



Australian Government

Australian Fisheries Management Authority

**Tropical Tuna and Billfish Fisheries
Resource Assessment Group
TTRAG 22**

Meeting Minutes

18 & 19 September 2018

Mooloolaba

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1 Preliminaries

1.1 Welcome and Apologies

The Chair, Dr Cathy Dichmont, opened the TTRAG 22 meeting at 8:30am.

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
Mr Pavo Walker	Industry member
Dr Julian Pepperell	Recreational fishing member
Mr Gary Heilmann	Industry member
Dr Ashley Williams	Scientific member, ABARES (appointed as a proxy for TTRAG22)
Invited Participants	
Mr Paul Williams	Industry invited participant
Mr David Ellis	Industry invited participant
Observers	
Dr Jason Hartog	CSIRO
Mr Adam Whan	Industry
Mrs Sara Murphy	AFMA
Dr Renata Brooks	AFMA Commissioner (attended half of first day)
Executive Officer	
Ms Amelinda Byrne	AFMA

Apologies were received prior to the meeting from Dr James Larcombe (Scientific member, ABARES), Dr Rich Hillary (Scientific member, CSIRO), Professor John Tisdell (Economic member, UTAS) and Mr John Abbott (Industry member).

1.2 Pecuniary interest declarations

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.

The attendees declared their conflict of interests as follows:

Member/ participant	Declared Interests
Dr 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>Declared an interest under agenda item 8.</i>

Ms Amelinda Byrne	Employee of AFMA, which includes a salary. Acting as the Executive Officer for the TTRAG 22, but has no pecuniary interest in Australian 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>Declared an interest in Agenda items 5 and 8.</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	Has a consultancy company and is the CEO of the industry association, Tuna Australia. <i>Declared an interest in Agenda items 4, 5 and 7.</i>
Dr Jason Hartog	Employee of CSIRO, no pecuniary interest in Australian tropical tuna fisheries. Is actively engaged in Oceanography research project. Participating as an observer for the TTRAG22. <i>Declared an interest in Agenda items 6 and 8.</i>
Mr Gary Heilmann	Industry member, director of a processing company, no longer holds ETBF boat or quota SFRs. <i>Declared an interest in Agenda items 4, 5 and 7.</i>
Mrs Sara Murphy	Employee of AFMA, which includes a salary. Participating as an observer for the TTRAG 22, but has no pecuniary interest in 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>Declared an interest under agenda item 6.</i>
Mr Pavo Walker	Owns several ETBF boat SFRs, and ETBF quota SFRs for all species. Holds a Coral Sea permit and minor line permits. <i>Declared an interest in Agenda items 4, 5 and 7.</i>
Dr Ashley Williams	Employee of ABARES and participating in TTRAG22 as the scientific member for ABARES proxy. Involved in fisheries research, primarily through engagement with the Indian Ocean Tuna Commission. Has no pecuniary interest in the Australian Tropical Tuna Fisheries. <i>Declared an interest under agenda item 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 4, 5 and 7.</i>

Mr Adam Whan	Owns several ETBF boat SFRs, and ETBF quota SFRs for all species. Participating in TTRAG22 as an observer. <i>Declared an interest in Agenda items 4, 5 and 7.</i>
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In all cases where a member or participant declared a conflict of interest, and left the room, 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 the role for the TTRAG was to provide advice and recommendations for final decisions.

1.3 Adoption of Agenda

The agenda was endorsed by TTRAG and the final agenda is provided in Appendix 1.

It was noted however that the update and subsequent discussion under agenda item 4.1 (Fishery indicators - Fishery operations) will be discussed under agenda item 10 (other business).

1.4 Acceptance of minutes

TTRAG accepted the minutes of TTRAG 21.

1.5 Actions arising

The RAG discussed the action items arising from TTRAG 21 and ongoing action items from previous RAG meetings and commented on the progress on each item (Table 1).

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 22
1	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 Pepperell clarified that he had not received data from Dr Sam Williams but had discussions on the relevant data for potential use on the database. Drs Campbell and Pepperell to meet and discuss the data with an update of this project to be presented at the next TTRAG meeting in March 2019. Dr Pepperell informed the TTRAG that getting club catch and landed catch data has been difficult as individual data on fish caught was digitised from paper logs to 2011 but not after.
2	Quota zones: AFMA and CSIRO to prepare a paper that includes information from the harvest strategy, stock status information, the CSIRO MSE analysis and connectivity review assess sustainability issues in implementing inshore and offshore quota zones for swordfish.	TTRAG 15	AFMA/CSIRO	ONGOING: This project stalled due to a lack of required funds to undertake the field-based components. AFMA to discuss with FRDC about the flexibility in modes of funding this research. The upcoming project to redevelop the HS will inform consideration of whether a quota zones approach is appropriate. TTRAG22 agreed to collapse items 2, 10 and 11 into one action to assist in retaining the understanding and progress of the item.
3	Economic advice: AFMA will provide economic data from ABARES to include in the RBCC advice in future.	TTRAG 16	AFMA	ONGOING: Dr John Tisdell had intended to come to Canberra to assist with this in August/September 2018 but this has not occurred. TTRAG agreed to also combine this item with item 5. AFMA to put this as an agenda item for update at the next TTRAG meeting in March 2019
4	Dr Robert Campbell to follow up with Simon Hoyle if there is value and if it is practical to conduct the two-stage	TTRAG 17	Dr Robert Campbell	ONGOING: Dr Campbell has followed this up with Simon Hoyle and have agreed there is room for continual improvement. Will

	Action	Meeting raised	Responsibility	Status as of TTRAG 22
	process for models not tested under Group-A			progress this later in the year and provide update at the March 2019 RAG meeting.
5	Economic advice: 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: This was discussed under item 3. No meeting by the RAG sub-committee has yet occurred with TTRAG and TTMAC agreeing this action is not an immediate high priority. However, Dr Tisdell will continue to explore options for economic indicators based on those used in the WCPFC.
6	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 has been unable to find the date as yet but will confirm and report back on details as part of the continual improvements to the spreadsheet. However, this is not currently considered a high priority. Industry indicated this also occurred before the OCS was amended.
7	Dr Julian Pepperell to update the recreational sector significant events and add to the document out of session	TTRAG 18	Dr Julian Pepperell	ONGOING: An update provided by Dr Pepperell at TTRAG 21 showed the recreational component of the spreadsheet was mostly completed, with only a few final details on when first clubs were formed and data collected yet to input. The RAG agreed that this spreadsheet should be circulated to WA regulators and recreational organisations to gather historical tuna and billfish data. It was noted that this action of including WA data is not a high priority but any data collected would provide valuable information. AFMA to follow up on WA commercial catches and Dr Pepperell on recreational sector. It was noted however that the Annual General Meeting of the Game Fishers Association is to occur in November with this proving an ideal opportunity for circulation.

	Action	Meeting raised	Responsibility	Status as of TTRAG 22
8	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: This will be part of the wider discussions around the development of the new harvest strategy. TTRAG identified that actions related to the redevelopment of a harvest strategy should be collated as a group.
9	Dr Campbell to touch base with SPC staff to discuss the inclusion of NSW recreational tagging data in the SPC tagging database.	TTRAG 19	Dr Robert Campbell	ONGOING: TTRAG noted that it would be beneficial for SPC to be made aware of the data so people can request the data if interested. Dr Campbell spoke with Peter Williams and will liaise further for the data.
10	AFMA suggested contacting John Annala from New Zealand Ministry of Primary Industries to see if New Zealand would be interested in supporting the swordfish project and investigate the potential of New Zealand providing some funding.	TTRAG 19	AFMA	ONGOING: This will remain as ongoing action to contact John Annala from DPI pending industry/AFMA getting FRDC funding for the project
11	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 is continuing for AFMA to follow up on zone sample requirements to meet design with regards to inshore and offshore split to the TAC zones. Karen Evans has been successful in securing access to swordfish samples from New Zealand for this season and next season, thanks to assistance from Dr Simon Nicol (ABARES) and Dr James Larcombe (ABARES).

