



Australian Government

Australian Fisheries Management Authority

**Tropical Tuna and Billfish Fisheries
Resource Assessment Group
TTRAG 20**

Meeting Minutes

21-23 March 2018

Canberra

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1 Preliminaries

1.1 Welcome and Apologies

1. The Chair, Dr Cathy Dichmont, opened the TTRAG 20 meeting at 8:30am.
2. The following participants were in attendance at the meeting:

Members	
Dr Cathy Dichmont	Chair
Dr Don Bromhead	AFMA Member
Dr Robert Campbell	Scientific member, CSIRO
Dr Rich Hillary	Scientific member, CSIRO
Mr James Larcombe	Scientific member, ABARES
Mr John Abbott	Industry member (attended days 2 & 3 only)
Mr Pavo Walker	Industry member
Dr Julian Pepperell	Recreational fishing member
Dr John Tisdell	Economics Member, UTAS
Invited Participants	
Mr Paul Williams	Industry
Observer	
Mr Adam Whan	Industry
Mr Trent Timmiss	AFMA
Ms Natalie Rivero	AFMA
Dr Jason Hartog	CSIRO (attended days 2 & 3 only)
Dr Alistair Hobday	CSIRO (attended day 3 only)
Dr David Mobsby	ABARES (attended days 1 & 3 only)
Dr Robert Curtotti	ABARES (attended days 1 & 3 only)
Executive Officer	
Ms Stephanie Martin	AFMA
Members not present	
Mr Gary Heilmann	Industry
Mr David Ellis	Industry Invited Participant

1.2 Pecuniary interest declarations

3. The Chair asked all participants present at the meeting to declare any conflict of interest with the agenda items. Each participant with a declared conflict of interest was then asked to leave the room while the remaining members discussed their individual claims.
4. The attendees declared their conflict of interests as follows:

Member/ participant	Declared Interests
Mr John Abbott	Owns an ETBF boat SFR, and ETBF quota SFRs, and also holds a state licence fish receiver permit. <i>Declared an interest in Agenda items 3, 5.4 and 6.</i>
Mr Don Bromhead	Employee of AFMA, which includes a salary. Is the Manager of the tropical tuna fisheries. No pecuniary interest in tropical tuna fisheries. <i>No conflict of interest declared.</i>
Dr Robert Campbell	Employee of CSIRO, no pecuniary interest in Australian tropical tuna fisheries. Is actively engaged in research on the Eastern and Western Tuna and Billfish Fisheries. PI of the following research project: “ <i>Data management, provision of fishery indicators and implementation of the harvest strategies for Australia’s tropical tuna fisheries</i> ”. <i>No conflict of interest declared.</i>
Dr Cathy Dichmont (Chair)	Has a consulting company, but has no pecuniary interests in the tuna fisheries. <i>No conflict of interest declared.</i>
Mr David Ellis	Previously involved in the Southern Bluefin Tuna Fishery, has a consultancy company and is the CEO of the industry association, Tuna Australia. <i>Did not attend TTRAG 20.</i>
Mr Gary Heilmann	Industry member, director of a processing company, no longer holds ETBF boat or quota SFRs. <i>Did not attend TTRAG 20.</i>
Dr Rich Hillary	Employee of CSIRO, no pecuniary interest in Australian tropical tuna fisheries. Is the PI for the Management Strategy Evaluation (MSE) project for the tropical tuna and billfish species. <i>No conflict of interest declared.</i>
Mr James Larcombe	Employee of ABARES, involved in fisheries research, primarily through engagement with the Western Central Pacific Fisheries Commission. Has no pecuniary interest in the Australian Tropical Tuna Fisheries. <i>No conflict of interest declared.</i>
Dr Julian Pepperell	Independent fisheries consultant and representative of the recreational fishing sector. Is currently undertaking research into game fishing. Is involved in projects including the monitoring of fish landed at game fishing tournaments and pop-up satellite tagging on juvenile Black Marlin. <i>No conflict of interest declared.</i>
Ms Stephanie Martin	Employee of AFMA, which includes a salary. Is the Executive Officer for the TTRAG, but has no pecuniary interest in Australian tropical tuna fisheries. <i>No conflict of interest declared.</i>

Professor John Tisdell	Employee at the University of Tasmania and is a scientific member of the Great Australian Bight Resource Assessment Group (GABRAG). Has no pecuniary interest in tropical tuna fisheries. <i>No conflict of interest declared.</i>
Mr Pavo Walker	Owns several ETBF boat SFRs, and ETBF quota SFRs for all species. Holds a Coral Sea permit and minor line permit. <i>Declared an interest in Agenda items 3, 5.4 and 6.</i>
Mr Paul Williams	Director of a company that holds an ETBF boat SFR, ETBF quota SFRs, and holds a Commonwealth fish receiver's permit. <i>Declared an interest in Agenda items 3, 5.4 and 6.</i>

5. All industry members declared their interests in agenda items 3 Harvest Strategy, 5.4 Data Strategy (Fishery Management Strategy) and 6 Ecological Risk Assessment.
6. In all cases where a member or participant declared a conflict of interest, the remaining members unanimously agreed they were permitted to participate in the item of discussion. It was decided that the expertise of the members and invited participants present at the meeting was critical for comprehensive discussion of the agenda items, further noting that no final decisions were being made at the meeting.

1.3 Adoption of Agenda

7. The agenda was endorsed by TTRAG and the final agenda is provided in Appendix 1.
8. It was noted that agenda item 4 Tuna Indicators and RBCCs was deferred for discussion at TTRAG 21 in July as it would be more relevant then.

1.4 Acceptance of minutes

9. The minutes from TTRAG 19 were accepted by TTRAG without amendment.

1.5 Actions arising

11. The RAG discussed the action items arising from TTRAG 19 and ongoing action items from previous RAG meetings and commented on the progress on each item (

12. Table 1).

13. A summary of actions arising from this meeting is included at Appendix 2.

Table 1. Status of actions arising from previous TTRAG meetings.

	Action	Meeting raised	Responsibility	Status as of TTRAG 20
1	ETBF Management Arrangements spreadsheet: TTRAG members to each review their area of expertise and add relevant management arrangements to the existing table also including management arrangements in the WTBF. Separate sheets suggested for economic factors and recreational fishing.	TTRAG 14	TTRAG	ONGOING: The update of this spreadsheet will be completed routinely (as a standing agenda item for the July meeting each year).
2	Estimating Recreational Catch: AFMA to contact NSW fisheries for the charter boat logbook data. Dr Julian Pepperell with contact Danielle Ghosn to see what recreational club data she can provide.	TTRAG 14	AFMA/Dr Julian Pepperell	ONGOING: Dr Campbell received the data, but only a small amount was provided. TTRAG emphasised the need for more, quality data and from other States such as Queensland. Dr Julian Pepperell to request data from Dr Sam Williams.
3	5 year research plan: Dr Julian Pepperell to prepare a recreational fishing proposal to be included in the 5 year research plan and circulate to TTRAG out of session.	TTRAG 14	Dr Julian Pepperell	COMPLETED: This project has been funded.
4	AFMA and CSIRO to prepare a paper that includes information from the harvest strategy, stock status	TTRAG 15	AFMA/CSIRO	ONGOING: When requesting funding from FRDC, this project became much more involved than originally intended. AFMA will discuss further with FRDC to more flexibility in the funding model

	Action	Meeting raised	Responsibility	Status as of TTRAG 20
	information, the CSIRO MSE analysis and connectivity review assess sustainability issues in implementing inshore and offshore quota zones for swordfish.			and report back to TTRAG at the next meeting. Dr Karen Evans has also had agreement from New Zealand to obtain some Swordfish samples, which will aid the project.
5	AFMA will provide economic data from ABARES to include in the RBCC advice in future.	TTRAG 16	AFMA	ONGOING. Dr John Tisdell will be coming to Canberra to assist with this in August/September 2018.
6	AFMA to send management arrangements booklet out to TTRAG members in future	TTRAG 17	AFMA	COMPLETED: Booklets were emailed to members on 7 March 2018.
7	AFMA to present Catchwatch reports as cumulative plots showing catch per month over current and preceding years.	TTRAG 17	AFMA	COMPLETED: These plots will be displayed at TTRAG 20 under agenda item 2.2.
8	AFMA to follow up on whether a review will be conducted to determine if the TAP aligns with the ACAP	TTRAG 17	AFMA	COMPLETED: Review is being conducted by the Threatened species sub-committee and the new TAP is less prescriptive, but not inconsistent with the ACAP guidelines.

	Action	Meeting raised	Responsibility	Status as of TTRAG 20
	guidelines and if so who will be undertaking the review.			
9	AFMA member to seek clarification from the ERA TWG on their advice regarding bypassing the species component at the SICA stage.	TTRAG 17	AFMA	ONGOING: This has been passed onto the AFMA ERA team who have indicated it will be raised at the next ERA TWG, but this meeting has not occurred yet. This issue is about bypassing just species sustainability component of SICA, not habitats and community elements. Managers of fisheries undertaking ERAs have also been informed of the issue.
10	AFMA to follow up internally on how to best provide EM data to Dr Robert Campbell.	TTRAG 17	AFMA	ONGOING: This will be discussed under agenda item 5.4. AFMA has been able to link the logbook and e-monitoring data and ABARES have completed some analyses. However, improvements will continue to be made and AFMA will continue to work with CSIRO on this.
11	Dr Robert Campbell to follow up with Simon Hoyle if there is value and if it is practical to conduct the two-stage process for models not tested under Group-A	TTRAG 17	Dr Robert Campbell	ONGOING: This is a longer-term issue that will be addressed during 2018. Dr Campbell has followed this up with Simon Hoyle and will progress over the coming months.
12	Dr Julian Pepperell to follow up with Dr Karen Evans regarding recreational fishing contacts that may provide useful for sample collection.	TTRAG 17	Dr Julian Pepperell	COMPLETE: AFMA has passed on contact details of Dr Sam Williams to Karen Evans regarding additional access to samples.
13	All RAG members to contact any relevant researchers/contacts who	TTRAG 17	TTRAG	COMPLETE: AFMA has provided TTRAG with Karen Evans' contact details.

