

Commission for the Conservation of
Southern Bluefin Tuna



みなまぐろ保存委員会

Report of the Thirteenth Meeting of the Scientific Committee

**5 - 12 September 2008
Rotorua, New Zealand**

Report of the Thirteenth Meeting of the Scientific Committee
5-12 September 2008
Rotorua, New Zealand

Agenda Item 1. Opening of meeting

1. The independent Chair, Dr Annala, 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 Thirteenth Meeting of the Scientific Committee, which is at **Appendix 2**.

Agenda Item 3. Other business

4. There was no other business.

Agenda Item 4. Adoption of report of meeting

5. The report of the Scientific Committee was adopted.

Agenda Item 5. Closure of meeting

6. The meeting was closed at 12:15pm, on 12 September 2008.

List of Appendices

Appendix

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

List of Participants
Thirteenth Meeting of the Scientific Committee
5 - 12 September 2008
Rotorua, New Zealand

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Commission for the Conservation of
Southern Bluefin Tuna



みなまぐろ保存委員会

Appendix 2

**Report of the Extended Scientific Committee for
the Thirteenth Meeting of the Scientific
Committee**

**5 - 12 September 2008
Rotorua, New Zealand**

**Report of the Extended Scientific Committee for
the Thirteenth Meeting of the Scientific Committee
5-12 September 2008
Rotorua, New Zealand**

Agenda Item 1. Opening

1. The meeting was opened by the appointed Chair of the Extended Scientific Committee, Dr Annala, who welcomed participants.

1.1 Introduction of participants

2. Participants who were not present at the SAG meeting 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. Australia, Japan and New Zealand assigned rapporteurs to produce and review the text of the substantive agenda items.

Agenda Item 3. Adoption of agenda and document list

5. The agreed agenda is shown in **Attachment 2**.
6. The agreed document list is shown in **Attachment 3**. Specific papers relevant to this meeting were identified.

Agenda Item 4. Review of SBT fisheries

4.1 Presentation of national reports

7. Japan presented CCSBT-ESC/0809/SBT Fisheries-Japan. In 2007, the national catch allocation of Japan decreased to 3000 t. Catch and effort in both 2006 and 2007 was lower than in previous years for most CCSBT statistical areas. Maps of locations of catch and effort are provided. Further details on effects of recent management changes on effort were given in CCSBT-ESC/0809/37. Observer activity is detailed

in CCSBT-ESC/0809/32. Archival and pop-up tags were released in 2007 as detailed in CCSBT-ESC/0809/34, while details of otolith collection are provided in CCSBT-ESC/0809/33.

8. New Zealand presented CCSBT-ESC/0809/SBT Fisheries-New Zealand. The commercial catch in 2006/07 was 379 t, larger than catches in both 2005 and 2006. This rise was due in part to an increase in effort, and also to an increase in the abundance of small SBT coming into the fishery. CPUE in 2006/07 was similar to that observed in 2005/06, an increase from three years of very low CPUE (2002/03 to 2004/05). CPUE for the charter fishery dropped slightly in 2006/07, but increased in the domestic fishery. Target observer coverage levels (10%) were exceeded in both the charter and domestic fishery. Otolith collection, tag releases and discards are described in the document.
9. Taiwan presented CCSBT-ESC/0809/SBT Fisheries-Taiwan. In recent years, Taiwanese vessels have begun to target SBT seasonally. In 2007, the catch was estimated to be 841 t and 30 vessels were authorised to fish for SBT. Nominal CPUE in 2007 was 2.0, increasing from the 2003-06 nominal CPUE of 0.9-1.9. Observer coverage levels in 2007 were 10% for vessels and 15% for hooks.
10. Participants asked what proportion of the Taiwanese fleet authorised to catch SBT actually targeted SBT in 2007, and what were the target species of those authorised vessels that retained SBT as bycatch. Taiwan replied that about 1/6 of authorised vessels operating in the Indian Ocean shifted to targeting SBT on a seasonal basis in 2007. Prior to 2006, authorised vessels were mainly targeting albacore and caught SBT as bycatch.
11. Participants also asked whether spatial shifts in the distribution of SBT catches reflected changes in targeting by size. Taiwan responded that some vessels had begun to target oil fish in 2006, and that this change in targeting practice had resulted in the spatial shifts in SBT catch distribution.
12. Indonesia presented CCSBT-ESC/0809/SBT Fisheries-Indonesia. The 2007 catch was approximately 1077 t. SBT is not a target species for Indonesian longliners, but is caught as bycatch by vessels targeting tropical tunas. The number of Indonesian longliners has decreased substantially in recent years, from around 1800 in 2003 to 600 in 2007. This decrease resulted from a government policy to reduce fuel subsidies. In 2007, average trip duration was 35 days at sea, and vessels tended to move into western rather than southern Indonesian waters, concentrating in the Indonesian archipelago rather than moving beyond EEZ waters of Indonesia in the Indian Ocean. A research and monitoring station is being established at Benoa, Bali, whose objective, among others, is to monitor Indian Ocean tuna fisheries including SBT. The Indonesian Government funded research on bigeye and yellowfin tuna in 2008, and it is hoped to expand such research to SBT in 2009.
13. Members welcomed Indonesia as a formal Member of the ESC, and noted the significance of the development of the research and monitoring station at Benoa.
14. Korea presented CCSBT-ESC/0809/SBT Fisheries-Korea. The 2007 catch by Korea was 453 t, an increase from 130 t in 2006. Twelve vessels were active in 2007.

Catches between January and July in 2008 were already higher than the total catch of 2007, perhaps reflecting a change in targeting practices.

15. Participants asked why catches had increased in 2007. Korea replied that this increase was due to the rising price of SBT, and possibly also reflected more favourable fishing conditions for other species in 2007.
16. Australia presented CCSBT-ESC/0809/SBT Fisheries-Australia. In 2006/07, 14 commercial vessels landed SBT: 6 purse seiners in the GAB, and 8 longliners off the east coast. The total catch in 2006/07 was 5234 t, with 99.9% taken by purse-seiners in the GAB and the remainder by longliners off the east coast. A 2-year trial of the release of live SBT commenced in 2007/08 as a means of avoiding catching over the national allocation. No mortalities were recorded during the initial tow-back and release of 39 t of SBT. The trial will be assessed at the end of the 2008/09 fishing season. Target observer coverage levels were exceeded in all components of the fishery in 2007/08.
17. Members provided updated summaries of their observer activities, which are presented in **Attachment 4**.

4.2 Secretariat review of catches

18. The Secretariat presented paper CCSBT-ESC/0809/06. The estimated SBT catch for the 2007 calendar year was 11540 t, which is the lowest estimated SBT global catch for over 50 years. The global SBT catch by flag is shown at **Attachment 5**. Due to confidentiality reasons, the unreported catch estimate scenarios have not been included in **Attachment 5** and the Secretariat stated that Attachment A of CCSBT-ESC/0809/06 would remain confidential and be excluded from the public domain.
19. In response to requests from the 2007 ESC meeting, data summaries from the CCSBT Trade Information Scheme (TIS), and information on methods used by Members to raise processed weights to whole weights when reporting catches, were also included in paper CCSBT-ESC/0809/06. The Secretariat advised that the TIS was not designed for estimating global catches and that it had major limitations in this respect. Bearing this in mind, Table 1 of CCSBT-ESC/0809/06 provided catch estimates by flag for TIS import documents. The estimates were converted from processed to whole weight estimates using the ad-hoc conversion factors specified in Table 2 of CCSBT-ESC/0809/06. The Secretariat noted that the TIS usually underestimates the true weight of the catch so the five highlighted catches in Table 1 that were greater than the corresponding estimates in the global catch table warranted further investigation. The Secretariat also noted that the figures for the Australian farms were higher than reported in Australia's six monthly TIS farm reports. This was considered by the Secretariat and Australia to be an effect of inappropriate values of conversion factors, particularly for dressed product, where the Secretariat used a conversion factor of 1.8, but Australian sources suggested a conversion factor of 1.2 would be more appropriate for dressed product from the farms. In the absence of a set of agreed conversion factors for the CCSBT, the

Secretariat advised that in future it would seek and use Member specific conversion factors if these were available. This proposal was endorsed by the ESC.

20. Following questions from the SAG, the Secretariat re-confirmed that the TIS information in Table 1 of CCSBT-ESC/0809/06 did not represent the full catch of the different flags, but rather represented the exports from different flags to CCSBT Members and Cooperating Non-Members. Furthermore in recent years, due to the CCSBT authorised vessel list resolution, only exports from Members and Cooperating Non-Members are included in the TIS Scheme. The Secretariat further advised that the global catch table should be used to obtain the best catch estimate for each flag.
21. The Secretariat tabled the methods used by Members to raise processed weight to whole weights for reporting their catches. Japan advised that it used a conversion factor of 1.15 to convert gilled and gutted product to whole weight as agreed in the Trilateral Workshop in 1994.

Agenda Item 5. Report from intersessional CPUE modelling work

22. A brief summary of the intersessional work carried out by the CPUE Working Group was presented. CCSBT-ESC/0809/09 covers details of work conducted by the group in seven web based meetings held in 2008. An additional report of the CPUE Working Group's discussions during the 2008 SAG meeting is included as Attachment 5 to the SAG report. The recommendations provided by the SAG to the ESC are summarised in paragraphs 7-8 of the 2008 SAG report. It was noted that most of the recommendations addressed further studies on the adequacy of the CPUE series and potential for statistical bias. The ESC endorsed these recommendations.
23. Members of the CPUE Working Group were thanked for their participation in the intersessional work, especially for Dr. Itoh and Ms. Lawrence. The ESC agreed that web meetings were a useful way of conducting intersessional work. However it was acknowledged that detailed discussion of technical issues was difficult within this type of forum. It was agreed that two to three web meeting should be scheduled for 2009 to facilitate the continuation of intersessional work on CPUE analyses. It was also agreed that the number of scheduled web meetings should not exceed three as there was a considerable amount of time and effort involved in preparing for the web meetings, especially by the authors of the working papers. In light of this, the ESC agreed that a work schedule should be developed, including deadlines for papers in advance of web meetings, so that working papers can be distributed, comments exchanged and points for focussed discussion developed prior to such meetings.

Agenda Item 6. Australian SBT farm study

6.1 Report of Australian farm experiments in 2007-08 season

24. CCSBT-ESC/0809/12 was presented. The paper summarised the results of the Australian farm experiments in 2007-08. In April 2008, a series of 16 transfers were conducted over three days between two research pontoons moored in the vicinity of Port Lincoln. The primary objectives of the study were to (1) assess the accuracy and precision of stereo-video length measurements obtained under operational conditions, (2) develop statistically robust sample sizes and sampling regimes that will collect a subset of stereo-video length measurements representative of the length distribution in a transfer, and (3) assess the robustness and suitability of the stereo-video equipment in operational conditions. During CCSBT14, Japan offered to contribute a sonar module and the expertise of two engineers to Australia's farm study, and a fourth objective was developed to compare the accuracy of the stereo-video camera with the sonar system supplied by Japan (CCSBT14 paragraphs 209-211).
25. The study obtained SBT (n = 563, approx. 9.6 t) from a 10 t RMA allocated to Australia at CCSBT14. A total of 474 SBT were measured before commencement of the transfers to obtain the true length distribution directly.
26. All 16 transfers were recorded by the stereo-video camera, while 11 complete transfers were recorded by sonar. In most cases, stereo-video length measurements did not differ significantly among transfers. Means of stereo-video length distributions varied by 0-3 cm from the mean of direct length distributions. Models and sampling regimes were developed to predict the direct length distributions from stereo-video measurements.
27. The stereo-video camera proved to be robust and easy to use under operational conditions, and remained calibrated throughout the trials. Minor problems were encountered with the mounting of the sonar module.
28. The DIDSON sonar module measured total length rather than fork length. No conversion factor from total length to fork length was available. Both automated and manual measurements could be taken from sonar imagery. Automated measurements were less accurate than manual measurements. Overall the sonar measurements did not approach the accuracy and precision of the results obtained from stereo-video.
29. Japan thanked Australia for organising the Port Lincoln trials, and requested that Australia consider the issue of converting length data to weights, specifically that Australia start collecting weight and length data on wild SBT on the fishing ground, thereby avoiding any uncertainty arising from weight change during towing. Australia responded that another objective of this project was to explore options for converting lengths to weights, including the use of length-weight data collected from the GAB immediately after capture. However, discussions were ongoing and no decision had yet been reached. Australia agreed to report on any progress at the next ESC meeting.
30. Participants noted that the study provided useful results on the performance of stereo-video equipment, which certainly seemed to hold promise as a monitoring tool in the future, but also questioned whether the study offered an opportunity to correct any potential bias in historical farm catch data. It was suggested that comparisons between the lengths or weights of SBT in the experiment and the 40-fish sample could be explored for this purpose. Australia advised that the study was

not designed to explore bias in the 40-fish sample and that such analysis had not been conducted, but noted that the median length of fish measured from the 40-fish sample (97.3 cm: 95.7-99.5_{95% CI}) and 474 SBT fish in the holding pontoon (99.6 cm: 98.7-100.5_{95% CI}) were similar with overlapping confidence intervals.

31. Participants queried whether the stereo-video measurements could be automated. Australia advised that no steps had yet been taken toward automation, but noted that private researchers within Australia were working on this issue.
32. Paper CCSBT-ESC/0809/46 was presented. The paper summarised further experiments on DIDSON sonar measurements of yellowtail conducted by Japan at Goto Island in July 2008, which were independent of the Australian farm study. The sonar camera produced more accurate results than in Port Lincoln in April 2008. The effect of wave action on the stability and resolution of sonar footage was alleviated by securing the DIDSON module to a submerged pole fixed to the transfer gate. A new automated measurement program had also been developed. When two DIDSON modules were used simultaneously, it was possible to measure total length more accurately in addition to fork length.
33. Australia noted that the sonar camera appeared to operate reasonably well under the conditions of the Goto Island trial but recognized the conditions were not comparable to those of the Australian farming environment, in particular pontoon size. Several technical modifications were considered necessary, if the system was to be functional within Australian commercial farming conditions: i) development of a mounting system that did not rely on a fixed framework secured within the pontoon; and ii) use of lenses with a wider field of view to allow the camera to be set closer to the transfer gate and maintain adequate image resolution.
34. In response to questions on possible double-counting by automated software, Japan replied that only yellowtail swimming forward through the gate had been measured because of the acoustic doppler effect influencing the DIDSON. A new program was being developed to resolve the issue of this effect.
35. Paper CCSBT-ESC/0809/39 was presented. This paper summarised analysis on age composition of farmed SBT based on size data at harvest in 2007. Size frequencies of 168,556 farmed SBT were decomposed into age for each month, and age compositions were estimated as 6% for age 2, 54% for age 3 and 36% for age 4. These estimated age compositions differed appreciably from age compositions reported from the 40-fish sample (9% for age 1, 43% for age 2, 44% for age 3 and 3% for age 4). The paper urged that bias in the 40-fish sample be examined, and that methods of estimating age composition and total weight of catch in the Australian surface fishery needed to be improved.
36. Australia commented that the paper used an approach similar to that of previous reports (including the 2006 Independent Review of Australian SBT Farming Operations Anomalies; CCSBT-ESC/0607/12), albeit with new data, and that criticisms of the assumptions, analysis and input data used in the approach were unchanged from those outlined in the independent review and subsequent peer review (see CCSBT-ESC/0610/21). In particular, the limitations in applying such an approach to farm reared harvested fish, where final harvest weights (and lengths) at

the individual pen and fish level are affected by a range of factors, including different farming and feeding practices; different holding patterns, such as keeping smaller fish longer to bring them up to size; and different growth rates of fish of different ages. Consequently, there is an inherent bias in the input data for such an approach, irrespective of the number of fish sampled. Australia also noted concerns about the bias in the input data from certain frozen fish, as well as packing lists of fresh fish, which are selectively chosen for their large size. Australia further noted that the paper raised awareness of potential bias in the 40-fish sample, and reiterated that it was working on improved catch monitoring techniques including stereo-video.

37. Japan replied that a large amount of data were now available, and that those data include both fresh (n = 29,304) and frozen (n = 139,552) SBT. This amounted to about 50% of the total surface catch by number in the 2006/07 fishing season. Japan noted that the analysis also provided confidence intervals, which were very small. This was not surprising because the modes corresponding to different age classes were clear under visual inspection of the length distributions. Japan emphasised the need for age-frequency data from Australian surface fisheries in which the SAG/ESC can be confident.
38. Australia noted that the sampled SBT for which both length and weight were collected were less than 20% (52,795 individuals) of the total SBT harvested from Australia.
39. Participants then discussed proportions of fresh to frozen imports, and the size-based selectivity of these imports. An industry representative from Australia also questioned whether length-weight data could have been collected onboard Japanese freezer boats in Port Lincoln because of the speed of the processing lines, which cast further uncertainty over the frozen product data used in the age composition analysis.

6.2 Revised experimental design for 2008-09 season

40. Japan recalled the proposed work timetable from the report of the 2007 ESC meeting (paragraph 55), and asked Australia to provide updated information on the 2008-09 stereo-video trials. Australia responded that the scientific assessment of the stereo-video camera is now complete, and that no further scientific testing was proposed for the 2008-09 fishing season. Australia noted that discussions are currently underway regarding potential operational trials to scale up the application of stereo-video to commercial transfers, but that no decision had yet been reached as to the nature of these trials or when they would be conducted. Australia agreed to report on any progress at the next ESC meeting.
41. Participants questioned whether the proposed sampling regimes would be suitable if stereo-video were applied to commercial transfers. Australia responded that sampling regimes were expected to be adequate given the number of SBT in commercial transfers, and that appropriate sampling regimes would be considered and robustly tested in future operational trials.

