completed under the same controls.

Conclusions

On the basis of otolith exchanges it appears that the level of inter-reader agreement in age determination of silver hake is variable and that differences may be biased. The direction of the bias may have changed in 1986.

The usefulness of continuing exchanges between age readers is questionable unless additional information and analysis can be achieved. It is suggested that the following factors be incorporated in designing future experiments:

1. Intra-reader agreement should be assessed;
2. Additional information should be recorded with the age, either as remarks or using a standard code to identify specific characteristics;
3. Some attempt should be made to identify the source of disagreement (center, checks, edge, etc);
4. A workshop, with participants who are actively involved in age determination of silver hake, might help to reduce bias and improve agreement.

Table 1. Results of comparison age determination of the 1986 silver hake otolith exchange.

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

Table 2. Results of comparison age determination of the 1987 silver hake otolith exchange.

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

Table 3. Comparison of the level of inter-reader agreement for silver hake otolith exchanges, 1984-87.

Exchange Year	Difference	Canadian reading relative to USSR				
		-2	-1	0	+1	+2
1987	Percent	0	6	70	24	0
1986	Percent	0	11	82	6	1
1985}	Percent	1	4	68	25	2 Cdn/USSR
1985}	Percent	0	4	83	13	0 Cdn/Cuba
1985}	Percent	0	8	72	18	2 Cuba/USSR
1985	Percent	1	13	85	1	0
1984	Percent	1	14	82	3	0