



**REPORT OF THE 6th MEETING OF THE STOCK  
ASSESSMENT GROUP AND THE 10th MEETING  
OF THE SCIENTIFIC COMMITTEE**

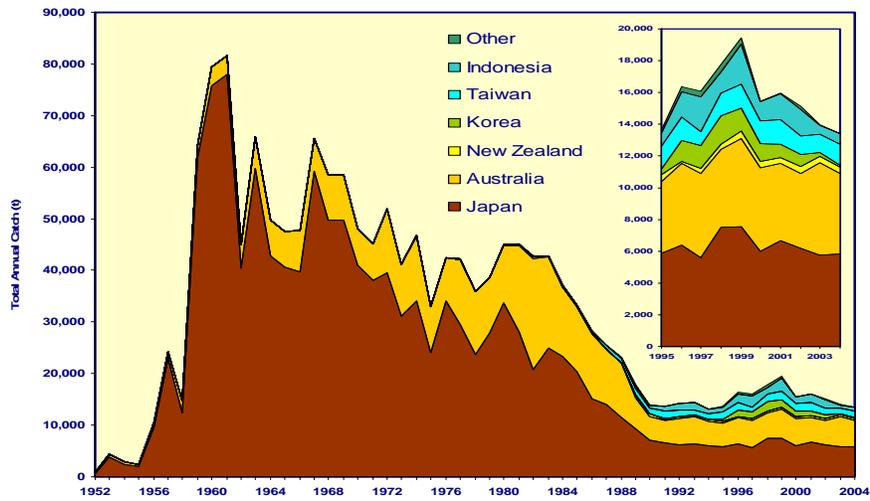
Taipei, 28 Aug - 9 Sep 2005



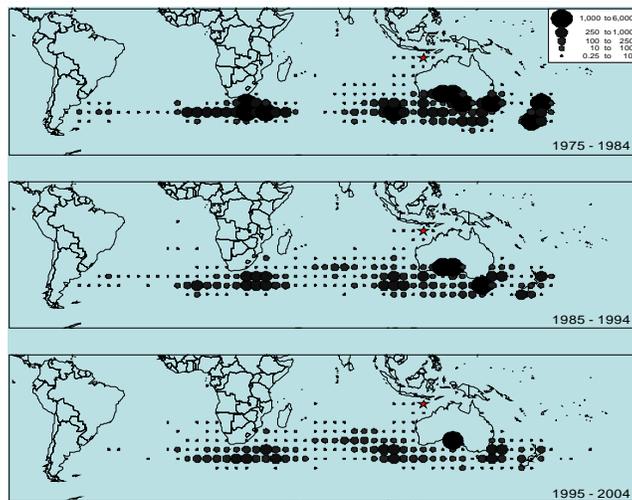
**Review of SBT Fisheries**



## SBT Global Catches: 1952 - 2004



## SBT Catch Distribution: 1975 - 2004



There has also been about a one-third reduction in the number of 5° blocks fished since 1975.



## Issues of Concern Related to Catch Characterization

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- Loss of information on non-member catches from import / TIS data, once imports of non-member catch are prohibited.
- Reports of a substantial increase in Indonesian catch in area 2 in 2005.
- The possibility of unreported or under-reported catches.



## 2005 Review of Fisheries Indicators



## Recruitment Indicators

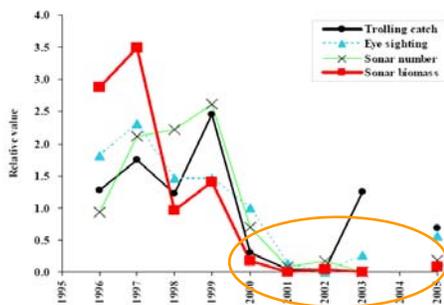
Various indicators presented in 2005 confirm that there have been at least two very low recruitments in 2000 and 2001:

- Acoustic Survey: Acoustic data indicate low recruitment after 1999.
- Size Frequency: Size distribution data in the Japanese LL fishery shows virtual absence of cohorts recruited from the 1999 -2001 cohorts. The charter fishery in New Zealand also shows an absence of fish recruited since 1999.
- Commercial Spotting: Australian commercial aerial spotting data show lower abundance in 2003 and 2004.
- Tagging Data: Exploitation rates on the 2000 and 2001 year classes are high, and are consistent with estimates of low recruitments to these year classes.

