Commission for the Conservation of
Southern Bluefin Tuna

みなみまぐろ保存委員会

Report of the Twenty Seventh Meeting of the Scientific Committee

5 September 2022
Online

Report of the Twenty Seventh Meeting of the Scientific Committee
5 September 2022
Online

Agenda Item 1. Opening of meeting

1. The independent Chair, Dr Kevin Stokes, welcomed participants and opened the meeting. The Chair advised that the meeting this year is being held as a video conference due to the COVID-19 pandemic.
2. The list of participants is at **Appendix 1**.

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

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

Agenda Item 3. Other business

4. There was no other business.

Agenda Item 4. Adoption of report of meeting

5. The report of the Scientific Committee was adopted.

Agenda Item 5. Closure of meeting

6. The meeting was closed at 12:24 pm, on 5 September 2022, New Zealand time.

List of Appendices

Appendix

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

Appendix 1

List of Participants
The Twenty Seventh Meeting of the Scientific Committee

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Commission for the Conservation of
Southern Bluefin Tuna

みなみまぐろ保存委員会

Appendix 2

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

29 August – 5 September 2022
Online

Extended Scientific Committee
for the Twenty Seventh Meeting of the Scientific Committee
29 August – 5 September 2022
Online

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 the meeting this year is being held as a video conference due to the COVID-19 pandemic, and that discussion for some agenda items had commenced by correspondence in advance of the meeting. The Chair thanked participants for their cooperation with this special arrangement.
2. The Chair noted that the European Union (EU) and South Africa were not present at the meeting.
3. Delegations introduced their key speakers. The list of participants is included at **Attachment 1**.

1.2 Administrative Arrangements

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

Agenda Item 2. Appointment of Rapporteurs

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

Agenda Item 3. Adoption of Agenda and Document List

6. The agenda was agreed and is provided at Attachment 2.
7. The agreed list of documents is provided at **Attachment 3**.
8. The Chair noted and accepted New Zealand's request to discuss, during the video conference, its proposal to incorporate electronic monitoring systems in the Scientific Observer Program Standards (SOPS). This matter will be discussed at agenda item 19 on "Other Matters".

Agenda Item 4. Review of SBT Fisheries

4.1. Presentation of National Reports

9. The majority of discussion for this agenda item was conducted by correspondence in advance of the ESC.

10. The Chair noted that no national report had been received from either the EU or South Africa. In the EU's case, the EU advised that this is because strictly speaking 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/2208/SBT Fisheries-Australia (Rev.1). Australia's allocation as agreed by the CCSBT was 6,238.4 t for the 2020–21 fishing season. However, this was adjusted to account a set aside for the recreational sector, so the effective commercial total allowable catch (TAC) was 5,926.5 t. A total of 36 commercial fishing vessels landed SBT in Australian waters in the 2020–21 fishing season for a total catch of 5,645 t. A total of 81.3% of the catch was taken by purse seine with the remainder taken by longline, pole-and-line, rod-and-reel and trolling. Seven purse seiners fished off South Australia for the Australian farming operations during the 2020–21 fishing season, with live bait, pontoon-towing and feeding vessels also involved. Most of the purse seine fishing commenced in December 2020 and finished in March 2021. Length frequency data from the purse seine fishery from 2005–06 to 2006–07 indicated a shift to smaller fish compared to previous years, but this trend has showed signs of reversal since 2007–08, possibly due to the targeting of larger fish. The average length of SBT transferred to farms in South Australia in 2020–21 was 85.7 cm. In the 2020–21 fishing season, observers monitored 13.2% of purse seine sets where fish were retained for the farm sector and 14.1% of the estimated SBT catch. In 2021, e-monitoring also monitored 12.0% 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. Observer coverage of longline hook effort in the entire Western Tuna and Billfish Fishery by e-monitoring was 8.3% in 2021.

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

- Its most recent recreational catch survey concluded that recreational interest in the fishery had likely peaked some years ago and that fishers are releasing more SBT than before. Australia also noted that its allowance for recreational catch is proportional to its overall allocation and is likely to continue to increase as the stock recovers. Australia continues to monitor likely changes in recreational catch and will review the need for additional studies should this be required in future.
- Australian compliance officers reported investigating thirteen incidents relating to the discarding of dead SBT in 2021. In total 608 kg of SBT quota was deducted from concession holders to account for mortality relating to these events.
- Otolith collection in the farm sector is undertaken using farm mortalities. These mortalities are very rarely sold for human consumption which allows access to the carcass for otolith collection. Mortalities encountered during purse seine operations are often only lightly damaged and may be retained for sale precluding otolith collection.

13. Australia also submitted paper CCSBT-ESC/2208/12 which described Australia's data preparation and validation process. On behalf of the Australian Government, the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) has compiled aggregated catch and effort, catch by

fleet, raised catch, catch at size, and non-retained catch for submission to 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 provides copies of data collection forms, as well as flow charts illustrating the data integration procedures. The paper also describes the data validation procedures.

14. Indonesia submitted paper CCSBT-ESC/2208/SBT Fisheries-Indonesia. SBT is seasonally caught as by-catch from Indonesian tuna longline fleets operating in the Indian Ocean. This report provides scientific information on the Indonesian tuna longline fishery related to SBT for the 2021 calendar year, spanning from 1 January to 31 December 2021. The total number of active longline vessels recorded was 149 units, whereas the total reported SBT catch was 1,122.7 t, or 12,463 individuals. Size of SBT ranged from 130-240 cm fork length (FL) (mean=168.5 cm FL) for Statistical Area 1 and 82-218 cm FL (mean=161.7 cm FL) for Statistical Area 2. Impacted by COVID-19 pandemic, only five successful scientific observer trips were deployed in 2021, covering at least 0.58% in Statistical Area 1 and 1.14% in Statistical Area 2 in terms of total hooks.

15. In response to questions on its national report, Indonesia advised:

    - It is currently conducting scientific observer training in collaboration with the Indian Ocean Tuna Commission (IOTC) and the Western and Central Pacific Fisheries Commission (WCPFC) to enhance the capacity of observers. Thus, improvement (including additional number of observers) is expected starting next year.

16. Indonesia submitted paper CCSBT-ESC/2208/Info01 on Preliminary Analysis on Catch of SBT by Fishing Area from Indonesian Tuna Longline Fleet. SBT has been historically caught as a by-catch by Indonesian tuna longline fisheries since 1970s. However, little is known about their biological characteristics. This study was undertaken to determine the catch and size composition of the SBT caught by Indonesian longline fleets by their fishing area by utilising port sampling, scientific observers and e-logbook data. The results showed that recently (2015-2019), SBT dominated landings in Benoa Port, comprising between 40 and 75 percent of the catch. The SBT fishing season began in September, peaked in January and February, and then began to decline throughout the second and third quarters. During the peak season (January-March), the majority of SBT were captured in Statistical Area 2 (between 20^{o}S and 37.5^{o}S), whereas Statistical Area 1 had a greater catch at the beginning of the season (September-December). The monthly median size caught in the Area 2 was relatively lower compared to Area 1, except for certain months (April and May), however this is overshadowed by the lack of data available.

17. The meeting commented that Indonesia's paper contains important information, such as the apparent extension of Indonesia's fleet into Statistical Area 2 and the reduction of effort in Statistical Area 1. In response to questions Indonesia advised that the shift in effort to Area 2 commenced around 2015 and does involve targeted fishing by vessels with freezer capacity in Area 2. The ESC thanked Indonesia for this additional analysis and requested that further details and explanation behind this shift in effort be made available as such information would be valuable for consideration in next year's full Stock Assessment.

18. A Member questioned that the dominant catch by yellowfin tuna in the southern part of Area 2 seems unlikely. Indonesia noted that they will further investigate this matter.

19. Japan submitted its national report (CCSBT-ESC/2208/SBT Fisheries-Japan), which described the Japanese commercial longline fishery for SBT in terms of catch, effort, nominal CPUE, length frequency, number of vessels and geographical distribution of fishing operations in 2021. In 2021, 78 vessels caught 6,452 t and about 109,000 individual SBT. No scientific observers were deployed due to difficulty of dispatch overseas with COVID-19.

20. In response to questions on its national report, Japan advised:

    - The post-release mortality estimate for dead discards plus live releases was 54 t and this was deducted from Japan's national allocation for the 2021 fishing season.
    - In order to increase the survival rate after release, the length and weight of released and discarded SBT are not measured. Instead, fishermen's visual estimation of body weight in three categories is performed and recorded.
    - A fork length of 140 cm is approximately 40 kg body weight. 43.0% of the SBT retained in 2021 were less than 140 cm, and 57.0% were 140 cm or more.

21. Korea submitted paper CCSBT-ESC/2208/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 2021, the SBT catch in the calendar year of Korean tuna longline fishery was 1,241 t (1,241 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 (Statistical Area 9) from April to July/August and in the eastern Indian Ocean (Statistical Area 8) from July/August to December. However, since 2014 SBT fishing vessels have moved further westward than 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 and Korean longline vessels targeting SBT were recently operating again in the eastern Indian Ocean from 2020. In 2021, total CPUE increased slightly compared to last year, whereas the CPUE in Area 8 was lower than the previous year.

22. In response to questions on its national report, Korea advised:

- Korea has implemented its electronic reporting systems from 1 September 2015. Information collected includes operation data, location, effort (no. of hooks, sets, etc.), catches, releases/discards, etc. by species (SBT, BET, YFT, SWO, BSH, etc.).
- Korea deducts 5 t from its SBT national quota every year for released/discarded SBT.
- Scientific observers have been placed on two Korean longline vessels targeting SBT in 2022.

23. New Zealand submitted paper CCSBT-ESC/2208/SBT Fisheries-New Zealand. For the 2020/21 fishing year, within New Zealand's national allocation of 1,102.5 t, there were the following allowances: a total allowable commercial catch (TACC, which is the commercial allowance) of 1,046 t; a recreational allowance of 34 t; a customary non-commercial allowance of two t; and an allowance for other sources of fishing mortality caused by fishing of 20 t. Additionally, 220.5 t were carried forward from the previous fishing year. For the 2020/21 fishing year, commercial removals of SBT were 788 t from 28 vessels. Given no foreign charter vessels have fished for SBT in New Zealand since 2015, the entire commercial catch was taken by the domestic fleet. Discard mortality for the domestic commercial fleet was estimated at 10.4 t. On average across the two areas, 16% of catch and 10% of effort was observed during the 2021 calendar year. Standardised CPUE showed a marked decline in 2019 but has since increased substantially to near 2018 levels. The 2020/21 fishing year had the highest standardised CPUE on record for the domestic fleet. In the 2000s, there was a reduction in the range of sizes of SBT taken in the New Zealand fishery. There is evidence of growth (shown by progression of modes) over this period, but little evidence of recruitment of smaller fish to New Zealand waters until recently with smaller recruits appearing in the fishery. New Zealand has continued to closely monitor both the commercial and recreational catch. Recreational removals were estimated at 57.2 t, and there were no customary removals reported.

24. Taiwan submitted paper CCSBT-ESC/2208/SBT Fisheries-Taiwan. Since Taiwan became a Member of the Extend Commission (EC) of CCSBT in 2002, all SBT fishing vessels are required to be authorised to access this fishery, and the authorisations are reviewed and renewed by Fishery Agency of Taiwan (FA) annually. In 2021, 58 fishing vessels were authorised to fish for SBT, which consist of seasonal target vessels and bycatch vessels, and the SBT catch was 1,274 t for calendar year and quota year both. Observers were sent onboard SBT fishing vessels for collection and recording of the detailed information of catch and effort of fishing operation. In 2020 calendar year, 10 observers were deployed on 10 of the 38 fishing vessels authorised to target SBT seasonally, and one was deployed on one of the 32 fishing vessels authorised to bycatch SBT. There were 2,336 fishing days with 1,957 days observed. Nine observers were deployed on nine of the 37 fishing vessels authorised to target SBT, and three were deployed on three of the 21 fishing vessels authorised to bycatch SBT in 2021 with 1,343 days observed out of 2,142 fishing days. In 2020, the coverage rate of observation was 15.7% by vessels, 10.2% by hooks and 10.0% by catch. The coverage rate accounted for 20.7% by vessels in 2021, 8.1% by hooks, and 8.5% by catch. In 2021, the deployment of observers was hindered by the COVID-19 pandemic, thus the observers dispatched on fishing vessels

were decreased greatly. The observer coverage rate by effort and catches closely approached to 10% in 2021, however, the coverage rate by vessels still met the requirements. In recent years, Taiwanese SBT fishing vessels mainly operate in the IOTC area, and partial SBT bycatch vessels operate in the area of the International Commission for the Conservation of Atlantic Tunas (ICCAT). Therefore, the FA has adopted the conservation management measures/resolutions/recommendations of all t-RFMOs into domestic fishery regulations, which become mandatory obligations for our fishing fleet.

25. In response to questions on its national report, Taiwan advised:

- For Taiwanese scientific observer coverage in 2020, the coverage rates in Statistical Area 14 almost reached the 10% target and were 8.9% by hook and 9.2% by catch respectively. Due to the COVID-19 pandemic, the rate of observers dispatched on Taiwanese vessels decreased not only in Area 14 but all areas. Taiwan will continue to improve its coverage rates in all areas in the future.

26. Taiwan also submitted paper CCSBT-ESC/2208/27 which describes preparation of Taiwan's SBT catch and effort data submission for 2021. 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

27. Discussion for this agenda item was conducted by correspondence in advance of the ESC.

28. The Secretariat's paper CCSBT-ESC/2208/04 provided an update of the reported SBT global catches, the spatial distribution of catch and effort, exports from CCSBT Members, as well as the distribution of reported Non-Member effort in areas where SBT are caught. It reported that the estimated total catch for the 2021 calendar year was 17,703 t, an increase of 1,256 t or 7.6% from the 2020 calendar year. The global reported SBT catch by flag is shown at **Attachment 4**. The paper also included comparisons of global adjusted TAC against reported catch by fishing season, which showed that reported catch was less than the adjusted TAC by 1,065 t for the 2021 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 Ecologically Related Species Working Group meeting

29. Discussion for this agenda item was conducted by correspondence in advance of the ESC.

30. The 14th meeting of the Ecologically Related Species Working Group (ERSWG) met from 21-25 March 2022. The Chair advised that the report of the ERSWG was provided to the ESC as CCSBT-ESC/2208/Rep02 and was summarised in the Secretariat's paper CCSBT-ESC/2208/05.

31. The ERSWG has developed a multi-year seabird strategy and has requested that the ESC be informed that information from scientific observers and consideration of electronic monitoring techniques form an integral part of the multi-year seabird strategy, and that the ESC may wish to consider these items.

32. The Secretariat's paper summarised advice provided to the EC by the ERSWG that has some relevance to the ESC, including: Concerning level of interaction between seabirds and SBT fisheries; best practice seabird mitigation measures; lack of specific concerns about shark bycatch that warrant additional mitigation; Consideration of the Performance Review recommendations from an ERS perspective; and holding more regular ERSWG meetings by holding a full, face-to-face ERSWG meeting every second year and hybrid scientific technical meeting(s) in the intersessional years.

33. The ESC noted that it had no comments on the report of ERSWG 14 for consideration by the EC.

Agenda Item 6. Report from the Twelfth Operating Model and Management Procedure (OMMP) Technical Meeting

34. The 12th meeting of the OMMP working group (OMMP WG) was conducted at the CSIRO facilities in Hobart in June 2022 as a hybrid meeting. The meeting was attended in person by the CSIRO members of the WG, a member of the Japanese delegation, the Chair of the ESC, the independent panel and the OMMP consultant. The rest of the Members attended by videoconferencing.

35. The main purpose of the meeting was to complete the analyses required to provide advice on a TAC for the period 2024-2026, including:

- Reviewing the work conducted by the CPUE working group on the development of a new index to resolve the technical problems encountered in 2020, which led to exceptional circumstances being declared;
- Reconditioning of the Operating Model (OM) to check the performance of the Cape Town Procedure (CTP) in projections using as input the new CPUE series proposed by the CPUE working group; and
- Discussing the outcomes of the metarule process triggered by the need to replace the CPUE index as an input to the CTP.

36. In addition, the OMMP WG discussed the need and possible approaches for rewriting the OM code, which was submitted as a research proposal to be evaluated as a component of the Scientific Research Program (SRP) during this meeting.

37. In terms of the OM reconditioning, the WG reviewed the different data inputs and evaluated model fits. The preliminary examination of results indicated that the fits to the updated data were good, and that the new generalised additive model (GAM) CPUE series was consistent and fit reasonably well.

38. Outputs from the OMMP are reported in detail in OMMP 12 and will be discussed under other agenda items. In particular, the approach and outcomes of the metarule process will be discussed in detail under Agenda item 11.

Agenda Item 7. Review of results of the Scientific Research Program and other intersessional scientific activities

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

7.1. Results of scientific activities

40. Intersessional scientific activities are described in the following papers from Members. These were not presented to the virtual meeting, but in discussion of this agenda item the ESC noted that close-kin tissue and otolith collection in Indonesia in the 2021-22 season did not proceed. The impact of this break in collection could be rectified by collection of additional samples in the following year. It was noted that this does not lead to a break in the series because of the nature of the method, which builds on information across the adult cohorts each year data are collected. Juvenile samples have been collected in South Australia. These provide half-sibling pairs (HSP) data and will be matched to parents across the cohorts.

41. The ESC noted there is uncertainty regarding resumption of the sample collection program in Indonesia, which is further addressed in the metarules discussion.

42. The ESC noted the strong collaboration by Members on the maturity project. Jess Farley, CSIRO, passed on her thanks to all participants. The Chair commended the excellent collaboration and results. The ESC noted that a small amount of work will be undertaken to finalise the maturity ogive before the 2023 ESC.

43. Paper CCSBT-ESC/2208/09 provides an update on the SBT close-kin tissue sampling, processing and kin-finding. Muscle tissue samples were collected from harvested SBT at tuna processors in Port Lincoln, Australia (juveniles; n=1600) in 2022. However, muscle tissue samples were not collected from SBT landed by the Indonesian longline fishery in Bali in 2021/22, due to disruptions caused by Institutional changes in Indonesia. Australia proposes to collect an additional 1500 muscle tissue samples in Indonesia in 2022/23 to compensate for the lack of Indonesian muscle tissue sampling in the 2021/22 season. The tissue subsampling, DNA extraction, sequencing, and kin-finding for both the 2020 and 2021 samples from Australia (juveniles) this year was completed. The kin-finding analyses to identify parent-offspring pairs (POPs) and HSPs were updated to include these data and the identified POPs and HSPs provided to the CCSBT in April 2022. A total of 102 POPs and 214 HSPs were identified with high confidence, with a false negative rate of 0.25. Next year Australia aims to use methods currently being developed using a new genome assembly of SBT that will improve ability to identify HSPs, reducing the number currently being excluded.

44. Australia, Taiwan and Korea submitted paper CCSBT-ESC/2208/10 which provides results of combined analyses of SBT ovaries collected across the southern oceans by CCSBT Members to estimate a maturity ogive. A total of 861 ovaries were collected from fishing grounds south of 30°S between 2010 and 2019, generally between the designated non-spawning months of April to August. Females ranged in size from 66 to 190 cm FL, although most were between 110 and 160 cm FL. An agreed histological classification scheme was used by two readers to differentiate mature from immature females. Immature and regenerating females were differentiated by the presence/absence of maturity markers in sectioned ovaries. The proportion of mature females was modelled as a function of length and age using logistic regression. Maturity ogives were similar across the four areas examined, suggesting that spatial differences in maturity do not exist or are not large enough to be detected with the current data. The data suggest, however, that differences among readers may exist which result in different forms of the maturity ogive. This may be due to differences in classification methods, sample sizes and/or the size range of fish analysed. The authors recommend that all samples are read by multiple readers with consensus results before drawing any conclusions. Preliminary results of fitting a maturity ogive to data by Reader 1 (75% of slides) predicted length at 50% maturity of 145.1 cm FL (8.1 years). In addition to the traditional maturity ogive, based on the established criteria, Reader 1 scored the histological sections by the relative abundance and size of the maturity markers present. Ovaries with larger numbers/size of maturity markers were assumed to be highly fecund. Based on this new 'fecundity index', the predicted length at which 50% of females were highly fecund was much higher at 158.8 cm FL (11.2 years). Although qualitative, the fecundity ogive may be a more direct measure of reproductive potential than the traditional maturity ogive as it combines maturity status and annual egg production. The collaborative effort among CCSBT Members to collect ovaries, prepare histological slides and participate in the 2019 CCSBT maturity workshop have been extremely successful, and it culminated in the development of new maturity and fecundity ogives for SBT.

45. Paper CCSBT-ESC/2208/11 provides an update on the gene-tagging program. The CCSBT gene-tagging program provides an estimate of the absolute abundance of the age-2 cohort, for use in the CTP and stock assessment models. The four estimates available are for the age-2 cohorts in 2016-2019. The 2020 program of work was cancelled because of disruption to the field work from COVID-19. The 2021 field work recommenced with over 7000 aged-2 fish tagged. The collection of tissue samples from age-3 fish in 2022 has been completed with over 11000 fish sampled. DNA from these two sets of samples will be compared and an estimate of abundance of the age-2 cohort in 2021 will be available in early 2023. The 2022 field work was also successful with over 5000 fish tagged.

46. Australia submitted paper CCSBT-ESC/2208/13 which provides an update on the SBT otolith collection and ageing activities in Australia in 2021. Otoliths from 123 SBT caught in the Great Australian Bight (GAB) by the purse seine fishery were received and archived in the CSIRO hard-parts collection. Age was estimated for 100 of these fish and the age data were provided to CCSBT during the 2022 data exchange. An additional 173 otoliths sampled in 2022 have been

received very recently, but are not yet archived. Last year Australia developed a preliminary algorithm to estimate decimal (biological) age from otoliths using the zone counts and otolith measurements, which is more precise than whole year measures (zone counts). This algorithm was applied to the age data from 2021. Quality control of age data is extremely important to ensure high quality age estimates are generated for assessment and management needs. An SBT age determination workshop was proposed in 2014 to standardise approaches for converting increment counts to age estimates amongst Member laboratories. Paper CCSBT-ESC/1509/15 reiterated the requirements for an ageing workshop, including the need for pre-workshop inter-laboratory otolith exercises to estimate precision and bias, because the last age validation workshop was in 2002.

47. Australia submitted paper CCSBT-ESC/2208/14 which discusses methods for evaluating electronic tagging designs for SBT through spatial simulation. While conventional and genetic tagging studies are often based on statistical designs, electronic tagging studies are typically determined by ad-hoc or budgetary constraints. Additionally, there are few examples detailing statistical approaches to inform the design of electronic tagging studies. This paper considers how to perform quantitative evaluation of electronic tagging deployments against specific study goals, given hypothesised changes in the extent of movement patterns. Using Markov models of movement, it estimates quarterly transition rates between spatial zones from historical archival tag data for SBT (N=149) spanning 1998 to 2010. As an illustration of the potential for design, these estimates were used to simulate data from four study design scenarios (three of archival tags and one design using pop-up satellite tags). Additionally, the authors simulated data from a scenario where the movement rate between parts of the GAB doubled relative to historically observed levels. While these initial results would require much further exploration for an actual study design, this paper outlines a framework for a quantitative assessment of optimal electronic tag deployment to deliver robust insights on changes in movement.

48. Japan submitted paper CCSBT-ESC/2208/19. This reported which the trolling survey that provides the data for recruitment index of age-1 SBT was carried out in February 2022. Due to the global epidemic of COVID-19, the survey was forced to make major changes to the plan to reduce the number of survey objectives; however, the numbers of survey days and extent of the survey area from Esperance to Bremer Bay were as large as before 2020. The paper reported that a total of 48 SBT individuals, 94% of which were presumably age-1, were caught during the survey.

49. Japan submitted paper CCSBT-ESC/2208/20 which provides updates on two recruitment indices of 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 2022. The piston-line trolling index (TRP) is derived from catch per 100 km search distance on a pre-determined transect line (called the piston-line) without model-based standardisation. The grid-type trolling index (TRG) is calculated from aggregated data by latitude and longitude 0.1 degrees, date, hour, and type of area, based on data from wider area than the TRP and standardised by a generalised linear model (GLM) with delta lognormal approach. The TRG was compared to various indices: the recruitment estimated from the OMMP

meeting in 2022 based on the reference set operating models, age specific standardised CPUE from all Japanese longline vessels for age-4 and age-5, the aerial survey index, and the abundance estimates from gene tagging. The paper found that although similar trends were seen to the 2015 year class, the difference was larger after the 2016 year class, and the TRG index has lower values than the other indices. The paper advised that it is necessary to continue to carefully monitor the status of recruitment in recent years by making full use of various information from scientific research as well as from fisheries.

50. Korea submitted paper CCSBT-ESC/2208/24 on the Korean SBT otolith collection activities in 2021. To investigate the age and growth of SBT, Korea collected 131 otolith samples in 2021, totalling 1,061 otoliths since 2015. The relationship between fork length and total weight was TW=6.4E-05 x FL2.758 (r^2=0.913). The von Bertalanffy growth' s parameters estimated from the non-linear method using length-at-age data were $L\infty$=177.3 cm, K = 0.177/year, t0 = -1.492 years.

51. Taiwan submitted paper CCSBT-ESC/2208/28 on updated gonadal characters information and analysis of SBT collected by Taiwanese scientific observer program. A total of 950 gonad samples of SBT was collected during the period from April to September from 2010 to 2021 by the Taiwanese scientific observer program. The majority of fork lengths of female and male samples was concentrated between 90 and 150 cm. For the monthly GSIs, the females' GSI remained at the higher values from April to July than for other months, and the trend revealed a decline after July. The monthly males' GSIs showed the higher values from March to May and then decreased gradually. They reached their lowest value in September. Using the results from the histological sections, a total of 792 gonad samples in the collection period of 2010-2020 were analysed for sexual maturity stage determination. The majority of these samples was determined to be of immature stage, and about 11.4% of the samples designated as mature but of a reproductively inactive status. Furthermore, most mature females were identified as at regressed or regenerating stages during May to July, and most mature males were also identified at regenerating stages during June and July.

