Commission for the Conservation of
Southern Bluefin Tuna

みなみまぐろ保存委員会

Report of the Twenty-Ninth Meeting of the Scientific Committee

5 September 2024

Report of the Twenty Ninth Meeting of the Scientific Committee
5 September 2024

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**.
3. The Chair advised that the Twenty-Ninth meeting of the Scientific Committee (SC 29) is being opened in Taipei, Taiwan, but that report adoption and closing of SC 29 will be conducted electronically through the intersessional decision-making process after Members have returned from the meeting.

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

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

Agenda Item 3. Other business

5. There was no other business.

Agenda Item 4. Adoption of report of meeting

6. The report of the Scientific Committee was adopted.

Agenda Item 5. Closure of meeting

7. The meeting was closed on 5 September 2024 electronically through the intersessional decision-making process.

List of Appendices

Appendix

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

Appendix 1

List of Participants
The Twenty Ninth Meeting of the Scientific Committee

First name	Last name	Title	Position	Organisation	Postal address	Email
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Yoko	YAMAKAGE	Ms				
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Appendix 2

Commission for the Conservation of
Southern Bluefin Tuna

みなみまぐろ保存委員会

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

2 – 5 September 2024
Taipei, Taiwan

Extended Scientific Committee
for the Twenty Ninth Meeting of the Scientific Committee
2 – 5 September 2024
Taipei, Taiwan

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 Cheng-Fang Wang, the Deputy Director General of the Fisheries Agency of Taiwan, welcomed all participants to Taipei, Taiwan, and provided the opening remarks for the ESC, shown in **Attachment 1**.
3. Each delegation introduced its participants. The list of participants is included in **Attachment 2**.
4. The Chair noted that the European Union (EU) and South Africa were not attending 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 for the substantive agenda items.

Agenda Item 3. Adoption of Agenda and Document List

7. The agreed agenda is provided at **Attachment 3**.
8. The agreed list of documents is provided at **Attachment 4**.

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 with additional detail and follow-up queries provided by Members during the meeting.

10. The Chair noted that no national report had been received from the EU. The Chair reiterated the EU's previous advice that this is because, strictly speaking, as the EU does not have a southern bluefin tuna (SBT) fishery, it does not target SBT, and it has not reported any by-catches of SBT in the relevant reporting period.

11. Australia submitted paper CCSBT-ESC/2409/SBT Fisheries-Australia (Rev.1). The 2022–23 SBT fishing season report summarised catches and fishing activities in the Australian SBT Fishery up to and including the 2022–23 fishing season (1 December 2022 – 30 November 2023). Australia's allocation, as agreed by the CCSBT was 6,238.4 t for the 2022–23 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 Total Allowable Catch (TAC) was 6,608.2 t. A total of 44 commercial fishing vessels landed SBT in Australian waters in the 2022–23 fishing season for a total catch of 6,035 t. A total of 77.8 % of the catch was taken by purse seine with the remainder taken by longline, pole-and-line, rod-and-reel and trolling. Six purse seiners fished off South Australia for the Australian farming operations during the 2022–23 fishing season, with live bait, pontoon-towing and feeding vessels also involved. Most of the purse-seine fishing commenced in December 2022 and finished in March 2023. 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 2022–23. In the 2022–23 fishing season, observers monitored 8.1 % of purse-seine sets where fish were retained for the farm sector and 12.7 % of the estimated SBT purse-seine catch. In 2023, 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 9.0 %. In 2023, the review rate for e-monitoring footage of longline hook effort in the entire Western Tuna and Billfish Fishery was 9.0 %.

12. Australia also submitted paper CCSBT-ESC/2409/13, 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 has compiled aggregated catch and effort, catch by fleet, raised catch, catch at size and non-retained catch for submission to the 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 provided copies of data collection forms, as well as flow charts illustrating the data integration procedures. The paper also described the data validation procedures.

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

    - There have been a number of discussions between fisheries management, industry and researchers with regard to an appropriate sampling regime for

otoliths from the longline fishery. Australia continues to refine how a research program, if required, should be conducted to ensure that otoliths, along with tissue samples for the purposes of epigenetic ageing, are necessary and able to generate cost-effective improvements to the SBT stock assessment; and

- Discards due to shark damage are an issue that has emerged with the increase in longline catch in the domestic fishery as quota has become available and this increase has become more pronounced in recent seasons. Australia will commence work to produce a best estimate of discards including an estimate of post-discard mortality to incorporate into Australia's attributable catch in future.

14. Indonesia submitted paper CCSBT-ESC/2409/SBT Fisheries-Indonesia. SBT is seasonally caught as by-catch from Indonesian tuna longline fleets operating in the Indian Ocean. This report provided scientific information on the Indonesian tuna longline fishery related to SBT for the 2023 calendar year, spanning from 1 January to 31 December 2023. In 2023, 227 active longline vessels were recorded. Additionally, SBT catches were reported from 5 handline vessels and 3 troll line vessels. The total reported SBT catch was 1,031 t, or equal to 11,085 individuals. Size of SBT ranged from 107-235 cm FL (mean=163.9 cm FL) for Area 1 and 91-219 cm FL (mean=165.2 cm FL) for Area 2. There were seven observer trips deployed in 2023, covering at least 0.36 % in Area 1 and 2.16 % in Area 2 in terms of total hooks.

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

    - For a question on a plan for meeting its observer coverage requirements for CCSBT, Indonesia advised that there is a national observer program under the Ministry of Marine Affairs and Fisheries (MMAF) of the Government of Indonesia. In 2024, MMAF recruited twenty-five new observers to increase the observer coverage. In addition, the Indonesian Tuna Longline Association (ATLI) is currently in the process of obtaining sustainability certification under a Fisheries Improvement Project (FIP). The FIP program includes observer deployment at tuna fishing vessels who report the operational data including bycatch. Electronic Monitoring (EM) is also under discussion. This aims to have a pilot monitoring program for an Indonesia tuna longliner;
    - Indonesia noted that there was an increase of tuna longline vessels operating in the Indian Ocean in 2023 (170 vessels in 2022 to 227 vessels in 2023), and explained that some of the tuna longline vessels that have recently been registered to CCSBT are actually targeting tropical tunas but may interact with SBT as bycatch. All SBT catches are recorded in the CDS.
    - Indonesia also noted that its payback plan (for its SBT overcatch in the 2019 and 2020 seasons) is a challenging situation for Indonesia as a developing coastal state that has a low SBT quota compared to some Members. Therefore, an early warning system is being implemented by informing quota utilisation quarterly, and when the catch approaches 80 % of the catch limit, then there will be a warning sent to the operators and Tuna association.
    - Indonesia also noted that mechanisms were in place domestically to reduce the quota in the following year should an overcatch occur, in accordance with the Corrective Actions Policy.

- Indonesia also clarified that vessels operating in Area 2 were not new vessels but were seasonally shifting their effort from other areas.
- Indonesia revised the information on the two dart tags in the report, which are supposed to be tags returned in January 2024 instead of 2023.

16. Japan submitted its national report (CCSBT-ESC/2409/SBT Fisheries-Japan). This paper described the Japanese commercial longline fishery for SBT for catch, effort, nominal Catch per Unit Effort (CPUE), length frequency, number of vessels and geographical distribution of fishing operations in 2023. In 2023, 73 vessels caught 6,232 t which is about 107,000 individual SBT. Nineteen scientific observers were dispatched and observed 21.3 % of the hooks used in Area from 4 to 9.

17. In response to questions on Japan's national report:

    - Japan clarified that fishers at sea measure fork length before tails are removed and that fishers report the measured fork length to relevant organisations as part of the Real Time Monitoring Program (RTMP) process pursuant to the instruction of the Fisheries Agency of Japan; and
    - For accounting dead discards against Japan's national allocation, Japan explained that some portion of Japan's national allowance is not allocated to each vessel and is set aside as a reserved allowance for dead discards.

18. Japan also submitted paper CCSBT-ESC/2409/20 on the change in the operating pattern of Japanese SBT longliners in the 2023 fishing season. It noted that the Japanese longline data have been used as the most important scientific data in stock assessment and Management Procedure (MP) of SBT in CCSBT. Compared to the past 10 years, the paper examined the change of the operation pattern of the longline fishing in the most recent year. It concluded that no major change was evident in the 2023 operational pattern in terms of the amount of catch, the number of vessels, time and area operated, proportion by area, length frequency, release and discard, and spatial concentration of operations. The paper noted that the Japanese longline CPUE in 2023 represents the change of SBT stock abundance consistently as in previous years. The increase in catch quotas over the last decade has had the greatest impact on the increase in CPUE, with the expansion of operating space-time and the increase in the number of operations to a lesser extent.

19. Korea submitted paper CCSBT-ESC/2409/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 2023, SBT catch in calendar year of Korean tuna longline fishery was 1,305 t (1,305 t in fishing year) with 9 vessels in active. In general, fishing occurs between 35^{o}S-45^{o}S and 10^{o}E-120^{o}E, 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 from previous years, and mainly operated in the western Indian Ocean and eastern Atlantic Ocean between 20^{o}W-35^{o}E (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.

20. In response to questions on Korea's national report:

    - For the discrepancy in total catch of 0.2 %, Korea advised that it operates an Electronic Reporting (ER) system to collect operational data from vessels in real-time. The total SBT catch of 1,302 t (NIFS) is the amount reported by the vessels through the ER system, while 1,305 t (NFQS) is the landed catch recorded in the issued Catch Documentation Scheme (CDS). Minor discrepancies in the total SBT catch may occur, for example, due to the refrigeration methods used, such as glazing and quick-freezing, which can increase fish weight; and
    - Regarding the progress of the pop-up tagging program for 2023, Korea advised that there are no notable updates at this time, and expressed its hope that positive results could be achieved in the future.

21. New Zealand submitted paper CCSBT-ESC/2409/SBT Fisheries-New Zealand (Rev.1). For the 2023 calendar year, New Zealand's national allocation was 1,102.5 t - however, New Zealand held a carry-forward from the previous year's under-catch of 220.5 t, so the total available catch in 2023 was 1,323 t. Within New Zealand's national allocation of 1,102.5 t, there were the following allowances: a domestic total allowable commercial catch (TACC, which is the commercial allocation) 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 2023 calendar year, commercial removals were 1102.8 t. 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 3.5 t based on 70 authorised discards of dead SBT by Fisheries New Zealand observers. Recreational removals were estimated at 69.3 t, and there were no customary removals reported. The 2022/23 fishing year standardised CPUE for the domestic fleet remained consistent with the 2021/22 standardised CPUE which was the highest on record.

22. South Africa submitted paper CCSBT-ESC/2409/SBT Fisheries – South Africa (Rev.1). South Africa's tuna directed fishery is comprised of two fishing fleets, a baitboat (tuna pole-line) fleet of 139 vessels, and a longline fleet with a domestic (ZAD) and a Japanese-flagged joint venture (charter vessel(s); ZAC) component of currently a total of 34 vessels. SBT has previously only been caught by the longline fleet but the tuna pole-line fleet started catching SBT in small quantities since South Africa became a full Member of CCSBT in 2016. South Africa continues to develop its SBT directed performance within its large pelagic directed fishing sectors. SBT effort in the ZAD has been steadily increasing over the period 2006-2016, from a mere 45 thousand hooks in 2006 to present levels of over 500 thousand hooks, whilst ZAC effort was absent in 2020, 2022 and 2023 and only one vessel operated in 2021. Similar to effort, total annual SBT landings attained a maximum of 222 t in 2018 and have declined to on average 133 t per year since. In the 2022/2023 season (1 March 2022 to 28 February 2023), ZAD longline vessels landed 145.7 t (N = 1964) and tuna pole-line vessels landed 0.8 t (N = 10). The longline fishery operates mostly within South Africa's EEZ from May to October; however, the majority of SBT catch is typically taken over a four-month period; June, July, August and September. A decline in size composition data is indicative of a decline in SBT catch after 2019. In addition,

overall (all sets) observer coverage has decreased in recent years and South Africa looks to improve on observer coverage that is spatially and temporally representative in the ZAD fleet. The 100 % observer coverage required on ZAC vessels assisted in measuring 31.2 % and 14.9 % of SBT caught in 2019 and 2021, respectively. Small samples sizes have resulted in large variability in mean lengths (between 133.7 cm and 192.5 cm) from 2020 to 2023 in Area 9. The mean lengths in Area 14 and 15 have been fairly similar over the last four years, 171.4 cm and 166.1 cm, respectively. The effective observer coverage of SBT effort (number of hooks per sets with at least one SBT) for the ZAD fleet declined in 2021 (6.2 %) and 2022 (2.4%) and efforts in place in 2023 has seen observer coverage increase to 13.9 %.

23. In response to questions, South Africa advised that:

    - It would consider using the length frequencies in the CDS data. Preliminary plots of the length/weight data from the CTFs of SBT with dressing type GGO/GGT have revealed outliers that must be addressed (i.e. LFs of DRO (head off) SBT reported as GGO (head on)); and
    - The offload sampling in the tuna pole-line sector is funded by that sector, not including the longline sector. South Africa is actively working with the longline sector to increase human observer coverage to meet the requirements of their permit regulations.

24. Although South Africa was not present at the meeting, the ESC did wish to recognise the comprehensive report submitted by South Africa and the recent improvements made in terms of the submission of data. The ESC welcomed these improvements and encouraged South Africa to maintain its efforts in these areas.

25. Taiwan submitted paper CCSBT-ESC/2409/SBT Fisheries-Taiwan. Since Taiwan became a member of the Extend Commission 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 2023, 64 fishing vessels were authorised to fish for SBT, which was consist of seasonal target vessels and bycatch vessels, and the SBT catch was 1,135 t for calendar year and 1,235 t for 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 2022 calendar year, 14 observers were deployed on 14 of the 43 fishing vessels authorised to target SBT seasonally, and there were not deployed on fishing vessels authorised to bycatch SBT. There were 3,405 fishing days with 2,897 days observed. And 15 observers were deployed on 15 of the 47 fishing vessels authorised to target SBT seasonally, and 1 was deployed on 1 of the 17 fishing vessels authorised to bycatch SBT in 2023 with 2,670 days observed out of 3,310 fishing days. In 2022, the coverage rate of observation was 25.55 % by vessels, 17.69 % by hooks and 12.00 % by catch. The coverage rate was accounted for 25.00 % by vessels in 2023, 20.18 % by hooks, and 19.85 % by catch. To conducting effectively monitoring, it is necessary for FA to considering the sustainable development observer program and budget to reduce the affluence of fishing vessels changing which may involve the coverage rates. In recent years, Taiwanese SBT fishing vessels mainly operate in the IOTC area, and partial SBT bycatch vessels operate in the ICCAT and WCPFC 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 their fishing fleet.

26. For the tori line experiments, Taiwan advised that it conducted these in the Indian Ocean in 2021 and in the Pacific Ocean in 2022. Since there was no seabird bycatch in the Indian Ocean, the results were reported to the Western and Central Pacific Fisheries Commission (WCPFC). Taiwan also advised that, in 2024, a workshop for vessel skippers, operators, observers and inspectors will be held in Taiwan as a part of the CCSBT Seabird Project. Taiwan advised that it is consistently dedicated to promoting the use of tori lines in its regular operations.

27. Taiwan also submitted paper CCSBT-ESC/2409/30, which describes preparation of Taiwan's SBT catch and effort data submission for 2023. The SBT fishery data submitted to the CCSBT 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 was 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/2409/04 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 near areas where SBT are caught. It shows that the estimated total catch for the 2023 calendar year was 18,173 t, an increase of 36 t or 0.2 % from the 2022 calendar year. The global reported SBT catch by flag is shown at **Attachment 5**. 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 933 t for the 2023 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.

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

30. The Chair of the Operating Model and Management Procedure Technical Group (OMMP), Dr Ana Parma, provided a summary of the activities and progress made by the group over the past year. Three meetings were held as part of the Operating Model Specification and Software Upgrade project, a 3-year research project approved by CCSBT in 2022. The first workshop was held in Tokyo, Japan, from 20-23 November 2023, the second was the 14th Operating Model and Management Procedure Technical Meeting (OMMP 14) held from 24 – 29 June 2024 in Seattle, USA, and the third was a one-day informal OMMP meeting held

immediately before this ESC 29 meeting. The full report of OMMP 14 is provided to this meeting as CCSBT-ESC/2409/Rep 02.

