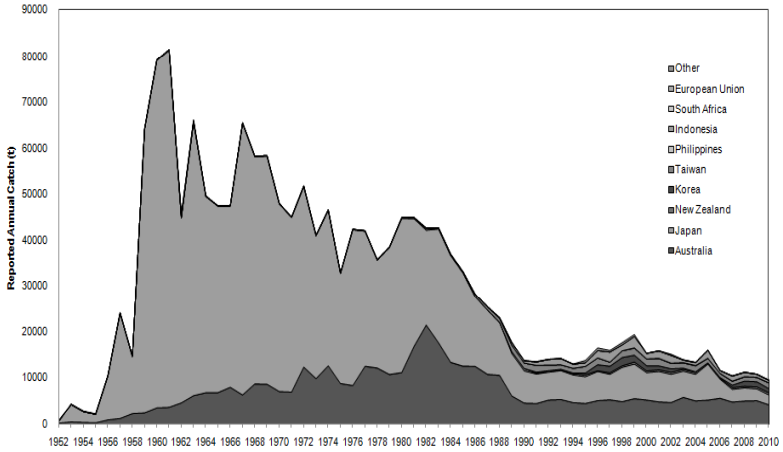
REPORT OF THE 16th MEETING OF THE SCIENTIFIC COMMITTEE

Bali, Indonesia, 19 – 28 Jul 2011

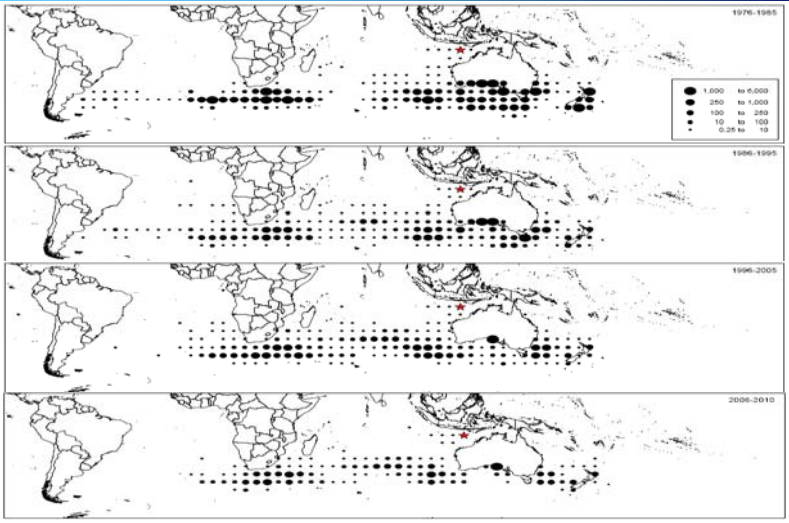
Review of SBT Fisheries and Fisheries Indicators

Reported SBT Global Catches: 1952 – 2010



Reported southern bluefin tuna catches by flag, 1952 to 2010

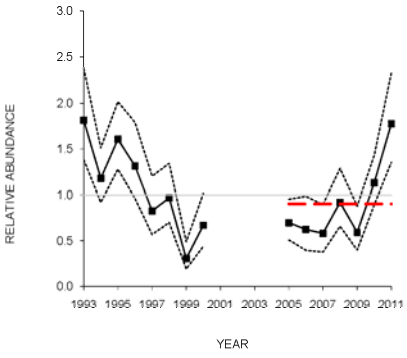
SBT Distribution Range: 1976 – 2010



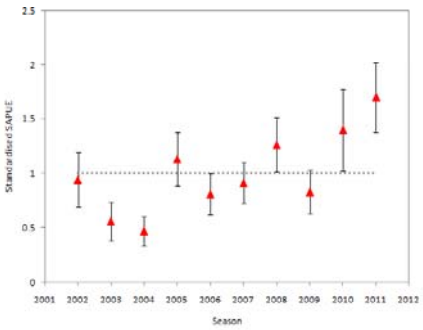
Trends in juvenile abundance

- Scientific aerial surveys in the Great Australian Bight
- Index of juvenile abundance in 2011 is greater than the 2005-11 median value
- It is also the highest since surveys began in 1993
- Commercial spotting index (SAPUE)
- Median estimates have varied over the last 8 years, However there has been an increasing trend over that time
- The 2010-11 value was significantly higher than the 2009-10 estimate and the highest since series began in 2001-02

Recruitment Indicators



Scientific aerial survey index of relative abundance of juvenile SBT in the Great Australian Bight.

