

Commission for the Conservation of
Southern Bluefin Tuna



みなまぐろ保存委員会

Report of the Sixth Meeting of the Scientific Committee

**28-31 August 2001
Tokyo, Japan**

REPORT OF THE SIXTH MEETING OF THE SCIENTIFIC COMMITTEE
Tokyo, Japan, 28 - 31 August 2001

1. Opening

1. The independent Chair, Mr Penney, declared the Scientific Committee (SC) meeting open. On behalf of Japan as host country, Mr Yuge welcomed all participants to the meeting. He noted that the 5th SC meeting had made substantial progress towards development of a Scientific Research Program proposal (SRP) for the CCSBT, and had proposed an interim assessment approach to be used by the Stock Assessment Group (SAG). He expressed the hope that the momentum of the 2nd SAG meeting would be carried forward by the SC to reduce uncertainties and develop scientific management advice for the 8th CCSBT meeting later this year.

1.1 Introduction of Participants

2. Member delegations from Australia, New Zealand and Japan and observers from Korea, Taiwan, Indonesia and South Africa introduced their delegation members and presented brief opening comments. Participants noted that the advice from the SC must remain scientific and objective. It was agreed not to append opening statements to the SC report, and members were asked to raise any relevant aspects of their opening comments under the appropriate agenda items. The list of participants is shown in **Attachment A**.

1.2 Administrative Arrangements

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

2. Appointment of Rapporteurs

4. Participants accepted an offer by the Chair and Executive Secretary to act as rapporteurs and produce the report of the meeting.

3. Adoption of Agenda and Document List

5. A revised draft agenda prepared by the Chair was tabled for consideration, and accepted without change (shown in **Attachment B**). The document list for the meeting (shown in **Attachment C**) was presented by the Deputy Executive Secretary.

4. Review of SBT Fisheries

6. Country Fishery Review reports were submitted by Australia, Japan, New Zealand, Korea and Taiwan. It was noted that, with the exception of the Korean report, these had been reviewed and summarised at the 2nd SAG meeting and participants were referred to the relevant section of the report of that meeting. Japan requested that Australia provide

information on decadal changes in the catch distribution and size-composition in Australian fisheries, and asked that some form of effort index be presented for the surface fishery in the national fishery report. In response to a question regarding recreational fisheries, Australia noted that results from a substantial National Recreational Fishing Survey were being analysed, and should become available within 6 months. Australia asked Japan for clarification of increases in effort in marginal SBT fishing grounds west of Australia, thought to be pre-spawning aggregation areas. Japan noted that the area concerned fell to the west of the spawning migration route of SBT, outside the Japanese SBT fisheries management area, and that catches of bigeye tuna, that may account for these effort changes, have not been well documented. It was noted that information on catch and effort in these marginal fishing areas would be useful at future meetings, to facilitate understanding of possible changes in SBT stock or fisheries distributions.

7. Korea presented an overview of their fishery report. Certain Korean vessels shifted southwards from tropical bigeye and yellowfin tuna fisheries and started targeting SBT in the SE and SW Indian Ocean from 1991 onwards. Catches increased to a maximum of 1 562 mt in 1998 (19 vessels) and then decreased as a result of voluntary effort reduction to 16 vessels. CPUE fluctuated from 1991 - 1995 and has remained fairly stable since then. Korea was uncertain why the CPUE had been so high in 1991, but noted that this had been an initial joint-venture fishery with only two vessels, and may not be representative of the current Korean fleet.
8. Mr Kennedy, newly appointed Database Manager at the CCSBT Secretariat, was requested to coordinate a summary table and graph of the final reported total catches by country and gear type for inclusion in the report. This summary, which follows, would include non-party catches and would document the sources of data.

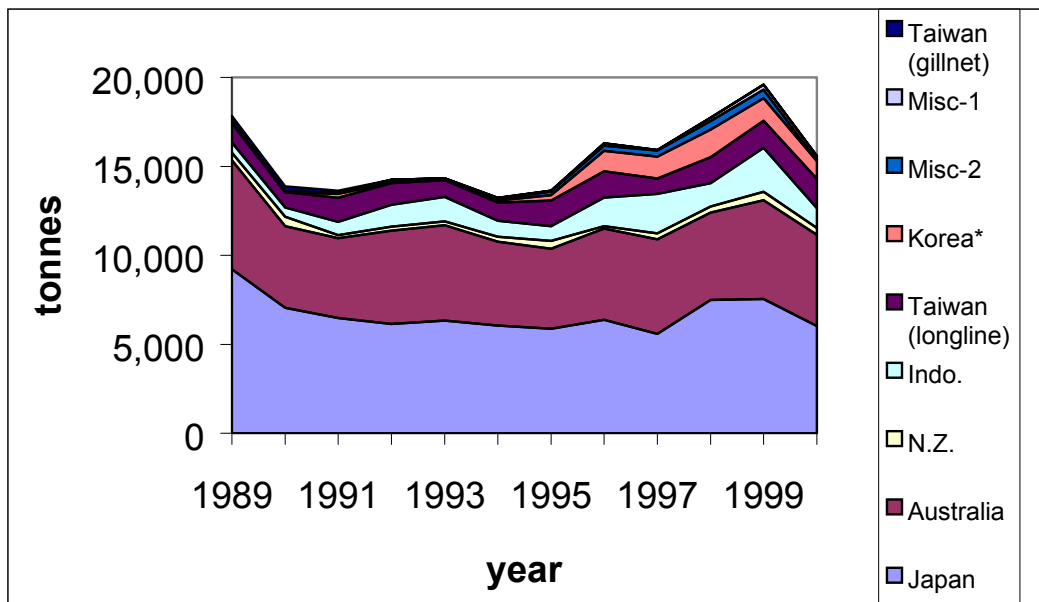
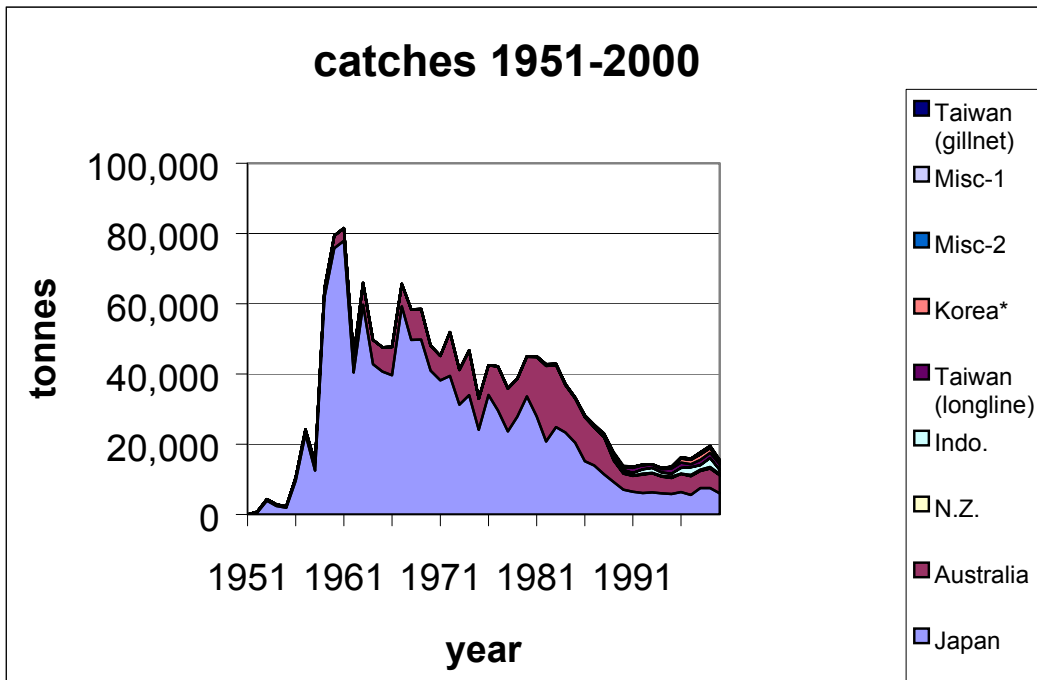
Estimates of total catches of SBT. Data were obtained from CCSBT-SC/0108/21, and updated in consultation with participants at the SC meeting.

	Australia	Japan	N.Z.	Korea*	Taiwan (longline)	Taiwan (gillnet)	Indo.	Misc-1	Misc-2	Total
1951										
1952	264	565	0	0	0	0	0	0	0	829
1953	509	3,890	0	0	0	0	0	0	0	4,399
1954	424	2,447	0	0	0	0	0	0	0	2,871
1955	322	1,964	0	0	0	0	0	0	0	2,286
1956	964	9,603	0	0	0	0	0	0	0	10,567
1957	1,264	22,908	0	0	0	0	0	0	0	24,172
1958	2,322	12,462	0	0	0	0	0	0	0	14,784
1959	2,486	61,892	0	0	0	0	0	0	0	64,378
1960	3,545	75,826	0	0	0	0	0	0	0	79,371
1961	3,678	77,927	0	0	0	0	0	0	0	81,605
1962	4,636	40,397	0	0	0	0	0	0	0	45,033
1963	6,199	59,724	0	0	0	0	0	0	0	65,923
1964	6,832	42,838	0	0	0	0	0	0	0	49,670
1965	6,876	40,689	0	0	0	0	0	0	0	47,565
1966	8,008	39,644	0	0	0	0	0	0	0	47,652
1967	6,357	59,281	0	0	0	0	0	0	0	65,638
1968	8,737	49,657	0	0	0	0	0	0	0	58,394
1969	8,679	49,769	0	0	80	0	0	0	0	58,528
1970	7,097	40,929	0	0	130	0	0	0	0	48,156
1971	6,969	38,149	0	0	30	0	0	0	0	45,148
1972	12,397	39,458	0	0	70	0	0	0	0	51,925
1973	9,890	31,225	0	0	90	0	0	0	0	41,205
1974	12,672	34,005	0	0	100	0	0	0	0	46,777
1975	8,833	24,134	0	0	15	0	0	0	0	32,982
1976	8,383	34,099	0	0	15	0	12	0	0	42,509
1977	12,569	29,600	0	0	5	0	4	0	0	42,178
1978	12,190	23,632	0	0	80	0	6	0	0	35,908
1979	10,783	27,828	0	0	53	0	5	0	4	38,673
1980	11,195	33,653	130	0	64	0	5	0	7	45,054
1981	16,843	27,981	173	0	92	0	1	0	14	45,104
1982	21,501	20,789	305	0	171	11	2	0	9	42,788
1983	17,695	24,881	132	0	149	12	5	0	7	42,881
1984	13,411	23,328	93	0	244	0	11	0	3	37,090
1985	12,589	20,396	94	0	174	67	3	0	2	33,325
1986	12,531	15,182	82	0	433	81	7	0	3	28,319
1987	10,821	13,964	59	0	623	87	14	0	7	25,575
1988	10,591	11,422	94	0	622	234	180	0	2	23,145
1989	6,118	9,222	437	0	1,076	319	568	0	102	17,843
1990	4,586	7,056	529	0	872	305	517	0	4	13,869
1991	4,489	6,474	165	214	1,353	107	759	0	77	13,637
1992	5,248	6,137	229	36	1,219	3	1,232	0	141	14,245
1993	5,373	6,320	217	80	958	0	1,369	1	18	14,335
1994	4,700	6,064	277	119	1,020	0	906	91	55	13,232
1995	4,508	5,866	436	317	1,431	0	830	43	201	13,632
1996	5,128	6,373	139	1,148	1,467	0	1,609	143	291	16,298
1997	5,316	5,588	334	1,238	872	0	2,210	24	333	15,915
1998	4,896	7,502	337	1,562	1,446	0	1,329	177	476	17,726
1999	5,552	7,552	461	1,271	1,513	0	2,483	274	483	19,589
2000	5,131	6,027	380	987	1,638	0	1,126	241	49	15,579

Misc-1: Fresh SBT catch by vessels registered as Indonesian (but recorded in Japan import statistics as Taiwanese). Further clarification of these data may be required.

Misc-2: SBT catch other than those listed.