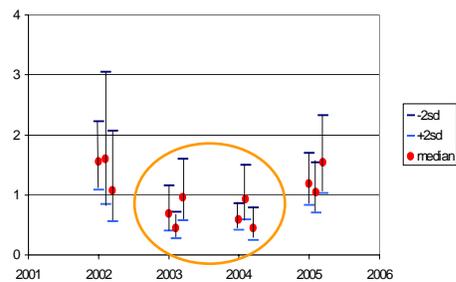
In summary, indicators of recruitment suggest markedly lower recruitment in 2000 and 2001, with some indication that recruitment in 1999 was also weak.



## Recruitment Indicators



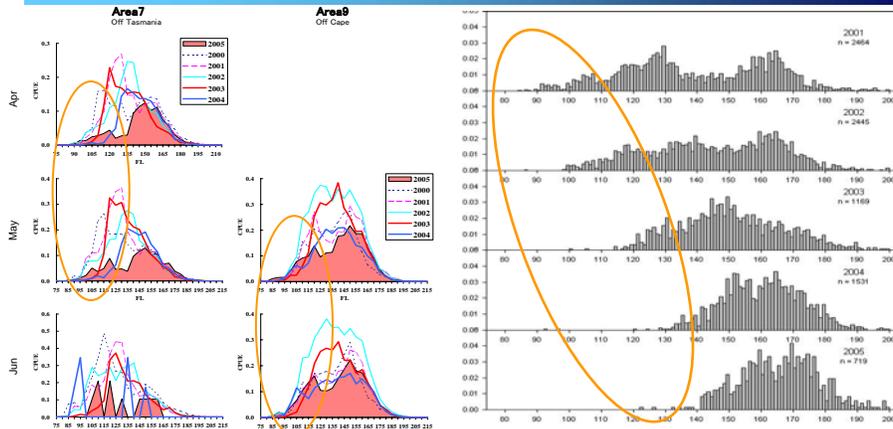
Relative values of four acoustic abundance indices for age 1 SBT off south-western Australia, showing low recruitment after 1999.



Estimates of surface abundance of age 2-4 SBT in the Great Australian Bight from commercial spotter pilot data, showing lower abundance in 2003 and 2004.



## Recruitment Indicators



Size composition in the Japanese LL fishery from 2000 - 2005, showing a marked reduction of fish from the 1999 - 2001 year classes.

Length-frequency distribution of SBT in the New Zealand charter catch, showing the near absence of fish from the cohorts of 1999 onwards.



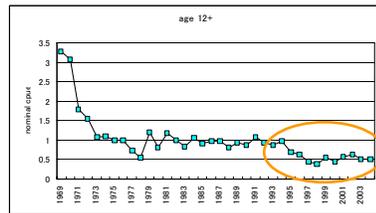
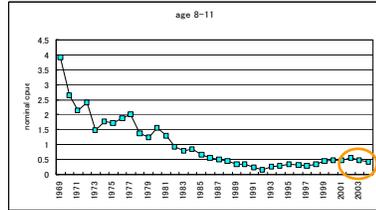
## Spawning Stock Biomass Indicators

- Catch rates of fish aged 12 and older by Japanese LL indicate a drop in spawning stock biomass in about 1995. Recent Indonesian catch has remained low and the majority of the catch has been relatively young spawners. Observer data from Indonesian fisheries trainees from 2000 to 2005 is consistent with a declining spawning stock biomass.
- In addition, the preliminary Indonesian catch estimate for the first six months of 2005 suggests a substantial increase in exploitation of the spawning stock.