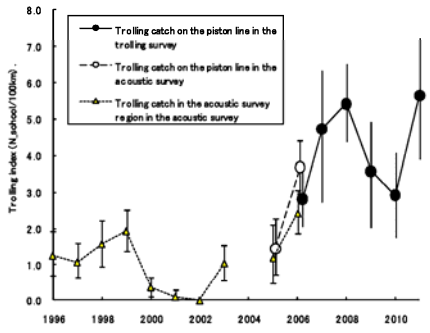


SAPUE index of relative surface abundance of juvenile SBT in the Great Australian Bight.

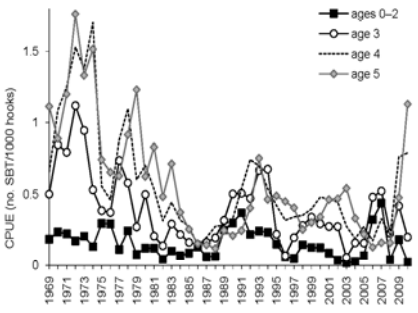
Trends in juvenile abundance

- Trolling catch index
- The trolling index increased from 2005 to 2008, declined in 2009-10, and then increased to its highest level in 2011
- Trolling indices are consistent with other indices and may prove useful in monitoring age 1 recruitment
- Japanese longline CPUE for juveniles
- The longline CPUE indices for age 3 in 2007, age 4 in 2009, and age 5 in 2009 and 2010 show large upturns
- It is not known if these upturns reflected increased stock abundance and/or change in catchability

Recruitment Indicators



Trends of trolling catch index of age 1 SBT in the Western Australia.



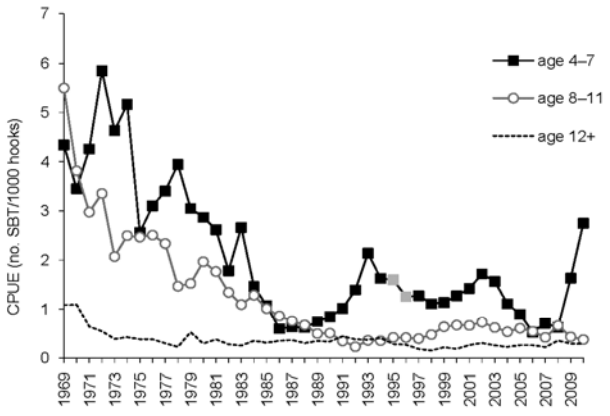
Nominal CPUE of ages 0-2, 3, 4 and 5 SBT for Japanese longliners operating in statistical areas 4-9 in months 4-9.

Trends in age 4+ SBT

Japanese longline CPUE for age 4+

- Age 4-7 CPUE have shown a recent increase
- Age 8-11 CPUE has shown a stable trend since the late 1990's
- Age 12+ CPUE has remained low with little variability since the early 1970's

Juvenile and Age 4+ Biomass Indicators



Nominal CPUE of ages 4-7, 8-11 and 12+ SBT for Japanese longliners operating in statistical areas 4-9 in months 4-9

Update of Operating Model

Update using most current data

Two major changes

- Underlying growth model changed
- Two additional years of data (catch, CPUE, aerial survey indices, etc.) were added

This resulted in:

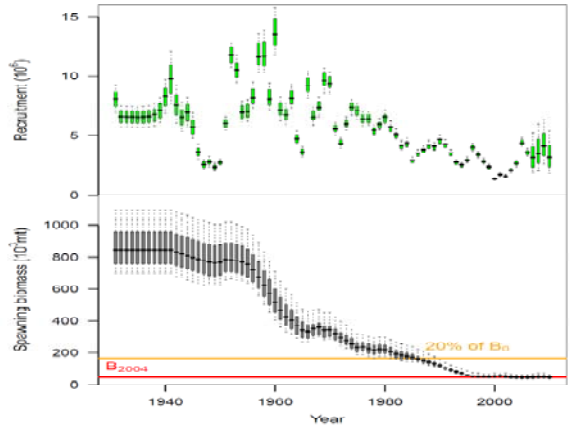
- Conditioning of operating model preferred higher values of steepness (S-R relationship) indicating a more productive stock
- Historical trajectories for recruitment over the last decade are higher than the result estimated in 2010
- These flow through to the projections from 2011 onwards that were more optimistic than past results