52. Taiwan submitted paper CCSBT-ESC/2208/30 on direct ageing of the SBT caught by Taiwanese longliners. This report updated the results for SBT direct ageing of fish caught by Taiwanese longliners during 2018-2020. The fish collected for direct ageing were predominantly between 90-120 cm with very few fish < 80 cm or > 130 cm. The fish examined for these three years were mainly of ages 2-5 years, contributing 92% in 2018, 80% in 2019 and 78% in 2020. For the SBT caught in 2018, direct ageing data and fork length are used to construct an age-length key that shows the proportion of ages for each 10 cm fork length interval for the fish. The age-length key is used further to convert the length data of all the SBT catch in 2018 to an age composition. The total catch of the SBT caught by Taiwanese long-liners in 2018 was predominantly of ages 2-5 years (>80%), which is similar to the direct ageing result. The sample sizes for direct ageing in 2019 and 2020 are insufficient to construct a reliable age-length key; therefore the age compositions of the total catches in 2019 and 2020 are not reported in this document. More otoliths will be aged for the SBT caught in 2019 and 2020 and the age data will be updated next year.

7.2. Progression of CPUE analyses

53. Korea submitted paper CCSBT-ESC/2208/25 on data exploration and CPUE standardisation for the Korean SBT longline fishery. The authors standardised SBT CPUE from Korean tuna longline fisheries (1996-2021) using GLMs 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. The authors explored CPUE by area and identified two separate areas (Statistical Areas 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 increasing trends since that time.

54. Taiwan submitted paper CCSBT-ESC/2208/29 on CPUE standardisation analysis for SBT caught by the Taiwanese longline fishery from 2002 to 2021. The CPUE standardisation analyses were conducted using the statistical information of Taiwanese longline fleets operating in the waters south of 20°S of the Indian Ocean from 2002 to 2021. First, the cluster analysis was processed for exploring the targeting of fishing operations, and also to produce the data filter for selecting the data for the CPUE standardisations. In order to identify various targeting of fishing operations, the cluster analyses were conducted with the weekly-aggregated data instead of set-by-set data. Second, the simple delta-lognormal model without interactions was adopted to avoid the confounding from interactions for the CPUE standardisations analyses. The cluster analyses were applied for the central-eastern area (Area E) and the western area (Area W) separately. The pattern of the CPUE trends in both areas (Area E and Area W) remained similar to the past but slightly increased with updated data in 2021.

55. Japan submitted paper CCSBT-ESC/2208/BGD01, which was originally submitted as CCSBT-OMMP/2206/06 on the change in the operation pattern of Japanese SBT longliners in the 2021 fishing season. It explained that the Japanese longline data are critically important scientific data for input to the stock assessment of and the Management Procedure (MP) for SBT. The change in the operation pattern of the longline fishing of the most recent year was examined through comparison to the last 10 years. For the 2021 operational pattern, the catch amount, the number of vessels, time and area of operation, proportion by area, length-frequency and spatial concentration of operations were similar to the recent past. The increase in catch quotas over the last decade has had the greatest impact on the increase in CPUE, with the expansion of operating areas and periods. There was also a slight increase in the total number of operations.

56. Japan submitted paper CCSBT-ESC/2208/BGD02, which was originally submitted as CCSBT-OMMP/2206/07. This paper summarises the core vessel CPUE which is an abundance index for SBT used in the CCSBT's MP. It

explains data preparation, CPUE standardisation using GLM, as well as GLMMs and GAMs used in the 2020 ESC, and area weightings. The data were updated up to 2021. The index values in 2021, in the w0.8 and w0.5 series for the base GLM model, are at the same level as the average over the past 10 years.

57. Japan submitted paper CCSBT-ESC/2208/BGD03, which was originally submitted as CCSBT-OMMP/2206/08. It noted that at ESC 26, it had been decided to develop a new CPUE abundance index for SBT to be used in the OMs and MP. The methodology was examined jointly with the CPUE consultant. A working arrangement was developed regarding use of operational data from Japanese fishermen. Those data are confidential information belonging to the Japanese fishermen, so that they were therefore unavailable for broad distribution to Member scientists. Consequently, the analyses were carried out by Japanese scientists. This paper summarised the base case and various robustness tests. The CPUE standardisation applied a two-step GAM approach (the delta lognormal method). The abundance index was the lowest in 2006 and increased in most subsequent years until 2019. In 2020 and 2021, the index decreased to 2015-2017 levels. The results showed that the index was robust to a variety of sensitivity analyses, including model selection approaches, retrospective analysis, vessel ID, area range changes, age range changes, and data and model resolution changes. The authors noted that for future applications, as new data are added the relative values for the past will change when the data for the most recent year are added.

58. The ESC identified that the very high 2018 data point in the Core Vessel CPUE index based on GLMs used in the CTP (Figure 1, CCSBT-OMMP/1906/09) constituted exceptional circumstances in 2020 and initiated a program of work under the CPUE WG determine the cause and to develop appropriate action. This investigation identified that the increasing effort concentration had resulted in sparse data and, consequently, unrealistic CPUE predictions from the GLM standardisation (ESC 25, para 37). The CPUE working group was tasked to identify an alternative CPUE methodology that would be more robust to the problems caused by the increased aggregation of fishing effort and consequent data sparsity in some regions.

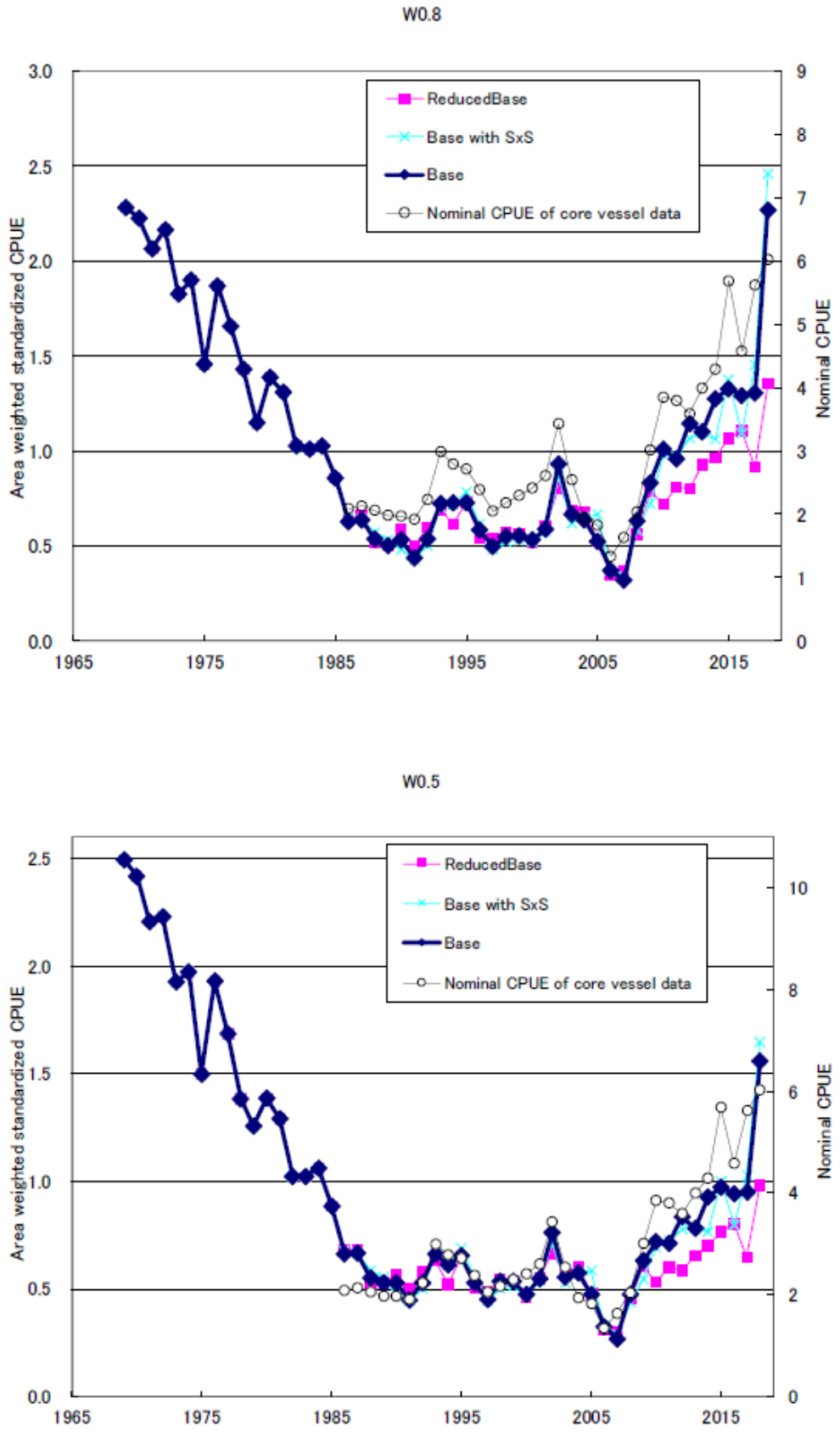

Figure 1: From CCSBT-OMMP/1906/09. Area weighted standardised core vessels CPUEs based on GLMs (Base w0.8 and w0.5). Nominal CPUE for the core vessels is also shown.

59. Dr Hoyle presented CCSBT-ESC/2208/BGD05 that reports on the approach used to validate the newly developed primary CPUE index of SBT abundance, based on GAMs with spatiotemporal smoothers, and a delta lognormal approach. Maps along with time series showed that the temporal and spatial distributions of both fishing effort and the highest catch rates have changed between 1986 and 2020, while the spatial and temporal extents of fishing effort have declined. Simulated data were generated from the best models fitted to the aggregated dataset, and used to explore the effectiveness of different model configurations for dealing with these changing distributions. The principal GAM models produced unbiased estimates with the simulated data, while GLM models and less flexible GAM smoothers provided biased indices, particularly at the end of the time series as effort became more concentrated, and data became sparse. Manipulating the simulated dataset to produce a large rapid change in fish distribution resulted in moderately biased indices. Increasing the effort concentration through time to focus effort on areas with higher CPUE also resulted in estimation bias, particularly at the end of the time series when concentration was greatest. This bias may be due to loss of information from the dataset rather than model failure, and it may be helpful to increase the information via models that include data from other fleets as well as from Japan. In general, GAM models provided less biased indices than either a GAM equivalent to the variable squares method (GAM_VS) or a combined model (w0.8) approach.

60. Based on the work completed by the CPUE WG and the recommendation of OMMP 12, the ESC adopted the CPUE standardisation approach developed in CCSBT-OMMP/2206/08 and the draft specification in Attachment 4 of the OMMP 12 report.

61. The ESC noted that:

- the selected standardisation model based on GAMs was robust to a number of sensitivities and improved upon the previous model based on GLMs;
- it also better reflected the type of index used for simulation-testing the MPs; that is, the CPUE index simulated by the OM lacked data characteristics that would lead to the exceptional circumstances on technical grounds as had occurred in the observed base CPUE index;
- the new GAM-based CPUE standardisation approach captured interacting spatio-temporal trends and thus obviated the need to continue with Constant Squares and Variable Squares approaches (basis for previous w0.5 and w0.8 series) to contrasting stock and fishery distribution hypotheses;
- the Variable Squares approach was shown to result in biases when tested on simulated data;
- the Korean CPUE indices resulted in broadly similar trends to the recommended Japanese CPUE standardised index; and
- the OMMP 12 meeting considered incorporating Korean, Taiwanese, and New Zealand longline data for further evaluation of CPUE. This issue will be discussed further at the next ESC.

62. The ESC noted that the development of an alternative monitoring series that captures plausible scenarios for future potential changes in the stock and/or the fisheries is a high priority and will be included in the future work program for

the CPUE WG. A proposal to continue this and other tasks has been submitted for consideration under the SRP.

7.3. Updated UAM information

63. New Zealand tabled paper CCSBT-ESC/2208/BGD04, which provided estimates of unreported longline effort by CCSBT non-cooperating non-member states between 2007 and 2020. The level of unaccounted mortality (UAM) by non-members of CCSBT is a key input to assessments of stock status for SBT. However, there is no reliable information available on SBT catch by the non-cooperating non-members (NCNMs) of the CCSBT. Analysis of the effort data reported to other regional fisheries management organisations (RFMOs), particularly the IOTC and WCPFC, shows a large degree of overlap with SBT fishing grounds for these tuna fisheries. However, SBT catch is generally not reported to the IOTC, WCPFC or ICCAT, even though these tuna fleets likely take quantities of SBT bycatch in their albacore, bigeye and yellowfin target fisheries. Some catches may also be targeted, and in general, the extent to which Non-Member SBT catches are due to targeted or bycatch fishing is unknown.

64. New Zealand's paper documented work undertaken to provide updates to the Non-Member effort time series from the IOTC, WCPFC and ICCAT, up to and including 2020. Longline fishing effort reported to the WCPFC, IOTC and ICCAT by non-cooperating non-members of the CCSBT was presented. Changes in the Non-Member effort provide an indication of likely changes in the magnitude of unaccounted SBT mortality. These data are necessary for a review of exceptional circumstances for the current Management Procedure. Overall, total Non-Member effort increased from around 26 million hooks per annum in 2007 to around 65 million hooks per annum in 2017. Most of this effort was reported to the WCPFC and concentrated in Statistical Area 12 to the north of New Zealand. Alongside a gradual increase in effort reported to the WCPFC, in 2017 there was an increase in Non-Member effort reported to the IOTC in Statistical Area 14, to the east of South Africa. Since 2017 the total effort has been reasonably consistent, although there did seem to have been an uptick in 2020

65. The Chair opened the agenda item for discussion. New Zealand stated that the only notable point from paper CCSBT-ESC/2208/BGD04 was an increase in effort, which implies an increase in catch, towards the end of the series (2020), and the possible implications for the 2023 stock assessment. Australia raised the issue of EU reporting and the potential influence on estimates of UAM, given that the EU has declined to provide current or future reports to the CCSBT. Several requests concerning observer coverage had been submitted to the EU, given the potential for overlap between the EU fleet and likely SBT distribution, but none have been answered. Australia asked how these issues might be included in the calculations of UAM in 2023. New Zealand responded that this issue will be addressed in the SRP agenda item related to new work required in the coming years.

Agenda Item 8. Development of the Operating Model and Management Procedure

8.1. Maintenance and development of OMMP Code

66. ESC 26 noted the need to review, modernise, and rewrite some of the OM code to facilitate incorporation of within-cell uncertainty, among other refinements, to improve its suitability for current and future stock assessment and MP testing needs. More detailed discussions were completed at OMMP 12 (Report of OMMP 12, paras 56-71), including considerations of alternative coding platforms, the form of the model itself and the need to give consideration to the development process so that it allowed for broader engagement and learning across the OMMP and ESC. Following OMMP 12, a small group collaborated on the development of a multi-year proposal for the creation of new OMMP code (Proposal #1, **Attachment 5**), which will be considered under agenda item 12 (SRP), to deliver an operation platform in time to be used for the stock assessment scheduled for 2026.

Agenda Item 9. Evaluation of Fisheries Indicators

67. The ESC considered papers CCSBT-ESC/2208/15 and CCSBT-ESC/2208/21 and updated the summary table of recent trends in all indicators of the SBT stock (**Attachment 6**). The results were summarised as follows:

- Compared to the previous year, the indicators are mixed (some increased, some decreased, and others were neutral); however, there were no unusual signals nor suggestions of any reasons for concern. Overall, the longer-term trends in the indicators are consistent with the most recent assessment that indicated a resource that is expected to continue increasing.
- Two age-1 abundance indices are derived from the trolling survey. The TRG recruitment index shows a low level from the 2016 to 2021 cohort, and the TRP recruitment index recorded zero values in 2018 and 2019, suggesting some concern about potential low recruitment in recent years, although the TRP index increased in 2022.
- The Parent-Offspring-Pairs detections rate decreased for the latest year it was calculated (2018), which is consistent with an increase in population size.
- The gene-tagging age 2 abundance estimate for 2019 increased compared to the estimates for 2017 and 2018 (no estimate for 2020 is available this year due to the impact of COVID-19).
- The Japanese longline nominal CPUE for age 4+ increased in 2021 and was above the 10-year mean. In contrast, the new Japanese standardised CPUE series (GAM) for age 4+ decreased slightly. Both series indicate that CPUE has been increasing since 2007.
- The standardised CPUE for all ages from the New Zealand domestic longline fishery increased.
- The Korean standardised CPUE for all ages in Statistical Areas 8 and 9 showed an increasing trend since the mid-2000s.

- For the standardised Taiwanese CPUE for all ages, the trends remained similar to the past but increased in both areas (central-eastern and western) with updated data in 2021.

68. Australia summarised its paper CCSBT-ESC/2208/15. The 2021–22 update of fishery indicators for the SBT stock includes indicators in two groups: (1) indicators unaffected by the unreported catch identified by the 2006 Japanese Market Review and Australian Farm Review; and (2) indicators that may be affected by the unreported catch. Given the time since these reviews, the recent trends for some of these indicators are unlikely to be affected by unreported catches. In this paper, interpretation of indicators is restricted to the subset considered to be unaffected by the unreported catch. Two indicators of juvenile (age 1–4) SBT abundance were updated. The piston-line trolling survey decreased from the last index in 2020, while the grid-type trolling index increased from 2021. The gene-tagging abundance estimate was not updated in 2021. Indicators of age 4+ SBT exhibited mixed trends. For close-kin, the Parent-Offspring-Pairs detection rate decreased for the latest year it was calculated (2018), which is consistent with an increase in population size. The age and size data from the Indonesian spawning ground were not updated this year. The standardised CPUE from the New Zealand domestic longline fishery increased, as did the Japanese longline nominal CPUE in 2021. In contrast, the new Japanese standardised CPUE series (the new GAM series) decreased slightly.

69. Japan summarised its paper CCSBT-ESC/2208/21. Fisheries indicators along with fishery-independent indices 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 more or less fluctuated in an aperiodic way and/or showed increasing trend over past 10 years. Gradual declines of the indices for age class 12+ observed from 2011 appear to have ceased in recent years. Other age-aggregated (age 4+ group) CPUE indices that have been used in the Operating Model and/or Management Procedure show increasing trends over the past 10 years. The current levels of these indices are well above the historically lowest observed levels 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 the 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 for the 2016 to 2021 cohort, while the TRP recruitment index recorded zero values in 2018 and 2019, suggesting some concern of potential low recruitment in recent years. A high recruitment level for the 2013 and 2014 cohorts estimated from the Operating Model in the 2020 stock assessment (directly pertaining to the highest value of the 2016 AS index) is not supported by longline CPUE indices by age (from 4 to 8 years old) from 2017 to 2021, and is not supported by the TRG value in 2014.

70. It was suggested that the title of this agenda item change to ‘Fisheries and Scientific Indicators of Stock Status’ so that it is clear that the outcomes of fisheries-independent research projects are being included.

Agenda Item 10. SBT stock status

71. The most recent full stock assessment for the SBT stock was completed in 2020 and reported in the Report of ESC 25 (paras 105-109, 158-159). Key outputs relating to current status are summarised in Table 1, which included information on catch from CCSBT-ESC/2108/04, and the catch management measures from the adopted Management Procedure, CTP (Report of CCSBT 27, paras 70, 73).

72. ESC 25 noted from the 2020 stock assessment that:

- The stock, as indicated by relative Total Reproductive Output (TRO), was estimated to be 20% (16-24%; 80% P.I.) of TRO_0;
- The stock remained below the level estimated to produce maximum sustainable yield (MSY);
- Stock status had improved since the previous stock assessments conducted in 2017 which indicated that relative TRO was at 13% (11-17%; 80% PI) of TRO_0;
- The fishing mortality rate was below the level associated with MSY; and
- The stock had been rebuilding by approximately 5% per year since the low point in 2009 (Figure 2).

73. The 2020 assessment also indicated that the stock had increased from a low of 10% of TRO_0 in 2009.

Table 1: Assessment of stock status from the 2020 stock assessment and current catch and management measures.

Southern Bluefin Tuna Summary of 2020 Assessment of Stock Status[1]	
Reported 2020 catch	16,441 t
Current (2020) Total Reproductive Output (TRO)*	1,546,180 (1,397,040-1,759,312)
Current (2020) biomass (B10+)	204,596 t (184,272-231,681)
Current status relative to initial	
TRO	0.20 (0.16-0.24)
B10+	0.17 (0.14-0.21)
TRO (2020) relative to TRO_{MSY}	0.69 (0.49-1.03)
Maximum sustainable yield	33,207 (31,471-34,564) t
Current management measures	Effective catch limit for Members and Cooperating Non-Members: 17,647 t /yr for the years 2018-2020 and 2021-2023.

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

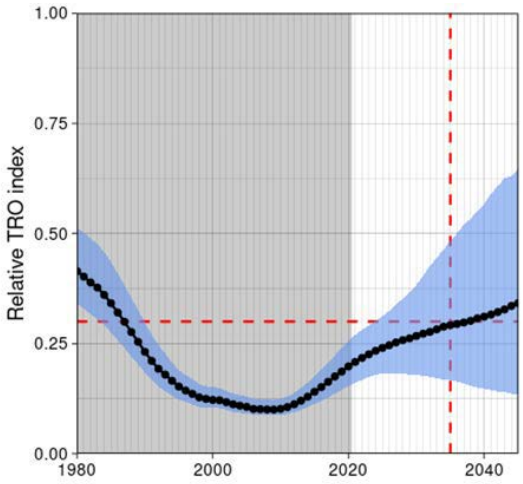

Figure 2: Recent and projected trends in the relative TRO index (median and 5th-95th percentiles) from the 2020 stock assessment. A value of 1 corresponds to the unfished level (TRO_0). Red lines correspond to the rebuilding target of 0.30 TRO_0 (horizontal) and the tuning year (2035) for the CTP (vertical).

75. The next full stock assessment is due to be conducted in 2023. The outcomes of the OM reconditioning and future projections using the CTP undertaken at OMMP 12 in 2022, while not as comprehensive as undertaken for a full stock assessment, are insightful for making inferences about more recent stock status. The reconditioning incorporated new information on:

- Catches;
- Length/age compositions;
- Gene tagging results;
- Close kin mark recapture results; and
- Japanese longline CPUE, which utilised a single GAM index rather than the combinations of variable squares and constant squares indices based on an initial version of the GAM-based index used in 2020

76. In addition to the above updates for data inputs, the grid of models used as a reference set was modified in 2020 compared to the one used in 2019 when the CTP was initially adopted and tuned (see Table 3 from OMMP 12 report). A summary of the stock status and rebuilding statistics from projections for each of the base OMs is given in Table 2 (Table 4 from the OMMP 12 report).

Table 2. Comparison of stock status estimates in 2019 (TRO@2019) and in the final year (TRO@final year), projected TRO depletion in 2035, and the probability of meeting the interim rebuilding objective of the CCSBT ($Pr[TRO/TRO_0>0.2]>0.70$) in 2035. All relative TRO estimates are medians. Base2021 used the new GAM CPUE series whereas Base2018 and Base2019 used a mixture of constant squares and variable squares indices, based on the standard GLM approach in Base18 and on an initial GAM model in Base2019.

Base OM	TRO/TRO_0 @ 2019	TRO/TRO_0 final year	TRO/TRO_0 @ 2035	$Pr(TRO>0.2TRO_0)$ @ 2035
Used for tuning CTP (base2018)	0.17 (0.15-0.21)	0.17 (0.15-0.21)	0.30	0.90
Used for 2020 stock assessment (base2019)	0.17 (0.14-0.20)	0.20 (0.16-0.24)	0.28	0.86
Current (base2021)	0.18 (0.15-0.20)	0.22 (0.19-0.26)	0.28	0.87

77. This table indicates that stock status has recently met or exceeded a median level of 20% TRO_0 and indicates that the stock is continuing to rebuild.

78. OMMP 12 noted that the difference in projections appeared to be mostly driven by the updated data and the change to the new CPUE series. Furthermore, the probability of achieving $0.3TRO/TRO_0$ by 2035 was 0.39 using the updated CPUE series. This result is consistent for both the base2019 and base2021 reference grids when using updated data.

79. The estimated stock status in 2022 (base2021 grid) was 0.22 (0.19-0.26) compared to 0.20 (0.16-0.24) estimated in the full stock assessment in 2020 (base2019 grid).

80. 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 7**.

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

81. The ESC chair noted there were the following issues to be considered at this meeting in relation to the operation of the CTP and management advice:

- The recommendation from OMMP 12 to adopt the new GAM CPUE series for use in the CTP, following the identification of exceptional circumstances in 2020 associated with the GLM CPUE series previously adopted with the CTP;
- The regular annual review of exceptional circumstances under the Meta-rules for the CTP for the current (2023) TAC and for the new TAC to be recommended for 2024-26 using the new GAM CPUE series; and
- The application of the CTP to provide a recommendation for the TAC for 2024-26.

11.1. Evaluation of meta-rules and exceptional circumstances

Development of new CPUE series and impact on CTP performance

82. The OMMP Chair presented the advice of the OMMP and CPUE WG on the development of a new CPUE series for use in the CTP and the OMMP's assessment of exceptional circumstances in relation to the performance of the CTP following incorporation of the new CPUE series. The technical problems encountered with the GLM CPUE index used as one of the inputs for the CTP, and the need to develop a more robust index as a replacement, triggered exceptional circumstances. A new standardisation method was developed based on a GAM and as recommended by the CPUE Working Group and the new GAM CPUE time series was found to be well within the bounds of the CPUE projections conducted using the 2019 OM when the CTP was adopted (Figure 3).

