Commission for the Conservation of
Southern Bluefin Tuna

みなみまぐろ保存委員会

Report of the Eighth Meeting of the Scientific Committee

1-4 September 2003
Christchurch, New Zealand

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Agenda Item 1. Opening of meeting

1. The independent chair, Mr Penney declared the Scientific Committee (SC) meeting open, and welcomed all participants.
2. Those participants who were not present at the previous SAG meeting were introduced. The list of participants is at **Appendix 1**.
3. The SC meeting was adjourned.

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

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

Agenda Item 3. Other business

5. There was no other business.

Agenda Item 4. Adoption of report of meeting

6. The report of the Scientific Committee was adopted.

Agenda Item 5. Closure of meeting

7. The meeting was closed at 7:05pm on 4 September 2003

List of Appendices

Appendix 1

List of Participants
CCSBT
The 8th Scientific Committee Meeting
1 - 4 September 2003
Christchurch, New Zealand

CHAIR

Mr Andrew PENNEY
Pisces Environmental Services (Pty) Ltd
22 Forest Glade
Tokai Road, Tokai 7945
South Africa
Phone: +27 21 7154238
Fax: +27 21 7154238
Email: apenney@pisces.co.za

ADVISORY PANEL

Dr Ana PARMA
Centro Nacional Patagonico
Pueto Madryn, Chubut
Argentina
Phone: +54 2965 451024
Fax: +54 2965 451543
Email: parma@cenpat.edu.ar

Dr James IANELLI
REFM Division
7600 Sand Pt Way NE
Seattle, WA 98115
USA
Phone: +1 206 526 6510
Fax: +1 206 526 6723
Email: jim.ianelli@noaa.gov

Dr John POPE
The Old Rectory
Burgh St Peter
Norfolk, NR34 0BT
UK
Phone: +44 1502 677377
Fax: +44 1502 677377
Email: PopeJG@aol.com

Professor Ray HILBORN
School of Fisheries Box 355020
University of Washington
Seattle, WA 98195
USA
Phone: +1 206 543 3587
Fax: +1 206 685 7471
Email: rayh@u.washington.edu

SAG CHAIR

Dr John ANNALA
Science Policy Manager
Ministry of Fisheries
PO Box 1020
Wellington
New Zealand
Phone: +64 4 470 2661
Fax: +64 4 470 2669
Email: annalaj@fish.govt.nz

CONSULTANT FOR MP

Ms Vivian HAIST
6224 Groveland Drive
Nanaimo, B.C. V9V1B1
Canada
Phone: +1 250 756 0518
Email: haistv@shaw.ca

AUSTRALIA

Mr Jay HENDER
Policy Officer
Fisheries & Aquaculture Branch
Dept. of Agriculture, Fisheries & Forestry
PO Box 858, Canberra ACT 2601
Phone: +61 2 6272 3608
Fax: +61 2 6272 4875
Email: jay.hender@affa.gov.au

Dr James FINDLAY
Senior Research Scientist
Fisheries & Aquaculture Branch
Dept. of Agriculture, Fisheries & Forestry
PO Box 858, Canberra ACT 2601
Phone: +61 2 6272 5534
Fax: +61 2 6272 3882
Email: james.findlay@brs.gov.au

Mr Andy BODSWORTH
Manager
Southern Bluefin Tuna Fishery
Australian Fisheries Management Authority
PO Box 7051, Canberra Mail Centre
ACT 2610
Phone: +61 2 6272 5290
Fax: +61 2 6272 4614
Email: Andy.Bodsworth@afma.gov.au

Dr John GUNN
Senior Research Scientist
Tropical & Pelagic Ecosystem Program
Division of Marine Research
CSIRO
P.O. Box 1538
Hobart, Tas 7001
Phone: +61 3 6232 5375
Fax: +61 3 6232 5012
Email: John.Gunn@csiro.au

Dr Tom POLACHECK
Senior Principal Research Scientist
Pelagic Ecosystems Sub-Program
Division of Marine Research
CSIRO P.O. Box 1538
Hobart, TAS 7001
Phone: +61 3 6232 5312
Fax: +61 3 6232 5012
Email: tom.polacheck@csiro.au

Dr Marinelle BASSON
Senior Research Scientist
Pelagic Ecosystems Sub-Program
Division of Marine Research
CSIRO P.O. Box 1538
Hobart, Tas 7001
Phone: +61 3 6232 5336
Fax: +61 3 6232 5012
Email: marinelle.basson@csiro.au

Dr Dale KOLODY
Research Scientist
Pelagic Ecosystems Sub-Program
Division of Marine Research
CSIRO P.O. Box 1538
Hobart, Tas 7001
Phone: +61 3 6232 5121
Fax: +61 3 6232 5012
Email: dale.kolody@csiro.au

JAPAN

Dr Sachiko TSUJI
Section Chief
Temperate Tuna Section
National Research Institute of
Far Seas Fisheries
5-7-1 Orido, Shimizu, Shizuoka,
Shizuoka 424-8633
Phone: +81 543 36 6042
Fax: +81 543 35 9642
Email: tsuji@fra.affrc.go.jp

Dr Norio TAKAHASHI
Senior Researcher
Temperate Tuna Section
National Research Institute of
Far Seas Fisheries
5-7-1 Orido, Shimizu, Shizuoka,
Shizuoka 424-8633
Phone: +81 543 36 6043
Fax: +81 543 35 9642
Email: norio@affrc.go.jp

Dr Hiroyuki KUROTA
Temperate Tuna Section
National Research Institute of
Far Seas Fisheries
5-7-1 Orido, Shimizu, Shizuoka,
Shizuoka 424-8633
Phone: +81 543 36 6043
Fax: +81 543 35 9642
Email: kurota@affrc.go.jp

Dr Kazuhiko HIRAMATSU
Section Chief
Mathematical Biology Section
National Research Institute of
Far Seas Fisheries
5-7-1 Orido, Shimizu, Shizuoka,
Shizuoka 424-8633
Phone: +81 543 36 6014
Fax: +81 543 35 9642
Email: hira@affrc.go.jp

Mr Hiroshi SHONO
Mathematical Biology Section
National Research Institute of
Far Seas Fisheries
5-7-1 Orido, Shimizu, Shizuoka,
Shizuoka 424-8633
Phone: +81 543 36 6039
Fax: +81 543 35 9642
Email: hshono@affrc.go.jp

Prof Doug BUTTERWORTH
Department of Mathematics and Applied
Mathematics
University of Cape Town
Rondebosch 7701
South Africa
Phone: +27 21 650 2343
Fax: +27 21 650 2334
Email: dll@maths.uct.ac.za

Mr Hajime TAGUCHI
Section Chief
Fisheries Agency
1-2-1 Kasumigaseki, Chiyoda-ku
Tokyo 100-8907
Phone: +81 3 3501 5098
Fax: +81 3 3502 1682
Email: hajime_taguchi@nm.maff.go.jp

Mr Yuji NISHIMOTO
Section Chief
Fisheries Agency
1-2-1 Kasumigaseki, Chiyoda-ku
Tokyo 100-8907
Phone: +81 3 3502 8479
Fax: +81 3 3591 5824
Email: yuji_nishimoto@nm.maff.go.jp

Ms Miho WAZAWA
International Affairs Division
Fisheries Agency
1-2-1 Kasumigaseki, Chiyoda-ku
Tokyo 100-8907
Phone: +81 3 3591 1086
Fax: +81 3 3502 0571
Email: miho_wazawa@nm.maff.go.jp

Mr Nozomu MIURA
Assistant Chief
International Business and Planning
Division
Federation of Japan Tuna Fisheries
Cooperative Associations
3-22 Kudankita 2-chome, Chiyoda-ku
Tokyo 102-0073
Phone: +81 3 3264 6167
Fax: +81 3 3234 7455
Email: miura@japantuna.or.jp

NEW ZEALAND

Dr Talbot MURRAY
Pelagic Project Leader
National Institute of Water & Atmospheric
Research Ltd
PO Box 14-901, Kilbirnie, Wellington
Phone: +64 4 386 0300
Fax: +64 4 386 0574
Email: t.murray@niwa.cri.nz

Ms Emma WATERHOUSE
Senior International Advisor
Ministry of Fisheries
PO Box 1020, Wellington
Phone: +64 4 470 2644
Fax: +64 4 470 2669
Email: emma.waterhouse@fish.govt.nz

Dr William EMERSON
Senior International Advisor
Ministry of Fisheries
PO Box 1020, Wellington
Phone: +64 4 470 2650
Fax: +64 4 470 2669
Email: william.emerson@fish.govt.nz

FISHING ENTITY OF TAIWAN

Dr Shui Kai CHANG(Eric)
Associate Researcher
Deep Sea Fisheries Research and
Development Center
Fisheries Agency
Council of Agriculture
No. 2, Chaochow St.
Taipei 100, Taiwan
Tel: +886 2 33436133
Fax: +886 2 33436268
Email: skchang@msl.fa.gov.tw

Dr Shu-Hui WANG
Assistant Researcher
Overseas Fisheries Development
Council of the Republic of China
19, Lane 113, Roosevelt Road
Sec. 4, Taipei, Taiwan
Tel: +886 2 2738 1522
Fax: +886 2 2738 4329
Email: Jessica@ofdc.org.tw

REPUBLIC OF KOREA

Dr Dae-Yeon MOON
Senior Scientist
Distant-water Fisheries Research Div.
National Fisheries R & D Institute
408-1 Shirang-ri, Kijang-gun
Pusan 619-902
Tel: +82 51 720 2320
Fax: +82 51 720 2337
Email: dymoon@nfrda.re.kr

Dr Kyu-Jin SEOK
Research Scientist
International Cooperation office
Ministry of Maritime Affairs and Fisheries
50 Chungjeong-Ro 3, Seodaemoon-Gu
Seoul 120-715
Phone: +82 2 3148 6994
Fax: +82 2 3148 6996
Email: pisces@momaf.go.kr

CCSBT SECRETARIAT

PO Box 37, Deakin West ACT 2600
AUSTRALIA
Phone: +61 2 6282 8396
Fax: +61 2 6282 8407

Mr Brian MACDONALD
Executive Secretary
Email: bmacdonald@ccsbt.org

Mr Yukito NARISAWA
Deputy Executive Secretary
Email: ynarisawa@ccsbt.org

Mr Robert KENNEDY
Database Manager
Email: rkennedy@ccsbt.org.

INTERPRETERS

Ms Saemi BABA
Ms Kumi KOIKE
Ms Yuki SAYEG

Commission for the Conservation of
Southern Bluefin Tuna

みなみまぐろ保存委員会

Appendix 2

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

1-4 September 2003
Christchurch, New Zealand

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

1-4 September 2003
Christchurch, New Zealand

Agenda Item 1. Opening of meeting

1. The meeting was opened by the appointed Chair of the Scientific Committee and of the Extended Scientific Committee, Mr A. Penney, who welcomed participants.

1.1 Introduction of participants

2. Most participants attended the SAG4 meeting the previous week, and so had already been introduced. Additional participants that had not participated in the SAG meeting were introduced by members. It was noted that the invited Indonesian representatives had not arrived. The list of participants is shown in **Attachment A**.

1.2 Administrative matters

3. Administrative arrangements for the meeting were presented by the Deputy Executive Secretary.

Agenda Item 2. Appointment of rapporteurs

4. The Chair offered to work together with the Executive Secretary to draft the report of plenary sessions of the meeting. It was agreed that, where discussions were held in informal working groups, rapporteurs would be specifically appointed for each such working group when they first met.

Agenda Item 3. Adoption of agenda and document list

5. Following minor re-arrangement of the sub-items under agenda item 6, the draft agenda was adopted. The agreed agenda is shown in **Attachment B**.
6. The draft list of documents for the meeting remained unchanged from the list of documents presented to the SAG4 meeting, and was adopted. Papers relevant to the meeting were identified against the relevant agenda items. The agreed document list is shown in **Attachment C**.

Agenda Item 4. Review of SBT fisheries

4.1 Presentation of national reports

7. Country review reports were submitted by Australia, Japan, New Zealand, Korea and the Fishing Entity of Taiwan (reports CCSBT-ESC/0309/SBT Fisheries ...).

8. In response to questions, Australia was uncertain about the relative importance of factors contributing to the substantial increase in search effort in the surface fishery over the past two seasons. Various potential factors were recognised, including possible decline in recruitment and operational factors such as selection of smaller schools. However, the fishing area and actual size of fish caught had not changed significantly. Apparent changes in Australian longline CPUE should be interpreted with caution as SBT are a small by-catch in this fishery, and vessels move away from areas in which SBT are caught to target on bigeye and yellowfin tunas.