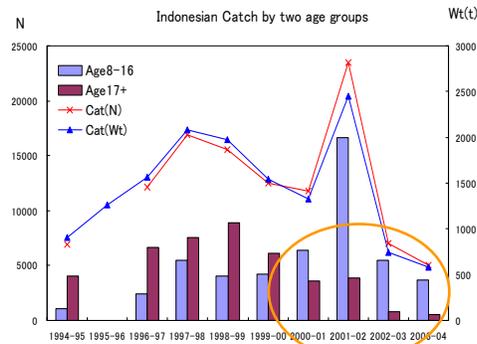
In summary, spawning stock indicators suggest that spawning stock biomass has declined since the mid to late 1990s, after a period of relative stability in the 1980s and early 1990s.



## Spawning Stock Biomass Indicators



Nominal CPUE of Japanese LL catches by age group, showing reduced catch rates of 12+ SBT from 1995 onwards,



Trends in Indonesian SBT catch for 2 age-groups, showing the recent decline in catches and decreased contribution of 17+ large adult SBT.



## Exploitable Biomass Indicators

- Japanese LL CPUE of SBT for all ages combined suggests that LL exploitable biomass has remained fairly constant during the past 10 years, though this level is low compared to historical values. Results indicate increases in the CPUE of ages 8-11 since about 1992, but there was a slight decline in 2003 which continued into 2004. CPUE of fish aged 4-7 has increased since the mid-1980s and remained broadly constant over the last 10 years.

In summary, CPUE indicators suggest stable exploitable biomass over the last 10 years. However, recent low recruitments are likely to lead to declines in future exploitable biomass.



## MP Development & Management Advice



## Management Advice Requested

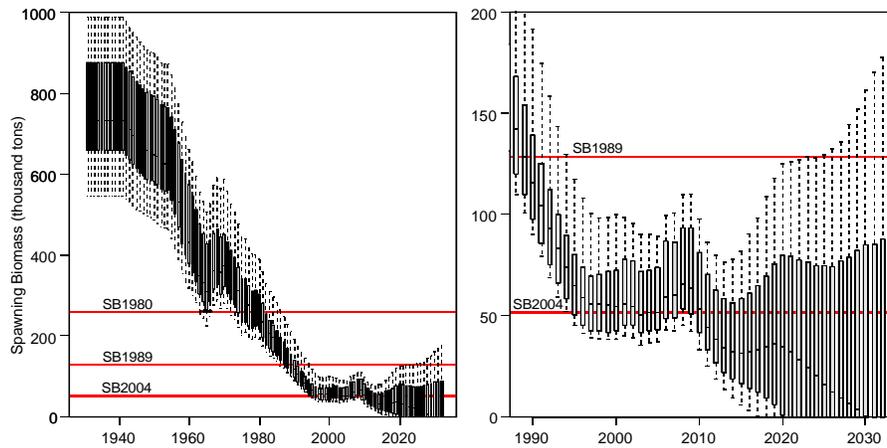
CCSBT11 requested advice on:

- The need for immediate catch reductions.
- The choice of an MP.
- Recommended tuning parameters (or 'objectives') for the chosen MP.
- Schedule for implementation of the chosen MP.

Given the stock rebuilding objectives of CCSBT, the ESC interpreted that it needed to recommend management actions sufficient to prevent further declines in the stock.



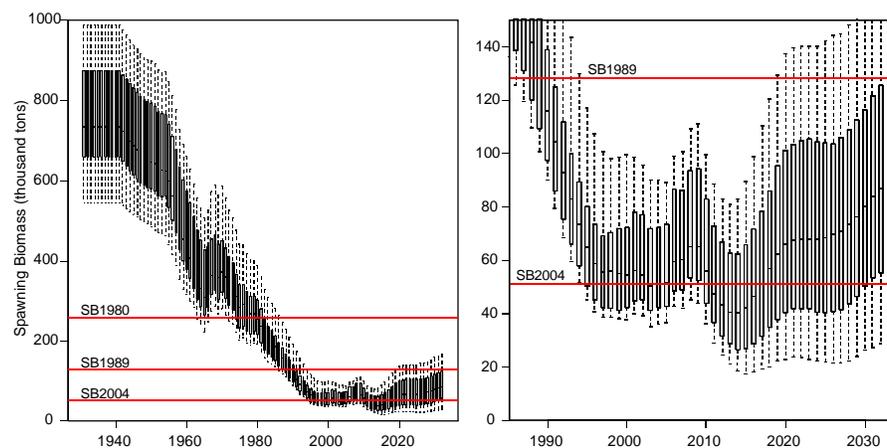
## Spawning Biomass Projections under Current Catch, With No Management Action



