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Update on Age Training for Silver Hake

by

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### **Introduction**

At the June 94 NAFO meeting a paper summarizing the protocol used for developing expertise for a new silver hake age reader was presented (Hunt and Bourbonnais, 1994). This report continues the assessment of inter-reader agreement for the new reader.

### **Methods**

Results of comparisons were assessed using algorithms developed by Campana et al., 1995.

To assess the impact of age length keys derived by the two readers for the 1994 samples, a length frequency representative of the commercial fishery (Observer samples for 1994) was partitioned using the two keys. The resultant 'catch at age' was compared to evaluated potential bias between the two estimates.

### **Results**

Comparisons for 1994 samples consisted of 354 samples and results are summarized in Table 1. Regression analysis gave a slope of .92 which was significantly different from zero, and the Wilcoxon matched-pairs test was also significant, indicating some bias in the results. The first author (agera) was under ageing compared to the second author (agerb). However the amount of bias (Fig. 1) was very small (mean of 0.25 year). The coefficient of variation between readings was 7.14%, rather higher than the 5.84% obtained in 1993, overall percent agreement was nonetheless high at 71%.

Otolith quality was assessed to be a factor in assigning ages. Many of the commercial otoliths did not clear out properly from the nucleus out towards the first and second annulus, and this reintroduced an uncertainty in determining the first annulus which caused some of the differences in age assignment between readers. Thirty one samples in which the readers disagreed, and for which the first reader confirmed her initial interpretation, were re-examined to assess the source of difference but there appeared not to be a predominant factor. As well as the size of the first annulus, checks, ring spacing and edge type were all considered the basis of differences. The second reader changed his interpretation to agree with the first reader in 16 cases and confirmed his first reading in 15 cases. These results indicate that differing estimates of age are probably due to the degree of otolith difficulty and not due to a difference in the conventions used for interpretation.

Results of the two catch at age estimates, by sex and combined, are shown in Table 2 as the percent age composition. At ages 1-5 the percent composition is very similar although the difference at age 3 for females appears to be more substantial. A two-sample analysis of variance indicates no significant difference between the estimates for males, females or the total. Results are summarized in Figure 2 by sex.

**Conclusions**

The approach used to develop ageing expertise has resulted in an acceptable degree of inter-reader agreement. The overall level of agreement is in excess of 70% and, while there is some indication of bias, the differences are small and arise from differences in reader judgment and not from differences in criteria applied. The differences in ageing have no significant effect on estimated removals at age.

Training of an additional reader in order to discuss interpretations is presently being carried out.

**References**

Campana, S.E, M.C. Annand and J.I. McMillan. 1995. Graphical and Statistical Methods for Determining the Consistency of Age Determinations. Trans. Am. Fish. Soc. 124:131-138.

Hunt, J.J. and M.C. Bourbonnais. 1994. Summary of Age Training for Silver Hake. NAFO SCR Doc. 94/34, 7 p.

Table 1. Summary of statistical comparisons between the 1994 age readers.

STOCK:	27	4VMX Silver Hake												
Variable(s) Entered on Step Number 1..		AGERA	AGE											
Multiple R		.91060												
R Square		.82920												
Adjusted R Square		.82872												
Standard Error		.62899												
F =	1708.89373	Signif F =	.0000											
----- Variables in the Equation -----														
Variable	B	SE B	95% Confdnce Intrvl B	Beta	T	Sig T								
AGERA	.920258	.022261	.876476 .964040	.910604	41.339	.0000								
(Constant)	.349030	.076715	.198152 .499908		4.550	.0000								
- - - - - Wilcoxon Matched-Pairs Signed-Ranks Test														
Mean Rank	Cases													
48.64	39	- Ranks (AGERB LT AGERA)												
54.82	65	+ Ranks (AGERB GT AGERA)												
	250	Ties (AGERB EQ AGERA)												
	354	Total												
Z =	-2.7013	2-Tailed P =	.0069											
STOCK	AGERA	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	TOT
27	1	37	10	.	.	.	.	.	.	.	.	.	.	47
27	2	3	73	8	.	.	.	.	.	.	.	.	.	84
27	3	.	8	69	18	7	1	.	.	.	.	.	.	103
27	4	.	.	7	44	10	2	.	.	.	.	.	.	63
27	5	.	.	1	10	17	7	1	.	.	.	.	.	36
27	6	.	.	.	1	6	6	.	.	.	.	.	.	13
27	7	.	.	.	.	.	1	1	1	.	.	.	.	3
27	8	.	.	.	.	.	.	.	2	.	.	.	.	2
27	9	.	.	.	.	.	.	.	2	1	.	.	.	3
STOCK	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	TOTAGERB	TOTAGERA
27	40	91	85	73	40	17	2	5	1	.	.	.	354	354
STOCK	CV	APE	D	AGREE	VALIDCNT	PERAGREE								
27	7.14	5.05	5.05	250	354	70.62								

