Comparison of Two Indices of Adult Striped Bass Abundance

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Investigation of the cause(s) of the decline in striped bass depends critically on the two indices of abundance, and in some instances these two indices lead to different conclusions. As examples, the CPE index implies a smooth decline of adults, but the Peterson estimate implies a dramatic decline between 1976 and 1977, and the CPE index implies the increase in adult mortality occurred primarily in younger adults, but the Peterson estimates implies that it was confined to older adults. It is therefore desirable to obtain some measure of the relative quality (accuracy or reliability) of these two estimates.

One of the criteria that both of these age-structured estimates would be expected to satisfy is consistency within cohorts. The relative size of a cohort should decline consistently rather than erratically. One of the ways of measuring this consistency is to compute the correlation along cohorts, that is between numbers at age a, time t and numbers at age a+1, time t+1. A more consistent estimate will have higher correlations. We have computed these correlations between natural logarithms of abundance for each of several pairs of ages for both sexes for both the Peterson estimate and the CPE index (Table 1).

For the CPE index the correlations increase from marginal values at ages 3-4 and 4-5 up to values near 0.9 for ages 5-6 and higher. For the Peterson estimate, because the dramatic decline in this estimate between 1976 and 1977 would prejudice the outcome, we eliminated those years from the correlation. Even with that adjustment, correlations between adjacent ages for the Peterson index are considerably lower than those for CPE index.

These results imply that the CPE index is more reliable and conclusions based on it should be given more weight in situations where only an index is needed. The results are not completely unexpected. The wide error bars on the Peterson estimate during recent years of low tag returns have been cause for caution in their use. The fact that the Peterson estimate is an estimate of abundance whereas the CPE index is merely proportional to abundance should be kept in mind. The additional cost of obtaining an estimate of abundance rather than just an index leads to greater relative error. Also of importance, especially in planning future research, is the fact that the Peterson estimate is our only estimate of absolute abundance. Table 1. Correlations between consecutive year-classes in consecutive years in the CPE ans peterson abundance indices. Correlations were calculated from the natural logs of the indices for each sex.

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	index	Correlation between ages $3-4$ $4-5$ $5-6$ $6-7$ $7-8$					
Fomales							
1 CIIIATE2	CPE	0.443	0.758	0.904	0.911	0.931	0.907
A STATISTICS	Peterson	0.464	0.360	0.357	0.867	-	-
Peterson w	/0 76-77	0.677	0.655	0.545	0.861		-
Males							
A CARACTER AND A CARA	CPE	0.536	0.779	0.894	0.894	0.905	0.889
	Peterson	0.416	0.330	0.742	0.640	-	
Peterson w	/0 76-77	0.550	0.583	0.781	0.499		-