6.3 Scientific advice/recommendations on Australian SBT farm study from the ESC to the Extended Commission

42. The Advisory Panel questioned whether average weight and/or length data from the 40-fish sample had been compared with the measurement data from the stereo-video as part of the Australian farm study (CCSBT-ESC/0809/12), and whether it was possible to calculate the historical bias in the 40-fish sample. One approach would be to continue with the 40-fish sampling in parallel with the stereo-video system to obtain enough samples from both methods to calculate the potential bias in the 40-fish sample. An industry representative from Australia noted that if stereo-video replaces the 40-fish sample, then the current 10 kg rule in the 40-fish sampling would need to be reconsidered, potentially leading to changed fishing practices where smaller fish are targeted. In such circumstances, a comparison between the stereo-video and 40-fish sample would not reflect the historic size composition of the fishery owing to changed targeting behaviour.
43. An alternative approach to estimate the age composition of the surface catch was proposed by Japan in paper CCSBT-ESC/0809/39. Potential weaknesses of this approach were discussed, including inherent sampling bias and issues with the statistical methodology (see paragraphs 36-39). It was suggested that the modes seen in the data indicate that a mixture modelling approach could, if sampling bias can be addressed, provide useful estimates of the proportions at age. The serious potential weakness is the nature of the samples, whereby larger fish that attract higher prices are selectively chosen for market. The Australian industry identified five classes of markets/fates for SBT in net pens that are potentially size-selective. The first is mortalities, up to 15% of fish put in net pens die before marketing and no length frequency is available for this group of fish. The second category is small fish that are filleted and sent to markets other than Japan. At present this is a relatively small portion of the total production, but there is no length or age distribution available. The third is freezer vessels, where fish are shipped in bulk by Japan. The fourth category is freezer containers, where individual SBT are frozen by Australian companies, placed in containers and sent to Japan. The fifth category is fresh fish, typically selected for their large size and sent fresh to Japan.
44. Estimates for recent years were that 10% of the fish for Japan go fresh and 75-80% go in freezer vessels, leaving 10-15% in freezer containers. It should be noted that these proportions vary from year to year, as do the proportions of filleted fish and mortalities before harvest. To estimate the bias in the estimated age composition of the 40-fish sample it would be necessary (1) to have adequate samples of these three categories, (2) to know the proportion of fish in each of the 5 categories, and (3) to have confidence in a mixture analysis method to estimate ages from the length frequency classes. There was disagreement among participants as to whether the proportion of SBT in each category could be estimated even if there was adequate sampling within each category.
45. The Advisory Panel considered that if the modes were as clear as they were in CCSBT-ESC/0809/39, then results would not be sensitive to these remaining technical issues and the mixture method would provide useful estimates of the age composition in the surface fishery catch. The Advisory Panel also considered that

these estimates could replace the adjustments now made in age composition for historical data if adequate samples could be obtained and proportions in each category estimated. New Zealand and Japan supported the views of the Advisory Panel.

46. Australia argued that bias in the samples would remain in farm reared SBT, irrespective of the number of samples measured, due to individual pen-level grow-out effects (see paragraphs 36-39). In addition, a number of technical issues needed to be overcome in applying the mixture distribution method. Australia felt that there had been no discussion of replacing the current estimates of bias in age composition with analysis using the length modes.

Agenda Item 7. Review of revisions in historical catch numbers and size

47. As discussed by the SAG, there has been no new information to change the unreported catch estimates or the assumptions about the size of historic catches, with the exception of estimates on surface fishery catches and size composition provided in CCSBT-ESC/0809/39. However, participants have differing views on uncertainty associated with analyses and input data used to generate the new information in CCSBT-ESC/0809/39 (see agenda item 6). If new information becomes available it will be examined and, if considered more reliable than the information currently available, will be used in conditioning the operating model. The ESC noted that the same level of scrutiny would be applied to any new information regardless of whether it was obtained from longline or surface fisheries.
48. Although unreported catch estimates were left unchanged by the SAG, new information on the estimated lag between capture and sale at Tsukiji market (provided in CCSBT-ESC/0809/40) was considered. Catch estimates used in the OM were adjusted according to the new lag.

Agenda Item 8. Report on potential genetic tagging

49. Paper CCSBT-ESC/0809/13 was summarised. The paper advised that the SRP tagging program was suspended in 2007, primarily due to concerns about difficulties in estimating reliable reporting rates. The ESC identified two alternative tagging methods that could potentially overcome the issues associated with reporting rates (CCSBT-ESC12 paragraph 112). CCSBT-ESC/0809/13 examines the potential for using genetic tags (DNA ‘fingerprints’) to mark and recapture individuals in place of conventional tags. The use of ‘invisible’ genetic markers overcomes two of the major limitations of conventional tagging programs—tag shedding and non-reporting of tag recaptures—thereby reducing the confidence intervals on the parameters of interest (e.g. F and M). In turn, fewer individuals are required to be tagged for the same level of precision.
50. The paper notes that DNA fingerprinting has been used in tagging programs for other fisheries, including pelagic species, and that the development of large-scale

commercial genetics laboratories has substantially reduced the cost of DNA fingerprinting over recent years. The paper also notes that a set of DNA microsatellite markers is available for SBT (developed as part of close-kin genetics research; see CCSBT-ESC/0809/29).

51. The paper notes that the cost involved in ‘releasing’ a genetic tag at sea would be similar to costs involved in placing a conventional tag and, with the development of appropriate field equipment, should result in the same, or less, stress on the fish as for the conventional tagging program. The cost of tag recovery will depend on how and where sampling takes place, though it was noted that there should be no need for ‘reward’ costs, in contrast with the return of conventional tags. The cost of the genetic analysis of both the ‘tagged’ and ‘recaptured’ samples depends on the number of loci considered. It is expected that further efficiencies associated with a large-scale program would reduce the unit costs.
52. The paper stated that a genetic tagging program would require some design, similar to that required for a conventional tagging program, to determine the number of SBT required for initial capture/release and the number required for recapture.
53. Participants discussed likely total annual costs of tagging and recapture phases. Australia added that the cost per unit for gene tagging would be possibly similar to or less than cost per unit of current conventional tagging. Participants encouraged further work including estimation of total annual costs and sample size design.
54. Participants further identified that samplers would require appropriate training so that genetic contamination of samples could be avoided, and that such training would represent an additional cost.
55. Australia raised the possibility of resuming the conventional tagging program, which would also provide an opportunity to conduct an operational feasibility pilot study for genetic tagging of SBT. This matter is discussed further in paragraphs 100-102.

Agenda Item 9. Report on potential PIT tagging project

56. Paper CCSBT-ESC/0809/14 examines the potential use of Passive Integrated Transponder (PIT) tags in place of conventional dart tags. PIT tags are approximately 11-22 mm in length and are surgically implanted into fish in specific locations. The unique identifier stored within the tag can be ‘retrieved’ by a tag reader that sends a signal to the tag, providing the tag with sufficient power to transmit its identification code back to the reader. This code can be automatically logged for downloading. Historically the tags have been encased in glass, but recently they have become available encased in food-safe surgical grade acrylic plastic.
57. The paper describes important considerations in using this technology and presents the preliminary results from initial field trials undertaken to address some of these issues. The paper concludes that this technology has the potential to overcome issues associated with reporting rates and increase the quality of release and recapture data, particularly if used in conjunction with individual fish marking under a Catch

Documentation Scheme. The use of PIT tags would also eliminate the need for tag rewards, which are currently a large proportion (25-35%) of the cost of the conventional tagging program.

58. The paper identifies two major obstacles that need to be overcome before it will be feasible to use this tagging method: 1) food safety concerns relating to the unintentional ingestion of PIT tags by consumers; and 2) the development of tag readers that can achieve a high rate of tag detection from reasonable distances. In addition to these obstacles, it was noted that the current commercially available tag applicators were not suitable for field tagging programs for SBT, and more efficient and reliable applicators would be required before larger-scale field trials could be initiated. It was also noted that it may be useful to consider combining this technique with gene tagging (CCSBT-ESC/0809/13), if the aforementioned obstacles can be overcome.
59. As discussed at the 2007 ESC (paragraph 95), Japan reminded participants that owing to a domestic food hygiene law prohibiting the sale of food containing foreign objects, including PIT tags, it was impossible for JFA to support the application of PIT tags to SBT. It was brought to participants' attention that tuna heads were also consumed in Japan; thus insertion into cheek muscle was not a viable tagging option for tuna intended for import to Japan.
60. Participants felt that the genetic tag was preferable to the PIT tag.

Agenda Item 10. Report on potential for spawning and feeding ground surveys

61. Paper CCSBT-ESC/0809/15 presents a report on the potential for a spawning ground survey to provide a fisheries-independent time series of abundance. This was requested by the SAG in 2007 to address the issue of uncertainty in the Japanese longline CPUE series from market anomalies and recent changes in management, noting that this is the primary index for conditioning of the OM.
62. The paper collates information on the principles for design of spawning ground surveys from work by the technical sub group of the Experimental Fishing Program working group in 1999, and revises a general guide for potential development of a survey. It was noted that if a spawning ground survey were to proceed, it should be implemented as soon as possible because it would take several years before a time series of trends in abundance became available. In addition to the design principles, suggestions are made for cost-reduction measures, and preliminary development of habitat models and statistical design that would be required. It is expected that such a survey would involve substantial costs to CCSBT Members.
63. Japan provided additional information on spawning and feeding ground surveys that have been conducted in the past. Consideration of the feasibility of any new surveys would need to take into account issues regarding difficulties of surveys, costs and all historical information available from previous surveys. Such information is available in previous reports (CCSBT-ESC/0409/39). Importantly, the catch rate of adult SBT

on the spawning ground was very low in 2000-2003, suggesting that catchability of SBT on the spawning ground is poor.

64. Indonesia suggested that a larval survey should be considered in addition to a spawning ground survey, in order to compare with results from larval surveys conducted by Japan more than 10 years ago. This was suggested in the context of rising water temperatures on, and potential changes in the location of, the spawning ground.
65. The ESC concluded that when considering the potential for a long-term relative abundance index of surveys of the spawning ground, it would be many years before a time series of relative abundance would become available. It was agreed that a spawning ground survey is not a high priority for the ESC at present, particularly given that alternative sources of relevant information are currently being developed.
66. Indonesia agreed to provide a review of information on potential changes in the location of the spawning ground.

Agenda Item 11. Evaluation of a proposal for under and over-catch balancing

67. CCSBT-ESC/0809/10 was presented. The paper outlined a draft under- and over-catch resolution to be considered at CCSBT15, specifying that up to 10% for smaller national allocations (5% or 3% for larger national allocations) may be carried forward from one year to the next. A sliding scale of penalty provisions for over catch is described in the document. CCSBT 14 agreed in principle to the adoption of such a scheme, however, no agreement on the detail of under and over catch provisions was able to be achieved at that meeting, in part because participants felt that it would be appropriate for the ESC to consider the proposal.
68. A small biological gain through growth might be anticipated under this scenario for SBT not taken in the previous year, and the ESC was asked for comments on the biological implications. The ESC recognised the importance of evaluating the effects of under and over catch scenarios on stock status. However, a conditioned OM is not yet available to test such scenarios.
69. The following general statements on the proposal were provided:
 - Penalty provisions are more appropriately considered by the CCSBT Compliance Committee;
 - Australia advised that the introduction of such measures should only be considered once a comprehensive Catch Documentation Scheme is established; and
 - Japan provided in principle support for formalizing a 'payback' system for overcatch noting that: i) implementing a 'payback' system is likely to have positive conservation outcomes; and ii) CCSBT does not have a formal 'payback' rule.

Agenda Item 12. SBT assessment, stock status and management

12.1 Review of fisheries indicators

70. The ESC reiterated the observations stated in paragraphs 66 to 71 of the SAG9 report that:
- There are a range of indices that may reflect abundance of SBT at different ages. All indices were converted by the appropriate time lag to reflect year class strength (see Attachment 6), although each index can be affected by differential vulnerability to the sampling method/area and previous exploitation. Using these indices as representing year class strength the SAG agreed to the following:
 - The indicators continue to support the previous conclusion of poor 2000 and 2001 year classes. The evidence is stronger now that the 2002 year class was also poor. The status of the 2003 year class is unclear, but there are indications of a better year class in 2004 for a number of the indicators (Table 1). Overall recruitment levels remain lower than the 1990s and considerably lower than the 1980 estimates.
 - The size distribution in the New Zealand charter longline fishery and in the Japanese longline fishery both indicate poor 1999, 2000, 2001 and 2002 year classes (though the latter indicator is subject to potential bias due to the catch anomaly). The Australian scientific aerial survey fluctuates without trend from 1994 to 2005, however year class strength in terms of this index was on average three times higher for the period 1990-1993. The commercial spotting (SAPUE) index shows particularly low year class strength for 2000 and 2001 (these were 2 of the 4 years when the scientific aerial survey did not take place). The high fishing mortality rate estimates for age 3 and 4 from recent SRP tagging suggest low year class strengths between 2001 and 2003. Trends in CPUE at ages from the Japanese longline fleet show poor strength of the 1999-2001 year classes, but preliminary indications are that the 2003 and 2004 year classes may be larger. This is also shown in the New Zealand longline and the trolling indices. The trolling index shows similar trends to other indices for year classes 1995-2001, with a rapid increase since then (however this is confounded by a design change in 2005) The acoustic index shows a decline in year class strength since 1996, followed by low year classes from 1999 (see Table 1).
 - The base case of the OM is broadly consistent with the indicators described above. The model indicates year class strengths since 1991 have been lower than in previous decades and that the 2000-2002 year classes were the lowest on record.
 - Reported catch rates of fish aged 12 and older in the Japanese longline indicate a drop in spawning stock biomass between 1993 and 1998; since 1998 this index has been stable. The catch anomalies make interpretation of CPUE less certain. The increase in tonnage of the Indonesian catch in 2004-2005, as well as the increase in proportion of SBT in a component of the Indonesian catch, was associated with a possible shift in the behaviour of the Indonesian fleet to target SBT south of the spawning ground. The average age in the Indonesian catch declined from about 21 years prior to 1998/1999 to about 15 since 2001/2002 and has remained the same since then.

- Reported Japanese longline CPUE of SBT for all ages combined suggests that the exploitable biomass for this fleet has remained fairly constant during the past 10 years, though this level is low compared to historical values. Confidence in this indicator has diminished considerably due to the uncertainty associated with catch anomalies. Reported CPUE indicate increases in the CPUE of ages 8-11 since about 1992, but there is a slight decline in 2003 and 2004, with a slight increase in 2005, and 2006 is similar to 2005. Reported CPUE of fish aged 4-7 has increased since the mid 1980s but has been declining in recent years.

12.2 Use of constant catch projections from operating model as a basis for management advice in 2009

71. The ESC also reiterated the observations stated in paragraphs 72 to 75 and 77 of the SAG9 report that:

- The SAG agreed that the basis for management advice at this time would be the reconditioned operating model, in conjunction with an evaluation of current stock status and recent recruitment based on indicators. The conditioning of the operating model would be broadened to include some of the available indicators. The indicators that were evaluated for inclusion in the operating model at the SAG included the aerial survey and trolling index. The development of methods and code for inclusion of information from recent (SRP) tagging data was considered a high priority for the intersessional period.
- It was agreed that management advice in 2009 could be based on constant catch projections from the reconditioned operating model, and an evaluation of current stock status and recent recruitment based on indicators, in contrast to a fully developed Management Procedure.
- Options for constant catch projections were discussed. Five alternative future constant catch options were suggested: 1) TAC in 2009, 2) TAC 2009 + 2000 t, 3) TAC 2009 - 2000 t, 4) TAC 2009 + 4000 t, and 5) TAC 2009 - 4000 t. The ESC should seek advice from the Extended Commission on these choices for constant catch projections. The year in which TAC would change for future catch projections is 2010.
- The reference points to be reported from constant catch projections were suggested to include:
 - probability of $B_{2014} > B_{2004}$,
 - probability of $B_{2014} > B_{2008}$ ¹,
 - medians and lower 10th percentiles of B_{2014}/B_{2004} , B_{2014}/B_{2008} ¹, B_{2022}/B_{2004} , B_{2022}/B_{2008} ,
 - medians of B_{2008}/B_{1980} , B_{2008}/B_0 ²,

where B is spawning biomass.

¹ To reflect previous advice on risk of further short term decline in spawning stock biomass and therefore possible future declines in recruitment

² To reflect current stock status relative to historic reference point and unfished biomass.

- The SAG drew the attention of the ESC to its previous caution on the interpretation of constant catch predictions for the medium to long term, in the absence of feedback decision rules (i.e. an MP), the low level of spawning stock biomass and low recent recruitments.

12.3 Status of the SBT stock

72. At the 2008 SAG meeting the operating model was run under a number of scenarios that are generally similar to those evaluated in 2006. The scenarios indicate that spawning stock biomass is still at a very low level (generally below 10% of pre-exploitation spawning stock biomass, a level at which recruitment may be at risk of further decline). This is well below the 1980 level and 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. Presently, however, there is no sign of spawning stock biomass rebuilding.
73. Recruitments in the last two decades are estimated to be well below the levels in the period 1950-1980. All scenarios suggest that recruitment in the 1990s fluctuated at a low level with no overall trend. Analysis of the average of all indicators suggest historically low recruitments from 1999-2002. The indicators suggest that 2004 and 2005 year classes are stronger and close to the average of the 1990s.
74. Consistent with the poor recruitment from 1999 to 2002, a gap in the size (and presumably age) composition is apparent. By inference this gap will lead to a further decline in spawning stock biomass in coming years.
75. The ESC updated the annual report on biology, stock status and management of SBT that it prepares for provision to FAO and the other tuna RFMOs. The updated report is at **Attachment 6**.

12.4 SBT management recommendations

76. In the light of the current stock status and concerns, management advice is as follows.
77. Positive factors affecting sustainability of future catches are:
 - the reported catch has been reduced; and
 - indicators suggest that the 2004 and later year classes are not as low as the 2000, 2001, and 2002 year classes.
78. However, there remain serious sources of concern from new and previous information including:
 - a very low spawning stock;
 - at least three poor recruitments in the recent past which will lead to a further decline in spawning stock biomass;
 - a general decline in recruitment since about 1970, coincident with declining spawning stock sizes;

- increased exploitation rates, particularly on recent weak year classes;
 - overall, exploitation has shifted towards younger ages, the abundances of which are poorly estimated; and
 - there is the potential for increasing exploitation rate with declining recruitment, which would pose a serious risk to rebuilding.
79. The ESC notes that given the current reported catch and previously reported constant catch projections (SAG 7), the stock is likely to rebuild very slowly in the long term. However, there is about a 50:50 chance that the spawning stock will decrease over the next 6 years. The possibility of further decline is of concern.
80. The ESC recognises the CCSBT has set a constant TAC until 2009. However, given the current stock status, the ESC recommends that the Extended Commission consider:
- **Reducing fishing mortality by immediately eliminating all unreported/under-reported catches.** The 2007 ESC also made this recommendation, as follows: *“To ensure a high probability of stock rebuilding, all unreported and under-reported catches must be eliminated...”*; and
 - **Applying a broader suite of technical measures after the 2009 fishing season. If the Extended Commission so decides it should seek specific advice from the ESC.**
81. The ESC makes the additional **recommendations**:
- **A management procedure needs to be adopted by no later than 2011 as a basis to guide management advice.** The 2007 ESC also made this recommendation, as follows: *“... a management procedure needs to be adopted as a basis to provide TAC advice in 2011 or 2012 when catch quotas will again be reconsidered by CCSBT. A work plan has been agreed to advance the development of an MP, with initial emphasis placed on re-conditioning the operating model and refining the scenarios used for testing different candidate decision rules, and the extent to which they will result in management objectives being achieved in the face of uncertainties.”*
 - **Reduce uncertainty about historical catch and effort.** The 2007 ESC also made this recommendation, as follows: *“While some progress has been made towards development of new historical CPUE series, further work is needed to reduce the uncertainty about historical catches (including that associated with possible bias in the 40-fish sampling used to estimate size composition and mean weight of the surface catch), and to evaluate the effect of market anomalies on CPUE and determine appropriate adjustments.”*
 - **Accurate future catch and effort reporting needs to be ensured.** The 2007 ESC also made this recommendation, as follows: *“In terms of future data, accurate catch and effort estimates are critical to any stock assessment or management procedure. There needs to be assurance that these data are accurate through some combination of comparison of data from vessels with and without observers, and other monitoring and compliance measures, including the possibility of further market and farming monitoring. Increased levels and*

quality of observer coverage would increase the value of these analyses as well as the value of information from tagging programmes, though this needs to be considered in the light of cost and benefit analyses. Also, monitoring of recruitment and of the spawning biomass must continue, and where possible, be improved.”