*: Japanese import statistics for 1993, 94, 96, 97, and 98 are higher than these official statistics, being 117, 147, 1179, 1325, and 1897 respectively.



5. Matters Arising from the Report of the 2nd Stock Assessment Group Meeting

9. The Chair noted that, under the SC terms of reference, discussions and advice under this item should primarily be based on the technical outcomes of the 2nd SAG meeting. The Advisory Panel was requested to draft a summary of their interpretation of the main outcomes of the 2nd SAG meeting to serve as a basis for discussion. The Panel members agreed to work with members to obtain any further information required to synthesize assessment and projection results presented in submissions to the SAG meeting.

5.1. Status of the SBT Stock

10. Following a request from the meeting, the Advisory Panel produced a draft summary of the principal outcomes of the 2nd SAG meeting, including a summary of assessment results, projections and fishery indicators. The summary prepared was taken directly from the SAG Report. This was presented and explained by Dr Hilborn and, after review, correction and addition of explanatory comments, was adopted as the SC summary of the most important SAG results.
11. The summary is based on text initially prepared by the independent Advisory Panel and approved by the SC. . At the 2001 SAG and SC meeting, Japan and Australia both presented assessments using several different models in addition to the ADAPT VPA which has been the primary model used in recent past assessments. The SAG agreed that the new methods appeared to resolve some of the problems with ADAPT, and agreed in the future to move beyond ADAPT. The results below reflect an integration of all the available information.

Indicators

12. Provided here is a brief summary of the stock status indicators and trends. These data are independent of any stock assessment models and are drawn from papers CCSBT-SC/0108/25 presented by Australia, and CCSBT-SC/0108/34 presented by Japan.
13. The goal is to reduce the multitude of indicators to a few pages and a few graphs. To do this it was decided to choose to only use quantitative measures that were believed to be useful. Thus, measures such as the density of fish in New South Wales where no quantitative numbers were available at the SAG meeting, and quantitative measures such as the number of areas fished, which is difficult to interpret due to the impacts of quota regulation, were excluded.
14. The indicators were categorized into three groups; CPUE trends over time, CPUE trends in the Japanese longline fishery by cohort, and a miscellaneous group including aerial survey, acoustic survey, tagging and growth rates.

CPUE Trends Over Time

15. Figure 1 shows 6 different CPUE trends, all expressed as nominal fish/1000 hooks. It shows ages 4-7, 8-11 and 12+ from the Japanese longline fishery in areas 4-9, CPUE in the New Zealand zone, Taiwanese CPUE and Korean CPUE. Table 1 summarizes the trends in three ways, the ratio of 2000 to 1995 CPUE, an index of recent direction; the

ratio of 2000 to 1988, an index of performance since the major quota reductions of 1988; and the ratio of 2000 to 1980, 1980 being a common reference year in CCSBT.

Table 1. CPUE By Cohort

Index	Current trend 2000/1995	2000/1988	2000/1980
Japanese 4-7	0.93	3.04	0.79
Japanese 8-11	1.63	1.13	0.29
Japanese Plus Group	0.64	0.36	0.29
New Zealand	0.82	2.51	0.53
Taiwan	2.01	4.17	
Korea	0.39		

16. Since 1988 all CPUE indices except the Korean and the plus group in the Japanese longline fishery have increased, in some cases dramatically so, but the decline in the plus group is a serious concern. All indices are lower in 2000 than in 1980, with the Japanese age 4-7 the closest. Trends since 1995 are mixed, with some indices increasing and some decreasing.
17. Most faith was placed in the Japanese longline data as these fleets have been most consistent in fishing patterns over time. The recovery of New Zealand CPUE since 1988 is encouraging since the decline of New Zealand CPUE was one of the indicators of concern in 1988. It is difficult to interpret the contradictory trend of the Taiwanese and Korean CPUE. It is noted that the Taiwanese CPUE includes only data with SBT catch greater than zero.

CPUE Trends by Cohorts

18. Figure 2 shows the trend in CPUE by cohort aggregated in groups of 5 cohorts. The result is summarized in Table 2.

Table 2. Trends in Cohort CPUE

Cohorts	CPUE ages 3-5	CPUE ages 6-8
80-85	0.21	0.10
86-90	0.64	0.22
91-96	0.40	0.24

19. The 1986-1990 cohorts were as much as three times more abundant than the 80-85 cohorts at ages 3-5, but by ages 6-8 were only twice as abundant. The 1991-1996 cohorts have been twice as abundant as the 1980-1985 cohorts across all ages. CPUE at ages 3-5 is thought to reflect a combination of recruitment and fishing mortality at ages 1-2. These results indicate the reduced quotas after 1988 have resulted in lower fishing mortality rates, leading to better survival to age 8.

Other Indices

20. Other indices included are acoustic survey estimates of age 1 fish in Western Australia, aerial survey estimates of age 2-4 in the Great Australian Bight, and tagging estimates of fishing mortality rates. Figure 3 shows these indicators.
21. The acoustic estimates of age 1 fish off Western Australia show a dramatic decline in 2000 and 2001, which is of clear concern, although the survey method is considered experimental.
22. The aerial index of age 2-4 abundance is similarly considered of questionable utility, but shows a slightly declining trend. For 1999 and 2000 two estimates are available depending upon how different observers are weighted, and the survey was not conducted in 2001 due to logistic problems.
23. Tagging estimates of fishing mortality rate are shown as cumulative survival from fishing, and show an increasing trend in fishing mortality at ages 3 and 4 for the 1993 and 1994 cohorts.

Figure 1. Trends in CPUE

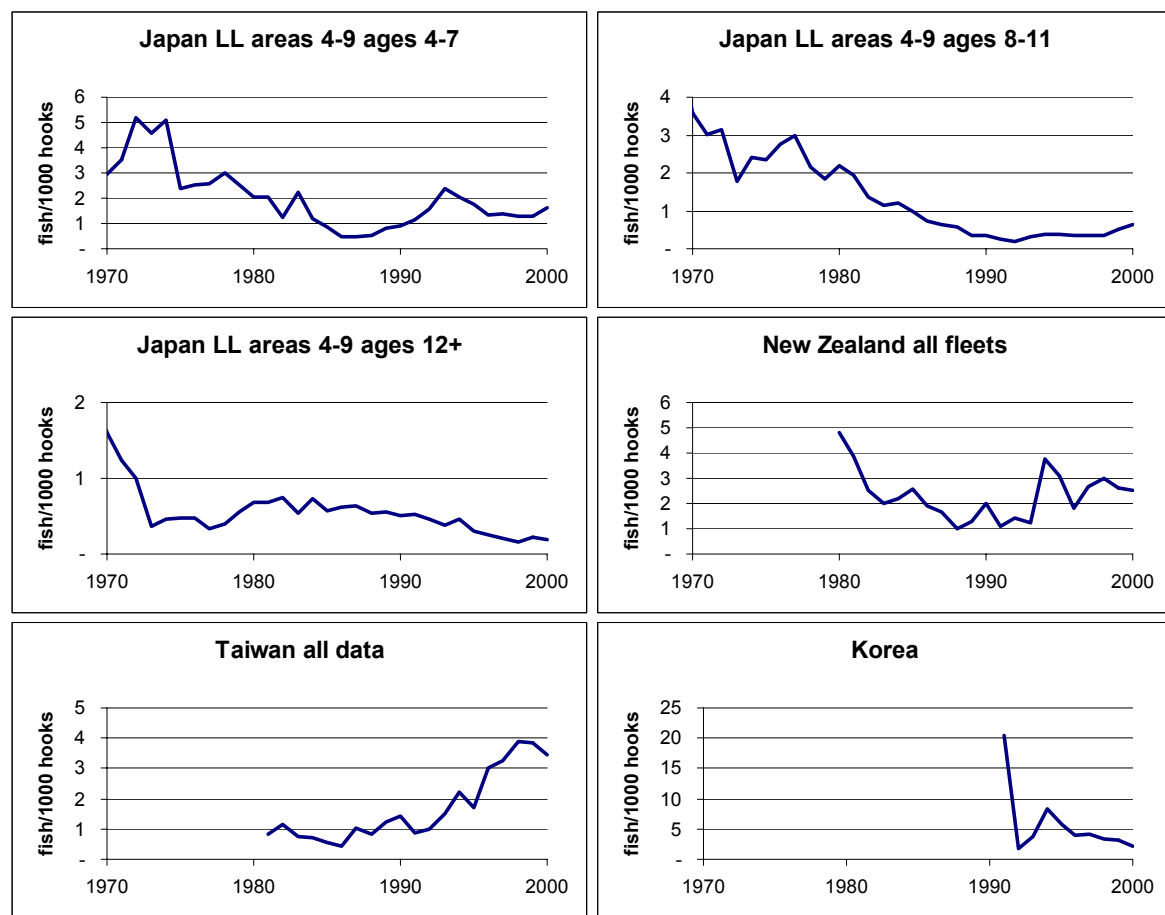


Figure 2. Trends in cohort CPUE.

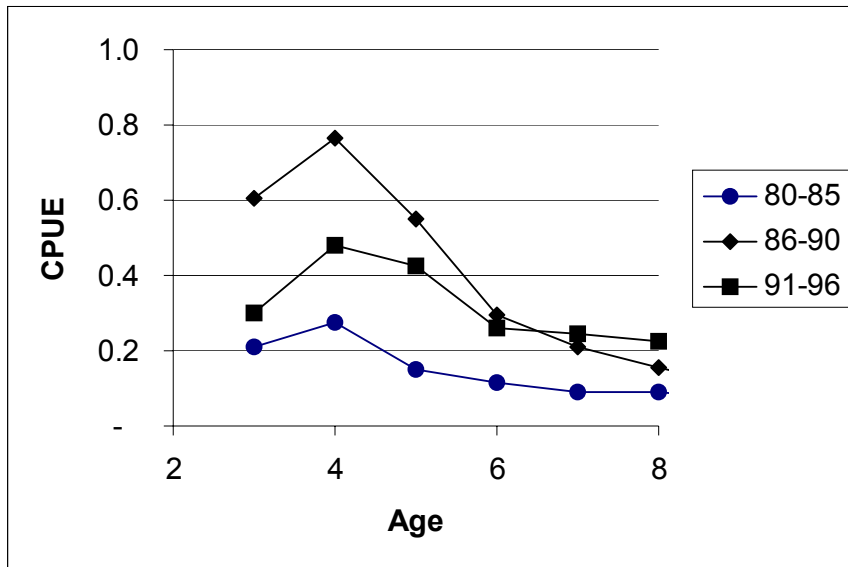
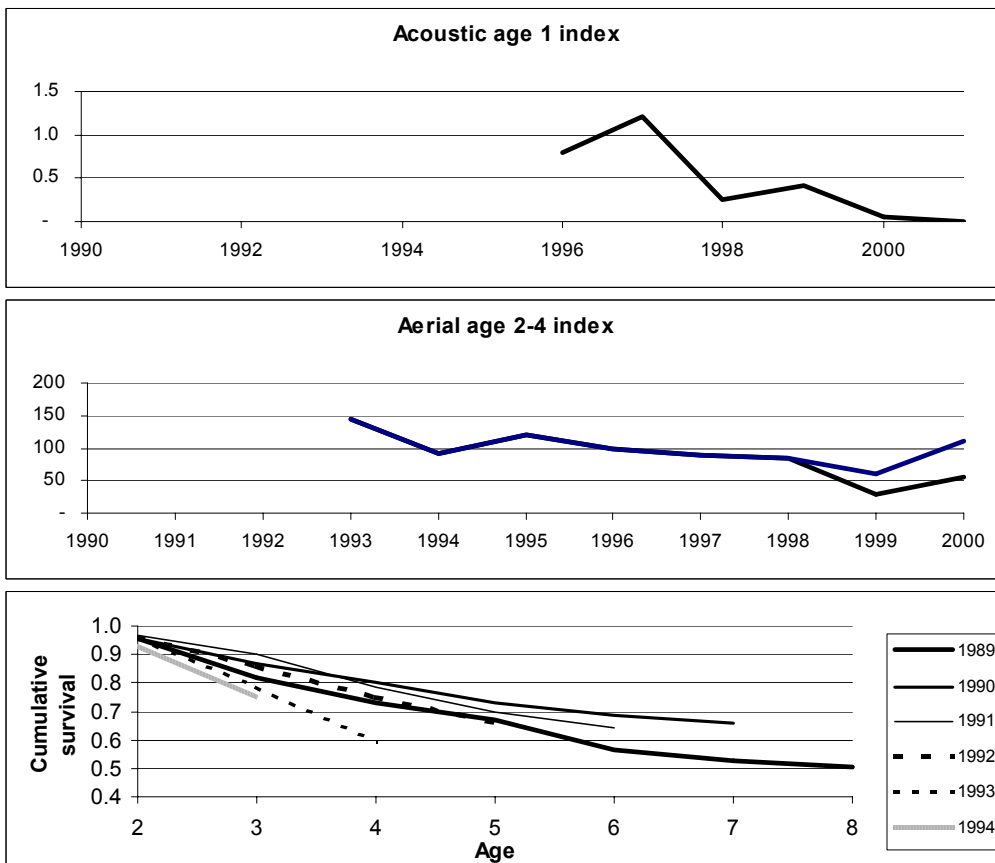


Figure 3. Other indices.



