Commission for the Conservation of
Southern Bluefin Tuna

みなみまぐろ保存委員会

Report of the Tenth Meeting of the Scientific Committee

9 September 2005
Narita, Japan

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Agenda Item 1. Opening of meeting

1. The independent Chair, Mr Penney, declared the Scientific Committee meeting open and welcomed all participants.
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 Tenth 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 2.10pm, on 9 September 2005.

List of Appendices

Appendix 1

List of Participants
Tenth Meeting of the Scientific Committee
9 September 2005
Narita, Japan

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Ms Saemi BABA

Commission for the Conservation of
Southern Bluefin Tuna

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Appendix 2

Report of the Extended Scientific Committee for the Tenth Meeting of the Scientific Committee

5-8 September 2005
Taipei, Taiwan

Report of the Extended Scientific Committee for

the Tenth Meeting of the Scientific Committee

5-8 September 2005

Taipei, Taiwan

Agenda Item 1. Opening

1. The meeting was opened by the appointed Chair of the Extended Scientific Committee, Mr Penney, who welcomed participants. The Chair thanked Taiwan for hosting the meeting and assisting with meeting arrangements.

1.1 Introduction of participants

2. Participants were introduced at the opening of the Scientific Committee meeting. The list of participants is shown in **Attachment 1**.

1.2 Administrative arrangements

3. There were no new administrative arrangements since the previous meetings.

Agenda Item 2. Appointment of rapporteurs

4. It was agreed that the Secretariat and the Chair would rapporteur agenda items 1 to 4, and 8 to 15. Australia and Japan provided rapporteurs to jointly develop the draft report for agenda items 5 to 7. Text from all technical discussion groups would be provided by those groups.

Agenda Item 3. Adoption of agenda and document list

5. The draft agenda was adopted and is provided at **Attachment 2**.
6. The Chair outlined his proposal for scheduling meeting discussions and the need to run some small group meetings for technical discussions.
7. Australia advised that it had prepared a paper on comparison of CCSBT catch data and Japanese auction sales of frozen SBT and requested that the paper be accepted as a formal document to the meeting. Australia noted that late documents had been accepted in the past. However, after consultation with the meeting and the lack of unanimous agreement to accept the paper, the Chair cited the rules of procedure (Attachment F of the Peer Review Workshop, 2000) and ruled that the paper could be accepted as a working paper to the meeting, but not as a formal document for the meeting.

8. The Chair requested that the Extended Scientific Committee (ESC) focus discussions arising from this working paper on the scientific implications of possible under reporting. The meeting agreed that the potential implications of under reporting on stock status advice and on the management procedure implementation should be discussed under agenda items 5.2, 6.4 and wherever else it was relevant to discussions.

9. It was noted that the Secretariat had provided a revised version of CCSBT-ESC/0509/06 and that Australia was circulating paper CCSBT-ESC/0509/31.

10. The agreed document list is shown in **Attachment 3**. Members identified which papers were related to each of the agenda items.

Agenda Item 4. Review of SBT fisheries

4.1 Presentation of national reports

11. Participants presented brief overviews from their National Reports of important characteristics or changes in their fisheries in 2004.

12. Australia presented CCSBT-ESC/0509/SBT Fisheries-Australia which summarised catches and fishing activities in the Australian Southern Bluefin Tuna Fishery up to and including the 2003/04 quota year. Noting the Stock Assessment Group (SAG) and ESC concerns in relation to recent recruitment declines, Australia's report includes some preliminary results for the 2004/05 surface fishery season.

- A total of 55 commercial fishing vessels landed SBT in Australian waters in 2003/04. 95.2% of the catch was taken by purse seine with the remainder taken by longline. Six purse seiners fished during the 2003/04 quota year, with purse seine fishing commencing in early December 2003 and finishing in late March 2004.
- The 2003/04 quota year catch was 5,120t which was under the previously agreed national allocation to Australia to account for an over-catch of 128t in the 2002/03 season. This over catch was subsequently deducted from the 2003/04 allocation for the operators concerned.
- Length frequency data from the purse seine fishery for the 2003/04 and 2004/05 seasons shows a shift to smaller fish. Australian industry attributes this shift to mixing of two- and three-year-old fish, low prices, and weather in recent seasons.
- In the 2004/05 quota year, observers monitored 11% of purse seine sets and 8.5% of the estimated SBT catch. In 2004, observers also monitored 11.7% of longline sets in the area and time that SBT were likely to be caught. Observers also monitored 4.5% of longline sets in the Southern and Western Tuna and Billfish Fishery.

13. In response to questions from the members, Australia advised that:

- It does not have an extrapolated estimate of the discards in the longline fishery because log books are not a good tool for estimating discards and prior to 2004 there were not high levels of observer coverage in this fishery.

- There are slight differences between the size distribution of discards and retained catch, but in general discarding appears to be conducted due to lack of quota availability and all sizes of SBT are discarded. The status of discards is recorded where possible and 58% were alive and vigorous when discarded with the remainder being dead or moribund.
- The recreational catch is difficult to estimate and the recreational catch has not been included in the Australian reported catch.
- From tag release data, there is no indication of major changes in the size of fish caught in the longline fishery.
- Australian industry advised that for the surface fishery, there has been a preference for 3 year old fish. However, in more recent years there has been more of an age mix in schools. This together with declining profitability has resulted in less searching for schools of just 3 year olds and a greater catch from mixed age schools. At present Australia does not have comprehensive data on search effort in the purse seine fishery. However, the industry advises that they have been conducting less searching.

14. Taiwan presented ESC/0509/SBT Fisheries-Taiwan. In addition to the CPUE and catch-at-size of the Taiwanese fleet that were presented in the SAG6 meeting, the report provides a brief description on the fishery activities in 2004. The 2004 catch exceeded Taiwan's annual quota by 158 tonnes due to good catch conditions. This over catch will be deducted from the quota in 2005. The number of vessels that have been involved in the SBT fishery has declined to 92 in 2004 and will decline further. The number of observers onboard of SBT vessels has increased from two in 2003 to three in 2004 and observers collected 316 otoliths in 2004, compared to 102 in 2003. Observers also collected stomach contents for a diet study. Two of the three observers have conducted collaborative tagging with Australia. A total of 37 archival tags were released in 2004 and four of them have been recovered so far.

15. Japan presented CCSBT-ESC/0509/SBT Fisheries-Japan, which summarised catch, effort, nominal CPUE, size composition, fleet size and distribution of the Japanese commercial fisheries up to and including 2004. Longline is the only method that Japanese fleets used to catch southern bluefin tuna. Catch and effort in Area 7 have decreased since 2003. Few small fish were observed in the whole fishing ground, and particularly in Area 4 and 7. Nominal CPUE increased until 2002 and then decreased. CPUE in 2004, compared to 2000-2003, was low in Areas 4, 7 and 9 and high in Area 8. Scientific research activities were conducted, including onboard research on a longline vessel involving archival tagging and research for the Recruitment Monitoring Program which is conducted in collaboration with Australian scientists. Otoliths were collected from 655 fish in 2004. Ages were estimated for 1421 fish caught until 2002.

16. In response to questions from the members, Japan advised that:

    - There are few SBT discards in Japanese fishing operations. This is based on log book and observer data. Discards will be reported in Japan's future national fishing reports.

- SBT is not targeted in Area 1. The effort in Area 1 is targeted on bigeye and other species. The number of SBT by area is shown in table 2 of the report and few SBT were reported in Area 1.
- The eastwards shift in fishing noted by some members is considered to result from year to year changes in the location of fishing in Area 9. The causes of such changes have not been identified. This could be due to oceanic change or economic preferences.

17. New Zealand presented CCSBT-ESC/0509/SBT Fisheries-New Zealand.

    - Catches for the 2003 and 2004 seasons were below the national allocation being 392 and 394t respectively. For 2003, the regulatory limit was reduced to take account of over catch in the previous year and for 2004 the season was closed early resulting in an under catch of the national allocation. Vessel numbers in the New Zealand fishery declined during 2003 and 2004 relative to the peak in 2002; however effort (hook numbers) peaked during 2003/04. Both areas of the New Zealand fishery have shown CPUE declines in recent years, with a steady decline of 55-70% in the northeast fishery and a 60% reduction in the southwest fishery since 2001.
    - There has been a very clear reduction in the range of sizes of southern bluefin tuna taken in the New Zealand fishery since 2001. The proportion of fish less than 140cm in length has declined rapidly since that time. The lack of small fish reflected in the length data corresponds to a series of weak cohorts in the proportional ageing data for the New Zealand fishery. Overall, the data suggest three consecutive weak year classes from 2000 to 2002 and that the 1999 cohort is also low. Preliminary data for the 2005 fishing year (the fishery is still underway) indicate a continuation of the lack of small fish observed in the data for the 2004 fishing year.
    - For the 2004 fishing season 100% of the charter catch was observed and 15% of the domestic catch. Two discards were observed each from the charter fleet (0.1% rate) and domestic fleet (0.4% rate). It was noted that the domestic coverage was not necessarily representative of the overall domestic fishery.

18. New Zealand advised that there was bycatch of SBT in the hoki trawl fishery and the SBT were taken in the nets.

19. Korea presented CCSBT-ESC/0509/SBT Fisheries-Korea. In 2004, six out of 16 registered longliners fished for SBT and caught 114t, which is a decrease of about 48% from 2003. Most of the fish in 2004 were taken from EEZ area of the Republic of South Africa and targeting was also changed from SBT to bigeye and yellowfin tuna. During 2004 and 2005, two observers were deployed on the SBT longline fishing vessel operating in the EEZ of South Africa. During the trip, observers were to monitor the catch of target and by-catch species and tags.

20. The meeting noted that the spatial distribution maps of CPUE illustrated in the report of the Korean fishery reflected all tunas not just SBT. Korea was requested to provide the spatial distribution of catch and effort data relating to SBT in future

reports and, if time permits, to provide this information in the report that Korea prepares for CCSBT12.

21. Indonesia provided the following verbal report on its fishing activities in 2004.

- The Indonesian tuna fisheries in the Indian Ocean consist of industrial and artisinal fisheries. Longline is the only fishing gear in industrial fisheries, while in the artisinal fisheries several fishing gears are used including small purse seine, trolling, gill nets, as well as hand line which mainly catch skipjack and yellowfin.
- Bigeye is the dominant catch for longlines followed by yellowfin and SBT. The number of longline vessels in the Indian Ocean decreased from 1,095 in 1999 to 755 in 2004.The fishery uses both deep and shallow longline sets.
- The amount of SBT exported from Bali was 24t from July to December 2004 and 9t from January to March 2005.
- Based on the data from one company it seems that the long line fleet operated further away from fishing ports and the catch rate has decreased.
- A collaborative project between the Ministry of Marine Affair and Fisheries (MMAF), the Commonwealth Scientific and Industrial Research Organisation (CSIRO), the Australian Government Department of Agriculture Fisheries and Forestry (DAFF), the Australian Centre for International Agricultural Research (ACIAR), the Indian Ocean Tuna Commission (IOTC) and the Overseas Fishery Cooperation Foundation (OFCF) has resulted in better estimation of tuna landings as well as better biological information from the Indian Ocean. For 2004 the project estimated a catch of 677t of SBT.
- The government of Indonesia is trying to continue this activity; however, support from international organisations is still needed.

4.2 Secretariat review of catches

22. The Data Manager presented CCSBT_ESC/0509/06, which contained an update of the estimated catches for 2003 and 2004.

23. The global catch by flag is presented at **Attachment 4** and the global catch by gear is at **Attachment 5**. Excluding research mortalities, the total catch for 2004 was estimated to be 13,490t.

24. It was noted that the 2003 and 2004 figures included small catches (3t and 1t respectively) reported by scientific observers on exploratory fishing surveys by Spain outside of Spain's usual fishing grounds. It was also noted that the Secretariat had requested SBT catch information from South Africa but they had not responded.

25. Preliminary information on Indonesia's 2005 catch collected by the collaborative project and provided by the IOTC indicated that the January to June 2005 catch of SBT was 1,383t which is nearly a 6 times increase in the catch for the same period last year.

26. Concerns were expressed about the emergence of SBT catch by Spain, the lack of response from South Africa concerning its catches and the increase in Indonesia's catch. In addition:

- It was agreed that CCSBT must insist on reporting of all catches of SBT and that the EU should be requested to provide data on all SBT catches.
- In September 2004, anecdotal reports from South African industry indicated that small numbers of adult SBT had been caught by South African flagged longliners off the South African east coast during the previous austral winter. The Secretariat was asked to make a further request from South Africa for its 2004 SBT catch data, mentioning these reports in that request.
- It was noted that the increase in Indonesia's catch was primarily from one company that fished mainly in Area 2.

27. Australia presented a working paper advising that a range of publicly available market data suggested that auction sales of frozen SBT in Japan appear to greatly exceed the quantity expected from CCSBT catch data.

- Information presented suggest that auction sales of frozen SBT were 9,193t higher than expected in 2002, 9,036t higher than expected in 2003 and 7,050t higher than expected in 2004.
- Preliminary unconfirmed data back to 1991 also indicate that this anomaly may have been occurring since that time.
- Australian industry data indicate that a very small proportion of Australian farmed SBT was sold at auction, and that double counting of catch appears to account for only a small part of the gap between reported CCSBT catch and the estimated over catch.
- These initial results require careful consideration within the CCSBT scientific process. If marketed catches of SBT are considerably larger than the recorded catch then this may have a substantial impact on:
  - fishery-dependent stock status advice (including advice derived from CPUE and catch at age);
  - anticipated recovery trajectories under a Management Procedure and the short-term risks under different Candidate Management Procedures; and
  - the data collection requirements for implementation of a Management Procedure (i.e. the ability of current catch and effort data collection systems to support the effective operation of the MP would be called into question).
- Australia stated that it would continue to refine the market information for the past fourteen years between now and the Commission meeting and hopes other members, in particular Japan, will also provide information on market data (including weights, numbers, numbers at size for both frozen and non-frozen fish) at the Commission meeting in October 2005, paying particular attention to checking assumptions about the proportion of the longline frozen catch that goes to the Japanese auction market rather than direct sale, the potential for double counting and the possibility that Australian farmed SBT are included in market reports.

28. Japan noted that Australia provided its estimate to Japan only seven working days before the SAG6 meeting, and that Japan had not had time to check the information presented. Based on Japan's preliminary examination, Australian estimates appear to include at least the following two important sources of error:

    - Double Counting: Australian estimates treat the sale data from consumer markets and the landing market in the same way. In general practice, the consumer markets trade fish provided by licensed dealers whose sales include fish imported directly, fish already sold at the landing market and fish retained by trading companies. Most fish sold at the landing markets are transferred to consumer markets for re-sale, and so the estimates presented are likely to include substantial double counting.
    - Australian Farmed Frozen SBT: The paper estimates that 8,604t of frozen SBT was sold by auction at the Tokyo Market (Tsukiji, Adachi, Ota) in 2004 and that only 69t of Australian frozen SBT was sold by auction at the Tokyo Market. However this estimate includes not only the auction sale but also other sales at the Tokyo Market. More than 1000t of farmed frozen SBT was sold through the Tokyo Market in 2004.

29. The Chair noted that the ESC made a statement at a previous meeting on the importance of complete data and that the ESC requested the Commission to ensure the collection and provision of complete and accurate data on global SBT catch to the SAG/ESC.

30. The Secretariat was requested to compare the publicly available 5*5 to catch and effort data held by the IOTC for all fleets with the same data held by the CCSBT and provide a report to SC11 on the discrepancies in the catch and effort between the two data sets. This would form part of the Secretariat's review of catches. Japan noted that the data provided by Japan to CCSBT are different from those provided to the IOTC. The Japanese data provided to the IOTC are based on logbooks, whereas the data provided to CCSBT include the RTMP data.

Agenda Item 5. Management procedure

5.1 Selection of operating models and candidate management procedures

31. The Chair thanked the SAG for their comprehensive report and asked the Chair of the SAG to provide an overview for the ESC. Dr Annala summarised key results and conclusions in the ESC to the Report of the 6th meeting of the SAG.

32. The ESC noted that the SAG had agreed that the existing reference set provided the best available basis to evaluate short-term risks, the effects of alternative initial catch reductions and Candidate Management Procedures (CMPs), with their associated tuning level. The ESC noted that alternative scenarios for recent recruitment ("lowR4", "expl") had been considered as robustness tests.

33. The ESC recalled the Commission's request for advice on the "best" MP, but that no specific criteria had been provided to determine this. In the context of the current

estimated very low level of the stock, confirmation of recent low recruitment and the Commission's rebuilding objective, the combination of initial catch reductions and an MP should address both short-term risk to the stock and the long-term objectives of the Commission for stock rebuilding, average catch and catch stability.

34. The process by which the SAG had reduced the number of combinations of initial catch reductions, schedules for initial catch reduction and commencement of MP, selection of MP and tuning level is described in paragraphs 42-44 of the SAG6 report, with detailed comparisons included in Attachment 4 of that report. The ESC agreed on the urgent need for initial catch reductions recommended by the SAG, and agreed that any decision not to reduce catches in the immediate future was a high risk option, given the recent low recruitments and low stock status (SAG6 Report paragraph 46), and the risk that further stock decline could jeopardise short and long-term recovery prospects.

35. A summary of the relative performances of the four CMPs is provided in paragraphs 47-51 of the SAG6 Report.

36. The ESC noted the desirable features of an MP, given the current state of the SBT stock, are to protect against further reduction of the spawning stock, in the short and long term, to keep short term TAC fluctuations small, and to respond by increasing TACs in the longer term, if the stock shows signs of rebuilding strongly.

37. The report of SC9 highlighted concern about stock status and suggested that catch reductions might be required in addition to adoption of an MP. Given the stock status described in Section 6 below (and in more detail in the SAG6 report), particularly the low recruitments of 2000 and 2001 and the ongoing low SSB, the ESC considers that there is an urgent need to reduce catches to prevent further stock decline. It is recommended that the global SBT catch should be reduced to 9,930t for 2006, which corresponds to a 5,000 tonne reduction in the assumed global catch of 14,930t for 2004 and 2005. This level of catch reduction was chosen so that, when coupled with the implementation of an MP, it would provide an estimated 50% probability that the spawning stock biomass in 2014 (when a minimum is forecast) would be no lower than 2004 spawning stock biomass which is currently the lowest estimated.

38. In the event that the catch is not reduced until 2007, in order to maintain the same estimated 50% probability that 2014 biomass will be no lower than the estimated 2004 biomass, the global SBT catch would need to be reduced to 7,770t in 2007 (this corresponds to a reduction of 7,160t in the annual assumed global catch of 14,930t for 2004 and 2005).

39. The SAG report noted that "In the event that it is determined that the global catches are higher, or the characteristics of the catch (e.g. the age, and size composition, distribution among sectors) are substantially different than those assumed in the operating model, then the total catch reduction required to achieve the same stock stabilisation would need to be recalculated. It is expected that the catch reduction required would be approximately an equivalent percentage of total removals under most circumstances. Therefore, in the absence of a calculation, the SAG recommended a catch reduction equivalent in percentage of total removals". These observations and recommendation were endorsed by the ESC.

40. The potential impact of unreported catches was discussed extensively in a small group chaired by Professor Hilborn of the panel. The group noted that the SAG's primary conclusions regarding the status of the stock and the need for immediate catch reduction are robust to uncertainty in the total catch and its characteristics. One important reason for this is that the indications of recent poor recruitment come from several data sources independent of the catch and CPUE data, (commercial aerial spotting data, tagging data, acoustic surveys, and age composition in NZ LL observer data). The choice of an MP is robust to uncertainty in total catch and catch composition, although a substantial change in either catch and catch composition would require a retuning of the MP to achieve the same objectives. The ESC reviewed calculations carried out for several hypotheses of historically higher catch assuming no historical revision to the CPUE previously assumed in the operating model. These calculations suggest that under those hypotheses the stock status would be somewhat more pessimistic than evaluated using the catches currently assumed.

41. The SAG judged that all MPs showed reasonable feedback behaviour and made different tradeoffs between the objectives of CCSBT when combined with catch reductions in 2006. However, the Commission had asked the ESC to recommend a single MP for implementation at the current meeting without further opportunity for MP modification.

42. The SAG also recognised that a 5,000 tonne reduction in 2006 will be highly disruptive to fishing industries but is considered essential to achieve an estimated 50% probability that spawning stock biomass in 2014 will be above the SSB in 2004. The ESC recommends that the Commission accepts CMP_2 as its procedure, combined with a corresponding reduction in the annual assumed global catch specified for 2006 (reduction of 5,000t) or 2007 (reduction of 7160t).