- **Consider using a wider range of indicators within MPs to guide management.**
The 2007 ESC made this recommendation, as follows: “*Previous MP development used LLI [Japanese longline] CPUE and its age structure as the sole input. The ESC agreed that future MPs should be based on inputs from a broader range of indicators.*”
- **Reliable indices of recruitment and spawning biomass need to be developed and maintained long-term.**

82. In summary, the ESC stresses to the Extended Commission that the SBT stock is in a very poor state, that management decisions must take serious account of this, and that adoption by 2011 of a management procedure to guide TAC setting must be given a high priority.

Agenda Item 13. Review of ongoing data collection and analysis

13.1 Characterisation of SBT catch

83. Paper CCSBT-ESC/0809/17 was prepared in response to requests from CCSBT-ESC12 and CCSBT-EC14, and outlined all available information on Australian recreational fisheries for SBT including current management arrangements and broad options for ongoing catch monitoring. The ESC noted that there is currently no reliable data on the size and magnitude of catches of SBT taken by recreational fishers. The ESC welcomed advice that Australia would consider options for estimating recreational catches in more detail over the next 12 months and will report on progress at the next ESC meeting. Participants noted that while it would be preferable to adopt a comprehensive monitoring program capable of providing robust estimates of recreational catch, the cost-effectiveness of such a program will be an important consideration.
84. Paper CCSBT-ESC/0809/18 reported on the longline catch of SBT and other tuna and billfish species landed at the Benoa Fishing Port, Bali in 2007. SBT landings in Benoa were reportedly higher in 2007 (1916 t) than in 2006 (1664 t), but were still well below 2003 and 2004 levels. The ESC were advised that the higher catches observed in 2007 were thought to be the result of increased activity within the Benoa-based fleet in addition to landings from vessels previously based at Muara Baru. However, high fuel price rises were also reported to have had an appreciable impact on fleet operation and behaviour. Preliminary catch estimates for SBT landings at Benoa during January to May in 2008 (455.3 t) are substantially lower than for the same period in 2007. The ESC was advised that 2007 landings from ports other than Benoa were not yet available.

85. Paper CCSBT-ESC/0809/40 was presented at SAG8 (paragraph?) and summarised under this agenda item. Data from management tags attached to SBT caught by Japanese longliners and sold at Tsukiji were collected and analysed to determine the time lag between catch and sale at market. The research was conducted once a month from October 2007 to August 2008, and data on 829 individuals were collected. Mean annual proportions of SBT sold in year *i* were calculated as 7% caught in *i* year, 86% caught in year *i*-1, and 7% caught in year *i*-2.

13.2 CPUE interpretation and analysis

86. CCSBT-ESC/0809/37 was presented. This paper investigates the change in operational pattern and numbers of operations of Japanese SBT longliners in 2007 resulting from the introduction of the individual quota system in 2006. While the number of operations per 5x5 degree square in a month decreased considerably, the spatial-temporal distribution of operations has not changed much from 2006. The author noted that the interpretation of observed and potential changes in operation and catch is difficult because there are many possible causes. The factors involved include the change in fishery management, the decrease of the Japanese quota, and the increase in fuel prices as well as other socio-economic factors.
87. A question as to whether quota can be transferred between vessels was asked. In response it was advised that quota can only be transferred between vessels under the same ownership. The author was also asked whether there were many vessels that operated in all three fishing areas. The author stated that the data were not analysed in this level of detail, but that it was not likely that each vessel operated in many areas due to their limited quota.
88. Some participants noted that this work reinforced the need for continual monitoring of the CPUE series in terms of change in fleet behaviour.
89. CCSBT-ESC/0809/19 was summarised for the ESC. This paper reviews progress made in addressing the influence of the uncertainty due to overcatch on the CPUE. While some progress has been made, it has been limited, especially in relation to the impacts of the unreported catches on the CPUE. This paper outlines exploratory analyses that look at improving the CPUE data, e.g. investigating the potential for changes in the spatial distribution of the SBT stock in relation to the spatial distribution of fishing effort. In light of the limited progress, this paper recommends using fishery independent data and investigating analyses to make the CPUE data more reliable. CCSBT-ESC/0809/30 gives more details on the rationale for and potential approaches to providing management advice using more fisheries independent data sources.

13.3 Scientific observer program

90. Updates on the Australian, Indonesian and Japanese observer programs were provided. The ESC referred to papers CCSBT-ESC/0809/20, 0809/32 and 0809/SBT Fisheries-Australia. **Attachment 4** summarizes the observer coverage and activity by country.

91. The ESC noted the Indonesian observer program was established as part of collaborative capacity building project with Australia, scheduled for completion in December 2008. Participants commended Indonesia for implementing a successful trial observer program and encouraged Indonesia to continue the program beyond the trial phase. Indonesia advised that the project team were working to develop a national fisheries observer program that would cover a range of fisheries, including SBT.
92. In response to questions from participants, Indonesia confirmed that their observers were Indonesian and had been trained for 1 month before deployment, with some holding university degrees in fisheries and some graduating from fisheries high school. Indonesia advised that ongoing funding arrangements for both training and salaries were being considered. It was likely that many observers would be trained by private institutes in the future, and it was hoped that Indonesian observers would be made available to foreign fleets, notably fleets from East Asia.
93. With regards to the Japanese observer program, participants sought advice on whether Japan had plans to increase its coverage rates in the future and, if so, to what level. Japan advised that its observer program was constrained financially and anticipated that it would be difficult to expand beyond current levels. Japan stated it would try to maintain current levels but noted that this will depend on the number of vessels active in the SBT grounds.
94. Paper CCSBT-ESC/0809/38 was presented. This paper provides detail on scientific observer coverage by time and area, and length frequency comparisons between observed and non-observed operations. The paper also considered the difference between ex-fisher and other observers and concluded that there was no substantial difference between standardised CPUE for these two types of scientific observers. It was noted by some participants that there was a statistically significant observer effect within the model.

13.4 SBT tagging program

95. The Secretariat presented paper CCSBT-ESC/0809/07 which summarised activity for the CCSBT SRP tagging program for 2007/08. Following the ESC's review in 2007, the tagging program was suspended for 2007/08 and consequently the Secretariat's efforts for the tagging program were limited to tag recovery. As at 21 July 2008, a total of 8,519 SBT had been recaptured as part of the SRP tagging program. Most SBT (7,446) were recovered from the farms at Port Lincoln, but 766 were recaptured from wild commercial fishing, 169 from research (tagging) cruises, 91 from amateur fishers and 47 from other sources including tags found on beaches. A variety of mechanisms were in place for recovering tags, including an agent in Port Lincoln, Taiwanese and Indonesian representatives in Mauritius and Benoa respectively, promotion by Members' fishing authorities and recreation fishing associations, and observation on board freezer vessels. The cost of tag recoveries in 2009 is expected to be \$20,000 less than in 2008 because the number of tag recoveries from farms is expected to be only about 60% of 2007 levels due to the lack of tagging in 2007/08.

96. The ESC considered the resumption of the CCSBT conventional tagging program in 2008/09. It was noted that tagging can be expensive, and that the relative cost of projects should be considered by the ESC when setting priorities and determining the work plan for 2009 (SC agenda item 17).
97. Japan's tagging information was presented (CCSBT-ESC/0809/34). During July to October 2007, onboard researchers released SBT with archival tags (n=51) and PAT tags (n=10) in areas 2 and 8 from a Japanese longline vessel. Japan also conducted conventional tagging as part of CCSBT tagging for mainly age-1 SBT (n=193) in the trolling survey in January 2008. From the Japanese longline vessels, 100 individuals with conventional tags were recovered between September 2007 and July 2008.
98. There was general concern about the low return rates of archival tags released by Japanese longline vessels (~4%). The question was asked whether this could be due to high tag-related mortality. The fact that 8 out of 10 PAT tags released by Japanese longline vessels popped up some period after release suggests that many SBT survive the tagging process, and that tag-related mortality may not be a serious issue. It was suggested that longline vessels tend to tag larger fish that are less likely to be caught in the GAB fishery, and this may contribute to the low return rate.
99. Paper CCSBT-ESC/0809/21 provides estimates of reporting rates from the surface fishery based on tag seeding experiments, and CCSBT-ESC/0809/22 provides an updated analysis of the tag return data from the SRP tagging program. These two papers were already presented in detail during the SAG. Concerns about interpretation of the recent SRP tagging results, due in part to low reporting rates in recent years in the surface fishery and the lack of information about reporting rates in the longline fisheries, led to the CCSBT tagging program being suspended last year. In response, two alternative types of tagging were reviewed: genetic tagging (paper CCSBT-ESC/0809/13) and PIT tagging (paper CCSBT-ESC/0809/14). The ESC concluded that genetic tagging is a more viable approach than PIT tagging (see agenda item 8 and 9).
100. Australia proposed on behalf of the ESC that tagging be resumed in 2009. The proposal included: 1) conventional tagging, and 2) a genetic tagging field trial. The aim of the tagging program is primarily to provide estimates of fishing mortality, with natural mortality and abundance as a secondary outcome. It also provides valuable information about migration patterns of juvenile fish. Background information on the conventional SRP tagging operations conducted by the CCSBT was provided. It was noted that the information this program would provide on exploitation rates of younger fish is of particular importance. The genetic tagging trial would refine methods to be applied in future in a large-scale program.
101. Some of the concerns with reporting rates that led to conventional tagging being suspended in 2008 have been identified and are being addressed; in particular, the issue of low returns from freezer vessels.
102. The ESC decided that instead of implementing both a conventional tagging and genetic tagging field trial in 2009, intersessional work should be conducted on the feasibility of a genetic tagging program. This would involve developing a proposal that addresses the sample sizes required to achieve reasonable precision and the costs

associated, and the operational and training requirements for implementing a large scale program. This should be developed collaboratively by Members.

103. CCSBT-ESC/0809/29 was presented. This paper provides an update on progress of the close-kin spawning abundance estimation project. While this project is not part of the SBT tagging program, it was noted that it is relevant to this agenda item in the context of the potential to combine estimates of fishing mortality from tagging with estimates of spawning biomass from the close-kin approach to inform an MP. Participants were referred to CCSBT-ESC/0709/18 for a full technical description of the approach, design considerations and robustness to various assumptions. The paper notes that funding for the project has been secured, and that an international steering committee has been established to provide technical review and to communicate project progress and developments to key management and policy personnel. Participation of ESC members in the steering committee was welcomed. The results of more extensive analyses of the microsatellite loci were provided, which demonstrate that the original sampling design should achieve the stated level of precision. The project schedule includes reporting of a preliminary estimate to the SAG and ESC at the 2009 meetings, with an estimate based on the full sample size scheduled to be available and presented to the 2010 meetings.
104. In presenting the paper it was noted that, if successful, the close-kin approach would provide an absolute estimate of biomass of the SBT spawning stock, and that this could potentially be combined with estimates of fishing mortality from conventional tagging to provide the basis of an MP using only fisheries-independent data. It was emphasised that, while the close-kin approach was new methodology, it provided a basis for substantially reducing the large uncertainty in current spawning stock status.
105. In response to an enquiry as to whether the close-kin approach has been applied in other fishery situations, it was noted that it has been applied to a sub-stock of whales by the IWC. However, there are difficulties in this particular case (such as age determination and sampling of spawning adults) that do not apply to SBT.
106. The ESC expressed support for the close-kin project, and are hopeful that it will be able to provide absolute estimates of spawning stock. Such estimates are seen as highly important given that information on the current spawning stock is limited, despite rebuilding of this component of the stock being the primary management objective.

13.5 Recruitment monitoring

107. Paper CCSBT-ESC/0809/24 was presented on the scientific aerial survey for juvenile SBT in the Great Australian Bight (GAB). Total search effort declined steadily from 1994 to 2007, but increased in 2008 due primarily to good weather conditions in March. The sightings rate in 2008 was among the highest of all survey years, but the average patch (i.e. school) size was the lowest. The point estimate for 2008 is higher than the estimates for 2005 to 2007, but remains appreciably below the average level in the mid-1990s. Furthermore, the 90% confidence interval on the

2008 estimate overlaps with the confidence intervals for the 2005 to 2007 estimates, so the increase cannot be considered statistically significant.

108. Paper CCSBT-ESC/0809/25 was presented; this provides an update of the commercial spotting SAPUE index. Data on the sightings of SBT schools by experienced tuna spotters during commercial spotting operations in the GAB were again collected between December 2007 and March 2008, resulting in seven consecutive seasons of data which can potentially be standardised to obtain an index of juvenile abundance (ages 2-4 primarily) in the GAB. The index is lowest in 2003 and 2004, close to average in 2006 and 2007, and highest in 2008. It is important to consider these results, especially the 2008 estimate, in the context of the much longer scientific aerial survey index of abundance (CCSBT-ESC/0809/24). This aerial survey index, which shows a similar pattern for the period of overlap (2005-2008) with the SAPUE index, still estimates the 2008 index as being below the long term average over 1993-2008.
109. Japan asked if it was possible to use purse seine CPUE for recruitment monitoring. It was noted that because of the nature of purse seine fishing operations, the CPUE index is not likely to be informative. CCSBT-ESC/0809/36 Fig 2.1 provides an examination of these data.
110. Papers CCSBT-ESC/0809/41, 42, 43, 44 and Info 2 were presented.
111. The result of the trolling survey in Western Australia for age 1 SBT in 2007/2008 were presented in CCSBT-ESC/0809/41. In January 2008, the trolling research survey was carried out for 13 days by chartering an Australian vessel and the straight research line (piston line) off Bremer Bay was repeatedly surveyed for five days. The area adjacent to the piston-line and the area between Esperance and Albany were also surveyed. The trolling index, the number of SBT age 1 school per 100 km searched, was higher for the 2005-2007 year classes than the 1995-1998 year classes comparing the trolling survey and the trolling catch data in the earlier acoustic surveys.
112. CCSBT-ESC/0809/42 and CCSBT-ESC/0809/Info-02 were presented and provide the results of the acoustic tagging between 2005 and 2007. They showed the distribution and movement patterns of age 1 SBT in the southern coast of Western Australia and discussed its relation to oceanographic conditions. CCSBT-ESC/0809/44 was also presented to provide the result of the acoustic tagging in 2008.
113. A proposal for recruitment research for age 1 SBT in Western Australia in 2008/2009 was presented in CCSBT-ESC/0809/43. It includes the trolling survey, as well as the acoustic and archival tagging. The troll survey will be carried out in a manner consistent with previous years. The CCSBT conventional tags will be used in the survey. The Secretariat was thanked for their assistance and support for this project.
114. Japan was asked if there were plans to calibrate the new trolling survey to compare the index values with the past acoustic survey between 1996 and 2006, noting that the 3 years of data from the new piston line trolling survey gave high estimates with larger variance compared with the acoustic survey data from earlier years.

115. Japan responded that the trolling survey was designed initially to give relative recruitment strength in terms of a low, medium and high recruitment, rather than a quantitative index. The trolling survey has replaced the acoustic survey as a more cost effective method. Ideas for improvement to the design and analysis would be welcomed.
116. In reference to Figure 9 in paper CCSBT-ESC/0809/42 showing sea surface temperature (SST) data from the survey area, the question was asked how the trend in SST would influence interpretation of the trolling index. Japan had noted some interesting preliminary results regarding the relationship between SST and distribution of these 1+ age fish, but was waiting for more years of data before drawing conclusions.
117. Three main areas for the focus of additional work in the trolling and acoustic tagging surveys were suggested: the space and time strata for the survey, and the form of analysis and methods used. This would include addressing: 1) issues of whether the survey covers the area before or after the expected split in age 1+ fish movement down the WA coast, and whether it covers inshore and offshore strata sufficiently; 2) temporal issues such as time of day, tide cycle, and period within migration season, 3) analysis methods to address the potential for autocorrelation from multiple encounters of individual schools. It was suggested that these issues be incorporated in next year's work. The ESC encouraged further consideration of these issues. Details will be discussed intersessionally.

13.6 Direct aging

118. Activities of otolith collection and direct age estimation in 2007 in Japan were presented in CCSBT-ESC/0809/33. Otoliths were collected from 636 SBT individuals in 2007. Ages were estimated for 190 SBT individuals that were caught in 2005 and the data were submitted to the Secretariat.
119. CCSBT-ESC/0809/26 was presented relating to the otolith collection activities for 2007/08 and estimation of age and proportion at age for the Australian surface fishery for the 2005/06 and 2006/07 seasons. Otoliths were sampled from 308 SBT caught in the surface fishery during 2007/08, and 18 were collected during the acoustic tagging operations in Western Australia. Since there was no conventional tagging in 2008, additional otoliths could not be collected, and it is likely that the resulting age-length key will have "missing rows" where there are no age estimates for the smaller length classes. Of the otoliths collected in the previous two seasons (2005/06 and 2006/07), age was estimated from 198 fish ranging in size from 42-142cm. Proportions at age in the catch were estimated using age-length keys. These showed that the age distributions in seasons 2003/04-2006/07 were similar (ages 2 and 3), but that seasons 2001/02 and 2002/03 were different with most fished aged 3 and 4. Parametric analysis approaches have been developed, and should be pursued when decisions are made to use the ageing data in stock assessments / conditioning operating models.

120. CCSBT-ESC/08009/27 was presented regarding otolith collection and direct ageing activities in the Indonesian longline fishery. Otoliths were sampled from 1586 SBT caught by the Indonesian fishery in the 2006/07 season. 500 were selected for age estimation. Age distributions were estimated for the spawning population on the spawning ground. The age distribution for SBT caught south of the spawning ground was estimated separately. A slight bias in age estimates from one of the readers was detected and is being further investigated; therefore the results for 2006/07 season are preliminary and will be updated in 2009.
121. The interesting changes in the sex ratio over time, and difference in mean length by sex for Indonesian caught SBT were noted by the ESC. It was suggested that a simple comparison between the existing growth curve and these new data should be included in the work plan to check for consistency.
122. Regular cross-lab comparisons for quality control of ageing methods were suggested to avoid drift in age estimations occurring over a long period. It was noted that a direct ageing workshop was held in 2002 and the Report of the Direct Age Estimation Workshop (June 2002) is available on the CCSBT website.
123. It was noted from the New Zealand fishery report (CCSBT-ESC/0809/SBT Fishery New Zealand) that otolith collection activities were continued in the charter fishery in 2007. 714 otoliths were collected, and a sub sample of otoliths collected from 2001-2007 have been aged.
124. It was noted from the Taiwanese fishery report (CCSBT-ESC/0809/SBT Fishery Taiwan) that otolith collection activities were continued in 2007, with 191 otoliths collected by observers in 2007.

