



Australian Government

Australian Fisheries Management Authority

Southern Bluefin Tuna Fishery

Strategic Research Plan

(2014-2018)

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SBTF 5 year Strategic Research Plan (2014-2018)

Introduction

The SBTF Strategic Research Plan aims to provide a framework that identifies the key strategic research needs for the five-year period 2014-2018 inclusive. The Strategic Research Plan will assist the SBT Management Advisory Committee (SBTMAC) to identify and support research that will help achieve management goals.

The Plan will include annual research priorities that detail the specific research topics of focus each financial year that have been identified by SBTMAC, with advice from the Research Sub-Committee (RSC).

The SBTF Strategic Research Plan takes into account the fact that Australia is a member of the CCSBT that is responsible for the international management of the global SBT stock. The objectives of CCSBT are to ensure, through appropriate management, the conservation and optimum utilisation of the global SBT fishery. Management arrangements agreed at CCSBT are implemented in the domestic fishery through the SBT Management Plan and associated legislative instruments. The CCSBT Extended Scientific Committee provides the stock assessment and scientific advice associated with the SBT stock. Historically research contributing to the SBTF has been commissioned by AFMA, the Department of Agriculture, FRDC, CCSBT and ACIAR. This strategic research plan focuses on the priorities identified by SBTMAC and AFMA.

At the eighteenth annual Commission meeting of the CCSBT in 2011 a Management Procedure (MP) was adopted that outlines a rebuilding strategy for the Southern Bluefin Tuna stock. The MP aims to achieve rebuilding of the stock to 20 per cent of the initial unfished biomass (the interim rebuilding target) by 2035, with 70 per cent probability. Elements of this research plan refer or link to Australia's obligations as a member of CCSBT.

AFMA Corporate goals and strategies

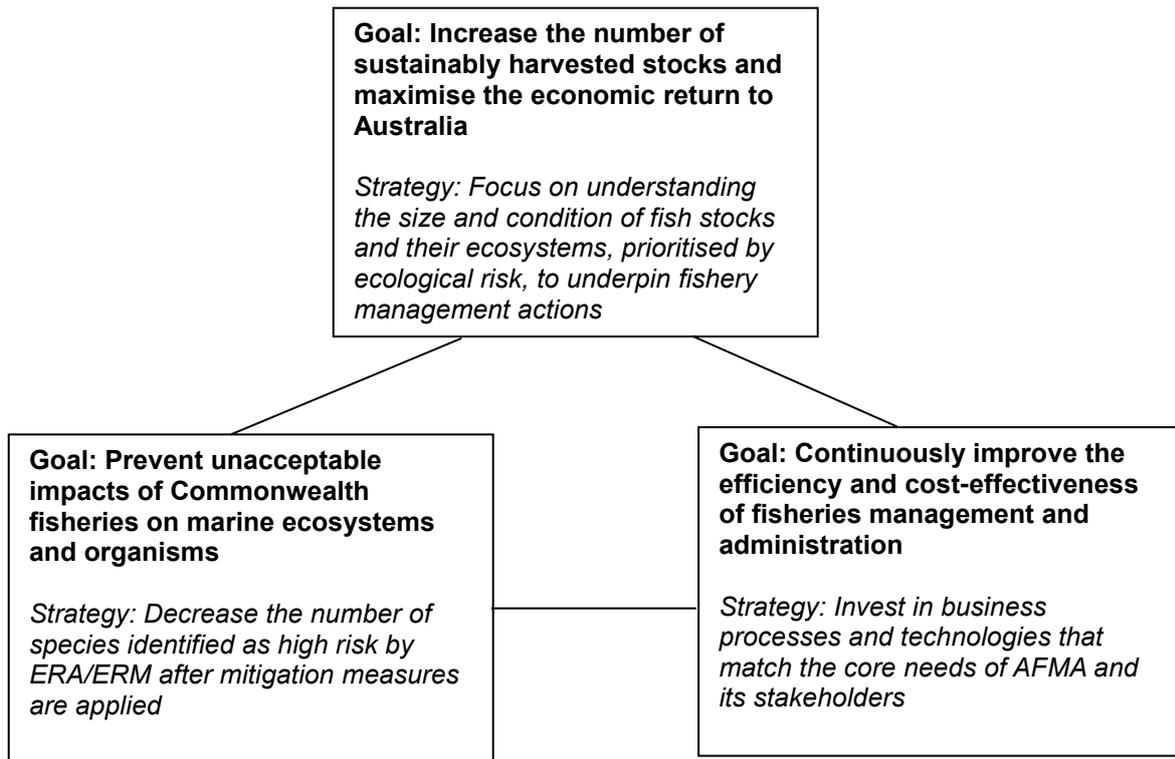
Research activities funded by AFMA must focus on attaining AFMA's primary management objectives, which are:

- i) to ensure the ecological sustainability of the fishery; and
- ii) to maximise the economic efficiency of the fishery.

