Commission for the Conservation of
Southern Bluefin Tuna

みなみまぐろ保存委員会

Report of the Fifth Meeting of the Scientific Committee

19-24 March 2001
Tokyo, Japan

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Agenda Item 1. Opening and Welcome

1. Representatives from Australia, Japan, and New Zealand and members of the Scientific Advisory Panel met as the CCSBT Scientific Committee (SC) from 19 to 24 March, 2001 in Tokyo. Observers from the Republic of Korea, South Africa and Taiwan also attended in the meeting. The meeting was chaired by Mr Penney, the appointed SC Chair.

2. Mr Yuge, on behalf of Japan as the host county for the meeting, welcomed participants and expressed the desire for a constructive exchange of views on the matters to be considered at the meeting.

Agenda Item 2. Adoption of Agenda

3. The proposed agenda circulated before the meeting was adopted without change, and is shown in **Attachment A**. It was noted that the agenda was extensive and that the time available would not permit detailed discussions on all items. Participants were requested to identify items of highest priority which should be addressed in detail, such as reaching agreement on a Scientific Research Program (SRP) and discussion of required inputs to the forthcoming stock assessment process. The list of documents tabled at the meeting is shown in **Attachment C**.

Agenda Item 3. Introduction of Delegations

4. Participants introduced the members of their delegations and identified agenda items of highest priority to each delegation. The list of meeting participants is attached in **Attachment B**. All members agreed with the need to finalise the SRP proposal and considered that it was also important to develop an agreed framework for undertaking the stock assessment later in the year.

Agenda Item 4. Scientific Research Program

5. Under the guidance of the Advisory Panel, extensive preliminary informal discussions were held with individual member delegations regarding the revised draft SRP proposal developed by the Advisory Panel at their meeting in La Jolla during January 2001. The Advisory Panel was requested to prepare an amended draft SRP proposal for consideration by the SC based on these discussions.

4.1 Presentation by the Advisory Panel

6. Dr Hilborn presented a brief overview of the main conclusions from the Advisory Panel SRP proposal of February 2001(as presented in CCSBT-SC/0103/04), and then summarised the main issues raised during the informal discussion of this proposal. The Panel draft proposal had been revised in response to many useful suggestions made during the informal discussions, and a draft of this revised proposal was circulated for consideration by the SC as an SRP SC proposal.

7. Dr Hilborn noted that the four original primary components of the SRP proposal had been retained, as these had specific implications for direct CCSBT co-ordination and funding. However, discussions had resulted in a change in the proposed priority of these four main components:

- Characterization of all SBT catches remained the highest priority component, but the proposal was expanded to provide guidelines for data collection from all fleets and gear types.

- Development and acceptance of CPUE analysis methods for inclusion in stock assessments was elevated to the second priority component, in view of the urgent need to reduce uncertainty in CPUE indices used in stock assessments. Noting that the SRP should provide medium-term research priorities, this component recommended further exploration of the B-ratio and geostatistical CPUE interpretation methods, and guidelines for this process are included. Nonetheless, it was noted that interim approaches will be required for the next assessment meeting.

- Implementation of a scientific observer program was accorded the same priority as implementation of a conventional tagging program. A set of principles for design of such a program was proposed. While member countries should be responsible for implementation, the Commission should set standards for both training and data collection, and the resultant data should be submitted to a central CCSBT database coordinated by the Secretariat.

- Implementation of a conventional tagging program was proposed to provide an alternative index of abundance, particularly under conditions of stock recovery. Tagging of juvenile fish is likely to be most cost-effective, and it will be important to ensure adequate tagging coverage in all known areas of juvenile abundance. It will also be important to quantify return rates, probably through the observer program.

4.2 Comments by Member Countries

8. In initial response to the revised SRP proposal, Japan re-iterated the need for comment on the relative importance of the other five components originally under the mandate of the SRP development process, to allow existing national programs to be reviewed in relation to the importance of new work under the four priority components. Japan noted that the CCSBT could also play a leading role in coordinating cooperation among members

under these components. It was also noted that tagging programs could only take priority over the CPUE Interpretation Experiment if consensus was reached over narrowing the range of uncertainty in CPUE indices. Australia noted the importance of further direct ageing work. Japan agreed that this should be done, and also indicated the importance of aerial surveys, suggesting that results should be exchanged between members. Finally, it was noted that specific attention would have to be given to the details of research to be conducted under each of the four priority SRP components over the next year.

4.3 Development of an Agreed SRP Proposal

9. The first draft SC SRP proposal was revised in response to initial comments received from members and presented in plenary for consideration. Various issues were identified as requiring further revision, particularly those related to optimum and practical observer coverage target levels to achieve various scientific objectives, and certain of the details regarding design of tagging programs on surface fisheries and longline fleets. Members provided written proposals on these and other issues to the Panel for incorporation in a further revision of the proposal.

10. In presenting the revised draft SC SRP proposal, Dr Hilborn noted that key changes under catch characterization related to inclusion of the need for catch enumeration and length information for tunas and tuna-like species, but that biological information would be collected from SBT only. Regarding CPUE analysis replication, members should each have sufficient information and specifications to re-run these. Issues related to the proposed observer program were most contentious. Regarding target coverage levels, it was considered preferable to just give recommendations on levels required to achieve certain scientific objectives. While members should co-ordinate their own observer programs, exchange of observers was encouraged to improve standardization across programs and increase confidence in results. While tagging on pole & line vessels was considered most cost effective, tagging on longline vessels should also be considered.

