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Comparison of Canadian and USSR Estimates of Age for 1989 Observer Program Otolith Collections

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Introduction

Results of comparison ageing of silver hake otoliths during scientific discussions with the USSR (Murmansk, March 1990) indicated a need to examine a larger sample of otoliths in order to assess agreements. It was concluded that the USSR reader would age as many as possible of the samples collected by Canada in 1989 and these would form the basis of comparisons. This report summarizes results of those comparisons.

Methods

A subsample of 1065 silver hake otoliths was selected from those aged by Canada for 1989 Observer Program collections and sent to the USSR for independent ageing. Prior exchanges have indicated very high agreement at age 1 and therefore only samples greater than 25cm were included in the exchange. Samples were stored in glycerin and the whole otolith was used to estimate age. Original readings by Canada (1989) were used for comparison with those estimated by the USSR reader. The USSR reader was provided with all relevant sampling data for each otolith (fish sex, length and weight and date of sample collection). The USSR reader was not aware of the Canadian age.

Otolith samples and the USSR estimated age were returned to the author after the completion of the study.

Results

Of the 1065 samples available, 876 were aged by both the Canadian and USSR age reader. Comparison of the two independent ages is shown in Table 1 and indicates an overall 70% agreement. A substantial bias is also apparent with 187 of the USSR ages being one or more years less and 77 being one or more years older than the Canadian estimate. Of the 264 disagreements, 71% were less and 29% more than the Canadian estimated age. There was also a strong progression in disagreements as apparent age of the fish increased. At age 2, agreement was 91% followed by 84%, 72%, 52%, 50%, 18% and 25% for ages 3-8. For ages 2-4, which comprise most of the commercial catch overall agreement was 82%.

Age length keys derived from the independent estimates of age are given for males and females by age readers in Table 2. Similar distributions of age at length are apparent for both keys and these are summarized in Table 3.

Proportion at length for each agegroup was calculated and results are shown in Figure 1. For ages 2 and 3, the proportion for males and females are almost co-incident with a slight tendency for USSR ages to be shifted to the right. At ages 4 and 5 this tendency becomes more pronounced.

Conclusions

A high level of agreement in estimated age for ages 2-4, the dominant agegroups in the commercial fishery, is confirmed by results of the current otolith exchange. Proportion at length by age indicate that little difference in estimated numbers at age would be expected if length frequencies were partitioned with either a USSR or Canadian age length key.

For ages greater than four years, when agreement drops to less than 50%, some additional work may be required to resolve interpretations.

Table 1. Results of ageing comparison for 1989 silver hake samples.

USSR Age

		1	2	3	4	5	6	7	8	9	10	Total
C	1											-
A	2		149	14								163
N	3		11	176	23							210
A	4			45	152	8	7					212
D	5			3	34	58	15	1				111
A	6				10	36	54	5	2			107
A	7					8	17	6	2			33
G	8				1	2	9	9	7			28
E	9								1			1
	10								1			1
	Total		160	238	220	112	102	21	13			866

Summary: USSR age relative to Canadian age

	-4	-3	-2	Difference -1	0	+1	+2
Number	1	2	31	153	602	67	10
Percent	0.1	0.2	3.6	17.7	69.5	7.7	1.2

Table 2. Age length keys derived from Canadian and USSR age determinations
of 1989 Observer Program silver hake samples.