Agenda Item 14. Management Procedure

14.1 Inputs to the operating model

125. The ESC noted that the SAG had thoroughly discussed the inputs to the OM. In particular, the merits of using indicators in the conditioning of the OM were discussed. The indicators considered for inclusion were the scientific aerial survey index, commercial spotting (SAPUE) index, trolling survey index, NZ CPUE data and 2001-2007 conventional tagging data. Given the time constraints of the meeting, only the possibilities of including the scientific aerial survey, SAPUE and trolling survey indices in the OM code were explored.
126. The incorporation of the scientific aerial survey in the conditioning of the OM was agreed, in preference to the SAPUE, as the former follows a scientific design; inclusion of the troll survey was explored and will be considered further in the future following further exploration. The NZ CPUE index and 2001-2007 conventional tagging data were discussed briefly and recommended for further consideration during intersessional work. The group also noted that further consideration should be given to the way that the earlier tagging data had been incorporated in the model, as it is likely that improvements to the methodology could be made that would make greater use of the potential information on natural mortality.

127. The ESC noted the SAGs discussion of CCSBT-ESC/0809/40. This paper presented an examination of the time lag between catching SBT and selling at the Tsukiji Fish Market, based on records of the management tag attached to SBT caught by Japanese longliners. The mean annual proportions of fish sold in year i were calculated as 7% caught in year i , 86% of caught in year $i-1$, and 7% of caught in year $i-2$. The paper stated that the lag was indicative of 2007-08 only and that simply applying this lag to years before 2007 was questionable. However, the method of calculating the 2007-08 lag was considered to be more appropriate than the approach used in 2006 to calculate the lag as 70% in year $i-1$ and 30% in year $i-2$.
128. The ESC confirmed the SAGs recommendation that if and when new information is provided on the unreported catch estimates, it would be examined. If the new information is more reliable than the current information, the new information will be used in conditioning the OM.

14.2 Reconsideration of operating models

129. The ESC noted that the MP Working Group evaluated the influence of a range of scenarios on the goodness of fit of the OM (SAG9 paragraphs 87-96). After detailed discussions of the results of these exploratory runs, a base case model was selected to be used in further conditioning and robustness testing. This base case was agreed to be:
- LL1 overcatch scenario based on Case 1 of the market review report.
 - Surface fishery overcatch scenario of 20%.
 - CPUE scenario $S = 25\%$ (25% of the unreported catch attributed to the LL1 reported effort).
 - CPUE data up to and including 2006.
 - Lower bound on CPUE $CV=0.20$.
 - OM fitting to the aerial survey with selectivity 0.5/1/1 for ages 2/3/4.
 - LL1 selectivity blocks changed in 2006 and 2007, and every 4 years prior to that with $CV=0.5$.
 - LL2 selectivity blocks: pre 2002, 2002-2005, 2006-2007.
 - Other assumptions retained as in previous OM.
130. The ESC agreed with the SAGs recommendation that the assumptions specified for the base case would be used for conditioning the OM in 2009. In particular, the scientific aerial survey would be included in the base case, and the two CPUE series estimated by the CPUE working group including data only to 2006.
131. In considering the SAG report in relation to scenarios for which constant catch projections would be examined in 2009, the ESC endorsed a Reference Set based on the base case and the integration of uncertainty along a number of factors specified in the revised grid (Table 2 of SAG9 report).
132. In addition, the following further factors were considered important to include amongst the scenarios to be used to span a plausible range of hypotheses.

1. Effects of overcatch on CPUE: S=50% and S=75%, where S is the proportion of longline overcatch attributed to the reported effort.
 2. Japanese longline overcatch scenario based on Case 2 of Market Report.
 3. Projected recruitment deviates uncorrelated to historical estimates from conditioning.
 4. Inclusion of troll survey data.
 5. Increase the CV on CPUE to 0.30 and set the additional process error estimated for the aerial survey (τ_{aerial}) to 0.
 6. Use likelihood-based weights for M0, M10 and omega for grid integration.
133. In the light of examination of the results obtained, either or both 3) and 6) might replace the current approaches for these aspects in the Reference Set.
134. For an exploratory investigation of the implications for results, the following scenarios would also be run:
- Truncate CPUE series in 1992.
 - Use five historical CPUE series (i.e. incorporate three more series in addition to w0.5 and w0.8)
 - Break the CPUE into two time series, the second starting in 1986.

14.3 Possible MP options and modelling implications

135. The ESC noted the discussion by the SAG on CCSBT-ESC/0809/30. This paper proposes a shift away from relying on catch and CPUE as the primary inputs in an MP, and the development and testing of MPs using indicators based on fisheries-independent data. One of the main reasons for this suggested shift in focus are concerns about the scientific credibility of work based on the catch (and associated CPUE) scenarios and the lack of the required information on the characteristics of the unreported catches (see CCSBT-ESC/0809/19). The paper also outlined an approach to the development and testing of a MP based on fisheries independent data, largely focussed on different tagging approaches. The paper acknowledges that there would be important issues that would need to be resolved and time involved in developing and evaluating this form of MP. Not the least of these would be the development and conditioning of an appropriate testing framework, which would necessarily be spatial. However, this would be likely to result in a more robust MP.
136. The ESC noted that it would not be able to develop a new MP, test it under a conditioned OM and adopt it before the 2010 meeting. The ESC supported the SAGs recommendation for further work on the concept of broadening future decision rules, the MP and the OM to include indicators and/or fishery independent data, noting that this process could incorporate the concepts outlined in CCSBT-ESC/0809/30.

14.4 Performance criteria

137. The ESC noted that a formal MP was not discussed during the SAG meeting. However, it recognised that performance criteria were developed in previous MP testing and these could be used as a starting point for developing future performance criteria.

Agenda Item 15. Data exchange

15.1 Requirements for data exchange in 2009

138. The requirements for the 2009 data exchange were discussed and agreed in the margins of the meeting. These requirements were endorsed by the ESC and are provided in **Attachment 7**.

Agenda Item 16. Research mortality allowance

139. Japan presented CCSBT-ESC/0809/45. This paper detailed the use of 154 kg (from 1 t) of RMA in 2007/08, and outlined an application for a 1 t RMA for 2008/09 for recruitment surveys, including the trolling survey.
140. The ESC endorsed Japan's application.
141. Australia presented CCSBT-ESC/0809/31. This paper outlined an application for a 10 t RMA for 2008/09 for two initiatives: (1) deployment of pop-up archival satellite tagging projects on adult SBT, in particular in the Tasman Sea in collaboration with NZ, and continued release of archival tags on juvenile SBT off Southern Australia and South Africa in collaboration with Taiwan; and (2) a proposal for resumption of conventional dart tagging and/or an operational pilot project for gene tagging.
142. Participants questioned why an RMA was required for tagging projects in which the intention was to release SBT alive. Australia responded that an application for RMA was simply a precaution in case e.g. longlines set to capture SBT for tagging projects caught a large number of SBT. It was not anticipated that a large proportion of the RMA would be used.
143. The ESC endorsed Australia's application.

Agenda Item 17. Workplan, timetable and research budget for 2009

144. The ESC encouraged Japan to continue the trolling survey and for the Secretariat to provide administrative support to Japan to assist the implementation of the survey for 2009.
145. The ESC developed a workplan for 2009 that focuses on the need for the ESC to provide stock assessment and management advice to the Extended Commission in 2009. In developing the workplan, the ESC also considered the structure for

scientific meetings in 2009 as described in **Attachment 8**. The workplan has the following key elements, which are described in Table 1.

- Continuation of tag recovery efforts, including freezer vessel observations;
- Further development of the CPUE series;
- Updating the operating model to provide stock status and management advice and to conduct further development towards an MP; and
- Holding a combined SAG/ESC meeting, with a single agenda for finalising the assessment and providing management advice to the Extended Commission.

Table 1: Summary of the ESC workplan for 2009.

Activity	Approximate Period	Resources or approximate budgetary implications ³
Provide SBT Stock Status report to the other tuna RFMOs.	Sep.-Nov. 08	N/A
National scientists to prepare evaluations of technical measures in response to CCSBT requests	Nov. 08 – Jul. 09	N/A
Data Exchange	Nov. 08 – Jul. 09	N/A
Continuation of tag recovery efforts	Tag recovery is continuous.	\$90,000 for tag recovery.
Further development of the CPUE series. See Attachment 9 for further details.	Dec. 08 to Sep. 09. Webinars/meeting in: <ul style="list-style-type: none"> • Feb. 09 • Apr. 09 • Jul. 09 	Development of papers by scientists and discussion at either 3 webinars or 2 webinars and the small technical meeting. No interpretation. 6 panel days.
Update the operating model to provide stock status and management advice (first priority) and development of the MP (second priority). See Attachment 10 for further details. This will include preparation of a report from the meeting.	Dec. 08 to Sep 09. A 5 day small technical meeting, probably to be held in Seattle in mid-July 09	Work and analyses to be conducted by National scientists, MP coordinator and consultant. A 5 day meeting to be held with: 1 interpreter; no Secretariat; 15 panel days, 5 consultant days, plus travel. An extra 10 days (5 panel days, 5 consultant days) will be required for development and coordination.
Explanation of the operating model and management procedure approach to Indonesian scientists and managers	2 day discussion in Indonesia during Mar. or Apr. 2009	2 panel days plus travel.
Investigate operational and training requirements for implementation of large scale gene-tagging including design and cost analyses.	Prepare report for presentation at the ESC in Sep. 09	N/A

³ These preliminary estimates will be refined in the proposed budget for 2009 that the Secretariat will submit to the Extended Commission.

Activity	Approximate Period	Resources or approximate budgetary implications ³
Provide paper(s) examining the technical issues associated with the development and evaluation of MPs based on fisheries independent indicators.	Prepare report for presentation at the ESC in Sep. 09	N/A
10 th SAG / 14 th Scientific Committee meeting (including potential evaluations of technical measures prepared in response to CCSBT requests)	6 or 7 days (if requested to initially consider technical measures), Sep 09, Busan	Full panel, interpretation and Secretariat involvement. One Chair

Agenda Item 15. Other matters

146. The ESC provided the following advice on relevant sections of the Report of the Performance Review Working Group.

Section 4.2.3. Performance Review Working Group comments and recommendations— status of living marine resources

147. The ESC strongly recommends that development of an MP be continued, noting that:

- an MP will provide a neutral framework upon which to make consensus recommendations to the Extended Commission for the SBT fishery;
- the ESC currently has no basis for conventional stock assessment but has instead adopted a scenario approach because of uncertainties about past catches;
- an MP should incorporate indicators such as (but not limited to) the scientific aerial survey; the possibility for incorporation of further indicators in the future should remain open;
- verified catch and effort data will be pivotal to the effectiveness of an MP. Such data would be provided through an effective Catch Documentation Scheme and other MCS measures.

148. The ESC emphasises that the failure to implement an MP in 2006 was entirely the result of information on substantial overcatches suddenly becoming available, and should not be misinterpreted as a flaw in the MP approach for provision of management recommendations.

149. The ESC strongly supports the recommendation to give maximum priority to accurate reporting and validation of future catch and effort. The ability of the ESC to provide robust advice to the Extended Commission is contingent on the provision of verified and accurate catch and effort data.

150. The ESC endorses the recommendation to implement items prioritised in the Scientific Research Program (report of CCSBT-ESC12 Attachment 9), and further emphasises that ongoing data collection (verified catch and effort data, and indicator data required as inputs for MP implementation) is essential.

151. In re-affirming that priority should be given to MP development and implementation, the ESC recognises that this will allow the Extended Commission to better develop

specific management objectives by providing information on trade-offs between catch levels in the medium term and rebuilding rates.

152. Further, management objectives defined by the Extended Commission in an MP can incorporate broader fishery issues, notably the effects of fishing on ecologically related species (ERS). The ESC noted that the final recommendation of the Performance Review Working Group on status of living marine resources is assumed to relate to the “impacts of SBT fisheries on ERS”. The ESC supported this recommendation.

Section 4.3.3 Performance Review Working Group comments and recommendations - data collection and sharing

153. The ESC strongly endorses the recommendation to improve data collection and reporting in particular through development and implementation of effective MCS measures.
154. Of particular importance is the availability of detail and disaggregation in data from all components of the fishery provided in the data exchange. While recognising the need to protect commercial confidentiality (e.g. through the provision of anonymous vessel identification) and to maintain reciprocity, robust scientific assessment does require detailed data to the maximum extent possible.
155. The ESC encourages the development of data-sharing arrangements among Members and further collaboration through joint analyses amongst Members, which will offer benefits in terms of exchange of expertise and methods development.

Section 4.4.3 Performance Review Working Group comment and recommendations—quality and provision of scientific advice

156. In the context of the primary terms of reference of the Advisory Panel—to facilitate consensus among Members—the ESC advises that the Advisory Panel has very effectively facilitated such consensus in the past, which has to a great extent negated any need for it to provide independent advice directly to the Extended Commission.
157. However, the ESC notes that roles and relationships will evolve over time, and that the ESC and Extended Commission should review structural arrangements for the Advisory Panel according to the work program.
158. It was noted that the role of the Advisory Panel and Chairs had been an essential and very effective component of the MP work program between 2002 and 2005. This is reflected in the successful development and testing of a range of MPs, and the adoption by the Extended Commission of a preferred MP in 2005. Unfortunately, revelations of the unreported catches resulted in the need to suspend the implementation of an MP and revisit the conditioning and evaluation processes.

Agenda Item 16. Adoption of meeting report

159. The ESC expressed its gratitude to the rapporteurs for their efficient and unbiased work.

160. The report was adopted.

14.3 Next meeting

161. The SAG and next ESC meeting is recommended for 5 or 6 September to 11 September 2009, at Busan, Korea.

Agenda Item 17. Close of meeting

162. The meeting closed at 12:15pm on 12 September 2008.

List of Attachments

Attachment

- 1 List of Participants
- 2 Agenda
- 3 List of Documents
- 4 Summary of observer activities by country, year and sector
- 5 Global SBT catch by flag
- 6 Report on biology, stock status and management of southern bluefin tuna: 2008.
- 7 Data exchange requirements for 2009
- 8 Consideration of Scientific Meeting Structure for 2009
- 9 CPUE Workplan
- 10 Workplan for stock assessment and management procedure

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Extended Scientific Committee Meeting of the Thirteenth Scientific Committee Meeting

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Agenda

**Extended Scientific Committee for the Thirteenth Meeting of the Scientific Committee
Rotorua, New Zealand
9-12 September 2008**

1. Opening

- 1.1. Introduction of Participants
- 1.2. Administrative Arrangements

2. Appointment of Rapporteurs

3. Adoption of Agenda and Document List

4. Review of SBT Fisheries

- 4.1. Presentation of National Reports
- 4.2. Secretariat Review of Catches

5. Report from intersessional CPUE modelling work

6. Australian SBT farm study

- 6.1. Report of Australian farm experiments in 2007-08 season
- 6.2. Revised experimental design for 2008-09 season
- 6.3. Scientific advice/recommendations on Australian SBT farm study from the ESC to the Extended Commission

7. Review of revisions in historical catch numbers and size

8. Report on potential genetic tagging

9. Report on potential PIT tagging project

10. Report on potential for spawning and feeding ground surveys

11. Evaluation of a proposal for under and over-catch balancing

12. SBT Assessment, Stock Status and Management

- 12.1. Review of Fisheries Indicators
- 12.2. Use of constant catch projections from operating model as a basis for management advice in 2009.
- 12.3. Status of the SBT Stock
- 12.4. SBT Management Recommendations

13. Review of ongoing data collection and analysis

- 13.1. Characterisation of SBT Catch
- 13.2. CPUE Interpretation and Analysis
- 13.3. Scientific Observer Program
- 13.4. SBT Tagging Program
- 13.5. Recruitment Monitoring
- 13.6. Direct Ageing
- 13.7. Other activity

14. Management Procedure

- 14.1. Inputs to the Operating Model
- 14.2. Reconsideration of Operating Models
- 14.3. Possible MP options and modelling implications
- 14.4. Performance criteria

15. Data Exchange

- 15.1. Requirements for Data Exchange in 2009

16. Research Mortality Allowance

17. Workplan, Timetable and Research Budget for 2009

- 17.1. Requirements/need for Stock Assessment and Management Procedure in 2009
- 17.2. Other Workplan Requirements
- 17.3. Overview, time schedule and budgetary implications of proposed 2009 research activities.

18. Other Matters

19. Adoption of Meeting Report

- 19.1. Next meeting

20. Close of Meeting

List of Documents
Ninth Meeting of the Stock Assessment Group
and Fifth Meeting of the Management Procedure Workshop
and Extended Scientific Committee for the Thirteenth Meeting of the Scientific
Committee

(CCSBT-ESC/0809/)

1. Draft Agenda of the 9th SAG and 5th MPWS
2. List of Participants of the 9th SAG and 5th MPWS
3. Draft Agenda of the ESC for the 13th SC
4. List of Participants of the 13th SC and ESC
5. List of Documents - The ESC for the 13th SC and 9th SAG / 5th MPWS
6. (Secretariat) Secretariat Review of Catches (ESC agenda item 4.2)
7. (Secretariat) Surface Fishery Tagging Program (ESC agenda item 13.4)
8. (Secretariat) Data Exchange (ESC agenda item 15.1)
9. (CPUE Modelling Group) The development of new agreed CPUE series for use in future MP work. Itoh, T., Lawrence, E. and Pope, J.G.
10. (New Zealand) Scientific evaluation of a catch balancing scheme
11. (Australia) Preparation of Australia's southern bluefin tuna catch and effort data submission for 2008. Hobsbawn, P.I., and Sahlqvist, P.
12. (Australia) Assessing the accuracy and precision of stereo-video and sonar length measurements of southern bluefin tuna (*Thunnus maccoyii*). Phillips, K., Rodriguez, V., Harvey, E., Ellis, D., Seager, J., Begg, G., Honda, N., Shibata, K., and Hender, J.
13. (Australia) Report on the potential and feasibility of genetic tagging of SBT. Davies, C., Moore, A., Grewe, P., and Bradford, R.
14. (Australia/New Zealand) Using passive integrated transponder (PIT) technology to improve performance of CCSBT's conventional tagging program. Harley, S., Bradford, R., and Davies, C.
15. (Australia) Report on the potential of spawning ground surveys. Phillips, K., and Begg, G.
16. (Australia) Fishery indicators for the SBT stock 2007/08. Hartog, J., and Preece, A.
17. (Australia) Estimating Australia's Recreational Catch of Southern Bluefin Tuna.

