Commission for the Conservation of
Southern Bluefin Tuna

みなみまぐろ保存委員会

Report of the Twenty Eighth Meeting of the Scientific Committee

1 September 2023
Jeju island, Republic of Korea

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Jeju island, Republic of Korea

Agenda Item 1. Opening of meeting

1. The independent Chair, Dr Kevin Stokes, welcomed participants and opened the meeting.
2. The list of participants is at **Appendix 1**.

Agenda Item 2. Approval of decisions taken by the Extended Scientific Committee

3. The Scientific Committee endorsed all the recommendations made by the Extended Scientific Committee for the Twenty Eighth Meeting of the Scientific Committee, which is at **Appendix 2**.

Agenda Item 3. Other business

4. There was no other business.

Agenda Item 4. Adoption of report of meeting

5. The report of the Scientific Committee was adopted.

Agenda Item 5. Closure of meeting

6. The meeting was closed at 4:12 pm, on 1 September 2023.

List of Appendices

Appendix

1. List of Participants
2. Report of the Extended Scientific Committee for the Twenty Eighth Meeting of the Scientific Committee

Appendix 1

List of Participants
The Twenty Eighth Meeting of the Scientific Committee

First name	Last name	Title	Position	Organisation	Postal address	Tel	Email
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Commission for the Conservation of
Southern Bluefin Tuna

みなみまぐろ保存委員会

Appendix 2

Report of the Extended Scientific Committee for the Twenty Eighth Meeting of the Scientific Committee

28 August – 2 September 2023
Jeju island, Republic of Korea

Extended Scientific Committee
for the Twenty Eighth Meeting of the Scientific Committee
28 August – 2 September 2023
Jeju island, Republic of Korea

Agenda Item 1. Opening

1.1 Introduction of Participants

1. The independent Chair of the Extended Scientific Committee (ESC), Dr Kevin Stokes, welcomed participants and opened the meeting. The Chair advised that discussion for some agenda items had commenced in advance by correspondence and thanked participants for their cooperation with this arrangement.
2. Mr Dong-sik Woo, President of the National Institute of Fisheries Science, Ministry of Oceans and Fisheries of the Republic of Korea, welcomed all participants to Jeju Island, Korea, and provided the opening remarks for the ESC.
3. Each delegation introduced its participants. The list of participants is included at **Attachment 1**.
4. The Chair noted that the European Union (EU) and South Africa did not attend this meeting.

1.2 Administrative Arrangements

5. The Executive Secretary announced the administrative arrangements for the meeting.

Agenda Item 2. Appointment of Rapporteurs

6. Australia, Japan and New Zealand provided rapporteurs to produce and review the text of the substantive agenda items.

Agenda Item 3. Adoption of Agenda and Document List

7. The agreed agenda is provided at **Attachment 2**.
8. The agreed list of documents is provided at **Attachment 3**.

Agenda Item 4. Review of SBT Fisheries

4.1. Presentation of National Reports

9. The majority of discussion for this agenda item commenced by correspondence in advance of the ESC.
10. The Chair noted that no national report had been received from either the EU or South Africa. In the EU's case, the Executive Secretary relayed the previous

advice from the EU that it does not have a target southern bluefin tuna (SBT) fishery, and it has not reported any bycatch of SBT in the relevant reporting period. South Africa did not provide a reason for the absence of its report.

11. The ESC stated that the lack of national reports from the EU and South Africa was regrettable and also noted that the ESC has not accepted the EU's reasoning for not submitting its national report. The ESC also stated that the information in the EU report would be beneficial in the context of supporting the work aimed at estimating UAM.

12. Australia submitted paper CCSBT-ESC/2308/SBT Fisheries-Australia. The 2021–22 SBT fishing season report summarises catches and fishing activities in the Australian SBT Fishery up to and including the 2021–22 fishing season1 (1 December 2021 – 30 November 2022). Australia's allocation as agreed by the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) was 6,238.4 t for the 2021–22 fishing season. However, this was adjusted to account for a set aside for the recreational sector and to account for undercatch in the previous fishing season, so the effective TAC was 6,653.4 t. A total of 31 commercial fishing vessels landed SBT in Australian waters in the 2021–22 fishing season for a total catch of 5,972 t. A total of 82.75% of the catch was taken by purse seine with the remainder taken by longline, pole-and-line, rod-and-reel and trolling. Eight purse seiners fished off South Australia for the Australian farming operations during the 2021–22 fishing season, with live bait, pontoon-towing and feeding vessels also involved. Most of the purse seine fishing commenced in December 2021 and finished in March 2022. Length-frequency data from the purse-seine fishery indicate a shift to smaller fish in recent years. Average lengths of SBT transferred to farms in South Australia declined from 96.4 cm in the 2016–17 season to 83.3 cm in 2021–22. In the 2021–22 fishing season, observers monitored 9.6% of purse seine sets where fish were retained for the farm sector and 10.8% of the estimated SBT purse-seine catch. In 2022, the review rate for e-monitoring footage of longline hook effort in the Eastern Tuna and Billfish Fishery during the months and in the areas of the SBT migration through that fishery was 10.8%. In 2022, the review rate for e-monitoring footage of longline hook effort in the entire Western Tuna and Billfish Fishery was 11.1%.

13. Australia also submitted paper CCSBT-ESC/2308/11, that describes Australia's catch and effort data submission. On behalf of the Australian Government, the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) has compiled aggregated catch and effort, catch by fleet, raised catch, catch at size, and non-retained catch for submission to CCSBT. This has been compiled from a number of databases including daily fishing logbooks, catch disposal records and fisheries observer reports, collected and managed by the Australian Fisheries Management Authority. The Australian catch of SBT from the surface (purse seine) fishery is also sampled by contracted field staff prior to release into farm cages. The sample data include size and weight measurements that are used to calculate representative size distributions and average weights. PARQUET files in the Azure Data Lake, spreadsheets and Synapse workflows are used to integrate and process the source data sets and create the data files required for the CCSBT data exchange. This report provides copies of data collection forms, as well as flow charts illustrating the data integration procedures. The paper also describes the data validation procedures.

14. In response to questions on its national report, Australia advised that:

- For the stereo-video commercial trial, this report refers to the results of the second and final phase of the trial, and upon completion of year two of the trial, Australia will report the final results of the trial to EC 31;
- Fish caught in the longline fishery that have been shark damaged to the point of being unfit for human consumption are not deducted from quota statutory fishing rights (SFRs). Operators in the purse-seine sector are required to record fish mortalities observed during purse seine, tow and transfer operations. Mortalities are fish that have died in the purse-seine net or in the tow cage and these fish are deducted from quota SFRs. Due to the nature of operations, shark predation in the purse seine and tow cages is likely to be cryptic. Once fish have been transferred into farm pontoons (where fish spend most of their time prior to harvest), any depredation that takes place would already have been deducted from a quota holder's entitlements;
- For depredation, no estimate of weight was reported because of the state of the fish. Further, no estimate of cryptic mortality was able to be made;
- For observer coverage, the data to calculate an estimate of the proportion observed by weight for the surface longline fishery may be available, but the benefits of presenting both (number of fish and kg of fish) is limited as it is expected that it would produce similar coverage rates without adding appreciable value to the reporting; and
- While restrictions around the COVID-19 pandemic are no longer preventing the collection of otoliths in Australia's longline fishery for SBT, previous collection of otoliths in the sector has been opportunistic. In the light of the outcomes of CSIRO's study in 2017, Australia is considering options to collect otoliths according to the framework proposed in the 2017 study.

15. Indonesia submitted paper CCSBT-ESC/2308/SBT Fisheries-Indonesia. SBT (*Thunnus maccoyii* Castelnau, 1872) is seasonally caught as by-catch from Indonesian tuna longline fleets operating in the Indian Ocean. This report provides scientific information on the Indonesian tuna longline fishery related to SBT for the 2022 calendar year, spanning from 1 January to 31 December 2022. The total number of active longline vessels recorded was 170 units, whereas the total reported SBT catch was 1,031 tons, or equal to 11,207 individuals. Size of SBT ranged from 112-210 cm FL (mean=165.7 cm FL) for Area 1 and 100-245 cm FL (mean=166 cm FL) for Area 2. There were ten observer trips were deployed in 2022, covering at least 2.74% in Area 1 and 0.33% in Area 2 in terms of total hooks.

16. In response to questions on Indonesia's national report:

- To the question if there is any regulation to require all vessels to retain all the caught SBTs on board, Indonesia advised that there is no National Regulation to retain all SBTs caught on board. All SBTs caught are retained.
- Regarding the recent reduction in the number of SBT catches in Area 1, Indonesia advised that the ID's longline vessels have in general for the last 2 years (2021, 2022) fished more in Area 2 compared to Area 1. As these vessels are targeting tropical tunas, not SBT, it is unclear whether this indicates a decline of the SBT spawning stock or of other tropical tuna;

- Indonesia clarified that the Indonesian fleet operates between 25-30°S when it operates in Area 2;
- For the future prospects for providing catch and effort data by 5x5 degrees by month, Indonesia advised that logbook data for LL vessels is compulsory by regulation. The level of logbook submission is improving; however, there is a need to improve the quality and completeness of logbook data submitted. In general, the 5x5 degrees LL C/E by month is possible to provide with some limited records with SBT catch; and
- To resolve a barrier to reimplementing a monitoring program due to the transition of the National Research Innovation Agency (NRIA-BRIN), Indonesia advised that:
    - There is an on-going process of development of a MoU between BRIN-CSIRO and BRIN- ACIAR; this is expected to be settled by 2024; and
    - National budget for NRIA is to date in general appreciably lower than the previous figure that Indonesia ever had for research on the fisheries sector.
- For reporting of fishing location, Indonesia verifies data by cross-checking the logbook, observer report and information from other review processes, including VMS and port sampling.

17. It was suggested that further analysis could be conducted on the ratio of SBT bycatch in the tropical tuna fishery to determine whether any trends are apparent.

18. Japan submitted its national report (CCSBT-ESC/2308/SBT Fisheries-Japan), which described the Japanese commercial longline fishery for SBT in terms of catch, effort, nominal CPUE, length frequency, number of vessels and geographical distribution of fishing operations in 2022. In 2022, 70 vessels caught 5,887 t or about 103,000 individual SBT. No scientific observers were deployed due to difficulty of dispatch overseas with COVID-19.

19. Japan also submitted paper CCSBT-ESC/2308/BGD02, which was originally submitted as CCSBT-OMMP/2306/04 on the change in the operation pattern of Japanese SBT longliners in the 2022 fishing season. It explained that the Japanese longline data have been used as very important scientific data in stock assessment and for the MP for SBT in CCSBT. The change in the operation pattern of the longline fishing of the most recent year was examined through comparison to the last 10 years. For the 2022 operational pattern, the catch amount, the number of vessels, time and area of operation, proportion by area, length-frequency and spatial concentration of operations were similar to the recent past. The increase in catch quotas over the last decade is related to the increase in CPUE, to a lesser extent with the expansion of operating areas and periods and the increase in the number of operations.

20. One Member noted that Japan did not deploy any scientific observers in 2022, a matter explained by COVID-19, and questioned how did the pandemic impact these processes and what actions is Japan taking to reinstate observer programmes. Japan advised that Japanese SBT scientific observers need to go abroad to board on the Japanese longline vessels. Due to COVID-19, flights from Japan and immigration to certain destinations were severely restricted, so dispatch was not possible. Fortunately, observers have already been dispatched in 2023.

21. Korea submitted paper CCSBT-ESC/2308/SBT Fisheries-Korea. Korean longline fleets have engaged in fishing for SBT in the CCSBT convention area. This

fishery commenced with a small experimental operation in the Indian Ocean in 1957, mainly fishing for bigeye tuna, yellowfin tuna and albacore tuna but shifted targeting SBT in 1991. In 2022, SBT catch in calendar year of Korean tuna longline fishery was 1,173 t (1,173 t in fishing year) with 9 vessels in active. In general, fishing occurs between 35ºS-45ºS and 10ºE-120ºE, in the western Indian Ocean (Area 9) from April to July/August and in the eastern Indian Ocean (Area 8) from July/August to December. However, since 2014 SBT fishing vessels have moved westward than previous years, and mainly operated in the western Indian Ocean and eastern Atlantic Ocean between 20ºW-35ºE (Area 9). Until the early 2010s the CPUE was low and since 2012 it has increased. In general, the CPUE in Area 9 is higher than in Area 8. In particular, during 2017-2019 there has been no fishing in Area 8.

22. One Member questioned why the Table 3 of Korea's national report includes the estimated total efforts, rather than the efforts of the vessels recorded. Korea responded that as it had collected operational data in logbooks until 2015, the effort of vessels was "estimated total effort". However, as Korea has collected real-time operational data through the Electronic Reporting (ER) system since 2015, the term "total effort" is more appropriate in Table 3. Korea has revised the legend of Table 3 to "total effort".

23. New Zealand submitted paper CCSBT-ESC/2308/SBT Fisheries-New Zealand. For the 2021/22 fishing year, within New Zealand's national allocation of 1,102.5 t, there were the following allowances: a total allowable commercial catch (TACC, which is the commercial allowance) of 1,046 t; a recreational allowance of 34 t; a customary non-commercial allowance of 2 t; and an allowance for other sources of fishing mortality caused by fishing of 20 t. For the 2021/22 fishing year, commercial removals of SBT were 876 t from 28 vessels. Given no foreign charter vessels have fished for SBT in New Zealand since 2015, the entire commercial catch was taken by the domestic fleet. Discard mortality for the domestic commercial fleet was estimated at 6.2 t. On average across the two areas, 4% of catch and 5% of effort was observed during the 2022 calendar year. Standardised CPUE showed a marked decline in 2019 but has since increased substantially. The 2021/22 fishing year had the highest standardised CPUE on record for the domestic fleet. In the 2000s, there was a reduction in the range of sizes of SBT taken in the New Zealand fishery. There is evidence of growth (shown by progression of modes) over this period, but little evidence of recruitment of smaller fish to New Zealand waters until recently with smaller recruits appearing in the fishery, especially in 2018. New Zealand has continued to closely monitor both the commercial and recreational catch. Recreational removals were estimated at 59.8 t, and there were no customary removals reported.

24. One Member questioned what is exactly "the noncompliant watchkeeping practice" mentioned in second paragraph of "overview of the most recent fishing season" of New Zealand's national report. New Zealand clarified that some surface longline vessels are not keeping watch at all times during fishing operations. This is a health and safety issue for its observers. New Zealand is working to resolve this issue to increase observer coverage.

25. Taiwan submitted paper CCSBT-ESC/2308/SBT Fisheries-Taiwan. Since Taiwan became a member of the Extended Commission (EC) of CCSBT in 2002, all SBT

fishing vessels are required to be authorised to access this fishery, and the authorisations are reviewed and renewed by Fishery Agency of Taiwan (FA) annually. In 2022, 55 fishing vessels were authorised to fish for SBT, which consists of seasonal target vessels and bycatch vessels, and the SBT catch was 1,318 tons for both calendar year and quota year. The observers were sent onboard SBT fishing vessels for collection and record of the detailed information of catch and effort of fishing operation. In 2021 calendar year, 9 observers were deployed on 9 of the 37 fishing vessels authorised to target SBT seasonally, and 3 were deployed on 3 of the 21 fishing vessels authorised to bycatch SBT. There were 2,142 fishing days with 1,343 days observed. And 13 observers were deployed on 13 of the 43 fishing vessels authorised to target SBT, and there were none deployed on fishing vessels authorised to bycatch SBT in 2022 with 2,675 days observed out of 3,089 fishing days. In 2021, the coverage rate of observation was 20.7% by vessels, 8.1% by hooks and 8.5% by catch. The coverage rate was accounted for 23.6% by vessels in 2022, 16.3% by hooks, and 11.7% by catch. In 2021, the deployment of observers was hindered by covid-19 pandemic, thus the observer dispatched on fishing vessels were decrease greatly. However, the observer coverage rate by vessels was still meet the requirements, only for efforts and catches were close approach to 10%. In recent years, Taiwanese SBT fishing vessels mainly operate in the IOTC area, and partial SBT bycatch vessels operate in the ICCAT area. Therefore, the FA has adopted the conservation management measures/resolutions/recommendations of all t-RFMOs into domestic fishery regulations, and which become mandatory obligations for our fishing fleet.

26. One Member asked about the large increase in the number of discarded SBT in 2022. Taiwan responded that it could be due to the improvement in the quality of discard information collected by scientific observers and Taiwanese commercial longline vessels. Taiwan noted that such improvements in data quality will continue.

27. Taiwan also submitted paper CCSBT-ESC/2308/25, which describes preparation of Taiwan's SBT catch and effort data submission for 2022. The SBT fishery data submitted to the EC from Taiwan includes total catch by fleet, aggregated catch and effort, catch-at-size, catch-at-age and non-retained catch data. The data submitted is compiled from the electronic logbook (e-logbook) data and catch documentation scheme (CDS) data collected from authorised SBT fishing vessels with cross checking against VMS data, observer data and traders' sales records. No discrepancy found among datasets on catch.

4.2. Secretariat Review of Catches

28. Discussion for this agenda item commenced by correspondence in advance of the ESC.

29. The Secretariat paper CCSBT-ESC/2308/04 provides an update of the reported SBT global catches, the spatial distribution of catch and effort, exports from CCSBT Members, as well as the distribution of reported Non-Member effort in areas near where SBT are caught. The estimated total catch for the 2022 calendar year was 18,189 t, an increase of 473 t or 2.6% from the 2021 calendar year. The global reported SBT catch by flag is shown at **Attachment 4**. The paper also included comparisons of global adjusted TAC against reported catch by fishing

season, which showed that reported catch was less than the adjusted TAC by 1,114 t for the 2022 fishing season. Indonesia exceeded its Total Available Catch for the 2020 fishing season by 456.6 t. CCSBT 28 agreed that Indonesia will repay this amount by reducing its Total Available Catch by 91.3 t for each of the 2022-2026 fishing seasons.

30. In response to questions, the Secretariat provided the following responses:

- The number of active vessels per Member in the original table is derived from CDS data provided by Members for Q1 2023. The tables in this paper have been updated with data provided for Q2 2023, which has increased the number of active vessels for Japan to 68 (see CCSBT-ESC/2308/04 Rev1);
- The CCSBT's standard for the fishing effort reporting was set in 2003. The requirements for Catch and Effort data for the 2004 Data Exchange notes "A template showing the required information was provided in Attachment B of CCSBTESC/0309/16". In that document for both Aggregated Catch and effort data and Shot by Shot data, it is noted that (item 1 of the notes) "This information should be recorded for all commercial fishing that targeted SBT, or that caught SBT while targeting other species". Over the years the reference to CCSBTESC/0309/16 was removed; and
- The exporting Members (from CMF data) to the USA, Korea and Australia in 2022 were Australia (221.3 t), New Zealand (63.7 t) and South Africa (65.6 t).

31. One Member asked whether future reports could include a matrix of exporting and importing countries for the most recent year of data. The Secretariat clarified that this information was already available to Members in a report to the Compliance Committee but could be presented at future ESC meetings as well.

Agenda Item 5. Report from the Thirteenth Operating Model and Management Procedure (OMMP) Technical Meeting

32. The Chair of the Operating Model and Management procedure Technical Group (OMMP), Dr Ana Parma, briefly reviewed the progress made during the 13th OMMP meeting and intersessionally. The OMMP 13 was held in Seattle in June 2023 as an in-person meeting. Short summary sessions were held daily to report progress to interested online participants.

33. The main purpose of the OMMP 13 meeting was to prepare for the stock assessment to be presented at this ESC meeting. In addition, some brief discussions took place about the Scientific Research Program (SRP) and the development of a new code for the SBT Operating Model (OM).

34. The OM had been reconditioned in 2022 in order to evaluate the impact of using the new GAM-based CPUE series instead of the standard GLM series as input to the Cape Town Management Procedure (CTP). Therefore, the data-input files used in 2022 were updated by adding one year of data only for each of the data components.

35. The OMMP 13 reviewed all data inputs including the new gene tagging and close-kin-mark recapture results, the size and age composition for the main fleets, and the CPUEs.

36. The ESC devoted substantial effort to evaluating the Japanese longline CPUE, which showed a large increase in 2022 when the time series was updated using the new GAM-based methodology agreed upon at ESC 27. The OMMP 13 reviewed analyses conducted by Dr. Itoh indicating that the abundance index was robust to a variety of sensitivity analyses, including model selection, retrospective analysis, inclusion of vessel ID, area range changes, age range changes, and data and model resolution changes. It also concluded that the high value estimated for 2022 was not a result of unrealistically high catch rates inferred for unfished or lightly fished areas, as was the case in 2018 when using the standard GLM method.

37. The OMMP 13 noted that the relative contribution of unfished areas to the total index of abundance had increased over time, a result of the continuing range contraction in the longline fishing effort. A comparison of alternative CPUE indices calculated using different spatial domains corresponding to areas that had been fished in recent years showed little differences among the resulting series. A main driver for the overall CPUE trend was found to be the year effect estimated by the GAM.

38. The OMMP 13 concluded that the impact of the steep recent increase in CPUE should be examined as sensitivity tests by removing the last five data points. A proposal was also made to calculate a new CPUE series to evaluate sensitivity with respect to possible bias introduced in the GAM index if effort concentrated preferentially on high CPUE strata. The proposal was to replace by zero the strata predictions that were highly uncertain (i.e., predictions that did not meet a certain precision threshold). The suggestion was implemented by Dr. Itoh using a range of precision thresholds. The CPUE WG evaluated this additional analysis during an intersessional webinar (details are provided in **Attachment 5**) and decided not to use these series as sensitivities. The reason is that the approach would cause a systematic negative bias in the last year of the series, given the lower precision of those CPUE predictions.

39. In terms of UAM, the catches from Non-Cooperating Non-Member (NCNM) countries used as input to the stock assessment were estimated as in the previous assessments by applying Japanese longline catch rates to Non-Member countries longline effort reported in areas where SBT is known to occur. The group noted that Non-Member effort had approximately doubled over the period of UAM estimation, while the Non-Member catch estimates had increased from approximately 100 t to over 1000t in the same period, a result of the increasing Japanese catch rates. The analysis presented in a paper by New Zealand included some modifications which were reviewed and accepted as improvements to the methodology. Nevertheless, it was noted that these and further refinements to the CPUE methodology do not resolve the basic problem that these estimates represent potential catches only, and no data are available to ascertain their relationship to actual catches.

40. The OMMP 13 evaluated the results of reconditioning the reference set of models using the updated data inputs using the Shiny application developed by the OMMP Consultant. Results showed that the fits to the different data inputs were generally good and there was no need to adjust fixed parameters and weights assigned to the different data components.

41. The OMMP 13 evaluated the support provided by the data and prior assumptions to the range of parameter values considered in the grid that specifies the reference

set of models. The values used for steepness (h) and natural mortality at age 0 and 10 were considered appropriate. The group also examined the two alternative age ranges used to normalise the selectivity for predicting CPUE, which were included as one of the grid axes. A comparison of the stock depletion estimated under the two alternative assumptions indicated very little impact on the results. Therefore, the reference set was reduced by keeping a single age range which was selected based on a review of the range of ages with higher estimated long-line selectivity over the whole period.