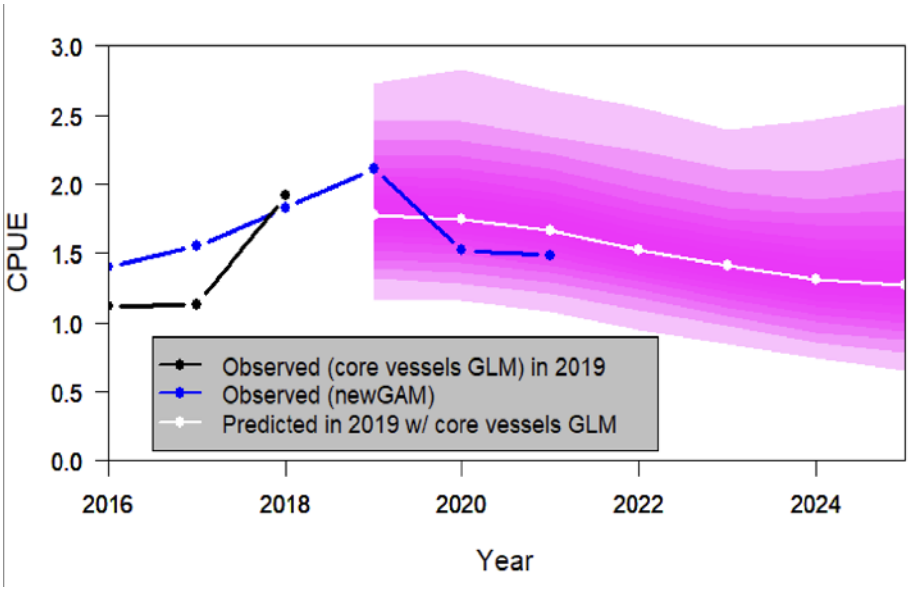

Figure 3: Figure 4 of OMMP 12 report. Comparison of the new GAM CPUE series with the 95% probability intervals of the CPUE values projected in 2019 (using base2018) when the CTP was adopted.

83. Application of the meta-rules process also required an evaluation of the consequences of replacing the CPUE series in terms of CTP performance. To inform this process, OMMP 12 evaluated projections conducted with an OM that was reconditioned using the new CPUE series as well as updated data inputs (catches, length/age compositions, gene tagging and CKMR data). The OM grid was the same one used for the 2020 stock assessment, which had been modified with respect to the original grid used for testing candidate management procedures in 2019. The resulting 80% uncertainty envelopes for projected TRO overlapped substantially with those obtained in 2019, when the CTP was adopted (Figure 4). Furthermore, the probability of meeting the interim rebuilding target agreed in 2011 (0.20 TRO_0 by 2035) was 0.87, exceeding the minimum 0.70 rebuilding probability established by the CCSBT.

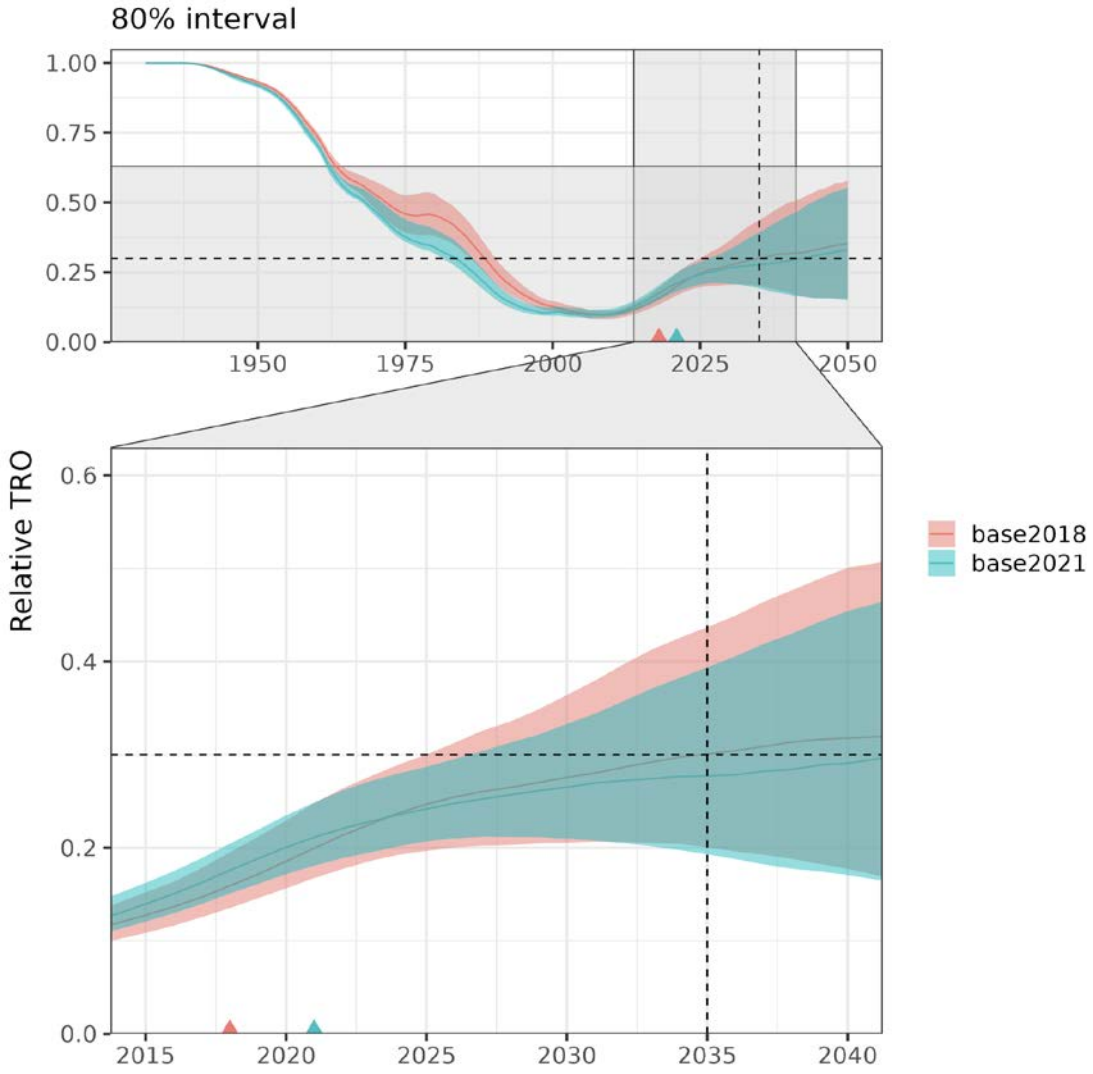

Figure 4: Figure 3 of OMMP 12 report. Projections of relative TRO (medians and 80% probability intervals) calculated using the CTP and the OM developed in 2019 (base 2018) and the updated OM (base2021) conditioned to the new CPUE series. Top figure: full period covered by the OM; Bottom figure: recent period. Small triangles: end of data and start of projections.

84. The ESC thanked the CPUE WG and the OMMP technical group for the development of the new GAM CPUE series and the comprehensive review of the impact on the performance of the CTP.

85. The ESC agreed with the results reviewed by the OMMP technical group, summarised as follows:

- The 80% uncertainty envelopes for the projected TRO overlapped substantially with those obtained in 2019, when the CTP was adopted;
- The probability of meeting the interim rebuilding target (0.20 TRO_0 by 2035) was 0.87, exceeding the minimum 0.70 probability established by CCSBT in 2011;
- The median relative TRO projected for 2035 was 0.28 and the probability of achieving 0.30 TRO_0 (the tuning target) by 2035 was 0.39; and

- While this value is lower than projected in 2019, differences in estimated probabilities that the median TRO meets the tuning target are to be expected as a result of updates in the data and OM, and the fact that the TACs already adopted for 2021-2023 constrain the range of subsequent TACs in projections.

86. The ESC agreed that:

- The impact of changing the CPUE series, together with updating data inputs and modifying the OM grid, was minor;
- The exceptional circumstances triggered by the issues identified with the previous CPUE series have been resolved through the process for action initiated in 2019; and
- On this basis, the ESC recommended that the CTP be applied without modifications, using the new GAM CPUE series as input, to calculate the recommended TAC for 2024-2026.

Annual Review of Exceptional Circumstances

87. Australia presented paper CCSBT-ESC/2208/16. The meta-rules adopted with the CCSBT MP provide a process to determine whether exceptional circumstances exist and a process and guidelines for action to address issues when identified. The aim is to identify exceptional circumstances where stock or fishery indicators, the MP input data, population dynamics, fishing or fishing operations are substantially different from the conditions under which the MP was tested or if catches have been greater than the recommended TAC. If there is evidence for exceptional circumstances, then the process is to determine the severity of these and follow the guidelines for action. The exceptional circumstance identified in 2019 regarding the very high Japanese longline CPUE estimate for 2018 and use of these data in the MP has been resolved through development of a new CPUE series. The impact of the new series on the operation of the MP was evaluated at the OMMP, for presentation to the 2022 ESC, and did not trigger exceptional circumstances. The estimate for the 2020 age 2 cohort from the gene-tagging program is missing because the tagging program was cancelled in 2020 as a result of poor fishing and COVID-19 travel complications. The 2020 ESC noted that the MP is designed to operate even in the case of missing gene-tagging data in the time series used in the MP. Review of other inputs to the MP and indicators of the stock and fishery has not identified any unusual conditions, and no substantial changes in fishing operations had been noted. There is uncertainty in the catch at size data from Indonesia and conflict between data sources that need to be investigated further and resolved, as these data are used in the OMs and in the close-kin mark-recapture program. An estimate of potential Non-Member effort identified an increase in effort in 2020, but there had been no new estimate of Non-Member unaccounted mortality and no evidence provided that would indicate that these catches are being taken at levels above that against which the MP is considered to be robust. This review of evidence for exceptional circumstances has thus not identified any need for changes to the recommended TAC.

88. Japan presented paper CCSBT-ESC/2208/22 that examined observations of input index/data (core vessels longline CPUE, close-kin mark recapture data) for the CTP compared to the 2019 OM predictions. These examinations indicate that all the observations 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. As there is no estimate available from gene-tagging in 2022, the age 1 trolling index was checked to inform on recruitment. There is no major recent decline to warrant declaring exceptional circumstances. Accordingly, as regards a decision on implementation of the recommended TAC (17,647 t, calculated by the CTP in 2020 to be applied to the 2021-2023 fishing seasons) for the 2023 season, the conclusion follows 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 relevant factors (the extent by which the total reported global catch exceeds the TAC, unaccounted mortality, results of the stock assessment conducted in 2020 and OM reconditioning in 2022, potential change in operation pattern of Indonesian longline fleet); and (2) no unexpected change has been detected in the fisheries indicators examined. Additionally, the authors reviewed the metarules process which was done at the OMMP 12 meeting in June 2022 to consider the validity of operation of the CTP using the new CPUE series based on the generalised additive model ("new GAM") regarding a TAC recommendation for the 2024-2026 seasons. This paper confirms the conclusion from the OMMP 12 meeting that, using the new GAM series along with other currently available information as inputs, the CTP can be applied as it was adopted in 2019 to provide TAC advice for the 2024-2026 seasons.

89. While discussing the results of the tests for the occurrence of exceptional circumstances, the meeting noted a difference in the manner in which these tests were conducted for the CPUE compared to the gene tagging and CKMR information. For CPUE, new data were compared with the probability envelope for projections as determined at the time the MP was adopted. In contrast, for the other two types of monitoring data, this comparison is for the most recent year only, and against a projected value (and CI) determined by an updated fit of the OM which is conditioned on all the data up to but not including that most recent year; hence it takes account of data that have become available only after the MP was adopted. Conceivably, the latter process might make the criterion for no occurrence of exceptional circumstances easier to satisfy, as incorporating new data post-MP-adoption in the conditioning of the model used for comparison with the most recent data could moderate any indication of the resource behaving differently from what was assumed at the time of MP adoption. The meeting agreed that this matter merited further consideration over the intersessional period – both as to whether this was a noteworthy concern, and if so, how best to rectify it in the future. It may be considered further at OMMP 13.

90. The ESC noted that there were a number of issues related to the operation of the catch monitoring program in Benoa, Indonesia, and the data series derived from it, that have been identified to have the potential to constitute exceptional circumstances in the future. These include:

- The previously identified uncertainty in the location of catches sampled by the catch monitoring program, i.e., Statistical Area 1 vs Statistical Area 2 (CCSBT-ESC/2208/Info01). It was noted that the substantial shift in the distribution of catch and effort into Area 2, associated with development of

targeted fishing for SBT and freezer capacity in Indonesian vessels warrants further consideration.

- The differences in the length frequency distributions between the CDS and catch sampling programs noted by the ESC and CCSBT-ESC/2108/07, and the implications for the length and age compositions used in the stock assessment.
- The interruption of the otolith and tissue sampling, which is directly associated with the catch monitoring program, as a result of the institutional restructure of fisheries science and monitoring capability in Indonesia, and the implications for the close-kin data used in both the stock assessment and CTP.

91. The ESC strongly encouraged continued efforts to resolve the current uncertainties and to secure the future of the catch monitoring and biological sampling program, given the importance of these Indonesian monitoring data to the assessment of the stock and operation of the CTP for recommending the TAC.

92. Following this review of stock or fishery indicators, the MP input data, population dynamics, fishing or fishing operations and the OMMP advice on the incorporation of the new CPUE series on performance of the CTP, the ESC agreed:

- There was no need to modify the TAC for 2023;
- The CTP can be used to recommend the 2024-2026; and
- There is a need to consolidate the future operation of the Indonesian catch and biological monitoring program, resolve the current uncertainty in the length frequency distributions between the CDS and catch monitoring program, and undertake a more detailed assessment of the implications of the shift in fleet operations between Statistical Area 1 and Statistical Area 2 over recent years and its potential implications for stock assessment.

11.2. Management Procedure recommended TAC for 2024-2026

93. Paper CCSBT-ESC/2208/17 details the key data inputs to the CTP (gene tagging, Japanese long-line CPUE, CKMR POP and HSP data), the TAC calculation for the 2024-2026 period given the agreed data, and the breakdown of the relative impact of each component of the CTP to the TAC calculation. The full specification of the CTP, the data inputs and the associated meta-rules for implementation are provided in Attachment 2 of the report of ESC 25.

94. There are three main data inputs to the CTP: the Japanese longline CPUE index, the CKMR data (POPs and HSPs) and the gene tagging estimates.

95. The equation used to calculate the TAC can be found at Attachment 8, Report of ESC 25[1]. A simplified, high-level depiction of the equation used to calculate the next block of TAC recommendations is given below:

[1] Specifications of the CCSBT Management Procedure, Section 3. Specifications of the population model and HCR used in the MP, Harvest Control Rule.

TAC(next) = TAC(current) * (1 + CPUE impact + CKMR impact) * GT impact

where the current TAC is 17,647 t;

the impact of the 4-year average in the Japanese longline CPUE index is 0.2;

the impact of the close kin mark recapture trend is 0.01; and

the impact of the 4-year average in the gene tagging index is 1 (no change).

96. Taken together, this equation indicates that the next block of TACs could be the current TAC multiplied by 1.21. This is greater than the allowable maximum increase of 3,000 t. Therefore, the recommended TAC for 2024-26 is 20,647 t (i.e. 17,647 + 3,000 t).

11.3. Summary of SBT management advice

97. The OMMP convened in June 2022 (OMMP 12) to complete the analyses required to provide advice on the current TAC and a TAC recommendation for the period 2024-2026. This entailed reviewing the work conducted by the CPUE working group on the development of a new CPUE index to resolve the technical problems encountered in 2020, updating the OM to check the performance of the CTP using the new CPUE index, and discussion of the outcomes of the metarule process triggered by the need to replace the CPUE index as an input to the CTP.

98. The performance of the CTP incorporating the new CPUE was tested using the updated OMs at OMMP 12 and was deemed appropriate for determining the next block of TACs. The metarules evaluation undertaken by OMMP 12 did not identify any exceptional circumstances in relation to the incorporation of the new CPUE series in the CTP.

99. While the next full stock assessment is not due to be conducted until 2023, the outcomes of updating the OMs with new data and the new CPUE index undertaken at OMMP 12 provide inferences about current stock status. Results indicated that the SBT stock is continuing to rebuild and is likely to be near or above the 20% TRO_0 level (median result).

100. Analyses subsequently undertaken by the ESC, such as an updated indicators analysis (Agenda item 9), and regular review of the metarules to identify potential exceptional circumstances (Agenda item 11.1) also did not identify exceptional circumstances with respect to both the operation of the CTP and the TAC advice for 2023 (the TAC calculated for 2021-2023 by the CTP in 2020).

101. The ESC recommends that the global TAC in 2023 should remain at 17,647 t.

102. Operation of the CTP led to a recommended global TAC for 2024-2026 of 20,647 t.

103. In addition to the recommended TAC for 2024-2026, the ESC provided broad indications concerning the potential TAC for the next TAC block (2027-2029).

104. Projections conducted at OMMP 12 for evaluating CTP performance with the new CPUE series covered the period of 2027-2029, and the results are summarised below:

- the probability of the TAC decreasing below 20,647 t was very small, while the probability of remaining at this level, or increasing by 100-399 t was about 40%;
- the probability of the TAC increasing by 400-2,999 t was about 40%, with a more or less even probability for each 100 t TAC increment within this range; and
- the probability of the TAC increasing by the maximum amount of 3,000 t was about 20%.

105. These results should be considered with caution for two key reasons:

i. A new full stock assessment will be conducted in 2023, which will change these probabilities to some extent. The above projections were not based on a full evaluation of a reconditioned set of the OMs, as will be done for the full stock assessment.

ii. Projections this far into the future are driven almost entirely by model assumptions rather than by actual data. New CTP data inputs (CPUE, close-kin and gene tagging) will become available over the next 3 years that will to a large extent determine the result of the TAC calculation for 2027-2029.

106. The ESC noted the OMs will be fully reconditioned in 2023, as part of the full stock assessment. This will include a review of the grid and two additional years of CKMR data that are not currently included, in addition to new CPUE and gene-tagging data to be used as input to the CTP in projections. The ESC considered projections using these fully reconditioned OMs and new CTP data inputs would provide a stronger basis for advice on the likely TAC recommendation for the 2027-2029 TAC block.

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

12.1. The 2023-2027 SRP

107. The ESC adopted the 2023-2027 SRP developed intersessionally by the SRP working group (**Attachment 8)**. The new program builds on the work and progress made in previous SRPs. The 2023-2027 SRP has revised research topics within five priority research categories. Further research in these five areas will improve stock assessment and management advice by reducing key uncertainties, as well as pursuing, where practical, basic research that improves understanding of SBT biology. The five SRP research categories are:

1. Characterisation of catch;
2. Abundance indices;
3. Biological parameters;
4. MP Implementation; and
5. Stock Assessment (OM development).

108. The priority research topics specified within each of the five main categories are related to future research, and do not include the currently adopted ‘ongoing’ research projects that provide data for the stock assessment and the CTP, i.e., the gene-tagging program, the CPUE analysis, the close-kin program, the otolith, tissue and size data collection, and the trolling survey. The ESC noted that SRP

research projects can be, and have historically been, funded by Members and the EC.

12.2. SRP Research Proposals

109. The ESC has adopted a new process for submitting and ranking research project proposals that address topics in the SRP. The SRP working group developed a template for summarising proposal details (**Attachment 9**) and criteria for ranking proposals. The criteria are:

- Relevance –clearly identifies the need and urgency for the research in terms of improving the stock assessment, operating model, and/or management procedure;
- Impact – realistically describes the actual or potential magnitude of improvement and/or risks associated with not doing the research within the current 5-year SRP cycle;
- Feasibility – clearly describes how the research will be accomplished with the CCSBT funding provided in combination with existing or other resources over the 5-year SRP period; and
- Cost – provides an accurate estimate of and justification for project costs.

110. The ESC received 10 proposals using the new template. Not all projects seek funding from the CCSBT, but endorsement of their relevance and impact by the ESC can help to secure funding from alternative sources. The ESC Members provided their views on the priority of the research (high, medium, and low), which were averaged to provide relative ranking of the projects. Cost information was not available at the time of ranking for all projects. The proposals are provided at **Attachment 5**. The ESC supported all the projects, but sought additional clarity on some (discussed below).

111. The ESC made the following recommendations on priority of the current proposals (1=highest, some have equal weighting):

Priority	Proposal Title
1	Operating model recoding and improvements
1	Simple update of NCNM UAM estimates
2	Improving the robustness of SBT CPUE indices to changes in spatio-temporal concentration of fishing fleets
3	Trolling survey
3	Advancement of the trolling survey
4	Pop-up Satellite tagging in the Great Australian Bight
5	Develop methods for estimating UAM
5	Second workshop on otolith-based ageing of SBT
6	Age-0 distribution survey

112. The ESC noted during the discussion of the process, that the template is useful but provides only limited information, and that more detailed background material should be provided in papers to the ESC as a basis for more detailed review, discussion and evaluation. It is anticipated that the discussion of the SRP research proposals will be improved through in-person ESC meetings,

where scientific research priorities and proposals can be more thoroughly discussed and there is more time and opportunity to ask informal questions in the breaks to clarify the project designs, objectives and deliverables. The ESC noted that the virtual meetings were making detailed, comprehensive discussion very difficult.

113. The ESC noted that new SRP proposals should be discussed and evaluated each year at the ESC, along with a more thorough annual review of research activities. The 2023 stock assessment (and the future MP review) may identify new key uncertainties, which can be included in the SRP as new research topics to be addressed in future research proposals.

114. There was a discussion regarding the future direction of the UAM work. The ESC agreed that a simple update of the UAM catch estimates is required for the 2023 assessment. The relative priority between improving the methods for estimating potential UAM catches, and considering options for determining if those potential catches are actually being taken, was not possible to resolve at this meeting. The ESC noted that there would be benefits in continuing more detailed conversations on this priority and encouraged papers for these alternatives to be submitted to the ESC for consideration next year. A proposal for conducting such work beginning in 2024 is included in the current SRP.

Agenda Item 13. Consideration of recommendations from the Performance Review of the CCSBT

115. The ESC reviewed the report from the Performance Review and noted the approach used by ERSWG to rank recommendations (Report of ERSWG14), leading to identification and highlighting of seven recommendations considered to be of most importance to the ERSWG.

116. No papers were submitted by Members to the ESC on the Performance Review recommendations. However, the Secretariat circulated a paper in mid-July containing the recommendations from the Performance Review that the Secretariat identified as possibly relevant to the ESC. That paper included a table as used by the ERSWG in which Members were asked to comment on the priority assigned, level of action required, and whether the ESC should take the lead. Members were also asked to comment on each recommendation.

117. Using the same ranking criteria as the ERSWG, the Secretariat ordered the recommendations and highlighted those that might be of most relevance and priority. The ESC thanked the Secretariat for the preparation of the summary of recommendations and preliminary ranking.

118. While the ESC found the approach useful, it noted that there was a large degree of variation in Members responses to individual recommendations, in terms of the extent to which a recommendation fell within the purview of the ESC, the priority given to different recommendations for the ESC, and the extent to which new action was considered a priority action. It was also noted that while the overall response from Members to numerical ranking of individual recommendations was high, only a few Members had provided commentary to add context to their rankings.

119. Following further discussion, an alternative system to rank the priority of individual recommendations using the pre-meeting input from Members was agreed, and the Secretariat provided an updated table of relative priorities (**Attachment 10**).

120. The ESC noted that while this revised prioritisation approach identified some natural priorities among the highest ranking recommendations, it also resulted in other recommendations that Members, to differing degree, considered should be afforded higher priority. Importantly, given the relatively low level of pre-meeting commentary from Members on potential activities/actions, even for recommendations that were unanimously considered high priority, there was discomfort that the process being used was adequate to properly respond to the large list of recommendations. It was also noted that all of the Performance Review recommendations have merit and using a prioritisation approach should not be interpreted as implying those ranked lowest do not have value and should not be responded to fully.

121. Notwithstanding this difficulty, there were some common themes to recommendations that were scored as high priority by Members:

- Ongoing activities (e.g., gene tagging, CKMR, and otolith ageing) were seen as high priority, consistent with the Performance Review recommendations.
- Capacity building was seen as a high priority, but it was recognised that responsibility to take action lies primarily with the EC and individual Members. While responsibility for ensuring capacity building lies with the EC and Members, the ESC is in a strong position to assist and advise.
- Forecasting the impacts of climate change on SBT and other fisheries and ERS was seen as high priority but there was no discussion on how the ESC or Members could be involved in collaborative programs.

122. The ESC considered the option of following the approach of the ERSWG, at least as an initial step for this year, and recommending the 6-10 highest recommendations to the EC. However, for the reasons noted above, it was agreed that this would risk excluding potentially important recommendations, that are lower ranked using the current system, from being considered for future action (e.g. development of electronic monitoring and cross tuna RFMO coordination).

123. The ESC considered it would be valuable to develop a synthesised ranking of priority areas and associated actions. However, given the large number of recommendations considered relevant to the ESC and the diversity of views on relative priority and relevance to the ESC, it was not considered practical to work through individual recommendations to do this at ESC27.

124. The ESC noted that the Strategy and Fisheries Management Working Group (SFMWG) has been tasked by the EC to complete an Implementation Plan in response to the Performance Review recommendations by EC 30. It also notes there is a SFMWG meeting scheduled in 2023 prior to EC 30 which may present an opportunity to develop such a list of priority recommendations and actions. The ESC encouraged Members to provide their synthesised views on priorities and actions to the SFMWG. The ESC does not have further action in its workplan and budget for 2023.

Agenda Item 14. Predation of SBT

125. The 2021 meeting of the CC sought advice as to whether predation of SBT on longlines is an issue that should be considered in relation to the stock assessment and MP, and if so how to account for it (para 74, Report of CC 16). Members were asked to voluntarily provide estimates of the number of predated SBT. Due to the limited sources of data which could be used, only New Zealand and Australia provided actual estimates from available information.

126. It was noted that the relatively small levels of removals, indicated by the available estimates, are unlikely to pose a problem for the stock assessment or MP. If there are changes in the level of removals over time, then this may need to be taken into account, but if the total levels are small, relative to other sources, then this is not likely to be an issue. It was noted that it is more important to identify trends over time, rather than the actual number, of estimated removals.

127. In order to estimate predation, a sufficient level of observer coverage that is representative of the fishing activities of each fleet is required. It was suggested that information on the degree of overlap of predators with SBT habitat, which the ERSWG could potentially provide, may assist such estimation.

128. The ESC concluded, on the basis of the available information, that it does not consider depredation to be a priority issue. It noted that the sensitivity of the stock assessment and/or TAC advice from the MP could be evaluated through robustness tests and, even in this case, given the scale indicated roughly by the estimates available, this had potentially already been covered by the current UAM scenarios used in MP testing and in the most recent stock assessment.