	Action	Meeting raised	Responsibility	Status as of TTRAG 22
12	TTRAG to consider the AFMA Commission's request regarding a harvest strategy for the WTBF at the July 2018 meeting.	TTRAG 20	TTRAG	COMPLETE: TTRAG 21 developed advice for the Commission, recommending that an indicators approach similar to ETBF be used in the WTBF. The AFMA Commission endorsed this on 5 September 2018.
13	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.	TTRAG 20	Dr Robert Campbell	ONGOING: Dr Campbell noted that the past CPUE analysis completed with these vessel effects had little impact on the CPUE. The RAG agreed to keep this as an ongoing item as part of the Harvest Strategy review to analyse whether there was a difference pre and post introduction of the quota system (repeating Rob and Anne's previous analyses on this). Dr Campbell to run this analysis and present the findings at the March 2019 TTRAG meeting.
14	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.	TTRAG 20	Dr Robert Campbell and Dr Rich Hillary	COMPLETE: Dr Takeuchi ran the 72 models and provided the results to Dr Hillary and Dr Campbell approx. 10 days ahead of TTRAG22. Dr Hillary to input the data and run the MSE analysis.
15	FMS Data Strategy: 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.	TTRAG 20	AFMA	COMPLETE: This is related to information required from RFMOs, in particular WCPFC. Dr Campbell provided comments after the last RAG meeting that were not included into the table. AFMA has updated the data strategy to include this information and provided an update under agenda item 9.

	Action	Meeting raised	Responsibility	Status as of TTRAG 22
16	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.	TTRAG 20	ABARES	COMPLETE: ABARES provided an update to this under agenda item 6.
17	ABARES to contact the WCPFC SC regarding improving the management of the tissue bank.	TTRAG 20	ABARES	ONGOING: It was noted that Dr Evans had experienced issues in the past getting samples. ABARES followed up at the SC meeting to progress Australia's interest in this area. At the time of the meeting, ABARES, AFMA and CSIRO were to attend a stock structure workshop in Noumea in October and aimed to discuss the issues associated with the tissue bank

	Action	Meeting raised	Responsibility	Status as of TTRAG 22
18	AFMA to confirm a comment from the last minutes.	TTRAG 21	AFMA	COMPLETE: AFMA confirmed the comment from the Scientific member and provided an amendment out-of-session. The amendment was also recorded in the minutes.
19	AFMA to confirm whether the new IOTC CMM size limits for billfish (< 60cm) refers to Swordfish or Striped Marlin or all billfish.	TTRAG 21	AFMA	COMPLETE: The new IOTC size limits refer to Striped Marlin Black Marlin, Blue Marlin and Indo Pacific Sailfish (IOTC CMM 18/05).
20	Data Summaries: Dr Campbell to update data for the next meeting and also include information on species proportions provided in spatial maps also be presented as proportional bar plots over time for each 5 degree square, to examine changes in species proportions over time.	TTRAG 21	Dr Robert Campbell	COMPLETE: Dr Campbell incorporated the 5 degree square into analyses.
21	Regional Data Summary: Dr Campbell to provide the most up-to-date Swordfish regional data at the next TTRAG meeting.	TTRAG 21	Dr Robert Campbell	COMPLETE: Discussed under agenda item 4.3
22	CPUE analyses: Dr Campbell to contact ABARES regarding their 'clustering' analyses work to determine if it may provide insights for improving the CPUE analyses (and vice versa).	TTRAG 21	Dr Robert Campbell	ONGOING: Dr Campbell to update progress on work between ABARES and CSIRO at the March 2019 meeting.

	Action	Meeting raised	Responsibility	Status as of TTRAG 22
23	TACC Indicators paper: AFMA to modify the indicators table ('WCPO Stock Assessment') in the first row to be a summary of the whole WCPO assessment and then add a second row to focus to our region.	TTRAG 21	AFMA	COMPLETE: AFMA has prepared the indicators table with the recommended modifications and discussed under agenda item 5.
24	Dr Rich Hillary to provide the most recent assessment on Swordfish and Striped Marlin to the TTRAG and provide a summary of key points on the assessments to aid with discussion at the next meeting.	TTRAG 21	Dr Rich Hillary	COMPLETE: Dr Hillary and AFMA provided stock assessment and MSE information relevant to Swordfish and Striped Marlin.
25	TTRAG requested that the AFMA member write a draft of the TTRAG response on the suite of indicators for the WTBF to the Commission and circulate to TTRAG out of session for review and comment.	TTRAG 21	AFMA	COMPLETE: The AFMA member circulated the draft response to the AFMA Commission to TTRAG on 9 August 2018 for comment. The response was provided to and endorsed by the AFMA Commission and discussed further under agenda item 3.2.
26	Data Strategy: AFMA to include reference to environmental, recreational and international fisheries data in the Data Strategy and to input Dr Campbell's suggestions from the last meeting and circulate revision to the TTRAG ahead of the next meeting.	TTRAG 21	AFMA	COMPLETE: AFMA has included these references with Dr Campbell's suggestions included. Discussed under Agenda Item 9.

	Action	Meeting raised	Responsibility	Status as of TTRAG 22
27	Data Strategy: AFMA to begin a logbook review with industry and Dr Campbell to determine if there should be any amendments in logbook data fields (including those discussed at TTRAG21). AFMA will report progress at the next TTRAG meeting.	TTRAG 21	AFMA/industry/Dr Robert Campbell	ONGOING: AFMA has started work internally on a logbook review. This was identified as an action to identify whether there were further details that could be collected on logbooks to assist in the CPUE standardisations analyses by CSIRO. It was identified that an initial workshop be conducted with AFMA, Tuna Australia (as industry representative) and CSIRO in January 2019 (combining with economics workshop) and to then be presented at the March 2019 meeting.
28	TTRAG asked that AFMA work with scientific members prior to TTRAG22 to develop a more detailed scope for the harvest strategy redevelopment project for the annual research statement.	TTRAG 21	AFMA/CSIRO	COMPLETE: Dr Rich Hillary provided a scope for the harvest strategy redevelopment for inclusion into the annual research statement, discussed under agenda item 6.
29	AFMA and Tuna Australia to work together to assess options for the ongoing collection of size data and report back to TTRAG22, including if required, developing a more detailed scope for the annual research statement.	TTRAG 21	AFMA and Tuna Australia	ONGOING: AFMA and Tuna Australia are exploring options for future implementation of size data collection. It has been determined that the two preferred options are either via Industry Co-management or through AFMAs existing data collection processes as the current contract finishes in August 2019 with the final report due in December 2019. Further discussions under agenda item 6.1 and 6.2.

	Action	Meeting raised	Responsibility	Status as of TTRAG 22
30	AFMA to liaise with Dr Karen Evan's on her availability to attend the next TTRAG meeting in September, or the potential for an out-of-session teleconference/webinar for the genetics project update.	TTRAG 21	AFMA	COMPLETE: Dr Evans was not available to attend this meeting. Dr Evans has provided additional updates in particular on access to swordfish samples in New Zealand (TTRAGs primary concern to date) with AFMA to request Dr Evans attendance at the March 2019 meeting for a full update on progress as requested by the TTRAG, rather than intersessional teleconference.
31	AFMA to query with Dr Karen Evan's whether she has obtained samples from areas directly east (and from Indonesia) for Bigeye tuna sampling.	TTRAG 21	AFMA	ONGOING: AFMA enquired with Dr Evans and indicated it was not the intention to acquire bigeye samples from NZ but focus on north-south sampling. Samples have been gathered from Australia, Solomon Islands and Marshall Islands. The RAG noted it might be worthwhile to get samples from NZ (in the absence of samples collected at the SPC tissue bank). While there may not be funding left to run the analysis on the samples, there may be scope to collect and run the analysis in the future. AFMA to follow up with Dr Evans whether NZ is able to collect bigeye samples (alongside their gathering of swordfish samples as part of this project), and store these for future use.
32	ABARES and Dr Campbell to liaise with Dr Evans on attending the upcoming SC meeting. If she is unable to attend the meeting, then seek a clear direction from her on which countries to target to facilitate the provision of samples for the genetics project.	TTRAG 21	ABARES/Dr Robert Campbell	COMPLETE: Dr Campbell updated the TTRAG that the samples this is referring to has been collected.

