

THE BIOLOGY, ECOLOGY AND EXPLOITATION
OF LONGTAIL TUNA, *THUNNUS TONGGOL* (BLEEKER)
IN OCEANIA

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in fulfilment of the conditions required
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A handwritten signature in cursive script, reading "Marc Wilson". The signature is written in dark ink and is positioned above the printed name.

Marc Wilson

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ABSTRACT

This study was undertaken at the behest of the Papua New Guinea Government in 1973 and extended to 1978. It aimed at elucidating the various aspects of the life history of longtail tuna *Thunnus tonggol* with a consideration of the factors influencing distribution, relative abundance and exploitation. During this period, 414 tagged fish were released with an overall recapture rate of 8.6% being recorded. Age at first maturity was established at approximately 60 cm for both sexes with a spring-summer spawning being postulated on the basis of gonadal development as evidenced by increasing gonadal indices. No significant departure from the 1:1 sex ratio was observed.

Von Bertalanffy growth equations were derived from the reading of increments on sagittal otoliths and modal progression analysis, and yielded respectively:-

$$L_t = 131.8 \left[1 - e^{-.395(t-.035)} \right] \text{ and } L_t = 122.91 \left[1 - e^{-.41(t-.032)} \right]$$

Both curves were consistent with growth indications from tag recoveries. The predictive length-weight relationship was determined to be $\ln(Wt) = -9.67 + 2.656 \ln(L.C.F.)$ and no significant differences existed between the sexes.

Longtail were shown to be opportunistic feeders: fish constituted the major portion of the diet and increased in accord with longtail size. It is postulated that longtail undergo longshore migrations due to thermal requirements and that these allowed for a hypothetical spawning site around the

Aru Island region - an acknowledged nutrient rich area during spring. Both morphometric and biochemical analyses failed to establish the existence of an eastern and western Australian longtail tuna population although there is strong evidence to suggest that sub-specific differences occur between Malaysian and Australian-P.N.G. stocks.

The exploitation of longtail at three levels; artisanal, amateur and commercial are reported. Concern is expressed as to the lack of data collection and collation of the Taiwanese gillnet fleet operating in the Australian Fishing Zone and about the exploitation of pre-adult longtail tuna. Accordingly, recommendations are made to alleviate the statistical problems and that consideration be given to a detailed study of the fishing parameters which affect the population dynamics of longtail tuna. The latter recommendation in particular should examine the impact that the foreign operated fishery has had on the stocks in Oceania.

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