43. In the event that the recommended 2006 or 2007 catch reductions do not occur, then the conservation risk of CMP_2 would be higher and would not meet the same objectives. Additional measures would then be required to prevent further stock decline, and these measures could include additional catch reductions, retuning of CMP_2 or adoption of another MP.

44. The MP workshop in May 2005 outlined a process by which the selected MP could be re-tuned after the selection. The ESC considered alternative tuning levels in the context that one of the prime objectives of CCSBT is to rebuild the spawning stock, which requires markedly reducing the probability of the further decline of the SBT stock.

45. Hence, the ESC recommends that CMP_2 be tuned so that there is an estimated 90% probability that the 2022 biomass will be at or above the 2004 biomass. This means, in effect, that there is an estimated 10% chance that the stock will be below the 2004 level in 2022. This would lead to a higher estimated median biomass in 2022 than those examined at MPWS4 but lower than either the 1980 or 1989 stock levels. Associated tabular and graphical results are given in Attachment 4 of the SAG Report, together with those for an alternative tuning level which corresponds to an estimated 20% chance that the stock will be below the 2004 level in 2022.

46. The ESC recommends that following implementation of the MP, the performance of the MP and the management system should be reviewed periodically following the process outlined in Attachment 9 of the MPWS4 report or any subsequent revision thereof.

47. The ESC thanked the SAG for their comprehensive evaluation of the candidate MPs and complimented the SAG on the successful MP development and evaluation process that has resulted in a robust and rigorous procedure for future management of the fishery.

5.2 Metarules and implementation issues

48. The proposals for a Metarules Process and a Regular MP Review Process drafted at the 4th Management Procedure Workshop were endorsed and are included in the draft MP Specification document shown in **Attachment 6**.

49. Australia presented a working paper on potential implications for SBT assessment and management procedure evaluation of possible under-reporting of catch as indicated in market data. Four alternative scenarios were used to explore the potential implications of higher catches than assumed in the operating model for the current estimate of the state of the stock.

50. The ESC recalled that the question of how to evaluate the implications of potential errors in catch estimation had been raised at previous MP workshops (e.g. Report from the second Management Procedure Workshop, 2003; paragraph 15, section 4.4).

51. In the working paper, the potential implications of a hypothetical additional catch of 5000t gilled and gutted weight (which equates to 5750t whole weight) were explored using alternative selectivity scenarios: i) selectivity is equivalent to that of LL1, ii) 50% of the catch has selectivity equivalent to LL1 and 50% equivalent to LL2. Two additional scenarios included were: iii) systematic errors in the estimation of the size distribution in the juvenile surface catches, and iv) a combination of the first and third scenarios. All scenarios assumed that CPUE was unchanged i.e. as used in the reference set

52. Results of these analyses indicated that:

- Current estimates of the state of the stock are not substantially changed under the scenarios explored. The objective function values did not show any signals of fitting the data in the alternative scenarios any better or worse than in the reference case;
- The LL1 scenario suggests a more depleted state than the operating model reference set, and generally lower absolute biomass and recruitment. In this scenario, even if the catch is dropped to 14,930t from 2006 onward (i.e. a complete reduction of the hypothesised 5,750t over catch), the LL1 scenario still indicates considerably lower spawning biomass in 2014 (relative to 2004) than under the reference set;
- If the hypothesised additional catch continued into the future, the projections of biomass would be substantially lower than for the case where the hypothesised

additional catch does not continue into the future. The LL1&LL2 scenario is intermediate between the LL1 and reference set scenarios;

- Overall, the results suggest qualitatively similar outcomes to previous assessments that have included additional catch scenarios, with the biggest differences being in the projection period, depending on whether the hypothetical additional catch continued into the future or not.

53. The above results were discussed in the group chaired by Professor Hilborn, and the conclusions of the ESC regarding the potential implications are reflected in paragraph 40.

5.3 MP Specification

54. The ESC noted the need for an overview document describing all elements comprising the full specification of the recommended CCSBT MP, including technical description of the MP algorithm, underlying assumptions, input data, metarules process, MP review process and responsibilities. A draft MP Specification is provided in **Attachment 6**.

55. Issues related to the provision of fine scale catch and effort data for the purpose of calculating the CPUE indices (specifically the ST Window Index) used by the MP were referred by the working group on MP Data Inputs to the ESC for further discussion.

56. Provision of fine-scale catch and effort data has been discussed extensively at previous ESC meetings. It has been recognised that, "for scientific purposes, access to data at the finest spatial and temporal scale is desirable to assist resolution of key uncertainties in assessments such as CPUE standardisation" (Report of SC8, Christchurch, 2003).

57. However, provision of fine-scale data requires implementation of measures to protect data confidentiality, and domestic data provision policies of some countries currently prevent the provision of such data. The ESC recognises that it is the responsibility of the Commission to address such issues and to decide on the resolution of data to be provided by Commission members.

58. As yet, there has been no agreement to provide high spatial resolution data to the CCSBT as part to the annual data exchange. Nonetheless, members have agreed that, "if higher resolution data is required for assessment or detailed analysis, then the countries concerned would provide the necessary resolution of data for those agreed purposes" (Report of SC9, Jeju 2004).

59. There is, in principle, a range of options that could be considered for provision of data for calculation of the Space-Time (ST) Window CPUE index. These include: i) Calculation of CPUE indices by individual members and provision of these indices to the Secretariat for use in the MP (the process used in MP testing); ii) Calculation of the CPUE indices by the Secretariat, in cooperation with the specific members responsible for providing the input data for each index; and iii) Regular provision / exchange of fine-scale data for use in calculating the CPUE indices.

60. Regarding calculation of the CPUE indices used by the MP, it has been recommended that "Ideally these would be calculated by the CCSBT Secretariat. However, practical considerations will require that they be provided by countries in the first year." (Report of the CPUE Modelling Group, Attachment E to the SC8 report). Thus, while there has been no agreement to adopt the last option (exchange of high resolution data), the ESC notes the desirability of moving from the process used during MP testing towards the central option, whereby the Secretariat would calculate the required CPUE indices in cooperation with the individual members responsible for providing the data for each index, in a manner that protects the confidentiality of the data.

61. The Commission was requested to consider which option they wished the ESC to use in implementation of the MP, noting the preference expressed at SC8 (Attachment E to the SC8 Report) that the calculations be undertaken by the CCSBT Secretariat.

62. In conclusion, it was noted that the use of the median of the five agreed CPUE series is supposed to be a short term solution, used only for the first five years of MP implementation. The CPUE modelling Group has noted that "Future work plans call for a definitive CPUE series for use by 2009" (Report of the CPUE Modelling Group, Attachment E to the SC8 report) and that, in the longer run "there is likely to be a need to develop an agreed CPUE measure for the first review and this will need greater priority once scientific inputs to the MP have been completed" (Report of the CPUE Modelling Group, Attachment 9 to the SC9 Report).

Agenda Item 6. SBT assessment, stock status and management

6.1 Review of fisheries indicators and assessment results

63. The SAG Chair, Dr Annala, provided an overview of relevant paragraphs from the SAG6 report. The ESC endorsed all the outcomes from the SAG6 meeting and their summary of these is reproduced below:

Recruitments

- The indicators presented in 2005 reinforce the evidence available in 2004 that the 2000 and 2001 year classes were considerably smaller than previous years and the sum of the evidence is now convincing that there have been at least two very low recruitments. There are four primary data sources to indicate this poor recruitment: acoustic survey, size frequency, commercial spotting (SAPUE), and tagging data. The acoustic data indicated markedly low recruitment after 1999. The size distribution data in the Japanese LL fishery show a marked reduction in the number of fish from the 2000 and 2001 year classes. The charter fishery in New Zealand also shows a near total absence of fish recruited since 1999. The Australian commercial aerial spotting data (CCSBT-ESC/0509/23 Figure 8) show lower abundance in 2003 and 2004. The tagging data show that the exploitation rates on the 2000 and 2001 year classes are high, and hence are consistent with estimates of low recruitments to these year classes.

- In summary, the indicators of recruitment suggest markedly lower recruitment in at least 2000 and 2001 with some indication that recruitment in 1999 was also weak.

Spawning stock biomass

- Catch rates of fish aged 12 and older in the Japanese LL indicate a drop in spawning stock biomass in about 1995. Recent Indonesian catch has remained low and the majority of the catch has been relatively young spawners. The data from the Indonesian fishery training schools from 2000 to 2005 is consistent with a declining spawning stock biomass.

Exploitable biomass for the longline fishery

- Japanese LL CPUE of SBT for all ages combined suggests that the exploitable biomass for these gears has remained fairly constant during the past 10 years, though this level is low compared to historical values. Results indicate increases in the CPUE of ages 8-11 since about 1992, but there is a slight decline in 2003 which continued into 2004. CPUE of fish aged 4-7 has increased since the mid 1980s and remained broadly constant over the last 10 years.
- In summary, these CPUE indicators generally suggest stable exploitable biomass over the last 10 years. However, recent low recruitments are likely to lead to declines in future exploitable biomass trends.

64. In addition to the SAG6 conclusions, the ESC noted that the preliminary catch estimate for the first six months of 2005 suggests a substantial increase in exploitation of the spawning stock biomass.

6.2 Status of the SBT stock

65. The ESC endorsed the overall assessment of stock status from the SAG6 report, which is reproduced below:

- The current assessments through the operating model (using data available from the 2004 SAG/ESC) suggest the SBT spawning biomass is at a low fraction of its original biomass and well below the 1980 level. The stock is estimated to be well below the level that could produce maximum sustainable yield. Rebuilding the spawning stock biomass would almost certainly increase sustainable yield and provide security against unforeseen environmental events. Recruitments in the last decade are estimated to be well below the levels in the period 1950-1980. Assessments estimate that recruitment in the 1990s fluctuated with no overall trend. Analysis of several independent data sources and the operating model indicate very low recruitments in 2000 and 2001. There is some evidence that the 1999 cohort is relatively weak and that the 2002 cohort is unlikely to be as strong as those estimated during the 1990s. Other indicators show that the Indonesia LL fishery on spawning fish catches fewer older individuals. One plausible interpretation is that the spawning stock has declined in average age and may have declined appreciably in abundance. The decline in average age may be due to the disappearance of older fish, a pulse of younger fish entering the spawning stock, or a combination of the two factors. A pulse of younger fish entering the

spawning stock is consistent with the assessment model output which suggests that the spawning stock has been largely stable over the last decade and increased slightly over the last four years.

- Given all the evidence, it seems highly likely that current levels of catch will result in further declines in spawning stock and exploitable biomass, particularly because of recent low recruitments.

66. In addition to the above SAG6 conclusions, the ESC recalled its conclusions last year regarding the possibility of ongoing low recruitment and the need to monitor recruitment trends. The SAG conducted an analysis of the full set of indicators of recruitment this year. Clear inferences regarding the strength of the 2002 and subsequent cohorts are not yet possible, and the possibility that there is an ongoing marked reduction in recruitment cannot be ruled out. The situation should be kept under review as further data become available, in case it merits invoking a meta-rule in future.

6.3 Stock status reports

67. At the SC8 meeting in 2003, it was agreed that the ESC would assume responsibility for preparing an annual overview report on biology, assessments and management of SBT for submission to other regional fisheries management organisations. The CCSBT report to ICCAT, IOTC and the FAO was produced during the meeting and is at **Attachment 7**.

6.4 SBT management recommendations

68. The ESC endorses the following SBT management recommendations and associated comments from the SAG6 report:

- That the Commission accepts CMP_2 as its procedure, combined with a corresponding reduction in the annual assumed global catch (14,930t) specified for 2006 (by 5,000t) or 2007 (by 7,160t).
- In the event that the recommended 2006 or 2007 catch reductions do not occur, then the conservation risk of CMP_2 would be higher and would not meet the same objectives. Additional measures would then be required to prevent further stock decline, and these measures could include additional catch reductions, retuning of CMP_2 or adoption of another MP.
- The MP workshop in May 2005 outlined a process by which the selected MP would be re-tuned after the selection. Alternative tuning levels were considered in the context that one of the prime objectives of CCSBT is to rebuild the spawning stock, which requires minimising the probability of the further decline of the SBT stock to minimise conservation risk.
- That CMP_2 be tuned so that there is an estimated 90% probability that the 2022 biomass will be at or above the 2004 biomass. This means, in effect, that there is an estimated 10% chance that the stock will be below the 2004 level in 2022. This would lead to a higher estimated median biomass in 2022 than that examined

at MPWS4 but lower than either the 1980 or 1989 stock levels. Associated tabular and graphical results are given in Attachment 4 of the SAG6 report, together with those for an alternative tuning which corresponds to an estimated 20% chance that the stock will be below the 2004 level in 2022.

69. The ESC also noted the possible implications for management of global catches that are higher than current reported catch, and reiterated the advice stated in paragraph 40of this report.

70. The ESC was concerned about new information suggesting marked increases in the Indonesian catch. The ESC recommended the Commission make every effort to minimise the likelihood of increased catches from non-cooperating non-members.

71. Given the current low spawning levels, Japan stressed the importance of restricting exploitation in the area when and where the fish aggregate to spawn.

72. Japan similarly stressed the importance of restricting exploitation in nursery areas, given recent low recruitment.

73. Australia considered that analyses presented at the SAG and ESC did not support the need to specifically restrict catches in nursery areas. Australia considered that eliminating unregulated catches (across the full range of age classes and areas) was a serious concern for the Commission.

74. Japan noted that the current MP evaluation assumed that general catch characteristics such as gear composition and gear selectivity showed no trend. Substantial TAC changes would be likely to cause substantial changes to fishing patterns. Some management actions, such as a ban of quota changes between gears and the introduction of catch number control together with TAC control would be effective to prevent drastic changes in fishing patterns.

75. Other Members believed that such actions were an issue for the Commission.

76. The ESC noted that there are several important underlying assumptions in the Operating Model used for MP development which are related to the proportional distribution of catches between SBT fisheries, and to the selectivity (size distribution of fish caught) by these fisheries. (These assumptions are summarised in the MP Specification Document shown in **Attachment** 6.) Marked changes in fisheries as a result of future TAC changes could result in violation of these underlying assumptions, in which case the MP might not respond as predicted.

77. Nevertheless, it was noted that the MP has been extensively tested, and should be relatively robust, to fishery changes that could be expected to result from the TAC changes recommended by the MP. However, the MP has not been fully tested for robustness under the situation where the TAC adopted by the Commission was different from that specified by the MP, or for changes in the proportional allocation of catches between fisheries that might be adopted by the Commission. Australia suggested with respect to the latter that if concerns of this type exists it would be straightforward to check the performance of the MP under extreme changes in the catch proportions among fisheries. Australia noted that previous projection analyses of this type were not very sensitive to such changes (e.g. CCSBT-SC/108/23).

78. The ESC therefore strongly recommends that the Commission seeks advice from the SAG/ESC on the potential implications for MP performance of Commission decisions that result in:

    - Deviation from the TAC changes recommended by the MP.
    - Large changes that could compromise the underlying assumptions of the SBT Operating Model, e.g. changes in the proportional distribution of catches between SBT fisheries or changes in the selectivity of these fisheries.

Agenda Item 7. Implementation of the SRP

79. Papers including CCSBT-ESC/0509/27, 29, 30, 32 and 47 were discussed under this agenda item

7.1 Characterisation of SBT catch

80. The CCSBT Data Manager presented paper CCSBT-ESC/0409/07 on characterisation of SBT catch. The paper summarised catch reporting by members in terms of both the types of catch, effort and size data that have been submitted and the compliance of submitted data with the fields of information that are required to be provided. While members have provided fairly comprehensive data to the CCSBT, some data still remain that have not been submitted.

81. Members' response to queries on their catch and effort reporting is at **Attachment 8**.

82. The ESC noted that the CCSBT received estimates of Indonesia's catch from January through to June 2005 from the IOTC, which reported a catch of nearly 1400t. For other non-members, Japanese import statistics and the CCSBT Trade Information Scheme (TIS) have been the major source of catch estimates. However, from July 2005, the situation will change as a result of the CCSBT decision that imports of SBT may only be accepted from members and cooperating non-members. Thus, from July 2005, Japanese import statistics and the TIS will no longer be able to provide information on the catches of non-members.

83. Australia and Taiwan proposed the creation of a new statistical area in the Indian Ocean to cover the area fished by Taiwanese vessels. The ESC recommended that the Data Manager lead an intersessional discussion regarding the proposal for a new statistical area.

7.2 CPUE interpretation and analysis

84. Professor Pope chaired a meeting of the CPUE Modelling Group. The report of the meeting is at **Attachment 9**. The group discussed short-term CPUE required for input to the MP, and future research plans. The need to monitor and evaluate the different CPUE series was recognised as an ongoing requirement for MP implementation, and procedures for dealing with the potential absence of one or more of the indices were recommended. It was recognised that in preparation of the

first review of the MP, CPUE studies should receive a higher priority. A work plan for future CPUE research was proposed, including the calibration of RTMP with post-season data, and long-term research aimed at improving interpretation of CPUE data. A one day workshop was proposed for the 2006 SAG/ESC, with the intention of undertaking collaborative analyses of fine-scale Japanese CPUE data.

85. The CPUE modelling group (**Attachment 9**) made a number of suggestions regarding how to deal with the potential absence of one or more of the indices. However, due to time constraints, these were not discussed by the ESC.

7.3 Scientific observer program

86. Members presented reports on their observer programs. A comparative table summarising member observer programs for 2004/05, including coverage levels, is provided (**Attachment 10**).

87. Japan presented paper CCSBT-ESC/0509/37 on its observer program for 2004. Japan noted a major difficulty was that deployment of observers depends on supply vessels, and there could be difficulty transferring observers in dangerous sea conditions. Therefore, the number of days the observers were actually observing was reduced to around 60% of the total days of employment. Japan's observers had retrieved 13 CCSBT tags in 2004.

88. Comparison of the number of tags returned from observers with the total number of tags returned suggested that the tag return rate from vessels with observers appeared higher than that for other Japanese longline vessels. Japan suggested this was due to a range of issues including a time lag of reporting between observers and other vessels, which could be up to one year.

89. CCSBT-ESC/0509/SBT Fisheries – New Zealand (Appendix 2) was presented. The target for observer coverage was 10% of longline sets in each fleet and area, and 10% coverage of the catch. As in previous years, observers were deployed on all charter vessels and 100% of the catch was observed. Candidate domestic vessels for observer coverage were selected on the basis of ability to accommodate an observer (e.g., some small vessels were excluded) and vessels fishing plans. While 15% of the domestic catch was observed, the coverage was predominantly in the southern region and was not representative of the entire domestic fishery. This was an issue that New Zealand was seeking to address in 2005. A large number of biological samples were taken from the SBT observed. Almost all the SBT were sexed (98%) and over 50% had otoliths removed. A sub sample of the otoliths collected in 2004 had been aged and results are provided in CCSBT-ESC/0509/12.

90. Australia presented relevant information from its national fisheries report (CCSBT-ESC/0509/SBT Fisheries-Australia), including some 2004-05 season data in recognition of the importance of such data to current recruitment of younger fish into the Australian surface fishery. Details of the levels of coverage achieved are provided in **Attachment 10**. Australia noted high levels of discarding in its longline fisheries and subsequent management responses including 100% observer coverage and minimum quota holdings in areas where SBT were most likely to be taken. A

comparison of observer with catch and effort logbook data also suggested that logbook data may not accurately reflect non-retained catch.

91. Taiwan presented relevant information from its national fisheries report (CCSBT-ESC/0509/SBT Fisheries-Taiwan). Three observers were deployed in 2004 on five vessels. However, owing to difficulties in vessel arrangement and transferring at sea, two of the vessels were only observed partially. For SBT catching activities, the coverage was 5% by vessel and 4% by catch in number.

92. Indonesia presented a brief verbal report on its efforts to obtain observer data on its fisheries where SBT are taken as bycatch. Indonesia noted the data collected as a result of its fisheries school training program, and that observers were being trained and deployed in its fisheries.

93. In Korea's absence the ESC Chair presented a brief summary of the relevant observer information from Korea's national report (CCSBT-ESC/0509/SBT Fisheries Korea).

94. The ESC agreed that observer programs were very important in supporting a range of SRP objectives. The Chair urged members to work to meet the agreed observer standards, particularly in relation to observed coverage of catch and effort. The absence of clear guidance in relation to the use of data collected through the various observer programs was also noted.

95. The ESC agreed that the Secretariat will work with members intersessionally on improving the provision of observer information, particularly that which could support of SRP objectives. The Executive Secretary noted the increasing data workload being imposed upon the Secretariat, and that additional observer data analysis and reporting functions for the Secretariat may require further resources or prioritisation of existing work.

