Direct aging and age compositions of SBT caught by Taiwanese longliners in 2019-2022

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Fish demography provides valuable insights into understanding fish population dynamics. The age composition of fish population can be accurately estimated using otolith direct ageing. This report presents the estimated age compositions of Southern Bluefin Tuna (SBT) caught by Taiwanese longliners in the Indian Ocean between 2019 and 2022, employing both otolith direct ageing and age-length key methods.

The otoliths samples were collected by scientific observers aboard the longline vessels, while additional otoliths were obstained from the SBT landed in Taiwanese fishing port. To facilitate the process, we acquired pairs of head sections containing the basi-occipital plates from the tuna processing factories in Kaohsiung harbor, Taiwan. These head sections, along with plastic tags clamped on the fish at the time of catch, were sent to my lab for otolith extraction and age determination. The ID number on each tag allowed us to access the biological and sampling information of each SBT from the catch documentation scheme database.

The direct ageing of SBT otoliths was conducted following the guidelines outlined in the ageing manual (Anonymous 2002), with certain modifications described in Shiao et al. (2008, 2017). By combing the direct ageing results with the fork length data, we construct an age-length key. This length to age conversion table was then used to estimate the age composition of the SBT caught by Taiwanese longliners during this period. The resulting age composition is depicted in Figure 1.

The findings show that Taiwanese longliners predominantly caught young SBT, aged between 2 to 5 years, accounting for over 70% of the total catch. While SBT older than 10 years were occasionally caught, their numbers were scarce and reliable estimation were challenging due to limited otoliths samples from larger-sized SBT. Besides, the estimated age compositions remained consistent throughout the years 2019 to 2022. These results suggested that the fishing activities of Taiwanese longliners did not undergo significant changes over this period, and the SBT population in the central Indian Ocean appears to be stable, displaying no major shift in demography.

Reference

Anonymous (2002) A manual for age determination of southern bluefin tuna *Thunnus maccoyii*: otolith sampling, preparation and interpretation. Report of the Direct Age Estimation Workshop. 11-14 June 2002, Victoria, Australia.

Shiao JC, Chang SK, Lin YT, Tzeng WN (2008) Size and age composition of southern bluefin tuna (*Thunnus maccoyii*) in the central Indian Ocean inferred from fisheries and otolith data. Zoological Studies 47(2): 158-171.

Shiao JC, Lu HB, Hsu J, Wang HY, Chang SK, Huang MY, Ishihara T (2017) Changes in size, age, and sex ratio composition of Pacific bluefin tuna (*Thunnus orientalis*) on the northwestern Pacific Ocean spawning grounds. ICES Journal of Marine Science. 204–214. doi:10.1093/icesjms/fsw142

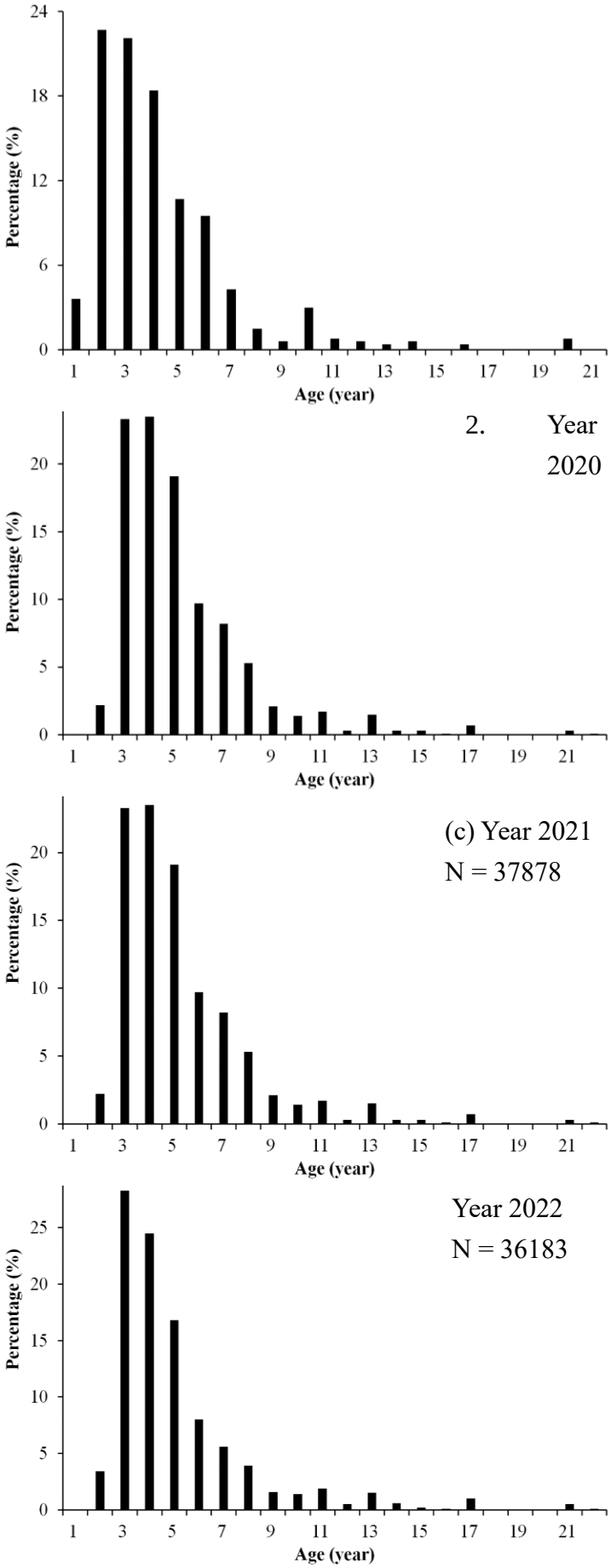

Figure 1. The estimated age composition of the SBT by otolith direct ageing.