Assessment Results

24.

- At the time of the most recent round of quota reductions (1988), spawning stock size was well below levels in 1980 and earlier and has declined further since then, with a possible upturn in recent years.
- The models consistently indicate a decline in recruitment with recruitments in the 1990s less than half of those in earlier years.
- The models consistently indicate the combination of high recruitment and high spawning stock in early years, with low recruitment and low spawning stock in more recent years.
- Overall, stock biomass has been roughly stable since the mid 1990s or early 1990s (depending on the model) with possible slight increases or decreases – thus recent removals are to be close to recent surplus production.
- Quota reductions in all fisheries in 1988 (and earlier) and subsequent changes in the selectivity pattern for the surface fishery reduced fishing mortality rates and led to an increase in abundance of younger fish.
- It is unclear if the increases in young fish abundance has resulted in increases in abundance of older ages.
- Age structured models show strong auto-correlation in recruitment residuals that are partially due to aging errors resulting from cohort slicing
- If constant catchability over time is assumed, there are inconsistencies in CPUE by age or by size – some models partly resolve this by letting selectivity or catchability change over time. This problem is especially strong in the plus group or larger sizes. The problem may be related to difficulties in estimating catch-at-age distributions and changing growth rates.
- While there is considerable uncertainty in absolute stock sizes, models are much more consistent regarding trends in abundance during the last decade.
- There is general agreement that the new approaches tabled at this meeting resolve some of the problems with the ADAPT VPA (and its associated cohort slicing) that have been used for SBT.

25. A comparison of assessment results for Australian and Japanese model runs. Australian VPA results shown are the mean weighted results from the Australian preferred set and the Japanese preferred set as defined in 1998. Australian catch-at-age model shows mean and range of preferred model set and data uncertainty. Australian statistical catch-at-age/length model results show range from optimistic and pessimistic models (maximum likelihood estimates) with input data uncertainty. Japanese ADAPT VPA cases include C1J08, C4J08, C5J08, C6J08 using the catch-at-age data derived using the Mauritius age composition for the Taiwanese data. Japanese production model cases are A6-7w0.8 and W4+w0.8

Table 4. Comparison of Assessment Results

	Australia			Japan			
	Adapt VPA	Statistical catch-at-age	Statistical catch-at-length (and age)	Adapt VPA	Length VPA	Age structured production model	Production model
Spawning stock biomass							
2000/1980	0.31-0.43	0.29 (0.11-0.51)	0.17-0.76	0.41-0.53	0.50	0.23	0.45-0.52
2000/1988	0.43-0.70	0.47 (0.21-0.74)	0.49-1.21	0.73-0.99	0.70	0.58	0.86-1.43
2000/1998	0.91-1.02	0.99 (0.75-1.10)	0.91-1.21	1.07-1.11	1.04	1.05	0.94-1.06
Age 12+ biomass							
2000/1980	0.31-0.42	0.28 (0.11-0.48)	0.15-0.79	0.31-0.62	0.48	0.12	
2000/1988				0.44-0.69	0.53	0.25	
2000/1998				0.94-1.37	1.00	0.94	
Age 8-11 biomass							
2000/1980	0.38-0.44	0.43 (0.17-0.70)	0.40-0.96	0.48-0.60	0.55	0.52	
2000/1988				1.17-1.53	1.28	2.27	
2000/1998				1.02-1.30	1.11	1.12	
Age 5-7 Biomass							
2000/1980	0.41-0.43	0.26 (0.05-0.56)	0.23-0.63	0.46-0.52	0.26	0.48	
2000/1988				1.90-1.92	1.23	3.09	
2000/1998				0.75-0.90	0.63	0.70	

Projection Results

- 26.
- Projection results were available from the Australian ADAPT VPA, and catch-at-age model, but were not available for the Australian catch-at-length model. Projection results were available from the Japanese Fox production models, age-structured production model and ADAPT VPA but not for the Japanese length-based VPA.
 - In general, assessments that resulted in low historical abundance/high fishing mortality scenarios indicated higher productivity and thus higher probability of stock recovery. The opposite was true for trajectories with high historical abundance and low fishing mortality.
 - Projections made assuming status quo (2000) catches resulted in either increasing or decreasing biomass trends depending upon model assumptions and input data.

- The 2000 global catch levels appear to be roughly close to replacement yield, either below or above depending on small differences in the assessments. Consequently projections show divergent trends under current catch levels ranging from recovery to continued decline. As a result, overall probability statements about whether the stock will increase or decrease if current catch levels are maintained at the 2000 level are sensitive to the weighting given to alternative cases.
- Overall, few of the scenarios presented resulted in recovery to the 1980 spawning biomass level by 2020 under status quo catches.
- For projections based on specific assessment models:
 - The high sensitivity of the estimated biomass trend in ADAPT VPA to small variation in CPUE indices in combination with different plus group methods was amplified in the projections. Thus slight differences in data inputs determined whether estimates of the stock would increase or decrease.
 - Projections based on the statistical catch-at-age model showed stock decreases at current catch levels for most scenarios.
 - No projections were tabled based on assessments using catch-at-length data.
 - Results from the Fox surplus production model and the age-structured-production model indicated a similar diversion of projections at current catches depending on CPUE time series and assumptions used.
- The projections should be regarded as exploratory tools and not be used as a primary guide to determination of stock status and choice of catch levels; rather catches should be adjusted based on an integrated view of empirical trends in indices and assessment model results.

Summary of projections from different models.

27. For the Australian projections the removals were assumed the same as in 2000 (about 16,000 mt). For the Japanese ADAPT results, removals were assumed the same as in 2000 and table 5 shows the average and range for reference cases. For Japanese Fox and ASPM cases catch level of 15,000 mt was assumed and the range of the best fit estimates for the 4 CPUE indices are shown.

Table 5. Summary of Projection Results for spawning biomass

Indicator	Australia		Japan		
	ADAPT VPA	Statistical catch-at-age	ADAPT VPA	Fox Production Model	ASPM
Prob 2020>2000	0.24-0.57	0.18			
Prob 2005>2000	0.45-0.56	0.34			
Prob 2020>1980	0.06-0.07	<0.01	0.32 (0-1)		
B2005/2000			1.08 (0.94-1.23)		
B2020/B2000			2.26 (0.12-7.00)	0.31-4.43	0.33-3.09

B2020/B1980			1.37 (0.03-5.29)	0.11-2.23	0.12-0.73
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5.2 Implications for SBT Management

28. The summary of 2nd SAG outcomes in section 5.1 above was used by the Advisory Panel to produce a draft set of management comments and recommendations regarding likely impacts of alternate quota levels. After discussion these were also adopted by the SC :

Recommendations Regarding Impacts of Alternative Quota Levels

29.

- At current catch levels, the probability of the SBT spawning stock being larger in 2020 than it is today is about 50%, with an equal probability the stock will be smaller in 2020.
- At current catch levels there is little chance that the SBT spawning stock will be rebuilt to the 1980 levels by 2020, and substantial quota reductions would be required to achieve that goal.

30. Regarding the choice of quota levels over the next few years:

1. Any growth in non-party catch would be of very serious concern and every effort should be made to decrease total removals or at least keep them at their current level.

2. The low level of SBT spawning stock biomass in relation to historical levels is recognized and there is an associated risk of further recruitment declines. While it is not possible to quantitatively determine this level of risk, this risk is not felt to be particularly high. An immediate reduction in total removals is thus not recommended as a necessary action to prevent stock collapse.

3. It is believed that, as the SBT stock has changed relatively slowly under current catches, a policy of maintaining current removals would most likely enable the CCSBT to react in a timely fashion to future stock trends. This ability would be enhanced if more certain monitoring of recruitment and SSB could be developed. If in the future the stock declines further, the CCSBT should be prepared to react appropriately.

4. There is a risk of further stock declines if current removals are maintained, and depending upon members aversion to this risk, differing levels of catch reductions would be appropriate forms of insurance for the sustainability of the current fishing industries.

6. Matters Arising from SC5 and CCSBT7

31. The Chair noted that the SRP proposal developed at the SC5 meeting, and approved by the Commission at CCSBT7, contained specific research guidelines on the four main components of the SRP. Initial implementation proposals made at the CCSBT7 meeting focussed on background data collection and planning meetings to develop detailed workplans for these SRP components. The SC6 meeting should specifically focus on implementation workplans and schedules for SRP research activities to be conducted during 2002, particularly where there were direct CCSBT financial or coordination implications. The proposed workplan for 2002 developed at this meeting would be submitted to CCSBT8 for approval.

6.1 Implementation of the SRP

6.1.1 Characterization of SBT Catch

32. As required in the SRP implementation schedule for 2001, the Secretariat distributed questionnaires to members, other countries involved in SBT fisheries and regional fisheries management organizations, requesting information on existing catch, effort and size-frequency data collection systems. The Database Manager distributed copies of replies received and presented an overview of CCSBT-SC/0108/06, summarizing these responses. Replies had so far been received from Australia, Japan, New Zealand, Korea, Taiwan, the Secretariat for the Pacific Community and the Seychelles Fishing Authority. Four steps were identified to make progress on developing standardized CCSBT catch and effort data collection systems:
- Obtain information from those involved in SBT fisheries that had not yet responded to the questionnaires.
 - Resolve uncertainties or ambiguities in responses, particularly regarding fleet, spatial or temporal coverage by existing systems
 - Compare information provided on existing SBT catch and effort monitoring systems with the requirements proposed in the SRP.
 - Identify specific improvements that could be made to existing systems to meet the proposed CCSBT catch and effort monitoring requirements.
33. The Database Manager agreed to coordinate an informal Catch Characterization Working Group to discuss data requirements and make recommendations on steps to be taken during 2002 towards the improvement and implementation of SBT catch and effort data collection systems to meet CCSBT requirements. The report of the working group is at **Attachment D**.

6.1.2 CPUE Interpretation and Analysis

34. This issue was dealt with to some extent at the 2nd SAG meeting, and a draft report of the SAG CPUE Modelling Group was attached to the SAG report. Dr Pope of the Advisory Panel briefly reviewed this report and noted that additional information was required on concomitant variables and fishery characteristics to improve understanding of factors that affect CPUE trends. Dr Pope agreed to continue coordinating the informal work of this group to further clarify these data requirements, and to develop a proposal for a specific CPUE modelling workshop. The CPUE Modelling Group reported as follows:
35. Indicators of relative trends in stock abundance, such as Catch per Unit Effort data, are a vital ingredient for understanding the status of the SBT stock. SRP Component 2.3 ((CCSBT-SC/0108/Info 2) requires SAG/SC to evaluate and discuss exploratory modelling papers with a view to selecting appropriate methods for modelling CPUE and effort data and to make recommendations to SC for further work on these.
36. Eight papers on the interpretation of Catch per Unit Effort (CPUE) were presented to SAG. CCSBT-SC/0108/ 8, 9, 10, 22, 26, 28, 29 and 30. Of these a number presented analysis in forms agreed previously while CCSBT-SC/0108/ 09 presented an overview

and CCSBT-SC/0108/ 10 and 30 proposed new methods analysis. Other papers presented to SAG were concerned with using CPUE measures in assessments and are consequently relevant to the interpretation of CPUE data (CCSBT-SC/0108/ 13, 24 and 32).