96. In order to improve the outcomes derived through collection and analysis of observer data, the ESC agreed to review potential analyses of observer data that may be particularly useful to the Commission, and also to review which elements of observer data might be exchanged between members to best meet agreed management objectives.

7.4 SBT tagging program

Conventional Tagging

97. The Secretariat presented paper CCSBT-ESC/0509/08 noting that the most recent tagging season had been very successful. The Secretariat noted difficulties in getting information on tag recoveries from vessels operating out of South Africa and was attempting to improve this through greater liaison with members and third party authorities. The Secretariat also sought advice from members on the numbers of tags likely to be recovered to allow them to plan associated expenditure on tag rewards.

98. Australia reported on its tag seeding activities during the 2004-05 surface fishery season (CCSBT-ESC/0509/20) noting the increase to 34 out of 36 tow cages that had

been seeded, and the high levels of cooperation from its industry in supporting these activities. The ESC noted that tag seeding results had been used for the first time in the SAG's quantitative analysis, had provided useful results, and stressed the importance of this continuing.

99. CCSBT-ESC/0509/32 suggested that SBT growth rates are slightly higher than those in the 1990's. In addition to providing a comparison of growth rates from the 1990's, the results presented were also valuable in tracking changes in growth rates over time.

100. Members agreed that the current and any future tagging programs should be carefully evaluated against objectives and performance criteria. Any such evaluation work should be included in the Commission's work-plan, and a range of options to undertake this work was discussed. It was agreed that this may require a dedicated meeting out of session either inter-sessionally, or prior to/after SC11.

Archival and Pop Up Tagging

101. Australia presented a report on the global spatial dynamics tagging project including the collaborative component with Taiwan (CCSBT-ESC/0509/30). This program also involved a collaborative component with New Zealand on the latest results of pop-up tagging. As a result of the lack of agreement among CCSBT members regarding the chartering of South African flagged vessels, efforts to release tags off South Africa were unsuccessful. The lack of small fish off New Zealand and south eastern Australia in recent years has also impacted on the process. Substantial observer training in Australia, New Zealand, and Taiwan has been completed in preparation for this program. The program successfully tagged juveniles in Australia and the Indian Ocean with a total of 107 SBT archival tags released in Australia and 85 in the central Indian Ocean.

102. Japan's tagging information was presented (CCSBT-ESC/0509/Fisheries Japan). During December 2004 to January 2005, 40 SBT were released with archival tags in areas 2 and 8 by an onboard researcher from a Japanese longline vessel.

103. New Zealand presented their tagging report (CCSBT-ESC/0509/SBT Fisheries New Zealand - Appendix 3). Their tagging programme had projected the release of up to 50 SBT smaller than 40kg with archival tags. SBT of this size were chosen to determine the extent of interchange with other fisheries. In addition, it was planned to release up to 10 SBT with "pop-up" tags to clarify the movement of SBT back to the spawning grounds. The near absence of small fish during the season and absence of vessels after the season in areas where SBT could be caught, meant that only six SBT were tagged with archival tags in 2004. New Zealand would discuss options with other members for modifying this programme to achieve the original objectives.

104. CCSBT-ESC/0509/29 was presented. Australia noted an improvement in retention of pop-up tags since the start of the program, as well as improved knowledge about residency of SBT in the Tasman sea. There had also been indications of tagging mortality after about four days, and again around 30 days after tag deployment. The

importance of tagging SBT in New Zealand's fisheries was noted, acknowledging the difficulties associated with the recent lack of small SBT in these fisheries.

105. It was noted that post-tagging mortality of around 15-20% was suggested by initial data from pop-up tags that had released prematurely when SBT had died and sunk to the depth at which tags automatically release.

106. A proposal for multilateral co-ordination and co-operation in electronic tag deployment was presented by Australia (CCSBT-ESC/0509/27). This sought more detailed advice, as was agreed to be provided intersessionally from members last year. Australia noted the importance of collaborative work on this project and the risk that the opportunity for ongoing collaboration may be limited in the future if this opportunity was missed. New Zealand agreed that data arising from such a tagging program would be very valuable in supporting SRP objectives, and that there was a need for collaboration between members on tagging work. Japan noted the importance of ensuring that resources were used carefully in any such program, and that collaboration should ensure full involvement in the initial planning processes.

107. The ESC supported the need for increased collaboration on electronic tagging. Members were again requested to consider the proposed principles for multilateral collaboration on electronic tagging, and were asked to discuss further options at the next SAG and ESC meetings.

7.5 Recruitment monitoring

108. CCSBT-ESC/0509/22 was presented and reiterated the importance of retaining consistency in aerial spotters to ensure reliability of the time series from earlier scientific aerial surveys.

109. CCSBT-ESC/0509/26 noted that the continuation of the current aerial survey time series was a valuable fishery independent contribution to knowledge of recruitment trends.

110. CCSBT-ESC/0509/38 summarised recruitment monitoring in Western Australia and the reports of the Review and RMP Workshops (CCSBT-ESC/0509/Info04 and CCSBT-ESC/0509/Info05) were tabled.

111. Professor Hilborn noted the increasing importance of recruitment indices, and the recent contribution of information from tagging work and aerial surveys. The ESC Chair noted that considerable work had been carried out recently to validate the aerial survey and that this had resulted in higher levels of confidence in the survey outcomes. The external panel suggested that the aerial survey outcomes may now be at the stage where they could be included in the tuning of the operating model.

112. Japan suggested that the aerial survey index was not consistent with recruitment trends from the operating model and that the Japanese acoustic index was more sensitive to the changes in recruitment. Japan reiterated the importance of early signals of recruitment prior to their exploitation in the Australian surface fishery. Japan also suggested it may be possible to develop some form of abundance index arising from interpretation of trolling catches and school spotting from conventional

tagging vessels, and requested provision of raw catch and effort data from the CCSBT conventional tagging activities to initiate a feasibility study.

113. Australia proposed that the line transect aerial spotting survey should be included in the SRP. Japan noted that the current combination of aerial and acoustic surveys was expensive and both should be included under the CCSBT SRP framework if members wish to utilise this information as a future input to the MP.

114. The ESC agreed that it would be valuable to evaluate all of the current research and data collection activities contributing to the Commission's SRP and consider what, if any, additional items should be added to the future SRP. **Attachment 11** provides draft terms of reference for an evaluation of SRP.

7.6 Direct ageing

115. CCSBT-ESC/0509/12, 18, 19, 33, 34 and 46 were presented under this agenda item.

116. A summary table of the number of otoliths collected and analysis by all members is provided in **Attachment 12**.

117. CCSBT-ESC/0509/12 summarised otolith interpretation by New Zealand. As the fish from the fishery were caught during winter when growth checks are laid down on the otoliths. Uncertainties were encountered in the assignment of fish to cohorts. New Zealand sought guidance from the ESC on this problem.

118. The ESC noted the problem of analysing otoliths from fish caught during winter months and recognised the possible need for models to be developed and the data to be analysed stochastically (CCSBT-ESC/0509/Info01). The ESC recommended that this issue be discussed inter-sessionally by those involved and results reported to the ESC in 2006.

119. CCSBT-ESC/0509/18 outlined the collection and sampling of otoliths from the Australian surface fishery and CCSBT tagging program.

120. Documents CCSBT-ESC/0509/19 and CCSBT-ESC/0509/46 examined alternative procedures to use direct ageing to convert catch size composition into age composition.

121. Australia noted that CCSBT-ESC/0509/16 details direct ageing data for the Indonesian fishery. For the 2004 spawning season, 494 ageing estimates were obtained.

122. The ESC noted that consideration must be given to which ageing procedure/s to use and how direct age data would be used in future assessments before the next stock assessment is conducted, and recommended that this be discussed at the next SAG.

123. Taiwan presented paper CCSBT-ESC/0509/33 which describes the ageing profile of SBT by analysing otoliths from SBT from the Indian Ocean. Taiwan stated that most SBT caught by the Taiwan longline fishery in the central Indian Ocean are immature fish. 80% of fish caught were aged between 2-8 years while only 20% of fish were 8 years or older.

124. CCSBT-ESC/0509/34 discussed the migratory environmental history of SBT as indicated by otolith chemical fingerprints. It was noted that such analysis on otoliths from fish that have been archivally tagged may provide a useful validation tool, although this may be statistically difficult. Australia offered access to existing otoliths collected from archivally tagged fish for such work.

125. The ESC agreed that that efforts should be made to collect otoliths from fish tagged with orange tags which had been injected with strontium chloride during an ageing validation study in the 1990s. It was recommended that observers be trained and requested to collect otoliths from tagged fish on future observer cruises.

126. CCSBT-ESC/0509/SBT Fisheries-Japan reported on otolith collection, noting that this is specifically stratified by fish length-class, to provide otoliths across the size range of fish caught.

7.7 Other SRP requirements

127. CCSBT-ESC/0509/35 detailed a preliminary study of the stomach contents of Taiwanese longline caught SBT. The calculation of daily ration was discussed. The ESC noted that the size of prey by predator size is useful data to collect.

128. CCSBT-ESC/0509/36 investigated the relationship between Taiwanese longline fishing activities in the central Indian Ocean and ocean temperature variability. Analysis of data from 1981 to 2003 suggested a negative correlation between catch rates and sea surface temperature in the area of operation of the Taiwanese fishery.

129. The ESC discussed options for relating data arising from this work to other data obtained from recent archival tag information and analyses in relation to SBT habitat and distribution. Some of these data suggested a correlation between CPUE and environmental conditions, and it was suggested that this be investigated at a wider spatio-temporal scale. However, it was pointed out that similar attempts in the past had not met with much success.

Agenda Item 8. Data exchange

130. All data exchange items were dealt with by the data exchange working group. The report of that group including the data exchange requirements for 2006 is at **Attachment 13**.

Agenda Item 9. Indonesian catch monitoring

131. The ESC reiterated the previous advice provided in 2004 that the Indonesian catch monitoring programme is essential and also stated that the substantial increase in catch of SBT from the Indonesian fishery further emphasises the importance of this programme. Previous advice from the ESC is in CCSBT-ESC/0509/10.

Agenda Item 10. Ecologically related species working group

132. Members considered agenda items proposed for the next meeting of the Ecologically Related Species Working Group. In light of agreement to further evaluate data requirements for member observer programs, New Zealand and Australia suggested that the ERS working group also consider future options for the collection, analysis, and exchange of observer and logbook data on interactions with ecologically related species. It was noted that the ESC and the ERSWG had previously highlighted the value of data on catches of species other than SBT.

Agenda Item 11. Research mortality allowance

133. The ESC recommended the following research mortality allowance and SRP mortality allowances for 2005, requiring a total of 51t.

Program	Requested Mortality Allowance
CCSBT Surface Fishery Tagging	8t
Global Spatial Dynamics Archival Tagging Program in Juvenile Fish-Australia	12t
Tasman Sea/Indian Ocean Pop-up Tagging Program in Mature Fish-Australia	15t
Acoustic Surveys in WA-Japan	1t
Tagging in Western Indian Ocean off South Africa-Japan	10t
NZ contribution to Global Spatial Dynamics Tagging Program	5t

Agenda Item 12. Workplan, timetable and research budget for 2006

12.1 Requirements/needs for stock assessment in 2006

134. The ESC noted that the stock assessment process for 2006 would include the annual review of the agreed set of indicators by the SAG7 meeting, as well as (if the MP under schedule b is implemented by the Commission), the first run of the MP.

12.2 Other workplan requirements

135. It was recommended that a three day SRP Review Meeting be held during 2006 to review progress made towards achieving the objectives of the SRP, particularly those of the CCSBT tagging program. This review process would specifically need to consider whether the conventional tagging program, the first five year phase of which is scheduled to end in 2006, should be included in the budget for the next phase. A proposal for this review was developed by a small group chaired by Professor Hilborn, and is shown in **Attachment 11**.

136. Professor Pope noted that the CPUE Modelling Group also proposed to conduct two days of discussions during 2006. One day of which could be conducted in parallel with the SRP Review meeting but one day would need to be in full session. Proposed CPUE modelling work to be conducted is shown in the report of the CPUE Modelling Group in **Attachment 9**.

12.3 Overview, time schedule and budgetary implications of proposed 2006 research activities

137. The proposed work plan, timetable and budgetary implications of SAG / ESC work during 2006 are summarised in the table below.

Activity	Approximate Period	Budgetary Implications
Report to other RFMO's	November 2005	N/A
Surface fishery tagging program	Dec 2005 – March 2006	$606,000
Secretariat coordination of the tagging program, including rewards.		$131,000
Data exchange	October 2005 - June 2006	N/A
SRP Review Workshop	Max 3 days, prior to SAG, September 2006	$310,000 (11 working days in total)
CPUE Modelling Group	1 day concurrent with SRP review and one day in full session during the SAG	
7th Stock Assessment Group Meeting.	4 days, after SRP Review and CPUE Group in September 2006	
11th Scientific Committee Meeting.	4 days, second week in September 2006	
Presentation of ESC report to Extended Commission at CCSBT13	2nd week in Oct 2006	N/A

138. The ESC noted that a one day break between the SAG and ESC meetings would still be required.

Agenda Item 13. Other matters

139. There were no other matters.

Agenda Item 14. Adoption of meeting report

140. The report was adopted.

Agenda Item 15. Close of meeting

141. The meeting closed at 9:25pm on 8 September 2005

List of Attachments

Attachment 1

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5 - 8 September 2005
Taipei, Taiwan

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Attachment 2

Agenda
Extended Scientific Committee for the Tenth Meeting of the Scientific Committee
5-8 September 2005
Taipei, Taiwan

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

2. Appointment of Rapporteurs

3. Adoption of Agenda and Document List

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

5. Management Procedure

- 5.1 Selection of Operating Models and Candidate Management procedures
- 5.2 Metarules and Implementation Issues
- 5.3 MP Specification

6. SBT Assessment, Stock Status and Management
- 6.1 Review of Fisheries Indicators and Assessment Results
- 6.2 Status of the SBT Stock
- 6.3 Stock Status Reports
- 6.4 SBT Management Recommendations

7. Implementation of the SRP
- 7.1 Characterisation of SBT Catch
- 7.2 CPUE Interpretation and Analysis
- 7.3 Scientific Observer Program
- 7.4 SBT Tagging Program
- 7.5 Recruitment Monitoring

7.6 Direct Ageing

7.7 Other SRP Requirements

8. Data Exchange

8.1 Review of Data Exchange in 2005

8.2 Requirements for Data Exchange in 2006.

8.3 Data Exchange Workshop

9. Indonesian Catch Monitoring

10. Ecologically Related Species Working Group

11. Research Mortality Allowance

12. Workplan, Timetable and Research Budget for 2006

12.1 Requirements/need for Stock Assessment in 2006

12.2 Other Workplan Requirements

12.3 Overview, time schedule and budgetary implications of proposed 2006 research. activities.

13. Other Matters

14. Adoption of Meeting Report

15. Close of Meeting

Attachment 3

List of Documents
Extended Scientific Committee for the Tenth Meeting of the Scientific Committee and Sixth Meeting of the Stock Assessment Group

(CCSBT-ESC/0509/)

01. Draft Agenda of 6th SAG
02. List of Participants of 6th SAG
03. Draft Agenda of the Extended SC for 10th SC
04. List of Participants of the 10th SC and Extended SC
05. List of Documents - The Extended SC for 10th SC & 6th SAG
06. (Secretariat) 4. Review of SBT Fisheries
07. (Secretariat) 7.1. Characterisation of SBT Catch
08. (Secretariat) 7.4. SBT Tagging Program
09. (Secretariat) 8. Data Exchange
10. (Secretariat) 9. Indonesian Catch Monitoring
11. (Secretariat) Catch calculations for the management procedure
12. (New Zealand) Catch at age of Southern bluefin tuna in the New Zealand longline fishery, 2001-2004.: K. Krusic-Golub.
13. (New Zealand) Preparation of New Zealand catch and effort data for the CCSBT data exchange.: S. Harley, T. Murray, and L. Griggs.
14. (Panel) Performance of the final candidate management procedures selected at the 4th Management Procedure Workshop.: Branch, T.A. and A.M. Parma
15. (Australia) The catch of SBT by the Indonesian longline fishery operating out of Benoa, Bali in 2003.: R. Andamari, T.L.O. Davis, B. Iskandar, D. Rentowati, M. Herrera, C.H. Proctor and S. Fujiwara.
16. (Australia) Update on the length and age distribution of SBT in the Indonesian longline catch on the spawning ground.: Farley, J.H. and Davis, T.L.O.
17. (Australia) Indonesian fishery school data on Southern Bluefin tuna: summary and preliminary analyses.: M. Basson, D. Bromhead, T.L.O. Davis, R. Andamari, G.S. Mertha and C. Proctor.
18. (Australia) An update on Australian Otolith Collection Activities: 2003/04.: Stanley, C. & Polacheck, T.
19. (Australia) Estimates of proportions at age in the Australian surface fishery catch from otolith ageing and size frequency data.: M. Basson, M. Bravington, S. Peel and J. Farley.
20. (Australia) Tag Seeding Activities in 2004/2005 and Preliminary estimates of

reporting rate from the Australian surface fishery based on previous tag seeding experiments.: Tom Polacheck and Clive Stanley.

21. (Australia) Initial analyses of tag return data from the CCSBT SRP tagging program.: T. Polacheck, P. Eveson.
22. (Australia) The Aerial survey indicex of abundance, updated to include the 2005 survey.: M. Bravington, P.Eveson, J. Farley.
23. (Australia) Commercial spotting in the Australian surface fishery, updated to include the 2004/5 fishing season.: M. Basson, J. Farley.
24. (Australia) Trends in catch, effort and nominal catch rates in the Japanese longline fishery for SBT-2005 update.: Hartog, J., T. Polacheck and S. Cooper.
25. (Australia) Fishery indicators for the SBT stock 2004/05.: D. Kolody, J. Hartog, M. Basson and T. Polacheck.
26. (Australia) Proposal for continued monitoring of southern bluefin tuna recruitment via aerial survey of juveniles in the Great Australian Bight.: C.R. Davies, J. Farley, P. Eveson, M. Basson, M. Bravington.
27. (Australia) A Proposal for Multi-lateral Co-ordination and Co-Operation in Electronic Tag Deployment under the CCSBT Scientific Research Programme.: T. Polacheck, J. Gunn and A. Hobday
28. (Australia) Post-processing of data from the 2005 data exchange.: A. Preece, S. Cooper.
29. (Australia) Movement and residency of adult SBT in the Tasman Sea and on their spawning grounds south of Indonesia using pop-up archival tags: a summary of results for 2004.: T. Patterson, J. Gunn, K. Evans, T. Carter.
30. (Australia/Taiwan) Update on the Global Spatial dynamics Archival Tagging project.: T. Polacheck, S.K. Chang, Chien-Ho Liu, A. Hobday. G. West, J. Gunn.
31. (Australia) Proposal for work requiring RMA/SRP allowance.: T. Polacheck, J. Gunn.
32. (Australia) Updated estimates of growth rates for juvenile SBT using tag-recapture and otolith direct ageing data up to 2005.: P. Eveson, T. Polacheck and J. Farley.
33. (Taiwan) Age and size composition of southern bluefin tuna (*Thunnus maccoyii*) caught by Taiwanese longliners in the central Indian Ocean.: J.C. Shiao, W.N. Tzeng, Y.T. Lin and S.K. Chang.
34. (Taiwan) Tracing the life history of southern bluefin tuna (*Thunnus maccoyii*) using otolith chemical fingerprints.: C.H. Wang, Y.T. Lin, J.C. Shiao, C.F. You, Y. Iizuka, S.K. Chang and W.N. Tzeng.
35. (Taiwan) A preliminary study on the stomach content of southern bluefin tuna *Thunnus maccoyii* caught by Taiwanese longliner in the central Indian Ocean.: K.M. Liu, W.K. Chen, S.J. Joung and S.K.Chang.
36. (Taiwan) Investigation on Taiwanese longline fishing condition of Southern Bluefin Tuna in the Central Indian Ocean and its relationship with ocean temperature variability.: H.J. Lu, K.T. Lee, S.C. Kao, C.H. Cheng and S.K. Chang.