Projections made using the Operating Model and reference set under current catch (14,930t), with no management action, show very high probability of substantial future declines in spawner biomass.



## Spawning Biomass Projections Under an MP, but Without Initial Catch Reduction



Even under an MP implemented in 2008, without any initial reduction in catch, projections still show a more than 50% probability of further declines in spawner biomass before recovery.



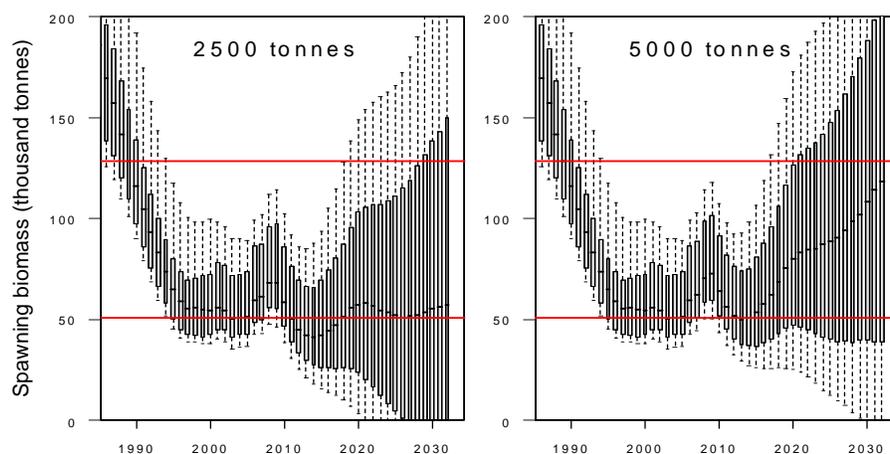
## Conclusions Regarding Stock Status

Taking into account the review of fisheries indicators, and the assessment results and projections using the Operating Model:

- The SBT stock in 2004 was at an all time low.
- In the absence of immediate catch reductions the spawning biomass would have a high risk (> 50%) of declining further under all tested candidate MPs.
- Further stock declines could jeopardize recovery prospects.



## Effect of Alternative Initial Catch Reductions



An immediate catch reduction of 5000 tons would have a 50% probability of arresting further stock decline and initiating re-building under subsequent constant catch.



## Recommendation 1: Initial Catch Reduction

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Considering that:

- An immediate catch reduction of 5000 tons would have a 50% probability of arresting further stock decline, irrespective of which CMP is used.

*The SAG/ESC recommends that the global SBT catch be reduced to 9,930 tons for 2006.*



## Progress with MP Development

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- MP development and testing has been successfully completed.
- A range of MPs has been tested with a range of initial catch reductions.
- A combination of actions that have a high probability of achieving the desired objectives can now be recommended.



## Review of the MP Testing Process

- Using the latest data available at MPWS4 a “Reference Set” of stock status scenarios was defined that represents the most likely stock status for MP testing.
- SAG6 agreed that this reference set was consistent with the most recent indicators of stock status, and provided the best available basis to evaluate short-term risks and the effects of catch reductions and alternative candidate MPs.
- Recognizing that the future may be better or worse than the range of scenarios admitted in the “reference set”, a number of “robustness trials” were specified for more and less pessimistic stock status scenarios.



## Evaluation of Alternative Candidate MPs

The relative performance of the four CMPs selected at MPWS4 was compared, combined with the recommended catch reduction of 5000 tons in 2006.

