

Commission for the Conservation of
Southern Bluefin Tuna



みなまぐろ保存委員会

Report of the Seventh Meeting of the Scientific Committee

**9-11 September 2002
Canberra, Australia**

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Agenda Item 1. Opening of Meeting

1. The independent chair, Mr Penney declared the Scientific Committee (SC) meeting open, welcomed all participants and in particular the Fishing Entity of Taiwan as the most recent member, and the observers from Indonesia.
2. The Executive Secretary explained the process in relation to the SC and Extended SC (ESC) that would be adopted as a result of the Fishing Entity of Taiwan's membership.

1.1 Introduction of participants

3. Those participants who were not present at the previous SAG meeting were introduced. The list of participants is at **Appendix 1**.

1.2 Administrative matters

4. Administrative arrangements for the meeting were presented by the Deputy Executive Secretary.
5. The SC meeting was adjourned.

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

6. The Scientific Committee approved the decisions taken by the Extended Scientific Committee for the Seventh Meeting of the Scientific Committee, which is at **Appendix 2**.

Agenda Item 3. Other Business

7. The Chairman asked for his concern over the shortening of the time available for the 7th Scientific Committee by the Commission to be recorded. It was his view that the scientific work of the Committee could not be properly addressed over a three day period. The Chairman also asked for his view to be recorded that the Stock assessment Group could not adequately complete a full stock assessment in less than five days.
8. He indicated he would be conveying these views to the Commission in his report to CCSBT9.

Agenda Item 4. Adoption of Report of Meeting

9. The report of the Scientific Committee was adopted.

Agenda Item 5. Formal Closure of Meeting

10. The meeting was closed at 10:30pm on 11 September 2002.

List of Appendices

Appendix

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

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CCSBT
The 7th Scientific Committee Meeting
9 - 11 September 2002
Canberra, Australia

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Commission for the Conservation of
Southern Bluefin Tuna



みなまぐる保存委員会

Appendix 2

(CCSBT-SC/0209/04)

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

**9-11 September 2002
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for the Seventh Scientific Committee Meeting
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Agenda Item 1. Appointment of rapporteurs

1. Each country appointed rapporteurs to produce the text of the report of the meeting.
2. The list of participants is at **Attachment 1**.

Agenda Item 2. Adoption of agenda and document list

3. A revised agenda was adopted. The agreed agenda is at **Attachment 2**.
4. The draft list of documents for the meeting was considered. The agreed list is at **Attachment 3**.
5. The meeting assigned individual documents from the list to relevant agenda items.

Agenda Item 3. Review of SBT fisheries

6. Country review reports were submitted by Australia, Japan, New Zealand, Korea, the Fishing Entity of Taiwan, and Indonesia.
7. New Zealand reported that because of fleet and fishing areas changes, New Zealand's nominal CPUE index should be viewed with caution. For stock assessment purposes some standardisations would be necessary. The reported trends in fish sizes were also dependent to some degree on areas fished.
8. It was noted that the average size of fish in the Korean catch was larger than those in the Japanese catch. Korea noted that the sample size for the data was relatively small and could be influencing the data.
9. In relation to the report from the Fishing Entity of Taiwan, it was noted the Taiwanese CPUE values in recent years were 2-3 times higher than those of the Japanese and Korean fleets in the Indian Ocean. The Fishing Entity of Taiwan indicated the upward trend since 1996 is probably biased due to the incomplete effort information being reported in weekly reports for some vessels. This deficiency has been resolved from 2002 and onwards. The Fishing Entity of Taiwan also indicated that SBT was generally a bycatch in their fishery and the log book reporting rate could be affected by this factor.

10. Korea and the Fishing Entity of Taiwan both indicated they are looking at ways to improve timeliness of data collection in the future. Japan's RTMP arrangements were mentioned as an appropriate model to follow.

Agenda Item 4. Matters arising from the report of the 3rd Stock Assessment Group Meeting

4.1 Review of fishery indicator analysis and status of the SBT stock

11. Based on an inter-sessional review of 7 fisheries indicators (listed in CCSBT-ESC/0209/06), the SAG decided that there was no evidence of substantial changes in the SBT fishery between 2001 and 2002, and no reason to undertake a full model-based stock assessment in 2002 (CCSBT-ESC/0209/06). The external advisory panel provided an assessment of the indicators (CCSBT-ESC/0209/06, attachment C); members also provided papers that examined these indicators plus some additional ones (CCSBT-ESC/0209/27, CCSBT-ESC/0209/37).

4.2 Implications for SBT management

12. Based on the review of fishery indicators (4.1), the Extended Scientific Committee (ESC) decided that there was no reason to change the SBT stock status advice that was provided to the CCSBT in 2001.

4.3 Management procedure and management strategy evaluation

13. As documented in the report from the third SAG meeting, substantial progress was made on the development of operating models and the initial trial specifications. A small working party was tasked with resolving a number of issues related to the development of a management procedure that were unable to be completed during the third SAG meeting, namely:
 - a. Selection of a minimum set of performance statistics required to be reported for management procedure evaluation.
 - b. Consideration of proposals for generalizing the operating models for a second-stage of testing of management procedures.
 - c. Consideration of alternate formulations for the fishing mortality.

14. Results from discussions are reported in **Attachment 4**.

4.4 Stock assessment process for 2003

15. The ESC accepted the SAG proposal for two options for a stock assessment approach during 2003, as described in the 3rd SAG report (CCSBT-ESC/0209/Rep12, Agenda Item 6). It was noted that a full stock assessment would delay MP development. The list of fishery indicators data for the 2003 decision process resembles the list used in 2002 with some modifications and additions (**Attachment 5**).

Agenda Item 5. Matters arising from SC6 and CCSBT8

5.1 Review Implementation of the SRP

5.1.1 Characterisation of SBT catch

16. The Database Manager presented paper CCSBT-ESC/0209/09. The paper reported deficiencies of members' data collection systems in relation to the catch characterisation data items specified in the Scientific Research Program (SRP). The deficiencies were presented in three categories, these being: (1) Data items that are not collected; (2) Data that is being collected, but with a low sample size; and (3) Timeliness of data collection. The paper also specified that overall, members are collecting most of the crucial information specified in the SRP.
17. Deficiencies identified for fisheries with minor SBT catches were not reviewed by the meeting because the meeting considered that there was little value to be gained by seeking improvements in these areas. The fisheries that were not considered are Australian pole and line fishing, and other fisheries¹ for Australia and New Zealand.
18. **Attachment 6** presents a report from the catch characterisation working group on deficiencies in member's data collection systems. In some cases where deficiencies have been identified, members are either making efforts to address those deficiencies or will consider whether it is feasible for them to address the deficiency. In the case of otolith collections, implementation of the scientific observer program was considered an appropriate way of addressing the deficiencies. However, for size measurements, existing scientific observer coverage is unlikely to provide adequate coverage for many fisheries/areas. An adequate level of size data coverage should be developed through sampling regimes that are appropriate for each fishery.
19. Discussion was held on the issue of how the catch of badly damaged fish (for example when only a head was left) is reported by the different members. The level of reporting depends on circumstances and fishery. For example: in Japan, badly damaged catch is reported if there is some commercial value in the damaged fish (e.g. a fillet can be obtained); in Australia, this catch may be recorded as discards or in comments; and in New Zealand this catch will be recorded as discards on the new catch and effort log sheets and by observers as has been done for many years. The catch of badly damaged fish is not usually reported by Korea and the Fishing Entity of Taiwan. It is known that extensive damage can occur for the catch of individual sets, but there is uncertainty regarding the overall extent of this problem. It was felt that data collection (for example in association with an observer program) would be useful to gauge the extent of this problem.

5.1.2 CPUE modelling

¹ Trolling and hand lining etc.

20. The SAG endorsed a plan of action for dealing with Japanese longline CPUE analyses that was proposed by a small CPUE working group and revised with plenary input (Attachment 5 of CCSBT-ESC/0209/Rep12). This report focused on the selection of relative abundance indices derived from CPUE for the purposes of testing and implementing Management Procedures in the short to long term. A small working group met at the ESC to make recommendations for handling CPUE in the event that a full (model-based) stock assessment is required in 2003 or 2004, and to refine the ideas proposed at the SAG for future CPUE studies (**Attachment 7**)

5.1.3 Scientific observer program standards

21. The Secretariat presented a paper summarizing the inter-sessional progress that has been made on agreeing the standards for the CCSBT Scientific Observer Programme. The Secretariat noted that the members had agreed to coordinate existing national programmes or initiate observer programmes (Korea and the Fishing Entity of Taiwan) to meet the requirements identified for the SRP. While considerable agreement had been reached, the Secretariat identified eight areas that had yet to be agreed and summarised the differences in positions expressed by members

22. The meeting reviewed the eight outstanding issues and reached agreement as follows:

1) Areas and fleets to be covered:

The meeting agreed that members' fisheries catching significant quantities of SBT should be covered. It was noted that minor fisheries (recreational, handline and troll fisheries) would not be covered. Korea reported that MOMAF had instituted an observer program after consulting members and various other international agencies on observer program implementation. Korea's initial efforts have five observers in training in the USA who will be deployed in the near future.

2 and 3) Target level and definition of observer coverage:

Regarding the 10% target level, it was noted that this is not a mandatory minimum that members must attain, but a level that all members should make their best efforts to reach in order to achieve the objectives of the SRP. The Fishing Entity of Taiwan stated that they would have difficulties in reaching the 10% target level and considered that 5% would be more reasonable for them. Ray Hilborn (advisory panel) was asked to recommend a clear basis on which the 10% target could be defined, in consultation with participants. He reported back during the meeting and his recommendations have been incorporated in the revised draft of the observer programme standards.

4) Removal of sections 8-12 from the initial draft:

These sections were considered to include a combination of administrative functions and scientific criteria necessary for meeting the objectives of the SRP. It was agreed that most of these could be deleted from the observer program standards. However, certain of the scientific aspects should be retained as principles to incorporate when designing scientific observer programs. These were incorporated in a revised draft of the observer program standards.

The Extended Committee agreed that reporting of observer program outcomes should be required and that the reports should be included in the national fishery reports required from members.

5. Inclusion of observer data in the CCSBT database:

The meeting agreed that, provided the observer information was collected and stored by members, it was not essential to incorporate observer data into the CCSBT database this year. However, it was agreed that data important for stock assessment purposes, particularly size measurement data, should be incorporated in the database as soon as possible. It was agreed that the Database Manager should resolve this matter with members inter-sessionally. It was recognised that incorporation of scientific observer data into the CCSBT database would have to be addressed when the Commission considered the issue of database contents, standards and confidentiality.