31. The objective of the OM Specification and Software Upgrade project is to upgrade the code used for SBT stock assessments and for evaluating MPs with the aim of using the new code for the full stock assessment to be conducted in 2026. The project involves i) moving the code from AD Model Builder (ADMB) to a new platform called Template Model Builder (TMB), ii) implementing and evaluating alternative model assumptions proposed by the working group and iii) taking advantage of some new efficient algorithms available in TMB to evaluate the uncertainty in stock assessments and projections using Bayesian approaches.

32. Dr. Darcy Webber has been working hard on developing the code, and the research project is on track with results far exceeding expectations.

33. The first milestone achieved at the Tokyo meeting was to have a version of the TMB code that mimics the results produced with the old conditioning code developed in ADMB. That code version has been saved for future reference.

34. The meeting in Seattle concentrated on model changes that were introduced to improve efficiency and numerical performance. In particular, the group decided to treat two of the smaller longline fisheries (LL3 and LL4) and the Australia surface fishery as direct removals (i.e., subtracting the corresponding catches at age directly) instead of modelling each fishery's selectivity by year. This change had minimum impacts on the results but saved a large number of parameters, and eliminated some parameters that were performing poorly in the Markov chain Monte Carlo (MCMC) algorithm.

35. Other changes were introduced to some of the likelihood components; these are documented in the report from the 14th OMMP Technical Meeting (CCSBT-ESC/2409/Rep 01) and in paper CCSBT-ESC/2409/11.

36. An important result evaluated during the Seattle meeting was a comparison of the uncertainty around the estimates of Total Reproductive Output (TRO) evaluated using two different approaches. The first was the traditional approach used for SBT, consisting of integrating results across a grid, in this case of 108 models defined by fixing some key parameter values. The second involved using the MCMC algorithm when combining a few separate MCMC runs produced using a much-reduced grid of fixed model parameters. The comparison showed that the uncertainty approximated by the traditional grid approach was underestimating the parameter uncertainty in the SBT assessment, a result that will be relevant for evaluating risks.

37. The group reconsidered the structure of the reduced grid and decided to keep the set of four fixed steepness values used in the 2023 stock assessment grid, but to estimate psi (the parameter controlling the change in relative reproductive output by age) and the natural mortality parameters (M0 and M10) together with the rest of model parameters. This implies that the assessment would involve running four separate MCMCs and combining them with equal weight.

38. A list of further changes in model assumptions and main pending tasks was prepared and priorities were assigned. Some of the tasks are ongoing, and progress will be evaluated on the sides of the ESC meeting. The priority for next year will be to develop and evaluate the projection and MP codes so that they are ready for the 2026 assessment.

39. An important aspect of the project that was emphasised during the meetings is the training of participants in the use of the new code. User documentation and examples had been prepared and made available on GitHub, and support was provided for participants to be able to install and run the code on their own computers. Dr. Webber has developed a very comprehensive website for the SBT model development which can be accessed at https://www.quantifish.co.nz/sbt/.

40. The ESC noted that the progress and the next step of the OM Specification and software upgrade project will be considered further under Agenda Item 7.3.

41. The ESC agreed about the importance of the project and the benefits of having upgraded efficient software that i) will facilitate revising and implementing alternative hypotheses in the stock assessments and future MP evaluations, ii) provides improved estimates of uncertainty about stock status and future projections, and iii) improves transparency and transferability of model operations.

42. The ESC noted that it is planned to run the Cape Town Procedure (CTP) in 2025 to recommend the global TAC for the 2027 – 2029 quota period, and agreed that the terms of reference for the 15th OMMP meeting in 2025 will be to complete the analyses required, including reviewing the CTP input indices and evaluating the existence of exceptional circumstances. In addition, the workshop will continue to evaluate and advance the development of the new software.

43. Another high-priority change that the OMMP working group discussed is the estimation of a separate selectivity to use for CPUE prediction. Currently, the CPUE is predicted based on the selectivity derived from catch-weighted size compositions for the aggregated LL1 fleets. It would be more appropriate to use a selectivity corresponding to the Japanese CPUE-weighted size compositions. Figures were produced from 5x5 nominal and GAM predicted CPUEs by-month and compared to the LL1 size compositions data used in the assessment (see **Attachment 6**). The difference observed is partly due to the differences in the weightings of the size compositions but also the influence of data from other fleets (e.g. Korean longline) included in the LL1 fishery, but not in the CPUE-weighted size compositions.

Agenda Item 6. Report back against objectives of the Strategic Plan

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

45. The Chair advised that the CCSBT Strategic Plan, adopted in 2023, states that "Subsidiary bodies holding responsibility for particular action items are expected to report back on the progress of those activities as part of their respective meeting reports". The ESC was asked to consider a reporting template developed by the Secretariat and provide an assessment of progress against those activities assigned to the ESC.

46. The Secretariat introduced paper CCSBT-ESC/2409/05 (Rev.1) on Report against Strategic Plan. At CCSBT 30, Members adopted a revised Strategic Plan that outlines a common vision for how the Commission will operate in order to

meet the overall objective of the Convention. To ensure that the objectives of the Strategic Plan are met, the plan outlines a process that commits to annual monitoring and reporting against the actions agreed under the plan. Members were asked to consider the reporting template developed by the Secretariat along with some initial responses.

47. A small group was convened to develop a report from the ESC on Progress Against the Strategic Plan. Mr David Galeano from Australia led the work of this small group.

48. The ESC thanked the small group for its hard work and agreed to report the progress against the Strategic Plan, which is shown in **Attachment 7**.

49. The ESC wishes to draw attention to the potential impacts of climate change and recommends that the EC consider updating the Strategic Plan to include actions relating to climate change (in line with PR2021-06 from the Report of the Independent Performance Review).

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

7.1. Results of scientific activities

50. 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.

51. Paper CCSBT-ESC/2409/09 provided an update on the SBT close-kin tissue sampling, processing and kin-finding for 2024. The Close-kin project is an on-going monitoring program that provides data on the adult component of the population for use in the Cape Town Management Procedure (CTP) and stock assessment models. Muscle tissue samples collected from harvested juvenile SBT at tuna processors in Port Lincoln, Australia, in 2022 were subsampled, and DNA was extracted and sequenced. The kin-finding analysis to identify parent-offspring pairs (POPs) and half-sibling pairs (HSPs) was updated to include the new juvenile data. The results were provided to the CCSBT in June 2024. A total of 123 POPs and 232 high-confidence HSPs have now been identified, with a false negative rate for the HSPs of 0.25. Sampling of juvenile SBT in 2023 and 2024 is complete. As reported previously (CCSBT-ESC/2308/07), muscle tissue samples were not collected from the Indonesian longline fishery in 2021/22 and only 148 SBT were sampled in 2022/23 due to disruptions caused by institutional changes in Indonesia. In January 2024, a training workshop was held in Benoa, Bali, for Enumerators from the Directorate General of Capture Fisheries (DGCF) on how to collect SBT muscle tissue and otolith samples, to enable the SBT monitoring and sampling in Benoa to recommence. Sampling recommenced in January 2024 and 236 muscle tissue samples were collected. A second meeting with the enumeration team and DGCF monitoring program managers was held in August 2024 to review the season's data and prepare for the upcoming sampling season, which is anticipated to be recommenced in September 2024.

52. The ESC asked how accurately the offspring can be identified in Parent-Offspring Pair (POP) comparisons. The ESC was informed that the Close-kin

Mark Recapture (CKMR) sampling program currently uses only 3-year-old fish as the putative offspring to ensure certainty in the POP comparisons.

53. A follow-on question was whether the search for POPs uses only the adult samples from the spawning grounds? The ESC was advised that the ageing error inherent for both adults with observed ages and those with only observed length covariates had led the bioinformatics team to avoid doing these comparisons. The age of the youngest animal in the comparison needs to be known with a high degree of accuracy to make such comparisons informative. If, in addition, the identification of what is the youngest animal in the comparison is also uncertain this further degrades the utility of such a comparison.

54. Given the continually increasing sample size, and the apparent lack of a clear distinction between the identified Half-Sibling pairs (HSPs) and lesser kin such as half-aunt/uncles (HTPs) and half-cousins (HCPs) advised in paper CCSBT-ESC/2409/09 (CKMR paper), is work going on to both increase the certainty in the identified kin pairs and minimise the loss of true kin pairs given the false positive constraints imposed by the current kin finding method and (growing) number of comparisons? The ESC was informed of current efforts to use the recently available high coverage genome assembly for SBT to include the genetic linkage information that this genome assembly includes given the current suite of markers already being used.

55. The ESC asked about the relationship between sample size/number of comparisons and the precision of the estimated stock status variables from the stock assessment. The relationship between comparisons (which scale with the square of the number of samples genotyped) has a directly inverse relationship to the CV of adult abundance – not the inverse square root as is the case with classical mark-recapture and sample size. Given both the computational burden of ever-increasing numbers of genotyped animals, as well as the apparent continuing recovery of the adult population, the paper's authors were asked what impact this might have on current sampling levels (and their efficacy in continuing to provide informative data). In terms of computational challenges, the ESC was informed that an effective saturation level of comparisons being undertaken has been reached more and more fish are being genotyped in the CKMR program, but these new samples are not being compared to every other sample. Specifically, comparisons unlikely to produce matches (e.g., juveniles born 8+ years apart in the HSP case) are avoided. Additionally, the overall data set can be split into subsets that have their own false positive (and related false negative) probabilities which will also reduce the number of true kin pairs that need to be discarded to avoid false positives in the assessment data.

56. For a continuing increase in the adult population, the sample size required to give the same precision scales with the square root of the population size. Given the currently estimated relative TRO level (median of 23 %) and the target level to which the MP is tuned (30 %) it would not be expected that there would be a meaningful reduction in the likely precision of the estimates as the target level is approached, relative to the present estimated level. Additionally, there is no direct linkage between sample size requirements and the rebuilding objective (50 % probability of reaching 30 % relative TRO by 2035). At the time of development of the current MP, there was agreement that (i) the current sample size levels were clearly providing informative data and (ii) it was apparent in the projections

that these sample sizes were adequate to keep providing informative data even as the stock reaches the rebuilding objective.

57. Paper CCSBT-ESC/2409/10 provided an update on the Gene-tagging program for 2024 and the 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. The program has been running since 2016. The estimate of abundance for the 2022 age-2 cohort is not yet available for the CCSBT Scientific Committee, because there have been delays in genotyping the harvest tissue samples collected in 2023. This delay does not impact running of the Cape Town Procedure (which is scheduled for 2025) or the assessment of stock status (scheduled for 2026).

58. In this paper, CSIRO provided an update of progress on tissue sample collections that will be used in the estimate of abundance for the 2022, 2023 and 2024 age-2 cohorts. To estimate the abundance of the 2022 age-2 cohort, tissue samples were collected from over 5,000 aged-2 fish in 2022, and the fish were released alive. In 2023 over 15,000 harvest samples were collected from age-3 fish. Sampling logistics were more complex with tissue samples collected during offshore processing. Samples from a wider length range were collected, to allow for a potential shift in length at age which is being investigated. DNA extraction has been completed, but genotyping was delayed this year. The DNA genotypes from the two sets of samples will be compared to detect matches. The gene-tagging data and results will be provided to the CCSBT later this year. To estimate the abundance of the 2023 age-2 cohort, 3,000 fish were tagged and released in 2023. During the 2024 commercial harvest, over 15,000 samples were collected from a broader length range. These samples will be processed, and genotypes compared to detect matches. The data will be available for the CCSBT data exchange in 2025 and will be used in the Cape Town Procedure. At sea tagging field work in 2024 occurred over 20 days in March. Over 3,700 fish were tagged and released. The research mortality allowance that was used was 271kg. Harvest sampling of age-3 fish will occur in 2025. The abundance estimate for this cohort will be available in 2026 for the next assessment of stock status.

59. CSIRO advised that the delay in receiving genotyping data from the provider is specific to this year, and next year's data are expected to be available on time, as scheduled.

60. Given that, as the adult abundance recovers, mean recruitment would also be expected to increase, the authors were asked whether sample sizes in the gene tagging program require modification to maintain the expected precision in the estimates. Given the current (23 %) and objective (30 %) levels of relative TRO, the increase in mean recruitment is likely to be quite small (i.e., less than the increase in adult abundance) and, as such, it would be unlikely that an increase in sample size would be required in the program to maintain the levels of precision observed at present.

61. The authors were asked whether there was a target CV defined in the original gene tagging program. The original target CV was set at 0.25 (or 16 matches on average) and the sample size required was defined based on the average estimate of age 2 fish at that time. It was noted that most of the CV estimates have been more precise relative to this target and the question was raised as to whether this meant current sampling levels are too high. In response, the point was made that

the series of estimates is still relatively short, so it is challenging to assess meaningful differences between the average observed CVs and the target level.

62. Given the apparent higher precision of the estimates, the ESC asked the authors whether additional dependence between the data (i.e. over-dispersion) is taken into account in the provision of the CVs. The ESC was reminded that the shortness of the series makes robust and accurate estimation of over-dispersion challenging. This feature is included in the Operating Model (OM) and was also included in the MP testing process.

63. Given the hypothesis that not all age 1 fish necessarily move into the GAB in summer as they reach age 2+, the authors were asked how this might affect the estimates of age 2 fish from the gene tagging program. It was noted that this would negatively bias the estimates of age 2 fish in the gene tagging but would not affect the HSP data in the CKMR program. This effect is included in the OM and was included in the suite of robustness trials used in the testing and selection process of the current MP (REF – SC 2019).

64. The authors were asked what protocols are in place to check the robustness of the identification of true recaptured fish. The ESC was informed that blind replicates are not submitted to the genotyping company to estimate the degree of genotyping error, and its implications for the robust detection of recaptures. Currently blind replicates are not introduced into the post-genotyping recapture ID process, and this was suggested as an additional test of robustness to be considered for the future. The authors were asked whether the relative split in the sampling effort (in terms of sample size) between the release and recapture phase of the program was designed to minimise the overall costs of the program. The overall sample size is basically fixed by the target CV, but the split – which involves much more sampling in the recapture phase - reflects both the relative platform cost and operational constraints.

65. Australia presented paper CCSBT-ESC/2409/14, which provided an update on recent satellite tag deployments in GAB on juvenile SBT. CSIRO has been conducting satellite tagging of juvenile SBT in the Great Australian Bight (GAB) to understand if the habitat and distribution of these fish has changed relative to observations collected from previous electronic tagging programs. The work is also examining oceanographic trends in the GAB which may drive changes in distribution of SBT. This paper provides an overview of tagging results from 14 short term popup tag data sets obtained during 2024. The tagged SBT remained in the GAB region, with deployments ranging from ~3 – 96 days. Several of the tags appear to have been ingested, most likely by other SBT. The aim for future deployments is to deploy tags from recreational or charter vessels immediately prior to or during the Australian surface fishery activities. Deployment of tags further east, for instance in Bass Strait, would be desirable in order to monitor movement and habitat preferences of 3-4 year-old SBT appearing in regions outside the traditional GAB grounds.

66. The ESC asked how marine heatwaves in the wider region might play a role in future dynamics in the western GAB, which itself has experienced an apparent cooling trend. It was noted that South Australian waters are warming in general, but that there are still clear differential trends where cooling is occurring, or the rate of warming is slower. The ESC also commented on the associated need to better understand the thermal tolerance of SBT and how this might affect future

potential changes in habitat preference. The ability to determine climate change impacts was discussed: e.g., will climate change impact range expansions or contractions and translational shifts. The authors noted that making explicit links to climate variables should be explored, but are currently not definitive, possibly due to the limited observed range of the tagged fish. The work of Korea in releasing pop-up tags in notably different regions of the range of SBT was agreed to be beneficial in this regard.

67. Given the apparent change in the average size of fish in the GAB, the authors were asked whether the cause was known. The ESC was informed that there are currently not enough data to choose between the plausible hypotheses for the change in mean size.

68. Australia presented paper CCSBT-ESC/2409/15 which provided the update on Australian otolith collection, ageing and the SRP ageing workshop 2024. This report provided an update of the SBT otolith collection and ageing activities in Australia in 2024, along with plans for the SRP ageing workshop. Otoliths from 177 SBT caught in the Great Australian Bight (GAB) by the purse seine fishery in 2023 were received and archived in the CSIRO hard-parts collection. Age was estimated for 100 of these fish and the data were provided to the CCSBT in 2024. An additional 148 otoliths sampled in 2024 have recently been received, but are not yet archived.