11. In response, Japan noted that the SC SRP proposal should not give the impression that the other 5 research components were of no concern to the Commission, and they should remain next in priority after the primary four components. The option for conducting a CPUE Interpretation Experiment (CIE) at some stage in the future, should this be considered necessary, should be retained. Regarding the observer program, the recommended 20% - 30% coverage rates were considered by Japan to be unrealistically high, and improved estimation of tag reporting levels was also related to number of fish tagged and recapture rates. Australia cautioned against weakening the wording to the extent that these were no longer objective recommendations. There was some discussion regarding which age classes should be tagged in which region off Australia, and this was recognised as an issue that required further attention at a detailed planning workshop. While recognising the need for clear recommendations, New Zealand noted that the proposal should not be prescriptive on observer program implementation.

12. Members provided written proposed changes to the Advisory Panel, and a further draft was prepared based on these and the discussions held. The Panel noted that they considered this to be a final draft, which should not be further revised. Dr Hilborn summarised the main changes. It was recognised that, on some fleets, fish were

weighed and not measured, observer coverage rates should be determined when observer programs are planned. A number of minor proposed wording changes had also been incorporated. The final draft of the SC SRP proposal was accepted without reservation by all members, and is shown in **Attachment D**.

13. Some discussion was held regarding the possibility of documenting details of research to be conducted under each of the four primary SC SRP components over the coming year. It was noted that detailed recommendations had been made at this meeting on data preparation, exchange and raising in preparation for the next SAG meeting. Proposals for interim CPUE model selection had also been accepted for the next assessment. Members felt that there would be little scope for additional Commission activities, such as workshops, before the next SC meeting. Australia stated that it would work to develop proposals in the areas identified by the SC SRP proposal. It was agreed that details of further work to be conducted under the SC SRP proposal should be discussed at the next SAG and SC meetings.

14. In particular, it was noted that a specific technical workshop should be held to plan tagging programs, and perhaps the observer program as well. Such a workshop should include experts from other international fisheries commissions involved in tuna tagging programs, such as the Inter-American Tropical Tuna Commission (IATTC) and the Secretariat of the Pacific Community (SPC). Proposals for such workshops should be specifically addressed at the next SAG and SC meetings, and members should come to these meetings prepared to discuss how best to plan these activities. It was suggested that inter-sessional exchange of documentation through the Secretariat for existing tagging and observer programs would be useful, as would communication between coordinators of existing scientific observer programs run by member countries. Members should also consider preparing draft program proposals based on such inter-sessional exchanges, for discussion at the next meeting.

Agenda Item 5. Stock Assessment Process

15. Substantial informal discussion was held under the guidance of Dr Annala (Chair of the SAG) regarding work required to provide guidelines and inputs to the stock assessment process to be conducted later in the year.

5.1 Stock Projection Verification

16. Dr Parma, coordinator of the inter-sessional work on verification of the stock-projection software and algorithms used for past assessments, presented a brief summary of progress made, as summarised in the November 2000 draft report of the projection verification working group (CCSBT-SC/0103/info02). During the inter-sessional review process, six sources of difference in projections had been identified. Of these, three had minor implications, and it was decided to leave these unchanged. One (the method used to add variability around recruitment) had a moderate effect, and it was agreed to use the method implemented by Japan. The reference year used to determine selectivity had a substantial effect, and it would be better to use average selectivity over a range of years.

Japan and Australia initially proposed different averaging periods, but it was agreed to use an average from T-1 to T-3, where T is the latest year for which catch data is used in the assessment.

17. During the meeting, Australia also agreed to the recommended interim approach regarding the constrained or unconstrained estimation of parameters of the stock-recruitment model. It was proposed to fit a standard, unconstrained Beverton-Holt model, and subsequently constrain the output recruitment estimates. This will allow the remaining verification work to be completed in the near future under the coordination of Dr Parma. A final report on this process should therefore be available before the next SAG meeting.

5.2 Stock Assessment Inputs

18. Dr Annala presented a summary of the key issues covered during informal discussions. The Stock Assessment Process Workshop in May 2000 produced a summary of processes for development and evaluation of data inputs (CCSBT-SC/0103/info07). Progress had been made on the exchange of information on differences in length:weight relationships, and ideas had been exchanged regarding substitution rules and raising procedures for production of the catch-at-age matrices to be used. Regarding the latter, there were concerns that results of substitution and raising procedures differed between members, and detailed discussions were held on options to resolve these differences. Specific issues addressed in depth during subsequent informal discussions were:

- Selection of Growth Models: The need to move forward from the growth models used in previous assessments was recognised. However, evaluation of improved or alternate growth models was a complex process which would not be complete in time for the next assessment, particularly regarding inclusion of direct ageing information. As an interim measure, it was therefore agreed to use two growth curves, the 1960s curve (CCSBT SC/0103/18) and an average of the 1980s (CCSBT SC/0103/18) and Richards curves (developed in CCSBT-SWG/0011/03) (which were very similar) in the 2001 assessment. There was also agreement on how to approximate the process used in the last assessment to generate the catch-at-size data over the 1970 to 1980 transition period, using the agreed growth curves. The table of mean length-at-age referred to in **Attachment E** will be provided inter-sessionally by Dr Ianelli.

- Development of the 2001 Catch-at Size Database: Dr Ianelli summarised the report of the informal sub-group established to propose a process for generating the catch-at-size database for the forthcoming assessment (attached as **Attachment E**). This should be derived from a single set of agreed catch data. Although this should be coordinated through the CCSBT Secretariat in future, this would not be possible for the next assessment. Neither would it be possible to review the raising and substitution algorithms before then. It was therefore agreed to use the algorithm and data used previously to generate catch-at-size data for the period prior to 1998, which would be provided by Australia. This will allow each member to generate catch-at-age data using the proposed growth curves. For the post-1998 period, each member should generate their own catch-at-size database for their respective fisheries. Further specific details requiring clarification are outlined in the attached sub-group report in

Attachment E, and the schedule in **Attachment F**. The Panel offered to check the data conversion results at each stage, if this was considered necessary. It was also agreed that Dr Ianelli would determine whether partial data for 2000 should be included in the assessment or not, after inspection of the data.

