

Project title: Alfonsino age protocol development

Project Code: ALF-2024-01

Terms of Reference

1 Introduction

Recent work on alfonsino otoliths has shown that the current aging protocol used to estimate age from otoliths may have severely underestimated the age of these fish (SC-09-29). As such a new and validated ageing technique is needed. This requires the development of a protocol for ageing, training some age readers in this technique and then testing it on a sample set of otoliths.

Key to this process is to get f fish age readers from multiple reading laboratories involved so that otoliths from the region can be aged consistently using a revised protocol.

2 Project Objectives

1. Develop a new protocol for ageing sectioned otoliths of alfonsino.
2. Age a selection of otoliths from a length stratified sample of fish.
3. Compare ages between workshop participants to validate the protocol.

3 Expected deliverables

1. Hold a workshop with alfonsino age reading specialists to develop an agreed protocol for ageing alfonsino from otoliths.
2. Develop growth curves for the 2026 alfonsino stock assessment provide SIOFA with:
 - a) Growth parameters - sex, separated and combined with a recommendation on which curves to use.
 - b) Raw length-at-age data for the assessment inputs and for the SIOFA database for future assessments. SIOFA will need to flag the previous data as incorrect in the data base.
 - c) Undertake additional ageing using the new protocol to expand the number of samples and compare estimates developed in different laboratories.
3. Develop workshop recommendations:
 - a) Protocol document same for each lab (CK, JP, AU, NZ, SPC).

- b) Otolith library/reference set for each lab to be developed. This set should be cross validated between at least two labs. Set some timeframe for this so it's done while the protocol is fresh in everyone's mind.
4. Develop the reference set as a training set for training new age readers.
5. The training protocol should include a process to blind age the reference set prior to undertaking future analyses and the workshop should recommend a minimum standard required prior to undertaking future analyses.
6. Workshop summary paper to be presented at SIOFA SC11 in March 2026. This will include the workshop summary as well as the new protocol documentation.

Lead: JPN (Takehiro Okuda)/COK (Stephen Brouwer)

Funding source: MoP

Budget: A total of 15,000 € was allocated for this project. the expenses foreseen are as follows.

Item	Cost (Euros)
Workshop venue costs	4,746 €
Attendance of experts (x2)	4,722 €
Post workshop bomb radiocarbon validation	~3,030 €
Total	12,497 €

4 Workshop Agenda

Location: SPC Noumea

Date: 13-17 October 2025

Funding requirements: Travel and DSA for invited experts

Agenda

1. Confirmation of the agenda
2. Planned activities in Noumea:
 - a. Discussion on preparation methods used by participant countries and determine if a standardised approach is required for best practise.
 - b. Discussions regarding previous age validation data (e.g., bomb radiocarbon), and potential for complimentary methods (e.g., schlerochronological synergies with time-specific climate records).
 - c. Comparison of whole and sectioned otoliths.
 - d. Preparation of a small reference set of otoliths for ageing.
 - e. Develop an ageing protocol for alfonsino.
 - i. Develop otolith preparation procedures;
 - ii. Develop reading protocol;
 - iii. Develop multivariate ensemble model to determine the influence of each variable (otolith weight and thickness measurements).

- f. Advise on the number samples and size/age range required to develop reliable growth curves.
- g. Otolith sample selection (random vs stratified). Currently the objective is for a reliable growth curve for the assessment (stratified sample) but if the age data are also to be used for mortality estimates derived from age compositions then random sampling would be required.

5 Post-Workshop Activities

1. Age full sample and provide additional otolith weight and thickness measurements at home laboratory in Cook Islands and Japan [October 2025 - January 2026].
2. Cross validation between laboratories. Swap 100 processed and aged otoliths between Cook Islands and Japan and 50 from each of these sub-samples to be aged at FAS and SPC. Compare the results.
3. Growth estimates produced. Provide data to the stock assessment team who should assess the suitability for use in the assessment [and a random sample for mortality estimation - possibly only if reliable thickness/weight age relationship is achievable and a larger data set can be easily obtained in time for the assessment]. Aim to be completed by March 2026, as the assessment team will need the data by April 2026.
4. Bomb radiocarbon dating for heaviest otoliths to determine longevity, important for estimating natural mortality required for stock assessments (SPC), and validate periodicity of annuli using schlerochronologies (SPC).
5. Planned paper to SIOFA SC11 in 2026 by Japan, Cook Islands, FAS and SPC.
 - a. One joint paper including presentation of available age data. Noting that the full age sample and cross validation may not be completed by the SIOFA SC paper submission date (mid-February 2026). *An updated version of this paper once the work is completed could be produced as an information paper and provided to the SC in 2027 alongside the assessment.*
6. Develop an alfonsino age protocol manual for future use.