



Workplan and budget for close-kin mark recapture and Indonesian length/age monitoring

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CCSBT-ESC/2409/19

Prepared for the CCSBT Extended Scientific Committee for
the Twenty Ninth Meeting of the Scientific Committee

2-6 September 2024

Introduction

The Close-Kin Mark-Recapture (CKMR) and Indonesian length/age project is an ongoing monitoring program that provide essential data on the adult component of the SBT population for use in stock assessment models and the Cape Town management procedure used to recommend the global TAC for the fishery.

The CCSBT has funded this project since 2014/15. It includes the collection and genotyping of DNA from muscle tissue samples collected in Indonesia (adults) and Australia (juveniles) to identify parent-offspring pairs (POPs) and half-sibling pairs (HSPs) on an annual basis. In 2019, the CCSBT agreed to increase the number of tissue samples genotyped annually from approximately 2,000 to 3,100 (including both adults and juveniles) to enhance the "POPs per cohort comparison" (Anon 2019). The project also includes the collection and ageing of otoliths from the Indonesian longline fishery to estimate the age distribution of the SBT spawning stock.

The project was designated as an ongoing monitoring program in the 2023-2027 Scientific Research Program (SRP) in 2022 (Anon, 2022, ESC report Attachment 8). The workplan and budget for CKMR and Indonesian size/age monitoring program for the next three years (2025-2027) is provided below. CSIRO also co-invests funds for the project, but these costs are the CCSBT component only. In the past, the CCSBT has funded the projects on an annual basis, which can continue or be combined into one three-year project.

We note that the gene-tagging and close-kin monitoring programs are not included in the CCSBT Scientific Research Plan (SRP) priority research areas (Att 8 of 2022 ESC report). This is because a distinction was made between on-going monitoring programs that provide data for the stock assessment and the Cape Town Procedure, and future SRP research proposals (that should be ranked relative to SRP priorities, para 108 2022 ESC report).

Work plan - CKMR

The CKMR monitoring program runs on a 3 year cycle:

Year 1: Collect tissue samples from juveniles in Australia (~June to July) and adults in Indonesia (September to April). Note that the adult sampling occurs across two calendar years.

Year 2: Archive tissue, extract DNA and send DNA for sequencing using the CSIRO SNP markers.

Year 3: Analyse sequence data and calculate the number of POPs and HSP. The kin data are provided to the CCSBT's scientific data exchange in April of the 3rd calendar year.

In 2014/15 to 2020/21, muscle tissue samples were collected from 3,100 SBT each year (1,600 juveniles in Australia and 1,500 adults in Indonesia). Since then, sampling in Indonesia has been reduced to a total of ~380 over the past three seasons. Recent training of enumerators at the port of Benoa, Bali, has enables Indonesia to set a target of 3,000 tissue samples for the 2024/25 aiming to compensate for the lower-than-expected sampling in previous years (Farley et al., 2024). The sampling target will be reduced to the 'normal' 1,500 the following season. The annual variation in available samples for archiving, DNA extraction and sequencing has led to different

workplans for each year of the three-year project (Table 1), which is subsequently reflected in the annual budget for the project (Table 2).

Table 1. Number of tissue samples and DNA extractions planned each (calendar) year of funding.

Year	Target sampling		DNA extraction & sequencing		Comment
	Juveniles	Adults	Juveniles	Adults	
2025	1,600	1,500	1,600	0	No tissue from adults (Indonesia) will be sequenced as not yet available.
2026	1,600	1,500	1,600	3,382	Adult tissue for analysis will include samples collected in Indonesia in 2022/23 (n=148), 2023/24 (n=236) and 2024/25 (n=3,000).
2027	1,600	1,500	1,600	1,500	The 'usual' target of 1,600 & 1,500 tissue samples from Australia and Indonesia will be sequenced.

Table 2: CCSBT budget for the CKMR component of the project.

Year	CCSBT budget	Comment
2025	\$173,000	Reduced cost due to no tissue samples from Indonesia being sequenced
2026	\$290,000	Cost is increased due to more samples collected in Indonesia in the 2024/25 season and receiving ~380 samples from the preceding two years
2027	\$227,000	Costing based on 'normal' sampling levels sequencing workplan.

Work plan – Indonesian length/age

The Indonesian otolith collection and ageing program works on a 2 year cycle:

Year 1: Collect otoliths from adults in Indonesia (September to April). Note that the Indonesian sampling occurs across two calendar years.

Year 2: Archive and age the otoliths. Epigenetic ageing of muscle tissue samples (collected for CKMR) will supplement the otoliths ageing. The length and age data are provided to the CCSBT's scientific data exchange.

In 2014/15 to 2020/21, otoliths were collected from 1,500 adult SBT in Indonesia and 500 were aged to develop an annual age-length-key (ALK). Since then, sampling in Indonesia has been reduced to a total of ~169 otoliths and ~380 tissue samples over the past three seasons. As noted above, recent training of enumerators at the port of Benoa, Bali, has enables Indonesia to set a target of 3,000 tissue samples for the 2024/25 aiming to compensate for the lower-than-expected

sampling in previous years (Farley et al., 2024). In addition, a target of 300 otoliths was set for age estimation. A combination of otolith and epigenetic ageing will be undertaken to develop ALKs in this project. The annual variation in available samples for archiving and ageing has led to different workplans for each year of the three-year project (Table 3), which is subsequently reflected in the annual budget for the project (Table 4).