69. The ESC asked what data would be obtained from the project and how it would be used in the wider science program and stock assessment. The authors advised that these data are not currently used directly in the assessment, but that they could be in the future.

70. Japan presented paper CCSBT-ESC/2409/22, which reported the piston-line trolling monitoring survey for the age-1 SBT recruitment index in 2024. The survey was conducted in January to February 2024, to provide the data for recruitment index of age-1 SBT. The surveyed area extended from Esperance to Albany, including Bremer Bay with 12 repeats of the piston line. A total of 292 SBT were caught during the survey. Forty SBT individuals were released with archival tags attached, and the stomach contents of 105 fish including SBT were analysed. Oceanographic observations were also conducted at 18 locations using CTD. In the past, the majority of the fish caught were 1.0 years old, but this time those were fewer, and for the first time, the majority of the fish caught were 0.3 year old.

71. Given the apparent strong dominance of 0.3 year old fish in the most recent trolling survey, the ESC asked what possible environmental drivers might cause this apparent change in the survey age composition. Does this reflect a change in distribution or alternatively a change in abundance? The ESC was informed that this question could not currently be answered. Oceanographic data on the survey grounds did not show any apparent deviations from previous years. The author offered the hypothesis that the abundance of age-1 fish was low, and age-0.3 fish were therefore able to extend their distribution to the coast, which is the usual habitat for age-1 fish. The ESC asked how age was determined, and was informed that the age was assumed from fork length based on previous results from age estimations using otolith daily increments.

72. The ESC asked what results had been obtained from current and previously archivally tagged fish. The ESC was informed that there were more than 50 recaptures of these fish, and that their inferred spatio-temporal tracks seem to agree – both within and outside of the GAB region - with the overall patterns seen in recaptures from existing large-scale CCSBT conventional and electronic tagging programs.

73. Japan presented paper CCSBT-ESC/2409/23 which reported the second survey of age-0 SBT distribution in the northwest coast of Western Australia in 2024. Little is known about the distribution and migration of SBT from larvae to age 1. A research project to investigate the distribution of small age-0 fish (<25 cm fork length) along the northwest coast of Western Australia was started in 2019 and has been successful in collecting small SBT with a minimum fork length of 23.0 cm, including in the second survey in 2022. The third survey was conducted for 7 days in March 2024, and attempted to catch SBT using trolling, but no SBT were collected.

74. Given the presence of a small yellowfin tuna in a skipjack tuna stomach, which was confirmed by DNA analysis, it was suggested that juvenile SBT around 3 cm in body length may be able to be detected in the future by examining the stomach contents of predator species.

75. Korea presented paper CCSBT-ESC/2409/28 on Korean SBT otolith collection activities in 2023. To investigate the age and growth of SBT, Korea collected 74 otolith samples in 2023, totalling 1,193 otoliths since 2015. The relationship between fork length and total weight was TW=8.4E-05 x FL2.705 (r^2=0.912). The von Bertalanffy growth parameters estimated from the non-linear method using length-at-age data were $L\infty$=176.2 cm, k = 0.188/year, t0 = -1.210 years.

76. Taiwan presented paper CCSBT-ESC/2409/31, which updated gonadal information and analysis of SBT collected by the Taiwanese scientific observer program. Gonadal samples were collected by Taiwanese scientific observers dispatched on the longline vessels operated in the Indian Ocean. There were 1,260 gonad samples in total collected from 2010 to 2023 including 599 females and 661 males. The fork length of the samples were concentrated between 90 and 150 cm in females and males. According to the trends of the monthly gonado-somatic index (GSI) analyses, 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 values of GSI were revealed in July. The monthly GSI of males decreased gradually after the highest value in March. The trends of monthly GSI for both females and males showed no obvious differences from previous results. According to the histological results, a total of 947 gonad samples in the collection period of 2010-2022 was analysed for sexual maturity stage determination, including 469 females and 478 males with updated 78 samples in 2022. The majority of these samples were diagnosed as the immature stage, and about 10.9 % samples designated as mature but at a reproductively inactive status. Also, most mature females were identified at regressed or regenerating stages from April to August, and most mature males were founded at regressing or regenerating stages during March to August.

77. Taiwan presented paper CCSBT-ESC/2409/32 on the otolith sampling activities and direct aging of the SBT caught by Taiwanese longliners in 2022 and 2023. This report updated the result for otolith sampling and direct ageing of the SBT

caught by Taiwanese longliners in the Indian Ocean. Taiwan collected otoliths from 141 SBT caught in 2022. Their fork length and age were 109.5 ± 19.1 (range: 70-159 cm) and 4.5 ± 2.4 (range: 2-16 years), respectively. In addition, Taiwan collected otoliths from 149 SBT caught in 2023. Their fork length and age were 113.5 ± 9.1 (range: 92-150 cm) and 4.7 ± 1.3 (range: 3-13 years), respectively. Taiwanese longliners caught predominantly young SBT, aged between 2 to 5 years, accounting for 70-80 % of the total catch. The estimated age compositions were similar between the years of 2022 and 2023, suggesting no major shift in the demography of the SBT in the central Indian Ocean.

7.2. Improving Robustness of CPUE indices

78. The Chair of the CPUE Modelling Group, Dr Jim Ianelli, briefly summarised the progress made in relation to CPUE work intersessionally since the ESC 28 meeting last year. Dr Ianelli noted the delay in the work to be done in 2024; this will be completed by December 2024.

79. Japan presented paper CCSBT-ESC/2409/21 which provided an update of CPUE abundance index using the GAM for SBT in CCSBT up to the 2023 data. At ESC 27 in 2022, the new calculation method for the abundance index for SBT, which was standardised via a generalised additive model (GAM) in the two-step delta log-normal approach with area weighting, was agreed. The CPUE abundance index was updated for fishery data up to 2023 according to the agreed methodology. This document presents the base case results as well as the results of various sensitivity tests. The index value had increased moderately in 2022 and decreased slightly in 2023. The abundance index was robust to a variety of sensitivity analyses, including model selection, retrospective analysis, vessel ID, area range changes, age range changes, and data and model resolution changes. There were cases where the predicted CPUE for space-time cells without fishery showed high values.

80. It was noted that when vessel ID was included, the recent increase was somewhat more pronounced. In response to questions about this effect, Japan chose to exclude vessel ID because the CPUE Modelling Group had already agreed to eliminate this factor in 2022, and was concerned that having the index higher in 2022 would create instability.

81. Korea submitted paper CCSBT-ESC/2409/29 on Data exploration and CPUE standardisation for the Korean SBT longline fishery (1996-2023). In this study, Korea standardised SBT CPUE from Korean tuna longline fisheries (1996-2023) using Generalised Linear Models (GLM) with set-by-set (operational) data. The data used for the GLMs were catch (number), effort (number of hooks), number of hooks between floats (HBF), fishing location (5° cells), and vessel identifier by year, quarter and area. Korea explored CPUE by area and identified two separate areas (CCSBT statistical Area 8 and 9) in which Korean vessels have targeted SBT. SBT CPUE was standardised for each of these areas. Two alternative approaches, data selection and cluster analysis, were applied to address concerns about target change over time that can affect CPUE indices. Explanatory variables for the GLM analyses were year, month, vessel identifier, location (5° cells), number of hooks and targeting (HBF and cluster). GLM results for each area suggested that year, month, location and targeting effects

were the principal factors affecting the nominal CPUE. The standardised CPUEs for both areas decreased until the mid-2000s and have shown an increasing trend since that time.

82. For the Korean analysis, ESC asked about how the cluster analysis results differed between Area 8 and 9. Specifically, the SBT response was dominant in cluster 1 in Area 8 and in cluster 3 in Area 9. Korea clarified that they were computed independently.

83. Taiwan submitted paper CCSBT-ESC/2409/33 on CPUE standardisation analyses for SBT based on the Taiwanese longline fishery data from 2002 to 2023. The CPUE standardisation analyses were conducted with the statistical information from the Taiwanese longline fleets. The data covered the period from 2002 to 2023. The main operating waters of the large-scale Taiwanese longliners were distributed south of 20°S of the Indian Ocean. For the first step of the CPUE standardisation analyses, the cluster analysis was processed to explore the targeting of fishing operations and to produce the data filter for selecting the data for the next step. Weekly-aggregated data was applied for clarifying various styles of the targeting of fishing operations. Second, the simple delta-lognormal model without interactions was adopted to avoid the confounding from interactions for the CPUE standardisations analyses. The fishing areas of Indian Ocean were divided into the central-eastern area (Area E: main fishing area) and the western area (Area W: secondary fishing area) for the cluster analyses. For the results of the CPUE standardisations, both the CPUE trend of Area E and Area W decreased with updated data in 2023. The pattern of the CPUE trends in both fishing areas remained similar to the past for retrospect analyses using updated data.

84. There was a question about Fig. 15 of the Taiwanese report; it was noted that there were so few data that the colour scheme was not visible.

85. Dr Ianelli presented paper CCSBT-ESC/2409/34 which reported the progress towards the development of joint CPUE indices based on data from multiple fleets. This report was developed by the CCSBT CPUE Consultant, Dr Simon Hoyle. It reported on progress towards developing CPUE indices for SBT based on data from multiple fleets. The analyses will apply generalised additive models (GAMs) with spatiotemporal smoothers, and a delta lognormal approach, with operational data. Progress to date includes acquiring operational data for the Australian, Korean and New Zealand fleets, importing all datasets into R, data cleaning, preparation, and preliminary characterisation of the New Zealand and Korean datasets. The current workplan is to complete analyses by December 2024.

86. The ESC thanked Korea, New Zealand and Australia for extending the period of availability of their data so that the analyst may proceed with the analysis. Based on discussions, the ESC agreed that coordinating the completion of this project near the end of the year should include a virtual inter-sessional meeting of the CPUE working group in early 2025 to agree on the next steps prior to ESC30.

87. A small group was convened for planning CPUE work. Dr Simon Hoyle joined via Skype to update the group on the status of the work and planned completion for December. The results will be reviewed by the group and discussed at a planned virtual working group meeting to be held early next year. The group

discussed difficulties with CPUE standardisation when potential confounding factors such as changes in targeting practices, fleet concentration, and climate may be relevant. They also noted the need to consider how some missing operational data may affect a combined fleet model. At the meeting to be held in early 2025, the potential benefit of broadening the analyses to include Taiwanese data may be discussed.

7.3. Maintenance and development of OMMP Code

88. Dr. Darcy Webber briefly discussed paper CCSBT-ESC/2409/11, which documents some of the modifications implemented in the new TMB Operating Model. First, the tagging likelihood was modified by subtracting the (adjusted by reporting rates) number of tags recovered during the year of release instead of modeling them with a tag-specific harvest rate to account for lack of mixing. This reduced the number of estimated parameters and had minimal impact on model fits.

89. The POP likelihood was also modified to incorporate uncertainty in the age of potential parents checked in the CKMR comparisons when only their sizes are available. Other changes include treating catches for the LL3, LL4 and Australian surface fisheries as direct removals, after applying cohort slicing to the length frequencies of catch to approximate the respective catches at age. Finally, time-varying selectivities for the LL1, LL2 and Indonesian fisheries were specified using Gaussian Markov random fields (GMRF). The latter component is still under development as initial runs showed some problems (divergent transitions) when running MCMCs.

90. A list of pending tasks (included as **Attachment 8**) was compiled by the OMMP working group and priorities were assigned.

7.4. SBT otolith-based ageing workshop

91. The Chair advised that the SBT otolith-based ageing workshop was suggested as a 3-day workshop at the CSIRO laboratory in Hobart in 2024, but the workshop has not been held so far. The Chair further advised that the ESC should re-confirm Members' willingness to attend and clearly determine the timing of the workshop.

92. Australia presented the relevant part of paper CCSBT-ESC/2409/15 which provided the update on Australian otolith collection, ageing and the SRP ageing workshop for 2024. The SRP ageing workshop planned for early 2024 was postponed due to logistical challenges. However, preparatory work is underway. This includes daily age estimation of 100 otoliths from small fish to determine otolith size-to-daily age relationships and to verify annual growth zone locations. Additionally, annual age estimation is being conducted on 15 otoliths from tag-recaptured SBT, some of which have been at liberty for over 30 years, to validate current ageing protocols. Work is also progressing to confirm the time of year when opaque and translucent zones are deposited in otoliths through increment measurements and marginal increment analysis. Australia aims to reschedule the workshop for later this year.

93. The ESC asked whether the ongoing epigenetic ageing work would ultimately mean that the ongoing collection and the reading of otoliths is not required. In response, the following points were raised for additional consideration:

    - Age data are still required to calibrate the epigenetic ageing;
    - Periodic checks and possible recalibration work would be advisable; and
    - Given the above, the maintenance of a group of experienced otolith readers is necessary.

94. Currently, there is work being undertaken to licence existing large-scale sequencing labs to predict the epigenetic age of tuna at the scale required for the kinds of sample sizes required in tuna assessments and modelling. The group was asked whether an additional purpose of the workshop was to produce a kind of "global" SBT standardised set of otolith readings for use in growth modelling and stock assessment work, with potential extensions to other species. The work was envisaged to be SBT specific, with a reading component prior to the workshop to examine potential biases, and likely solutions, at the meeting. If the requisite level of reading consistency could be established this would be seen as viable alternative to having a more centralised ageing location and protocol (e.g. Fish Ageing Services).

95. Given budgetary challenges, the organisers of the workshop were asked if there could be changes made to the envisaged form of the workshop. It was suggested that a potentially viable alternative to an in-person workshop could be an online workshop and the sharing of a set of sectioned otoliths prior to the workshop for calibration purposes to be read by relevant parties. The results of the calibration work would be discussed at the online workshop.

96. The ESC was also made aware of an example of using Machine Learning (ML) to automatically read otoliths for Pacific bluefin tuna in Taiwan; one of the developers was interested in applying this approach to SBT.

7.5. Capacity building for SBT Spawning Ground Monitoring Program

97. The Chair reminded the ESC that, as a part of the Scientific Research Program (SRP) Project, ESC 28 agreed to implement a new project on capacity building for the SBT Spawning Ground Monitoring Program in Indonesia.

98. CSIRO presented paper CCSBT-ESC/2409/12, which provided an update on SBT catch monitoring and capacity building for the biological sampling of spawning ground catches in Indonesia. Since the 1990s, monitoring the size and age distribution of SBT catches by Indonesian longline vessels has been crucial for stock assessment. The program expanded in the mid-2000s to include tissue sampling for CKMR studies. Recent challenges, including COVID-19, institutional changes in Indonesia and changes in the Indonesian fleet distribution, prompted a call from the CCSBT to review and rebuild the program, and in early 2024 a CCSBT-funded project was initiated to undertake the work. Training workshops were held in Bali in January and August 2024, focusing on practical training and capacity building. Sampling commenced during the first workshop, with 236 SBT sampled by April 2024 (2023/24 season).

99. Due to a decline in fresh SBT landings from Area 1, discussions were held to expand the program to include sampling from Area 2 to meet targets. Although a

proportion of fish caught in Area 2 are unlikely to be returning from spawning on the spawning ground, the CTP and stock assessment models explicitly account for the probability that each sampled fish was a likely parent of juveniles born in the years before its capture, thus maintaining the integrity of the CKMR data. For the 2024/25 season, a target of 3,000 SBT has been set, prioritising muscle tissue collection for CKMR analysis (500 samples/month) over otolith sampling (50 samples/month) as age estimation can be undertaken using epigenetic ageing methods. A collaborative team (BRIN, MMAF and CSIRO) has been established to analyse the various sources of SBT size data from the longline fishery, including catch monitoring, the catch documentation scheme (CDS), logbooks and observer data to determine the most appropriate method for obtaining representative length and age frequency data for the spawning ground catches.

100. The ESC noted the presence of small fish in the catches on the spawning grounds and asked what proportion of fish are small. This proportion is currently unknown. The ESC was informed that there is a clear mode of smaller fish moving through the age data and entering the historically central distribution of fish caught in this fishery. The main question is whether they were caught in Area 1 or Area 2. In relation to the capacity building side of the project, the ESC was informed regarding the collection of otoliths, as well as the statistical analyses of the catch and effort data, that the Indonesian scientists were undertaking this work.