a) Canada

Sex	Len	1	2	3	4	5	6	7	8	9	10	11	12	Total
1	25	.	.	.	.	.	.	.	.	.	.	.	.	.
1	26	.	36	1	.	.	.	.	.	.	.	.	.	37
1	27	.	21	11	2	.	.	.	.	.	.	.	.	34
1	28	.	11	24	5	.	.	.	.	.	.	.	.	40
1	29	.	2	28	5	3	.	.	.	.	.	.	.	38
1	30	.	1	16	17	.	.	.	.	.	.	.	.	34
1	31	.	.	6	19	4	.	.	.	.	.	.	.	29
1	32	.	.	6	18	3	5	1	.	.	.	.	.	33
1	33	.	.	3	13	7	6	.	2	.	.	.	.	31
1	34	.	.	1	6	8	9	2	.	.	.	.	.	26
1	35	.	.	.	2	8	6	2	2	.	.	.	.	20
1	36	.	.	.	1	.	3	2	1	.	.	.	.	7
1	37	.	.	.	.	.	.	.	.	.	.	.	.	.
1	38	.	.	.	.	.	.	.	.	.	.	.	.	.
1	39	.	.	.	.	.	.	.	.	.	.	.	.	.
1	40	.	.	.	.	.	.	.	.	.	.	.	.	.
Total		.	71	96	88	33	29	7	5	.	.	.	.	329
2	25	.	.	.	.	.	.	.	.	.	.	.	.	.
2	26	.	33	2	.	.	.	.	.	.	.	.	.	35
2	27	.	30	6	1	.	.	.	.	.	.	.	.	37
2	28	.	19	15	2	1	.	.	.	.	.	.	.	37
2	29	.	9	23	5	.	.	.	.	.	.	.	.	37
2	30	.	2	26	11	1	.	.	.	.	.	.	.	40
2	31	.	.	16	14	2	.	.	.	.	.	.	.	32
2	32	.	.	8	22	2	.	.	.	.	.	.	.	32
2	33	.	.	13	12	5	.	.	.	.	.	.	.	30
2	34	.	.	4	20	8	.	.	.	.	.	.	.	32
2	35	.	.	2	13	18	3	.	.	.	.	.	.	36
2	36	.	.	1	11	8	9	1	.	.	.	.	.	30
2	37	.	.	.	7	9	15	2	1	.	.	.	.	34
2	38	.	.	.	2	6	12	5	.	.	.	.	.	25
2	39	.	.	.	3	8	8	3	1	.	.	.	.	23
2	40	.	.	.	1	4	11	1	3	.	.	.	.	20
2	41	.	.	.	.	2	6	3	4	1	.	.	.	16
2	42	.	.	.	.	1	6	3	4	.	.	.	.	14
2	43	.	.	.	.	2	4	.	3	.	.	.	.	9
2	44	.	.	.	.	.	3	1	3	.	.	.	.	7
2	45	.	.	.	.	1	2	1	1	.	.	.	.	5
2	46	.	.	.	.	.	.	2	2	.	1	.	.	5
2	47	.	.	.	.	.	.	1	2	.	.	.	.	3
2	48	.	.	.	.	.	1	2	.	.	.	.	.	3
2	49	.	.	.	.	.	.	1	1	.	.	.	.	2
2	50	.	.	.	.	.	.	1	2	.	.	.	.	3
Total		.	93	116	124	78	80	27	27	1	1	.	.	547

b) USSR

Sex	Len	1	2	3	4	5	Age 6	7	8	9	10	11	12	Total
1	25	.	.	.	.	.	.	.	.	.	.	.	.	.
1	26	.	35	2	.	.	.	.	.	.	.	.	.	37
1	27	.	21	13	.	.	.	.	.	.	.	.	.	34
1	28	.	10	28	2	.	.	.	.	.	.	.	.	40
1	29	.	3	24	10	1	.	.	.	.	.	.	.	38
1	30	.	1	22	11	.	.	.	.	.	.	.	.	34
1	31	.	.	12	13	3	1	.	.	.	.	.	.	29
1	32	.	.	3	20	6	4	.	.	.	.	.	.	33
1	33	.	.	4	18	4	4	1	.	.	.	.	.	31
1	34	.	.	1	8	11	6	.	.	.	.	.	.	26
1	35	.	.	1	4	6	8	1	.	.	.	.	.	20
1	36	.	.	.	1	2	2	1	1	.	.	.	.	7
1	37	.	.	.	.	.	.	.	.	.	.	.	.	.
1	38	.	.	.	.	.	.	.	.	.	.	.	.	.
1	39	.	.	.	.	.	.	.	.	.	.	.	.	.
1	40	.	.	.	.	.	.	.	.	.	.	.	.	.
Total		.	70	110	87	33	25	3	1	.	.	.	.	329
2	25	.	.	.	.	.	.	.	.	.	.	.	.	.
2	26	.	33	2	.	.	.	.	.	.	.	.	.	35
2	27	.	31	6	.	.	.	.	.	.	.	.	.	37
2	28	.	18	16	3	.	.	.	.	.	.	.	.	37
2	29	.	6	24	7	.	.	.	.	.	.	.	.	37
2	30	.	2	26	11	1	.	.	.	.	.	.	.	40
2	31	.	.	18	14	.	.	.	.	.	.	.	.	32
2	32	.	.	15	17	.	.	.	.	.	.	.	.	32
2	33	.	.	14	11	4	1	.	.	.	.	.	.	30
2	34	.	.	5	20	4	3	.	.	.	.	.	.	32
2	35	.	.	1	19	15	1	.	.	.	.	.	.	36
2	36	.	.	1	13	8	8	.	.	.	.	.	.	30
2	37	.	.	.	9	13	11	1	.	.	.	.	.	34
2	38	.	.	.	4	8	11	1	1	.	.	.	.	25
2	39	.	.	.	2	9	8	4	.	.	.	.	.	23
2	40	.	.	.	3	7	8	1	1	.	.	.	.	20
2	41	.	.	.	.	5	7	2	2	.	.	.	.	16
2	42	.	.	.	.	2	6	3	3	.	.	.	.	14
2	43	.	.	.	.	1	5	.	3	.	.	.	.	9
2	44	.	.	.	.	1	3	1	2	.	.	.	.	7
2	45	.	.	.	.	2	1	1	1	.	.	.	.	5
2	46	.	.	.	.	.	1	1	3	.	.	.	.	5
2	47	.	.	.	1	1	1	.	.	.	.	.	.	3
2	48	.	.	.	.	.	1	2	.	.	.	.	.	3
2	49	.	.	.	.	.	.	1	.	1	.	.	.	2
2	50	.	.	.	.	1	1	.	1	.	.	.	.	3
Total		.	90	128	134	82	77	18	17	1	.	.	.	547