9. Regarding recent marked increase in Australian surface fishery search time, it was important to try and ascertain to what extent this has resulted from extended searching time to select smaller fish schools, and to what extent it may have resulted from reduced abundance or availability of SBT in the fishing area and in that regard needs to be interpreted with caution. It was recognised that trends in this fishery may reflect localised changes in the fishing area. However, where such localised changes coincide with other indicators from other areas, this should be noted as a cause for concern.

10. Improved reporting by the Taiwanese distant-water fleet showed a wider spatial distribution of catch. Despite the geographic expansion of catch, the level of catches had decreased. Taiwan reported that the decreased catches were considered to have resulted from implementation of catch limits agreed within the CCSBT. It was suggested that CPUE trends for SBT seasonal targeted and SBT by-catch fisheries be reported separately in future. This may be difficult as a number of vessels are involved in both of these fishery components. However, some degree of separation should be possible using different time/area strata, and nominal CPUE data could be provided by these components. Recent apparent substantial declines in the proportion of small fish in the Taiwanese catch should also be interpreted with caution as 2002 was the first year in which size data had been collected under a quota management system, and sample sizes in previous years were very low.

11. Japan noted that nominal CPUE has remained fairly constant in recent years, but that some anomalous CPUE patterns between fishing areas had been noted over the past season. The reasons for these were unclear. The size distribution of fish caught has also remained fairly constant for 5 years up to 2002, although a marked decline in the proportion of SBT < 115cm occurred in 2003.

12. Korea explained that the decline in Korean SBT catch resulted from decreased profitability of fishing for SBT in the Indian Ocean, and vessels moving to target bigeye tuna in the Pacific Ocean. Of the 16 vessels registered to target on SBT, only 10 were active in 2002. Nominal CPUE had increased in 2002 compared to 2001.

13. New Zealand noted a 10% increase in domestic (i.e. non-charter vessel) fishing effort on SBT in 2002. This continued a trend of increasing longline effort for a

range of tuna. The number of vessels targeting tunas has now increased to more than 150, mostly small vessels < 50 GRT. Approximately half of the catch is made by the larger chartered longline vessels. In addition to SBT, some 55 tons of Pacific bluefin had been caught.

4.2 Secretariat review of catches

14. The Data Manager presented an updated global SBT catch table (CCSBT-ESC/0309/06). It was noted that revision of certain past annual catch series had resulted from provision of Japanese data in calendar years for 1991 - 2001, raising of Korean catches from processed weight to whole weight for 1991 - 2001 and correction of raw data used to estimate Indonesian catches from 1993 - 2001. Indonesian catches for 2002 were estimated using partial data from the CSIRO/RIMF and the IOTC monitoring programs, and might be revised slightly downwards following correction of the raising procedure used to combine these data.
15. Catches reported under Misc-1 and Misc-2 were reported against import date, which could differ by 6-8 months from catch date, and the Data Manager inquired whether efforts should be made to report these catches against catch year. Questions were also raised regarding differences in reported Seychelles catches in the IOTC data and Japanese import statistics provided to CCSBT, although these differences were not substantial.
16. In response to a question, it was noted that the raising factor generally used for converting processed to whole weights was 1.15, although this was known to vary with fish length.
17. A small group met to further discuss issues relating to the global catch table. It was agreed that:
    - the "Misc-1" category (and its associated catch) should be completely removed from the table because the catch reported here is considered very likely to be northern, not southern bluefin tuna;
    - Taiwan's catches for gillnet and longline fishing should be combined into a single "Taiwan" column. In a related change, it was recommended that the reports of future SC meetings include an additional table which is catch by gear (containing no country information);
    - The report of future SC meetings should also include Japanese import statistics by year and country. This will improve the understanding of catches reported in the miscellaneous category.
18. The finalised global catch table is presented at **Attachment D**.

Agenda Item 5. Matters arising from the report of the Fourth Meeting of the Stock Assessment Group

5.1 Review of fisheries indicator analysis and status of the SBT stock

19. Dr Annala, Chairman of the Stock Assessment Group, presented the section of the SAG4 report dealing with this issue. Based on an inter-sessional review of fishery indicators and review of additional papers (CCSBT-ESC/0309/26, CCSBT-ESC/0309/34, CCSBT-ESC/0309/44), the ESC endorsed the conclusion of the SAG that there has been no dramatic change in stock status since the 2001 assessment, and that there is therefore no reason to change the advice given at that time.

20. However, the SAG did note a number of indicators (2000 acoustic survey, 2002 Australian surface fishery CPUE, Japanese longline CPUE for 3 year olds in 2002 and absence of age 4 fish (<115cm) in the Japanese fishery in Apr-Jun 2003) consistent with a marked decline in recruitment in 1999 and 2000. Indications of ongoing low recruitment in the 2001, 2002 and 2003 acoustic surveys, 2003 aerial survey and the 2002 and 2003 surface fishery CPUE will need to be evaluated following analysis of Japanese longline data for 2004 (and possibly 2005) before recent recruitment can be properly assessed. Trends in recent recruitment remain a key uncertainty in provision of advice on stock status.

21. The value of fisheries-independent indices of SBT recruitment has been repeatedly emphasized in the past, and efforts should continue to try and resolve logistic difficulties and technical concerns with the aerial and acoustic surveys to improve the results. The meeting encouraged Australia and Japan to continue collaborative efforts to review all aspects of these programs. It was noted that these surveys are conducted in limited areas, and may not provide robust indices of global recruitment. When reviewing these surveys, efforts should focus on attaining adequate statistical precision for the intended use (whether indices as qualitative indicators or quantitative estimates), and understanding additional variances resulting from changes in movement and distribution patterns.

22. It is difficult to envisage any way to evaluate the overall precision of such surveys and in particular the effects of inter-annual or longer term changes in geographical distribution of the cohorts being surveyed. This might be done by calibrating survey results against assessments over a period of time. With regard to using any such indices within the context of a Management Procedure approach, it was noted that this should be considered to be potentially part of the second phase of Management Procedure revision.

5.2 SBT management recommendations

23. Based on the review of fishery indicators, it was concluded that there was no reason to change the SBT management advice that was provided to the CCSBT in 2001 (paragraphs 29-30 of the Report of the Sixth Meeting of the Scientific Committee).

24. However, the meeting did note the concern of the SAG4 meeting regarding the apparent coincidence of a number of indicators of poor recruitment in 1999/2000. If preliminary indications of continued marked decline in recruitment since 1999 are confirmed, this will have major implications for conclusions regarding the state of the stock, and its potential to rebuild.

5.3 Development of the SBT management procedure

25. Dr Annala presented the section of the SAG4 report dealing with this issue (see section 6 of the SAG4 report for details). It was noted that the SAG4 meeting had been highly successful, and that substantial progress was made in resolving all the outstanding issues in preparation for the final stage of MP development. The member scientists, Panel members and Vivian Haist were thanked by the chair for their substantial efforts in this regard, particularly Dr Ana Parma, who chaired the technical MP development sessions. Provided some Commission guidance is received on management objectives, it should be possible to complete this process on schedule at the MP3 workshop in April 2004, and to be able to present a range of final MP options for consideration by the Commission at their 2004 meeting.

26. It was noted that the MP development process to date has used a standard data set provided in 2002 for conditioning. Certain data have been updated since then, but have not been incorporated in the MP evaluation process. In addition to agreeing on which MP to implement, it is important to agree on which data are to be used in implementation. The MP3 workshop in April 2004 will need to consider which updated data need to be used in the final MP evaluations presented for the Commission's consideration in 2004.

5.4 SBT management objectives

27. Dr Annala noted that this item had also been discussed by the SAG4 meeting, which recognised three main categories of management objectives for SBT: Those related to optimizing catch; those related to optimizing some measure of biomass; and those related to stability of TACs over time.

28. Paper CCSBT-ESC/0309/30 was presented. This discussed a number of factors to consider when setting appropriate management objectives for SBT, and identified five broad approaches to defining and establishing possible rebuilding targets.

29. Following discussions in a technical working group, Prof. Ray Hilborn produced a proposed draft presentation for the CCSBT10 meeting on the trade-offs between catch and biomass, and questions that will need to be addressed when selecting management procedures. The concluding questions regarding management objectives, on which the ESC requires guidance from the Commission, are:

    - Are the bounds we are using between catch oriented and recovery oriented policies appropriate?
    - Should we present more policies intermediate between these bounds?
    - Policies will be presented that update TAC annually or every three years. Should we explore policies that update TAC at some other time interval?

30. When presenting MP options for consideration, the SC will provide the following "performance measures". Are these sufficient?

    - Average catch,
    - Average spawning biomass,

- Spawning biomass relative to 2002,
- Spawning biomass relative to 1980,
- Frequency of TAC change,
- Proportion of simulations exceeding specific thresholds.

31. At the 2004 CCSBT meeting the SC will provide a range of several candidate management procedures and the Commission will be asked to choose between them.

    - What additional information will CCSBT need in order to do this?

5.5 Stock assessment process for 2004

32. The SAG4 meeting concluded that there was no reason to change the original work plan to conclude the MP development work at the 2004 MP 3 workshop, and to conduct a stock assessment in 2004 at the SAG/SC meetings. The ESC endorsed the stock assessment process proposed by the SAG for 2004, and noted the importance of considering a range of alternate assessment models.

33. The prime requirement of an assessment will be to provide CCSBT with an update of the best scientific view on the current status of the stock relative to a long term strategy and in comparison to its reported status at the last full assessment made in 2001. It is the belief of the SC that in normal circumstances a well tested management procedure will provide TAC advice which will achieve management objectives better than would assessment based calculations. However, it is always conceivable that circumstances in any fishery or stock may alter in such a dramatic fashion that the stock or fishery moves outside the range for which the management procedures were tested. In these circumstances urgent "hands on" management intervention could be required. Hence, a second objective for the assessment will be to advise management if this need arises. With these issues in mind SC proposes that the 2004 assessments be made with the following Terms of Reference.

34. To prepare a full assessment of the status of the SBT stock and to advise the SC of CCSBT:

    - On the current stock status relative to its assessed status in 2001 and the rebuilding strategy of CCSBT;
    - If there are any dramatic changes in the stock or fishery that are outside the range for which management procedures were tested and that would require CCSBT to adopt urgent management measures beyond those already existing or proposed under an agreed management procedure.

Agenda Item 6. Review of Scientific Research Program

6.1 Characterisation of SBT catch

35. The Data Manager presented report CCSBT-ESC/0309/08, which reviewed progress made with improving data collection deficiencies that were identified at the SC7 meeting.

36. Members reported on improvements to their respective data collection systems, and provided explanations for ongoing difficulties in collecting certain data. Due to practical difficulties of implementing some of the specified improvements, most members have made little progress in improving their data collection systems. However, Taiwan has made significant progress in increasing its sample sizes of length data.

37. With regard to development of agreed data reporting standards, it was noted that these standards were well-advanced, and that there were now only two remaining issues on which final agreement had not been reached: Reporting of data on species other than SBT, and the geographic resolution of reported data.

38. A small committee met to consider data exchange and standards. For scientific purposes access to data at the finest spatial and temporal scale is desirable to assist resolution of key uncertainties in assessments such as CPUE standardization. CPUE analysis incorporating 1x1º longline data have formed a critical part of past assessments and the current management procedure development efforts.

39. The ESC was unable to agree on the appropriate level of spatial resolution for a CCSBT data reporting standard. The members agreed to exchange data required for the 2004 assessment, as was done for the 2001 assessment including data required for calculating the agreed CPUE indices.

40. The ESC recognizes the scientific value of information on the catch of other tuna and tuna-like species for the interpretation of CPUE trends and the analysis of targeting practices that may affect them. Although the problem of targeting on other species varies in importance among the different fisheries that catch SBT, the committee considers that regular availability of these data for all fisheries is desired for the examination of potential changes in targeting, even if these data are not used directly for CPUE standardization. Members were encouraged to provide further information on this issue to the next ESC meeting.

41. It was noted that further consideration should be given at the next ESC meeting to the criteria which might underpin the setting standards for data provision to the CCSBT scientific process.

6.2 CPUE modelling

42. Prof. John Pope presented an overview of the work conducted by the CPUE Modelling Group in 2003. The group last met at the MP2 workshop in April, and the report of that meeting was included as Appendix 5 to the workshop report. Since then the CPUE group has suspended their work because of higher priority for completion of the MP development process.

43. Regarding future work, initial indications are that further efforts should be made to investigate use of concomitant variables to improve understanding of changes in the fishery, fish distribution and environmental issues.

44. The CPUE steering group met briefly to discuss paper CCSBT-ESC/0309/28 and to standardise the definition of CPUE to be used for operational management procedures (**Attachment E**).

45. It was noted that the agreed CPUE indices (Nominal, B-Ratio Proxy, Geostat Proxy, Laslett Core and Space Time Window) will need to be updated up to 2003 for use in implementation of the agreed MP. The meeting confirmed that the actual index to be used will be the median of these indices, as specified in **Attachment E**.