Agenda Item 15. Improving communication between the ESC and Extended Commission

129. In 2021, the ESC discussed a range of activities and material that could be produced to improve communication between the ESC and EC (paragraph 158, Report of ESC 26). The 2021 EC agreed that Members would provide feedback on these suggestions to the Secretariat for discussion by the ESC in 2022. The Secretariat advised that it had not received any feedback from Members for discussion under this agenda item.

130. The ESC noted that the following items suggested in 2021 have been implemented:

- The CCSBT website has been updated to include links to a non-technical summary of the MP;
- The ESC Chair produced a non-technical summary of his report on outcomes from the 2021 ESC; and
- Potential future TACs (2027-2029), beyond the next TAC block (2024-2026), were collated (see Agenda Item 11.3).

131. The ESC agreed that, for many purposes, in-person dialogue was often more effective, and has fewer associated costs, than providing more documentation to Commissioners. The ESC will discuss any feedback that it receives from the EC or Members at its next meeting.

Agenda Item 16. Requirements for Data Exchange in 2023

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

133. The Secretariat submitted paper CCSBT-ESC/2208/08 (Rev1) which proposed the data exchange requirements for 2023. These requirements are based on the 2022 data exchange requirements with all items rolled over and the dates incremented. Some changes were made to the requirements for CPUE series data in accordance with the agreed changes to the CPUE series to be used by the Operating Model and Management Procedure.

134. The ESC agreed that the GAM CPUE Index that was previously provided by Australia is no longer required.

135. The proposed data exchange requirements were endorsed by the ESC and are provided in **Attachment 11**.

Agenda Item 17. Research Mortality Allowance

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

137. CSIRO summarised the Research Mortality Allowance (RMA) related part of paper CCSBT-ESC/2208/11 which reported on the 2021-2022 RMA usage and the requested RMA for 2023. In 2022 233 kg of RMA was used. There were 26 mortalities. The request for RMA for the 2023 field trip is 1.5 t (this has been reduced from the 2 t specified in the paper). This is expected to be an over-estimate of the requirements, that allows for unusual and unforeseen conditions.

138. Australia provided paper CCSBT-ESC/2208/18. Australia requested a research mortality allowance of up to 3 t in 2023 for a project to trial the use stereo video technology to determine the weight of catch taken in the tuna farm sector of Australia's SBT Fishery. The trial is expected to commence in January 2023. The 3 t research mortality allowance agreed at CCSBT 28 was not used, due to unforeseen ongoing logistical issues related to the COVID-19 pandemic.

139. Australia also requested RMA of 0.5 t in the event that a small number of popup satellite tags are released in 2022-23 to examine localised GAB movement and behaviour over the summer.

140. Japan submitted paper CCSBT-ESC/2208/23. Japan reported 0.0453 t of RMA usage for 2021/2022 from the RMA approval of 0.5 t. Japan requested 1.0 t of RMA for the 2022/2023 research, including for an age-0 distribution survey and an age-1 trolling survey in Western Australia.

141. The ESC supported the 6 t of RMA requested for the specified projects, and noted that this is the full amount that the EC had set aside with the TAC for RMA.

Agenda Item 18. Workplan, Timetable and Research Budget for 2023 (and beyond)

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

142. The ESC's three-year workplan and resource requirements for 2023 to 2025 is provided at **Attachment 12**. This workplan is limited to projects that require CCSBT funding and includes the regular scientific meetings, ongoing essential SRP projects and the new SRP projects that were considered by this meeting.

18.2. Timing, length and structure of next meeting

143. The EC has agreed tentative dates for the CCSBT's main meetings in 2023. The agreed tentative date for the next ESC meeting is from 28 August 2023 to 2 September 2023 inclusive in Jeju, Korea.

144. As indicated in the workplan, a five-day intersessional OMMP meeting is planned to be held in Seattle, USA during June/July 2023 to prepare for next year's full stock assessment. The specific dates for this meeting will be organised by the Executive Secretary in consultation with Member scientists and the Panel after the October 2022 annual meeting as per standard practice.

145. The ESC noted that the pre-meeting discussion process developed for online ESC meetings has been very beneficial. It was agreed that the pre-meeting discussion process should be continued for future in-person meetings, particularly in relation to National Reports, and associated questions and answers. It was further agreed that presentations of scientific papers during meetings would be resumed for in-person ESC meetings.

Agenda Item 19. Other Matters

146. New Zealand submitted paper CCSBT-ESC/2208/26, a proposal to update SOPS to incorporate electronic monitoring. It had drafted a proposal for the use of electronic monitoring systems (EMS) to meet monitoring requirements in SBT fisheries. In drafting the proposal, New Zealand had noted the value that EMS brings to monitoring of fisheries with the potential to review footage of up to 100% of catch, if required. EMS also adds considerable value in monitoring of ecologically related species bycatch and the use of mitigation devices. Furthermore, EMS can provide coverage where historically it has been difficult to do so, such as on smaller vessels and during the COVID-19 pandemic. The proposal is meant to be a temporary solution that allows for the use of EMS, but New Zealand fully anticipates there will be additional work required in the

future to develop more tailored and detailed standards for the use of EMS in CCSBT fisheries.

147. New Zealand drew attention to the fact that, as per section 6 of appendix 1 (revised CCSBT Scientific Observer Program Standards), Members are responsible for ensuring representative information and sampling when placing observers on board vessels, or when selecting EMS footage for review. While EM will not provide biological sampling, New Zealand considers that this requirement is partially superseded by the CDS which provides length and weight data for the fishery. New Zealand further considers that the monitoring of fishing activity by EMS will appreciably exceed that which can logistically be provided by observers, a benefit which outweighs the cost of potentially reduced scientific observer sampling.

148. There was a general view that if EMS is to be included in the SOPS, then Members should be permitted to use: (1) only human observers; (2) only EMS; or (3) a combination of both human observers and EMS.

149. The ESC discussed issues related to using data from EMS compared to data from human observers. Advantages of using EMS noted by Members included:

- The quality of catch and bycatch data reported by fishermen using EMS is improved appreciably;
- EMS can cover 100% of the fleet with monitoring coverage flexible, and can be done retrospectively; and
- EMS coverage was not impacted by the COVID-19 pandemic, whereas some Members had struggled to place human observers on their fleets.

Concerns with EMS data noted by Members included:

- Certain information, such as biological samples, are more difficult to obtain, particularly for distant water fleets;
- Some Members have very little experience with or knowledge of EMS; and
- It has not yet been reported how the type and quality of EMS data compares to human observer data.

150. The meeting further noted that:

- Members using EMS required recognition of the use of EMS data as an alternative to human observer data in order for EMS data to count towards the 10% target for observer coverage;
- More work was required to develop tailored and detailed measures on the use of EMS; and
- The method to calculate the coverage of EMS data has not been clarified.

151. The ESC made some minor revisions to the draft revised SOPS provided by New Zealand and recommends that the revised SOPS at **Attachment 13** be adopted by the EC.

152. Members agreed that EMS activities should be reported to the ESC in Member's National Reports, in the relevant areas of Section 7 and Annex 1 of the ESC annual report template. The information reported should include:

- How EMS has been implemented, particularly in the context of the CCSBT Scientific Observer Program;
- How observer coverage has been calculated;
- What information previously collected by human observers is no longer collected; and
- What information cannot be collected by EMS.

153. Members further agreed that additional papers could be submitted to the ESC if there were any technical issues to report.

154. The meeting recommended that an additional agenda item specific to EMS be added to future meetings of the ESC, to consider new information on EMS and the protocols in use.

Agenda Item 20. Adoption of Meeting Report

155. The report was adopted.

Agenda Item 21. Close of meeting

156. The ESC expressed its sincere appreciation to Mr Robert Kennedy for his substantial contribution to the ESC over a long period of time through his role as the Executive Secretary of the CCSBT Secretariat.

157. The meeting closed at 12:22 pm on 5 September 2022, New Zealand time.

List of Attachments

Attachments

1	List of Participants
2	Agenda
3	List of Documents
4	Global Reported Catch by Flag
5	Proposals to the CCSBT Scientific Research Program
6	Summary of recent trends in all indicators of the SBT stock
7	Report on Biology, Stock Status and Management of Southern Bluefin Tuna: 2022
8	CCSBT Scientific Research Program 2023-2027
9	Template for submitting and prioritising CCSBT Scientific Research Program proposals 2023-2027
10	2021 CCSBT Performance Review recommendations ordered by ESC Members' view of Priority
11	Data Exchange Requirements for 2023
12	ESC’s three-year workplan, including resource requirements
13	Proposed revisions to the CCSBT Scientific Observer Program Standards to allow for the use of electronic monitoring systems

Attachment 1

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Extended Scientific Committee Meeting
of the Twenty Seventh Meeting of the Scientific Committee

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INTERPRETERS								
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First name	Last name	Title	Position	Organisation	Postal address	Tel	Fax	Email
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Attachment 2

Agenda
Extended Scientific Committee for the Twenty Seventh Meeting
of the Scientific Committee
29 August – 6 September 2022
Online

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 Ecologically Related Species Working Group meeting**

6. **Report from the Twelfth Operating Model and Management Procedure (OMMP) Technical Meeting**

7. **Review of results of the Scientific Research Program and other inter-sessional scientific activities**
   - 7.1. Results of scientific activities.
   - 7.2. Progression of CPUE analyses
   - 7.3. Updated UAM information

8. **Development of the Operating Model and Management Procedure**
   - 8.1. Maintenance and development of OMMP Code

9. **Evaluation of Fisheries Indicators**

10. **SBT stock status**

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

12. **Update of the Scientific Research Program (SRP)**

13. **Consideration of recommendations from the Performance Review of the CCSBT**

14. Predation of SBT

15. Improving communication between the ESC and Extended Commission

16. Requirements for Data Exchange in 2023

17. Research Mortality Allowance

18. Workplan, Timetable and Research Budget for 2023 (and beyond)

18.1. Overview, time schedule and budgetary implications of proposed 2023 research activities and implications of Scientific Research Program for the work plan and budget

18.2. Timing, length and structure of next meeting

19. Other Matters

20. Adoption of Meeting Report

21. Close of Meeting

Attachment 3

Draft List of Documents
Extended Scientific Committee
for the Twenty Seventh Meeting of the Scientific Committee

(CCSBT-ESC/2208/)

1. Provisional Agenda
2. List of Participants
3. List of Documents
4. (Secretariat) Secretariat review of catches (ESC agenda item 4.2)
5. (Secretariat) Report from the Fourteenth Meeting of the Ecologically Related Species Working Group (ESC agenda item 5)
6. (Secretariat) ESC Recommendations from the Performance Review of the CCSBT (ESC agenda item 13)
7. (CCSBT) 2021 CCSBT Performance Review (ESC agenda item 13)
8. (Secretariat) Data Exchange (Rev.1) (ESC agenda item 16)
9. (CCSBT) Update on the SBT close-kin tissue sampling, processing and kin-finding 2022 (ESC Agenda item 7.1)
10. (Australia, Taiwan and Korea) New maturity ogive estimates for southern bluefin tuna (ESC Agenda item 7.1)
11. (CCSBT) Report of the SBT gene tagging program 2022 (ESC Agenda item 7.1, 17)
12. (Australia) Preparation of Australia's southern bluefin tuna catch and effort data submission for 2021 (ESC Agenda item 4.1)
13. (Australia) An update on Australian otolith collection activities and direct ageing activities for the Australian surface fishery 2022 (ESC Agenda item 7.1)
14. (Australia) Methods for evaluating electronic tagging designs for southern bluefin tuna through spatial simulation (ESC Agenda item 7.1)
15. (Australia) Fisheries indicators for the southern bluefin tuna stock 2021–22 (ESC Agenda item 9)
16. (Australia) Consideration of exceptional circumstances - SBT 2022 (ESC Agenda item 11.1)
17. (Australia) Running the Cape Town Procedure for 2022 (ESC Agenda item 11.2)
18. (Australia) Research mortality allowance: Proposed allowance for 2022 and 2023 and 2021 usage report (ESC Agenda item 17)
19. (Japan) Report of the piston-line trolling monitoring survey for the age-1 southern bluefin tuna recruitment index in 2022 (ESC Agenda item 7.1)

20. (Japan) Trolling indices for age-1 southern bluefin tuna: update of the grid type trolling index in 2022 (ESC Agenda item 7.1)
21. (Japan) Summary of fisheries indicators of southern bluefin tuna stock in 2022 (ESC Agenda item 9)
22. (Japan) A check of operating model predictions from the viewpoint of implementation of the management procedure in 2022 (ESC Agenda item 11.1)
23. (Japan) Report of the 2021/2022 RMA utilization and application for the 2022/2023 RMA (ESC Agenda item 17)
24. (Korea) Korean SBT otolith collection activities in 2021 (ESC Agenda item 7.1)
25. (Korea) Data exploration and CPUE standardization for the Korean southern bluefin tuna longline fishery (1996-2021) (ESC Agenda item 7.2)
26. (New Zealand) Proposal to update CCSBT Scientific Observer Program Standards to incorporate electronic monitoring (ESC Agenda item 19)
27. (Taiwan) Preparation of Taiwan's Southern bluefin tuna catch and effort data submission for 2021 (ESC Agenda item 4.1)
28. (Taiwan) Updated gonadal characters information and analysis of southern bluefin tuna collected by Taiwanese scientific observer program (ESC Agenda item 7.1)
29. (Taiwan) CPUE standardization analysis for southern bluefin tuna caught by Taiwanese longline fishery from 2002 to 2021 (ESC Agenda item 7.2)
30. (Taiwan) Direct ageing of the SBT caught by Taiwanese longliners in 2018-2020 (ESC Agenda item 7.1)

(CCSBT- ESC/2208/BGD)

1. (Japan) Change in operation pattern of Japanese southern bluefin tuna longliners in the 2021 fishing season (*Previously* CCSBT-OMMP/2206/06) (ESC Agenda item 7.2)
2. (Japan) Update work of the core vessel data and CPUE for southern bluefin tuna in 2022 (*Previously* CCSBT-OMMP/2206/06) (ESC Agenda item 7.2)
3. (Japan) Development of the new CPUE abundance index using GAM for southern bluefin tuna in CCSBT (*Previously* CCSBT-OMMP/2206/08) (ESC Agenda item 7.2)
4. (New Zealand and CCSBT) Estimates of unreported longline effort by CCSBT non-cooperating non-member states between 2007 and 2020 (*Previously* CCSBT-OMMP/2206/10) (ESC Agenda item 7.3)
5. (CCSBT) Validating CPUE model improvements for the primary index of Southern Bluefin Tuna abundance (*Previously* CCSBT-OMMP/2206/04) (ESC Agenda item 7.2)

(CCSBT-ESC/2208/SBT Fisheries -)

Australia	Australia's 2020–21 southern bluefin tuna fishing season (Rev.1)
Indonesia	Indonesia Southern Bluefin Tuna Fisheries: A National Report Year 2021
Japan	Review of Japanese Southern Bluefin Tuna Fisheries in 2021
Korea	2022 Annual National Report of Korean SBT Fishery
New Zealand	New Zealand Annual Report to the Extended Scientific Committee
Taiwan	Review of Taiwan SBT Fishery of 2020/2021(Rev.1)

(CCSBT-ESC/2208/Info)

1. (Indonesia) Preliminary Analysis on Catch of Southern Bluefin Tuna (*Thunnus maccoyyi*) by Fishing Area from Indonesian Tuna Longline Fleet (ESC Agenda item 4.1)

(CCSBT-ESC/2208/Rep)

1. Report of the Twelfth Operating Model and Management Procedure Technical Meeting (June 2022)
2. Report of the Fourteenth Meeting of the Ecologically Related Species Working Group (March 2022)
3. Report of the Twenty Eighth Annual Meeting of the Commission (October 2021)
4. Report of the Sixteenth Meeting of the Compliance Committee (October 2021)
5. Report of the Twenty Sixth Meeting of the Scientific Committee (August 2021)
6. Report of the Twenty Seventh Annual Meeting of the Commission (October 2020)
7. Report of the Twenty Fifth Meeting of the Scientific Committee (August - September 2020)
8. Report of the Eleventh Operating Model and Management Procedure Technical Meeting (June 2020)
9. Report of the Twenty Sixth Annual Meeting of the Commission (October 2019)
10. Report of the Twenty Fourth Meeting of the Scientific Committee (September 2019)
11. Report of the Tenth Operating Model and Management Procedure Technical Meeting (June 2019)

Global Reported Catch By Flag

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

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

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

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

Attachment 5

Proposals to the CCSBT Scientific Research Program 2023 – 2027

Proposal #1. Operating model recoding and improvements

A (Start year): 2023

B (Duration): 3 years

C (General category): OM

D (Sub category): Asses

E (Project title): **Operating model specification and software upgrade**

F (Problem): The current operating model (OM) specifications, code, and software present challenges for (i) communicating the population dynamics and statistical assumptions underpinning the SBT model; (ii) addressing uncertainty within the OM grid; and (iii) revising and implementing alternative hypotheses in stocks assessments and future MP evaluations.

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

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

I (Impact Scale): High

J (Impact timing): Med

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

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

** (budget source): CCSBT

Budget:

Resources		
2023	2024	2025
25d Consultant	20d Consultant	20d Consultant
2d MP Coordinator	2d MP Coordinator	2d MP Coordinator

Resources		
2023	2024	2025
-	1d extra at ESC meeting (VEH, Cat, 3P, 1C, 1Ch, Sec)	-
1d extra at Seattle OMMP meeting (Cat, 3P, 1C, 1Ch)	-	-
3d dedicated inf. OMMP meeting (Tokyo: FreeV, Cat, 3P,1C, 1Ch)	5d dedicated OMMP meeting (Seattle: FreeV, Cat, 3P, 1C, 1Ch)	-
2*2hr online meetings (3P,1C, 1Ch, Sec)	2*2hr online meetings (3P,1C, 1Ch, Sec)	2*2hr online meetings (3P,1C, 1Ch, Sec)
$130,000	$155,000	$30,000

The abbreviations used in the above are: Sec=Secretariat Staff, Ch=Independent ESC Chair, P=Independent Advisory Panel, C=Consultant, Cat=Catering only, VEH=venue & equipment hire etc., FreeV=Venue & some equipment at no cost.

Workplan:

Year 2023

- Cleaning of old code and documentation.
- Darcy works on new conditioning code to match old code.
- One or more informal short (1-2 hour) online meetings.
- One extra day added to the scheduled in-person OMMP meeting to discuss progress.
- 3-day in-person meeting in November focused on the transition to the new code:

  (i) compare conditioning results obtained with old and new code;

  (ii) show structure and receive feedback;

  (iii) discuss projection code (could run old projection code with outputs from new code as an intermediate step);

  (iv) prioritise work (changes to the code) for 2024

  (v) Provide training/tutorial

Year 2024

- 5-day OMMP in person meeting in June to discuss/implement/evaluate changes to the OM (conditioning and projections), and provide training/tutorial
- One extra day at ESC to discuss progress.

Proposal #2. Simple Update of NCNM UAM estimates

A (Start year): 2022-23

B (Duration): Potentially every year, but mostly needed when the MP or the stock assessment, particularly the latter, is updated

C (General category): Both

D (Sub category): Catch (unreported catch)

E (Project title): **Update NCNM UAM estimates**

F (Problem): Updated UAM estimates are needed for the upcoming stock assessment in 2023.

G (Objectives): Provide updated UAM estimates

H (Rationale): UAM estimates are critical for both the MP and the stock assessment.

I (Impact Scale): High

J (Impact timing): Short

K (Priority): High

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

** (budget source): CCSBT Secretariat

Budget:

2023 Option 1	2023 Option 2
20 d Consultant	25-30 d Consultant
A simple update of the 2019 GLM analysis (including refinements made at the time), but excluding the Random Forest analysis	Simple update of GLM estimates (for continuity) in addition to a GAM analysis along the lines of the new CPUE (but needs tweaking). Also, conduct an exploratory analysis clustering the aggregated catch data on species composition to improve the definition of target CPUE. Other minor refinements might be pursued if time allows.
No extra meeting time required.	Potential need for a half day virtual meeting to discuss interim results.

Proposal #3. Improving the robustness of SBT CPUE indices to changes in spatio-temporal concentration of fishing fleets

A (Start year): 2022

B (Duration): One

C (General category): both the operating model (OM and stock assessment), and the Cape Town Procedure (CTP)

D (Sub-category): Indices and Assess

E (Project title): **Improving the robustness of SBT CPUE indices to changes in spatio-temporal concentration of fishing fleets**

F (Problem): Recent CPUE research indicates increasing spatio-temporal concentration of fleets involved in the SBT index. Differences between the actual and assumed spatio-temporal coverage of CPUE standardisation models could, therefore, undermine robustness and reliability of future CPUE indices.

G (Objectives): Ensure that index standardisation methods are fully in place that improve upon what is presently available (or at least retain status quo) and that provide consistently available data and information on stock trends at similar spatial coverage to those presently available.

a. Develop methods to mitigate the effects of increasing effort concentration based on GAM-based indices that include data from multiple fleets, using initially aggregated data and subsequently operational data.
b. Improve understanding of how increasing effort concentration may affect GAM-based indices via simulation.
c. Evaluate incorporation of Korea, Taiwan, and New Zealand longline CPUE data

H (Rationale): Robust CPUE is critical to the OM, Assessment, and CTP and can help avoid invoking exceptional circumstances. However, differences between actual and assumed spatio-temporal coverage of fishing fleets contributing to SBT CPUE indices are only recently recognised and their impacts are not well-understood.

I (Impact Scale): High

J (Impact Timing): Short (within 1 year) extending to 2-4 years depending

Budget:

Resources		
2023	2024	2025
20d Consultant	10-30d Consultant	20d Consultant
2d CPUE Coordinator	2d CPUE Coordinator	2d MP Coordinator
-	In-country and/or online meetings to develop 5	-

Resources		
2023	2024	2025
	national operational datasets	
		-
		-
1*2hr online meetings (3P,1C, 1Ch, Sec)	2*2hr online meetings (3P,1C, 1Ch, Sec)	2*2hr online meetings (3P,1C, 1Ch, Sec)
$30,000	$20,000-$40,000	$30,000

The abbreviations used in the above are: Sec=Secretariat Staff, Ch=Independent ESC Chair, P=Independent Advisory Panel, C=Consultant, Cat=Catering only, VEH=venue & equipment hire etc., FreeV=Venue & some equipment at no cost.

Workplan:

Year 2023

Consultant to assess potential effects of effort concentration, and benefits of combining data from multiple fleets.

- Prepare maps of coverage and catch rates through time for each fleet, including the Australian, Japanese, Korean, New Zealand, and Taiwanese fleets, and compare coverages of Japanese and combined datasets.
- Review associated size data to determine whether the selectivities are similar enough to combine the effort.
- Fit GAM models of CPUE using aggregated data from multiple fleets and compare trends with indices based on Japanese data alone.
- Review DHARMa and mgcViz model diagnostics.
- Simulate from fitted models to explore the benefits of combined datasets under scenarios representing current and greater levels of effort concentration.
- Present results to CPUE WG, who decide whether to progress to joint analyses of operational data.
- Writes report for CPUE WG and ESC.

- One or more informal short (1-2 hour) online meetings.
- Time included in scheduled in-person OMMP meeting to discuss progress. Extra time?

Year 2024

Consultant:

- Develop operational longline data simulator and use it to explore scenarios of effort concentration and their effects on indices (20 days). Potential to cover other issues (e.g., targeting) as time allows.
- Work remotely with Australian, Japanese, Korean, New Zealand, and Taiwanese scientists to prepare data for joint analysis. (10 days)

Year 2025

Depending on decisions about next steps:

- Collaborative in-person meetings to prepare data for joint analysis.
- Conduct initial joint analyses and provide training to members in use of code.

(20 days)

There are also various steps involved in changing the CPUE index for the OM and MP, which would need to be considered if the 2023 work shows that this process would be helpful.

Proposal #4. Trolling survey

A (Start year): Ongoing. Since 1989 as the recruitment monitoring. The research in the current design started in 2006.

B (Duration): 5 years (every year)

C (General category): Both

D (Sub category): Indices

E (Project title): **Trolling survey**

F (Problem): Recruitment levels are unpredictable and can fluctuate significantly and have a strong impact on the stock management. It is desirable to know the recruitment level as soon as possible.

G (Objectives): Provide a recruitment index of age-1 immediately.

H (Rationale): The recruitment index is important for the stock management. The recruitment index obtained from this survey used in the robustness test in MP development. The index has also been used for the stock assessment and in the meta-rule process of MP.

I (Impact Scale): High.

J (Impact timing): Short (ongoing)

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

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

** (budget source): The Japanese government is contributing the budget.

Proposal #5. Advancement of the trolling survey

A (Start year): Ongoing.

B (Duration): 5 years

C (General category): Both

D (Sub category): Indices

E (Project title): **Advancement of the trolling survey index**

F (Problem): The standardisation of the trolling index has not been sufficiently carried out.

G (Objectives): Improve the standardisation of the trolling index to provide more accurate and robust age-1 recruitment index.

H (Rationale): The recruitment index is important for the stock management. The recruitment index obtained from this survey used in the robustness test in MP development. The index has also been used for the stock assessment and in the meta-rule process of MP.

I (Impact Scale): High.

J (Impact timing): Short (ongoing)

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

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

** (budget source): The Japanese government is contributing the budget.

Proposal #6. Pop-up Satellite tagging in the Great Australian Bight

A (Start year): 2022

B (Duration): 2 years

C (General category): OM

D (Sub category): Biology

E (Project title): **Pop-up Satellite tagging in the Great Australian Bight.**

F (Problem): Data on SBT habitat and movement in the areas targeted by the Australian surface fishery are now typically ~20 years old. Over that time, the surface fishery has needed to move its operations and seen changes in the size structure of fish typically encountered in the GAB. Additionally, the GAB and SE region has seen changes to oceanographic conditions.

G (Objectives): The tags will return information on depth/temperature preferences, short term (<2 years) movements and allow an insight into contemporary movement patterns and comparisons with legacy archival tag data from the late 1990s-2000s.