- Rowell, M., Moore, A., and Sahlqvist, P., and Begg, G.
18. (Australia) The catch of SBT by the Indonesian longline fishery operating out of Benoa, Bali in 2007. Prisantoso, B.I., Andamari, R., and Proctor, C.
 19. (Australia) Choice, use and reliability of historic CPUE. Davies, C., Lawrence, E., Basson, M., , and Preece, A.
 20. (Australia) A summary of progress with a trial observer program for Indonesia's tuna longline fishery in the Indian Ocean. Sadiyah, L., Andamari, R., Prisantoso, B.I., Proctor, C., and Retnowati, D.
 21. (Australia) Estimates of reporting rate from the Australian surface fishery based on previous tag seeding experiments and tag seeding activities in 2007/2008. Hearn, B., Polacheck, T., and Stanley, S.
 22. (Australia) Analyses of tag return data from the CCSBT SRP tagging program - 2008. Eveson, P., and Polacheck, T.
 23. (Australia) Update on the Global Spatial dynamics Archival Tagging project – 2008. Polacheck, T., Chang, K.S., Hobday, A., West, G., Eveson, P., and Chung, K.N.
 24. (Australia) The aerial survey index of abundance: updated analysis methods and results. Eveson, P., Bravington, M., and Farley, J.
 25. (Australia) Commercial spotting in the Australian surface fishery, updated to include the 2007/8 fishing season. Farley, J., and Basson, M.
 26. (Australia) An update on Australian otolith collection activities, direct ageing and length-at-age in the Australian surface fishery. Farley, J., and Clear, N.
 27. (Australia) Update on the length and age distribution of SBT in the Indonesian longline catch. Farley, J., Andamari, R., and Proctor, C.
 - ~~28. (Australia) Recent market data for SBT. Jeffriess, B. (withdrawn)~~
 29. (Australia) Update on SBT close-kin abundance estimation, 2008. Bravington, M., and Grewe, P.
 30. (Australia) The potential use of indicators as a basis for management advice in the short term. Basson, M., and Davies, C.
 31. (Australia) Proposed use of CCSBT Research Mortality Allowance to facilitate electronic tagging of adult SBT as part of Australia's contributions to the CCSBT SRP in 2008/09. Evans, K., and Davies, C.
 32. (Japan) Report of Japanese scientific observer activities for southern bluefin tuna fishery in 2007/2008. Osamu SAKAI, Tomoyuki ITOH, Shingo Fukui and Toshiyuki TANABE
 33. (Japan) Activities of otolith collection and age estimation and analysis of the age data by Japan in 2007. Tomoyuki ITOH, Akio HIRAI and Kenichiro OMOTE

34. (Japan) Report of activities for conventional and archival tagging and recapture of southern bluefin tuna by Japan in 2007/2008. Osamu SAKAI and Tomoyuki ITOH
35. (Japan) Further examinations of the SBT operating model under overcatch scenarios to select critical uncertainty factors for the update. Hiroyuki Kurota and Doug S Butterworth
36. (Japan) Summary of Fisheries Indicators in 2008. Norio TAKAHASHI and Tomoyuki ITOH
37. (Japan) Change in operation pattern of Japanese SBT longliners in 2007 resulting the enforce of the individual quota system. Tomoyuki ITOH
38. (Japan) Comparison between observer data and data reported by fishermen. Osamu SAKAI and Tomoyuki ITOH
39. (Japan) Analysis on age compositions of southern bluefin tuna used for farming. Tomoyuki ITOH, Hiroshi SHONO and Takaaki SAKAMOTO
40. (Japan) Report of the time lag of southern bluefin tuna caught by Japanese longline between catch and sold at market. Tomoyuki ITOH, Osamu SAKAI and Hirohide MATSUSHIMA
41. (Japan) Report of the piston-line trolling survey in 2007/2008. Tomoyuki ITOH and Osamu SAKAI
42. (Japan) Interannual variation in habitat use by juvenile Southern Bluefin Tuna in southern Western Australia during the summers of 2005 – 2007: implication for recruitment index estimates. K. Fujioka, A. Hobday, R. Kawabe, K. Miyashita, T. Itoh, and Y. Takao
43. (Japan) Proposal for the recruitment monitoring survey in 2008/2009. Tomoyuki ITOH
44. (Japan) Preliminary report on migration paths of juvenile southern bluefin tuna determined by acoustic tagging in Western Australia 2007 - 08. Hobday, Alistair J., Kawabe, Ryo., Takao, Yoshimi, Miyashita, Kazushi, and Itoh, Tomoyuki
45. (Japan) Report of the 2007/2008 RMA utilization and application for the 2008/2009 RMA. Fisheries Agency of Japan
46. (Japan) Advance technique for measuring the length of fish during transfer by the acoustic camera (DIDSON) system. Naoto Honda, Koji Shibata, Takurou Hotta, Akira Asada

(CCSBT-ESC/0709/SBT Fisheries)

New Zealand Annual Review of National SBT Fisheries for the Scientific

	Committee
Australia	Australia's 2006-07 Southern Bluefin Tuna Fishing Season. Hobsbawn, P.I., Phillips, K., and Begg, G.
Japan	Review of Japanese SBT Fisheries in 2007. Osamu SAKAI, Tomoyuki ITOH and Shingo Fukui
Korea	Review of Korean SBT Fishery of 2006/2007. Doo-Hae An, Seon-Jae Hwang, Dae-Yeon Moon, Soon-Song Kim, Kyu-Jin Seok
Taiwan	Review of Taiwanese SBT Fishery of 2006/2007.
Indonesia	Review of Indonesian SBT Fishery

(CCSBT-ESC/0709/Info)

1. (Australia) A preliminary evaluation of Indonesia's Indian Ocean tuna and bycatch longline fisheries, based on historical and newly established sources of CPUE information: a project overview. Sadiyah, L., Proctor, C., and Dowling, N.
2. (Australia) Correction factors derived from acoustic tag data for a juvenile southern bluefin tuna abundance index in southern Western Australia. Hobday, A.J., Kawabe, R., Takao, Y., Miyashita, K., and Itoh, I.

(CCSBT-ESC/0809/Rep)

1. Report of Tagging Program Workshop (October 2001)
2. Report of the CPUE Modeling Workshop (March 2002)
3. Report of the Special Management Procedure Technical Meeting (February 2005)
4. Report of the Fourth Meeting of the Management Procedure Workshop (May 2005)
5. Report of the Management Procedure Special Consultation (May 2005)
6. Report of the Special Meeting of the Commission (July 2006)
7. Report of the Seventh Meeting of the Stock Assessment Group (September 2006)
8. Report of the Eleventh Meeting of the Scientific Committee (September 2006)
9. Report of the Second CPUE Modelling Workshop (May 2007)
10. Report of the Eighth Meeting of the Stock Assessment Group (September 2007)
11. Report of the Twelfth Meeting of the Scientific Committee (September 2007)
12. Report of the Fourteenth Annual Meeting of the Commission (October 2007)

Attachment 4

Table 1: Summary of observed catch and effort coverage by country, year and sector

Country	Year	Sector	Observers Deployed	Sea Days	Sets/Tows Observed	Observed Vessels	Observed Effort (% , units)	Observed Catch (%)	Total Cost
Australia	2002	Purse Seine ^a	N/A	47	24		11% (sets)	11% (est. total weight)	60,000 (A\$)
Australia	2002	Towing ^a	N/A	19	1		2.6% (tows)		(included above)
Australia	2002	East Coast Longline	17	323	198		14.4% (hooks)	35.5% (no. retained catch)	NA
Australia	2002	West Coast Longline	N/A	N/A	N/A		N/A (hooks)	N/A (no. retained catch)	NA
Australia	2003	Purse Seine ^a	2	27	21		13% (sets)	12.8% (est. total weight)	60,000 (A\$)
Australia	2003	Towing ^a	2	30	2		5.6% (tows)		(included above)
Australia	2003	East Coast Longline	10	242	168		14.9% (hooks)	55.2% (no. retained catch)	303,000 (60,000 A\$ SBT component)
Australia	2003	West Coast Longline	4	72	54		2.0% (hooks)	4.5% (no. retained catch)	42,247 (A\$)
Australia	2004	Purse Seine ^a	2	36	15		11.2% (sets)	8.5% (est. total weight)	60,000 (A\$)
Australia	2004	Towing ^a	2	24	2		5.7% (tows)		(included above)
Australia	2004	East Coast Longline	11		68		11.7% (hooks)	5.4% (no. retained catch)	966,000 (150,000 A\$ SBT component)
Australia	2004	West Coast Longline			59		3.9% (hooks)	0% (no. retained catch)	57,384 (A\$)
Australia	2005	Purse Seine ^a	2	47	14		9.2% (sets)	10.1% (est. total weight)	78,000 (A\$)

Country	Year	Sector	Observers Deployed	Sea Days	Sets/Tows Observed	Observed Vessels	Observed Effort (% , units)	Observed Catch (%)	Total Cost
Australia	2005	East Coast Longline	14		128		37.5% (hooks)	62.8% (no. retained catch)	723,289 (160,000 A\$ SBT component)
Australia	2005	West Coast Longline			47		9.1% (hooks)	(no observed catch)	0
Australia	2006	Purse Seine ^a	2	19	9		5.6% (sets)	5.6% (est. total weight)	68,000 (A\$)
Australia	2006	Towing ^a	2	38	2		6.0% (tows)		(included above)
Australia	2006	East Coast Longline	17		156		30.2% (hooks)	23.2% (no. retained catch)	180,000 (A\$)
Australia	2006	West Coast Longline			10		1.9% (hooks)	(no observed catch)	15,589 (A\$)
Australia	2007-08	Purse Seine ^a	2	50	17		11.8% (sets)	12.1% (est. total weight)	62,017
Australia	2007-08	Towing ^a	2	41	2		6.5% (tows)		(included above)
Australia	2007	East Coast Longline	20		138		22.1% (hooks)	88.9% (no. retained catch)	653,334 (40,240 A\$ SBT component)
Australia	2007	West Coast Longline	1		8		17.4% (hooks)	(no observed catch)	6,078
Indonesia	2005	Longline	6	189	112		0.38% (hooks)	0.037%	91,391 (\$AU)
Indonesia	2006	Longline	6	724	439		1.01% (hooks)	2.78%	72,858 (\$AU)
Indonesia	2007	Longline	6	417	242		0.63% (hooks)	0.33%	70,171 (\$AU)
Japan	2002	Longline	16	1135	642	9%	3% (hooks)	3%	31,607,000 (Yen)
Japan	2003	Longline	15	1135	694	9%	6% (hooks)	5%	37,941,000 (Yen)
Japan	2004	Longline	14	1441	653	8%	5% (hooks)	4%	37,240,000 (Yen)
Japan	2005	Longline	16	1178	913	10%	5% (hooks)	4%	43,439,000 (Yen)
Japan	2006	Longline	14	1257	1092	10%	9% (hooks)	6%	43,500,000 (Yen)
Japan	2007	Longline	9	616	538	7%	8% (hooks)	7%	21,326,000 (Yen)
Korea	2004	Longline	1	39	38	9%	2% (hooks)	0.2%	7,050,000 (Won)
Korea	2005	Longline	1	29	20	9%	2% (hooks)	-	6,459,000 (Won)

Country	Year	Sector	Observers Deployed	Sea Days	Sets/Tows Observed	Observed Vessels	Observed Effort (% , units)	Observed Catch (%)	Total Cost
Korea	2006	Longline	1	24	21	9%	2% (hooks)	-	8,400,000 (Won)
Korea	2007	Longline	1	95	76	9%	2% (hooks)	27.5%	16,350,000 (Won)
New Zealand	2002	Charter	4	177	100%	100%	100% (hooks)	100%	88,500 (NZ\$)
New Zealand	2002	Domestic	5	104			8% (hooks)	NA	52,000 (NZ\$)
New Zealand	2003	Charter	4	194	100%	100%	100% (hooks)	100%	97,000 (NZ\$)
New Zealand	2003	Domestic	5	127			7% (hooks)	NA	63,500 (NZ\$)
New Zealand	2004	Charter	4	363	100%	100%	96% (hooks)	100%	181,500 (NZ\$)
New Zealand	2004	Domestic	10	231			15% (hooks)	16%	115,500 (NZ\$)
New Zealand	2005	Charter	2	225	100%	100%	89% (hooks)	100%	181,500 (NZ\$)
New Zealand	2005	Domestic	8	260			12% (hooks)	9%	130,000 (NZ\$)
New Zealand	2006	Charter	2	225	100%	100%	88% (hooks)	100%	112,500 (NZ\$)
New Zealand	2006	Domestic	14	214			6% (hooks)	4%	107,000 (NZ\$)
New Zealand	2007	Charter		254		50%	55% (hooks)	60%	157,500 (NZ\$)
New Zealand	2007	Domestic		242			13% (hooks)	16%	150,000 (NZ\$)
Taiwan	2002	Longline	1	202	126	1.64%	6.08% (hooks)	0.97%	560,000 (NT\$)
Taiwan	2003	Longline	2	177	133	2%	3.61% (hooks)	0.55%	630,000 (NT\$)
Taiwan	2004	Longline	5	263	165	5%	6.52% (hooks)	3.06%	940,000 (NT\$)
Taiwan	2005	Longline	4	681	444	7.02%	13.27% (hooks)	6.65%	1,600,000 (NT\$)
Taiwan	2006	Longline	3	296	253	8.33%	12.78% (hooks)	4.26%	1,250,000 (NT\$)
Taiwan	2007	Longline	3	395	347	10%	15.11% (hooks)	10.14%	2,460,000 (NT\$)

Table 2: Number of biological samples taken in observer programs separated by country, year and sector

Country	Year	Sector	Otoliths	Sex	Tags	Stomach contents	Length Measurement
Australia	2002	Longline	0	124	165	0	300
Australia	2003	Longline	0	51	229	1	388
Australia	2004	Longline	5	62	0	5	187
Australia	2004-05	Purse seine	2	2	0	0	3
Australia	2005	Longline	63	189	19	12	264
Australia	2005-06	Purse seine	46	46	0	0	23
Australia	2006	Longline	0	4	1	0	32
Australia	2006-07	Purse seine	9	17	0	16	19
Australia	2007	Longline	9	41	0	0	42
Australia	2007-08	Purse seine	4	4	0	0	4
Indonesia	2005	Longline					7
Indonesia	2006	Longline					155
Indonesia	2007	Longline					38
New Zealand	2002	Combined	1199	3013	15	2340	2996
New Zealand	2003	Combined	838	1658	5	1537	1668

New Zealand	2004	Combined	1140	1961	5	1846	2008
New Zealand	2005	Combined	432	1099	4	972	1121
New Zealand	2006	Combined	444	1252	4	1071	1281
New Zealand	2007	Combined	714				1748
Japan	2002	Longline	308	2683	2	229	2712
Japan	2003	Longline	338	4719	21	563	4757
Japan	2004	Longline	655	4112	20	671	4155
Japan	2005	Longline	522	3915	22	563	3949
Japan	2006	Longline	469	4244	13	766	4372
Japan	2007	Longline	620	3550	52	648	3926
Korea	2007	Longline	0	0	0	0	494
Taiwan	2002	Longline	-	-	0	-	338
Taiwan	2003	Longline	102	-	0	-	174
Taiwan	2004	Longline	316	86	0	93	1290
Taiwan	2005	Longline	210	261	0	257	2217
Taiwan	2006	Longline	56	57	0	57	1484
Taiwan	2007	Longline	191	>18	0	183	3173

Global SBT Catch By Flag

Catches are presented as whole weights in tonnes. All shaded figures are subject to change as they are either preliminary figures or they have yet to be finalised.

Note: Recent reviews of SBT farming and market data suggests that southern bluefin tuna catches may have been substantially under-reported over the past 10-20 years and the data presented here do not yet include estimates for this unreported catch.

Calendar Year	Australia		New Zealand							South Africa	European Commission	Miscellaneous	Research & Other
	Commercial	Amateur	Japan	Commercial	Amateur	Korea	Taiwan	Philippines	Indonesia				
1952	264		565	0		0	0	0	0	0	0	0	0
1953	509		3,890	0		0	0	0	0	0	0	0	0
1954	424		2,447	0		0	0	0	0	0	0	0	0
1955	322		1,964	0		0	0	0	0	0	0	0	0
1956	964		9,603	0		0	0	0	0	0	0	0	0
1957	1,264		22,908	0		0	0	0	0	0	0	0	0
1958	2,322		12,462	0		0	0	0	0	0	0	0	0
1959	2,486		61,892	0		0	0	0	0	0	0	0	0
1960	3,545		75,826	0		0	0	0	0	0	0	0	0
1961	3,678		77,927	0		0	0	0	0	145	0	0	0
1962	4,636		40,397	0		0	0	0	0	724	0	0	0
1963	6,199		59,724	0		0	0	0	0	398	0	0	0
1964	6,832		42,838	0		0	0	0	0	197	0	0	0
1965	6,876		40,689	0		0	0	0	0	2	0	0	0
1966	8,008		39,644	0		0	0	0	0	4	0	0	0
1967	6,357		59,281	0		0	0	0	0	5	0	0	0
1968	8,737		49,657	0		0	0	0	0	0	0	0	0
1969	8,679		49,769	0		0	80	0	0	0	0	0	0
1970	7,097		40,929	0		0	130	0	0	0	0	0	0
1971	6,969		38,149	0		0	30	0	0	0	0	0	0
1972	12,397		39,458	0		0	70	0	0	0	0	0	0
1973	9,890		31,225	0		0	90	0	0	0	0	0	0
1974	12,672		34,005	0		0	100	0	0	0	0	0	0
1975	8,833		24,134	0		0	15	0	0	0	0	0	0
1976	8,383		34,099	0		0	15	0	12	0	0	0	0
1977	12,569		29,600	0		0	5	0	4	0	0	0	0
1978	12,190		23,632	0		0	80	0	6	0	0	0	0
1979	10,783		27,828	0		0	53	0	5	0	0	4	0
1980	11,195		33,653	130		0	64	0	5	0	0	7	0
1981	16,843		27,981	173		0	92	0	1	0	0	14	0
1982	21,501		20,789	305		0	182	0	2	0	0	9	0
1983	17,695		24,881	132		0	161	0	5	0	0	7	0
1984	13,411		23,328	93		0	244	0	11	0	0	3	0
1985	12,589		20,396	94		0	241	0	3	0	0	2	0
1986	12,531		15,182	82		0	514	0	7	0	0	3	0
1987	10,821		13,964	59		0	710	0	14	0	0	7	0
1988	10,591		11,422	94		0	856	0	180	0	0	2	0
1989	6,118		9,222	437		0	1,395	0	568	0	0	103	0
1990	4,586		7,056	529		0	1,177	0	517	0	0	4	0
1991	4,489		6,477	164		246	1,460	0	759	0	0	97	0
1992	5,248		6,121	279		41	1,222	0	1,232	0	0	73	0
1993	5,373		6,318	217		92	958	0	1,370	0	0	15	0
1994	4,700		6,063	277		137	1,020	0	904	0	0	54	0
1995	4,508		5,867	436		365	1,431	0	829	0	0	201	296
1996	5,128		6,392	139		1,320	1,467	0	1,614	0	0	295	290
1997	5,316		5,588	334		1,424	872	0	2,210	0	0	333	0
1998	4,897		7,500	337		1,796	1,446	5	1,324	1	0	471	0
1999	5,552		7,554	461		1,462	1,513	80	2,504	1	0	403	0
2000	5,257		6,000	380		1,135	1,448	17	1,203	4	0	31	0
2001	4,853		6,674	358		845	1,580	43	1,632	1	0	41	4
2002	4,711		6,192	450		746	1,137	82	1,701	18	0	203	17
2003	5,827		5,770	390		254	1,128	68	565	15	3	40	17
2004	5,062		5,846	393		131	1,298	80	633	19	23	2	17
2005	5,244		7,855	264		38	941	53	1,726	24	0	0	5
2006	5,635		4,207	238		150	846	50	598	9	0	0	5
2007	4,813		2,840	379	4	524	841	46	1,077	41	10	0	3

European Commission: The 2007 estimate is from EC reports to the CCSBT. Earlier catches were reported by Spain and the IOTC.

