



# Gene-tagging 2025-2027, workplan and budget

**Ann Preece**

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# Introduction

The gene-tagging program was designed to provide a fishery independent estimate of the absolute abundance of the age-2 cohort, with specified precision, to monitor recruitment and provide data essential for running the Cape Town Procedure (see design study; Preece et al, 2015). A pilot study commenced in 2016 and gene-tagging has continued as an on-going monitoring program since 2017.

The workplan and budget for the gene-tagging program in 2025-2027 is described here. CSIRO co-investment in the project has been reduced and, therefore, the workplan has been slightly modified to reduce total costs. These changes may increase some risks to achieving the intended outcomes of the program. The aim of this paper is to inform discussion at the ESC and provide background to the discussion at the Finance and Administration Committee of the Commission.

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 the future SRP research proposals that should be ranked relative to SRP priorities (para 108 2022 ESC report).

## Work plan (original design)

The gene-tagging program works on a 2 year cycle that has 3 stages:

**Stage 1 in year 1:** Charter vessel (20 days) and collect tagging data and tissue samples from ~5,000+ juvenile (age-2) SBT each year.

**Stage 2 in year 2:** Collect tissue samples from ~10,000+ fish (age-3) during harvest by the Australian Purse Seine fishery, and process all samples (tagging and harvest) and archive extracted DNA.

**Stage 3 in year 2:** Genotype the DNA samples using the CSIRO SNP markers, and calculate an abundance estimate. The tag and release data and abundance estimate are provided to the CCSBT's scientific data exchange.

The number of fish tagged and number of samples collected at harvest varies from year to year. When possible, more than 5000 fish are tagged as this can improve the precision of the estimate. If fewer than 5000 fish are tagged, the harvest sample collection can be increased to maintain precision of the estimate of abundance.

## Modified workplan

The modified workplan introduces costs saving by reducing the number of days at sea and total number of samples collected. The budget is outlined in the table below.

Milestone payments are in May to pay stage 1 costs, and December to cover stage 2 and 3 costs. CSIRO provides a report on progress on stage 1 and 2 to the ESC, and a milestone report on progress on stage 3 to the CCSBT in December each year. CSIRO is reducing its co-investment of funds in this project, and the costs included in the table below are the CCSBT component only.

Budget for workplan 2	Milestone	2025	2026	2027
Stage 1 costs: Vessel charter, labour, tagging equipment and supplies. Reduce costs - Shorter vessel charter: 1 trip, 15d. Fish tagged: target 5,000 - max 8,000.	April	\$390,000	\$390,000	\$390,000
Stage 2 and 3. Harvest sample collection, lab supplies and labour, genotyping, data analysis and management. Reduce costs - Total tissue samples collected (from harvest sample collection and tagging): max 15,000 samples.	December	\$390,000	\$395,000	\$395,000
<b>CCSBT Total</b>		<b>\$780,000</b>	<b>\$785,000</b>	<b>\$785,000</b>

The risks associated with the modified workplan are:

1. Fewer days at sea increases the of risk not tagging the target number of fish (as specified in the design). Fewer days at sea may limit the opportunity to work around difficulties in finding schooling fish and bad weather, and there is less opportunity to spread tagging temporally and spatially.
2. Reducing the total number of tissue samples collected (harvest plus tagging) limits flexibility to collect more samples at harvest to maintain precision of the abundance estimates. It also does not allow for the usual (small) loss of samples due to poor tissue collection or failure to meet genotyping quality controls.

## Strategic value of recruitment monitoring

The SBT stock is vulnerable to changes in recruitment because SBT is a long-lived and late-maturing species; today's recruits will have an impact on the SBT spawning stock size in 8-12 years time. Climate change impacts on the stock (e.g. survivorship of juveniles, changes in spawning success, mortality changes that affect spawning stock size) are most likely to be first detected through changes in recruitment. Recruitment monitoring can provide an early warning of change, and when combined with responsive management action, should provide resilient stock management.

As the gene-tagging timeseries grows it will provide information on natural recruitment variation, the relationship between spawning stock and recruitment, and gene-tagging data will overlap with close kin adult abundance data to reduce uncertainty in estimates of cohort size, age structure, and parameters in the models.

## Summary

This paper provides a summary of a proposed modified workplan for gene-tagging in 2025-2027, that reduces total costs by reducing numbers of days at sea and total number of samples collected and processed. The budget includes the CCSBT component only, for consideration at ESC and for discussion by the CCSBT Finance and Administration Committee of the Commission. CSIRO also co-invests in this project.