6.3 Scientific observer program

6.3.1 Scientific observer program standards

46. The Executive Secretary presented the 7th draft of the Observer Program Standards (CCSBT-ESC/0309/09), noting the outstanding issues upon which agreement had not yet been reached. These issues were resolved in a smaller working group and the final Observer Program Standards (see **Attachment F**) were accepted by the ESC.

47. With regard to these final standards, the following comments were made:

- The Fishing Entity of Taiwan's view that the target for observer coverage of 10% is not feasible for them, and that 5% would be more reasonable, was noted.
- It was agreed that the reference to "significant by-catch" in Section 4 of the Standard should not be interpreted to read "any by-catch".
- It was noted that the documentation to be reported to the Extended Scientific Committee under the Standard's reporting provisions relating to the collection of data, would be important in evaluating the scientific aspects of the program and whether the underlying objectives were being met.

48. General data collection priorities were agreed to serve as a guideline for CCSBT observer programs. However, allocating observer effort among these tasks remains an important and fundamental issue. The Extended Scientific Committee noted that for the data collected by observers to be used in estimates of catch and catch rates of all catch components, careful documentation of the proportion of the catch/haul observed was essential.

6.3.2 Report on scientific observer programs in 2002-2003

49. Australia presented paper CCSBT-ESC/0309/33 describing their observer programs in 2002. Coverage of 11% of effort had been achieved in the surface fishery, deploying observers for 47 days and 19 days monitoring a tow cage operation. 13% coverage was attained for the east coast longline effort south of 30º S. Observers collected all data sought in the draft CCSBT observers standards.

50. Japan presented the information on their observer program contained in their national report. 14 observers were deployed in 2002, of which 12 had substantial seagoing experience and 10 had experience working as SBT observers. 7% of the vessels active in areas 4, 7, 8 and 9 carried observers, who observed 3.5% of the total efforts in those areas. Size-composition, biological data and otoliths were collected. It was noted that cost and time required for deployment of observers was the main factor making it difficult to increase observer coverage levels.

51. New Zealand noted that their observer program had been operating for over 15 years, and attempted to characterize all aspects of the tuna longline fisheries. 100% coverage was obtained on the charter vessels in 2002, and 7% on the domestic fleet. Size composition and biological data were collected for all tunas, billfishes and sharks, and tag recoveries monitored. Responding to a request, New Zealand stated that they would provide a written overview of their program as soon as possible.

52. Korea noted that they are developing their observer program, and current emphasis is on training of observers. Five observers were trained on the Hawaiian longline fishery training program in 2002, and further training will be undertaken in 2003. No observer deployments have yet been conducted.

53. Taiwan trained 6 observers during 2002. Taiwan planned to deploy two observers on SBT vessels in 2002. However, problems with deployment / boarding of observers on vessels resulted in only one observer trip in 2002. Two observers have been deployed on SBT vessels since the middle of 2003. Observers collected most of the agreed fisheries data for SBT, and also collected otoliths.

54. Australia reported that a recent visit to Indonesia ascertained that they have been conducting an observer program on their vessels for a number of years, deploying observers on 40 - 50 vessels a month for 10 months each year, and observing 20 - 30 shots on each trip. It is expected that analyses of the resultant data will substantially improve understanding of Indonesian fishery behaviour, and results will be reported to the next ESC meeting.

55. Members were requested to provide written reports on their observer programs in the agreed format to the next ESC meeting.

6.3.3 Plans for scientific observer programs in 2003-2004

56. Australia will continue observer programs on their surface and longline fleets in 2004 along the same lines as in 2003. Efforts will be made to maintain at least 10% coverage of effort in both fisheries, and to spread observer effort more evenly across the fishing season and areas.

57. The Japanese observer program for the 2003/04 season has already started in the Tasman Sea, again with a planned coverage of 7% of vessels by 16 observers. Efforts will be made to increase actual coverage of fishing effort in 2003/04.

58. New Zealand has budgeted for 760 observer days on the domestic and charter fleet combined, and will again implement 100% observer coverage of the charter fleet.

As fishing effort by the domestic fleet increases, New Zealand will attempt to achieve and maintain 10% coverage.

59. Korea plans to continue training of observers, with emphasis of developing a domestic training program to replace foreign training. However, it is not known when actual deployment will commence. Initial efforts will be made to place a few trainees on purse seine vessels in the Pacific Ocean for training purposes.

60. Taiwan hopes to deploy at least two observers on SBT fishing vessels, following evaluation of experiences with the 2003 deployment. They noted that cost and difficulties in deployment of observers on distant water fishing vessels were also major factors limiting the number of deployments in their fishery, and that Taiwan had to divide observer effort between fisheries in a number of ocean areas.

6.4 CCSBT tagging program

6.4.1 Tag Deployment

61. The Executive Secretary presented report CCSBT-ESC/0309/10, summarising the results of the Secretariat-managed surface fishery tagging program in Western and South Australia in 2002/2003. A total of 13 147 fish had been tagged, meeting the agreed target tagging range of 10 000 - 15 000 tags for this fishery. Length-frequency data indicated that different size components of the juvenile SBT had been tagged in South Australia in December and March.

62. It is planned to conduct the surface fishery tagging program the same way in 2004, but perhaps starting earlier to coincide with vessel availability. In 2002, the cost of the tagging had been about AU$10 500 / day in South Australia and AU$ 6 500 in Western Australia. Some saving in budgeted costs had been achieved and it was planned to increase efforts directed at tag recovery initiatives. A proposed budget will be presented to the Commission for their consideration.

63. It was noted that availability of juvenile SBT in southern Australia has historically been low before late November and after April, and so tagging effort should remain within this period of availability. It was suggested that tagging should be spread across the November to March period to maximise coverage of the various SBT size/age components in the area. It was also noted that one of the original intentions in the tagging proposal had been to tag after the fishing season, to reduce the number of short-term tag recoveries. Tagging efforts should therefore remain flexible, perhaps extending to tagging between commercial fishing trips across the season. The Executive Secretary was asked to bear these issues in mind when contracting tagging vessels.

64. Members reported on their pilot tagging projects. Australia reported on the 2003 AFFA/AFMA/CSIRO program to tag longline-caught SBT off the Australian east coast. Tagging efforts had been constrained by weather conditions, but observers in this area were currently still tagging SBT. 210 fish have been tagged to date, and it was expected to tag about 300 fish. The associated tagging mortality had been reduced from ~40% to ~30% through use of shorter soak times and/or smaller sets, and this mortality was within the SRP allowance. Two conventional tags have been

recaptured to date. In addition to conventional tags, 9 pop-up archival tags (PAT) have been deployed to track migration into the Tasman Sea, and these have remained on the fish for over two months so far. Australia plans to continue this tagging in 2004, and it is planned to deploy 25 PAT tags over the next 12 months off New South Wales and Western Australia.

65. Results of the Japanese pilot tagging program off SE Africa in 2002 were presented in CCSBT-ESC/0309/35. 318 fish of ages 2 - 5 years were tagged. Of these, 5 were tagged with PAT tags and 40 with archival tags. One conventional tag and 2 archival tags have been recaptured to date. The total tagging mortality was 4.75 tons, within the SRP allowance of 6.5 tons. A similar program has been planned for 2003/2004. Japan also reported that 36 conventional tagged fish and 8 archival tagged fish were released from Western Australia during the Recruitment Monitoring Survey.

66. New Zealand presented a proposal to conduct a tagging program using pop-up and archival tags to tag large SBT in 2004. NZ$ 250 000 has been budgeted to place up-to 10 pop-up and 30 archival tags in the New Zealand fishing area. The objectives of this study will be to investigate interchange of large SBT across the Tasman Sea and return of large SBT to the spawning grounds. Considering the similarity in proposed methods and objectives with Australian and Japanese longline tagging projects, the ESC supported the project. New Zealand was encouraged to also place conventional tags, to increase the global numbers of conventional tags in large SBT. New Zealand noted that a SRP mortality allowance of 5 tons would be requested to support this work.

6.4.2 Tag recovery

67. The Secretariat reported substantial effort on tag recovery initiatives during 2002/03, including contracting a sampler in Port Lincoln to liaise with the industry there regarding tag recoveries. 200 recoveries have been received so far, with another estimated 200 tags awaiting forwarding from Port Lincoln. Taiwanese representatives in Port Louis (Mauritius) and Cape Town (South Africa) had liaised with Taiwanese vessels operating in these ports, although not many tag returns have been received from these ports as yet.

68. With regard to where to place general emphasis during the coming tagging year, it was noted that the number of recaptures from longline fisheries was expected to increase rapidly in 2004, particularly from the Taiwanese fishery. Given the low level of observer coverage to facilitate monitoring of tag returns and estimation of reporting rates, efforts need to be made to maximize tag returns. Past experience has indicated that direct contact with individual vessels, before they commence fishing and when they return to port, was crucial to doing this.

69. Continued liaison efforts in Port Lincoln, Port Louis and Cape Town were strongly supported. Consideration could perhaps be given to contracted CCSBT port samplers at these ports, to ensure coverage of all longline vessels. At other landing

areas, members must implement effective liaison with their vessels in their ports to ensure that tags are recovered.

70. Members reported on past and planned future initiatives to recover tags from their vessels.

71. During 2003 Australia has implemented numerous measures to increase tag-recovery rates and estimate reporting rates. These procedures will continue in the 2003-2004 season and will be improved where possible:

- Australian fisheries logbooks have dedicated tag recapture reporting fields, and logbook officers and fisheries officers provide regular contact with fleets in key ports before, during and after the fishing season. The Australian government also employs dedicated liaison officers in the longline fisheries who are located within industry associations.
- Australian purse seine and longline fleets had more than 10% observer coverage in the last season. Fishery observers are briefed on the CCSBT tagging program and the importance of tag recoveries. Observers are routinely present in key ports and undertake regular liaison with fishermen.
- For the surface fishery, a dedicated contractor is employed to sample and count SBT taken for farms. Their responsibility includes coordination of tag collection and reporting. Australia also has implemented a tag-seeding project in the SBT farms. The project aims to estimate tag shedding rates and reporting rates.

72. To improve the understanding on the importance of tagging program and to increase the tag recovery rate, Taiwan has made every effort to convey the necessary information to its fishermen:

- Posters were translated into Chinese and together with the English version, were not only distributed through domestic governmental agencies, tuna association, and overseas representatives to the SBT fishing vessels, but also published on six different fishery publications or journals that fishermen read most. Information on the poster was regularly aired on the three major fishery radio stations
- An educational program was also designed for those who attend fishery training classes for renewing their licenses.
- Monitoring of tag recovery was requested as one of the major tasks to our scientific observers.
- Every vessel approved to fish for SBT last year have received and were requested to post the water-proof CCSBT leaflet on board.
- Taiwan's overseas representatives in Mauritius and Cape Town are appointed to be liaison officials and requested to interview with our fishermen for promoting the tagging program and collection of tags. There were 22 tags reported since 2001 and one of them was an archival tag.
- In the future, a supplementary tag-rewarding program might be considered, which might include taking the number of tags recovered as bonus points for future quota allocation amongst their fleet.

73. The following efforts were made by Japan to improve tag recovery in 2002 and 2003. This list includes a plan in 2003:

- The posters on Tagging Program of Japanese, Indonesian, and English versions were produced and distributed to all fishing vessels who would operate on SBT in January before leaving for fishing grounds in February.
- The system for industry representatives to communicate with vessel owners and fishing masters of vessels who would land its catch at Shimizu Port was established in May 2003. The industry representatives would explain about tagging program, inquire of existence of recovered tags and deliver tag rewards. The NRIFSF kept regular contact with the industry representatives.
- The dedicated person to communicate with vessel owner and fishing masters for vessels landing at Shimizu Port will be contracted by the NRIFSF during the high landing season, i.e. November to February. This dedicated person will take the similar role as the one described above and work in a close collaboration with the industry representatives
- It was set to incorporate a sentence asking for a cooperation in recovering tags to SST map sent to all vessels daily through FAX
- The newsletter with Japanese and Indonesian languages was produced in March 2003 and distributed through observers and fishing agencies. Indonesian language was included to also address to majority of crews of Japanese longliners. This newsletter is planed to produce once every year informing SBT ecology and biology as well as various scientific programs including tagging.
- Special session was included into observer training for observers to obtain a capacity to explain to crews about the CCSBT Tagging Program and its impact for future improvement of understandings on SBT behaviors, migration, and stock status.

74. Efforts to maximise tag recovery in New Zealand fisheries included:

- Briefing scientific observers before each longline trip.
- Providing observers with tagging posters in both English and Japanese.
- Debriefing observers regarding any tags recovered at the end of each trip.
- Describing the tagging program to commercial and recreational fishery organisations.
- Sending posters to all longline fishers, fishing companies and to landing points.