	Action	Meeting raised	Responsibility	Status as of TTRAG 20
	may have (or are able to collect) samples relevant to the project and contact Karen directly.			
14	Dr Sean Tracey to provide Dr Karen Evans with Swordfish samples for the genetics project.	TTRAG 18	Dr Sean Tracey	COMPLETE: The samples that Dr Tracey has do not currently suit the genetics project, but they may be of some use in the future. This will be addressed on an ad-hoc basis as Dr Tracey will be tagging fish in Victoria during 2018 and may be able to add to the sample size then.
15	The RAG sub-committee explore options available to the RAG for collecting economic information and prepare a paper for RAG and MAC consideration.	TTRAG 18	Tuna Australia, AFMA, ABARES, Professor John Tisdell	ONGOING: No meeting has yet occurred and based on TTRAG 19 and TTMAC discussion this is not an immediate high priority. However, Dr Tisdell will continue to work on this, keeping in mind confidentiality issues and ensuring that there is a broader scope addressed.
16	Dr Robert Campbell to add the nominal CPUE to the first and last stepwise influence plots for comparison.	TTRAG 18	Dr Robert Campbell	ONGOING: Dr Campbell will next present the CPUE standardisations at TTRAG 21 in July 2018.
17	The AFMA member contact AFMA staff attending the ComRAC meeting to suggest TTRAG be the steering the committee for the oceanography research project	TTRAG 18	AFMA	COMPLETE: CSIRO agreed to hold steering meetings with TTRAG and include as sub-set of TTRAG members on steering committee. A presentation was provided by Dr Alistair Hobday at TTRAG 20 under agenda item 7.1. TTRAG noted that a FFA representative has not yet been secured.

	Action	Meeting raised	Responsibility	Status as of TTRAG 20
18	AFMA to clarify the FRDC contract provisions around intellectual property	TTRAG 18	AFMA	COMPLETE: The AFMA Research team has confirmed that FRDC enable research outputs, including models, to be available in the public domain and may be shared with international collaborators.
19	AFMA to follow up on the exact date the trip limit for Mahi Mahi was removed and add it to the significant events spreadsheet	TTRAG 18	AFMA	ONGOING: Gary Heilmann recalled the limit being removed in 2002, noting that it was an amendment to the OCS arrangements. AFMA to confirm and report back on details. This is not currently considered a high priority.
20	Dr Julian Pepperell to update the recreational sector significant events and add to the document out of session	TTRAG 18	Dr Julian Pepperell	ONGOING: Dr Pepperell indicated that he is still waiting on a few more data inputs and this is actually more complicated for the recreational sector than for the commercial sector. He is planning to have this completed by TTRAG 21 in July 2018.
21	AFMA to split action items into two categories; standing items that require regular meeting updates, and actionable actions to be addressed in the short term.	TTRAG 19	AFMA	ONGOING: Will be completed for TTRAG 21 in July.
22	AFMA to examine the cumulative impacts of the annual 10 per cent change threshold for the small fish CPUE trend under the Harvest Strategy Review.	TTRAG 19	AFMA	ONGOING: To be discussed under Agenda Item 3 – Harvest Strategy Review.

	Action	Meeting raised	Responsibility	Status as of TTRAG 20
23	Dr Pepperell to touch base with SPC staff to discuss the inclusion of NSW recreational tagging data in the SPC tagging database.	TTRAG 19	Dr Julian Pepperell	ONGOING: Dr Robert Campbell to discuss this with SPC at the next pre-assessment workshop. TTRAG noted that it would be beneficial for SPC to be made aware of the data so people can request the data if interested.
24	Dr Karen Evans (CSIRO) to provide an update on the FRDC yellowfin tuna project by the next TTRAG meeting in March 2018.	TTRAG 19	Dr Karen Evans	COMPLETED: Will be provided by AFMA under Agenda Item 7.2 (i).
25	Dr Pepperell to talk to Karen Evans to consider morphological differences in yellowfin tuna sickle size from studies done by Schaefer and Diplok in the oceanography project.	TTRAG 19	Dr Julian Pepperell Dr Karen Evans	ONGOING: Dr Pepperell stated that this has not yet happened and the context needs to be clarified. Differences in sickle size in Yellowfin Tuna have been noticed by industry, it is just a matter putting a project proposal together. This information could be useful for Dr Karen Evans' genetics project.
26	Dr Campbell to produce a contour map of all sized fish by region using logbook data for the next RAG meeting.	TTRAG 19	Dr Robert Campbell	ONGOING: Dr Campbell distributed the paper prior to TTRAG 20 and will discuss under the harvest strategy agenda item.
27	Dr Campbell to update the tagging paper and analysis that was presented on bigeye tuna a few years ago to tie in with the new oceanographic studies.	TTRAG 19	Dr Robert Campbell	ONGOING: Dr Campbell to distribute the Hillary et al. paper on this analysis and AFMA to include on the Govdex research paper depository.
28	Dr Campbell to obtain updated catch data for Region 5 to provide an update	TTRAG 19	Dr Robert Campbell	ONGOING: Dr Campbell has contacted Peter Williams at SPC, but this data will not be able to be obtained until later in 2018.

	Action	Meeting raised	Responsibility	Status as of TTRAG 20
	to the RAG in the March 2018 meeting.			
29	Dr Campbell to present information on fishing effort and catch rates of the foreign catch within Region 5 to the RAG March 2018 meeting. Mr Bromhead and Dr Campbell to investigate the available information to help the RAG understand the additional foreign catch in Region 5.	TTRAG 19	Dr Robert Campbell	ONGOING: This action item to be combined with Action Item 28.
30	Mr Bromhead to talk to Rich Hillary about timelines for target reference points (TRPs) on swordfish.	TTRAG 19	Dr Don Bromhead Dr Rich Hillary	COMPLETED: Will be discussed under Agenda Item 3.4 – Target and Limit Reference Points.
31	The RAG agreed to capture a statement in the MAC report that provides a summary of the condition of the fishery as per the industry updates.	TTRAG 19	TTRAG	ONGOING: Statement to be included in TTRAG advice at TTRAG 22 to be held in August 2018.
32	AFMA to provide a brief WTBF catchwatch report at each July TTRAG meeting.	TTRAG 19	AFMA	ONGOING: To be provided at the July 2018 TTRAG meeting.
33	AFMA suggested contacting John Annala from New Zealand Ministry of Primary Industries to see if New	TTRAG 19	AFMA	ONGOING: Discussions have been held with New Zealand, but funding has not yet been secured.

	Action	Meeting raised	Responsibility	Status as of TTRAG 20
	Zealand would be interested in supporting the swordfish project and investigate the potential of New Zealand providing some funding.			
34	AFMA to follow up with Karen Evans of CSIRO to determine exactly how many swordfish samples would be required from each zone to satisfy an adequate sampling design, for each inshore, offshore and potential western New Zealand. David Ellis to also work with AFMA to assist in sourcing offshore samples and possible funding from the ETBF.	TTRAG 19	AFMA Dr Karen Evans Mr David Ellis	ONGOING: This item relates to Action Item 4 – see TTRAG response for that item.
35	AFMA to investigate where the AFMA conversion factors were originally derived from.	TTRAG 19	AFMA	ONGOING: AFMA explained to TTRAG that the current conversion factors were derived from the available literature at the time. However, that was in the early 2000s and the conversion factors should be updated to reflect more current data. AFMA will investigate this issue further and report back at TTRAG 21 in July 2018.

1.6 Out of session correspondence

14. The RAG noted the out of session correspondence between the TTRAG 19 and TTRAG 20 meeting described in Agenda item 1.6 with no further correspondence added to the list.