42. The OMMP 13 specified a set of sensitivity tests for exploring additional uncertainties outside of the reference set of models. The list included runs designed for different purposes: (1) to evaluate the impact of using alternative data inputs (specifically CPUE and UAM scenarios) or assumptions (e.g., nonlinear relationship between CPUE and abundance, a more rigid selectivity for the Indonesian fishery), (2) to acknowledge uncertainty in data inputs (e.g., overcatch scenarios); and (3) to evaluate the information content and influence of different data sources (e.g., exclusion of different data components or data points). These sensitivity runs were conducted intersessionally and the results presented at this meeting.

43. Finally, the project to develop a new code for the SBT operating model, which was approved by CCSBT as part of the SRP, was discussed. The pros and cons of two candidate software platforms were considered and a decision was made to use the Template Model Builder (TMB) R package, with possible interfaces with Stan. While the two candidates considered have good institutional support and would be suitable, the reason for favouring TMB was that it has been developed more specifically for fisheries applications. The current operating model coded in AD Model Builder will be first coded in TMB so that the two codes could be run in parallel and compared before new changes are introduced to the operating model. The decision allowed Dr Darcy Webber to start his work and he will present a brief progress report for Agenda item 7.

44. The OMMP 13 discussed four other SRP components in preparation for this meeting. These were (1) future CPUE work designed to explore the potential consequences of preferential sampling due to fishing behaviour, (2) a global tagging project involving both conventional and archival tags for the purpose of investigating changes in the spatial distribution of SBT, (3) improvements on the current methods used to estimate potential catches by NCNM countries, and (4) also regarding UAM, a review possible approaches to investigate the extent to which such estimated potential catches by Non-Members are being taken, including, for example, market surveys, genetics or other methods to enhance traceability.

45. Further details can be found in paper CCSBT-ESC/2308/Rep 02.

Agenda Item 6. Consideration of science related items of draft Strategic Plan

46. The Chair reminded the meeting that the EC advised that the ESC is expected to consider the science-related part of the draft Strategic Plan. The Chair advised that the Sixth Meeting of the Strategy and Fisheries Management Working Group (SFMWG 6) was held from 25 to 28 July 2023 in Tokyo, Japan, and developed a

draft revised CCSBT Strategic Plan including an Implementation Plan for recommendations from the 2021 CCSBT Performance Review. The full report of the SFMWG 6 has been provided to the ESC as CCSBT-ESC/2308/Rep01.

47. The science-related items of the draft Strategic Plan include:

- 1a (i) PR2021-02: Explore the need for additional measures (such as protected areas and area closures) to support spawning and recruitment;
- 1a (ii) PR2021-29: Due to the central importance of spawning and recruitment for stock rebuilding, additional efforts should be made to develop, in Indonesian waters, spatio-temporal restrictions, equitable and compatible with the rest of the management strategy;
- 2 (i) Further increase efforts, including analysis on the application of electronic monitoring, to improve and supplement observer coverage in accordance with Scientific Observer Program Standard (SOPS); and
- 3 (i) Prioritise the establishment and ongoing review of long-term research strategic planning in the ESC.

48. The ESC noted that item 2 (i) was already on the agenda of the ESC as an ongoing item and will be discussed under Agenda item 13, while item 3 (i) will be discussed under Agenda item 8.

49. It was noted that item 1a (ii) was dependent on the outcome of 1a (i), so 1a (i) should be considered first. The initial view of the meeting was that there was no need for protected areas or area closures for the spawning area due to the following:

- SBT is a highly migratory species;
- There are effective controls on fishing mortality and no indication of recruitment problems;
- There is no clear and obvious evidence that area closures would be effective in this case; and
- There are now informative data on recruitment (gene tagging) and the spawning stock (close kin);
- The stock is recovering and in a much better state than when the recommendation was first made in the 2014 Performance Review.

50. However, the ESC recommended that Members, ahead of ESC 29, consider in more detail the draft Strategic Plan priority to "Explore the need for additional measures (such as protected areas and area closures) to support spawning and recruitment."

Agenda Item 7. Review of results of the Scientific Research Program and other inter-sessional scientific activities

7.1. Results of scientific activities

51. Some discussion for this agenda item commenced by correspondence in advance of the ESC, but all papers were presented and discussed. Papers were presented in the following non-numerical order, to group related topics together.

52. Paper CCSBT-ESC/2308/10 provides an update of SBT length and age data from the Indonesian longline fishery operating out of the port of Benoa, Bali. Otoliths collected in 2019/20 and 2020/21 were transported to Australia. A subsample of 500 otoliths was aged for each season and separate age-length keys (ALKs) were developed. Determining suitable length data to which to apply the age-length keys continues to present a challenge. This year, length data obtained from the otolith sampling program were used as the fish were landed fresh and more likely to have been caught in CCSBT Statistical Area 1. The updated length and age distribution data were provided to CCSBT and are used in the 2023 stock assessment. The data showed that the mean size/age of SBT monitored has fluctuated around 160-165 cm FL / ages 12-15 for the last 9 seasons. It is unclear if a higher proportion of small fish may be classed as "reject" (and available for sampling), skewing the size frequency data used in the ALK analyses over this period. Otolith samples were not collected in Indonesia in 2021/22 due to disruptions caused by institutional changes in Indonesia. Sampling recommenced in February 2023 and 148 otolith pairs were collected (2022/23 season). It will not be possible to build annual age-length-keys for these two seasons. However, an ALK can be developed using the direct age data for the two preceding seasons (2019/20 and 2020/21) and this can be applied to the 2021/22 and 2022/23 length frequency data, when and if those are available.

53. The presenter clarified that the length frequency, from the CDS data and the Benoa sampling program of fresh fish, are different. It is unclear why they are different and a research project to examine the collection of these data is proposed for the ESC's discussion of the Scientific Research Plan (SRP). It is assumed that fresh fish are more likely to be from Area 1 (spawning ground) and not Area 2. Information on the catch location of fresh fish potentially caught in Area 1 can be obtained from the fishing vessel during port sampling, but it may be more difficult for fish caught in Area 2 as some fish may be transhipped at sea. This needs to be reviewed and will be examined under a project proposed for the SRP.

54. Paper CCSBT-ESC/2308/07 provides an update of the SBT close-kin tissue sampling, processing and kin finding. Muscle tissue samples collected in 2019/20 and 2020/21 from SBT landed by the Indonesian longline fishery were transported to Australia (adults; n=3,000) and the tissue subsampling, DNA extraction, and sequencing was completed. The kin-finding analysis to identify parent-offspring pairs (POPs) was updated to include the new adult data. The results were provided to the CCSBT in May 2023 and are used in the 2023 stock assessment. A total of 120 POPs have now been identified. The half-sibling pairs (HSP) analysis was not updated because there were no new juvenile data; the juveniles sampled in 2020 and 2021 were sequenced and had been included in the HSP analysis in 2022. Muscle tissue samples were not collected in Indonesia in 2021/22 due to disruptions caused by institutional changes in Indonesia. Sampling recommenced in February 2023 and 148 muscle tissue samples were collected. It is anticipated that sampling will recommence in September for the 2023/24 spawning season.

55. The authors noted that this paper provided an update on POPs, HSPs and recent sampling program disruptions, but that there are no changes to the detection methods. The SRP proposal covers training in both the otolith collection and tissue sample collection programs, as these programs are linked.

56. Australia and Indonesia provided paper CCSBT-ESC/2308/14 on SBT catch monitoring and capacity building for biological sampling of spawning ground catches in Indonesia. Monitoring of the size and age distribution of catches of SBT landed by Indonesian longline vessels from the SBT spawning ground has been an important source of data since the early 1990's. The extension of this monitoring program to include collection of tissue samples, since the mid-2000's, was central to the application of Close-kin Mark Recapture (CKMR) for SBT. These data series form essential inputs to the regular CCSBT stock assessment and the Cape Town Procedure used to recommend the global TAC for the fishery. In 2021, the ESC recognised the need to review the length and age monitoring program due to changes in the fleet dynamics of the Indonesian longline fleet, with some vessels fishing well south of the spawning ground during the winter months. Differences were also apparent in the age structure generated from age length keys when comparing results using the length data from catch monitoring and Catch Document Scheme. The combination of COVID-19 impacts and recent institutional changes associated with the transfer of research capability from the Ministry of Marine Affairs and Fisheries to the new National Research and Innovation agency (BRIN) has impacted on the resourcing and availability of experienced staff to conduct the catch monitoring and biological sampling program. In addition, in 2021 and 2022, there has been a substantial shift in the distribution of catch and effort by the Indonesian longline fleet, which resulted in the majority of catch and effort now being taken in Area 2, rather than Area 1 (the spawning ground). This paper summarises these issues and outlines the steps that need to be taken to address them to ensure the longer-term sustainability of this important monitoring program. This includes a proposal for funding from the CCSBT SRP to provide the capacity building for the training required to support the institutional transition and review and refinement of the monitoring program.

57. The ESC discussed the issues raised in the previous three papers (CCSBT-ESC/2308/10, CCSBT-ESC/2308/7 and CCSBT-ESC/2308/14), and how to get better data on location, catch length frequency, otoliths and tissue samples. The ESC noted that these data were essential for defining the size frequency of the catch from the spawning ground fishery (Area 1), to avoid biases in estimates of fishing mortality on adult age classes. The tissue samples, otolith collection and location of catch are essential for the close-kin results used in the assessment and the Cape Town Procedure. The SRP proposal aims to investigate the different data sources as well as assist in staff training and capability building in the catch monitoring program. The SRP project aims to look at the representativeness of the fresh fish in Benoa, and check location via logbooks, VMS and observer data.

58. Paper CCSBT-ESC/2308/08 provides a workplan to finalise the maturity ogive parameter estimates for SBT based on histological analysis of ovaries collected by CCSBT members. The workplan includes: (1) An exchange of ovary histology between histology readers from Farley et al. (2022) in early 2024; the exact number of slides to be exchanged is yet to be determined but will be a representative proportion of the total number analysed; (2) Readers classifying the maturity stage of each fish and the resulting data discussed among readers; multiple online meetings will be held with the aim of identifying the reasons for different results among readers; (3) A small workshop (online or in person) to finalise maturity data; and (4) Updating the maturity modelling based on the revised data set and reporting to the CCSBT ESC in 2024.

59. The maturity studies inform the two fixed values for maturity in the operating models and the remaining values are estimated.

60. Paper CCSBT-ESC/2308/09 provided updates on the Gene-tagging program 2023 and RMA request. The CCSBT gene-tagging program provides an estimate of the absolute abundance of the age-2 cohort, for use in the Cape Town Procedure and stock assessment models. Five estimates are available for the age-2 cohorts in 2016-2019 and 2021. The estimate of abundance of fish aged-2 in 2021 is 1.68 million, and coefficient of variation (CV) is 0.16. This is an increase in abundance compared to the previous estimate. Tissue samples were collected from over 7,000 age-2 fish in 2021, and the fish were released alive. Over 11,000 tissue samples were collected from age-3 fish in 2022 during harvest in South Australia. The DNA genotypes from the two sets of samples were compared to detect matches. Over 68 million DNA comparisons were made, and 41 matches detected. The gene-tagging data and results were provided to the CCSBT data exchange in early 2023. The 2022 and 2023 field work trips have been completed with over 5000 fish tagged in 2022, and under 3000 fish tagged in 2023. The 2023 harvest sampling logistics were more complex this year with tissue samples collected during off-shore processing. Over 15,000 harvest samples have been collected from a wider length range, to allow for a potential shift in length at age which will be investigated before calculating the next (i.e., 2022) estimate of abundance.

61. One Member asked for more detail about the length frequency of the age 2 fish landed during the gene tagging field work. CSIRO advised that it is not sure if there is a shift in size at age, or if only smaller fish were available when the gene-tagging sampled age 2 fish. CSIRO will have more information on this next year when it has age 3 harvest data and any new advice from the direct age workshop. Other studies and sources of data to detect changes in growth would also be useful.

62. It was noted that faster growth was detected in the 1960s to 1990s based on conventional tagging and that a decadal change in growth is included in the operating model. It is hypothesised that growth may be density-dependent.

63. Australia submitted paper CCSBT-ESC/2308/12. This report provides an update on the SBT otolith collection and ageing activities in Australia in 2022. Otoliths from 173 SBT caught in the Great Australian Bight (GAB) by the purse seine fishery were received and archived into the CSIRO hard-parts collection. Age was estimated for 100 of these fish. An additional 177 otoliths sampled in 2023 have just been received but are not yet archived. In 2021, a preliminary algorithm was developed to estimate fractional (decimal) age from otoliths using the zone counts and otolith measurements. This algorithm was applied to the current age data. Further work is needed to refine the age algorithm - specifically the relationship between daily age and otolith size. Australia hopes to obtain these data through the daily ageing work undertaken in preparation for the CCSBT funded SBT age determination workshop planned for early 2024.

64. Australia responded to a question on the size classes in the purse seine fishery, that these are mainly 2–4-year-old fish, and some 1-year-old fish are also caught. The smaller fish, age 0, are migrating down the Western Australian coast from the Indonesian spawning grounds.

65. Australia submitted paper CCSBT-ESC/2308/13. This paper provides an update on work to improve rapid epigenetic ageing of SBT from muscle tissue samples. DNA methylation is an epigenetic modification to DNA and is mostly known for its role in regulating gene expression through cytosine-phosphate-guanine (CpG) sites. Australia has developed a cost-effective approach by targeting the minimum number of CpG sites required for age prediction. A preliminary epigenetic clock using 22 CpG sites was previously presented for SBT in 2021 (CCSBT-ESC/2108/10). This epigenetic clock has been expanded to include bigeye and yellowfin tuna using the same 22 CpG sites. Additional modelling has improved the epigenetic clock age calibration and prediction, which accounts for any nonlinear relationship between methylation and age. Age prediction by DNA has the potential to reduce cost and time, making it advantageous with large sample sizes required for CKMR for other species. It also has the potential to improve the spatial and temporal coverage of catch-at-age data by fleet substantially as it requires tissue collection only, and it provides a basis to readily estimate growth rates and other life-history parameters required to assess the status of a stock.

66. In response to a question, Australia advised that the CpG sites are conserved across the *Thunnus* genus and that they have successfully amplified the markers in bigeye, yellowfin, southern bluefin, Atlantic bluefin, albacore, and skipjack (*Katsuwonus*). However, Australia is yet to generate an epigenetic clock for each species. The advantage of the CpG sites being conserved is that this reduces the assay optimisation require for each species. Although Australia is using the same markers for each species, their methylation patterns differ across CpG sites and therefore Australia calibrates a specific epigenetic clock for each species. Hence, the GAM derived calibration relationships are species specific in the plot of the three species split on page 7 of this paper. A universal *Thunnus* epigenetic clock may be possible but would most likely require large sample sizes with age information from a variety of populations to calibrate the model. Hence, in the case of CKMR and or catch at age applications for tuna Australia is pursuing species specific calibrations.

67. The ESC noted the potential of this method, and advantage of having common CpG sites for the three species of the genus *Thunnus*. Australia noted that for bigeye and yellowfin, fractional ages are used, but this has not yet been achieved for SBT. The otolith ages used in the calibration of epigenetic age were from otoliths with a high rank in the reading and age estimate. The otoliths had been collected over a long time period, and therefore were not from a single area or time that may have had environmental conditions that could cause a systematic bias in the methylation signal. After calibration, only a tissue sample needs to be collected for estimation of epigenetic age. This can result in cost savings where tissue collected for one purpose (e.g, close-kin), can also be used for epigenetic age, and otolith collection is no longer required. Further work to refine the practical implementation of the methodology may be needed.

68. Japan submitted paper CCSBT-ESC/2308/19. This reported on the scientific trolling survey that provides the data for recruitment index of age-1 SBT which was carried out during January and February 2023. Japan surveyed from Esperance to Albany, including Bremer Bay in southern Western Australia with 12 piston lines. The surveys were forced to make major changes from the plan for the previous two years due to COVID-19. This year the survey was able to proceed on a large number of survey days, cover a wide range of survey area as

well as detailed survey items similar to those before 2020. The paper reported that a total of 214 SBT individuals, mainly presumably age-1, were caught during the survey.

69. The ESC congratulated Dr Itoh on the 1400 archival tags released and 50 tag recoveries, and the analysis of the tag data from a fish tagged at age 1 and returned from the Indonesian fishery after 10 years at liberty with 9 years data kept in the tag. Itoh, showed the movement tracks of the fish, including that it entered the Great Australian Bight in two seasons at age 2 and 3, and spent most time in the Indian Ocean. After age 4 the east and west movement range became narrower. The fish was age 10 at time of capture (175cm, 80kg) and had never migrated to the spawning ground but was slightly further north than it had been previously. The battery life of the tag was exceptional. The stomach contents from the survey work were of interest, comprising mainly sardines.

70. Japan submitted paper CCSBT-ESC/2308/21 which provides updates on two recruitment indices for age-1 SBT from the trolling catch data of the scientific recruitment monitoring surveys conducted on the southwestern coast of Australia for more than 20 years since 1996, through to 2023. The piston-line trolling index (TRP) is derived from catch per 100 km search distance on a pre-determined transect line (called the piston-line) without model-based standardisation. The grid-type trolling index (TRG) is calculated from data aggregated by latitude and longitude 0.1 degrees, date, hour, and type of area, based on data from wider area than the TRP and standardised by a generalised linear model (GLM) using the delta lognormal approach. The TRG in 2023 was higher than in the previous two years, but only 63% of the 26-year average. The TRG was compared to various other indices: the recruitment estimated from the OMMP meeting in 2023 based on the reference set operating models, age specific standardised CPUE from all Japanese longline vessels for age-4 and age-5, the aerial survey index, and the abundance estimates from gene tagging. The paper found that although similar trends were seen up to the 2015 year class, the difference was large after the 2016 year class, and the TRG index has lower values than the other indices. The paper advised that it is necessary to continue to monitor the status of recruitment in recent years carefully by making full use of various information from scientific research as well as from fisheries.

71. The ESC noted the low recruitment estimates from the TRG index relative to other juvenile abundance indices. Spatial and temporal change in movement of juvenile SBT may affect the TRG estimates and relationship with abundance. Long term studies on distribution of juvenile fish may be informative. The ESC asked Japan to consider whether the survey design or timing should change to improve its utility as an index of recruitment.

72. Japan submitted paper CCSBT-ESC/2308/20. Because little is known about the distribution and migration of SBT between larvae and age-1, Japan planned a research project to investigate the distribution of small age-0 fish (< 25 cm in fork length) off the north-western coast of Western Australia. They succeeded in catching two SBT including a 24.4 cm small age-0 fish in 2019. The paper reported that the second survey was carried out in December 2022 for eight days. It was reported that the targeted 14 age-0 SBT ranging from 23.0 to 25.2 cm fork length were collected by trolling gears, and that the sampling locations were offshore from the shelf-edge at depths of about 400m.

73. The ESC noted that the 2024 survey is planned for April/May, off Exmouth. Japan confirmed that the fishing methods are consistent with those used for Pacific Bluefin tuna of similar sizes. The timing of the survey in April is to capture fish born in January on the spawning ground.

74. Taiwan submitted paper CCSBT-ESC/2308/26 on updated gonadal information and analysis of SBT collected by Taiwanese scientific observer program. A total of 1021 gonad samples were collected from 2010 to 2022 including 71 gonad samples updated in 2022. The range of fork length were concentrated between 90 and 150 cm. The trend of monthly GSI of females indicated that higher values occurred during April to July and gradually decreased after the peak in April, the second highest value of GSI was indicated to occur in July. On the other hand, the monthly GSI of males decreased gradually after the maximum value in April. The trends of monthly GSI of both genders showed similar pattern with previous results without dramatically change. For the histological sections, a total of 869 gonad samples collected from 2010 to 2021 were analysed for the sexual maturity stages determination including 424 females and 445 males. The majority of these samples were diagnosed as immature stage, and about 10.5% samples designated as mature but at reproductively inactive status. Also, most mature females were identified at regressed (stage 6) or regenerating (stage 7) stages from April to August, and most mature males were also identified at regenerating (stage 7) stages during June to August.

75. The ESC noted that a virtual meeting is planned to finalise the histology reading criteria, and results will be reported in 2024.

76. Taiwan submitted paper CCSBT-ESC/2308/28 on direct aging and age compositions of SBT caught in Taiwanese longliners in 2019-2022. This report presents the estimated age compositions of SBT caught by Taiwanese longliners in the Indian Ocean between 2019 and 2022. The otoliths samples were collected by scientific observers aboard the longline vessels, while additional otoliths were obtained from the SBT landed in Taiwanese fishing port. By combing the direct ageing results with the fork length data, an age-length key had been constructed. This length to age conversion table was then used to estimate the age composition of the SBT caught by Taiwanese longliners during this period. The findings show that Taiwanese longliners caught predominantly young SBT, aged between 2 and 5 years, which accounted for over 70% of the total catch. While SBT older than 10 years were caught occasionally, these were scarce and reliable estimation were challenging due to limited otoliths samples from larger-sized SBT. In any case, the estimated age compositions remained consistent throughout the years 2019 to 2022. These results suggested that the fishing activities of Taiwanese longliners did not undergo appreciable changes over this period, and that the SBT population in the central Indian Ocean appears to be stable, displaying no major shift in demography.

77. Korea submitted paper CCSBT-ESC/2308/29 and briefly commented on Korean SBT otolith collection activities in 2022. Korea is constantly sampling SBT otoliths to investigate the age and growth of SBT since 2015. Korea collected 58 otolith samples in 2022, contributing to a total of 1,119 otoliths since 2015. The relationship between fork length and total weight was TW=7.6E-05 $FL^{2.723}$ (R^2=0.911). The von Bertalanffy growth’s parameters estimated from the non-

linear method using length at age data were L_∞=175.5 cm, K = 0.190/year, t_0 = -1.209 years.

78. The ESC noted that the CCSBT direct ageing workshop will be held in Hobart early 2024 to examine and update direct ageing methods.

79. Australia briefly introduced CCSBT-ESC/2308/Info02 on the large-scale collaborative juvenile tagging program that operated from 2004-2009. CCSBT members collaborated to release 568 archival tags across 5 sites from South African waters across to New Zealand (in the Tasman Sea). The project noted high variability in migration paths and identified that low spatial coverage of effort would be a serious problem for an index of abundance from catch and effort data.

80. Australia briefly introduced CCSBT-ESC/2308/Info01 on the e-tagging research project that has commenced in the Great Australian Bight (GAB). The latest pop-up satellite tags are being used. The project will examine short term movement in the GAB. This is a step in the design of broader studies and potential collaboration with CCSBT members, that could look at eastward shift of SBT, links to climate and environmental change, and stock recovery related changes in migration and distribution.

7.2. Improving Robustness of CPUE indices

81. Taiwan presented Paper CCSBT-ESC/2308/27, which reported on CPUE standardisation analyses with the statistical information of Taiwanese longline fleets from 2002 to 2022 including updated data from 2022. For the first step, the cluster analysis was processed with weekly-aggregated data instead of set-by-set data to explore the targeting of fishing operations and to produce the data filter for selecting the data for the CPUE standardisations. Secondly, the simple delta-lognormal model without interactions was adopted to avoid confounding from interactions for the CPUE standardisations analyses. The cluster analyses were applied for main fishing area (central-eastern area: Area E) and secondary fishing area (western area: Area W) separately. In the Area E, the standardised CPUE series continued the higher and relatively stable increasing pattern in recent two years given the data updated to 2022. For Area W, the standardised CPUE series continued the stable low pattern from 2013 to 2019, after which it provided an increasing trend. With the updated data for 2022, it decreased slightly to return to a level similar to 2020. The pattern of the CPUE trends in Area E and Area W remained similar to the past. With updated data in 2022, the CPUE trend for Area E increased and the CPUE trend for Area W decreased slightly.