6 & 7. Inclusion of data on other species:

It was noted that, in terms of the SRP, all data on tuna and tuna-like species should be included. It was also noted that a critical component of the observer program was to aid interpretation of CPUE of SBT and that the catch of other species may have an effect on this. For this reason it was agreed that full data on the catch of all species should be collected to the extent possible. Where this is not possible, a hierarchy of data collection and sampling priorities would need to be developed and implemented. The Secretariat was asked to compile a summary of sampling hierarchies currently used by members and to circulate these for consideration in aligning member observer programs.

8. Independence of observers

It was noted that the issue of independence of the observer from the operation of the vessel was an important aspect of data integrity. Every effort must be made to ensure the integrity and independence of observers.

23. A revised draft standard was prepared incorporating the above comments and will be circulated for intersessional consideration by members. Members were requested to provide further comment on this draft by the end of November, particularly regarding the following major issues:

- Requirement for a paragraph on observer integrity issues.
- Ensuring that the data collection specifications included only items which are relevant to the Commission's interest.
- The inclusion of a hierarchy of sampling priorities such that sampling of SBT receives the highest priority and sampling of other species is only conducted where time permits.
- It may be necessary to revise observer coverage rates in the light of tagging program plans.
- The definition of 10 percent coverage and stratification principles.

24. The Secretariat would then prepare a further revised draft for consideration by members with the aim of adoption at SC8.

5.1.4 Tagging program

25. The Secretariat presented paper CCSBT-ESC/0209/11, which reports on results from the CCSBT tagging program conducted under the Scientific Research Program (SRP) in 2001. In particular, the program addressed tagging in the surface fishery in the waters off the southern and western Australian coasts.
26. The summary of results shows that the target for number of fish to tag was not met. It was explained that the reasons for the low tag deployment rates included difficulty in locating fish in Western Australia and delays in securing a vessel in South Australia. A delay in the finalisation of funding and poor weather during the tagging period also affected operational aspects of the program.
27. The ESC agreed that the CCSBT tagging program in the surface fishery should continue. The ESC noted its previous conclusion that unless reporting rates could be reliably estimated, the tagging program would not be able to meet its objectives. Concerns were expressed about whether this was likely to be achieved given the current state of observer programs.
28. The ESC emphasised the need for improvements to the current surface tagging program. Three areas for improvement were identified: (1) early availability of funding, (2) meeting target number of tags deployed, (3) tag recovery.
29. With regard to meeting the target number of tags deployed, there are two options with different associated risks of meeting the target: (i) fixing the number of days for tagging, or (ii) continuing tagging operations until the target number of tags have been deployed. The first option implies that the number of deployed tags can be strongly affected by poor weather, but implies a fixed budget. The second option would be less strongly affected by poor weather, but clearly has budgetary implications.
30. It was also noted that if tagging targets were to be met in both southern and western Australia in the coming year, an increase in the number of tagging days should be considered.
31. It was noted that tag recovery is as important as tag deployment. From a financial point of view, it was noted that in previous SBT tagging programs and in other tagging experiments, effective tag recovery programs have required equal funding to the tag deployment component. The ESC noted that there was a need to ensure that there was an appropriate balance in funding and resources for these two aspects of the tagging program.
32. The Secretariat reported on progress made with tag recovery promotion. A memorandum of understanding has been reached with all members. Publicity material has been sent to all members and they have passed this information to their relevant fishing associations. The Fishing Entity of Taiwan agreed to coordinate tag recovery initiatives in Cape Town (South Africa) and Port Louis (Mauritius). In Indonesia,

catch monitoring enumerators engaged under the CSIRO/RIMF catch monitoring program will assist with tag recovery.

33. The Secretariat was commended for the work already done to publicise the tagging program, distribute reward material, and arrange contacts. However, it was emphasised that direct, regular contact with vessels was crucial if tag recovery programs were to be effective. The ESC needs to have information that would allow it to evaluate the effectiveness of tag recovery programs. It was suggested that the Secretariat should have regular contacts with those responsible for tag recovery programs, and that concrete information be collected from these individuals to allow for evaluation of the likely success of the tag recovery program. Examples of the type of information are: numbers of vessels visited relative to number of vessel landings, promotional materials distributed, position of persons contacted on vessel during visit, frequency of visits to vessels, etc.
34. It was emphasised that the feasibility and reliability of reporting rate estimates are closely linked to the level of observer coverage. The target number of tags to deploy in the current CCSBT tagging program was based on an assumption that there would be at least a 10% level of coverage. In practice, the level of coverage may need to be greater than 10% in order to obtain reliable estimates of reporting rates. If observer coverage is too low, it may not be possible to reliably estimate reporting rate.
35. Members advised their intentions regarding levels of observer coverage in the coming year as follows:
 - Australia: aiming for 10% coverage in the surface fishery; already above 10% in the longline fishery
 - Japan: will implement similar coverage (16 observers) as last year, which is about 4% coverage in terms of fishing effort.
 - Korea: only recently started an observer program and cannot specify a level of coverage in the longline fishery for next year.
 - New Zealand: 100% coverage in the charter boat fishery (which takes about half of the New Zealand catch) and aiming for 10% coverage for the remaining half of the New Zealand catch
 - The Fishing Entity of Taiwan: only recently started an observer program and cannot specify a level of coverage in the longline fishery for next year.Concerns were expressed that, at the above coverage levels, the tagging program may not achieve its primary objective.
36. It was noted that the nature of the Australian surface fishery meant that observer data during the capture process provides no information that can be used to estimate tag reporting rate. Australia indicated that efforts will be made to continue tag seeding in the surface fishery in the coming year. This information may be useful for estimating reporting rates in this fishery. The placement of an observer in Port Lincoln to monitor tag recoveries during the harvesting of fish from farms, as recommended by the Tagging Program Workshop (CCSBT-ESC/0209/Rep06), could provide estimates of reporting rates. The ESC encouraged that this be done.

37. Results from a pilot study to examine the feasibility of tagging of mature SBT in the western Tasman Sea (CCSBT-ESC/0209/36) were presented. It was noted that there is considerable uncertainty about movement of adult SBT, and that it is much more difficult to tag adult SBT than juvenile (1 to 4 year old) SBT which have been tagged in large numbers in the past. The pilot program demonstrated that reasonably large numbers of mature SBT can be tagged from longliners in the Tasman Sea. In addition to conventional tags, three pop-up archival tags (PAT) were also deployed.
38. Results from a pilot tagging program from a Japanese longline vessel off South Africa were presented (CCSBT-ESC/0209/21). A total of 381 fish, mainly aged 2 to 4, were tagged with conventional tags and released. Small numbers of pop-up archival (7) and archival tags (45) were also deployed. It was noted that the pilot study targeted juveniles for tagging in an area where they had not previously been tagged, and also attempted to obtain information on mixing rates from the PAT and archival tags.
39. New Zealand reported that it had been unable to implement its proposed pilot longline tagging program in 2002 because of insufficient lead time and budgetary constraints.
40. It was noted that the costs of tagging from longline vessels is very high. It was questioned whether tagging from longline vessels was cost effective for tagging large numbers of fish with conventional tags. Consideration should therefore be given to the use of PAT and/or archival tags which may provide a better return on tagging investment since more information are obtained from these types of tags than from conventional tags. It was emphasised that the information from PAT and archival tags address the secondary components of tagging under the SRP, namely information on migration and movement.
41. It was recognised that modest numbers of PAT/archival tags provide valuable qualitative information on mixing and movement patterns. It was also noted that the tagging of adults, as was the objective in the Western Tasman sea pilot study, would not directly contribute to the main objectives of the SRP surface tagging program.
42. The ESC agreed that the objectives of pilot studies, and studies involving tagging from longliners are aimed at learning whether such approaches could contribute to the main SRP objective of estimating fishing and natural mortality, in the longer term. The ESC agreed that data from tagging of juveniles or adults from longline vessels in areas other than South and Western Australia would be valuable, but that members would need to continue these programs at their own cost. Members were encouraged to deploy PAT and archival tags rather than focusing only on conventional tagging.
43. The Secretariat advised that the cost of maintaining the agreed components of the tagging program with the same number of sea days in 2003 would be \$562,000.

44. However, it was noted that increased tagging days might be required to achieve the target number of tag releases. Consideration should be given to extending the number of tagging days in Western Australia, perhaps by ten days.

5.1.5 Other SRP components

45. Archival and pop-up tags:
The use of archival and pop-up tags was discussed above.
46. Recruitment Monitoring Program:
Recent work under Recruitment Monitoring Program was presented in the Report of 14th Workshop of the program (CCSBT-ESC/0209/Info08). Acoustic surveys for age one fish and aerial surveys for ages 2-4 fish were conducted in collaboration between Australia and Japan. It was reported that the transfer of past RMP conventional tagging data to the CCSBT database was agreed in the Workshop.
47. Development of a spawning biomass index:
Results of 2001/2002 spawning ground surveys conducted by Japan were presented in CCSBT-ESC/0209/20. Quantity of used research mortality allowance (RMA) by the spawning research survey as well as the Acoustic Survey was shown in CCSBT-ESC/0209/22. Japan requested in total of 6.5 tons of RMA for 2002/2003 similar surveys in 2003.
48. Fisheries oceanography for improvement habitat definition:
CCSBT-ESC/0209/39 presented results of preliminary analysis of potential habitat distribution for SBT and fishing vessels, focusing on sea temperature as an oceanographic habitat factor using the concept of the Habitat Suitability Index model

5.2 Development of the CCSBT central database

5.2.1 Database content, standards and confidentiality

49. A working group was convened by Dr Annala to discuss issues relating to the database. Dr Annala introduced paper CCSBT-ESC/0209/12 that was prepared by the Secretariat.
50. The working group meeting discussed section 4 (including Appendix B) of the Secretariat's proposal on Development of the CCSBT Central Database. Following discussion of some required and optional fields of information, there appeared to be general agreement on most items in Section 4 and Appendix B. It was noted that some required fields of information were not available for all fisheries and it was stated that it is accepted that "required" fields will not be provided if that information does not exist. There are also some technical issues that need to be resolved including calculation of days searched and days fished. The Database Manager will conduct further discussion with members as required on an intersessional basis and refine the database proposal accordingly.