Miscellaneous: Before 2004, these were from Japanese import statistics (JIS). From 2004, the higher value of JIS and CCSBT TIS was used combined with available information from flags in this category.

Research and other: Mortality of SBT from CCSBT research and other sources such as discarding practices in 1995/96. scenarios that were considered at SAG7.

*: JIS for 1993, 1994 and 1998 are higher than these official statistics and are: 117, 147 and 1897 respectively. Assessments would normally use the higher of these values.

REPORT ON BIOLOGY, STOCK STATUS AND MANAGEMENT OF SOUTHERN BLUEFIN TUNA: 2008

A review of fisheries indicators was conducted by the CCSBT Stock Assessment Group during 2008. In response to indications from a 2006 review of SBT farming and market data that catches over the past 10 to 20 years may have been substantially under-reported, a range of alternate past catch scenarios was also explored in 2006, but was not updated in 2008. This report updates description of fisheries and state of stock, and provides fishery and catch information, in the light of these evaluations.

1. Biology

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

SBT can attain a length of over 2m and a weight of over 200kg. Direct ageing using otoliths indicates that a significant number of fish larger than 160cm are older than 25 years, and the maximum age obtained from otolith readings has been 42 years. Analysis of tag returns and otoliths indicate that, in comparison with the 1960s, growth rate has increased since about 1980 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), and perhaps as old as 15 years. SBT exhibit age-specific natural mortality, with *M* being higher for young fish and lower for old fish.

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

2. Description of Fisheries

Reported catches of SBT up to end 2007 are shown in Figures 1 - 3. However, as a result of indications in SBT farming and market data that there may have been substantial under-reporting of SBT catches over the past 10 - 20 year period, there is currently substantial uncertainty regarding the true levels of total SBT catch over this period. Historically, the SBT stock has been exploited for more than 50 years, with total catches peaking at 81,750t in 1961 (Figures 1 - 3). Over the period 1952 - 2003, 79% of the reported catch has been made by longline and 21% using surface gears, primarily purse-seine and pole&line (Figure 1).

The proportion of reported catch made by surface fishery peaked at 50% in 1982, dropped to 11-12 % in 1992 and 1993 and increased again to average 33% 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 79% of the SBT catch has been made in the Indian Ocean, 17% in the Pacific Ocean and 4% in the Atlantic Ocean (Figure 2). The reported Atlantic Ocean catch has varied widely between about 18t and 8,200t since 1968 (Figure 2), averaging about 830t 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). Since 1968, the reported Indian Ocean catch has declined from about 45,000t to 10,000t, averaging about 21,000t, and the reported Pacific Ocean catch has ranged from about 800t to 19,000t, averaging about 5800t, over the same periods (although SBT farming and market data analyses indicate that these catches may be under-estimated).

3. Summary of Stock Status

At the 2008 Stock Assessment Group meeting the operating model was run under a number of scenarios that are generally similar to those evaluated in 2006. The scenarios indicate that spawning stock biomass is still at a very low level (generally below 10% of pre-exploitation spawning stock biomass, a level at which recruitment may be at risk of further decline). This is well below the 1980 level and 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. Presently, however, there is no sign of spawning stock biomass rebuilding.

Recruitments in the last two decades are estimated to be well below the levels in the period 1950-1980. All scenarios suggest that recruitment in the 1990s fluctuated at a low level with no overall trend. Analysis of the average of all indicators suggest historically low recruitments from 1999-2002. The indicators suggest that 2004 and 2005 year classes are stronger and close to the average of the 1990s.

Consistent with the poor recruitment from 1999 to 2002, a gap in the size (and presumably age) composition is apparent. By inference this gap will lead to a further decline in spawning stock biomass in coming years.

4. Current Management Measures

At its Thirteenth annual meeting the CCSBT agreed to a total allowable catch (TAC) for 2007-2009 of 11,810 tonnes, which was a TAC reduction of 3,115 tonnes. This TAC will only be reviewed before 2009 if exceptional circumstances emerge in relation to the stock. The current allocation of the TAC amongst Members and Cooperating Non-Members are specified below:-

Members

The allocations below are fixed to 2011 for Japan and to 2009 for other Members except for Indonesia which will be reviewed at CCSBT15.

Japan	3,000 tonnes
Australia	5,265 tonnes
Republic of Korea	1,140 tonnes
Fishing Entity of Taiwan	1,140 tonnes
New Zealand	420 tonnes
Indonesia	750 tonnes

Cooperating Non-Members and Observers

The allocations amongst Cooperating Non-Members have only been set for 2008.

Philippines	45 tonnes
South Africa	40 tonnes
European Community	10 tonnes

Furthermore, to contribute to the recovery of the SBT stock, Taiwan and the Republic of Korea undertook to maintain their actual catch below 1,000 tonnes for a minimum of 3 years from 2007. This will result in an actual catch level below 11,530 tonnes for a 3 year period.

The Fourteenth annual meeting of the CCSBT noted that the report from the Extended Scientific Committee did not show any indication of a change in the status of the stock since 2006 and that the TAC set by CCSBT 13 was in the range recommended by the Extended Scientific Committee. Consequently, the Extended Commission reconfirmed CCSBT13's decision on the TAC and its allocation as summarised above.

The CCSBT has also implemented a Trade Information Scheme (TIS) for SBT, in which a CCSBT TIS document must be issued for all exports of SBT. The scheme also 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 where they are used to maintain a database for monitoring catches and trade and for conducting reconciliations between exports and imports of SBT.

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.

The CCSBT has recognised the critical importance of adopting and fully implementing at the earliest possible time an integrated package of compliance measures which would ensure the elimination of unreported catch and provide accurate data as a basis for proper stock assessment. At its Thirteenth annual meeting, the CCSBT adopted draft resolutions on the following compliance measures and work will be undertaken during 2007 towards refining and implementing these measures:

- A catch documentation scheme;

- A vessel monitoring system; and
- Regulation of transshipments by large scale fishing vessels.

Further work was conducted on developing these and other MCS measures during 2007 and 2008, but consensus has yet to be reached between CCSBT Members concerning the details of these measures.

5. Scientific Advice

In the light of the current stock status and concerns, management advice is as follows.

Positive factors affecting sustainability of future catches are:

- the reported catch has been reduced; and
- indicators suggest that the 2004 and later year classes are not as low as the 2000, 2001, and 2002 year classes.

However, there remain serious sources of concern from new and previous information including:

- a very low spawning stock;
- at least three poor recruitments in the recent past which will lead to a further decline in spawning stock biomass;
- a general decline in recruitment since about 1970, coincident with declining spawning stock sizes;
- increased exploitation rates, particularly on recent weak year classes;
- overall, exploitation has shifted towards younger ages, the abundances of which are poorly estimated; and
- there is the potential for increasing exploitation rate with declining recruitment, which would pose a serious risk to rebuilding.

The Extended Scientific Committee (ESC) notes that given the current reported catch and previously reported constant catch projections (SAG 7), the stock is likely to rebuild very slowly in the long term. However, there is about a 50:50 chance that the spawning stock will decrease over the next 6 years. The possibility of further decline is of concern.

The ESC recognises the CCSBT has set a constant TAC until 2009. However, given the current stock status, the ESC recommends that the Commission consider:

- **Reducing fishing mortality by immediately eliminating all unreported/under-reported catches.** The 2007 ESC also made this recommendation, as follows: “*To ensure a high probability of stock rebuilding, all unreported and under-reported catches must be eliminated...*”; and
- **Applying a broader suite of technical measures after the 2009 fishing season. If the Extended Commission so decides it should seek specific advice from the ESC.**

The ESC makes the additional **recommendations**:

- **A management procedure needs to be adopted by no later than 2011 as a basis to guide management advice.** The 2007 ESC also made this recommendation, as follows: “*... a management procedure needs to be adopted as a basis to provide TAC*”

advice in 2011 or 2012 when catch quotas will again be reconsidered by CCSBT. A work plan has been agreed to advance the development of an MP, with initial emphasis placed on re-conditioning the operating model and refining the scenarios used for testing different candidate decision rules, and the extent to which they will result in management objectives being achieved in the face of uncertainties.”

- **Reduce uncertainty about historical catch and effort.** The 2007 ESC also made this recommendation, as follows: *“While some progress has been made towards development of new historical CPUE series, further work is needed to reduce the uncertainty about historical catches (including that associated with possible bias in the 40-fish sampling used to estimate size composition and mean weight of the surface catch), and to evaluate the effect of market anomalies on CPUE and determine appropriate adjustments.”*
- **Accurate future catch and effort reporting needs to be ensured.** The 2007 ESC also made this recommendation, as follows: *“In terms of future data, accurate catch and effort estimates are critical to any stock assessment or management procedure. There needs to be assurance that these data are accurate through some combination of comparison of data from vessels with and without observers, and other monitoring and compliance measures, including the possibility of further market and farming monitoring. Increased levels and quality of observer coverage would increase the value of these analyses as well as the value of information from tagging programmes, though this needs to be considered in the light of cost and benefit analyses. Also, monitoring of recruitment and of the spawning biomass must continue, and where possible, be improved.”*
- **Consider using a wider range of indicators within MPs to guide management.** The 2007 ESC made this recommendation, as follows: *“Previous MP development used LLI [Japanese longline] CPUE and its age structure as the sole input. The ESC agreed that future MPs should be based on inputs from a broader range of indicators.”*
- **Reliable indices of recruitment and spawning biomass need to be developed and maintained long-term.**

In summary, the ESC stresses to the Extended Commission that the SBT stock is in a very poor state, that management decisions must take serious account of this, and that adoption by 2011 of a management procedure to guide TAC setting must be given a high priority.

6. Biological State and Trends

Analyses suggest the SBT spawning biomass is at a low fraction of its original biomass and well below the 1980 level as well as 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.

Exploitation rate: High fishing mortality
Exploitation state: Overexploited
Abundance level: Low abundance

SOUTHERN BLUEFIN TUNA SUMMARY
(global stock)

Maximum Sustainable Yield	Not estimated
Current (2007) Catch	Reported to be 11,540t.
Current Replacement Yield	Not estimated
Current Spawner Biomass	112,272 - 166,312 t ¹
Current Depletion	SSB ₂₀₀₆ / SSB _K : 0.101 - 0.127 ¹
Current Management Measures	Global TAC for Members and Cooperating Non-Members of 11,060t.

¹ These are the ranges in estimates of median spawning biomass obtained from evaluation of a range of alternate possible past catch scenarios during the 2006 Stock Assessment Group meeting.

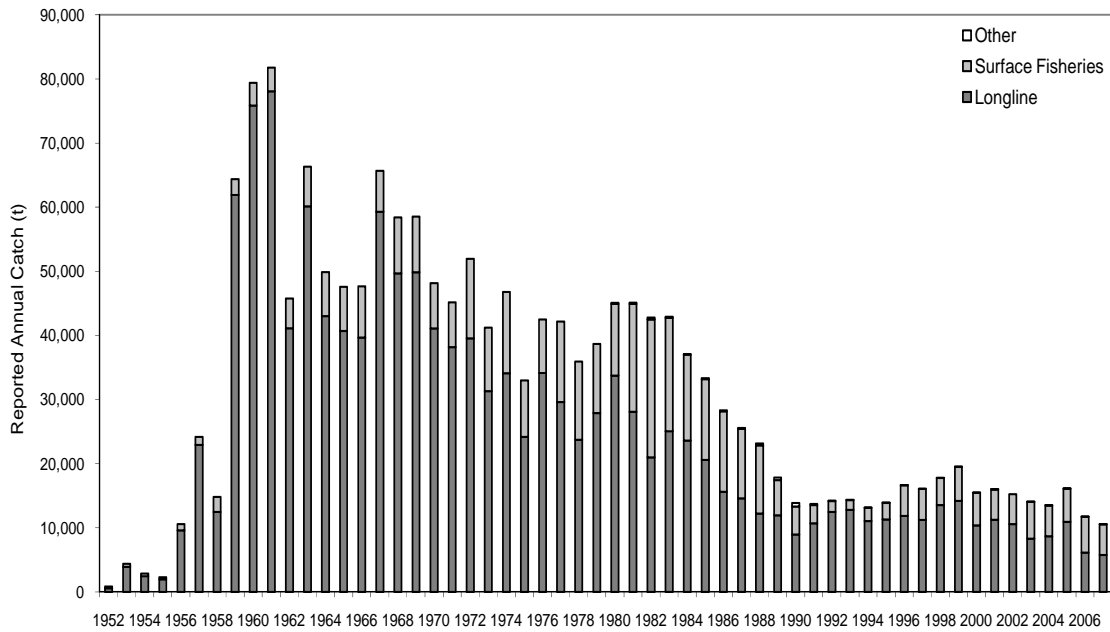


Figure 1: Reported southern bluefin tuna catches by fishing gear, 1952 to 2007. Note: Recent review of SBT farming and market data suggests that these catches may have been substantially under-reported over the past 10 to 20 years.

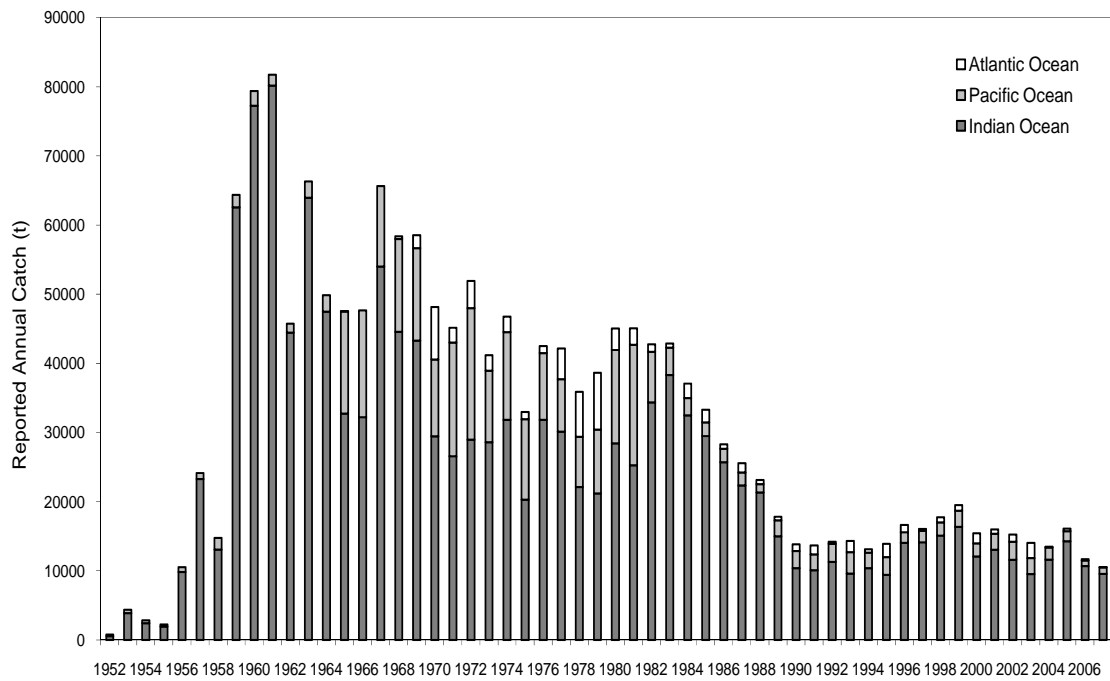


Figure 2: Reported southern bluefin tuna catches by ocean, 1952 to 2007. Note: Recent review of SBT farming and market data suggests that these catches may have been substantially under-reported over the past 10 to 20 years.

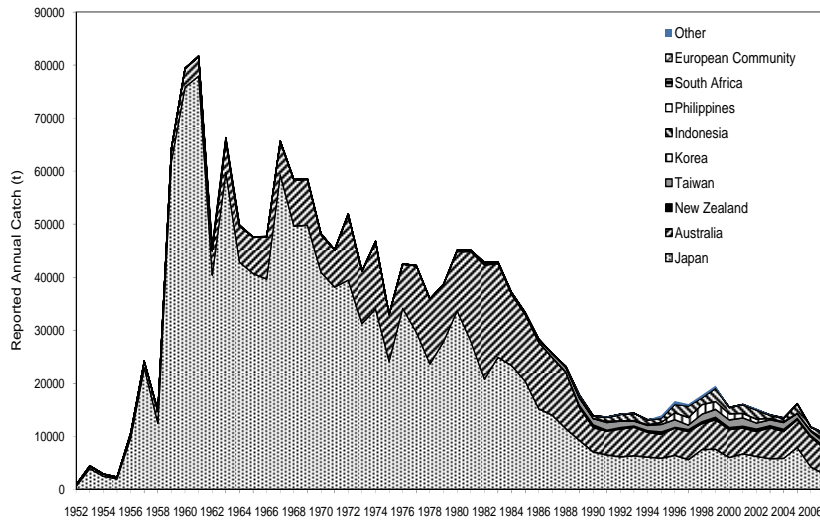


Figure 3: Reported southern bluefin tuna catches by flag, 1952 to 2007. Note: Recent review of SBT farming and market data suggests that these catches may have been substantially under-reported over the past 10 to 20 years.

