Australian Government
Australian Fisheries Management Authority

Tropical Tuna and Billfish Fisheries Resource Assessment Group TTRAG 24

Meeting Minutes

17 and 18 July 2019

Mooloolaba

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1 Preliminaries

1.1 Welcome and Apologies

The Chair, Dr Cathy Dichmont, opened the TTRAG 24 meeting at 8:30am and introduced new members. Dr Dichmont also noted that AFMA are still seeking an additional industry member for TTRAG to represent the south coast industry. 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 Pavo Walker	Industry member (second day only)
Dr Julian Pepperell	Recreational fishing member
Mr Gary Heilmann	Industry member
Mr James Larcombe	Scientific member, ABARES
Mr David Mobsby	Economics member
Mr Ian Knuckey	Scientific member
Invited Participants	
Mr Paul Williams	Industry invited participant
Mr Terry Romaro	Industry invited participant (July meetings)
Observers	
Dr Karen Evans	CSIRO (second day only)
Dr Peter Grewe	CSIRO (second day only)
Mr Nick Mammides	AFMA
Executive Officer	
Ms Amelinda Byrne	AFMA

Apologies were received from Mr David Ellis and Mr Pavo Walker prior to the meeting.

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 Cathy Dichmont (Chair)	Has a consulting company, but has no pecuniary interests in the tuna fisheries. *No conflict of interest declared.*

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. *No conflict of interest declared.*
Ms Amelinda Byrne	Employee of AFMA, which includes a salary. Acting as the Executive Officer for the TTRAG 24, but has no pecuniary interest in Australian tropical tuna fisheries. *No conflict of interest declared.*
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: "*Data management, provision of fishery indicators and implementation of the harvest strategies for Australia's tropical tuna fisheries*". *Agenda item 5.2 research statement. .*
Dr Karen Evans	Participating as an observer for TTRAG24 – day 2. Employee of CSIRO, no pecuniary interest in Australian tropical tuna fisheries. Is the PI for the following research 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".* *Declared an interest in Agenda item 5.2.*
Dr Peter Grewe	Participating as an observer for TTRAG24 – day 2. Employee of CSIRO, no pecuniary interest in Australian tropical tuna fisheries. *Declared an interest in Agenda item 5.2.*
Mr Gary Heilmann	Industry member, director of a processing company, no longer holds ETBF boat or quota SFRs. *Declared an interest in Agenda item 3.3 and 4.1.*
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. *Declared an interest in Agenda item 5.2.*
Dr Ian Knuckey	Has a consulting company with interests in electronic monitoring in the tuna fisheries, and is a member on several other AFMA Committees. *Declared an interest in Agenda item 5.2.*
Dr 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. *Declared an interest in Agenda item 5.2.*
Mr Nick Mammides	Employee of AFMA, which includes a salary and is participating as an observer at TTRAG 24, but has no pecuniary interest in Australian tropical tuna fisheries.
Mr David Mobsby	Employee of ABARES, involved in fisheries research, primarily through the economic survey of the Eastern Tuna and Billfish Fishery. Has no pecuniary interest in the Australian Tropical Tuna Fisheries. *Declared an interest in Agenda item* 5.2

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. *Declared an interest in Agenda item 5.2.*
Mr Terry Romaro	Director of a company that owns several SFRs in multiple fisheries for multiple species. Is a member on SBT and TTMAC. *Declared an interest under agenda item 3.4 and 4.1.*
Mr Pavo Walker	Owns several ETBF boat SFRs, and ETBF quota SFRs for all species. Holds a Coral Sea permit and minor line permits. *Declared an interest in Agenda item 3.3 and 4.1.*
Mr Paul Williams	Director of a company that holds an ETBF boat SFR, ETBF quota SFRs, and holds a Commonwealth fish receiver's permit. *Declared an interest in Agenda item 3.3 and 4.1.*

In all cases where a member, invited participant or observer declared a conflict of interest, the participant left the room. The remaining members unanimously agreed they were permitted to participate in the item of discussion.

The TTRAG noted that the expertise of the members and invited participants present and was critical for full and comprehensive discussions, further noting that the role for the TTRAG was to provide advice and recommendations for final decisions.

1.3 Adoption of Agenda

The TTRAG agreed to adjust the agenda slightly to discuss items 2.3 and 2.4 under other business to allow sufficient time for other agenda items. There was some discussion on whether the RAG will discuss the ERA and the AFMA member noted that the report was sent just prior to the meeting and he will circulate the report out-of-session. The RAG also agreed to discuss the catchwatch report prior to industry comments.

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

1.4 Acceptance of minutes

TTRAG accepted the minutes of TTRAG 24 without amendment.

1.5 Actions arising

The RAG discussed the action items arising following TTRAG 23 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 23	Discussion at TTRAG24
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: Details of this project will be discussed under agenda item 5.	Agreed to briefly discuss in agenda item 5. The recreational member noted that the final report will be due in October.
2	**Quota zones:** 1. 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. 2. 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	1. TTRAG 15 2. TTRAG 19 3. TTRAG 19	AFMA/CSIRO	*TTRAG22 agreed to collapse items 2, 10 and 11 into one action to assist in retaining the understanding and progress of the item. TTRAG noted at TTRAG23 there was ongoing discussions about whether to manage according to quota zones, which is a TTMAC decision, but could have implications for the harvest strategy which the RAG will need to consider. AFMA to discuss further with Tuna Australia. Addressing 2) and 3) is not needed until 1) is addressed* 1. ONGOING: This project stalled due to a lack of required funds to undertake the field-based components. AFMA to discuss	*AFMA member provided brief background to the quota zones issue and this agenda item.* *Industry raised issue on whether this was needed dependent on the genetic work being undertaken. Industry queried whether work on the HS could continue with scientists saying that they weren't constrained with this.*

	Action	Meeting raised	Responsibility	Status as of TTRAG 23	Discussion at TTRAG24
	the potential of New Zealand providing some funding.			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. 2. ONGOING: This will remain as ongoing action to contact John Annala from MPI pending industry/AFMA getting FRDC funding for the project.	
3	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: There has not been progression on this particular item, however Drs Robert Campbell, Shijie Zhou and Simon Hoyle Hoyle have written a related paper which will soon be published. This could be for further discussion at the TTRAG in July 2019.	No further progress however, Dr Campbell noted this paper has now been published.
4	**Economic advice:** 1. 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, Economics member	COMPLETE: Noting FMA will coordinate a scoping paper for the September TTRAG meeting on potential in season economic indicators and data sources and associated availability and costs.	TTRAG noted this is complete is pending on the paper to be prepared for the September TTRAG meeting.

	Action	Meeting raised	Responsibility	Status as of TTRAG 23	Discussion at TTRAG24
	2. *AFMA will provide economic data from ABARES to include in the RBCC advice in future. *moved from action item 3				
5	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	COMPLETE: bag limit for Mahi Mahi removed in June 2003.	COMPLETE
6	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 provided an update on the WA recreational sector. It was noted however, that the Annual General Meeting of the Game Fishers Association is currently reviewing the document but does not expect significant changes (Broome sailfish is an exception) and will be complete by July 2019 TTRAG.	COMPLETE: This was provided by Dr Pepperell and included in the significant events spreadsheet, discussed under agenda item 6. The TTRAG noted however that the events for western commercial and recreational sectors was still to be done, and was further discussed under agenda item 6.
7	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: Dr Campbell will speak with SPC when he attends the pre-assessment workshop in early April 2019. Dr Campbell noted that if SPC don't have this data but the SPC want to include the tagging data, NSW is able to provide, depending on a service	COMPLETE - Dr Campbell spoke to Peter Williams at SPC who would need a licence agreement with NSW Fisheries to access the data. ABARES will follow now continue work on this.

	Action	Meeting raised	Responsibility	Status as of TTRAG 23	Discussion at TTRAG24
				agreement. TTRAG agreed that this would be beneficial for NSW with SPC running analyses along the east coast.	
8	ABARES to contact the WCPFC SC regarding improving the management of the tissue bank.	TTRAG 20	ABARES	ONGOING: TTRAG noted this was an ongoing discussion.	COMPLETE - Dr Larcombe provided the TTRAG with some background on the item to note it arose out of some frustration the tissue bank wasn't providing what was needed. But now there is an acknowledgement that the bank is unable to provide required samples and rather an acceptance that new species samples are needed for collection particularly in relation to further genetics research. The RAG agreed there is no doubt that a tissue bank is needed but whether new samples should be taken by WCPFC or elsewhere. The RAG agreed that this can be removed and marked as complete as this is no longer a RAG issue and should now be driven by the scientists on the TTRAG with the Commission.