51. The meeting agreed to the data security policy detailed in Appendix A of the proposal on Development of the CCSBT Central Database. The issue of network security (to outside access) was discussed and this issue was left to the judgment of the Database Manager.
52. The meeting agreed that the Secretariat should revise the draft confidentiality policy for the CCSBT Central Database to reflect multiple levels of confidentiality for further intersessional consideration. The following example of confidentiality levels was presented by the Chair:
- Data available for public release.
 - Data available for CCSBT members.
 - Data that is only available with specific approval from CCSBT members.
53. The Database Manager will lead an intersessional discussion to identify suitable confidentiality levels and the data sets that should be released under such levels.
54. The global SBT catch table was discussed. The database manager advised the meeting that: The Fishing Entity of Taiwan had revised the figures for its catch in 2000 and 2001; that there is uncertainty in the units (processed or whole weight) for Korea's catch in recent years; and that Japan's data was provided in fishing years (as opposed to calendar years) for the recent part of the time series.
55. Discussion was held on the "Miscellaneous 1" category of the global catchtable. Japan is of the opinion that this is mislabeled northern bluefin as opposed to southern bluefin. The Fishing Entity of Taiwan expressed uncertainty that this was northern bluefin and the meeting agreed that this should be discussed further and resolved intersessionally.
56. The global catch table is presented at **Attachment 8**. The contents of this table are considered to be interim figures and these figures will be revised further before CCSBT 9 if members can make progress with some of the issues. In particular, it is hoped that progress can be made with the "Miscellaneous 1" issue, the units for the Korean catch (processed or whole weight), provision of calendar year data for Japan's catches, and provision of historic data on mortalities from research and other undocumented sources.
57. Due to the short time remaining for the SC to complete its business, it was agreed that the Database Manager would lead intersessional discussion in order to reach agreement for the remaining outstanding issues relating to the database. The Database Manager asked for members cooperation in this process and also provided advance warning that he will be requesting that the remaining historical data be provided to the database by the end of December 2002. This timeframe is necessary in order to have the database operational for 2003 data exchange.

5.3 Direct age estimation workshop

58. The direct age estimation workshop agreed to at the 6th SC meeting was held in Queenscliff, Australia, from 11 - 14 June 2002. An overview of the report of the workshop (CCSBT-ESC/0209/13) was presented by Mr Findlay, who chaired the workshop.
59. At the workshop, age estimation techniques were reviewed and substantial increases in consistency were achieved in readings between participants. By the end of the workshop it was concluded that the various members were all capable of providing reasonably consistent SBT otolith interpretations.
60. An SBT age determination manual was developed as a product from the workshop, the 4th draft of which awaits resolution of a few remaining issues. It was agreed that scientific representatives of the member countries would work inter-sessionally with the Secretariat to finalise these remaining issues and agree the draft manual for publication.
61. The workshop participants also agreed to establish a reference set of SBT otoliths, with accompanying electronic images incorporating age estimates, to be housed at the CCSBT Secretariat. A second otolith exchange was initiated at the SC7 meeting.
62. At previous SC meetings, a number of proposals have been made for increased future use of direct age estimation in SBT assessments, including:
 - Supplementation or replacement of catch-at-age tables raised from catch-at-weight data by direct age-length keys.
 - Revision or improvement of growth curves for use in assessments.
 - Use of revised age-length keys and growth curves to improve estimates of age-at-maturity from length-at-maturity data.
63. It has also been noted in previous reports that otolith collection programs have already been implemented by Australia, New Zealand and Japan. However, otolith sample numbers for some fishery components are not yet adequate to provide reliable age-length keys. Otolith collection programs need to be expanded and extended to new members if provision of such age-length keys is considered a priority. There is also a need to further investigate suitable modelling techniques for use of direct ageing data.
64. There are substantial benefits to be derived from a standardised and coordinated otolith sampling program by all members, but objectives of a coordinated direct age estimation program would need to be agreed on as a basis for finalising the details of such sampling programs. However, members noted that they are currently heavily committed to the management procedure development process, and that further consideration of objectives and sampling program design should be deferred to the next SC meeting.
65. However, immediate attention should be given to the following aspects:

- Encourage new members to establish SBT otolith collection and interpretation programs for their fisheries.
- Encourage members that already have otolith collection systems to implement regular interpretation of these otoliths, using the techniques agreed to at the direct ageing workshop.
- Develop a centralised database for storage of otolith age readings within the CCSBT Secretariat.
- Encourage members to prepare and submit initial draft proposals on objectives and sample design for otolith collection programs to the next SC meeting.

Agenda Item 6. Review of reports from other subsidiary bodies

6.1 The fourth meeting of the Ecologically Related Species Working Group

66. The report of the 4th meeting of the ecologically related species working group (ERSWG) was presented in CCSBT-ESC/0209/Rep08. Discussion was held on the focus of recent activities of the ERSWG, and whether these met the ERSWG terms of reference or not. It was particularly noted that data collection and data exchange, which have not been addressed, should be improved. Japan considered that there was a need for better balance between activities directed at evaluating species affected by SBT fisheries, and predator / prey relationships that affect SBT. Dr Polacheck suggested that in view of the workload of the last ERSWG, consideration should be given to increasing the frequency and/or duration of ERSWG meetings. Mr Endo noted that this workload could be reduced by summarising the information presented at the meeting. It was suggested that the Commission review the recent focus of the ERSWG in relation to its terms of reference to determine whether these are being adequately met.

Agenda Item 7. Other SBT research requirements

7.1 Monitoring and estimation of Indonesian catches

67. The Executive Secretary outlined the background to the proposal from Australia to review research into the Indonesian component of SBT fishery. The meeting noted that a draft terms of reference had already been circulated to members for consideration although no decisions had been reached.
68. It was pointed out that the current joint monitoring program in Indonesia reflects the outcome of a recent review, which resulted in significant improvement to the program. It was also observed that any review would need to be cognizant of IOTC activity in Indonesian monitoring and the expertise that is available from that Commission.
69. However, caution was expressed that too much reliance should not be placed on the IOTC, which was focused on species other than SBT. The CCSBT should ensure that its own specific interests are properly covered by the review.

70. It was agreed that representation from members was essential and that current participants in the Indonesian monitoring program should also be engaged in the review. There was general consensus that one or more members of the advisory panel to facilitate the review would be desirable. In addition, representatives from IOTC and Indonesia should be included.
71. In terms of process it was agreed that the most appropriate method for conducting the review would be by a working group comprising members, representatives from the parties already conducting the monitoring program (CSIRO, RIMF, IOTC), and one or more advisory panel members. The current independent chairman of the Scientific Committee would be appropriate to chair this working group. The working group would meet immediately after the management procedure workshop in April 2003.
72. The chairman prepared a revised draft terms of reference incorporating members initial comments at **Attachment 9** for this working group. Members were requested to review this draft with a view to finalising the draft terms of reference for consideration at the CCSBT9 meeting.

Agenda Item 8. Overview, time schedule and budgetary implications of proposed 2003 research activities

73. The meeting considered the time scheduling for the agreed work plan, which is at **Attachment 10**.

Agenda Item 9. Other matters

74. There were no other matters.

Agenda Item 10. Adoption of meeting report

75. The report was adopted.

Agenda Item 11. Close of meeting

76. The meeting closed at 10:15pm on 11 September 2002.

List of Attachments

Attachment

- 1 List of Participants
- 2 Agenda
- 3 List of Documents
- 4 Further issues related to the development of management procedures
- 5 List of SBT fisheries indicator data to be exchanged among the CCSBT-SAG members by 30 April 2003
- 6 Report of the Catch Characterisation Working Group on deficiencies in data collection systems
- 7 Report of Additional Meeting of CPUE Steering Group
- 8 Estimated Global Catch of SBT
- 9 Draft terms of reference: Review of monitoring program of Indonesian SBT catch
- 10 Scientific Committee Work Plan for 2003.

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9 - 11 September 2002
Canberra, Australia

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**THE EXTENDED SCIENTIFIC COMMITTEE FOR THE 7th SCIENTIFIC
COMMITTEE MEETING
CANBERRA, AUSTRALIA
9-11 September 2002
AGENDA**

1. Appointment of rapporteurs
2. Adoption of agenda and document list
3. Review of SBT fisheries
4. Matters arising from the report of the 3rd Stock Assessment Group Meeting
 - 4.1 Review of fisheries indicator analysis and status of the SBT stock
 - 4.2 Implications for SBT management
 - 4.3 Management procedure and management strategy evaluation
 - 4.4 Stock assessment process for 2003
5. Matters arising from SC6 and CCSBT8
 - 5.1 Implementation of the SRP
 - 5.1.1 Characterisation of SBT catch
 - 5.1.2 CPUE modelling
 - 5.1.3 Scientific observer program standards
 - 5.1.4 Tagging program
 - 5.1.5 Other SRP components
 - 5.2 Development of CCSBT central database
 - 5.2.1 Database content, standards and confidentiality
 - 5.3 Direct age estimation workshop
6. Review of reports from other subsidiary bodies
 - 6.1 The fourth meeting of the Ecologically Related Species Working Group
7. Other SBT research requirements
 - 7.1 Monitoring and estimation of Indonesian catches
8. Overview, time schedule and budgetary implications of proposed 2003 research activities
9. Other matters
10. Adoption of meeting report
11. Close of meeting

List of Documents
Extended Scientific Committee for 7th Scientific Committee (SC) & 3rd Stock
Assessment Group (SAG)

(CCSBT-ESC/0209/)

1. Draft Agenda of 3rd SAG
2. List of Participants of 3rd SAG
3. Draft Agenda of the Extended SC for 7th SC
4. List of Participants of the Extended SC for 7th SC
5. List of Documents- The Extended SC for 7th SC & 3rd SAG
6. (Secretariat) 5.1. Review of Fisheries Indicators Analysis
7. Initial Specifications of Operating Models for Southern Bluefin Tuna Management Procedure Evaluation. : Haist, V., Parma, A.M. and Ianelli, J.
8. Discussion Document for the CPUE Group. : Pope, J.
9. (Secretariat) 6.1.1. Characterization of SBT Catch
10. (Secretariat) 6.1.3. Scientific Observer Program Standards
11. (Secretariat) 6.1.4. CCSBT Scientific Research program Tagging Program
12. (Secretariat) 6.2.1. Development of the CCSBT Central Database
13. (Secretariat) 6.3 Direct age estimation workshop
14. (Secretariat) 7.1 4th Meeting of the Ecologically Related Species Working Group
15. (Secretariat) 8.2 Monitoring and Estimation of Indonesian Catches
16. (Secretariat) 9. CCSBT Tagging Program- 2003 Cost Estimates
17. (Japan) Data Preparation for Management Procedure Development Work by Japan. : Tuji, S.
18. (Japan) Simulation model toward development of assessment procedures of tagging data. : Kurota., Hiramatsu. and Tsuji.
19. (Japan) Review of the current estimation procedures of Indonesian southern bluefin tuna catch.: Tsuji, S.
20. (Japan) Report of 2001/2002 spawning ground surveys.: Itho., Kurota., Takahashi. and Tsuji.
21. (Japan) Report of 2001/2002 pilot tagging program from longline vessel off Cape Area and proposal for 2002/2003 activity.: Itho., Takahashi., Tsuji. and Hosogaya.
22. (Japan) Proposal on Research Mortality Allowance (RMA) in 2002/2003 and Report on Result of RMA in 2001/2002.: JFA.
23. (not to be presented)
24. (Australia) Catch Monitoring of the Fresh Tuna Caught By the Bali-Based Longline Fishery in 2001.: T.L.O. Davis and Andamari, R.
25. (Australia) Length and age distribution of SBT in the Indonesian longline catch on the spawning ground.: Farley, J.H. and Davis, T.L.O.
26. (Australia) Trends in Catch, Effort and Nominal Catch Rates In the Japanese Longline Fishery for SBT – an update.: Daniel Ricard and Tom Polacheck.