	Action	Meeting raised	Responsibility	Status as of TTRAG 22
33	Genetics project: ABARES and Dr Campbell to also confirm whether samples from PNG have been collected.	TTRAG 21	ABARES/Dr Robert Campbell	ONGOING: AFMA to confirm which species this action is referring to. Likely that this is either bigeye tuna or yellowfin tuna, in which case these samples have been collected and the action can be marked as completed.
34	AFMA determine if Wez Norris is still willing to represent FFA on the Fisheries Oceanography project steering committee and then seek FFA endorsement. AFMA to inform ABARES and Dr Campbell information on which delegates to approach in relation to additional data provision at the upcoming SC meeting.	TTRAG 21	AFMA Dr Campbell and ABARES	ONGOING: ABARES determined that Mr. Wez Norris is still willing to represent FFA. FFA secretariat asked that project PIs seek countries endorsement individually. AFMA asked ABARES to follow up with Fiji and PNG in particular, with both countries willing to join the project. ABARES suggested that Mr. Norris be approached to provide his views and experience from time in the Pacific. TTRAG agreed that Mr. Norris' skills and expertise would be invaluable.
35	AFMA to coordinate with Dr Hobday on the next Steering Committee meeting in conjunction with the next TTRAG meeting.	TTRAG 21	AFMA	ONGOING: AFMA and CSIRO determined that TTRAG22 would be provided a face to face "update" by CSIRO on the project and that the March 2019 meeting would be adjacent to a formal Steering Committee meeting.
36	ABARES to continue work on the PRM of Dusky sharks, including species identification and review work done on similar species for update at the next meeting.	TTRAG 21	ABARES	COMPLETE: ABARES provided a paper on post capture mortality under agenda item 7.1 and AFMA will presented some additional information relevant to the consideration of species identification which included a comparison to EM and observer data, also discussed under item 7.1.
37	AFMA to liaise with the ERA team for their attendance at the TTRAG 22 in September 2018.	TTRAG 21	AFMA	COMPLETE: A member from the ERA team was in attendance at TTRAG22.

	Action	Meeting raised	Responsibility	Status as of TTRAG 22
38	AFMA to input TTRAGs suggestions on the ETBF and WTBF significant events spreadsheet and circulate out-of-session.	TTRAG 21	AFMA	ONGOING: AFMA have not prioritised this since the last TTRAG but will address post TTRAG22. The spreadsheet was discussed in detail at TTRAG 21 in July 2018.
39	AFMA to determine, in the absence of key TTRAG members, if there are procedures governing the use of proxies and whether the appointment of a proxy is possible.	TTRAG 21	AFMA	COMPLETE: CEO appointed a proxy to TTRAG and subsequently AFMA asked Dr Ashley Williams from ABARES who was in attendance at TTRAG22.

1.6 Out of session correspondence

The RAG noted the out of session correspondence between the TTRAG 21 and TTRAG 22 meeting described in Agenda item 1.5 with no further correspondence added to the list.

2 Review of fishery performance

2.1 Current catches and effort in the domestic fishery

The recreational member noted there was an annual Mako Shark tournament off Sydney and has proven to be a good indicator of sizes and unusual aggregations, with 48 sharks tagged and released this year compared to about 150 last year. Blue sharks are appearing in higher numbers and juvenile Black Marlin are appearing off Cairns and Townsville indicating good consecutive recruitment years. In the west, good numbers of fish were tagged at the annual Sailfish tag and release tournament off Broome, with a sailfish recently caught 7 years after it was tagged in same area. Bad weather has prevented significant Swordfish effort off Tasmania.

All industry members noted the high SBT catches along the east coast of Australia, including higher up the coast earlier in the season than has been seen in a number of years. All industry members noted high whale predation during this season, particularly in northern areas, but this has dramatically decreased in the months since June. Industry members also noted albacore numbers have started to increase and are expected to remain high through the latter part of the season.

Likewise, industry members noted the increasing yellowfin catches, particularly in the northern parts of the east coast, with the quality of yellowfin higher in the south despite lower catches. Industry members commented on the changes to marine parks and eddy locations along the coast has resulted in difference to the usual catches, particularly an increase in swordfish. Catches of Bigeye tuna have been particularly low this year and noted by all industry members. As noted in the July TTRAG, squid bait prices have decreased slightly but continue to remain high and are expected to remain higher than normal with the increased demand. An industry participant noted the work done on the fisheries assistance program and the cooperation with the Department of Home Affairs on the Pacific work program with crews from Tuvalu beginning to work on Australian fishing boats.

2.2 Catchwatch report

The AFMA member presented the Catchwatch report to the TTRAG noting that the catches displayed reflect the numbers partway through the season.

The reports however, do reflect the lower numbers seen this season in Bigeye tuna and Striped Marlin. The season is also tracking at about the historic average for Albacore, Yellowfin and Swordfish catches. It was also noted that Bigeye tuna has seen lower catches by size classes in recent seasons. With industry comments of the increase in catches entering the later part of the season, it may be that catches will increase for all species before the season end.

3 Meeting updates

3.1 Update on the WCPFC SC meeting in Korea

The scientific member presented the outcomes from the last WCPFC Scientific Committee meeting in Busan South Korea, from 8 to 16 August 2018.

The scientific member informed the TTRAG of the main issues and discussions that occurred during the meeting. He informed the RAG that there were four main themes of the meeting with the first being data and statistics. The information in this section included that:

- The total catch in the WCPO area (2,539,950mt) was the lowest in 6 years,
- Skipjack and bigeye tuna had the lowest catch rates in a number of years (2011 and 1006 respectively), while the catch of yellowfin and albacore were both the highest on record, with the increase in yellowfin catches likely due to the increased purse seine effort in the region,
- The scientific Services Provider (SPC) continue to work on by-catch estimates for purse seine and longline fisheries, with members encouraged to provide catch estimates for all species; and,
- SPC to investigate the difference between longline observer data presented in some papers. With the scientific member requesting the matrix include estimate percentage of hooks and trips coverage as this can change the data between members.

He next provided the TTRAG with the main outcomes provided under the stock assessment theme. This included:

- the updated bigeye tuna stock assessment included an update to the growth curve, with old growth curve models removed resulting in lower uncertainty, with the stock not overfished and not subject to overfishing.
- the Scientific Committee recommended in particular that the fishing mortality on the bigeye tuna stock should not be increased from the recent average level until the Commission can agree on an appropriate target reference point or properly articulate the management objectives.
- For Albacore Tuna, an update to the 2015 assessment which included the more recent fishery data, a simplified regional structure, separation of longline fleets into DWFN and PICT fleets and inclusion of a new CPUE standardised index, indicated that the stock not is overfished and not subject to overfishing.

The management issues discussed at WCPFC SC included developing harvest control rules (for skipjack and albacore) and developing an MSE operational model. Only skipjack currently has had a Target Reference Point (TRP) set. The management issues session also included information on the estimation of the number of drifting fish aggregating devices (FADs), active FADs per vessel and an analysis of the FAD tracking program, run by the PNA. The scientific member noted that CPUE signals can be disrupted by the use of FADs and this work will be particularly important.

3.2 MAC/AFMA Commission outcomes

The AFMA member gave a verbal update on two issues from the recent AFMA Commission meeting of direct relevance to the TTRAG. The first was the Commissions endorsement of the TTRAG recommendation to use an ETBF indicators template for providing advice to the Commission on ETBF Striped marlin and Swordfish in the temporary absence of a harvest strategy.

The second was the Commissions endorsement of the development of a similar indicators template for monitoring and providing advice in relation to WTBF quota species TACCs. This followed on from the RAGs recommendation that the use of a harvest strategy was inappropriate due to the low level of catches relative to regional catches. Likewise, the use of catch triggers was considered inappropriate due to the lack of information on what these

triggers may be. Monitoring a suite of indicators was deemed the most appropriate and in-line with the approach in the ETBF to mitigate any risk that appears in the western tuna fishery. Over the next 12 months, the TTRAG will be tasked with developing these indicators as appropriate for use in the WTBF.

4 Fishery indicators

4.1 Fishery operations – moved to other business.

This item was discussed under agenda item 10 (Other business) during the TTRAG.

The scientific member gave a brief report of this agenda item for information to the TTRAG. The member spoke on the main changes as an action from the last meeting to determine the changes in fishing strategies through time and their impacts on catch rates and the harvest strategy. The information is based on vessel logbooks which record the catch and associated effort pertaining to each individual longline set deployed in the ETBF. The main changes in fishing practices identified were an increase in the average number of multiple sets per day, the number of sets per vessel per year and the number of hooks per set.

TTRAG discussed whether the increase seen since 2016 could have been as a result of more accurate logbook reporting since the introduction of EM. The member also noted that in doing the analysis, that there were a number of duplicates in the database which AFMA would need to remove in the database.

Industry also suggested that the change in fishing practices could likely be as a result of a shift to targeting SBT where boats shoot less hooks, more often.

Since a slight increase in 2010, the average trip length has declined to around 6.5 days where it has remained for the past three years.

ACTION ITEM 1 – Dr Campbell to send the AFMA data section a list of duplicate logbook entries as identified during the analysis.

4.2 Size data – update

The scientific member presented an update to the size data paper presented to the TTRAG meeting in July, showing trends in size class proportions by year and quarter and plotting 5x5 degree square per quarter where the data was available.