101. The ESC asked whether gonad tissue was also being collected, and it was agreed that this would be useful to assess whether SBT sampled in Area 2 for CKMR work were mature and show evidence of spawning activity.

102. Indonesia thanked Dr Jessica Farley of CSIRO for her extensive contributions to the project. As a result, there is now a clear expansion of the data collection and analytical capabilities within Indonesia that will contribute greatly to existing SBT work.

Agenda Item 8. Fisheries and Scientific Indicators of Stock Status

103. Discussions for this agenda item commenced by correspondence in advance of the ESC.

104. Australia submitted paper CCSBT-ESC/2409/16. The 2023–24 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. Two indicators of juvenile (age 1–4) SBT abundance were updated. The piston-line trolling survey increased from the last index in 2023, while the grid-type trolling index decreased slightly from 2023. The gene-tagging abundance estimate has not yet been updated. Indicators of age 4+ SBT exhibited mixed trends. The standardised CPUE from the New Zealand domestic longline fishery increased slightly in 2023. In addition, both the Japanese longline nominal CPUE and standardised CPUE series (GAM series) decreased slightly in 2023. Updated

Indonesian length and age data and updated close-kin data for adult fish were not available, due to an interruption in sampling in Indonesia.

105. Japan submitted paper CCSBT-ESC/2409/24, which provided an update 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 2024. 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) was calculated based on data from wider area and standardised by the generalised linear model with delta lognormal approach. ESC noted that of the two indices there is more confidence in the TRG, which has remained steady following a decline in 2017. The TRG in 2024 was slightly lower than that in 2023 and 61 % of the 27-year average.

106. Japan submitted paper CCSBT-ESC/2409/25, 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 4, 5, 6&7, and 8-11 age groups are well above the 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 the past 10 years. Especially, CPUE indices for ages 4 and 5 showed drastic increases from 2021 to 2022 while other CPUEs for other age groups did not show such changes. Gradual declines of the indices for age class 12+ observed from 2011 appear to cease and considerably increase in recent years. Age-aggregated (age 4+ group) CPUE indices that include the one used in the OM and MP show increasing trends over the past 10 years. The current levels of these indices are well above the historically lowest 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) but 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 from the 2016 to 2023 cohort, as well as the TRP recruitment index recorded zero values in 2018 and 2019, suggesting some concern of potential low recruitment in recent years.

107. ESC noted the shift in catch composition in the Australian purse seine fishery where age-2 fish have gradually become by far the dominant component of the catch, with ages 3 and older virtually non-existent in 2023. ESC discussed whether an increase in the cohort of age-2 individuals may impact on the gene tagging program which targets age-3 fish. To date, the gene tagging program has been able to collect the required samples of age-3 fish. The ESC compared the TRG to and divergence from other indices including 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, but was unable to reach firm conclusions due to lack of sufficient comparisons.

108. While the TRG does not indicate any immediate concerns with the stock, ESC discussed the possible cause of the observed divergence. It was suggested that spatial and temporal changes in the movement of juvenile SBT may affect the

TRG estimates. Noting the TRG's spatial constraints, changes in the distribution of juvenile SBT may impact on the results. It was noted that effort in the Australian purse seine fishery has also shifted in recent years. While the surveys for the TRG and TRP are constrained spatially, the surveys are estimated to cover a high proportion of the area of expected age-1 SBT distribution (estimated to be greater than 50 %) including southwestern and southern Western Australia. As such, they may provide a useful indicator of SBT recruitment at age-1, and while results should be interpreted with caution, ESC recommended the TRG should continue to be monitored in conjunction with other recruitment indices.

109. ESC noted that the fisheries and scientific survey indicators presented in the three papers provide information relevant to the review of exceptional circumstances, which is covered in Agenda item 9.

110. A summary of indicators, which was tabulated by Australia, is included in **Attachment 9**.

Agenda Item 9. Operation of the Management Procedure and SBT Management Advice

9.1. Evaluation of meta-rules and exceptional circumstances

111. Australia presented paper CCSBT-ESC/2409/17 on Evaluation of exceptional circumstances – SBT 2024. The meta-rules adopted with the CCSBT Management Procedure (MP) provide a process to determine whether exceptional circumstances exist and a process and guidelines for action to address issues when identified. Review of the population dynamics, other indicators of the stock and fishery, and fishery operations, did not identify any unusual conditions. The CCSBT's total reported catches are below the TAC. The estimates of potential non-member unaccounted mortality were updated in 2023, and the MP has been tested to be robust to these levels. The most recent gene-tagging estimate of abundance, for the 2022 age-2 cohort, has been slightly delayed and is not yet available, but preliminary indications are that the estimate will be within the range of estimates seen previously. The close-kin data and CPUE index are within the expected range of values. This paper noted that there is no evidence for exceptional circumstances, and the MP recommended TAC for 2024-2026 should therefore remain unchanged.

112. Japan presented paper CCSBT-ESC/2409/26 on a Check of Operating Model Predictions from the Viewpoint of Implementation of the MP in 2024. Japan examined observations/information 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) comparing to the 2019 OM prediction. These examinations indicate that all the observations/information are consistent with the predicted ranges from 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 to the 2024-2026 fishing seasons) for the 2025 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, results of stock assessment conducted in 2023, issues related to biological sampling in Indonesia and changes in the operation pattern of Indonesian fishery); and 2) no unexpected change has been detected in the fisheries and scientific survey indicators examined.

113. Both papers noted issues of concern that, while not triggering exceptional circumstances, should continue to be monitored. These include:

- The absence (2021/22) or very limited collections (2022/23 and 2023/24) of adult tissue samples for CKMR analysis from the Indonesian fishery;
- Changes in the distribution and operation of the Indonesian fleet from Area 1 to Area 2; and
- Contraction of the Japanese longline fishery and any potential impact on CPUE.

114. The ESC also noted future potential concerns related to climate change and how this might affect recruitment or the overall distribution of SBT. The ESC expressed concern that the Strategic Plan does not mention climate change even though this was mentioned in the previous Performance Review.

115. The ESC further 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 previous stock assessment conducted in 2020, and projections for the reference set indicated that the target of 30 % TRO_0 would be reached by 2035 with a probability of 0.51.

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

9.2. Confirmation of Management Procedure recommended TAC for 2024-2026

117. The CTP was adopted in 2019. The full specification of the CTP, the data inputs and the associated meta-rules for implementation are provided in Attachment 8 of the report of ESC25 (2020). The CTP has been used to provide advice on the TAC for the blocks of years 2021-2023 and 2024-26.

118. In 2022, the CTP 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; ESC27).

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

9.3. Summary of SBT management advice

Recommended global TAC for 2025

120. Application of the CTP in 2022 led to a recommended global TAC for 2024-2026 of 20,647 t/year. The 2024 ESC reviewed evidence of exceptional circumstances

and confirmed that there is no need to modify the TAC recommended for the 2024-2026 fishing years.

121. The ESC therefore recommend that the 2025 global TAC should remain at 20,647 t.

SBT Stock Status Summary

122. The ESC completes a stock assessment every three years, as required by the meta-rules schedule of activities adopted with the CTP. ESC 28 in 2023 conducted the stock assessment, which was the first full assessment since 2020. Key outputs from the 2023 assessment are in **Table 1** below.

123. 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[1]) 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**);
- The stock is at approximately 85 % of the level previously estimated to produce maximum sustainable yield (MSY); and
- The fishing mortality rate is below 50 % of the level associated with MSY.

Table 1: 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
2023 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
2023 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.

[1] PI: probability interval

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

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

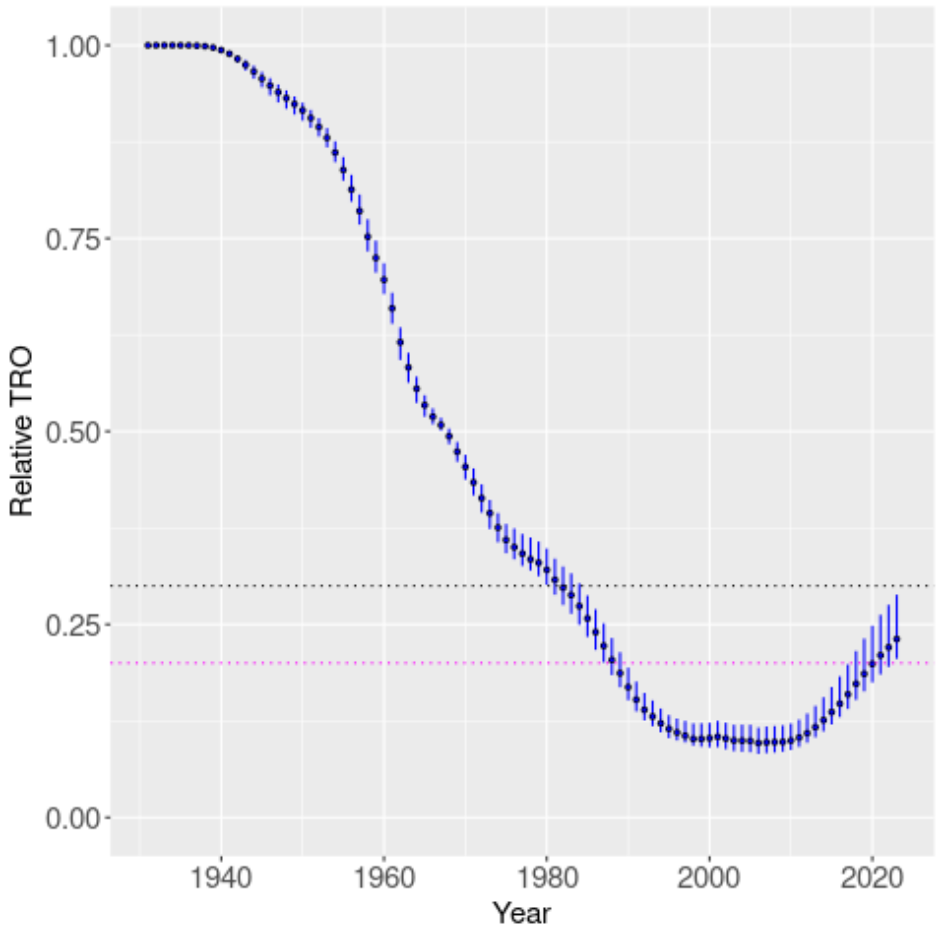

Figure 1: Relative TRO (median and 80 % PI) for the reference set of models for the 2023 stock assessment. The magenta horizontal line is at 20 % TRO_0; the black horizontal line is at 30 % TRO_0.

124. 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 10.

Future considerations

125. The ESC is confident that the SBT stock is rebuilding, TRO is well above the low point reached in 2009, and no exceptional circumstances apply. However, there is concern that climate change could affect recruitment or the overall distribution of SBT but there is limited understanding of this. There is already evidence that a number of other stocks and species have been impacted by warming ocean waters and/or changing ocean currents.

126. Future ESC meetings should therefore discuss and possibly undertake analyses of existing data that could indicate any potential climate change related effect on SBT. It may also be useful to consider work currently underway in other tRFMOs, such as WCPFC, on modelling climate change impacts.

Agenda Item 10. Update of the Scientific Research Program (SRP)

127. The Chair advised that this is now a standing agenda item to allow Members to consider new proposals and/or changes to existing SRP projects (including timing of deliverables). The Chair also noted that discussion of individual SRP projects has taken place primarily under agenda item 7 and this agenda item is limited to potential amendments to the existing SRP.

128. Australia and CSIRO presented paper CCSBT-ESC/2409/18 on a Proposal on the gene-tagging workplan and budget for 2025-2027. The gene-tagging program was designed to provide a fisheries independent estimate of the absolute abundance of the age-2 cohort, with specified precision, to monitor recruitment and provide data essential for running the Cape Town Procedure (see design study; Preece at al, 2015). A pilot study commenced in 2016 and gene-tagging has continued as an on-going monitoring program since 2017. The workplan and budget for the gene-tagging program in 2025-2027 is described here. CSIRO co-investment in the project has been reduced and, therefore, the workplan has been slightly modified to reduce total costs. These changes may increase some risks to achieving the intended outcomes of the program. The aim of this paper is to inform discussion at the ESC and provide background to the discussion at the Finance and Administration Committee of the Commission.

129. In papers 18 and 19 (see below), Australia noted that the gene-tagging and close-kin monitoring programs are not included in the CCSBT Scientific Research Plan (SRP) priority research areas (Attachment 8 of 2022 ESC report). This is because a distinction was made between on-going monitoring programs that provide data for the stock assessment and the Cape Town Procedure, and future SRP research proposals (that should be ranked relative to SRP priorities, para 108 2022 ESC report).

130. The ESC discussed the gene-tagging program budget and explored cost-reduction strategies. The ESC considered several options included conducting the program every second year, reducing the annual sample size, or a combination of both approaches. The discussion highlighted potential cost saving by not tagging SBT in 2025, which would eliminate the need for SBT sampling at harvest the following year and the associated costs of DNA extraction and genotyping. It was noted that in scenarios involving reduced annual sampling, cost saving would not be directly proportional to the decrease in sample size due to fixed operational costs.

131. The ESC briefly discussed the vessel chartering and start-up costs associated with the program. Australia advised that the vessel charter was undertaken via a competitive process so that discontinuing the annual program could strain established relationships and logistical challenges in the future including limited availability of staff and difficulty in securing a suitable tagging vessel and crew. Australia confirmed the need to re-evaluate the budget to accurately determine potential cost savings for both the annual and non-annual scenarios. As CSIRO co-invests in the project, potential cost savings will be proportional for both current CCSBT and CSIRO investments.

132. The ESC discussed the trade-off between reducing the frequency of gene-tagging and decreasing the annual sample size. Key points included: (i) a missing gene-tagging abundance estimate does not result in a lack of data for the MP as it uses

a 5-year moving average and (ii) the MP is designed to handle missing data points; thus exceptional circumstances would not necessarily be triggered in such cases. However, concerns were raised about potentially missing a year of poor recruitment if the gene-tagging program was not conducted annually.

133. The Chair noted the following previous advice from paragraph 96 of the ESC 26 report in relation to missing data and the meta-rules:

> *For the abundance series - longline CPUE and gene tagging – it was recommended that there should be a minimum of at least two data points in any relevant moving average. For the CPUE index, which uses a 4-year moving average, that suggests that missing any more than 2 data points in a given 4-year time window would make it difficult to run the MP. For the gene tagging data, which uses a 5-year weighted moving average, missing data were automatically accommodated in the weighting scheme (by design) and any more than 3 missing data points in a 5year time window would make it difficult to run the CTP. For both POPs and HSPs, missing data can easily be handled by the CKMR model embedded within the CTP but, as the severity of the missing data increases, the model gradually ceases to update the more recent population dynamics and reverts to the prior values together with the influence of the historical abundance and mortality information. In all cases of missing data, the meta- rules processes will be used to assess any additional information, or indicators, and the relative severity of events on the likely performance of the MP.*

134. It was noted that the ESC defined a required level of precision for the gene-tagging abundance estimate (25 %), and the average CV to date has been slightly below this level, based on current sample sizes. Scaling down the sampling level could result in lower precision than required. Australia responded to a question on over-dispersion and the potential aggregation of juveniles. Strong grouping of SBT recaptures has not been seen; over time the level of overdispersion in gene-tagging versus conventional tagging will become estimable, but there is no robust estimate as yet.

135. The ESC emphasised the need for additional analysis to determine the impact of potential changes to the gene-tagging program on the MP and stock assessment. The question as to how these changes in frequency of sampling and/or sample size might affect the outcomes of the MP was debated. Given the specific risk criteria that the MP was tuned to (50 % probability of a relative TRO of 30 % by 2035), a decrease in the precision of the moving average used in the MP (with reduced frequency and decreased sample size) could lead to a reduction in the average TACs and increasing variability in TAC when retuning the MP. The ESC noted that the additional analyses could be undertaken as part of the scheduled 2027 review of the MP, or earlier, making use of the OM conditioned for the stock assessment of 2023, and further that the current gene-tagging project will provide an estimate of abundance of 2-year-olds in 2024 for the stock assessment due to take place in 2026. Additional funding for the testing may be required.