AFMA has developed three research goals to assist in achieving these management objectives, which are outlined in Figure 1.

These research goals should act as a guide for SBTMAC in developing SBTF research plans, identifying research priorities for the annual call for research and assessing research proposals.

Figure 1. AFMA's corporate goals and strategies 2011-2016



Identifying research needs

Research activities must be consistent with AFMA's corporate goals and strategies and the drivers of research can be considered to fall into five categories:

Biological

Across AFMA's fisheries, biological and fisheries information is essential to adequately assess the stocks and estimate the size of sustainable harvests from those stocks.

In the SBTF this has been and continues to be a **strong driver** for research. Biological and fisheries information and research to underpin the assessment of the SBT stock and implementation of the management procedure are essential. The depleted state of the stock, its current listing as conservation dependent under the EPBC Act and the rebuilding target reinforces the need for robust assessments and scientific monitoring.

The CCSBT management procedure (MP) provides a scientific monitoring and assessment schedule (summarised below) that includes a MP run every 3 years to recommend the global TAC; annual status assessment and consideration of whether there are indicators of exceptional circumstances; and an in-depth stock assessment (reconditioning of the operating model) every 3 years.

There is also a need for research to address key uncertainties in the stock assessment (operating model) and continue to develop and implement robust indicators of the stock. Research that aims to increase the cost-effectiveness of monitoring and assessment approaches should also be a priority.

Research that contributes to understanding the broader environmental and ecosystem effects on the SBT stock, habitat and distribution are also considered under this driver.

Environmental

In general, information about the impact of fisheries on the marine ecosystem is essential to assist AFMA achieve our objective of ensuring Commonwealth fisheries are ecologically sustainable. Ecological risk assessments (ERAs) are a central component of the Ecological Risk Management (ERM) framework and are conducted on all Commonwealth fisheries. The results of ERAs assist in identifying and prioritising research needs regarding fishery impacts on the marine ecosystem, and in guiding research investment, data collection, monitoring, and future management decisions.

In the SBTF this is a **weaker driver** for research, while noting the need for continued scientific monitoring in line with the 2009 SBTF ERM work plan.

The ecological effects of fishing in the SBTF addressed here focus on the purse seine fishery. The purse seine fishery takes ~ 98 per cent of the SBT catch. There is some catch of SBT in pelagic longline operations, however, the research associated with this is dealt with in the Australian Longline Tuna and Billfish Fishery (ALTBF) ERA reports, ERM work plan and the ALTBF Strategic Research Plan.

The 2009 SBTF ERM report concluded that the ecological effects of fishing in the SBTF are minimal and are largely due to the small incidental capture of non-target species (including the capture of protected species). Purse seining was found to have no direct impact on the physical marine environment.

The level 3 SAFE assessment on chondrichthyans and teleosts identified no non-target species to be at high risk to the effects of fishing. The level 2 PSA identified three species at high risk (Dusky Shark, White Shark and Southern Bluefin Tuna) all of which were reduced to either low or medium risk through the level 2 Residual Risk process. While 182 threatened, endangered or protected (TEP) species were assessed as occurring in the area of the SBTF, no TEP species were found to be at high risk through the ERA process. Consistent with AFMA's objectives, and good fisheries management practices all steps will be taken to minimise interactions with these species within the fishery.

The ERM priority for the SBTF is to maintain and build on the monitoring already conducted in the fishery. By continuing to monitor aspects of the fishery such as bycatch, discarding and interactions with TEP species AFMA will be able to adequately respond to issues in the fishery in an adequate and timely manner.

Legislative

There are a range of legislative and international requirements which influence research activities in the SBTF. Research priorities must be consistent with AFMA's other research programs, International obligations under the Convention for the Conservation of Southern Bluefin Tuna and obligations under the *Environment Protection and Biodiversity Conservation Act 1999*.

This is a **strong driver** of research in the SBTF, with the research primarily related to the fisheries biology and monitoring.

Southern Bluefin Tuna is listed as conservation dependent under the EPBC Act 1999. The listing advice evaluated the measures outlined in the *Resolution on the Total Allowable catch and future management of Southern Bluefin Tuna* of the 16th meeting of the Extended CCSBT and considers that they could be effective in halting further decline and supporting the recovery of SBT in order to maximise its chance of survival in nature. The CCSBT Management Procedure provides the rebuilding plan for SBT.

Over time, there may be research associated with this status and the conditions of the SBTF wildlife trade operation approval.