- Non-Member Catch and Size Data: Korea and Taiwan both indicated their willingness to provide catch, effort and size data for inclusion in the next stock assessment, provided this was done on the same basis as provision of data by members. They requested guidance on the data to be provided, data formats and the submission procedures, and would undertake to exchange data according to the same schedules and formats as member countries (as specified in **Attachment F**). Indonesian data collected under a bilateral agreement with Australia would also be available for the assessment. However, there was a need to check this against catch estimates provided directly by Indonesia. It was noted that size data provided by Korea and Taiwan would only be used for a sensitivity analysis in the 2001 assessment.

19. Another issue identified as requiring attention, although over a longer time frame, was further work on conversion factors for dressed products, particularly fillets and belly-meat from Indonesia, to allow the Japanese import data to be correctly raised. It was suggested that the port sampling program currently operating under the Australian/ Indonesian bilateral agreement could be considered for use for collection of the data required to generate the necessary conversion ratios. It was also recommended that the Commission should discuss the correct documentation of these product categories under the SBT trade certification scheme.

5.3 CPUE Models

20. The meeting agreed to use the equation 1 given below with w = 0.5 and w=0.8 to provide two CPUE series for assessment purposes which were considered reasonably representative of plausible interpretations of the available catch-effort information. These should not be considered as bounds on plausible CPUE trends, but instead as two interim alternative hypotheses. The w=0.5 choice was made by estimating the value of w_a that most closely represents the B-ratio trend since 1989 and averaging over age ranges, in circumstances where it would not be possible to implement code for B-ratio calculation in time for the forthcoming SAG meeting. The w=0.8 was the estimate to represent the geostatistical trend since 1989 calculated in the same way. This approach does not exactly capture pre-1989 trends in the B-ratio and geostatistical indices.

$$I_{y,a} = wCS_{y,a} + (1-w)VS_{y,a} \qquad (1)$$

Where $I_{y,a}$ is the new index for year y age a, w is the weighting between the CS and VS, $CS_{y,a}$ is the constant squares index in year y for age a and $VS_{y,a}$ is the variable squares index in year y for age a. Both $CS_{y,a}$ and $VS_{y,a}$ would be normalized so that the mean value over all years = 1.0.

21. Australia and Japan will each conduct GLM standardisation of CPUE data to provide CS and VS indices. The approaches used by these two members are virtually identical, and no differences of substance are expected in the results. However, should such differences arise, Dr Ianelli will determine the action to be taken. This is an interim approach to be used only for the 2001 stock assessment and a new CPUE analysis method will be developed for the 2002 assessment. The Panel was requested to investigate whether it would be feasible for them to develop an initial specification for a simplified B-ratio CPUE modeling approach for discussion at the next SAG meeting. This would allow rapid progress to be made with B-ratio calculations after the next assessment. In this regard, Australia extended an invitation for collaboration with others on development of improved CPUE indices.

5.4 Reference Points

22. Australia noted that this issue should be discussed further in the future, and they did not wish to comment further on reference points at this stage. No other members wished to comment on this issue.

5.5 Progress on Work Plans from May 2000 SAP Workshop

23. The meeting noted that progress on most of the proposals from the May 2000 SAP Workshop had already been summarised under agenda items 5.1 - 5.3, and that substantial further progress had been made at this meeting. Australia noted that they had presented a paper at the May 2000 SAP workshop (CCSBT-SAP/0005/22) investigating some exploratory length-based modeling. They would present further work on this approach in a paper to the next SAG meeting. Japan noted that they had similarly presented a paper to the November 2000 SWG Meeting (CCSBT-SWG/0011/16) investigating the use of simpler models.

5.6 Data Exchange Arrangements

24. Arrangements and schedules for the exchange of data required for the next SAG meeting were discussed extensively by the informal sub-group on data inputs. The proposed data exchange requirements are included in the report of the sub-group (**Attachment E**) and the proposed schedule for data preparation and exchange was discussed further under agenda item 7.

Agenda Item 6. Further Discussion of Management Procedure/Strategy

6.1 Review of Inter-Sessional Activities

25. No substantive inter-sessional work was reported by members on matters related to development of a SBT management strategy. Australia noted that their paper on evaluation of management strategies (CCSBT-SC/0103/11) developed for the May 2000 Management

Strategy Workshop had been presented again to this meeting for information. Japan noted that this was a useful example, particularly for evaluation of performance against long-term objectives. However, additional attention was required on short-term performance measures, related to how management actions might progress towards the longer term objectives.

6.2 Observational Inputs

26. It was noted that selection of reliable operational inputs would be dependent on the outcome of the next SAG meeting, as these would essentially be those indices considered to be reliable in the assessments. This issue should therefore be specifically addressed towards the end of the next SAG meeting, in the light of the assessment results.

6.3 Development of an Operating Model

27. The Panel proposed that the Commission should consider the development and evaluation of a simplified version of the current stock assessment model to be used as direct input into an analytical decision rule in future management procedures for SBT. This simple model should use trends in abundance as estimated from all data sources, including CPUE, tagging and surveys to determine changes in allowable catch. This would allow reduced dependence on the results of stock assessments and stock projections in the development of these future management procedures. The Advisory Panel suggested that it become involved in the development of a management strategy evaluation framework and procedure to provide assistance in future management decisions by the CCSBT.