MP	TAC Rule Responds to Changes in:		Constraint
	Stock Size	Recruitment	
CMP_1	Model fitted to CPUE and catches	Age 4 in recent catch	No TAC increases until 2015
CMP_2	Model fitted to CPUE and catches	Young fish in catch	No TAC increase until 2011
CMP_3	CPUE trends	CPUE age 4	Max increase 10%
CMP_4	CPUE trends	-	No TAC increase until 2011



## MP Performance Criteria

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Desirable features of an MP are:

- Protect against further reduction of spawning stock in the short and long term.
- Keep short-term TAC fluctuations small.
- Respond by increasing TACs in the longer term if the stock rebuilds strongly.



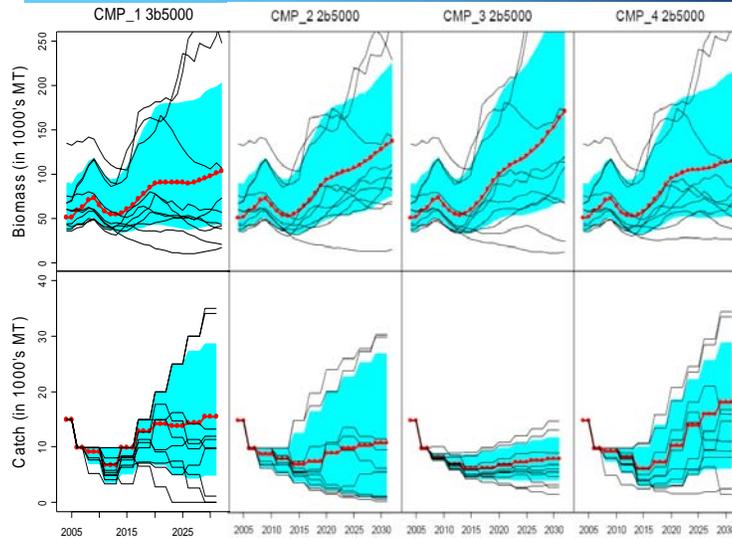
## MP Evaluation Results

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- All CMPs performed adequately when combined with initial catch reductions.
- However, they made different trade-offs between the different management objectives.



## Performance of Candidate MPs



Performance of each CMP with initial 5000t catch reduction in 2006



## Performance of Different CMPs

CMP_1	Most responsive to stock trends and productivity. Increased TAC in later years when stock was rebuilding. Produced quite variable TACs.
CMP_2	Responsive to stock trends and productivity, but less so than CMP_1. Provided smoother and less variable catch series.
CMP_3	Provided the least variable catches. Unresponsive to stock increases in later years.
CMP_3	Simple, easy to understand decision rule. Good performance in terms of trade-off between average long-term catch and stock rebuilding. Did not use recruitment data and produced quite variable TACs.



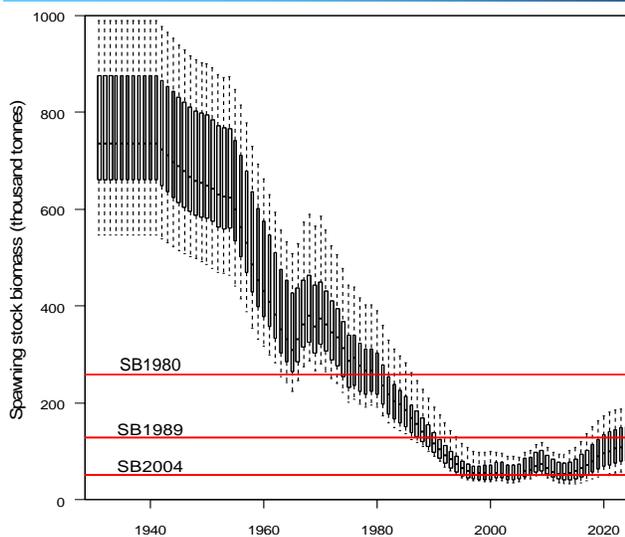
## Recommendation 2: Choice of MP

Considering the pros and cons of the four CMPs:

*The SAG/ESC recommends that CMP\_2 be adopted starting in 2008, following the recommended initial reduction in catch in 2006.*



## Spawning Biomass Projections



Projections of spawning biomass under the recommended MP and a 5000 ton catch reduction in 2006.