136. Australia and CSIRO presented paper CCSBT-ESC/2409/19 on the workplan and budget for close-kin mark recapture and Indonesian length/age monitoring. The CKMR and Indonesian length/age project is an ongoing monitoring program that provides essential data on the adult component of the SBT population for use in stock assessment models and the CTP used to recommend the global TAC for the

fishery. The CCSBT has funded this project since 2014/15. It includes the collection and genotyping of DNA from muscle tissue samples collected in Indonesia (adults) and Australia (juveniles) to identify parent-offspring pairs (POPs) and half-sibling pairs (HSPs) on an annual basis. In 2019, the CCSBT agreed to increase the number of tissue samples genotyped annually from approximately 2,000 to 3,100 (including both adults and juveniles) to enhance the "POPs per cohort comparison" (Anon 2019). The project also includes the collection and ageing of otoliths from the Indonesian longline fishery to estimate the age distribution of the SBT spawning stock. The project was designated as an ongoing monitoring program in the 2023-2027 Scientific Research Program (SRP) in 2022 (Anon, 2022, ESC report Attachment 8). The workplan and budget for CKMR and Indonesian size/age monitoring program for the next three years (2025-2027) is provided. CSIRO also co-invests funds for the project, but these costs are for the CCSBT component only. In the past, the CCSBT has funded the projects on an annual basis, which can continue or be combined into one three-year project.

137. The ESC briefly discussed the implications of modifying the CKMR program to reduce its budget, including reducing the number of samples collected/genotyped, and implementing biennial sampling. It was noted that the current MP was tested on 1,000 juvenile and 1,000 adult samples. Australia emphasised the importance of maintaining sampling in Indonesia noting logistical challenges in maintaining sampling capacity. Reducing the frequency of juvenile sampling in Australia may be logistically more feasible than other options.

138. The ESC briefly discussed the relative value of the gene-tagging (juvenile index) and CKMR (adult index) used in the MP. In periods of normal recruitment, the gene tagging part of the MP is by design not going to change the TAC, but in periods of very low recruitment it would have a very strong effect on the TAC. The CKMR is more gradual and consistent in its impact, but also if the dynamics are proceeding as expected the main role of the CKMR is to adjust the behaviour of the MP as it approaches the target. Their relative behaviours are very different as to how they affect the stock assessment and their relative importance will be linked to the particular robustness trial or tuning scenario that is being explored.

139. The ESC briefly discussed estimating potential Unaccounted Mortality (UAM). Australia confirmed that a submission made to the ESC in 2023 to develop a full proposal to detect unreported catch using genomic methods has not been developed yet. New Zealand enquired about the necessity of estimation of UAM using the method of Edwards and Hoyle (2023). The ESC recognises the importance of developing reliable UAM estimation methods, and encouraged proposals to be submitted to the ESC in 2025.

Agenda Item 11. Report from the Fifteenth Meeting of the Ecologically Related Species Working Group

140. The Fifteenth Meeting of the Ecologically Related Species Working Group (ERSWG 15) was held from 4 -7 June 2024 in Tokyo, Japan. Following the Terms of Reference of the ERSWG, the ESC may provide comments to the Extended Commission (EC) on the ERSWG report.

141. The Secretariat submitted paper CCSBT-ESC/2409/06 on Report from the ERSWG 15. While the ERSWG 15 did not make specific recommendations or requests to the ESC, the Secretariat introduced some outcomes from the ERSWG 15, such as the progress against the CCSBT Strategic Plan and discussion on EM and the Scientific Observer Program Standards (SOPS), that would be useful for the ESC's discussion.

142. Further information on the Spatially Explicit Fisheries Assessment (SEFRA) for Seabirds, collaboratively undertaken under the seabird strategy by the ERSWG since 2022, was provided to the ESC and is shown in **Attachment 11.**

143. The Chair suggested that there was a lack of process to align the activities of the ERSWG and the ESC. Members commented on the link between the two groups and the potential for the ERSWG's work to impact on the work of ESC, noting that, for example, consideration of spatial management measures could influence CPUE analysis.

144. The ESC noted the report of ERSWG 15.

Agenda Item 12. Electronic Monitoring Systems (EMS)

145. The Chair advised that Members agreed to include an agenda item to address issues relating to EM/S in future meetings of the ESC. As agreed at ESC 28, Members were requested to complete a questionnaire regarding EM/S in data collection, including how EM/S can collect the data elements currently required under the Scientific Observer Program Standards (SOPS).

146. The Chair invited the Secretariat to present paper CCSBT-ESC/2409/07 on Impacts of Electronic Monitoring on Scientific Observer Data. The Secretariat reminded the meeting of the previous request from the EM Working Group that the ESC and ERSWG review the data elements currently required to be collected by the CCSBT SOPS with respect to EM/S at their earliest convenience. These reviews were to include an assessment of the data being collected and whether their ongoing collection was necessary. Accordingly, the Secretariat asked Members to take part in a review of existing data requirements as part of the SOPS and how these may be impacted by the use of EM. The ESC was asked to consider the feedback from this review.

147. In response to ESC paper CCSBT-ESC/2409/07, Members considered a list of data requirements included in the SOPS that may no longer be required. The list was compiled based on the questionnaire circulated as part of the intersessional discussion (CCSBT-ESC/2409/07) around EM and indicated items identified by one or more members as no longer being required. Members were asked whether these data requirements could be removed from the SOPS. Some Members supported the proposed changes while others stated that they would need additional time to consider any proposed changes to the SOPS. ESC recommends no changes to the SOPS at this stage.

148. In response to CCSBT-ESC/2409/07, the ESC notes the differing views on the ability of EM programs to meet the requirements of SOPS. Noting that Members are at different stages of implementing EM programs, the ESC does not consider this difference of views to present immediate concerns. Members with

operational EM programs will work together intersessionally and present to ESC 30 on how information is collected by EM and how this meets the requirements of the SOPS. CCSBT-ESC/2409/07 will be used to inform the intersessional work and reporting back to ESC 30. The ESC highlighted the importance of harmonising work on EM with other RFMOs, noting especially the ongoing WCPFC initiative to develop EM standards.

Agenda Item 13. Requirements for Data Exchange in 2025

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

150. The Secretariat submitted paper CCSBT-ESC/2409/08, which proposed the data exchange requirement for 2025. These requirements are based on the 2024 data exchange requirements with all items rolled over and the dates incremented. The special conditions for the submission of Indonesia's Catch and Effort and Non-retained Catch data have been removed to be the same as other Members. The paper provides a summary of issues with the 2024 Data Exchange, which were:

- Korea submitted raw size data. Regarding the ESC's request, Korea will cooperate in providing the raised length data in the near future.
- Several datasets provided by Australia were submitted late due to cross-validation discrepancies, and some datasets provided by the Secretariat were submitted late due to the late Australian data and delays encountered by the scientific data contractor.
- 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 2021 calendar year.
- New Zealand's Raised Length Data in recent years were not raised to its total catch. New Zealand is revising its processes for this dataset but at the time of writing had not submitted revised data.

151. A small working group met to discuss methods for calculating raised length data for New Zealand and Korea, that is a requirement of the Data Exchange. The group agreed that using a model-based method with observer length data was preferred, and this would be discussed further intersessionally. The Secretariat volunteered to undertake a comparison of CDS length data with observer length data for both New Zealand and Korea to see if using CDS data is a viable alternative.

152. It was stated that there is a deeper issue with raised length data and how to account for missing length frequency samples in the OM. The best approach is to model the length frequencies and there would be advantages in combining Member's data, but this would not be a simple exercise. The meeting noted that an SRP proposal presented to ESC would be required before considering undertaking this work

153. The data exchange requirements for 2025 were endorsed by the ESC and are provided in **Attachment 12**.

Agenda Item 14. Research Mortality Allowance

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

155. CSIRO summarised the Research Mortality Allowance (RMA) related part of paper CCSBT-ESC/2409/10, which reported on the 2023-2024 RMA usage and the requested RMA for 2025. In 2023, 271.1 kg of RMA was used from 22 mortalities. The request for RMA for the 2025 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.

156. Australia presented the related part of paper CCSBT-ESC/2409/14 on Update on recent satellite tag deployments in GAB on juvenile SBT. Australia 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 to cover planned deployment of up to 30 pop-up tags in the 2024-25 summer season.

157. Japan submitted paper CCSBT-ESC/2409/27 on Report of the 2023/2024 RMA utilisation and application for the 2024/2025 RMA from Japan. Japan reported 167.4 kg of RMA usage for 2023/2024 from the RMA approval of 1.0 t. Japan requested 1.0 t of RMA for the 2024/2025 research, including for an age-0 distribution survey and an age-1 trolling survey in Western Australia.

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

Agenda Item 15. Workplan, Timetable and Research Budget for 2025-2027

15.1. Overview, time schedule and budgetary implications of proposed 2025-2027 research activities and implications of Scientific Research Program for the workplan and budget

159. The ESC's recommended three-year workplan and resource requirements for 2025 to 2027 is provided at **Attachment 13**. This workplan is limited to projects that require CCSBT funding and includes regular scientific meetings and ongoing essential SRP projects. These projects are necessary to support stock assessment and MP.

160. The ESC discussed possible implications of reducing the scope of the Close Kin and Gene Tagging programs, but no analyses were undertaken and no requests for specific project changes have been proposed.

161. The ESC recommends that if a specific request for reducing GT and CKMR projects is received more detailed analyses of the implications of reducing the scope and realising cost savings could be carried out in time for EC 32 in 2025.

15.2. Timing, length and structure of next meeting

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

163. The Chair advised that the EC has agreed on tentative dates for the CCSBT's main meetings in 2025 and the agreed tentative dates for the next ESC meeting are from Tuesday 26 August to Friday 29 August 2025 inclusive in Bali, Indonesia.

164. ESC agreed that, based on the preferred timing and location for the OMMP in recent years, the next OMMP meeting will be taken place during the week starting 23 June 2025 in Seattle, USA.

Agenda Item 16. Other Matters

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

166. The Chair noted that the input from Members to the pre-meeting discussion process has decreased over the years and sought guidance from the ESC as to whether this process should be continued.

167. The ESC noted the benefits of the pre-meeting document process and agreed to continue the practice at the next meeting of the ESC recognising the need for greater engagement from Members to ensure its effectiveness.

Agenda Item 17. Adoption of Meeting Report

168. The report was adopted.

Agenda Item 18. Close of meeting

169. The meeting closed at 1:00 pm on 5 September 2024.

List of Attachments

Attachments

Attachment 1

Opening Remarks

by the Deputy Director General of the Fisheries Agency of Taiwan

Good morning, Chair, distinguished delegates, participants and friends. As the Director-General of the Fisheries Agency of Taiwan, I would like to extend my warmest welcome everyone.

It is my pleasure that the Extended Scientific Committee Meeting of CCSBT is held in Taiwan this year, so that our friends from other countries can have this chance to visit our beautiful island.

Science is the fundamental basis of fishery management. Through the researches and discussions of the Extended Scientific Committee, the recommendations to the Extended Commission will be considered as basis of management measures. Therefore, the functioning of the Extended Scientific Committee is very important to conservation and management of Southern Bluefin tuna.

The stock of Southern Bluefin Tuna is in a critical condition. Although in recent years the stock of Southern Bluefin Tuna has improved, we still shoulder responsibility to put more efforts in the conservation of this important and valuable tuna species. This year, we will discuss topics including improving robustness of CPUE indices, as well as whether the total allowable catch should be adjusted. I believe that with the close cooperation of all participants, we will have a fruitful and productive meeting. I wish you all have a successful meeting.

Last but not least, since this venue is close to many historic sites of Taiwan, I hope everyone can make use of this opportunity to visit some places in Taipei. I wish everyone enjoy this memorable staying in Taiwan.

Attachment 2

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

First name	Last name	Title	Position	Organisation	Postal address	Email
CHAIR						
Kevin	STOKES	Dr			NEW ZEALAND	kevin@stokes.net.nz
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First name	Last name	Title	Position	Organisation	Postal address	Email
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INTERPRETERS						
Kumi	KOIKE	Ms				
Yoko	YAMAKAGE	Ms				
Kaori	ASAKI	Ms				
CCSBT SECRETARIAT						
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Attachment 3

Agenda

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

2 - 6 September 2024

Taipei, Taiwan

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 Fourteenth Operating Model and Management Procedure (OMMP) Technical Meeting

6. Report back against objectives of the 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. Maintenance and development of OMMP Code

7.4. SBT otolith-based ageing workshop

7.5. Capacity building for SBT Spawning Ground Monitoring Program

8. Fisheries and Scientific Indicators of Stock Status

9. Operation of the Management Procedure and SBT Management Advice

9.1. Evaluation of meta-rules and exceptional circumstances

9.2. Confirmation of Management Procedure recommended TAC for 2024-2026

9.3. Summary of SBT management advice

10. Update of the Scientific Research Program (SRP)

11. Report from the Fifteenth Meeting of the Ecologically Related Species Working Group

12. Electronic Monitoring Systems (EMS)

13. Requirements for Data Exchange in 2025

14. Research Mortality Allowance

15. Workplan, Timetable and Research Budget for 2025 (and beyond)

15.1. Overview, time schedule and budgetary implications of proposed 2025 research activities and implications of Scientific Research Program for the work plan and budget.

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

16. Other Matters

17. Adoption of Meeting Report

18. Close of Meeting

Attachment 4

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

(CCSBT-ESC/2409/)

1. Provisional Agenda
2. List of Participants
3. List of Documents
4. (Secretariat) Secretariat review of catches (ESC agenda item 4.2)

5 (Rev.1). (Secretariat) Report Against Strategic Plan (ESC Agenda item 6)

6. (Secretariat) Report from the Fifteenth Meeting of the Ecologically Related Species Working Group (ESC Agena item 11)
7. (Secretariat) Impacts of Electronic Monitoring on Scientific Observer Data (ESC Agenda item 12)
8. (Secretariat) Data Exchange (ESC Agenda item 13)
9. (CCSBT) Update on the SBT close-kin tissue sampling, processing and kin-finding 2024 (ESC Agenda item 7.1)
10. (CCSBT) Update on the Gene-tagging program 2024 and RMA request (ESC Agenda items 7.1 and 14)
11. (CCSBT and Australia) – Southern Bluefin Tuna Operating Model Progress (Agenda item 7.3)
12. (CCSBT) Update on SBT catch monitoring and capacity building for biological sampling of spawning ground catches in Indonesia (ESC Agenda item 7.5)
13. (Australia) Preparation of Australia's southern bluefin tuna catch and effort data submission for 2023 (ESC Agenda item 4.1)
14. (Australia) Update on recent satellite tag deployments in GAB on juvenile SBT (ESC Agenda item 7.1)
15. (Australia) Update on Australian otolith collection, ageing and the SRP ageing workshop 2024 (ESC Agenda items 7.1 and 7.4)
16. (Australia) Fisheries indicators for the southern bluefin tuna stock 2023-24 (ESC Agenda item 8)
17. (Australia) Evaluation of exceptional circumstances – SBT 2024 (ESC Agenda item 9.1)
18. (Australia/CSIRO) Gene-tagging 2025-2027, workplan and budget (ESC Agenda item 10)
19. (Australia/CSIRO) Workplan and budget for close-kin mark recapture and Indonesian length/age monitoring (ESC Agenda item 10)