75. Since Korea did not deploy scientific observers on board Korean longliners fishing for SBT in the Indian Ocean, the direct recovery of tagged fish has required voluntary cooperation by fishermen. Korea sought cooperation by visiting fishing vessel captains and encouraging them to report the tagged fish caught aboard during their operation before they depart their fishing trips. The NFRDI scientists have a chance to interview the captains as they visit the Korean Tuna Longline Association before their trip. The purpose of interviews is to teach fishers about the data reporting, biological measurement of catch, tagging method, and tag recovery and reporting etc. During the 2002/2003 fishing season, scientists emphasized the

importance of tagging and recovery of tags, and that rewards were provided for recovered tags. During the 2002/2003 season, Korea distributed the reward posters translated into the Korean language and the letter of Executive Secretary of the CCSBT to both the fishing captains and fishing companies. The posters and rewards for recovered tags have been displayed at the Longline Association where the fishing captains take a routine visit. These types of measures will be continued in the 2003/2004 fishing season.

76. Members were also requested to report back to the next ESC meeting on their tag recovery initiatives and liaison programs during 2004.

6.4.3 Estimation of reporting rates

77. Paper CCSBT-ESC/0309/22 explored the trade-off between tag release numbers and observer coverage in estimating reporting rates and providing estimates of fishing mortality (F) and natural mortality (M). Additional issues, including the effects of a multi-year program and assumptions regarding what is known about catch-at-age were explored. Simulations indicate that an observer coverage level of 20% - 30% would be required to achieve CVs in F estimates of about 20%. Significant increases in precision of reporting rate estimates with increased tag numbers depended on knowledge of the catch at age. Estimates of M were more dependent on tag numbers.

78. The meeting again noted the practical constraints and difficulties with achieving high observer coverage levels. If adequate observer coverage (and estimates of reporting rate) cannot be achieved, consideration will need to be given to the resultant implications for the objectives of the tagging program, particularly deriving independent estimates of F. Options will need to be considered, such as accepting higher CV's on tagging estimates of F, alternative measures to estimate reporting rates, or reconsidering the usefulness of the tagging program.

79. A small working group met under Prof Ray Hilborn's guidance to further consider implications of the tag release / observer coverage trade-off, and to make recommendations for more detailed evaluation of this issue at the 2004 SAG/SC meetings.

80. From papers presented to this ESC meeting, this working group considered that the current levels of observer coverage in the Japanese, Korean and Taiwanese longline fisheries are not high enough to provide useful estimates of fishing mortality rates in the longline fisheries. However, previous analyses (CCSBT-SC/0209/18 and CCSBT-ESC/0309/33) need to be extended using current estimates of surface reporting rates and longline observer coverage to reach firm conclusions. None of the analyses presented at this meeting allow us to evaluate the effectiveness of the tagging and recovery programs as currently implemented to estimate fishing mortality rates and recruitment trends. The group agreed that a technical group should be convened next year to address these issues and proposed terms of reference for such a technical meeting. The proposed terms of reference are given below.

- Evaluate the level of precision of mortality and abundance estimates that the current tagging program will be likely to provide at current levels of observer coverage and anticipated (given current efforts directed to increasing) recovery rates.
- Evaluate the levels of observer coverage and recovery rates that would be required for the tagging program to provide acceptable levels of precision in key mortality and abundance estimates and how these are influenced by model assumptions.
- Consider alternative methods, other than increasing observer coverage, for improving the estimates of reporting rates.
- Evaluate the value and limitations of a tagging program based on tag recoveries obtained from only the surface fishery.

6.5 Direct age estimation

6.5.1 Current status of otolith collection in each fishery

81. Members reported on their otolith collection activities. From the Australian surface fishery (CCSBT-ESC/0309/21), an additional 360 otoliths were collected over the past season, ranging from 2 - 4 year old fish in South Australia. A number of otoliths were also collected during tagging activities from fish of 47cm - 191cm. This is an ongoing program and similar otolith collection will be conducted next year. Numbers of otoliths collected could be increased if this was considered necessary.
82. In the collaborative CSIRO/RIMF program, 500 - 700 otoliths have been collected per year from Indonesian catches for the past decade (CCSBT-ESC/0309/18). Indonesian otolith collection increased to 1000 this year.
83. Observers on New Zealand vessels collected 1203 otoliths in 2002 and 845 in 2003 from fish across the entire size range caught. These have been archived. New Zealand undertook to provide information on distribution of otoliths by fish length.
84. Japan also relied on observers to collect otoliths, and they were instructed to collect a certain number per size class. 308 cores were collected in 2002, from which it is expected to obtain more than 250 otoliths. It might be possible to increase the number of otoliths collected, but this would require negotiation with industry, and would be dependent on workload of the observers.
85. Taiwan collected cores from 40 SBT heads provided by industry in 2002, but length information was unavailable for these. Observers are being requested to collect otoliths this year, and about 50 have been collected so far, across the size range of fish caught.
86. Korea did not collect any otoliths in 2002.

6.5.2 Development of otolith sampling programs for each fishery

87. Paragraphs 62-64 of the Report of the Extended Scientific Committee for the Seventh Meeting of the Scientific Committee explained the need for direct aging programs but specifying such programs was deferred until this year

88. Paper CCSBT-ESC/0309/32 noted that there was a strong interaction between length-frequency data and otolith readings in determining catch-at-age for SBT. Incorporation of length-frequency information provides substantial increases in precision compared to age-length keys for fisheries on small fish, such as the Australian surface fishery, but less so for large fish, such as the Indonesian fishery. The main determinant remains the number of otoliths, and initial results indicate that acceptable precision could be obtained with about 100 - 200 otoliths for the surface fishery, 200 - 500 otoliths for the Japanese fishery and 500 otoliths for the Indonesian fishery.

89. The Panel noted that this was similar to the 500 or so otoliths per stratum used to generate age-length keys for a number of North Pacific groundfish stocks which also contain 15 - 20 age classes. Otolith sampling emphasis would need to focus on areas in which growth rates were expected to vary in any year, and particularly on the Indonesian fishery for large fish, in which there is substantial overlap in ages at length. Incorporation of age data had substantially improved SBT stock assessments.

90. The Panel noted that the adoption of a Management Procedure approach reduced the need for precise estimation of TACs, and so lower precision might also be acceptable in direct age information. The meeting also noted the value of direct catch-at-age data in improving understanding of apparent selectivity changes in the LL1 fishery coming out of the current Operating Models.

91. Objectives and sampling design for a CCSBT direct ageing program were discussed further in a technical working group convened by Prof. John Pope.

92. CCSBT is engaged in developing a management procedure approach to setting annual TACs which will not necessarily use age-based methods directly in their estimation. However, age based methods are required to set up the operating models used to test MPs and also to provide assessment of stock status and assurance that the stock is in the range over which MP were tested. Therefore, the SC recommends that the objectives for otolith programs should be to estimate reliable annual catch-at-age from direct ageing methods. These methods will use length samples in addition to age-determinations from otoliths on an annual basis.

93. Since the CCSBT does not set annual TACs based upon assessments the requirements for catch at age precision may not be very exacting. A reasonable aim might be to be able to distinguish between appreciable changes in spawning stock biomass over a 5 year period and to be able to estimate recruitment with a reasonable CV on average. The precise requirements to achieve these objectives need to be further studied but experience from other stocks suggests that annual otolith collections per stratum on the order of a few hundred might well achieve sufficient precision (e.g., CCSBT-ESC/0309/22). Suitable strata for an initial program are listed below, although it is recognised that it may not be possible to collect adequate numbers of otoliths from all strata:

- Surface fishery
- Indonesian longline fisheries
- Taiwanese longline fishery
- Other longline fisheries

94. Analyses of length-at-age differences and age structure between alternative strata (e.g., by fleet, area, & time) that may make random sampling difficult will be needed. These analyses should be conducted and presented at the 2004 ESC to determine whether modifications in strata definitions are needed.

95. Otolith collections and age-determinations should begin as soon as practical. Data from the 2002 fishery be should be made available for inclusion in 2005 analyses. Subsequent years should follow a similar pattern and feasibility of shortening the delay in data availability should be examined.

6.5.3 Discussion of outcome of otolith readings

96. The Deputy Executive Secretary presented report CCSBT-ESC/0309/11, summarizing the results of reading of the reference set of SBT otoliths by the members. Although there were some discrepancies in readings, there was a marked degree of consensus, suggesting that members should be able to produce comparable readings from their collected otoliths.

6.6 Other SRP components

97. Feedback was provided on the Australia-Japan collaborative Recruitment Monitoring Program (RMP) (CCSBT-ESC/0309/Info03), and results of the aerial surveys were presented in paper CCSBT-ESC/0309/24. It was planned to continue the commercial aerial survey analysis and reduced aerial line transect survey next year. A long enough time series of aerial survey data has now accumulated to start examining correlations between surveys results and recruitment estimates obtained from stock assessments. Following indications of low acoustic detectability of SBT during the 2002/03 acoustic evaluation survey, acoustic surveys were suspended for one year to allow for a full review of acoustic survey results in relation to other factors including oceanographic and fisheries information. Japan encouraged other members interested in this work to participate in the review process. Results will be presented at the next ESC meeting.

98. In an ancillary project, the first archival tag recovery was received from a fish tagged in Western Australia, showing that the fish had moved into the Indian Ocean and returned to South Australia. Japan also reported recoveries of 2 archival tags from the area off southern Africa ("off-Cape" area) after periods at large of 6 and 8 months. One of these tags had moved to the central Indian Ocean and returned to the off-Cape area. The other had remained near the tagging area.

99. Australia noted that paper CCSBT-ESC/0309/Info04 provided an overview of the global spatial dynamic project for juvenile SBT. This project aims to use data

collected using archival tags to improve understanding of the implications of incorporating spatial dynamics and habitat information into analysis of conventional tagging data. The project seeks to collaborate with other CCSBT members in all aspects of the work, including tag deployment, recovery and analysis of results.

100. It was also noted that Australia has initiated a project to use genetic analysis of historic SBT scale collections dating back to the 1960s to develop estimates of effective SBT population size (specifically estimating the number of females that could have contributed to the genetic diversity observed in these scales). Members with historic scale collections were asked to consider contributing samples to this study. Results of this work should be available within the next 12 - 15 months.

6.7 Report on the Indonesian Catch Monitoring Workshop

101. The meeting noted the contents of the report of the Indonesian Catch Monitoring Workshop, held in Queenstown in April 2003, and endorsed the conclusions and recommendations made in that report. Inter-sessional work (presented in CCSBT-ESC/0309/17, 19 and 20) had addressed all of the outstanding questions arising from the workshop and the ESC specifically acknowledged the workshop conclusions that:

- Past data do not exist to allow uncertainties in Indonesian catch estimates to be fully quantified, and it is not feasible to substantially improve estimates of past Indonesian catches. However, understanding of uncertainties in these past estimates has been improved.
- Development of the IOTC coordinated catch monitoring system has substantially improved monitoring of Indonesian catches and addressed a number of past concerns regarding possible sources of bias.

102. With specific regard to the IOTC coordinated monitoring program, the ESC confirmed that the information generated by this program is critical for estimation of spawning ground and global SBT catches, and that every effort should be made to continue this program. It was noted that IOTC funding for this work would be discontinued within a few years, and other options for continuing the monitoring work in Benoa will have to be considered as a matter of priority.

6.8 Report on scientific activities utilising RMA and SRP mortality allowances

103. Japan conducted two acoustic surveys and spawning ground survey during 2002/03 which utilised 0.8 tonnes out of the requested RMA allowance. It was planned to conduct a survey using two vessels on the spawning ground in 2003/04, and a 10 tonne RMA allowance was again requested for this survey. Under the SRP, Japan planned to again conduct a tagging program in the off-Cape area, and requested a 10 tonne SRP mortality allowance for this work.

104. Australia reported that 6.97 tonnes of the 15 tonne SRP mortality allowance had already been used for the tagging programs conducted on Australian fisheries. This was expected to increase slightly, but not to reach the 15 tonne limit. The same allowance was requested to allow for continued tagging operations in 2004. In

addition, Australia requested 6 tonnes of SRP allowance for use in placing archival tags. It was planned to deploy 400 - 500 archival tags over a three year period, and an annual SRP allowance would be required for this tagging.

105. New Zealand requested 5 tonnes of SRP allowance for the proposed longline tagging program in 2003.

106. The Secretariat requested an allowance of 4 tons of SRP allowance, resulting in a total request for 10 tonnes of RMA allowance and 40 tonnes of SRP allowance.

107. The ESC noted that every effort would be made to minimise research mortalities through operational modification, and it was not expected to fully utilise these total mortality allowances.