37. (Japan) Report of Japanese scientific observer activities for southern bluefin tuna fishery in 2004.: T. Itoh and K. Miyauchi
38. (Japan) Review of recruitment indices obtained from the Recruitment Monitoring Program.: T. Itoh and S. Tsuji
39. (Japan) Summary of fisheries indicators in 2005.: N. Takahashi, T. and S. Tsuji.
40. (Japan) Comparison among various recruitment indices.: S. Tsuji
41. (Japan) Report of the 2004/2005 RMA utilization and application for the 2005/2006 RMA.: Fisheries Agency of Japan.
42. (Australia) Metarules: update of status of a “Metarule Process” document.: M. Basson, T. Polacheck.
43. (Secretariat) Intersessional Discussion on Management Procedure Implementation Issues
44. (Japan) Consideration on metarules, implementation issues and MP performance monitoring.: Hiroyuki KUROTA, Norio TAKAHASHI and Sachiko TSUJI.
45. (Japan) Preliminary analysis on effect of changes in fishing pattern on CPUE.: Norio TAKAHASHI.
46. (Japan) Possible application of finite normal mixture distribution with a structural model to estimate SBT catch composition from otolith direct aging data.: Hiroshi SHONO and Tomoyuki ITOH.
47. (Japan) Quick consideration toward future Scientific Research Program under the CCSBT and preferable management actions under low recruitments.: Sachiko TSUJI.

(CCSBT-ESC/0509/SBT Fisheries)

New Zealand	The New Zealand southern bluefin tune fishery in 2004.: T. Kendrick, T. Murray, S. Harley, and A. Hore
Republic of Korea	Korean longline fishery for southern bluefin tuna in 2004.: Dae-Yeon Moon, Jeong-Rack Koh and Soon –Song Kim
Fishing Entity of Taiwan	Review of Taiwanese SBT Fishery of 2003/2004
Australia	Australia CCSBT Season Report
Japan	Review of Japanese SBT Fisheries in 2004. T. Itoh and K. Miyauchi

(CCSBT-ESC/0509/Info)

01. (Australia) Investigating the timing of annual growth zones in otoliths of southern bluefin tuna (Thunnus maccoyii).: Naomi P. Clear, J. Paige Eveson and Tom Polacheck. Appendix 11 of Final Report for FRDC Project 1999/104
02. (Australia) withdrawn
03. (Australia) Estimation of mortality rates and abundance for southern bluefin tuna

(Thunnus maccoyii) using tag-return and catch data from 1991 to 1997.: J. Paige Eveson, Tom Polacheck and Geoff M. Laslett. Appendix 15 of FRDC Project No. 2002/015 (as listed above)

04. (Japan) Proceedings of SBT Recruitment Monitoring Review Workshop: The role and constraints of scientific monitoring for stock management - brain storming using southern bluefin tuna experiences as an example.

05. (Japan) Southern bluefin tuna recruitment monitoring and tagging program

(CCSBT-ESC/0509/Rep)

01. Report of Tagging Program Workshop (October 2001)

02. Report of the First Meeting of Management Procedure Workshop (March 2002)

03. Report of the CPUE Modeling Workshop (March 2002)

04. Report of Direct Age Estimation Workshop (June 2002)

05. Report of the Third Stock Assessment Group Meeting (September 2002)

06. Report of the Seventh Meeting of the Scientific Committee (September 2002)

07. Report of the Second Meeting of the Management Procedure Workshop (April 2003)

08. Report of the Indonesian Catch Monitoring Review Workshop (April 2003)

09. Report of the Fourth Meeting of the Stock Assessment Group (August 2003)

10. Report of the Eight Meeting of the Scientific Committee (September 2003)

11. Report of the Tenth Annual Meeting of the Commission (October 2003)

12. Report of the Fifth Meeting of the Ecologically Related Species Working Group (February 2004)

13. Report of the Third Meeting of the Management Procedure Workshop (April 2004)

14. Report of the Special Meeting of the Commission (April 2004)

15. Report of the Fifth Meeting of the Stock Assessment Group (September 2004)

16. Report of the Ninth Meeting of the Scientific Committee (September 2004)

17. Report of the Eleventh Annual Meeting of the Commission (October 2004)

18. Report of the Special Management Procedure Technical Meeting (February 2005)

19. Report of the Fourth Meeting of the Management Procedure Workshop (May 2005)

20. Report of the Management Procedure Special Consultation (May 2005)

Global Catch by Country

Catches are presented as whole weights in tonnes. Numbers in **bold** font differ from those in Attachment 4 of the SC9 Report. ***All 2004 figures are to be considered preliminary.***

Calendar Year	Australia	Japan	New Zealand	Korea*	Taiwan	Philippines	Indo.	Misc	Total (excludes 'other')	Other
1952	264	565	0	0	0	0	0	0	829	
1953	509	3,890	0	0	0	0	0	0	4,399	
1954	424	2,447	0	0	0	0	0	0	2,871	
1955	322	1,964	0	0	0	0	0	0	2,286	
1956	964	9,603	0	0	0	0	0	0	10,567	
1957	1,264	22,908	0	0	0	0	0	0	24,172	
1958	2,322	12,462	0	0	0	0	0	0	14,784	
1959	2,486	61,892	0	0	0	0	0	0	64,378	
1960	3,545	75,826	0	0	0	0	0	0	79,371	
1961	3,678	77,927	0	0	0	0	0	0	81,605	
1962	4,636	40,397	0	0	0	0	0	0	45,033	
1963	6,199	59,724	0	0	0	0	0	0	65,923	
1964	6,832	42,838	0	0	0	0	0	0	49,670	
1965	6,876	40,689	0	0	0	0	0	0	47,565	
1966	8,008	39,644	0	0	0	0	0	0	47,652	
1967	6,357	59,281	0	0	0	0	0	0	65,638	
1968	8,737	49,657	0	0	0	0	0	0	58,394	
1969	8,679	49,769	0	0	80	0	0	0	58,528	
1970	7,097	40,929	0	0	130	0	0	0	48,156	
1971	6,969	38,149	0	0	30	0	0	0	45,148	
1972	12,397	39,458	0	0	70	0	0	0	51,925	
1973	9,890	31,225	0	0	90	0	0	0	41,205	
1974	12,672	34,005	0	0	100	0	0	0	46,777	
1975	8,833	24,134	0	0	15	0	0	0	32,982	
1976	8,383	34,099	0	0	15	0	12	0	42,509	
1977	12,569	29,600	0	0	5	0	4	0	42,178	
1978	12,190	23,632	0	0	80	0	6	0	35,908	
1979	10,783	27,828	0	0	53	0	5	4	38,673	
1980	11,195	33,653	130	0	64	0	5	7	45,054	
1981	16,843	27,981	173	0	92	0	1	14	45,104	
1982	21,501	20,789	305	0	182	0	2	9	42,788	
1983	17,695	24,881	132	0	161	0	5	7	42,881	
1984	13,411	23,328	93	0	244	0	11	3	37,090	
1985	12,589	20,396	94	0	241	0	3	2	33,325	
1986	12,531	15,182	82	0	514	0	7	3	28,319	
1987	10,821	13,964	59	0	710	0	14	7	25,575	
1988	10,591	11,422	94	0	856	0	180	2	23,145	
1989	6,118	9,222	437	0	1,395	0	568	103	17,843	
1990	4,586	7,056	529	0	1,177	0	517	4	13,870	
1991	4,489	6,477	164	246	1,460	0	759	97	13,691	
1992	5,248	6,121	279	41	1,222	0	1,232	73	14,217	
1993	5,373	6,318	217	92	958	0	1,370	17	14,344	
1994	4,700	6,063	277	137	1,020	0	904	54	13,154	
1995	4,508	5,867	436	365	1,431	0	829	201	13,637	
1996	5,128	6,392	139	1,320	1,467	0	1,614	295	16,356	
1997	5,316	5,588	334	1,424	872	0	2,210	333	16,076	
1998	4,897	7,500	337	1,796	1,446	5	1,324	471	17,776	
1999	5,552	7,554	461	1,462	1,513	80	2,504	403	19,529	
2000	5,257	6,000	380	1,135	1,448	17	1,203	31	15,472	
2001	4,853	6,674	358	845	1,580	43	1,632	41	16,026	4
2002	4,711	6,192	450	746	1,137	82	1,691	203	15,212	17
2003	**5,827**	5,762	**390**	254	**1,128**	68	**564**	**48**	14,042	17
2004	5,062	5,846	393	131	1,298	80	677	3	13,490	17

Misc: SBT catch other than those listed. For years up to and including 2002, these were obtained from Japanese import statistics (JIS). The 2003 figure was from both JIS and a report from Spain on bycatch form surveys outside its normal fishing grounds in 2003. From 2004, the higher value of Japanese import and CCSBT Trade Information Scheme statistics was used. In 2004, the "Misc" catch was from China and further bycatch from Spanish fishing surveys.

Other: Mortality of SBT from other sources that have not been included in country figures. This includes mortality that occurred during research programs including the CCSBT Scientific Research Program. This information has yet to be compiled for years prior to 2001.

*: Japanese Import Statistics for 1993, 1994, and 1998 are higher than these official statistics and are: 117, 147, and 1897 respectively. Assessments would normaly used the higher of these values.

Attachment 5

Global Catch by Gear

Catches are presented as whole weights in tonnes. **All 2004 figures are to be *considered preliminary.***

Catches from Indonesia and the "Misc" category of countries were assigned to the longline fishery. Catches from other line fisheries not listed below (such as "minor line") were also assigned to the longline fishery.

		Surface Fisheries				
Calendar Year	Longline	Purse Seine	Pole and Line	Trol	Handline	Gill Net
1952	565	264			0	0
1953	3,890	509			0	0
1954	2,447	424			0	0
1955	1,964	322			0	0
1956	9,603	964			0	0
1957	22,908	1,264			0	0
1958	12,462	2,322			0	0
1959	61,892	2,486			0	0
1960	75,826	3,545			0	0
1961	77,927	3,678			0	0
1962	40,397	4,636			0	0
1963	59,724	6,199			0	0
1964	42,838	6,832			0	0
1965	40,689	6,876			0	0
1966	39,644	8,008			0	0
1967	59,281	6,357			0	0
1968	49,657	8,737			0	0
1969	49,849	8,679			0	0
1970	41,059	7,097			0	0
1971	38,179	6,969			0	0
1972	39,528	12,397			0	0
1973	31,315	9,890			0	0
1974	34,105	12,672			0	0
1975	24,149	8,833	0	0	0	0
1976	34,126	3,155	5,228	0	0	0
1977	29,609	1,550	11,019	0	0	0
1978	23,718	3,577	8,613	0	0	0
1979	27,890	2,097	8,686	0	0	0
1980	33,729	2,036	9,159	0	130	0
1981	28,088	6,752	10,091	0	173	0
1982	20,971	6,831	14,670	0	305	11
1983	25,042	5,872	11,823	0	132	12
1984	23,586	4,444	8,967	0	93	0
1985	20,575	5,179	7,410	0	94	67
1986	15,625	6,376	6,155	0	82	81
1987	14,609	5,411	5,409	0	59	87
1988	12,227	2,820	7,770	0	94	234
1989	11,950	1,626	3,807	31	109	319
1990	8,968	2,511	1,803	21	263	305
1991	10,692	1,034	1,823	1	35	107
1992	12,467	22	1,673	4	48	3
1993	12,770	536	1,018	0	20	0
1994	11,036	1,269	844	0	4	0
1995	10,979	1,840	795	8	15	0
1996	11,564	3,121	1,659	3	8	0
1997	11,200	2,998	1,843	31	5	0
1998	13,537	3,584	640	13	2	0
1999	14,177	5,325	22	3	2	0
2000	10,339	5,132	0	1	0	0
2001	11,259	4,767	0	0	0	0
2002	10,528	4,683	0	1	0	0
2003	**8,250**	**5,792**	0	**0**	**0**	0
2004	8,654	4,834	0	1	1	0

Attachment 6

DRAFT CCSBT Management Procedure Specification

This purpose of this document is to summarise, in one consolidated overview, all essential components and aspects of the specification of the Management Procedure for CCSBT.

NOTE: Shaded items surrounded by square brackets within these specifications require further work and once the work is complete, the shaded item will either be deleted or replaced with the outcome of the work

1. Description of the Management Procedure Algorithm

The MP is based on fitting a discrete age-aggregated Fox dynamic production model to past catch and CPUE data from the LL1 longline fishery.

The dynamics of the SBT population are taken to be represented by the discrete equation (Fox model):

$$B_{y+1} = B_y + rB_y\left(1 - \frac{\ln\left(B_y\right)}{\ln\left(K\right)}\right) - C_y \qquad (1)$$

where:

B_y is the biomass of SBT present at the start of year *y*,

C_y is the catch by mass (all fisheries combined) for year *y*,

K is the pre-exploitation biomass (taken to have units of tons in this application), with the associated assumption of a population at pre-exploitation equilibrium when harvests commenced, i.e. $B_{1952} = K$, and

r is the growth rate parameter for the population.

For this model $B_{MSY} = Ke^{-1}$ and $MSY = (r/lnK)\, Ke^{-1}$.

To estimate the parameters *r* and *K*, the model is fit to the available index of abundance (CPUE) by assuming:

$$I_y = q\left(\frac{B_y + B_{y+1}}{2}\right)^{\delta} e^{\varepsilon_y} \qquad (2)$$

where:

I_y is the CPUE index for year *y*,

q is a constant of proportionality (the catchability coefficient when δ=1),

δ is a nonlinear parameter that modifies the relationship between CPUE and the abundance index to a non-linear form (which is linear when $\delta = 1$, and is set to 1 for the procedure following) , and

ε_y from $N\left(0, \sigma^2\right)$.

Catches and CPUE are input for past years as described above, and the operating models underlying the trials generate values for future years for each projection in a trial.

The associated negative log likelihood minimized in the fitting process is:

$$-\ln L = \sum_y \mu_y \left[\ln\sigma + \frac{\left(\varepsilon_y\right)^2}{2\sigma^2} \right] \tag{3}$$

for which setting partial derivatives to zero ($\frac{\partial(-\ln L)}{\partial q} = 0$, $\frac{\partial(-\ln L)}{\partial \sigma} = 0$) yields closed form solutions for best estimates of q and σ:

$$q = \exp\left[\sum_y \mu_y \left\{ \ln I_y - \ln\left(\frac{B_y + B_{y+1}}{2} \right)^{\delta} \right\} / \sum_y \mu_y \right] \tag{4}$$

$$\sigma = \sqrt{\frac{\sum_y \mu_y \left(\varepsilon_y\right)^2}{\sum_y \mu_y}} \tag{5}$$

The μ_y factor is introduced to allow for less recent data to be down-weighted in the fitting process, so that management recommendations remain reasonably sensitive to the most recent observations. The specific form used is:

$$\mu_y = e^{-\lambda\left(y_{current} - y\right)} \tag{6}$$

where λ is a parameter, which controls the extent of the down-weighting of the older relative to the more recent data. Here we set λ=0.046, which means that the weight accorded to the CPUE value for 1969 to the likelihood is 10% of that of value for 2020.

Estimates of the parameter values from this model fit are used to compute future TACs as follows.

$$TAC_{y+1} = \left(w\ TAC_y + \alpha\left(1 - w\ \right) \cdot M\hat{S}YR_y \cdot \hat{B}_{MSY,y} \cdot \left(\frac{\hat{B}_y}{\hat{B}_{MSY,y}} \right)^{\gamma} \cdot g\left(\hat{r}_y\right) \cdot h\left(CPUE_y^{rat}\right) \right) \cdot f\left(LL_y\right) \tag{7}$$

where:

$\hat{B}_{MSY,y}$ is the maximum sustainable yield level (*MSYL*) as estimated in year *y*,

γ is a control parameter (here fixed to be 0.6),

w is a control parameter,

$M\hat{S}YR_y$ is the year *y* estimated maximum sustainable yield rate, calculated as $M\hat{S}Y_y / MSYL_y$ ($\hat{r}_y / \ln\hat{K}_y$ for the Fox model),

$\hat{B}_y$ is the estimated biomass for year *y*, which (together with $\hat{r}_y$ and $\hat{K}_y$) is re-estimated each time the TAC is calculated,

$g(\hat{r}_y)$ is a function which reduces the TAC further if $\hat{r}_y$ is low,

$f(LL_y)$ is a function which adjusts the TAC depending on the proportion of lower ages (LL_y) in the LL1 longline catch in year y,

α is a tuning parameter and

$h(CPUE_y^{rat})$ is a function which adjusts the TAC depending on the ratio of the immediate LL1 fishery CPUE compared to that over the period immediately preceding application of the MP.

The TAC reduction factor $g(\hat{r}_y)$ is set to:

$$g(\hat{r}_y)=\begin{cases} 0 & \text{for } 0 \le \hat{r}_y \le r_1 \\ \dfrac{1}{r_2-r_1}(\hat{r}_y - r_1) & \text{for } r_1 < \hat{r}_y < r_2 \\ 1 & \text{for } r_2 \le \hat{r}_y \end{cases}. \qquad (8)$$

with parameter values fixed at r_1=0.4, r_2=1.0.

The w parameter is introduced to moderate the extent to which the TAC is adjusted from year to year in the interests of industrial stability. The γ parameter's role is to stabilize the TAC trend and avoid instances where the TAC outputs show a decrease for the first few years followed by a subsequent increase. Setting γ to a value <1 tends to smooth out this undesirable behaviour.

The function $f(LL_y)$ modifies the TAC depending on the proportion of lower ages in longline catch as follows:

1) For the First TAC Change Year (i.e. 2008)

[Note: For schedule e, this applied to 2009 which is the first year that the CMP is applied.]

$$LL_{2008} = \left(\frac{\sum_{a=4}^{5} LLC_{2004,a}}{\sum_{a=4}^{30+} LLC_{2004,a}} + \frac{\sum_{a=4}^{5} LLC_{2005,a}}{\sum_{a=4}^{30+} LLC_{2005,a}} \right) \Big/ 2 \qquad (9)$$

where:

$LLC_{y,a}$ is the number of age a caught by the LL1 longline fishery in year y

$f(LL_{2008}) = 1$ if $LL_{2008} \le 0.13$

$f(LL_{2008}) = (1 + (LL_{2008} - 0.13)\cdot\phi_1)$ if $0.13 < LL_{2008} < 0.20$

$f(LL_{2008}) = (1 + 0.07\cdot\phi_1) = \theta_1$ if $LL_{2008} \ge 0.20$

2) For the Second TAC Change Year (i.e. 2011)

$$LL_{2011} = \left(\frac{\sum_{a=4}^{6} LLC_{2006,a}}{\sum_{a=4}^{30} LLC_{2006,a}} + \frac{\sum_{a=5}^{7} LLC_{2007,a}}{\sum_{a=4}^{30} LLC_{2007,a}} + \frac{\sum_{a=6}^{8} LLC_{2008,a}}{\sum_{a=4}^{30} LLC_{2008,a}} \right) \Big/ 3 \qquad (10)$$

where:

$$f(LL_{2011}) = 1 \qquad \text{if } LL_{2011} \le 0.16$$

$$f(LL_{2011}) = (1 + (LL_{2011} - 0.16) \cdot \phi_2) \qquad \text{if } 0.16 < LL_{2011} < 0.30$$

$$f(LL_{2011}) = (1 + 0.14 \cdot \phi_2) = \theta_2 \qquad \text{if } LL_{2011} \ge 0.30$$

Parameter values in the equations above were chosen based on the distributions of LL_{2008} and LL_{2011} in the old reference set Cfull2, and in trials Cfull2_noAC and Cfull2_noAC_tripleR (see Butterworth and Mori 2005). This function allows the TAC to vary depending on good or poor recruitment in recent years as reflected by the proportion of lower ages in the longline catch.

The function $h(CPUE_y^{rat})$ controls the TAC depending on the ratio of immediate CPUE value compared to that when the MP was first put into effect:

$$CPUE_y^{rat} = \left(\frac{1/3 \sum_{y'=y-4}^{y-2} CPUE_{y'}}{1/5 \sum_{y=1998}^{2002} CPUE_y} \right) \qquad (11)$$

where:

$$h(CPUE_y^{rat}) = 0 \qquad \text{if } 0 < CPUE_y^{rat} \le 0.5$$

$$h(CPUE_y^{rat}) = \frac{1}{0.9 - 0.5}(CPUE_y^{rat} - 0.5) \qquad \text{if } 0.5 < CPUE_y^{rat} < 0.9$$

$$h(CPUE_y^{rat}) = 1 \qquad \text{if } CPUE_y^{rat} \le 0.9$$

Further constraints added were that for the first two years in which the TAC can change, it is not permitted to exceed its immediately previous value. These were added to counter the consequences of an inaccurate initial determination of *r* leading to an increase in the TAC before more information indicated that the reverse action was required.

The control parameter values for tuning under the Cfull2 trial are listed in Table 1.

Table 1. Control parameter values for CMP_2.