37. All these papers and the way SC should move forward were reviewed in subgroup meetings of SAG (SAG report Attachment 7) and of SC. Given the importance of modelling CPUE data a workshop to further this work was proposed and tentative Terms of Reference for this workshop are given in **Attachment E**. However, several other Workshops are proposed for 2002 that will involve considerable scientific inputs. Hence, it was decided that the work on CPUE modelling should be ongoing and should be consolidated at a workshop to be held sometime after the next SC meeting. This would also allow the form of necessary data to be established and where appropriate to be made available. It was considered important to keep this work moving forward and consequently a steering group consisting of Prof. John Pope (Advisory Panel), Dr Dale Kolody (Australia), Dr Norio Takahashi (Japan) and Dr Talbot Murray (New Zealand) was established to:

- Refine the Terms of Reference for a workshop on CPUE modelling.
- Develop the list of data inputs to the proposed workshop.
- Encourage scientific contributions to the workshop.

38. The steering group would meet by correspondence and report to the 2002 SC. To further encourage work on this area it was also suggested that one day be added to the proposed 2002 workshop on Developing Management procedures. The costs involved would be those with adding a day to this meeting. This time would also allow progress to be made on the question of “Statistically appropriate levels of collection of direct aging materials in the various SBT fisheries” that was also charged to the steering group (see Agenda 7.2.2).

6.1.3 Development of a Scientific Observer Program

39. The SRP implementation table approved at CCSBT7 requires the SC to discuss information on existing observer programs and make initial recommendations on development of SBT observer program requirements and standards. The Secretariat distributed questionnaires to all members, other SBT fishing countries and regional fisheries management organizations for tuna requesting background information on past observer programs implemented for tuna fisheries. Responses were received from Japan, Australia and New Zealand describing past and existing observer programs implemented on their fisheries, and from the Inter-American Tropical Tuna Commission (IATTC) on the purse-seine tuna fishery observer program associated with its Dolphin Conservation Program. Korea noted that there has been no observer coverage yet on their high-seas fleet, but that a small-scale program was recently initiated in their domestic fisheries.

40. Dr Ianelli of the Advisory Panel agreed to work together with the Chair to produce a summary of information collected on past and existing tuna observer programs, with draft proposals on components of an effective CCSBT scientific observer program, to serve as a basis for further discussion. The resultant first draft of a proposed outline of a CCSBT Scientific Observer Program is shown in **Attachment F**. The meeting felt that an indication of the extent to which past and existing observer programs cover the proposed

observer program components would be useful, as well as an indication of existing observer coverage of SBT fleets.

41. It was recognized that a process would be required to ensure that progress was made during 2002 in development of proposals for observer data collection and training standards, so that this proposal can be finalised at the next SC meeting. Members noted that substantial work had already been done on developing observer program standards for the RTMP in 1994, but that these had continuously changed and improved since then. It should be straight forward to establish standards, at least for longline observer programs. Similar observer standards had not been developed yet for surface fisheries, but information was available from other organizations on such observer programs. It was noted that implementation of the proposed tagging program would create an urgent need for an observer program to monitor tag reporting rates and to provide size-composition data required to interpret these. It was agreed to take the following steps during the remainder of 2001 and early 2002:
- Existing observer program data sheets and standards for longline fleets would be exchanged between member countries, through the Secretariat, as soon as possible. The Secretariat would initiate this process in consultation with national observer program coordinators.
 - Australia would develop proposed program standards and data forms for the surface fisheries, taking note of characteristics of observer programs on such fisheries administered by other fisheries management organizations.
 - The Secretariat would coordinate an exchange of this information between national observer program coordinators during 2002. Proposals on draft CCSBT observer program standards will be presented and finalised at the next SC meeting.

6.1.4 Development of a SBT Tagging Program

42. Australia and Japan presented papers outlining proposals for conventional SBT tagging programs to be implemented under the SRP (papers CCSBT-SC/0108/15 and CCSBT-SC/0108/33 respectively). In addition, the SRP proposal (SC5 Report Attachment D) lists key aspects of the recommended approach to be taken in developing such a program. It was noted that similarity between these proposals but a number of important differences.
43. A Tagging Workshop has been planned for 17 - 19 September 2001 in Hobart, Australia, to develop a CCSBT conventional tagging program proposal for submission to CCSBT8. These issues will be discussed in detail there and the SC6 meeting focussed on identifying issues to be discussed at the Tagging Workshop, as well as the information required to support these discussions. In particular, it would be beneficial to develop ideas regarding how differences between proposals might be resolved. Some estimate of budgetary limitations would also help the Workshop to design an affordable tagging program. A number of additional issues were identified for discussion during the Tagging Workshop, particularly regarding activities to be initiated during 2002:
- Proposals regarding tagging program phases and timing of implementation of tagging programs on different fleets or fisheries.

- Summaries of existing information on SBT fish and fishery distribution patterns, particularly the distribution of age 1 - 4 SBT.
 - Summaries of existing understanding of SBT migration patterns and mixing rates.
 - Options for effective estimation of rates of tag loss, tagging mortality for SBT and tag reporting rates..
 - The possible role of the CCSBT Secretariat in coordinating tagging programs and the tagging database.
44. With regard to the incorporation of use of archival tags in the CCSBT tagging program, it was noted that this was not an original objective of the SRP. However, the value of information provided by archival tags had been widely recognised at previous SAG and SC meetings. Members were therefore encouraged to incorporate archival tagging in any future CCSBT conventional tagging program on a voluntary basis, where considered feasible.
45. Together with Dr Hilborn of the Advisory Panel, the Chair agreed to summarize the key similarities and differences between the Australian and Japanese tagging program proposals, to serve as a basis for deciding on issues to be discussed at the Tagging Workshop. The resultant proposed list of issues to be discussed at the Tagging Workshop shown in **Attachment G** was accepted by the SC as a basis for the agenda of that workshop.
46. The Executive Secretary noted that letters of invitation had been sent out requesting names of participants to the workshop, and noting the technical nature of the intended discussions. Responses still had not been received. The workshop was scheduled to be held at a hired venue in Hobart. Indonesia requested that an invitation also be sent to the appropriate Indonesian authorities.

6.2 Management Procedure and Management Strategy Evaluation

47. Dr Parma presented a draft of a proposed plan for development of SBT management procedures developed by the Panel. The Commission's agreement that any management procedure would need to be developed in a collaborative manner with managers and industry was noted. In discussing this proposal it was noted that there had been substantial confusion in the past over terms such as operational management procedure, management strategy, performance indicators, etc. There also needed to be a clear understanding of the respective roles of the coordinator and the consultant in the process. The proposal was revised by Dr Parma to clarify these issues, and adopted by the SC.

Proposed Plan for Development of Management Procedures

48. This section describes how we believe the CCSBT could develop, test and accept a management procedure. A management procedure is defined as a set of rules that are agreed in advance, that dictate how the Total Allowable Catch (TAC) for the fishery will be adjusted as new data are collected. A management procedure normally has three components: (1) a list of data used as inputs, (2) an algorithm or model to process the data and (3) rules to translate the algorithm output into a TAC.
49. The main advantage of the management procedure approach is that it provides a basis to guide the process of quota setting which does not demand an agreement on a preferred

assessment approach. It should be emphasized that the management procedure is only intended to guide the quota setting, and should not be viewed as a replacement for the stock assessment.

50. Each year, or perhaps every 2 or 3 years, the data would be summarized, and the rules used to calculate the recommended TAC. On the same schedule, stock assessments would be updated by incorporating the most recent data. These assessments would be updated using an accepted model or models, only conducted as a safe-guard to make sure the management procedure recommendations are consistent with the estimated status of the stock. Under normal circumstances the CCSBT would presumably accept the TAC that emerged from the management procedure, but CCSBT would always have the option of setting an alternative TAC.
51. The steps involved in development of a management procedure include:
 1. Identification of a set of operating models.
 2. Identification of possible management procedures including data used as inputs to the decision rule, likely a subset of all the data used in the assessments.
 3. Identification of robustness trials with each operating model.
 4. Identification of performance indicators.
 5. Simulation testing.
 6. Report to SC.
52. The above steps are complex and would undoubtedly take several years. The following is a plan of specific actions that would be the best way for CCSBT to proceed to accomplish this.
 - A. Appoint a coordinator to supervise the entire process. This could be proposed by Anna Parma a member of the advisory panel, a consultant or a national scientist.
 - B. Hire a consultant to develop computer code, documentation and preliminary trials. The consultant will be a stock assessment scientist skilled in the implementation of simulation-estimation techniques.
 - C. Hold a workshop to do identification (steps 1-4 above). The main output of this workshop will be:
 - (a) a document including initial formal specification of the operating models and perhaps some candidate management procedures to be examined, the set of robustness trials to be conducted, and the performance indicators to be used in their evaluation.
 - (b) a time table for completion of the tasks.
 A steering committee will be appointed to facilitate email exchanges and coordination of inter-sessional work.
 - D. Consultant and/or national scientist do parameter estimation with operating models and examine results, defining for each operating model the parameter values to be used in preliminary simulation testing.
 - E. Consultant and/or national scientists run preliminary trials.
 - F. Hold Workshop to:
 - (a) evaluate performance of operating models in fitting to the historical data.
 - (b) assign weights to alternative operating models.
 - (c) examine results of first set of trials.
 - (d) identify changes to be made and second set of simulation testing.
 - G. Consultant and/or national scientists run 2nd stage trials.

- H. Hold workshop to evaluate results and make recommendations to SC regarding recommended procedure.
53. The major workshops (B,E and G) would likely be one year apart; inter-sessional work will be coordinated by e-mail and during regular SAG or SC meetings. Based on experience in other fisheries, this is probably optimistic and it might be necessary to add an additional year and workshop.
54. In accepting this proposal, the following aspects were noted and agreed on:
- The coordinator would assist in the initial workshop preparation and model specification phases, but would not actually develop the software, and would simply coordinate activities of other participants.
 - The consultant should be a stock assessment scientist capable of participating in development of the model specifications, and then producing the necessary software code.
 - The model specification would be done together with national scientists from the member countries, who would assist in identifying the plausible range of hypotheses to include.
 - In testing the operating models developed, there would need to be a trade-off between thoroughness and practicality.
 - The holding of workshops and the hiring of a coordinator and a software development consultant will have significant budgetary implications.
 - The overall process will require iterative interaction with managers, scientists and industry. Special ad-hoc sessions to allow such formal interaction should be convened. In particular there is likely to be a need to convene a short session of this nature at the time of the 2002 SAG and SC meetings.

6.3 Reference Points

55. It was noted that there has also been substantial confusion in the past over the use of “reference points” to describe a wide range of very different fishery indicators and management procedure components. The SC agreed to adopt the following standard terms for different classes of these indicators:
- *Comparative Statistics*: Statistics that scientists use to compare and contrast different assessments for their own understanding.
 - *Management Indicators*: Statistics that scientists provide to managers to advise on the current and future status of the stock.
 - *Management Reference Points*: Statistics that managers have agreed to guide the management of the stock.
56. Following further discussion, Dr Hilborn of the Advisory Panel agreed to summarize lists of preferred indicators from members, and to propose a reduced number of standard reporting statistics to be used for future assessments. Dr Hilborn presented the resultant suggested list of recommended model outputs to use as comparative statistics and management indicators during future SBT assessments. This was revised in response to comments from SC participants, and adopted by the SC.

Recommendations for Standardized Model Outputs

57. Comparison of assessment model results is facilitated by all model teams producing standard outputs. This simplifies understanding differences between models and summarizing conclusions for CCSBT. Model outputs should be available in two forms. First: an extensive set of standardized year-by-year outputs in electronic form, which would not normally be included in papers documenting the models. Second, a standard table reporting a brief summary of model outputs. This table should also be available electronically to ease report preparation at meetings.