Agenda Item 7. Development of CCSBT database

7.1 Review of CCSBT database development

108. The Data Manager presented report CCSBT-ESC/0309/13 on the current status of the CCSBT database. Most of the data received has been loaded onto the database, which now contains a substantial quantity of data. Members were asked to notify the Secretariat of any requirements they might have for access to data other than the regular data exchange, bearing in mind the agreed data confidentiality standards.

7.2 Participation in FAO FIGIS/FIRMS systems

109. The Executive Secretary presented report CCSBT-ESC/0309/14 on the design and information submission requirements of the FAO FIRMS/FIGIS fisheries database systems. A number of other fisheries Commissions have indicated their intention to participate in these systems, and the CCSBT has been approached in this regard. The ESC was asked to comment on the feasibility of producing the proposed annual FIRMS "species fact sheets", and on the content and resolution of data that the CCSBT might want to make publicly available through a system such as FIRMS.

110. As a general principle, the ESC agreed that transparency of scientific data and processes at the CCSBT was desirable. However, it was noted that provision of data would inevitably generate an additional workload, either related to correction, raising, substitution and aggregation of data before provision, or related to resolving problems resulting from incorrect interpretation of data provided in a more raw form.

111. It was concluded that the ESC would need to know substantially more about the proposed use of the FIRMS data, and how these data would need to be structured to make such uses feasible, before further scientific comment could be made. More importantly, it was concluded that a decision was first required from the Commission on the issue of provision of data, and data resolution.

112. Regarding the fact sheet, it was noted that this would be brief and concise, and the ESC would be capable of producing such reports. The final product would have to be approved by the Commission before release.

113. Consideration of this issue raised questions regarding options for providing broader access to CCSBT data. It was noted that a number of other fisheries Commissions do provide access to data in the form of data reports etc. Then similar access could be provided by the CCSBT in the form of annual data reports, and/or through an international facility such as FIRMS. If the Commission supports such a concept, further consideration could be given to options at the next ESC meeting.

Agenda Item 8. Matters relating to other CCSBT bodies

8.1 Suggestions to Ecologically Related Species Working Group

114. The ESC meeting had no scientific comments to make on the proposed agenda of the 5th ERS meeting.

115. Regarding the seabird pamphlets, it was suggested that appropriate seabird species for the Indonesian fishing zone be used for the Indonesian pamphlets, rather than the southern Ocean birds depicted in the other language versions.

Agenda Item 9. Data exchange requirements for 2004

116. The data exchange requirements for 2004 including the data required to update the operating model were discussed by a small working group. The agreed list of data to be exchanged is provided at **Attachment G**.

117. The group also considered an appropriate time frame for the data exchange. It was agreed that the main data exchange needed to be completed by 30 April 2004 and that the additional data required for updating the operating model should be exchanged by 31 May 2004.

Agenda Item 10. Overview, time schedule and budgetary implications of proposed 2004 research activities

118. The Extended Scientific Committee agreed that the following work plan would be submitted to the Extended Commissions.

Activity	Approximate Period	Budgetary Implications[1]
Formally commence implementation of observer program standards.	Late Oct 2003 after CCSBT10	N/A
Surface fishery tagging program.	Dec 2003 – March 2004	$692,000
Third Management Procedure Workshop	19-24 Apr 2004	$206,000
Management Procedure consultation options: - Feedback by member scientists. - Append one day to MP3 workshop. - Append one day to CCSBT11. - Hold special one day meeting at some other time between MP3 and CCSBT11.	After MP3 workshop	Cost dependent on consultation option chosen
Data exchange.	30 Apr 2004	N/A
Data exchange for operating models.	31 May 2004	N/A
5th Stock Assessment Group Meeting.	Last week in Aug 2004	$180,000
9th Scientific Committee Meeting.	First week in Sep 2004	$144,000
Special technical group to discuss tagging component of SRP. To be held at SC9	First week in Sep 2004	No additional cost
Presentation of ESC report to Extended Commission at CCSBT11	(First week in Oct 2004)	N/A
Work associated with actual implementation of MP (tuning to final ranges selected by Commission, updating of data inputs to OM, setting up centralised process to run MP).	Dependent on MP implementation date chosen by the Commission.	$8,000

To adhere to this work plan the Extended Scientific Committee identified the following timelines as critical for feedback from managers on development of the management procedure:

- 9 October 2003 – respond to request for advice from the Extended Scientific Committee on management objectives at CCSBT10.
- May – July 2004 – consider the options for the management procedure produced at the third management procedure workshop in April 2004.
- September 2004 – participate in discussion of the management procedure at the third meeting of the Extended Scientific Committee to ensure any remaining management issues are addressed.
- October 2004 – decide on preferred management procedure and implementation schedule at CCSBT11.

[1] Detailed costings will be prepared for the Extended Commission by the Secretariat.

119. With regard to options for providing feedback to fishery managers following completion of the MP3 workshop in 2004. These might include adding an extra day to the MP3 workshop, conducting individual feedback to member countries by a panel member, providing an opportunity some time before the CCSBT11 meeting for a special feedback meeting or relying on member scientists to conduct the necessary briefing of their own managers.

120. It was recognised that there would be various implications from pursuing any of these options, including time, cost, the need to assemble managers and the possibility of having to conduct extra refinement of proposed MPs after such feedback. It was agreed to ask the Commission to comment on whether they would like some form of dedicated feedback, and which option they would prefer.

Agenda Item 11. Other matters

121. Japan noted that they have been responsible for preparing and submitting an annual report on SBT to ICCAT. They suggested that this should more appropriately be done by the ESC from 2004 onwards.

122. The ESC recognised the high standard and balanced nature of ICCAT reports prepared by Japan in the past. It was agreed that the ESC could prepare such reports on behalf of CCSBT. The Commission is requested to consider whether the ESC should assume responsibility for preparation of these reports from 2004 onwards.

Agenda Item 12. Adoption of meeting report

123. The report was adopted.

Agenda Item 13. Close of meeting

124. The meeting closed at 7:00pm on 4 September 2003.

List of Attachments

Attachment

Attachment A

List of Participants
CCSBT
The Extended Scientific Committee for the 8th Scientific Committee Meeting
1 - 4 September 2003
Christchurch, New Zealand

CHAIR

Mr Andrew PENNEY
Pisces Environmental Services (Pty) Ltd
22 Forest Glade
Tokai Road, Tokai 7945
South Africa
Phone: +27 21 7154238
Fax: +27 21 7154238
Email: apenney@pisces.co.za

ADVISORY PANEL

Dr Ana PARMA
Centro Nacional Patagonico
Pueto Madryn, Chubut
Argentina
Phone: +54 2965 451024
Fax: +54 2965 451543
Email: parma@cenpat.edu.ar

Dr James IANELLI
REFM Division
7600 Sand Pt Way NE
Seattle, WA 98115
USA
Phone: +1 206 526 6510
Fax: +1 206 526 6723
Email: jim.ianelli@noaa.gov

Dr John POPE
The Old Rectory
Burgh St Peter
Norfolk, NR34 0BT
UK
Phone: +44 1502 677377
Fax: +44 1502 677377
Email: PopeJG@aol.com

Professor Ray HILBORN
School of Fisheries Box 355020
University of Washington
Seattle, WA 98195
USA
Phone: +1 206 543 3587
Fax: +1 206 685 7471
Email: rayh@u.washington.edu

SAG CHAIR

Dr John ANNALA
Science Policy Manager
Ministry of Fisheries
PO Box 1020
Wellington
New Zealand
Phone: +64 4 470 2661
Fax: +64 4 470 2669
Email: annalaj@fish.govt.nz

CONSULTANT FOR MP

Ms Vivian HAIST
6224 Groveland Drive
Nanaimo, B.C. V9V1B1
Canada
Phone: +1 250 756 0518
Email: haistv@shaw.ca

AUSTRALIA

Mr Jay HENDER
Policy Officer
Fisheries & Aquaculture Branch
Dept. of Agriculture, Fisheries & Forestry
PO Box 858, Canberra ACT 2601
Phone: +61 2 6272 3608
Fax: +61 2 6272 4875
Email: jay.hender@affa.gov.au

Dr James FINDLAY
Senior Research Scientist
Fisheries & Aquaculture Branch
Dept. of Agriculture, Fisheries & Forestry
PO Box 858, Canberra ACT 2601
Phone: +61 2 6272 5534
Fax: +61 2 6272 3882
Email: james.findlay@brs.gov.au

Mr Andy BODSWORTH
Manager
Southern Bluefin Tuna Fishery
Australian Fisheries Management Authority
PO Box 7051, Canberra Mail Centre
ACT 2610
Phone: +61 2 6272 5290
Fax: +61 2 6272 4614
Email: Andy.Bodsworth@afma.gov.au

Dr John GUNN
Senior Research Scientist
Tropical & Pelagic Ecosystem Program
Division of Marine Research
CSIRO
P.O. Box 1538
Hobart, Tas 7001
Phone: +61 3 6232 5375
Fax: +61 3 6232 5012
Email: John.Gunn@csiro.au

Dr Tom POLACHECK
Senior Principal Research Scientist
Pelagic Ecosystems Sub-Program
Division of Marine Research
CSIRO P.O. Box 1538
Hobart, TAS 7001
Phone: +61 3 6232 5312
Fax: +61 3 6232 5012
Email: tom.polacheck@csiro.au

Dr Marinelle BASSON
Senior Research Scientist
Pelagic Ecosystems Sub-Program
Division of Marine Research
CSIRO P.O. Box 1538
Hobart, Tas 7001
Phone: +61 3 6232 5336
Fax: +61 3 6232 5012
Email: marinelle.basson@csiro.au

Dr Dale KOLODY
Research Scientist
Pelagic Ecosystems Sub-Program
Division of Marine Research
CSIRO P.O. Box 1538
Hobart, Tas 7001
Phone: +61 3 6232 5121
Fax: +61 3 6232 5012
Email: dale.kolody@csiro.au

JAPAN

Dr Sachiko TSUJI
Section Chief
Temperate Tuna Section
National Research Institute of
Far Seas Fisheries
5-7-1 Orido, Shimizu, Shizuoka,
Shizuoka 424-8633
Phone: +81 543 36 6042
Fax: +81 543 35 9642
Email: tsuji@fra.affrc.go.jp

Dr Norio TAKAHASHI
Senior Researcher
Temperate Tuna Section
National Research Institute of
Far Seas Fisheries
5-7-1 Orido, Shimizu, Shizuoka,
Shizuoka 424-8633
Phone: +81 543 36 6043
Fax: +81 543 35 9642
Email: norio@affrc.go.jp

Dr Hiroyuki KUROTA
Temperate Tuna Section
National Research Institute of
Far Seas Fisheries
5-7-1 Orido, Shimizu, Shizuoka,
Shizuoka 424-8633
Phone: +81 543 36 6043
Fax: +81 543 35 9642
Email: kurota@affrc.go.jp

Dr Kazuhiko HIRAMATSU
Section Chief
Mathematical Biology Section
National Research Institute of
Far Seas Fisheries
5-7-1 Orido, Shimizu, Shizuoka,
Shizuoka 424-8633
Phone: +81 543 36 6014
Fax: +81 543 35 9642
Email: hira@affrc.go.jp

Mr Hiroshi SHONO
Mathematical Biology Section
National Research Institute of
Far Seas Fisheries
5-7-1 Orido, Shimizu, Shizuoka,
Shizuoka 424-8633
Phone: +81 543 36 6039
Fax: +81 543 35 9642
Email: hshono@affrc.go.jp

Prof Doug BUTTERWORTH
Department of Mathematics and Applied
Mathematics
University of Cape Town
Rondebosch 7701
South Africa
Phone: +27 21 650 2343
Fax: +27 21 650 2334
Email: dll@maths.uct.ac.za

Mr Hajime TAGUCHI
Section Chief
Fisheries Agency
1-2-1 Kasumigaseki, Chiyoda-ku
Tokyo 100-8907
Phone: +81 3 3501 5098
Fax: +81 3 3502 1682
Email: hajime_taguchi@nm.maff.go.jp

Mr Yuji NISHIMOTO
Section Chief
Fisheries Agency
1-2-1 Kasumigaseki, Chiyoda-ku
Tokyo 100-8907
Phone: +81 3 3502 8479
Fax: +81 3 3591 5824
Email: yuji_nishimoto@nm.maff.go.jp

Ms Miho WAZAWA
International Affairs Division
Fisheries Agency
1-2-1 Kasumigaseki, Chiyoda-ku
Tokyo 100-8907
Phone: +81 3 3591 1086
Fax: +81 3 3502 0571
Email: miho_wazawa@nm.maff.go.jp

Mr Nozomu MIURA
Assistant Chief
International Business and Planning
Division
Federation of Japan Tuna Fisheries
Cooperative Associations
3-22 Kudankita 2-chome, Chiyoda-ku
Tokyo 102-0073
Phone: +81 3 3264 6167
Fax: +81 3 3234 7455
Email: miura@japantuna.or.jp