The catch data was limited to the recent six-year period 2011-2016 and distributions of the catch are provided for Yellowfin tuna, Bigeye tuna as well as Swordfish and Striped Marlin. Two sets of maps were produced to show the proportion of the catch in each size class within each 5x5-degree square and the average is based across all six years, and the proportion of the catch in each size class within each 5x5-degree square per quarter across the six years.

There are some seasonal signals but the sample sizes make these signals appear a bit 'noisier' but as more information, will become clearer over time. The RAG noted that it would be valuable to see the spatial squares plots of species proportions over time. This could also compliment the anecdotal advice from industry on the distribution of fish throughout the year. The RAG discussed that this plot could be made either yearly or quarterly to provide valuable information, however, it was decided this plot would be provided by quarter.

ACTION ITEM 2 – Dr Campbell to make the spatial plots series 5x5 by species proportion by quarterly to show seasonal signals for update at the March TTRAG meeting.

4.3 South west pacific data

The Scientific member presented the paper and it was noted by the TTRAG that this work has been integral to the understanding of the RAGs understanding of the proportion of Australian catch in the region.

The Scientific member reminded the TTRAG that the main region presented, Region 5, is one of the nine regions used in the stock assessments for yellowfin tuna and bigeye tuna within the WCPO. Region 5, extends eastwards from the east coast of Australia and comprises both the entire area fished by the ETBF fleet and a large proportion of the southwest Pacific. There are also two alternative regions that were examined in the paper. The first moves the eastern boundary of Region 5 out to roughly align with the boundary of the New Zealand exclusive economic zone and is known as the Region 5 extension. The second region is based on Region 1 from the swordfish stock assessment that extends north into parts of PNG.

The scientific member clarified that Region 1 is what has been used in MSE analysis for Striped Marlin and Swordfish (which includes only recreational catch data from Australia), with Region 5 being used for the tropical tunas. It was determined in the future, to save from potential confusion on the regions being used between the different species, then only those maps that are relevant for those species will be used in the plots.

ACTION ITEM 3 – Dr Campbell to remove the regional maps that are not relevant for the billfish and tuna species, and a brief explanation of the main proportion percentage in the regions, to make the regions used in each analysis easier for the TTRAG to interpret.

It was further clarified that at the last TTRAG meeting in July, it was agreed that where there is a regional stock assessment then we will use the subregional spatial areas from the assessment to give advice on stock status relevant to our region. Where there is no assessment, but an MSE (as is the case with Striped Marlin) then we will use the subregional (and stock) structure used in the MSE.

4.4 Catch rate standardisations

The scientific member presented an update to the CPUE paper presented to TTRAG in July 2018.

At the July TTRAG meeting a number of recommendations were made by the RAG on the different age classes to be used in the models and presented the results of this analysis. Bigeye and yellowfin tuna were determined to have two CPUE indices representing pre-spawners and spawners respectively with albacore retaining the base case model of one CPUE index for all age classes combined.

For swordfish, the July TTRAG meeting requested further analyses of the following options:

- a) immatures C1-4 and matures C5-13
- b) Recruits C1-2, sub-adults C3-4 and adult C5-13.
- c) Recruits C1-2, sub-adults C3-5 and then adults 6+

The TTRAG22 discussed which options would be best for swordfish, noting to use the terms as decided at the March TTRAG of, recruits, sub-adults and adults to better reflect the biological traits of each of the cohort groups. The AFMA member reiterated to the TTRAG that the decision on which age class structure to use for the CPUE indices needed to be made on biological grounds and not based on what the CPUE series trends (which have implications for TACCs) were under each of the different scenarios. Industry had concerns that the timeframe of ten years distorted the catch rates of swordfish when the 20-year time scale frequently showed swordfish number declining and increasing over a number of years, reflecting the long-lived nature of the species.

Industry queried where the nomenclature was derived in the determination of the cohort group names and it was clarified that the change in names to identify the pre-spawners and the spawners was to recognise the age at which they reached maturity – not the ages that was reflected in the catches. This is why the cohort groups are split between age classes C4 and C5, the period during which maturity is reached for this species.

TTRAG discussed whether there should be two age classes. Based on the maturity of the species, the growth curve should determine the cohorts. When identifying the cohorts, the TTRAG discussed the importance of choosing size categories that accurately distinguish between life-history stages, rather than having ‘blurring’ between the cohorts. Some members iterated the importance of maintaining a ‘small’ category because there is a peak in the early growth stages of swordfish and by splitting the early stages (C1-C4), this ensures no recruitment signals are lost.

In summary, the TTRAG decided that the base case CPUE indices for swordfish will be C1-2 representing “recruits”, C3 and C4 for “subadults” and C5 and older being the adults.

For all other species TTRAG continued to recommend that Model 2 be run as a sensitivity test. The scientific member also clarified that the age classes are determined using weights at processing, and then using an age-length key to determine the size data to determine the progression by age. This is where swordfish is different to the tuna species. In tuna, it is easier to distinguish the growth periods in early years as several age-based modes can be identified in the distribution of weights. It was also noted that the growth rates are based on female growth rates in swordfish. SPC are working on a sex-based stock assessment model but it was noted that sex-based catch and size data can be difficult to obtain.

The scientific member also worked through the comparisons between old and new cut-offs determined at the last meeting with the new model run. It was noted that the bigeye tuna results had not changed significantly using the new cut-offs. The peaks and low years are still clearly seen with the last three years also continuing to show low numbers of the pre-spawners (recruits). If this trend continues, we should expect to see low numbers coming through the spawners (adult) cohorts.

For striped marlin TTRAG noted the higher catches rates shown in the CPUE data from 1999 – 2002, with a relatively stable trend since then.

4.5 Fishery indicators

The scientific member introduced this item and noted much of this information was provided when going through the advice from the recent WCPFC Scientific Committee meeting.

The TTRAG agreed, that this agenda item will be discussed in tandem with agenda item 5 by species for the ease of retaining information as each species is discussed during the provision of stock status advice.

The AFMA Commissioner observing the TTRAG noted that swordfish was a particular interest for the upcoming Commission meeting and the RAG agreed discussions would start on swordfish for her observation.

5 Stock status advice

5.1 Swordfish

Dr Campbell presented the draft indicators paper which outlines key information from each species latest stock assessment as well as ETBF CPUE indicators and other relevant information

Dr Campbell noted a number of key outcomes from the 2017 stock assessment for swordfish including:

- Significant depletion occurred to the stock since 1990
- Median spawning biomass is at 35% of unfished levels
- Fishing mortality is high on the large fish and this is a concern looking forward to the adult stock. Fishing mortality relative to MSY levels is at 87%.
- Stock is not overfished and not subject to overfishing overall
- Region 1 median spawning biomass is at about 40% of unfished levels and in Region 2 this is at about 30% unfished levels.
- WCPFC SC recommends management being developed in the area north of 20S and measures south of 20S being maintained. The AFMA member noted the current measure does little to restrict fishing mortality of swordfish.
- High catches in the north-eastern area of the stock are taken due to high longline effort taking swordfish as bycatch while targeting tropical tunas, and because this area may not be connected to the ETBF, CSIRO has asked SPC to remove that area and rerun the model to determine what the depletion levels look like if we assume separate stocks. TTRAG noted that the ETBF genetics project will provide samples to test connectivity in 2019. Tagging showed little movement between region 1 and 2.

TTRAG considered catch trends from Region 1 (including ETBF) and region 5 “extension” (whole) as the catch statistics. TTRAG noted that after peak ETBF catches in 1999-2000, the catch level has been relatively stable over the past decade from 2007/08, despite cuts in TACC during that period. TTRAG also noted:

- changes in the ETBF proportion of total Region 1 swordfish catches which have varied between 50 and 70% in recent years.
- Increase in median sizes due to the decline in the numbers of small fish as reflected in the small fish CPUE.
- 2017 recruits CPUE down 20% on average, sub-adults CPUE also down while the adult CPUE are above the long-term average.

ACTION ITEM 4 – Dr Campbell to put legend in the map to clearly indicate which regions are for and develop a clear name to identify Region 5 “extension” (e.g. Tasman Region).