	Action	Meeting raised	Responsibility	Status as of TTRAG 23	Discussion at TTRAG24
9	CPUE analyses: 1. 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). 2. Dr Campbell to work intersessionally with Dr Simon Nicol on these analysis work and update TTRAG at the March 2019 meeting.	TTRAG 21 TTRAG 22	Dr Robert Campbell CSIRO ABARES	1. ONGOING: ABARES presented an update of the metiers work March 2019 TTRAG but TTRAG noted this work is ongoing. 2. COMPLETE	Dr Campbell has had discussions with ABARES and is considered an ongoing item. The TTRAG also agreed this item will be slightly rewritten to acknowledge staffing changes at ABARES (i.e. Dr Simon Nicol no longer works there).
10	**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: the AFMA member informing the TTRAG that there has not been a field-by-field review of the logbooks as yet for identifying unnecessary fields but TTRAG and the data subgroup have reviewed what additional data is needed. Review of logbooks to identify unnecessary fields can be an option in the future under the FMS data strategy and the TTRAG can agree resources should be allocated to doing this review.	The TTRAG agreed that identifying any unneccesary fields can be an ongoing item.

	Action	Meeting raised	Responsibility	Status as of TTRAG 23	Discussion at TTRAG24
11	**Size monitoring project:** 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 is currently in the final stages of assessing applications for the continuation of the size monitoring project.	ONGOING
12	AFMA to input TTRAGs suggestions on the ETBF and WTBF significant events spreadsheet and circulate out-of-session.	TTRAG 21	AFMA	ONGOING: There has not been progression on this item since the March TTRAG.	Discussed under item 6. The TTRAG agreed to mark as complete but keep in the recurring actions table.

	Action	Meeting raised	Responsibility	Status as of TTRAG 23	Discussion at TTRAG24
13	**Indicators and CPUE standardisation:** 1. 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. 2. 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). 3. Dr Campbell to include the plots for Region 5 catch by fleet and the CPUE indices for the tropical tuna species. 4. 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.	TTRAG 22	CSIRO	It was agreed at TTRAG 23 that items relating to the CPUE standardisation work (previously items 24, 27 and 28) will be collapsed into 1 item and will all be included as part of the CPUE analysis presented at September TTRAG meetings. ONGOING: this will be included in the SW-Pacific data presented to the TTRAG in September 2019.	TTRAG agreed this item will be for discussion at TTRAG25 September 2019.

	Action	Meeting raised	Responsibility	Status as of TTRAG 23	Discussion at TTRAG24
14	Dr Campbell will look to explore potential changes in fishing practices (particularly with the start of set location) associated with the introduction of Marine Parks, and determine potential implications for CPUE standardisations.	TTRAG 23	CSIRO	COMPLETE: This will be discussed at agenda item 3.	This should be marked as ONGOING. Dr Campbell still needs the details of marine park areas. AFMA will contact to the compliance section to provide accurate coordinates and provide this information to Dr Campbell.
15	AFMA to coordinate and lead development of a discussion paper that provides an initial list of potential economic in-season indicators, including identifying those that are already collected, where other indicators can be sourced, and any associated costs to assist TTRAG in undertaking a step-wise review of the feasibility and cost effectiveness of developing in-season indicators. This to be completed by the September TTRAG meeting.	TTRAG 23	AFMA/TTRAG	ONGOING: This will be listed as ongoing in preparation ahead of the September TTRAG meeting.	AFMA will work with David Mobsby and David Ellis ahead of the September meeting.

	Action	Meeting raised	Responsibility	Status as of TTRAG 23	Discussion at TTRAG24
16	AFMA to determine how EM are recording heads that are brought up on board and report back to TTRAG with a short discussion paper including data collection options after consultation with AAP.	TTRAG 23	AFMA	ONGOING: AFMA has determined that heads that are brought up on-board are recorded as discard However, AFMA has not developed a subsequent options paper.	This is relevant to determining predated fish. Difficult to determine species but they are recorded as 'tuna – discards'. Determining clean hooks can be done, but this is not considered economically viable at this stage. The TTRAG would be interested that there would be random video samples kept for a long period as videos are currently only kept for6 months. AFMA will look into/review whether this would be feasible and will discuss internally.

	Action	Meeting raised	Responsibility	Status as of TTRAG 23	Discussion at TTRAG24
17	**Electronic logbooks** 1. TTRAG to consider whether a research priority is required to address the uncertainty around changes in fishing practices, particularly for monitoring fishing depth. 2. AFMA to seek to include the following data fields into future ETBF e-logs - Vessel log speed (important distinction from vessel speed), Shooter speed, and bubble dropper length.* 3. TTRAG to consider development of TDR based research and/or data collection in the ETBF to better understand and account for (in CPUE analyses) the relationship between fishing strategies (including vessel log speed, shooter speed and dropper lengths etc) and fishing depth.** *moved from item 18 **moved from item 20	TTRAG 23	AFMA	1. ONGOING: for discussion under agenda item 5. 2. ONGOING: this remains an ongoing item until the discussion is held to review logs. This has not occurred since TTRAG23. 3. ONGOING: This will be further discussed in the group under agenda item 3.	*TTRAG agreed to combine items 17, 18 and 20 into one item.* 1. This was further discussed under item 5 2. AFMA has been in discussion with the internal licensing area to have these fields included, particularly with the introduction of e-logs. AFMA will also soon notifying industry on the mandatory introduction of e-logs in October. 3. TTRAG agreed this is an ongoing discussion.

	Action	Meeting raised	Responsibility	Status as of TTRAG 23	Discussion at TTRAG24
18	Dr Campbell to distribute PDF of previous ETBF TDR study and Yoshahara 1951 study.	TTRAG23	CSIRO	COMPLETE: these reports were circulated by Dr Campbell on 3 June 2019.	TTRAG noted that this item was complete.
19	Dr Campbell to investigate potential trends in fishing location changes (fleet and vessel specific) and to extend the fleet and vessel specific fishing method factor trends back to at least 10 years and aggregated at an annual level.	TTRAG23	CSIRO	COMPLETE: This will be discussed under agenda item 3.	COMPLETE
20	Dr Campbell to explore the potential estimation of “hook hours fished” for use in CPUE standardisation	TTRAG23	CSIRO	COMPLETE: This will be discussed under agenda item 3.	COMPLETE

Table 2. Status of annual action items

	Action	Next Discussion	Responsibility	Status as of TTRAG 23	Discussion at TTRAG24
1	Review, update and input TTRAGs suggestions into the fishery events spreadsheets	TTRAG 24 – July 2019	AFMA to prepare updated draft	ONGOING: AFMA to input RAGs suggestions as they occur for the July TTRAG meetings.	For discussion under item 6.

1.6 Out of session correspondence

The TTRAG noted the out of session correspondence between the TTRAG 23 and TTRAG 24 meetings with no further correspondence added to the list.

2 Review of fishery performance

2.1 Catchwatch report – swapped in agenda

The Catchwatch report was presented to the TTRAG by the AFMA member, noting a couple of key statistics. The AFMA member went through the cumulative catch by target species noting that bigeye, swordfish and striped marlin catches are at the lowest level, for this time of year, of any year since 2006. He noted that this could be due to a range of factors including the change of season start date, availability, environmental or other factors.

A scientific member queried why some of the CDR figures in the catchwatch report are different to those in Dr Campbell's ETBF data summary papers. The RAG noted differences in conversion factors used by AFMA for quota monitoring and by Dr Campbell and the need for consistency in the use of conversion factors might be further discussed and resolved in future.

Dr Campbell will re-name the data in his paper to make it clear they are different factors to those used by AFMA. AFMA also agreed to develop a paper explaining the origin of current quota conversion factors.

The TTRAG discussed the trends in the fishery compared to other years, with industry members noting that based on experience, there is a clear third year of a downturn in the availability of bigeye and yellowfin in the fishery. The TTRAG noted that there are mid-year peaks historically on the graphs for bigeye. However, despite no changes in effort in the fishery at this time, catch rates for bigeye has not increased as usually anticipated. The report showed a slight peak at the end of the first quarter, but there has been a downturn since and corresponds to what is seen on-the-water. TTRAG requested that SBT catches in the ETBF longline sector be included in future catchwatch reports to the RAG.

ACTION ITEM 1 – AFMA to include SBT catches in the catchwatch reports alongside the target species for information.

ACTION ITEM 2 – AFMA to prepare a historical paper on the origins of conversion factors used by AFMA for quota monitoring and those used by Dr Campbell in the ETBF data summaries.

2.2 Current catches and effort in the domestic fishery

The TTRAG industry members (including recreational members) provided updates of the current catches and effort in the fishery since the last TTRAG meeting in March.

The recreational member noted that there was an east coast low system that affected tournaments due to bad weather. Black and striped marlin catches were lower than usual, however blue marlin catches were relatively high. Large (~50 to 70kg) yellowfin are being caught by the recreational sector in the area between Sydney and Bermagui as well as SBT between 50 to 70kg off Sydney, and between 70 to 130kg range off Bermagui. Swordfish tagging has been undertaken to determine range of these fish, with anecdotal information of high swordfish availability. In Western

Australia, sailfish have been present off Broome but not many tags retrieved due to uncertain survivability of the animal post-release.