NEW ZEALAND

Dr Talbot MURRAY
Pelagic Project Leader
National Institute of Water & Atmospheric
Research Ltd
PO Box 14-901, Kilbirnie, Wellington
Phone: +64 4 386 0300
Fax: +64 4 386 0574
Email: t.murray@niwa.cri.nz

Ms Emma WATERHOUSE
Senior International Advisor
Ministry of Fisheries
PO Box 1020, Wellington
Phone: +64 4 470 2644
Fax: +64 4 470 2669
Email: emma.waterhouse@fish.govt.nz

Dr William EMERSON
Senior International Advisor
Ministry of Fisheries
PO Box 1020, Wellington
Phone: +64 4 470 2650
Fax: +64 4 470 2669
Email: william.emerson@fish.govt.nz

FISHING ENTITY OF TAIWAN

Dr Shui Kai CHANG(Eric)
Associate Researcher
Deep Sea Fisheries Research and
Development Center
Fisheries Agency
Council of Agriculture
No. 2, Chaochow St.
Taipei 100, Taiwan
Tel: +886 2 33436133
Fax: +886 2 33436268
Email: skchang@msl.fa.gov.tw

Dr Shu-Hui WANG
Assistant Researcher
Overseas Fisheries Development
Council of the Republic of China
19, Lane 113, Roosevelt Road
Sec. 4, Taipei, Taiwan
Tel: +886 2 2738 1522
Fax: +886 2 2738 4329
Email: Jessica@ofdc.org.tw

REPUBLIC OF KOREA

Dr Dae-Yeon MOON
Senior Scientist
Distant-water Fisheries Research Div.
National Fisheries R & D Institute
408-1 Shirang-ri, Kijang-gun
Pusan 619-902
Tel: +82 51 720 2320
Fax: +82 51 720 2337
Email: dymoon@nfrda.re.kr

Dr Kyu-Jin SEOK
Research Scientist
International Cooperation office
Ministry of Maritime Affairs and Fisheries
50 Chungjeong-Ro 3, Seodaemoon-Gu
Seoul 120-715
Phone: +82 2 3148 6994
Fax: +82 2 3148 6996
Email: pisces@momaf.go.kr

CCSBT SECRETARIAT

PO Box 37, Deakin West ACT 2600
AUSTRALIA
Phone: +61 2 6282 8396
Fax: +61 2 6282 8407

Mr Brian MACDONALD
Executive Secretary
Email: bmacdonald@ccsbt.org

Mr Yukito NARISAWA
Deputy Executive Secretary
Email: ynarisawa@ccsbt.org

Mr Robert KENNEDY
Database Manager
Email: rkennedy@ccsbt.org.

INTERPRETERS

Ms Saemi BABA
Ms Kumi KOIKE
Ms Yuki SAYEG

Attachment B

The Extended Scientific Committee for the
8th Scientific Committee Meeting
Christchurch, New Zealand
1-4 September 2003

Agenda

1. Opening of meeting
   1.1 Introduction of participants
   1.2 Administrative matters

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. Matters arising from the report of the 4th Stock Assessment Group Meeting
   5.1 Review of fisheries indicators analysis and status of the SBT stock
   5.2 SBT management recommendations
   5.3 Development of the SBT Management Procedure
   5.4 SBT management objectives
   5.5 Stock assessment process for 2004

6. Review of Scientific Research Program

   6.1 Characterisation of SBT catch
   6.2 CPUE modelling
   6.3 Scientific observer program
      6.3.1 Scientific observer program standards
      6.3.2 Report on scientific observer programs in 2002-2003
      6.3.3 Plans for scientific observer programs in 2003-2004
   6.4 CCSBT tagging program
   6.5 Direct Age Estimation
      6.5.1 Current status of otolith collection in each member's fishery
      6.5.2 Development of otolith sampling for each fishery
      6.5.3 Discussion of outcome of otolith readings
   6.6 Other SRP components
   6.7 Report of the Indonesian Catch Monitoring Workshop
   6.8 Report on scientific activities utilising RMA

7. Development of the CCSBT database.
   7.1 Review of CCSBT database development
   7.2 Participation in FAO FIRMS/FIGIS systems.

8. Matters relating to other CCSBT bodies

   8.1 Suggestions to Ecologically Related Species Working Group

9. Data exchange requirements for 2004

10. Overview, time schedule and budgetary implications of proposed 2004 research activities

11. Other matters

12. Adoption of meeting report

13. Close of meeting

Attachment C

List of Documents
Extended Scientific Committee for 8th Scientific Committee (SC)
and 4th Stock Assessment Group (SAG)

(CCSBT-ESC/0309/)

01. Draft Agenda of 4th SAG
02. List of Participants of 4th SAG
03. Draft Agenda of the Extended SC for 8th SC
04. List of Participants of the Extended SC for 8th SC
05. List of Documents－The Extended SC for 8thSC&4th SAG
06. (Secretariat) 4.Review of SBT Fisheries
07. Consultation with Industry and Managers: Hilborn, R. (to be prepared at SAG)
08. (Secretariat) 6.1. Characterization of SBT Catch
09. (Secretariat) 6.3. Scientific Observer Program Standards
10. (Secretariat) 6.4. CCSBT Scientific Research Program Tagging Program
11. (Secretariat) 6.5 Direct Age Estimation
12. (Secretariat) 6.6. Other SRP components
13. (Secretariat) 7.1. Review of CCSBT datebase development
14. (Secretariat) 7.2. CCSBT Collaboration with FIRMS/FIGIS systems
15. (Secretariat) 8.1. Suggsstion to Ecologically Related Speacies Working Group
16. (Secretariat) 9. Data exchange requirements for 2004
17. (Australia) The catch of SBT by the Indonesian longline fishery operating out of Benoa, Bali in 2002.: T.L.O. Davis and Andamari, R.
18. (Australia) Length and age distribution of SBT in the Indonesian longline catch on the spawning ground.: Farley, J.H. and Davis, T.L.O.
19. (Australia) The effect of alternate raising factors on the estimated catch of SBT by the Indonesian longline fishery.: Davis, T.L.O. and Polacheck, T.
20. (Australia) Estimates of SBT catches in Bali based on the CSIRO/RIMF estimation procedure and sub-samples of the data collected by the IOTC coordinated monitoring program.: Polacheck, T. and Davis, T.L.O.
21. (Australia) An update on Australian Otolith Collection Activities: 2002/03.: Stanley, C. and Polacheck, T.
22. (Australia) Exploring the Trade-off between Tag Releases and Observer Coverage in the Estimation of Mortality Rates through an Integrated Brownie and Peterson Mark-Recapture Estimation Approach.: Polacheck, T., J. P. Eveson and G. M. Laslett.

23. (Australia) An update of the graphics used for evaluating the performance of candidate management procedures for southern bluefin tuna.: Eveson, P.
24. (Australia) Aerial survey indices of abundance: comparison of estimates from line transect and "unit of spotting effort" survey approaches.: Farley, J. and S. Bestley.
25. (Australia) Report from a Pilot Tag Seeding Program for Estimating Tag Reporting Rates from the Australian Surface fishery.: Stanley, C.A. and T. Polacheck.
26. (Australia) Trends in catch, effort and nominal catch rates in the Japanese longline fishery for SBT – 2003 update.: Hartog, J., D. Ricard, T. Polacheck and S. Cooper.
27 (Australia) Issues in the selection of final trials for testing SBT management procedures and for the process of synthesizing results from the simulation testing.: Polacheck, T., D. Kolody and M. Basson.
28. (Australia) An update on estimating a CPUE series for southern bluefin tuna using enhanced tree-based modelling methods.: Venables, B., P. Toscas, M. Bravington and T. Polacheck.
29. (Australia) Results from further testing of candidate management procedures for southern bluefin tuna.: T. Polacheck, D. Ricard, P. Eveson, M. Basson, D. Kolody and J. Hartog.
30. (Australia) Issues related to setting rebuilding objectives for southern bluefin tuna.: Polacheck, T.
31. (Australia) A Description of the Distribution System for export and reject quality tuna landed at Port of Benoa.: Proctor, C.H., A. Andmari, G.S. Merta, and S. Simorangkir.
32. (Australia) Estimation of age profiles of southern bluefin tuna.: Morton, R. and MV Bravington.
33. (Australia) An Overview of the Australian Southern Bluefin Tuna Purse Seine Pilot Observer Programme (02/03) and Observed Longline Operations 2002.: Stanley, R, and M. Scott.
34. (Japan) Interpretation of fisheries indicators by in 2003. (S.Tsuji)
35. (Japan) Report of 2002/2003 results and proposal for 2003/2004 activities on CCSBT tagging by Japan.: Itoh., Takahashi., Tsuji. and Hosogaya.
36. (Japan) Interpretation of second evaluation results of otolith aging. (T.Itoh and S.Tsuji)
37. (Japan) Further investigations of a Fox model based Management Procedure for Southern Bluefin Tuna. (D.S.Butterworth and M.Mori)
38. (Japan) Further exploration of CPUE-based management procedures. (S.Tsuji et al)
39. (Japan) Report of the 2002/2003 RMA utilization and application for the 2003/2004 RMA. (JFA)
40. (Korea) Preliminary results of testing on the candidate management procedures for southern bluefin tuna.: Moon, D.Y, An, D.H and Koh, J.R.

41. (Japan) Some consideration toward the selection of a management procedure.: H.Kurota, H.Shono, N.Takahashi, K.Hiramatsu and S.Tsuji.
42. (Japan) Issues to be considered for further development of MP.: K.Hiramatsu, H.Kurota, H.Shono, N.Takahashi and S.Tsuji.
43. (Japan) Comments by Japan's fisheries administrators regarding management procedure.: JFA.
44. (Advisory Panel) Overview of Indicators of SBT stock status.: R. Hilborn, A. Parma, J. Ianelli and J. Pope.
45. (Australia) Results of the second year of a pilot program to examine the feasibility of tagging mature SBT in the western Tasman Sea.: J. Gunn, J. Hender and M. Scott.HH
46. (New Zealand) Within EEZ movements of southern bluefin tuna.: New Zealand.

(CCSBT-ESC/0309/SBT Fisheries)

Australia	Australia's 2001-02 Southern Bluefin Tuna Fishing Season.: J. Findlay.
Japan	Review of Japanese SBT Fisheries in 2002.: Itoh. and Nishimoto.
Fishing Entity of Taiwan	Review of Taiwanese SBT Fishery of 2001/2002.: Fishing Entity of Taiwan.
New Zealand	Trends in the New Zealand southern bluefin tuna fishery to 2002.: T. Murray.
Republic of Korea	Korean SBT longline fishery.: Moon, D.Y, Koh, J. R and An, D.H.

(CCSBT-ESC/0309/Info)

01. (Australia) Size at first maturity and recruitment into egg production of southern bluefin tuna. Final Report FRDC Project No. 1999/106.: Davis, T., Farley, J., Bravington, M, and Andamari, M.
02. (Australia) A pilot study to examine the potential for using pop-up satellite transmitting archival tags (PATs) to examine the migrations and behavior of adult Southern Bluefin Tuna (SBT).: Gunn, J., and T. Patterson.
03. (Australia, Japan) Southern Bluefin Tuna Recruitment Monitoring and Tagging Program: Report of the Fifteenth Workshop.
04. (Australia) Global Spatial Dynamic Project for Juvenile SBT.: Polacheck, T., J. Gunn, and A. Hobday.
05. (Japan) Proposal for Shoyo-maru spawning ground survey.: JFA
06. (Nature) Rapid worldwide depletion of predatory fish communities.: Ransom A. Myers and Boris Worm

07. (Japan) Proposal for Number 2 Taikei-maru spawning ground survey.: JFA

(CCSBT-ESC/0309/Rep)

01. Report of the Sixth Meeting of the Scientific Committee (August 2001)
02. Report of Tagging Program Workshop (October 2001)
03. Report of the Eighth Annual Commission Meeting (October 2001)
04. Report of the Fourth Meeting of Ecologically Related Species Working Group (November 2001)
05. Report of the First Meeting of Management Procedure Workshop (March 2002)
06. Report of the CPUE Modeling Workshop (March 2002)
07. Report of Direct Age Estimation Workshop (June 2002)
08. Report of the Third Stock Assessment Group Meeting (September 2002)
09. Report of the Seventh Meeting of the Scientific Committee (September 2002)
10. Report of the Ninth Annual Commission Meeting (October 2002)
11. Report of the Second Meeting of the Management Procedure Workshop (April 2003)
12. Report of the Indonesian Catch Monitoring Review Workshop (April 2003)