2 Review of fishery performance

2.1 Current catches and effort in the domestic fishery

15. The scientific, industry and recreational members of the RAG gave an update of the catches in the fishery since the last RAG meeting in August 2017.
16. Industry members indicated that the last fishing season (2017/18) was not a particularly good season, with Yellowfin Tuna catches remaining relatively low until late in the season. There was a small peak in Yellowfin catches in November/December 2017, but this coincided with a large amount of product hitting the Japanese market making it difficult for ETBF operators to access worthwhile prices.
17. For the start of the current (2018/19) season, catches of Yellowfin Tuna have been positive and large numbers of high quality fish have been reported off the Queensland coast as well as off Sydney and the NSW south coast. Given this, industry members predicted that the current season will be a big one for Yellowfin Tuna which may lead to quota becoming restricted at the end of the season, similar to what happened in the 2015/16 season.
18. In relation to Swordfish, industry members stated that they have not observed the decline in availability that has been indicated in the Catch-Per-Unit-Effort (CPUE) analyses displayed by CSIRO. One industry member stated that he has just leased in an additional 100 tonnes of Swordfish quota in preparation for this season.
19. The main concern expressed by industry members was that there is currently large amounts of farmed Bluefin species (Pacific, Northern, Atlantic) have been hitting the Japanese and US markets meaning that the sale of other tuna species has been more difficult, particularly for Bigeye Tuna. There is increased demand for these high quality farmed fish and it makes it difficult for Australia's industry to compete.
20. Dr Julian Pepperell updated the RAG on the current status of the recreational fishery. Marlin species catches off southern Queensland have been the best ever so far, indicating that the management of Blue and Black Marlin has been very successful. Large numbers of marlin have been caught in tournaments off Port Stephens in February and approximately 750 individuals have been tagged and released (Blue, Black and Striped Marlin). There definitely appears to be some influence from environmental factors, given the distribution and availability of these species at this time of year.
21. TTRAG also noted reports that large numbers of spearfish have been encountered by recreational fishers, which is reflective of the extent of the warmer tropical waters pushing southwards. The distribution of all the major gamefish species at this time of year is highly unusual and is worth noting as part of the oceanographic studies being undertaken.
22. It was reported that the recreational catches for Yellowfin Tuna have been abysmal for the last few years, however this current season has seen a dramatic increase in catches of large fish. Many of the fish caught have displayed the large yellow sickles indicative of offshore Yellowfin Tuna and it is unusual to see these fish being caught within recreational fishing range. The AFMA member queried whether the sickle size of the Yellowfin Tuna can be determined through electronic monitoring (e-monitoring), it might be something worth investigating to determine movement trends of offshore vs inshore fish.

23. In Western Australia recreational fishing for marlin has been good and tournament participants are catching up to 10 marlin per day. The RAG noted that the first 1000 pound Blue Marlin caught in Australia under IGFA rules was landed in Exmouth earlier this year, however this attracted significant negative media attention due to being landed rather than released. It is thought that this individual could potentially have been approximately 18-20 years old (according to a Hawaiian study). The otoliths from the Western Australian individual have been kept to determine possible age.
24. Regarding catches of Albacore Tuna, the price for commercial catches has increased and the associated bait (pilchard) price is relatively cheap. One industry operator is considering increasing his effort on Albacore as this is the only quota species with the potential for expansion. In general, industry do not catch large numbers of Albacore Tuna as only operators with greater boat capacity can steam to the Coral Sea and catch them in larger numbers.
25. Industry members further stated that east coast catches of Striped Marlin and Yellowfin Tuna have been good for the start of the current season, particularly off the shelf. The current catches of Bigeye Tuna have been better than usual as well, which is earlier than normal. Large numbers of Swordfish have been seen out near Lord Howe Island and many of the smaller ones are being cut off. There appears to be large abundances of Striped Marlin around at the moment and industry indicated that there may be quota issues with this species this season as well, leading to high levels of discarding.

2.2 AFMA Catchwatch reports

26. AFMA presented the RAG with the latest catchwatch report noting that the current figures only extend to the end of the 2017/18 fishing season.
27. 2017 was a good year for Bigeye Tuna catches and Albacore Tuna catches have been better than normal. Swordfish catches have remained fairly consistent as with Striped Marlin catches. 2016 was a strong year for Yellowfin Tuna catches, but there was not the “boom” like what was seen in 2015. The catchwatch report data was generally reflective of all industry reports.
28. A major concern raised by industry members was that Swordfish is currently worth more than Yellowfin Tuna for the first time ever and the changes in catches may be more reflective of industry avoidance tactics rather than availability. In comparison, Bigeye Tuna is currently only worth ~\$5 per kilogram rather than ~\$18 per kilogram for Swordfish. Bait (squid) prices for Swordfish have also dramatically increased, which is also influencing how industry fish. These economic trends are the greater drivers of industry targeting behaviours now rather than fish availability, however this is not accurately reflected in logbook and CPUE data (though changes in gear settings such as bait type are). These behaviours are also being reported in the WTBF and operators there are trialling different bait types in an attempt to improve economic efficiency.
29. There were also concerns expressed by industry at the market and the timing of high catch runs for Australian species coinciding with peak times in the US and Canadian fisheries. This puts added pressure on the ETBF industry, making it difficult for operators to sell their catch for reasonable prices.

2.3 WTBF review

30. The AFMA member provided an update on the status of the Western Tuna and Billfish Fishery (WTBF). After speaking to the major operator in the WTBF, the indication was that catches in the 2017/18 season were generally good, but they have been struggling with the increased

price of bait (predominantly squid). Currently other bait types are being trialled by operators to try and improve the situation. There is a large presence of Blue Shark in the WTBF as well, which makes it more difficult to get the value out of operations.

31. It was reported that the current season has begun poorer than the previous one so things are not looking good. Overall, Bigeye Tuna catch was slightly less than previous seasons and the catches of the other quota species; Swordfish, Striped Marlin and Yellowfin Tuna were relatively stable. As there are only two boats operating in the WTBF, catches of the quota species never reach the TACC.
32. Industry queried the reports of foreign boats entering the fishery and the AFMA member confirmed that foreign boat applications have been received by AFMA, but no approvals have been given yet.
33. It was noted by TTRAG that the TACC for the WTBF species has been set for 3 years and will need to be renewed for the 2021/22 season. A harvest strategy cannot be applied currently as the catches of all quota species are too low, however the AFMA Commission has requested advice regarding at what catch data level will a harvest strategy be necessary for the WTBF. This discussion has been scheduled for the July 2018 TTRAG meeting.

ACTION ITEM 1 – TTRAG to consider the AFMA Commission’s request regarding a harvest strategy for the WTBF at the July 2018 meeting.

2.4 Update on the 14th Regular Session of the WCPFC

34. The AFMA member updated the RAG on the outcomes of the 14th Regular Session of the Western and Central Pacific Fisheries Commission (WCPFC) held in Manila, Philippines during December 2017.
35. Prior to the WCPFC, a Forum Fisheries Agency (FFA) pre-meeting was held which attempted to enable FFA members (Australia, New Zealand and various Pacific Island countries) to have a combined, unified position going into the Commission meeting. Australia came under pressure from other FFA members regarding our declared Albacore Tuna allocations, however these were defended by the Department of Agriculture and AFMA representatives.
36. The WCPFC meeting focussed mainly on the Tropical Tuna Measure and Industry members David Ellis and Pavo Walker also attended the Commission meeting in December 2017. Other dominant items discussed were the Target Reference Point for South Pacific Albacore Tuna and the development of harvest strategies for all species.
37. The tropical tuna measure discussion was slightly different to previous years as the Bigeye Tuna assessment was revised in 2017, indicating that the species was in a much better condition sustainability-wise than previously thought. However, the WCPFC Scientific Committee has recommended that any changes to current management should be limited as there is still some uncertainty regarding the growth parameters of Bigeye Tuna and further sampling is being undertaken. A new assessment will be completed in 2018.
38. Discussion regarding the tropical tuna measure in general were very difficult given that the US was in favour of more relaxed management of Bigeye Tuna, but Australia, New Zealand and Japan rejected their approach. The outcome was a weaker measure than preferred by FFA, but not as weak as favoured by the US and the European Union (EU).

39. General outcomes from the meeting included; a 3-month Fish Aggregating Device (FAD) ban for the Purse Seine fishery and additional 2-month ban on the high seas, high seas effort limits imposed between 20°N and 20°S and a catch retention provision between 20°N and 20°S meaning that all Bigeye Tuna, Skipjack Tuna and Yellowfin Tuna must be kept. Australia has also maintained a 2000 tonne catch limit (in zone) for Bigeye Tuna, but there is a new commitment to agree hard limits on all allocations by 2020 (optimistic).
40. TTRAG noted that as Australia already has a strong quota management system in place and high levels of monitoring and compliance, the WCPFC has high confidence in Australia's management.
41. Regarding the Target Reference Point for South Pacific Albacore Tuna, China is blocking all negotiations and refuse to agree. This has a flow on effect with other distant water fishing nations (EU, US etc) so no agreement is likely to be reached for some time. However, it was noted that the Commission has stated that a Target Reference Point shall be adopted at WCPFC15 in 2018.
42. The harvest strategy workplan that Australia has been leading development of is slowly progressing, but no formal agreement has yet been reached.
43. In relation to the seabird measure, adjustments were made to allow the use of hook shielding devices as an alternative mitigation option.
44. TTRAG further noted that the WCPFC Scientific Committee meeting is coming up on 17-20 April 2018 and Dr Robert Campbell and Dr Jess Farley will be attending from Australia. More tissue samples for Bigeye Tuna are being collected and results will be presented at the meeting. The ageing study will also be revisited for Bigeye Tuna as well as the growth models. It is important to get the new assessment right. However, TTRAG noted that this means that the updated assessments for other species such as Striped Marlin and Swordfish will be delayed for another year.
45. The AFMA member informed TTRAG that for the next year, before the next WCPFC meeting, the goal will be to try to progress towards stronger international management of Swordfish and Australia will be investigating the best tactical option to achieve that progress and then will take this forward to the Commission meeting in December. Unfortunately, Swordfish management is only really a priority for Australia so it is difficult to encourage the Commission to address this species and agree on a way forward. This situation is the same for Striped Marlin and the recreational fishing scientific member expressed his concern and frustration.