20. (Japan) Change in operation pattern of Japanese southern bluefin tuna longliners in the 2023 fishing season (ESC Agenda item 4.1)
21. (Japan) Update of CPUE abundance index using GAM for southern bluefin tuna in CCSBT up to the 2023 data (ESC Agenda items 7.1 and 8)
22. (Japan) Report of the piston-line trolling monitoring survey for the age-1 southern bluefin tuna recruitment index in 2024 (ESC Agenda item 7.1)
23. (Japan) Report of the second survey of age-0 southern bluefin tuna distribution in the northwest coast of Western Australia in 2024 (ESC Agenda item 7.1)
24. (Japan) Trolling indices for age-1 southern bluefin tuna: update of the grid type trolling index in 2024 (ESC Agenda item 8)
25. (Japan) Summary of Fisheries and Scientific Survey Indicators of Southern Bluefin Tuna Stock in 2024 (ESC Agenda item 8)
26. (Japan) A Check of Operating Model Predictions from the Viewpoint of Implementation of the Management Procedure in 2024 (ESC Agenda item 9.1)
27. (Japan) Report of the 2023/2024 RMA utilization and application for the 2024/2025 RMA from Japan (ESC Agenda item 14)
28. (Korea) Korean SBT otolith collection activities in 2023 (ESC Agenda item 7.1)
29. (Korea) Data exploration and CPUE standardization for the Korean southern bluefin tuna longline fishery (1996-2023) (ESC Agenda item 7.2)
30. (Taiwan) Preparation of Taiwan's Southern bluefin tuna catch and effort data submission for 2023 (ESC Agenda item 4.1)
31. (Taiwan) Updated gonadal information and analysis of southern bluefin tuna collected by Taiwanese scientific observer program (ESC Agenda item 7.1)
32. (Taiwan) Otolith sampling activities and direct aging of the SBT caught by Taiwanese longliners in 2022 and 2023 (ESC Agenda item 7.1)
33. (Taiwan) CPUE standardization analyses for southern bluefin tuna based on the Taiwanese longline fishery data from 2002 to 2023 (ESC Agenda item 7.2)
34. (CCSBT) Progress towards the development of joint CPUE indices based on data from multiple fleets (ESC Agenda item 7.2)

(CCSBT-ESC/2409/SBT Fisheries -)

Australia	Australia's 2022–23 southern bluefin tuna fishing season
Indonesia	Indonesia's tuna longline fishery interacted with Southern Bluefin Tuna in 2023
Japan	Review of Japanese Southern Bluefin Tuna Fisheries in 2023
Korea	2024 Annual National Report of Korean SBT Fishery
New Zealand	New Zealand Annual Report to the Extended Scientific Committee (Rev.1)

South Africa	South African National Report to the Extended Scientific Committee of the Commission for the Conservation of Southern Bluefin Tuna (CCSBT), 2019-2023 (Rev.1)
Taiwan	Review of Taiwan SBT Fishery of 2022/2023 (Rev.1)

(CCSBT-ESC/2409/Rep)

1. Report of the Fourteenth Operating Model and Management Procedure Technical Meeting (June 2024)
2. Report of the Fifteenth Meeting of the Ecologically Related Species Working Group (June 2024)
3. Report of the Thirtieth Annual Meeting of the Commission (October 2023)
4. Report of the Eighteenth Meeting of the Compliance Committee (October 2023)
5. Report of the Twenty-Eighth Meeting of the Scientific Committee (August – September 2023)
6. Report of the Thirteenth Operating Model and Management Procedure Technical Meeting (June 2023)
7. Report of the Twenty Seventh Meeting of the Scientific Committee (August – September 2022)
8. Report of the Twelfth Operating Model and Management Procedure Technical Meeting (June 2022)
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)

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
2007	4,813		2,840	379	4	521	841	46	1,077	58	18	0	3

Calendar Year	Australia		Japan	New Zealand		Korea	Taiwan	Philippines	Indonesia	South Africa	European Union	Miscellaneous	Research & Other
	Commercial	Amateur		Commercial	Amateur								
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		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	126	0	0	0
2021	5,459	270	6,452	788	57	1,241	1,274	0	1,123	161	0	0	0
2022	6,266	312	5,887	875	60	1,173	1,318	0	1,031	165	0	0	0
2023	5,850	312	6,335	1,103	69	1,305	1,135	0	1,031	131	0	0	1

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.

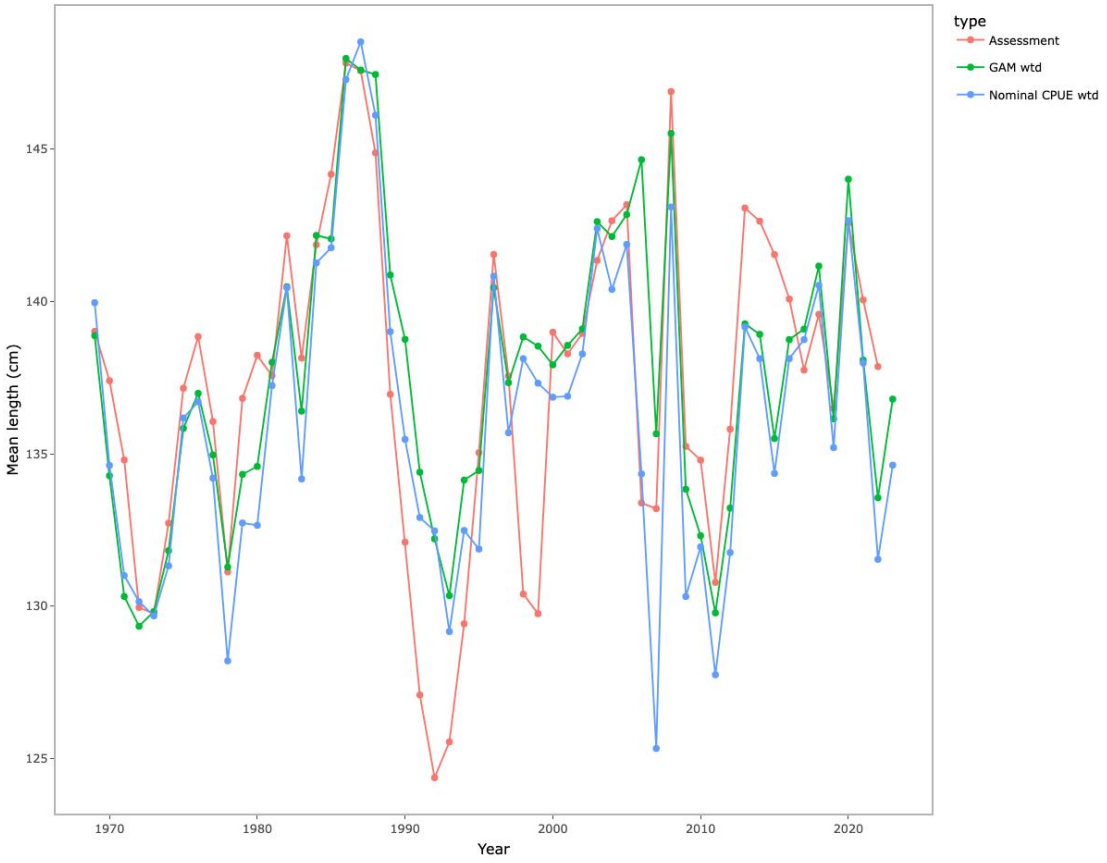
Research and other: Mortality of SBT from CCSBT research and other sources such as discarding practices in 1995/96.

Attachment 6

SBT length frequencies weighted by CPUE

Data sources

CCSBT Secretariat provided the data for the length frequencies of SBT. The data were provided in the form of a csv file which was then imported into R for further analysis. Four sets of length frequency data were developed and compared. The first set of data was the raw catch-raised length frequency data as is directly available in the data section of the CCSBT website. These data were screened to be only from the Japanese fleet from 1969-2023. A second set of data was compiled by first normalizing the catch-weighted data weighted within each year-month-5x5 grid cell (within each cell the length frequencies were converted to proportions that sum to one). These proportions within each cell were then re-weighted by the SBT catch divided by the number of hooks in each cell. These CPUE-by-cell length frequencies were then summed over all month-5x5 cells to get final proportions at length for each year. A third set was developed that was processed in the same way as the second, but in place of the nominal CPUE within cells, the GAM predictions were used. Finally, we extracted the current length frequency data used for the LL1 fishery, noting that the LL1 fishery includes a broader area and some components of other fisheries that are excluded from the Japanese GAM CPUE analysis. The results for this analysis are plotted below.



Mean lengths of SBT by year from the CCSBT data and the GAM CPUE data.

```
#---get the LFs used in the model
```

Attachment 7

Report from CCSBT Subsidiary Bodies on Progress Against Strategic Plan

Subsidiary Body: ESC	**Year**: 2024

Vision and Goals

	Comments from Subsidiary Body
Management of SBT The Commission agrees the SBT tuna stock is to be managed at a biomass level that supports the maximum sustainable yield, and the risks related to fishing for SBT and impacts from fishing for SBT on ecologically related species are mitigated. • This includes strategies concerning stock rebuilding, allocation and ecologically related species. • This also includes consideration and review of all other risks including, but not limited to, marine pollution and human safety.	ESC supports the vision as described here. ESC has contributed to SBT stock rebuilding and management advice based on scientific evidence. The ESC considers that the SBT tuna stock is being rebuilt towards a biomass level that will support the MSY. The most recent stock assessment indicates that the stock is rebuilding at approximately 5% per year and is currently estimated at 23% of TRO_0. The ESC notes that demonstrating progress towards stock rebuilding has and will continue to rely on the significant investment in innovative science including genetic studies that have allowed a robust estimate of population size to support decision making on TAC's, monitoring stock recovery and demonstrating progress towards the rebuilding targets. The current MP is based on sound science and processes which are unique in their approach to tuna fisheries management relative to approaches in other relevant RFMOs. The ESC provides advice on TACs based on a fully tested management procedure (MP). The ESC also runs an annual metarule process to assess whether or not exceptional circumstances have occurred. The ESC notes advice from the ERSWG to the EC on ecologically related species, including seabirds. While not the responsibility of ESC, marine pollution and human safety is an important issue.
Operation/Administration of the Commission and Secretariat It was agreed the Commission should operate effectively and efficiently, to responsibly manage fishing for SBT. • This includes strategies for effective and efficient operation of Commission, its subsidiary bodies	ESC supports the strategic goals on the operation/administration of the Commission and Secretariat and considers that opportunities for harmonising with other RFMOs should continue to be pursued including for developing electronic monitoring (EM) standards. The ESC has regularly reviewed and updated the Scientific Research Plan as well as the schedule and budget implications. The Commission and Secretariat should be aware of any implications that arise from the BBNJ agreement.

and Secretariat, including harmonisation with other RFMOs.		
Participation and implementation by Members, including Compliance Members are actively participating in management of SBT through the Commission and implementing its decisions. • This includes strategies concerning MCS, sanctions and assistance to developing countries.	The ESC also considers there has been progress with participation in ESC meetings and will continue to work toward the goal of maximising participation by all Members. The ESC notes that a robust monitoring control and surveillance (MCS) program is critical to the assessment of the SBT and its recovery. The ESC also notes the importance of adequate observer coverage. The ESC has encouraged timely data collection and submission, and there has been some improvement recently. The ESC notes the importance of identifying any non-compliance, and the reasons for that non-compliance.	
Action Plan		
Action	**Progress since previous report**	**Planned work**
PR2021-02: Explore the need for additional measures (such as protected areas and area closures) to support spawning and recruitment.	As noted in the ESC28 Report, the ESC considers that there is no need for protected areas or area closures to protect the SBT spawning grounds.	Nil for ESC.
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).	The ESC undertook a recent review of the potential impacts of EM on the collection of data currently required under the existing SOPS.	The ESC considers that there is merit in ensuring the development of the CCSBT EM standards are aligned with other relevant RFMOs. The ESC notes the planned work taking place as part of the Seabird Project to support capacity development in the area of electronic monitoring.
Prioritise the establishment and ongoing review of long-term research strategic planning in the ESC.	Each ESC includes a standing item on the Scientific Research Plan, including a procedure for evaluating new research proposals.	Continue current annual process.
Ongoing Work Plan		

Action	Changes since previous report	Planned work
PR2021-01: Members continue to support the MP, by remaining within their allocation limits, and eliminating areas of uncertainty such as Non-Member catches that could undermine its performance.	ESC Members actively participated in the MP development and implementation through their research activities. This also includes assessing whether there have been exceptional circumstance including catch beyond their allocation, and concluded there is no need to update the TAC in 2025 through the metarule process. The ESC considered non-member catches in the 2023 stock assessment and recommended a TAC to CCSBT based on a level of unaccounted mortality.	The ESC notes the importance of strong compliance framework to ensure catch limits are maintained. Consider further analysis of markets to better understand possible non-member catch.
PR2021-26: Continue monitoring to ensure the effectiveness of the rebuilding strategy for SBT	The ESC supports this action and notes that this action has been made possible through the implementation of the Close Kin, Gene Tagging and efforts to improve the standardisation of CPUE projects. The ESC has monitored and discussed the national reports and results and progress of the research activities. Ongoing work around development of EM standards for CCSBT.	ESC recommends continued support for and implementation of science projects to meet this action under the CCSBT Strategic Plan.
PR2021-12: Continue to develop and embed innovative methods such as gene-tagging and close kin mark-recapture to improve scientific processes.	Updates to the Operating Model have been progressed. ESC has discussed and reviewed the progress and results of gene-tagging and Close Kin regularly.	Finalise upgrades to the operating model which will be used for the MP in 2025 and the stock assessment in 2026.
PR2021-24: CCSBT should continue to implement CMMs based on ESC and ERSWG advice for both target and non-target species.	Implementation of CMM's has been possible with a robust stock assessment conducted in 2023. Updates to the operating model has progressed in preparation for running the management procedure in 2025 and stock assessment in 2026. ESC notes the updated advice from the ERSWG15 on seabirds.	The ESC supports progress towards this action and notes effective monitoring of fishing activity including through observer coverage or EM program is essential. The ESC also notes that implementation of CMM's relies on a strong compliance program.

PR2021-55: ESC to improve accessibility of reports to non-technical readers.	ESC has developed and made each meeting report available. This has included a Chair's summary for each ESC in non-technical language to help facilitate communication with EC/other subsidiary bodies.	
Ensure members are submitting high quality, clear, consistent, and completed reporting.	ESC has encouraged all members to submit annual reports, and there have been some improvements recently. The ESC notes that not all members submit reports as required.	The ESC will continue to encourage all members to submit high quality, clear, consistent, and completed reporting.
PR2021-16: Continue to study the spatial aspects of the SBT stock structure and movements, and the fleets that exploit SBT.	Tagging projects continue to be delivered to improve understanding of stock structure.	