28. The Committee noted that the operating models used for testing a management procedure would essentially comprise the suite of models developed for assessment of the SBT resource, and that this issue would therefore best be addressed after such models had been selected during the next SAG meeting. Regarding models to be used in the analytical decision rule of the management procedure to compute the TAC, Japan noted that their paper presented to the November 2000 SWG meeting (CCSBT-SWG/0011/16) proposed some simpler models which might be used for this purpose. The Committee endorsed the suggestion that the Advisory Panel become involved in the development of a framework for a management strategy evaluation process. Japan suggested that the Panel might be requested to oversee the conduct of trials of possible management procedures. These trials would preferably be run by members using common software developed, perhaps by the Panel, on the basis of a framework initially proposed by the Panel and then further refined by the Committee. The Panel responded that they had not as yet had time to develop their thoughts on this matter in detail, and that their level of involvement would naturally need to depend upon the time which they could make available.

Agenda Item 7. Future Work Plans and Schedules

29. The informal sub-group on data inputs developed a proposed schedule of data development and exchange in preparation for the next SAG meeting, assuming that the

meeting will start on 19 August. This was approved by the Committee and is attached as **Attachment F**.

Agenda Item 8. Other Issues

8.1 Appointment of Database Manager

30. The Executive Secretary reported that arrangements had been made for a selection committee to finalise recommendations for selection of the Database Manager just before the CCSBT7 Commission meeting. These recommendations would be considered, and the selection finalised, at that meeting.

8.2 Matters Related to Database Establishment

31. The Executive Secretary noted that the impending appointment of a database manager emphasized the need to reach agreement on the format and structure of the CCSBT database to be developed and maintained by the Secretariat. Although details of finer-scale data required for stock assessments still had to be finalised, progress should be made on submission of basic data to the database. Two proposals for a database format tabled by Japan and Australia were considered. Catch and effort by area, catch by country and size data requirements were discussed. With the exception of the detail of spatial scale of data, agreement was reached on an interim database format and a proposal (as shown in **Attachment G**) was prepared for consideration at the CCSBT7 meeting.

32. New Zealand emphasized the need to ensure that data security and confidentiality receive adequate attention from the inception of the database. Australia suggested that the Secretariat consult commercial service providers on these issues.

8.3 Report on Surveys Conducted During 2000-2001

33. Japan presented a summary of submitted papers on the spawning ground survey conducted during 2000/2001 (CCSBT-SC/0103/16) and a cruise proposal for 2001/2002 (CCSBT-SC/0103/17). Low catch rates (2 fish) made it difficult to draw any conclusion regarding spawning behaviour. During the 2001/2002 cruise it is proposed to also attempt oceanographic observations, sonar tracking and archival or satellite tagging of fish, assuming that an adequate number of fish is caught. Japan extended an invitation to Australia for scientists to participate in the next cruise, should they wish to do so.

9. Adoption of Report

34. The draft SC report was reviewed by the Committee. Following inclusion of suggested changes, the report was adopted.

10. Close of Meeting

35. All members thanked Japan for providing the venue and facilities for the meeting. The Chair was thanked for his leadership of the meeting, the Secretariat for their efficient organization and observers for their participation. Specific thanks were extended to the Advisory Panel for their substantial contribution during the meeting, and over the past year, and the hope was expressed that they would continue to participate actively in the work of the Committee. Finally, the interpreters were thanked for their patience, and for the excellence of their interpretation.

36. The meeting was closed at 16.00h on 24 March 2001.

The List of Attachments

Attachment A

Agenda
Fifth Scientific Committee Meeting
19-24 March 2001
Tokyo

1 Opening
- 1.1 Introduction
- 1.2 Administrative matters

2. Adoption of Agenda

3. Opening comments by member countries

4. Scientific Research Program (SRP)
- 4.1 Presentations from External Scientists
- 4.2 Comments from member countries
- 4.3 Development of an agreed SRP proposal

5. Stock Assessment Process (SAP)
- 5.1 Stock projection verification
- 5.2 Stock assessment inputs
- 5.3 CPUE models
- 5.4 Reference points
- 5.5 Progress on workplans from May SAP Workshop
- 5.6 Data exchange arrangements

6. Further discussion on Management Procedure/Strategy
- 6.1Review of intersessional activities
- 6.2 Observational inputs
- 6.3 Developing an operational model

7. Future work plans and schedules

8. Other Issues
- 8.1 Appointment of database manager
- 8.2 The matters related to database establishment
- 8.3 Report of surveys conducted during 2000-2001

9. Adoption of the report for the Committee

10. Close of meeting

Attachment B

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CCSBT
Scientific Committee Meeting
19-24 March 2001
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Attachment C

Document List of the Fifth Scientific Committee

Document number ***Document title***

(CCSBT-SC/0103/)

1. Agenda
2. Participant List
3. Development of a Scientific Research Program for SBT (8 December,2000)
4. Report of the Advisory Panel to CCSBT on the Scientific Research Program (15 February, 2001)
5. (Australia) Comments on Development of a Scientific Research Program for SBT
6. (Australia) Exploratory analysis of the SBT CPUE data using smoothing spines
7. (Australia) Size distribution of southern bluefin tuna(Thunnus Maccoyii) with depth on their spawning grounds in the Indian Ocean
8. (Australia) Estimating long-term growth rate change of southern bluefin tuna from two episodes of tag-return data
9. (Australia) A flexible maximum likelihood approach for fitting growth curves to tag- recapture data
10. (Australia) Exploratory and Descriptive Analyses of Catch, Effort and Size Data for Southern Bluefin Tuna from Japanese Longline Vessels
11. (Australia) Development and Evaluation of Management Strategies for the Southern Bluefin Tuna Fishery
12. (Japan) Japan's comments on Development of SRP (Japan, January 2001)
13. (Japan) Japan's comments on the SRP report developed by Advisory Panel
14. (Japan) Quick examination of Japanese longline CPUE data in the light of SRP development
15. (Japan) Japan's proposal on Database format for data maintained at the Secretariat of the CCSBT
16. (Japan) Brief report of the surveys conducted during 2000-2001
17. (Japan) The cruise proposal of SBT spawning ground survey in 2001/2002
18. (Australia) Preliminary Results from Combined Analyses of Direct Aging and Tag-Recapture Data for Estimating SBT Growth Curves
19. (Australia) Effects of Observer Coverage in the Estimation of Reporting and Fishing Mortality Rates in Tagging Experiments