82. Dr Simon Hoyle (consultant) presented CCSBT-ESC/2308/32 on "Mitigating the effects of increasing effort concentration by developing indices based on data from multiple fleets". This paper reports work to explore the potential to develop CPUE indices for SBT based on data for multiple fleets in addition to Japan. The analyses used generalised additive models (GAMs) with spatiotemporal smoothers, and a delta lognormal approach. The temporal and spatial distributions of both fishing effort and the highest catch rates have changed between 1986 and 2022, while the spatial and temporal extents of fishing effort have declined. Simulated data were generated from the best models fitted to the aggregated dataset, and used to explore the effectiveness of different model configurations for

dealing with these changing distributions. The principal GAM models produced unbiased estimates with the simulated data, while GLM models and less flexible GAM smoothers provided biased indices. Manipulating the simulated dataset to produce a large rapid change in fish distribution resulted in moderately biased indices. Increasing the effort concentration through time to focus effort on areas with higher CPUE also resulted in estimation bias, particularly at the end of the time series when concentration was greatest. This bias may be due to loss of information from the dataset rather than model failure, and it may be helpful to increase the information via models that include data from other fleets as well as Japan. In general, GAM models provided less biased indices than either a GAM equivalent to the variable squares method (GAM_VS) or a combined model (w0.8) approach.

83. The paper compared how the number of strata fished changed over time by fleet. The strata and fleets used in future analyses could change depending on the distribution of fleets. The Taiwanese data were excluded from the current analyses because they tend to fish in areas outside of the core area, generally catch smaller SBT and have CPUE patterns that differ substantially from those for other fleets. Taiwan confirmed that their data should be sub-divided between the east and west, and advised that this is discussed in their paper (CCSBT-ESC/2308/27). It was noted that the Taiwanese catch and length frequency data are part of a unique LL series in the assessment.

84. The ESC stressed the importance of continuing the activity of incorporating data from other fleets because 1) an increasing concentration of Japanese effort will reduce information about the biomass trend, 2) uncertainty in the recent Japanese CPUE trend may be able to be reduced, particularly if indices support one another rather than diverging, and 3) strategically it will be important to consider a wide area given climate change impacts that could affect SBT distributions.

85. Potential difficulties with conducting these analyses include logistical constraints (forming a group of scientists from all relevant Member countries to convene periodically) and clustering issues due to confounding between vessel identification and targeting.

86. It was noted that the initial SRP covered one year and extending the research to 2-4 years was pending. The ESC also noted that research cross-referencing the ERSWG and SFMWG related to climate change should be included as a rationale for the CPUE work.

87. In conclusion, the work presented demonstrated that data from other fleets increases coverage and may reduce the impact of effort concentration. More work and time is needed to prepare data from other fleets. Results also indicated that including data from other fleets appeared to lead to little conflict with the higher 2022 estimate from the Japanese GAM model. Operational data should be used if possible, to better allow for variation in fishing behaviour that results from targeting of different species, vessel effects and other factors.

88. The CPUE working group also met during the ESC and discussed the practical issue of how best to account for the fact that the CPUE should be predicted using the selectivity corresponding to the Japanese CPUE-weighted size compositions. Currently, the CPUE is predicted based on the selectivity derived from catch-weighted size compositions for the aggregated fleets (LL1). Maunder et al.

(2020)[1] noted that the size composition for CPUE indices should be tied to the catch rates (index fleet) rather than the current practice where size compositions are linked to removals (removals fleet). Figures were produced from raw 5x5 by month data showing how different CPUE-weighted size composition data compared to the LL1 data used in the assessment. The difference is partly due to catch versus CPUE size composition weighting and the fact that the predicted CPUE should be based on Japanese size composition data alone rather than that from all of LL1. The ESC recommended that the length frequency data be explicitly included in the CPUE standardisation. It was also suggested that standardisation of length frequencies should be explored.

89. Intersessional work on improving the robustness of CPUE indices not covered here is reported in **Attachment 5**.

7.3. Updated of NCNM UAM estimates

90. New Zealand mentioned that paper CCSBT-ESC/2308/BDG01 "Estimates of unreported SBT catch by CCSBT non-cooperating non-Member states between 2007 and 2020" by Drs Charles Edwards and Simon Hoyle had already been presented at OMMP13 and was summarised in the OMMP13 report. The authors recommended moving to a spatiotemporal model for future analyses as they believed catch rates could be more appropriately represented as a function of the underlying biomass density distribution.

91. However, the OMMP 13 noted that these estimated catches represent potential catches only, and that there are no data to ascertain their relationship to actual catches. It was therefore questioned whether it was useful to continue to refine estimates of NCNM effort for SBT, or rather to develop methodology to detect unreported catches instead. The ESC agreed to discuss this further under agenda item 12.

7.4. Maintenance and development of OMMP Code

92. ESC was informed of the OMMP decision to base the updated suite of Operating Model code within the Template Model Builder (TMB) software framework, interfacing with the tmbstan software package that permits the use of the STAN package's MCMC capabilities. The existing ADMB OM has recently been recoded in TMB, with accompanying notes (written in an accessible format) on how to use the new model, and how closely it replicates the previous model. The ESC chair suggested that the group could return to more specific details of project progress in the SRP discussion. It was suggested that all issues pertaining to the requirements of the model – not just in the strict assessment sense – might be better served by all being collected in one single group discussion.

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[1] Maunder, Mark N., James T. Thorson, Haikun Xu, Ricardo Oliveros-Ramos, Simon D. Hoyle, Laura Tremblay-Boyer, Hui Hua Lee, Mikihiko Kai, Shui-Kai Chang, Toshihide Kitakado, Christoffer M. Albertsen, Carolina V. Minte-Vera, Cleridy E. Lennert-Cody, Alexandre M. Aires-da-Silva, Kevin R. Piner. (2020) The need for spatio-temporal modeling to determine catch-per-unit effort based indices of abundance and associated composition data for inclusion in stock assessment models. *Fisheries Research 229.* https://doi.org/10.1016/j.fishres.2020.105594

Agenda Item 8. Fisheries and Scientific Indicators of Stock Status

93. Australia submitted its paper CCSBT-ESC/2308/15 (Rev.1). The 2022–23 update of fishery indicators for the SBT stock includes indicators in two groups: (1) indicators unaffected by the unreported catch identified by the 2006 Japanese Market Review and Australian Farm Review; and (2) indicators that may be affected by the unreported catch. Given the time since these reviews, the recent trends for some of these indicators are unlikely to be affected by unreported catches. In this paper, interpretation of indicators is restricted to the subset considered to be unaffected by the unreported catch. Recent trends in indicators are summarised in Appendix 1. Three indicators of juvenile (age 1–4) SBT abundance were updated. The piston-line trolling survey decreased from the last index in 2021, while the grid-type trolling index increased slightly from 2021. The gene-tagging abundance estimate also increased. Indicators of age 4+ SBT exhibited mixed trends. For close-kin, the Parent-Offspring-Pairs detection rate decreased for the latest year it was calculated (2021), which is consistent with an increase in population size. The mean length of SBT caught by Indonesia has generally decreased since 2011, but increased slightly in 2021. The standardised CPUE from the New Zealand domestic longline fishery increased in 2022, as did the Japanese longline nominal CPUE. The Japanese standardised CPUE series (GAM series) increased substantially in 2022.

94. Japan submitted paper CCSBT-ESC/2308/22, which summarised fisheries indicators for the SBT stock in 2023. Fisheries and scientific survey indicators were examined to provide information for overviewing the current stock status of SBT. The Japanese longline CPUE indicators for the 4, 5, 6&7, and 8-11 age groups are well above their historically lowest levels observed in the late 1980s or the mid-2000s. CPUE indices for these age groups have fluctuated in an aperiodic way and/or showed increasing trend over past 10 years. The CPUE indices for ages 4 and 5 especially showed drastic increases from 2021 to 2022 while CPUEs for other age groups did not show such a change. Gradual declines of the indices for age class 12+ observed since 2011 appear to cease and increase in recent years. Age-aggregated (age 4+ group) CPUE indices that include the one used in the operating model and management procedure show increasing trends over the past 10 years. The current levels of these indices are well above the historically lowest values observed in the mid-2000s. Various recruitment indicators inspected suggest that recruitment levels in recent years have been similar to or higher than those observed in the 1990s (before markedly low recruitments of 1999 to 2002 cohorts occurred), though the levels of recruitment have varied from year to year. It should be noted that among the two indices derived from the trolling survey for age-1 fish, the TRG recruitment index shows a low level for the 2016 to 2022 cohorts. Furthermore, the TRP recruitment index recorded zero values in 2018 and 2019.

95. A summary of indicators presented in CCSBT-ESC/2308/15 (Rev.1) is included in **Attachment 6**.

96. ESC noted that the fisheries and scientific survey indicators presented in the two papers provide supplementary information about changes in the SBT status that may inform review of exceptional circumstances. In considering the two papers, the ESC observed that given the range of factors that may lead to variation in

indicators, it is important that the outcomes of the papers should be interpreted with caution.

Agenda Item 9. SBT Stock Assessment

97. Australia and Japan collaborated on paper CCSBT-ESC/2308/16 on the 2023 stock assessment for SBT. The assessment provides estimates of current stock status in 2023. The assessment includes a revised reference set of 108 models and data through to 2022, following the review of preliminary models and data and decisions made at the 13th Operating Model and Management Procedure (OMMP) technical meeting, June 2023. The reference set of models indicates further rebuilding of the stock since the last assessment in 2020. The stock is currently estimated to be 23% (21-29%) of initial Total Reproductive Output (TRO_0). The fits to the data did not indicate any areas of concern, although the fit to the CPUE index value for 2022 is poor and this is explored further in sensitivity tests. The sensitivity tests were specified to assess the impacts on stock status estimates from additional areas of uncertainty that are not covered in the reference set of 108 models. Most of the sensitivity tests results indicate consistent or slightly more optimistic stock status results compared to the reference set, with results from only 2 of 12 sensitivity tests being slightly more pessimistic. Projections for the reference set of models indicate that the management procedure is on track to reach the new rebuilding target (50% probability of being greater than 30% TRO_0, by 2035) and maintain the stock at this level after the target year.

98. The ESC noted that the reference set of 108 operating models (Table 1 below) and sensitivity tests (**Attachment 7**, Table 1) were defined at OMMP 13. The reference set is the cross-combination of four values of steepness (h), three values of natural mortality at age 0 (M0), three values of mortality at age 10 (M10), a single value of Omega (Ω) (implying a linear relationship between CPUE and LL1 exploitable biomass), a single age range used to standardise LL1 selectivity over time, a single CPUE series (GAM), and three values of Psi (ψ) (the power parameter for relative reproductive contribution by age). The values for h, M0, M10, Omega and Psi are the same as the stock assessment in 2020. The reference set includes the following changes from the set used for the 2020 assessment:

- A single Japanese longline CPUE series (GAM model: CCSBT-ESC/2308/BGD 03).
- The age range for standardising the selectivity to predict LL1 CPUE has changed from two options (8-12 and 4-18) to a single range: 5-17.
- For the Indonesian selectivity, the lower age is changed from age 8 to age 6.

Table 1: Revised reference set grid for the stock assessment. Sampling weight refers to how the grid of models is sampled to generate a distribution from 2000 parameter draws.

Parameter	Value	Cumul N	Prior	Sampling weight
h	0.55, 0.63, 0.72, 0.8	4	Uniform	Prior
M_0	0.4 0.45 0.5	12	Uniform	Posterior
M_{10}	0.065, 0.085, 0.105	36	Uniform	Posterior
Omega (Ω)	1	36	Uniform	Prior
CPUE	GAM	36	Uniform	Prior
CPUE age range	5-17	36	Uniform	Prior
Psi (ψ)	1.5, 1.75, 2.0	108	0.25, 0.5, 0.25	Prior

99. The ESC agreed with the advice that for the reference set of models, the 2023 estimate of relative TRO (TRO_{2023}/TRO_0) is 0.23 (0.21-0.29) (Table 2 below). The estimate of relative biomass of animals aged 10+ is 0.22 (0.19-0.26). These stock status estimates have improved since the 2020 assessment (Figure 1).

100. MSY is estimated to be lower than in the previous assessment, with a narrower range (Table 2 below). Current Fishing mortality (F) is well below F_{MSY}: the F to F_{MSY} ratio is 0.46 (0.34-0.65). Current TRO is estimated to be at 0.85 of TRO_{MSY}, with the range including values greater than 1.0 (0.61-1.29).

Table 2: Summary of stock status for the reference set of OMs. Presented as the median and 80% PI. The assessment results from 2020 are included for comparison.

Assessment year (y)	Relative TRO (TRO_y/TRO_0)	Relative B10+ ($B10+_y/B10+_0$)	F-to-F_{msy} ratio	TRO_y/TRO_{MSY}	MSY (t)
2023	0.23 (0.21-0.29)	0.22 (0.19-0.26)	0.46 (0.34-0.65)	0.85 (0.61-1.29)	30,648 (29,152-31,376)
2020	0.20 (0.16-0.24)	0.17 (0.14-0.21)	0.52 (0.37-0.73)	0.69 (0.49-1.03)	33,207 (31,471-34,564)

101. The ESC discussed the fixed parameters in models and noted the following aspects.

102. The psi (ψ) parameter in the grid allows for estimation of the relative reproductive contribution by age. When ψ is equal to 1, TRO is directly proportional to SSB. Psi values in the grid are fixed at 1.5, 1.75 and 2.0 and are not estimated, because of correlation with other parameters. The central value in the range, 1.75, was the most likely value from the external analyses of the POP and HSP data. The comparison of the ogives for knife edge 50% maturity, SSB and TRO is shown in Figure 2 in **Attachment 7**.

103. The HSP false negative retention probability is updated when the OMs are reconditioned, and the value is based on the cut-off needed to ensure exclusion of

false positive HSPs from the analysis. See paper CCSBT-ESC/2208/09 for more details.

104. The (log) recruitment standard deviation (SD) is fixed at 0.6 which is above the empirical value calculated from the model estimates. In projections, the estimated empirical value, plus auto-correlation, are used. The initial recruitment deviates generated for projections are independent of the most recent recruitment deviation estimates because of the high influence of these on initial rebuilding trajectories.

105. The Close-kin type II error probability is the most sensitive fixed parameter, because it scales the HSP data and, hence, the expected number of adults.

106. The ESC discussed the weighting of factors in the grid, as the model fits suggest there is a preference for higher steepness, and very low preference for low steepness. A uniform prior on the four steepness values in the grid has been chosen, because it is considered that steepness cannot be estimated reliably without more information from extreme population dynamics, such as rebuilding the stock, crashing it again and then rebuilding it again. The information on steepness for SBT has been shown to be driven mostly by the recruitment penalty in the models, and decadal recruitment trends. The preference for higher steepness in this assessment is probably driven by both higher recent recruitments and a clear general preference for higher steepness values in the data.

107. The ESC noted that the recruitment estimated for 2018 is above average (Figure 2). Unfortunately, this estimate is not directly informed by the gene-tagging juvenile abundance estimates because of the missing gene-tagging data in 2020. This value is likely informed by the high CPUE value in 2022 and higher catches of age 4 and age 5 fish in 2021 and 2022 in the LL1 size data.

108. The last four years of recruitment in the models are estimates from the stock recruitment relationship and autocorrelation in the deviations around it, and there are no data informing these recruitments directly. These recruit values should therefore not be interpreted as a decrease in actual recruitment; they reflect only a gradual shrinkage effect back to the mean.

109. The ESC noted that the sensitivity tests mostly indicated similar or more positive stock status estimates (**Attachment 7**, Table 2). The upq2008 sensitivity test gave a slightly lower level for current stock status. In projections (**Attachment 7**, Table 2), this sensitivity test indicated that rebuilding of the stock would continue, but it would be below the target in 2035. The ESC noted that the MP would respond appropriately to the conditions in this scenario.

110. The upq2008 scenario allows for a potential shift in catchability that may have occurred during the structural changes in the longline fishery following cessation of the period of over-catch. The catchability increase estimated in the upq2008 sensitivity test, is a 40% increase on the pre-2008 level, which was not considered to be very plausible. The group noted that this value would be dependent on the assumptions made about what proportion of the overcatch occurring prior to 2005 affected the CPUE (a value set at 25% in the base case). To evaluate the sensitivity to this assumption, a higher (50%) impact of overcatch on the CPUE was used in combination with the upq2008 sensitivity. The 2008 catchability increase was estimated at 25% under this combined test, which was considered more plausible. The impact of allowing a break in the catchability was to reduce

the estimated recruitments in the period 1998-2018, which resulted in poorer fits to the aerial survey data compared to the fits obtained when a single catchability was estimated. However, the deterioration in the fits was not sufficiently substantial to justify discarding the test.

111. The ESC noted that the upq2008 sensitivity test projections indicated that the CTP would act to rebuild the TRO from 0.2 in 2023 to 0.25 by 2035 which reflects acceptable performance of the MP under this more extreme sensitivity test.

112. The trolling index sensitivity test gave slightly more positive estimates of stock status relative to the reference set, but in projections, performance was poorer with slower rebuilding due to the lower estimated recruitment levels. The ESC discussed the trolling index results and noted that the trolling survey results are inconsistent with the gene-tagging estimates; the gene-tagging data are considered to be more comprehensive and reliable estimates of incoming recruitment.

113. In summary, the ESC noted the strong rebuilding of the stock and improved stock status since the 2020 assessment. Projected rebuilding of the stock is on track, and even under more extreme sensitivity tests there is further rebuilding of the stock. Most sensitivity tests give similar, or better, stock status results to the reference set. Further detailed results from the stock assessment are in **Attachment 7**.

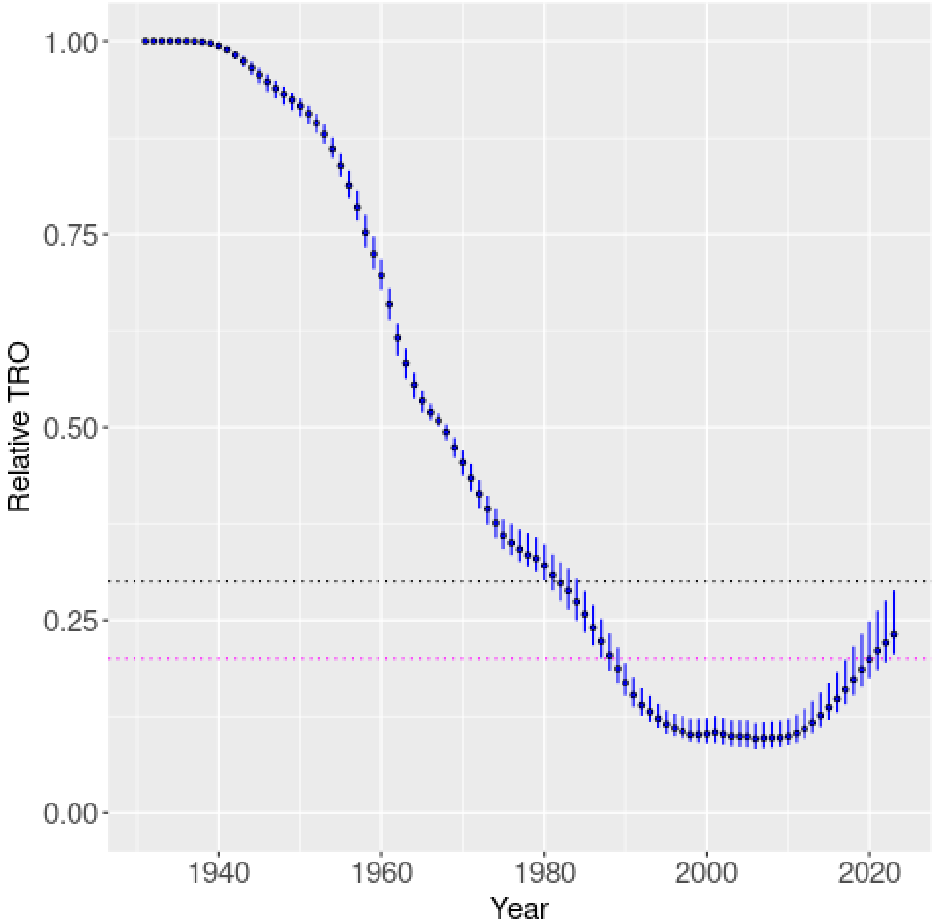

Figure 1: Relative TRO (median and 80% PI) for the reference set of models for the 2023 stock assessment. The magenta horizontal line is at 20% TRO_0; the black horizontal line is at 30% TRO_0.

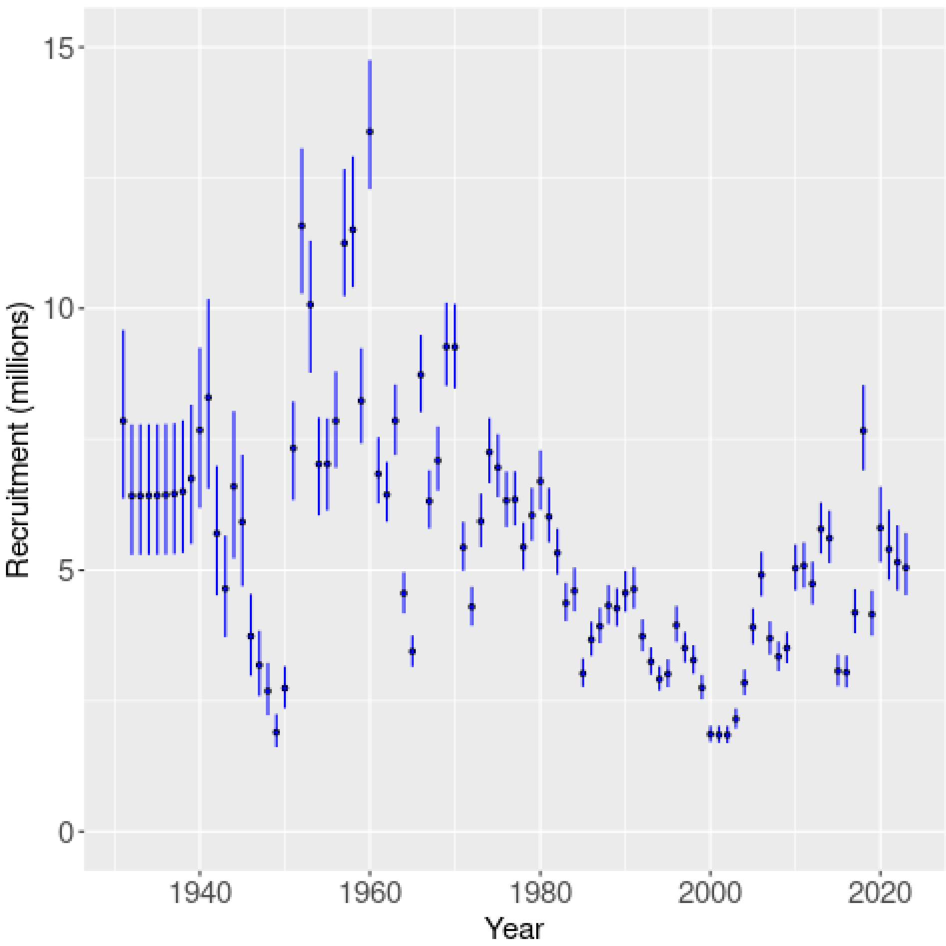

Figure 2: Absolute recruitment of age-0 fish (median and 80% PI). The last estimated recruitment is 2019; the final four recruitments shown are model predictions given the preceding recruitments and the autocorrelation in the historical year-class deviations.