- 27.(Australia) A Review of Recent Trends in Southern Bluefin Tuna Fishery Indicators. :Dale Kolody, Ann Preece, Tom Polacheck, Tim Davis, Jessica Farley, Clive Stanley and John Gunn.
28. (Australia) Further exploration of biomass dynamics models for SBT stock assessment.: Daniel Ricard, Dale Kolody and Marinelle Basson.
29. (Australia) Progress on a Simulation Study to Evaluate Stock Assessment Models for Fisheries Resembling Southern Bluefin Tuna.: Dale Kolody, Ann Preece, Daniel Ricard, Paavo Jumpanen, Tim Jones, Scott Cooper and Tom Polacheck.
30. (not to be presented)
- 31.(Australia) Estimating a CPUE Series for SBT using Enhanced Tree-based modelling methods.: Venables, W.N and Toscas, P.J.
- 32.(Australia) Modelling Catch and Effort in the Southern Bluefin Tuna Fishery. : Toscas, P.J., W.J. Venables, M.R Thomas and T. Polacheck.
- 33(Australia) A method for determining relative weighting factors for length-frequency data.: J. Paige Eveson and Tom Polacheck.
- 34.(Australia) Issues and process and observation models to be considered for the SBT fishery operating model used to evaluate management procedures.: Dale Kolody, Tom Polacheck, Marinelle Basson and Ann Preece.
- 35.(Australia) An integrated analysis of the growth rates of southern bluefin tuna for use in estimating catch at age in stock assessments (Main report and the Appendix 9, 10). Polacheck, T., G.M. Laslett and J.P. Eveson
- 36.(Australia) A pilot study to examine the feasibility of tagging of mature SBT in the western Tasman Sea
37. (Japan) Interpretation by Japan on various fisheries indicators. : Tsuji, Takahashi, Itoh and Shono
38. (Japan) Attempts for estimation of standardized CPUE by tree-regression models and neural network. :Shono
39. (Japan) Preliminary analysis of potential habitat distributions of southern bluefin tuna and fishing vessel. :Takahashi, Tsuji, Inagake, Gunn
- 40.(Australia) Some Additional Runs of the Initial Operating Model for Southern Bluefin Tuna Management Procedure

(CCSBT-ESC/0209/SBT Fisheries)

Australia...	Australia's 2000-01 Southern Bluefin Tuna Fishing Season. : Hender, J. and Findlay, J.
Japan...	Review of Japanese SBT Fisheries in 2001. : Itoh and Nishimoto.
Korea...	Korean SBT Fisheries in the Indian Ocean. : Moon, D.Y, Koh, J. R and An, D,H.
Fishing Entity of Taiwan...	Review of Taiwanese SBT Fishery.: Chang, S.K and Wang, S.H
New Zealand...	Trend in the New Zealand southern bluefin tuna fishery.: T. Murray and L.Griggs
Indonesia...	Review of the Indonesian SBT Fisheries

(CCSBT-ESC/0209/BGD)

(CCSBT-ESC/0209/Info)

1. Report of the SC to CCSBT on the Scientific Research Program(Attachment D of 5th SC Report)
2. Development of a SBT scientific research program including a scientific fishing component by the CCSBT external scientists (Attachment L of the Special Meeting held in November 2000)
3. Research Mortality Allowance (RMA) within the Framework of CCSBT (Attachment M of the Special Meeting held in November 2000)
4. (Japan) Report of the 2001/2002 Shoyo-maru cruise: Southern Bluefin Tuna Spawning Area Survey.: Itoh., Kurota. and Uehara.
5. (Japan) Report of the 2001/2002 field survey activities of Southern Bluefin tuna Sub-group.: FRA, JAMARC and JFA
6. (Japan) Proposal of the 2002/2003 Shunyo-maru survey in the Australia waters.: Japan
7. (Japan) Proposal of the 2002/2003 No.2 Taikei-maru survey in the Australia waters.: Japan
8. Southern Bluefine Tuna Recruitment Monitoring and Tagging Program.: Report of the fourteenth workshop
- 9.(Australia) Spatio-temporal Trends of Longline Fishing Effort in the Southern Ocean and Implications for Seabird Bycatch.: Geoff N. Tuck, Tom Polacheck and Cathy Bulman.
- 10.(Australia) Application of an age-structured production model (ASPM) to the Indian Ocean bigeye tuna (*Thunnus obesus*) resource.: Daniel Ricard and Marinelle Basson
- 11.(Australia) Further considerations on the analysis and design of aerial surveys for juvenile SBT in the Great Australian Bight.: Mark Bravington.
- 12.(Australia) Commercial Aerial Spotting for Southern Bluefin Tuna in the Great Australian Bight by Fishing Season 1982-2000.: Neil Klaer, A. Cowling and Tom Polacheck.
- 13.(Australia) Aerial survey indices of abundance: comparison of estimates from line transect and “unit of spotting effort” survey approaches.: Farley. J. and Bestley, S.
14. Resolution to establish an Extended Commission and an Extended Scientific Committee (Attachment I of the Report of the Seventh Annual Meeting held in April 2001)

(CCSBT-ESC/0209/Rep)

1. Report of the Management Strategy Workshop (May 2000)
2. Report of the Fifth Meeting of the Scientific Committee (March 2001)
3. Report of the Seventh Annual Commission Meeting (April 2001)
4. Report of the Second Meeting of the Stock Assessment Group (August 2001)
5. Report of the Sixth Meeting of the Scientific Committee (August 2001)

6. Report of Tagging Program Workshop (October 2001)
7. Report of the Eighth Annual Commission Meeting (October 2001)
8. Report of the Fourth Meeting of Ecologically Related Species Working Group (November 2001)
9. Report of the First Meeting of Management Procedure Workshop (March 2002)
10. Report of the CPUE Modelling Workshop (March 2002)
11. Report of Direct Age Estimation Workshop (June 2002)
12. Report of the Third Stock Assessment Group Meeting

Classification of List of Documents

(CCSBT-ESC/0209/)

Documents to be discussed at the meeting and not yet given a document number of CCSBT, to be classified into this category.

(CCSBT-ESC/0209/BGD)

Documents to be discussed at the meeting and already given a document number of CCSBT in the previous meeting, to be classified into this category.

(CCSBT-ESC/0209/Info)

Documents not to be discussed at the meeting but presented for information and reference, to be classified into this category.

(CCSBT-ESC/0209/Rep)

The previous report of CCSBT to be classified into this category.

(CCSBT-ESC/0209/SBT Fisheries-)

SBT Fisheries Reviews of countries and entities to be classified into the category.

(CCSBT-ESC/0209/WP)

The draft of the document and report developed through the discussion of the meeting and documents of informal meetings, to be classified into this category.

Further issues related to the development of management procedures

A number of issues related to the development of a management procedure were discussed by a small working party:

- 1- Selection of a minimum set of performance statistics required to be reported for management procedure evaluation.
- 2- Consideration of proposals for generalizing the operating models for a second-stage of testing of management procedures.
- 3- Consideration of alternative formulations for the fishing mortality.

SELECTION OF A MINIMUM SET OF PERFORMANCE STATISTICS FOR EVALUATING MANAGEMENT PROCEDURES

A minimum set of performance statistics was selected among those contained in the output of the projection program. This set is the minimum required to be reported for management procedure evaluations. Users are encouraged to compute and explore other statistics in addition to the minimum required set.

Maximizing catches:

Let Y represent the first year of the simulations, C_y the total catch in year y and $C_{surface,y}$ the surface fishery catch in year y

$$(1) \frac{\sum_Y^{Y+4} C_y}{5} \quad (2) \frac{\sum_Y^{Y+19} C_y}{20} \quad (3) \frac{1}{20} \sum_Y^{Y+19} \frac{C_{surface,y}}{C_y}$$

Biomass (S : spawning biomass, NB : non-spawning biomass)

$$(4) \frac{S_{Y+5}}{S_Y} \quad (5) \frac{S_{Y+20}}{S_Y} \quad (6) \frac{S_{2020}}{S_{1980}} \quad (7) \frac{NB_{Y+20}}{NB_Y}$$

Inter-annual variations in catches:

$$(8) \quad AAV = \frac{1}{20} \sum_{Y-1}^{Y+18} \frac{|C_{y+1} - C_y|}{C_y + 1^{-6}}$$

PROPOSALS FOR 2ND –STAGE OPERATING MODELS

A number of proposals for generalizing the operating models were made. These are intended for a second-stage of testing management procedures to be conducted in year 2003-2004. Some of the generalizations affect the conditioning code and others the projections. A new set of control parameters (separate from those that specify the structure of the conditioning model) will be used to determine the structure of the projections, for processes not determined by parameters estimated in the conditioning (e.g., the existence of a future regime shift).

1. CPUE-abundance relationship:

Conditioning:

Allow for:

- nonlinear relationship between *CPUE* and *N* (eg N^2)
- effects of effort *E* (or change in *E*) on *CPUE*, e.g. quadratic.
- more general formulation to link abundance, selectivity and *CPUE*.
- trends in *q*: historical changes in catchability will be allowed for by reading an input of *q* multipliers.