Table 3. Comparison of observed length at age for ages 2-5 from Table 2.

a) Males

	Age	Minimum	Maximum	Mode
Cdn	2	26	30	26
USSR		26	30	26
Cdn	3	26	34	29
USSR		26	35	28
Cdn	4	27	36	31
USSR		28	36	32
Cdn	5	29	35	34
USSR		29	36	34

b) Females

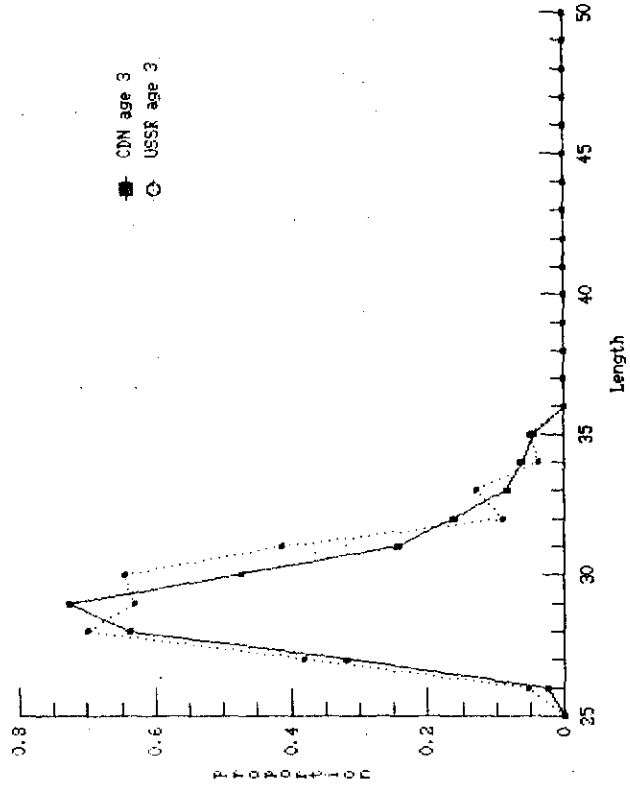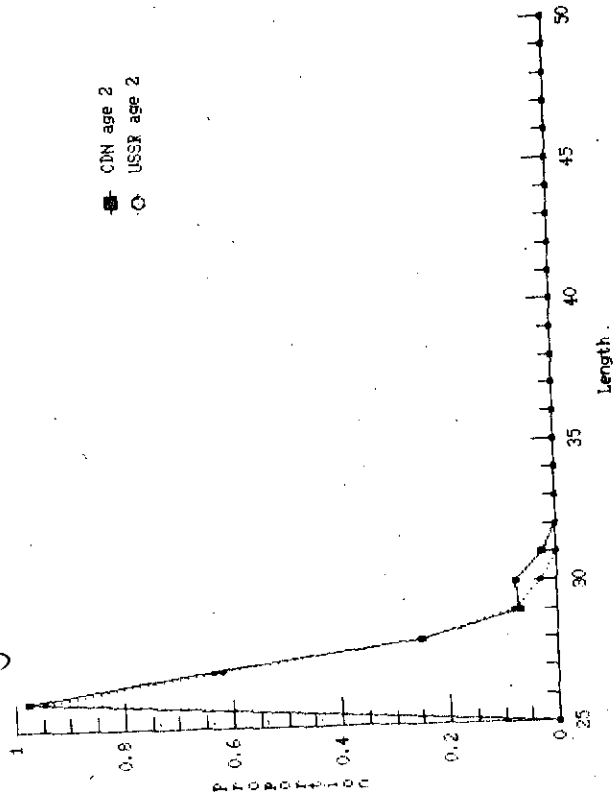|	Age	Minimum	Maximum	Mode
Cdn	2	26	30	26
USSR		26	30	27
Cdn	3	26	36	30
USSR		26	36	30
Cdn	4	27	40	32
USSR		28	47	34
Cdn	5	28	45	35
USSR		30	50	35