Industry again noted that squid bait prices are causing an impact on operations and that swordfish catches are lower this year due to a move to more economical bait alternatives. Industry members agreed the tuna species catch rates and weights are very low this season. Industry noted that New Zealand are also recording lower yellowfin and bigeye this year, but are experiencing high abundance of SBT. Albacore however, seems to be remaining relatively stable in the ETBF.

The western tuna invited participant informed the TTRAG on the main issues affecting the WTBF. He noted that catches are fairly normal and that operators on the west coast would like more scientific analysis, including oceanographic factors that may affect fishing on the west coast and are willing to participate in any studies.

2.3 TTMAC and AFMA Commission update

The AFMA member provided a brief overview of relevant discussions and outcomes from the most recent TTMAC meeting (3 May 2019), including:

- TTMAC reviewed and endorsed advice from TTRAG on the redevelopment of the ETBF Harvest Strategy for Broadbill Swordfish and Striped Marlin.
- TTMAC reviewed and endorsed the draft ETBF fishery management strategy to be submitted to the AFMA commission, pending some minor changes being made.

He then noted that the AFMA Commission had subsequently endorsed the ETBF Fishery Management Strategy at its May 2019 meeting and thanked TTRAG members for their inputs and advice on that document over the past 18 months.

2.4 International meetings update

The AFMA member provided a brief overview of relevant discussions and outcomes from the most recent international tuna fishery meetings, including the FFC Officials and FFC Ministerial meetings from May and June 2019respectively and the IOTC Meeting (May 2019).

FFC Officials May 2019 and FFC Ministerial June 2019

The AFMA member noted this is the first FFA meeting of the year where FFA countries come together to consider the issues on the WCPFC agenda for the year and to prioritise where FFA as a block would be concentrating their efforts in a coordinated way. The outcomes and advice from this meeting on WCPFC priorities are then sent to FFC Ministerial in June for endorsement and that sets the agenda for the FFA members for the rest of the year. The key issues of relevance to the ETBF discussed were:

- Australia's statement of intent on the strengthening of the regional management of swordfish
- Identification of WCPFC priorities
- FFA's Regional longline strategy

In relation to Australias desire to strengthen regional management of swordfish it was noted that the current CMM places effectively no restraint on the potential catch and fishing mortality of swordfish in the SWPO – there is no catch restriction north of 20S and an ineffective restriction south of 20S**.** Australia made a statement of intent to draft a revised SWO CMM to constrain catches to sustainable levels and then consulted in the margins with FFA member countries on their interests and how this matter would be progressed going forward. Exactly what the draft measure will look like is still to be determined – its development will be a 2 year process with significant consultation in FFA and WCPFC required.

In relation to FFAs WCPFC Priorities for 2019, the main ones of relevance to TTRAG and ETBF were:

- Progress agreement of the high seas purse seine and bigeye longline limits under the TTCMM (roadmap to agreement in 2020)
- Progressing harvest strategy workplan – setting BET and YFT TRPs – aiming for modest increase in spawning biomass ration for BET and possibly YFT after work by SPC on economic tradeoffs between different TRPs and impacts at whole fishery level.
- Skipjack stock assessment and TRP review – implications and finetuning the MSE process
- Roadmap for progression and reform of the Southern Albacore CMM and development of the Albacore harvest strategy.

In relation to the FFA Regional Longline Strategy, the core aim is to ensure a greater level of benefits (esp economic) to FFA members from the regional longline fishery inzone and on the high seas. The strategy considers a range of elements including zone based limits, high seas limits, development of harvest strategies that take account of those limits and the interface with the regional purse seine fishery, improving MCS and addressing human rights issues in the fishery, as well as addressing the development aspirations of domestic FFA member longline fleets.

The FFC Ministerial meeting addressed a range of issues including the confirmation of the FFA priorities identified above.

IOTC Meeting May 2019

The key issues of relevance discussed at the most recent IOTC Commission meeting in May 2019 in Hyderabad, India, were:

- Yellowfin Tuna Management Procedure - While this wasn't presented for adoption at this years meeting, there was good reception to Australia's proposal for a management procedure for yellowfin with the EU interested in co-sponsoring the proposal. A few comments were received, but no major changes were suggested or raised. Some of the parameters were narrowed down by the Technical Committee on Management Procedures (TCMP) before the Commission meeting.

- Introduction of electronic monitoring - The EU introduced a proposal to increase observer coverage and introduce electronic monitoring into the IOTC area. Australia supported the EU on the proposal with an inclusion of provisions to allow EM for longline vessels (not just PS as drafted). However, an increase to the observer coverage was not accepted by plenary and remains at 10% of effort.

- Gear marking and lost and abandoned gear - The EU proposed a measure for gear marking and lost/abandoned gear. Most were supportive however, the proposal excluded FAD gear marking from this measure. Australia outlined the importance of addressing lost/abandoned gear with most members speaking in favour of including FADs into the measure. As FADs are one of the main sources of marine pollution from fishing, we could not support this measure without FADs being included.

- Other measures adopted included:

    - Non-targeting and non-retention of **mobulids**

    - Tweaks to the **discard ban** relating to fish not fit for consumption (non-contentious)

- For yellowfin there was no change to the catch reductions, but (watered down) overcatch penalty provisions and some FAD management changes

3 Review of Fishing Practices and Fishery Indicators

3.1 Fishery Data summaries

Due to the renewed membership and presence of new members and invited participants, this agenda item began with Dr Campbell noting that these papers and analyses allow TTRAG review of the fishery data to then be used in fishery indicators and harvest strategies for the fishery which are normally presented at the September TTRAG meeting.

A query was received on the timeframe used in the data summaries, with Dr Campbell clarifying that it was by calendar year however, the financial year is still provided. The TTRAG agreed that the financial year will be removed from the next year's indicators paper, and calendar year only will be provided going forward. One member raised concerns that financial year was useful for comparison with recreational catches, however it was noted that monthly catch data will still be provided to undertake this comparison.

Dr Campbell then began the session by presenting the analysis in his paper - *Summary of Catch and Effort information.* The effort data in the paper showed the historical trends in effort from the late 1980s and showed that despite lower effort in the 2011 to 2012 period, there was a general trend in increase in effort and stable numbers of boats operating. The number of hooks set, number of days and hooks deployed have slightly increased as more boats became full-time. There was discussion amongst the RAG that this can also be attributed to economic factors, and the need to pay crews wages that drive the increase in effort. When going through the targeted catch, Dr Campbell noted that the inclusion of target species field in the AL06 logbook does not provide an accurate indication of what is targeted as it is generally completed after the trip and depends on what is caught. Industry agreed that this is not really used as intended because they are targeting whatever multi-species are present.

Changes in gear through time showed a few distinguishing patterns in the ETBF. There was an apparent increase in the past 5 years or so in the use of light sticks for targeting swordfish. Much of the trend in fishing including set start times, but hooks per float was the biggest change to gear. Since the mid-2000s the increase to hooks per float could be largely attributable to the targeting of swordfish and therefore a reduction in deeper setting. Mainline length has increased the last 6 years or so as has hooks-per-kilometre. TTRAG noted the increase in bait prices is affecting the use of squid as bait. When discussing whether there has been a pushback on using squid considering the price increase, industry noted that this is a 2018 phenomenon but if the prices do not reduce, there will be a more pronounced shift in the 2019 figures.

Annual trends in catch weight showed that 2 species in particular, bigeye and swordfish, had lower average weights in 2018 when compared to a number of previous years. Conversely, SBT were presenting with increased weights in the longline sector. Dr Campbell then went through discards where the RAG queried whether they are considered in the over/under TACs as discussed earlier in the day. The AFMA member noted that discards are not currently considered in quota decrementing. However, discards are included in the CPUE analyses alongside retained numbers and are always used in the indicators.

The scientific member finished this agenda item with the information on the environmental factors affecting the fishery. The AFMA member also noted that there are 2 projects, the oceanography project and the stock structure genetics will help our understanding of the fishery and the environmental factors that could be affecting the region.

3.2 Fishing Practices

Fishing depth

Dr Campbell provided an overview of his paper ”*Use of logbook data to estimate fishing depth of longline fishing operations in the ETBF*”. This paper was developed to determine whether there was a better way to determine or proxy fishing depths in the CPUE standardisations as historically hooks-per-basket has been used as a proxy to understand the depth of the longline. Concerns were raised at the previous TTRAG meeting that hooks-per-basket were a poor proxy for determining depth as it does not consider a range of factors that can impact the slackness or tautness of the line in addition to the hooks-per-basket. Dr Campbell informed the TTRAG that through his analysis it is theoretically possible to determine depth with the data currently collected.