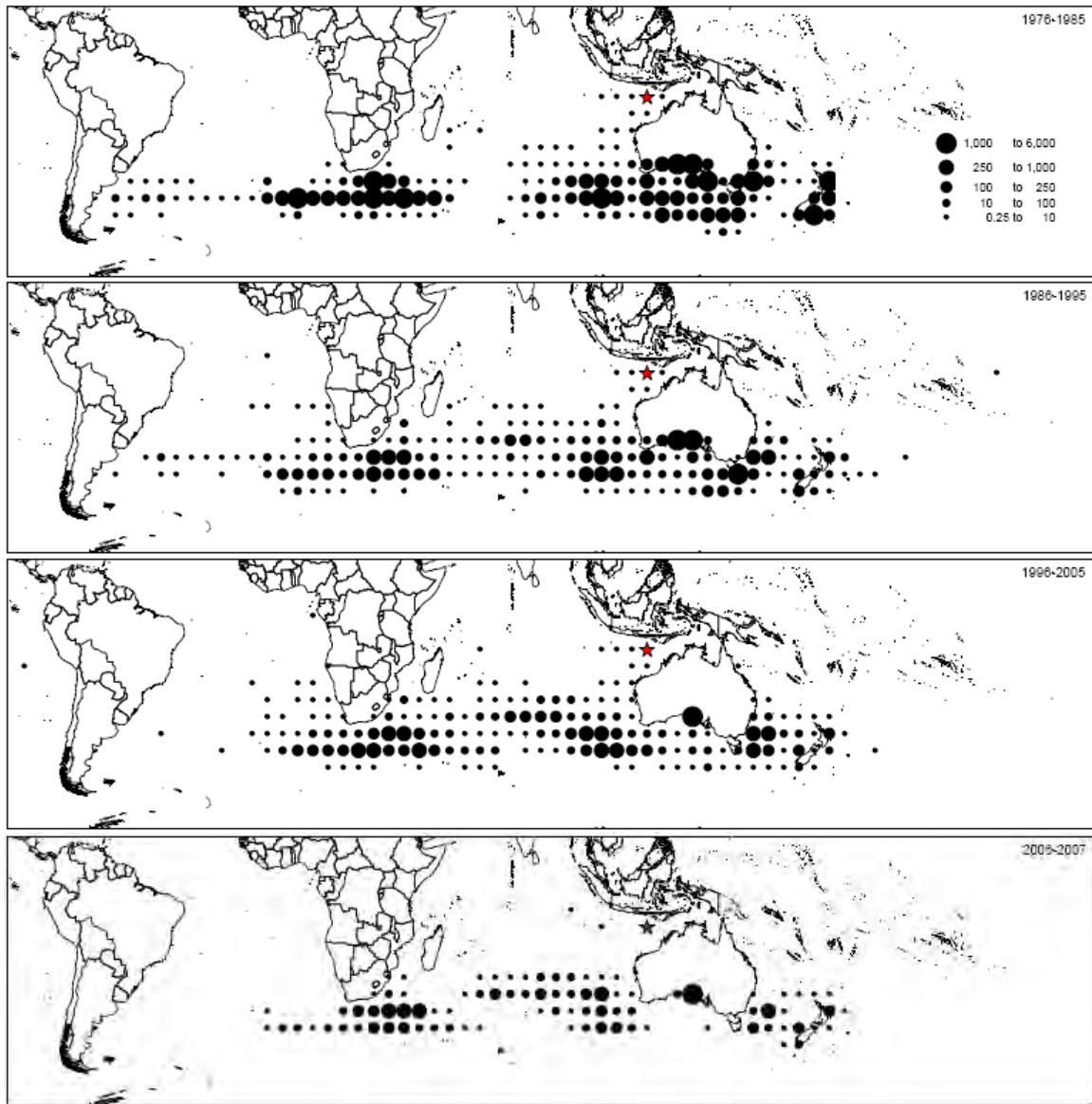


Figure 4: Geographical distribution of average annual southern bluefin tuna catches (t) by CCSBT members and cooperating non-members over the periods 1976-1985, 1986-1995, 1996-2005 and 2006-2007 per 5° block by oceanic region. The area marked with a star is an area of significant catch in the breeding ground. Block catches averaging less than 0.25 tons per year are not shown. Note: This figure may be affected by past anomalies in catch.

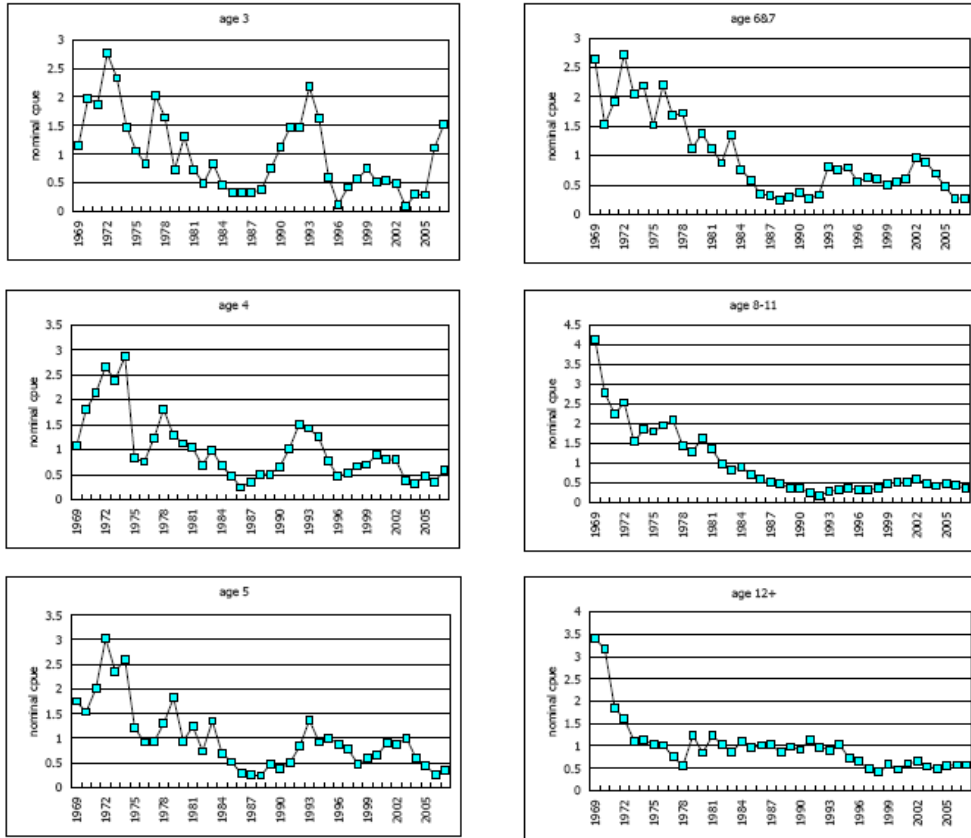


Figure 5: Trends in nominal catch rates (numbers per 1000 hooks) of SBT by age group (ages 3, 4, 5, 6-7, 8-11 and 12+) caught by Japanese longliners operating in CCSBT statistical areas 4-9 in months 4-9. Note: This figure may be affected by past anomalies in catch.

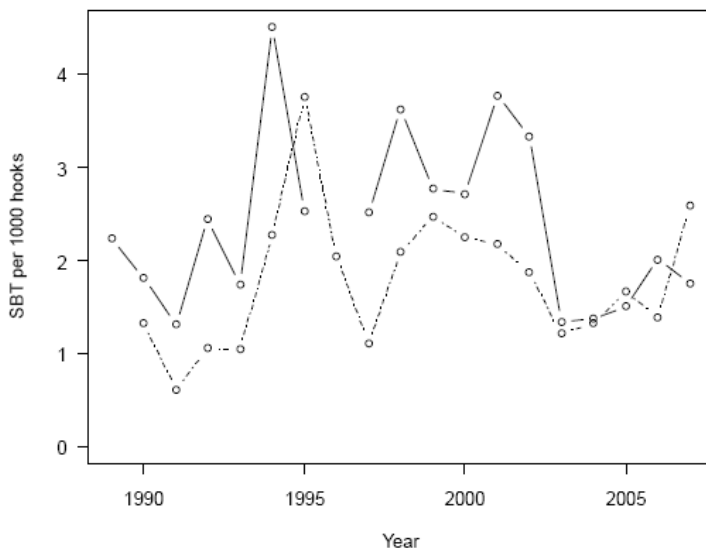


Figure 6: Nominal catch per unit effort (number of SBT per thousand hooks) by calendar year for the New Zealand Charter (solid line) and domestic (dashed line) longline fleets based only on effort from sets that either targeted or caught southern bluefin tuna.

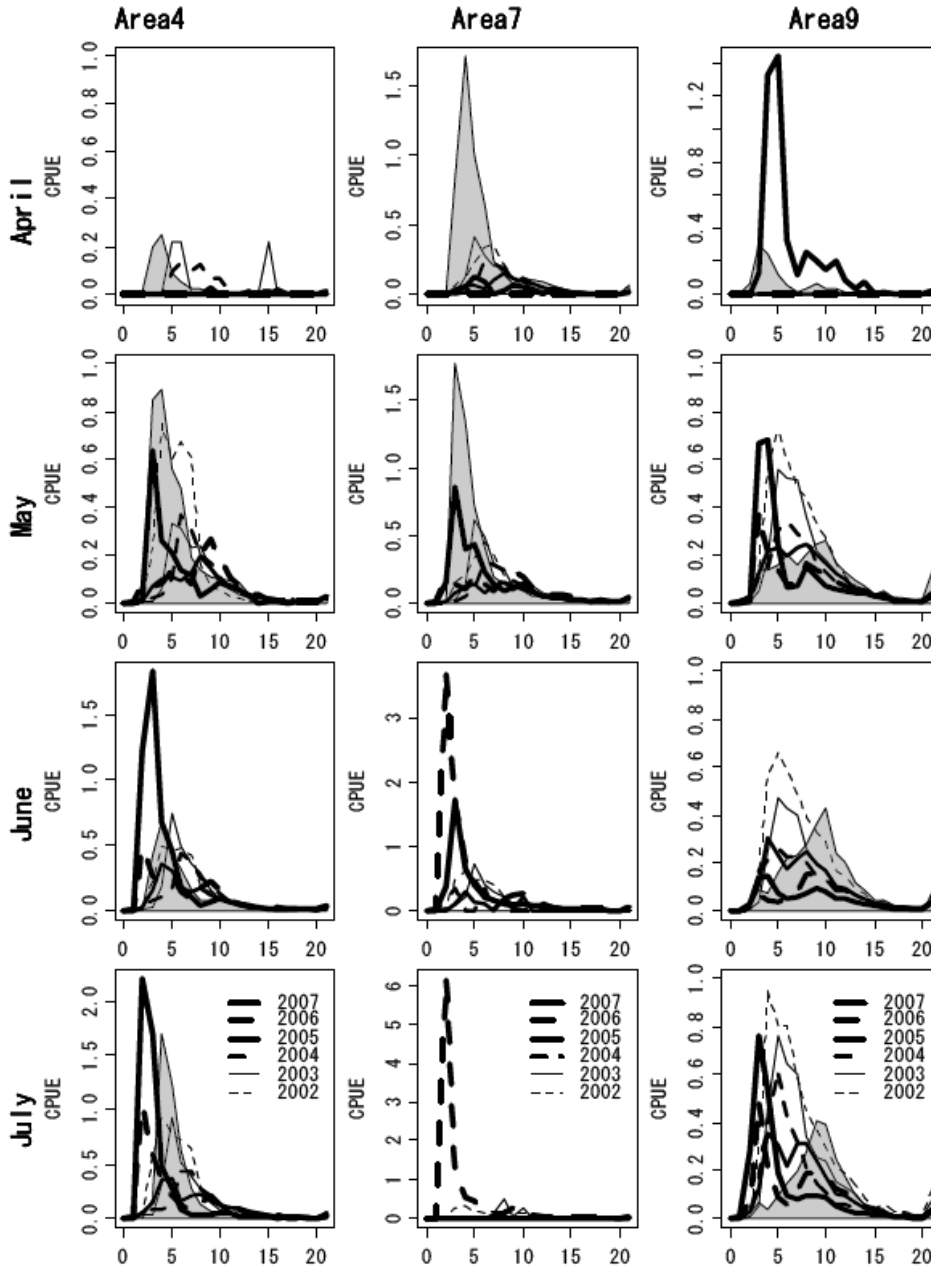


Figure 7: Age composition of nominal CPUE of Real Time Monitoring Program data for the Japanese longline fishery for recent seven years by month and area. Note: This figure may be affected by past anomalies in catch.

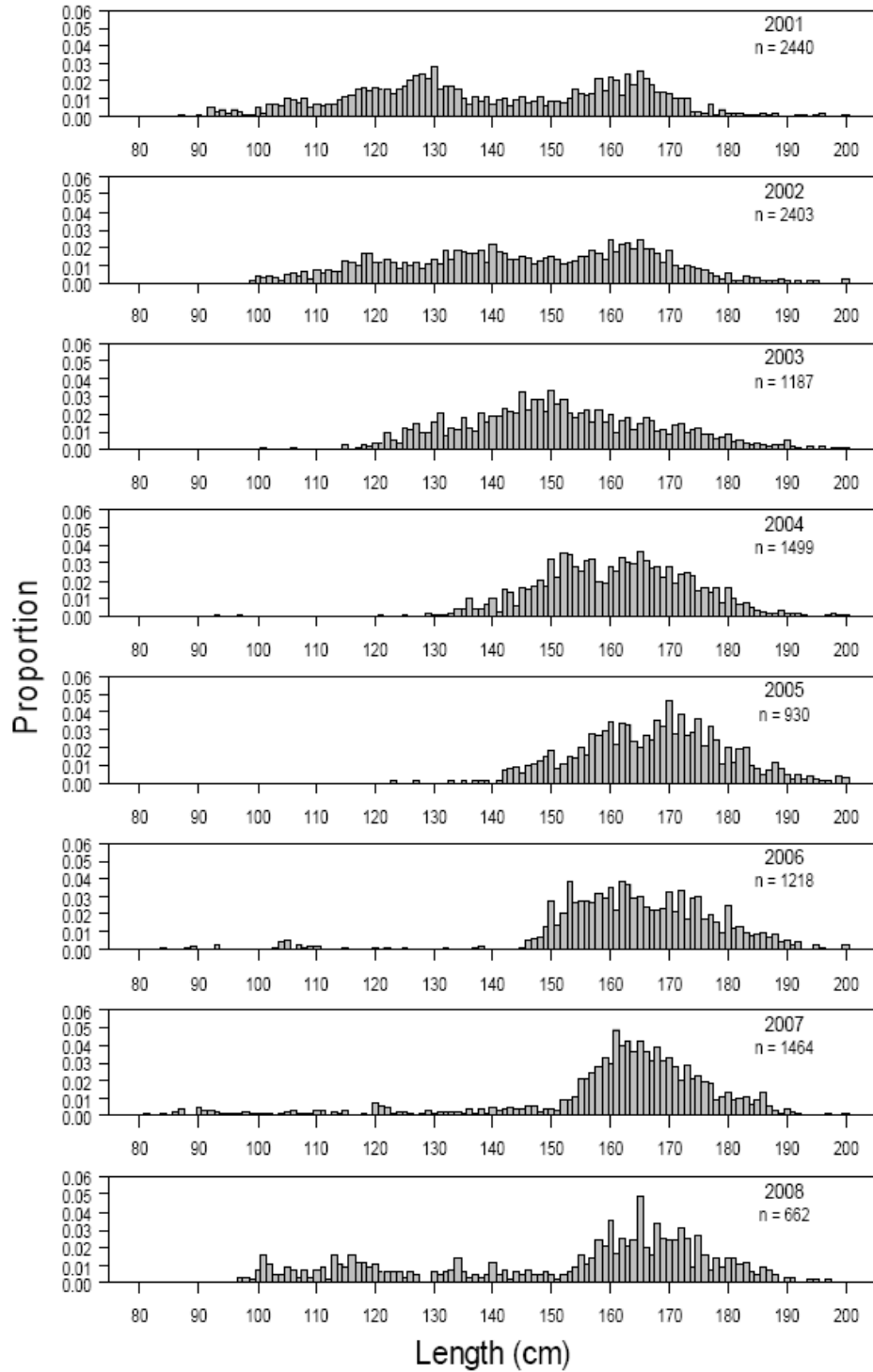


Figure 8: Proportion at length of SBT from the New Zealand charter fleet for 2001 to 2008 (Data for 2008 is preliminary and does not contain data from all vessels).

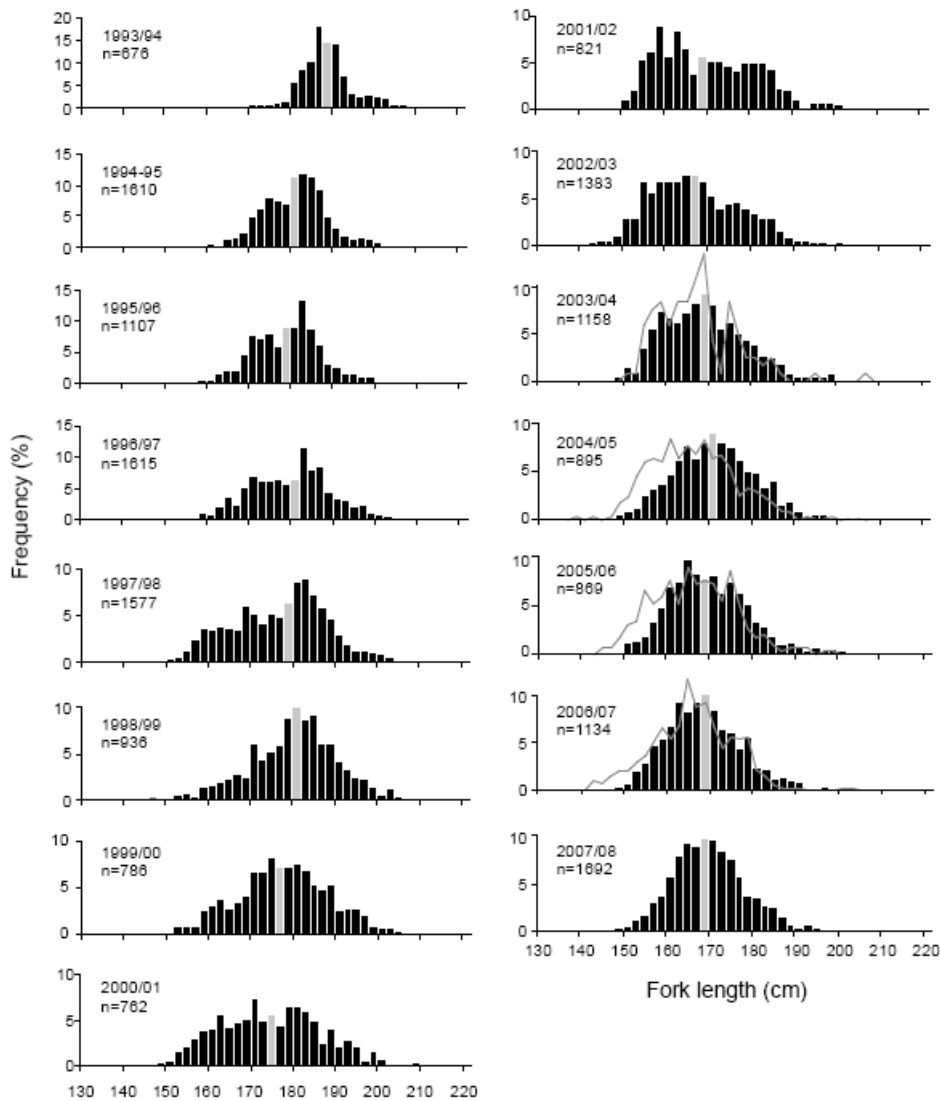


Figure 9: Length frequency (2 cm intervals) of SBT caught on the Indonesian spawning ground (bars) by spawning season. The grey bar shows the median size class. For comparison, the length distribution of SBT thought to be caught south of the spawning ground (Processor A) is shown for the 2003/04 (n=121), 2004/05 (n=685), 2005/06 (n=311) and 2006/07 (n=452) seasons (grey line). A spawning season is defined as July 1 of the previous year to June 30 of the given year.