20. (Australia) Real Time Monitoring Program
21. Draft Report of the SSC to CCSBT on theScientific Research Program
22. Report from sub-committee on Agenda Item 5.2, stock assessment inputs
23. Timing for Exchange of Data and Documents for the 2001 SAG and SC

Information paper

Document number ***Document title***

(CCSBT-SC/0103/info)

1. Development of a SBT Scientific Research Program including a Scientific Fishing Component by the CCSBT External Scientists
2. Progress Report of the Working Group Established to Identify and Evaluate Sources of Difference in Projection Results Between Approaches used by Australia and Japan(16 November 2000)
3. Meeting Time Table for 2001
4. Timing for Exchange of Data and Documents in Normal Stock Assessment Year
5. Recommendation for Document Exchange
6. Terms of Reference for a Database and Database Manager for the CCSBT Secretariat
7. Appendixes of the report of the Stock Assessment Process Workshop(22-26 May 2000, Tokyo Japan)
8. Some Simulation Analyses for Evaluating Length Based Stock Assessment Methods

Attachment D

Report of the SC to CCSBT on the Scientific Research Program

Friday, March 23, 2001

Introduction

Following the November 2000 scientific meeting of CCSBT to discuss the development of a Scientific Research Program (SRP) the advisory panel prepared a report. At the SC meeting in March 2001 discussions were held with all member countries and the SC formulated an integrated SRP. The following report is the recommended SRP as adopted at that meeting.

The SC considers that the main objective of an SRP is to improve the quality of the data used as input to the stock assessment and to contribute to the development of reliable indices to monitor future trends in stock size. Future trend indicators will be a critical component of a feedback rule to facilitate setting TACs.

A number of topics have been proposed as desirable components of a SRP, namely:

1- Characterization of the SBT catch.

2- CPUE interpretation and analyses.

3- Scientific observer program.

4- Conventional tagging program.

5- Direct ageing.

6- Archival and pop-up tagging.

7- Recruitment monitoring program.

8- Development of a spawning biomass index.

9- Fisheries oceanography for improved habitat definition.

Some of these components (items 5 through 9) represent ongoing research by member countries; the SC fully endorses these programs and encourages their continued support. Items 1-4 are viewed by the SC as areas where additional directed initiatives by the CCSBT are most needed and will likely result in substantial gains in reducing

uncertainty in the stock assessment in the short term. CCSBT will likely have a role to play in items 5-9 as well.

Characterisation of the SBT catch

Characterisation of the SBT catch taken by all fleets is fundamental to the stock assessment process. The information that should be collected to characterise the SBT catch includes:

A. Longline fisheries

1. Details of effort, including:
   - Number of hooks set
   - Position of set and haul
   - Date and time of set and haul
2. Details of the catch, including:
   - Catch composition (number and length or weight for SBT, other tuna and tuna like species)
   - Catch retained and discarded
3. Length, weight, sex and other biological data for SBT
4. Otoliths of SBT for age determination
5. Any tags recovered
6. Environmental data that may influence SBT CPUE (sea surface temperature, wind direction and speed, etc.)

B. Purse seine fisheries

1. Details of effort, including:
   - Size of net (length and depth)
   - Position of haul
   - Date and time of set and haul
   - Utilization of any spotting devices including aerial spotters
   - Information on schools spotted (number of schools, school size, etc.)
2. Details of the catch, including:
   - Catch composition (number and length or weight for SBT, other tuna and tuna like species)
   - Catch retained and discarded
   - Number and weight of dead fish during fishing activity
   - Number and weight of dead fish during towing process to cages

3. Length, weight, sex and other biological data for the SBT at time of capture.
4. Otoliths of SBT for age determination
5. Any tags recovered
6. Environmental data that may influence SBT CPUE (sea surface temperature, wind direction and speed, etc.)

C. Pole and line fishery

1. Details of effort, including:

- Number of poles (automatic and manual)
- Position at start and end of poling activity
- Date and time of start and end of poling activity
- Utilization of any spotting devices including aerial spotters
- Information of schools spotted (number of schools, size of schools, etc.)

2. Details of the catch, including:

- Catch composition (number and length or weight for SBT, other tuna and tuna like species)
- Catch retained and discarded

3. Length, weight, sex and other biological data for SBT
4. Otoliths of SBT for age determination
5. Any tags recovered
6. Environmental data that may influence SBT CPUE (sea surface temperature, wind direction and speed, etc.)

D. Other fisheries (e.g. Trolling, handlining, etc.)

1. Details of effort, including:

- Number of hooks set or appropriate effort measure
- Position at start and end of fishing activity
- Date and time of start and end of fishing activity

2. Details of the catch, including:

- Catch composition (number and length or weight for SBT, other tuna and tuna like species)
- Catch retained and discarded
- Time of catch

3. Length, weight, sex and other biological data for SBT
4. Otoliths of SBT for age determination
5. Any tags recovered
6. Environmental data that may influence SBT CPUE (sea surface temperature, wind direction and speed, etc.)