Bulk Output Available in Electronic Form

58. For each model run, base case, sensitivity test, etc. the following should be available in electronic form

59. For each year from the start of the model to the current time:

- Recruitment (Number of 0 year olds)
- Biomass ages 5-7
- Biomass ages 8-11
- Biomass ages 12+
- Spawning stock biomass

60. For deterministic projections the same outputs for each year of projection.

For stochastic projections the average of the same outputs for each year of projection.

Summary Table

61. From the assessments the following ratios for stock biomass for Ages 5-7 ages 8-11 ages 12+ spawning stock:

- Current/1950
- Current/1980
- Current/1990

62. From the assessment models the following exploitation rates with selectivity patterns as used in the author's projections:

- The ratio of current fishing mortality rate to F_{msy} to be used in calculating the appropriate selectivity pattern.
- The ratio of current fishing mortality rate to F_{rep} where the most recent 5 years recruitments are used.
- The ratio of current fishing mortality rate to F_{rep} where the entire recruitment series is used.

63. From the assessment models the ratio of the current spawning stock biomass to the spawning stock biomass at equilibrium under F_{msy} .

64. The author of individual assessments will make their own choices for the estimation of the stock-recruitment relationship and period of years considered for estimating F_{msy} and F_{rep} .

65. All projections should be performed on agreed levels of future catch. The catch levels to be used should be 0, current catch, current catch * .75 and current catch * 1.25. In all cases the catches would be rounded to the nearest 1,000 tonnes.
66. From deterministic projections the following ratios for biomass ages 5-7, ages 8-11 ages 12+ and spawning stock biomass.
- 2005/current
 - 2020/current
 - 2020/1980
67. From stochastic projections the following ratios for biomass ages 5-7, ages 8-11 ages 12+ and spawning stock biomass.
- Probability 2005 >current
 - Probability 2020 >current
 - Probability 2020 >1980
68. Discussion identified the need to develop a useful way to summarise recruitment trends: this will be discussed further at a future meeting.

7. SBT Research Requirements

7.1 Assessment Approach for Future SAG Meetings

69. The SC endorsed the SAG observation that it was not necessary to conduct full assessments every year, and noted that current trends in the status of the SBT stock were not expected to change suddenly. However, it was recognized that the impact of fisheries, particularly of non-party catches, might unexpectedly change. There would certainly be concern should effort or catch in any of the SBT fishery components increase significantly, even though impacts on the stock might not become immediately apparent in assessments. It was therefore agreed that some form of monitoring and review of fishery indicators was required on an annual basis.
70. The SC noted that particular emphasis has been placed on the need to develop an agreed management strategy and evaluation process for SC, and that a specific workplan has been proposed to accomplish this (see section 6.2). It was envisaged that this process would take at least two years, and that a full re-assessment in 2002 would further delay this process. However, it was also noted that the specification of operating models for inclusion in any future management strategy would include development of the sort of models proposed by the SAG for future SBT assessments (such as statistical length-based models). If a full re-assessment is unexpectedly considered to be necessary, progress made on these models would still be beneficial. The SC recognised that three assessment options might be pursued during 2002:
1. An update of fisheries indicators only to provide information on fisheries trends.
 2. An “assessment update”, using models and methods used in 2001.
 3. A full re-assessment, primarily using new assessment models.
71. Of these, the first was the option proposed by the SC, to allow the management strategy development process to proceed rapidly towards implementation of option 3 in 2003.

However, an adaptive approach should be maintained such that, if fishery indicators indicate unexpected large changes, the necessary modelling and assessment can be conducted to determine the management implications of these changes. This could best be achieved by initially scheduling a SAG meeting to review fishery indicators, and then scheduling a second meeting if a full assessment is considered necessary. Further data preparation would be required between these meetings.

7.2 Other Research Requirements

7.2.1 Development of the CCSBT Central Database

72. It was noted that an interim database structure proposal had been accepted at the CCSBT7 meeting to form the basis for initial planning of the database, at least for catch, effort and size composition data. In response to questions regarding security of data, the Database Manager noted the difference between security and confidentiality of data. Security would be achieved using well tested security measures, including encryption of the database and data transmissions, and he was developing a proposal in this regard. Consideration then needed to be given to two levels of data confidentiality: the extent to which confidential data are provided to the database, and the control of subsequent access to the data. These aspects need to be considered further by the Commission.
73. Australia noted the need for further discussion of the spatial scale of data provided, that fine scale data had proved scientifically useful in past assessments and that availability of fine-scale data will permit similar analyses in future. The Advisory Panel agreed that such data were useful, but did not consider them to be high priority among other current requirements. New Zealand suggested that fine-scale data be provided to increase future analysis options, but that access to such data be given only as and when necessary. Japan noted that longline sets typically extend across areas larger than $1^{\circ} \times 1^{\circ}$. Japan also had a policy of providing data to all regional fisheries management organizations at a standard resolution of $5^{\circ} \times 5^{\circ}$.
74. With regard to inclusion of data other than catch, effort and size-composition data into the database, Australia noted that there were implications from some of the proposed SRP activities for the database design. In particular, if analyses are to be conducted on optimal tagging rates and estimation of rates of tag reporting, then at least some of the observer data would need to be included.

7.2.2 Direct Age Estimation

75. Participants provided brief overviews of their current SBT otolith collection and interpretation activities. Australia routinely collects otoliths from their surface fishery, from mortalities in the tow cages and rearing pens. 366 otoliths were collected in 1999/00 and 285 in 2000/01, the goal being to collect 10 otoliths from each tow cage. Approximately 360 otoliths per year are considered adequate to provide an age-length key for the two age classes in this fishery. In the absence of agreed interpretation standards, these otoliths are currently archived, but not interpreted. In addition, some 500 otoliths are collected per year from the Indonesian fishery under the collaborative research program, and routinely aged.

76. New Zealand initiated otolith collection in 1998 using observers on New Zealand longline vessels. 522 otoliths were collected in 1998, none in 1999, 149 in 2000 and 777 in 2001. These are also currently archived but not interpreted. Only experienced observers are used, and there is no reduction in the economic value of the fish. Acceptance of sampling by vessel operators has increased as awareness of this lack of damage has developed.
77. Japan started collecting otoliths using observers on Japanese longline vessels in the early 1990s, and the level of co-operation and tagging success rate has improved steadily. In recent years, some 200 - 300 otoliths have been collected per year, and sampling is stratified in 10cm age classes to ensure sampling of larger fish. A routine ageing process has been established and approximately 50% of the otoliths have been aged.
78. It was noted that some progress had been made with standardization of otolith interpretation techniques, and that this should be extended to develop standard protocols for SBT otolith reading. Further consideration must also be given to the appropriate sample sizes for the various components of the SBT stock. Statistical sampling requirements and technical aspects of otolith interpretation were recognized as being separate issues, best dealt with by different participants in different inter-sessional activities. Dr Pope noted that the statistical sampling design issue could be dealt with to some extent at the proposed CPUE Modelling workshop (see section 6.1.2), provided participants developed papers on the issue for discussion at the workshop. It was agreed that this be added to the CPUE workshop agenda.
79. Regarding standardization of otolith interpretation, it was agreed that a dedicated technical Ageing Workshop should be held during 2002. Australia suggested that the Central Ageing Facility (CAF) at the Marine & Freshwater Research Institute in Queenscliff, Victoria, Australia would be a suitable venue. The facility has indicated that they would be interested in hosting the workshop. This commercial facility is used to conduct standardized ageing of otoliths from many Australian fisheries, including SBT, and has suitable equipment for use in an ageing workshop. Australia also noted that this central facility was available to be contracted to age SBT otoliths, once standard protocols had been agreed on and implemented, should members or non-members not wish to conduct their own otolith interpretation. The meeting agreed that this would be a suitable workshop venue. The participation of observers who have not yet established an age estimation capacity is also strongly encouraged. It was suggested that the workshop extend over 5 days, probably with less than 10 participants. Australia was requested to ascertain what the costs of using the facility for the workshop may be, for consideration at the 8th CCSBT meeting.

7.2.3 Improvements to the SAG / SC Process

80. After overview and discussion, a number of suggestions were made for possible ways of improving the efficiency of the SAG / SC process, for consideration by the Commission and the Secretariat:
- A sequential SAG / SC meeting of some two weeks without a break was considered excessive, and it was proposed that at least a two day break be scheduled between future SAG and SC meetings. This would allow more time for SAG report preparation, distribution and reading by SC participants.

- It was agreed that a specific day would still be required at the start of the SAG meeting to allow participants to read the papers submitted, even if these were available beforehand.
 - It was suggested that consideration be given to standardizing electronic formats of papers into some portable format (such as Acrobat .pdf format), making these available on a CCSBT FTP site some time before the meeting and providing papers submitted before the meeting to participants on CD-ROM at the start of the meeting.
 - High capacity LaserJet printers should be provided for meetings, including one available for participants to print papers off the CD-ROM, or working papers prepared at the meeting.
 - The final collection of papers, working papers and reports for the meeting could also be provided to participants or national agencies on CD-ROM some time after the meeting.
 - Wherever possible, simultaneous translation should be used, particularly for plenary discussions. At informal working group discussions, at least sequential translation should be provided, unless the participants in such informal discussions specifically agree that this is not required.
 - The Secretariat would benefit from additional assistance, specifically for document revision and copying, at meetings.
81. During discussions it was also confirmed that it was desirable to move away from expression of national views in the scientific process, and particularly at SAG meetings, and to rather express individual scientific views.

7.2.4 Review of Data Preparation and Submission Schedules

82. It was noted that numerous problems had been experienced with data preparation and exchange and preparation of assessments for the 2nd SAG meeting. As a result, the agreed schedules had been substantially overrun. However, it was also noted that the assessment process was currently in state of revision, and that data preparation and submission requirements were therefore likely to change substantially over the next few years. It was also noted that the SC was recommending that a full re-assessment not be conducted in 2002, to allow maximum progress to be made with development of new operating models under the Management Strategy development process. Nonetheless, it was agreed that a process to ensure that basic catch, effort and size data are collected, prepared and exchanged prior to SAG meetings should be maintained, to ensure that such data were available for any required assessment activity, particularly for updating of indicators.
83. After substantial discussion it was agreed to adopt the interim approach:
- The existing agreed schedule of submission of standard data prior to SAG meetings would be maintained. This exchange would be initiated and coordinated by the Database Manager.

- The Database Manager would also liaise with members to determine to what extent further data preparation was required for the next SAG meeting. A process to conduct such preparation would then be proposed and agreed on in consultation between the Database Manager and members.
- Members were requested to cooperate fully with the Database Manager with regard to prompt submission of requested data, and development of an agreed process for any further data preparation that may be required.
- If and when necessary, a member of the Advisory Panel could then be requested to assist with the coordination of further data preparatory steps, as had been done prior to the 2nd SAG meeting.

7.3 Overview, Time Schedule and Budgetary Implications for 2001/2002 Research Activities

84. Substantial inter-sessional activities, proposed workshops and scheduled meetings for 2002 are summarised in the table below, with an indication of likely duration and time period and whether there are budgetary implications. The indicated budgetary implications are very approximate, and dependent on the decisions of the Commission.