1.1 tuning for a TAC change interval of three years starting with year 2008

MP name	θ_1 (ϕ_1)	θ_2 (ϕ_2)	*w*	α
D&M_03_2b	1.2 (2.86)	1.2 (1.43)	0.65	1.402

1.3 tuning for a TAC change interval of three years starting with year 2008

MP name	$\theta_1(\phi_1)$	$\theta_2(\phi_2)$	w	α
D&M_03_3b	1.2 (2.86)	1.2 (1.43)	0.65	0.878

CMP_2 was retuned by altering the α parameter to achieve the recommended rebuilding probability levels in 2022.

Table 2. Control parameter values for the retuned CMP_2 catch schedules.

		Probability	Catch reduction (year)					
Catch schedule	Tuning	$B_{2022}<B_{2004}$	2006	2007	$\theta_1(\phi_1)$	$\theta_2(\phi_2)$	w	α
4b5000	4	0.10	5000	0	1.2 (2.86)	1.2 (1.43)	0.65	1.13
4e7160	4	0.09	0	7160	1.2 (2.86)	1.2 (1.43)	0.65	1.13
7b5000	7	0.20	5000	0	1.2 (2.86)	1.2 (1.43)	0.65	3.00
7e7160	7	0.20	0	7160	1.2 (2.86)	1.2 (1.43)	0.65	4.8

There is potential for convergence issues to arise with the chosen MP when fitting the Fox model. The process for dealing with this is given at **Annex 1**.

Reference

Butterworth, D.S. & Mori, M. 2005. Results of refined D&M Management Procedure applied to the Seattle 2005 trials. *CCSBT-MP/0505/06*, 32pp.

2. MP Data Inputs

2.1 Provision of Data

The data provision requirements for the MP are described in the Data Exchange Requirements document shown in Attachment 13 of the SC10 Report and form the basis for the inputs to the MP.

There are 4 basic items of data required for running the MP:

- Time Series of Actual Catches

  The catch time series used by the MP will be calculated in the same manner as the catch time series that was produced for the operating model from the data provided in the data exchange. This is specified in CCSBT-ESC/0509/11. Some changes to this calculation method were agreed and these changes are specified in Annex 2 of Attachment 13 of the SC10 Report.

  Mortalities from all sources should be included in catch calculations for the MP. Mortalities from scientific research will not be included until a more complete time series of such mortalities is available.

- CPUE Series

  The median of the following 5 CPUE series will be used:
  - Nominal
  - Laslett Core Area
  - B-Ratio proxy (W0.5)
  - Geostat proxy (W0.8)
  - ST Windows

  [Full documentation of the CPUE series will be developed and included as an Annex to these specifications at SC11]

  [Timeframe for CPUE series to be specified – i.e. years used in the MP]
  [Scaling of CPUE series to be specified – i.e. years over which each CPUE series is normalised to before the median is taken]

- Catch at Age (for the MP's recruitment index)
  The catch at age data required for the selected MP's recruitment index will be obtained by cohort slicing by month of the 5x5 raised length data provided by members. The data used will be the data for LL1 fisheries only. For LL1 fisheries where raised length data are not available (Korea, Philippines, Miscellaneous), the Secretariat will use Japanese length frequency data as a substitute in the same manner as conducted when producing the length frequency inputs for the operating model.

  [Australia and Japan will provide the Secretariat with the appropriate algorithms for the cohort slicing together with explanations and assistance as required. A specification of the cohort slicing process will be developed from this information and will become an Annex to these specifications].

- Recent TAC's
  The formula for the TAC in the recommended MP includes the TAC for the immediately preceding period. The value used for TAC_y should be as was evaluated from the MP for that preceding period. The Commission might adopt a TAC for that period that differs from the output from the MP. If this difference is insubstantial, the MP should be sufficiently robust to ensure that longer term management objectives will still be realized.

  However, if the difference is substantial, the Scientific Committee will need to consider whether longer term performance of the MP will be appreciably affected, and whether there is a need to invoke the metarules process.

2.2 Validation and Improvement in Data Reliability

Performance of the MP is dependent on the quality of input data and appropriate mechanisms should be put in place to collect and validate the required data.

2.3 Translation from MP "Years" to Actual Years Used to Manage Member's Fisheries

The recommended translation of MP "years" to the quota years used to manage the various fisheries is specified below, for an MP recommended TAC for 2008. Translation for other years would follow the same principles.

- 1/10/2007-30/9/2008 (New Zealand)
- 1/12/2007-30/11/2008 (Australia)
- 1/1/2008-31/12/2008 (Taiwan, Philippines)
- 1/3/2008-28/2/2009 (Japan, Korea)

These translations are close (and in some cases identical) to the way in which the operating model was structured with respect to the data from each of these fisheries.

While non-cooperating non-members do not necessarily currently manage their fisheries to national allocations set by the Commission, recommend translation years for these fisheries that could be used by the Commission for the MP TAC year 2008 when it considers catch allocations for non-cooperating non-members are:

- 1/7/2007-30/6/2008 (Indonesia)
- 1/1/2008-31/12/2008 (all other non-cooperating non-members)

These recommendations are consistent with the structure of the operating model with respect to these fisheries.

In setting a TAC for Members, it will be necessary to estimate the expected catches of non-cooperating non-members. [A process for providing such estimates will be developed as part of the MP implementation at SC11].

2.4 Use of Revised Historical Data by the MP

The "best" estimate of catches should be used, so revisions to historical data should be used by the MP.

3. Metarule Process

Metarules can be thought of as "rules" which prespecify what should happen in unlikely, exceptional circumstances when application of the TAC generated by the MP is considered to be highly risky or highly inappropriate. Metarules are not a mechanism for making small adjustments, or 'tinkering' with the TAC from the MP. It is difficult to provide firm definitions of, and be sure of including all possible, exceptional circumstances. Instead, a process for determining whether exceptional circumstances exists is described below. The need for invoking a metarule should only be evaluated at the SAG/SC based on information presented and reviewed at the SAG/SC. (Note: All examples provided are illustrative, and not meant as complete or exhaustive lists.)

3.1 Description of Process to Determine Whether Exceptional Circumstances Exist

Except for identifying broad circumstances that may invoke the metarules process, it is not possible to pre-specify the data that may trigger a metarule. If a Member or the independent panel is to propose an exceptional circumstances review, then that Member or the panel must outline the reasons why they believe exceptional circumstances exist and must either indicate where the data are found supporting the review or they must supply those data in advance of the SAG/ESC meeting.

Every year the SAG will:

- Review stock and fishery indicators, and any other relevant data or information on the stock and fishery.
- On the basis of this, determine whether there is evidence for exceptional circumstances.

Examples of what might constitute an exceptional circumstance include, but are not limited to:

- Recruitment well outside the ranges for which the MP was tested)
- CPUE trends that are notably outside the bounds predicted in the MP testing.

Every three years (not coinciding with years when a new TAC is calculated from the MP) the SAG will:

- Conduct an in depth stock assessment
- On the basis of the assessment, indicators and any other relevant information, determine whether there is evidence for exceptional circumstances (a core example of exceptional circumstances here is if the stock assessment is substantially outside the range of simulated stock trajectories considered in MP evaluations).

(Every year) IF the SAG concludes that there is no or insufficient evidence for exceptional circumstances, the SAG will:

- Report to the SC that exceptional circumstances do not exist

The SC will consider the advice from the SAG and report to the Commission

IF the SAG has agreed that exceptional circumstances exist, the SAG will:

- Determine the severity of the exceptional circumstances
- Follow the “Process for Action” described below.

3.2. Specific issues that will be considered annually (Underlying Assumptions of the OM for the MP Testing Process)

The following critical assumptions underlying the operating model need to be monitored after MP implementation. Any substantive deviation from these underlying assumptions may

constitute an exceptional circumstance (i.e. potential meta rule circumstance) and will require a review, and possible revision, of the OM:

- Catch split between the fisheries considered in projections is not substantially different from the average of catch proportions for 2001-2003 assumed in the OM.
- Selectivity of the fisheries varies within the bounds admitted in the OM.
- The relationship between CPUE and the size of the exploitable stock for the main Japanese longline fishery remains within the bounds admitted in the OM.
- Recruitment levels are within bounds projected by the OM.
- Life-history parameters remain estimated to be within the range of values assumed in the OM.

Annual comparisons should be conducted between officially reported catch weights and catches calculated from raised size data. Some of the catch data used in the MP will be calculated from raised size data and an annual comparison would ensure that a diverging trend in the catch estimates would be identified. Such annual comparisons could be conducted by the Secretariat

3.3 Description of Process for Action

Having determined that there is evidence of exceptional circumstances, the SAG will, at the same meeting/ in the same year:

- Consider the severity of the exceptional circumstances (for example, how severely "out of bounds" are the CPUEs or recruitment)
- Follow the principles for action (see examples below).
- Formulate advice on the action required (this could include an immediate change in TAC, a review of the MP or collection of ancillary data to be reviewed at the next SAG).
- Report to the SC on their suggested advice for action.

The SC will:

- Review the advice from the SAG.
- Report to the Commission that exceptional circumstances exist and provide advice on the action to take.

The Commission will:

- Consider the advice from the SC.
- Decide on the action to take.

Examples of 'Principles for Action'

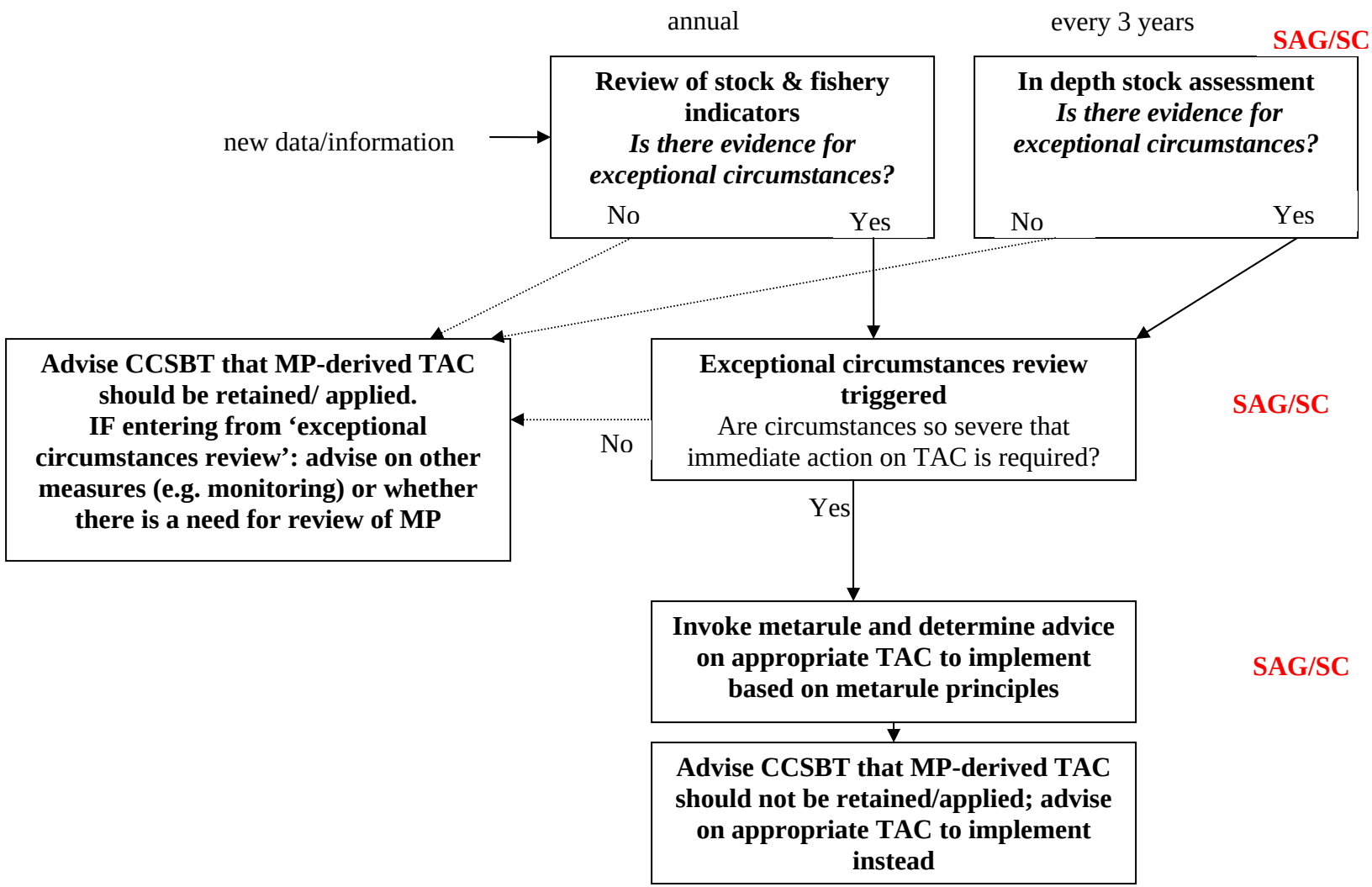
If the risk is to the stock, principles may be:

- The MP-derived TAC should be an upper bound.
- Action should be at least an x% change to the TAC, depending on severity.

If the risk is to the fishery, principles may be:

- The MP-derived TAC could be a minimum.
- Action should be at least an x% change to the TAC, depending on severity.

Figure 2: Flowchart for Metarules Process



4. Regular MP Review and Revision Process

The procedure for regular review and potential revision of the MP is the process for updating and incorporating new data, new information and knowledge into the management procedure, including the operating model. This process should happen on a relatively long time-scale to avoid jeopardising the performance of the MP, but can be initiated at any time if the SAG/SC consider that there is sufficient reason for this, and that the effect of the revision would be substantial. During the revision process the MP should still be used unless a metarule is invoked.

All examples given in this document are meant to be illustrative, and NOT meant as complete or exhaustive lists.

4.1 Description of Process for Regular Review

Every year the SAG will:

- Consider whether the procedure for Metarule Process has triggered a review/revision of the MP

Every three years the SAG will:

- Conduct an in depth stock assessment and review stock and fishery indicators, and any other relevant data or information on the stock and fishery.
- On the basis of this, determine whether the assessment (or other) results are outside the ranges for which the MP was tested (Note that evaluation for exceptional circumstances would be done in parallel with this process; see procedure for Metarule Process), and whether this is sufficient to trigger a review/revision of the MP.
- Consider whether the procedure for Metarule Process triggered a review / revision of the MP.

Every nine years since the last revision of the MP the SAG will:

- Review whether we have learned enough to appreciably improve/change the operating model, or improve the performance of the MP, or to provide new advice on tuning level (the achievability of management objectives).
- On the basis of this, whether the new information is sufficient to trigger a review/revision of the MP.

In any year, IF the SAG concludes that there is sufficient new information to trigger a review/revision of the MP, the SAG will:

- Outline the work plan and timeline (e.g. over a period of 2-3 years) envisaged for conducting a review.
- Report to the SC that a review/revision of the MP is required with details of the proposed work plan and timeline.

- Confirm to the SC that the MP can still be applied while the revision process is being completed.

In any year, IF the SAG concludes that there is no need to commence a review/revision of the MP, the SAG will:

- Report to the SC that a review/revision of the MP is not yet required.

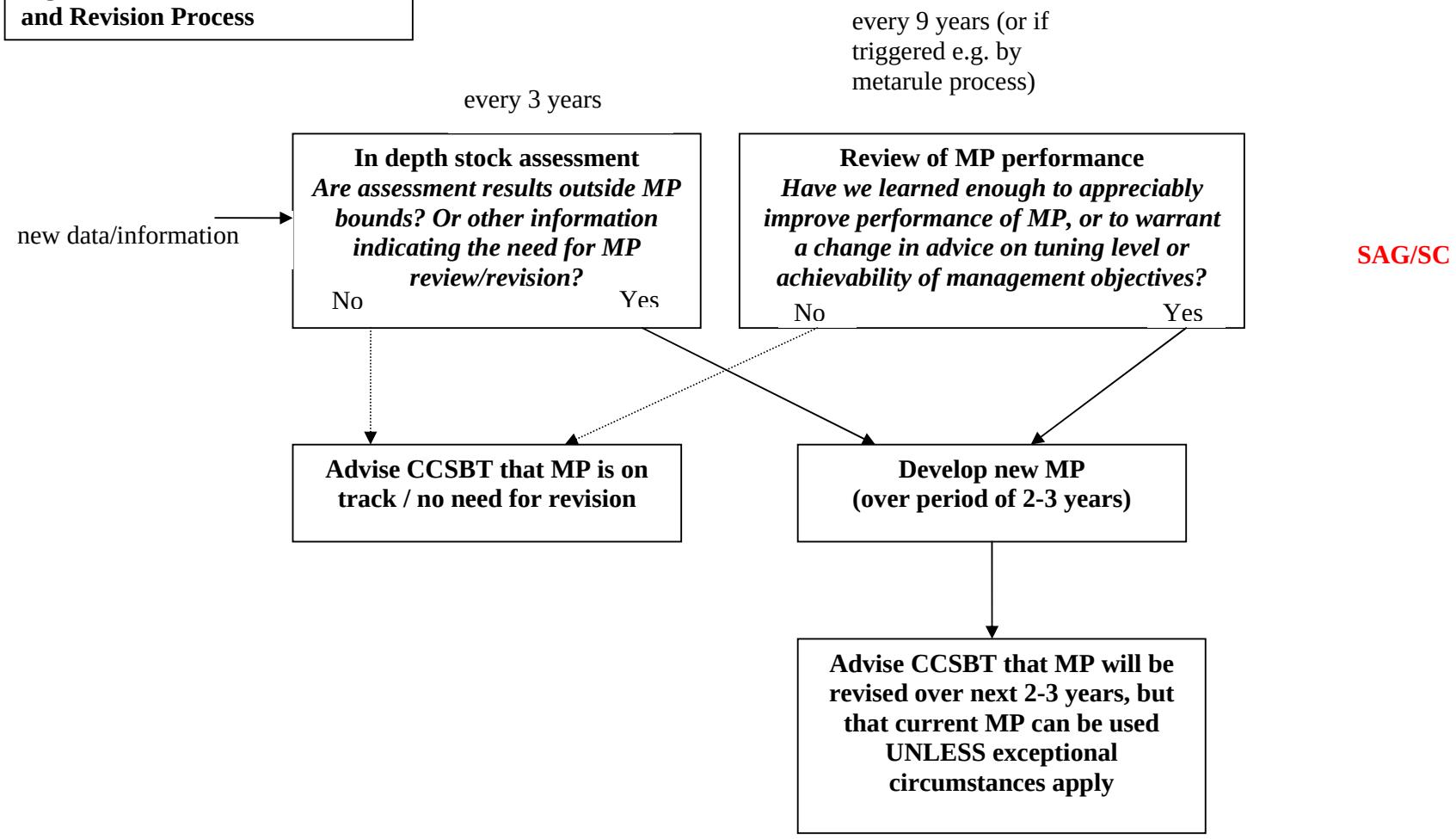
The SC will:

- Consider the advice from the SAG, and if the SC agrees with the SAG, prepare a report to the Commission:
- Summarising the need for a review/revision.
- Proposed work plan and timeline.
- Budgetary implications.
- Confirm to the Commission that the MP can still be applied while the revision process is being completed.

The Commission will:

- Review the report from the SC.
- Decide whether to initiate the review/revision process.

Figure 3. Flowchart for Review and Revision Process



5. Other Implementation Issues

5.1 MP Performance Monitoring Measures

At the 4th Management Procedure Workshop (Canberra May 2005) it was noted that the Commission was likely to require some process to review and report on the performance of the final MP in managing the SBT stock towards some goal after implementation. It was emphasized that this not straight forward. Given the substantial uncertainties incorporated into the Operating Model and the MP Reference Set, the stock cannot be expected to recover along a specific trajectory under MP management, but could be anywhere within the estimated uncertainty envelopes.

Nonetheless, it is acknowledged that some process to monitor MP performance will be required, particularly to respond to improved understanding regarding the uncertainties incorporated into the OM, and to determine whether revision of the OM or re-tuning of the MP may be required. Member scientists were asked to evaluate options and submit proposals to the SAG6 / SC10 meetings for ways to meaningfully monitor and report on MP performance after implementation.

[Further work is required to develop suitable performance measures.]

5.2 Monitoring of Possible Future Fishery Changes

At the CCSBT Special Consultation held in May 2005 to provide feedback on the MP development process, it was noted that, if a change in longline fishing behaviour results in longline CPUE not changing as expected with abundance, then the MP would fail to perform as expected and a meta rule would need to be invoked. The MP is not robust to marked changes in longline fishing behaviour.