Update using most current data

Current (2010) stock status

- The current (2010) spawning stock biomass is still at a very low level compared to pre-exploitation biomass levels (~ 5% of the pre-fishing state)

Update using most current data



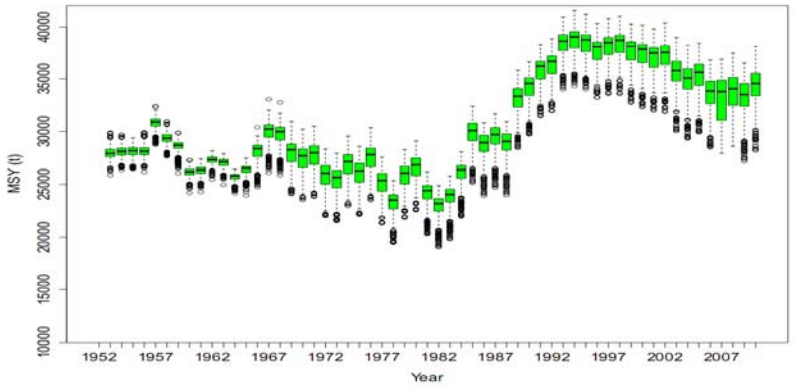
Recruitment and spawning stock biomass for the base case, showing the medians, quartiles and 90th percentiles, together with reference points of 20% of pre- exploitation spawning stock biomass (SSB_0) and the spawning stock biomass in 2004 (SSB_{2004}).

Evaluation of stock status with respect to reference points

Estimates of MSY

- Current MSY = 34,500 t (30,700 – 36,400), which is considerably higher than those estimated prior to most recent update of the OM
- Annual estimates of MSY vary greatly between early and late periods of the fishery, driven largely by changes in growth and selectivity and other inputs (aerial survey, CPUE, catch composition and the related impacts on the OM preference for steepness and natural mortality)

Estimates of MSY



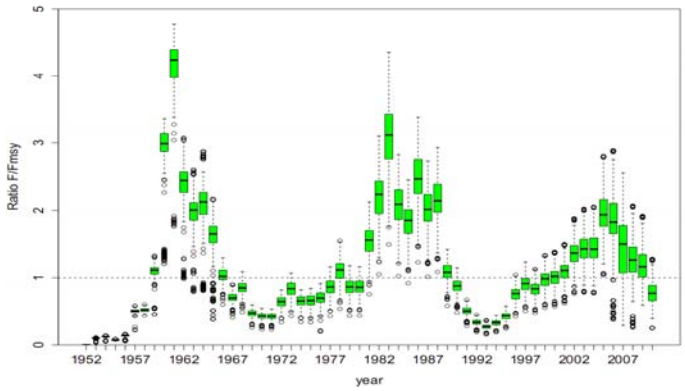
Estimated MSY based on annual age-specific mean weight and selectivity estimates as computed over the base grid of the operating model.

Current fishing mortality rate

Current fishing mortality rate

- Current F is now below FMSY, caused by:
  - Reductions in the global TAC in 2006 and 2009 resulting in reduced catches
  - Higher recruitment in the early 2000's for the past 4-5 years
- Maintaining F at a level below F_{MSY} means that overfishing is not occurring and is required for continued stock rebuilding

Current fishing mortality rate



Boxplots of average fishing mortality over the F_{msy} (for ages 2-15).

Responses to Additional Commission Requests

Replacement yield at 20% B0

- Constant catch that keeps the median SSB at 20% SSB_0 is 29,600 t
- This compares with MSY = 34,500 t, which corresponds to B_{MSY} of 24% of SSB_0

Trends in annual surplus production

- Trends in annual surplus production are consistent with trends in MSY and replacement yields
- The current surplus production is 27,200 t

Summary of current stock status

Maximum Sustainable Yield	34,500 t (30,700–36,400 t)[1]
Reported (2010) Catch	9547 t
Current Replacement Yield	27,200 t (22,200–32,800 t)
Current (2010) Spawner Biomass	45,400 (30,800–72,700
Current (2010) Depletion	0.055 (0.035–0.077)
Fishing Mortality/F_{msy}	0.77 (0.50–1.07)

[1]Median and range from lower 5th to upper 95th percentile of 320 models contained in the base case.

