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Reproductive biology of albacore tuna (*Thunnus alalunga*) in the Western Indian Ocean

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Abstract

Information on the biology of albacore tuna, *Thunnus alalunga*, in the Indian Ocean is scarce and little new information on the population is available. Scientific advice on the status of fish stocks relies on indicators that are based on strong assumptions on biological parameters such as condition, maturity and fecundity. Currently, reproductive parameters used in stock assessment models for Indian Ocean albacore originate largely from other studied stocks or species of tuna. Differences that may exist in the population biology of other albacore stocks from different regions may exert a great impact on the Indian Ocean albacore stock assessment, the fishery and management advice. Maturity, fecundity, sex ratio, condition and reproductive history are the fundamental factors that affect fish population productivity and are thus used for estimating the reproductive potential. They not only incorporate changes that occur in the reproductive success of a population into stock assessments but also allow estimation of Spawning Stock Biomass (SSB).

In this work, the reproductive biology of albacore tuna from the Western Indian Ocean was examined through analysis of the sex ratio, spawning season, length-at-maturity (L_{50}), spawning frequency and fecundity. From 2013 to 2015, a total of 923 female and 867 male albacore caught by different fishing gears were sampled. A bias in sex-ratio was found in favour of females with fork length <100 cm. Using histological analyses and gonadosomatic index, spawning was found to occur between 10°S and 30°S, mainly on the east of Madagascar from October to January. Large females contributed more to reproduction through their longer spawning period compared to small individuals. The L_{50} of female albacore was estimated at 85.3±0.7cm. Albacore spawn on average every 2.2 days during the peak spawning months in November and December. Batch fecundity ranged between 0.26 and 2.09 million eggs and the mean relative batch fecundity was estimated at 53.4 (±23.2) oocytes g^{-1} of somatic weight. The study provides new information on the reproductive development and classification of albacore in the Western Indian Ocean. The reproductive parameters will in turn significantly benefit its stock assessment by enhancing the confidence of the state and productivity estimates, especially taking into consideration the bias in sex ratio.