Programs to collect this information to characterise the catch should comprise a combination of the following approaches:

1. Reporting of information on catch and effort by the fishing fleet using a logbook system
2. Monitoring and sampling of landings by port samplers
3. Monitoring and sampling of catches at sea by scientific observers
4. Verification procedures through mechanisms such as the Trade Information Scheme

There is obvious overlap between this component of the proposed SRP and some of the other proposed components, such as the scientific observer program. The following guidelines should govern the collection of these data

1- Member countries will be responsible for collection of these data for their own flag vessels.

2- CCSBT shall prepare quality standards for the data that are collected

3- The CCSBT data manager shall work with member countries to assure that the data collected by member countries is integrated into the CCSBT data base with the spatial resolution of the data transmitted to CCSBT determined by agreement

4- Where existing bi-lateral agreements with non-member countries exist for collection of catch data, the data obtained from these bi-lateral agreements shall be transmitted to the CCSBT data manager for integration into the CCSBT data base so long as this is within the framework of the bi-lateral agreement. If the bi-lateral agreement does not permit transmission to other parties every effort should be made to develop such an arrangement.

5- Where there are no existing arrangements for determination of catch from a non-member state, the CCSBT Secretariat shall take a lead role in securing such data collection.

6- The CCSBT data manager shall take responsibility for assembly and maintenance of data regarding non-member catch.

7- National confidentiality requirements may limit the detail of data transmitted to CCSBT, and CCSBT will need to develop confidentiality protocols for release of data stored by CCSBT.

CPUE Interpretation and Analysis

The General Objective of CPUE Interpretation and Analyses would be to reduce the uncertainty in historical trend in stock size and thus the uncertainty in current assessments, and to provide a reliable index to monitor future trends in stock size to be used as a part of a decision rule to set TAC.

Experimental Fishing Programs conducted in the past were conceived in the context of the two extreme interpretations of CPUE trends represented by the Constant-square (CS) and the Variable-square (VS) models. The data available indicate that the VS interpretation of CPUE trends is not valid; there are many fish in areas not now being fished by Japanese longliners. This is demonstrated, at a large spatial scale, by the distribution of effort by other parties and, at a local scale, by results of past Experimental Fishing Programs. One potential problem with the CS interpretation is that some of the CPUE rise since 1990 in younger ages may be due to the contraction in the area fished, and not exclusively to increases in abundance.

Thus previous CCSBT stock assessments that used VS and CS as bounds have overestimated the uncertainty in the CPUE trend and the Scientific Committee recommends that all parties further explore methods intermediate between these two. For fine-scale analysis, the B-ratio method (Campbell et al. SBFS/95/, SBF/96/10) seems appropriate as a lower bound, because it assumes excellent ability of vessels to target high catch rate areas. We believe the geostatistical method merits further work as well as other methods for fitting spatial and temporal trends. The following guidelines should govern the development of CPUE analysis methods in the future.

1- A complete algebraic formulation and input data base for all methods should be available so that any party can replicate the method once it is tabled

2- Before a CPUE analysis method is used in an assessment, all interested parties should have computer code to replicate the method

3- Before a CPUE analysis method is used in an assessment, the CCSBT protocols for introduction of new information or a new method will be followed.

The SC does not believe it will be practical to meet the above standards in time for an assessment in July-September 2001 using Bratio or geostatistical approaches, and the SC will need to adopt some interim CPUE time series for the 2001 assessment as guided by the Advisory Panel

Once one or more CPUE analysis methods are developed, it will then be possible to evaluate the need for and design of a CPUE interpretation experiment.

Scientific Observer Program

Scientific Observer Programs are internationally accepted as an essential component in any fisheries management system and will be a key element of a SRP for CCSBT.

Information that should be collected by scientific observers includes:

1. Details of effort to aid the interpretation and standardisation of CPUE data, including:

    - Amount of gear used and technical details of gear
    - Position of fishing activity
    - Date and time of fishing activity

2. Details of the catch, including:

    - Catch composition (number and length or weight for SBT, other tuna and tuna like species)
    - Catch retained and discarded

3. Length, weight, sex and other biological data for SBT

4. Otoliths of SBT for age determination

5. Monitoring of tag recoveries

6. Environmental data that may influence SBT CPUE (sea surface temperature, wind direction and speed, etc.)

7. Research duties – qualified observers may collect detailed reproductive samples, and tag fish as practical and appropriate etc.

The following principles should govern the implementation of an observer program for CCSBT

1- The SC recommends an observer coverage of 10% for catch and effort monitoring as a target level.

2- The appropriate level of observer coverage for estimation of tag returns will depend on the scale of the tagging program and the tag recovery rate. The trade-off between more intensive observer coverage and more intensive tagging will need to be explored in planning the tagging program.

3- CCSBT shall prepare standards for training of observers, operation of observer programs and the data to be collected including the forms to be used.

4- The CCSBT Secretariat shall work with observer coordinators in member countries to assure that the data collected becomes part of the CCSBT data base as agreed in CCSBT protocols.

5- Member countries will be responsible for operation of observers in high seas and domestic EEZ fisheries on their flag vessels.

6- All fleet components should be observed and target levels of observer coverage should be the same for all fleet components.

7- In the interests of maintaining consistency between fleets and increasing mutual trust in the results of the observer program, exchange of observers between countries on a regular basis and recruiting some observers from non-member nations should be encouraged.