As a member of the CCSBT Australia has obligations with respect to data exchange and national reporting, as well as participation in the Extended Scientific Committee and Ecologically Related Species Working Group.

Economic

Many factors influence the overall economic performance of the fishery. In general, AFMA require an understanding of the effects of economic changes to manage Commonwealth fisheries to maximise economic efficiency.

Currently, this is a **weaker driver** of research in the SBTF. However, in considering research priorities, activities that aim, or have the potential, to increase the cost-effectiveness of monitoring and assessment approaches should be a priority.

Social

In general, research into the social aspects of Commonwealth fisheries can contribute to consideration of maximising the social benefits. Social research aspects may include investigating access to the resource and resource allocation issues.

Currently this is a **weaker driver** of research in the SBTF.

Performance Indicators

The effectiveness of the Strategic Research Plan should be measured through appropriate performance indicators and the SBTMAC will consider the development of these in 2014.

The CCSBT Management Procedure

In 2011 CCSBT adopted an agreed MP (also known as the 'Bali procedure') to recommend the level of the global TAC to the CCSBT. The MP has been implemented from 2012 and is the analogous of a harvest strategy. The CCSBT MP specifications (Attachment 15 of CCSBT 2012) outline the required data inputs, which include the scientific aerial survey index. The specifications also outline the cycle of MP runs to generate the TAC (every 3 years), in-depth stock assessment (every 3 years, not coinciding with years when a new TAC is calculated from the MP) and formal review of MP performance (after 6 years, not coinciding with years when a new TAC is calculated from the MP).

During the life of this SBTF Strategic Research Plan (2014-18), the MP specifies the following stock monitoring and assessment schedule:

Annual Review of stock and fishery indicators (including the scientific aerial survey index) and any other relevant data or information, for evidence of exceptional circumstances.

2014 In depth stock assessment (including reconditioning of the operating model with new and updated data). The technical work to enable an in depth stock assessment in 2014, commenced in 2012, with the inclusion of new data and the specifications for the OM and data updates were concluded at the 4th OMMP technical meeting (July 2013) and the 2013 ESC. There is intersessional work required to conduct the exploratory analyses and conduct the assessment, with an OMMP technical meeting scheduled for June-July 2014, to ensure the 2014 ESC is able to complete the in depth stock assessment.

The 2013 meeting of the Commission requested the ESC also conduct sensitivity analyses around all sources of unaccounted catch mortality and provision of preliminary advice on the impact of any unaccounted catch mortalities on the stock assessment projections and possible MP recommendations beyond the 2015-17 quota block.

On the basis of the assessment, indicators and any other relevant information, determine whether there is evidence for exceptional circumstances. For example, exceptional circumstances could be indicated if the stock assessment indicates that the stock is outside the range of projected stock trajectories considered in the MP evaluations.

2016 MP scheduled to be run to recommend the annual TAC for the years 2018-20 for consideration by the Extended Commission.

2017 First formal review of MP performance, including consideration of whether there are indications of any need or not, to revise the current MP. Initial discussion of potential performance criteria for the formal review are likely to commence at the 2015 ESC, to provide recommendations for consideration by the Extended Commission at their 2016 meeting. It is likely that the 2016 ESC would discuss the work needed to measure performance against the agreed criteria, so that the results are available for consideration in 2017.

If there is a decision to revise the MP, there is likely to be work required to develop this over the following 2-3 years.

2017 In depth stock assessment (including reconditioning of the operating model with updated data). The technical work to enable an in depth stock assessment in 2017 is likely to commence in 2016 and the scale of work program likely to depend on

whether there are new data for inclusion in the operating model. There may be a need for an inter-sessional technical meeting prior to the 2017 ESC.

On the basis of the assessment, indicators and any other relevant information, determine whether there is evidence for exceptional circumstances.

SBTF Research Framework

The SBTF Strategic Research Plan is structured around research activities, including:

- 1) Scientific monitoring;
- 2) MP implementation;
- 3) Stock assessment (OM development); and
- 4) Research activities that aim to improve scientific monitoring or address key uncertainties in the stock assessment, MP or annual status advice.

1. **Scientific monitoring.** This includes fishery dependent and independent monitoring that forms the basis of the annual advice on SBT stock status and management recommendations and the key data series in the OM and MP. This includes the required data provision under CCSBT. These are on-going activities that generally require annual updates, including:
 - i) Characterisation of catch
 - ii) Abundance Indices
 - a) Recruitment
 - b) Sub-Adults
 - c) Spawning biomass
 - iii) Biological parameters

The SBTF Strategic Research Plan identifies research to address areas of uncertainty or alternative, more cost-effective approaches to monitoring, generation of abundance indices or data collection.