Table 3. Number of otolith samples and age estimates planned for each (calendar) year of funding.

Year	Target otolith sampling	Otolith and epigenetic ageing ¹	Comment
2025	300	0	No otolith or epigenetic ageing will be undertaken in 2025 as not yet available.
2026	300	884	Otolith and/or tissue for analysis will include samples collected in 2022/23 (n=148), 2023/24 (n=236) and 2024/25 (n=500).
2027	300	500	The 'usual' target of 500 age estimates will be obtained in 2027.

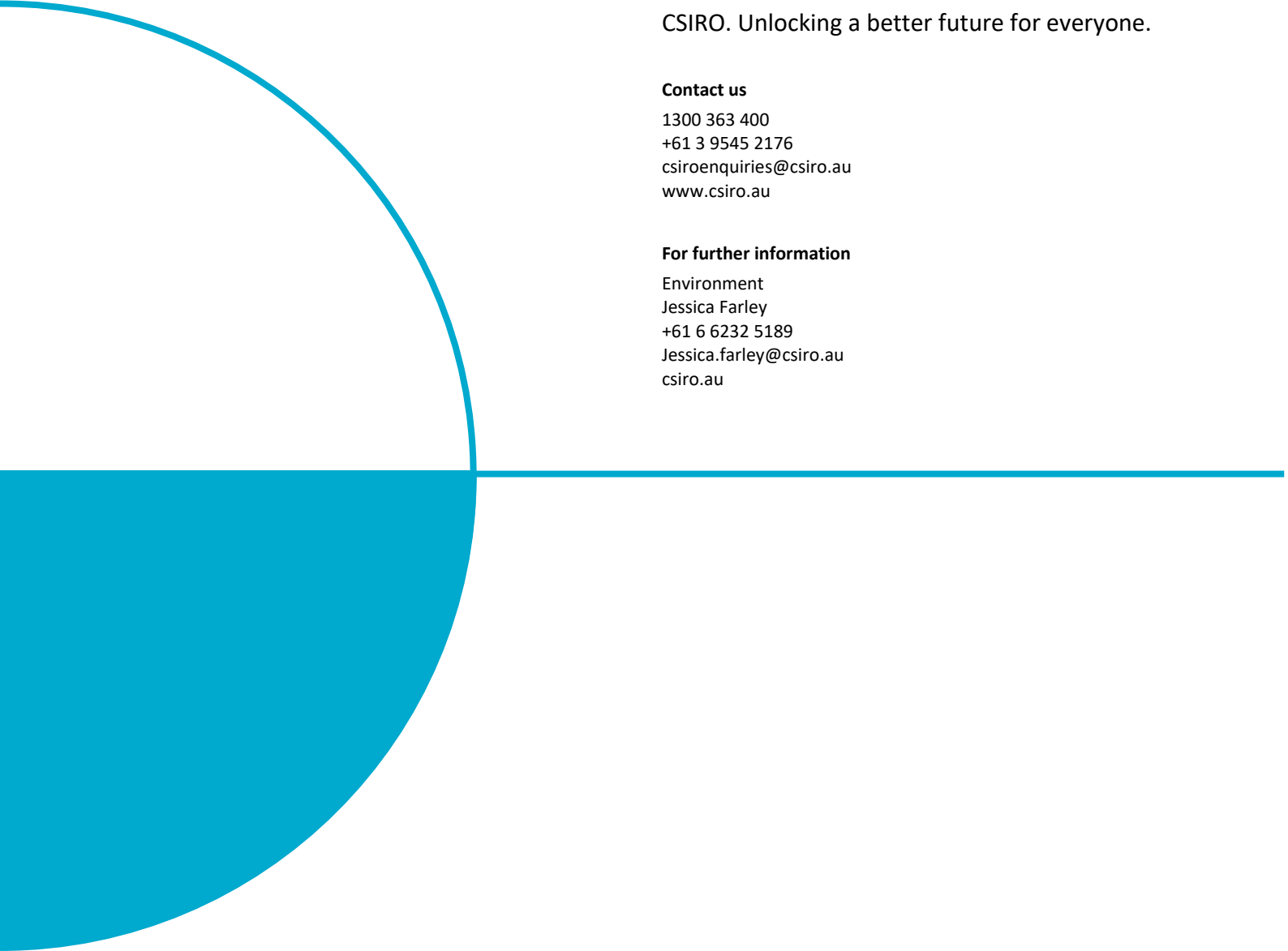
¹ If insufficient otoliths are collected across appropriate length classes, additional age estimated will be obtained using epigenetic ageing methods on muscle tissue samples.

Table 4: CCSBT budget for the Indonesian age component of the project.

Year	CCSBT budget	Comment
2025	\$0	Reduced cost due to no otoliths (or muscle tissue) from Indonesia being aged.
2026	\$52,000	Cost is increased due to more samples collected in Indonesia in the 2024/25 season and receiving ~380 samples (otoliths and/or muscle tissue) from the preceding two years.
2027	\$41,000	Costing based on 'normal' sampling and ageing workplan (otolith and/or epigenetic ageing).

References

Farley J, Satria F, Sadiyah L, Suadela P, Sulistyaningsih R et al. 2024. Update on SBT catch monitoring and capacity building for biological sampling of spawning ground catches in Indonesia. CCSBT/2409/12.



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