2.5 MAC/AFMA Commission outcomes

46. The AFMA member provided TTRAG with an update on outcomes from recent TTMAC and AFMA Commission meetings.
47. Regarding the AFMA Commission, the WTBF TACCs were endorsed and Determined in December 2017 with the TACCs set at the same levels for the next three seasons. The Commission however has requested TTRAG advice relating to the level of catch needed to require the use of a harvest strategy in the WTBF. A paper will be presented by AFMA to the next TTRAG meeting in July 2018.
48. The AFMA Commission also considered a draft of the ETBF Fishery Management Strategy (FMS) at their last meeting. The overall comment was positive and the Commission agreed that it is a very useful document. They encouraged the development of an FMS for all AFMA fisheries and only provided a few suggestions relating to editorial and structural refinements.

49. The AFMA Commission agreed the ETBF TACCs out of session in January 2018. Noting that the current ETBF season is a 10-month transitional one, the TACCs are slightly reduced in comparison with past seasons. The AFMA Commission endorsed the approach and Determined the TACCs as recommended by TTRAG and TTMAC.
50. The AFMA member also advised that the current TTMAC membership will expire in June this year and a process to renew the membership has begun. If any RAG members are interested in applying to be a MAC member they should be aware of application details to be distributed soon.

3 Harvest strategy review

3.1 Background and status update

51. The AFMA member began discussions by summarising the background to why this review is being undertaken, the review objectives and review progress to date.
52. In 2014 it was determined that the ETBF Harvest Strategy could no longer be applied to tropical tuna species, due to the low ETBF catch relative to regional catch levels. Since then the RAG has only provided Recommended Biological Commercial Catch (RBCC) advice to the AFMA Commission for Broadbill Swordfish and Striped Marlin. Indicators and general stock status advice only is provided for the three tuna species (Albacore, Bigeye and Yellowfin Tuna).
53. Over the last few years, TTRAG members raised various issues and concerns in relation to the effectiveness of the current harvest strategy model and CPUE indices it is based on. In some cases these issues were addressed at the time of being raised or by subsequent technical work, but in others they were deferred to be looked at more closely during the ETBF Harvest Strategy Review.
54. In 2016 and early 2017, TTRAG conducted an assessment of the issues that had been identified over the preceding years and then prioritised those issues for consideration under the harvest strategy review.
55. The key questions raised relate to various aspects including:
- Data and monitoring
 - CPUE standardisation
 - Reference points
 - Decision tree and control rules
 - Overall effectiveness of the harvest strategy to manage Swordfish and Striped Marlin.
56. CSIRO has completed significant work to try to provide answers and improvement to these areas of the harvest strategy and several of these papers were included under this agenda item. This also includes a significant Management Strategy Evaluation (MSE) study completed by Dr Rich Hillary (CSIRO).

3.2 CPUE standardisation

57. Dr Robert Campbell presented his paper "*Review of Area Effects used in the Standardisation of Catch-rates in the ETBF*" to TTRAG and summarised the results.
58. TTRAG noted that there are many different ways that the ocean can be zoned into different "areas" and the influence of using different areas in the standardisation of catch rates can be

substantial. Area effects can be very informative in stock assessments, however the current areas used in the ETBF harvest strategy have been used since 2011 when quota came in to the fishery.

59. Dr Campbell divided the ETBF into 271 1-degree squares where fishing had occurred and determined that only 79 squares had been actively and regularly fished for Swordfish every year from 1991 to 2017. A core area of fishing was described that reflected where 90% of the Swordfish catch was taken each year and this core area was then divided into seven area-effects using a slight modification of the method used previously.
60. Industry questioned the accuracy of the data stating that targeting behaviours for Swordfish has changed over recent years. Relating to Swordfish, the two major operators in Mooloolaba take the majority of the catch so could potentially influence the CPUE intentionally by shifting their fishing to a different area. Dr Campbell clarified that a change in fishing behaviour of operators (such as shifting areas) should still be picked up through the standardisation and it is expected that operators will have higher catch rates in certain areas. The unknown is actually in areas where operators do not fish as there is no data for that.
61. Dr Campbell presented the old area effects map for comparison and asked TTRAG to decide which to use. Overall, the maps are very similar with the new map just removing a small area of very low swordfish catch and had no great influence on the CPUE standardisation. The old map includes the areas of very low Swordfish catch and members agreed that removing the areas of low catch would have an unknown impact on the standardisation, potentially affecting the weighting of the effects.
62. For Striped Marlin, the updated area map did not show any improved pattern so the RAG agreed to keep the current areas used. The RAG noted that Area 1 (Coral Sea) has always been removed from the standardisation because there is only one operator that fishes up there and he does not retain any Striped Marlin, it is always reported as discarded and there were concerns over the accuracy of the data.
63. The Chair reminded the RAG that any changes to area effects in the standardisation should be done on the basis of science, not on whether the TACC will be affected or not.
64. Concern was expressed by the TTRAG economics member that removing the Coral Sea area for Striped Marlin may also create inaccuracy in the standardisation. Discard reporting has always been considered to be less accurate than retained catch reporting. However, since e-monitoring was implemented, discard reporting has significantly improved. To address this Dr Campbell offered to exclude any operators that discard 90% or more of their Striped Marlin catch in a season and provide the updated results intersessionally.

ACTION ITEM 2 – Dr Robert Campbell to remove any operators that discard 90% or more of their Striped Marlin catch from the data set and distribute the results to TTRAG out of session.

3.3 Size categories

65. Dr Robert Campbell presented and discussed his paper "*Identifying Cohorts in the Eastern Tuna and Billfish Fishery and application to the Harvest Strategy*" relating to the size category thresholds for Swordfish and Striped Marlin.

66. Currently, small fish are defined as within the lower 25th percentile of the weight distribution, prime fish are defined as within the mid-50th percentile of the weight distribution and large fish are defined as within the upper 25th percentile of the weight distribution. These thresholds are not based on any specific biological information.
67. Members questioned the accuracy of the current size class cut-offs, noting that fish age and grow differently between years, quarters and areas.
68. For Swordfish, the cohorts on the histogram plots appear reasonably strong. 13 cohorts were defined and Dr Campbell displayed new size categories as follows:
- Small fish = Cohorts 1 and 2 (representing 33% mean proportion of catch)
 - Prime fish = Cohorts 3 to 5 (representing 46% mean proportion of catch)
 - Large fish = Cohorts 6 to 13 (representing 21% mean proportion of catch)
69. Given these proposed thresholds, Dr Campbell ran the CPUE standardisation again. The overall CPUE prime result was slightly higher than the current model used for Swordfish, but overall there was very little difference.
70. For Striped Marlin, only 8 cohorts were fitted rather than 13 and only 3 modes in the plots accounted for the majority of the size distributions. TTRAG considered that from this only two real age classes contribute to the catch of Striped Marlin. The overall result demonstrated a slight increased CPUE compared to the current models. The suggested revised thresholds were as follows:
- Small fish = Cohorts 1 and 2 (representing 5% mean proportion of catch)
 - Prime fish = Cohorts 3 (representing 57% mean proportion of catch)
 - Large fish = Cohorts 4 to 8 (representing 37% mean proportion of catch)
71. Small fish are considered to be an index of recruitment, but for Striped Marlin the results are not useful. Small marlin are not generally seen in the fishery.
72. The RAG discussed at length the pros and cons for adjusting the size classes for Swordfish and Striped Marlin and agreed that any thresholds should be defined on a biological basis and should have a constant cut-off number by quarter. In the case of Striped Marlin, it is not sensible to have a small size class due to the very small proportion of small fish in the ETBF catch.
73. Swordfish was a little more difficult as there was some debate around age of maturity. It was concluded that Swordfish generally mature at about age 5 so those in cohorts C6 onwards could be considered to be spawners (large fish). However, there was some concern expressed by members around excluding the 2-year-old fish (C2) by grouping them in the small fish category as they are considered to be pre-spawners and not recruits. These fish also contribute to the largest proportion of the Swordfish catch. If C2 was included in the prime size category then this would mean only having one cohort in the small size class. It was uncertain if there is sufficient data to support that division.
74. TTRAG noted that the small size class does contribute to the swordfish harvest strategy by providing an earlier indicator of the health of the stock. However, industry members maintained their argument that the reason for the decline in small Swordfish in the ETBF is due to operator avoidance behaviour and a shifted area of fishing (away from small fish areas) rather than a decline in abundance. While this behaviour shift should be picked up through the current CPUE standardisation, TTRAG suggested that CSIRO explore the fisheries data to look for evidence of such fishing area and strategy changes.

75. It was concluded by TTRAG that ideally for Swordfish and if sufficient data allow; small fish should include C1 only (recruitment), prime fish includes C2 to C5 and large fish include C6 to C13. However, this structure was not unanimously agreed and industry members expressed some reservations regarding the definition of small fish and the need to base the thresholds on biological information. It was agreed by all that this size class structure would need to be MSE tested before any final decision can be made.
76. In conclusion for Striped Marlin, TTRAG expressed reservations regarding changing the current cut-offs and reiterated the need for MSE testing of any alternatives. Members were generally uncomfortable with removing the small size class, but agreed that a single “all fish” CPUE index should be used instead of the three separate size classes.