H (Rationale): The project will improve habitat understanding and potentially habitat prediction for the Australian fishery as well as contribute to understanding of plasticity in the movement patterns of juvenile SBT. We therefore seek 0.5 t of research mortality allowance (RMA) to facilitate deployment of 20-50 (dependent

on funding) pop-up satellite tags on juvenile SBT (ages 2-4) in South-Eastern Australian waters.

I (Impact Scale): High

J (Impact timing): Med

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

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

** (budget source): No funding for this research is sought from the CCSBT

Proposal #7. Develop methods for estimating UAM

A (Start year): 2023

B (Duration): Two years

C (General category): Both

D (Sub category): Catch (unreported catch)

E (Project title): **Develop methods for estimating UAM**

F (Problem): UAM estimates are currently indirect and sensitive to the estimation methodology. The feasibility of improving these methods is uncertain because of the complex nature of the input data and assumptions (e.g., ESC25 para. 179, 181, 182).

G (Objectives): Convene an inter-sessional working group, supported by knowledgeable experts and contractors from member countries, to investigate and further develop methodologies for estimating unaccounted (fishing) mortality (UAM) catches from non-cooperating, non-member countries.

H (Rationale): UAM estimates are uncertain, but critical, for both the MP and the stock assessment.

I (Impact Scale): High

J (Impact timing): Short

K (Priority): High

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

** (budget source): CCSBT Secretariat

Budget:

2023-24
30 – 40 d Consultant(s)
Updates of UAM would not be conducted; rather a thorough exploration of the data and data sources would be undertaken with input from a moderately large group of experts (e.g. compliance specialists, data experts, SBT fisheries experts)
2 – 3 workshops need over a 2 year period; 1 or 2 could be virtual but at least one in-person meeting is desirable.

Proposal #8. Second workshop on otolith-based ageing of southern bluefin tuna

A (Start year): 2023

B (Duration): 1 year

C (General category): Operating model

D (Sub category): Biology

E (Project title): **Second workshop on otolith-based ageing of southern bluefin tuna**

F (Problem): Quality control of age data is extremely important to ensure high quality age estimates are generated for assessment and management needs. It is important to standardise approaches for converting increment counts to age estimates (including decimal ages) amongst member laboratories. The last age validation workshop was held in 2002.

G (Objectives): Improve age estimation protocols and quality control procedures (checking precision and drift). Improve decimal age estimation methods. Revise the age determination manual including methods related to reading otolith margins. Provide capacity building training for members who have not been involved in SBT age estimation.

H (Rationale): The project will improve age-based parameters for assessment and management advice for SBT.

I (Impact Scale): High

J (Impact timing): Medium

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

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

** (budget source): CCSBT Secretariat AU$37,000.

- Costs of an invited expert: e.g., Kyne Krusic-Golub (Fish Ageing Services Pty Ltd, Australia).
- 100 otoliths prepared and daily aged to assist decimal age estimation following Farley et al. (2021; CCSBT-ESC/2108/11).
- Interpreters
- Members to pay their own travel expenses.

Proposal #9. Age-0 distribution survey

A (Start year): Ongoing. The first survey carried out in 2019.

B (Duration): 5 years (every year)

C (General category): Both

D (Sub category): Biology

E (Project title): **Age-0 distribution survey**

F (Problem): It is unknown when, where and how the fish born at the spawning grounds migrate to the northwestern coast of Australia at the age of 3 months old in age-0 fish.

G (Objectives): Obtain information of age-0 SBT distribution

H (Rationale): Based on the understanding of the age-0 fish distribution, the recruitment index for age-0 fish can be developed. It helps to examine the ecological problem of SBT, which affects the stock assessment and management, for example, the hypothesis that the migratory route divides east and west off the southwest coast of Australia.

I (Impact Scale): Med

J (Impact timing): Med

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

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

** (budget source): The Japanese government is contributing the budget.

Attachment 6

Summary of recent trends in all indicators of the SBT stock

Indicator	Period	Min.	Max.	2018	2019	2020	2021	2022	12-month trend	Main Ages	NOTES
Trolling index (piston line)	1996–2003 2005–06 2006–14 2016–22	0.00 (2018, 2019)	5.09 (2011)	0.00	0.00	1.72	–	0.887	–	1	
Trolling index (grid)	1996–2003 2005–14 2016–22	0.26 (2002)	1.77 (2008, 2011)	0.655	0.375	0.779	0.416	0.551	↑	1	
Gene tagging	2016–19	1.14 (2018)	2.27 (2016)	1.14	1.52	–	–		–	2	
NZ domestic standardised CPUE	2003–2021	0.355 (2006)	2.99 (2016)	2.25	1.21	1.94	2.45		↑	All	
NZ domestic age/size composition (proportion age 0–5 SBT)*	1980–2021	0.001 (1985)	0.48 (2017)	0.33	0.27	0.24	0.25		↑	2-5	Peripheral Area
Indonesian mean size class**	1993–19	156 (2016)	188 (1994)	161.9	161.1	–	–		–	spawners	
Indonesian age composition:** mean age on spawning ground, all SBT	1994–19	11.8 (2016)	21.2 (1995)	13.4	13.2	–	–		–	spawners	
Indonesian age composition:** mean age on spawning ground 20+	1994–19	21.3 (2016)	25.3 (2004)	23.1	22.4	–	–		–	Older spawners	
Indonesian age composition:** median age on spawning ground	1994–19	11.5 (2017)	21.5 (1994–95; 1996–97; 1998–99)	12.5	12.5	–	–		--	spawners	

Indicator	Period	Min.	Max.	2018	2019	2020	2021	12-month trend	Main Ages	Notes
Japanese nominal CPUE, age 4+	1969–2021	0.34 (2006)	2.73 (1969)	1.24	1.21	1.13	1.17	↑	4+	
Japanese standardised CPUE, age 4+ (new GAM series for OM/MP)	1969–2021	0.38 (2006)	2.43 (1969)	1.82	2.11	1.52	1.49	↓	4+	
Korean nominal CPUE	1991–2020	1.312 (2004)	21.523 (1991)	7.406	8.702	7.487	7.879	↑	4+	Bycatch effects
Korean standardised CPUE Area 8	1996-2020	0.36 (2002)	3.20 (2016)	–	–	2.24	2.51	↑	4+	
(selected data) Area 9	1996-2020	0.17 (2005)	2.56 (2019)	2.04	2.46	1.80	1.82	↑		
Korean standardised CPUE Area 8	1996-2020	0.42 (2002)	3.63 (2020)	–	–	2.64	2.85	↑	4+	
(clustered) Area 9	1996-2020	0.18 (2005)	2.63 (2020)	2.03	2.46	1.82	1.85	↑		
Taiwanese nominal CPUE, Areas 8+9	1981–2020	<0.001 (1985)	0.956 (1995)	0.217	0.204	0.283	0.388	↑	2+	Bycatch effects
Taiwanese nominal CPUE, Areas 2+14+15	1981–2020	<0.001 (1985)	3.672 (2007)	1.686	1.638	1.324	2.325	↑	2+	Bycatch effects
Taiwanese standardised CPUE (Area E)	2002-2021	0.089(2004)	0.947 (2021)	0.830	0.750	0.843	0.947	↑	2+	In development
(Area W)	2002-2021	0.185(2016)	1.303 (2002)	0.221	0.192	0.369	0.673	↑		Bycatch effects
Japanese age comp, age 0–2*	1969–2021	0.004 (1966)	0.192 (1998)	0.006	0.009	0.004	0.007	↑	2	Affected by release/discard
Japanese age comp, age 3*	1969–2021	0.011 (2015)	0.228 (2007)	0.047	0.082	0.080	0.111	↑	3	Affected by release/discards
Japanese age comp, age 4*	1969–2021	0.091 (1967)	0.300 (2010)	0.145	0.160	0.087	0.149	↑	4	
Japanese age comp, age 5*	1969–2021	0.072 (1986)	0.300 (2010)	0.123	0.196	0.089	0.092	↑	5	
Taiwanese age/size comp, age 0–2*	1981–2021	<0.001 (1982)	0.251 (2001)	0.009	0.015	0.002	0.004	↑	Mostly 2	
Taiwanese age/size comp, age 3*	1981–2021	0.024 (1996)	0.349 (2001)	0.063	0.108	0.059	0.101	↑	3	
Taiwanese age/size comp, age 4*	1981–2021	0.027 (1996)	0.502 (1999)	0.234	0.168	0.169	0.317	↑	4	
Taiwanese age/size comp, age 5*	1981–2021	0.075 (1997)	0.428 (2018, 2021)	0.428	0.338	0.325	0.428	↑	5	
Australia surface fishery median age composition	1964–2021	age 1 (1979–80)	age 3 (multiple years)	age 3	age 2	age 2	age 2	–	1-4	

Indicator		Period	Min.	Max.	2018	2019	2020	2021	12-month trend	Ages	Notes
Jpn LL standardised CPUE (age 3)	w0.5^	1969–2021	0.23 (2003)	3.32 (1972)	0.56	0.71	1.16	1.38	↑	3	Affected by release/discard
	w0.8		0.26 (2003)	3.04 (1972)	0.75	0.88	1.52	1.77			
Jpn LL standardised CPUE (age 4)	w0.5^	1969–2021	0.27 (2006)	2.95 (1974)	1.13	1.06	0.85	1.29	↑	4	
	w0.8		0.29 (2006)	2.59 (1974)	1.52	1.30	1.06	1.61			
Jpn LL standardised CPUE (age 5)	w0.5^	1969–2021	0.23 (2006)	2.71 (1972)	0.89	1.31	0.86	0.88	↑	5	
	w0.8		0.25 (2006)	2.42 (1972)	1.17	1.63	1.06	1.08			
Jpn LL standardised CPUE (age 6&7)	w0.5^	1969–2021	0.18 (2007)	2.47 (1976)	1.04	0.97	1.35	1.13	↓	6-7	
	w0.8		0.20 (2007)	2.18 (1976)	1.32	1.21	1.72	1.42			
Jpn LL standardised CPUE (age8-11)	w0.5^	1969–2021	0.27 (2007)	3.81 (1969)	0.87	0.83	1.41	1.13	↓	8-11	
	w0.8		0.29 (1992)	3.31 (1969)	1.13	1.07	1.82	1.47			
Jpn LL standardised CPUE (age 12+)	w0.5^	1969–2021	0.45 (2017)	3.44 (1970)	0.56	0.47	1.02	0.87	↓	12+	
	w0.8		0.59 (1997)	2.92 (1970)	0.75	0.61	1.29	1.13			

*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).

Note that the close kin mark recapture index is not provided in this table as the years for which the index is available do not match the years covered in the table. See the text in agenda item 8 for information on the index.

Attachment 7

Report on Biology, Stock Status and Management of Southern Bluefin Tuna: 2022

The CCSBT Extended Scientific Committee (ESC) updated the stock assessment and conducted a review of fisheries indicators in 2020 to provide updated information on the status of the stock. The next stock assessment is scheduled in 2023. This report updates the description of fisheries and the state of stock as advised in 2022 by the ESC using the most recent information.

1. Biology

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

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

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

2. Description of Fisheries

Reported catches of SBT up to the end of 2021 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 - 2021,

77% of the reported catch was taken by longline and 23% using surface gears, primarily purse-seine and pole and line (Figure 1). The proportion of reported catch made by the surface fishery peaked at 50% in 1982, dropped to 11-12 % in 1992 and 1993 and increased again to average 34% since 1996 (Figure 1). The Japanese longline fishery (taking a wide age range of fish) recorded its peak catch of 77,927t in 1961 and the Australian surface fishery catches of young fish peaked at 21,501t in 1982 (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, 78.3% of the SBT catch has been made in the Indian Ocean, 16.8% in the Pacific Ocean and 4.9% in the Atlantic Ocean (Figure 2). The reported Atlantic Ocean catch has varied widely between about 18t and 8,200t since 1968 (Figure 2), averaging 1,348t over the past two decades. This variation in catch reflects shifts in longline effort between the Atlantic and Indian Oceans. Fishing in the Atlantic occurs primarily off the southern tip of South Africa (Figure 4). Since 1968, the reported Indian Ocean catch has declined from about 45,000t to less than 11,000t, averaging 17,985t, and the reported Pacific Ocean catch has ranged from about 800t to 19,000t, averaging 4,980t 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. The 2020 stock assessment indicated that the SBT TRO is at 20% of its initial biomass as well as below the level that could produce maximum sustainable yield. The 2020 assessment indicated the stock has increased from a low of 10% of initial TRO in 2009.

A new stock assessment will be carried out in 2023. In 2022, however, further indication of stock status was available through reconditioning and future projections using the adopted management procedure. This is not a full stock assessment but is useful in providing an interim update on stock status informed by more recent data and accounting for recent removals. The interim estimates of stock status are consistent with those from the 2020 stock assessment and suggest the stock is continuing to rebuild and in 2021 the SBT TRO was at 22% of its initial biomass, still below the level that could produce maximum sustainable yield.

A review of indicators in 2022 shows little overall change since the 2020 review. Age 1 recruitment may have decreased somewhat in recent years, but recruitment levels still remain above historical averages. 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

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

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 on the new MP. The CCSBT set TAC for 2021-2023 in line with advice from the ESC.

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

The allocations of the TAC to Members and Cooperating Non-Members of the CCSBT from 2016 to 2021 is summarised below. In addition, some flexibility is provided to Members for limited carry-forward of unfished allocations between quota years.

Current Allocations to Members (tonnes)

	2016-2017	2018-2020	2021-2022
Japan	4,737	6,117[1]	6,197.4[3]
Australia	5,665	6,165	6,238.4[3]
Republic of Korea	1,140	1,240.5	1,256.8
Fishing Entity of Taiwan	1,140	1,240.5	1,256.8
New Zealand	1,000	1,088	1,102.5
Indonesia	750	1,023[1]	1,122.8[3]
European Union	10	11	11
South Africa	150	450[2]	455.3[3]

Current Allocations to Cooperating Non-Members (tonnes)

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

Monitoring, Control and Surveillance

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

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

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

In addition, the CCSBT has implemented a Quality Assurance Review (QAR) program to provide independent reviews to help Members identify how well their management systems function with respect to their CCSBT obligations and to provide

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

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

[4] Ceased 12 October 2017.

recommendations on areas where improvement is needed. It is further intended that QARs will:

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

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

Catch Documentation Scheme

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

Monitoring of SBT Transhipments

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

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

Transhipments in port must be to an authorised carrier vessel (container vessels are exempted) at designated foreign ports and, amongst other things, require prior

notification to Port State authorities, notification to Flag States, and transmission of the CCSBT transhipment declaration to the Port State, the Flag State and the CCSBT Secretariat.

Port State Measures

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

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

List of Approved Vessels and Farms

The CCSBT has established records for:

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

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

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

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

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

Vessel Monitoring System

The CCSBT Vessel Monitoring System (VMS) came into effect immediately after the

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

5. Scientific Advice

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

At its 2022 meeting, the ESC used the adopted MP to calculate a recommended TAC for the period 2024-2026. The recommended TAC is 20,647 tonnes which is an increase of 3,000 tonnes, the maximum allowed under the adopted MP.

6. Biological State and Trends

The 2020 stock assessment indicated that the SBT TRO is at 20% of its initial level and remains below the target and the level that could produce maximum sustainable yield. However, as estimated by the 2020 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 2023. An interim update available in 2022 suggests the stock is continuing a slow upward trend with an indication that the SBT TRO in 2021 is at 22% of its initial level. Note that the summary presented below relies on the last full stock assessment and will be updated following the 2023 full stock assessment.

Exploitation rate: Moderate (Below F_{MSY})

Exploitation state: Overexploited

Abundance level: Low abundance

SOUTHERN BLUEFIN TUNA SUMMARY FROM ESC in 2020 (global stock)	
Maximum Sustainable Yield	33,207t (31,471-34,564t)
Reported (2020) Catch	16,441t
Current (2020) biomass (B10+)	204,596t (184,272-231,681)
Current condition relative to initial	
TRO	0.20 (0.16–0.24)
B10+	0.17 (0.14–0.21)
TRO (2020) Relative to TRO_{msy}	0.69 (0.49–1.03)
Fishing Mortality (2019) Relative to F_{msy}	0.52 (0.37–0.73)
Current Management Measures	Effective Catch Limit for Members and Cooperating Non-Members: 17,647t per year for the years 2021-2023

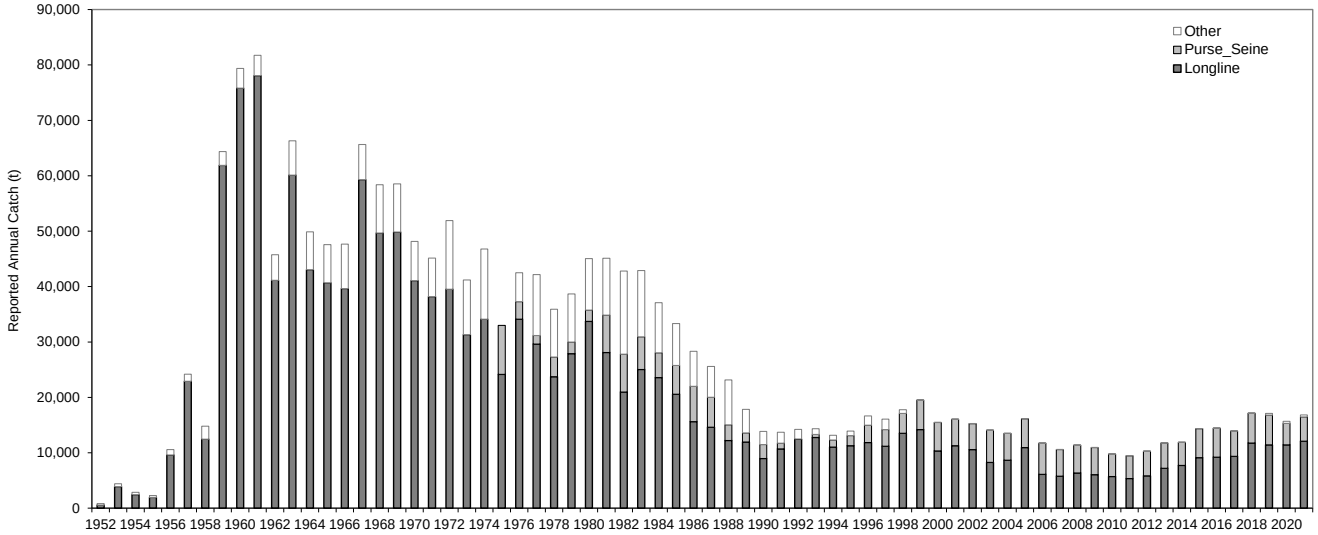

Figure 1: Reported southern bluefin tuna catches by fishing gear, 1952 to 2021. Note: a 2006 review of SBT data indicated that catches over the preceding 10 to 20 years may have been substantially under-reported.

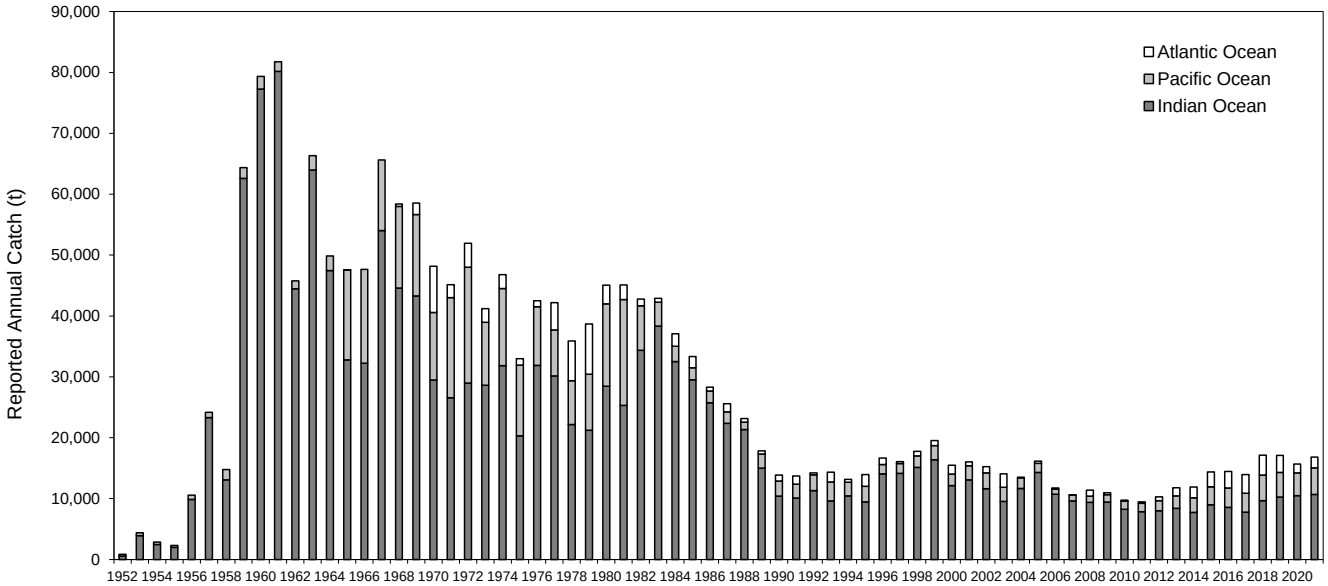

Figure 2: Reported southern bluefin tuna catches by ocean, 1952 to 2021. Note: a 2006 review of SBT data indicated that catches over the preceding 10 to 20 years may have been substantially under-reported.

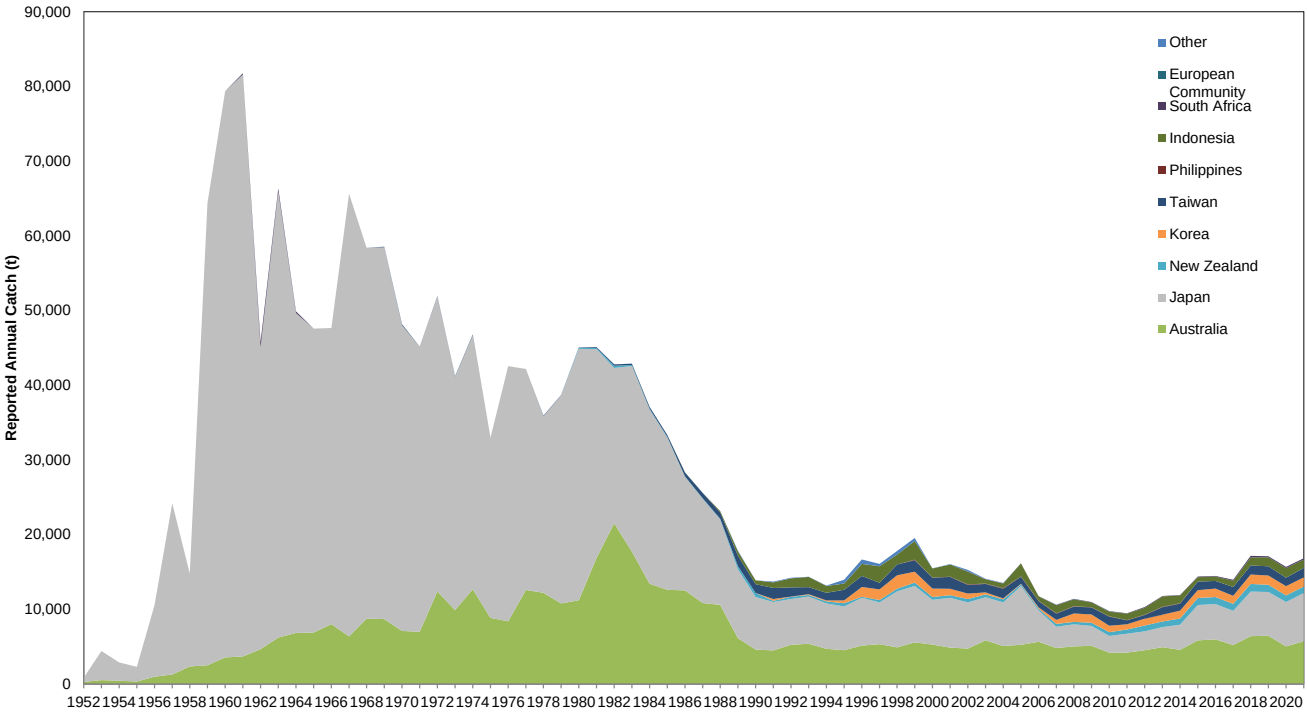

Figure 3: Reported southern bluefin tuna catches by flag, 1952 to 2021. Note: a 2006 review of SBT data indicated that catches over the preceding 10 to 20 years may have been substantially under-reported.