[Further discussion of this issue is required]

6. Responsibilities

6.1 Running the MP

The CCSBT Secretariat will be responsible for running the MP, but the Secretariat will contract this out for the first year in which the MP is run.

Annex 1

Considerations related to algorithm for fitting Fox model in Management Procedure

The recommended Management Procedure includes fitting a Fox model to past catch and CPUE data (see equations 1-6). This involves the use of a non-linear maximization method to estimate the values of Fox model parameters *r* and *K*. The Committee agreed that the computer code for this MP as used in the simulation tests (the "CODE") also be used for implementation (thus, for example, implementations would use the same basis for fixing starting values for *r* and *K* in the maximization process).

However, for any implementation, it is important to carry out tests that the maximization has been successfully achieved, which for reasons of computing time are not viable as a routine component of the simulation testing process. In particular, this includes checking whether estimates fall on bounds set for parameters in the "CODE", and whether the likelihood is multi-modal with the "CODE" having located only a local rather than the global maximum.

Three possible outcomes from such an exercise, together with the associated recommended action, are as follows:

1) Successful maximization achieved.
   Action: use result obtained in MP.

2) Parameter estimates at the true global maximum differ from those provided by the "CODE", but the net effect on the TAC calculated is minimal (for example, because of a rather flat surface near the maximum, with estimates of *r* and *K* manifesting high negative correlation).
   Action: input the *r* and *K* estimates corresponding to the true global maximum to the MP's TAC formula (equation 7).

3) A parameter estimate from the "CODE" lies on a bound, or the estimates obtained do not correspond to the global maximum.
   Action: give consideration to invoking the metarule process.

[The Committee also noted that it would be desirable to check the frequency of occurrence of parameter estimates on bounds in the simulations, and possibly also that of multi-modal behaviour. It recommended that this be done before the next formal review of the MP (see Section 4), together with examination of some modifications to the maximization method to attempt to reduce the frequency of such occurrences if this proves not be very low.]

Attachment 7

REPORT ON BIOLOGY, STOCK STATUS AND MANAGEMENT OF SOUTHERN BLUEFIN TUNA

A review of fisheries indicators was conducted by the CCSBT Stock Assessment Group during 2005, results of which are summarised below. This report also updates description of fisheries and state of stock, and provides fishery and catch 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 breeding 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 extend their distribution 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 bigger 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 as the stock has been reduced. 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). SBT exhibit age-specific natural mortality, with M being higher for young fish and lower for old fish.

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

Historically, the SBT stock has been exploited by Australian and Japanese fisheries for more than 50 years, with total catches peaking at 81,605t in 1961 (Figure 1). The current (2004) total catch is about 13,490t (preliminary data), continuing a declining trend in total catches from a recent peak of 19,529t in 1999, 16,026t in 2001, 15,212t in 2002 and 14,042t in 2003. Over the period 1952 - 2003, 79% of the catch has been made by longline and 21% using surface gears, primarily purse-seine and pole&line (Figure 1). The proportion of catch made by surface fishery peaked at 50% in 1982, dropped to 11-12 % in 1992 and 1993 and increased again to average 30% 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 73% of the SBT catch has been made in the Indian Ocean, 21% in the Pacific Ocean and 6% in the Atlantic Ocean (Figure 2). The Atlantic Ocean catch has varied widely between about 300t and 8,200t since 1968 (Figure 2), averaging about 1,000t over the past two decades. This variation in catch reflecting 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). The Indian Ocean catch has declined from about 54,000t to 11,000t, averaging about 14,600t, and the Pacific Ocean catch has ranged from about 1,200t to 19,000t, averaging about 2,100t, over the same periods.

3. Summary of Stock Status

SBT stock status was reviewed at the 10th meeting of the CCSBT Scientific Committee in 2005. Assessments using the SBT Operating Model suggest that the SBT spawning biomass is at a low fraction of its original biomass and well below the 1980 level. The stock is estimated to be well below the level that could produce maximum sustainable yield. Rebuilding the spawning stock biomass would almost certainly increase sustainable yield and provide security against unforeseen environmental events that might affect recruitment or productivity. Assessments estimate that recruitment in the 1990s fluctuated with no overall trend. Recruitments in the last decade are estimated to be well below the levels in the period 1950-1980.

Analysis of several independent data sources and the operating model indicate very low recruitments in 2000 and 2001. There is some evidence that the 1999 cohort is relatively weak and that the 2002 cohort is unlikely to be as strong as the average of those estimated during the 1990s. Other indicators show that the Indonesia longline fishery on spawning fish catches fewer older individuals. One plausible interpretation is that the spawning stock has declined in average age and may have declined appreciably in abundance. The decline in average age may be due to the disappearance of older fish, a pulse of younger fish entering the spawning stock, or a combination of the two factors. A pulse of younger fish entering the spawning stock is consistent with the assessment model output which suggests that the spawning stock has been largely stable over the last decade and has increased slightly over the last four years.

Given all the evidence, it seems highly likely that current levels of catch will result in further declines in spawning stock and exploitable biomass, particularly because of recent low recruitments.

4. Current Management Measures

SBT were managed by means of quota limits agreed at tri-partite meetings between Australia, Japan and New Zealand from 1985 through to the establishment of the CCSBT in 1994. The global quota was reduced several times after the initial level of 38,650t for the 1984/85 season. The combined quota for these three countries was maintained at 11,750t from the 1989/90 season through to 2002/03. Following increases in membership of the CCSBT (Republic of Korea, and the Fishing Entity of Taiwan joined in 2001 and 2002 respectively), the CCSBT

extended the following national catch limits for 2003/04 to 2004/05:

Japan	6,065 tons
Australia	5,265 tons
Republic of Korea	1,140 tons
Fishing Entity of Taiwan	1,140 tons
New Zealand	420 tons
Total	14,030 tons

An additional catch limit of 900 tonnes has also been set in 2004/05 for cooperating non-members, of which 50 tonnes was allocated to the Philippines (which was recently admitted as a cooperating non-member) and 800 tonnes set aside for Indonesia should it become a cooperating non-member

The CCSBT has also implemented a Trade Information Scheme (TIS) for SBT. This requires all members of the CCSBT to ensure that all imports of SBT are to be accompanied by a completed CCSBT TIS Document, endorsed by an authorised competent authority in the exporting country, and including details of the name of fishing vessel, gear type, area of catch, dates, etc. Shipments not accompanied by this form must be denied entry by members and cooperating non-members. Completed forms are lodged with the CCSBT Secretariat and are used to maintain a database for monitoring catches and trade. As markets for SBT are now developing outside CCSBT member countries, the TIS scheme was recently amended to require the document to be issued for all exports, and to include the country of destination,

At its annual meeting in October 2003, the CCSBT agreed to establish a list of vessels over 24 metres in length which are approved to fish for SBT, to be completed by 1 July 2004. The list included vessels from CCSBT members and cooperating non-members. At its annual meeting in October 2004, the CCSBT agreed to expand the list to include all of the vessels, regardless of size, that are authorised to catch SBT. Members and cooperating non-members are required to refuse the import of SBT caught by vessels not on the list.

5. CCSBT Management Procedure

The 10th meeting of the CCSBT Scientific Committee held in 2005 finalised the development and evaluation of candidate management procedures for SBT, and has recommended a final management procedure, implementation schedule and initial catch reduction for consideration by the Commission.

SOUTHERN BLUEFIN TUNA SUMMARY (global stock)	
Maximum Sustainable Yield	Not estimated
Current (2004) Yield	13,490t (preliminary)
Current Replacement Yield	Less than 15,000 t
Relative Biomass	SSB_{2004}/SSB_{1980} 0.14 - 0.33[1]
	SSB_{2004} / SSB_{K} 0.05 - 0.12
Current Management Measures	Global quota of 14,030t (Australia, Fishing Entity of Taiwan, Republic of Korea, Japan, and New Zealand) plus 900t provision for cooperating non-members

[1] Estimates calculated using the reference set operating model adopted for the development of the CCSBT management procedure; ranges indicated refer to 90% probability intervals.

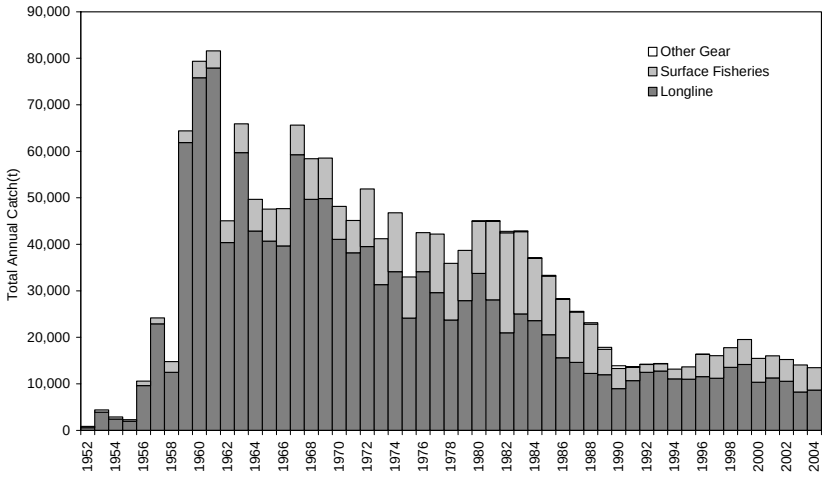


Figure 1. Global southern bluefin tuna catches by fishing gear (t), 1952 to 2004.

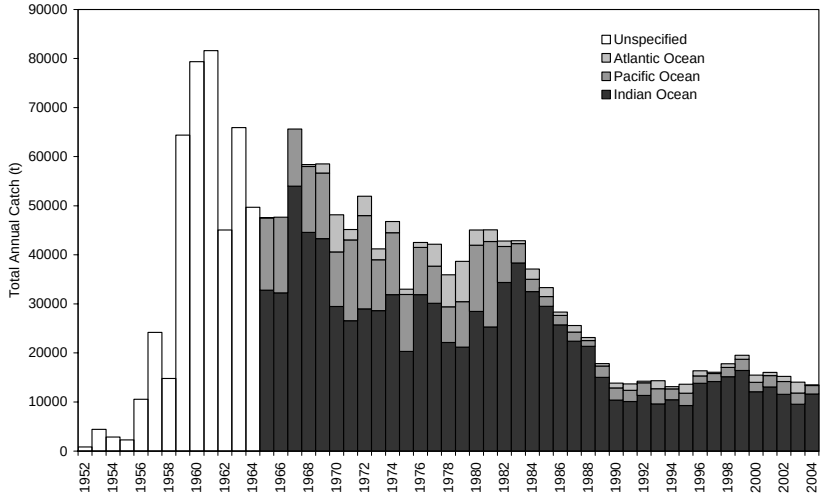


Figure 2. Southern bluefin tuna catches by ocean (t), 1952 to 2004.

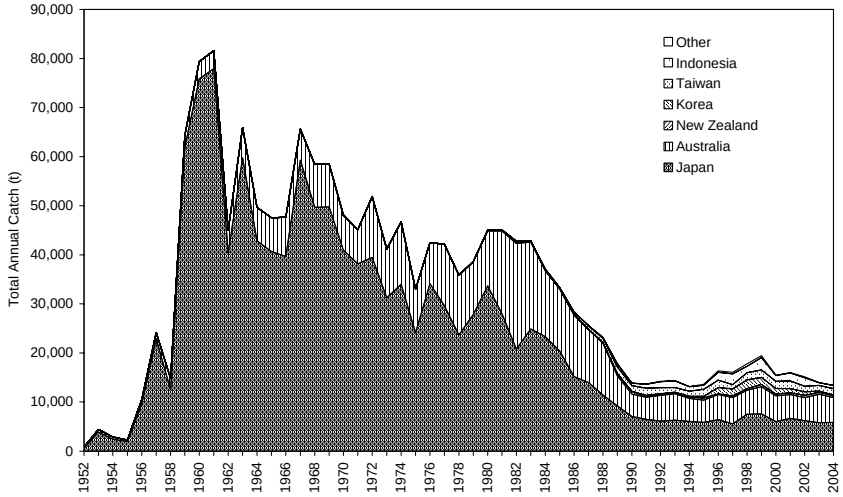


Figure 3. Total annual southern bluefin tuna catch (t) by flag, 1952 to 2004.

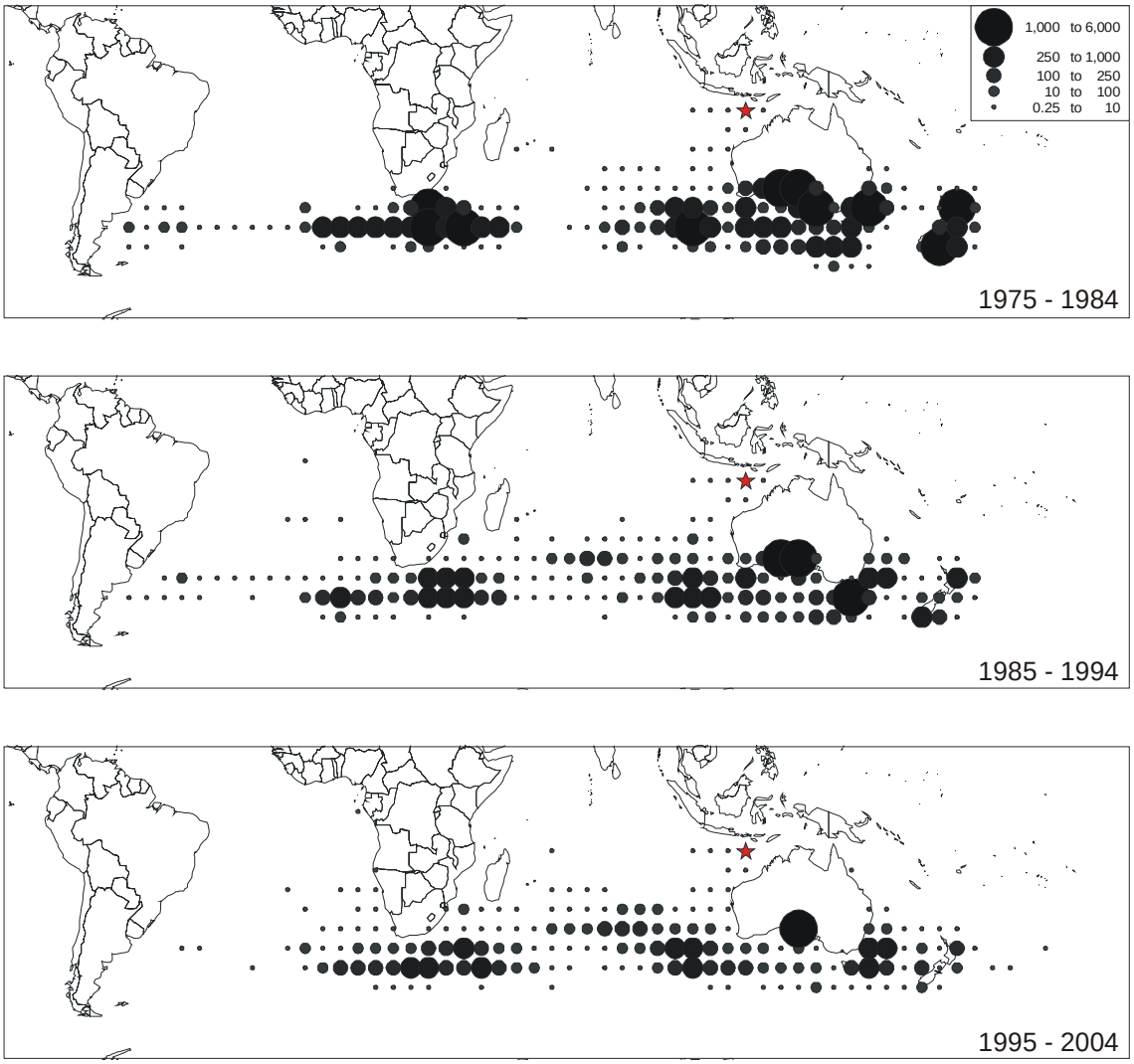


Figure 4. Geographical distribution of average annual southern bluefin tuna catches (t) by CCSBT members and cooperating non-members over the decades 1975-1984, 1985-1994 and 1995-2004 per 5° block by oceanic region. The area marked with a star is an area of significant non-member catch. Block catches averaging less than 0.25 tons per year are not shown.

Figure 5. Trends in nominal catch rates (numbers per 1000 hooks) of SBT by age group (ages 3, 4, 5, 6-7, 8-11 and 12+) caught by Japanese longliners operating in CCSBT statistical areas 4-9 in months 4-9.

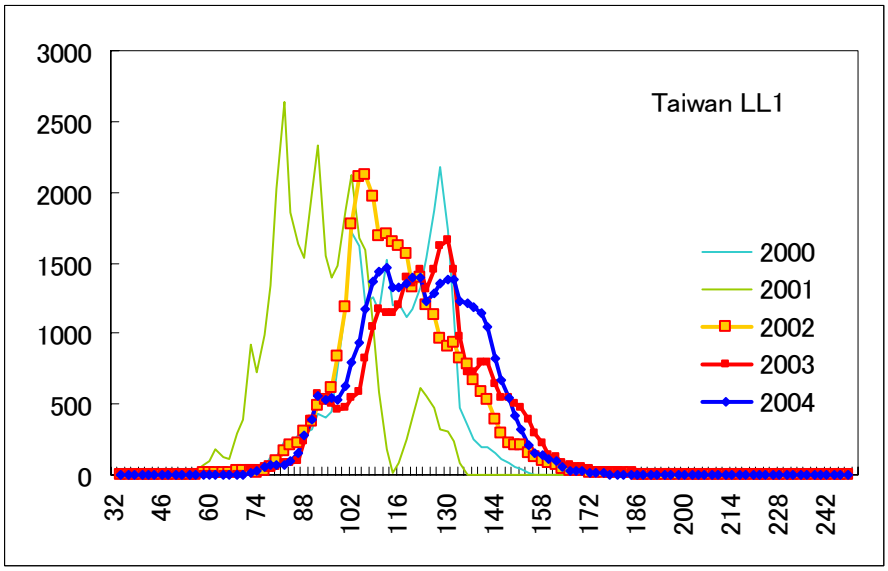


Figure 6. Changes in the size composition of the seasonal Taiwanese SBT longline target fishery (This figure may be revised in the future due to a new criteria for subdividing Taiwan's catch into LL1 and LL2).

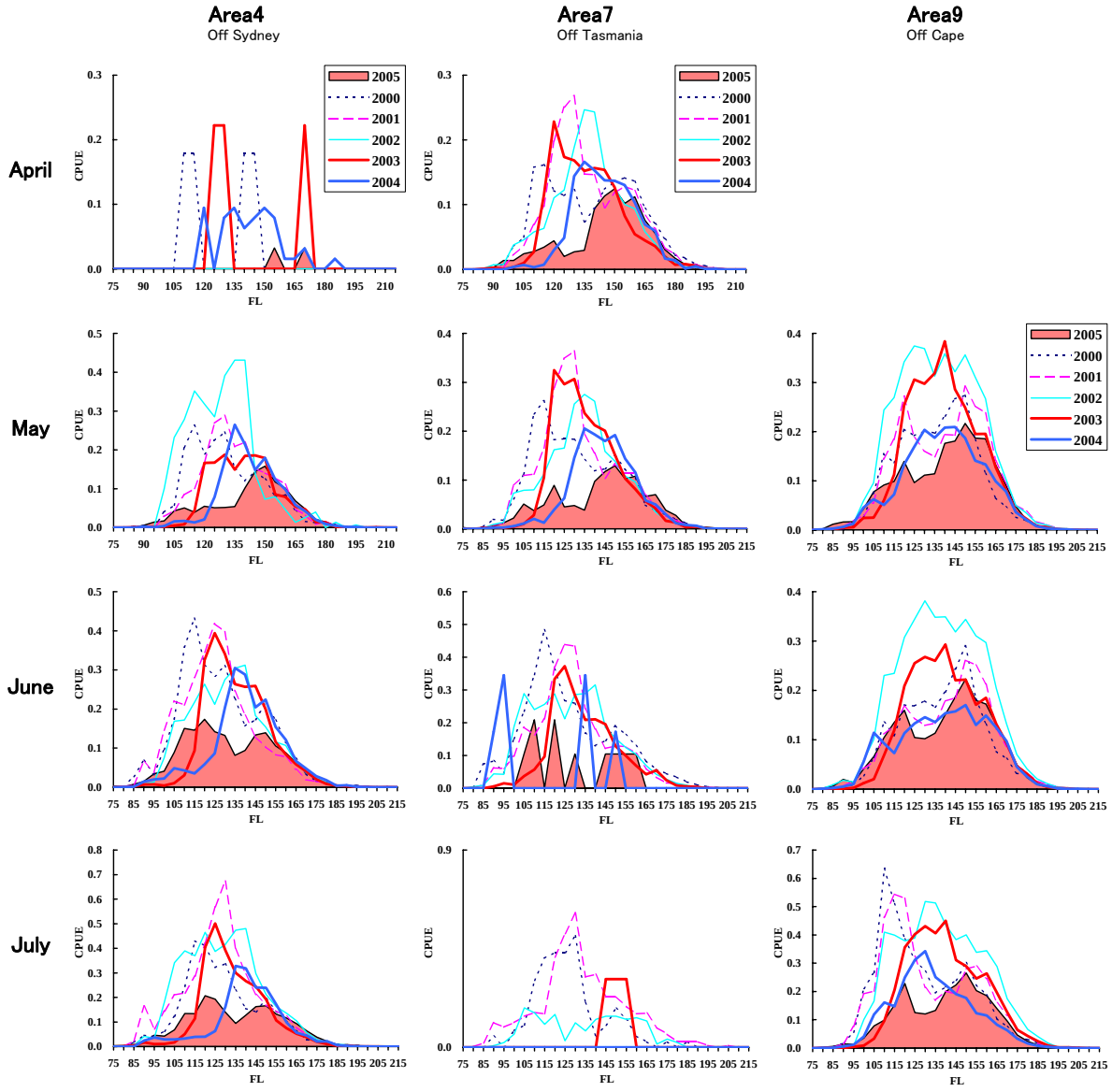


Figure 7. Size composition of nominal CPUE of Real Time Monitoring Program data for the Japanese longline fishery for five recent years by month and area.