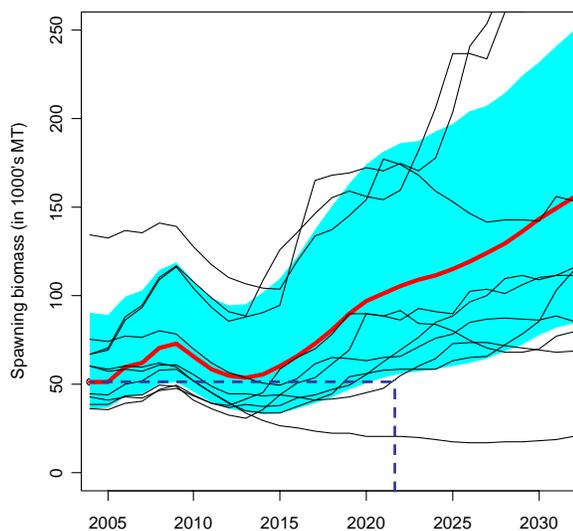
### Recommendation 3: MP Tuning Level

Considering the SAG interpretation of the CCSBT rebuilding objectives:

*The SAG/ESC recommends that parameters for the CMP\_2 be tuned so that there is an estimated 90% probability that the spawning biomass in 2022 will be at or above the 2004 level.*



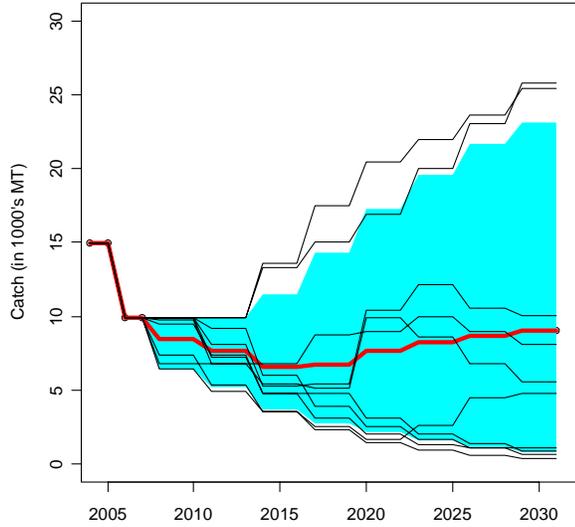
### Spawning Biomass Projections



Projections of spawning biomass under a 5000 ton catch reduction in 2006 and the recommended MP tuned so that there is a 90% probability that the spawning biomass in 2022 will be at or above the 2004 level.



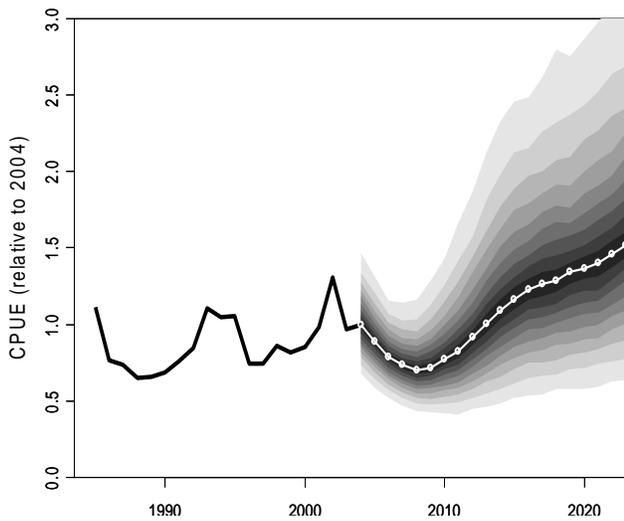
## Catch Projections



Projections of catch under the recommended MP and a 5000 ton catch reduction in 2006.



## CPUE Projections



Projections of CPUE under the recommended MP, and a 5000 ton catch reduction in 2006.