He explained that the logbooks currently require the location coordinates for the start/end of hook setting and the coordinates for the start/end of the haul. This spatial information could then be combined with the logbook details on mainline length and other details on the configuration of the line (such as the hooks-per-basket used and setting speed). From here, Dr Campbell applied the equation developed by Yoshihara to the analysis to determine a *sag ratio* or depth of each hook based on the known configuration details. The AFMA member noted that VMS, e-log and EM positional data could also assist with future analysis.
There was a brief discussion on the maximum length of mainline and the need for some guidance of where to place ‘cut-offs’ or boundaries of what data is filtered out. The RAG suggested that any data appearing over 100km mainline length be removed, to ensure there is no corrupting data, especially if this could be used in the standardisation in the future. It was suggested that AFMA could examine VMS data to determine if sets over 100km are verifiable.

ACTION ITEM 3 – AFMA to examine VMS data to check and verify sets reported on logbooks as having mainline lengths greater than 100km.

The scientific member then went through the analysis of the estimated depths and showed the TTRAG that the average depth reached per set was fairly consistent up to about 14 hooks-per-basket set, with the divergence to a deeper set occurring around 16 hooks-per-basket.

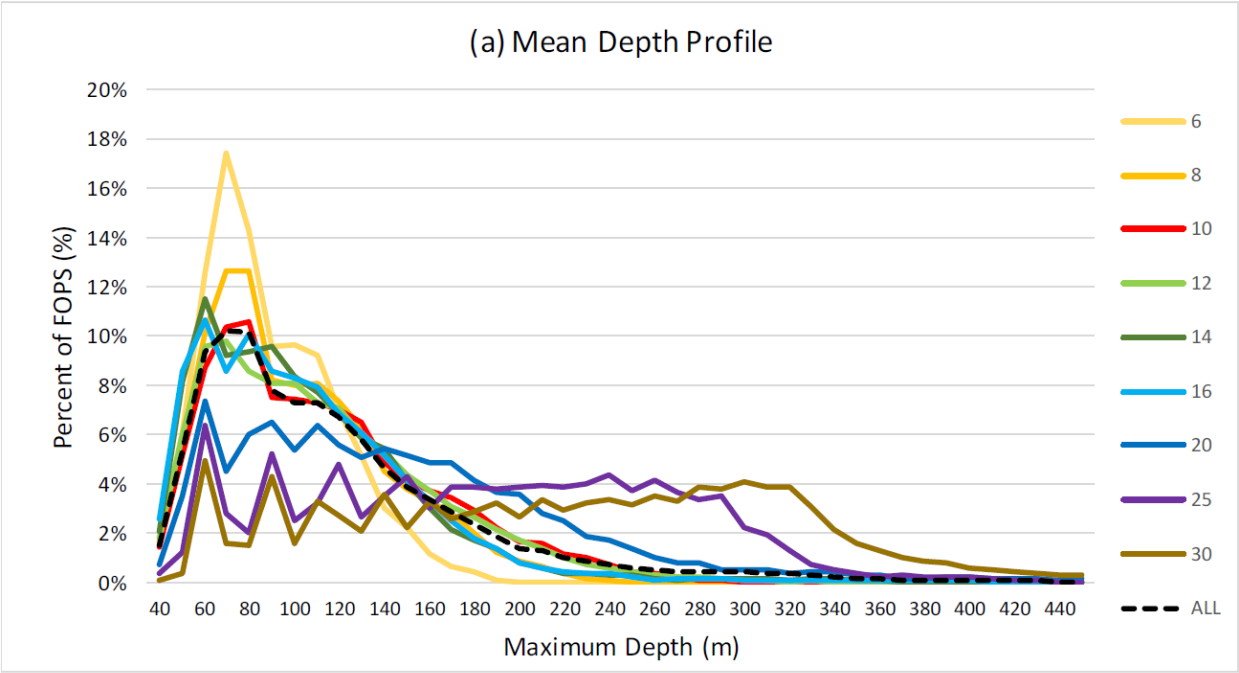


Figure 25 - *Use of Logbook Data to Estimate Longline Fishing Depths in the ETBF.*

The TTRAG discussed that this contrasts the WCPFC definition of deep-setting of any more than 10 hooks-per-basket which may not be necessarily reflective of what is happening in the WPO region, depending on the gear and setting practices, but this analysis shows the intricacies of what is happening in the ETBF. The recreational scientific member noted at the important linkages between this and how fish interact with environmental factors such as the thermocline, particularly with seasonal or even daily patterns. The AFMA member also emphasised that understanding fishing depths is relevant for the work currently being undertaken by ABARES aimed at understanding factors impacting ETBF turtle interactions.

Trends in gear use

Dr Campbell then provided an overview of the paper "*Trends in Fishing practices in the ETBF over the past decade*". He explained that this is an update on a previous paper presented to the TTRAG and that the time period has changed at the request of the RAG to a 12-year time frame as opposed to 4-year period by quarter previously submitted.

He then went through all the data that was input into the analysis, which included mainline length, hooks deployed, lightstick usage and bait amongst others. In looking at the distribution of target species caught, the analysis showed that yellowfin was the most targeted species and it was clear that those catching more swordfish were catching less yellowfin, but were catching more albacore. Aggregated time series of gear use over 12-years of the fleet showed:

- An increase in the proportion of sets with high hook numbers (e.g. >2000 hooks)
- A reduction in high (>20) HPB sets over time and an increase in intermediate (15-19) HPB sets
- An increase in the proportion of sets using at least some lightsticks and a high proportion of lightsticks.
- An increase in the proportion of sets greater than 60km in length.
- Seasonal patterns in species composition based set types.

One of the clearest shifts through time was the type of bait used and the TTRAG should be mindful that decreases in squid bait use in swordfish fishing may be offset by increased use associated with SBT fishing.

Discussion amongst the TTRAG moved to the reason why this practices paper was important with the AFMA member noting that these analyses (and the other papers presented) examine the information that feeds into the CPUE standardisation and harvest strategies. There have been questions raised, and particularly from industry, on whether certain factors were picked-up by the standardisations. Previous discussions indicated that some factors needed further exploration on a vessel specific level through time, to explore industries statements regarding a shift from catching swordfish. This could provide industry with assurances that their concerns in the standardisation were addressed in the analyses presented through this paper. A scientific member queried whether this analysis gave industry the assurances their concerns were addressed. Industry members responded that it was a highly detailed analysis and further time and summary was needed to consider this question. This could then give a degree of comfort that the changes in swordfish targeting practices noted by industry were fully picked up in the standardisation, which has been the driver for changes in swordfish TACs. TTRAG noted the potential complementary nature of metiers analyses conducted by ABARES for the ETBF, with AFMA to circulate that analysis to new TTRAG members.

The RAG agreed that presenting the fishing practices time-series using quarterly periods highlights the seasonal shifts but annual time steps are more useful for assessing trends over time.

Hook hours

The paper "*Hook Hours – an alternative measure of effort in the ETBF longline fishery*", was presented by Dr Campbell. The paper examined whether it may be more useful to provide a measure of 'hook hours fished' rather than just 'hooks fished' to perhaps more accurately capture the "effective" fishing effort associated with each fishing operation.

Dr Campbell began this paper with outlining this was to determine whether the total time spent by all hooks in the water made a difference to the catchability of target species. During a setting operation, as hooks are deployed into the water, the first hooks released will have a longer soak time, than the later hooks deployed. Dr Campbell went through the analysis to show that the total times between setting and hauling has not significantly changed over time, despite the average number of hooks per set increasing.

When comparing to 2 two-year time periods (2007 – 2009 and 2016 – 2018), the average number of hooks deployed per set increased by about 28%. While this has led to both an increase in time taken to set the hooks (+18%) and haul the hooks (+11%), the vessels have not significantly increased the total time of the fishing operation (between first hook in and last hook out) by simply reducing the soak time (-14%) i.e. the time between last hook set and first hook hauled).. Subsequently, the total "hook hours" of each set has increased proportionally (+27%) to the number of hooks deployed per set (+28%). Industry commented that this also matches up to what they have noted previously that the soak time is now much shorter at approx. 2 hours when compared to 4 - 6 hour soak time, and the freshest hook is hauled first, particularly to ensure tuna is not left for a prolonged period on the line. The key finding of the study is that as a result of the proportional relationship between hooks deployed and hook hours, using hook hours in the CPUE estimations for target species makes very little difference to the "normalised" CPUE time series trends, relative to using total catch/1000 hooks. Therefore there would appear to be little

justification to changing the fishing effort measure currently used in the ETBF standardised CPUE analyses.

Operation	Hooks Deployed	Set Time	Soak Time	Haul Time	Total Time	Hook Hours	Per-Hook Soak
2007-09	1301	218	465	426	1109	17721	13.6
2016-18	1664	257	398	474	1129	22454	13.5
Change	28%	18%	-14%	11%	2%	27%	-1%

TTRAG queried whether baits were equally effective at the end of a set compared to the start, with one member suggesting a TDR study could test this, while another suggested comparing short versus long sets.