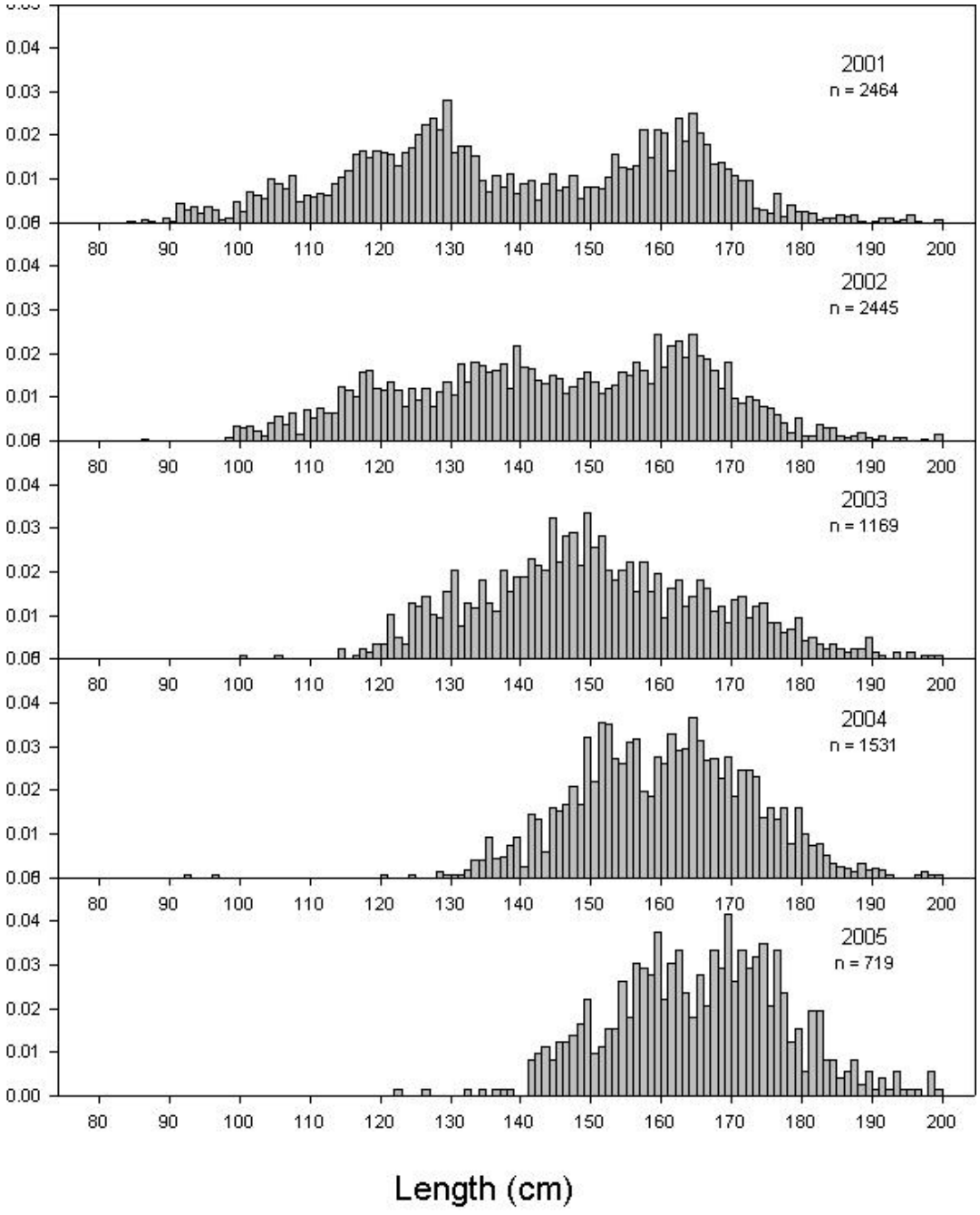


Figure 8. Proportion at length of SBT from the New Zealand charter fleet for 2001 to 2005. Data for 2005 is based on about 75% of the catch.

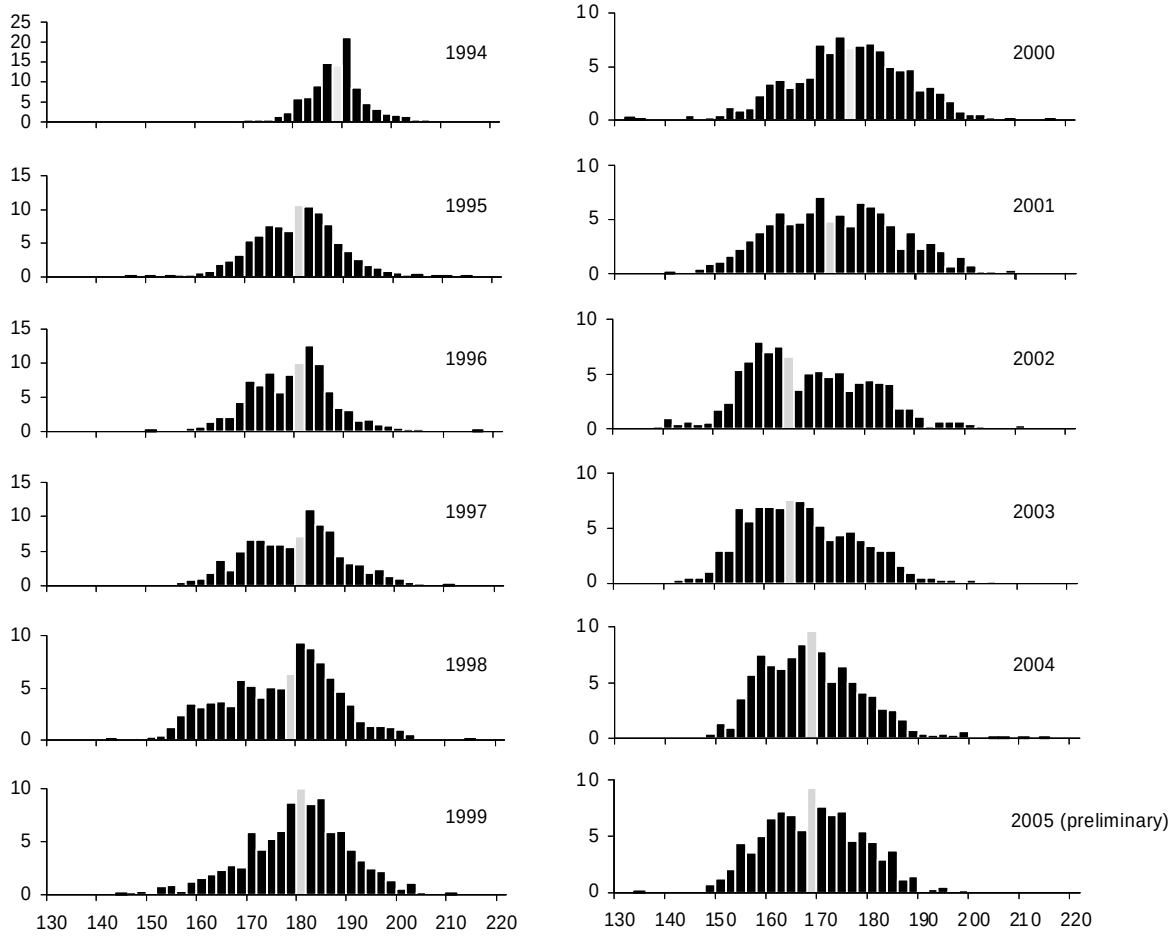


Figure 9. Length frequency (2cm intervals) of SBT by spawning season from the Indonesian spawning ground longline fishery. The grey bar shows the median length class. A spawning season is defined as July 1 of the previous year to June 30 of the given year. The pale bar represents the median length.

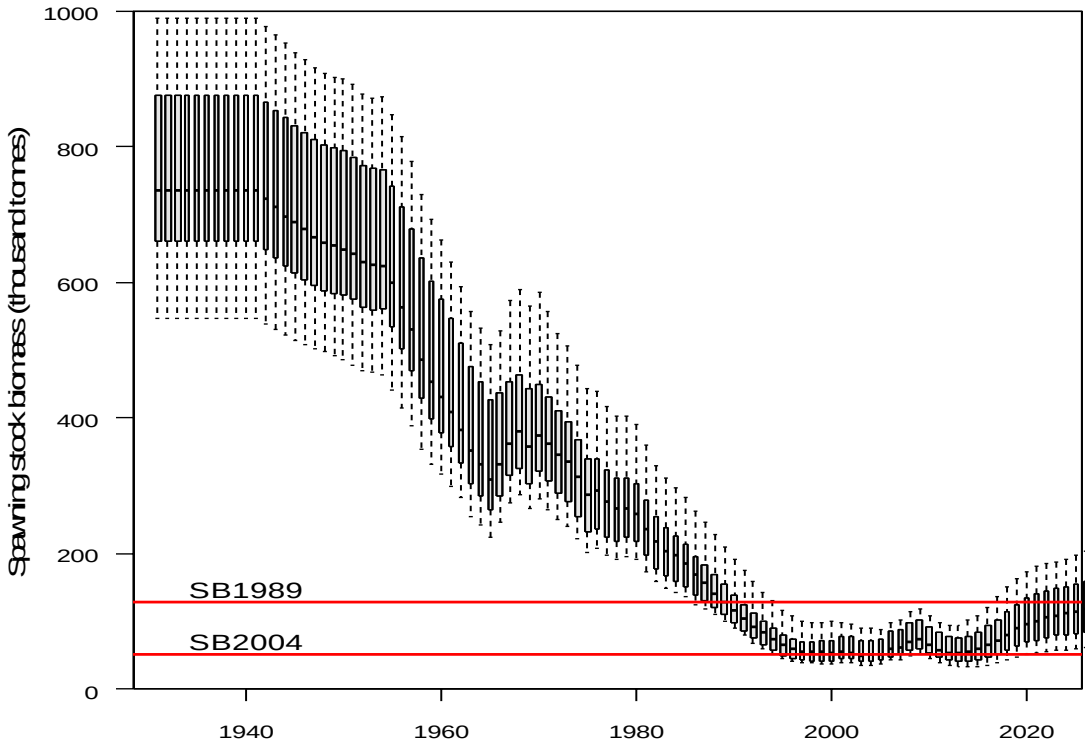


Figure 10. Historic and projected spawning biomass under the recommended SBT management procedure and implementation schedule. Lines indicate the median spawning biomass in 1989 and in 2004.

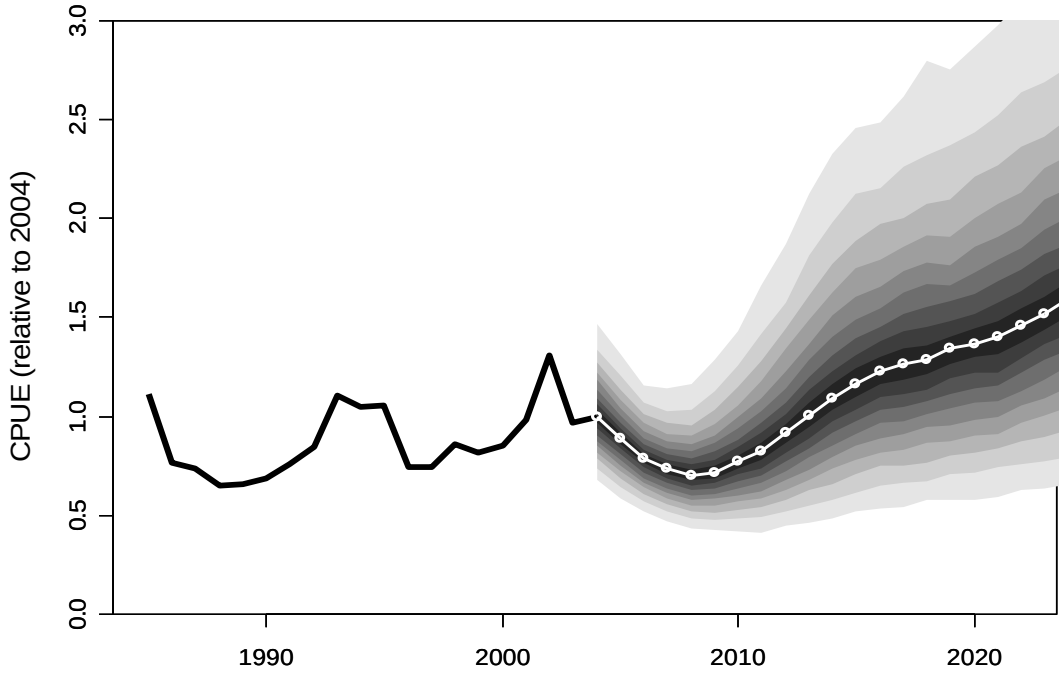


Figure 11: SBT Historical (solid line) and projected CPUE (relative to the median value in 2004) for the recommended SBT management procedure, implementation schedule and 5000t catch reduction in 2006.

Attachment 8

Member Responses to Agreed Catch Characterisation Information that they are not currently providing

Australia

Target Species
In the purse seine fishery the fishers complete an SBT specific logbook and hence all catch and effort recorded in that fishery can be considered to be exclusively targeting SBT. However, it should be noted that there is a small amount of mistaken reporting of purse seine sets for skipjack tuna in the same logs.

Australia's longline fisheries are multi-species fisheries that target a wide range of tuna and billfish species. Longline logbooks collected target species information until 2001 after which time that field was removed because many fishers stated that they targeted a wide range of species on a single set or did not complete the logbook until after the catch had been retrieved. Scientists believed that target information for CPUE purposes could be determined through other more reliable means (e.g. set characteristics).

In summary, all purse seine effort reported to the CCSBT can be considered to be targeting SBT. The multi-species nature of Australia's pelagic longline fisheries makes target information collected by logbooks largely unusable.

Number retained (surface)
At present it is not possible to provide accurate estimates for number retained in the catch and effort data because of the nature of the Australian fishery (fish are caught and kept alive in the water). There has been some consideration of techniques to collect data on the number of fish caught and retained but any developments are likely to be some time away. Numbers of fish caught are provided from farm sampling and tow mortality data but it is not possible to directly link these to the effort data.

Number of baskets
Australia's pelagic longline fishers do not use hook baskets but rather set all hooks from one-six hook bins hence *number of baskets* is not applicable for the Australian longline fishery.

Substitution information and raw frequencies (LL)
Failure to provide this information was an oversight and this will be remedied in the next data exchange.

Taiwan

Target species
Since SBT was both a bycatch and seasonal target species to Taiwanese fleet, and the current revised logbook form does not include this item yet, this information is not available.

Number of boats, days fished and sets

Taiwan started to provide number of boats in 2005 for 2002-2004. Since it is difficult to separate the fishing days that relating to SBT fishery, the information of days fished and sets will be misleading and therefore considered meaningless for provision.

Number of discarded
Taiwanese revised logbook contains item of discard since 2004. Therefore this information will be available when the logbooks recovered.

Number of basket
Number of basket was requested to provide in Taiwanese logbook since 1995, but the coverage was still low. Taiwan will consider if it is meaningful to provide this information.

Japan

Target species
Japan have no data for this item.

Weight retained
It is because weight data was not used in stock assessment.

Number discarded
Japan have no data for this item. However, no SBT is discarded unless it was damaged by sharks.

New Zealand

Number discarded
Prior to 2003, the only source of discard information was observer data. Since the introduction of a revised catch and effort form in 2003, there has been a requirement for discarded catch to be reported on catch and effort forms. It is however unlikely to be complete in part because of industry confusion regarding its reporting obligations. Therefore, while there are some data for 2003/04 on discards from catch and effort forms, these are unlikely to be reliable for estimating actual discards and New Zealand continues to rely on observer data to estimate historical discarding. From the 2004/05 fishing season, there is now a clear requirement for these specified discards to be reported on catch and effort forms and these data, in addition to observer estimates, will be reported in future data exchanges.

Attachment 9

Report of the CPUE Modelling Group

Introduction

There was no formal meeting of the CPUE group during SAG6 but issues important to the immediate and future needs of Management Procedures were discussed in the margins of the meeting. The chair then produced a report that was further developed at a short meeting held during the ESC.

CPUE results are a vital component of the Management Procedure chosen by SAG for the management of SBT. There are several concerns that need to be addressed in order that the CPUE series can be used in the MP without problems arising. The CPUE modelling group are particularly concerned with the following two issues. These are

- Uniqueness: the CPUE input to be used must be unambiguously defined each year.
- Lack of bias: The CPUE input must represent changes in SBT abundance.

Others issues such as the detailed provision of data were considered by the data exchange working group and provision of fine scale data for the ST windows CPUE series by the ESC.

Additionally there is the important but less immediate need to develop new and better series as is recorded in past reports of the group and agreed by the ESC.

Uniqueness

Clearly if a management procedure is to give unambiguous advice it must be based upon unique inputs and these include the annual update of CPUE. The interim CPUE series to use has already been agreed. The CPUE modelling group meeting held in September 2003 (see SC8 report annex) provided a detailed specification for the CPUE Series to use for the first 5 years of operation of a management procedure.

This specification for CPUE series is clear and unambiguous but it seems worthwhile to clarify what should happen if one or more of the series became unavailable/ uncalculable or in the future the CPUE Modelling Group agree that its performance has become too erratic for it to be used. In these circumstances:

- If one series drops out then the median should be replaced by the average of the centre two series in a year.

- If two series drop out then the median of the remaining three series should be used but the CPUE Modelling Group would need to advise on the need to invoke a Meta Rule.

- If 3 or more series drop out then Meta Rules should be invoked.

Lack of bias

In the chosen MP the CPUE is used to represent the stock abundance. There is thus an ongoing need to check that the aggregate (median of the 5 series) CPUE measure defined above reflects 4+ SBT stock abundance. Since assessment models rely upon CPUE series to indicate recent trends in stock abundance, direct tests of their bias are difficult to develop. However, a number of indirect tests for bias are possible and these should be further developed and applied as an ongoing short term task of the CPUE Modelling Group.

Some of these already exist or are relatively simple and obvious. In particular

- we should ensure that using the RTMP programme does not introduce any bias in the last years results. Since the RTMP lacks non-target SBT CPUE, upward bias is possible. This could be checked by retrospective analysis of the ratio of the RTMP results with the final results.
- the 5 series could be compared and any significant deviations in their trends detected.
- analyses of changes in fishing activity distribution in time and space should be presented.

Others tests need to be developed and existing tests need to be quantified to determine when a series' behaviour is sufficiently anomalous to warrant it being discarded.

New series

The CPUE series to use for the first 5 years of operation of a MP were specified in 2003. Studies of CPUE have subsequently had a lower priority in the work program of ESC due to the need to develop and test MPs. However, as discussed in the reports of previous years there is a requirement to develop an improved CPUE series to be available for the first major review of MP based management. Hence in 2006-2008 CPUE studies will be given a high priority.