3.4 Target and limit reference points

77. Dr Robert Campbell presented his paper “*Re-estimation of the target CPUE for Broadbill Swordfish based on the 2017 stock assessment*” to the RAG.
78. TTRAG noted that the most recent Swordfish stock assessment was completed in 2017 by the Secretariat of the Pacific Community (SPC). The assessment included two regions, Region 1 represents Australian waters (largely the ETBF) and Region 2 represents waters further east around New Zealand and the Pacific.
79. Dr Campbell summarised his paper and explained how the current target reference point is defined for Swordfish. He also compared the 72 different assessment models used. He highlighted to TTRAG that there was much variation and uncertainty between the model runs, with some being very optimistic and others not as much. Overall though for both Region 1 and Region 2, the Swordfish stock appears to be in a reasonable condition. TTRAG further noted that the harvest strategy can use either the standardised CPUE or the standardised CPUE with the LOESS smoother applied and all members agreed that the smoothed CPUE was more useful.
80. Dr Rich Hillary then presented his MSE analysis results to the RAG (see the “*Updating the ETBF Broadbill Swordfish MSE analyses*” paper). He explained that the current results are an update on the analysis that was conducted two years ago and now take into account the new Swordfish stock assessment endorsed by the WCPFC at SC in August 2017.
81. TTRAG noted that level 1 in the decision tree of the harvest strategy refers to the CPUE of prime-sized fish and if the slope is moving towards the target then catches and management are on track. However, if the CPUE slope is declining more sharply below the target then the stock is in trouble. Level 2 of the decision tree addresses the rate of change in the CPUE, level 3 addresses the old or large fish size class and level 4 addresses the small fish or recruitment indicators. Prime size fish are used in both levels 1 and 2 of the decision tree and this is also where the Target Reference Point is used. The current ETBF harvest is highly complex and AFMA has attempted to simplify or explain things more clearly for members.
82. TTRAG further noted the following conclusions from the previous MSE analysis:
- ETBF catches were declining, but the non-ETBF catches were slightly increasing.
 - The Spawning Stock Biomass (SSB) depletion was above the target of 0.48.
 - The prime size CPUE hit the target of 0.82 (median terms).
83. Given these conclusions, TTRAG questioned why catches were continuing to be cut in the ETBF. The biomass target was being overshoot, but the CPUE was on target so it is unclear why the TACC was reduced. It is possible the target reference point was not correct (i.e. the target SSB and target CPUE were not correctly aligned).

84. Further, there were two reference sets compared in the past MSE analysis; the first did not include a migration estimate and the second did. The conclusions from the two sets were outlined as follows:

Reference set (no migration)

- Current harvest strategy settings were cutting the ETBF catches
- The “trade-off test” failed – i.e. there was no apparent gain in the SSB.
- There was an apparent mis-match between the target CPUE and SSB.

Robustness test (11% migration)

- Current harvest strategy settings were cutting the ETBF catches drastically.
- It was assumed that non-ETBF effort was maintained.
- SSB depletion approached limit level of 20% SSB₀.
- CPUE fell well below the target level.

85. Dr Hillary informed TTRAG that the inclusion of a migration estimate complicates the results and makes the level of depletion appear worse than it might actually be.

86. TTRAG noted that Region 1 (ETBF mainly) still takes the majority of the Swordfish catch, however there is still a proportion of non-ETBF catch occurring. While the non-ETBF catch continues to exist, any adjustments made to the harvest strategy and the ETBF catch will only affect the ETBF proportion even though total Swordfish catches may be increasing. This means that the condition of Swordfish and the effectiveness of the harvest strategy are highly uncertain.

87. The growth curve included in the 2017 Swordfish assessment is based on the most research presented to the Scientific Committee in 2016 and removes the uncertainty in growth which was present in the previous assessment. The MSE analysis results using the new stock assessment are as follows:

- The future SSB decreased initially, but remains above the target level.
- ETBF catches declined sharply while the non-ETBF catches also declined.
- The future CPUE declined sharply as well and ended up below the target level.

88. Considering these results, Dr Hillary attempted to tweak the harvest strategy, however this did not display any significant difference in results and the CPUE still trended downwards to almost the level of the Limit Reference Point. TTRAG expressed concern as to the uncertainty of why this trend was occurring, as there did not seem to be any explanation.

89. Following this discussion, Dr Hillary described the new stock assessment and explained that on the surface everything appears the same, but in the detail there was low recruitment estimates and an unexplained spike in fishing mortality (F) of the prime size (sub-adult) fish across all regions in the Swordfish assessment. This result had a flow-on effect to the large fish (spawners), displaying a sharp decline. These trends are what have been driving the ETBF harvest strategy results.

90. TTRAG noted that recruitment in Region 1 was at the lowest on record in 2012 and this result subsequently lowers the expected future prime size CPUE. This means that the Swordfish CPUE declines even if the ETBF catches are reduced, making the harvest strategy ineffective.

91. The overall results from the updated MSE analysis were displayed as follows:

Reference set (no migration)

- ETBF catches consistently being cut with no clear conservation reason (SSB target consistently being overshot).
- Future projected CPUE was well below current level.
- No consistent “tuning” of harvest strategy parameters.

Robustness test (11% migration)

- ETBF catches consistently cut with no clear conservation outcome (SSB continues toward the limit reference point).
- The ETBF could maintain current catches or close the fishery and the outcome would be the same.

92. It was further noted by TTRAG that the revised assessment for Swordfish has been accepted by the WCPFC and the ETBF continues to be the dominant data source for this assessment. Given the acceptance of this assessment with the large catches in Region 2 included, the projections for the future of Swordfish are looking dire.
93. Both Region 1 and Region 2 have been included in the new assessment and TTRAG expressed significant concern regarding a large amount of catch that has been included in the north-eastern area of Region 2 that was spatially separated from much of the other catch. The inclusion of this catch in this new assessment is different from previous assessments and it is significantly influencing CPUE results. The TTRAG scientific members agreed that this large portion of Swordfish catch being taken in the Central Pacific Ocean should not be included in the assessment as it is likely that this catch is more connected to the Eastern Pacific stock, which is separate to the Swordfish stock that is accessed by ETBF operators. Unfortunately, when Australia requested that this large catch portion be removed from the assessment, the WCPFC Scientific Committee only excluded a small part of that catch and this did not affect the overall result.
94. Dr Karen Evans, CSIRO, is currently undertaking a genetics project to determine the level of connectivity of Swordfish in the Pacific Ocean in order to address this Region 2 issue. However, she is currently experiencing great difficulty accessing useable muscle and tissue samples from countries such as French Polynesia that are close to the area of high catch in the central Pacific (area 2N). Current electronic tagging data indicates that there is no evidence of connectivity of Swordfish between the Western Pacific (Australia and New Zealand) and the Eastern Pacific (Central and South America), but the studies completed have all been short term so the evidence is less conclusive.
95. It was noted by TTRAG that the area 2N catches of Swordfish are actually a bycatch of the longline fishery for Bigeye Tuna and not targeted swordfish fishing.
96. Focussing on the ETBF, an industry member explained that there are two major companies located in Mooloolaba that own or control the majority of the Swordfish quota. The way these companies target Swordfish is dependent on seasonality, the availability of the quota and the market prices. In previous years boats have targeted Swordfish specifically, but now tuna species tend to be the target and Swordfish is taken more as a bycatch. He further explained that if industry really intends to target Swordfish they will fish further east out past longitude 160°E towards Norfolk Island. Realistically though, fishing far out east is not often economically viable as increase storage and freezing capacity on boats is needed to maintain quality and freshness and there are only a couple of boats in the fishery that are large enough and have this capability. To access Swordfish closer inshore, operators wait until early spring, but unfortunately this tends to coincide with the US market being at its poorest and flooded with farmed tuna. This reduces the return to operators and makes fishing for Swordfish less viable.

There is also the added change in gear setting as if targeting mixed species then the sets are not as shallow as when targeting Swordfish only.

97. An AFMA observer queried the CPUE standardisation as to whether this change in behaviour has been reflected.
98. An industry member expressed further concern that if Swordfish quota continues to be cut then the avoidance costs are going to increase adding greater pressure on fishing businesses. They stated that it essential for them to maintain Swordfish quota to cover the bycatch of the species even if they are mainly targeting other tuna species. These factors will contribute to effort shifting and will exacerbate the problem of Swordfish quota and avoidance.
99. Considering these statements from industry members, Dr Robert Campbell agreed to obtain from AFMA a list of boats that have fished in the fishery for a long time and recently changed their targeting behaviour. He will then check to see if this shift has been accounted for within the CPUE standardisation.

ACTION ITEM 3 – AFMA to provide Dr Robert Campbell with a list of ETBF boats that have been in the fishery for an extended period and have recently changed their targeting practices for Swordfish.

100. Another industry member confirmed industry's concerns regarding economic viability of Swordfish targeting, stating that a 20% cut in Swordfish quota has resulted in a reduction of ~100 tonnes of Swordfish quota for his business alone costing him a significant amount of income. Continued cuts to Swordfish quota could result some industry operators going broke and/or having to leave the fishery.
101. The AFMA member stated his own concern for the impact that Swordfish quota reductions are having on industry operators and reiterated that it is important that any change in targeting behaviour is captured in the CPUE standardisation. However, he also reminded members however that the current CPUE standardisation results only include data up until the end of the 2016 fishing season so quota reductions will not have impacted fishing behaviour (and CPUEs) in the data analysed to this point in time. Data from 2017 (under quota cuts) will be incorporated into this year's CPUE standardisation.
102. TTRAG noted that industry has been making small attitudinal shifts in gear and targeting practices over several years and these shifts have not necessarily been picked up through logbook reporting. There needs to be a much more detailed analysis undertaken to address these behaviour changes within the CPUE standardisation.

3.5 Decision rules

103. This agenda item was not specifically addressed by TTRAG given the conclusions outlined in the following agenda item.