<u>Agenda Item 10. SBT Stock Status Summary</u>

114. The ESC completes a stock assessment every three years, as required by the meta-rules schedule of activities adopted with the CTP. The 2023 stock assessment is the first full assessment since 2020. Key outputs are in **Table 3**.

115. The ESC notes from the 2023 assessment that:

- The stock, as indicated by relative Total Reproductive Output (TRO), is estimated to be 23% (21-29%; 80% PI) of TRO_0;
- Stock status has improved since the previous stock assessments conducted in 2020 which indicated that relative TRO was at 20% (16-24%, 80% PI) of TRO_0;
- The stock had been rebuilding by approximately 5% per year since the low point in TRO_0 in 2009 (Figure 1 in agenda item 9);
- The stock is at approximately 85% of the level estimated to produce maximum sustainable yield (MSY); and
- The fishing mortality rate is below 50% of the level associated with MSY.

Table 3: Southern Bluefin Tuna summary of 2023 assessment of stock status.

Southern Bluefin Tuna Summary of 2023 Assessment of Stock Status[2]	
Reported 2022 catch	17,139 t
Current status relative to initial	
TRO	0.23 (0.21-0.29)
B10+	0.22 (0.19-0.26)
TRO (2023) relative to TRO_{MSY}	0.85 (0.61-1.29)
F/F_{MSY}	0.46 (0.34-0.65)
Maximum sustainable yield	30,648 (29,152-31,376) tonnes
Current biomass (B10+)	266,187 (247,963-283,275) tonnes
Current management measures	Effective catch limit for Members and Cooperating Non-Members: 17,647 t /yr for the years 2021-2023.

TRO is the total reproductive output summed over all age classes weighted by their relative individual contribution to reproduction.
B10+ is the biomass of fish aged 10 years and over.

116. The ESC updated the annual report on biology, stock status and management of SBT that it prepares for provision to FAO and the other tuna RFMOs. The updated report is at **Attachment 8**.

Agenda Item 11. Operation of the Management Procedure and SBT Management Advice

11.1. Evaluation of meta-rules and exceptional circumstances

117. Japan presented Paper CCSBT-ESC/2308/23 (Rev.1), which examined observations of input index/data (Japanese longline GAM CPUE, age 2 abundance estimate from the gene-tagging, and close-kin mark recapture data) for the Cape Town procedure (CTP) compared to the 2019 operating model (OM) predictions. These examinations indicate that all the observations are consistent with the predicted ranges indicated by the 2019 OM. Regarding the input index/data for the CTP, therefore, there is no evidence to support a declaration of Exceptional Circumstances. Accordingly, regarding a decision on implementation of the recommended TAC (20,647 t, calculated by the CTP in 2022 to be applied for the 2024-2026 fishing seasons) for the 2024 season, it is concluded that no modification of the value of this TAC is required because: 1) there is no conclusive evidence to support a declaration of Exceptional Circumstances from the viewpoints of a check of the OM predictions and other potential factors (the extent by which the total reported global catch exceeds the TAC, unaccounted mortality, and results of the stock assessment conducted in 2023); and 2) no unexpected change has been detected in the fisheries and scientific survey indicators examined.

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[2] Values in parentheses are 10^{th} and 90^{th} percentiles.

118. Australia presented Paper CCSBT-ESC/2308/31. This review of exceptional circumstances aims to identify stock or fishery indicators, MP input data, population dynamics, fishing or fishing operations that are substantially different from the conditions under which the MP was tested or if catches have been greater than the recommended Total Allowable Catch (TAC). The exceptional circumstances process provides transparency in the TAC decisions of the Commission. The 2023 review notes that the inputs to the MP, the gene-tagging estimate of abundance, the close-kin data and CPUE index are within the expected range of values. Review of the population dynamics, other indicators for the stock and fishery, and fishery operations, did not identify any unusual conditions. The CCSBT's total reported catches are below the TAC. The updated estimates of potential Non-Member unaccounted mortality are smaller than in previous years and the MP has been tested to be robust these levels. There is no evidence for exceptional circumstances, and the MP recommended TAC for 2024-2026 should therefore remain unchanged. The issues that remain of concern, but do not currently trigger exceptional circumstances, are: 1) Absence of close-kin tissue sample collection in Indonesia for the 21/22 and 22/23 seasons and the potential loss of this essential dataset for use in the MP in the future, 2) The high 2022 CPUE point from the new GAM index, and the impact of contraction in the areas of operation of the Japanese longline fishery on the standardisation, and 3) Changes in the Indonesian spawning ground fishery, uncertainty in the length/age frequency, and the potential loss of otolith collection from the catch monitoring program.

119. The ESC noted that the reported catch has been less than the global TAC every year since 2017, the 2023 stock status represents an improvement over the 2020 status estimated in the last stock assessment conducted in 2020, and projections for the reference set indicate that the target of 30% TRO_0 will be reached by 2035 with a probability of 0.51.

120. Efforts also need to be made to resolve the issues of concern that do not yet trigger exceptional circumstances noted above by Australia. A proposal to reinstate the close kin sampling in Indonesian waters is considered in the update of the scientific research program (Agenda item 12).

121. The ESC concluded that there is no evidence for exceptional circumstances and that therefore the recommended TAC does not need to be modified.

11.2. Management Procedure recommended TAC for 2024-2026

122. The Cape Town Procedure (CTP) was adopted in 2019 and has been used to provide advice on the TAC for the block of years 2021-2023. The full specification of the CTP, the data inputs and the associated metarules for implementation are provided in Attachment 8 of the report of ESC25 (2020).

123. The CTP was applied in 2022 (ESC27) and provided a recommendation that the TAC for the 2024-2026 TAC block should increase by the maximum amount of 3,000 t (from 17,647 t to 20,647 t).

124. The 2023 ESC concluded that there is no evidence of exceptional circumstances and therefore confirms the TAC recommended for 2024-2026 of 20,647 t/year.

11.3. Indicative 2027-2029 TAC

125. In 2021, the Commission requested estimates of the potential TAC for the next TAC block. These were documented in ESC27 and are updated here.

126. Projections from the 2023 stock assessment using the reference set provided the following indicative probabilities of TAC changes for the years 2027-2029, but the ESC noted that these are simulated estimates and the CTP will be run formally in 2025 (by which time further data will be available for input) to provide the recommended TAC for the years 2027-2029:

- the probability of the TAC decreasing below 20,647 t, or increasing by 0-1,999t is small;
- the probability of the TAC increasing by 2,000-3,000 t is high.

127. New CTP data inputs (CPUE, close-kin and gene tagging) will become available over the next two years and will fully determine the result of the TAC calculation for 2027-2029.

11.4. Summary of SBT management advice

128. Application of the CTP in 2022 led to a recommended global TAC for 2024-2026 of 20,647 t/year. The 2023 ESC reviewed evidence of exceptional circumstances and confirmed that there is no need to modify the TAC recommended for the 2024-2026 fishing years.

129. The ESC therefore recommend that the 2024 global TAC is 20,647 t.

Agenda Item 12. Update of the Scientific Research Program (SRP)

130. The ESC reviewed the action plan in the draft CCSBT strategic plan (Attachment A of the SFMWG 06 report) and noted that the SRP outlined in Attachment 8 of the ESC 27 report pertains to both strategic and ongoing work.

131. Australia presented Paper CCSBT-ESC/2308/17, which states that the Cape Town Procedure metarules indicate that the MP should be reviewed in 2026 or 2027. Terms of reference, expectations and workload will need to be discussed over the next few years and factored into the ESC work plan.

132. As the next stock assessment is due to take place in 2026, the ESC suggested that the review is initiated in 2027. However, the terms of reference need to be developed soon.

133. The ESC was reminded that, in relation to the Performance Review, it may be necessary for future development of the MP to deal with the issue of non-stationarity, particularly in light of the environmental implications of climate change. The MP needs to be robust to likely or plausible levels of non-stationarity.

134. The ESC received two SRP proposals, which are provided at **Attachment 9**.

135. Proposal CCSBT-ESC/2308/14 is for a bridging project to support the continuation of the SBT spawning ground monitoring and sampling program in

Indonesia, and the necessary capacity building for new enumerators/samplers, during the MMAF-BRIN institution transition. The project will review and refine the monitoring program, rebuilding it back to the level required by the CCSBT for input into stock assessments (catch and catch composition, age and CTP) and the Cape Town Procedure (CKMR). It is essential, given the importance of the catch monitoring data, and the otolith and CKMR samples associated with them, to address these issues to ensure that the program is on a solid foundation for the future. CCSBT funding is requested for this project.

136. SRP proposal CCSBT-ESC/2308/33 is for a project to provide advice on the feasibility and cost-benefits of techniques for detection of UAM for CCSBT. The project will collate information from studies of existing and new UAM detection techniques. It will also develop a work plan and SRP proposal to provide consolidated advice on detection techniques. These could be applied to SBT compliance and supply chain monitoring, in collaboration with the CCSBT's Compliance Manager, for consideration by the ESC and CC in 2024. The estimates of UAM are included directly in the stock assessment. The UAM sensitivity tests indicate that there is little effect on current stock status but faster rebuilding of the stock and a higher probability of reaching the target, if UAM is reduced.

137. The author clarified that the project would develop a list of proposed methods to detect UAM, including new genetic technology currently under development.

138. A small SRP group met to review and discuss the two new SRP proposals and current research projects from 2022. The table below summarises these projects, their indicative budgets for 2024 and beyond, and provides a brief progress update.

Table 4: Update on current SRP projects and new proposals

Source	Title	Budget				Update
		2023	2024	2025	2026	
Current projects						
OMMP WG	Operating model recoding and improvements	130k	155k	30k		New OM coded in TMB and compared to ADMB model. The committee determined the match was adequate. For 2023-2024 meeting in Tokyo will run sensitivity models as group with training and tutorials, prioritize work on the model for 2024 through the special OMMP-? mtg to propose changes to OM structure.
UAM WG	Update NCNM UAM estimates	30k				New UAM estimates updated and used in 2023 stock assessment
UAM WG	Develop methods for estimating UAM					Project deferred indefinitely but retained within the SRP in case fishing effort conditions generating UAM change
CPUE WG	Improving the robustness of SBT CPUE indices to changes in spatio-temporal concentration of fishing fleets	30k	20-40k	30k		The ESC stressed the need for work on incorporating data from other fleets for CPUE analyses because of the increasing concentration of Japanese effort in space and time. Also, there continues to be uncertainty on the recent population trend. Also, this work will be important given climate change impacts and the potential changes in fish distributions The initial SRP covered one year with the option of extending to 2-4.
Australia	Second workshop on otolith-based ageing of southern bluefin tuna	35k				To be completed early 2024
Japan	Age-0 distribution survey					Carried out 2nd cruise and succeeded in sampling age-0 SBT
Japan	Trolling survey					Carried out trolling survey in 2023
Japan	Advancement of the trolling survey					Updated TRG and TRP indices
Australia	Pop-up Satellite tagging in the Great Australian Bight					Project was funded in AUS and has commenced for 3 yrs
New proposals						
AUS/IND	SBT catch monitoring and capacity building for biological sampling of spawning ground catches in Indonesia		62k			AUS-IND SRP Proposal
AUS-UAM	Preparatory work on detection of unaccounted mortality		0k			AUS-UAM SRP proposal

139. The two new SRP proposals were evaluated and ranked by Members as *High*, *Medium*, or *Low* and scored 3, 2, and 1, respectively according to the same procedure used from ESC 27.

140. ESC discussion highlighted the importance of the proposal for improving the Indonesian catch monitoring, tissue sampling and capacity building, of SBT on the spawning ground. These data and samples are fundamental for the CKMR estimation of abundance and input to the MP for setting TACs, and for monitoring changes in the size and age distribution of the spawning stock.

141. The proposal to conduct preparatory work on detection of unaccounted mortality (UAM) was determined to be important, but not necessarily urgent or critical given the recent updated estimates and scale of UAM.

142. The SBT spawning ground sampling and UAM detection proposals were rated High and Medium, respectively. The ESC agreed that the SBT spawning ground sampling ranks at the top of the entire SRP package, including projects supported at ESC 27.

143. The ESC briefly discussed the low values in the TRG index of age-1 SBT from the trolling survey after ~2016. It was noted that the index is not consistent with the results of the gene tagging or other juvenile abundance indicators which are used in the stock assessment. The ESC recommended that Members develop hypotheses and SRP proposals to investigate potential reasons for the low recruitment level from the trolling survey for consideration in 2024.

144. Noting that in 2024 there is no assessment or implementation of the MP, the ESC suggested that there should be an in-depth consideration of the SRP at ESC 29.

Agenda Item 13. Electronic Monitoring Systems (EMS)

145. The Chair invited the Executive Secretary to introduce ESC/2308/05 (Rev.1) - Draft High Level Electronic Monitoring/Systems (EM/S) Guiding Principles for CCSBT.

146. The Executive Secretary reported back from the inter-sessional Electronic Monitoring Working Group. The purpose of the working group session was for Members to agree on high level principles for EM/S, not to agree any technical details.

147. The Executive Secretary noted that EM/S is already being used, and there is a growing level of interest in its use. The adoption of Guiding Principles is seen as a necessary step in terms of achieving consistency of use and implementation.

148. The Executive Secretary noted there were three actions requested of the ESC in the paper, plus a fourth added verbally regarding agreeing an inter sessional process for continuing this work.

149. In considering the High Level EM/S Guiding Principles, the ESC noted that there had been discussion around one of the principles: *"In cases where EM/S can be utilised, the data and information collected by EM/S should, at a minimum, be as robust as that collected by human observers"*. Japan also raised the potential increased cost and expectations for reviews and analysis of the data collected by

EM/S that may arise as EM/S becomes more widespread. Indonesia emphasised the need to be flexible in terms of technology; relatively simple technology could still meet requirements. New Zealand noted that the Electronic Monitoring Working Group deliberately framed the use of EM/S as voluntary, so each Member can determine the cost-benefit of use. The Chair, and New Zealand, noted that the principles are written with the aim of being permissive and flexible, in response to Indonesia's point.

150. The Executive Secretary suggested an approach over the coming year whereby the Secretariat will reach out to Members and seek contacts/experts from each delegation. Each nominee will receive a questionnaire to complete, regarding EM/S in data collection, including how EM/S can collect the data elements currently required under SOPS. This accumulated information will be brought back to the next ESC in 2024 for consideration of those data elements with respect to EM/S. The ESC agreed on this suggested approach.

Agenda Item 14. Requirements for Data Exchange in 2024

151. Discussion for this agenda item commenced by correspondence in advance of the ESC.

152. The Secretariat submitted paper CCSBT-ESC/2308/06, which proposed the data exchange requirement for 2024. The requirements were based on the 2023 data exchange requirements with all items rolled over and the dates incremented. The paper provided a summary of issues with the 2023 Data Exchange, which were:

- South Africa did not submit any data, nor provide any indication of when it might submit them. It also did not provide any data to the 2021 or 2022 Data Exchanges.
- Korea submitted raw size data. It has not provided Raised Length Data since the requirement was introduced in 2015.
- Several datasets provided by the Secretariat and Australia were delayed due to database system issues encountered by Australia.
- The most recent Direct Age data Japan submitted was for 2018, which means that Japan has not met the reporting requirements for these data that require data to have been submitted for at least the 2020 calendar year.
- New Zealand's Raised Length Data in recent years were not raised to New Zealand's total catch. New Zealand is revising its processes for this dataset but at the time of writing had not submitted revised data.

153. The ESC agreed to add a new item to provide new information on CCSBT conventional tag recaptures to the Secretariat.

154. The data exchange requirements for 2024 were endorsed by the ESC and are provided in **Attachment 10**.

Agenda Item 15. Research Mortality Allowance

155. Discussion for this agenda item commenced by correspondence in advance of the ESC.

156. CSIRO summarised the Research Mortality Allowance (RMA) related part of paper CCSBT-ESC/2308/09 which reported on the 2022-2023 RMA usage and the requested RMA for 2024. In 2023, 359.7 kg of RMA was used from 44 mortalities. The request for RMA for the 2024 gene-tagging field trip is 1.5 t. This is expected to be an over-estimate of the requirements, that allows for unusual and unforeseen conditions.

157. Australia presented paper CCSBT-ESC/2308/18. Australia requested an RMA of up to 3 t in 2023 for a project to trial the use stereo-video technology to determine the weight of catch taken in the tuna farm sector of Australia's SBT Fishery. The trial proceeded in January 2023, with the adopted methodology meaning that 683 kilograms of SBT (60 fish) was required for the trial. RMA is not required for the next stage of the trial in 2024.

158. Australia also received an RMA of 0.5 t for the e-tagging project in the Great Australia Bight in 2023. No RMA was used for this project in 2023, and Australia requested 0.5 t of RMA again in 2024.

159. Japan submitted paper CCSBT-ESC/2308/24. Japan reported 0.147 t of RMA usage for 2022/2023 from the RMA approval of 1.0 t. Japan requested 1.0 t of RMA for the 2023/2024 research, including for an age-0 distribution survey and an age-1 trolling survey in Western Australia.

160. The ESC supported the 3 t of RMA requested for the specified projects.

Agenda Item 16. Workplan, Timetable and Research Budget for 2023 (and beyond)

16.1. Overview, time schedule and budgetary implications of proposed 2022 research activities and implications of Scientific Research Program for the work plan and budget

161. The ESC's three-year workplan and resource requirements for 2024 to 2026 is provided at **Attachment 11**. This workplan is limited to projects that require CCSBT funding and includes the regular scientific meetings, ongoing essential SRP projects and the new SRP projects that were considered by this meeting.

162. In recognition of the priorities identified in the draft updated Strategic Plan, the ESC recommended that the item concerning the need to explore additional measures to support spawning and recruitment should be investigated by Members in more depth ahead of ESC 29.

163. In response to a request from the Electronic Monitoring Working Group, the ESC agreed to undertake intersessional work to assess the potential impact of electronic monitoring on the information currently gathered as part of the Scientific Observer Programme Standards (SOPS). This work will be coordinated by the Secretariat and supported by technical experts nominated by Members.

16.2. Timing, length and structure of next meeting

164. Discussion for this sub-agenda item commenced by correspondence in advance of the ESC.

165. The EC has agreed tentative dates for the CCSBT's main meetings in 2024. The agreed tentative date for the next ESC meeting is from Monday 2 September to Friday 6 September 2024 inclusive in Taipei, Taiwan.

166. The Chair noted that, under the SRP, a 5-day meeting of the OM Specification and software upgrade project is planned in 2024. Through the pre-meeting discussion, Members agreed that, based on the preferred timing and location for the OMMP in recent years, the OM Specification and software upgrade project meeting will take place during the week starting 24 June 2024 in Seattle, USA.

167. The next ESC meeting will continue to make use of the pre-meeting document exchange to maximise effectiveness of meeting time.

Agenda Item 17. Other Matters

168. Discussion for this agenda item commenced by correspondence in advance of the ESC, and no other matters to discuss were raised by the Members.

Agenda Item 18. Adoption of Meeting Report

169. The report was adopted.

Agenda Item 19. Close of meeting

170. The meeting closed at 4:08 pm on 1 September 2023.

List of Attachments

Attachments

1	List of Participants
2	Agenda
3	List of Documents
4	Global Reported Catch by Flag
5	Intersessional CPUE evaluations
6	Recent trends in all indicators of the SBT stock
7	Stock Assessment Tables
8	Report on Biology, Stock Status and Management of Southern Bluefin Tuna: 2023
9	New SRP proposals
10	Data Exchange Requirements for 2024
11	ESC's three-year workplan

Attachment 1

List of Participants
Extended Scientific Committee Meeting
of the Twenty Eighth Meeting of the Scientific Committee

First name	Last name	Title	Position	Organisation	Postal address	Tel	Email
CHAIR							
Kevin	STOKES	Dr			NEW ZEALAND		kevin@stokes.net.nz
SCIENTIFIC ADVISORY PANEL							
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INDONESIA							
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INTERPRETERS							
Kumi	KOIKE	Ms					
Yoko	YAMAKAGE	Ms					
Kaori	ASAKI	Ms					
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Attachment 2

Agenda
Extended Scientific Committee for the Twenty Eighth Meeting of the Scientific Committee
28 August – 2 September 2023
Jeju island, Korea

1. Opening
- 1.1. Introduction of Participants
- 1.2. Administrative Arrangements

2. Appointment of Rapporteurs

3. Adoption of Agenda and Document List

4. Review of SBT Fisheries
- 4.1. Presentation of National Reports
- 4.2. Secretariat Review of Catches

5. Report from the Thirteenth Operating Model and Management Procedure (OMMP) Technical Meeting

6. Consideration of science related items of draft Strategic Plan

7. Review of results of the Scientific Research Program and other inter-sessional scientific activities
- 7.1. Results of scientific activities
- 7.2. Improving Robustness of CPUE indices
- 7.3. Update of NCNM UAM estimates
- 7.4. Maintenance and development of OMMP Code

8. Fisheries and Scientific Indicators of Stock Status

9. SBT Stock Assessment

10. SBT Stock Status

11. Operation of the Management Procedure and SBT Management Advice
- 11.1. Evaluation of meta-rules and exceptional circumstances
- 11.2. Confirmation of Management Procedure recommended TAC for 2024-2026
- 11.3. Summary of SBT management advice

12. Update of the Scientific Research Program (SRP)

13. Electronic Monitoring Systems (EMS)

14. Requirements for Data Exchange in 2024

15. Research Mortality Allowance

16. Workplan, Timetable and Research Budget for 2024 (and beyond)

16.1. Overview, time schedule and budgetary implications of proposed 2024 research activities and implications of Scientific Research Program for the work plan and budget

16.2. Timing, length and structure of next meetings (including ESC, OMMP and relevant subsidiary bodies).

17. Other Matters

18. Adoption of Meeting Report

19. Close of Meeting

Attachment 3

List of Documents
Extended Scientific Committee
for the Twenty Eighth Meeting of the Scientific Committee

(CCSBT-ESC/2308/)

1. Provisional Agenda
2. List of Participants
3. List of Documents
4. (Secretariat) Secretariat review of catches (Rev.1) (ESC agenda item 4.2)
5. (Secretariat) High Level Electronic Monitoring/Systems (EM/S) Guiding Principles for CCSBT (Rev.1) (ESC agenda item 12)
6. (Secretariat) Data Exchange (ESC agenda item 13)
7. (CCSBT) Update on the SBT close-kin tissue sampling, processing and kin-finding 2023 (ESC Agenda item 7.1)
8. (CCSBT) Workplan for new estimates of maturity ogive parameters for southern bluefin tuna (ESC Agenda item 7.1)
9. (CCSBT) Update on the gene-tagging program 2023 and RMA request (ESC Agenda item 7.1 and 14)
10. (CCSBT) Update on the length and age distribution of southern bluefin tuna (SBT) in the Indonesian longline catch (ESC Agenda item 7.1)
11. (Australia) Preparation of Australia's southern bluefin tuna catch and effort data submission for 2022 (ESC Agenda item 4.1)
12. (Australia) An update on Australian otolith collection activities and direct ageing activities for the Australian surface fishery 2023 (ESC Agenda item 7.1)
13. (Australia) Update on epigenetic ageing (ESC Agenda item 7.1)
14. (Australia and Indonesia) SBT catch monitoring and capacity building for biological sampling of spawning ground catches in Indonesia (ESC Agenda item 7.1 and 11)
15. (Australia) Fisheries indicators for the southern bluefin tuna stock 2022–23 (Rev.1) (ESC Agenda item 8)
16. (Australia and Japan) The southern bluefin tuna stock assessment in 2023 (ESC Agenda item 9)
17. (Australia) Planning for review of the CCSBT Cape Town Management Procedure (ESC Agenda item 10)
18. (Australia) Research mortality allowance: Proposed allowance in 2024 and 2023 usage report (ESC Agenda item 14)