An industry participant questioned why fishing effort jumps in 2015 to 2017, with it being noted that it was likely to be a combination of fishing on SBT and also a trend to more hooks per set. An industry member indicated that standardisation doesn't take the increase in hooks per set into account but the AFMA member clarified that Dr Campbell had accounted for this in the

standardisation. Industry members still feel it doesn't account for the effect of this trend fully. The AFMA member also clarified that effort directed at SBT does catch some swordfish, while the industry member noted that the standardisation does not take into account soak time which is much shorter on SBT sets. Dr Campbell also clarified that much of the SBT effort is not even included in the CPUE standardisation for Swordfish, so the increase in ETBF effort in recent years is not all included in the model. Industry again emphasised that vessels are putting more effort into tuna and there is avoidance of swordfish. TTRAG Scientific member suggested that the effort plots should only include the effort that went into the standardisation.

Dr Campbell highlighted the fact that a key driver of the TACC cuts was the declining small fish CPUE which in recent years has flowed into the prime (now subadult) CPUE, and may in future flow into the adult catch rates. Industry noted that the TACC cuts had no impact on the actual catch levels (due to previous undercatches) or the CPUE. Dr Campbell noted it may not be catch driving the CPUE down, that it could be poor recruitments (for reasons other than catch e.g. environmental factors). Industry suggested the small fish CPUE trend is driven by spatial shift off the shelf in waters north of QLD border. Dr Campbell noted that the catch rate models are spatially structured and should take these effort shifts into account. Industry believe that the fish have shifted further south, with catch rates good in those areas, explaining lower CPUEs off Mooloolaba. The AFMA member agreed that the impact of oceanography on fish distribution is unknown and is the reason for the ETBF Oceanography project, but until we have evidence we can't assume this is the case.

Industry believe the cuts in quota have led to substantial avoidance of swordfish and the reducing trends in CPUE, with the TACC cuts leading to lease prices increasing significantly. Dr Campbell noted the potential for changes in discarding trends, possibly for small fish. Industry feel that TACC cuts should occur to protect the stock but there is no evidence of a decline in the stock, and with the HS thrown out there should never have been TACC cuts.

The AFMA member noted that while fishing strategies may have changed as described by industry in recent years, the catch rate models take into account many of the factors that signal a shift in strategy including factors such as spatial area, numbers of hooks set etc. that industry feel have an impact. While the models are not perfect, they are our best indicators. It would be wrong and irresponsible to ignore the standardisations because they are giving a signal about the stock in our area and while it may not be the fishery driving the stock down there are other factors, such as environmental impacts, that can drive such trends and we must take account of these indicators.

The Chair noted that the effort represented in the plot is total effort and not the effort in the standardisation. The standardisation is the best available and while future data may lead to improvements and uncertainties can be noted, TTRAGs task at this meeting is to interpret the trends in the indicators.

TTRAG noted that it will be important to try to capture under the logbook review the types of factors that will capture the changes in fishing strategy industry have described. Dr Campbell also noted the need to run analyses specifically on the swordfish targeting vessels catch rates (for the March 2019 meeting) and also questioned why the large fish CPUE has stayed flat if industries claim of avoiding Swordfish not being picked up in the models is accurate.

An industry member stated that they were not targeting swordfish and were avoiding it.

Industry stated that they can simply change the angle of a shot and then change the composition of the catch, when fishing in basically the same area. They again raised the idea that they don't

ACTION ITEM 5 – Dr Campbell to analyse swordfish boats specifically.

fish the shelf anymore and the NZ boats are gone, all effecting spatial patterns. Also, a number of boats no longer using squid, with concerns these are not picked up in the standardisation.

The AFMA member noted that it might be expected that with the introduction of EM in 2015 to see the CPUE increase due to better reporting of discards, particularly small fish.

TTRAG then discussed the advice paper summary for Swordfish, led by Dr Campbell. The following minutes focus' on questions and concerns raised and doesn't repeat points now captured in the advice paper. Dr Campbell highlighted the key catch and stock statistics in the summary tables. The final draft is provided at Attachment A. During the meeting, Dr Hillary provided some updated depletion estimates for Regions 1 and 2 from the models. TTRAG agreed to:

- change from using 5-year catch trends statements to using 10-year trend statements (5 years was specific to use of the harvest strategy previously)
- inclusion of key catch and effort and stock depletion graphs in the advice paper to the Commission

A key point emphasised by an industry member was that the TACC for swordfish has been consistently under-caught since quota was introduced because every operator with a permit got allocated some of the swordfish quota when quota was introduced. It has taken the industry several years since quota introduction for the two major operators to consolidate that quota to easily access it to support their larger operations. Previously they could not access enough quota resulting in undercatch. But now the TACC cuts are meaning that they still catch the same amount of fish (as each SFR is worth less kg). He stated that vessels further south wont target swordfish due to squid and light stick costs and distance of fishing.

It was noted that the increasing trend in median fish size is likely due to the lower number of small fish (consistent with the CPUE) but industry members felt it could be due also to overall average size of fish in the population increasing.

TTRAG accepted the draft text suggested by Dr Campbell on many sections including Recreational Catch, stock assessment and management strategy evaluation text, with the draft text on the MSE significantly simplified to ensure clarity for the AFMA Commission. Clarifications were provided by Dr Campbell and the AFMA member around a number of statements regarding the MSE analyses.

In relation to the section on localised depletion analyses it was noted that there was strong evidence for localised depletion in the early 2000s but more recent analyses did not find strong evidence for this. The work did suggest a possible relationship between increasing effort and decreasing catch rate in offshore area, although this fining could also be explained by factors other than localised depletion (e.g overall fish down of stock). It was clarified that the analyses were not specifically about seamount depletion, and the language needed to be made consistent with the new size class terminology. The use of the term "offshore" was also clarified to be areas still within the ETBF, and the reason for including the clarification in the advice was due to the significant importance of local depletions in the past and the likelihood that this could be questioned again by the Commission in the absence of a harvest strategy. An industry member questioned the conclusions that linked declines in swordfish catch rates in all three size classes in offshore regions with increases in fishing effort in those regions, but Dr Campbell emphasised that the conclusion used the word "may" and other factors were acknowledged to possibly explain the relationships.

TTRAG agreed that in order to ensure industry's concerns regarding the CPUE analyses and interpretation of localised depletions analyses are captured properly, industry would provide a paragraph expressing their concerns to include in the advice paper to the AFMA Commission.

TTRAG noted the AFMA Commissioners request for clear reference to the original scientific paper and opportunity for industry concerns to be expressed.

TTRAG agreed that overnight industry members would provide the paragraph of their concerns and Dr Campbell, Dr Bromhead and Dr Williams would edit other sections of the Swordfish advice summary consistent with issues identified by TTRAG, and present to TTRAG on day 2 for clearance.

TTRAG resumed discussion of Swordfish advice on day 2 and noted in particular:

- the revised median depletion estimates provided by Dr Hillary for 0%, 11% and 25% diffusion estimated in Region 1, (See Attachment A) and the importance of these depletion figures for the AFMA Commission which will consider depletion in Region 1 in the context of the Commonwealth Harvest Strategy Policy and the proxy target reference points it advocates. It was clarified that for international stocks the Policy requires that a stock is either managed under an RFMO adopted HS (if one has been adopted), or in the absence of an RFMO adopted HS, a local HS if catch proportions are sufficient to justify the use of a local HS. Industry questioned how under the SBT management procedure TACC increases were recommended when the stock was highly depleted and it was clarified the increases were based on improved recruitment and forward projections of higher biomass.
- Increased recent catches taken by the EU longline fleet in the Tasman region, immediately adjacent to Region 1.
- The additional regional depletion estimates from models recently run by SPC which remove the north eastern area catches, and the need to provide these additional estimates if possible to TTMAC and the AFMA Commission.
- The high fishing mortality on 4-6 aged fish in region 2 that Dr Hillary had warned has implications for the stock going forward, particularly when compared to natural mortality levels. Industry suggested that the 4-6 aged mortality is a result of high grading (discarding smaller fish).
- The localised depletion analyses wording was adjusted to more clearly note that fishing effort was only one of a range of explanations for the lower offshore catch rates. Industry remained concerned that it was suggesting industry effort drove down swordfish CPUE when they believe that they have reduced targeted effort on swordfish and increased it on Yellowfin, Bigeye Tuna and Southern Bluefin Tuna. They emphasised in relation to increasing effort offshore, that the spatial areas are longitudinal and the southern parts of offshore areas may see significant increase in SBT fishing effort. The concern was this increase in effort (for SBT) might explain the potential relationship between increasing effort offshore and decreasing swordfish catch rate in recent years. Some members noted that the previous analyses of SBT targeted fishing on swordfish catch rates indicated there was relatively little impact. There was some concern that the text was not consistent with the original paper and discussion.
- AFMA Member agreed industry concerns on the CPUE standardisation should be included in the paper but expressed concern that equally there needs to be the scientific view of scientific members on the issues being raised by Industry reflected in the advice paper, which is intended to be a scientific advisory paper to the Commission. TTRAG noted that it would be important that the Scientific and Management Members views that the CPUE standardisation accounts for many of the issues raised by industry should be captured in the advice paper and this would be added during the meeting.