The group thought that improvements should be possible using further statistical analysis. They would therefore welcome papers both describing the results of analyses and also concept papers describing potentially useful approaches. However, they felt that the most promising route to improved CPUE series would involve developing a better understanding of how the various fleets had operated through time.

The CPUE modelling group noted that historically the SBT fishery could be considered in three phases coinciding with presumed major changes in the fishery. In general the phases correspond to:

- Early years corresponding to the most rapid declines in CPUE that is roughly equivalent to the period when vessels were broadly exploring the geographical extent of the resource and realising high catch rates relative to recent years ("fish-down" phase).
- Middle years when all known fishing grounds were fished and CPUE is nearly stable or exhibits a gradual decline and abundance becomes relatively "patchy".
- Recent years when the fishing areas and periods have reduced and catch rates are very low and highly variable.

The CPUE group considered that with changes in spatial patterning and relative "patchiness", that fishing strategies, gear effectiveness, and economics of the fishery are likely to be very different between phases and between fleets. They further considered that understanding the changes (in "key" fleets/fisheries) in fishing strategies, evolution of gear and technological improvements, and influence of economics could improve our understanding of CPUE as an index of abundance. This study may be helpful to understand possible reactions by the fishing fleets if the CCSBT adopts recommendations for catch reductions.

Studies would seek to identify and quantify changes in fisher's behaviour and/or fishing gear (including the introduction of fish finding or ship positioning electronics) that might influence catch rates. Useful steps in this process would be:

- Papers that described the "metier" of the various SBT fleets. That is to say descriptions of how SBT fishing fits into their annual activities and how changes in the abundance or TAC of SBT and other tuna fisheries might influence decisions as to when and where SBT is fished.
- Papers that reviewed gear and ship technology developments in SBT fisheries.
- Papers that reviewed published or anecdotal information from fishing masters about changes in the industry.
- Papers that review past CPUE studies.

Work Program

During the 2006 SAG/ESC
The CPUE Modelling Group to meet in open session to:

- Agree any corrections needed to RTMP based estimates of the five operational CPUE series.
- Agree ongoing checks of the consistency and quality of the five operational CPUE series.
- Study the development of new CPUE series.
- Propose detailed plans for 2007 special meeting.

Additionally it was considered that it would be useful to capitalise on the SAG/ESC meeting being in Japan in 2006. This might be achieved by a 1 day subgroup (perhaps two members from each country) of the CPUE Modelling Group conducting a joint statistical analyses of an existing series (given its use of fine scale data the Takahashi space-time window would be our preferred candidate series). This initial meeting would be designed as a test of concept for a more extended statistical working group planned for 2007. The approach proposed would be for Japanese scientists to analyse fine-scale data in jointly agreed ways and for the group to jointly discuss aggregate statistical outputs. This seems the most appropriate way of making statistical analyses of fine-scale data possible while allowing Japan to protect the confidentiality of data. Such an approach also seems the most likely path to developing jointly agreed CPUE series.

Work for 2007

Hold a statistical meeting of the CPUE Modelling Group for 1 week in Japan.

At 2007 SAG/ESC

- Apply ongoing checks of the consistency and quality of the five operational CPUE series as needed.
- Review development of new CPUE series.
- Review output of statistical meeting of the CPUE Modelling Group.

Ideas for 2008

Review and if possible select candidate CPUE series.

Attachment 10

Summary of Results for Scientific Observer Programs

Country	Sector	Observers Deployed	Sea Days	Sets/Tows Observed	Observed Vessels (%)	Observed Effort (%, units)	Observed Catch (%, units)	Total Cost
Australia	Purse Seine[a]	2	36	15		11% (sets)	8.5% (est. total weight)	A$55,000
	Towing[a]	2	24	2		5% (tows)		Included above
	East Coast Longline	11		204		12% (hooks)	5% (no. retained catch)	A$180,000
	West Coast Longline	4	75	59		5% (hooks)	0% (no. retained catch)	A$90,000
Japan	Longline	16	1441	652	8%	5% (hooks)	4% (no. total catch)	¥37,240,000 (A$467,000)
Korea	Longline	1						
New Zealand	Charter Longline	4	363	350	100%	96.5% (hooks)	100% (no. total catch)	
	Domestic Longline	10	231	199		6.3% (hooks)	16% (no. total catch)	
Taiwan	Longline	3		200[b]	5%		4% (no. total catch)	
Indonesia	Longline - Trained Observers	6	240		2%			

[a] -2005 (in 2004 observers monitored 13% of effort, 14% of catch and 6% of tows in the purse seine fishery) - remainder are 2004

[b] - approximate value due to difficulties in separating the SBT fishery from other fishery.

Summary of Biological Sampling by Scientific Observer Programs in 2004

Country	Otoliths (pairs) Collected	Fish measured	Sex ID	Tags Recovered
Australia - PS	n/a	n/a		
Australia - LL	n/a	412		
Japan	655	4155	4112	20
Korea	0			
New Zealand	1140	2007	1961	5
Taiwan	316	1267	93	8
Indonesia	1283	1279	494	
CCSBT Tagging	267	267		

Attachment 11

Draft Terms of Reference for SRP review

The ESC requests that CCSBT approve a review of the SRP. The SRP was defined in 2001 at which time the following statement was made regarding SRP program objectives. "The SC considers that the main objective of an SRP is to improve the quality of the data used as input to the stock assessment and to contribute to the development of reliable indices to monitor future trends in stock size. Future trend indicators will be a critical component of a feedback rule to facilitate setting TACs."

The Terms of Reference for the review will be:

1. Within the objectives for the SRP, as specified by CCSBT, review all the components of the SRP adopted in 2001 and consider possible additional components for future inclusion. Specifically:
   a. review the objectives of the projects and the extent to which objectives have been achieved.
   b. in the case of projects that have been implemented by CCSBT as part of the SRP, the review would include consideration of the cost and benefits of the project.

2. Review and where appropriate, revise project objectives for each element of the SRP.

3. Prioritise the components of the SRP, and the projects comprising each component, in terms of importance for SBT management given the effectiveness at achieving objectives and importance of the resultant data for SBT management. The review will recognize that the SRP projects will contribute to: monitoring of trends in the stock, implementation of the MP, testing key assumptions of the operating model used to develop the MP, indicators for evaluating MP performance, trends in recruitment and data for future assessments. These factors will determine the relative priority of SRP components.

The membership of the review team is recommended to be a combination of the independent advisory panel and a maximum of three representatives from each member. The CCSBT may wish to consider the benefits to the review for CCSBT members and/or external scientists with experience in similar fisheries to be invited to participate in the review.

Members will be requested to provide papers evaluating the elements of the SRP and the associated projects with respect to the above criteria.

The report from this review will be provided to CCSBT in 2006.

Attachment 12

Summary of Otolith Collection and Direct Ageing

Country	Otoliths (pairs) collected in 2004	Total Otolith Readings Submitted to CCSBT (all years)	Otolith Reading for the 2002 catch year submitted to the Secretariat
Australia - PS	360	415	114
Australia - LL		0	0
Japan	381	1421	9
Korea	0	0	0
New Zealand	1140	798	198
Taiwan	316	102	0[1]
Indonesia	1283	4,370	542
CCSBT Tagging	267	0	0

[1]Taiwan started to collect otoliths in 2003 by the observer program.

Attachment 13

Report of the Data Exchange Working Group

The data exchange working group met to discuss the data exchange items in the Extended Scientific Committee's (ESC) agenda and to provide a report to the ESC on those items.

(1) Review of Data Exchange in 2005

The group agreed that the data exchange for 2005 went far more smoothly than data exchanges in recent years. The majority of data was provided on time and there was much less confusion regarding which data had been provided and which were the latest versions of re-submitted data.

The process of clearly specifying the required data together with placing submitted data on the private area of the CCSBT web site were considered to be significant improvements in the data exchange process.

It was noted that there was still room for improvement in timely submission of data as well as reduced instances of incorrect data being submitted, and it is expected that these improvements will occur over time.

It was also agreed that future data exchanges would be simplified if there was greater uniformity and robustness in the data provision format. It was agreed that the CCSBT should move towards a process where all members provided data in an identical format. To achieve this goal, it was agreed that the Secretariat would develop an empty MS-Access database which members could use for submitting data into. The database would contain some pre-defined rules which would ensure consistency in things such as the use of codes. No time frame was specified for the development of this database or any subsequent requirement to use the database for data provision. Instead, it was agreed that this work would be done as time permitted and that a gradual adoption of this data exchange mechanism would be most appropriate.

(2) Requirements for Data Exchange in 2006

The requirements for the 2006 data exchange were agreed and are detailed in **Annex 1**.

The method for calculating the time series of actual catches for the operating model and management procedure is specified in CCSBT-ESC/0509/11. The ESC agreed to changes recommended for the calculation method and these changes are specified in **Annex 2**.

(3) Data Exchange Workshop

The working group considered that there was no need for a data exchange workshop in 2006.

Annex 1

Data Exchange Requirements for 2006

The following table shows the data that is to be provided during 2006 and the dates and responsibilities for the data provision.

Catch effort and size data should be provided in the identical format as it was provided in 2006. If the format of the data provided by a member is changed, then the new format and some test data in that format must be provided to the Secretariat by 31 January 2006 to allow development of the necessary data loading routines.

Data listed in the following table should be provided for the complete 2005 calendar year plus any other year for which the data has changed. If changes to historic data are more than a routine update of the 2004 data or very minor corrections to older data, then the changed data will not be used until discussed at the next SAG/SC meeting (unless there was specific agreement to the contrary). Changes to past data (apart from a routine update of 2004 data) must be accompanied by a detailed description of the changes.

Type of Data to provide[1]	Data Provider(s)	Due Date	Description of data to provide
Cohort slicing algorithms	Australia Japan	31 Oct 05	The cohort slicing algorithms for cohort slicing are to be provided to the Secretariat for the Secretariat to use when it conducts cohort slicing for the MP. These algorithms will also be used by the Secretariat when producing the CPUE inputs file that is used to calculate the CPUE series. Explanations and assistance will also be provided to the Secretariat as is required.
Recommendation on split of Taiwan's fishery into LL1 and LL2 based on size selectivity **for MP/OM**	Taiwan	31 Dec 05	The MP data inputs working group at SC10 recommended that Taiwan's data be split between LL1 and LL2 based on size selectivity instead of targeting criteria. Taiwan's recommendation will be subject to intersessional discussion and agreement prior to providing the revised data for the data exchange.
CCSBT Data CD	Secretariat	31 Jan 06	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 2004 data exchange and any additional data (e.g. tag/recapture) received since that time. *The Secretariat will provided additional updates of the tag-recapture data during 2006 on request from individual members.*
Total catch by Fleet	all members and cooperating non-members	30 Apr 06	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.
Total Indonesian catch by month and % of Indonesian LL catch that is SBT	IOTC/ Secretariat	30 Apr 06	The Secretariat is to liaise with the IOTC to obtain the required data for 2005.
SBT import statistics	Japan	30 Apr 06	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.

[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
Mortality allowance (RMA and SRP) usage	all members (& Secretariat)	30 Apr 06	The mortality allowance (kilograms) that was used in the 2005 calendar year. Data is to be separated by RMA and SRP mortality allowance. If possible, data should also be separated by month and location.
Global SBT catch by flag and by gear	Secretariat	14 May 06	Global SBT catch by flag and gear as provided in recent reports of the Scientific Committee.
CPUE data preparation documentation **for MP**	Australia Japan New Zealand	30 April 06	Documentation specifying the data preparation process from the raw catch and effort logbook data to the final data which are used as inputs for the CPUE calculations.
Complete documentation on the method for calculating the 5 CPUE series **for MP**	Australia Japan	30 Apr 06	o A description of the specific input data for each specific CPUE series; o Complete details of the method used to calculate the CPUE series; o Description of the software used to calculate the CPUE series, including the code used for those calculations. Depending on the nature of the code provided, a navigation document may need to be provided which describes how to run the code or where to find different components of the code.
Catch and Effort	all members (& Secretariat)	23 Apr 06 (New Zealand)[2] 30 Apr 06 (other members & Secretariat)	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. A template showing the required information is provided in Attachment B of CCSBT-ESC/0509/09.
Non-retained catches	All members	30 Apr 05	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. An historic time series of these data should be provided in addition to the data for 2005.
RTMP catch and effort data	Japan	30 Apr 06	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.
NZ joint venture catch and effort data at 1*1 spatial resolution	Secretariat	30 Apr 06	Aggregated New Zealand catch and effort data, to 1*1 degrees of resolution instead of 5*5 degrees. The Secretariat will produce and provide these data to Japan only for use in the $W_{0.5}$ and $W_{0.8}$ CPUE indices produced by Japan. *Other members may request approval from New Zealand to be provided with access to these data for necessary analyses.*

[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
Raised catch data for AU, NZ and KR catches	Australia, Secretariat, Korea,	30 Apr 06	Aggregated raised catch data should be provided at a similar resolution as the catch and effort data. Japan 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.
Split of Taiwanese catch into LL1 and LL2 **For MP/OM**	Taiwan	24 May 06[3]	Provide the split of the Taiwanese catch (in numbers and weight) into the LL1 and LL2 fisheries based on size selectivity criteria. In addition to data for 2005, a revised time series of data should be provided that uses the size selectivity criteria. It was agreed that this changed historic data can be used prior to SAG7 without the need further agreement.
Total catch per fishery each year from 1952 to 2004. **For MP/OM**	Secretariat	31 May 06	The Secretariat will use the various data sets provided above together with previously agreed calculation methods to produce the necessary total catch by fishery data required by both the Management Procedure and the Operating Model.
Observer length frequency data	New Zealand	30 Apr 06	Raw observer length frequency data as provided in previous years.
Raised Length Data	Australia, Taiwan, Japan, New Zealand	30 Apr 06 (Australia, Taiwan, Japan) 7 May 06 (New Zealand)[4]	Raised length composition data should be provided[5] 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/0509/09. New Zealand will be providing a revised historic time series which will have very minor differences form the time series it provided in 2005. It was agreed that this changed historic data can be used prior to SAG7 without the need further agreement.
RTMP Length data	Japan	30 Apr 06	The length data from the real time monitoring program should be provided in the same format as the standard length data is provided.

[3] The date is set 1 week before 31 May to provide sufficient time for the Secretariat to process this data and produce the data required by the MP/OM on 31 May.

[4] 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.

[5] The data should be prepared using the agreed CCSBT substitution principles where practicable. It is important that the complete method used for preparing the raised length data be fully documented.

Type of Data to provide[1]	Data Provider(s)	Due Date	Description of data to provide
Raw Size Data	Korea	30 Apr 06	Raw length/weight measurement data should be provided by Korea instead of raised length data because Korea does not yet have a suitable sample size to produce raised length data. *However, Korea is encouraged to improve its sample sizes of length frequency data in the future.*
Raised Catch-at-length (2 cm bins) for Taiwan split into LL1 and LL2 **For OM**	Taiwan	24 May 06[6]	Provide the raised catch-at-length data split into the LL1 and LL2 fisheries. In addition to data for 2005, a revised time series of data should be provided that uses the size selectivity criteria It was agreed that this changed historic data can be used prior to SAG7 without the need further agreement.
Catch at age data	Australia, Taiwan, Japan, New Zealand	14 May 06	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. New Zealand will be providing a revised historic time series which will have very minor differences form the time series it provided in 2005. It was agreed that this changed historic data can be used prior to SAG7 without the need further agreement.
Indonesian LL SBT age and size composition	Australia	30 Apr 06	Estimates of both the age and size composition (in percent) is to be generated for the spawning season July 2004 to June 2005 and the 2005 calendar year. 2004 calendar year age frequency also needs to be provided.
Raised catch-at-age (ages 0 – 30) for Australia surface and Indonesia spawning ground fisheries. **For OM**	Australia	24 May 06[7]	These data will be provided to June 2005 in the same format as previously provided. The Indonesian catch at age should be updated for all years (except 2003 and 2004 – which were updated in the 2005 data exchange) because of small changes to direct aging data in earlier seasons.
Catch-at-length (2 cm bins) and catch-at-age proportions **for OM**	Secretariat	31 May 06	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).
Catch at Age **for MP**	Secretariat	31 May 06	Cohort slicing by month of the 5*5 raised length data provided by members. The data used would be the data for LL1 fisheries only. For LL1 fisheries where raised length data are not available (i.e. Korea, Philippines, Miscellaneous), the Secretariat will use Japanese length frequency data as a substitute in the same manner as conducted when producing the length frequency inputs for the operating model

[6] The date is set 1 week before 31 May to provide sufficient time for the Secretariat to process this data and produce the data required by the OM on 31 May.

[7] The date is set 1 week before 31 May to provide sufficient time for the Secretariat to incorporate these data in the data set it provides for the OM on 31 May.

Type of Data to provide[1]	Data Provider(s)	Due Date	Description of data to provide
Global catch at age	Secretariat	31 May 06	Calculate the total catch-at-age in 2005 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 06	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. This will be the first time that the Secretariat has generated the CPUE input data. Australia and Japan will provide any advice and assistance requested by the Secretariat in a timely manner. Minor historical differences in the historic CPUE input data are expected due to the revised New Zealand data and once the discrepancies between the Australian and Japanese calculation methods have been resolved. It was agreed that the revised series produced by the Secretariat be used prior to SAG7, but that members would conduct some quality control checks on the revised series before using the revisions.
CPUE series. **For OM**	Australia / Japan	15 Jun 06	5 CPUE series are to be provided for ages 4+, as specified below: • Nominal (Australia) • Laslett Core Area (Australia) • B-Ratio proxy (W0.5) (Japan) • Geostat proxy (W0.8) (Japan) • ST Windows (Japan) The operating model uses the median of these series.
Direct ageing data	All members	30 Apr 06	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 2003 calendar year (see paragraph 95 of the 2003 ESC report). The format for each otolith is: Flag, Year, Month, Gear Code, Lat, Long, Location Resolution Code[9], Stat Area, Length, Otolith ID, Age estimate, Age Readability Code[10], Sex Code, Comments. It was agreed that any revised series provided in 2006 due to re-interpretation of otoliths can be used prior to SAG7 without the need further agreement.
Tag return summary data	Secretariat	30 Apr 06	Updated summary of the number tagged and recaptured per month and season.
Tag releases / recoveries and reporting rates. **For OM**	Australia	31 May 06	The RMP tag/recapture data for the period 1991-1997 will be updated for any changed/new data in the database.
Acoustic index of age 1 SBT off Western Australia	Japan	31 May 06	Estimates from the 2005/06 season sampling.

[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] M1=1 minute, D1=1 degree, D5=5 degree.
[10] 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
Aerial survey index	Australia	31 Jul 06	Estimates from the 2005/06 fishing season.

Annex 2

Changes to the method for calculating the time series of actual catches for the operating model and management procedure

Some changes were recommended in the way that the catch time series should be calculated. These changes are listed below and should only be applied once all the revised data are available. This should ideally be before the MP is first used to recommend a TAC (which will be in 2006). The changed calculations will also be used by the operating model when the operating model is next used as an assessment model.

- Split of Taiwan's catch between the LL1 and LL2 fisheries
  The basis for the split of Taiwan's catch between the LL1 and LL2 fisheries should be based on size selectivity, not on targeting / by-catch criteria. The original split of Taiwan's fisheries based on targeting the albacore fishery or not is thought to be essentially identical to splitting the fishery according to size selectivity. However, in recent years, this has changed, so an explicit split of the fisheries by size selectivity is required.

  Before the end of 2005, Taiwan will analyse the size selectivity in its fishery over the last 4-5 years and provide an intersessional recommendation to members on how its fishery should be split between LL1 and LL2. Members will respond to these recommendations intersessionally and Taiwan will provide a revised series for the data exchange due on 30 April 2006.

  The immediate priority is to examine the data for the most recent years but that, after this is done, Taiwan should also examine its historical data to determine whether the split for earlier years should also be revised.

- Inclusion of mortalities associated with Japan's non-retained catch in 1995 and 1996
  Mortalities from Japan's non-retained catch in 1995 and 1996, as provided in the 2005 data exchange, should be included in future operating model (OM) and MP catch calculations.

  Mortalities from all sources should be included in OM and MP catch calculations and members were encouraged to provide a time series of such mortalities. Mortalities from scientific research will not be included until a more complete time series of such mortalities is available.

- Change in the method for calculating the total catch weights for LL1 fisheries
  The method for calculating catch weights in LL1 fisheries will be changed to that recommended in CCSBT-ESC/0509/11. This involves using the total catch in weight provided for some of the fisheries (e.g. Korea, Philippines, Miscellaneous), rather than the current process of converting this weight to a number and back to a weight.