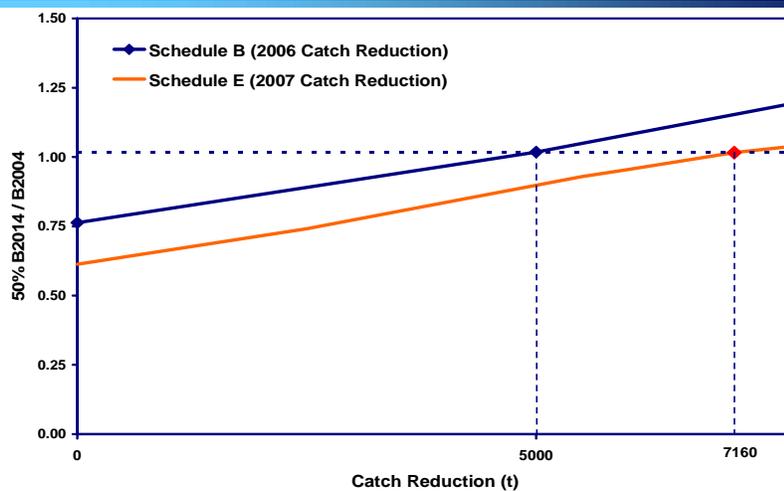


## Timing of Catch Reduction and MP Initiation

- The recommendation for a 5000 tons reduction in catch and CMP\_2 was based on schedule B, defined as
  - **Schedule B:** catch reduction in 2006 and MP-based TAC in 2008 and every three years thereafter.
- In addition the SAG evaluated the extent of catch reduction and MP tuning parameters that would achieve similar short-term risks and stock rebuilding by 2022 if their implementation followed schedule E, defined as:
  - **Schedule E:** catch reduction in 2007 and MP-based TAC in 2009, 2011 and every three years thereafter.



## Effect of Time of Catch Reduction and MP Initiation on Short-Term Risks to Spawning Stock



Comparison of catch cuts required under different (2006 and 2007) implementation schedules in order to achieve the same probability of stabilising spawning biomass under CMP\_2.



## Recommendation 4: Timing of Catch Reduction and MP Initiation

- If CCSBT postpones the reduction in catch until 2007 (Schedule E), then a higher catch reduction of 7160 tons would be required to achieve a 50% probability that the spawning stock biomass in 2014 is larger than in 2004.
- Tuning parameters for the chosen MP would need be adjusted to achieve same rebuilding levels in 2022.



## Underlying Assumptions of the OM

The following critical assumptions underlie the Operating Model:

- Catch split between the fisheries considered in projections is not substantially different from the average catch proportions for 2001-2003 assumed in the OM.
- Selectivity of the various SBT fisheries varies within the bounds admitted in the OM.
- The relationship between CPUE and the size of the exploitable stock for the main Japanese longline fishery remains within the bounds admitted in the OM.
- Recruitment levels are within bounds projected by the OM.
- Life-history parameters remain estimated to be within the range of values assumed in the OM.



## Recommendation 5: Deviation from the OM Assumptions and MP Advice

The SC strongly recommends that the Commission seeks advice from the SAG/ SC on the potential implications for MP performance of Commission decisions that result in:

- Deviation from the TAC changes recommended by the MP.
- Possible compromise of the underlying assumptions of the SBT Operating Model (e.g. changes in the proportional distribution of catches between SBT fisheries or changes in the selectivity of these fisheries).