The formulation below incorporates all four effects:

$$CPUE_y = q_y \tilde{N}_y^v \left(1 + \mathbf{b} \left(\frac{E_y - E_{2000}}{E_{2000}} \right) + \mathbf{g} \left(\frac{E_y - E_{2000}}{E_{2000}} \right)^2 \right)$$

$$\text{where } \tilde{N}_y = \sum_a \left(\frac{s_{LL1,y,a}}{1 + \sum_{j=a_1}^{j=a_2} s_{LL1,y,j}} \right) N_{y,a}$$

$$\text{and } E_y = \frac{C_{LL1,y}}{CPUE_y}$$

Parameters $\mathbf{b}, \mathbf{g}, \mathbf{v}, \mathbf{y}, q_y$ and a_1 and a_2 will be fixed by the user. Note that in this formulation selectivity is standardized with respect to the average over an arbitrary range of ages ($a_1 \geq a_{mins}, a_2 \leq a_{maxs}$) so that different reference ages can be chosen.

Projections:

- density/effort dependence: same formulation as in conditioning. The only difficulty is that, because effort is needed to simulate *CPUE* data, it has to be calculated from abundance and catch. In the standard approach, effort is simply computed as

$$E_y = \frac{C_y}{q_y \tilde{N}_y}$$

Here instead

$$\frac{C_y}{E_y} = q_y f(E_y) \tilde{N}_y$$

so, given *C* and *N*, to get *E* solve

$$E_y f(E_y) = \frac{C_y}{q_y \tilde{N}_y}$$

$$\text{In the equation above } f(E_y) = 1 + \mathbf{b} \left(\frac{E_y - E_{2000}}{E_{2000}} \right) + \mathbf{g} \left(\frac{E_y - E_{2000}}{E_{2000}} \right)^2$$

- Trends in q : future trends will be incorporated by reading an input vector of q multipliers for each year. These will be stored in binary form.

2. Selectivity:

Conditioning:

- Allow for the penalties on curvature and year-to-year changes to be year and fishery-specific
- Consider alternate parametrizations/smoothing: allow for options to penalize second differences or third differences, and to raise selectivities to a power (parameter controlled by the user) before differencing (second or third) is applied.

Projections:

It was agreed that random selection of historic (estimated) selectivities in the projection phase is not desirable. Specific hypotheses to accommodate future trends in selectivity will need to be developed.

3. Regime shifts:

Conditioning:

No code changes required.

Projections:

Allow for steepness and M_0 to vary from year to year in simulations. Future trends will be incorporated by reading an input vector of year-specific multipliers for each parameter. Binary files will be used.

4. Variability in recruitment:

Conditioning:

No code changes required.

Projections:

Allow for control of s^2_R and σ so they can be set either at the empirical value or at a value controlled by the user.

5. Depensation:

Conditioning:

Use a scale-invariant parameterization:

$$R_y = \frac{aS_y}{b + S_y} \left(1 - \exp\left(\frac{\ln(0.5)S_y}{\Phi S_0} \right) \right)$$

where the parameter F is the fraction of unexploited spawning biomass (S_0) at which fertilization rate is 50% the maximum rate possible at large spawning biomass. The value of F will be fixed by the user. Setting F to a very small number corresponds in the limit to no depensation.

Projections:

Same as in conditioning.

5- Bycatch

Conditioning:

No code changes required.

Projection:

Allow for the option to treat the LL4 fishery as a non-regulated bycatch fishery not subject to quota restrictions. This should be coded for both the case where the user specifies the between-fleet split of TAC and where the user does not specify the split. Catches for this non-regulated fishery could be determined by fixing its fishing mortality to its average value over the last x years. Allow the number of years (x) to be under user control. The management procedure in this case will only determine catches for the remaining three fisheries.

6- Availability of tagging data for the management procedure:

No code changes required.

7- Availability of recruitment indices for MP:

No code changes required.

8- Sample sizes:

Conditioning:

At present the conditioning model does not have the capability to use year-specific sample sizes for length/age frequency data. This capability will be incorporated.

Projections:

The user should be able to specify a sample size for each LFD series. The value would be fixed over time.

9- Growth models:

Conditioning:

Different hypotheses about historical growth patterns could be incorporated by using different size-at-age input data. No model changes will be required.

Projections:

No code changes required.

10- Spawning biomass:

Conditioning:

Incorporate size effects on spawning potential when computing spawning biomass:

$$S_y = \sum_{a=1}^m b_a (w_{y,a}^1)^d N_{y,a}$$

The value of d should be fixed by the user.

Projections:

Same as in conditioning.

11- Errors in catches:

Conditioning:

Different hypotheses about unreported past catches could be implemented by using different input catch data. No changes required to the code.

Projections:

- When underreporting of catches is allowed in the conditioning, only reported catches will be assumed known by the MPs. In other words, the MP will not know the “true” historical catch vectors used for conditioning.
- Simulated future catches may allow for different levels of underreporting as well. Specific hypotheses will need to be developed.

12- Further coding issues

- To facilitate identification of runs from different operating models and management procedures, the output from the conditioning code should include the name of the operating model so that the name is passed to the projection output. The model name could be read from the sbtmod.dat file and write into the file read by the projection code.
- MCMC: 2000 realizations from the MCMC posterior distribution are being output but only a subsample of those will be used for MP evaluation (500 for first year tests done with model h6mcmc). The subsample will be selected by picking every i -th set of parameters out of the total, where $i = \text{int}(n_{\text{total}}/n_{\text{subsample}})$.

PROPOSALS FOR ALTERNATE FISHING MORTALITY SPECIFICATIONS

Fishing mortality specifications in the current model are based on:

Note: year subscripts omitted for simplicity

$$C = \sum_f \sum_a s_{f,a} F_f N_a \tag{1}$$

$$C = \sum_f C_f \quad \text{so that} \quad C_f = (\sum_a s_{f,a} N_a) F_f \tag{2}$$

$$\text{and} \quad F_f = \frac{C_f}{\sum_a s_{f,a} N_a} \tag{3}$$

Note also: $C_{f,a} = s_{f,a} F_f N_a \tag{4}$

$$C_a = (\sum_f s_{f,a} F_f) N_a \tag{5}$$

Problem arises if $(\sum_f s_{f,a} F_f) > 1$ so that $C_a > N_a$.

In the current version of the model age-specific exploitation rates $(\sum_f s_{f,a} F_f)$ are bounded at 0.99. When the bound is exceeded, the catch at age for the fisheries involved is reduced to meet the bound but the exploitation rates of the other ages are not adjusted. This may lead to unnecessary reductions of catches in cases when the TAC could have been taken if selectivities of the other ages had been increased.

A number of proposals to address this problem were discussed and are reported below:

- (1) Use an instantaneous formulation both for conditioning and in forward projections (formulation proposed by Vivian Haist).
- (2) Use finite harvest rates and adjust selectivities in the projection model to try to meet fishery-specific TACs without exceeding the bounds on harvest rates (formulation proposed by Doug Butterworth).
- (3) Approximate the catch equation with a quadratic function (formulation proposed by John Pope).

These proposals will be considered for the second-stage of operating models and a choice will be made based on performance.

(1) Instantaneous formulation

$$N_{y+1,a+1} = N_{y,a} (1 - H_{y,a}^1) (1 - H_{y,a}^2) e^{-M_a} \quad \text{for } 0 \leq a \leq m-2$$

$$N_{y+1,m} = N_{y,m-1} (1 - H_{y,m-1}^1) (1 - H_{y,m-1}^2) e^{-M_{m-1}} + N_{y,m} (1 - H_{y,m}^1) (1 - H_{y,m}^2) e^{-M_m}$$

$$N_{y,a}^* = N_{y,a} (1 - H_{y,a}^1) e^{-M_a/2}$$

$$H_{y,a}^1 = \left(1 - \exp \left(- \sum_{f \in f^1} s_{fy} F_{fy} \right) \right) \quad H_{y,a}^2 = \left(1 - \exp \left(- \sum_{f \in f^2} s_{fy} F_{fy} \right) \right)$$

$$C_{f,y} = \sum_a \frac{s_{f,y,a} F_{f,y}}{\sum_{f \notin f^1} s_{f,y,a} F_{f,y}} \left(1 - \exp \left(- \sum_{f \in f^1} s_{f,y,a} F_{f,y} \right) \right) N_{y,a} v_{f,y,a} \quad \text{for } f \in f^1$$

$$C_{f,y} = \sum_a \frac{s_{f,y,a} F_{f,y}}{\sum_{f \notin f^2} s_{f,y,a} F_{f,y}} \left(1 - \exp \left(- \sum_{f \in f^2} s_{f,y,a} F_{f,y} \right) \right) N_{y,a} v_{f,y,a} \quad \text{for } f \in f^2$$

$$v_{f,y,a} = \begin{cases} 1 & \text{if } C_{f,y} \text{ in numbers} \\ w_{f,y,a} & \text{if } C_{f,y} \text{ in biomass} \end{cases}$$

where:

- $N_{y,a}$ is the number of fish of age a at the start of year y ,
- $N_{y,a}^*$ is the number of fish of age a at mid-year y ,
- M_a denotes the natural mortality rate on fish of age a ,
- $C_{f,y}$ is the catch of fish (numbers or biomass) in fishery f in year y ,
- $F_{f,y}$ is the fishing mortality rate of fishery f in year y ,

$H_{y,a}^p$ is the fishing proportion of fishing pulse p in year y for fish of age a ,
 $s_{f,y,a}$ is the standardized selectivity of fish of age a in fishery f in year y ,
 $w_{f,y,a}$ is the average weight of fish of age a in year y in fishery f ,
 R_y is the age -0 recruitment in year y ,
 f^1 is the set of fisheries that occur in the first season,
 f^2 is the set of fisheries that occur in the second season, and
 m is the maximum age considered (taken to be a plus-group).

(2) Finite harvest rates and selectivity adjustments

Case of one fleet (or non-overlapping selectivities):

Consider the single-fleet case, so omit f subscript:

Compute F using equation (3) above; if $F = 0.9$, no change

If $F > 0.9$, then:

$$C = \sum_a g(s_a F) N_a \quad (6)$$

$$C = \sum_a s_a^* F N_a \quad \text{where modified selectivity} \quad s_a^* = \frac{g(s_a F)}{F} \quad (7)$$

$$\text{Propose} \quad g(x) = \begin{cases} x & x \leq 0.9 \\ 0.9 + 0.1[1 - \exp(-10(x - 0.9))] & 0.9 < x \leq \infty \end{cases} \quad (8)$$

Note: (i) $g(x) < 1$

hence: $C_a = g(s_a F) N_a < N_a$ as required.