3.6 Conclusions – revised harvest strategy

104. Following the lengthy discussions held by TTRAG regarding the state of the current harvest strategy and the previous agenda items, the Chair outlined agreed conclusions from TTRAG.
105. Discussions were held in the tea break and the following discussion template was developed to guide TTRAG discussions:
 1. CPUE standardisation

- a. Issues (pros/cons) and actions
 - b. Is it useable for assessment (2015) and harvest strategy (2017)
- 2. Assessment (operating model)
 - a. Issues (pros/cons)
 - b. Migration assumption
- 3. Harvest Strategy
 - a. Issues (pros/cons)
 - b. Options
- 4. Next steps
 - a. Approach
 - b. Target

106. The discussions regarding each point (above) are described below.

CPUE Standardisation

107. TTRAG members and particularly the scientific and AFMA members generally stated that they have reasonable confidence in the current CPUE standardisation, but industry members reiterated their concerns regarding economic drivers and resulting changes to targeting behaviours that they believe are not captured in the CPUE standardisation. There was also acknowledgement by TTRAG that the CPUE standardisation should be continually improved.
108. The TTRAG economics member clearly expressed his concern for the need for economics drivers to be incorporated into the standardisation, however other members indicated that the CPUE standardisation captures changes in fishing behaviour that are responses to economic drivers and the target reference point development is where the economic drivers should be taken account of.
109. TTRAG noted that CPUE standardisation is currently the best method available for measuring the state of the resource (i.e. Swordfish and Striped Marlin), so it must continue to be used.
110. In terms of the standardisation's useability for the stock assessment and the harvest strategy, there was general agreement that it is the best science we currently have, noting the ongoing issues regarding stock structure and the inclusion of the large catch portion in area 2N of Region 2. This issue is resolvable, but it will take time.

Assessment (operating model)

111. TTRAG reconfirmed that there are several issues ongoing with this aspect, such as the stock structure (connectivity) concerns, the area of relevance not being appropriate, inclusion of migration estimates and the dire results indicated from the updated MSE analysis.
112. TTRAG agreed that the best way forward on this point would be to ask SPC (Yukio Takeuchi) to re-do the stock assessment with the two northern areas of Regions 1 and 2 (ie. areas 1N and 2N) removed, but including all 72 model runs. This would be including only the two movement scenarios; no movement (migration) and 11% default movement (migration). 11% migration is a large enough estimate to enable the populations to be genetically indistinct

ACTION ITEM 4 – Dr Robert Campbell and Dr Rich Hillary to ask Yukio Takeuchi (SPC) to re-run the Swordfish assessment with areas 1N and 2N removed for the two movement scenarios (no movement and 11% movement) and using all 72 parameters.

Harvest Strategy

113. TTRAG expressed concern with all levels within the current ETBF harvest strategy. There was support for a “change rule” that would maximise stability around the TACC and would operate similar to what is used for Southern Bluefin Tuna (SBT), i.e. if the population tracks above the target reference point then the TACC is increased and if it tracks below the Limit Reference Point then the TACC is decreased. Alternatively, CPUE “bands” could be used where the TACC is set within each band (this approach is generally used for fisheries with high uncertainty).
114. TTRAG agreed that the slope to target approach used in level 1 is not working and industry reiterated their support for stability.
115. For level 2, TTRAG agreed that some measure of all three size classes is necessary, especially a measure that accurately captures the recruits. This can be tested through a MSE analysis. However, TTRAG were uncertain as to how these size categories would be defined.
116. Following further discussion, TTRAG unanimously agreed that the current harvest strategy overall is not achieving its objectives for sustainability and maximising economic return to industry. This conclusion means that there needs to be a significant overhaul of the harvest strategy to the point where it is completely redesigned. The continued cuts to the Swordfish TACC due to the harvest strategy output is creating an economic impact for industry with no benefit to the sustainability of the Swordfish stock. Any small improvements to the harvest strategy, as shown in the updated MSE analysis, would only delay the same outcome as described.
117. TTRAG concluded that the ETBF harvest strategy would be redesigned over a 2-year timeframe. This would be done for both Swordfish and Striped Marlin. Several suggestions were voiced by members on interim arrangements, but the only viable option agreed was to set a constant TACC for the redesign period. The justification for this approach was as follows:
- “An MSE analysis on the current ETBF harvest strategy demonstrated that the objectives for economic efficiency and sustainability are not being met, putting increasing financial pressure on industry with no conservation benefit. TTRAG have serious concerns regarding the CPUE data, but are confident of the health of the overall stock for both Swordfish and Striped Marlin and would support maintaining the current TACCs for both species until a new ETBF harvest strategy is developed.”
118. TTRAG also agreed that a new harvest strategy must be fully MSE tested.

ACTION ITEM 5 – AFMA to develop a statement and justification for the harvest strategy decision to be provided to the AFMA Commission and circulate to TTRAG out of session for comment.

119. TTRAG finished harvest strategy discussions by noting the concerns expressed by industry and the economics member. It was agreed that there is not enough consideration of economic drivers in the assessment of Swordfish and Striped Marlin even though these drivers are significantly influencing fishing behaviour.
120. The AFMA member stated that economic considerations should be at the forefront of discussions when determining a new Target Reference Point and redesigning the harvest strategy.
121. There is a need for a good economic model, but a good underlying biological model is also necessary and TTRAG agreed that this does not currently exist for the ETBF. However, the

economics member stated that while a bio-economic model is highly difficult and complex, this should not be a reason not to undertake the development of this model.

4 *(Item deferred) Tuna Indicators and RBCCs*

This item was deferred prior to the TTRAG 20 meeting by the AFMA member and was not discussed by members.

5 Fishery Management Strategy (FMS)

5.1 Overview of the FMS

122. The AFMA member summarised the current progress of the FMS to date and reminded TTRAG members of the purpose and outcomes of the ongoing project. He also indicated that the ETBF is a test case for the development of the FMS so there are likely to be ongoing alterations to the current draft.
123. TTRAG noted that at the last AFMA Commission meeting, the FMS concept was endorsed and will be applied to all Commonwealth fisheries once the test case has been finalised. The current FMS structure incorporates the essence of the new draft harvest strategy and bycatch policies. These policies are likely to be formally finalised by the Department of Agriculture and Water Resources (DAWR) in the coming months. The AFMA member also highlighted to TTRAG that the outcomes of the ETBF harvest strategy discussion at this meeting will need to be incorporated into the draft ETBF FMS.
124. TTRAG further noted that the FMS is being aligned with the ISO records standard and an expert will be examining the current document to ensure it is being designed correctly. Once finalised, the FMS will be the single point of reference for the fishery and will explain all aspects of the management of that fishery.
125. The current draft FMS is written in a series of chapters. This structure is as follows:
- **Background and overview of the FMS**
 - **Commercial species** – includes management information of commercial and byproduct species, discards and the harvest strategy.
 - **Bycatch species** – includes the ERA, bycatch management arrangements and compliance.
 - **Habitats and communities**
 - **Data and monitoring**
 - **Strategic research plan** – includes corporate goals and strategies and priority research areas. This is separate to the Annual Research Statement prepared by TTRAG in June/July every year.
 - **Review and improvement**
 - **Communication and reporting**
126. The AFMA member urged TTRAG members to thoroughly read the current draft FMS and makes comments as their input is vital to the development of this document. While it is an extensive document, he stated that comments from members out of session would be very welcome.

ACTION ITEM 6 – The TTRAG EO to send a reminder email to RAG members out of session requesting comments on the current draft FMS.

127. The FMS will also need the contribution of TTMAC members and will be asked to provide the final overall endorsement of the FMS as an accurate record of the management of the ETBF. However, it will be a living document and will also have a major review every 5 years.

5.2 Harvest Strategy

128. This item was not discussed by TTRAG at the meeting due to time constraints, however members were asked to provide their comments on all sections of the FMS out of session. The harvest strategy section in particular will need to be addressed later once TTRAG has developed a new or revised harvest strategy for the ETBF.

5.3 Bycatch Strategy

129. This item was not discussed by TTRAG at the meeting due to time constraints, however members were asked to provide their comments on all sections of the FMS out of session.

5.4 Data Strategy

130. An AFMA observer Ms Natalie Rivero presented this item. She began by indicating the types of questions that may be useful to answer and incorporate into the data strategy for the ETBF FMS. Examples of these questions included; if there is a current data source to collect further information needed for the fisher, if there are gaps in the current data collected for the fishery and if market prices/trends/bait prices might be more accurately collected and included in the fishery's monitoring and management. TTRAG was also urged to consider the cost and benefit of any additional data collection.
131. Following this introduction, Dr Tim Emery and Dr Rocio Noriega from ABARES gave a presentation on an analysis they undertook on e-monitoring and how it has influenced data collection in the ETBF since its implementation in 2015.
132. The first analysis presented addressed the equivalency between fisher logbook data and the data collected through e-monitoring. The data used was collected in the 2015/16 and 2016/17 fishing seasons. The overall results displayed a high congruence between logbook data and e-monitoring data for the recording of retained species (particularly target species), both in the ETBF and WTBF. There was lower congruence (larger variation) in the reporting of discarded species and there were some issues highlighted to TTRAG of instances where e-monitoring analysts had reported species as part of a group (e.g. sharks [mixed]). This was often the case when species were cut off the line while in the water or outside of the camera view. There were also some clear taxonomic issues indicated where industry operators and e-monitoring analysts identify the same species by different names. However, reporting and identification through logbooks and e-monitoring continues to improve overall.
133. The second analysis presented by ABARES was a comparison of logbook reporting by industry pre and post e-monitoring implementation. Once again, target species reporting did not change significantly however there was a marked improvement in discards reporting in logbooks post e-monitoring. TTRAG members noted that some of this increase in discards of commercial species may have been due to high grading of Yellowfin Tuna during the 2015 season as it was a bumper season for the species and quota was limiting. For non-target discard reporting, there was a definite overall increase in reporting post e-monitoring, particularly in shark reporting. These trends in reporting were also reflected in the WTBF. TTRAG members commented on the significant increase in protected species reporting post e-monitoring, particularly noting the biggest increase in the reporting of turtle interactions.