2. **CCSBT Management procedure implementation.** The MP is analogous to a harvest strategy for the SBTF. The MP specifications (CCSBT 2012, Attachment 7) identify regular activities required over the next five years. The SBTF Strategic Research Plan identifies research to improve future MPs or associated with the implementation of the current MP.
3. **Stock assessment (OM development).** The current MP requires an in-depth stock assessment every three years. The technical work to complete the 2014 in-depth stock assessment commenced in 2013. Intersessional work is required in 2014 to complete the assessment. In line with the three-year cycle of stock assessments and objective of providing a robust assessment of the SBT stock, the research activities that address key uncertainties for future stock assessments have been identified.

Economic and/or Social Research. The current SBTF Strategic Research Plan does not identify specific economic or social research activities. However, in prioritizing research activities consideration has been given to the potential of the activities to contribute to more cost-effective monitoring, assessment and MP implementation. In addition research activities that provide a potential opportunity for capacity building for other CCSBT members, and thereby broaden the contributions to research and monitoring of the fishery have also been identified.

Research Priority Areas and Needs

The following research areas have been identified as **essential and high priority** needs for the next five years by SBTMAC with input from the SRC. These are consistent with AFMA's strategic goals and priorities and are not listed in order of priority.

Provision of Data

- Provision of scientific and fishery monitoring data and indices to enable the implementation of the MP, annual status assessment and tri-annual stock assessments and meet Australia's reporting and data exchange obligations (Table 1).

Risks if not undertaken:

- *Substantially increased uncertainty around stock status and fishery management decisions*
- *if MP indices are not available this is likely to trigger exceptional circumstances and the MP may not be able to be used to recommend the global TAC*
- *if data are not available for the tri-annual stock assessment, the assessment will be less robust, which may have implications for exceptional circumstances*
- *if Australia does not meet the reporting and data exchange obligations there maybe CCSBT compliance ramifications.*

Biological Research Priorities

- Stock assessments (OM Development) (Tables 1 and 2)
 - Ensure annual status assessment is robust and based on the most up to date indicators and data.
 - Ensure three-yearly cycle of in-depth stock assessment (2014 and 2017) is conducted, robust and based on the most up to date indicators and data. Including sensitivity analysis around all sources of unaccounted catch mortality and the influence on projections.
 - Research towards addressing, key uncertainties specifically:
 - Information on total removals: recreational catches and mortalities
 - Understanding the proportion of the juvenile population that move into the GAB
 - Evaluation of the costs and benefits of sampling designs for continued close-kin data (design study), providing an index of abundance for the spawning biomass.

Risks if not undertaken:

- *Annual status assessments and in-depth stock assessments will depend on research provided by other CCSBT member scientists.*
- *Increased uncertainty in stock assessments will increase uncertainty around stock status and fishery management decisions. This may compromise the ability to demonstrate rebuilding of a conservation dependent species.*
- *Robust information on total removals is required for an understanding of the productivity of the stock*
- *If the assumptions around the population structure of juveniles are not correct this will influence the robustness of the stock assessment*
- *If the design study for future close-kin is not undertaken, further development on a cost effective index of spawning biomass will not occur. There is a risk of not maximising the benefits obtained from the close-kin investment to date.*
- Environmental influences on juvenile distribution (Table 2)
 - Investigate the oceanographic and environmental factors impacting on the distribution of SBT and the scientific aerial survey index (Medium).

- Investigate the potential impact of seismic surveys on the distribution of SBT and the scientific aerial survey index.

Risks if not undertaken:

- *If oceanographic and environmental factors or seismic surveys impact the distribution of juvenile SBT, they may influence the scientific aerial survey index. This index is one of the two indices used in the MP and the only fishery independent index. It is also a key input to the stock assessment.*

Environmental Research Priorities

- Monitoring of Bycatch and By-product in line with the SBTF ERM report (2009)

Risks if not undertaken:

- *Reduced ability to demonstrate the low risk of the surface fishery to bycatch and by-product species.*

Legislative Research Priorities

- Scientific monitoring and data provision (discussed above)
- Management Procedure implementation (Tables 1 and 2):
 - Annual review of whether there are indicators of exceptional circumstances
 - Consideration of the implications of the in-depth stock assessments (2014 and 2016) for the MP
 - 2016 MP run to recommend the 2018-21 global TAC
 - Preparation for and input to the first formal review of MP performance (2017).

Risks if not undertaken:

- *Implementation of the MP would be reliant on scientific representatives of other members.*
- *Lack of implementation of the MP would reduce certainty for industry, as there is less likelihood of three-year TACs, it would also compromise the science-based process for recommending TACs.*
- *Implementation of the MP is central to the rebuilding strategy for SBT as a conservation dependent species.*

Economic and Social Research Priorities

- Alternative measures of juvenile recruitment, with the first stage an evaluation of the cost effectiveness and possible sampling designs for gene tagging program (Table 2). The aim is to determine if there are more cost effective approaches that may reduce the long term monitoring cost.