(ii) $g(x)$ is continuous and derivative-continuous at $x=0.9$

A process such as Newton-Raphson is used to solve equation (6) for F and hence compute $C_a = g(s_a F) N_a$.

Extension to more than one fleet

If from equation (3) $\sum_f s_{f,a} F_f < 0.9$ for all ages, then equations (3)-(5) remain. If

$\sum_f s_{f,a} F_f > 0.9$ for any age, then

$$C = \sum_a g(\sum_f s_{f,a} F_f) N_a \quad (9)$$

where $g(x)$ as above, so that $C_a = g(\sum_f s_{f,a} F_f) N_a < N_a$ as required.

Assume farther that effective proportional reduction of selectivity for each fleet at a certain age a is the same for each fleet (but differs by age). Then the modified selectivity $s_{f,a}^*$ is given by:

$$s_{f,a}^* = s_{f,a} \left[\frac{g(\sum_f s_{f',a} F_{f'})}{\sum_f s_{f',a} F_{f'}} \right] \quad (10)$$

Then

$$C_{f,a} = s_{f,a}^* F_f N_a = s_{f,a} \left[\frac{g(\sum_f s_{f',a} F_{f'})}{\sum_f s_{f',a} F_{f'}} \right] N_a \quad (11)$$

Then

$$C_a = \sum_f C_{f,a} = \sum_f s_{f,a} F_f \left[\frac{g(\sum_f s_{f',a} F_{f'})}{\sum_f s_{f',a} F_{f'}} \right] N_a \quad \text{as required by (9)}$$

$$= g(\sum_f s_{f,a} F_f) N_a$$

Thus, a multivariate root finding process (e.g. extended Newton-Raphson) is needed to solve for F_f in the following coupled non-linear differential equations for $f=f_1, f_2, f_3, \dots$:

$$C_f = \sum_a C_{f,a} = \sum_a s_{f,a}^* F_f N_a$$

$$\text{i.e. } C_f = \sum_a s_{f,a} F_f \left[\frac{g(\sum_f s_{f',a} F_{f'})}{\sum_f s_{f',a} F_{f'}} \right] N_a$$

(3) Approximation to the catch equation

John Pope's solution to the single fleet case

Problem is to find F that corresponds to a certain TAC C (for simplicity here considered in Abundance terms)

We use the approx to the Baranov equation

$$C(a) = N(a) * F * S(a) * \exp(-.44444 * Z(a))$$

Test example

a	1	2
S	0.1	1
N	100	50
M	0.3	0.2

total catch 40

First we define a simple estimate of F_{prime} as $C / (\text{Sum.all ages } S(a)N(a))$

$S(a) * N(a)$	10	50	sum=	60
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Fprime 0.666667

Next we correct this by Fdelta

$C = \text{Sum. All ages } (F_{\text{prime}} + F_{\text{delta}}) * S(a) * N(a) * \exp(-.44444 * ((F_{\text{prime}} + F_{\text{delta}}) * S(a) + M(a)))$

expanding the exponential to first order terms gives

$C \sim F_{\text{prime}} * \text{Sum all a } (N(a) * S(a) * \exp(-.44444(F_{\text{prime}} * S(a) + M(a)))$

+Fdelta*Sum all a (N(a)*S(a)*exp(-.44444(Fprime.S(a)+M(a))
 -Fprime*Sum all a (N(a)*S(a)*exp(-.44444(Fprime.S(a)+M(a))*.44444*Fdelta*S(a)
 +Fdelta*Sum all a (N(a)*S(a)*exp(-.44444(Fprime.S(a)+M(a))
 +Fdelta*Sum all a (N(a)*S(a)*exp(-.44444(Fprime.S(a)+M(a))*.44444*Fdelta*S(a)

This may be rewritten as a quadratic in the form $a * F_{\text{delta}}^2 + b * F_{\text{delta}} + c = 0$

Form sub sum as follows.

snexp(-.4444z)	8.496228	34.01625	sum=	42.51247
snexp(-.4444z)*.4444s	0.37761	15.11832	sum=	15.49593

Then form quadratic terms

a	15.49593	Form interior of sqrt portion of solution of quadratic
b	-32.1819	17.69305 or its default -b-a*2
c	11.65835	for the imaginary case

Fdelta 0.467504

F=Fprime+Fdelta 1.13417

Calculate Catch 9.289542 31.30996 40.5995

If this isn't close to the desired catch can correct either by iterating this proc.

newF 1.117423 Or by simple step to $F_{\text{new}} = F * \text{Desired catch} / \text{achieved catch}$

Calculate catch 9.159512 31.05114 40.21065

Attachment 5.

List of SBT fisheries indicator data to be exchanged among the CCSBT-SAG members by 30 April 2003.

These data will form the basis for deciding on the 2003 stock assessment process options outlined in CCSBT-ESC/0209/Rep12, Agenda Item 6. The ESC recognizes that different interpretations and summary statistics may be derived by different members, based on the same data.

1. Longline fishery CPUE

Japanese Longline nominal CPUE data for the 2003 indicators will consist of:

ages 4-7 RTMP 1995-2002
ages 8-11 RTMP 1995-2002
ages 12+ RTMP 1995-2002

This does not preclude participants from exploring and presenting spatial, temporal and finer scale resolution age indices. (*Japan agreed to provide the RTMP data and the update of the official catch and effort data in the same format as this year*).

New Zealand longline nominal CPUE (all ages) dis-aggregated by fleet and area 1990 – 2002. It was noted that New Zealand has two distinct fleets operating in different areas and catching different size compositions. Dis-aggregation will be required to produce meaningful CPUE indices. (*New Zealand will provide*).

Korean longline nominal CPUE (all ages) 1991 – 2002 (*Korea will provide*).

Taiwanese longline nominal CPUE (all ages) 1995 – 2002. It was noted that there was a problem with effort reporting by some vessels in the Taiwanese fleet, particularly after 1996 because it is based on weekly report data. It may be possible to standardize (or correct) these data, and if this can be done, the Taiwanese longline CPUE series will be used. (*Taiwan will provide*).

2. Japanese Longline CPUE by cohort

Details of this will be determined intersessionally. (*Japan will provide*).

3. Total catch, effort and estimated age composition in Australian surface fishery

(*Australia will provide*).

4. Total Indonesian catch by month and % of Indonesian LL catch that is SBT

Annual estimates will be generated by spawning season (July to June) rather than calendar year, to be consistent with biology and the MP operating model fishery definition (*Australia will provide*).

5. Indonesian LL SBT age composition

Annual estimates will be generated by spawning season (July to June) rather than calendar year (*Australia will provide*).

6. Estimate of total global SBT catch (mass)

(*Secretariat to provide*).

7. Acoustic estimates of age 1 off Western Australia

(*Japan will provide*)

8) Aerial spotting data in the Great Australian Bight 2000/2001 and 2001/2002

(*Australia will provide*)

9) Tag returns

Information on tag release numbers and ages, recoveries (by release age) (*Australia to provide*)

Once the indicators have been exchanged and analysed, the interpretations of the indicators and summary results of these analyses will be circulated to all parties.

**Report of the Catch Characterisation Working Group
on deficiencies in data collection systems**

(1) Data items that are not being collected

Information on wind speed and/or wind direction is not being collected for many of the catch characterisation data sets. It was felt that this information was not of primary importance either because it could be obtained in part from alternative data sources, or because it was not considered to influence CPUE in a measurable manner. As a consequence, the working group has not recommended that this information be collected in cases where it is absent. This represents a change to the SRP requirements for catch characterisation data.

The table below lists items of data that are not being collected (in bold), together with comments provided earlier from the member that is not collecting the data (in italics) and recommendations or further comments from the catch characterization working group.

Member	Fishing Method	Item that is not collected (bold) <i>The Member's comment/explanation (italics)</i>	Comments and Recommendation from the catch characterization working group
Australia	PS	No date/time for end of haul. <i>Haul date and time is not reported as the date is the same as the set and the time difference is simply the time taken to set the seine.</i>	This information is important to distinguish hours fished from hours searched. However, because searching time is recorded separately for this fishery, the requirement for time at end of haul is not necessary.
Australia	PS	No information on schools spotted. <i>Spotter planes are used and the information on all schools spotted is not routinely provided to the vessel. The spotter planes direct the catching vessel to intercept a specific school. The information collected by the spotter planes was analysed but is considered to be of little direct value for assessment purposes in its current form.</i>	Information on schools spotted by spotter planes should continue to be collected. Australia has a program that is collecting this information separately from the catch and effort data.
Australia	PS	The number of SBT per shot (and other species) is not recorded. <i>As the fish are not landed aboard the vessel but rather left in the water alive it is very difficult to collect this data with any accuracy during the catching operation. It is conceivable that systems could be developed to monitor the number of fish during the transfer from the purse seine to the tow cage but this does not appear warranted.</i>	Both the number and weight of SBT should be recorded. It was recommended that work should continue on development of a technique to count the number of fish during transfer to tow cages. Australia also noted that it currently counts every fish, but on transfer from tow cages to farms, not on a per shot basis.
Australia	PS	Details of discards are not recorded.	Australia reported that there are no discards in the purse seine fishery.

Member	Fishing Method	Item that is not collected (bold) <i>The Member's comment/explanation (italics)</i>	Comments and Recommendation from the catch characterization working group
Australia	PS	The weight of dead fish is not recorded during fishing activity.	This information is monitored separately to the catch and effort data collection system..
Japan	LL	Position of set and haul is not recorded. <i>We collect only a noon position. The scale of longline gear used by Japanese fishermen are 130-150km in length. Therefore, one whole operation of longline gear usually covers an area at least across two to three 1x1degree cells because the longline gear is moved away by the current. To provide the data of 1x1degree cells is not international standard, because of the reason as mentioned above in addition to the issue of confidentiality. Therefore, to define the position of operation of 1x1degree cells is different from the actual condition. It is not much of a problem to use the data of noon positions when we provide the data of 5x5degree cells. (Please refer to "Japan's Comments on Development of SRP" presented by Japan in December 2001.)</i>	The RTMP collects both the position of set and of haul, so this information already exists for this fishery.
Korea	LL	Position of set and haul is not recorded. <i>We collect a noon position of the vessel because Korean longliners set hooks extending over 100km up to 150km (similar to Japanese longliners).</i>	This information is valuable to collect and should be collected if possible.
Korea	LL	Date and time of set and haul is not recorded. <i>We do not collect date and time of set & haul. Only the noon position of the vessel is collected</i>	This information is valuable to collect and should be collected if possible.
Korea	LL	Otoliths are not collected.	Collection of otoliths for the Korean fishery would be best collected as part of the scientific observer program when that commences.
New Zealand	LL	Position of haul is not recorded. <i>The position of haul is not recorded because it was considered to add little additional information over position of set. Other items of information were considered to be a higher priority</i>	It has yet to be verified whether the position of haul is specified on the recently introduced NZ catch effort form. This information is valuable to collect and should be collected if possible.