134. TTRAG industry members stated that they have been doing the best they can, given the circumstances while out fishing and it not being easy to report every single individual animal that comes onboard the boat. TTRAG also agreed that there is always going to be a small margin of error in any reporting, but there should be continued improvement over time.
135. The TTRAG Chair expressed concern at the inclusion of e-monitoring analyst only codes such as tuna [mixed] as this can reflect badly on the logbook analysis – industry operators do not have that option in their logbooks when identification is difficult.
136. The AFMA member suggested that the reporting of Shortfin Mako be checked as well, as they are considered to be protected species by e-monitoring analysts and therefore record them in a different database to the one for logbooks. AFMA currently considers Mako reporting to be relatively accurate, but this is not reflected in the study results.
137. TTRAG noted that the industry association Tuna Australia is working to improve the efficiency and ease of reporting for operators by developing a tablet-based system.
138. TTRAG agreed that, while there should be continued improvement in logbook reporting, e-monitoring has achieved its original objective.
139. The TTRAG Chair thanked ABARES for their study and presentation.
140. Following the e-monitoring presentation, the AFMA observer Natalie Rivero asked TTRAG to discuss the draft data strategy for the ETBF and consider aspects of the current data collection that could be improved or made more efficient. She also asked TTRAG to identify any gaps in the current data collection and provide suggestions or solutions as to how that could be improved. TTRAG further noted that this data strategy is a key part of the ETBF FMS and will link directly to the legislation and AFMA objectives.
141. To make the discussion more effective, TTRAG divided into two groups, each examining in detail the new ERA data and results and the current harvest strategy parameters.
142. The TTRAG ABARES member queried the collection of international data and how that should be included in the data strategy. It was agreed that this information could be included in a separate table outlining the aspects that are required for the management of the fishery, but not directly reported on.

ACTION ITEM 7 – AFMA to work with ABARES to develop a table for the data strategy that includes required information that is not directly reported on by AFMA or ABARES.

143. TTRAG considered the outcomes of the ERA and harvest strategy data input group discussions. It was noted by members that the costs relating to any new data collection would be considered by TTMAC.

ERA

144. The RAG identified a small number of additional attributes to improve the ERA data and results. These included; gear interactions (relating to lost gear mainly) and food webs (a current data gap, but with new information available in the near future).

Harvest Strategy

145. The RAG generally agreed that the current data used for the harvest strategy was of a high accuracy and quality. However, it was noted that the CPUE standardisation should always be reviewed and updated as necessary and where new information becomes available. The only aspect of note to include in future was data from e-monitoring, potentially in relation to fish size/length estimates.

146. TTRAG also discussed various other adjustments in relation to the harvest strategy, including taking better account of economic drivers and influencers in the CPUE standardisation that will be addressed internally at AFMA or by Dr Robert Campbell at CSIRO.
147. TTRAG endorsed the data strategy in principle, noting that there will be several future opportunities for additional input as the FMS as a whole progresses.

5.5 Research Strategy

148. This item was not discussed by TTRAG at the meeting due to time constraints, however members were asked to provide their comments on all sections of the FMS out of session.

5.6 Future TTRAG role (monitoring etc.)

149. This item was not discussed by TTRAG at the meeting due to time constraints, however members were asked to provide their comments on all sections of the FMS out of session.

5.7 Conclusions and recommendations

150. This item was not discussed by TTRAG at the meeting due to time constraints, however members were asked to provide their comments on all sections of the FMS out of session.
151. TTRAG did express their interest in the FMS as a single document displaying all management aspects of the ETBF and noted that they will be asked for future input and comments as the document is progressed and updated internally at AFMA.

6 Ecological Risk Assessment (ERA)

6.1 Background and status update

152. The AFMA member summarised the current status of the ETBF ERA. TTRAG noted that while the ERA results were presented in 2017 at a previous TTRAG meeting, a number of errors were discovered after RAG discussion and the results were subsequently revised.

6.2 Revised ERA results

153. Dr Jason Hartog, CSIRO, presented the revised ETBF ERA results to TTRAG, explaining that at the last TTRAG meeting the risk levels for some species in the ERA had been too low due to a coding error. The RAG noted that there were only a few small changes in the results after the error was fixed.
154. The AFMA member queried the range of information investigated per species and what happens if the available information for a particular species is very low. Dr Hartog indicated that FishBase is used as a last resort to determine the basic biological information for a species.
155. The revised results following the Level 2 SAFE assessment indicated changes to the ratings of two species:
- Dusky Whaler/Dusky Shark – High Risk
 - Blue Shark – Medium risk
156. These ratings remained the same for these species following the residual risk analysis. TTRAG noted that there is a high interaction rate for both the Dusky Whaler and Blue Shark, with some being retained, but most being discarded. It was highlighted by CSIRO however,

that the data used in the current ERA only goes up to 2015 so the results may differ again the next time the ERA is completed.

157. TTRAG members questioned the post-release mortality rate of the Dusky Whaler, however there was not the right expertise in the room to answer this question. The ABARES member agreed to investigate the literature on post-released mortality rates of sharks and Dusky Whalers in particular and provide that information to AFMA and CSIRO to consider.

ACTION ITEM 8 – ABARES to investigate the level of post-release mortality for Dusky Whaler sharks and provide results to AFMA and CSIRO for consideration in the ERA.

158. TTRAG noted that an “expert override” can be used to justify or alter an ERA rating. The high risk rating of Dusky Whaler is an example of where this could be applied. Post-release mortality is not an aspect used in the SAFE ERA analysis and so would need to be considered outside of the ERA process.

159. It was further noted by TTRAG that the ERA guidelines do not require the Residual Risk process to be run for medium risk species, only high risk. However, a residual risk analysis can be done for a lower risk species if requested. As a default though, it would follow the guidelines and therefore only present the residual risks of high risk species.

160. The RAG agreed that they support the ERA and the current results presented, noting any additional post-release mortality information for Dusky Whaler to be provided by ABARES. However any additional information may be considered and included in the next ERA.

6.3 Consideration of false negatives

161. This item was not specifically discussed by TTRAG, but was considered in the overall ERA revised results discussion above.

6.4 Review and advice to TTMAC/AFMA

162. This item was not specifically discussed by TTRAG, but was considered in the overall ERA revised results discussion above.

7 Research

7.1 Fisheries Oceanography Project Steering Committee

163. Dr Alistair Hobday, CSIRO, provided TTRAG with an update on the current progress of the Fisheries Oceanography Project being undertaken for the ETBF. He advised members that the project will run for 3 years with the final year being reserved for revision and refinement.
164. The project is a collaborative one with input from a wide range of contributors, both domestic (AFMA, CSIRO, ABARES Bureau of Meteorology etc.) and international (e.g. New Zealand, SPC and FFC member countries). TTRAG has also been included on the steering committee for the project.
165. The project has three objectives, these are:
1. Enhance AFMA and industry understanding of the influence of climate-ocean system drivers upon the spatial and temporal variability of key ETBF species.
 2. Develop and deliver predictive models at seasonal and decadal time scales to assist management and industry planning.

3. Provide operational forecasts of habitat distribution for Australia and the regional partners within the life of the project.

166. The project area of focus has been split into 3 areas of focus; the Western and Central Pacific, Regional and Sub-regional. However, TTRAG members suggested that the current areas Dr Robert Campbell uses for the ETBF CPUE standardisation and harvest strategy may be more appropriate to maintain consistency.

ACTION ITEM 9 – Dr Robert Campbell to provide Dr Alistair Hobday with more accurate boundaries for dividing the ETBF into sub-regional areas.

167. Dr Hobday explained that CSIRO will be attempting to age water current eddies in order to predict where certain commercial species may be present. For example, Southern Bluefin Tuna tend to be attracted to down-welling (counter clockwise) or “old” eddies. These eddies could be 80 weeks old or more and eddies tend to increase in age as they move southwards. There was a previous study done in 2014 that investigated species and eddy association that CSIRO will be drawing from for the current project.

ACTION ITEM 10 – Dr Alistair Hobday to distribute the previous study paper on species eddy association to TTRAG.

168. Information regarding water current eddies will be obtained via satellite mapping for the whole WCPO region and will be overlaid with sea surface temperature and water current data.

169. Dr Hobday informed TTRAG that the next steps for the project will be to ensure the environmental indicators are correct for the ETBF and then determine these for the WCPO. He asked the RAG to provide input on the usefulness of the information displayed.

170. Industry members were very supportive of the project and expressed their interest in the project becoming an ongoing predictive tool as it could greatly enhance their fishing efficiency. CSIRO indicated that this may be possible with appropriate resourcing and funding.

171. TTRAG noted that either Dr Alistair Hobday or Dr Jason Hartog will attend TTRAG meetings from now on to provide updates on the project progress. They will be focussing on developing the predictive modelling for Yellowfin Tuna and Broadbill Swordfish first as they are both the easiest and hardest species to do.