Risks if not undertaken:

- *Lack of a basis to determine if there are more cost effective approaches to monitoring juvenile recruitment.*

Prioritisation of research activities

- Essential:** this research is essential to meeting AFMA's primary objectives and/or Australia's obligations as a member of CCSBT. This includes elements specified in the CCSBT management procedure.
- High:** this research directly addresses key uncertainties that impact the MP, stock assessment (OM) or the monitoring of the fishery. If this research is not undertaken the science-base for management decisions has increased uncertainty.
- Medium:** this research addresses some key uncertainties but the impact on the robustness of the management decisions is less.
- Longer term:** this research may be important in a longer time period than this plan (2014-18) but is not a priority for the current plan.

Scientific monitoring and annual work program activities

Table 1: The scientific monitoring and annual work program activities, necessary to meet AFMA's primary objectives, provide input to the CCSBT MP, OM, stock status assessment and meet data submission and reporting requirements.

Activity	SBTF Priority	Input to	Current process (2013)	Risk if not undertaken
1. Ongoing scientific monitoring				
<i>j) Characterization of catch</i>				
Catch amount & fleet dynamics	Essential	OM and annual status advice	Logbook catch and effort, observer data, SAPUE index. Reported by ABARES (FRRF) and CSIRO (SAPUE)	Fundamental information for management and input to assessments. Not meeting Australia's reporting and data submission obligations to CCSBT.
Size structure	Essential	OM and annual status advice	Length frequency samples scaled up to whole catch. Reported by ABARES (FRRF)	Fundamental information for management and input to assessments. Not meeting Australia's reporting and data submission obligations to CCSBT.
Age structure <ul style="list-style-type: none"> Age-structure of Australian catch 	Essential	OM and annual status advice.	Generation of catch at age for Australian fisheries is currently undertaken by CSIRO 2013/14 as part of AFMA inter-sessional science project)	Inability to conduct the assessment and not meeting Australia's reporting and data submission requirements.
<ul style="list-style-type: none"> Annual collection and archiving of otoliths from the Australian fishery 	Essential	OM and annual status advice. Historically there has been a change in growth rates and this monitoring	Undertaken by CSIRO (Project: Archiving of hard parts for SBT) 2013/14)	Inability to assess changes in size at age.

Activity	SBTF Priority	Input to	Current process (2013)	Risk if not undertaken
		is needed to detect if this occurs again.		
<ul style="list-style-type: none"> Ageing of otoliths and generation of updated age-length keys for the Australian fishery. The frequency at which this needs to be done (annually, every 2nd year, etc) should be examined. 	High	OM and annual status advice. Simulation testing with the current OM, to determine how frequently updated age-length keys are required could identify efficiencies.	Undertaken by CSIRO (Project: Archiving of hard parts for SBT) 2013/14)	Inability to assess changes in size at age. Potentially increased uncertainty in the assessment, as reliant on "old" age-length keys.
Scientific observer program	Essential	Data validation and ERSWG assessments	Reported by ABARES (FRRF)	
ii) Abundance Indices				
a) Recruitment				
Scientific Aerial Survey	Essential	OM, MP and annual status advice	Undertaken by CSIRO (Project: Aerial survey in the Great Australian Bight (GAB) 2013; Aerial survey in the Great Australian Bight (GAB) 2014) that includes a contribution from CCSBT Total cost ~\$800k per year but may be reduced due to changed structure of contracting hardware.	One of the two indices on which the MP is based, may result in exceptional circumstances if not available.
Commercial SAPUE index	High	Annual status advice, fleet dynamics; if in the worst case scenario the scientific aerial survey does not take place one year this provides some information for that year.	Generated by CSIRO (Project: Aerial survey in the Great Australian Bight (GAB) 2013; Aerial survey in the Great Australian Bight (GAB) 2014) Small analysis cost as part of Scientific aerial survey project	No immediate impact. Not available for annual indicators analysis, nor contingency for lack of scientific aerial survey.
b) Sub-adults				
Monitoring and review of the core CPUE for the MP	Essential	OM, MP and annual status advice	Undertaken by Japan and CPUE Working Group; ABARES participation (FRRF); CSIRO participation (CSIRO).	One of the two indices on which the MP is based. May result in exceptional circumstances if not available. Procedure
Monitoring series ('reduced base' and 'shot by shot' stated	Essential	Annual status advice and MP implementation	Undertaken by Japan and CPUE Working Group; ABARES	Specified in the MP. Potential for inappropriate CPUE series to be adopted as monitoring