Activity	Approximate Period	Budgetary Implications
Exchange of data sheets and information on existing observer programs on longline fisheries (coordinated by the Secretariat)	End Sep - mid Dec 2001	None
Implementation of CCSBT tagging program components proposed at the Tagging Workshop and agreed at CCSBT8	Following approved by CCSBT8	To be ascertained at the Tagging Workshop
Development and exchange of revised observer program proposals (coordinated by the Secretariat)	Jan 2001 - 1 month before the SC meeting	
Establishment of Steering Committee and initiation of inter-sessional work on CPUE Modelling	Immediate	± AU\$5000 for Panel participation
Establishment of Steering Committee, appointment of Coordinator and Consultant and preparatory work towards the 1 st Management Strategy Development Workshop	Following approval by CCSBT8	Consultant & Coordinator: ± AU\$ 80,000
1 Day meeting of CPUE Modelling Group, including consideration of statistical otolith requirements	Appended to the 1 st Management Strategy Workshop	Included in budget for the 1 st MS Workshop

Activity	Approximate Period	Budgetary Implications
1 st Management Strategy Development Workshop	Dependant on schedule of hired consultant	Workshop costs ± AU\$25,000 Panel participation: ± AU\$25,000
Further inter-sessional development of the management strategy and observer program proposals	In time for the SAG and SC meetings	None
Age Estimation Workshop: Technical aspects of otolith interpretation and direct ageing	May – Aug 2001, dependant on availability of participants	± AU\$50,000, dependant of costs of workshop venue
Exchange of all data required for use at the 3 rd SAG meeting.	16 weeks before 3 rd SAG meeting	None
3 rd SAG Meeting: Not full assessment. Review of fishery indicators. Testing of alternate assessment models	Just before SC7 meeting	Already budgeted
7 th SC Meeting	Preferably 2 months before CCSBT9 meeting	Already budgeted
(Possible additional emergency SAG meeting. Considered unlikely.)	Between SC7 and CCSBT9 meetings	± AU\$25,000 Panel participation: ± AU\$25,000
Presentation of SC report at CCSBT 9 Meeting	To be determined by the Commission	Already budgeted

85. To facilitate the identification of possible future conflicts between proposed CCSBT workplans and those of other commissions in which SAG and SC participants might be involved, the Secretariat was requested to remain informed of the proposed meeting schedules of organizations such as the International Commission for the Conservation of Atlantic Tunas (ICCAT), the Indian Ocean Tuna Commission (IOTC), the Standing Committee on Tuna and Billfish (SCTB), the PrepCon of the West and Central Pacific Tuna Commission and the Commission for the Conservation of Antarctic Living Marine Resources (CCAMLR).

8. Other Matters

8.1 Confidentiality of SAG / SC Documents

86. The Executive Secretary confirmed that, under revised Rule 10 of the CCSBT, the documents submitted and produced during the SAG and SC meetings were considered to be confidential until the completion of the 8th CCSBT meeting in October 2001. It was noted that working papers prepared during the meetings will not have official status unless they have been included in the reports as an attachment.

9. Adoption of Meeting Report

87. Following inclusions of suggested changes, the report of the meeting was adopted.

10. Close of Meeting

88. Australia, Japan and New Zealand thanked the Chair for his cooperation, and the interpreters, the Panel and the Secretariat for their hard work.
89. John Pope, on the half of the Advisory Panel, thanked the Japanese host.
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LIST OF ATTACHMENTS

- Attachment A:** List of Participants
- Attachment B:** Agenda
- Attachment C:** List of Documents
- Attachment D:** Report from the Informal Working Group on Characterisation of SBT catch.
- Attachment E:** Report of the CPUE Modelling Group
- Attachment F:** Draft Outline of a Proposed CCSBT Scientific Observer Program
- Attachment G:** Issues for Discussion at the Tagging Workshop

**List of Participants
CCSBT
Scientific Committee Meeting
28-31 August 2001
Tokyo, Japan**

CHAIR

Mr Andrew PENNEY
Pisces Research & Management Consultants
22 Forest Glade
Tokai Road, Tokai 7945
South Africa
Phone: +27 21 7154238
Fax: +27 21 7154238
Email: piscescc@iafrica.com

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

ADVISORY PANEL

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

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

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

AUSTRALIA

Dr John KALISH
Senior Research Scientist
Fisheries & Forestry Sciences Division
Bureau of Rural Sciences
Dept. of Agriculture, Fisheries & Forestry
PO Box E11, Kingston ACT 2604
Phone: +61 2 6272 4045
Fax: +61 2 6272 4014
Email: john.kalish@brs.gov.au

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@fish.washington.edu

Mr Jonathon BARRINGTON
Program Manager
Strategic Fish Policy
Fisheries & Aquaculture Branch
Dept. of Agriculture, Fisheries & Forestry
GPO Box 858, Canberra ACT 2601
Phone: +61 2 6272 4975
Fax: +61 2 6272 4215
Email: jonathon.barrington@affa.gov.au

Dr Tom POLACHECK
Senior Research Scientist
Tropical and Pelagic Ecosystems Program
Division of Marine Research
CSIRO
PO Box 1538
Hobart, TAS 7001
Phone: +61 3 6232 5312
Fax: +61 3 6232 5012
Email: tom.polacheck@marine.csiro.au

Ms Ann PREECE
Research Scientist
Tropical + Pelagic Ecosystem Program
Division of Marine Research
CSIRO
P.O. Box 1538
Hobart, Tas 7001
Phone: +61 3 6232 5336
Fax: +61 3 6232 5012
Email: ann.preece@marine.csiro.au

Dr Dale KOLODY
Research Scientist
Tropical + Pelagic Ecosystem 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@marine.csiro.au

Ms Vanessa ATKINSON
Campaigner
Greenpeace Australia Pacific
GPO Box 3307
Sydney, NSW 2001
Phone: +61 2 9263 0306
Fax: +61 2 9261 4588
Email: Vanessa.Atkinson@au.greenpeace.org

JAPAN

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

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

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

Mr Hiroyuki KUROTA
Temperate Tuna Section
National Research Institute of
Far Seas Fisheries
5-7-1 Orido, Shimizu, 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 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 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 Shiro YUGE
Councillor
Resources Management Dept.
Fisheries Agency
1-2-1 Kasumigaseki, Chiyoda-ku
Tokyo 100-8907
Phone: +81 3 3591 2045
Fax: +81 3 3502 0571
Email: shiro_yuge@nm.maff.go.jp

Mr Hisashi ENDO
Deputy Director
International Affairs Division
Resources Management Dept.
Fisheries Agency
1-2-1 Kasumigaseki, Chiyoda-ku
Tokyo 100-8907
Phone: +81 3 3591 1086
Fax: +81 3 3502 0571
Email: hisashi_endo@nm.maff.go.jp

Mr Kouichi ISHIZUKA
Deputy Director
Resources and Environment Research Div.
Resources Development Dept.
Fisheries Agency
1-2-1 Kasumigaseki, Chiyoda-ku
Tokyo 100-8907
Phone: +81 3 3501 5098
Fax: +81 3 3592 0759
Email: kouichi_ishiduka@nm.maff.go.jp

Mr Teruaki MITSUISHI
Assistant Director
International Affairs Division
Resources Management Dept.
Fisheries Agency
1-2-1 Kasumigaseki, Chiyoda-ku
Tokyo 100-8907
Phone: +81 3 3591 1086
Fax: +81 3 3502 0571
Email: teruaki_mitsuishi@nm.maff.go.jp

Ms Emi MASHIKO
Assistant Director
Fisheries Division
Ministry of Foreign Affairs
2-2-1 Kasumigaseki, Chiyoda-ku
Tokyo 100-8917
Phone: +81 3 3581 1783
Fax: +81 3 3503 3136
Email: emi_mashiko@mofa.go.jp

Mr Kenichi NOTOU
Section Chief
Far Seas Fisheries Division
Resources Management Dept.
Fisheries Agency
1-2-1 Kasumigaseki, Chiyoda-ku
Tokyo 100-8907
Phone: +81 3 3591 6582
Fax: +81 3 3591 5824
Email: kenichi_noto@nm.maff.go.jp

Mr Hideki KATO
Section Chief
Resources and Environment Research Div.
Resources Development Dept.
Fisheries Agency
1-2-1 Kasumigaseki, Chiyoda-ku
Tokyo 100-8907
Phone: +81 3 3501 5098
Fax: +81 3 3502 1682
Email: hideki_kato@nm.maff.go.jp

Mr Yuji KAWAI
Manager
International Division
Federation of Japan Tuna Cooperative
Association
2-3-22 Kudankita, Chiyoda-ku Tokyou
Phone: +81 3 3264 6167
Fax: +81 3 3234 7455
Email: section2@intldiv.japantuna.or.jp

Mr Nozomu MIURA
International Division
Federation of Japan Tuna Fisheries
Cooperative Associations
3-22 Kudankita 2-chome, Chiyoda-ku
Tokyo 102
Phone: +81 3 3264 6167
Fax: +81 3 3234 7455
Email: section2@intldiv.japantuna.or.jp

Mr Taro TAKESHITA
International Division
Federation of Japan Tuna Fisheries
Cooperative Associations
3-22 Kudankita 2-chome, Chiyoda-ku
Tokyo 102
Phone: +81 3 3264 6167
Fax: +81 3 3234 7455
Email: section2@intldiv.japantuna.or.jp

Mr Kosuke HIGAKI
Deputy Manager
National Ocean Tuna Fisheries Association
1-1-12 Uchikanda Chiyoda-ku, Tokyo 101
Phone: +81 3 3294 9634
Fax: +81 3 3294 9607

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

OBSERVERS

REPUBLIC OF KOREA

Dr Dae-yeon MOON
Senior Scientist
Distant-water Fisheries Resources Division
National Fisheries R & D Institute
408-1 Shirang-ri, Kijang-gun
Pusan 619-902
Phone: +82 51 720 2320
Fax: +82 51 720 2337
Email: dymoon@nfrdi.re.kr

TAIWAN

Dr Shui Kai CHANG(Eric)
Deep Sea Fisheries Research and
Development Center
Fisheries Administration
Council of Agriculture
No. 1, Fishing Harbour North 1st Road
Chine Cheng District
Kaohsiung 80628
Taiwan
Tel: +886 7 8137437
Fax: +886 7 8136592
email: skchang@mail.dsfrdc.gov.tw

Mr Simon K.T.LEE
Assistant Secretary
Longline Division
Taiwan Deep Sea Tuna Boatowners and
Exporters Association
3F-2 Yu-Kang Middle 1st Road
Chien Jern District
Kaohsiung
Taiwan
Phone: +886 7 8419606
Fax: +886 7 8313304
Email: simon@tuna.org.tw

INDONESIA

Prof. Dr Hasjim DJALAL
Ambassador/Special Adviser to the Minister
for Maritime Affairs and Fisheries
Jalan Kemang IV/10A
Jakarta 10110
Phone: +62 21 385 8029,71790473
Fax: +62 21 7179 1920,3858029
Email: DKHUKLA@DFA-DEPLU.GO.ID

INTERPRETERS

Ms Akiko TOMITA
Ms Midori OTA
Ms Emiko KODAMA

SOUTH AFRICA

Mr Sarel VAN ZYL
First Secretary
South African Embassy
414 Zenkyoren Building
7-9 Hirakawa-cho
Chiyoda-ku, Tokyo 102-0093
Phone: +81 3 3265 3369
Fax: +81 3 3265 1108

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.au

Mr Morio KANEKO
Deputy Executive Secretary
Email: mkaneko@ccsbt.org.au

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

Ms Chika SCALLY
Administrative Officer
Email: cscally@ccsbt.org.au

Agenda
Sixth Scientific Committee Meeting
Tokyo, 28 - 31 August 2001

1. Opening
 - 1.1 Introduction of Participants
 - 1.2 Administrative Arrangements
2. Appointment of Rapporteurs
3. Adoption of Agenda and Document List
4. Review of SBT Fisheries
5. Matters Arising from the Report of the 2nd Stock Assessment Group Meeting
 - 5.1. Status of the SBT Stock
 - 5.2. Implications for SBT Management
6. Matters Arising from SC5 and CCSBT7
 - 6.1 Implementation of the SRP
 - 6.1.1 Characterization of SBT Catch
 - 6.1.2 CPUE Interpretation and Analysis
 - 6.1.2 Development of a Scientific Observer Program
 - 6.1.3 Development of a SBT Tagging Program
 - 6.2 Management Procedure and Management Strategy Evaluation
 - 6.3 Reference Points
7. SBT Research Requirements
 - 7.1 Assessment Approach for Future SAG Meetings
 - 7.2 Other Research Requirements
 - 7.2.1 Development of the CCSBT Central Database
 - 7.2.2 Direct Ageing
 - 7.2.3 Improvements to the SAG / SC Process
 - 7.2.4 Review of Data Preparation and Submission Schedules
 - 7.3 Overview, Time Schedule and Budgetary Implications for 2001/2002 Research Activities
8. Other Matters
9. Adoption of Meeting Report
10. Close of Meeting