Requirements for the 2009 Data Exchange

Catch effort and size data should be provided in the identical format as that were provided in 2008. If the format of the data provided by a member is changed, then the new format and some test data in that format should be provided to the Secretariat by 31 January 2009 to allow development of the necessary data loading routines.

Data listed in Attachment A should be provided for the complete 2008 calendar year plus any other year for which the data have changed. If changes to historic data are more than a routine update of the 2007 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 2007 data) must be accompanied by a detailed description of the changes.

Prepared by the Secretariat

Type of Data to provide ¹	Data Provider(s)	Due Date	Description of data to provide
CCSBT Data CD	Secretariat	31 Jan 09	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 2008 data exchange and any additional data received since that time, including: <ul style="list-style-type: none"> • Tag/recapture data (<i>The Secretariat will provide additional updates of the tag-recapture data during 2009 on request from individual members</i>); • Update the unreported catch estimates using the revised scenario (S1L1) produced at SAG9,
Total catch by Fleet	all Members and Cooperating Non-Members (excluding Indonesia – which is specified later)	30 Apr 09	Raised total catch (weight and number) and number of boats fishing by fleet and gear. These data need to be provided for both the calendar year and the quota year.
Recreational catch	all Members and Cooperating Non-Members that have recreational catches	30 April 09	Raised total catch (weight and number) of any recreationally caught SBT if data are available. A complete historic time series of recreation catch estimates should be provided (unless this has previously been provided). Where there is uncertainty in the recreational catch estimates, a description or estimate of the uncertainty should be provided.
SBT import statistics	Japan	30 Apr 09	Weight of SBT imported into Japan by country, fresh/frozen and month. These import statistics are used in estimating the catches of non-member countries.
Mortality allowance (RMA and SRP) usage	all Members (& Secretariat)	30 Apr 09	The mortality allowance (kilograms) that was used in the 2008 calendar year. Data is to be separated by RMA and SRP mortality allowance. If possible, data should also be separated by month and location.
Catch and Effort	all Members (& Secretariat)	23 Apr 09 (New Zealand) ² 30 Apr 09 (other members, South Africa & Secretariat) 31 July 09 (Indonesia)	Catch (in numbers and weight) and effort data is to be provided as either shot by shot or as aggregated data (New Zealand provides fine scale shot by shot data which is aggregated and distributed by the Secretariat). The maximum level of aggregation is by year, month, fleet, gear, and 5x5 degree (longline fishery) or 1x1 degree for surface fishery. Indonesia will provide estimates based on either shot by shot or as aggregated data from the trial Scientific Observer Program. <i>It was noted that with the implementation of two new statistical areas (areas 14 and 15), that catch and effort data should be provided with all fishing effort in these new areas regardless of whether SBT were caught (as is done for areas 1-10).</i>
Historical effort for areas 14 and 15)	Korea	30 Apr 09	The complete historic time series for areas 14 and 15 of all Members needs to be revised to provide full fishing effort in areas 14 and 15. <i>This was to be provided as part of the 2007 data exchange (before SAG8) by all Members who had fished in areas 14 and 15. Only one Member has yet to provide (or advise in relation to) this information.</i>

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

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

Type of Data to provide ¹	Data Provider(s)	Due Date	Description of data to provide
Non-retained catches	All Members	30 Apr 09 (most Members) 31 July 09 (Indonesia)	The following data concerning non retained catches will be provided by year, month, and 5*5 degree for each fishery: <ul style="list-style-type: none"> • Number of SBT reported (or observed) as being non-retained; • Raised number of non-retained SBT taking into consideration vessels and periods in which there was no reporting of non-retained SBT; • Estimated size frequency of non-retained SBT after raising; • Details of the fate and/or life status of non-retained fish. Indonesia will provide estimates based on either shot by shot or as aggregated data from the trial Scientific Observer Program.
Research and 'other' mortalities	Australia, Japan	30 Apr 09	Research mortalities prior to 2001 and any other forms of mortalities up to 2006 that have not been provided as part of the data exchange. Data should be provided at 5*5 by month resolution if available, but otherwise at the best available resolution. <p><i>This due date was set at SC11. Therefore as at 30 April 2009, Members will have had nearly 32 months to comply with this requirement. From this date, these "other" mortalities will be counted as part of the total catches in future global catch tables produced by the Secretariat.</i></p>
RTMP catch and effort data	Japan	30 Apr 09	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 09	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. <i>Other members may request approval from New Zealand to be provided with access to these data for necessary analyses.</i>
New Zealand joint venture shot by shot data	New Zealand	30 Apr 09	Shot by shot data for New Zealand joint venture vessels in statistical areas 5 and 6 for 2008. These data should specify which shots had an observer on board. These data are only being provided to Japan and are for use in the new CPUE index.
Raised catch data for AU, NZ and KR catches	Australia, Secretariat	30 Apr 09	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. Similarly, the Secretariat will be calculating and providing the raised catch data for Korea (based on raising Korea's catch effort data to its total catch).
Observer length frequency data	New Zealand	30 Apr 09	Raw observer length frequency data as provided in previous years.

Type of Data to provide ¹	Data Provider(s)	Due Date	Description of data to provide
Raised Length Data	Australia, Taiwan, Japan, New Zealand	30 Apr 09 (Australia, Taiwan, Japan) 7 May 09 (New Zealand) ³	Raised length composition data should be provided ⁴ at an aggregation of year, month, fleet, gear, and 5x5 degree for longline and 1x1 degree for other fisheries. Data should be provided in the finest possible size classes (1 cm). A template showing the required information is provided in Attachment C of CCSBT-ESC/0609/08.
RTMP Length data	Japan	30 Apr 09	The length data from the real time monitoring program should be provided in the same format as the standard length data is provided.
Raw Size Data	Korea	30 Apr 09	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. <i>However, Korea is encouraged to improve its sample sizes of length frequency data in the future.</i>
Indonesian LL SBT age and size composition	Australia Indonesia	30 Apr 09	Estimates of both the age and size composition (in percent) is to be generated for the spawning season July 2007 to June 2008. Length frequency for the 2008 calendar year and age frequency for the 2007 calendar year is also to be provided. Indonesia will provide size composition in length and weight based on the Port-based Tuna Monitoring Program. Australia will provide age composition data according to current data exchange protocols.
Direct ageing data	All Members	30 Apr 09	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 2006 calendar year (see paragraph 95 of the 2003 ESC report). Members will provide more recent data if these are available. The format for each otolith is: Flag, Year, Month, Gear Code, Lat, Long, Location Resolution Code ⁵ , Stat Area, Length, Otolith ID, Age estimate, Age Readability Code ⁶ , Sex Code, Comments.
Trolling survey index	Japan	30 Apr 09	Estimates of the different trolling indices for the 2008/09 season (ending Jan 2009), including any estimates of uncertainty (e.g. CV).
Tag return summary data	Secretariat	30 Apr 09	Updated summary of the number tagged and recaptured per month and season.
Catch at age data	Australia, Taiwan, Japan, Secretariat	14 May 09	Catch at age (from catch at size) data by fleet, 5*5 degree, and month to be provided by each member for their longline fisheries. The Secretariat will produce the catch at age for New Zealand using the same routines it uses for the CPUE input data and the catch at age for the MP.

³ The additional week provided for New Zealand is because New Zealand requires the raised catch data that the Secretariat is scheduled to provide on 30 April.

⁴ The data should be prepared using the agreed CCSBT substitution principles where practicable. It is important that the complete method used for preparing the raised length data be fully documented.

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

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

Type of Data to provide ¹	Data Provider(s)	Due Date	Description of data to provide
Total Indonesian catch by month and % of Indonesian LL catch that is SBT	Indonesia	15 May 09	The 2008 catch of SBT in numbers and weight and the number of vessels fishing for SBT for each port and month. Also the 2008 total catch by weight of each species.
Global SBT catch by flag and by gear	Secretariat	22 May 09	Global SBT catch by flag and gear as provided in recent reports of the Scientific Committee.
Raised catch-at-age for the Australia surface fishery For OM	Australia	24 May 09 ⁷	These data will be provided for July 2007 to June 2008 in the same format as previously provided.
Raised catch-at-age for Indonesia spawning ground fisheries. For OM	Secretariat	24 May 09	These data will be provided for July 2007 to June 2008 in the same format as on the CCSBT Data CD.
Total catch per fishery each year from 1952 to 2008. For MP/OM	Secretariat	31 May 09	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.
Catch-at-length (2 cm bins) and catch-at-age proportions for OM	Secretariat	31 May 09	The Secretariat will use the various catch at length and catch at age data sets provided above to produce the necessary length and age proportion data required by the operating model (for LL1, LL2, LL3, LL4 – separated by Japan and Indonesia, and the surface fishery). The Secretariat will also provide these catch at length data subdivided by sub fishery (e.g. the fisheries within LL1).
Catch at Age for MP	Secretariat	31 May 09	Cohort slicing by month of the 5*5 raised length data provided by members. The data used is 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.
Global catch at age	Secretariat	31 May 09	Calculate the total catch-at-age in 2008 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 09	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.
Tag releases / recoveries and reporting rates. For OM	Australia	1 Nov 08	The RMP tag/recapture data for the period 1991-1997 will be updated for any changed/new data in the database.

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.

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.

Type of Data to provide ¹	Data Provider(s)	Due Date	Description of data to provide
CPUE series.	Australia / Japan	15 Jun 09 (earlier if possible) ⁹	5 CPUE series are to be provided for ages 4+, as specified below: <ul style="list-style-type: none"> • Nominal (Australia) • Laslett Core Area (Australia) • B-Ratio proxy (W0.5) (Japan) • Geostat proxy (W0.8) (Japan) • ST Windows (Japan) • The number of 1*1 degree fished squares in each 5*5 degree square. These data will be accessed only by the Secretariat¹⁰. (Japan) The operating model uses the median of these series.
Aerial survey index	Australia	31 Jul 09 (every attempt will be made to provide this at least 4 weeks earlier)	Estimate of the aerial survey index from the 2008/09 fishing season, including any estimates of uncertainty (e.g. CV).
Commercial spotting index	Australia	31 Jul 09	Estimate of the commercial spotting index from the 2008/09 season, including any estimates of uncertainty (e.g. CV).

⁹ When there are no complications, it is possible to calculate the CPUE series less than two weeks after the CPUE input data is provided. Therefore, if there are no complications, Members should attempt to provide the CPUE series earlier than 15 June.

¹⁰ These data will be temporarily accessed, under Japan's supervision, by the Secretariat to allow the Secretariat to verify calculation of the ST Windows CPUE series.

Consideration of Scientific Meeting Structure for 2009

1. The ESC considered two options for meeting structure for 2009, noting the importance of being able to produce management advice from constant catch projections as are required by the Extended Commission at that time.
2. The first option involves an additional small intersessional meeting with the status of a sub-group of the SAG, and extending for five working days. This would report to a subsequent combined SAG/ESC meeting (i.e. single chair, single agenda) extending over only six or seven working days.
3. The second option is to retain the present structure of the SAG and ESC in a single continuous meeting period; because of the possibility of difficulties arising in finalising the conditioning of the operating models if attempted within a single period and the need to allow for sufficient time to resolve them, ten working days (as in 2008) would need to be allocated for such an arrangement.
4. Key features of the intersessional meeting would be as follows:
 - Dates after all data required for conditioning have definitely become available, but sufficiently long before the combined SAG/ESC meeting to allow necessary computing to be finalized; in practice this would likely mean dates in the July-early August period.
 - A primary purpose to review updated data and agree the specifics of updated operating model conditionings, complete the associated coding, and initiate and if possible complete conditioning of all the operating model scenarios already specified by this (2008) ESC meeting. If necessary the conditioning, and resolution of any glitches that might arise, could continue into the period before the SAG/SC meeting, but **MUST** be completed by the time that SAG/SC meeting commences.
 - A secondary purpose to pursue some of the CPUE modeling tasks set out in **Attachment 13**, as this would provide a more effective means than web-based meetings to address many of these, together with the associated computations, given that most of those involved in these analyses would likely attend for the discussions related to the operating models anyway.
 - Typically reduced numbers on Member delegations compared to past SAG meetings, as the meeting would be of a “small sub-group” nature.
 - A choice of venue that minimizes travel and meeting costs for the Extended Commission, noting the importance of attendance of Advisory Panel members, and the Consultant to carry out computations; this will probably be Seattle.
 - The Report from the meeting would be subject to subsequent review and acceptance by the SAG/ESC.
 - The meeting would be chaired by Dr. Parma.

5. The ESC strongly prefers the first of these options, and recommends that this be the one chosen by the Extended Commission. It draws the Extended Commission's attention to the fact that complex calculations as planned to provide the basis of management advice from the ESC in 2009 always carry the risk of hitting unexpected problems which occasion delays. Hence the first option provides much greater security that the ESC will indeed be able to complete this process satisfactorily before the end of the ESC meeting.
6. Indonesia suggested that consideration be given to an advisory session on the operating model being scheduled during March or April 2009 to assist local scientists in improved understanding the concepts, and for Indonesia to better be able to assess what further contribution in terms of fishery data and information it might be able to make towards further developments.
7. The ESC discussed the possibility of shortening and changing the structure of future SAG/ESC meetings, and in particular operating on the basis of a single meeting with a single agenda and chair, with the aim of seeking a more efficient process with still sufficient time to give adequate attention to items of business. It agreed that this merited a trial. However, if the Extended Commission decided on the second option above for 2009 (i.e. no intersessional meeting), this trial should be postponed to 2010, as for reasons explained above, a 2009 meeting on such a basis would continue to require ten working days. If on the other hand the Extended Commission decided on the first option above, that would provide a good opportunity for a trial of such an approach.
8. There is a need for review by the ESC of the respective roles and mandates of the SAG and the ESC and their working groups. Written contributions on this to the next SAG/ESC meeting would be welcomed.

CPUE Workplan

<i>Activity</i>	<i>Responsible Persons</i>	<i>Initial Action</i>
Specifying how to correct the RTMP estimate of CPUE in the last year of the CPUE series.		
Provide a correction factor for RTMP based CPUE. Provide historic series of proportion of zero SBT sets.	TI . TI .	W2 W3
Providing robustness tests for CPUE series and monitoring the future performance of the chosen series.		
<u>Size distribution</u> Preliminary analysis for each quartile length group Clarify age-size by year and indicate analyses.).	TI . CD	<u>W1</u> <u>W1</u>
<u>Trends in concentration of fisheries on the fine scale</u> Examining concentration patterns within 5x5 grids.	TI, CD, EL	<u>W1/W2</u>
<u>Adjusting for non-SBT targeting.</u> Include abundance indices of bycatch species in CPUE model. Include measure of the Poisson excess in CPUE model. Model CPUE with fishing effort as an offset. Develop theory of the zero % covariate method. Propose GAM analyses of SBT and by-catch distributions	DB, RH, TI JGP, TI . RH, EL . JGP . EL, CD	<u>W2</u> <u>W2</u> <u>W2</u> <u>W1</u> <u>W1</u>
<u>CPUE patterns relative to the environment</u> Specify and if possible supply environmental covariates.	CD	<u>W1/W2</u>
<u>Vessel effects</u> Add a vessel factor to the standard model.	JGP, TI, EL .	<u>W1/W2</u>
<u>Zero catch adjustments.</u> Investigate the possible use of the Tweedie distribution.	EL ,HS.	<u>W2</u>
The effect of market anomalies on longline CPUE		
Make GLMs with data from observed and unobserved sets.	JGP, TI, EL.	W1/W2
Alternative approaches to the calibration of the pre and post 1986 CPUE series		
Examine the effect of include both old and new series separately.	MPWG	MPWG
Possible discarding/fish release problems with long-line CPUE results		
Extend studies of obs. and unobs. sets to quantify the effects of the release of small fish/discards.	JGP, TI, EL.	W2/W3

W1, W2, W3 refer to the 1st, 2nd and 3rd Web meetings. Should an intersessional meeting be planned then items scheduled for W3 and MPWG would be conducted at the intersessional meeting together with follow on work from items scheduled to start at W1 and W2.

Workplan for stock assessment and management procedure

Task	Due Date	Responsibility
Distribute updated OM/grid code and input files for constant-catch projections (new data file containing old tagging data by release cohort will be used as input but old likelihood formulation will be kept in conditioning)	Dec 08	Ana Parma
Update R code for associated graphics and outputs	Jan 09	Consultant
National scientists conduct further analyses on the conditioning model, including: <ul style="list-style-type: none"> - reformulation of the (old) tagging component - possible inclusion of recent tagging data - selectivity of Indonesian fishery and plus group at low M 	-	-
Update agreed input data sets to include 2008 data (2008-09 aerial survey may not be available until later)	31 May 09	Secretariat
Conditioning and simulation code and input files sent	early June 09	Ana
Exchange of papers	July 10 th 09	
Small technical meeting to evaluate inter-sessional work and decide on the structure of the conditioning/projection model	July 15 th 09	Secretariat
OM/conditioning/simulation coding modifications finalized and distributed	early August 09	Ana/consultant
Scientists conduct constant catch projections using the specified OM and sensitivity trials (similar to 2006 ranges)		National scientists and consultant
National scientists prepare evaluations of technical measures in response to CCSBT requests		
SAG10/SC14 (2009)		
Stock status and management advice (first priority) <ul style="list-style-type: none"> - Final decision on OM structure and data inputs - Advice on stock status and short-term risks associated with various TACs (constant catch projections), based on scenario modeling and analyses of indicators. 		
Development of MP (second priority): <ul style="list-style-type: none"> - Discuss possible MP options and assumptions used to simulate MP input data. - Set up initial MP trials and refine 2-3 year workplan for future MP development 		
Discussion of possible technical measures		