3.3 CPUE standardisation

Dr Campbell presented the updated CPUE standardisations paper for each of the ETBF target species.

Yellowfin

He noted that the size classes were revised in 2018 following further analyses of age/size cohorts. The size classes now represent recruits and adult fish for Yellowfin and Bigeye; recruits, sub-adults and adult for Swordfish, while striped marlin and albacore have a single “all fish” CPUE. He noted that the size classes for striped marlin will be revisited if the growth curve work by Dr Jessica Farley is funded and completed in future. He noted that the outliers of data (for example the mainline, hooks per basket data etc.) that were present in the previous analyses were still included in the standardisation. A query was received about these outliers that may have incorrectly influenced the data and they should be filtered out. Dr Campbell agreed that in future these should be removed, but noted that they are a very small percentage of the data.

ACTION ITEM 4 – TTRAG to consider frequency distributions of values for all factors used in CPUE standardisations and provide advice regarding the removal of outliers.

ACTION ITEM 5 - Dr Campbell to revise Table 5 in the paper to reflect the new size categories, and fix labelling (e.g. YFT-5) to clarify the cluster analyses.

Annual CPUE was lower for the recruits (C1-2) and adult (C3 – C8) age classes with a decline from the peak in the 2016 season but had maintained above the long-term average. In response to an industry member observation that there is not much difference between nominal and standardised CPUE, he noted that when each of the factors are analysed individually there is quite a lot of difference, but then once added together, there is less, as trends in some factors act in opposite directions (to raise or lower CPUE).. Large/mature fish CPUE has been consistently above the long-term average.

Distribution of the fishery remains is primarily around the mid-NSW coast and off the sunshine coast. It was noted that the hooks per float effect matched quite well with the analysis of hook depth in the previous analysis, with Yellowfin CPUE maintained at 14-16 hooks per basket which is now recognised to be quite shallow and consistent with surface habitat of Yellowfin. TTRAG discussed the relative influences of different factors using the influence plots and noted that the

CPUE influence plots require caution in their interpretation as the y axis scales cannot be directly compared between plots to ascertain which factors are more influential overall.

Bigeye

Dr Campbell presented the CPUE standardisation results for bigeye tuna and informed the RAG that the last 3-years CPUE levels have been quite poor, with the recruit sized fish CPUE well under the average long-term CPUE. Mature sized fish standardised CPUE is also lower than average and is consistent compares with industry comments regarding lower catches and smaller sizes. Bigeye has quite clear age modes (as opposed to yellowfin) in the ETBF that can be tracked through the CPUE data over time. Noting the low recent standardised CPUE's, the AFMA member reminded the RAG and provided new members with background of previous discussion on whether ETBF stocks are connected to regional stocks. This question is critical to AFMA's capacity to respond effectively to declining CPUE trends.

Previous discussions have indicated that yellowfin stocks may have a wider connectivity through the region as the distribution of clear growth modes in the data is not as apparent, indicating a mixing outside the ETBF. In comparison to bigeye however, the clear age modes seen in the historical data might indicate a more localised population, with limited regional connectivity. He noted that it is important for the RAG to have proper discussion on apparent trends in local abundance indicated by the CPUE data. Other members agreed as historically bigeye has picked up again with recruits occurring in 2-year cycles, but this is a 3rd year without a pickup in recruits as historically this happens.

The TTRAG agreed that this is an important issue and further information is needed from WCPFC, SPC and regional data to support a full proper discussion at the September meeting. Specifically TTRAG requested AFMA and CSIRO provide the following information:

- Historic and recent catch and CPUE statistics for surrounding EEZs and fleets including from New Zealand, Fiji, Vanuatu, Solomon Islands and New Caledonia and the high seas. Including recent CPUE from SPC.
- Regional size data to examine indicators of potential localised stock, following SPCs observation on tropical versus ETBF size distributions (seasonal).
- ETBF Genetics project outcomes for Bigeye Tuna (not available at this meeting)
- Any relevant information from the current ETBF Oceanography project pertaining to potential environmental influences on Bigeye Tuna availability in recent years – CSIRO to provide a project update at the September TTRAG meeting
- Analyses of catch divided by CPUE to get the relative fishing mortality level – if it goes up it might signal a problem but if it is constant then it may be environmental.
- Subregional CPUE analyses confined to the Coral Sea.

Industry also noted that the catches for bigeye are already very low, and reducing the TAC even further will not make a further impact. However, it will be important that the RAG gives this issue its due diligence.

Albacore

The albacore results were presented briefly to the TTRAG. Albacore standardised CPUE appeared fairly flat and consistent against the historical average. No further comments or queries were received.

Swordfish

Dr Campbell compared the nominal CPUE rates compared to the standardised CPUEs through the different age classes. The recruits and sub-adult age class CPUEs have had clear and sequential downturns, relative to the historical average CPUE with the sub-adults seeing the fourth year without CPUE recovery. The RAG agreed however, that the new age class categorisations make the progression of the CPUE peaks through the different cohorts easier to see.

While the recruits may be picking up slightly, there is the potential for a further 4-years of decline for the adults. Industry noted that this has happened historically, with more effort in the fishery for swordfish than previously and the higher catches of smaller fish seen in the mid-2000s could have been the anomaly. TTRAG agreed that this is an important discussion at the next TTRAG meeting, with a potential for advice to go into the TTMAC and the AFMA Commission regarding the current TACCs. Like bigeye, the RAG agreed that this will be a substantial session and should have the latest information from the WCPFC SC to support ongoing discussions.

Striped marlin

The striped marlin results were presented briefly to the TTRAG. It has been tracking relatively n-line with historic trends though slightly below the average, however it was noted that there have been very low catches in striped marlin in the last few years, with a likelihood that there will be another year of low catches. One TTRAG member noted that this species seems to have decadal pattern and it seems that this is a lower period, but this is not necessarily a cause for concern. Industry noted that summaries of the Coral Sea catches and CPUEs of striped marlin and swordfish should be included in the information for September TTRAG, for awareness on the historical trends in billfish catches in that area of the fishery. The TTRAG agreed with this suggestion.

ACTION ITEM 6 – Dr Campbell to present Coral Sea area trends in catches and CPUEs for striped marlin and Swordfish to the September TTRAG meeting

WTBF Indicators

Due to the readjustment of the agenda, the WTBF indicators were discussed as the first item on the second day of the TTRAG. Dr Campbell presented the summary paper prepared for the WTBF. He noted:

- that swordfish remains the main target species in the WTBF
- the highest peaks in catch and effort occurring around 2001- 03. The WTBF invited industry participant noted that when the Japanese fleets were operating in the WTBF, they had consistently high catches of all of the key species, which has led to the belief that there is a lucrative fishery there. However the remoteness of the fishery has affected its success.
- Trends in the use of lightsticks, start time and depth of operations align well with swordfish as the main target species in the fishery.

The TTRAG noted the current fishery comprises a single longline operator and discussed the likelihood of the fishery developing in the next 5 years or so, with the WTBF invited participant noting that crewing in recent years has been problematic. He also noted that the remoteness of infrastructure is still causing issues and stressed the need to operators to use freezer boats to properly function.

The AFMA member then provided a brief summary of the WTBF fishery and stock indicators paper that has been developed at the request of the AFMA Commission in order to provide advice to the Commission to support TACC decisions processes in future years. This is similar to the process used for tropical tuna in the ETBF. While TTRAG considered this request last year and determined a number of indicators should be used, the RAG should confirm the list of indicators and propose any new ones for inclusion.

These indicators were:

i. Stock Region
ii. Stock Status (based on the most recent regional stock assessments):
iii. IOTC Scientific Committee Advice
iv. Present IOTC Management Arrangements
v. Catch: IOTC and WTBF
vi. CPUE: IOTC and WTBF
vii. Mean Catch Weight: IOTC and WTBF
viii. Mean Catch Weight and Catch Proportions by Size: WTBF

The AFMA member presented the WTBF indicators summaries (attachments to agenda item 3.4) and queried whether any other indicators should be included and if the section on implications for increase/maintaining/reducing TAC should be retained. TTRAG concluded it should not.

The scientific member from ABARES noted the Kobe strategy matrix is used in the IOTC for key species and what is the most likely source to further assist with developing the indicators paper and should be available for the key species (noting there remain some problems with yellowfin). He also noted that bMSY as target and limit and when the biomass levels are lower than 30% the IOTC classify this as overfished however, Australia's CHSP uses a proxy limit reference point of B20 and subsequently does not classify this as overfished. The RAG agreed that CHSP context should be added in the indicators paper, including an explanation why the international context is not applied. TTRAG discussed if it would be useful for the Commission to consider previous Japanese levels of catch in-zone as a trigger point on high levels of catch. However TTRAG noted there is a project currently underway in the IOTC to determine stock connectivity, particularly for swordfish. If it was determined that the WTBF was part of a wider regional stock, then it would be more appropriate to manage the stock under a regional IOTC harvest strategy.