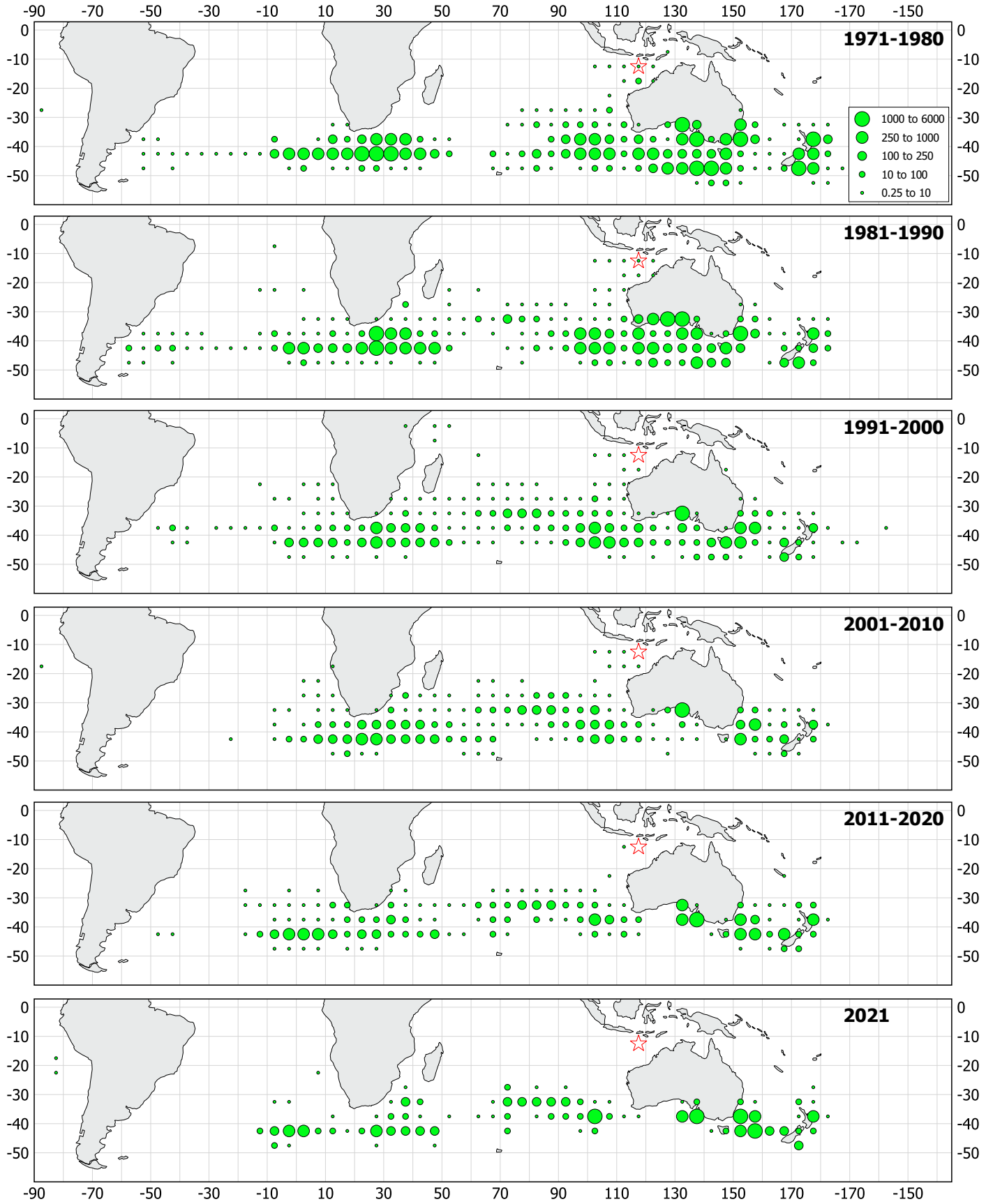

Figure 4: Geographical distribution of average annual reported southern bluefin tuna catches (t) by CCSBT members and cooperating non-members over the periods 1971-1980, 1981-1990, 1991-2000, 2001-2010, 2011-2020, and 2021 per 5° block. The area marked with a star is an area of significant catch in the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

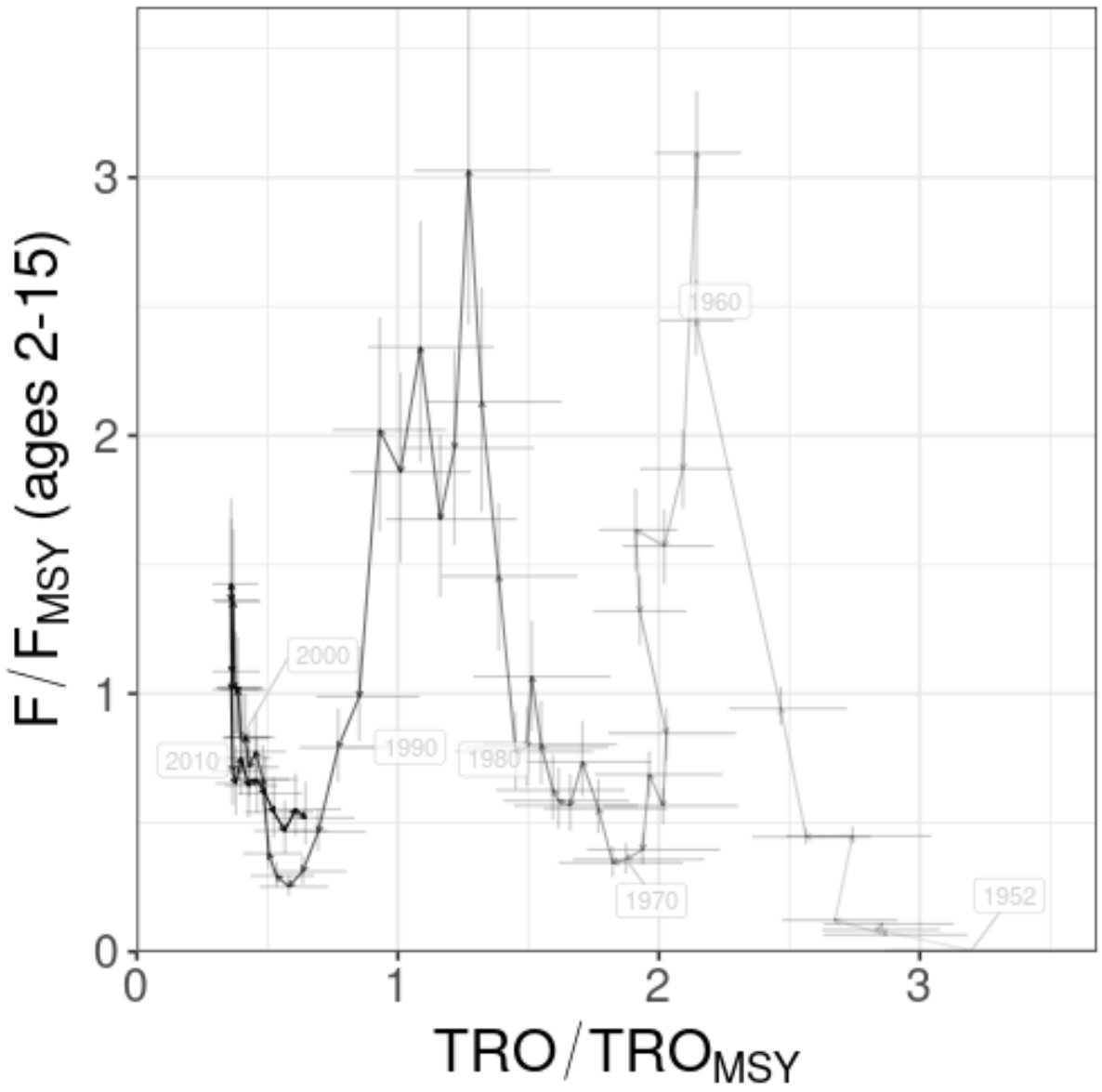

Figure 5. Time trajectory from 1952 to 2019 of median fishing mortality over the F_{MSY} (for ages 2-15) versus Total Reproductive Output (TRO) over TRO_{MSY}. The fishing mortality rates are based on biomass-weighted values and the relative fishery catch composition and mean SBT body weights in each year. Vertical and horizontal lines represent 25th-75th percentiles from the operating model grid.

Attachment 8

CCSBT Scientific Research Program 2023-2027

This document outlines the CCSBT Scientific Research Program for the period 2023-2027.

Historical context for CCSBT's Scientific Research Program

The CCSBT Scientific Research Program (SRP) was initiated in 2000 to address priority scientific monitoring and research requirements for the assessment of southern bluefin tuna (SBT) and management of the fishery (CCSBT 2000). The External Scientific Advisory Panel was engaged by the Commission to design the SRP in consultation with national scientists. In designing the SRP, the focus was on where potential improvements could be made in stock assessment inputs, basic fishery data (e.g. size and age distribution), biological parameters (e.g. natural mortality, age of maturity, growth rates etc), and absolute and/or relative measures of abundance (e.g. CPUE, fishery independent surveys, tagging experiments) (CCSBT 2000).

The original SRP identified the following four research areas where direct CCSBT initiatives could reduce uncertainty in the stock assessment over the short term (CCSBT-SC 2001, Attachment D):

1. Characterisation of the catch
2. CPUE interpretation and analyses
3. Development of a Scientific Observer Program
4. Development of a SBT Tagging Program.

The SRP has since involved a combination of tactical and strategic research activities identified to meet relevant research priorities over 5 year windows. Following a review at ESC12 in 2007 (Anon. 2007, Davies et al 2007, Itoh et al 2007), the 2008-2013 SRP shifted focus to redevelopment of the operating models, including the incorporation of the scientific aerial survey, and the design and testing of candidate management procedures, which culminated in the Bali Procedure (Anon 2011; Hillary et al 2016).

The structure and priorities for the 2014-2018 SRP developed over time as part of ESC17 (Anon 2012, Attachment 8, Davies et al 2012), the CCSBT strategic plan (CCSBT, 2011), and CCSBT's first independent performance review (Garcia and Koehler, 2014) (Anon 2013, Attachment 12). The new structure adopted by the ESC distinguished between the ongoing monitoring and work program associated with the stock assessment and MP from explicit research activities to be defined in the SRP.

Initial review of the 2014-18 SRP (Anon. 2021, paras 170-194; Davies and Preece 2021, Table 1) at ESC 25 noted how the SRP had been central to progress in the following areas:

1. **Characterisation of catch:** Encapsulating a greater proportion of total removals by defining attributable catch by the Extended Commission, developing approaches to estimating non-member UAM, and including UAM in operating

model (OM) conditioning have all improved stock assessment performance and management advice.

2. **Abundance indices:** Development and implementation of gene-tagging as an alternative to the scientific aerial survey for recruitment monitoring, updating Close-kin Mark Recapture (CKMR) genetic methods for direct monitoring of spawning SBT, and increased attention to alternative CPUE series have collectively reduced uncertainty in SBT abundance and stock assessment estimates.
3. **Biological parameters:** Fishery-independent estimates of size and age at maturity from autumn/winter feeding grounds along with standardised histological and reproductive staging methods reduced uncertainty about key biological traits of SBT.
4. **MP Implementation:** Methods developed to include gene-tagging and CKMR in candidate management procedures and the development, testing, and selection of the Cape Town Procedure reduce uncertainty in future SBT abundance and catch.
5. **Stock Assessment (OM development):** Modifying OM specifications and code to incorporate the new CKMR and gene-tagging data in conditioning and projections. Among other things, the new CKMR data improved estimates of natural mortality for the age-10+ SBT age-class (M10).

Strategic Research Priorities for the 2023-2027 SRP

The five SRP research priorities given above aim to improve stock assessment and management advice by reducing key uncertainties, as well as to pursue, where practical, basic research that improves our understanding of SBT biology. Table 1 lists priority research topics within each of these five main categories based on discussions at the most recent ESC, as well as within the 2022 SRP Working Group.

Table 1. Research priorities organised into the 5 SRP areas. Priorities are arranged in approximate rank order of importance.

1. **Characterisation of Catch**
    - Quantify sources of UAM and, in particular, develop methods for determining plausibility of indirect estimates of non-member UAM to include in future stock assessments and regular evaluation of exceptional circumstances for the MP
    - Reduce uncertainty in length and age composition of Indonesian catches and assignment to statistical areas for use in the stock assessment
    - Address current uncertainty in the magnitude and fate of discards by fishery for estimating total removals.
    - Review the potential value (via OM simulation) and feasibility of collecting tissue samples for epigenetic ageing of SBT as an alternative/complementary source of age data.

2. **Abundance indices**
    - Develop CPUE series to reflect alternative hypotheses for stock and fishery distributions in OM conditioning and MP exceptional circumstances
    - Explore and, where possible, refine CPUE monitoring series incorporating longline data from other fishing fleets
    - Continue development of alternative recruitment indices (e.g., piston-line survey, Taiwanese CPUE)
3. **Biological Parameters**
    - Complete unbiased estimation (e.g., histology, gonad samples) of size/age at maturity Complete age validation review workshop as agreed at ESC18 (high priority)
    - Review observer protocols and standard operating procedures for collection of additional biological samples (e.g. tissue samples for determining sex and age via DNA)
    - Investigate processes (e.g., selectivity, migration behaviour, skip spawning, within season
    - spawning frequency) leading to higher realised reproductive potential of larger SBT. Differential reproductive output at length is relevant to CKMR (φ parameter) estimates of spawning stock size Investigate spatial and temporal changes in biological processes, parameters, and dynamics of SBT stock, including
    - Rates of growth and variation in size-at-age over period of stock rebuilding
    - Timing and rate of migration 2-3 year old fish within the GAB and implications for recruitment monitoring (i.e. gene-tagging).
    - Short to medium-term changes in the spatial and temporal distribution across the current and historical range of the stock in response to changing environmental conditions and the distribution of fishing effort, as it relates to interpretation of CPUE as an index of stock abundance.
    - Medium to longer-term changes in the distribution of the stock as it rebuilds and the extent to which different life-history stages expand into areas they previously occupied (e.g., juveniles in SE Australia).
4. **MP implementation**
    - Develop criteria and schedule for CTP performance review
5. **Stock Assessment and OM development**
    - Develop new SBT assessment and OM platform for potential application by 2026 (high priority)
    - Determine direct ageing needs to enable the potential to move from fitting size distributions to estimated age frequency distributions
    - Develop a spatially explicit simulation model to explore ways of incorporating SRP tagging data into stock assessment and OM, as well as to investigate potential impacts of climate change on SBT stock and fisheries

Attachment 9

Template for submitting and prioritizing CCSBT Scientific Research Program proposals

A consistent format for submitting CCSBT SRP proposals would help to streamline the evaluation process. This template is meant to provide an informative summary of research proposals that can be easily sorted, searched, evaluated, and prioritised.

Description of template fields

A. Start year – the year in which the project is expected to begin and for which funding is needed. Ongoing projects should use "Ongoing" instead of a numerical year, e.g., 2022

B. Duration – the number of years, restricted to the duration of the current SRP C. General category – currently operating model (OM), Cape Town Procedure (CTP), or Both

D. Sub-category – these are roughly the original categories from the 2014-2018 SRP: Catch, Indices, Biology, Assess, Review

E. Project title – a concise, informative title for the project

F. Problem – a brief description of the specific problem being addressed

G. Objectives – a list of concise project objectives, which should include the main research objectives as well as an objective for how the results will be incorporated/implemented in the General Category (e.g., how results will be incorporated into the OM or CTP or Both)

H. Rationale – a brief statement justifying the project based on importance and impact

I. Impact-Scale – High, Med, Low impact on the General Category

J. Impact-Timing – expected timeframe in which the Impact-Scale will occur. These are labelled Short1 (within 1 year), Med2-4 (2-4 years), and Long6+ (more than 6 years)

K. Priority – to be completed at ESC meetings

L. Rank – to be completed at ESC meetings

M. Budget – get advice from the Secretariat on costs of in-person meetings, attendance of panel and chair, translation, venue and clarify if these are extra days attached to existing meetings.

N. CCSBT Funding Required – Note if CCSBT funds are required.

2021 CCSBT Performance Review recommendations ordered by ESC Members' view of Priority

Scores in columns "[1]" to "[4]" are the number of Members that responded to a question with the stated answer.

The "Priority score" is calculated by the following rules applied to column "[2]":
(1) Allocate 3 points for each "High" Priority, 2 points for "Medium", and 1 point for "Low" or N/A (if a Member answered "No" for question 1, it is treated as N/A).
(2) Multiply the number of Members to corresponding points above (1), then sum these up as "Priority score". The highest is 18, and the lowest score is 6.

The table below shows Performance Review recommendations ordered by Priority score.
Within the same score, recommendations are ordered based on the recommendation number (e.g. PR2021-01).

Recommendation No.	Recommendation	[1] Whether you consider this to be an appropriate recommendation for the ESC to consider (i.e. within the ESC's scope); **(Yes/No)**	These columns are only completed when a Member answered "Yes" in column (1)				Priority Score
			[2] Priority of the recommendation from your perspective **(e.g. low, medium, high)**	[3] The level of action required for the recommendation **(e.g. no action required, continue current level of activity, or new action required)**	[4] Which CCSBT body is recommended to take the lead for implementing the recommendation? **(e.g., ERSWG, ESC, CC or EC)**	[5] Pertinent comments relating to the recommendation	
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.	**Yes: 6** **No: 0**	**High: 5** **Medium: 0** **Low: 1** **N/A: 0**	**No action: 1** **Continue: 4** **New action: 1** **N/A: 0**	***ESC: 2.5*** **ERSWG: 0** **CC: 1.5** **EC: 2** **SFMWG: 0** **N/A: 0**	(AU) Reducing uncertainty in member catches and other sources of UAM is a high priority for the ESC. Continued compliance is a high priority, particularly with regard to evidence for scale of NM-UAM. We can't see any particular role for ESC in the recommendation except perhaps in reminding members of advantages of the management procedure and the potential risk to the stock in not following MP advice. (ID) New Action Required, i.e if CCSBT has not confidence on the estimation of SBT from Non members. Need a dedicated activity to estimate the catches from non member. (need to recheck wether this activity been established and need to continue). (NZ) Overall accountability must lie with Commission for this issue.	**16**
PR2021-26	Continue monitoring to ensure the effectiveness of the rebuilding strategy for SBT.	**Yes: 6** **No: 0**	**High: 5** **Medium: 0** **Low: 1** **N/A: 0**	**No action: 0** **Continue: 6** ***New action: 0*** **N/A: 0**	**ESC: 4.5** **ERSWG: 0** **CC: 0.5** **EC: 1** **SFMWG: 0** **N/A: 0**	(AU) This is the role of ESC. (ID) Retain current practice.	**16**
PR2021-08	Conduct capacity building programs to improve data collection and reporting, in particular in developing countries.	**Yes: 6** **No: 0**	**High: 3** **Medium: 3** **Low: 0** **N/A: 0**	**No action: 0** **Continue: 3** **New action: 3** **N/A: 0**	**ESC: 3.5** **ERSWG: 0** **CC: 1** **EC: 1.5** **SFMWG: 0** **N/A: 0**	(AU) Is not clear if the recommendation is to the Commission, or to Members, or both. (ID) Expand training on Data Collection, CPUE analysis, growth, aging, genetic and stock assessment. (JP) If requested by developing Members. (NZ) ESC can advise on where improvements are necessary.	**15**
PR2021-16	Continue to study spatial aspects of the SBT stock structure and movements, and the fleets that exploit SBT.	**Yes: 6** **No: 0**	**High: 3** **Medium: 3** **Low: 0** **N/A: 0**	**No action: 0** **Continue: 6** ***New action: 0*** **N/A: 0**	**ESC: 6** **ERSWG: 0** **CC: 0** **EC: 0** **SFMWG: 0** **N/A: 0**	(AU) Key data requirement for ESC. (ID) Re-inform past activities of spatial studies for SBT and explore possible new activities for this in the future.	**15**
PR2021-23	Prioritise the establishment and ongoing review of long-term strategic planning in the ESC.	**Yes: 6** **No: 0**	**High: 4** **Medium: 1** **Low: 1** **N/A: 0**	**No action: 0** **Continue: 6** ***New action: 0*** **N/A: 0**	**ESC: 5.33** **ERSWG: 0** **CC: 0** **EC: 0.33** **SFMWG: 0.33** **N/A: 0**	(AU) Is this the SRP? (ID) Retain current practice.	**15**

Recommendation No.	Recommendation	[1] Whether you consider this to be an appropriate recommendation for the ESC to consider (i.e. within the ESC's scope); **(Yes/No)**	These columns are only completed when a Member answered "Yes" in column (1)				Priority Score
			[2] Priority of the recommendation from your perspective **(e.g. low, medium, high)**	[3] The level of action required for the recommendation **(e.g. no action required, continue current level of activity, or new action required)**	[4] Which CCSBT body is recommended to take the lead for implementing the recommendation? **(e.g., ERSWG, ESC, CC or EC)**	[5] Pertinent comments relating to the recommendation	
PR2021-12	Continue to develop and embed innovative methods such as gene tagging and close-kin mark-recapture to improve scientific processes.	**Yes: 6** **No: 0**	**High: 4** **Medium: 0** **Low: 2** **N/A: 0**	**No action: 0** **Continue: 5** **New action: 1** **N/A: 0**	**ESC: 6** **ERSWG: 0** **CC: 0** **EC: 0** **SFMWG: 0** **N/A: 0**	(AU) It is important to continually monitor innovative methods in stock assessment. (ID) The continuation of SBT sampling through sampling activity in Benoa port. Need to develop Material Transfer Agreement and clear process. (NZ) Dependent on available funding.	**14**
PR2021-22	Formulate and implement a capacity-building work plan to improve data collection, scientific analysis, and compliance-related activities.	**Yes: 6** **No: 0**	**High: 2** **Medium: 4** **Low: 0** **N/A: 0**	**No action: 0** **Continue: 4** **New action: 2** **N/A: 0**	**ESC: 3.5** **ERSWG: 0** **CC: 0.5** **EC: 2** **SFMWG: 0** **N/A: 0**	**[Half of ERSWG-attended Members considered the ESC should take a lead]** (AU) Yes, subject to resourcing and relating to ESC. Probably a wider Commission discussion is needed. (ID) Evaluate past capacity building work plan (WP) – need recheck and carry over the outstanding WP. (NZ) A distinction should be made between the responsibilities of the ESC, CC, and EC for this recommendation.	**14**
PR2021-10	Conduct analysis on the use of electronic monitoring to supplement human observer coverage in SBT fisheries.	**Yes: 5** **No: 1**	**High: 2** **Medium: 2** **Low: 1** **N/A: 0**	**No action: 1** **Continue: 0** **New action: 3** **N/A: 1**	***ESC: 2*** **ERSWG: 0** **CC: 2** **EC: 0** **SFMWG: 0** **N/A: 1**	(AU) Noting Australia has already reported on congruence and compatibility research outcomes. Cross RFMO consistency an important issue. (ID) Need trial for EM for ID LL and capacity building for EM analysis. (NZ) AU and NZ can build on the analyses they have previously undertaken, while the ESC can conduct additional analysis.	**12**
PR2021-15	Continue to contribute to efforts by tuna RFMOs to develop management strategy evaluation and implementation capacity through the Joint Technical Working Group on MSE, and other avenues.	**Yes: 6** **No: 0**	**High: 2** **Medium: 2** **Low: 2** **N/A: 0**	**No action: 0** **Continue: 6** ***New action: 0*** **N/A: 0**	**ESC: 5** **ERSWG: 0** **CC: 0** **EC: 1** **SFMWG: 0** **N/A: 0**	(ID) Capacity building for MSE, through training and Scientific management dialogue.	**12**
PR2021-17	Address inconsistencies across Members in terms of quality and completeness of data reporting.	**Yes: 5** **No: 0** **Unclear: 1**	**High: 2** **Medium: 1** **Low: 2** **N/A: 1**	**No action: 0** **Continue: 5** ***New action: 0*** **N/A: 1**	***ESC: 1*** **ERSWG: 0** **CC: 2** **EC: 1** **SFMWG: 0** **N/A: 1** **Secretariat: 1**		**12**
PR2021-06	Consider the feasibility of a collaborative programme (between RFMOs and institutions with competency in biodiversity conservation) to forecast the likely impacts of climate change on tuna ecosystems, SBT, ERS, and their productivity, distribution, and resilience.	**Yes: 6** **No: 0**	**High: 1** **Medium: 3** **Low: 2** **N/A: 0**	**No action: 1** **Continue: 0** **New action: 5** **N/A: 0**	**ESC: 4.5** **ERSWG: 1.5** **CC: 0** **EC: 0** **SFMWG: 0** **N/A: 0**	(AU) Maybe ESC. Similar to the tRFMO bycatch WG, and the Kobe process. Perhaps also a role for FAO. Broader than CCSBT, but perhaps ESC could lead. We note also possible links to this activity and activity likely under the eventual BBNJ Treaty. (ID) Need additional budget and resources (are there implication to increase share budget among members). While acknowledging that climate change is important aspect to consider for SBT management, the ID expertise in this area is limited. (NZ) A distinction should be made between the responsibilities of the ESC and ERSWG on this recommendation.	**11**
PR2021-09	Increase efforts to improve observer coverage, in accordance with the standard agreed by the CCSBT.	**Yes: 4** **No: 2**	**High: 2** **Medium: 1** **Low: 1** **N/A: 0**	**No action: 0** **Continue: 3** **New action: 1** **N/A: 0**	***ESC: 1*** **ERSWG: 0** **CC: 3** **EC: 0** **SFMWG: 0** **N/A: 0**	(AU) Noting this should allow for and encourage EM as an alternative or supplement to human observers. (ID) Through capacity building on scientific observer program, Training On EM, communicating to Tuna Industry. (NZ) This is the responsibility of individual Members – potential for a role in the CC if Members are not meeting agreed standards.	**11**