## Summary of Management Recommendations

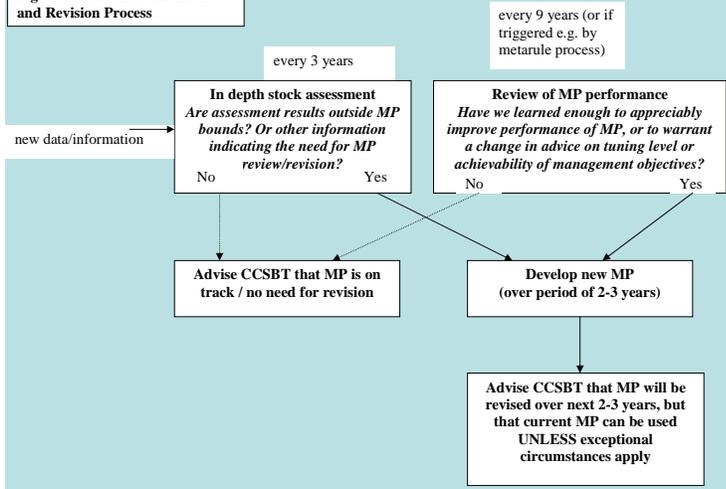
1. That the global SBT catch be reduced to 9930 tons for 2006.
2. That CMP\_2 be adopted starting in 2008, following the recommended initial reduction in catch in 2006.
3. That parameters for the recommended MP be tuned so that there is a 90% probability that the spawning biomass in 2022 is at or above the 2004 level.
4. That a higher catch reduction of 7160 tons would be required to achieve a 50% probability that spawning stock biomass in 2014 is larger than in 2004, if the reduction in catch is postponed until 2007. Tuning parameters for the chosen MP would also need to be adjusted to achieve same rebuilding levels in 2022.
5. That the Commission seeks advice from the SAG/ SC on the potential implications for MP performance of Commission decisions that result in deviation from the TAC changes recommended by the MP, or possible compromise of the underlying assumptions of the SBT Operating Model.





## MP Review Process

Figure 3. Flowchart for Review and Revision Process



Flowchart of the proposed regular MP review process.



## Review of the SRP and 2006 Work Schedule



## Implementation of the SRP

- Characterization of Catch: From July 2005, Japanese import statistics and the TIS will no longer provide information on the catches of non-members. Other options will be needed to monitor non-member catch. The SC is evaluating the need for an additional CCSBT statistical area in the central Indian Ocean, covering the area fished by Taiwanese vessels.
- CPUE Interpretation: Future CPUE work plans call for a definitive CPUE series for use by 2009, and there is likely to be a need to develop an agreed CPUE series for the first MP revision. The CPUE Group plans to meet at the SAG7 meeting to review development of a new CPUE series.
- Scientific Observer Program: There has been some improvement in observer coverage and the SC again recognized the importance of observer programs in supporting many of the SRP objectives. The SC will review which observer data might be included in the CCSBT data exchange requirements.



## Implementation of the SRP

- SBT Tagging Program: The recent tagging season was successful, and results had been incorporated in SAG analyses for the first time. Archival tagging programs have also provided useful information. The current tagging program, and the merits of continuing this after 2006, should be critically evaluated against objectives and performance criteria, at a specific SRP review workshop in 2006.
- Recruitment Monitoring: The SC recognized the increasing importance of recruitment indices, and noted that aerial survey time series are approaching the stage where they could be included in the tuning of the operating model.
- Direct Ageing: Substantial progress has been made with reading of otoliths to generate direct SBT age data. The next SAG/SC will consider options for using direct age data in future assessments.

The SC agreed that all of the current research and data collection activities under the SRP should be critically reviewed, and proposed that this be done under guidance of the Advisory Panel during a specific workshop preceding SAG7.



## 2005 Research Activities

Activity	Approximate Period	Budgetary Implications
Report to other RFMO's	November 2005	N/A
Surface fishery tagging program	Dec 2005 - March 2006	\$606,000
Secretariat coordination of the tagging program, including rewards.	Throughout the year	\$131,000
Data exchange	October 2005 - June 2006	N/A
SRP Review Workshop	Max 3 days, prior to SAG, September 2006	\$292,000
CPUE Modelling Group	1 days concurrent with SRP review and one day in full session	
7 <sup>th</sup> Stock Assessment Group Meeting.	3-4 days, after SRP Review and CPUE Group in September 2006	
11 <sup>th</sup> Scientific Committee Meeting.	4 days, 2 <sup>nd</sup> week in September 2005	
Presentation of SC report to Extended Commission at CCSBT13	2 <sup>nd</sup> week in Oct 2005	N/A



END