TTRAG then discussed the advice to be provided in the paper on the implications of either increasing, maintaining or decreasing the TACC upon the swordfish stock. In doing this TTRAG started by summarising key points on regional depletion and stock status information:

- Discussed the depletion levels and stock status, and the implications of the different migration (diffusion rates) for understanding of these. TTRAG noted that 25% diffusion is very unlikely and indicates a highly connected stock which present scientific evidence does not support. 11% diffusion was based on evidence from tagging data and an analysis by Karen Evans in 2012, noting further tagging and genetics work in progress that might inform this in future. TTRAG acknowledged that the stock assessment explored a range of 0 to 25%, but that a value of 11% is based on scientific evidence and a value of 25% is considered too high and highly unlikely. At 11% the Region 1 depletion is around 41% and this is what is considered to be the Bmsy proxy level.

Following this discussion TTRAG then developed text to describe the implications for the stock, relative to both the proxy limit and target reference statements.

TTRAG noted that the 11% diffusion may have been largely based on limited mixing of fish tagged off NZ and Australia and that the model however assumes 11% mixing of Region 1 and 2 across those full regions, but that it was unlikely mixing occurred up to the north eastern area. This assumption might need further exploration and in addition the genetics project may provide some further understanding of stock connectivity.

TTRAG discussed the fact that it considers the catches taken in the north east region of the area of the South Pacific used in the stock assessment to be taken from a stock not connected to that fished by the ETBF, and that assessment models that exclude that catch may provide depletion estimates that are more realistic. TTRAG noted that Dr Rich Hillary would be requested to provide depletion estimates for Regions 1 and 2 under model scenarios that remove entirely the north eastern region of the stock from the assessment, and that those estimates are provided to TTMAC and the AFMA Commission, if time allows. TTRAG also noted ongoing work on stock connectivity.

ACTION ITEM 6 – AFMA to request Dr Rich Hillary provide depletion estimates from models excluding north-east catches, to be included on papers/advice to TTMAC and the AFMA Commission.

All members of TTRAG endorsed the advice text as drafted on screen (at attachment A).

TTRAG Scientists and AFMA manager then drafted text in response to the industry concerns section.

The first paragraph of this text noted what is included in the standardisation (statement of fact). The industry asked why the length of longline is not included in standardisation when have start and end of shot information. Mainline length is used and the uncertainty is whether it is just the length of line on the drum. Start and end points don't allow for lines that are not laid out straight etc. The standardisation takes it into account as best as possible with the data available. The text emphasises that scientific and management members have greater confidence in the ability of the standardisation to account for changes in fishing strategy, than do industry members.

ACTION ITEM 7 – TTRAG requested that additional factors that need to be taken into account in the standardisation as part of the data review in January.

In finalising the Swordfish advice, the AFMA Member expressed significant concern that the advice being drafted did not accurately reflect the significant difference in opinion between Scientific/Management members on one hand and industry members on the other regarding the degree to which the CPUE standardisation was able to account for changes in fishing strategies as described in the industry comments section. Scientific and AFMA members believe the model does take into account changes in fishing strategy to a greater degree than industry believe. After substantial discussion among members, the final text was subsequently amended to reflect this division of opinion within TTRAG.

5.2 Striped Marlin

The scientific member presented the summary of fishery indicators for striped marlin and the preparation of the indicators paper was completed during the meeting.

Dr Campbell informed the TTRAG that the 2012 assessment was conducted at a time when WCPFC used SBmsy as the LRP and as such indicates striped marlin may be overfished when using SBmsy as a Limit Reference Point (LRP). However, when there is an application of the Commonwealth Harvest Strategy Policy default proxy LRP of SB20% of unfished spawning biomass, the stock is not classed as overfished.

The scientific member confirmed to the TTRAG that SPC still intends to conduct a reassessment for striped marlin in 2019, however was uncertain as to whether this will take into account spatial distribution (i.e. whether the stock assessment will be spatially structured). Currently, the assessment model is not spatially disaggregated so current total depletion in the ETBF region is uncertain. The TTRAG also noted that spatial distribution was requested for swordfish and some engagement is needed with SPC to gather information for a comparison to striped marlin.

TTRAG noted that the standardised CPUE of striped marlin in the ETBF has been stable over the past decade and this is the most up-to-date indicator of the relative abundance of striped marlin in the ETBF over time. This would indicate that the present catches in the ETBF have not adversely affected the status of striped marlin in our region. TTRAG developed text in the advice paper to indicate the implications of increasing, maintaining or decreasing the TACC (see attachment A).

The TTRAG agreed to the revised text for the fishery indicators for striped marlin.

5.3 Yellowfin Tuna

The TTRAG noted the information presented under yellowfin tuna indicators and are presented in the same format as previous years.

Some industry members queried whether this template should be the same as those used for swordfish and striped marlin to ensure consistency between all the species. The TTRAG agreed however, that the AFMA Commission was presented with a changed template for the billfish species with the move to stock status advice, rather than a template based on RBCC advice (which was based on the tropical tunas stock status template). The TTRAG agreed that a revision to the template for tuna species was not a useful use of the RAGs time at this meeting and noted that one change in particular, 'the proportion of regional catch taken in the ETBF', is much smaller proportion than for the billfishes.

An industry member indicated however, that he would prefer that the 'Implications for TACC' section now applied to billfish species also be applied to tuna species advice text. The AFMA member indicated this could be considered in future but felt that further information was needed on

stock connectivity otherwise the implications would essential be “unknown” in all cases. TTRAG Chair indicated that this had not been approved by the Commission and given time limitations in the current meeting that this could be raised by TTMAC as a request to TTRAG in future.

The TTRAG also agreed that:

- the ‘Trend’ category in the indicators table would be a five-year period, rather than longer due to the shorter-lived nature of the species (relative to swordfish); and,
- ‘Region 5 depletion’ would be amended to ‘spawning biomass’.

TTRAG noted the highly variable (between years) but in the long-term, relatively stable CPUE for yellowfin tuna. The scientific member suggested that the plots for the regional catch by fleet and the CPUE standardisation indices be included as these had been useful for the billfish species. The TTRAG agreed that these plots should also be used as a reference for the tuna species.

TTRAG gave preliminary endorsement to the revised indicators text (pending out of session minor changes to be made by Dr Campbell, which would be distributed for final endorsement after the meeting).

ACTION ITEM 8 – Dr Campbell to include the plots for Region 5 catch by fleet and the CPUE indices for the tropical tuna species.

5.4 Bigeye Tuna

The TTRAG noted the paper as presented by the scientific member and the updated data from the 2018 assessment.

A key observation noted by TTRAG is that while the bigeye tuna assessment indicates an SSB at about 36% with no overfishing and not overfished, the ETBF has seen low “sub-adults” (small fish) CPUE for the past three years. This trend is now seen in the adult catches with an expectation this trend will continue with 2018 catch likely to be lowest of past 15 years, while 2017 catches have already been very low, consistent with rest of the WCPFC fishery. ETBF bigeye are assumed part of the WCPO stock with Australia’s catches assumed to be a small fraction of this catch.

Of particular note in the indicators table, the TTRAG commented that:

- for the past three years, the CPUE for bigeye sub-adults has been well below the five year and long-term average, and is the lowest year on record;
- the new management advice from the recent WCPFC Scientific Committee largely maintains the advice from the previous meeting, albeit recognising the updated assessment in 2018.

The TTRAG endorsed the fishery indicators (see attachment A) for bigeye tuna, pending minor out-of-session changes and distribution of the draft text out of session.

5.5 Albacore tuna

The TTRAG noted the indicators and recent assessment as presented by the scientific member.

The TTRAG also noted in the indicators table that:

- it would be useful to include the Region 5 extended region statistics (to be named “west of 175E”).
- the last assessment completed in 2018 noted a substantial shift in the spawning biomass depletion estimate (to a less depleted state), although has not changed the status of the stock which remains not overfished and no overfishing.
- the ten-year trend (rather than a five- year trend) would be more appropriate given the longer lived nature of the species. The CPUE trend between years is stable over long term but variable between years.

