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Update on Australian otolith collection and ageing activities in 2026

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Abstract

This report provides an update on the southern bluefin tuna (SBT) otolith collection and ageing activities in Australia in 2026. Otoliths from 173 SBT caught in the Great Australian Bight by the purse seine fishery in 2025 were received and archived in CSIRO's hard-parts collection. Age was estimated for 100 of these fish and the data were provided to the CCSBT in April 2026. An additional 162 sets of otoliths were collected in 2026.

CSIRO continues to develop epigenetic ageing methods for tuna, including a new research collaboration with Diversity Arrays Technology (DArT). If successful, this approach could significantly improve the workflow and efficiency of applying epigenetic ageing methods within the CKMR program.

Introduction

Since the 2002 fishing season, Australia has been required to provide annual length-at-age estimates for the surface (purse seine) fishery in the Great Australian Bight (GAB) to the CCSBT. Under the current sampling protocol, each operator provides otolith samples from 10 fish that have died either during towing operations or within the first few weeks following transfer to stationary farm cages. These otoliths are collected for ageing to support the estimation of length-at-age compositions for the fishery. Historically, approximately 250–400 otoliths have been collected from this sector per season. In recent years, however, the number of available samples has declined, primarily due to reduced mortality during towing operations.

This report summarises activities undertaken in 2026, including progress on otolith ageing and the development of high-throughput approaches for epigenetic ageing of tuna.

Otolith sampling and reading

A total of 162 sets of otoliths were collected from the Australian surface fishery in 2026, but these samples have not yet been received, archived or aged.

Of the 173 sets of otoliths that were collected in 2025, 100 otoliths were selected for ageing using a length-stratified sampling strategy rather than random sampling (Figure 1). This approach ensured all length classes were represented, including those with small sample sizes. One otolith from each fish was sent to Fish Ageing Services Pty Ltd (FAS) in Victoria for weighing, sectioning, and reading. Transverse sections were prepared following established protocols (Anon., 2002). A final age (count of opaque zones) was obtained for all 100 otoliths selected for ageing. Ages ranged from 1 to 4 years. The length to age relationship is presented in Figure 2. The raw age data (counts of opaque zones) were provided to the CCSBT scientific data exchange.

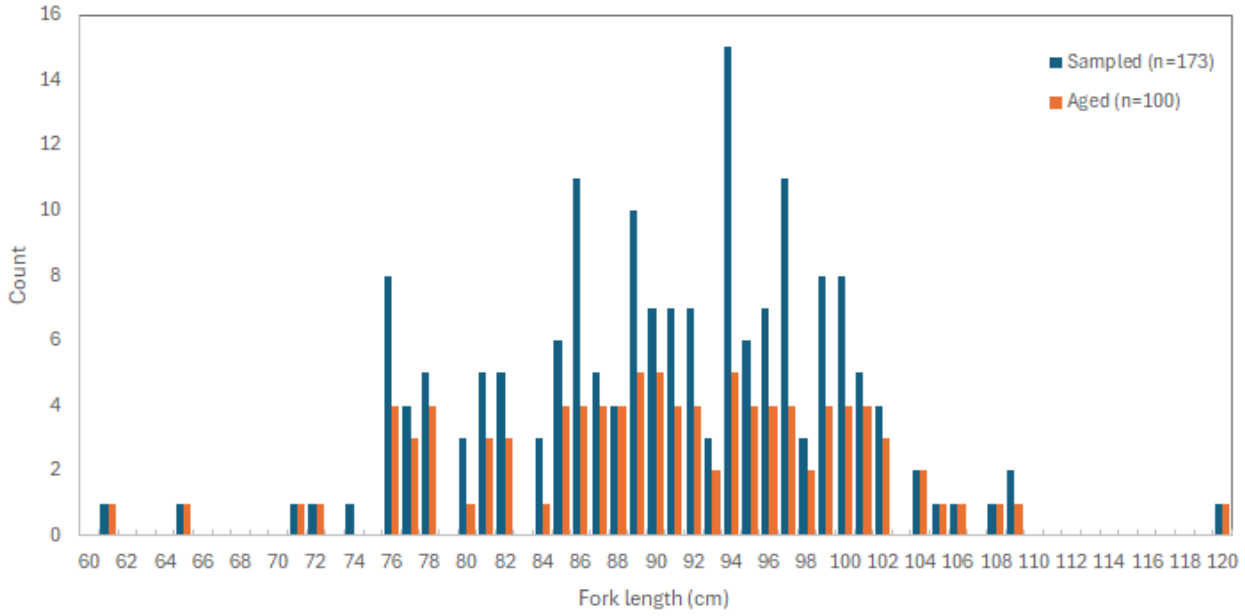


Figure 1. Length frequency of SBT with otoliths sampled and aged from the Australian surface fishery in 2025.

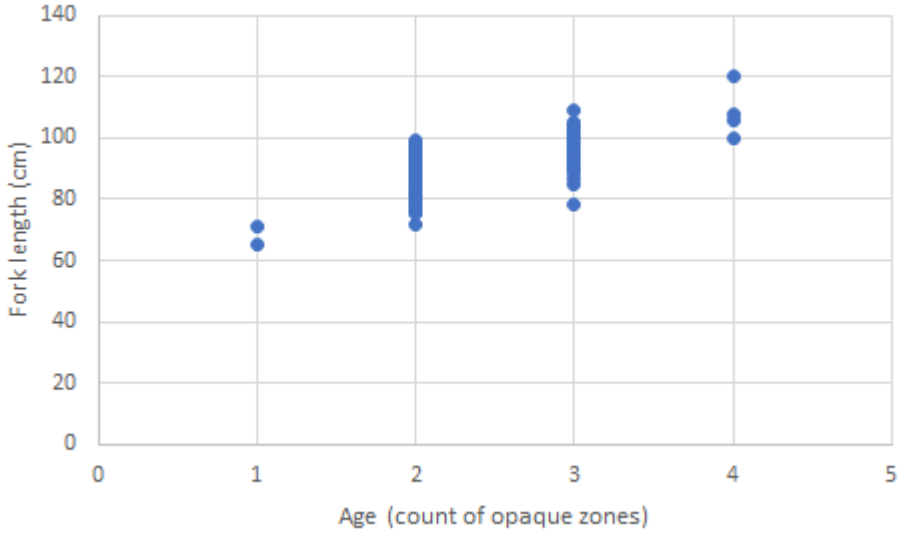


Figure 2. Length-to-age (zone count) relationship for SBT caught in 2025.

Epigenetic ageing

Epigenetic ageing has the potential to transform the assessment and management of tuna fisheries by being able to estimate age of individual fish directly from tissue samples. This approach would significantly reduce the cost and logistical challenges of collecting direct age data from otoliths.

CSIRO is collaborating with Diversity Array Technology (DArT) to develop a scalable, low-cost targeted epigenetic ageing assay for routine use in CKMR. Initial work in SBT demonstrated a strong age-associated methylation signal but was limited by low coverage and locus dropout. A refined panel of 2,640 markers has retained a strong age signal and is ready for development into a high-coverage DArTag assay, with the longer-term aim of a single assay applicable across multiple tuna species. Next steps are to validate the assay in SBT using more high-confidence aged fish.

References

Anonymous. (2002). A manual for age determination of southern bluefin Thunnus maccoyii. Otolith sampling, preparation and interpretation. The direct age estimation workshop of the CCSBT, 11-14 June 2002, Queenscliff, Australia, 39 pp.

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