Attachment 8

List of pending tasks for the Operating Model Specification and Software Upgrade project

Issue	Coding status	Evaluation	Priority
Dirichlet-multinomial for age/size composition data	Done	Pending	High
GMRF selectivity	Coded, not fully working	Pending	High
Add overdispersion parameters to tag likelihood	Straightforward to add parameters	Pending	High
Add overdispersion to GT, POPs and HSPs using a beta-binomial distribution	Needs coding of beta-binomial distribution	Pending	High
Superimpose priors on posterior distributions for comparison	Pending	Pending	High
Divergences in NUTS	Pending	Pending	High
Combine documentation for C++, R package, and model	Ongoing, github-based website resource (e.g., here)	Pending	High
Scale LFs for CPUE	Pending (data processing and model code)	Pending	High
Develop projection model	Implement projections within the "simulate" blocks of the TMB code	Pending	High (2025)
Compute MSY quantities by year using year-specific parameters and catch allocations between fleets	Need to add supplemental optimisation code (linkage between sub-MSY model and main)	Pending	High (2025)
Develop plots showing relationship between the posterior and values of M10 and steepness (and other relevant parameters)	Pending	Pending	High (2025)
Estimate recruitment SD and autocorrelation	Coded	Pending	Medium
Use model-estimated Indonesian age composition in POP likelihood	Conceptualised, incomplete	Pending	Medium
Make M a function of size using Lorenzen + age-based senescence	Coded, needs work, scale issue between ages 0 and 1…	Pending	Low
Moving average for missing LFs	Pending	Pending	Low
One-step-ahead (OSA) residuals	OK but not for random effects. Would needs major restructuring to code for random effects-model	Postponed for now	Low

Attachment 9

Recent trends in all indicators of the SBT stock

Indicator	Period	Min.	Max.	2020	2021	2022	2023	2024	12-month trend	Main Ages	NOTES
Trolling index (piston line)	1996–2003 2005–06 2006–14 2016–24	0.00 (2018, 2019)	5.09 (2011)	1.718	–	0.887	0.240	0.932	↑	1	
Trolling index (grid)	1996–2003 2005–14 2016–24	0.256 (2002)	1.77 (2008, 2011)	0.789	0.411	0.549	0.638	0.606	↓	1	
Gene tagging	2016–21	1.14 (2018)	2.27 (2016)	–	1.68	–			–	2	
CKMR hit rate	2010–21	5.98e-7 (2021)	1.13e-6 (2010)	6.08e-7	6.00e-7	–			–	juveniles/spawners	
NZ domestic standardised CPUE	2003–2023	0.297 (2006)	2.44 (2023)	1.81	1.95	2.42	2.44		↑	All	
NZ domestic age/size composition (proportion age 0–5 SBT)*	1980–2023	0.001 (1985)	0.48 (2017)	0.25	0.23	0.32	0.31		↓	2-5	Peripheral Area
Indonesian mean size class**	1993–21	158.16 (2014)	188.06 (1994)	160.64	161.55	–	–		–	spawners	
Indonesian age composition:** mean age on spawning ground, all SBT	1994–21	12.59 (2014)	21.19 (1995)	12.76	12.78	–	–		–	spawners	
Indonesian age composition:** mean age on spawning ground 20+	1994–21	22.35 (2016)	25.29 (2004)	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	–	–		–	spawners	

Indicator	Period	Min.	Max.	2020	2021	2022	2023	12-month trend	Main Ages	Notes
Japanese nominal CPUE, age 4+	1969–2023	0.32 (2006)	2.62 (1969)	1.56	1.81	2.16	2.05	↓	4+	
Japanese standardised CPUE, age 4+ (GAM series for OM/MP)	1969–2023	0.35 (2006)	2.48 (1969)	1.51	1.53	2.39	2.08	↓	4+	
Korean nominal CPUE	1991–2023	1.312 (2004)	21.523 (1991)	7.487	7.879	7.980	9.032	↑	4+	Bycatch effects
Korean standardised CPUE Area 8	1996-2023	0.33 (2002)	2.46 (2016)	2.16	2.40	–	1.77	↓	4+	
(selected data) Area 9	1996-2023	0.15 (2005)	2.34 (2019)	1.70	1.88	1.46	2.04	↑		
Korean standardised CPUE Area 8	1996-2023	0.36 (2002)	2.64 (2021)	2.47	2.64	–	2.12	↓	4+	
(clustered) Area 9	1996-2023	0.17 (2005)	2.32 (2019)	1.69	1.88	1.47	2.02	↑		
Taiwanese nominal CPUE, Areas 8+9	1981–2023	<0.001 (1985)	0.956 (1995)	0.283	0.388	0.849	0.700	↓	2+	Bycatch effects
Taiwanese nominal CPUE, Areas 2+14+15	1981–2023	<0.001 (1985)	3.672 (2007)	1.324	2.325	2.338	1.644	↓	2+	Bycatch effects
Taiwanese standardised CPUE (Area E)	2002–23	0.130 (2002)	0.996 (2012)	0.721	0.849	0.889	0.644	↓	2+	In development
(Area W)	2002–23	0.208 (2016)	1.224 (2004)	0.378	0.616	0.240	0.212	↓		Bycatch effects
Japanese age comp, age 0–2*	1969–2023	0.004 (1966, 2020)	0.192 (1998)	0.004	0.007	0.018	0.018	–	2	Affected by release/discard
Japanese age comp, age 3*	1969–2023	0.011 (2015)	0.228 (2007)	0.080	0.109	0.074	0.144	↑	3	Affected by release/discards
Japanese age comp, age 4*	1969–2023	0.091 (1967)	0.256 (2009)	0.087	0.147	0.218	0.100	↓	4	
Japanese age comp, age 5*	1969–2023	0.063 (1988)	0.300 (2010)	0.089	0.091	0.140	0.147	↑	5	
Taiwanese age/size comp, age 0–2*	1981–2023	<0.001 (1982)	0.251 (2001)	0.002	0.004	0.005	0.004	↓	Mostly 2	
Taiwanese age/size comp, age 3*	1981–2023	0.024 (1996)	0.349 (2001)	0.059	0.101	0.074	0.077	↑	3	
Taiwanese age/size comp, age 4*	1981–2023	0.027 (1996)	0.502 (1999)	0.169	0.317	0.237	0.184	↓	4	
Taiwanese age/size comp, age 5*	1981–2023	0.075 (1997)	0.428 (2018)	0.325	0.301	0.365	0.328	↓	5	
Australia surface fishery median age composition	1964–2023	age 1 (1979–80)	age 3 (multiple years)	age 2	age 2	age 2	age 2	–	1-4	

Indicator		Period	Min.	Max.	2020	2021	2022	2023	12-month trend	Ages	Notes
Jpn LL standardised CPUE (age 3)	w0.5^	1969–2023	0.22 (2003)	3.16 (1972)	1.06	1.28	1.78	2.95	↑	3	Affected by release/discard
	w0.8		0.24 (2003)	3.91 (2023)	1.37	1.61	2.38	3.91			
Jpn LL standardised CPUE (age 4)	w0.5^	1969–2023	0.26 (2006)	3.28 (2022)	0.78	1.19	3.28	1.50	↓	4	
	w0.8		0.26 (2006)	4.19 (2022)	0.96	1.47	4.19	1.96			
Jpn LL standardised CPUE (age 5)	w0.5^	1969–2023	0.22 (2006)	2.62 (1972)	0.82	0.84	1.83	2.10	↑	5	
	w0.8		0.23 (2006)	2.74 (2023)	0.99	1.01	2.39	2.74			
Jpn LL standardised CPUE (age 6&7)	w0.5^	1969–2023	0.18 (2007)	2.46 (1976)	1.31	1.11	1.12	1.50	↑	6-7	
	w0.8		0.19 (2007)	2.13 (1976)	1.66	1.38	1.47	1.97			
Jpn LL standardised CPUE (age8-11)	w0.5^	1969–2023	0.26 (2007)	3.81 (1969)	1.38	1.11	1.04	1.39	↑	8-11	
	w0.8		0.27 (1992)	3.25 (1969)	1.76	1.43	1.38	1.85			
Jpn LL standardised CPUE (age 12+)	w0.5^	1969–2023	0.44 (2017)	3.44 (1970)	0.99	0.85	0.96	1.58	↑	12+	
	w0.8		0.57 (1997)	2.87 (1970)	1.25	1.10	1.29	2.09			

* 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 10

Report on Biology, Stock Status and Management of Southern Bluefin Tuna: 2024

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 2024 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 most of 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 substantial 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, compared to 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 2023 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 - 2023, 76.7% of the reported catch was taken by longline, 10.4% using purse-seine, and

13.0% using other gears (Figure 1). The proportion of reported catch made by the purse seine fishery peaked at 48% in 2006, averaging 33.2% 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% of the SBT catch has been made in the Indian Ocean, 17% in the Pacific Ocean and 5% in the Atlantic Ocean (Figure 2). The reported annual Atlantic Ocean catch has varied widely between about 18t and 8,200t since 1968 (Figure 2), averaging 1,466t 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 10,000t, averaging 17,699t, and the reported Pacific Ocean catch has ranged from about 800t to 19,000t, averaging 4,971t 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 takes account of 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 2024 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 have not changed substantially. 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

Total Allowable Catch (TAC)

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 30% of initial TRO by 2035. In 2020 the ESC advised on a TAC for 2021-2023 based

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

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 MP adopted, the TACs were set for three-year periods. The TACs for 2018 to 2020 were 17,647 tonnes, the TAC for 2021-2023 was also 17,647 tonnes , and the TAC for 2024 to 2026 is 20,647 tonnes.

The allocations of the TAC to Members of the CCSBT from 2018 to 2026 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)

	2018-2020[2]	2021-2023[3]	2024-2026[4]
Japan	6,117	6,197.4	7,247
Australia	6,165	6,238.4	7,295
Republic of Korea	1,240.5	1,256.8	1,468
Fishing Entity of Taiwan	1,240.5	1,256.8	1,468
New Zealand	1,088	1,102.5	1,288
Indonesia	1,023	1,122.8	1,336[5]
European Union	11	11	13
South Africa	450	455.3	527

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

[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] Includes voluntary transfers to Indonesia of 21t from Japan and a special temporary allowance of 130 t. It also includes a voluntary transfer of 27t to South Africa from Japan.
[5] Does not include 91.3t to be repaid by Indonesia every year until 2026 as part of an agreed Payback Plan for a previous overcatch.

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 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 Member's 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 the following:

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) are 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 their ports to foreign fishing vessels shall, amongst other things:

- Designate a point of contact for the purposes of receiving notifications;
- Designate the 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 identifies 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

At its 2022 meeting, the ESC used the MP adopted 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 MP adopted. At its 2023 and 2024 meetings, the ESC followed its process for examining exceptional circumstances and, finding none, confirmed its advice for the TAC for 2024-2026.

The ESC will use the MP in 2025 to advise on the annual TAC for 2027-2029.

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: 20,647t per year for the years 2024-2026

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.

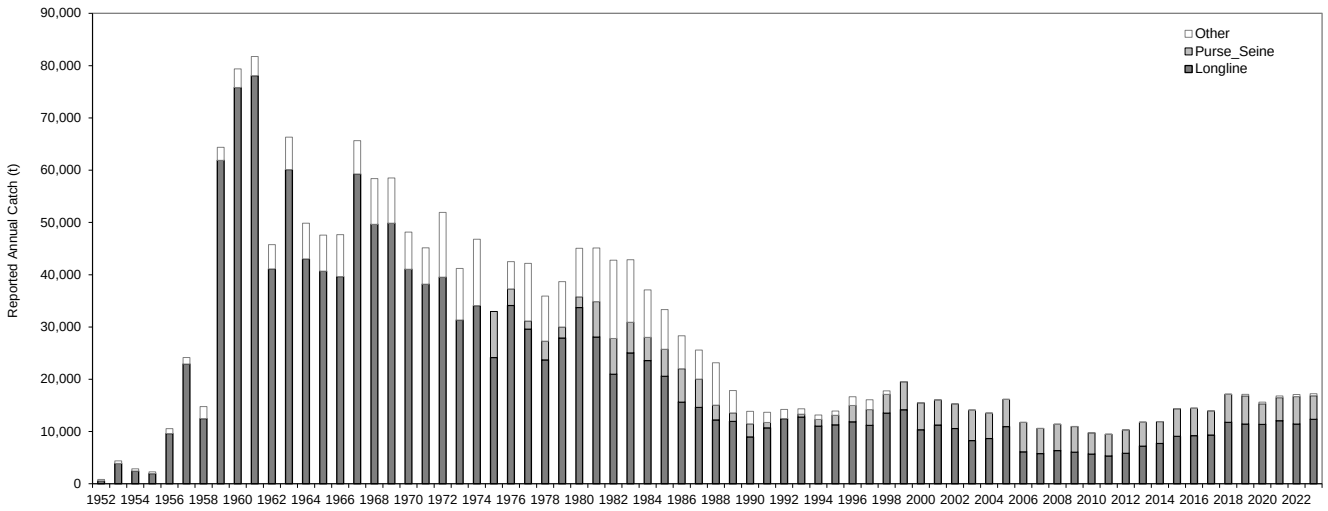


Figure 1: Reported southern bluefin tuna catches by fishing gear, 1952 to 2023. Note: a 2006 review of SBT data indicated that catches over the preceding 10 to 20 years may have been substantially under-reported.

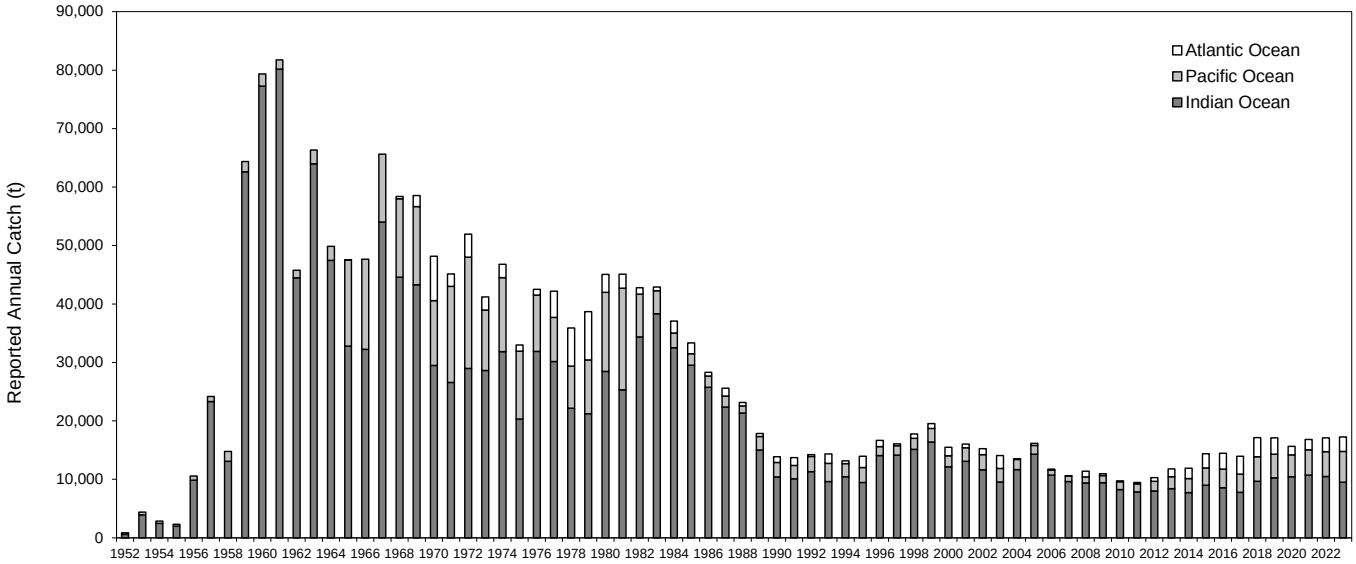


Figure 2: Reported southern bluefin tuna catches by ocean, 1952 to 2023. Note: a 2006 review of SBT data indicated that catches over the preceding 10 to 20 years may have been substantially under-reported.

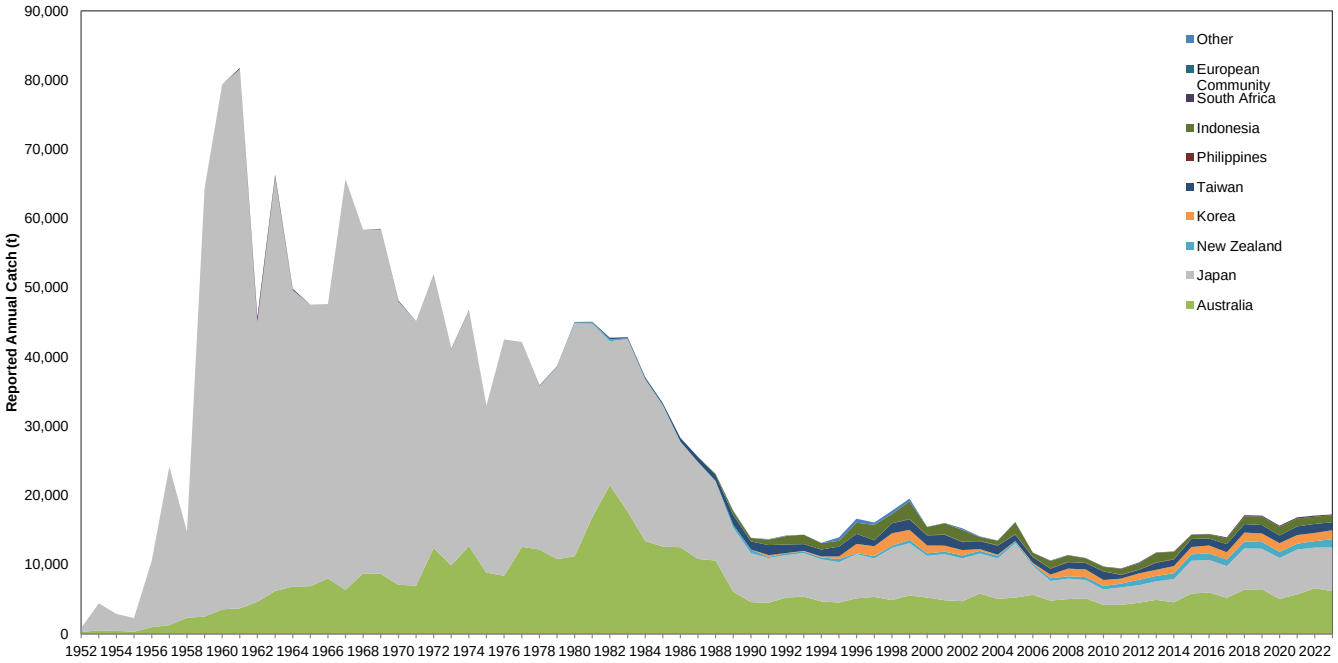


Figure 3: Reported southern bluefin tuna catches by flag, 1952 to 2023. Note: a 2006 review of SBT data indicated that catches over the preceding 10 to 20 years may have been substantially under-reported.