Activity	SBTF Priority	Input to	Current process (2013)	Risk if not undertaken
in the MP specifications			participation (FRRF); CSIRO participation (CSIRO).	series.
c) Spawning biomass				
Indonesian catch and effort data from observer program	High	OM and annual status advice Potential opportunity for capacity building and further collaboration	Provided by Indonesia Builds on capacity development work of CSIRO/ ACIAR/ AusAID/ DAFF projects, including PhD project.	Only fishery that occurs on the spawning ground.
<i>iii) Biological parameters</i>				
Age-length relationship	Essential	OM and annual status advice	See Age structure under catch composition	
2. MP Implementation				
Review of exceptional circumstances	Essential	MP and annual status advice	Annual review of indicators and exceptional circumstances. Undertaken by CSIRO (Inter-sessional Science Project 2013/14) & ABARES (FRRF)	Central to the effective implementation of MP and confidence internally and externally of CCSBT.
Consideration of the implications of the 2014 updated assessment for the MP. Are the individual grid and assessment results outside the range that the MP was tested for?	Essential	MP implementation	2014	Breaches the MP agreed implementation and would, therefore, trigger exceptional circumstances.
2016 MP run to recommend 2018-21 TAC	Essential	MP	2016	No agreed TAC advice from ESC.
Review of MP performance (2017) Likely elements: <ul style="list-style-type: none"> 2015 ESC consider draft performance measures (stock assessment outcomes and expectations of recovery; management and industry perspectives; new science 	Essential	MP	2015 – 2017 Substantial piece of work	First formal review of MP performance, so required for demonstrating it is achieving the objectives and working effectively.

Activity	SBTF Priority	Input to	Current process (2013)	Risk if not undertaken
inputs) and recommend to the Commission <ul style="list-style-type: none"> 2016 ESC workplan to deliver performance measures for consideration at 2017 ESC. 				
3. Stock Assessment (OM development)				
Revised stock assessment/reconditioning of the operating model (2014) Intersessional work for the OMMP5 workshop and delivering the revised assessment to 2014 ESC.	Essential	OM 2014, in depth stock assessment as described in the MP specifications including projections and analysis of impacts of unaccounted for mortality.		Breaches the MP agreed implementation and would, therefore, trigger exceptional circumstances. Need to define/develop approach for TAC recommendation at short notice. Difficult for ESC to develop consensus advice for Commission on MP implementation for 2016-17.
CCSBT 20 Request for conduct of sensitivity analysis around all sources of unaccounted catch mortality and provide preliminary advice on the impact of any unaccounted catch mortalities on the stock assessment projections and the possible MP recommendation beyond the 2015-17 quota block.	Essential	OM 2014 and consideration of exceptional circumstances		Needed to provide advice on stock status and the impact of unaccounted catch mortality. Potentially reduced confidence in the stock assessment.
Revised stock assessment (2017)	Essential	OM 2017	Likely to commence in 2016	As above, likely to contribute to the first formal review of the MP (2017).

Strategic research priorities (2014-19)

Table 2. Strategic research activities that have been identified to improve scientific monitoring and address key uncertainties in the stock assessment, annual status and future MP development/refinement. The relative priorities from the SBT MAC are shown.

Activity Potential research	Relevance	Timeframe	SBTF Priority	Related research	Risk
1. Scientific monitoring					
i. Characterization of catch (Future)					
<i>Catch amount</i>					
Robustness of total mortality data (all fleets)	Critical to estimates of total mortalities for OM and annual status advice; management procedure assumes the catch taken is the TAC.	Ongoing	High/ Essential	<ul style="list-style-type: none"> Partially addressed through regular review as part of ESC (ABARES & CSIRO) Information from the Compliance Committee 	<p>Increased uncertainty in stock status.</p> <p>MP may not achieve rebuilding objective due to under-estimation of total removals.</p>
Mortalities from fleets outside of CCSBT.	Improved estimate of total mortalities for the 2014 OM and annual status advice.	2013-14	Medium	<ul style="list-style-type: none"> Information from the Compliance Committee. 	<p>Increased uncertainty in stock status.</p> <p>MP may not achieve rebuilding objective due to under-estimation of total removals.</p> <p>Loss of economic returns to industry.</p>
Information on total removals: recreational catches and mortalities	<p>Improved estimate of total mortalities for the 2014 OM and annual status advice</p> <p>Recommendation of the WTO</p>	Ongoing	High	<ul style="list-style-type: none"> NZ led process for incorporation in 2014 stock assessment Development of methods for obtaining national estimates of recreational catch (ABARES/FRDC project 2012/022; 2013-15) Assessing post-release survival of SBT from recreational fishing (IMAS/FRDC project 2013/025) 	As above
Information on total removals: longline fleet releases/ discards & associated mortalities	Improved estimate of total mortalities for the 2014 OM and annual status advice	Ongoing	High	<ul style="list-style-type: none"> NZ led process for incorporation in 2014 stock assessment. It will require review and assessment of the suggested process. 	As above.
<i>Age structure</i>					