Member	Fishing Method	Item that is not collected (bold) <i>The Member's comment/explanation (italics)</i>	Comments and Recommendation from the catch characterization working group
New Zealand	LL	Catch discarded has not been recorded. <i>With new form (due to be implemented from 01/10/02) this will be collected for all species. Also observer data.</i>	Improvement is in progress. Discard information has also been available through observer data.
New Zealand	LL	Collection of individual weights with catch effort data will cease. <i>With new form (due to be implemented from 01/10/02) this will NOT be collected anymore, instead average weight (total weight by number of fish). Observers will continue to collect full biological data.</i>	Japan was disappointed with this change because coverage of the non-chartered fleet by observers is low (~5%) and the individual weight data was an important source of size frequency data for this fleet ¹ . New Zealand was encouraged to develop alternative programs for collecting size data from the non-chartered fleet.
Taiwan	LL	Position of haul is not recorded	This information is valuable to collect and should be collected if possible. Taiwan will consider whether it is able to collect this information, but has advised that this may not be easy.
Taiwan	LL	Time of set and Date/time of haul is not recorded. <i>Taiwan has collected noon time position data.</i>	This information is valuable to collect and should be collected if possible. Taiwan will consider whether it is able to collect this information, but has advised that this may not be easy.
Taiwan	LL	Otoliths are not collected.	Collection of otoliths for the Taiwanese fishery is not easy and was considered to be best collected as part of the scientific observer program when that commences.

(2) Data that is being collected, but with a low sample size

The table below lists items of data that are being collected, but where members had made comments regarding low sample sizes for the collection.

Member	Item with low sample size (bold) <i>The Member's comment/explanation (italics)</i>	Comments and Recommendation from the catch characterization working group
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¹ New Zealand explained that it consulted with Australia and Japan before making this change. The information was removed in part because quality of the data from the domestic fleet was regarded as poor. Generally domestic vessels cannot weigh fish at sea and only record estimated weights. In addition, domestic fishers were including other species weights and this was further reducing data quality.

Member	Item with low sample size (bold) <i>The Member's comment/explanation (italics)</i>	Comments and Recommendation from the catch characterization working group
Australia	The sample size of fish used to estimate weights for the SBT QMS may be too small to be reliable.	The variance in the weights of fish from this sampling has been low (see Australia's fishing season report) and as a consequence, Australia believes that the sample size is adequate. Nevertheless, improvement in the sampling is underway through development work on stereoscopic video techniques . Difference in the timing (about 3 weeks as an approximate average) between the actual catch and measurement of weight was raised. Australia believed that there was little feeding or weight gain during this period and that a slight loss of condition was more likely.
Korea	Korea's catch and effort reporting system only covers approximately 75-80% of the total SBT catch of Korea. <i>One trip by Korean longliners usually takes over 1 year up to 2 years which often causes delayed reporting of their fishing activities to NFRDI resulting in lower coverage than 100%. To avoid this, we persuade them to submit the required data by fax and we hope the coverage rate gradually increase</i>	Korea reported that most (~90%) vessels reported catch and effort data.
Korea	Small samples sizes of biological data (length, weight, sex etc.) are collected for SBT. <i>Fishermen are supposed to report these data but with practical difficulties length and/or weight data only have been reported by some vessels.</i>	The working group encouraged improved collection programs to obtain an adequate coverage of size data.
Taiwan	Taiwan's catch and effort reporting system only covered approximately 50-70% of the total SBT catch of Taiwan during 1997-1999 and about 90-95% in recent years.	Taiwan commented that the trend of increased coverage of catch and effort data in recent years appears to be continuing.
Taiwan	Small samples sizes of biological data (length, weight, sex etc.) are collected for SBT.	The working group encouraged improved collection programs to obtain an adequate coverage of size data.

(3) Timeliness of data collection

The Korean and Taiwanese fleets spend a considerable time away from home port and therefore, there can be long delays in the provision of log book data. As a consequence, Korea and Taiwan were asked to comment on their ability to provide catch and effort data in a timely manner for CCSBT purposes. Specifically, would they be able to provide catch and effort data for a specific calendar year by 30 April of the following year?

Korea advised that it should be able to meet the deadline, but that this might be with a lower than normal coverage of catch and effort data. In addition, Korea intends to look for ways to collect the data in shorter time following fishing.

Taiwan advised that for log book data it would have difficulties providing the information

by the specified timeframe. Taiwan advised that it would try to compile the catch effort data from its weekly report system within the required timeframe after reviewing the first year's implementation of this new system. Taiwan also advised that because the data would be coming from its weekly reporting system, this means that some information would not be available such as hooks per basket and the catch of species other than SBT etc.

Report of Additional Meeting of CPUE Steering Group

Introduction

A subgroup of the CPUE Steering Group met 3.30-5.00am Monday 9 September and 6.00 to 7.15pm Tuesday 10th September to consider subjects of concern to the Extended Science Committee. The report of the CPUE Steering Group {3rd SAG Report Attachment 5} was concerned with providing appropriate agreed inputs for the management procedures work. This additional report is concerned with giving guidance on CPUE for any new SBT assessment that might be required in 2003 or 2004, with furthering ongoing CPUE studies and with developing suitable questions to address at the CPUE working Group proposed in 3rd SAG Report Attachment 5.

The use of CPUE in any assessments that might be called for in 2003 or 2004.

It is possible that new assessments of SBT may be called for in 2003 or 2004. As in the past any assessment of SBT in 2003 or 2004 will be based upon the work of a number of analysts working in national institutes or elsewhere. It is appropriate that each group makes and defends its own choice of assessment model, preferred data sets and assumptions. In such assessments alternative relationships between abundance and CPUE could be explored. Such an approach will lead to a range of assessment results.

In order to assist with the comparison of assessment results it will be helpful if comparative runs based upon common data sets are provided. Consequently, the CPUE steering group recommends that all assessment groups provide results from a comparative run based upon a reference case CPUE series. The CPUE steering Group recommends that the Nominal CPUE Series be used for this purpose unless further work suggests a change. If an assessment technique requires age based CPUE it is recommended that where possible the equivalent comparative run be constructed from this series as $\text{Catch}(a,y) * \text{CPUE}(y) / \text{Total Catch}(y)$, where a and y are indices of age and year respectively. It would also be necessary for the comparative run to adopt other standard inputs (e.g. a single natural mortality vector). These data set sets and assumptions to be used in the comparative run need to be defined. The availability of a comparative run will help with understanding which differences in assessments derived from the use of differing data sets and which derived from differing assumptions (e.g. the relationship between CPUE and abundance) and methodologies.

Furthering ongoing CPUE studies.

The CPUE steering group welcomes the parallel studies of CPUE using Tree Regression approaches (Papers CCSBT-ESC/0209/31 and CCSBT-ESC/0209/38). It encourages the scientists involved to seek close collaboration to enable this work to provide an agreed new methodology for the refinement of CPUE series and if possible an agreed series. The CPUE Steering group also welcomes the collaborative work already achieved in the study of the relationship of the spatial distribution of SBT and the SBT targeted long line fishery with temperature (paper CCSBT-ESC/0209/39). It encourages the further development of this work. In the view of the steering group such studies that seek to relate catch rate to concomitant variables may well help develop more dependable CPUE series.

Aspects of CPUE modelling which might be addressed at the CPUE working Group proposed in SAG Appendix 5.

The CPUE Steering Group considers that, in addition to ongoing work to improve the statistical derivation of CPUE series, it would be helpful to develop approaches that:-

- Seek to understand the relationship of CPUE and the evolution of operation decisions of the long-line fisheries.
- Seek to relate SBT CPUE to available concomitant variables.

The CPUE steering group has proposed a CPUE working group to be held sometime after 2004. To further the aims outlined above in the bullet points, it needs to develop detailed questions to be addressed either at the Working Group or in supporting or ongoing studies. The CPUE steering group would welcome help in the formulation of further detailed questions. These could be directed to and discussed over the CPUE Groups email exchange address CPUE_Modeling@ccsbt.org.

Detailing available sets of concomitant variables.

To forward studies of how CPUE may change in response to changes in concomitant variables, the CPUE Steering group urges members to collaborate in providing a catalogue of data sources, not currently in the CCSBT database, which might provide informative concomitant variables for studies of CPUE. Such variables might be oceanographic, biological, environmental, catches of species other than SBT or relate to fleet technology. Where appropriate the details of such data would need to include their availability by 5 degree (or 1 degree squares) over all or part of the range (as defined by sub-areas) of the SBT as well as the years for which they are available. Such a catalogue would be a first step to providing a database of such concomitant variables suitable for use in CPUE studies.

Attachment 8

Interim Estimates of Global Catch For SBT

Highlighted figures differs from those in page 3 of the SC6 Report. The difference is often minor.
All 2001 figures are to be considered preliminary. Other, **bolded**, figures are also preliminary.