ATTACHMENT D

Global Catch Table

Catches are presented as whole weights in tonnes. Numbers in **bold** font differ from those in Attachment 8 of the SC7 Report. ***All 2002 figures are to be considered preliminary.***

Calendar Year	Australia	Japan	New Zealand	Korea*	Taiwan	Indo.	Misc	Total (excludes 'other')	Other
1952	264	565	0	0	0	0	0	829	
1953	509	3,890	0	0	0	0	0	4,399	
1954	424	2,447	0	0	0	0	0	2,871	
1955	322	1,964	0	0	0	0	0	2,286	
1956	964	9,603	0	0	0	0	0	10,567	
1957	1,264	22,908	0	0	0	0	0	24,172	
1958	2,322	12,462	0	0	0	0	0	14,784	
1959	2,486	61,892	0	0	0	0	0	64,378	
1960	3,545	75,826	0	0	0	0	0	79,371	
1961	3,678	77,927	0	0	0	0	0	81,605	
1962	4,636	40,397	0	0	0	0	0	45,033	
1963	6,199	59,724	0	0	0	0	0	65,923	
1964	6,832	42,838	0	0	0	0	0	49,670	
1965	6,876	40,689	0	0	0	0	0	47,565	
1966	8,008	39,644	0	0	0	0	0	47,652	
1967	6,357	59,281	0	0	0	0	0	65,638	
1968	8,737	49,657	0	0	0	0	0	58,394	
1969	8,679	49,769	0	0	80	0	0	58,528	
1970	7,097	40,929	0	0	130	0	0	48,156	
1971	6,969	38,149	0	0	30	0	0	45,148	
1972	12,397	39,458	0	0	70	0	0	51,925	
1973	9,890	31,225	0	0	90	0	0	41,205	
1974	12,672	34,005	0	0	100	0	0	46,777	
1975	8,833	24,134	0	0	15	0	0	32,982	
1976	8,383	34,099	0	0	15	12	0	42,509	
1977	12,569	29,600	0	0	5	4	0	42,178	
1978	12,190	23,632	0	0	80	6	0	35,908	
1979	10,783	27,828	0	0	53	5	4	38,673	
1980	11,195	33,653	130	0	64	5	7	45,054	
1981	16,843	27,981	173	0	92	1	14	45,104	
1982	21,501	20,789	305	0	182	2	9	42,788	
1983	17,695	24,881	132	0	161	5	7	42,881	
1984	13,411	23,328	93	0	244	11	3	37,090	
1985	12,589	20,396	94	0	241	3	2	33,325	
1986	12,531	15,182	82	0	514	7	3	28,319	
1987	10,821	13,964	59	0	710	14	7	25,575	
1988	10,591	11,422	94	0	856	180	2	23,145	
1989	6,118	9,222	437	0	1,395	568	103	17,843	
1990	4,586	7,056	529	0	1,177	517	4	13,870	
1991	4,489	**6,477**	164	**246**	1,460	759	97	**13,692**	
1992	5,248	**6,121**	279	**41**	1,222	1,232	73	**14,217**	
1993	5,373	**6,318**	217	**92**	958	**1,370**	17	**14,344**	
1994	4,700	**6,063**	277	**137**	1,020	**904**	54	**13,155**	
1995	4,508	**5,867**	436	**365**	1,431	**829**	201	**13,637**	
1996	5,128	**6,392**	139	**1,320**	1,467	**1,615**	295	**16,356**	
1997	5,316	**5,588**	334	**1,424**	872	**2,210**	333	**16,077**	
1998	4,896	**7,500**	337	**1,796**	1,446	**1,324**	476	**17,775**	
1999	5,552	**7,554**	461	**1,462**	1,513	**2,505**	483	**19,529**	
2000	5,257	**6,000**	380	**1,135**	1,448	**1,203**	49	**15,472**	
2001	**4,853**	**6,674**	358	**845**	1,580	**1,632**	60	**16,002**	**4**
2002	*5,374*	*6,192*	*450*	*746*	*1,137*	*1,930*	*266*	*16,096*	*17*

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

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

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

Notes regarding multi-year changes in global catch figures from previous years:

- Japan's catch figures for 1991 to 2001 were previously provided in fishing years (Mar-Feb). The calendar year version of these figures is provided now.
- Korea has advised that their catches have previously provided in processed weights. A correction factor of 1.15 has now been applied to convert these to whole weights.
- Differences in the Indonesian catch estimates from 1993 to 2001 are due to corrections made to the raw data used in the estimation procedure.

Attachment E

Report of the CPUE Modelling Group

The CPUE steering group met briefly to discuss paper CCSBT-ESC/0309/28 and to standardise the definition of CPUE to be used for operational management procedures.

Paper CCSBT ESC/0309/28 applied Tree regression methods to constructing CPUE series. It was noted that further testing was needed but the group agreed that the method was interesting and results might be used in the proposed 2004 assessment particularly if these provided contrast to other series. Since these methods are unfamiliar to a number of members the advantages are set out below.

Tree regression models (TRM) automatically detect and extract important factors to separate data into groups showing similar patterns. Their use for CPUE standardization is growing. TRM have several advantages compared to generalized linear models (GLM):

- **TRM allows the assumption of flexible model structure.**

TRM can analyze data as they are without assuming any specific distribution pattern such as CPUE model with log-normal error in the GLM.

- **TRM is rather robust to missing data.**

In TRM, we do not need to consider interactions such as an effect of (Year)*(Area) in the GLM. Because the spatial and temporal distribution pattern for SBT changes appreciably from year to year and area to area, the estimation of interactions like (Year)*(Area) is generally difficult by GLM.

- **GLM has some technical problems.**

In the CPUE-LogNormal model, the confidence interval for the estimated CPUE is biased because of the constant term added to the response variable. In the Catch-Poisson model, the structure is complicated due to the addition of the over-dispersion parameter. In TRM, these statistical problems do not have to be considered.

It was also noted by the CPUE Steering Group that it is difficult to choose objectively between CPUE series. It would be desirable to develop common methods/criteria to compare the effectiveness of different approaches to modelling abundance trends from CPUE data. It was suggested that some methods should be based on the "training and test" data concept (see CCSBT ESC/0309/28). Under this concept, the ability of a method to extrapolate to cells (areas/times) without data is best tested by checking that ability for cells where there is data, but which are omitted from the estimation process. Such methods need to be constructed carefully so that their tests are appropriately focussed on the scales at which extrapolation is required. Mechanistic simulations provide an alternative method of evaluating standardisation methods, and could be used to test the

effectiveness of extrapolating into unfished areas. This would be a more time consuming option and \would require careful formulation of hypotheses about fish and fishery behaviour.

CPUE Series to use for the first 5 years of operation of a management procedure

It was agreed that for the first 5 years of operation of a management procedure the CPUE measure adopted should be the median of the 5 series of Japanese LL CPUE indices previously agreed for testing purposes. These were

1. B-ratio Proxy,
2. Geo-Statistical Proxy,
3. Takahashi space-time window,
4. Laslett Core Area
5. Nominal series.

Medians should be calculated after series have been standardised relative to their average for the period 1991-2000.

Ideally these would be calculated by the CCSBT Secretariat. However, practical considerations will require that they be provided by countries in the first year. Japan agreed to provide series 1-3, Australia agreed to provide series 4 and the Secretariat would be asked to provide series 5. The formulation of this last series is:

$$I_{year} = \frac{\sum_{area=4}^{9} \sum_{month=4}^{9} \sum_{age=4+} Catch_{area,month,age,year}}{\sum_{area=4}^{9} \sum_{month=4}^{9} Hooks_{area,month,year}}$$

where year is from 1969 to the last available and the data comprises the Japanese longline, Australian joint venture and New Zealand charter fleets.

CPUE series calculated by countries will be agreed by the CPUE Steering Group at SAG5. The last year's results for the CPUE series will necessarily be based upon the results of the RTMP with no correction applied in the first year. In future years the possibility of bias between the RTMP results and the final results will be examined.

Future work

Future work plans call for a definitive CPUE series for use by 2009. As discussed last year this will require a small WG to work towards a consensual decision on the best CPUE series to use at sometime after the Management Procedures work has been completed (ie in 2005 or later). This will require approaches to the analysis of Japanese LL data in a fashion which allows agreed CPUE standardisation models to be run and

their diagnostics to be collectively examined in a fashion which respects requirements for the confidentiality of data. To forward this plan all members are requested to review past documents relating to CPUE modelling to avoid duplicate requests. All members are requested to reflect on and discuss intersessionally which new analyses need to be made. Japanese members of the CPUE steering group are requested to explore suitable procedures by which a working group could conduct collective modelling of CPUE while respecting the need to maintain confidentiality of sensitive data. They are requested to report on possible procedures to the 2004 SAG. Ideally various concomitant variables might be included in the analysis as well as data on SBT and a short list of these should be prepared by discussion. Japanese Industry perceptions of how their fishing behaviour may have changed through time in ways that may have modified the CPUE of SBT would be greatly valued by the working group.

Attachment F

Commission for the Conservation of
Southern Bluefin Tuna

みなみまぐろ保存委員会

CCSBT Scientific Observer Program
Standards

TABLE OF CONTENTS

LIST OF ATTACHMENTS

1. BACKGROUND

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

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

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

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

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

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

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

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

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

The tasks and record keeping requirements have been formulated to gather only that information, which is relevant to the objectives of the SRP. Consideration was also given to the practical limitations on the ability of observers to complete tasks in the fishing environment they would be operating in.

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

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

2. OBJECTIVES

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

The objectives of the standards are:

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

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

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

All members are expected to adapt their respective programs taking into account the standards but recognizing that members may have additional requirements they wish to maintain in their respective programs.

3. RESPONSIBILITY FOR PROGRAM OPERATION

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

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

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

4. COVERAGE

The CCSBT Scientific Observer Program will cover the fishing activity of CCSBT members and cooperating non-members wherever southern bluefin tuna are targeted or are a significant bycatch.

5. LEVELS OF SCIENTIFIC OBSERVER COVERAGE

The Program will have target observer coverage of 10% for catch and effort monitoring for each fishery.

Observer coverage should therefore be representative of different vessel-types in distinct areas and times.[1]

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

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

6. ASSIGNMENT OF SCIENTIFIC OBSERVERS TO VESSELS

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

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

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

The placement of observers should also encompass arrangements to ensure the independence and

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

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

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

scientific integrity of the data.

7. TAGGING PROGRAM

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

Observer plans and training programs should include specific provision for the role and responsibilities of observers for tag recapture reporting. A supplemental level of observer coverage may be required to take into account the results of the CCSBT tagging program.

8. RECRUITMENT AND TRAINING

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

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

Qualifications of Observers

Scientific Observers for the program should have the following attributes:

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

Independence / Integrity

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

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

Scientific Observer Training

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

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

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

Recruitment of Observers

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

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

9. THE OBSERVED VESSEL

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

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

10. INFORMATION AND DATA

Scientific data to be collected should include the following categories of information:

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

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

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

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

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

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

Most of the above categories of information are related to each other in a hierarchical relationship. So, the biological details of a fish (E) relates to a particular observed period (D) from a specific set (C) for a trip (B) on a particular vessel (A).

A detailed description of the proposed information to be collected for each of the above categories is provided in Attachment 1. Hierarchies for prioritising the collection of data by species caught and SBT data are at Annex 1.

11. REPORTING

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

12. CONFIDENTIALITY OF DATA AND INFORMATION

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

Attachment 1

Type and Format of Scientific Observer Data

A) Details of the observed vessel and gear
The vessel details are recorded only once for an entire trip

All fishing:

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

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

Longliners only:

- Material of mainlines (Nylon, Cotton thread, Other)
- Material of branchlines (Nylon, Cotton thread, Other)
- Material of buoylines (Nylon, Cotton thread, Other)
- Tori Pole used (Y/N)
- Bait thrower/line shooter used (Y/N)

Purse seiners only:

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

B) Summary of the observed trip

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

- Date observer disembarked (translatable to 24 hour clock, UTC to the day)

C) Comprehensive catch, effort and environmental information for each set
This information is recorded for each set while the observer is on-board a vessel, regardless of whether the set/haul was actually observed.

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

Longlining:
- Location at end of Set (latitude+N/S and longitude+E/W to a minute of accuracy)
- Direction of line set (eg straight, curved)[5]
- Wind speed (with unit) and direction (N, NNE, NE, etc.)
- (Comment: It is enough to collect the temperature at the start of set) At the period of the location and wind are measured for the operation (e.g. noon, start of set etc.)
- Direction of line set (straight,curved)
- Actually used mainline length (km)
- Actually used branchline length (m)
- Actually used buoyline length (m)
- Intended depth of the shallowest hook (m)
- Intended depth of the deepest hook (m)
- Number of hooks
- Number of baskets

Distance between baskets, beacons, buoys, or floats as is appropriate to the operation (m)
- Percentage of bait by bait categories that were Fish, Squid, Artificial, and Other
- Bait status (live or dead)
- Total number by species[4] of SBT, and other tuna and tuna-like species caught, retained or discarded.
- Total processed weight (kg) and Processed State[6] by species[4] of SBT, and other species caught. (i.e. all fish, birds, turtles etc.)