There was some uncertainty amongst the RAG whether the AFMA Commission expects the indicators paper to be complete for endorsement at its September meeting. Members noted that the WTBF scenario is a different circumstance to ETBF. Catch in the WTBF are well below the limit and unless something changes (for example stock connectivity), then there should be a management change and shift to a trigger approach. Members noted that this is more of a political issue rather than scientific and that there should be a trigger for a change in *management,* rather than a change harvest strategy trigger. The RAG should ensure the WTBF remains a developing fishery, with the current TACs maintained. Members noted that the RAG is not asked for information that affects the TAC such as in the ETBF, but rather it is more about when should management approaches begin to change, for example if the catch goes above a certain number of tonnes, then AFMA can implement a different change to management. Members suggested that this could be input in the indicators paper where 'TAC trigger implications' details are currently listed, can change this to a management of the WTBF once catches reach a certain level. This is also quite similar to the previous suggestion of including the Japanese longline catches as a measure of possible catch levels.

The TTRAG agreed that the paper to the AFMA Commission be kept very simple, as it is already quite long and detailed. The main point is that the WTBF is a very small proportion of the catch

within the region. As the Commission have already seen the indicators, the RAG should continue to provide advice but with a concise introductory paragraph at the beginning and a maximum 2 page indicators summary for each species.

ACTION ITEM 7 – AFMA to clarify whether there is an expectation from the AFMA Commission whether they are expecting to see the completed WTBF indicators from TTRAG at the September Commission meeting.

ACTION ITEM 8 – ABARES (with Dr Ash Williams as lead at IOTC SC) and CSIRO to look at framework with AFMA on the template and populating IOTC information.

4 Harvest Strategy

4.1 Harvest Strategy redevelopment

Dr Rich Hillary provided the TTRAG a brief overview of the status of the ETBF harvest strategy including why the previous HS is no longer used and the reasons for its current redevelopment. He explained that the harvest strategy has only been used for striped marlin and swordfish and the reasons for the decision for a redevelopment was, for swordfish, the lack of a feedback loop in the old HS meant that the RBCC would be continually cut even if it was above the target reference point. For striped marlin, the size data did not support the application of three indices used in the model.. For these higher-level reasons (amongst others), TTRAG decided in 2018 that the harvest strategy for these two billfish species should be redeveloped.

Operating models

Dr Hillary introduced the item specifically for swordfish and noted that the model run presented to the RAG was a simulation, or 'trial run' with the data and parameters identified previously. The reasons for this was to show some preliminary MSE work, and what other higher-level factors the RAG want included before a full model run. While the work isn't a full MSE analysis as this will be presented to the RAG next year, it will help decision-making will assist the scientific member with work going-forward.

The scientific member then informed the TTRAG that the operating model created had many of the same factors as previously; life history characteristics, the factors used in the WCPO assessment on maturity, natural mortality and growth. Selectivity is also quite simple as the ETBF and non-ETBF fleets as decided by the RAG previously. In terms of what was requested from the TTRAG, decision around starting depletion levels. He explained that if b48 is the target, then b30, b48 and b60 can be used as markers to explain a 'rebuild', 'status quo' and 'underutilised' possibilities to show what the model might do when these factors are input.

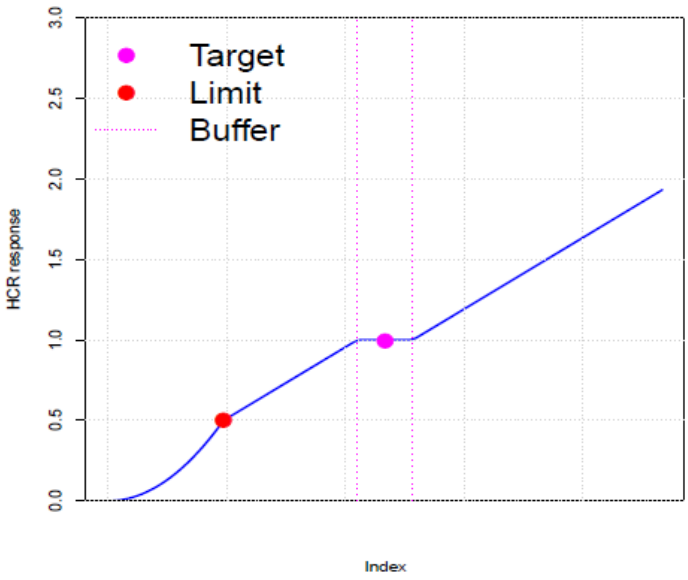
Another factor that the scientific member explored for the trial run was effort share (proportion of regional catch taken by the ETBF). He suggested the factors that can be used are 50%, 75% and 100% to test how the model is performing if these factors were known on the overall catch. TTRAG members discussed whether effort share and catch share were similar or different with the scientific member nothing that they have the same selectivity and the results between them is essentially the same. There was also some discussion on whether 100% effort share can be used as there is never going to be 100% in reality, and whether something more like 50% was more appropriate given the actual levels noted in the region (100% being total ETBF and the 50% is half the effort with region 5). The scientific member noted that any factor can be within scope and the figures being shown were a demonstration. TTRAG requested that a 25% share be added into the future analyses.

ACTION ITEM 9 – Dr Hillary to include an additional level of effort share being 25%.

The scientific member then moved onto the ETBF CPUE index. He explained that he wouldn't put the index that is straight from the standardisation as it will move around quite a bit showing different values. Instead, Dr Hillary used a 4-year moving average in the simulation for more stability within the model. There is a trade-off between shorter moving average periods (more reactivity) and longer periods (more stability). These trade-offs can be tested in future. He applied target and limit SSB levels taken directly out of the Commonwealth Harvest Strategy Policy (CHSP), i.e. *b48* and *b20* respectively. He noted the use of a buffer zone around the TRP, with TTRAG noting that there is an interaction between the buffer zone and the moving average chosen. Dr Hillary reiterated that the work was a simulation at this stage and this is an opportunity to look through what parameter values may or may not work in the model and avoid the factors that led to problems with the previous harvest strategy.

Candidate Harvest Strategies

Dr Hillary then discussed further exploratory work on the candidate harvest strategy and the proposed harvest control rule (HCR), as below.



He noted that:

- the *y axis* is how much the TAC will move up or down, depending on the formulation of the HCR and HS model.
- the HCR also has the 'target' and 'limit' reference points but these are not necessarily the default proxies advocated in the CHSP.
- the gradient of the HCR along the *x axis* will react depending on how much the TAC will need to be cut, or it can go the other way when there is an underutilisation of the stock and it does not need to necessarily be symmetrical.
- the initial buffer zone was set at 10% either side of the target, with an interdependency between where the buffer zone is set, and the responsiveness in the model. For example, if the zone was set too wide, there may not be enough time before a drastic management measures are required. This is one of the factors that will be tested in the later MSE work on how all these factors are related and correlate depending on what the TTRAG has decided to use in the model.

There was discussion amongst the TTRAG that the 'limit', as referred to in the CHSP, is where there is no longer targeting of that particular key species once levels move towards this point. Due to this the TTRAG decided that the use of the word 'limit' in the above HCR would cause confusion and should instead be referred to as a 'threshold'.

ACTION ITEM 10 – Dr Hillary to relabel the HCR plot "limit" to being the "threshold"

Dr Hillary then described a number of exploratory example runs of the operating model testing and comparing 1 year and 2 year TACC periods. The exploratory analyses demonstrated that using 1 year TACCs resulted in a higher risk of going below the limit reference point, compared to 2 year TACCs which appeared to more effectively avoid this. The plots showed that the 2-year TAC responses had a greater effect on stock recovery than the 1-year. He described that the 2-year TAC setting was better able to remove the influence of 'noise' in the CPUE signals, particularly given the long-lived nature of swordfish, and therefore provided a better response to actual stock levels (real signals in the CPUE data) than the 1-year TACs. He later noted that the +-10% buffer was also chosen to account for noise in the index. The Chair raised concern however, that the model was still showing a cut to the TAC even with perfect knowledge in the simulation. Dr Hillary explained that the model did not have perfect knowledge, and rather took into account observation errors. Some members raised concerns that from the plots, it looked as though the 20-year outlook showed a reduction in the TAC lower than the starting point. The scientific member reiterated that this was because the simulation did not have perfect knowledge and thought the situation was far worse than it was over long term behaviour.

The Chair further noted that this was a reason why the observation uncertainty should be removed from the model to better understand behaviour as industry members were concerned that the plots were showing a dramatic change in the long-term trends when comparing 1-year and 2-year TAC cuts. Dr Hillary explained that the model is using the CPUE analysis, and he then applied 10% uncertainty to this so that over time, the model still retained that uncertainty. He further explained that the comparison between the 1-year and 2-year TAC cuts showed clear change was because the year data input to the model, was on a 4-year moving average (as another year was added to the 4-year dataset, another year dropped off). Other members agreed that this is a reason why the uncertainty should be removed from the simulation to see how the harvest control rule responds based on the data. The Chair noted that there was still confusion amongst the group and one of the main factors was the uncertainty on what the 'index' referred to in the *x axis* of the harvest control rule.