Activity	Relevance	Timeframe	SBTF Priority	Related research	Risk
Potential research Feasibility of moving towards catch at age data rather than using cohort slicing in the OM.	Improved estimates of recruitment and selectivity from the longline fisheries, OM and annual status advice. Low cost for Australian data (as available). However, it would require changes to OM.	Longer term (dependent on appropriate sampling across all fleets)	Low (as ESC has concluded that it is not likely there will be sufficient sampling coverage for longline fleets in the short-medium term)	Australian data collected by CSIRO (Project: Archiving of hard parts for SBT 2013/14).	Uncertainty in the estimation of year class strength and recruitment variability. There may be an alternative through genetic tagging of juveniles.
Age structure - Indonesian catch	OM and annual status advice Potential opportunity for capacity building and further collaboration	On-going	Essential But not necessarily funded through AFMA research funds.	Collection in Indonesia, archiving and ageing (in Australia) Undertaken by CSIRO (Project: Archiving of hard parts for SBT 2013/14)	The use of "old" age-length keys has potential for increased uncertainty in the assessment.
ii. Abundance indices					
a) Recruitment					
Proportion of juvenile population that move into the Great Australian Bight (otolith microchemistry, gene tagging)	Juvenile population structure and assumptions for recruitment indices and close-kin analysis.	Prior to 2017	High	• Initial research to detect within year location signals in otolith microchemistry is underway (CSIRO)	Potentially biased estimation of recruitment and year class strength if current assumption is not correct. This could result in the MP not meeting the rebuilding objective.
Collaborative (with interested members and CNMs) design study based on simulation testing within the current OM framework to evaluate relative cost effectiveness and possible sampling designs for gene tagging program (to address proportion of juveniles that move into GAB; provide an index of absolute juvenile abundance)	Stock structure; estimates of absolute abundance for cohorts for the OM; potentially more cost-effective index of recruitment (and absolute) for future MP inclusion. Potential opportunity for capacity building with other members and CNMs	2014-15	High	Note potential for CCSBT funding in 2015 (see FAC report CCSBT 20)	Limits consideration of alternative, possibly, more cost-effective approaches for recruitment monitoring. Lack of contingency for the scientific aerial survey.

Activity	Relevance	Timeframe	SBTF Priority	Related research	Risk
Potential research					
Alternative measures of absolute juvenile recruitment (gene-tagging)	Estimates of absolute abundance of cohorts for the OM; potentially more cost-effective index of absolute recruitment for future MP inclusion	Dependent on the outcomes of the design study. 2015-2016 would be the earliest.	High		See above
Impact of environmental variation on the scientific aerial survey index	Improved relative recruitment index; MP implementation		Medium	<ul style="list-style-type: none"> The project Forecasting spatial distribution of SBT habitat in the GAB (CSIRO FRDC TRF), may provide some information on this 	Potential uncertainty in recruitment index, which is one of the two indices in the MP and provides input to the OM.
Impact of seismic surveys on scientific aerial survey index	Improved relative recruitment index; MP implementation		Medium		As above
b) Sub-adults					
Exploration and refinement of alternative CPUE monitoring series; and changes in core longline fleet operations over time	MP implementation and OM	Ongoing	High	<ul style="list-style-type: none"> Undertaken by Japan and CPUE working group ABARES (FRRF) generate CPUE monitoring series and review the CPUE series and fleet dynamics 	
Standardised CPUE series for other longline fleets (e.g. Taiwanese & Korean fleets)	Annual status advice	Ongoing	Medium	<ul style="list-style-type: none"> Taiwan, Korea and Japan progressing 	
c) Spawning biomass					
Close-kin genetics approach, collaborative design study using simulations with current OM framework to evaluate the costs and benefits of sampling designs for continued close-kin data	To inform future collection and processing for input to OM; long-term possible additional index for MP. Potential opportunity for capacity building with other members and CNMs.	2014-15	High	CCSBT20 agreed to fund a collaborative design study.	Monitoring is not continued and the ability to provide an index of the spawning stock is lost, not building on the investment in close-kin genetics research to date.

