

SOME COMMENTS ON STUDIES OF SKIPJACK TUNA GROWTH

By

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ABSTRACT

It is clear from Paul Struhsaker's presentation that otoliths of skipjack tuna may be used to provide reliable estimates of age. Hence, it should be possible now, using a standard technique and common set of criteria, to construct tables or curves giving size at age for skipjack tuna stocks in different areas of the Pacific and during different time periods.

Curves of apparent growth drawn from the otolith data tend to confirm and validate most estimates produced by other methods, such as modal progressions and tagging, in two areas of the Pacific so far studied. Within any particular stock, the discrepancies between estimates of size at age produced by the different techniques do not seem to be very serious (within the range of observations) in view of the various possible biases associated with each method, differences in time of sampling, etc. However, extrapolations beyond the range of observed lengths may lead to some disagreements. In this connection it should be noted that only in the growth curves of Brock for the Hawaiian skipjack tuna were observations made in the neighborhood of the estimated asymptotic size.

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The central Pacific otolith data so far accumulated indicate essentially linear growth up to about 75 mm. The estimates of von Bertalanffy K and L_{∞} for these data are not yet reliable. Assuming there is an asymptotic phase of growth for skipjack tuna, more observations will be required in the region of L_{∞} before L_{∞} or the growth rate K of the von Bertalanffy model can be determined precisely.

In comparing the growth curves from different areas, the most striking feature is of course the apparent differences in growth rate and maximum size between skipjack tuna taken in the Hawaiian region and skipjack tuna caught in the eastern Pacific and around Papua New Guinea. If these differences in growth are real, there could be a twofold to fourfold difference in yield per recruit at full exploitation between stocks in these areas. Whether the differences are primarily environmentally or genetically based cannot be determined at least until the subpopulation structure of the different stocks is elucidated. This may best be realized by a massive tag-and-recapture program coupled with comparative analyses of inheritable protein systems in the blood and other tissues.

In addition to clarifying the question of stock structure, tagging could shed some light on possible biases in the growth curves in all areas of the Pacific arising from such processes as size-specific migration. It has been hypothesized, for example, that the differences in growth rate between skipjack tuna caught in Hawaii and those taken in the eastern Pacific may be due in part to the longer residence time of slower growing skipjack tuna in the eastern Pacific and hence an overrepresentation of slower growing fish in the samples from this region.