19. (Japan) Report of the piston-line trolling monitoring survey for the age-1 southern bluefin tuna recruitment index in 2023 (ESC Agenda item 7.1)
20. (Japan) Report of the second survey of age-0 southern bluefin tuna distribution in the northwest coast of Western Australia in 2022 (ESC Agenda item 7.1)
21. (Japan) Trolling indices for age-1 southern bluefin tuna: update of the grid type trolling index in 2023 (Rev.1) (ESC Agenda item 7.1 and 8)
22. (Japan) Summary of Fisheries and Scientific Survey Indicators of Southern Bluefin Tuna Stock in 2023 (ESC Agenda item 8)
23. (Japan) A Check of Operating Model Predictions from the Viewpoint of Implementation of the Management Procedure in 2023 (Rev.1) (ESC Agenda item 10.1)
24. (Japan) Report of the 2022/2023 RMA utilization and application for the 2023/2024 RMA from Japan (ESC Agenda item 14)
25. (Taiwan) Preparation of Taiwan's Southern bluefin tuna catch and effort data submission for 2022 (ESC Agenda item 4.1)
26. (Taiwan) Updated gonadal information and analysis of southern bluefin tuna collected by Taiwanese scientific observer program (ESC Agenda item 7.1)
27. (Taiwan) CPUE standardization analyses for southern bluefin tuna based on the Taiwanese longline fishery data from 2002 to 2022 (ESC Agenda item 7.2)
28. (Taiwan) Direct aging and age compositions of SBT caught by Taiwanese longliners in 2019-2022 (ESC Agenda item 7.1)
29. (Korea) Korean SBT otolith collection activities in 2022 (ESC Agenda item 7.1)
30. ~~(Korea) Data exploration and CPUE standardization for the Korean southern bluefin tuna longline fishery (1996-2022) (ESC Agenda item 7.2)~~
31. (Australia) Evaluation of exceptional circumstances - SBT 2023 (ESC Agenda item 10.1)
32. (CCSBT) Mitigating the effects of increasing effort concentration by developing indices based on data from multiple fleets (ESC Agenda item 7.2)
33. (Australia) SRP proposal: Preparatory work on detection of unaccounted mortality (ESC Agenda item 11)

(CCSBT- ESC/2308/BGD)

1. (CCSBT) Estimates of unreported SBT catch by CCSBT non-cooperating non-member states between 2007 and 2020 (*Previously* CCSBT-OMMP/2306/07) (ESC Agenda item 7.3)
2. (Japan) Change in operation pattern of Japanese southern bluefin tuna longliners in the 2022 fishing season (*Previously* CCSBT-OMMP/2306/04) (ESC Agenda item 4.1 and 7.2)

3. (Japan) Update of CPUE abundance index using GAM for southern bluefin tuna in CCSBT up to the 2022 data (*Previously* CCSBT-OMMP/2306/05) (ESC Agenda item 7.2)
4. (Japan) Further examination of CPUE abundance index using GAM for southern bluefin tuna based on predicted values (*Previously* CCSBT-OMMP/2306/09) (ESC Agenda item 7.2)
5. (Korea) Data exploration and CPUE standardization for the Korean southern bluefin tuna longline fishery (1996-2022) (ESC Agenda item 7.2) (*Previously* CCSBT-OMMP/2306/06)

(CCSBT-ESC/2308/SBT Fisheries -)

Australia	Australia's 2021–22 southern bluefin tuna fishing season
Indonesia	Indonesia's tuna longline fishery interacted with Southern Bluefin Tuna in 2022 (Rev.1)
Japan	Review of Japanese Southern Bluefin Tuna Fisheries in 2022
Korea	2023 Annual National Report of Korean SBT Fishery (Rev.1)
New Zealand	New Zealand Annual Report to the Extended Scientific Committee
Taiwan	Review of Taiwan SBT Fishery of 2021/2022 (Rev.1)

(CCSBT-ESC/2308/Info)

1. (Australia) SBT e-tagging in the Great Australian Bight (ESC Agenda item 7.1)
2. (Australia) Spatial interactions among juvenile southern bluefin tuna at the global scale: A large scale archival tag experiment (ESC Agenda item 7.1)

(CCSBT-ESC/2308/Rep)

1. Report of the Sixth Meeting of the Strategy and Fisheries Management Working Group (July 2023)
2. Report of the Thirteenth Operating Model and Management Procedure Technical Meeting (June 2023)
3. Report of the Twenty Ninth Annual Meeting of the Commission (October 2022)
4. Report of the Seventeenth Meeting of the Compliance Committee (October 2022)
5. Report of the Twenty Seventh Meeting of the Scientific Committee (August – September 2022)
6. Report of the Twelfth Operating Model and Management Procedure Technical Meeting (June 2022)
7. Report of the Fourteenth Meeting of the Ecologically Related Species Working Group (March 2022)

8. Report of the Twenty Eighth Annual Meeting of the Commission (October 2021)
9. Report of the Twenty Sixth Meeting of the Scientific Committee (August 2021)

10. Report of the Twenty Fifth Meeting of the Scientific Committee (August - September 2020)
11. Report of the Twenty Sixth Annual Meeting of the Commission (October 2019)
12. Report of the Twenty Fourth Meeting of the Scientific Committee (September 2019)

Global Reported Catch By Flag

Reviews of southern bluefin tuna data presented to a special meeting of the Commission in 2006 suggested that the catches may have been substantially under-reported over the previous 10 to 20 years. The data presented here do not include estimates for this unreported catch.
All shaded figures are subject to change as they are either preliminary figures or they have yet to be finalised.
Blank cells are unknown catch (many would be zero).

	Australia			New Zealand									
Calendar Year	Commercial	Amateur	Japan	Commercial	Amateur	Korea	Taiwan	Philippines	Indonesia	South Africa	European Union	Miscellaneous	Research & Other
1952	264		565	0		0	0	0	0	0	0	0	
1953	509		3,890	0		0	0	0	0	0	0	0	
1954	424		2,447	0		0	0	0	0	0	0	0	
1955	322		1,964	0		0	0	0	0	0	0	0	
1956	964		9,603	0		0	0	0	0	0	0	0	
1957	1,264		22,908	0		0	0	0	0	0	0	0	
1958	2,322		12,462	0		0	0	0	0	0	0	0	
1959	2,486		61,892	0		0	0	0	0	0	0	0	
1960	3,545		75,826	0		0	0	0	0	0	0	0	
1961	3,678		77,927	0		0	0	0	0	145	0	0	
1962	4,636		40,397	0		0	0	0	0	724	0	0	
1963	6,199		59,724	0		0	0	0	0	398	0	0	
1964	6,832		42,838	0		0	0	0	0	197	0	0	
1965	6,876		40,689	0		0	0	0	0	2	0	0	
1966	8,008		39,644	0		0	0	0	0	4	0	0	
1967	6,357		59,281	0		0	0	0	0	5	0	0	
1968	8,737		49,657	0		0	0	0	0	0	0	0	
1969	8,679		49,769	0		0	80	0	0	0	0	0	
1970	7,097		40,929	0		0	130	0	0	0	0	0	
1971	6,969		38,149	0		0	30	0	0	0	0	0	
1972	12,397		39,458	0		0	70	0	0	0	0	0	
1973	9,890		31,225	0		0	90	0	0	0	0	0	
1974	12,672		34,005	0		0	100	0	0	0	0	0	
1975	8,833		24,134	0		0	15	0	0	0	0	0	
1976	8,383		34,099	0		0	15	0	12	0	0	0	
1977	12,569		29,600	0		0	5	0	4	0	0	0	
1978	12,190		23,632	0		0	80	0	6	0	0	0	
1979	10,783		27,828	0		0	53	0	5	0	0	4	
1980	11,195		33,653	130		0	64	0	5	0	0	7	
1981	16,843		27,981	173		0	92	0	1	0	0	14	
1982	21,501		20,789	305		0	182	0	2	0	0	9	
1983	17,695		24,881	132		0	161	0	5	0	0	7	
1984	13,411		23,328	93		0	244	0	11	0	0	3	
1985	12,589		20,396	94		0	241	0	3	0	0	2	
1986	12,531		15,182	82		0	514	0	7	0	0	3	
1987	10,821		13,964	59		0	710	0	14	0	0	7	
1988	10,591		11,422	94		0	856	0	180	0	0	2	
1989	6,118		9,222	437		0	1,395	0	568	0	0	103	
1990	4,586		7,056	529		0	1,177	0	517	0	0	4	
1991	4,489		6,477	164		246	1,460	0	759	0	0	97	
1992	5,248		6,121	279		41	1,222	0	1,232	0	0	73	
1993	5,373		6,318	217		92	958	0	1,370	0	0	15	
1994	4,700		6,063	277		137	1,020	0	904	0	0	54	
1995	4,508		5,867	436		365	1,431	0	829	0	0	201	296
1996	5,128		6,392	139		1,320	1,467	0	1,614	0	0	295	290
1997	5,316		5,588	334		1,424	872	0	2,210	0	0	333	
1998	4,897		7,500	337		1,796	1,446	5	1,324	1	0	471	
1999	5,552		7,554	461		1,462	1,513	80	2,504	1	0	403	
2000	5,257		6,000	380		1,135	1,448	17	1,203	4	0	31	
2001	4,853		6,674	358		845	1,580	43	1,632	1	0	41	4
2002	4,711		6,192	450		746	1,137	82	1,701	18	0	203	17
2003	5,827		5,770	390		254	1,128	68	565	15	3	40	17
2004	5,062		5,846	393		131	1,298	80	633	19	23	2	17
2005	5,244		7,855	264		38	941	53	1,726	29	0	0	5
2006	5,635		4,207	238		150	846	50	598	15	3	0	5

Calendar Year	Australia		Japan	New Zealand		Korea	Taiwan	Philippines	Indonesia	South Africa	European Union	Miscellaneous	Research & Other
	Commercial	Amateur		Commercial	Amateur								
2007	4,813		2,840	379	4	521	841	46	1,077	58	18	0	3
2008	5,033		2,952	319	0	1,134	913	45	926	44	14	4	10
2009	5,108		2,659	419	0	1,117	921	47	641	40	2	0	0
2010	4,200		2,223	501	0	867	1,208	43	636	54	11	0	0
2011	4,200		2,518	547	0	705	533	45	842	64	3	0	1
2012	4,503		2,528	776	0	922	494	46	910	110	4	0	0
2013	4,902		2,694	756	1	918	1,004	46	1,383	67	0	0	0
2014	4,559		3,371	826	0	1,044	944	45	1,063	56	0	0	1
2015	5,824		4,745	922	1	1,051	1,162	0	593	63	0	0	0
2016	5,962		4,721	951	1	1,121	1,023	0	601	64	0	0	2
2017	5,221		4,567	913	21	1,080	1,171	0	835	136	0	0	2
2018	6,401	0	5,945	1,008	12	1,268	1,218	0	1,087	207	0	0	2
2019	6,185	270	5,851	959	2	1,238	1,229	0	1,206	160	0	0	0
2020	4,757	270	5,929	853	50	1,231	1,116	0	1,298	162	0	0	0
2021	5,459	270	6,452	788	57	1,241	1,274	0	1,123	173	0	0	0
2022	6,266	312	5,887	875	60	1,173	1,318	0	1,031	217	0	0	0

European Union: From 2006, estimates are from EU reports to the CCSBT. Earlier catches were reported by Spain and the IOTC.
Miscellaneous: Before 2004, these were from Japanese import statistics (JIS). From 2004, the higher value of JIS and CCSBT TIS was used combined with available information from flags in this category.
Research and other: Mortality of SBT from CCSBT research and other sources such as discarding practices in 1995/96.

Attachment 5

Intersessional CPUE evaluations

As noted in ESC/2308/16, the CPUE working group met between the OMMP13 meeting and ESC28 on July 24/25th, 2023. The working group reviewed the level of uncertainty (CV) within strata at which unfished squares model predictions would be set to zero. The first part of this analyses was to examine the distribution of the uncertainty of model predictions based on the number of observations per cell (Figure 1). As expected, the distribution of uncertainty among cells is highest when there are no observations, and then tapers to a CV of around 0.1 and slightly lower as observations increased.

With this information, the trend information was evaluated relative to different threshold levels. Predictions in strata (without any observations) that had CVs higher than the threshold were omitted from the index. Figure 2 shows the impact on the trends for different threshold levels. Two key conclusions can be drawn from this result: 1) that thresholds at 0.125 and above gave similar results to the base case except in the last year; and 2) that the uncertainty for model predictions was higher in the terminal year due to the general nature of how smoothing affects the uncertainty of predictions; the terminal year would therefore be biased low. Consequently, the working group decided against pursuing options for these sensitivities.

The CPUE working group also evaluated some simple GLM models to consider as a sensitivity test. These results were like those for the existing GAM (Fig. 3) so the group considered that the other sensitivity tests (e.g., CPUE_Drop5) would provide appropriate contrast to the recent high levels of the CPUE index.

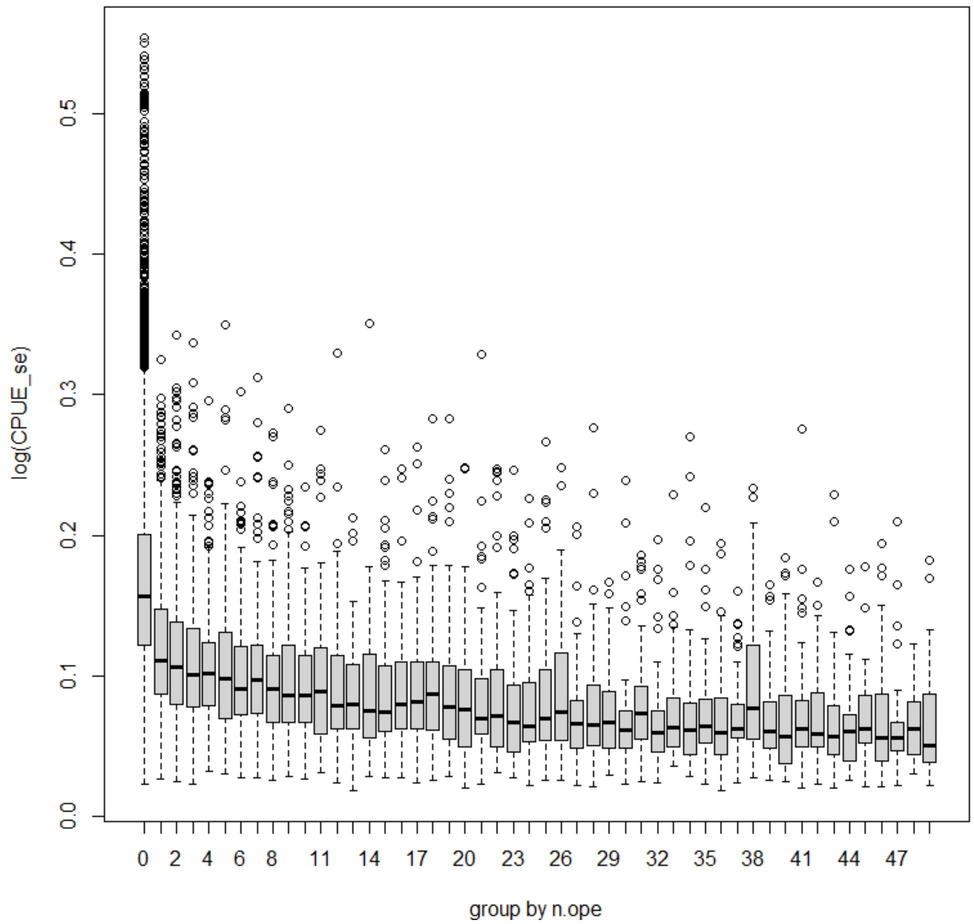

Figure 1: Distribution of standard errors of temporal and spatial cells (vertical scale) plotted by number of operations within cells (horizontal axis).

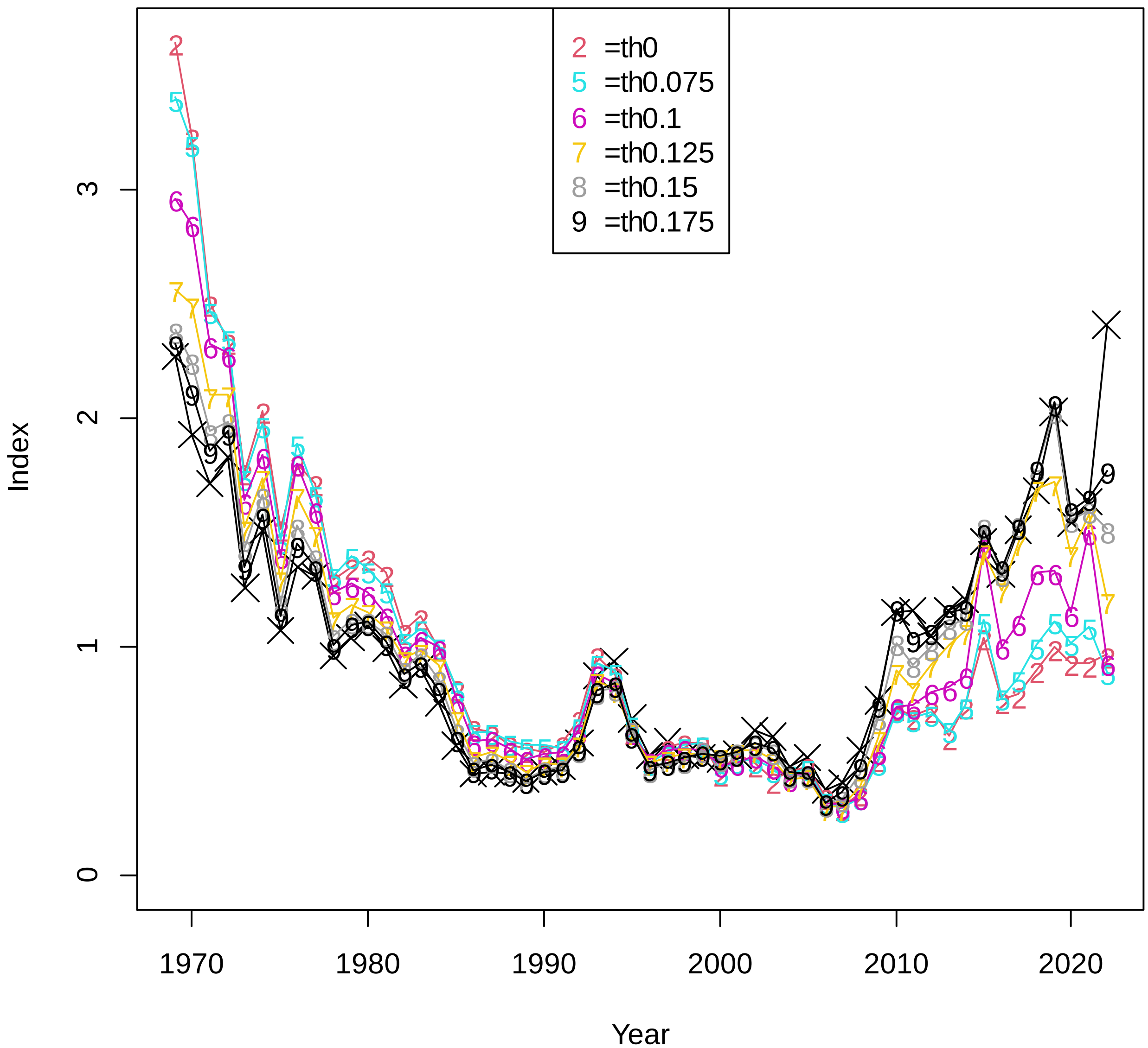

Figure 2: Plot of indices for different threshold levels (th0 indicates the case where all strata without observations were given a model prediction of zero—i.e., cells without any operations are all omitted)X denotes base-case GAM CPUE index.

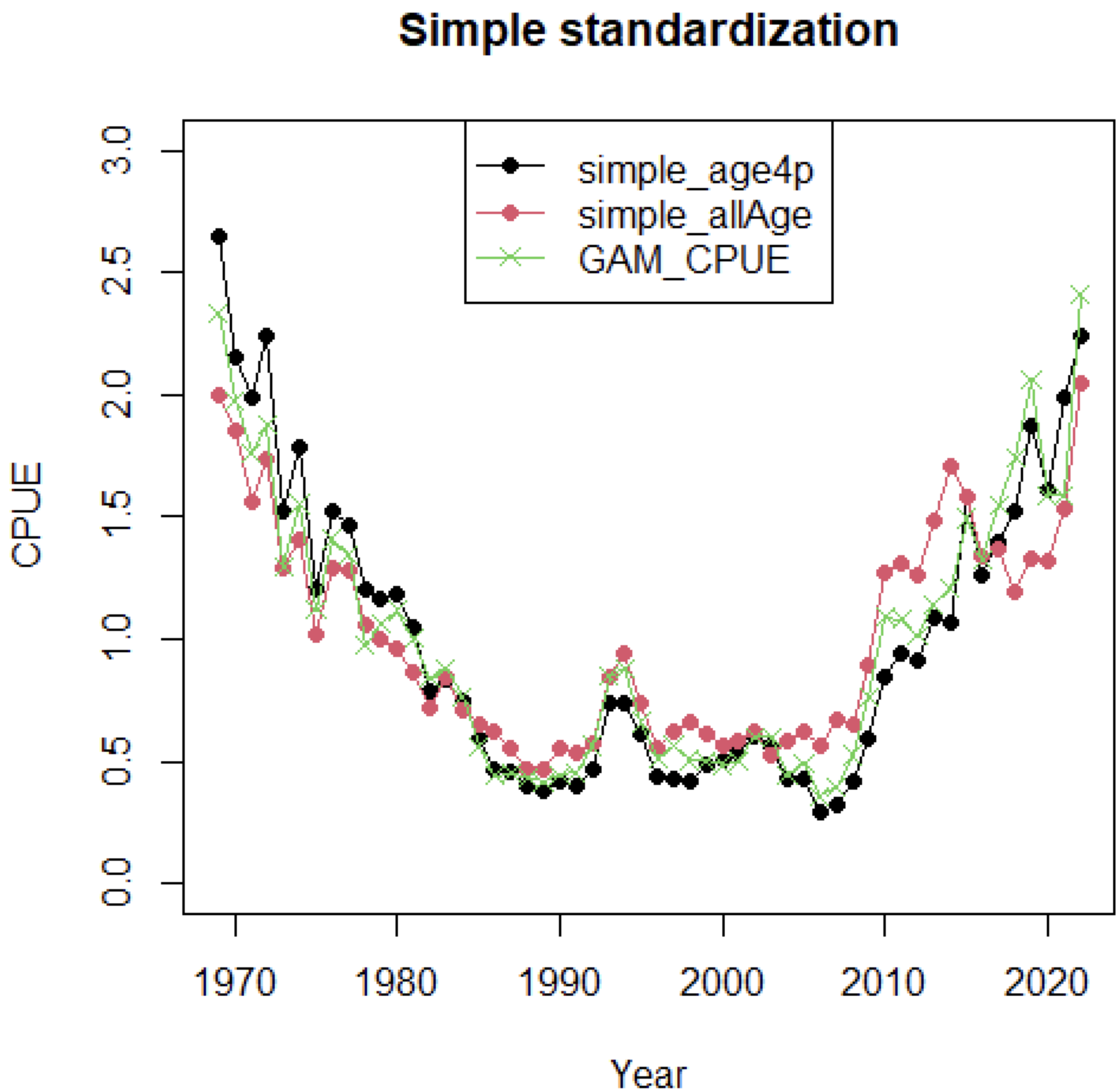

Figure 3: Alternative CPUE series considered during the working-group intersessional for potential sensitivity analyses.

