

Operating Model Specification and Software Upgrade Project

Introduction and Summary of the Tokyo Workshop

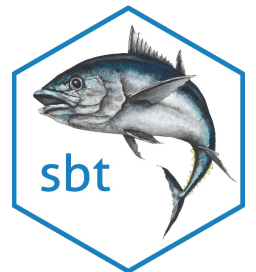
Darcy Webber

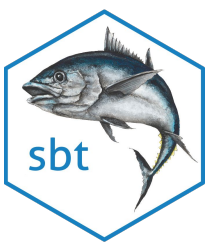
24 June 2024
Seattle



QUANTIFISH

Quantitative Fisheries Science





Contents

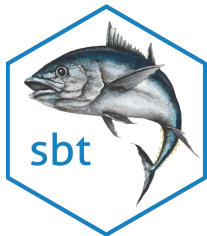
This presentation

1. Project specifications
2. Summary of the Tokyo workshop
3. Planning and overview of progress since the Tokyo workshop

Other presentations

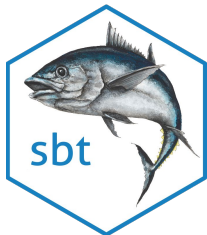
4. Details of progress since the Tokyo workshop
5. Next steps

Project specifications



Project specifications

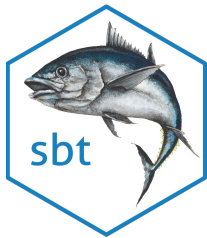
- A (Start year): 2023
- B (Duration): 3 years
- C (General category): OM
- D (Sub category): Asses
- E (Project title): Operating model specification and software upgrade
- ⋮
- I (Impact Scale): High
- J (Impact timing): Med
- K (Priority): to be completed at ESC meetings.
- L (Rank): to be completed at ESC meetings.
- ** (budget source): CCSBT



Project specifications: problem definition

F (Problem): The current operating model (OM) specifications, code, and software present challenges for

1. communicating the population dynamics and statistical assumptions underpinning the SBT model;
2. addressing uncertainty within the OM grid; and
3. revising and implementing alternative hypotheses in stocks assessments and future MP evaluations.



Project specifications: objectives

G (Objectives):

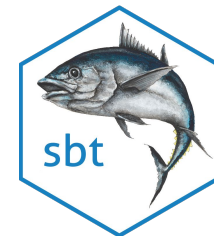
1. Update and revise OM documentation to match the OM code;
2. Develop new OM implementations in either ~~Star~~ or Template Model Builder (TMB) software;
3. Code modifications to the OM to be decided by the OMMP Working Group to improve estimation efficiency and allow future flexibility in adding/removing complexity and features as needed;
4. Complete validation test comparing estimates from new implementation with current ADMB version.



Project specifications: rationale

H (Rationale): Upgrading to modern software will improve the flexibility, utility, and understanding of the SBT operating and assessment models for all CCSBT participants. Improvements to model structural and statistical procedures will potentially result in better presentation and understanding of historical, current and future SBT stock status, its associated uncertainty, and MP performance.

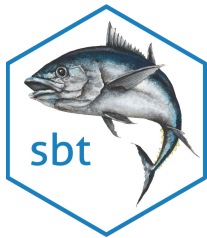
Project specifications: resources



2023	2024	2025
25d Consultant	20d Consultant	20d Consultant
2d MP Coordinator	2d MP Coordinator	2d MP Coordinator
—	1d extra at ESC meeting (VEH, Cat, 3P, 1C, 1Ch, Sec)	—
1d extra at Seattle OMMP meeting (Cat, 3P, 1C, 1Ch)	—	—
3d dedicated inf. OMMP meeting (Tokyo: FreeV, Cat, 3P, 1C, 1Ch)	5d dedicated OMMP meeting (Seattle: FreeV, Cat, 3P, 1C, 1Ch)	—
2*2hr online meetings (3P, 1C, 1Ch, Sec)	2*2hr online meetings (3P, 1C, 1Ch, Sec)	2*2hr online meetings (3P, 1C, 1Ch, Sec)

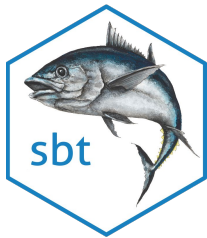
Abbreviations:

- Sec Secretariat Staff
- Ch Independ. ESC Chair
- P Independ. advisory panel
- C Consultant
- Cat Catering only
- VEH venue & equipment hire
- FreeV Free Venue & equip



Project specifications: work plan 2023

- ✓ Cleaning of old code and documentation.
- ✓ Darcy works on new conditioning code to match old code.
- ✓ One or more informal short (1-2 hour) online meetings.
- ✓ One extra day added to the scheduled in-person OMMP meeting to discuss progress.
- ✓ 3-day in-person meeting in November focused on the transition to the new code:
 - ✓ compare conditioning results obtained with old and new code;
 - ✓ show structure and receive feedback;
 - ✓ discuss projection code (could run old projection code with outputs from new code as an intermediate step);
 - ✓ prioritise work (changes to the code) for 2024
 - ✓ Provide training/tutorial