List of Documents
Scientific Committee (SC) & Stock Assessment Group (SAG)

(CCSBT-SC/0108/)

1. Draft Agenda of SAG
2. List of Participants of SAG
3. Draft Agenda of SC
4. List of Participants of SC
5. List of Documents – SC&SAG
6. Catch (and Effort) Data Collection Systems
7. Summary of Information Observer Programs
8. (Australia) Spatio-Temporal Analysis of Southern Bluefin Tuna Catch Per Unit Effort Data: A Best Linear Unbiased Predictor Approach. by P.J. Toscas¹, W.N. Venables¹ and T. Polacheck
9. (Australia) Where to with Modelling CPUE? Tom Polacheck, Ann Preece, Dale Kolody
10. (Australia) Modelling Catch and Effort in the Southern Bluefin Tuna Fishery. Peter J. Toscas, William N. Venables and Mervyn R. Thomas
11. (Australia) Catch Monitoring of the Fresh Caught t Tuna by the Bali-Based Longline Fishery. Tim Davis and S. Nurhakim
12. (Australia) Length at Age Distribution of Southern Bluefin Tuna in the Indonesian Longline Catch on Spawning Grounds.
13. (Australia) Application of a Statistical Catch-at-Age and -Length Integrated Analysis Model for the Assessment of Southern Bluefin Tuna Stock Dynamics 1951-2000. Dale Kolody and Tom Polacheck
14. (Australia) The effects of using cohort slicing to estimate age distributions. Paige Eveson and Tom Polacheck.
15. (Australia) Proposal for Conventional Tagging Program within the Scientific Research Program of the Commission for the Conservation of Southern Bluefin Tuna. Tom Polacheck, John Gunn, Clive Stanley.
16. (Australia) Size and Age at 50% Maturity in SBT: An integrated view from published information and new data from the spawning ground. Tim Davis, Jessica Farley and John Gunn.

17. (Australia) Taiwanese SBT catches and their size distribution in the Indian and Atlantic Oceans based on catch monitoring in Mauritius and Cape Town. Jessica Farley, Shui-Kai Chang, John Gunn.
18. (Australia) The Status of Southern Bluefin Tuna Relative to Fishing Mortality Reference Points. Tom Polacheck and Neil Klaer.
19. (Australia) An Integrated Statistical Time Series Assessment of the Southern Bluefin Tuna Stock based on Catch at Age Data. Tom Polacheck and Ann Preece.
20. (Australia) Assessment of the Status of the Southern Bluefin Tuna Stock Using Virtual Population Analysis – 2001. Tom Polacheck, Ann Preece and Dan Ricard.
21. (Australia) Summary of the primary data inputs to CSIRO's 2001 stock assessment models. A. Preece, T. Polacheck, D. Kolody, P. Eveson, D. Ricard, P. Jumppanen, J. Farley and T. Davis.
22. (Australia) Trends in Catch, Effort and Nominal Catch Rates In the Japanese Longline Fishery for SBT. Tom Polacheck and Dan Ricard.
23. (Australia) Southern Bluefin Stock and Recruitment Projections - Neil Klaer, Tom Polacheck, Ann Preece, Dale Kolody, Dan Ricard.
24. (Japan) Addendum To: CCSBT-SWG/0011/16: Exploratory analyses of southern bluefin tuna dynamics using production models. : Doug.S. Butterworth and Susan J Johnston
25. (Australia) Fishery Indicators for the SBT Stock. John Gunn, Tom Polacheck, Ann Preece, Dan Ricard, Paige Eveson, Tim Davis, Jessica Farely, Neil Klaer, Dale Kolody
26. (Australia) Some Comments on CPUE Tuning Indices in Repsonse to Questions from External Scientists. Tom Polacheck, Dale Kolody and Ann Preece.
27. (Australia) A Statistical Catch-at-Age/Length Integrated Model for Southern Bluefin Tuna Stock Assessment. Dale Kolody and Tom Polacheck
28. (Japan) Abundance indices of Southern Bluefin Tuna based on the Japanese longline fisheries data, 1969-2000, along the interim approach agreed for the 2001 Stock Assessment. : N. Takahashi, S. Tsuji, T. Itoh and H. Shono.
29. (Japan) Consideration on the B-ratio model and its potential alternative. : N. Takahashi and S. Tsuji.
30. (Japan) Preliminary analysis for CPUE standardization and area stratification by tree regression model. : H. Shono, S. Tsuji, N. Takahashi, and T. Itoh.
31. (Japan) Stock assessment and future projection of the southern bluefin tuna based on the ADAPT VPA. : K. Hiramatsu and S. Tsuji.
32. (Japan) Exploration of cohort analysis based on catch at length data for southern bluefin tuna. : H. Kurota, S. Tsuji, N. Takahashi, K. Hiramatsu, and T. Itoh.
33. (Japan) Proposal on framework of Tagging Program under the CCSBT/SRP. : S. Tsuji
34. (Japan) Review of history in recognition of stock status and some consideration on principles in

- developing management procedures. : S. Tsuji.
35. (Japan) Notes on data to be used for the 2001 Stock Assessment and its exchange process. : S. Tsuji.
36. (Japan) Steady-State Comparison of the Consequences of the Different Selectivity Patterns in the SBT Fishery. : S.J.Johnston and D.S.Butterworth

(CCSBT-SC/0108/SBT Fisheries)

Australia—Australia’s 1999-2000 and 2000-01 Southern Bluefin Tuna Fishing Season.

J.L. Foster, C.M. Robins and A.E. Caton and K.F. Williams.

Japan—Review of Japanese SBT Fisheries during 1998-2000. : T. Itoh and K. Notou

New Zealand—Trends in the New Zealand southern bluefin tuna fisheries. :

Murray,T & K. Richardson

Korea—Korean longline fishery for southern bluefin tuna.: Dae-Yeon Moon and

Kwang-Ho Choi

Taiwan—Analytical Review on Taiwan Southern Bluefin Tuna Fisheries.: Shui-Kai Chang

(CCSBT-SC/0108/BGD)

1. (Japan) CCSBT-SWG/0011/16: Exploratory analyses of southern bluefin tuna dynamics using production models. : D.S. Butterworth and E.E. Plangányi.

(CCSBT-SC/0108/Info)

1. List of Procedures and Arrangements for SAG&SC
2. Report of the working group on implementation of the CCSBT scientific research program
3. Conceptual figure of the management procedure of CCSBT (The Secretariat’s understanding of the report of MSWS)
4. The Commission’s work as proposed by the Management Strategy Workshop (29-31 May 2000), regarding the Development of the a Management Procedure Process Work Plan
5. Proposal on interim database format for data maintained at the Secretariat of the CCSBT
6. Brief Description of Modifications (Japan and Australia)
7. Rule of procedure of the commission, Rule10

(CCSBT-SC/0108/Rep)

1. Report of the First Meeting of the Stock Assessment Group
2. Report of the Fourth Meeting of the Scientific Committee
3. Report of the Stock Assessment Process Workshop

4. Report of the Management Strategy Workshop
5. Report of the Scientific Meeting for Development of a SRP for the CCSBT and Overview of Progress on Stock Assessment
6. Report of the Fifth Meeting of the Scientific Committee
7. Report of the Second meeting of Stock Assessment Group

Classification of List of Documents

(CCSBT-SC/0108/)

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

(CCSBT-SC/0108/ SBT Fisheries)

The documents titled “Country SBT Fisheries Review” , to be classified into this category.

(CCSBT-SC/0108/BGD)

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

(CCSBT-SC/0108/Info)

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

(CCSBT-SC/0108/Rep)

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

(CCSBT-SC/0108/WP)

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

Report from the Informal Working Group on Characterisation of SBT Catch

The Scientific Committee is required to make recommendations on the steps to be taken during 2002 towards improvement/implementation of SBT catch and effort data collection systems to meet CCSBT requirements.

The working group on characterisation of SBT catch reviewed responses to the catch characterisation questionnaire in an attempt to determine whether any improvements were required to existing catch and effort data collection systems.

Responses to the survey have been received from Australia, Japan, Korea, New Zealand, South Pacific Commission, Seychelles Fishing Authority and Taiwan. The informal working group is not able to comment on the adequacy of data collection systems from non-members that have not responded to the questionnaire. Obtaining responses to the questionnaire and then data from those non-members with a significant SBT catch is a priority.

When reviewing the summary of responses to the questionnaire, it was clear that some ambiguities existed in relation to precisely what and how some of the information was being collected. As a consequence, it was considered important to seek further detail and clarification on certain aspects of the responses. Participants of the informal working group should provide the Database Manager with details of items for which they seek further clarification and the Database Manager is then to obtain this information from respondents out of session. The initial questionnaire included a request for copies of data collection forms. Most respondents did not provide this information, but it is believed that current data collection forms together with any historical forms that are available, should be provided since it would help to better define what is being collected.

Some members and non-members updated their questionnaire responses and/or suggested corrections to the summary of responses while at the Scientific Committee meeting. It is important that all respondents be provided with the opportunity to update their response and to verify whether the summary of their response is correct.

As a general rule, participants of the informal working group believed that items specified in the SRP should be obtained by the catch (and effort) data collections systems and that all jurisdictions should be encouraged to collect the full list of information that applies to their fisheries. However, in forming this view, it was also recognised that:

- In some cases it may be more appropriate and reliable to collect certain information (e.g. discard information and biological measurements) from other data collection systems such as observer systems.
- Changes to catch and effort data collection systems are major undertakings that can take many years to implement. Similarly, changes to such systems often require trade-offs whereby collecting a new piece of information may require identification of other information that can be removed from the data collection forms.

- Practical difficulties and individual circumstances will limit the degree to which different jurisdictions can (or should) implement the recommended data collection requirements.

In general, most members and non-members that have responded to the survey appear to be collecting the crucial information, although, depending on fleets, there are concerns on the sample size being collected for size composition data, completeness of items where data collected, and the timeframe for data availability.

Rather than being prescriptive regarding information collection systems of different jurisdictions, the informal working group recommends that a table of information requirements be prepared for each member and non-member that specifies the areas in which they are not collecting the information specified in the SRP. Members and non-members should be requested to respond, stating whether the table is correct for their jurisdiction, and to discuss whether they believe that any of the identified “gaps” are areas that would be appropriate for them to include in their data collection systems. If so, comment should be sought on likely timeframes for any changes to their data collection systems.

In addition to data items specified in the SRP, the informal working group briefly discussed some of the other data items that were listed in the questionnaire. This included fields of information such as target species, and master identification as well as some precision issues such as the precise time of fishing operations and the resolution of location information that should be collected. No agreement was reached on the need for these items of information. Further discussion will be needed to determine whether these items should be included in the standard requirements for SBT catch effort data collection systems.

Table 1 outlines the next steps that the working group recommends to be taken in relation to characterisation of SBT catches.

Table 1: Suggested steps to be taken during 2002 towards improvement / implementation of SBT catch and effort data collection systems to meet CCSBT requirements

Step	Due
1. Database Manager to seek responses to the questionnaire from non-members that have a significant SBT catch, but that have yet to respond to the questionnaire.	Responses to be sought by the Database Manager during October 2001 ¹ .
2. Members and non-members who have responded to the questionnaire are to correct and update their responses and the summary of their responses, and provide all corrections and changes to the Database Manager. The Database manager will immediately circulate the corrections and changes to other respondents.	30 September 2001
3. Database Manager to revise the overall summary document according to the outcome of step 2 and circulate the revision to respondents (who should immediately check the correctness of the summary)	30 October 2001
4. Participants of the informal working group to provide the Database Manager with a list of specific areas (questions) concerning the data collection systems for which they require further clarification	30 November 2001
5. Database Manager to seek clarification of specified areas, including a request for data collection forms.	31 December 2001
6. Secretariat to develop and circulate a list that specifies the areas in which members and non-members (who have provided questionnaire responses) are not collecting the information specified in the SRP	31 December 2001
7. Clarifications (as requested from step 5) and copies of data collection forms to be provided to Database Manager	28 February 2002
8. Members and non-members to provide secretariat with a response to data items specified in the SRP that they are not collecting (as listed from step 6)	28 February 2002
9. Database Manager, to update summaries with new information and circulate to all respondents (who should check the summaries as soon as possible). Secretariat to also distribute responses received in step 8	30 April 2002
10. SC to discuss responses received from step 8	

¹ It is expected that responses will take one to two months to arrive. As a result, some of the remaining steps for these questionnaire responses will be conducted slightly later than for the responses that have already been received.