MP Implementation

MP Evaluations

MP evaluations

- The two MPs (MP 1 and MP 2) evaluated at the 2010 ESC meeting were re-evaluated against the updated OM in 2011
- The updated OM estimates a more productive stock due to higher steepness and recent good recruitments resulting in:
  - Neither MP could be tuned to the Initial Reduction Period (IRP) scenario
  - MP 2 had difficulty tuning to the more optimistic Operating Model for some runs

MP Evaluations

MP evaluations

- Both MPs were evaluated against the reference set and a series of 5 pessimistic robustness trials (which test for situations where reality is much worse than what is predicted in the model, e.g. much lower recruitment)
- The ESC agreed that both MPs performed well, and that there was little difference in their performance for the reference set
- For the robustness trails, the ESC noted mixed performance, with better or worse performance of one MP relative to the other
- Neither MP failed the robustness tests

Development of a joint MP

Development of a joint MP

•Given that MP 2 could not tune to all the tuning years, and that each MP performed better than the other for different robustness trials, a joint MP was developed that combines the best features of MP 1 and MP 2 into a single tuned MP (the "Bali Procedure" or BP for short)

•Key features of the BP are in Attachment 10 of ESC report

Development of a joint MP

Development of a joint MP

•The performance of the BP was compared against performance of MP 1 and MP 2

•For nearly all robustness tests, the BP performed better than MP 1 for the worst performance tests of MP 1 and better than MP 2 in the worst performance tests for MP 2

•The ESC agreed to recommend the BP for consideration by the EC

Bali Procedure results

Trade-offs between stock rebuilding and catch performance for tuning year, maximum TAC change, and TAC increase/no increase in first year were examined

•Tuning year – 2030, 2035, or 2040

Stock rebuilding

•2030 leads to more rapid rebuilding than other 2 years

Catch performance

•Earlier tuning means greater likelihood of lower average catches

•Early tuning increases up/down TAC behavior

Bali Procedure results

Maximum TAC change – 3000, 5000 t

Stock rebuilding

•3000 t max leads to more rapid rebuilding by 2025

Catch performance

•5000 t max leads to more inter-annual variation in catch

•5000 t max leads to higher likelihood of TAC increase followed by decrease in the first 2 and first 4 TAC decisions

•5000 t max leads to higher average catch between 2013 – 2025

Bali Procedure results

With or without TAC increase in first year of MP implementation

Stock rebuilding

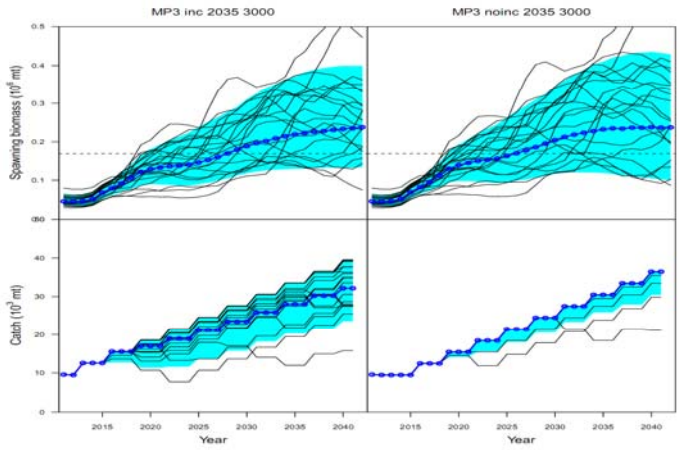
- Allowing increase results in MP meets rebuilding target
- Allowing increase slows rate of biomass rebuilding during 2011-2025

Bali Procedure results

Catch performance

- No increase reduces up/down TAC behavior from 2015-2021
- No increase reduces catch variation during 2013-2025
- No increase generally leads to lower catches from 2013-2025
- Allowing increase leads to higher max TAC decrease remainder of evaluation period
- Allowing increase leads to a 15% probability of a TAC decrease in 2015

Bali Procedure results



Projected spawning biomass (top row) and catch (bottom row) by the Bali Procedure (referred to in this figure as MP3) tuned to achieve a 70% probability of rebuilding to 0.2 SSB_0 by 2035 under the reference set.