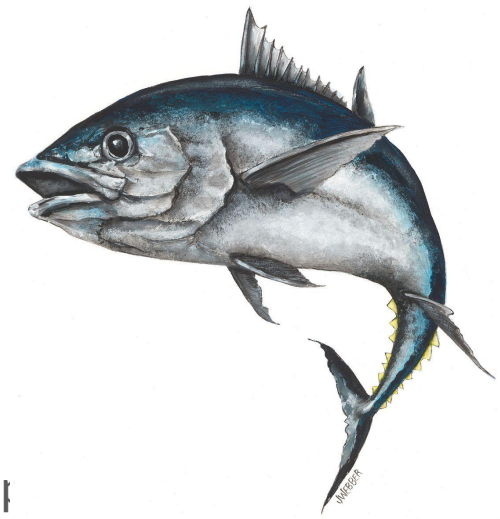
Project specifications: work plan 2024

- ✓ One or more informal short (1-2 hour) online meetings.
- ❑ 5-day OMMP in person meeting in June to discuss/implement/evaluate changes to the OM (conditioning and projections), and provide training/tutorial
- ❑ One extra day at ESC to discuss progress.

Summary of the Tokyo workshop

Progress prior to the Tokyo meeting

- The operating model (OM) was coded in template model builder (TMB)
- The model was integrated into an R package named *sbt*
- The SBT picture was painted by Joanne Webber (my mum) *sbt* package
- The R package was made available online on GitHub
- The R package is documented with examples on the package website <https://quantifish.co.nz/sbt/>
- Many of the outstanding issues can be found here: <https://github.com/quantifish/sbt/issues>
- The new OM mimics the ADMB OM very well (see the website)



Progress at the Tokyo meeting

- Everyone at the workshop successfully installed the *sbt* package and ran the software / fitted a model to data
- The model structured was investigated in detail
- Planning of new features and a timeline was discussed
- A meeting report was published

Commission for the Conservation of
Southern Bluefin Tuna



みなみまぐろ保存委員会



Report of the Operating Model Specification and Software Upgrade Workshop

20 – 22 November 2023
Tokyo, Japan

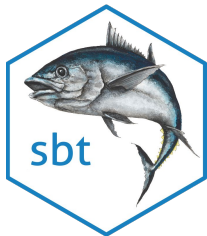
Planning and an overview of progress since the Tokyo workshop



Next steps: prior to June 2024 OMMP

Ideally the following changes would be implemented before the June 2024 meeting so that they can be evaluated by the OMMP working group:

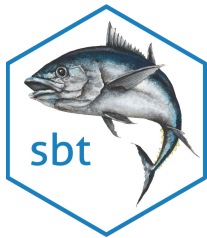
- ✓ Check age likelihood again (small difference in likelihood)
- ✓ Lump the LL3 and LL4 fisheries and cohort slice and treat as removals
- ❑ Specify the LL1, LL2, Australian and, Indonesian selectivity using GMRF (in progress)
- ❑ Review this years sensitivities and robustness tests and make sure all the code to do these is available
- ❑ Can filter out some of the POPs in get_data that result in likelihood values that are not used in the estimation
- ✓ Name the grid runs in run_grid
- ❑ Implement grid sampling in the R code (in progress)
- ✓ Re-code tag likelihoods to remove the H^* parameters (harvest rate for mixing periods) and add the output for the PSIS-LOO diagnostic
- ✓ Implement the Dirichlet-multinomial likelihood for composition data
- ❑ Code prior distributions in short-hand (following R format; e.g., dnorm()) (in progress)
- ❑ Incorporate the age-uncertainty for the adult part of the POP calculations (the possible ages given length) (in progress)
- ❑ Update website to improve documentation (e.g., add vignette on “how to run the grid”).
- ❑ Evaluate if other “Stan” R packages (e.g., adnuts) can be used to help evaluate model runs.



Next steps: at the June 2024 OMMP

Other tasks that could be completed at the June 2024 meeting include:

- ❑ Review harvest rate function and determine if a penalty is required to keep it below 0.9 (currently there is no penalty in the *sbt* model)
- ❑ Categorise what we want to add to REPORT and ADREPORT in the TMB code
- ❑ Implement “one-step ahead residuals” diagnostics for judging fits to composition data (in progress)
- ❑ Evaluate how the grid should be modified in light of new MCMC capabilities



Next steps: after the June 2024 OMMP

Tasks that could be done after the June 2024 meeting include:

- ❑ Projection model developments: two options were discussed, an interim option that requires the TMB code to output the same variables that the ADMB conditioning code passes to the projection code, so that the old projection code can be run (with inputs in the same format) or a final option where projections are implemented within the “simulate” blocks of the TMB code.
- ❑ Add in the supplemental optimization code to compute MSY quantities by year using year-specific parameters and catch allocations between fleets.