Industry members noted that the targeted albacore fishing in the ETBF catch table in the 2006-08 period, was likely due to the use of deep-setting practices which have not been used to the same extent in the last decade. An industry representative suggested that the increase in number of hooks per set (per unit distance) is likely to have elevated the nominal catch rate of albacore and potentially other tunas in recent years. TTRAG agreed that the catch trend data should exclude these higher periods and will now only include data from 2010 onwards.

The TTRAG agreed on the stock status advice for albacore tuna and closed the agenda item. The TTRAG further agreed that the document will be finalised and sent to the group post meeting for comment and minor edits, noting a quick turnaround for finalisation before the document is required for circulation to the TTMAC.

ACTION ITEM 9 – Dr Campbell to include the catch data from the area of Region 5 extension to the indicators table. This will be noted by its longitudinal marker.

6 Research

6.1 Current research update

The AFMA member provided a general overview of the main issues for this item to the TTRAG of the paper prepared by the Research section within AFMA. The TTRAG noted that previously listed research has been approved and would like to see those results of existing projects come through first rather than new items of research identified. The AFMA member notified the TTRAG of the ARC meeting on 9 October and informed the TTRAG of the following updates:

- status of relevant FRDC projects and proposals
- the update on the review of AFMA’s research program, currently underway to identify efficiencies
- the need to submit an ATBF annual research plan to identify research needs for 2019-20 funding (AFMA and potential FRDC funding) -
- the need to determine the future of the tropical tuna size monitoring program, including capabilities for this to be conducted through AFMA’s data section.

The details from the COMRAC meeting on 12 July was discussed at the July TTRAG meeting. Subsequent to this however, COMRAC discussed at its August meeting several other projects for consideration. These being:

- accumulative impacts across fisheries in Australian marine environments and the ERA processes

- harvest strategy assessment
- recreational and indigenous representation for better fisheries management

The TTRAG noted the current research update as prepared by AFMA's Research section.

6.2 Annual Research Statement

The AFMA member noted that TTRAG is due to consider tropical tuna fishery research priorities and develop and submit an Annual Research Statement to the AFMA Research Section by mid-September, in time for consideration at the ARC's 9 October meeting.

He noted that:

- TTRAG has had two meetings during which to develop and finalise the statement, including the current meeting and the September 18/19 meeting.
- Currently the ETBF has four major projects funded and in progress, being the TTRAG Assessment project (ARC funding), the size monitoring project (ARC funding), the fisheries oceanography project (FRDC funding) and the genetics project (FRDC funding).
- AFMA has identified two additional priorities for consideration by TTRAG being firstly, a renewed size monitoring project and secondly, a project to redevelop the harvest strategy.

The TTRAG noted:

- the scope of the harvest strategy redevelopment project accurately meets the intention.
- there was some uncertainty whether the project would go through the tender process when there is only one research provider with the capability to run the redevelopment project and the urgent nature of the project.
- the project will be 'in light' of information available, not for the collection of new information
- the input of the genetics project to the harvest strategy redevelopment project.
- the genetics project by Dr Evans has received an extension for an additional six months.

The TTRAG agreed that there is a need to get the harvest strategy redevelopment project funded and started, as this is the highest priority for the RAGs discussions. The scientific member noted we should include in the description of the harvest strategy project, that it is in-line with the new Commonwealth Harvest Strategy Policy. The TTRAG endorsed the annual research statement.

Action item 10 - The AFMA member is to update the economic subgroup of the TTRAG section on the FRDC funding and provide an overarching statement to the ARC on the reasons the RAG has decided not to pursue any projects.

7 Ecological Risk Assessment (ERA)

7.1 Residual Risk – Dusky Shark

The AFMA member introduced this paper and provided the background to the issue being considered, with Mr Hartog (CSIRO ERA analyst) then explaining the SAFE methodology applied and Dr Williams (ABARES) providing an overview of further analyses and results undertaken.

The AFMA member noted that CSIRO had identified through its assessment of ecological sustainability risks posed by ETBF longline fishing that one species, dusky whaler shark, has had a significant number of interactions with the fishery as recorded by observers and logbooks over a long period, with reported numbers also being higher since the introduction of electronic monitoring.

Subsequently, CSIRO assessed that dusky whaler shark remained high risk after the residual risk assessment.

While TTRAG endorsed the findings of the revised ERA, it noted that because dusky shark is classified as a byproduct, SAFE analyses assumes 100% post capture mortality (PCM), when fisheries data indicate significant discarding of this species and a proportion of discards being alive at release. TTRAG requested ABARES to conduct some further analyses on dusky whaler shark and advise TTRAG if a more evidence based estimate of PCM was available for use in the bSAFE for dusky shark. If so, AFMA would then request CSIRO to input that estimate to provide a more accurate bSAFE assessment of risk. AFMA also agreed to look into species identification accuracy after concerns were raised by TTRAG regarding this issue.

TTRAG agreed that any recalculation of the bSAFE score would not occur during the following discussions and review, but rather would be undertaken by CSIRO after final agreement on the most evidence based Post Capture Mortality (PCM), and would be done separate to (outside) the meeting. Mr Hartog then provided an overview of the bSAFE methodology, and explained that providing an evidence based estimate of PCM can be provided, CSIRO can apply that estimate within a continuous scale of PCM in bSAFE (instead of the categorical scoring approach previously applied), to provide a more evidence based estimate of risk.

1. Dr Williams (ABARES) then presented a revised review of the most recent and relevant research and data pertaining to PCM for dusky shark. Key points noted by ABARES included:
 - a. Advice from scientific shark experts to only use evidence from research on dusky shark and not related species, which can have substantially different post release survival.
 - b. That PCM should be considered in two parts, being
 - i. At vessel mortality (AVM) which can be determined from fishery dependent data (logbooks and observers)
 - ii. Post release mortality (PRM) while relies mainly on satellite tagging studies.
 - c. The most relevant PRM study for dusky sharks tagged 21 sharks on demersal longline, with key differences (to pelagic longline) being the depth of capture, shorter snoods, and shorter soak times (compared to ETBF). Another study using pelagic longline is still in progress.
 - d. Based on the above studies and data from ETBF logbooks and observers (relating to retention and life status trends), ABARES estimated:
 - i. At vessel mortality (AVM) is estimated to be 31.6% (average 2010-2014). That is, 31.6% of dusky sharks that are hooked and brought to the vessel are determined to be dead (or highly likely to die) at that point.
 - ii. Post release mortality (PRM) is estimated to be within the range 11-42% with the best point estimate around 29%. This notes however that an estimated 11-42% of sharks released alive and vigorous will die subsequently.
 - iii. Total PCM for dusky shark in the ETBF to fall in the range of 39.1% to 60.3% with an average of 51.4%.
2. Subsequent discussion by TTRAG noted that the calculations should (but didn't) assume that animals for which their fate was not recorded should (under a precautionary ERA approach) be assumed dead. Once this assumption is made, the revised figures were: 40.5% to 61.3% with an average of 52.6%. TTRAG members also sought a number of clarifications around what the different data figures (above) pertained to.
3. In response to the question of the accuracy of species identification, AFMA noted that preliminary data investigations did not provide any clear evidence that logbook reporting was biased by species misidentification, with:

- a. A comparison of logbook data for retained dusky sharks with electronic monitoring analyst data showing good agreement on species ID (however this analysis could only examine retained shark IDs and only for a few vessels that retain dusky shark), and;
 - b. A comparison of catch rates reported by observers, in the period 2011-2015, prior to implementation of electronic monitoring, showing good agreement with catch rates from logbook data, in 2016 and 2017 (combined) after implementation of EM. Both showed inter-annual variability in catch rates, but similar rates when aggregated.
4. This is not conclusive evidence of consistent species identification and it was noted that separating whaler species can be very difficult, not only for fishers but potentially for EM analysts also, and that this issue probably needs further investigation. Potentially running similar analyses for other whaler species might be useful, including looking at boat to boat species identification patterns for whaler sharks. It was noted that recreational tagging programs don't attempt to separate whalers due to difficulties in identifying them.
 5. Following discussion of all of the above information TTRAG concluded that the range of PCM (40.5% to 61.3%) identified by ABARES (and adjusted by TTRAG) represented the best evidence based estimates of PCM for dusky shark and should be used to revise the bSAFE assessment, and that the outcome of that revision be the final ERA risk score and outcome, but noting some continued uncertainties including relating to differences in branchline lengths, soak times and depth. As such, TTRAG also noted these scores should be reviewed when the current in-progress and pelagic longline based study of post release mortality is completed.
 6. In relation to branchline length an industry member noted that for species like swordfish, branchline length is key to mortality rates, with shorter branchlines in recent years (compared to early years) resulting in more small and moribund swordfish, the relevance being that mortality of dusky shark may be less on pelagic gear which has longer branchlines than demersal longline gear.
 7. Following the closing of the agenda item, the CSIRO ERA scientist left the meeting and later communicated results of the bSAFE utilising the range and average PCM scores, as follows:

	PCM	F	bSAFE Risk
Mean	52.60%	0.040006087	Low
Lower	40.50%	0.030803166	Low
Upper	61.30%	0.046623064	Medium

8. In summary, the final ERA for dusky shark has determined the risk for this species to be in the range of low-medium risk.