172. TTRAG further noted that it is vital that any results from this project are incorporated into the CPUE standardisation.

173. TTRAG thanked Dr Hobday for his presentation.

7.2 Update on current research projects

174. TTRAG noted that there are currently two other major research projects underway for the ETBF.

Genetics project

175. The AFMA member gave a summary of the progress of the genetics project (*Determination of the spatial dynamics and movement rates of the principal target species within the Eastern Tuna and Billfish Fishery and connectivity with the broader Western and Central Pacific Ocean – beyond tagging*) being undertaken by Dr Karen Evans, CSIRO.

176. It was noted by TTRAG that there have been difficulties in obtaining useable species muscle and tissue samples from the WCPO as many of the samples were thought to have been held in the WCPFC tissue bank were either not available or not suitable for sub-sampling. This has been very disappointing and Dr Evans is currently trying to work through this problem and obtain enough samples from the region.
177. There have also been difficulties with obtaining quality samples from more distant states such as French Polynesia and the Cook Islands where boats do not often come into port.
178. TTRAG expressed concern at the difficulties being experienced and stated the need for the project to provide the critical information required for ongoing management even if a delay is necessary.
179. TTRAG also expressed concern regarding the WCPFC tissue bank and noted that it is hosted by SPC. There is no benefit in having a tissue bank that does not hold useable samples.

ACTION ITEM 11 – ABARES to contact the WCPFC SC regarding improving the management of the tissue bank.

180. TTRAG requested that Dr Evans attend the July TTRAG meeting to provide another update on the project progress.

Recreational fishing project

181. The recreational fishing member provided the update on his project. The driver for this project was the increasing concern expressed by the recreational fishing sector of the decline in Yellowfin Tuna catches by recreational fishers. There has been a noticeable decline in the number of Yellowfin tagged per year also and there are now less than 100 being tagged annually.
182. Funding for the project was secured for one year from the NSW trust fund and Dr Pepperell is collaborating with Dr Robert Campbell to access the NSW Department of Primary Industries (DPI) tournament/gamefishing/club databases. They intend to use all available datasets to analyse the temporal and spatial information and determine if there are any correlations with environmental cues to explain the trend in Yellowfin Tuna that recreational fishers have been experiencing.
183. TTRAG noted that this project is difficult because there is large variation in the amount of data included per port and there is not a centralised database that includes all available data. There are also issues regarding confidentiality and NSW data access is strictly limited to the length of this project only.
184. TTRAG further noted that Dr Pepperell intends to use the data gathered to analyse trends in Striped Marlin catches as a secondary project focus to help address the resource-sharing issue between commercial and recreational fishers.

8 Other business

8.1 Accounting for recreational and indigenous fishing interests in fisheries management decisions (*Fisheries Legislation Amendment (Representation) Act 2017*)

185. TTRAG noted the new legislation that came into effect in November 2017 regarding the consideration of both recreational and indigenous interests in fisheries management decisions.

The RAG was asked by AFMA to provide their views on what the key challenges of this requirement are and comments on the proposed changes to the Fisheries Administration Paper 12 (FAP 12).

186. The TTRAG recreational fishing member stated that he feels that he almost fulfils two roles on the RAG, the scientist and the recreational fisher. He suggested that it may be beneficial for the RAG to include a separate active recreational fisher role. The AFMA member indicated that these roles already exist and are filled under TTMAC membership.
187. TTRAG generally agreed that RAG membership is expertise based and that Dr Pepperell fulfils his role well. The RAG noted that additional expertise can always be included when requested by the MAC or when specific technical skills are required. Members also noted however that the biggest challenge here is actually the lack of recreational fishing data, not the level of membership.
188. In relation to indigenous interests and membership, TTRAG agreed that it is not really their role to identify the existence of indigenous interests in the fishery. It was agreed that AFMA and TTMAC would need to determine potential indigenous representatives and what technical advice is required from that sector. Currently the level of indigenous interest in the ETBF and WTBF is unknown or undefined. TTRAG agreed that this is the main challenge regarding indigenous membership on TTRAG and further advice is needed.
189. Regarding the changes to FAP 12, the RAG identified a typing error but no further comments were provided.

8.2 Seabird strategy in Commonwealth fisheries

190. This item was not discussed at TTRAG due to limited time. This strategy will be distributed to TTRAG for comment out of session.

8.3 Economic survey presentation

191. Dr David Mobsby and Dr Robert Curtotti from ABARES provided a presentation to TTRAG on their economic indicators survey undertaken annually for the fishery. TTRAG noted that ABARES will be visiting the major ETBF ports in the coming months to collect economic information for the survey. The industry members were urged to encourage participation from other industry operators as the average participation rate is only approximately 15%.
192. TTRAG generally noted that the Net Economic Return is increasing for the ETBF and that is a positive sign.
193. TTRAG expressed their appreciation of Dr Mobsby and Dr Curtotti for their presentation.

9 Next meeting

194. The next meeting is tentatively scheduled for 16-17 July 2018 in Mooloolaba. This meeting will be confirmed by TTRAG out of session.
195. The Chair thanked all participants and observers for their contributions and closed the meeting at 3:30pm.

Appendix 1: Adopted Agenda

AFMA Canberra

21-23 March 2018

Commencing 8:30am

Wednesday 21 March 2018

1. Preliminaries

- 1.1 Welcome and apologies
- 1.2 Pecuniary interest declarations
- 1.3 Adoption of agenda
- 1.4 Acceptance of minutes
- 1.5 Actions arising/out-of-session developments
- 1.6 Out of session correspondence

2. Review of Fishery Performance

- 2.1 Current catches and effort in the domestic fishery – verbal updates from scientists, industry and recreational fishing members since last RAG Meeting (October 2016)
- 2.2. AFMA catch watch reports (AFMA)
- 2.3. WTBF review (AFMA)
- 2.4. Update from the 14th regular session of the WCPFC (AFMA)
- 2.5. MAC/AFMA Commission outcomes (AFMA)

3. Harvest Strategy Review

- 3.1 Background and status update (AFMA)
- 3.2 CPUE standardisation (CSIRO)
- 3.3 Size categories (CSIRO)
- 3.4 Target and limit reference points (CSIRO)
- 3.5 Decision rules (CSIRO)
- 3.6 Conclusions – revised harvest strategy

Thursday 22 March 2018

4. *(Item deferred) Tuna indicators and RBCCs*

5. Fishery Management Strategy (FMS)

- 5.1 Overview of the FMS (AFMA)
- 5.2 Harvest Strategy (AFMA)
- 5.3 Bycatch Strategy (AFMA)
- 5.4 Data Strategy (AFMA)
 - 5.4.1 EM analysis presentation (ABARES)
- 5.5 Research Strategy (AFMA)
- 5.6 Future TTRAG role (monitoring etc.)
- 5.7 Conclusions and recommendations

Friday 23 March 2018

6 Ecological Risk Assessment

- 6.1 Background and status update (AFMA)
- 6.2 Revised ERA results (CSIRO)
- 6.3 Consideration of false negatives (e.g. turtles)
- 6.4 Review and Advice to TTMAC/AFMA

7 Research

- 7.1 Fisheries Oceanography Project Steering Committee (CSIRO)
- 7.2 Update on current research projects
 - (i) Genetics project (AFMA)
 - (ii) Recreational fishing project (Dr Julian Pepperell)

8 Other Business

- 8.1 Accounting for recreational and indigenous fishing interests in fisheries management decisions (Fisheries Legislation Amendment (Representation) Act 2017)
- 8.2 Seabird Strategy in Commonwealth Fisheries
- 8.3 Economic Indicators survey presentation (ABARES)

9 Next Meeting

Appendix 2: Actions arising from TTRAG 20

	Action	Responsibility
1	TTRAG to consider the AFMA Commission's request regarding a harvest strategy for the WTBF at the July 2018 meeting.	TTRAG
2	Dr Robert Campbell to remove any operators that discard 90% or more of their Striped Marlin catch from the data set and distribute the results to TTRAG out of session.	Dr Robert Campbell
3	AFMA to provide Dr Robert Campbell with a list of ETBF boats that have been in the fishery for an extended period and have recently changed their targeting practices for Swordfish.	AFMA
4	Dr Robert Campbell and Dr Rich Hillary to ask Yukio Takeuchi (SPC) to re-run the Swordfish assessment with areas 1N and 2N removed for the two movement scenarios (no movement and 11% movement) and using all 72 parameters.	Dr Robert Campbell and Dr Rich Hillary
5	AFMA to develop a statement and justification for the harvest strategy decision to be provided to the AFMA Commission and circulate to TTRAG out of session for comment.	AFMA
6	The TTRAG EO to send a reminder email to RAG members out of session requesting comments on the current draft FMS.	Dr Campbell
7	AFMA to work with ABARES to develop a table for the data strategy that includes required information that is not directly reported on by AFMA or ABARES.	AFMA and ABARES
8	ABARES to investigate the level of post-release mortality for Dusky Whaler sharks and provide results to AFMA and CSIRO for consideration in the ERA.	ABARES
9	Dr Robert Campbell to provide Dr Alistair Hobday with more accurate boundaries for dividing the ETBF into sub-regional areas.	Dr Robert Campbell
10	Dr Alistair Hobday to distribute the previous study paper on species eddy association to TTRAG.	TTRAG EO
11	ABARES to contact the WCPFC SC regarding improving the management of the tissue bank.	ABARES