Workshop Proposal by the CPUE Modelling Group, 0900-1000h 30/8/2001

It was agreed that the further work on CPUE modeling was important and needed to be furthered by a workshop. However, several other Workshops are proposed for 2002 that will involve considerable scientific inputs. Hence, it is **suggested** to SC that work on CPUE modelling be progressed and be consolidated at a workshop to be held sometime after the 2002 SC. This would also allow the form of necessary data to be established and where appropriate to be made available. Since it was considered important to keep this work moving forward it is also **suggested** to SC that a steering group consisting of :

Prof. John Pope (Advisory Panel),
Dr Dale Kolody (Australia),
Dr Norio Takahashi (Japan), and,
Dr Talbot Murray (New Zealand)

be established to:-

- Refine the Terms of Reference for a workshop on CPUE modelling.
- Develop the list of data inputs to the proposed workshop.
- Encourage scientific contributions to the workshop.

The steering group would meet by correspondence and report to the 2002 SC.

To further encourage work on this area it was also **suggested** to SC that one day be added to the proposed 2002 workshop on Developing Management procedures. The costs involved would be those with adding a day to this meeting. This time would also allow progress to be made on the question of “Statistically appropriate levels of collection of direct aging materials in the various SBT fisheries” that was also charged to the steering group (see Agenda 7.2.2).

After discussion it was agreed that tentative terms of reference for the proposed Workshop on CPUE were:-

- a) To investigate and describe factors likely to affect CPUE in the SBT fisheries. This may well involve studies of the behavior of fish and also of the fishery through time.
- b) To examine alternative approaches to modeling of CPUE data sets from the SBT fisheries and if possible to advise on an agreed working approach to providing corrected estimates of CPUE for SBT. This work should have two foci.
 - i) Improving trends estimates over the immediate past so as to inform management procedures.
 - ii) Check long term trends for systematic temporal bias
- c) To encourage the development of new time-series of CPUE for SBT

- d) To comment on statistically appropriate levels of collection of direct aging materials in the various SBT fisheries.

Possible Concomitant Variables

It was noted that concomitant factors such as by-catch, moon-phase, southern oscillation index, meso-scale oceanographic variables, meso-scale environmental variables, information on changes in gear, changes in operating behavior, changes in market conditions, and management impacts on fishing practices would be useful and that the steering group would refine this list.

It was also noted that Information on fish behavior via archival tags such as spatial and depth distributions might help define what environmental signals might be of most interest. Ultimately archival tags might also illuminate problems such as the lower selection of larger fish in the long line catches though this was not likely to emerge in the immediate future due to tag life and due to problems of tagging larger fish.

Better Understanding of the Catching Process

It was noted that better understanding of the catching process would be likely to inform analysis of catch rate

Other CPUE Sets

It was considered that it would be very helpful to develop other CPUE time-series. In particular it would be helpful to develop a series for the Taiwanese fisheries. It would be highly desirable to develop a CPUE index or its proxy for the Indonesian fishery on the SBT spawning area. However, this seems less likely to emerge at present. It would also be important to try to develop a CPUE index for the surface fishery. The problems of doing this were noted but it was also noted that such an index might be to identify very low year-classes rather than provide a general index of abundance of the younger age of SBT caught by this fishery. It would also be worth exploring the use of CPUE from SBT spanning and staging grounds (e.g. Japanese LL fisheries in areas 1 and 2).

Initial Draft Outline for a CCSBT Scientific Observer Program

From the SC Report *“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.”*

In the interim, the Secretariat compiled a survey of observer programs around the world and presented a summary of results in document SC/0108/07. They provided some schedules and responses and outlined the Observer Program endorsed by the Commission. The purpose of this document is to develop further a set of draft standards for a scientific observer program to be coordinated by the CCSBT. These aspects are presented below in outline form.

Main Characteristics of a Scientific Observer Program

Description of the Observed Fishery

- Nationalities/flags of vessels.
- Information on vessel characteristics and power factors (e.g. length, GRT, hold capacities, instrumentation are required).
- Gear configuration and deployment methods (e.g., gear used, net or line types, depths fished, baits used).
- General areas fished.
- Target species.

Observer Program Coverage

- All SBT fishery components (fleets) should be observed and target levels of observer coverage should be the same for all fleet components.
- The extent of observer coverage depends on the goals of the program. In general, if sampling is truly “random,” the percentage coverage can be quite low. Unfortunately fishing vessels are notoriously poor platforms for random sampling. Therefore, vessel coverage needs to be relatively high, particularly if data are to be broken down into different geographic strata.
- There needs to be a process to determine the appropriate level of observer coverage, particularly with regard to the level of observation required for determination of tag reporting rates.
- The issue of observer coverage is one that should be evaluated at appropriate intervals, particularly if new goals or programs requiring different levels arise

- An added concern about lack of coverage is the potential for bias. Increasing coverage evenly across different fleets and within fleets operating in different periods or areas would be an important component. This requirement also tends to increase the level of coverage needed.
- One approach towards efficiency in sampling practices for observers is to have the ability of observers to rotate among vessels within a season. This may be impractical but may be one way to improve the efficiency of limited sampling resources.

Effort Data

- Depending on the type of information, a standard record-keeping method needs to be established.
- To the extent practical, obtain comprehensive estimates of the effort expended.
- Effort should be recorded to the actual location of operations (set time, end and start points etc.).
- Characteristics of fishing operations (any special attributes, e.g., associations of a school, curved vs. straight-line sets, etc.).

Catch and By-Catch Data

- Record number and weight of animals caught (including target and by-catch species).
- Report the observed percent of the estimated catch relative to the total catch of each fishing operation. I.e., the observed catch over the total vessel catch, by species. This provides some indication of the within-vessel sampling levels (recognizing that in many cases, there might be 100% coverage of the catch).

Size-Composition Data

- For the purposes of SBT analyses, accurate size measurements of SBT are required. These should be done 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 (i.e., sub-sampling catches throughout the brailing process).
- Effort should be made to measure other species as required by co-operative interests of other organizations and nations.
- 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. As noted above in the section on observer coverage, the required actual number of samples should be re-evaluated from time to time and as needs change.

Biological Sampling

- Observers will be expected to conduct biological sampling. For example, sampling for otoliths, tissues for genetic analyses, length and weight, food habits, and gonad status are commonly routine.
- As with the size composition information, the frequency and intensity of sampling needed will vary with requirements of individual studies.

Environmental Information

- Sea surface temperature, wind, swell, and weather conditions.
- Special projects (e.g., CTD casts etc).
- Where appropriate, collect information on responsible fishing practices (e.g., retrieval of lost gear). Of course this activity is anticipated only to the extent that it does not interfere with normal activities and only deals with improving scientific aspects of data collection (i.e., perhaps for other species).

Interaction with Tagging Programs

- Monitoring tag recoveries during observer trips.
- Providing publicity among the fleet in addition to observed vessel.
- Assist with reward systems and promote incentives.
- Where appropriate, observers may conduct tagging.
- Participate in tagging experiments such as tag-seeding for better appreciation of reporting rates.
- Interaction as needed for archival tagging programs.

Observer Qualifications

- University graduates or technically trained personnel, as considered appropriate for the fleets concerned, with interests related to fisheries.
- Ability to work at sea in difficult conditions.
- Ability to work alone under stressful psychological situations.

Observer Training

- Training in fishery management and biological field collection programs including species identification, data collection and sampling procedures.
- Regular training including safety at sea and first aid.
- Training in protocols for dealing with difficult situations (personal conflicts and physical hazards).
- Holding regular workshops where programs can exchange approaches and experiences and improve consistency in the data collection process. This recognizes that absolute consistency, while desirable, is unlikely given different observer programs currently in place.

Standardization of Observer Programs across Fleets and Fisheries

- It is essential to ensure that data and information collected are comparable across fisheries.
- Development of a common training procedure.
- Suggest that a CCSBT observer program co-ordinator be identified to work with national program co-ordinators to develop a training course and material, and participate in training courses. This co-ordinator would also conduct briefings and de-briefings with observers to ensure functions as planned, and to provide feedback on improvements.
- Regular exchange of observers among the different fisheries should be encouraged.

**ISSUES TO BE DISCUSSED AT THE CCSBT TAGGING WORKSHOP
Hobart, Tasmania, 15 - 19 September 2001**

Scientific Research Program Proposal

The Report of the SC to CCSBT on the Scientific Research Program (SC5 Report Attachment D) identifies the development of a CCSBT conventional tagging program as the fourth priority component of the SRP. The relevant section of the SRP recommends that the following approaches be included in the design of the tagging program:

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 effective way of releasing tags unto 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 should 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 yellow tags, and possibility 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. The 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 captured tags.
6. Any tagging programs will be co-ordinated by CCSBT and the data retained and managed by CCSBT and available to all members.

The SRP also contains the following relevant recommendation under approaches to be included in the design of a scientific observer program:

2. The appropriate level of 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.

These SRP recommendations should form the basis of planning discussions at the Tagging Workshop.

Tagging Program Proposals

Tagging proposals presented at the 6th SC meeting by Australia (CCSBT-SC/0108/15) and Japan (CCSBT-SC/0108/33) contain both similarities and differences, summarised in the table below:

Tagging Program Component	Australia	Japan
Administration		Coordinated by CCSBT
Data base		Administered by CCSBT
Conventional Tagging P&L		
- Location	West and South Australia	West Australia
- Number per year	7000 West Australia, 10,000 South Australia	3,000 West Australia
Conventional Tagging LL	By observers on commercial boats	By charter
Size of fish	Small fish	Random samples
Time and place	In active fisheries	Not in active fisheries
Tag Recovery efforts	Emphasis on port specialists and rewards	Uniformity of tags and rewards
Archival Tagging		
Cryptic Tagging		Explore feasibility in the first 3 years
Exploratory opportunistic tagging		As and when possible
Tagger Training	Field training on live fish	
Reporting rate estimation	Ensure sufficient observer coverage in all fisheries	

Workshop Topics

From the above, the Tagging Workshop should be structured to address the following aspects in developing a CCSBT Conventional Tagging Program Proposal:

- Review and summary of scientific requirements of the tagging program, use to be made of the information in assessments and resultant data requirements (statistical design considerations).
- Size / age components of the SBT stock to be tagged.
- Numbers of fish in these components to be tagged annually, and in total during the program.
- Areas and seasons where these SBT stock components can best be tagged.
- Fleets, fisheries or dedicated research platforms (research or charter vessels) that could be used to tag fish in the areas / seasons identified.
- Tag types, tagging methods and other technical tagging considerations.
- Development of tagger training standards and procedures
- Tag recapture monitoring and reporting systems, including observer program implications for monitoring of tag reporting rates.
- Tagging Program implementation phases and associated time schedule.
- Program co-ordination and database requirements for the CCSBT Secretariat.
- Budgetary implications for the CCSBT and member countries, including possible implications for cost recovery from fisheries.

These discussion topics should form the basis of the Tagging Workshop agenda, and of the Tagging Program proposal developed at the workshop. This proposal will be submitted to the 8th CCSBT Commission meeting for consideration.

Preparatory Work

In preparation for these discussions, intended participants should prepare information on the following to facilitate efficient progress at the meeting:

- Alternate tagging program proposals (including any revisions to existing proposals presented to the 6th SC meeting), specifically addressing the topics above.
- Proposals for reconciling differences between tagging program proposals presented at the 6th SC meeting.
- Information on seasonal and geographic distribution of SBT fisheries and stock components, particularly of 1 - 4 age fish.

- Summaries of existing understanding of SBT migration patterns and mixing rates.
 - Effective estimation of rates of tag loss and tagging mortality for SBT.
 - The possible role of the CCSBT Secretariat in coordinating tagging programs and the tagging database.
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