The scientific member noted that this was the 4-year moving average of the CPUE. TTRAG noted that it would be good to run through one simulation with Dr Hillary noting that he ran the simulation 1000 times and running through a simulation once does not fully show how the model properly reacts, but the group agreed it would be valuable to run through one simulation as a step-wise process to understand how the HCR works as an example.

ACTION ITEM 11 – TTRAG requested that Dr Hillary present future results to include both the average, the confidence intervals (violin plots) and the individual model runs (the "worms") similar to the work presented for the Southern Bluefin Tuna management procedure testing. TTRAG also requested that the HCR plot labelling being changed to reflect that the x axis "index" is the CPUE, and the Y axis "HCR response" is the relative TACC change. All of these modifications would help TTRAG members to better understand how the HCR is working.

The Chair summarised that there were three future decisions that TTRAG would need to make to guide Dr Hillary in his further HS development work, being in relation to:

- the gradient of the HCR (how sharply increased or decreased),
- how wide the 'buffer zone' will be and
- what the timeframe will be for the index, whether this will be a 2-year, 3-year or 4-year moving average of the CPUE.

TTRAG discussed that the candidate harvest strategy should be compared to the performance measures from the CHSP and that this will occur in the 'tuning' phase of the project. The AFMA member further noted that while the CHSP might guide the limit reference point, setting the target reference point will need to take into account the complicated international nature of the fishery and that swordfish is one species in a multi-target species fishery, with the CHSP advocating MEY based TRPs at the fishery level (not stock level) in multispecies fisheries. TTRAG will need to be clear on any decision and justification if a decision is made to change the target from *b48,* and consistency with the requirements of the CHSP. Dr Hillary informed TTRAG that the model would be tuned or reviewed every 5 or more years in line with revised SPC stock assessments.

Discussions moved to determining the factors needed for Dr Hillary to continue work on the harvest strategy. The RAG again queried the *b48* target reference point (applied via a CPUE proxy in the previous harvest strategy) and suggested that using the *bMSY* proxy of 1.2 might be more appropriate for swordfish, given that b48 is very conservative, but also noted that a lower TRP would start to impinge on the LRP. TTRAG noted that there needs to be consideration of what different TRPs mean for fishing profitability (e.g. trip level economics and fishery economics, similar to the South Pacific Albacore approach considering on the water CPUEs). A scientific member asked if swordfish and marlin had differing HS outcomes, could industry cope, i.e. change methods to avoid one or the other if needed. The RAG agreed that there needs to be a bit of conservatism in the models but there also needs to be some 'ground-truthing' on the *b48.*

Dr Hillary indicated that discussions had assisted in identifying the further work needed to continue development of the harvest strategy, acknowledging the TTRAGs request to see exploration of broader control parameters and new plots explaining the functioning of the HCR.

Striped marlin

Dr Hillary then presented an analysis of the movements of striped marlin throughout the region, developed as a paper for SPC to use to inform movement parameters in their new stock assessment. Dr Hillary explained that much of this work could feed into the ETBF harvest strategy redevelopment. He explained that two types of data were looked at – conventional tagging recapture data and satellite tags. The main analyses limited the data to tags that had been at liberty more than 90 days. Some conventional tags had been at liberty up to 4 years. The analysis showed the PSAT (satellite tags) tracks that have been obtained from NZ, which indicate that most of the tagged striped marlin from Australia do not cross over the 165 East longitudinal line with the tagged marlin from NZ. Only about a third of the tagged striped marlin crossed over the 165degree longitudinal line, with a very small amount going quite far. There was some discussion amongst the group that there could be potentially two spawning areas across the Lord Howe ridge and this could explain why there have not been many returns.

5 Research update

5.1 Processes and deadline update

The AFMA member reviewed the current research projects for both the ARC and FRDC funded projects and noted the upcoming ARC deadlines for the submission of Annual Research Statements (mid-September 2019).

The AFMA member noted that the cumulative effects research project listed in the current projects table would likely relate to ERA and would be spread throughout all the fisheries.

5.2 ATBF Annual Research Statement

The AFMA member introduced this item, noting that the July TTRAG meeting is usually where the TTRAG identify and prioritise research projects, for recommendation at its September meeting. AFMA prepared a document highlighting potential research needs to address issues currently facing the fishery. He noted that the past few years have seen a number of large projects funded by the ARC and FRDC which has meant new projects have not been put forward. Given that a few of these projects are drawing to a close, TTRAG is in a position to start thinking about future research needs. The AFMA member presented a number of potential areas that may benefit from further research to assist management decision making. These included:

1. Research to better understand hook depths associated with different fishing strategies - The AFMA member noted the analyses of fishing depth undertaken by Dr Campbell, and how this will help with the CPUE standardisation, and the need to potentially ground truth the analyses using TDR analysis. Understanding fishing depths provides an understanding of the key species CPUEs, how species interact with oceanographic conditions and can inform analyses and management decisions relating to protected species interactions with fishing gears – particularly for seabirds and turtles. The AFMA member noted there are turtle interactions occurring in the 14 hooks per basket range (previously assumed too deep) with the TTRAG discussing that continuing the analysis of deep setting that feeds into the CPUE standardisation was a good idea going forward.
2. Research to understand factors impacting seabird interactions and to improve seabird mitigation. The AFMA member noted the higher seabird interaction rates over the past 2 years and the need to reduce these as per the requirement of the seabird TAP which requires AFMA to take further action against boats recording higher rates of seabird interactions. He noted that the ABARES metiers analyses has helped with some understanding of the spatial distribution and trends in interactions. He noted there might be scope to formalise a project for the continuation of these analyses. There might also be an opportunity for a project to trial different mitigation measures (for example tori line designs) to assist with on the water mitigation.

TTRAG noted that better understanding interactions with protected species is important, but noted that there are already a number of studies, particularly on seabirds, currently underway or already released such as in the WCPFC or through ACAP. Any further research would need to address gaps not already addressed by previous or current research.

Industry members also suggested that the current ETBF oceanographic project undertaken might provide information on turtle interactions and the likely seasonal interaction trends. Some TTRAG members acknowledged that depth data is essential and that further depth work is very important and there is a need to understand the movements in the water of the target species (as well as the movements of protected species) however, there were concerns that these research ideas were not *vital* to one of the biggest issues currently in the fishery – the harvest strategy redevelopment. Some members expressed concern that money has been spent in the past in other fisheries on better understanding factors impacting CPUE, but this has not necessarily resulted in any clear results or impacted on management outcomes and thus may not be worthwhile use of research funds.

It was also noted that recreational data has been seen to be diminishing recently as clubs move to an electronic and social media based systems to calculate points, with information collected but then discarded rather than retained like the paper tournament data forms were previously. The RAG noted that there are quite a few apps that are around at the moment to capture some of this data but due to the multitude of apps available, they are not necessarily picked up by the fishers and the use is still quite ad-hoc, particularly between states. The RAG noted that it would be good to collect recreational data, with the recreational member to provide a research scoping document for consideration at the next meeting. TTRAG noted that a key area of data collection might be the developing recreational swordfish fishery off southern NSW, Victoria and Tasmania, particularly if swordfish is a more localised stock.

ACTION ITEM 12 – Dr Pepperell to provide a scoping document for potential recreational gamefishing data collection for consideration at the September TTRAG meeting.

A scientific member noted that there is work underway in automating EM analysis for biological data and there may be scope for further research on new technologies. While the TTRAG noted that this was a particular interest, some members did not recommend that it would be worthwhile for the TTRAG to recommend funding at this stage while there is a number of companies already looking at this technology and progressing the ability to properly ID species via EM and artificial intelligence.

Members noted that it would be important for AFMA to collect EM footage for seabird interactions for proper analysis in the future. AFMA informed that RAG that it has started to look at the clips already from what is included in logbooks, but this might go further and to properly analyse the specific data with specialists in the field to identify what is happening with interactions on a case-by-case basis.

The Chair noted that overall TTRAG was fairly quiet on identifying new research priorities and it seemed that the group is still in a ‘wait and see’ scenario on the major projects ongoing. The TTRAG agreed that the projects in-progress are major pieces of work for the understanding of the fishery and it is not until these are completed that any major ‘gaps’ in the knowledge can be identified. One scientific member noted that the issue of connectivity, which the current genetics project aims to address has been an ongoing uncertainty in the fishery that can have major ramifications for the management of the fishery. Further priorities for this project could become clearer after the presentation from Dr Evans in the following session. The TTRAG noted that while results should come in before and major pieces of FRDC funding is identified, there are a number of smaller projects (some of which has been noted a few times throughout the meeting as an area for further exploration, such as economics) that could be further explored by the next meeting.