Purse Seining:
- Spotter plane used (Y/N). If used:
    - Time (translatable to 24 hour clock, UTC) and location aircraft began search
    - Time (translatable to 24 hour clock, UTC) and location aircraft ended search
    - Number, location of schools spotted by aircraft
    - Estimated size of each school spotted by the aircraft
    - Total searched distance
- Bird Radar used (Y/N)
- Logbook number and type
- Start and end Time spent for searching (from xx:xx to yy:yy translatable to 24 hour clock, UTC), location and total searched distance
- School finder (plane/vessel)
- Chumming boat used (yes/no)
- Chum status (Alive/Dead)

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[4] All species should be reported with FAO species codes, or using National codes and providing a translation table to FAO species codes.

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

[6] RD=round/whole, GG=gilled and Gutted, DR=dressed etc., as per TIS codes.

- Amount of chum used
- Start and end time for chumming (translatable to 24 hour clock, UTC)
- Start and end time for net shooting (translatable to 24 hour clock, UTC)
- Start and end time for net hauling (translatable to 24 hour clock, UTC)
- Start and end location for net shooting
- Start and end location for net hauling
- Light attraction used (yes/no)
- Total of wattage of lights used
- Start and end time for light attraction
- School type (e.g., shoaling/surface, FAD/debris associated)
- Length (m) of net set
- Height (m) of the net
- Number of net skiffs used
- Date and time that transfer to tow cage commenced
- Identification number of the tow cage to which the SBT were transferred
- Name of Carrier Boat that received the fish
- Estimated catch per set, species composition
- Estimated weight (kg) and/or number by species of SBT and other species caught
- Estimated weight of SBT caught alive
- Estimated weight and/or number of SBT dead during operation

<u>Cage Towing:</u>

- Name of carrier boat
- Tow cage identification number
- Cage depth (metres)
- Cage ring diameter (metres)
- Cage mesh size (in centimetres)
- Cage has second or predator net (Y/N)
- Number of divers used
- Chute fitted in cage (Y/N)
- Effective tow speed (km/hour)
- If the catch was received from fishing operations, then for each catcher boat from which SBT were transferred, record:
    - Name of catcher boat
    - Call sign of catcher boat
    - Date and time (translatable to24 hour clock , UTC) transfer started
    - Estimated weight of SBT transferred (tonnes)/dead SBT before transfer
- If the catch was received from another tow cage, then, record:
    - Name of the carrier boat from which the SBT came
    - Identification number of the tow cage from which the SBT came
    - Date and time (translatable to 24 hour clock, UTC) transfer started.
    - Estimated weight of SBT transferred (tonnes)/dead SBT before transfer
- Date and time (translatable to 24 hour clock, UTC) and place that tow finished
- Total weight of SBT mortalities per day from commencement of towing to end of transfer to farm
- Total number of SBT mortalities per day from commencement of towing to end of transfer to farm

D) Observed catch information

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

<u>Longlining:</u>

- Date and time at the start of the observation period (translatable to 24 hour clock, UTC)
- Date and time at the end of the observation period (translatable to 24 hour clock, UTC)
- Number of hooks observed
- Total number by species[4] of caught and retrieved retained during the observed period
- Total processed weight (kg) by species[4] and Processed State[6] of all species caught and retained during the observed period
- Total number and weight when possible (whole weight, in kilograms) by species[4] caught but discarded during the observed period and life status.

Purse Seining:
The entire purse seining shooting and hauling operation should be observed

- Date and time at the start of the observation period (translatable to 24 hour clock, UTC)
- Date and time at the end of the observation period (translatable to 24 hour clock, UTC)
- Estimated % of school caught
- Estimated weight (tonnes for SBT, kg for all other species) and/or number by species of SBT, and other species caught, retained or discarded including life status
- Weight of SBT mortalities from commencement of fishing to end of transfer to cage
- Number of SBT mortalities from commencement of fishing to end of transfer to cage
- Number of species identified as escaped from commencement of fishing to end of transfer to cage
- Number by species identified as discarded from commencement of fishing to end of net hauling

Cage Towing:
The observer must observe or conduct each mortality count during the period of the tow.

- Date and time at the start of the observation period (translatable to 24 hour clock, UTC)
- Date and time at the end of the observation period (translatable to 24 hour clock, UTC)
- Total weight of SBT mortalities per day from commencement of towing to end of transfer to farm
- Total number of SBT mortalities per day from commencement of towing to end of transfer to farm

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

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

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

- Species[4]
- Life status category[7]
- Length (for SBT, fork length measured on straight length, rounded up to the centimetre[8])
- Length unit
- Length code (fork length, eye fork, etc.)
- Length, lower jaw-fork length

[7] The observer program will, as a minimum, distinguish the following life status categories: dead and damaged; dead and undamaged; alive and vigorous; and unknown.
[8] Length should be rounded (not truncated) to the nearest centimeter. For example, 62.4cm becomes 63cm and 62.5cm becomes 63cm (63 cm for both cases).

- Whole weight (kg), if possible. This is the measured weight before processing as opposed to a calculated whole weight.
- Processed weight (kg)
- Processed State[6]
- Sex (F=female, M=male, I=indeterminate, D= not examined)
- Samples taken, specifying:
    - A unique identification number given to the sample,
    - The type of samples taking, including: whole specimen, or samples of otoliths, scales, vertebrae, stomach, muscle, tissue, gonads, etc.)

F) SBT Tag recovery information

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

- Observer's name
- Vessel's name
- Vessel's call sign
- Vessel flag
- Collect and provide the actual tags
- Tag colour
- Tag numbers (The tag number is to be provided for all tags when multiple tags were attached to one fish. If only one tag was recorded, a statement is required that specifies whether or not the other tag was missing)
- Date and time of capture (UTC)
- Location of capture (latitude+N/S and longitude+E/W to 1 minute of accuracy)
- Length (fork length, rounded up to the nearest centimetre[8])
- Processed Weight (kg.)
- Processed State[6]
- Details of samples taken, specifying:
    - A unique identification number given to the sample,
    - The type of samples taking, including: whole specimen, or samples of otoliths, scales, vertebrae, stomach, muscle, tissue, gonads, etc.)
- Sex (F=female, M=male, I=indeterminate, D=not examined)
- Condition of recaptured fish and their life status
- Whether the tags were found during a period of fishing that was being observed (Y/N)
- Reward information (e.g., name and address where to send reward)

HIERARCHIES FOR DATA COLLECTED BY SPECIES AND SBT DATA

This annex provides a guideline for the collection of data by observers to enable prioritising of observer activities.
The flow of the main data collection activities are:

Fishing operation information

- All vessel and shot information

Monitoring of hauls

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

Biological sampling

- Collect data on length and whole and/or processed weight (including processed state)
- Check for presence of tags
- Record sex
- Collect biological samples
- Take photos

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

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

"tunas" means all *Thunnus* species except SBT

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

Attachment 2

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

REPORT COMPONENTS

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

A. Observer Training

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

B. Scientific Observer Program Design and Coverage

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

Details of observer coverage of the above fleets, including:
- Components, areas, seasons and proportion of total SBT catch, specifying units used to determine coverage.
- Total number of observer employment days, and number of actual days deployed on observation work.

C. Observer Data Collected

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

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

D. Tag Return Monitoring

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

E. Problems Experienced

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

Table 1: Information to be provided by 30 April 2004 for the data exchange
All data specified in this table are to be provided to the end of 2003 unless otherwise specified[1].

Type of Data to provide	Data Provider(s)	Description of data to provide[2]
Catch and Effort	all members	Catch (in numbers and weight) and effort data is to be provided as either shot by shot or as aggregated data. The maximum level of aggregation is by year, month, fleet, gear, and 5x5 degree (longline fishery) or 1x1 degree for surface fishery. A template showing the required information was provided in Attachment B of CCSBT-ESC/0309/16.
RTMP catch and effort data	Japan	The catch and effort data from the real time monitoring program to the end of 2003 should be provided in the same format as the standard logbook data is provided.
Raised catch data (or raising rule)	Australia New Zealand Korea	Aggregated raised catch data should be provided at a similar resolution as the catch and effort data. This can be provided either as raised data, or by providing a "rule" by which the Secretariat can calculate raised catches from catch and effort data. Japan and Taiwan do not need to provide anything here because they provide raised catch and effort data.
Size Data	all members	Raised size composition data should be provided using the CCSBT agreed method at an aggregation of year, month, fleet, gear, and 5x5 degree. Data should be provided in the finest possible size classes (1 cm). It is expected that raised data will be provided by Australia, Japan, New Zealand and Taiwan (the later only for size data from 2002 and onwards). Australia and Japan will provide advisory support for members who are providing raised size data for the first time. Members who cannot raise their size data in accordance with CCSBT agreed procedures, should provide raw size data (individual length/weight measurement data) at the same level of resolution. A template showing the required information was provided in Attachment C of CCSBT-ESC/0309/16.
Total catch by Fleet	all members	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.
SBT import statistics	Japan	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.
Total Indonesian catch by month and % of Indonesian LL catch that is SBT	IOTC/ Secretariat	The Secretariat is to liaise with the IOTC to obtain the required raw data for 2003 and to obtain details of the algorithms used for estimating the Indonesian catch from those data. The Secretariat will then do the necessary calculations and submit the estimated catches.
Indonesian LL SBT age and size composition	Australia	Annual estimates of both the age and size composition is to be generated by spawning season (July to June) rather than calendar year. Estimates will be shown for the seasons from 1994/95 to 2002/03.
Acoustic estimates of age 1 SBT off Western Australia	Japan	These estimates would normally be provided as part of the data exchange, but are not being provided in 2004 because sampling is not being conducted in the 2003/04 season.
Tag returns	Secretariat	Raw tagging and recapture data will be provided from both the CCSBT tagging programs and the RMP tagging program.
Catch at age data	all members	Catch at age (from catch at size) data by 5*5 degree, and month to be provided by each member for their longline fisheries. Korea and Taiwan should liaise with Japan and the Secretariat (since theirs is mainly an issue of substitution of Japanese/other length frequency data). New Zealand will be assisted by CSIRO to provide data separately for the charter and domestic fleets.

[1] In the case of the Australian surface fishery, Australia will attempt to provide preliminary/partial catch and effort data for the 2003/04 fishing season.
[2] It is accepted that there may be cases where specific items information cannot be provided because it has not been collected in the specified manner or because it is not readily available in the format required.

Table 2: Information to be provided for updating the operating model

The data specified below are to be provided by 31 May unless otherwise specified. The data are to be provided to either June or December 2003 depending on fishery. Unless there is reason to the contrary, the complete time series for each type of data used in the operating model will be updated using the historical data that members have provided to the Secretariat.

Type of Data to provide	Data Provider(s)	Description of data to provide
Total catch per fishery each year from 1952 to 2003	Secretariat / Australia / Japan / Taiwan	• Secretariat will do necessary calculations to obtain most totals • Australia will provide surface fishery update for 2001/02 and any previous seasons that it wishes to update • Japan will provide updates (2002 and 2003) of average weights for LL1, LL1 (areas 8/9 only), LL3 and LL4 • Taiwan to update the rule of thumb (2002 and 2003) for separating the target and non-target SBT fisheries.
Catch-at-length (2 cm bins) for LL1, LL2, LL3, and Japan spawning ground fisheries	Secretariat / Taiwan	• Secretariat to do necessary calculations from data provided for data exchange • Taiwan to provide an update of length frequency data for the LL2 fishery.
Catch-at-age (ages 0 – 30) for Australia surface and Indonesia spawning ground fisheries	Australia	• These data will be provided to June 2003 in the same format as provided for the initial management procedure data exchange.
CPUE series	Australia / Japan	5 CPUE series are to be provided for ages 4+, as specified below: • Nominal (Secretariat) • Laslett Core Area (Australia) • B-Ratio proxy (W0.5) (Japan) • Geostat proxy (W0.8) (Japan) • ST Windows (Japan) The operating model will then use the median of these series.
Tag releases/recoveries and reporting rates	Secretariat / Australia	The RMP tag/recapture data for the period 1991-1997 will be updated for any changed/new data in the database. The Secretariat and CSIRO will liaise in providing this update (either CSIRO provide the update, or the Secretariat provide it with specifications provided by CSIRO).
Mean length-at-age by year and season, and CV of length-at-age	Australia	CSIRO will consider the need for updating these data and advise other Members of its recommendation by 29 February 2004. CSIRO will then provide updated information if members considered it appropriate.