Fig 1a. Proportion at length by age for males
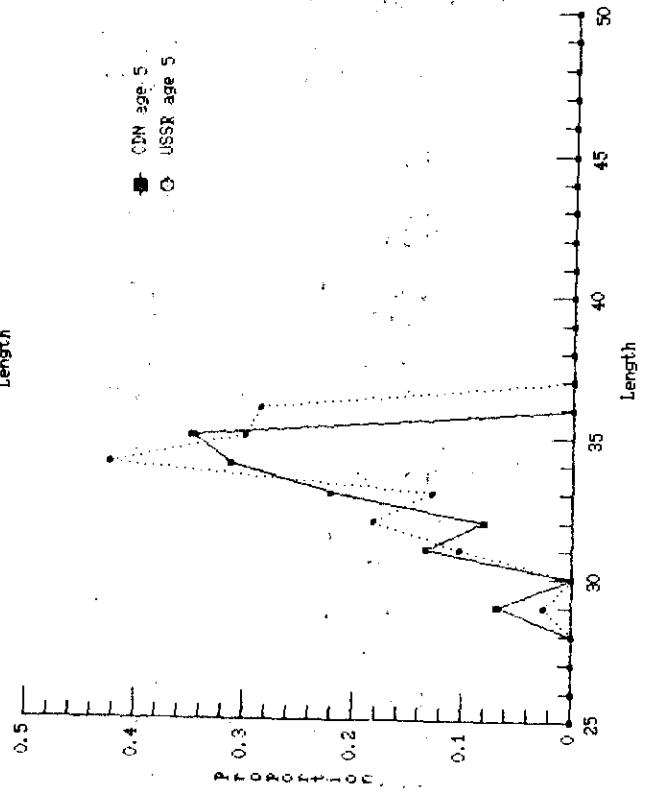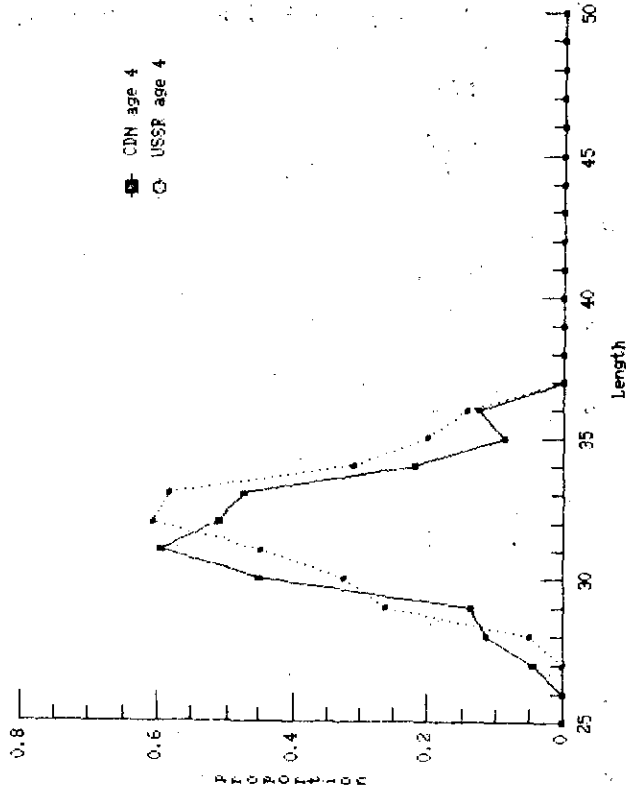
Fig 16. Proportion at length for females