Bali Procedure results

- Summary of performance of the BP
- The catch projections reach the interim rebuilding target of 0.2 SSB_0 with a 70% probability as specified by the tuning year
- An earlier tuning year, lower maximum TAC change and no TAC increase in the first TAC setting period leads to faster rebuilding, lower catches and lower probability of catch decreases in the short term
- Based on model results there is virtually no possibility of extinction under the recommended MP

SBT Assessment, Stock Status, and Management

Stock Status

- Current spawning stock biomass is very low (0.03 – 0.07 SSB0)
- However, there have been several positive signs about the outlook for the spawning stock and recruitment:

Stock

- Reduction in total reported global catch
- Current fishing mortality reduced and now below F_{MSY}
- Confirmation of increase in longline CPUE since 2007

Stock Status

Recruitment

- Increased scientific aerial survey and SAPUE indices
- Increased abundance of 1 year old SBT in scientific aerial survey for past 3 years and troll survey in most recent year
- Recent recruitments (2005-2011) estimated to be high, in contrast to weak cohorts in 1999-2002
- Increases in a number of CPUE indices in recent years, e.g. NZ domestic fishery and Japanese longline fishery for age classes 4 and 5

Management Recommendations

- The ESC recommends that the BP be adopted
- Based on the BP the TACs in the following table are recommended (assuming a 1-year time lag)
- Note: the no increase TAC results are not shown in the following table as the Recommended TAC for 2013-2015 is 9449 t in all cases

Management Recommendations

Tuning year	Maximum TAC change (t)	Increase in initial TAC setting	Recommended TAC (t) for 2013-2015
2035	3000	Yes	12449
2035	5000	Yes	13983
2040	3000	Yes	12449
2030	3000	Yes	12449

Management Recommendations

- The ESC strongly advises that any future TAC increases are considered in the context of an MP that reacts to data inputs
- If a zero lag is selected, the MP should be retuned, although difference in performance will be minor
- If the MP is implemented in 2011 with a 1-year lag, the ESC recommends that the current TAC of 9449 t remains in 2012 prior to implementation

Management Recommendations

- The ESC advises the EC that it could have additional flexibility by considering a smaller maximum TAC change for the first implementation only
- This could be incorporated together with any of the tuning year options, i.e. 2030, 2035, or 2040
- This would require retuning the MP prior to the EC meeting

Review of the 2012 Work Schedule

ESC Workplan for 2012

The proposed 2012 ESC workplan has the following elements:

- Evaluation of fishery indicators
- Consider the inclusion of new data sources and models, including:
  - ➢ Results from close-kin genetics analysis
  - ➢ Direct aging data
  - ➢ Results from global spatial dynamics project
  - ➢ Data from recent SRP tagging program

2011 -12 Proposed Workplan

Activity	Approximate Period	Resources or approximate budgetary implications[1]
Continuation of tag recovery efforts.	Tag recovery is continuous.	$10,550 for tag recovery as per draft budget in Attachment B of CCSBT-ESC/1107/05.
Provide SBT Stock Status repost to the other tuna RFMOs.	Aug – Nov 2011	N/A
Implement a version control system for the OM code and members clean up code as time permits	Begin 11 Nov 2011	Cost to be determined. Allocate 5 days by MP coordinator to provide advice on OM code
CPUE webinar to review progress of intersessional work in Attachment 5	Apr 2012	Work by Japan, Australia, NZ. Three panel days
Standard Scientific Data Exchange	Apr – Jul 2012	N/A
Provision of core vessel catch and effort data aggregated 5x5 and month	Jun – Jul 2012	Provision by Japan to requesting Member(s)

2011 -12 Proposed Workplan
(continued)

Activity	Approximate Period	Resources or approximate budgetary implications[1]
Update OM with Close-kin results	Jul – Aug 2012	Australia
Compile existing MP specifications for review by SC17	Aug 2012	Secretariat
Extended Scientific Committee for the 17th meeting of the Scientific Committee	5-6 days, first half of September 2012	ESC Chair, 2-3 panel members, full interpretation and 2-3 Secretariat staff

[1] These preliminary estimates will be refined in the proposed budget for 2012 that the Secretariat will submit to the Extended Commission

END