Recommendation No.	Recommendation	[1] Whether you consider this to be an appropriate recommendation for the ESC to consider (i.e. within the ESC's scope); **(Yes/No)**	These columns are only completed when a Member answered "Yes" in column (1)				Priority Score
			[2] Priority of the recommendation from your perspective **(e.g. low, medium, high)**	[3] The level of action required for the recommendation **(e.g. no action required, continue current level of activity, or new action required)**	[4] Which CCSBT body is recommended to take the lead for implementing the recommendation? **(e.g., ERSWG, ESC, CC or EC)**	[5] Pertinent comments relating to the recommendation	
PR2021-21	Explore mechanisms for an increase in active participation of Members in the ESC process in developing advice to the EC, such as hosting hybrid meetings.	**Yes: 5** **No: 1**	**High: 1** **Medium: 3** **Low: 1** **N/A: 0**	**No action: 0** **Continue: 3** **New action: 2** **N/A: 0**	**ESC: 3** **ERSWG: 0** **CC: 0** **EC: 1** **SFMWG: 0** **N/A: 0** **Secretariat: 1**	(AU) Resumption of face to face ESC and OMMP Technical meetings is the highest priority in this regard as this allows for more active engagement and in the margins discussions and capacity building. Hybrid and virtual meetings are leading to less active participation. which could be complimented/extended with other meetings focussed specifically around capacity building. See ESC advice to EC (NZ) This is the responsibility of individual Members – potential for a role in the CC if Members are not meeting agreed standards.	**11**
PR2021-33	Encourage Non-Members with a history of fishing for SBT to cooperate with the CCSBT.	**Yes: 3** **No: 3**	**High: 2** **Medium: 1** **Low: 0** **N/A: 0**	**No action: 0** **Continue: 1** **New action: 2** **N/A: 0**	**ESC: 1** **ERSWG: 0** **CC: 0** **EC: 2** **SFMWG: 0** **N/A: 0**	(AU) Unsure if there remain any non-members with SBT catch history that have not already interacted with the Commission in some way or other. (ID) Need feedback from past effort by CCSBT to engage non members cooperate to CCSBT.	**11**
PR2021-54	Review the reporting templates periodically.	**Yes: 5.5** **No: 0.5**	**High: 2** **Medium: 1** **Low: 3** **N/A: 0**	**No action: 0** **Continue: 3** **New action: 2** **N/A: 1**	***ESC: 2.33*** **ERSWG: 1.33** **CC: 1.33** **EC: 0** **SFMWG: 0** **N/A: 1** **All: 2**	(ID) When Necessary (every 3 years?)	**11**
PR2021-55	ESC to improve accessibility of reports to non-technical readers.	**Yes: 6** **No: 0**	**High: 1** **Medium: 3** **Low: 2** **N/A: 0**	**No action: 0** **Continue: 2.5** **New action: 3.5** **N/A: 0**	**ESC: 6** **ERSWG: 0** **CC: 0** **EC: 0** **SFMWG: 0** **N/A: 0**	(AU) Encourage the use of non-technical summaries. (ID) Non-technical reader may need not to detail info rather a "short summary" of ESC outcome.	**11**
PR2021-18	Develop research capacity in Member countries, in particular developing States.	**Yes: 6** **No: 0**	**High: 1** **Medium: 2** **Low: 2** **N/A: 0** **Discuss: 1**	**No action: 0** **Continue: 1** **New action: 4** **N/A: 1**	**ESC: 3** **ERSWG: 1** **CC: 0** **EC: 1** **SFMWG: 0** **N/A: 1**	(AU) This is similar to PR2021-14. (ID) Attachment Program (scientists of DS is attached with the related work of SBT by developed member state).	**10**
PR2021-24	CCSBT should continue to implement CMMs based on ESC and ERSWG advice for both target and non-target stocks.	**Yes: 4** **No: 2**	***High: 2*** ***Medium: 0*** **Low: 1** **N/A: 1**	**No action: 0** **Continue: 3** ***New action: 0*** **N/A: 1**	***ESC: 1*** **ERSWG: 0** **CC: 2** **EC: 0** **SFMWG: 0** **N/A: 1**	(AU) The recommendation needs to be more specific. (NZ) It is not the responsibility of ESC to implement CMMs, only to develop the management advice. (ID) Retain current practice.	**10**
PR2021-29	Due to the central importance of spawning and recruitment for stock rebuilding, additional efforts should be made to develop, in Indonesian waters, spatio-temporal restrictions, equitable and compatible with the rest of the management strategy.	**Yes: 5** **No: 1**	**High: 1** **Medium: 2** **Low: 2** **N/A: 0**	**No action: 1** **Continue: 2** **New action: 2** **N/A: 0**	**ESC: 4.5** **ERSWG: 0** **CC: 0** **EC: 0.5** **SFMWG: 0** **N/A: 0**	(AU) But an initial scientific case would be needed justifying why this is necessary. (JP) SBT adult stock has increasing under current management by MP. Rather than any measures to area closure, improve of data collection is more important.	**10**

Recommendation No.	Recommendation	[1] Whether you consider this to be an appropriate recommendation for the ESC to consider (i.e. within the ESC's scope); **(Yes/No)**	These columns are only completed when a Member answered "Yes" in column (1)				Priority Score
			[2] Priority of the recommendation from your perspective **(e.g. low, medium, high)**	[3] The level of action required for the recommendation **(e.g. no action required, continue current level of activity, or new action required)**	[4] Which CCSBT body is recommended to take the lead for implementing the recommendation? **(e.g., ERSWG, ESC, CC or EC)**	[5] Pertinent comments relating to the recommendation	
PR2021-44	Continue to formalize and strengthen the information sharing with other RFMO secretariats and alternative information sources.	**Yes: 3** **No: 2** **Unclear: 1**	**High: 1** **Medium: 2** **Low: 0** **N/A: 1**	**No action: 0** **Continue: 3** ***New action: 0*** **N/A: 1**	***ESC: 0.5*** **ERSWG: 0** **CC: 1** **EC: 1.5** **SFMWG: 0** **N/A: 1**	(AU) Recommendation unclear to provide advice. (NZ) A distinction should be made between the roles of the Secretariat and the ESC specifically.	**10**
PR2021-64	Members look for additional opportunities to engage with one another outside of the traditional meeting dates of the CCSBT to ensure that the limited time available at CCSBT meetings is maximized.	**Yes: 5** **No: 1**	**High: 1** **Medium: 2** **Low: 2** **N/A: 0**	**No action: 0** **Continue: 3** **New action: 2** **N/A: 0**	***ESC: 0.33*** **ERSWG: 1.33** **CC: 0.33** **EC: 1** **SFMWG: 0** **N/A: 1** **ALL: 1**	(AU) We think this already occurs to an extent. (ID) To many meetings? Often multiple with other Online meeting. (NZ) Include engagement with non-members whose vessels may catch SBT.	**10**
PR2021-67	Develop a targeted program of assistance to developing Members.	**Yes: 4** **No: 2**	**High: 1** **Medium: 2** **Low: 1** **N/A: 0**	**No action: 0** **Continue: 2** **New action: 2** **N/A: 0**	***ESC: 2*** **ERSWG: 0** **CC: 0** **EC: 1** **SFMWG: 0** **N/A: 0** **All: 1**	(AU) EC more broadly. Support, noting these positions are filled on a merit basis currently.	**10**
PR2021-02	Explore the need for additional measures (such as protected areas and area closures) to support spawning and recruitment.	**Yes: 5** **No: 1**	**High: 1** **Medium: 2** **Low: 2** **N/A: 0**	**No action: 1** **Continue: 2** **New action: 2** **N/A: 0**	**ESC: 4** **ERSWG: 0** **CC: 0** **EC: 1** **SFMWG: 0** **N/A: 0**	(AU) We are not aware of current area-based risks to spawning and recruitment areas, or the need for spatial closures. We note also link to this activity and activity likely under the eventual BBNJ Treaty. (ID) May go to complex discussion on compensation for tuna fishers operated in the spawning ground. Historically this area has been as fishing ground for ID fishers prior 1970. (JP) SBT adult stock has increasing under current management by MP. Rather than any measures to area closure, improve of data collection is more important.	**9**
PR2021-07	Improve transparency by providing and making public, historical data and information that are not currently accessible in the public domain.	**Yes: 3** **No: 3**	**High: 1** **Medium: 1** **Low: 1** **N/A: 0**	**No action: 0** **Continue: 2** **New action: 1** **N/A: 0**	**ESC: 1** **ERSWG: 0** **CC: 0** **EC: 2** **SFMWG: 0** **N/A: 0**	(AU) Not sure what data this recommendation refers to. But support greater transparency, if needed. EC makes decisions on data confidentiality and would be best placed to consider this. (ID) Need clear justification on the level of transparency for public. Is this will go to a full access on data attributed to member. (NZ) This is the responsibility of the EC/Secretariat.	**9**
PR2021-11	Establish mechanisms to improve consistency and avoid ambiguity in national reports.	**Yes: 3** **No: 3**	**High: 1** **Medium: 1** **Low: 1** **N/A: 0**	**No action: 0** **Continue: 1** **New action: 2** **N/A: 0**	**ESC: 1** **ERSWG: 1** **CC: 0** **EC: 0** **SFMWG: 0** **N/A: 0** **All: 1**	(AU) Annual CCSBT body meetings provide a regular mechanism to review report templates.	**9**
PR2021-13	Achieve a better balance between the scientific efforts dedicated to SBT and ERS.	**Yes: 4** **No: 2**	***High: 1*** ***Medium: 1*** **Low: 2** **N/A: 0**	**No action: 0** **Continue: 3** **New action: 1** **N/A: 0**	***ESC: 2.5*** **ERSWG: 1.5** **CC: 0** **EC: 0** **SFMWG: 0** **N/A: 0**	(AU) Recommendation a little unclear. CCSBT commissions lots of SBT research, but ERS is studied more widely. If the recommendation is that the CCSBT fund more ERS work, we would support that, if necessary and specific, and not available elsewhere. Effort should be based on priority, but we would welcome additional focus on ERS issues (noting recent agreement for additional ERSWG activity). (ID) Suggest not go to similar effort for non-target species by CCSBT, since it is already covered by other RFMO. (NZ) Most ERS research is funded by individual Members, a discussion of allocating more funding to ERS research could be beneficial.	**9**

Recommendation No.	Recommendation	[1] Whether you consider this to be an appropriate recommendation for the ESC to consider (i.e. within the ESC's scope); **(Yes/No)**	These columns are only completed when a Member answered "Yes" in column (1)				Priority Score
			[2] Priority of the recommendation from your perspective **(e.g. low, medium, high)**	[3] The level of action required for the recommendation **(e.g. no action required, continue current level of activity, or new action required)**	[4] Which CCSBT body is recommended to take the lead for implementing the recommendation? **(e.g., ERSWG, ESC, CC or EC)**	[5] Pertinent comments relating to the recommendation	
PR2021-14	Identify gaps in scientific skills among CCSBT Members and fill these through recruitment and capacity building in Member countries.	**Yes: 4** **No: 2**	**High: 1** **Medium: 1** **Low: 1** **N/A: 0** **Discuss: 1**	**No action: 0** **Continue: 2** **New action: 1** **N/A: 1**	**ESC: 3** **ERSWG: 0** **CC: 0** **EC: 0** **SFMWG: 0** **N/A: 1**	**[Half of ERSWG-attended Members considered the ESC should take a lead]** (AU) ESC, if necessary. Members skill-based recruitment should be a matter for them, but individual ESC members could perhaps support if requested. (ID) Skills required are for expertise in CPUE analysis , growth, aging, population genetic and stock assessment. (NZ) This is the responsibility of individual Members.	**9**
PR2021-20	Establish a clear and concise bycatch policy and management strategy.	**Yes: 4** **No: 2**	**High: 0** **Medium: 3** **Low: 1** **N/A: 0**	**No action: 1** **Continue: 1** **New action: 2** **N/A: 0**	***ESC: 0*** **ERSWG: 2.5** **CC: 0** **EC: 1.5** **SFMWG: 0** **N/A: 0**	(AU) It is an ERSWG role. Agreeing a broad policy would be useful, with agreed bycatch limits. But ERSWG work.	**9**
PR2021-39	Explore mechanisms to strengthen the observer program, including through the implementation of electronic monitoring.	**Yes: 3** **No: 3**	**High: 1** **Medium: 1** **Low: 1** **N/A: 0**	**No action: 1** **Continue: 0** **New action: 2** **N/A: 0**	**ESC: 2** **ERSWG: 0** **CC: 1** **EC: 0** **SFMWG: 0** **N/A: 0**	(AU) Probably CC first, but strongly supported. Need agreed EM standards first.	**9**
PR2021-42	Establish mechanisms to make the full use of data collected through catch documentation scheme.	**Yes: 3** **No: 2** **Unclear: 1**	***High: 1*** ***Medium: 1*** **Low: 1** **N/A: 1**	**No action: 0** **Continue: 3** ***New action: 0*** **N/A: 1**	***ESC: 2.5*** **ERSWG: 0** **CC: 0.5** **EC: 0** **SFMWG: 0** **N/A: 1**	(AU) Recommendation unclear to provide advice. (ID) Do CCSBT not have the mechanism on the use of CDS data? (need to recheck).	**9**
PR2021-40	Review existing standards for observer coverage to allow the use of electronic monitoring.	**Yes: 2** **No: 4**	**High: 1** **Medium: 1** **Low: 0** **N/A: 0**	**No action: 0** **Continue: 1** **New action: 1** **N/A: 0**	**ESC: 1** **ERSWG: 0** **CC: 1** **EC: 0** **SFMWG: 0** **N/A: 0**	(AU) See above. (ID) May need to start from the trial of EM in the ID LL prior the review? (Additional burden for DN of the cost and maintenance of EM).	**9**
PR2021-65	Encourage independent experts from developing Members to fill chairing roles within subsidiary bodies. Members should also consider the use of co-Chairs to specifically develop technical skills.	**Yes: 4** **No: 2**	***High: 1*** ***Medium: 1*** **Low: 2** **N/A: 0**	**No action: 0** **Continue: 2** **New action: 2** **N/A: 0**	***ESC: 1.5*** **ERSWG: 0.5** **CC: 0** **EC: 1** **SFMWG: 0** **N/A: 0** **All: 1**	(AU) EC more broadly. Support, noting these positions are filled on a merit basis currently.	**9**
PR2021-68	Continue to engage with Kobe intersessional processes, particularly as they relate to areas of shared interests.	**Yes: 4** **No: 2**	***High: 1*** ***Medium: 1*** **Low: 2** **N/A: 0**	**No action: 0** **Continue: 4** ***New action: 0*** **N/A: 0**	***ESC: 1*** **ERSWG: 0** **CC: 0** **EC: 3** **SFMWG: 0** **N/A: 0**	(AU) EC more broadly. Support, noting these positions are filled on a merit basis currently.	**9**

Recommendation No.	Recommendation	[1] Whether you consider this to be an appropriate recommendation for the ESC to consider (i.e. within the ESC's scope); **(Yes/No)**	These columns are only completed when a Member answered "Yes" in column (1)				Priority Score
			[2] Priority of the recommendation from your perspective **(e.g. low, medium, high)**	[3] The level of action required for the recommendation **(e.g. no action required, continue current level of activity, or new action required)**	[4] Which CCSBT body is recommended to take the lead for implementing the recommendation? **(e.g., ERSWG, ESC, CC or EC)**	[5] Pertinent comments relating to the recommendation	
PR2021-69	Continue the laudable work undertaken by the CCSBT for SBT and establish a similar effort for non-target species.	**Yes: 4** **No: 2**	**High: 0** **Medium: 3** **Low: 1** **N/A: 0**	**No action: 0** **Continue: 3** **New action: 1** **N/A: 0**	***ESC: 2*** **ERSWG: 1.5** **CC: 0** **EC: 0.5** **SFMWG: 0** **N/A: 0**	(AU) EC more broadly. Support, noting these positions are filled on a merit basis currently. (ID) For SBT Yes but Suggest not go to similar effort for non-target species by CCSBT, since it is already cover by other RFMO.	**9**
PR2021-28	Conduct a review analyzing the potential impact of lost or abandoned gear in CCSBT fisheries, and identify mechanisms to mitigate any impacts.	**Yes: 3** **No: 3**	**High: 0** **Medium: 1** **Low: 2** **N/A: 0**	**No action: 1** **Continue: 1** **New action: 1** **N/A: 0**	**ESC: 1.5** **ERSWG: 1.5** **CC: 0** **EC: 0** **SFMWG: 0** **N/A: 0**	(AU) (1) ERSWG, but an initial step would be to survey Members about lost gear. (4) ERSWG, to the extent that ghost nets impact ERS. (NZ) Opportunity to examine impacts on both SBT and ERS.	**7**
PR2021-38	Advocate for strengthened VMS measures in other RFMOs and decide whether the current VMS practice is sufficient for the purpose of the management of SBT and ERS, taking into account the overlapping areas and the compatibility of management measures with other RFMOs.	**Yes: 2** **No: 4**	**High: 0** **Medium: 1** **Low: 1** **N/A: 0**	**No action: 0** **Continue: 2** **New action: 0** **N/A: 0**	**ESC: 1** **ERSWG: 0** **CC: 1** **EC: 0** **SFMWG: 0** **N/A: 0**	(AU) Probably a state decision, to do with their engagement with the other RFMOs. Not an ESC role.	**7**
PR2021-63	Members look for opportunities to continue and reinvigorate the cooperation instigated through the Kobe Process	**Yes: 2** **No: 4**	**High: 0** **Medium: 1** **Low: 1** **N/A: 0**	**No action: 0** **Continue: 2** **New action: 0** **N/A: 0**	**ESC: 0** **ERSWG: 0** **CC: 0** **EC: 2** **SFMWG: 0** **N/A: 0**	(AU) EC issue, with specific subsidiary body opportunities. But follow cost/ benefit analysis indicating it is useful to continue this process.	**7**
PR2021-32	Modify the CCSBT Convention to include modern fisheries management concepts agreed by Members at the international level	**Yes: 0** **No: 6**	**High: 0** **Medium: 0** **Low: 0** **N/A: 0**	**No action: 0** **Continue: 0** **New action: 0** **N/A: 0**	**ESC: 0** **ERSWG: 0** **CC: 0** **EC: 0** **SFMWG: 0** **N/A: 0**	(AU) Amending a convention is a big task. Alternatives such as adopting modern terms and concepts in CCSBT resolutions and other decision should be the first approach. (ID) Need more explanation of this section by secretariat.	**6**

Attachment 11

Data Exchange Requirements for 2023

Introduction

The data exchange requirements for 2023, 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 2022. 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 2023 to allow development of the necessary data loading routines.

Data listed in Attachment A should be provided for the complete 2022 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 2021 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 2021 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 23	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 2022 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 2023 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 23	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 23	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 23	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 23	The mortality allowance (kilograms) that was used in the 2022 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 23 (New Zealand)[2] 30 Apr 23 (other members & Secretariat) 31 Jul 23 (Indonesia)	Catch (in numbers and weight) and effort data is to be provided as either shot by shot or as aggregated data (New Zealand provides fine scale shot by shot data which is aggregated and distributed by the Secretariat). The maximum level of aggregation is by year, month, fleet, gear, and 5x5 degree (longline fishery) or 1x1 degree for surface fishery. Indonesia will provide estimates based on either shot by shot or as aggregated data from the trial Scientific Observer Program.
Non-retained catches	All Members	30 Apr 23 (all Members except Indonesia) 31 Jul 23 (Indonesia)	The following data concerning non retained catches will be provided by year, month, and 5*5 degree for each fishery: • Number of SBT reported (or observed) as being non-retained; • Raised number of non-retained SBT taking into consideration vessels and periods in which there was no reporting of non-retained SBT; • Estimated size frequency of non-retained SBT after raising; • Details of the fate and/or life status of non-retained fish. Indonesia will provide estimates based on either shot by shot or as aggregated data from the trial Scientific Observer Program.
RTMP catch and effort data	Japan	30 Apr 23	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 23	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 23	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 23	Raw observer length frequency data as provided in previous years.
Raised Length Data	Australia, Taiwan, Japan, New Zealand, Korea	30 Apr 23 (Australia, Taiwan, Japan, Korea) 7 May 23 (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 23	Raw Length Frequency data from the South African Observer Program.
RTMP Length data	Japan	30 Apr 23	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 23	Estimates of both the age and size composition (in percent) is to be generated for the spawning season July 2021 to June 2022. Length frequency for the 2021 calendar year and age frequency for the 2021 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 23	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 2020 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 23	Estimates of the different trolling indices (piston-line index (TRP) and grid-type trolling index (TRG)) for the 2022/23 season (ending 2023), including any estimates of uncertainty (e.g. CV).
Tag return summary data	Secretariat	30 Apr 23	Updated summary of the number tagged and recaptured per month and season.
Gene tagging data **For OM and MP**	Secretariat	30 Apr 23	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 23	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.
Catch at age data	Australia, Taiwan, Japan, Secretariat	14 May 23	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 23	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 23[7]	These data will be provided for July 2021 to June 2022 in the same format as previously provided.
Raised catch-at-age for Indonesia spawning ground fisheries. **For OM**	Secretariat	24 May 23	These data will be provided for July 2021 to June 2022 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
Total catch per fishery and sub-fishery each year from 1952 to 2022. **For OM**	Secretariat	31 May 23	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 23	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 23	Calculate the total catch-at-age in 2022 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 23	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 23 (earlier if possible)[9]	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 23 (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 12

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)

	2023	2024 (Indicative only)	2025 (Indicative only)
Regular Meetings			
ESC Meeting	6 days FM: 1Ch, 3P, 1C, 3 Interp, 3 Sec	6 days FM: 1Ch, 3P, 1C, 3 Interp, 3 Sec	6 days FM: 1Ch, 3P, 1C, 3 Interp, 3 Sec
ESC Meeting Chair's report	1Ch, 1P days	1Ch, 1P days	1Ch, 1P days
June/July OMMP Meeting in Seattle *(no Sec, no Interp)*	5 days Cat: 3P, 1C, 1Ch + 3C Prep Days	No	5 days Cat: 3P, 1C, 1Ch + 3C Prep Days
Ongoing Essential SRP Projects requiring CCSBT resources			
Gene Tagging	Contracted ($720,000)	Contracted ($720,000)	Contracted ($800,000)
Continued close-kin sample collection & Processing	Contracted ($86,100)	Contracted ($183,000)	Contracted ($131,200)
Close-kin identification & exchange	Contracted ($52,900)	Contracted ($59,900)	Contracted ($57,600)
Collection & aging of Indonesian otoliths	Contracted ($26,200)	Contracted ($62,800)	Contracted ($61,500)
New SRP Projects requiring CCSBT resources (listed in descending order of priority)			
OM Specification and software upgrade *(no Interp at meetings)*	$130,000 for: • 25C, 2MPCoord • 1 extra day at June OMMP meeting (Cat, 3P, 1C, 1Ch) • 3 day Nov. inf. OMMP (Tokyo, FreeV, 3P, 1C, 1Ch) • 2*2hr online meetings (3P,1C, 1Ch, Sec)	$155,000 for: • 20C, 2MPCoord • 1 extra day at ESC OMMP meeting (VEH, Cat, 3P, 1C, 1Ch, Sec) • 5 day June inf. OMMP meeting (Seattle: FreeV, Cat, 3P, 1C, 1Ch) • 2*2hr online meetings (3P,1C, 1Ch, Sec)	$30,000 for: • 20C, 2MPCoord • 2*2hr online meetings (3P,1C, 1Ch, Sec)
UAM - Update NCNM estimates of unaccounted (fishing) mortality (simple update of GLM analysis)	$20,000 for: • 20C	-	-

	2023	2024 (Indicative only)	2025 (Indicative only)
CPUE index development	$30,000 for: • 20C, 2CECoord • 2*2hr online meetings (3P,1C, 1Ch, Sec)	$40,000 for: • 10-30C (used 30), 2CECoord • Meetings to develop 5 national operational datasets[1] • 2*2hr online meetings (3P,1C, 1Ch, Sec)	$30,000 for: • 20C, 2CECoord • 2*2hr online meetings (3P,1C, 1Ch, Sec)
Develop methods for estimating UAM *(no Interp at meetings)*		$83,000 for: • 20C • 1*3hr online meetings (3P,1C, 1Ch, Sec) • 3 day in-person meeting (New Zealand, Cat, FreeV, 1P, 2C, 1Ch, 1 Sec)	$26,000 for: • 20C • 2*3hr online meetings (3P,1C, 1Ch, Sec)
SBT otolith-based ageing workshop (3 days, CSIRO labs, Hobart)	$38,000 for: • 2 interpreters (whispering) • CSIRO hosting costs including invited expert	-	-

[1] These could be in-Member or on-line meetings. This has not been separately costed, but if held as online meetings, the selection of the larger number of consultancy days should hopefully cover this cost. In-Member meetings would cost considerably more.

Attachment 13

Proposed revisions to the CCSBT Scientific Observer Program Standards to allow for the use of electronic monitoring systems

Commission for the
Conservation ofSouthern
Bluefin Tuna

みなみまぐろ保存委員会

CCSBT Scientific Observer Program Standards

(revised at the Twenty-~~Second~~ Ninth Annual Meeting: ~~15~~ 10 October ~~2015~~2022)

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Attachment 2	Reporting Requirements

1. BACKGROUND

The Commission for the Conservation of Southern Bluefin Tuna (CCSBT) has adopted a Scientific Research Program (SRP) with an overall objective of improving the quality of the data and information used as input to the stock assessment for Southern Bluefin Tuna (SBT), contributing to the development of reliable indices to monitor future trends in SBT stock size and identifying directions for further scientific research.

At CCSBT7 in April 2001 the Commission adopted the report of the Fifth Meeting of Scientific Committee, which recommended a SRP incorporating a Scientific Observer Program as one of four priority elements. The Observer Program endorsed by the Commission comprised the following features:-

- an observer coverage of 10% for catch and effort as a target level
- the level of observer coverage for estimation of tag reporting rates will depend on the scale of the tagging program subsequently agreed by the Commission and the tag recapture rate.
- standards for training of observers, operation of observer programs and the data to be collected including the forms to be used will be prepared
- data collected would become part of the CCSBT database as subsequently agreed in CCSBT protocols
- member countries will be responsible for operation of observers in high seas and domestic EEZ fisheries on their flag vessels
- all fleet components should be observed and target levels of observer coverage should be the same for all fleet components
- an exchange of observers between countries on a regular basis should be encouraged to maintain consistency and increase mutual trust in the results of the observer program
- recruitment of some observers from non-member nations would be encouraged

To facilitate implementation, the 6th Scientific Committee agreed that:-

- there would be an exchange of data sheets and standards for longline fleets between member countries through the Secretariat
- Australia would develop proposed program standards and data forms for the surface fisheries, taking note of the characteristics of observer programs administered by other fisheries management organizations
- the information gathered would be exchanged through the Secretariat
- proposals on draft CCSBT observer program standards will be presented and finalized at the 7th Scientific Committee meeting in 2002

Dr. Ianelli of the Advisory Panel together with the SC chair developed an initial draft of proposed outline of a CCSBT scientific observer program at the 6th Scientific Committee to serve as a basis for further discussion (See the Attachment F of the 6th SC Report.).

CCSBT8 endorsed the 6th Scientific Committee's proposals in October 2001.

Advances in the development of electronic monitoring systems (EMS) presented an opportunity to diversify monitoring options and some Members independently developed systems to provide additional coverage of their fleets both domestically and on the high seas. At CCSBT29 in 2022 the Commission adopted the recommendation of ESC27 to update the Scientific Observer Program Standards to accommodate this development.

The standards set out in this document reflect these decisions of the Commission and were developed in consultation with national observer program coordinators. A target level of observer coverage to meet tag reporting rate objectives has not yet been determined. When determined, the standards will be updated.