Table 2. Calculated percent age composition for June 1994 length frequency using reader 1 and reader 2 age length keys.

Age								
	1	2	3	4	5	6	7	8
<b>Males</b>								
Reader 2	5.96	31.54	48.10	12.73	1.66	0.00	0.00	0.00
Reader 1	5.00	29.47	46.30	14.21	4.45	0.57	0.00	0.00
<b>Females</b>								
Reader 2	4.58	24.10	55.87	10.99	3.90	0.54	0.02	0.01
Reader 1	3.92	26.21	42.64	18.05	7.46	1.61	0.10	0.02
<b>Total</b>								
Reader 2	5.28	27.88	51.93	11.87	2.77	0.26	0.01	0.00
Reader 1	4.46	27.86	44.50	16.10	5.93	1.08	0.05	0.01

Figure 1. Age bias plot for 1994.

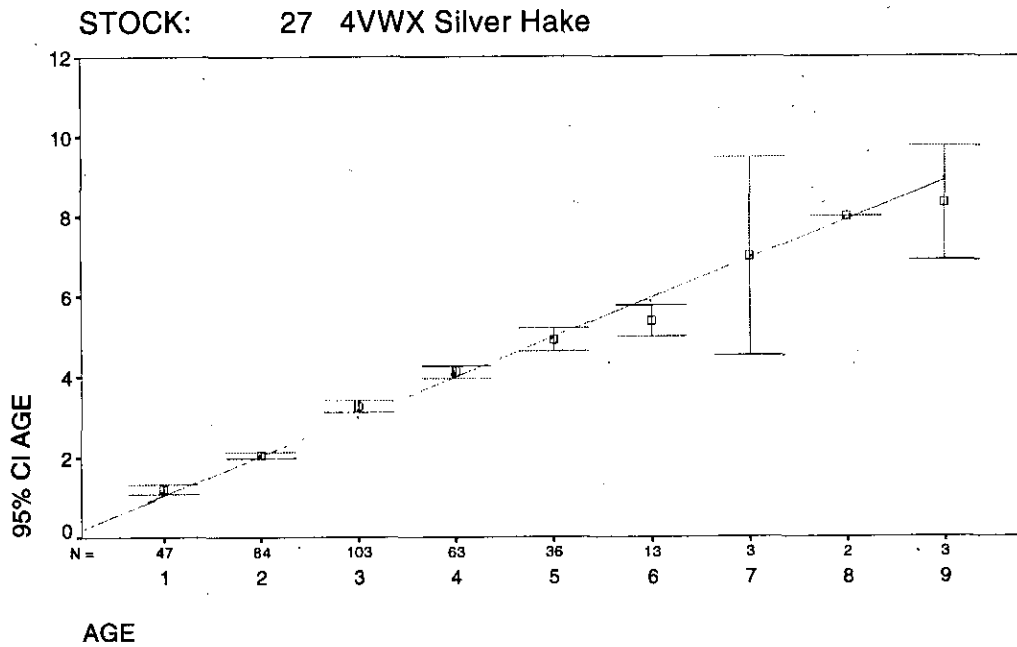


Figure 2. Comparison of percent catch at age for reader 1 and reader 2 ages.