Calendar Year	Australia	Japan	New Zealand	Korea*	Taiwan Longline	Taiwan Gillnet	Indo.	Misc-1	Misc-2	Total (excludes 'other')	Other
1952	264	565	0	0	0	0	0	0	0	829	
1953	509	3,890	0	0	0	0	0	0	0	4,399	
1954	424	2,447	0	0	0	0	0	0	0	2,871	
1955	322	1,964	0	0	0	0	0	0	0	2,286	
1956	964	9,603	0	0	0	0	0	0	0	10,567	
1957	1,264	22,908	0	0	0	0	0	0	0	24,172	
1958	2,322	12,462	0	0	0	0	0	0	0	14,784	
1959	2,486	61,892	0	0	0	0	0	0	0	64,378	
1960	3,545	75,826	0	0	0	0	0	0	0	79,371	
1961	3,678	77,927	0	0	0	0	0	0	0	81,605	
1962	4,636	40,397	0	0	0	0	0	0	0	45,033	
1963	6,199	59,724	0	0	0	0	0	0	0	65,923	
1964	6,832	42,838	0	0	0	0	0	0	0	49,670	
1965	6,876	40,689	0	0	0	0	0	0	0	47,565	
1966	8,008	39,644	0	0	0	0	0	0	0	47,652	
1967	6,357	59,281	0	0	0	0	0	0	0	65,638	
1968	8,737	49,657	0	0	0	0	0	0	0	58,394	
1969	8,679	49,769	0	0	80	0	0	0	0	58,528	
1970	7,097	40,929	0	0	130	0	0	0	0	48,156	
1971	6,969	38,149	0	0	30	0	0	0	0	45,148	
1972	12,397	39,458	0	0	70	0	0	0	0	51,925	
1973	9,890	31,225	0	0	90	0	0	0	0	41,205	
1974	12,672	34,005	0	0	100	0	0	0	0	46,777	
1975	8,833	24,134	0	0	15	0	0	0	0	32,982	
1976	8,383	34,099	0	0	15	0	12	0	0	42,509	
1977	12,569	29,600	0	0	5	0	4	0	0	42,178	
1978	12,190	23,632	0	0	80	0	6	0	0	35,908	
1979	10,783	27,828	0	0	53	0	5	0	4	38,673	
1980	11,195	33,653	130	0	64	0	5	0	7	45,054	
1981	16,843	27,981	173	0	92	0	1	0	14	45,104	
1982	21,501	20,789	305	0	171	11	2	0	9	42,788	
1983	17,695	24,881	132	0	149	12	5	0	7	42,881	
1984	13,411	23,328	93	0	244	0	11	0	3	37,090	
1985	12,589	20,396	94	0	174	67	3	0	2	33,325	
1986	12,531	15,182	82	0	433	81	7	0	3	28,319	
1987	10,821	13,964	59	0	623	87	14	0	7	25,575	
1988	10,591	11,422	94	0	622	234	180	0	2	23,145	
1989	6,118	9,222	437	0	1,076	319	568	0	103	17,843	
1990	4,586	7,056	529	0	872	305	517	0	4	13,870	
1991	4,489	6,474	164	214	1,353	107	759	0	97	13,657	
1992	5,248	6,137	279	36	1,219	3	1,232	0	73	14,228	
1993	5,373	6,320	217	80	958	0	1,369	1	17	14,334	
1994	4,700	6,064	277	119	1,020	0	906	91	54	13,231	
1995	4,508	5,866	436	317	1,431	0	830	42	201	13,632	
1996	5,128	6,373	139	1,148	1,467	0	1,609	145	295	16,304	
1997	5,316	5,588	334	1,238	872	0	2,210	24	333	15,915	
1998	4,896	7,502	337	1,562	1,446	0	1,329	206	476	17,754	
1999	5,552	7,552	461	1,271	1,513	0	2,483	274	483	19,588	
2000	5,257	6,027	380	987	1,448	0	1,126	240	49	15,513	
2001	5,523	6,408	358	735	1,580	0	1,552	0	60	16,216	4

Misc-1: Catch recorded in Japanese import statistics as being fresh SBT from Taiwan, but not recorded in Taiwan export statistics. Further clarification of these data is required.

Misc-2: SBT catch other than those listed (obtained from Japanese import statistics)

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 normally used the higher of these values.

Note regarding Japan's catch figures: From 1991 to 2001, Japan's catch refers to a fishing year (Mar-Feb), not a calendar year. Catches in 1990 or before are for calendar years (although this is not certain for 1989 and 1990). Japan is working to clarify the issue. However, in recent years, there has been little catch in January and February.

Note regarding Korean catch figures: There is uncertainty as to whether catches in recent years are presented as processed or whole weights.

Note regarding Indonesian catch figures: These are estimates and the estimation of Indonesian catches is under review.

**DRAFT TERMS OF REFERENCE:
REVIEW OF MONITORING PROGRAM OF INDONESIAN SBT CATCH**

For the purpose of obtaining reliable and comprehensive information on the Indonesian SBT fishery for stock assessment analysis and the recommendation of a TAC, the CCSBT requires appropriate fishery monitoring arrangements and methodologies used for estimating the Indonesian SBT catch to be reviewed.

For the purposes of assessing the impact of current Indonesian fishing practices and probable future developments on the SBT fishery, the CCSBT seeks guidance on the structure / profile of an appropriate fishery monitoring program which will provide data to enable a better understanding of an operating model for the fishery.

Review of Existing Catch Monitoring Systems

The review will:

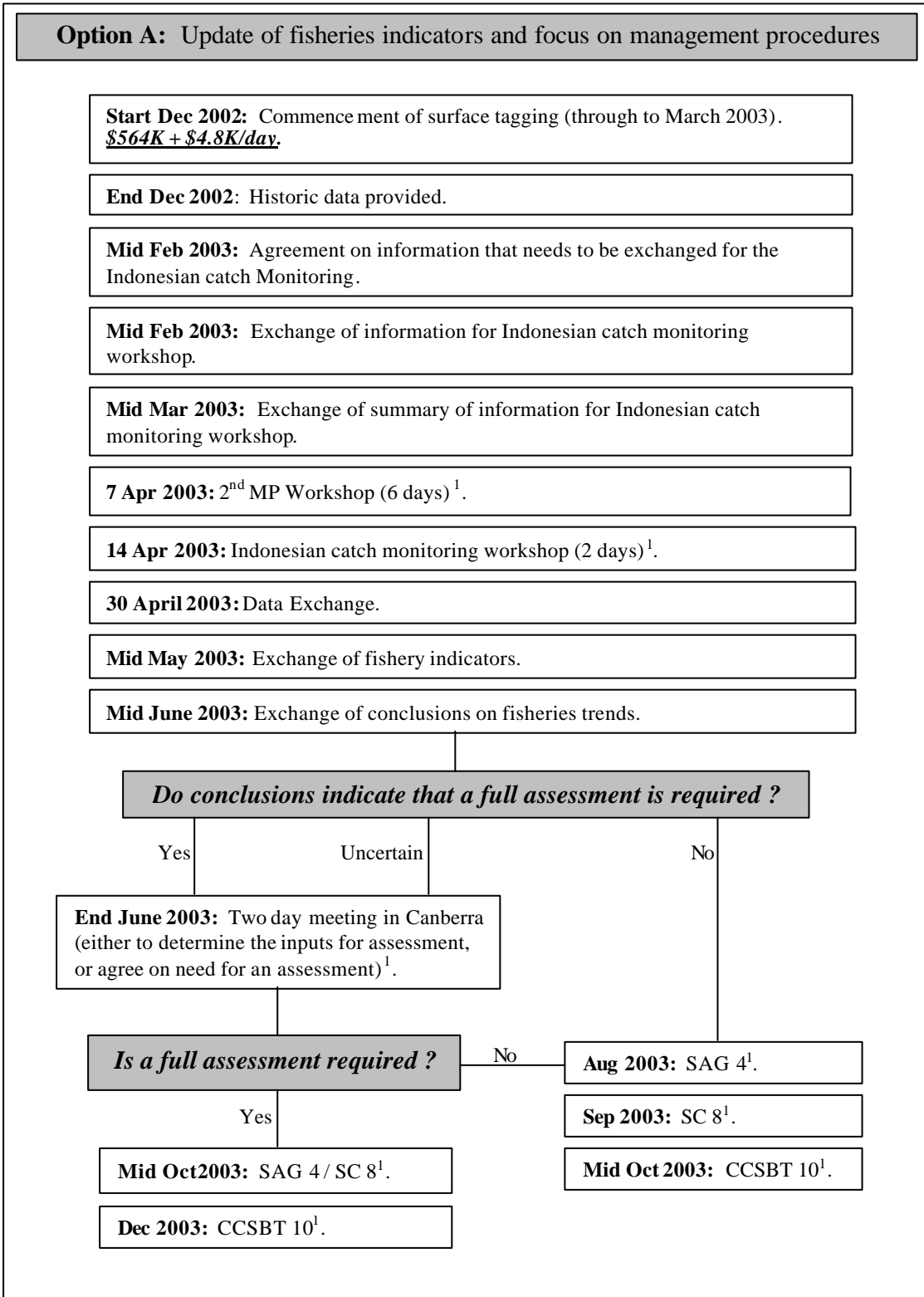
- Assess the systems currently used to provide data to the CCSBT on the catch of SBT by Indonesia, and evaluate their accuracy and coverage of the total Indonesian SBT catch..
- Where appropriate, provide recommendations for improving the existing Indonesian SBT catch monitoring systems.
- Trace a sample of the Indonesian records of exports to Japan through the Japanese import system and the CCSBT Trade Information Scheme to evaluate the consistency of these three sets of records, and to try and establish the source of any inconsistencies.
- Establish a set of objectives for a CCSBT fishery monitoring system and advise the Commission on how it might administer the monitoring program directly.
- Make recommendations on measures to coordinate CCSBT and IOTC monitoring programs to maximise compatibility between the IOTC and CCSBT programs.
- Provide an estimate of cost for any proposed improvements or additional monitoring.

Consultation

The review will be undertaken in consultation with:

- The Secretariat of the Indian Ocean Tuna Commission.
- Existing participants in the Indonesian monitoring program
- Nominated contact officers of the CCSBT members.
- The CCSBT Advisory Panel

Scientific Committee Work Plan for 2003



¹The Secretariat will provide cost estimates for this meeting at CCSBT 9.

Option B: Conduct a full model-based assessment

Start Dec 2002: Commencement of surface tagging (through to March 2003).
\$564K + \$4.8K/day.

End Dec 2002: Historic data provided.

Mid Jan 2003: Assessment planning meeting (2 days)¹.

Mid Feb 2003: Agreement on information that needs to be exchanged for the Indonesian catch Monitoring.

Mid Feb 2003: Exchange of information for Indonesian catch monitoring workshop.

Mid Mar 2003: Exchange of summary of information for Indonesian catch monitoring workshop.

14 Apr 2003: Indonesian catch monitoring workshop (2 days)¹.

30 April 2003: Data Exchange.

Aug 2003: SAG 4¹.

Sep 2003: SC 8¹.

Mid Oct 2003: CCSBT 10¹.

¹The Secretariat will provide cost estimates for this meeting at CCSBT 9.