Conventional tagging program

Stock assessment models are to some degree, predicated on fishing and perform best under contrast due to catches. Simulation studies have shown that the ability of depletion-type methods to correctly estimate abundance trends is particularly limited during population recovery (since catch is not a major factor explaining the trend in stock size). In other words, declining populations are estimated somewhat more accurately than increasing ones. Therefore, the SC feels that a tagging program can provide important additional information on natural and fishing mortality rates to improve the ability to estimate changes in stock size. Such age-specific information on tag-recapture rates can be important since it is relatively independent from other abundance indices.

To minimise problems on assumptions about mixing rates the SC recommends that tagging occur over a broad geographic area. While it is clearly most cost effective to tag young fish, a tagging program must make every effort to tag all components of the SBT stock. In addition, to provide good estimates of recovery and reporting rates, this component of the SRP should be linked to appropriate observer coverage.

A well designed and conducted conventional tagging program will provide information that supplements abundance indices from CPUE trends and aerial surveys. This additional information will help achieve the overall objective of an SRP of "providing statistically significant data for reducing the levels of uncertainty in stock assessments made by the Commission and to identify directions for future research". A well-designed tagging program will yield estimates of fishing mortality rates, which, when combined with estimates of the catch, provide estimates of the stock size.

The SC recommends that a conventional tagging program should be conducted using the following approaches:

1. Use of a dedicated pole and line vessel to tag juvenile SBT off the coasts of Australia during the summer months. The target number to be tagged annually is 10,000 to 15,000 fish. This appears to be the most cost effective way of releasing tags into the SBT population.

2. Concerns have been raised about the subsequent mixing of juveniles tagged off Australia into the SBT population. The SC recommends that where other sources of juvenile SBT can be identified, tagging in these areas also be initiated.

3. Ideally tagging would occur across all ages and locations of the SBT population. In order to achieve this, a well balanced tagging program would include some

combination of chartered longline tagging and voluntary tagging from commercially operating longliners by onboard observers. The details of this mix will need to be determined in the final design stages of the program.

4. CCSBT should explore the possibility of using some form of cryptic tag such as PIT tags to assist in determining the tag return rate of the traditional visible tags, and possibly as a replacement for visible tags. A number of possible problems have been identified with cryptic tags, primarily relating to impacts on the marketability of the fish. This problem is not unique to SBT and should be further explored.

5. As tag recovery is often one of the most problematic components of a tagging program, CCSBT should establish strong incentives for both effective tagging and returning recaptured tags

6. Any tagging programs will be co-ordinated by CCSBT and the data retained and managed by CCSBT and available to all members.

There is obvious overlap between this component of the proposed SRP and some of the other proposed components, specifically the scientific observer program. The determination of where, how, and by whom a tagging program should be conducted is the responsibility of the Commission to decide upon advice from the SC. Some tagging programs may best be conducted by the individual parties, while others may best be conducted using a centralised approach.

The SC believes that the results from a well-designed conventional tagging program that provides estimates of fishing mortality rate and therefore current stock size offers an opportunity to reduce the current uncertainty in the stock assessment. The SC recognizes that for a tagging program to provide a relative index of stocksize assumptions about tag reporting rates, tagging mortality, tag shedding and mixing must all be met.. The SC therefore recommends that the Commission addresses the issues of where, how, and by whom a tagging program should be conducted with some urgency to ensure that the information is obtained as soon as possible for input into future assessments.

Recommendations

The SC makes the following recommendations for a SRP.

- The highest priority item is the characterisation and quantification of the overall catch.

- The second priority is development and acceptance of CPUE analysis methods for inclusion in the stock assessments. Once one or more CPUE analysis methods are developed, it will then be possible to evaluate the need for and design of a CPUE interpretation experiment.

- Two items ranked third in priority. One of them is the implementation of a well designed conventional tagging program. The SC recommends that the results of this program have the potential to reduce uncertainty in the stock assessment in the future and the potential to augment CPUE as the main tuning index in the stock assessment. The SC believes that tagging of juveniles from pole and line boats should have priority over tagging of older ages from longliners due to the estimated high cost of longline tagging, but recognizes that tagging older fish will provide more useful information about stock mixing and distribution of older SBT.

- The other third priority item is the implementation of a more complete scientific observer program.

Attachment E

Report from informal sub-group on Agenda Item 5.2, stock assessment inputs

This group was convened to provide the details and conceptual framework for exchanging data inputs for assessments to be conducted this year. The goal is to provide a pragmatic, scientifically sound resolution on how catch data are to be estimated given the diverse aspects of the SBT fisheries. Furthermore, the SC believes that analyses using assessment models should use the same input data (specifically, the same estimates of catch numbers-at-age).

For the 1998 assessments, Australian scientists provided output from their catch-at-age algorithm. The algorithm uses substitution methods agreed at the 1994 working group meeting. Each member country provided data input to the algorithm. These inputs represent a substantial and diverse database. However, since that time questions have arisen about several aspects of this procedure (see CCSBT-SWG/0011/03). Furthermore, since 1998 normal database upgrading and error corrections have occurred only within each member country. Therefore, the previous inputs to the algorithm no longer apply.

All members (and non-members where possible) should provide data for the period 1969-2000. These data should then be incorporated into a single centralized CCSBT database. The CCSBT would then be responsible for coordinating a review and implementation of the algorithm used to generate the catch-at-length matrices by fleet or catch-at-age matrices as needed. Unfortunately, the CCSBT database manager (due to be hired before mid-2001) will not be available to facilitate this procedure in time for this year's SAG meeting. Furthermore, evaluating and certifying the catch-at-age algorithm itself will take directed effort by a group of member scientists. This also is unlikely to occur in the short-term. Consequently, the normal arrangements for data dissemination will have to be postponed until 2002.