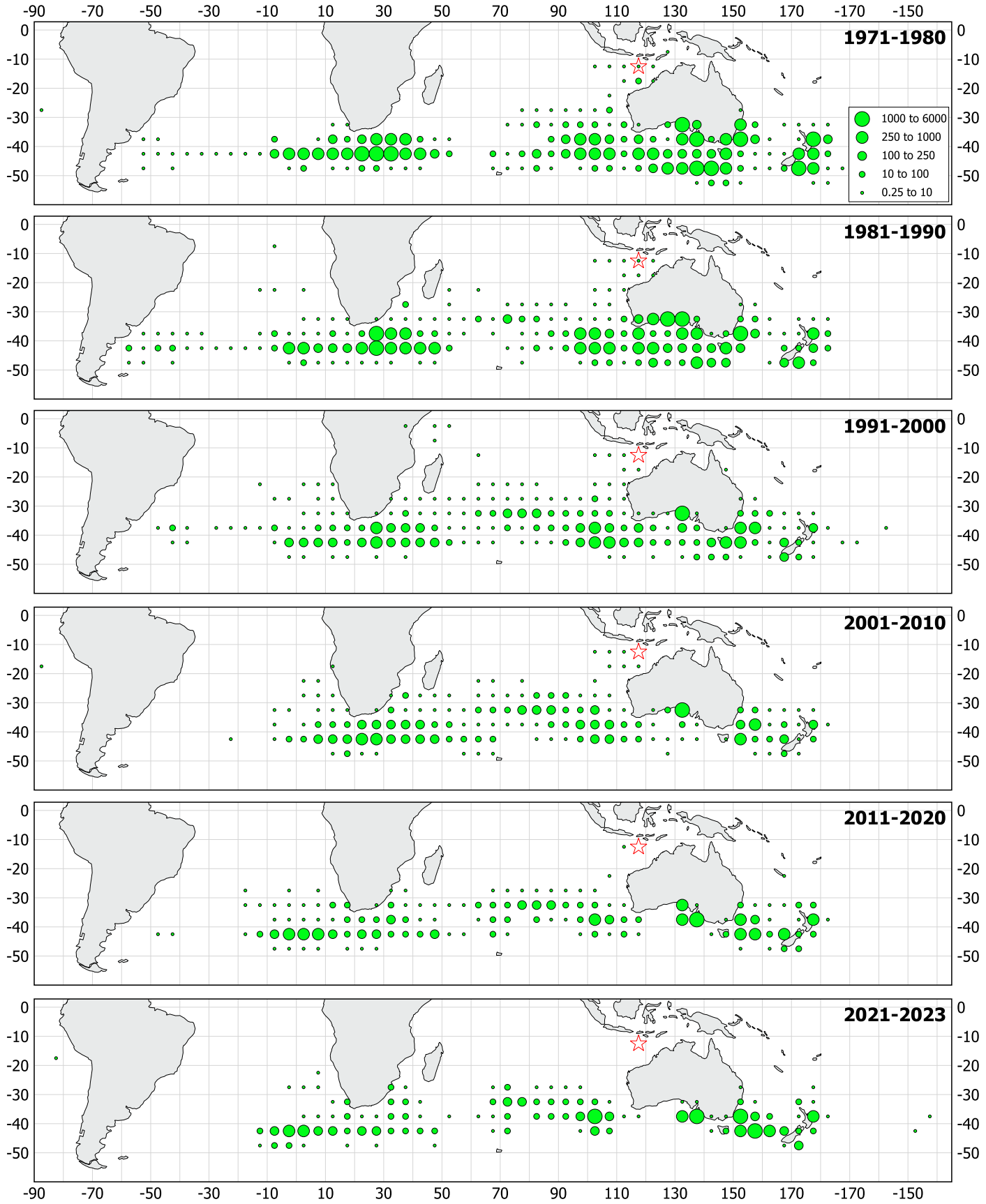


Figure 4: Geographical distribution of average annual reported southern bluefin tuna catches (t) by CCSBT members and cooperating non-members over the periods 1971-1980, 1981-1990, 1991-2000, 2001-2010, 2011-2020 and 2021-2023 per 5° block. The area marked with a star is an area of substantial catch 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.

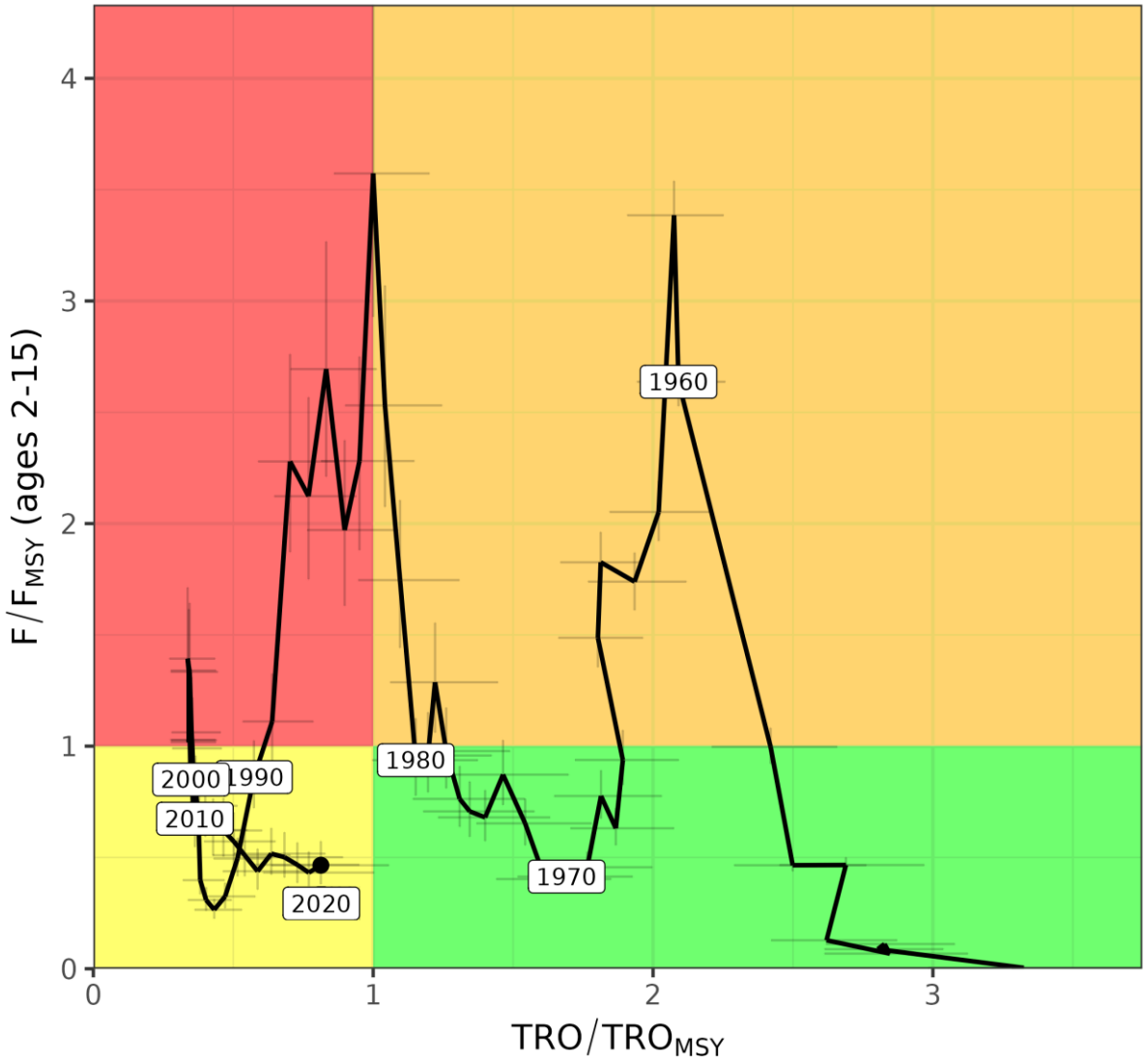


Figure 5. Time trajectory from 1952 to 2022 of median fishing mortality over the F_{MSY} (for ages 2-15) versus Total Reproductive Output (TRO) over TRO_{MSY}. The fishing mortality rates are based on biomass-weighted values and the relative fishery catch composition and mean SBT body weights in each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

Attachment 11

Additional Information on the Spatially Explicit Fisheries Risk Assessment (SEFRA) for seabirds undertaken by the ERSWG

1. Background

At the fourteenth meeting of the Ecologically Related Species Working Group (ERSWG) of the CCSBT in 2022, New Zealand presented the results of a domestic Spatially Explicit Fisheries Risk Assessment (SEFRA) for seabirds which extrapolated risk to seabirds from surface longline, bottom longline and trawl fishing across the Southern Hemisphere. This was a New Zealand initiative which used publicly available international effort data (in part from CCSBT Members) and New Zealand observer data to estimate risk to seabirds. It was noted at this meeting that *'collaboration should be continued with this [next] round of SEFRA, in the areas of data contribution, model development and examination of model robustness.'* It was agreed that a collaborative SEFRA would be undertaken by CCSBT Members to estimate risk to seabirds from their respective surface longline fisheries.

New Zealand and Japan led extensive intersessional work, including a technical ERSWG meeting in 2023, to develop the SEFRA model further and coordinate data inputs from other Members. The model was successfully run in early 2024 using data from Japan, New Zealand and Taiwan.

2. SEFRA Approach

The SEFRA approach is designed to accommodate multiple species and fisheries simultaneously, constructing risk profiles as a function of spatial and temporal overlap. SEFRA is a quasi-spatial model where temporal and spatial overlap of seabird distribution and fishing effort are used to predict a catch. Parameterisation of the capture rate per unit of overlap occurs via a fit to fisheries observer capture data, and total captures are calculated by multiplying the total overlap (including the unobserved component) with this estimated rate (i.e. catchability). Deaths are calculated from the predicted captures using a mortality multiplier that accounts for the probability of dead captures and cryptic mortality. Following estimation of the total deaths, the SEFRA attempts to quantify the relative mortality of the species which is equal to the proportion of the theoretical maximum growth rate removed by fisheries bycatch per year.

3. Outcomes and Next Steps

It was agreed that the process was useful for developing collaboration and understanding among Members, and additional Members indicated their willingness to participate in future iterations. However, there were some outstanding issues requiring attention in future model runs.

Some (but not all) results were agreed at the fifteenth meeting of the ERSWG in June 2024, and the ERSWG updated its advice on seabirds to the Extended Commission of the CCSBT as follows:

- *The level of interaction between seabirds and SBT fisheries remains a significant concern.*
- *The ERSWG noted that the most recent version of the Spatially Explicit Fisheries Risk Assessment, SEFRA, indicates that Wandering and Royal Albatross species groups are at high risk. Species in these groups are of high conservation concern and ACAP indicated that some populations are in sharp decline.*
- *The SEFRA indicates areas with higher risk in some parts of the Tasman Sea (especially), Southern Atlantic and Southern Indian Ocean. These areas account for a large proportion of the modelled risk to seabirds from SBT surface longline fisheries, but contain a very small proportion of SBT surface longline fishing effort.*
- *Based on the best scientific information available, the ERSWG recommends that CCSBT Members consider taking further actions that would ensure robust seabird mitigation measures and effective monitoring of implementation of the mitigation measures, whilst minimising impacts on SBT surface longline fisheries effort.*

The SEFRA process is ongoing and Members have committed to formalize the next iteration of the SEFRA as a CCSBT activity. Additionally, another model run is planned for early-mid 2025 for presentation/discussion at next year's technical ERSWG.

There is support that the SEFRA initiative be expanded in 2025 to the CCSBT Seabird Project, funded as part of the ABNJ Common Oceans Project, in order to maximise the use of available resources.

Attachment 12

Data Exchange Requirements for 2025

Introduction

The data exchange requirements for 2025, 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 2024. 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 2025 to allow development of the necessary data loading routines.

Data listed in Attachment A should be provided for the complete 2024 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 2023 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 2023 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 25	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 2024 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 2025 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 25	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 25	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 25	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 25	The mortality allowance (kilograms) that was used in the 2024 calendar year. Data is to be separated by RMA and SRP mortality allowance. If possible, data should also be separated by month and location.

[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.

Type of Data to provide[1]	Data Provider(s)	Due Date	Description of data to provide
Catch and Effort	all Members (& Secretariat)	23 Apr 25 (New Zealand)[2] 30 Apr 25 (other Members & Secretariat) 31 Jul 25 (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.
Non-retained catches	All Members	30 Apr 25 (all Members except Indonesia) 31 Jul 25 (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.
RTMP catch and effort data	Japan	30 Apr 25	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 25	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 25	Raised New Zealand number of hooks data, to be provided to NZ only, generated from NZ fine scale data by the Secretariat.

[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
Observer length frequency data	New Zealand	30 Apr 25	Raw observer length frequency data as provided in previous years.
Raised Length Data	Australia, Taiwan, Japan, New Zealand, Korea	30 Apr 25 (Australia, Taiwan, Japan, Korea) 7 May 25 (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.
Raw Length Frequencies	South Africa	30 Apr 25	Raw Length Frequency data from the South African Observer Program.
RTMP Length data	Japan	30 Apr 25	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 25	Estimates of both the age and size composition (in percent) is to be generated for the spawning season July 2023 to June 2024. Length frequency for the 2023 calendar year and age frequency for the 2023 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 25	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 2022 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.

[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.
[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
Trolling survey index	Japan	30 Apr 25	Estimates of the different trolling indices (piston-line index (TRP) and grid-type trolling index (TRG)) for the 2024/25 season (ending 2025), including any estimates of uncertainty (e.g. CV).
Gene tagging data **For OM and MP**	Secretariat	30 Apr 25	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.
Close Kin Data **For OM and MP**	Secretariat	30 Apr 25	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 25	Information on recaptured SRP tags that have not been previously reported to the Secretariat
Catch at age data	Australia, Taiwan, Japan, Secretariat	14 May 25	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 25	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 25[7]	These data will be provided for July 2023 to June 2024 in the same format as previously provided.
Raised catch-at-age for Indonesia spawning ground fisheries. **For OM**	Secretariat	24 May 25	These data will be provided for July 2023 to June 2024 in the same format as on the CCSBT Data CD.

[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
Tag return summary data	Secretariat	31 May 25	Updated summary of the number tagged and recaptured per month and season.
Total catch per fishery and sub-fishery each year from 1952 to 2024. **For OM**	Secretariat	31 May 25	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.
Catch-at-length (2 cm bins) and catch-at-age proportions. **For OM**	Secretariat	31 May 25	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 25	Calculate the total catch-at-age in 2024 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 25	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 25 (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 25 (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 13

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)

	2025	2026 (Indicative only)	2027 (Indicative only)
Regular Meetings			
ESC Meeting	4 days FM: 1Ch, 3P, 1C, 3 Interp, 3 Sec	4 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	1Ch	1Ch
June/July OMMP Meeting in Seattle *(no Sec, no Interp)*	5 days Cat: 3P, 1C, 1Ch + 3C Prep Days	5 days Cat: 3P, 1C, 1Ch + 5C Prep Days	5 days Cat: 3P, 1C, 1Ch + 4C Prep Days
Ongoing Essential SRP Projects requiring CCSBT resources			
Gene Tagging	$780,000	$785,000	$785,000
Close-kin sampling, sequencing, and identification	$173,000	$290,000	$227,000
Collection and aging of Indonesian otoliths	$0	$52,000	$41,000
SRP Projects requiring CCSBT resources			
OM Specification and software upgrade *(no Interp at meetings)*	$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	-
CPUE index development	$30,000 for: • 20C, 2CECoord	TBD	-
Capacity building for Southern Bluefin Tuna Spawning Ground Monitoring Program	$35,000 (carry forward) • Training and supervision of enumerators • Capacity building and analytical support for review of catch monitoring program	-	-