Attachment 6

Recent trends in all indicators of the SBT stock

Indicator	Period	Min.	Max.	2019	2020	2021	2022	2023	12-month trend	Main Ages	NOTES
Trolling index (piston line)	1996–2003 2005–06 2006–14 2016–23	0.00 (2018, 2019)	5.09 (2011)	0.00	1.72	–	0.887	0.188	↓	1	
Trolling index (grid)	1996–2003 2005–14 2016–23	0.26 (2002)	1.77 (2008, 2011)	0.374	0.787	0.407	0.550	0.634	↑	1	
Gene tagging	2016–21	1.14 (2018)	2.27 (2016)	1.52	–	1.68			↑	2	
CKMR hit rate	2010–21	5.98e-7 (2021)	1.13e-6 (2010)	6.31e-7	6.08e-7	5.98e-7			↓	juveniles/spawners	
NZ domestic standardised CPUE	2003–2022	0.306 (2006)	3.08 (2022)	1.12	1.84	2.11	3.08		↑	All	
NZ domestic age/size composition (proportion age 0–5 SBT)*	1980–2022	0.001 (1985)	0.48 (2017)	0.27	0.25	0.23	0.33		↑	2-5	Peripheral Area
Indonesian mean size class**	1993–21	158.16 (2014)	188.06 (1994)	162.04	160.64	161.55	–		↑	spawners	
Indonesian age composition:** mean age on spawning ground, all SBT	1994–21	12.59 (2014)	21.19 (1995)	13.66	12.76	12.78	–		↑	spawners	
Indonesian age composition:** mean age on spawning ground 20+	1994–21	22.35 (2016)	25.29 (2004)	22.51	23.40	23.29	–		↓	Older spawners	
Indonesian age composition:** median age class on spawning ground	1994–21	10 (multiple years)	21 (multiple years)	10	10	10	–		--	spawners	

Indicator		Period	Min.	Max.	2019	2020	2021	2022	12-month trend	Main Ages	Notes
Japanese nominal CPUE, age 4+		1969–2022	0.33 (2006)	2.67 (1969)	1.89	1.59	1.84	2.20	↑	4+	
Japanese standardised CPUE, age 4+ (GAM series for OM/MP)		1969–2022	0.38 (2006)	2.41 (2022)	2.03	1.54	1.63	2.41	↑	4+	
Korean nominal CPUE		1991–2022	1.312 (2004)	21.523 (1991)	8.702	7.487	7.879	7.980	↑	4+	Bycatch effects
Korean standardised CPUE (selected data)	Area 8	1996-2020	0.35 (2002)	2.58 (2016)	–	2.24	2.51	–	↑	4+	
	Area 9	1996-2020	0.16 (2005)	2.43 (2019)	2.43	1.76	1.95	1.50	↓		
Korean standardised CPUE (clustered)	Area 8	1996-2020	0.38 (2002)	2.85 (2021)	–	2.64	2.85	–	↑	4+	
	Area 9	1996-2020	0.17 (2005)	2.42 (2019)	2.42	1.77	1.97	1.51	↓		
Taiwanese nominal CPUE, Areas 8+9		1981–2020	<0.001 (1985)	0.956 (1995)	0.204	0.283	0.388	0.849	↑	2+	Bycatch effects
Taiwanese nominal CPUE, Areas 2+14+15		1981–2020	<0.001 (1985)	3.672 (2007)	1.638	1.324	2.325	2.338	↑	2+	Bycatch effects
Taiwanese standardised CPUE	(Area E)	2002–21	0.090(2002)	1.070 (2012)	0.668	0.733	0.900	0.926	↑	2+	In development
	(Area W)	2002–21	0.177(2019)	2.011 (2002)	0.177	0.357	0.468	0.336	↓		Bycatch effects
Japanese age comp, age 0–2*		1969–2022	0.004 (1966, 2020)	0.192 (1998)	0.009	0.004	0.007	0.018	↑	2	Affected by release/discard
Japanese age comp, age 3*		1969–2022	0.011 (2015)	0.228 (2007)	0.082	0.080	0.109	0.074	↓	3	Affected by release/discards
Japanese age comp, age 4*		1969–2022	0.091 (1967)	0.300 (2010)	0.160	0.087	0.147	0.218	↑	4	
Japanese age comp, age 5*		1969–2022	0.072 (1986)	0.300 (2010)	0.196	0.089	0.091	0.140	↑	5	
Taiwanese age/size comp, age 0–2*		1981–2022	<0.001 (1982)	0.251 (2001)	0.015	0.002	0.004	0.005	↑	Mostly 2	
Taiwanese age/size comp, age 3*		1981–2022	0.024 (1996)	0.349 (2001)	0.108	0.059	0.101	0.074	↓	3	
Taiwanese age/size comp, age 4*		1981–2022	0.027 (1996)	0.502 (1999)	0.168	0.169	0.317	0.237	↓	4	
Taiwanese age/size comp, age 5*		1981–2022	0.075 (1997)	0.428 (2018)	0.338	0.325	0.301	0.365	↑	5	
Australia surface fishery median age composition		1964–2022	age 1 (1979–80)	age 3 (multiple years)	age 2	age 2	age 2	age 2	–	1-4	

Indicator		Period	Min.	Max.	2019	2020	2021	2022	12-month trend	Ages	Notes
Jpn LL standardised CPUE (age 3)	w0.5^ w0.8	1969–2022	0.23 (2003) 0.25 (2003)	3.28 (1972) 2.95 (1972)	0.69 0.85	1.12 1.46	1.35 1.71	1.86 2.51	↑	3	Affected by release/discard
Jpn LL standardised CPUE (age 4)	w0.5^ w0.8	1969–2022	0.26 (2006) 0.27 (2006)	3.32 (2022) 4.25 (2022)	1.00 1.20	0.79 0.98	1.21 1.50	3.32 4.25	↑	4	
Jpn LL standardised CPUE (age 5)	w0.5^ w0.8	1969–2022	0.22 (2006) 0.24 (2006)	2.67 (1972) 2.46 (2022)	1.28 1.58	0.84 1.02	0.86 1.05	1.88 2.46	↑	5	
Jpn LL standardised CPUE (age 6&7)	w0.5^ w0.8	1969–2022	0.18 (2007) 0.20 (2007)	2.47 (1976) 2.17 (1976)	0.96 1.20	1.33 1.69	1.12 1.41	1.15 1.52	↑	6-7	
Jpn LL standardised CPUE (age8-11)	w0.5^ w0.8	1969–2022	0.26 (2007) 0.28 (1992)	3.82 (1969) 3.30 (1969)	0.83 1.06	1.40 1.80	1.12 1.46	1.07 1.44	↓	8-11	
Jpn LL standardised CPUE (age 12+)	w0.5^ w0.8	1969–2022	0.45 (2017) 0.58 (1997)	3.46 (1970) 2.92 (1970)	0.47 0.60	1.01 1.28	0.87 1.12	0.99 1.33	↑	12+	

* Derived from size data; ** Indonesian catch not restricted to just the spawning grounds since 2012–13; na = not available

^ All the Jpn LL standardised CPUE indicators are based on the standardisation model by Nishida and Tsuji (CCSBT/SC/9807/13) using all vessel data. w0.5 and w0.8 refer to the weighting in the formula of the indicator calculation, w*VS + (1-w)*CS (VS and CS represent Variable Square and Constant Square hypotheses, respectively).

Attachment 7

Stock Assessment Tables

Table 1: Sensitivity tests and priority

Test name	Code	Conditioning and projection notes	Priority
UAMbycatch	UAMbycatch	Replace LL1 NCNM catches estimated using Japanese catch rates with estimates calculated using Taiwanese catch rates.	**H**
No UAM	noUAM	Remove NCNM catches from conditioning and projections.	**H**
LL1 Case 2 of MR	case2	LL1 overcatch based on Case 2 of the 2006 Market Report	**L**
CPUE_Drop5	Drop_5yrs	Eliminate the last 5 years of CPUE Series	**H**
***CPUE_0**	DropCells	Set uncertain cells w/o data to zero (based on CV of positive CPUE rates)	**H**
Omega75	cpueom75	Power function for biomass-CPUE relationship with power = 0.75	**H**
Upq2008	Cpueupq	Estimate CPUE 2008 change in q for LL1 fleet	**H**
Q age range	cpue59	Age range for q equal to 5-9	**M**
LL1_sel	LL1_sel	Allow the terminal 3-years to be flexibly estimated to evaluate impact on year-class uncertainty and magnitude	**M**
Indo_sel	Indo_sel	Bi-modality in selectivity, more rigid (constrain amount of change) from 2013 on in Indonesian fishery	**H**
NoPOP&HSP	NoPOPHSP	Exclude both close-kin data (Parent-Offspring and Half-Sibling Pairs)	**H**
No HSP	NoHSP	Exclude half-sibling-pair close-kin data	**H**
GTI	Troll	Includes the grid-type trolling index as additional recruitment index. Increase CV of aerial survey to preclude aerial survey dominating the fit, given apparent conflicts in the data	**H**

*Not included following further discussion at the CPUE working group.

Table 2: Estimated stock status for the reference set (row 1) and sensitivity test results

Run	Relative TRO (TRO_{2023}/TRO_0)	Relative B10+	F-to-F_{msy}	TRO_{2023}/TRO_{MSY}	MSY
Reference Set 2023: base22	0.23 (0.21-0.29)	0.22 (0.19-0.26)	0.46 (0.34-0.65)	0.85 (0.61-1.29)	30,648 (29,152-31,376)
UAMbycatch	0.23 (0.21-0.29)	0.22 (0.19 -0.27)	0.46 (0.34-0.65)	0.86 (0.61-1.30)	30,325 (28,832-31,052)
No UAM	0.23 (0.21-0.29)	0.22 (0.20-0.27)	0.46 (0.33-0.66)	0.87 (0.62-1.31)	30,072 (28,594-30,820)
LL1 case2 of MR	0.23 (0.20-0.28)	0.21 (0.19-0.26)	0.46 (0.33-0.65)	0.84 (0.60-1.26)	30,968 (29,370-31,688)
CPUE_Drop5	0.23 (0.20-0.29)	0.22 (0.19-0.27)	0.48 (0.35-0.68)	0.85 (0.59-1.29)	30,534 (29,026-31,290)
Omega75	0.25 (0.22-0.30)	0.23 (0.20-0.28)	0.42 (0.31-0.61)	0.90 (0.64-1.36)	31,580 (29,862-32,435)
Upq2008	0.2 (0.17-0.25)	0.18 (0.15-0.23)	0.52 (0.37-0.76)	0.73 (0.5-1.13)	30,278 (28,810-31,162)
Q age range	0.26 (0.23-0.32)	0.25 (0.22-0.30)	0.40 (0.30-0.56)	0.98 (0.69-1.34)	31,467 (29,871-32,307)
LL1_sel	0.23 (0.21-0.29)	0.22 (0.19-0.26)	0.48 (0.35-0.67)	0.85 (0.61-1.29)	30,343 (28,880-31,071)
Indo_sel	0.25 (0.22-0.31)	0.23 (0.2-0.28)	0.46 (0.32-0.63)	0.88 (0.64-1.39)	30,809 (29,554-31,508)
No POP & HSP	0.22 (0.2-0.24)	0.2 (0.19-0.22)	0.5 (0.39-0.62)	0.77 (0.65-1.05)	31,011 (29,118-31,637)
No HSP	0.24 (0.21-0.28)	0.22 (0.19-0.27)	0.46 (0.35-0.65)	0.86 (0.62-1.18)	30,733 (29,239-31,382)
GTI	0.24 (0.21-0.29)	0.22 (0.19-0.27)	0.58 (0.42-0.82)	0.87 (0.61-1.31)	28,796 (27,538-29,477)

Table 3: Projection summary (median and 80% PI), for the reference set of OMs and using the CTP (row 1) and for the sensitivity tests.

Run	$P(TRO_{2035} > 0.2TRO_0)$	$P(TRO_{2035} > 0.3TRO_0)$	TRO_{2025}/TRO_0	TRO_{2035}/TRO_0	TRO_{2040}/TRO_0	Mean TAC to 2035
Base22 (reference set)	0.96	0.51	0.25 (0.22-0.31)	0.30 (0.22-0.41)	0.30 (0.19-0.45)	22,884 (22,528-23,938)
UAMbycatch	0.97	0.56	0.26 (0.23-0.31)	0.31 (0.23-0.42)	0.31 (0.20-0.46)	22,939 (22,528-23,939)
NoUAM	0.99	0.60	0.26 (0.23-0.32)	0.32 (0.23-0.42)	0.32 (0.21-0.47)	22,897 (22,528-23,939)
case2 MR	0.96	0.52	0.25 (0.22-0.31)	0.30 (0.22-0.41)	0.30 (0.19-0.45)	22,851 (22,528-23,937)
CPUE_Drop5	0.93	0.45	0.25 (0.22-0.31)	0.29 (0.21-0.40)	0.29 (0.18-0.44)	23,546 (20,556-24,771)
Omega75	0.98	0.63	0.27 (0.24-0.33)	0.33 (0.24-0.43)	0.32 (0.20-0.48)	23,548 (20,556-24,493)
Indosel	0.97	0.56	0.27 (0.24-0.34)	0.31 (0.22-0.43)	0.31 (0.19-0.48)	23,590 (22,575-23,983)
LL1sel	0.94	0.46	0.25 (0.22-0.31)	0.29 (0.21-0.40)	0.29 (0.18-0.44)	22,816 (22,528-23,938)
Upq2008	0.79	0.29	0.22 (0.18-0.27)	0.25 (0.17-0.36)	0.24 (0.14-0.40)	23,913 (22,619-24,079)
Q age range	1.0	0.73	0.29 (0.26-0.35)	0.35 (0.26-0.45)	0.34 (0.22-0.50)	22,594 (22,528-23,881)
No HSP	0.95	0.5	0.26 (0.23-0.31)	0.30 (0.22-0.40)	0.3 (0.19-0.44)	22,877 (22,528-23,939)
No CKMR	0.94	0.35	0.24 (0.22-0.26)	0.28 (0.21-0.36)	0.27 (0.18-0.41)	23,913 (22,528-24,167)
GTI	0.80	0.24	0.25 (0.22-0.30)	0.25 (0.18-0.35)	0.24 (0.14-0.38)	23,509 (20,556-24,263)
S50	0.93	0.42	0.24 (0.21-0.3)	0.29 (0.21-0.39)	0.28 (0.18-0.43)	23,050 (22,528-23,941)
S50_Upq2008	0.79	0.29	0.22 (0.18-0.27)	0.25 (0.17-0.36)	0.24 (0.14-0.4)	23,913 (22,614-24,038)

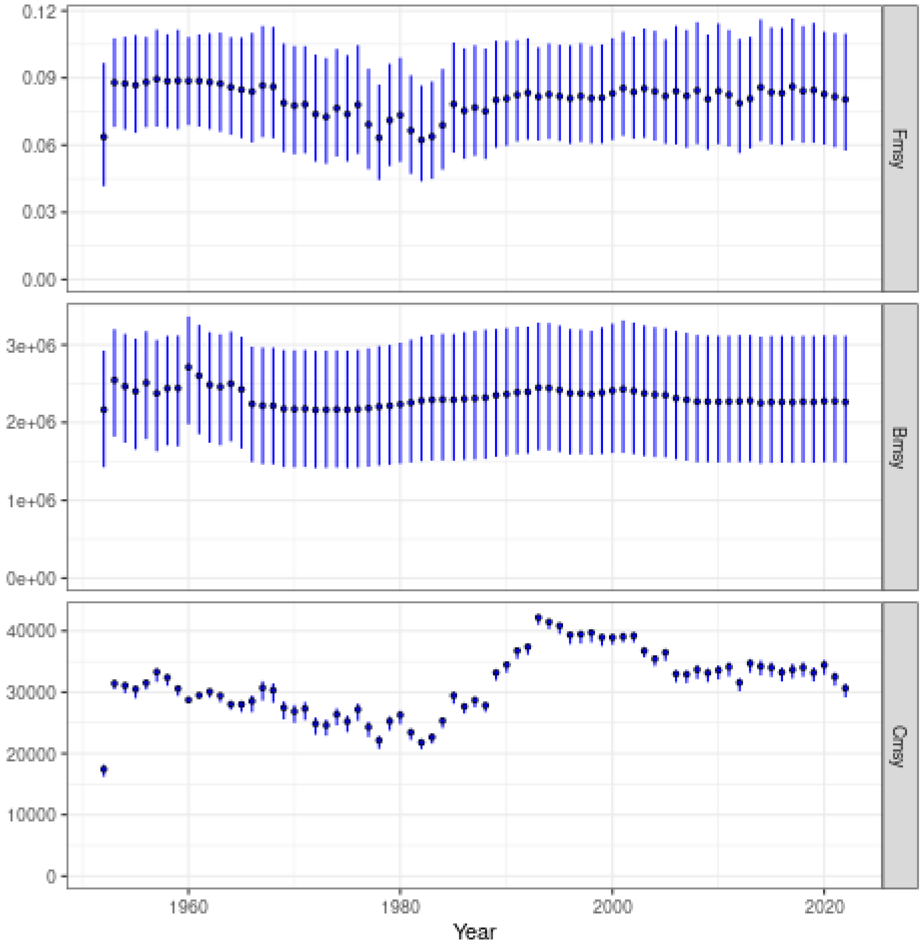

Figure 1: Estimated F_{MSY}, B_{MSY} and C_{MSY}

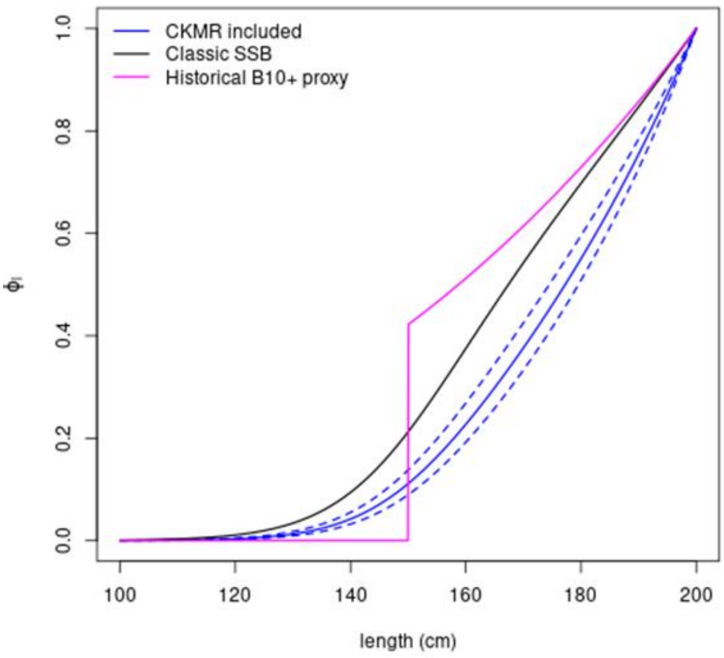

Figure 2: length-based comparison of (per capita) relative reproductive output (RRO) for the biomass of all animals aged 10+ (historical SSB proxy; magenta line), the actual SSB (given current assumed maturity relationship; black line), and the actual relationship used to define TRO in the assessment (median blue line 80% PI dotted blue line).

Attachment 8

Report on Biology, Stock Status and Management of Southern Bluefin Tuna: 2023

The CCSBT Extended Scientific Committee (ESC) updated the stock assessment and conducted a review of fisheries indicators in 2023 to provide updated information on the status of the stock. The next stock assessment is scheduled in 2026. This report updates the description of fisheries and the state of stock as advised in 2023 by the ESC using the most recent information.

1. Biology

Southern bluefin tuna (*Thunnus maccoyii*) are found in the southern hemisphere, mainly in waters between 30° and 50° S, but only rarely in the eastern Pacific. The only known spawning area is in the Indian Ocean, south-east of Java, Indonesia. Spawning takes place from September to April in warm waters south of Java and juvenile SBT migrate south down the west coast of Australia. During the summer months (December-April), they tend to congregate near the surface in the coastal waters off the southern coast of Australia and spend their winters in deeper, temperate oceanic waters. Results from recaptured conventional and archival tags show that young SBT migrate seasonally between the south coast of Australia and the central Indian Ocean. After age 5 SBT are seldom found in nearshore surface waters, and their distribution extends over the southern circumpolar area throughout the Pacific, Indian and Atlantic Oceans.

SBT can attain a length of over 2m and a weight of over 200kg. Direct ageing using otoliths indicates that a significant number of fish larger than 160cm are older than 25 years, and the maximum age obtained from otolith readings has been 42 years. Analysis of tag returns and otoliths indicate that, in comparison with the 1960s, growth rate has increased since about 1980 during the period when the stock was declining. There is some uncertainty about the size and age when SBT mature, but available data indicate that SBT do not mature younger than 8 years (155cm fork length), and perhaps as old as 15 years. SBT exhibit age-specific natural mortality, with M being higher for young fish and lower for old fish, increasing again prior to senescence.

Given that SBT have only one known spawning ground, and that no morphological differences have been found between fish from different areas, SBT are considered to constitute a single stock for management purposes.

2. Description of Fisheries

Reported catches of SBT up to the end of 2022 are shown in Figures 1 - 3. Note that a 2006 review of SBT data indicated that there may have been substantial under-reporting of SBT catches and surface fishery bias in the previous 10 - 20 year period, and there is currently substantial uncertainty regarding the true levels of total SBT catch over this period. The SBT stock has been exploited for more than 50 years, with total catches peaking at 81,750t in 1961 (Figures 1 - 3). Over the period 1952 - 2022, 67% of the reported catch was taken by longline, 30.6% using purse-seine, and 2.4% using other gears (Figure 1). The proportion of reported catch made by the purse seine fishery peaked at 48% in 2006, averaging 33.5% since 1996 (Figure 1). The Japanese longline fishery (taking a wide age range of fish) recorded its peak catch of 77,927t in 1961 (Figure 3). New Zealand, the Fishing Entity of Taiwan and Indonesia have also exploited southern bluefin tuna since the 1970s - 1980s, and Korea started a fishery in 1991.