Activity	Relevance	Timeframe	SBTF Priority	Related research	Risk
Potential research Collection of further close-kin samples	To take advantage of present opportunity given the genotyping done to date.	2014 & on-going dependent on design study	High	CCSBT20 agreed to fund.	Collection is relatively low cost and can't be undertaken retrospectively.
Processing of additional close-kin samples (currently archived)	Need to take advantage of present opportunity and capacity to process samples efficiently and with high QC.	Dependent on design study outcomes	High	The advantage of processing these samples is that it would provide sufficient "matches" that would result in further precision in the estimate of spawning abundance for the 2014 assessment.	Potentially increased cost to process samples at later date.
Updating close-kin estimation (trend)	To update stand alone close-kin assessment and potential future index for MP	Dependent on design study, longer term (prior to 2017)	High		Potential loss of fishery independent index of spawning stock.
Alternative genetic approach (SNPs)	Cost savings with newer technologies and synergies with gene tagging program. Potential opportunity for capacity building and collaboration with other members and CNMs.	3 – 5 years	Medium	There is a range of current research addressing this issue more generally (i.e. other than for SBT).	May be an additional cost associated with moving from microsatellite markers (for close-kin) to SNPs (for genetic tagging). This is likely to be small to moderate, relative to the investment already made in the current microsatellite technology.
iii. Biological parameters					
Independent estimate of maturity schedule	Defining effective reproductive contribution in the OM for estimate of MSY	Sample collection and storage (Age 8+) Processing once sufficient samples are available (Medium)	High Medium	<ul style="list-style-type: none"> Proposed sample collection by observers on longline fleets See Farley et al 2013 paper on method for identifying maturity markers in resting Albacore. 	Increased uncertainty (potential bias) in estimated long-term yield.

Activity	Relevance	Timeframe	SBTF Priority	Related research	Risk
Potential research					
Understanding within season spawning behaviour and potential skip spawning behaviour (e.g. electronic tagging approaches and otolith microchemistry for spawning frequency)	Defining effective reproductive contribution in the OM Potential opportunity for capacity building with other members	Dependent on outcomes of initial otolith microchemistry work.	Longer term	<ul style="list-style-type: none"> Otolith microchemistry (initial research by CSIRO) 	
2. MP Implementation					
MP retuning or redevelopment – dependent on outcomes of formal performance review (2017)	Preparation for first formal review of the MP (2017)	2018-	Essential/High		
Feasibility of alternative indices for input to the MP (estimated trends from the stand-alone close kin assessment)	For revised MP	Dependent on performance review and outcomes of other research.	Longer term		
3. Stock Assessment (OM development)					
Selectivity of the fishery on the spawning grounds. Collation and analysis of current data and information on investigations of fleet operations (shifts in targeting, spatial temporal distributions in effort, species composition, hook setting depth)	OM – basis for domed selectivity and defining effective reproductive contribution	2014, prior to OMMP meeting	High	<ul style="list-style-type: none"> Builds on capacity development work of CSIRO/ACIAR/AusAID/DAFF projects, including PhD project Indonesia requested to undertake collation and analysis of current data 	No further basis to resolve dome-shaped selectivity/senescence issue in OM.
Mortality estimates for mature fish (10+ years old)	Current OM does not have data sources that provide substantial information on M10. There may be potential to address this through the close-kin analyses		Longer term	Could be considered in the close-kin design study.	
Improved information on cohort abundance, fishing mortality and natural mortality (e.g. gene-tagging approaches)	OM – mortality estimates, particularly for 4-10 year olds		Longer term	Could be considered in design studies	

Activity	Relevance	Timeframe	SBTF	Related research	Risk
Potential research Evaluation of the costs and benefits of a spatially explicit stock assessment (dependent on stock structure and other research)	OM	Depends on outcomes of stock structure and other research	Longer term		
Incorporation of SRP tagging data from 2000s (requires a spatially explicit model)	OM	Longer term if move to spatial OM	Longer term		

Current and recently completed SBTF related projects

Project title	Years
Archiving of hard parts for SBT in 2013/14 (AFMA)	2013
Aerial survey in the Great Australian Bight (GAB) 2013; 2014 (AFMA – DAFF- CCSBT)	2013
Intersessional science 2012-13 (AFMA)	2013
National data/report submissions and scientific engagement 2012-13 (ABARES)	2013-14
Fishery-independent estimate of spawning biomass of southern bluefin tuna through identification of close-kin using genetic markers (CSIRO – FRDC 2007/034)	2006-13
Forecasting spatial distribution of SBT habitat in the GAB (CSIRO - FRDC TRF)	2013-15
Great Australian Bight Science Research Program	2013-17
Assessing post-release survival of SBT from recreational fishing (IMAS - FRDC 2013/025)	2013-15
Development of methods for obtaining national estimates of recreational catch of SBT (ABARES - FRDC 2012/022)	2013-15
Recreational value of SBT recreational fishing (Victoria)	2012-13