7.2 ETBF and WTBF significant events spreadsheet

The AFMA member introduced this item and noted this is a standing item at each of the July sessions of the TTRAG.

He explained the intent of the document is to record events that may provide an explanation for certain data trends and effects evident in the fishery.

The RAG discussed the document and suggested adding a number of new events which included:

- a) Dr Pepperell's game fishing and charter fishing significant events spreadsheet

- b) Date of the trip limit for Mahi Mahi. This is an action item from the last meeting.
- c) The change from 1 July 2018 to marine parks, and
- d) The date from when the decision was made to cease use of the harvest strategy (while it is redeveloped).

TTRAG also noted that more detail can be put into the management arrangements listed and what these actually entailed to make it a bit clearer (i.e. for the introduction of snoods, increased hooks/floats surface sets etc.). It was agreed this should be continually updated but AFMA will recirculate to the RAG once these amendments are made.

8 Oceanography project update

Mr Jason Hartog (CSIRO) provided the TTRAG with a brief update on the oceanography project.

The observer reminded the TTRAG of the background to this project, including that the abundance, distribution and availability of species on the east of Australia is influenced by the ocean-climate system, but the influence of a range of factors within the ETBF and with the west Pacific region is poorly understood.

The oceanographic project has been funded through FRDC is to determine the environmental factors impacting ETBF species and how this can influence the longline tuna fishery. It will also assist the development of appropriate management arrangements, including harvest strategies and resource sharing arrangements, provide insights into potential long-term changes in the ETBF that may result from climate change, and develop operational forecasts to aid fishers, managers and policy makers.

The observer noted that recent progress on the project included building habitat models and environmental datasets to explain variations in regional abundance. This included a mix of information of catch and tagging data from all target species in the ETBF.

He explained that the preliminary results from the models are first being applied to yellowfin tuna and are using historical data together with both archival tagging data and satellite tagging data. The initial results of this analysis were shown to the TTRAG. The observer informed the TTRAG that the next steps to the project are to collate data from catches and electronic tags from partner countries and develop management hypotheses for tuna movements. The project also aims to soon evaluate additional environmental variables for yellowfin tuna models across the region.

9 Fisheries Management Strategy

The AFMA member provided a brief update for this agenda item and noted that a significant update was not provided since the last TTRAG meeting in July. However, all comments received from TTRAG have been incorporated into the latest draft, the rationale used for the harvest strategy (before the decision for the need to redevelop the harvest strategy) and instead includes the rationale for the use of stock status advice during the redevelopment interim period.

The AFMA member will circulate a revision to the TTRAG inter-sessionally.

10 Other business

As agreed by the TTRAG while adopting the agenda, the scientific member's paper under agenda item 4.1 – fishery operations, was presented under this item in the interests of time.

No other items were put forward by the TTRAG for discussion under this agenda item.

11 Date and venue for next meeting

It was noted by the TTRAG that at the September meeting each year they would identify potential meeting dates in the following year for planning.

The dates proposed for 2019 are as follows:

- March TTRAG – from Tuesday 26 – 28 March 2019 (planned for 3 days but depending on the agenda can be made for 2 days),
- July TTRAG – Tuesday 16 and 17 July 2019, and;
- September meeting – Wednesday 4 - 5 September 2019.

All of the meetings were agreed to be held in Mooloolaba, Queensland.

The Chair thanked all participants and observers for their contributions and closed the meeting at 3:45pm.

Appendix 1: Adopted Agenda

Mantra Mooloolaba Beach, Mooloolaba
Commencing at: 8:30am Tuesday 18 September
& Wednesday 19 September 2018

1. Preliminaries

- 1.1. Welcome and apologies
- 1.2. Pecuniary interest declarations
- 1.3. Adoption of Agenda
- 1.4. Acceptance of TTRAG 21 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 (July 2018)
- 2.2. AFMA catchwatch report

3. Meeting updates

- 3.1 Update from the 14th session of the WCPFC Scientific Committee (WCPFC) (ABARES)
- 3.2 Outcomes from the AFMA Commission meeting on the ETBF and WTBF stock indicators

4. Fishery indicators

- 4.1. Fishery operations
- 4.2. Size data – update
- 4.3. South West Pacific Data – update
- 4.4. Catch Rate Standardisations
- 4.5. Fishery indicators

5. Stock Status Advice

- 5.1 Swordfish
- 5.2 Striped Marlin
- 5.3 Yellowfin Tuna
- 5.4 Bigeye Tuna
- 5.5 Albacore Tuna

6. Research

- 6.1. Research update
- 6.2. Annual research statement

7. Ecological Risk Assessment

- 7.1 Dusky Shark Assessment
- 7.2 Recommendations/advice

8. ETBF Oceanography project

8.1 Project design overview

8.2 Progress to date and next steps

9. Fishery Management Strategy

9.1 Update on draft revisions

10. Other business

11. Date and venue for next meeting

Appendix 2: Actions arising from TTRAG 22

	Action	Responsibility
1	Fishery indicators: Dr Campbell to send the AFMA data section a list of duplicate logbook entries as identified during the analysis.	CSIRO
2	Size data: Dr Campbell to make the spatial plots series 5x5 by species proportion by quarterly to show seasonal signals for update at the March TTRAG meeting.	CSIRO
3	Indicators: Dr Campbell to remove the regional maps that are not relevant for the billfish and tuna species, and a brief explanation of the main proportion percentage in the regions, to make the regions used in each analysis easier for the TTRAG to interpret.	CSIRO
4	CPUE standardisation: Dr Campbell to put legend in the map to clearly indicate which regions are for and develop a clear name to identify Region 5 “extension” (e.g. Tasman Region).	CSIRO
5	CPUE standardisation: Dr Campbell to analyse swordfish boats specifically to determine the factors affecting boats targeting swordfish.	CSIRO
6	Redevelopment of harvest strategy: AFMA to request Dr Rich Hillary provide depletion estimates from models excluding north-east catches, to be included on papers/advice to TTMAC and the AFMA Commission.	AFMA CSIRO
7	CPUE standardisation: TTRAG requested that additional factors need to be taken into account in the swordfish standardisation and will be part of the data review in January.	Tuna Australia AFMA
8	CPUE standardisation: Dr Campbell to include the plots for Region 5 catch by fleet and the CPUE indices for the tropical tuna species.	CSIRO
9	Indicators: Dr Campbell to include the catch data from the area of Region 5 extension to the indicators table. This will be noted by the longitudinal marker.	CSIRO
10	Research: The AFMA member is to update the economic subgroup of the TTRAG section on the FRDC funding and provide an overarching statement to the ARC on the reasons the RAG has decided not to pursue any projects.	AFMA
11	TTRAG economic sub-group: subgroup to meet ahead of March meeting with TTRAG economic member (or economic member proxy, ABARES, AFMA and Tuna Australia. This will also be combined with the meeting to explore options for the logbook update (Action item 14).	AFMA
12	Redevelopment of harvest strategy: combine the actions relating to the harvest strategy so considerations previously listed as action items can be included in the overall redevelopment.	AFMA
13	Clustering work: Dr Campbell to work intersessionally with Dr Simon Nicol on these analysis work and update TTRAG at the March 2019 meeting.	CSIRO ABARES

14	Data strategy logbook review: to identify whether there were further details that could be collected on logbooks to assist in the CPUE standardisations analyses by CSIRO. It was identified that an initial review be conducted with AFMA, Tuna Australia (as industry representative) and CSIRO to update on progress at the March 2019 meeting. Combine this meeting with the TTRAG economic sub-group meeting (Action item 11) in January 2019.	AFMA CSIRO Tuna Australia
15	Genetics project: Dr Karen Evans to attend the March 2019 TTRAG meeting to provide a full update on progress to-date on the project.	AFMA
16	Genetics project: AFMA to confirm with Dr Evans which species is being referred to in action item 33 and requires sourcing from PNG.	AFMA