On average, 78.2% of the SBT catch has been made in the Indian Ocean, 16.9% in the Pacific Ocean and 4.9% in the Atlantic Ocean (Figure 2). The reported Atlantic Ocean catch has varied widely between about 18t and 8,200t since 1968 (Figure 2), averaging 1,412t over the past two decades. This variation in catch reflects shifts in longline effort between the Atlantic and Indian Oceans. Fishing in the Atlantic occurs primarily off the southern tip of South Africa (Figure 4). Since 1968, the reported Indian Ocean catch has declined from about 45,000t to less than 11,000t, averaging 17,851t, and the reported Pacific Ocean catch has ranged from about 800t to 19,000t, averaging 4,966t over the same period[1].

3. Summary of Stock Status

Since 2017, CCSBT has measured reproductive capacity as Total Reproductive Output (TRO) rather than SSB. TRO is similar to SSB but assumes higher reproductive output for older fish. The 2023 stock assessment indicated that the SBT TRO is at 23% of its initial value as well as below the value that could produce maximum sustainable yield. The 2023 assessment indicated the stock has increased from a low of 10% of initial TRO in 2009.

A review of indicators in 2023 shows little overall change since the previous review. Age 1 recruitment indices have decreased somewhat in recent years, but recruitment levels are above those experienced from 1980 to the early 2000s and gene-tagging based estimates of age 2 recruitment are robust. There are consistent positive trends in the age-based longline CPUE estimates across a number of fleets. The detection rate of parent-offspring pairs from the most recent close-kin mark-recapture data is consistent with an increase in adult abundance.

4. Current Management Measures

<u>Total Allowable Catch (TAC)</u>

The primary conservation measure for management of the southern bluefin tuna stock is the TAC.

At its eighteenth annual meeting in 2011, the CCSBT agreed that a Management Procedure (MP) would be used to guide the setting of the SBT global total allowable catch (TAC) to ensure that the SBT spawning stock biomass achieves the interim rebuilding target of 20% of the initial spawning stock biomass. The CCSBT set TACs until 2020 based on the outcome of that MP. At its twenty sixth annual meeting in 2019, the CCSBT agreed a new MP tuned to achieve a 0.5 probability of achieving

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[1] Note: a 2006 review of SBT data indicated that catches over the preceding 10 to 20 years may have been substantially under-reported.

30% of initial TRO by 2035. In 2020 the ESC advised on a TAC for 2021-2023 based on the new MP. The CCSBT set TAC for 2021-2023 is in line with advice from the ESC.

In adopting the first MP in 2011, the CCSBT emphasised the need to take a precautionary approach to increase the likelihood of the spawning stock rebuilding in the short term and to provide industry with more stability in the TAC (i.e. to reduce the probability of future TAC decreases). Under the adopted MP, the TACs were set in three-year periods. The TACs for 2015 to 2017 were 14,647 tonnes and the TACs for 2018 to 2020 were 17,647 tonnes. In 2020, based on the new MP adopted in 2019, the TAC for 2021-2023 remained unchanged at 17,647 tonnes.

The allocations of the TAC to Members and Cooperating Non-Members of the CCSBT from 2016 to 2023 is summarised below. In addition, some flexibility is provided to Members for limited carry-forward of unfished allocations between quota years.

Current Allocations to Members (tonnes)

	2016-2017	2018-2020	2021-2023
Japan	4,737	6,117[1]	6,197.4[3]
Australia	5,665	6,165	6,238.4[3]
Republic of Korea	1,140	1,240.5	1,256.8
Fishing Entity of Taiwan	1,140	1,240.5	1,256.8
New Zealand	1,000	1,088	1,102.5
Indonesia	750	1,023[1]	1,122.8[3]
European Union	10	11	11
South Africa	150	450[2]	455.3[3]

Current Allocations to Cooperating Non-Members (tonnes)

	2016-2017[4]	2018-2022
Philippines	45	0

Monitoring, Control and Surveillance

The CCSBT has adopted a Compliance Plan that supports its Strategic Plan and provides a framework for the CCSBT, Members and Cooperating Non-Members to improve compliance, and over time, achieve full compliance with CCSBT's conservation and management measures. The Compliance Plan also includes a three-year action plan to address priority compliance risks. The action plan will be reviewed and confirmed or updated every year. The action plan is therefore a 'rolling' document and over time its emphasis will change.

The CCSBT has also adopted three Compliance Policy Guidelines, these being:

- Minimum performance requirements to meet CCSBT Obligations;
- Corrective actions policy; and
- MCS information collection and sharing

In addition, the CCSBT has implemented a Quality Assurance Review (QAR) program to provide independent reviews to help Members identify how well their

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[2] These figures reflect the voluntary transfers of 21t that Japan provided to Indonesia and 27t that Japan provided to South Africa for the 2018 to 2020 quota block.

[3] These figures reflect: (1) voluntary transfers of 21t that Japan is providing to Indonesia and 27t that Japan is providing to South Africa for the 2021 to 2023 quota block; (2) a voluntary transfer of 7t that Australia is providing to Indonesia for the 2021 to 2023 quota block; and (3) a special temporary allowance of 80t to Indonesia for 2021.

[4] Ceased 12 October 2017.

management systems function with respect to their CCSBT obligations and to provide recommendations on areas where improvement is needed. It is further intended that QARs will:

- Benefit the reviewed Member by giving them confidence in the integrity and robustness of their own monitoring and reporting systems;
- Promote confidence among all Members as to the quality of individual Members' performance reporting; and
- Further demonstrate the credibility and international reputation of the CCSBT as a responsible Regional Fisheries Management Organisation.

Individual MCS measures that have been established by the CCSBT include:

Catch Documentation Scheme

The CCSBT Catch Documentation Scheme (CDS) came into effect on 1 January 2010 and replaced the Statistical Document Programme (Trade Information Scheme) which had operated since 1 June 2000. The CDS provides for tracking and validation of legitimate SBT product flow from catch to the point of first sale on domestic or export markets. As part of the CDS, all transhipments, landings of domestic product, exports, imports and re-exports of SBT must be accompanied by the appropriate CCSBT CDS Document(s), which will include a Catch Monitoring Form and possibly a Re-Export/Export After Landing of Domestic Product Form. Similarly, transfers of SBT into and between farms must be documented on either a Farm Stocking Form or a Farm Transfer Form as appropriate. In addition, each whole SBT that is transhipped, landed as domestic product, exported, imported or re-exported must have a uniquely numbered tag attached to it and the tag numbers of all SBT (together with other details) will be recorded on a Catch Tagging Form. Copies of all documents issued and received will be provided to the CCSBT Secretariat on a quarterly basis for compiling to an electronic database, analysis, identification of discrepancies, reconciliation and reporting.

Monitoring of SBT Transhipments

The CCSBT program for monitoring transhipments at sea came into effect on 1 April 2009. The program was revised to include requirements for monitoring transhipments in port from 1 January 2015.

Transhipments at sea from tuna longline fishing vessels with freezing capacity (referred to as "LSTLVs") require, amongst other things, carrier vessels that receive SBT transhipments at sea from LSTLVs to be authorised to receive such transhipments and for a CCSBT observer to be on board the carrier vessel during the transhipment. The CCSBT transhipment program is harmonised and operated in conjunction with those of ICCAT and IOTC to avoid duplication of the same measures. ICCAT or IOTC observers on a transhipment vessel that is authorised to receive SBT are deemed to be CCSBT observers provided that the CCSBT standards are met.

Transhipments in port must be to an authorised carrier vessel (container vessels are exempted) at designated foreign ports and, amongst other things, require prior notification to Port State authorities, notification to Flag States, and transmission of the CCSBT transhipment declaration to the Port State, the Flag State and the CCSBT Secretariat.

Port State Measures

The CCSBT adopted a Resolution for a CCSBT Scheme for Minimum Standards for Inspections in Port in October 2015. The Resolution entered into force on 1 January 2017. The scheme applies to foreign fishing vessels, including carrier vessels other than container vessels. Under this scheme, Members wishing to grant access to its ports to foreign fishing vessels shall, amongst other things:

- Designate a point of contact for the purposes of receiving notifications;
- Designate its ports to which foreign fishing vessels may request entry;
- Ensure that it has sufficient capacity to conduct inspections in every designated port;
- Require foreign fishing vessels seeking to use its ports for the purpose of landing and / or transhipment to provide certain required minimum information with at least 72 hours prior notification; and
- Inspect at least 5% of foreign fishing vessel landings in their designated ports each year.

List of Approved Vessels and Farms

The CCSBT has established records for:

- Authorised SBT vessels;
- Authorised SBT carrier vessels; and
- Authorised SBT farms.

Members and Cooperating Non-Members of the CCSBT will not allow the landing or trade etc. of SBT caught by fishing vessels and farms or transhipped to carrier vessels that are not on these lists.

List of Vessels Presumed to have carried out IUU Fishing Activities for SBT

The CCSBT has adopted a Resolution on Establishing a List of Vessels Presumed to have Carried Out Illegal, Unreported and Unregulated Fishing Activities For Southern Bluefin Tuna.

At each annual meeting, the CCSBT will identify those vessels which have engaged in fishing activities for SBT in a manner which has undermined the effectiveness of the Convention and the CCSBT measures in force.

Vessel Monitoring System

The CCSBT Vessel Monitoring System (VMS) came into effect immediately after the Fifteenth Annual Meeting of the Commission, on 17 October 2008. It requires CCSBT Members and Cooperating Non-Members to adopt and implement satellite-linked VMS for vessels fishing for SBT that complies with the IOTC, WCPFC, CCAMLR, or ICCAT VMS requirements according to the respective convention area in which the SBT fishing is being conducted. For fishing outside of these areas, the IOTC VMS requirements must be followed.

5. Scientific Advice

Based on the new MP adopted in 2019 and implemented in 2020, and the outcome of reviews of exceptional circumstances at its 2020, 2021, and 2022 meetings, the ESC recommended that there is no need to revise the 2021-2023 TAC. The ESC-recommended annual TAC for 2021-2023 is 17,647t.

At its 2022 meeting, the ESC used the adopted MP to calculate a recommended TAC for the period 2024-2026. The recommended TAC is 20,647 tonnes which is an increase of 3,000 tonnes, the maximum allowed under the adopted MP. At its 2023 meeting, the ESC followed its process for examining exceptional circumstances and, finding none, confirmed its advice for the TAC of 2024-2026.

6. Biological State and Trends

The 2023 stock assessment indicated that the SBT TRO is at 23% of its initial level and remains below the target and the level that could produce maximum sustainable yield. However, as estimated by the 2023 stock assessment, it has trended upwards since its low point of 10% initial TRO in 2009. The next stock assessment will be carried out in 2026.

Exploitation rate: Moderate (Below F_{MSY})

Exploitation state: Overexploited

Abundance level: Low abundance

SOUTHERN BLUEFIN TUNA SUMMARY FROM ESC in 2023 (global stock)	
Reported (2022) Catch	17,139t
Current status relative to initial	
TRO	0.23 (0.21–0.29)
B10+	0.22 (0.19–0.26)
TRO (2023) Relative to TRO_{msy}	0.85 (0.61–1.29)
Maximum Sustainable Yield	30,648t (29,152-31,376)
Current (2023) biomass (B10+)	266,187t (247,963-283,275)
Fishing Mortality (2023) Relative to F_{msy}	0.46 (0.34–0.65)
Current Management Measures	Effective Catch Limit for Members and Cooperating Non-Members: 17,647t per year for the years 2021-2023

TRO is the total reproductive output summed over all age classes weighted by their relative individual contribution to reproduction.

B10+ is the biomass of fish aged 10 years and over.

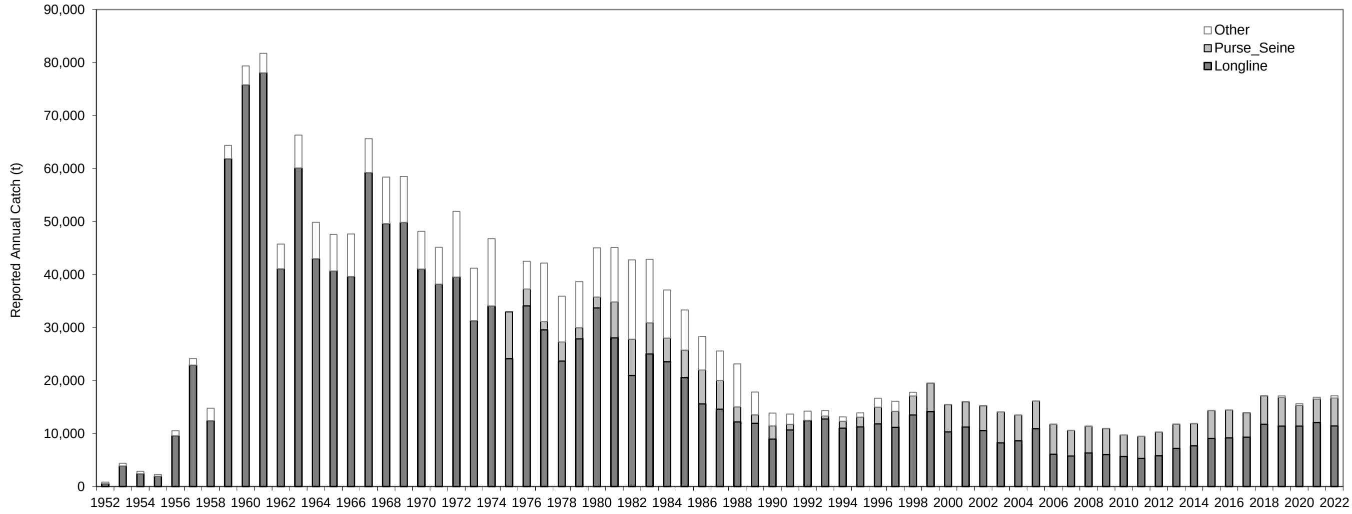

Figure 1: Reported southern bluefin tuna catches by fishing gear, 1952 to 2022. Note: a 2006 review of SBT data indicated that catches over the preceding 10 to 20 years may have been substantially under-reported.

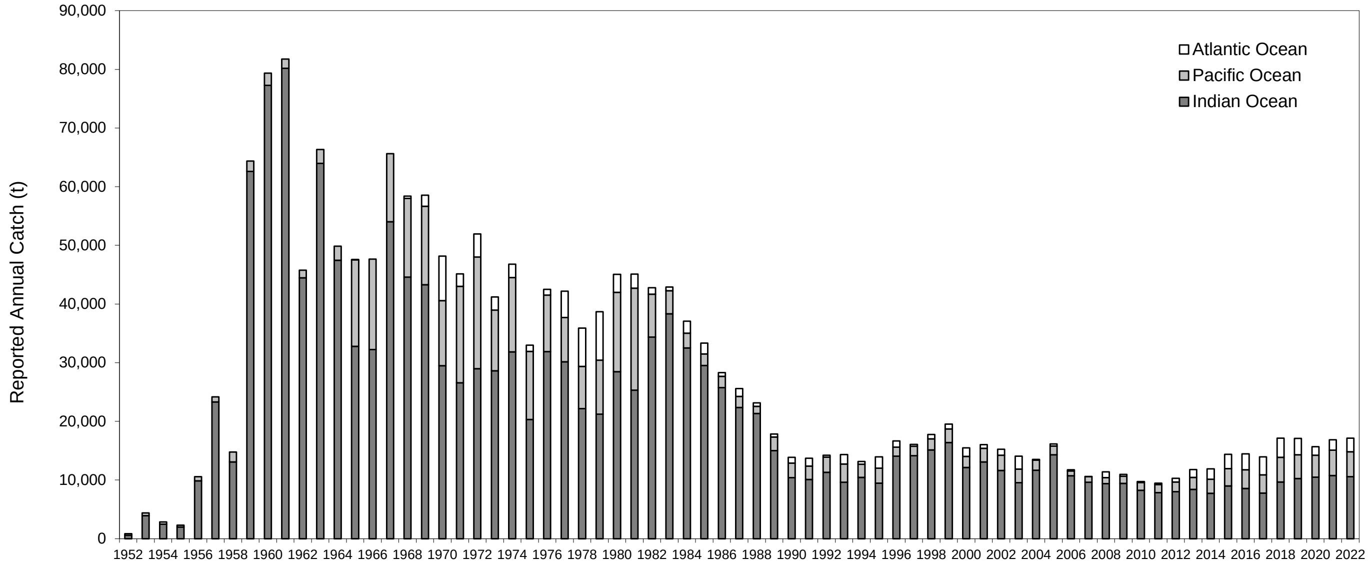

Figure 2: Reported southern bluefin tuna catches by ocean, 1952 to 2022. Note: a 2006 review of SBT data indicated that catches over the preceding 10 to 20 years may have been substantially under-reported.

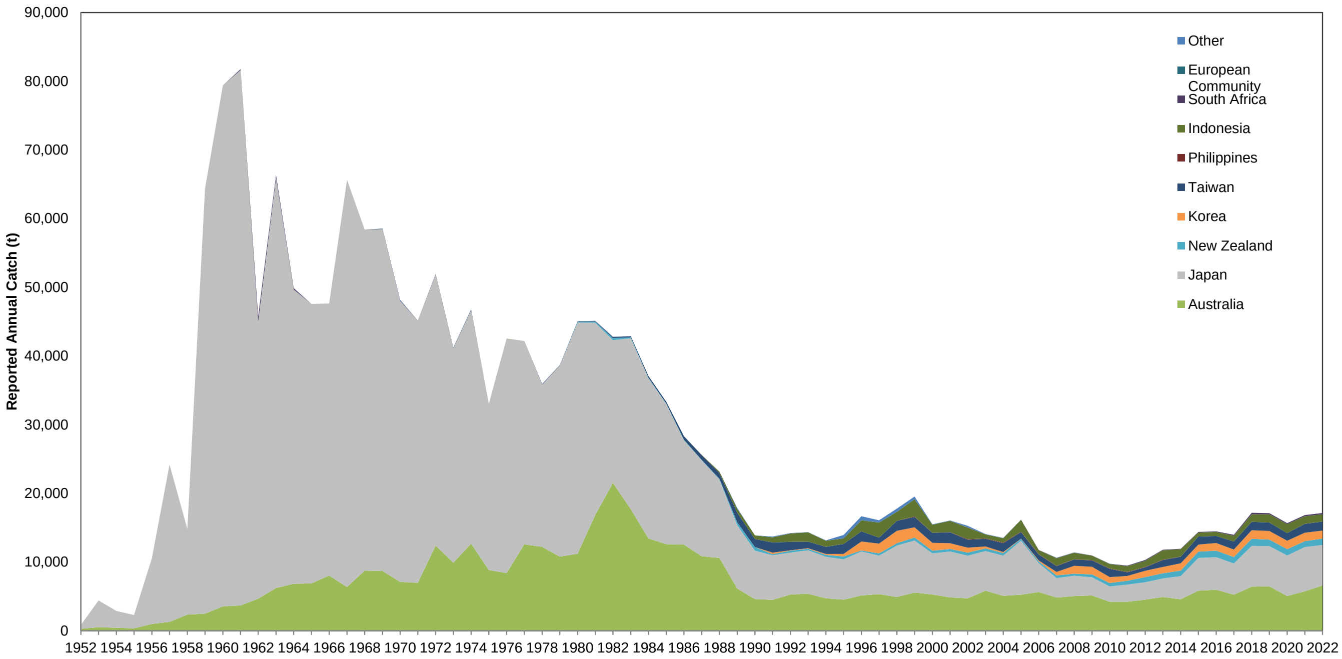

Figure 3: Reported southern bluefin tuna catches by flag, 1952 to 2022. Note: a 2006 review of SBT data indicated that catches over the preceding 10 to 20 years may have been substantially under-reported.

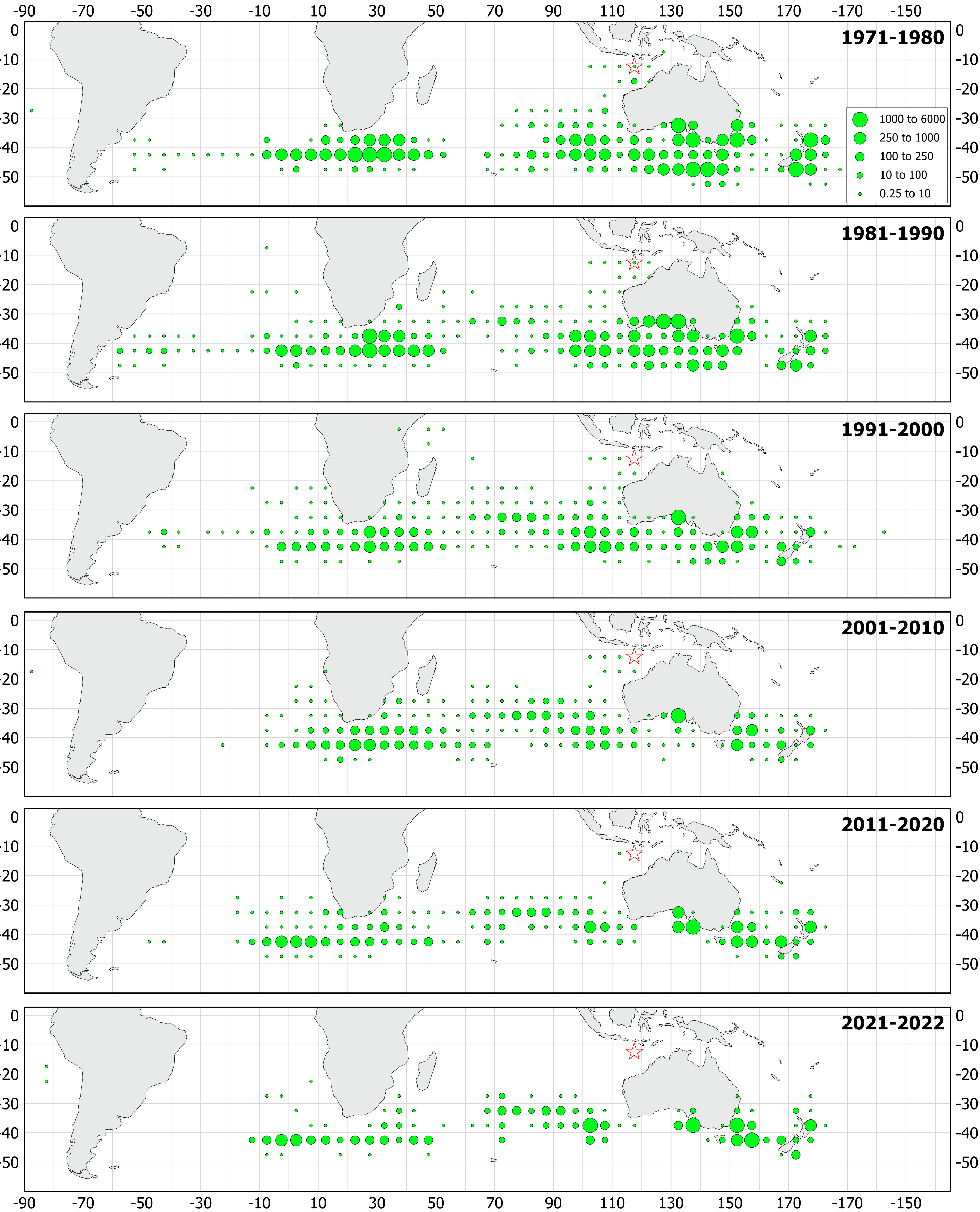

Figure 4: Geographical distribution of average annual reported southern bluefin tuna catches (t) by CCSBT members and cooperating non-members over the periods 1971-1980, 1981-1990, 1991-2000, 2001-2010, 2011-2020, and 2021-2022 per 5° block. The area marked with a star is an area of significant catch in the breeding ground. Block catches averaging less than 0.25 tons per year are not shown. Note: This figure may be affected by past anomalies in catch.