As an alternative, the SC has decided on an interim solution as follows. For the period 1969-1997 the same data submitted to the Australian catch-at-age algorithm in 1998 will be used to generate the fleet-specific catch-at-length data. These output data would then be made available to all interested parties. For the period 1998-2000, each member country will be responsible for providing catch-at-length estimates from all of their respective fleets for distribution to all interested parties. This approach provides a basis for developing a consistent dataset for the 2001 analyses within stock assessment models and avoids the controversy arising from past data sharing arrangements.

There are a number of details under this system that require clarification and are outlined as follows:

- The data need to be at the resolution suitable to continue development of catch-at-age estimates on the same basis as used for the 1998 assessments. The SC requests that the Australian scientists provide the specification of this resolution as soon as possible (e.g., the exact definitions of time-area strata used for the catch, effort, and length information by fleet).

- The catch-at-length estimates for 1998-2000 provided by member countries will be at this same resolution.
- Accounting for catch from non-members will be done the same way as in 1998 (i.e., assigned to the appropriate fishery analogues). As in the past, accounting for Indonesian catches will be done by Australian scientists. However:
- Length frequency data from non-members can be incorporated and used to generate a separate catch-at-length database. For this year's assessments, the new length data from non-members will be treated as a sensitivity test only. By 2002 it is planned that these data will be incorporated under the official CCSBT database.
- The same substitution rules as developed at the 1994 working group meeting will be used by all parties in computing catch-at-length data.
- Japanese scientists will provide estimates of imported SBT to aid in estimates of total catch from non-members. The non-member total catch figures used to calculate catches-at-age will, in each instance, be the larger of the estimate for that non-member and the indication from import statistics.

During the March 2001 SC meeting, a table containing mean length-at-age for each year was developed that shall be used by interested parties for converting catch-at-length data to catch-at-age. This table is based on the new analyses presented by Australian scientists at the meeting and on the growth curve for the 1980s presented at the November 2000 SC meeting by Japanese scientists. These curves for the 1980s are very similar (see Fig. 6 of CCSBT-SC/0103/18) and represent an improvement over the growth relationships used in the past.

The process of exchanging data (e.g., estimates of catch, catch-at-age, CPUE, tag placements and recoveries, tag reporting rates, aerial and acoustic survey indices) and comparing results will be done in the sub-committee and guided by a Panel member as needed following the timing outlined in **Attachment F**. It is the responsibility of the Advisory Panel member coordinating the data inputs for the 2001 stock assessment to determine if the year 2000 data will be included in the stock assessment based on the completeness of the 2000 data. The group noted that if the agreed time frames for data exchange in **Attachment F** were met, then the complete 2000 year data would be available for the stock assessment.

Attachment F

Timing for Exchange of Data and Documents
for the 2001 SAG and SC

Catch and Effort Data		April 30
Size Data		April 30
Catch at age*		May 7
List of Documents (preliminary)		June 11
Agenda		June 11
CPUE index and other substantial data**		June 11
Brief Description of Modification	7 weeks before	July 1
Abstract and Conclusion	4 weeks before	July 22
Documents	4 weeks before	July 22
Abstract and Conclusion (translation)	2 weeks before	August 5
SAG Meeting begins		August 19

All documents should be submitted as early as possible but no later than the above-mentioned deadlines.

* Whether this should be modified will depend upon results of the Stock Assessment Process Workshop and this item should be reviewed after the SAP Workshop.

** Examples of other substantial data could include tag-recapture and reporting rate information and acoustic and aerial survey indices.

Attachment G

Proposal on interim database format for data maintained at the Secretariat of the CCSBT

The following outline of an interim database format has been proposed as a basis for initiating the development and design of the fishery database to be maintained by the CCSBT Secretariat. Members noted that further consideration needed to be given to the spatial and temporal scale at which data should be provided to the Secretariat. Pending this consideration the text which is underlined and italicized reflects the proposal by Japan. Australia and New Zealand consider that longline and surface fishery data should be provided to the Commission at 1 X 1 degree resolution.

1. Catch and effort
   Monthly catch (by number and weight) and effort by *1 X 1 degree for the surface fishery and 5 X 5 degree for the longline fishery.* [Format: year, month, fleet, gear, location, effort, effort unit, number of boats fishing*, number of operating days, species, whole weight of retained fish, conversion factor*, number of fish retained, raising factor*, and number of non-retained fish].
   * May not be available especially for historical data.

2. SBT Catch by Fleet
   Annual (calendar and quota year) adjusted catches (by weight) for each fleet. All adjustment factors assumed should be noted with the data. [Format: year, fleet, gear, calendar year total SBT catch in weight and number, start and end date of quota year, quota year total SBT catch in weight and number, and number of active boats**].
   ** The definition of 'active boats' needs to be clarified and the data may not be available especially for historical data.

3. SBT Size data
   Size data should be collected on a *1 X 1 degree scale for the surface fishery and 5 X 5 degree scale for longline fishery*.
   (1) Data of size distribution of catch [Format: fleet, gear, year (calendar year), month, quarter, level of aggregation, location, catch in number, length frequency distribution data adjusted to the whole catch, data provider].
   (2) Sample information of size data [Format: fleet, gear, year (calendar year), month, quarter, level of aggregation, location, length sample number, weight sample number, data provider].

4. Trade statistics related to international trade of SBT
   (No discussion was made during the SC meeting. Further discussion is necessary among Members and Secretariat.)

Note: gears are those used by the SBT TRADE INFORMATION SCHEME - BB/GILL/HAND/HARP/LL/MWT/PS/RR/SPHL/SPOR/SURE/TL/TRAP/TROL/UNCL/OT