In developing the standards, the Secretariat has prepared a generic document for both surface and longline fisheries. Where the natures of the two types of fishery are differentiated in terms of observer activity, this is identified.

The tasks and record keeping requirements have been formulated to gather only that information,

which is relevant to the objectives of the SRP. Consideration was also given to the practical limitations on the ability of observers to complete tasks in the fishing environment they would be operating in.

In order to facilitate implementation of the standards, the term "member" in this document means any Member of the Extended Commission of the CCSBT.

Reference to the acronym CCSBT is inclusive of the Commission and Extended Commission.

2. OBJECTIVES

The standards set out below provide the framework for the operation of the CCSBT Scientific Observer Program by members.

The objectives of the standards are:

1. To provide a framework for the alignment of members' scientific observer programs with the objectives of the SRP.

2. To standardize scientific observer programs across fleets and fisheries among members.

3. To specify minimum standards for the development of a scientific observer program for members without a program.

4. To provide a minimum set of standards for collection of bycatch data, consistent with international recommendations, and where appropriate to assist in harmonization of bycatch data collection across tuna Regional Fisheries Management Organisations.

All members are expected to adapt their respective programs to, at a minimum, meet these standards but noting that members are encouraged to implement further requirements in their respective programs.

3. RESPONSIBILITY FOR PROGRAM OPERATION

Responsibility for the operation of the CCSBT Scientific Observer Program on the high seas and in domestic EEZ fisheries will lie with the member whose flag is flown on the vessel.

Each member's Scientific Observer Program will be managed taking into account these standards.

Where there is an external observer exchanged under agreements concluded between members or an observer recruited from a non-member nation, that observer shall comply with the laws and regulations of the member which exercises jurisdiction over the vessel to which the observer is assigned.

4. COVERAGE

The CCSBT Scientific Observer Program, including electronic monitoring systems (EMS), will cover the fishing activity of CCSBT members and cooperating non-members wherever southern bluefin tuna are targeted or are a significant bycatch.

5. LEVELS OF SCIENTIFIC OBSERVER COVERAGE

The Program will have a target observer coverage of 10% for catch and effort monitoring for each fishery. For the purposes of this document, 'observer coverage' is defined as monitoring by either human observers deployed physically onboard vessels, or reviewed catch and effort data from EMS.

Observer coverage, including the selection of EMS data for review, should therefore be representative

of different vessel-types in distinct areas andtimes[1].

In order to approach 10% coverage in some strata (e.g., specific vessel-types in certain areas and times) it may be necessary to have higher than 10% coverage in other strata[2].

The exact level of observer placement or EMS data review will require periodic assessment to determine if the target level of coverage is achieved.

Consideration should also be given to higher levels of coverage in some strata from time to time to address specific fisheries management questions (e.g. to better quantify non-fish and protected species bycatch where this is identified as a risk). Review of historically gathered EMS data may also be used for this purpose.

6. ASSIGNMENT OF SCIENTIFIC OBSERVERS TO VESSELS AND SELECTION OF EMS DATA FOR REVIEW

From the scientific perspective, it is important to ensure that the data collected through the scientific observer programs and EMS provide representative information and sampling for the entire fleet. Ideally, each individual operation should have an equal and independent probability of being physically observed or having EMS data from the vessel reviewed. In practice, this ideal may not be possible to achieve. Nevertheless, the basic principle of representative sampling should underlie the assignment of scientific observers to vessels and/or the selection of EMS data for review.

It is the responsibility of each member when implementing an observer program, to assign observers or EMS to its vessels and cruises based on a carefully considered and appropriately designed sampling scheme that has a high likelihood of ensuring reasonably representative coverage. The program should ensure that, within the main fishing areas and seasons and to the extent possible, all representative vessels, areas, and time periods have an approximately equal probability of being sampled.[3]

Each member should evaluate and analyse the sampling scheme used for the assignment of observers against the principles outlined above. Each member should document the scheme used for the observer assignments or selection of EMS footage for review that is ~~actually~~ implemented and make this information and data collected availableto the Commission in the manner described in Section 11 to enable review within the Commission of whether or not the standards are being met.

The placement of observers and EMS should also encompass arrangements to ensure the independence and scientific integrity of the data.

7. TAGGING PROGRAM

Observer programs make a very valuable contribution to the direct recording of recaptured tags, and to the estimation of non-reporting rates. Failure to adequately quantify the uncertainty associated with estimates of tag reporting rates will substantially degrade the value of any resultant mortality estimates for use in stock assessments.

Observer plans and training programs should include specific provision for the role and responsibilities of observers for tag recapture reporting. A supplemental level of observer coverage

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[1] For the purpose of this standard, it is recognized that there are many ways in which catch and effort can be stratified including vessels, areas and times. This level of coverage is relative to actual fishing operations, which, if randomly distributed, should result in about 10% of the catch.

[2] While it might be possible to observe 10% of the catch from a single vessel (if a hypothetical fleet consistedof 10 vessels with equal catch allocations), this would not achieve the objective of sampling fishing operations with approximately equal probability, particularly if the vessels fish in different areas using different techniques. Clearly there are logistical difficulties in achieving random observations of fishing operations.

[3] To achieve a desired target coverage level may require a higher observer placement level. For example, itmay take 150 observed vessel days out of a hypothetical 1,000 vessel-day year to achieve a target of 10% coverage for all important strata. In part, this may be due to the fact that the ability of observers to transfer among vessels on the fishing grounds is limited. The factors affecting this include the heterogeneity of the fleet and fishing behaviour.

may be required to take into account the results of the CCSBT tagging program.

8. RECRUITMENT AND TRAINING

Each member is responsible for the recruitment and training of observers for placement on their flagged vessels. Details of the processes maintained for this responsibility are for members to manage consistent with the domestic environment in which they operate.

Training schemes should be constructed to impart the skills necessary to adequately collect the scientific data and should take account of the following principles.

Qualifications of Observers

Scientific Observers for the program should have the following attributes:

- Technically trained or experienced personnel for the fleets concerned, with interests related to fisheries.
- Ability to work at sea in difficult conditions.
- Ability to work under stressful psychological and physical situations.
- Ability to work with a boat's crew on a cooperative and team basis over long and continuous periods at sea.
- Soundness of mind and body.

Independence / Integrity

Observers should not have current financial or beneficial interests in the fisheries in which they will be required to operate as observers.

Observers should not have been found guilty of a serious criminal offence for five years prior to appointment as an observer.

Scientific Observer Training

Members should establish and maintain a structured training program for the CCSBT Scientific Observer Program. Manuals should be developed for this purpose and courses operated, which would allow for observers to exchange approaches and experiences to improve the data collection process.

A Scientific Observer Training program of each Member should include, at least, the following items.

- Briefing on the CCSBT SRP, particularly the CCSBT Scientific Observer and Tagging Program elements to promote a full understanding of the rationale for the Programs.
- Fishery management and biological field collection programs including species identification, data collection and sampling procedures. This should also include identification of bycatch species, such as seabirds, sharks, marine reptiles, other ERS and knowledge of current mitigation measures that are used in the CCSBT.
- Monitoring tag recovery.
- Training on safety at sea and first aid.
- Protocols for dealing with difficult situations (personal conflicts and physical hazards).
- Preparation of cruise/trip reports
- De-briefing with observers to provide feedback on improvement.
- Any additional technical training required for special project such as tagging fish, when necessary

Recruitment of Observers

Scientific observers could be recruited from a variety of related fishery sectors to widen the knowledge and experience base of the observer cohort.

Exchange of observers between members and recruiting some observers from non-members should be encouraged to improve consistency and transparency in the program. Responsibility for implementing observer exchanges would reside with members and the exchanges would be

organised between relevant members and non-members as appropriate

9. THE OBSERVED VESSEL

Any vessel selected for an observation should be capable of meeting the minimum requirements for accommodation, sanitary facilities, meals, equipment and communication systems equivalent to those of the crew (junior officer when possible) so that the observer's duties are not compromised.

A selected vessel should be advised of its responsibility for the observer while they are on board.

10. ELECTRONIC MONITORING SYSTEMS (EMS)

Each member is responsible for the evaluation and contracting of EMS for placement aboard their flagged vessels. Details of the proportion of the fleet that is covered by EMS, as well as the proportion and diversity of footage that is reviewed, is for members to manage consistent with the domestic environment in which they operate.

EMS should be designed and installed to adequately collect relevant scientific information and data, and reporting provided to the Secretariat per section 12 of this document.

EMS can be used by Members on an experimental basis prior to the development of a new set of standards specific the use of EMS in SBT fisheries. Data from EMS may be used to contribute to the 10% target for observer coverage set out in this document. Members using EMS should report its implementation to ESC to review including the items related to EMS in this document.

~~10.~~11. INFORMATION AND DATA

Scientific data to be collected by observers and/or, where relevant, by EMS, should include the following categories of information:

A. Details of the observed vessel, including its size, capacity and equipment.

B. Summary of the observed trip, which will include information such as the observer name and identification number, degree of experience, dates of embarkation and disembarkation.

C. Comprehensive catch, effort and environmental information for each set that occurred while the observer was on-board the vessel, regardless of whether the set/haul was actually observed. This includes the target species, location fished and quantity of gear used.

D. Fishing methods and gear, including mitigation measures in use while fishing. The observer should record/describe mitigation measures, including the configurations that were in use during the observed period. This includes the details of mitigation measures and their use as described in Attachment 1. Where applicable, the absence of mitigation equipment should also be noted.

E. Observed catch information for each period of observation, including the time at start and end of observation, the number of hooks observed, the observed catch in number and weight for SBT and all other species caught to the extent possible.

F. Biological measurements taken of individual SBT, as much as possible, including its condition, length, weight, sex and details of samples (otoliths, scales, gonads, etc.) that were taken from the SBT for later analysis.

G. Information on SBT and ERS not retained should include counts by species and their life status (using the relevant codes as detailed in Attachment 1).

H. SBT tag recovery information, including, both tag numbers (actual tags also to be provided), date, location, length, weight, sex, details of samples taken (e.g. otoliths), and whether or not the tags were spotted during a period of fishing that was being observed.

Most of the above categories of information are related to each other in a hierarchical relationship.

So, the biological details of a fish (F) relates to a particular observed period (E) from a specific set (C) for a trip (B) on a particular vessel (A).

A detailed description of the proposed information to be collected for each of the above categories is provided in Attachment 1. Hierarchies for prioritising the collection of data by species caught andSBT data are at Annex 1. In severe weather conditions, data collection should only be conducted tothe extent that is it safe for the observer to do so.

~~11.~~12. REPORTING

Each member shall provide a report to the Extended Scientific Committee and the Ecologically Related Species Working Group on the sampling scheme and arrangements for collecting data of its observer program as a separate section in the member's annual fishery report. Attachment 2 documents the information that should be provided.

Each member shall include in National Reports to the Compliance Committee and Commission, a summary of the levels of compliance in relation to the implementation of mandatory mitigation measures.

~~12.~~13. CONFIDENTIALITY OF DATA AND INFORMATION

All data and information obtained through an observer program belongs to the flag country of the observed vessel. An observer should not disclose any information without the permission of the flag country.

Attachment 1

Type and Format of Scientific Observer Data

For observer coverage provided by EMS, not all of the information below will be readily available; therefore, as much detail as possible should be provided based on the below descriptions of data type/format

A) Details of the observed vessel and gear

The vessel details are recorded only once for an entire trip

All fishing:

- Vessel's Name
- Vessel's Call-sign
- Vessel's Flag Country
- Name of the Captain
- Name of the fishing master
- Year vessel built
- Engine brake power (kw/hp)
- Overall length (metres)
- Gross tonnage (tonnes)
- Number of people in crew (all staff, excluding observers)
- Total freezer capacity (cubic metres)
- Fuel capacity (tonnes)
- Instrumentation and electronic fishing equipment

Instrumentation	Yes/No (or code)
GPS	
Radio direction finder	
Radar	
Weather Fax	
Track plotter	
NOAA receiver	
Sounder (1=colour monitor, 2=monochrome monitor, 3=printer)	
Sonar (1=scanning, 2=PPI)	
Doppler current monitor	
Sea surface temperature recorder	
Bathy-thermograph	
Bird radar	

Longliners only:

- Material of mainlines (Nylon, Cotton thread, Other)
- Material of branchlines (Nylon, Cotton thread, Type of trace, Other)
- Material of buoylines (Nylon, Cotton thread, Other)

Purse seiners only:

- Capacity of power block
- Capacity of purse winch
- Lengths and depths of all nets on board including expanded figure
- Mesh sizes of nets on board
- Number of net skiffs on board

B) Summary of the observed trip

- Observer's name
- Observer's organisation
- Date observer embarked (translatable to 24 hour clock, UTC to the day)
- Date observer disembarked (translatable to 24 hour clock, UTC to the day)

C) Comprehensive catch, effort and environmental information for each set

This information is recorded for each set while the observer is on-board a vessel, regardless of whether the set/haul was actually observed.

All fishing:

- Date and time at start of Set (translatable to 24 hour clock, UTC)
- Date and time at end of Set (translatable to 24 hour clock, UTC)
- Date and time at start of Retrieval (translatable to 24 hour clock, UTC)
- Date and time at end of Retrieval (translatable to 24 hour clock, UTC)
- Location at start of Set (latitude+N/S and longitude+E/W to a minute of accuracy)
- Wind speed (with unit) and direction (N, NNE, NE, etc.) of the operation
- Time of wind measurement for operation (e.g. Noon, start of set etc.)
- Sea surface temperature (degrees Celsius, to 1 decimal place) at start of Set[4]
- Intended target species[5]

Longlining:

- Location at end of Set (latitude+N/S and longitude+E/W to a minute of accuracy)
- Direction of line set (eg straight, curved)[6]
- Direction of line set (straight,curved)
- Actually used mainline length (km)
- Actually used branchline length (m)
- Actually used buoyline length (m)
- Intended depth of the shallowest hook (m)
- Intended depth of the deepest hook (m)
- Type of hooks
- Number of hooks
- Number of baskets
- Seabird mitigation measure used:
    - Line weights used (Y/N)
    - Mass of added line weight (where applicable)
    - Distance between weight and hook (where applicable)
    - Number of tori lines used (where applicable)
    - Estimate of the aerial coverage achieved by tori lines (m)
    - Night setting with minimal deck lighting (Y/N)
    - Bait thrower/line shooter used (Y/N)
    - Dyed Bait (Y/N)
    - Details about management of offal
    - Underwater setting chute (Y/N)
    - Side setting (Y/N)
    - Haul mitigation (Y/N)
        - Branch line/snood haulers
        - Brickle curtain
        - Water cannon
    - Other mitigation measures used
- Distance between baskets, beacons, buoys, or floats as is appropriate to the operation (m)
- Percentage of bait by bait categories that were Fish, Squid, Artificial, and Other
- Bait status (live or dead)
- Total number by species[5] of SBT, and other tuna and tuna-like species caught, retained or discarded.
- Total processed weight (kg) and Processed State[7] by species[5] of SBT, and all other species caught.

Purse Seining:

[4] It is sufficient to collect the temperature at the start of a set – i.e. at the time the location and wind are measured (e.g. Noon, start of set, etc.).

[5] All species should be reported with FAO species codes, or using National codes and providing a translationtable to FAO species codes. Individuals should be identified as far as possible to species level.

[6] Codes will be used to describe the type of line set, e.g. S=straight, C=curved, U=u-shaped.

[7] As per processing codes identified in the CCSBT CDS Resolution.

- Spotter plane used (Y/N). If used:
    - Time (translatable to 24 hour clock, UTC) and location aircraft began search
    - Time (translatable to 24 hour clock, UTC) and location aircraft ended search
    - Number, location of schools spotted by aircraft
    - Estimated size of each school spotted by the aircraft
    - Total searched distance
- Bird Radar used (Y/N)
- Logbook number and type
- Start and end Time spent for searching (from xx:xx to yy:yy translatable to 24 hour clock, UTC), location and total searched distance
- School finder (plane/vessel)
- Chumming boat used (yes/no)
- Chum status (Alive/Dead)
- Amount of chum used
- Start and end time for chumming (translatable to 24 hour clock, UTC)
- Start and end time for net shooting (translatable to 24 hour clock, UTC)
- Start and end time for net hauling (translatable to 24 hour clock, UTC)
- Start and end location for net shooting
- Start and end location for net hauling
- Light attraction used (yes/no)
- Total of wattage of lights used
- Start and end time for light attraction
- School type (e.g., shoaling/surface, FAD/debris associated)
- Length (m) of net set
- Height (m) of the net
- Number of net skiffs used
- Date and time that transfer to tow cage commenced
- Identification number of the tow cage to which the SBT were transferred
- Name of Carrier Boat that received the fish
- Estimated catch per set, species composition
- Estimated weight (kg) and/or number by species of SBT and other species caught
- Estimated weight of SBT caught alive
- Estimated weight and/or number of SBT dead during operation

<u>Cage Towing:</u>

- Name of carrier boat
- Tow cage identification number
- Cage depth (metres)
- Cage ring diameter (metres)
- Cage mesh size (in centimetres)
- Cage has second or predator net (Y/N)
- Number of divers used
- Chute fitted in cage (Y/N)
- Effective tow speed (km/hour)
- If the catch was received from fishing operations, then for each catcher boat from which SBT were transferred, record:
    - Name of catcher boat
    - Call sign of catcher boat
    - Date and time (translatable to 24 hour clock , UTC) transfer started
    - Estimated weight of SBT transferred (tonnes)/dead SBT before transfer
- If the catch was received from another tow cage, then, record:
    - Name of the carrier boat from which the SBT came
    - Identification number of the tow cage from which the SBT came
    - Date and time (translatable to 24 hour clock, UTC) transfer started.
    - Estimated weight of SBT transferred (tonnes)/dead SBT before transfer
- Date and time (translatable to 24 hour clock, UTC) and place that tow finished
- Total weight of SBT mortalities per day from commencement of towing to end of transfer to farm

- Total number of SBT mortalities per day from commencement of towing to end of transfer to farm

D) Observed catch information

This relates to that part of the catch that was actually observed by the observer during the hauling process. All information recorded here relates only to the period(s) that were observed. Annex 1 provides hierarchies for the collection of data. Observers should use these hierarchies to prioritise data collection as circumstances prevail on the observed vessel.

Longlining:
- Date and time at the start of the observation period (translatable to 24 hour clock, UTC)
- Date and time at the end of the observation period (translatable to 24 hour clock, UTC)
- Number of hooks observed
- Total number by species[5] of all species caught and retained during the observed period[8]
- Total processed weight (kg) by species[5] and Processed State[7] of all species caught and retained during the observed period
- Total number and weight when possible (whole weight, in kilograms) by species[5] of all species caught but discarded during the observed period and life status[8,9].

Purse Seining:
The entire purse seining shooting and hauling operation should be observed
- Date and time at the start of the observation period (translatable to 24 hour clock, UTC)
- Date and time at the end of the observation period (translatable to 24 hour clock, UTC)
- Estimated % of school caught
- Estimated weight (tonnes for SBT, kg for all other species[5]) and/or number by species of SBT, and all other species caught, retained or discarded including life status[89]
- Weight of SBT mortalities from commencement of fishing to end of transfer to cage
- Number of SBT mortalities from commencement of fishing to end of transfer to cage
- Number of species identified as escaped from commencement of fishing to end of transfer to cage
- Number by species identified as discarded from commencement of fishing to end of net hauling

Cage Towing:
The observer must observe or conduct each mortality count during the period of the tow.
- Date and time at the start of the observation period (translatable to 24 hour clock, UTC)
- Date and time at the end of the observation period (translatable to 24 hour clock, UTC)
- Total weight of SBT mortalities per day from commencement of towing to end of transfer to farm
- Total number of SBT mortalities per day from commencement of towing to end of transfer to farm

E) Biological measurements of individual fish. Biological measurements are only required for SBT, but where possible, effort should be made to measure other species.

For the purposes of SBT analyses, accurate size measurements of SBT are required. SBT should be selected in a manner to ensure within strata randomness. For example, for large numbers of fish caught in a single operation (e.g., a purse seine vessel) a systematic sampling may be appropriate.

The actual number of fish should be spread throughout as many separate fishing operations as possible. For example, it is nearly always the case that sampling 20 fish (randomly) from 10 operations is much better than sampling 200 fish from every 10th operation. The required actual number of samples should be re-evaluated from time to time and as needs change.

[8] This includes target species (such as SBT) and all bycatch species such as seabirds, sharks, marine reptilesetc.
[9] Individuals that are discarded with significant injuries and are not considered likely to survive should beincluded in the number of dead individuals.

- Species[5]
- Life status category[10]
- Length (for SBT, fork length measured on straight length, rounded up to the centimetre[11])
- Length unit
- Length code (fork length, eye fork, etc.)
- Length, lower jaw-fork length
- Whole weight (kg), if possible. This is the measured weight before processing as opposed to a calculated whole weight.
- Processed weight (kg)
- Processed State[7]
- Sex (F=female, M=male, I=indeterminate, D= not examined)
- Samples taken, specifying:
    - A unique identification number given to the sample
    - The type of samples taking, including: whole specimen, or samples of otoliths, scales, vertebrae, stomach, muscle, tissue, gonads, feathers, bird bands etc.)
    - Any additional details that may explain the capture of the sample (e.g. for seabirds the specific mitigation at the time of capture)

F) SBT Tag recovery information

Some of the data recorded here duplicates data that already exists in the previous categories of information. This is necessary because tag recovery information may be sent separately to other observer data.

- Observer's name
- Vessel's name
- Vessel's call sign
- Vessel flag
- Collect and provide the actual tags
- Tag colour
- Tag numbers (The tag number is to be provided for all tags when multiple tags were attached to one fish. If only one tag was recorded, a statement is required that specifies whether or not the other tag was missing)
- Date and time of capture (UTC)
- Location of capture (latitude+N/S and longitude+E/W to 1 minute of accuracy)
- Length (fork length, rounded up to the nearest centimetre[11])
- Processed Weight (kg.)
- Processed State[7]
- Details of samples taken, specifying:
    - A unique identification number given to the sample,
    - The type of samples taking, including: whole specimen, or samples of otoliths, scales, vertebrae, stomach, muscle, tissue, gonads, etc.)
- Sex (F=female, M=male, I=indeterminate, D=not examined)
- Condition of recaptured fish and their life status
- Whether the tags were found during a period of fishing that was being observed (Y/N)
- Reward information (e.g., name and address where to send reward)

[10] The observer program will, as a minimum, distinguish the following life status categories: dead anddamaged; dead and undamaged; alive and vigorous; and unknown.

[11] Length should be rounded (not truncated) to the nearest centimeter. For example, 62.4cm becomes 63cm and 62.5cm becomes 63cm (63 cm for both cases).

HIERARCHIES FOR DATA COLLECTED BY SPECIES AND SBT DATA

This annex provides a guideline for the collection of data by observers to enableprioritising of observer activities.

The flow of the main data collection activities are:

Fishing operation information

- All vessel and shot information

Monitoring of hauls

- Record time and species caught
- Record whether the specimen was retained or discarded (with lifestatus)

Monitoring of sets

- To collect counts of seabird abundance around the vessel when setting(using standard counting practices)

Biological sampling

- Collect data on length and whole and/or processed weight (includingprocessed state)
- Check for presence of tags
- Record sex
- Collect biological samples
- Take photos, in particular to facilitate the identification of ERS

Both the monitoring of hauls and the biological sampling procedures should beprioritised among species groups as follows:

Species	Priority (1 is the highest)
SBT	1
Other tunas, billfishes, Gasterochisma, and sharks	2
All other species	3

"other tunas" means all *Thunnus* species except SBT

The allocation of observer effort among these activities will depend on the type of operation and setting. The size of sub-samples relative to unobserved quantities (e.g., number of hooks examined for species composition relative to the number ofhooks set) should be explicitly recorded under the guidance of member country observer programs.

Attachment 2

FORMAT OF NATIONAL REPORT SECTIONS ON DEVELOPMENT AND IMPLEMENTATION OF SCIENTIFIC OBSERVER PROGRAMS

REPORT COMPONENTS

The observer program implementation report should form a component of the annual National Reports submitted by members to the Scientific Committee. This report should provide a brief overview of observer programs for SBT fisheries, and is not intended to replace submitted papers containing proper analyses of collected observer data. This observer program report should include the following sections:

A. Observer Training

An overview of observer training conducted, including:

- Overview of training program provided to scientific observers.
- Number of observers trained.
- Summary of qualifications / training and years of experience of the observers deployed in SBT fisheries during the past year.
- A copy of the latest version of relevant manuals in their original language for reference

B. Scientific Observer Program Design and Coverage

Details of the design of the observer program, including:

- Which fleets, fleet components or fishery components were covered by the program.
- How vessels were selected to carry observers within the above fleets or components.
- How was observer coverage stratified: By fleets, fisheries components, vessel types, vessel sizes, vessel ages, fishing areas and seasons.
- The proportion of coverage provided by observers vs. EMS.

Details of observer coverage of the above fleets, including:

- Components, areas, seasons and proportion of total SBT catch, specifying units used to determine coverage.
- Total number of observer employment days, and number of actual days deployed on observation work.
- Total number of vessels with EMS systems deployed onboard, as well as the proportion of data returned to agencies that was analysed.

C. Observer Data Collected

List of observer data collected against the agreed range of data set out in Attachment 1. In broad structure this would include:

- Effort data: and — Amount of effort observed (vessel days, sets, hooks, etc), by area season and % observed out of total by area and seasons
- Catch data: — Amount of catch observed of SBT and other species (if collected), by area and season, and % observed out of total estimated SBT catch by area and seasons
- Length frequency data: — Number of fish measured per species, by area and season.
- Biological data: — Type and quantity of other biological data or samples (otoliths, sex, maturity, Gonosomatic index, etc) collected per species.
- The size of sub-samples relative to unobserved quantities.

D. Tag Return Monitoring

Number of tags returns observed, by fish size class and area.

E. Problems Experienced

- Summary of problems encountered by observers and observer managers that could affect the CCSBT Observer Program Standards and/or each member's national observer program developed in the light of the Standards.