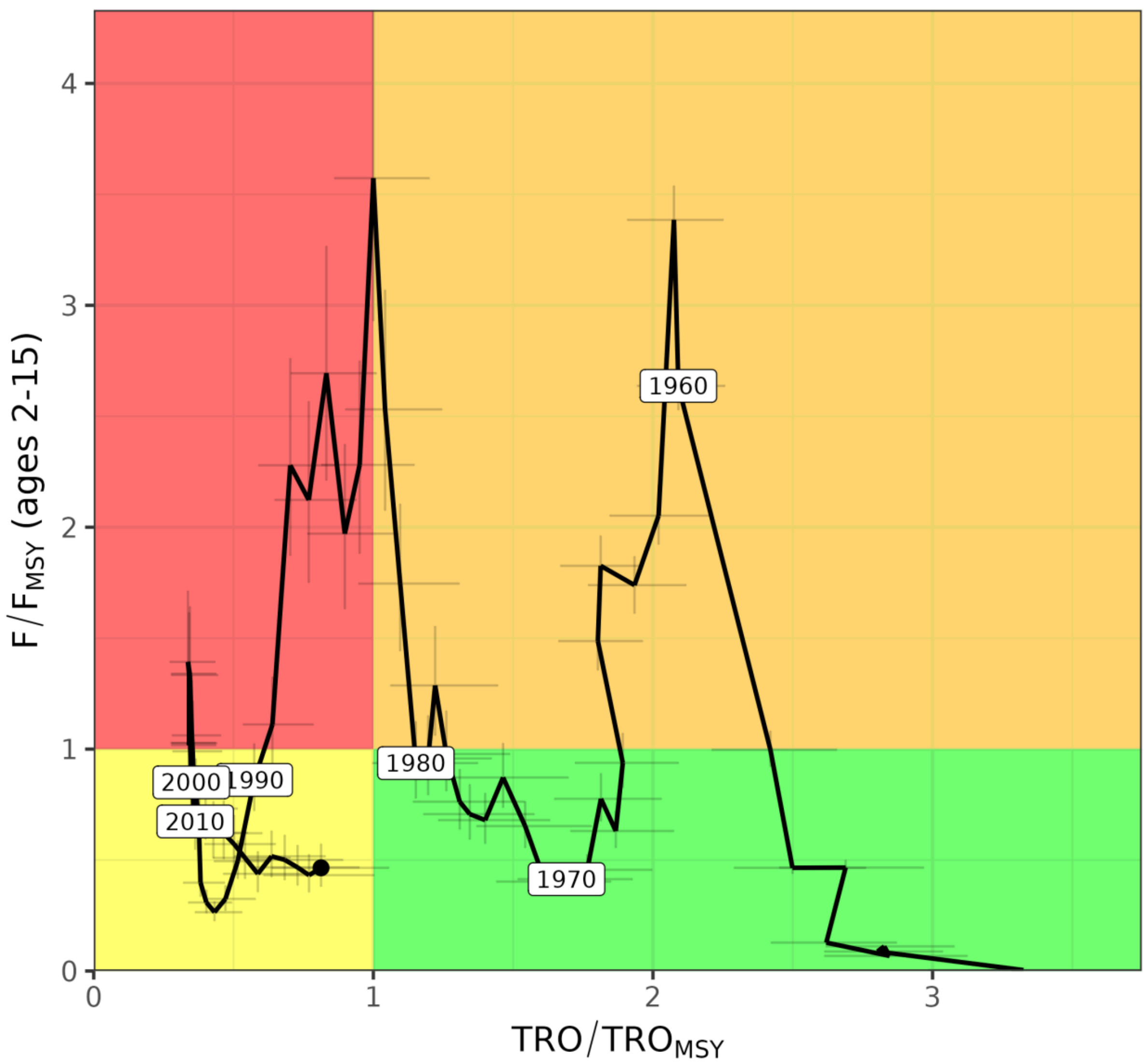

Figure 5. Time trajectory from 1952 to 2022 of median fishing mortality over the F_{MSY} (for ages 2-15) versus Total Reproductive Output (TRO) over TRO_{MSY}. The fishing mortality rates are based on biomass-weighted values and the relative fishery catch composition and mean SBT body weights in each year. Vertical and horizontal lines represent 25th-75th percentiles from the operating model grid.

Attachment 9

SRP proposal: Preparatory work on detection of unaccounted mortality (UAM)

A (Start year): 2024

B (Duration): 1 year

C (General category): CTP

D (Sub category): Catch

E (Project title): Preparatory work on detection of unaccounted mortality (UAM)

F (Problem): Currently, the CCSBT estimates potential UAM (Edwards and Hoyle, 2023) but there has been very limited detection of UAM to corroborate whether or not these catches are being taken. There are existing and potential techniques available for detection of UAM, including new genetic techniques.

G (Objectives):

1. Collate information from studies of existing and new UAM detection techniques.
2. Develop a work plan and SRP proposal to provide consolidated advice on detection techniques that could be applied to SBT compliance and supply chain monitoring, in collaboration with the CCSBT's Compliance Manager, for consideration by the ESC and CC in 2024.

   Deliverables: an SRP proposal for a project to provide advice on feasibility and cost-benefits of techniques for detection of UAM for CCSBT.

H (Rationale): The 2021 performance review identifies that uncertainty in UAM can undermine the rebuilding of the SBT stock (Performance Review recommendation number: PR2021-01). The current quantification of potential UAM does not provide any information on actual catches taken, which is unlikely to be improved by finessing of the data analysis method. New work should be focussed on detection of UAM, and then actions to reduce UAM.

The estimates of UAM are used in the exceptional circumstances process to check if the MP recommended TAC is safe to implement. The MP has been designed and tested to be robust to the UAM that was incorporated into the MSE operating models (in 2019). Current UAM estimates are below the threshold for exceptional circumstances.

The estimates of UAM are directly included in the stock assessment. The UAM sensitivity tests indicate that there is little effect on current stock status but faster rebuilding of the stock and a higher probability of reaching the target, if UAM is reduced.

I (Impact Scale): High

J (Impact timing): Medium

K (Priority): to be completed at ESC meetings.

L (Rank): to be completed at ESC meetings.

M (Budget): $0 –CSIRO/Australia, will utilise existing work, to inform this initial stage.

N (CCSBT funding required): None

SRP proposal from Indonesia and Australia: SBT catch monitoring and capacity building for biological sampling of spawning ground catches in Indonesia

A (Start year): 2024

B (Duration): 1.5 years

C (General category): Operating model

D (Sub category): Catch

E (Project title): SBT catch monitoring and capacity building for biological sampling of spawning ground catches in Indonesia

F (Problem): Over recent years, there have been noticeable shifts in the distribution of effort by the Indonesian longline fleet (from area 1 to area 2) that have potential implications for the use and interpretation of the length and age data derived from the Indonesian catch monitoring and biological sampling program. In addition, the transfer of research capability from the Ministry of Marine Affairs and Fisheries to the new National Research and Innovation agency (BRIN) has impacted on the resourcing and availability of experienced staff to conduct the catch monitoring and sampling program, leading to a two year disruption to the program.

G (Objectives): To support the transition and recommencement of SBT monitoring by MMAF and RCF-BRIN collaboratively with CSIRO including the catch monitoring, biological sampling and capacity building in analyses and reporting.

H (Rationale): It is essential, given the importance of the catch monitoring data, and otolith and CKMR samples associated with them, to address these issues and ensure that the program is on a solid foundation for the future. Monitoring of the size and age distribution of catches of SBT landed by Indonesian longline vessels from the SBT spawning ground has been an important source of data since the early 1990's. The extension of this monitoring program to include collection of tissue samples, since the mid-2000's, was central to the application of Close-kin Mark Recapture (CKMR) for SBT. These data series form essential inputs to the regular CCSBT stock assessment and the Cape Town Procedure used to recommend the global TAC for the fishery. This project will support the transition of and improve rebuild the program of spawning ground monitoring for SBT back to the required level by CCSBT.

I (Impact Scale): High

J (Impact timing): Med (1-2 years)

K (Priority): HIGH!!

L (Rank): to be completed at ESC meetings.

M (Budget): US$40,000. We are seeking funding for two activities to support the recommencement of the biological sampling and necessary capacity building to resolve the outstanding issues associated with the catch monitoring program following the disruption of the past 2 years:

1. Training and supervision for dedicated enumerators for SBT monitoring program in primary landing ports for SBT (e.g. Benoa, Cilacap and Muara Baru); and
2. Capacity building and analytical support for review of catch monitoring program, in particular, determining the most appropriate standard method for

obtaining representative length and age frequency for the spawning ground catches and CKMR tissue samples.

N (CCSBT funding required): US$40,000

Attachment 10

Data Exchange Requirements for 2024

Introduction

The data exchange requirements for 2024, including the data that are to be provided and the dates and responsibilities for the data provision, are provided in **Annex A**.

Catch effort and size data should be provided in the identical format as were provided in 2023. If the format of the data provided by a Member is changed, then the new format and some test data in that format should be provided to the Secretariat by 31 January 2024 to allow development of the necessary data loading routines.

Data listed in Attachment A should be provided for the complete 2023 calendar year plus any other year for which the data have changed. If changes to historic data are more than a routine update of the 2022 data or very minor corrections to older data, then the changed data will not be used until discussed at the next ESC meeting (unless there was specific agreement to the contrary). Changes to past data (apart from a routine update of 2022 data) must be accompanied by a detailed description of the changes.

Annex A

Type of Data to provide[1]	Data Provider(s)	Due Date	Description of data to provide
CCSBT Data CD	Secretariat	31 Jan 24	An update of the data (catch effort, catch at size, raised catch and tag-recapture) on the data CD to incorporate data provided in the 2023 data exchange and any additional data received since that time, including: • Tag/recapture data (*The Secretariat will provide additional updates of the tag-recapture data during 2024 on request from individual Members*); • Update the unreported catch estimates using the revised scenario (S1L1) produced at SAG9,
Total catch by Fleet	all Members and Cooperating Non-Members	30 Apr 24	Raised total catch (weight and number) and number of boats fishing by fleet and gear. These data need to be provided for both the calendar year and the quota year.
Recreational catch	all Members and Cooperating Non-Members that have recreational catches	30 Apr 24	Raised total catch (weight and number) of any recreationally caught SBT if data are available. A complete historical time series of recreation catch estimates should be provided (unless this has previously been provided). Where there is uncertainty in the recreational catch estimates, a description or estimate of the uncertainty should be provided.
SBT import statistics	Japan	30 Apr 24	Weight of SBT imported into Japan by country, fresh/frozen and month. These import statistics are used in estimating the catches of non-member countries.
Mortality allowance (RMA and SRP) usage	all Members (& Secretariat)	30 Apr 24	The mortality allowance (kilograms) that was used in the 2023 calendar year. Data is to be separated by RMA and SRP mortality allowance. If possible, data should also be separated by month and location.
Catch and Effort	all Members (& Secretariat)	23 Apr 24 (New Zealand)[2] 30 Apr 24 (other Members & Secretariat) 31 Jul 24 (Indonesia)	Catch (in numbers and weight) and effort data is to be provided as either shot by shot or as aggregated data (New Zealand provides fine scale shot by shot data which is aggregated and distributed by the Secretariat). The maximum level of aggregation is by year, month, fleet, gear, and 5x5 degree (longline fishery) or 1x1 degree for surface fishery. Indonesia will provide estimates based on either shot by shot or as aggregated data from the trial Scientific Observer Program.

[1] The text "**For MP/OM**" means that this data is used for both the Management Procedure and the Operating Model. If only one of these items appears (e.g. **For OM**), then the data is only required for the specified item.

[2] The earlier date specified for New Zealand is so that the Secretariat will be able to process the fine scale New Zealand data in time to provide aggregated and raised data to Members by 30 April.

Type of Data to provide[1]	Data Provider(s)	Due Date	Description of data to provide
Non-retained catches	All Members	30 Apr 24 (all Members except Indonesia) 31 Jul 24 (Indonesia)	The following data concerning non retained catches will be provided by year, month, and 5*5 degree for each fishery: • Number of SBT reported (or observed) as being non-retained; • Raised number of non-retained SBT taking into consideration vessels and periods in which there was no reporting of non-retained SBT; • Estimated size frequency of non-retained SBT after raising; • Details of the fate and/or life status of non-retained fish. Indonesia will provide estimates based on either shot by shot or as aggregated data from the trial Scientific Observer Program.
RTMP catch and effort data	Japan	30 Apr 24	The catch and effort data from the real time monitoring program should be provided in the same format as the standard logbook data is provided.
Raised catch data for AU, NZ catches	Australia, Secretariat	30 Apr 24	Aggregated raised catch data should be provided at a similar resolution as the catch and effort data. Japan, Korea and Taiwan do not need to provide anything here because they provide raised catch and effort data. New Zealand does not need to provide anything here because the Secretariat produces New Zealand's raised catch data from the fine scale data provided by New Zealand.
Raised number of hooks data for NZ catches	Secretariat	30 Apr 24	Raised New Zealand number of hooks data, to be provided to NZ only, generated from NZ fine scale data by the Secretariat.
Observer length frequency data	New Zealand	30 Apr 24	Raw observer length frequency data as provided in previous years.
Raised Length Data	Australia, Taiwan, Japan, New Zealand, Korea	30 Apr 24 (Australia, Taiwan, Japan, Korea) 7 May 24 (New Zealand)[3]	Raised length composition data should be provided[4] at an aggregation of year, month, fleet, gear, and 5x5 degree for longline and 1x1 degree for other fisheries. Data should be provided in the finest possible size classes (1 cm). A template showing the required information is provided in Attachment C of CCSBT-ESC/0609/08.

[3] The additional week provided for New Zealand is because New Zealand requires the raised catch data that the Secretariat is scheduled to provide on 30 April.
[4] The data should be prepared using the agreed CCSBT substitution principles where practicable. It is important that the complete method used for preparing the raised length data be fully documented.

Type of Data to provide[1]	Data Provider(s)	Due Date	Description of data to provide
Raw Length Frequencies	South Africa	30 Apr 24	Raw Length Frequency data from the South African Observer Program.
RTMP Length data	Japan	30 Apr 24	The length data from the real time monitoring program should be provided in the same format as the standard length data.
Indonesian LL SBT age and size composition	Australia Indonesia	30 Apr 24	Estimates of both the age and size composition (in percent) is to be generated for the spawning season July 2022 to June 2023. Length frequency for the 2022 calendar year and age frequency for the 2022 calendar year is also to be provided. Indonesia will provide size composition in length and weight based on the Port-based Tuna Monitoring Program. Australia will provide age composition data according to current data exchange protocols.
Direct ageing data	All Members except the EU	30 Apr 24	Updated direct age estimates (and in some cases revised series due to a need to re-interpret the otoliths) from otolith collections. Data must be provided for at least the 2021 calendar year (see paragraph 95 of the 2003 ESC report). Members will provide more recent data if these are available. The format for each otolith is: Flag, Year, Month, Gear Code, Lat, Long, Location Resolution Code[5], Stat Area, Length, Otolith ID, Age estimate, Age Readability Code[6], Sex Code, Comments. It is planned that the Secretariat will provide the direct age estimates for Indonesia through a contract with CSIRO.
Trolling survey index	Japan	30 Apr 24	Estimates of the different trolling indices (piston-line index (TRP) and grid-type trolling index (TRG)) for the 2023/24 season (ending 2024), including any estimates of uncertainty (e.g. CV).
Gene tagging data **For OM and MP**	Secretariat	30 Apr 24	An estimate of juvenile abundance, number of releases and harvest samples, number of matches and CV of the estimate from the gene-tagging study through a contract with CSIRO. The mark-recapture data which includes the tagging release data (e.g. date of tagging, length of fish), tag recapture data (e.g. recapture sample date, length) and whether or not a genetic match with a release tissue was found.

[5] M1=1 minute, D1=1 degree, D5=5 degree.

[6] Scales (0-5) of readability and confidence for otolith sections as defined in the CCSBT age determination manual.

Type of Data to provide[1]	**Data Provider(s)**	**Due Date**	**Description of data to provide**
Close Kin Data **For OM and MP**	Secretariat	30 Apr 24	Updated dataset of identified SBT parent-offspring pairs and half-sibling using SNPs. This is a deliverable of the SBT annual close-kin tissue sampling, processing, kin identification and Indonesian ageing project conducted by CSIRO under contract to the CCSBT.
Tag recapture data	All Members	30 Apr 24	Information on recaptured SRP tags that have not been previously reported to the Secretariat
Catch at age data	Australia, Taiwan, Japan, Secretariat	14 May 24	Catch at age (from catch at size) data by fleet, 5*5 degree, and month to be provided by each Member for their longline fisheries. The Secretariat will produce the catch at age for New Zealand and Korea using the same routines it uses for the CPUE input data and the catch at age for the MP.
Global SBT catch by flag and by gear	Secretariat	22 May 24	Global SBT catch by flag and gear as provided in recent reports of the Scientific Committee.
Raised catch-at-age for the Australia surface fishery. **For OM**	Australia	24 May 24[7]	These data will be provided for July 2022 to June 2023 in the same format as previously provided.
Raised catch-at-age for Indonesia spawning ground fisheries. **For OM**	Secretariat	24 May 24	These data will be provided for July 2022 to June 2023 in the same format as on the CCSBT Data CD.
Tag return summary data	Secretariat	31 May 24	Updated summary of the number tagged and recaptured per month and season.
Total catch per fishery and sub-fishery each year from 1952 to 2023. **For OM**	Secretariat	31 May 24	The Secretariat will use the various data sets provided above together with previously agreed calculation methods to produce the necessary total catch by fishery and total catch by sub-fishery data required by the Operating Model.

[7] The date is set 1 week before 1 June to provide sufficient time for the Secretariat to incorporate these data in the data set it provides for the OM on 1 June.

Type of Data to provide[1]	Data Provider(s)	Due Date	Description of data to provide
Catch-at-length (2 cm bins) and catch-at-age proportions. **For OM**	Secretariat	31 May 24	The Secretariat will use the various catch at length and catch at age data sets provided above to produce the necessary length and age proportion data required by the operating model (for LL1, LL2, LL3, LL4 – separated by Japan and Indonesia, and the surface fishery). The Secretariat will also provide these catch at length data subdivided by sub fishery (e.g. the fisheries within LL1).
Global catch at age	Secretariat	31 May 24	Calculate the total catch-at-age in 2023 according to Attachment 7 of the MPWS4 report except that catch-at-age for Japan in areas 1 & 2 (LL4 and LL3) is to be prepared by fishing season instead of calendar year to better match the inputs to the operating model.
CPUE input data	Secretariat	31 May 24	Catch (number of SBT and number of SBT in each age class from 0-20+ using proportional aging) and effort (sets and hooks) data[8] by year, month, and 5*5 lat/long for use in CPUE analysis.
CPUE series **for OM and MP**	Japan	15 Jun 24 (earlier if possible)	CPUE series based on the standardisation method developed in 2022 using generalised additive model (GAM).
CPUE monitoring and quality assurance series.	Australia, Japan, Taiwan, Korea	15 Jun 24 (earlier if possible)[9]	5 CPUE series are to be provided for ages 4+, as specified below: • Nominal (Australia) • B-Ratio proxy (W0.5)[10] (Japan) • Geostat proxy (W0.8)[10] (Japan) • Taiwan Standardised CPUE (Taiwan) • Korean Standardised CPUE (Korea)

[8] Data restricted to months April to September, SBT statistical areas 4-9, and the Japanese, Australian joint venture and New Zealand joint venture fleets.
[9] When there are no complications, it is possible to calculate the CPUE series less than two weeks after the CPUE input data is provided. Therefore, if there are no complications, Members should attempt to provide the CPUE series earlier than 15 June.
[10] This series is based on the standardisation model by Nishida and Tsuji (1998) using all vessel data. Due to loss of data from Japanese-flagged charter vessels in the New Zealand fishery from 2016 onward, these indices are calculated combining areas 4 and 5, areas 6 and 7, respectively.

Attachment 11

ESC's three-year workplan, including resource requirements

(abbreviations: Sec=Secretariat Staff, Interp=Interpretation, Ch=Independent ESC Chair, P=Independent Advisory Panel, MPCoord=MP Coordinator, CECoord=CPUE Coordinator, C=Consultant, Cat=Catering only, FM=full meeting costs – venue & equipment hire etc., VEH=venue & equipment hire etc., FreeV=Venue & some equipment at no cost, Contracted=CCSBT contract with CSIRO, inf=informal meeting)

	2024	2025 (Indicative only)	2026 (Indicative only)
Regular Meetings			
ESC Meeting	5 days FM: 1Ch, 3P, 1C, 3 Interp, 3 Sec	5 days FM: 1Ch, 3P, 1C, 3 Interp, 3 Sec	5 days FM: 1Ch, 3P, 1C, 3 Interp, 3 Sec
ESC Meeting Chair's report	1Ch, 1P days	1Ch, 1P days	1Ch, 1P days
June/July OMMP Meeting in Seattle *(no Sec, no Interp)*	This meeting will be funded by the OM Specification and software upgrade project below	5 days Cat: 3P, 1C, 1Ch + 3C Prep Days	5 days Cat: 3P, 1C, 1Ch + 3C Prep Days
Ongoing Essential SRP Projects requiring CCSBT resources			
Gene Tagging	Contracted ($720,000)	$740,000	$740,000
Continued close-kin sample collection & Processing	$104,000	$206,400	$201,600
Close-kin identification & exchange	$35,000	$67,700	$69,700
Collection & aging of Indonesian otoliths	$20,300	$66,100	$67,800
SRP Projects requiring CCSBT resources			
OM Specification and software upgrade *(no Interp at meetings)*	$155,000 for: • 20C, 2MPCoord • 1 extra day at ESC meeting (VEH, Cat, 3P, 1C, 1Ch, Sec) • 5 day June inf. OMMP meeting (Seattle: FreeV, Cat, 3P, 1C, 1Ch) • 2*2hr online meetings (3P,1C, 1Ch, Sec)	$30,000 for: • 20C, 2MPCoord • 2*2hr online meetings (3P,1C, 1Ch, Sec)	
UAM - Update NCNM estimates of unaccounted (fishing) mortality (simple update of GLM analysis)		-	$25,000 for: • 25C

	2024	2025 (Indicative only)	2026 (Indicative only)
CPUE index development	$40,000 for: • 10-30C (used 30), 2CECoord • Meetings to develop 3 national operational datasets • 2*2hr online meetings (3P,1C, 1Ch, Sec)	$30,000 for: • 20C, 2CECoord	$30,000 for: • 20C, 2CECoord
Develop methods for estimating UAM *(no Interp at meetings)*	-	• TBD	• TBD
SBT otolith-based ageing workshop (3 days, CSIRO labs, Hobart)	$32,000 • Carried forward from 2024 underspend		-
New SRP Projects requiring CCSBT resources			
Capacity building for Southern Bluefin Tuna Spawning Ground Monitoring Program	$61,700 • Training and supervision of enumerators • Capacity building and analytical support for review of catch monitoring program		