A further project identified as a potential high priority is to document, via a data dictionary, the ETBF data available on the AFMA/CSIRO database, and the various issues and problems associated with the different databases. This will protect TTRAG knowledge as new members are appointed and Dr Campbell retires. The TTRAG expressed concerns that the fishery is at risk of losing the continuity of knowledge with the loss of certain individuals, particularly Dr Campbell, and that AFMA and CSIRO need to properly manage the transition. It is also critical that CSIRO has support to fill this position appropriately.

ACTION ITEM 13 – AFMA and TTRAG Chair to discuss the most appropriate avenue to address the transition for Rob. Dr Knuckey to also send AFMA details on how similar situations have been handled, based on his prior experiences.

ACTION ITEM 14 – Research scoping papers to be developed ahead of the September TTRAG meeting. These are:

1. Depth of fishing research for CPUE and turtles/birds
2. Seabird mitigation research and video review
3. TRPs and economics for HS
4. Data paper project from Dr Campbell (TOP priority – ARC – 2mth)
5. Recreational fishing data from Dr Pepperell
6. Stock Structure (open until Karen presentation – see close kin discussion)

5.3 Genetics project update – Dr Karen Evans

Dr Karen Evans and Dr Peter Grewe (CSIRO) provided the TTRAG with an update and final report on the ETBF Stock Structure Project.

Dr Evans noted that the project aims to map connectivity of the principal target species in the ETBF with stocks in the Western Central Pacific Ocean, and that the project is in its last stages.

This session primarily focused on the results for 2 tuna species – albacore and yellowfin tuna, with data collection and analyses for other species still in progress. Bigeye tuna results were delayed due to last minute identification of some problem samples while swordfish samples have proven difficult to source from New Zealand (NZ) for a range of reasons. However, an industry member assisted during the meeting to explore the potential for securing an agreement with industry members in NZ to provide CSIRO with samples from swordfish caught in NZ. TTRAG expressed its sincere appreciation for his efforts.

Dr Evans began the session by noting that the outputs from the project were dependent on the quality of samples available for analysis and that the questions capable of being asked in terms of population structure and connectivity were dependent on the source of samples included. She noted that samples included in the study included a mix of individuals of varying sizes, sexes and reproductive status collected across multiple vessels on fishing grounds. This limits the ability of the project to investigate stock structure from an evolutionary perspective. Dr Evans summarised that given the samples available to the project meant that the project was focused on determining contemporary mixing across the regions samples were derived from (the ETBF and two external sites for each species), To do this, samples would need to be collected from spawning adults on distinct spawning grounds, samples that are largely not available at present and would require directed and dedicated sampling in order to obtain.

The multiple levels of quality control processes implemented under the project identified that some samples from some species and regions were of high quality and contained no cross-contamination while others could be considered a ‘mixed bag’. Dr Evans noted that the first stage of quality control identified that a number of yellowfin tuna samples derived from the WCPFC Tropical Tuna Tissue Bank were denatured which meant that little or no DNA could be extracted from the samples. CSIRO subsequently received replacement samples from the tissue bank, but

this caused a delay in the analysis. Dr Grewe noted that the size of fish these samples were derived from suggested that most of the samples were from fish less than 5-years old.

All samples were then run through a species identification process followed by a 15 step quality control. This identified individuals that were misidentified to species and then filtered out samples that were denatured, cross contaminated or were subject to user error (e.g. mislabelling, mixing up of samples). High levels of heterozygosity, which is an indicator of high levels of cross-contamination were present in albacore samples from New Caledonia, with lower levels observed in yellowfin samples derived from Fiji. Samples of albacore and yellowfin from the ETBF were relatively "clean" with lower levels of heterozygosity. Samples form albacore had higher levels of degradation than yellowfin and bigeye taken from the same area. Drs Evans and Grewe explained that this could be due to a range of factors including handling quality, or could be that there is an enzyme present in the animal causing quicker degradation due to a freezing and thawing cycle.

CSIRO emphasised that this rigorous QC process is needed to ensure that samples included in the population structure analysis were of high quality and also that the potential for misinterpretation of results was minimised (e.g. interpreting cross contaminated samples as related).

The outputs from the population structure analysis (which used three approaches to investigate the potential for population structure) do not support the hypothesis that there are multiple stocks present in albacore samples from the ETBF, New Zealand and New Caledonia or that there are multiple stocks for yellowfin tuna from the ETBF, Fiji and the Marshall Islands. Dr Grewe noted that, it may be possible to investigate the connectivity of individuals between sampling locations via determining kinship relationships.

Members noted that it was clear the project has been very challenging in terms of attaining quality samples and discussed whether there was some scope for further funding and an extension to the project, particularly with respect to attaining swordfish samples, particularly in association with a second year of sampling and the associated analyses. Dr Evans noted that the project team have already been given a non-financial extension on the project by the FRDC, but there could be the potential do the same again, pending agreement by FRDC. While sample collection and analyses were built into the current project, AFMA and CSIRO would need to determine how to fund salary time for the extension to the project.

The ABARES scientific member questioned whether the results confirmed that there is one genetic stock for each of the species. CSIRO noted that as explained earlier, stock structure based on evolutionary time scales wasn't able to be determined from the samples included in the project because of the mix of ages, unknown reproductive states and lack of information on spawning areas and their relationship to where samples were collected. CSIRO noted the earlier discussion on the limitations of samples included in the project and the questions able to be asked of the samples. TTRAG queried as to whether undertaking a close kin approach was the next best step in building on the analyses undertaken as part of this project. Undertaking such an approach would provide a better picture of connectivity but would mean that new samples (and therefore a larger cost) will be needed to determine any further information. A scientific member confirmed that close kin approaches would assist in determining if individuals in different regions were mixing. Dr Evans and Dr Grewe noted that such research relies on getting ripe and running (spawning) adult samples which is very difficult to attain reliably.

While there wasn't certainty on the confirmation of connectivity, the RAG questioned whether any hypotheses that could be excluded from the results. Dr Evans noted that overall genetic divergence across the Pacific Ocean basin for albacore, bigeye and yellowfin has not been resolved as yet. Other studies currently being conducted by CSIRO that are incorporating samples from more sites across the Pacific Ocean have observed clear genetic divergence between yellowfin from sites in the eastern Pacific Ocean and those derived from sites in the western Pacific Ocean. Within the western Pacific Ocean genetic diversity is less evident with results supporting isolation by distance in both yellowfin and bigeye. While the genetics didn't fully provide all the

answers sought by the RAG, members noted that there are other indicators and information that could be overlayed to provide a more holistic understanding of potential connectivity between the ETBF and wider Pacific. Additional information on connectivity could be derived from tagging studies, otolith microchemistry and parasite diversity and presence (discussed at a stock structure workshop held at SPC in late 2018, the outputs of which have been made available as an information paper provided to this years Western and Central Pacific Fisheries Commission Scientific Committee). TTRAG noted that the previously developed overview/summary of understanding of species stock structure developed by Dr Campbell for TTRAG could be usefully updated to include this information.

Dr Grewe noted that initial work on the stock structure of yellowfin tuna in the Pacific Ocean is available as a published paper and recently completed work on the stock structure of yellowfin and bigeye in the Indonesian Archipelago is available as an ACIAR report. TTRAG asked that those papers be distributed to members by CSIRO.

The Chair noted that there isn't a clear research priority for next steps. However, as this project falls into the scope of FRDC funding, which has multiple calls for research annually, there isn't a rigid time frame that the TTRAG needs to follow to secure funding (unlike to secure ARC funding) so further research scopes (potentially developed by collaboration between AFMA, CSIRO and ABARES members) can be revisited at the March meeting.

ACTION ITEM 7 – TTRAG requested that in relation to this project:

a. Dr Grewe to distribute published Indian Ocean and Pacific Ocean centered research papers on tropical tuna stock connectivity to TTRAG members.
b. CSIRO/AFMA/ABARES to update the overview/summary of stock structure evidence developed by previously developed Dr Campbell, Dr Evans and others.
c. AFMA, CSIRO and ABARES to develop a potential research scope for future research into stock connectivity following the March 2020 TTRAG meeting, to include consideration of the potential use of close kin methods.
d. CSIRO and AFMA to discuss and secure extension of the project including relevant funding components (in particular salary time) to ensure collection and analyses of year-2 swordfish samples from AU and NZ.

5.4 Recreational fishing project update (Dr Julian Pepperell and Dr Robert Campbell)

Dr Pepperell and Dr Campbell provided the TTRAG a brief update of the recreational fishing project and draft report.

TTRAG discussed the potential reasons for lower numbers of yellowfin being caught in the recreational fishery on the shelf. Dr Pepperell explained that the patterns seen correlate to the withdrawal of commercial trawlers from mid-north NSW and QLD from 2007 onwards. It was considered possible that yellowfin were drawn closer inshore from the presence of the trawlers (and the fish discards from those boats) and therefore in closer contact with recreational fishers.

The TTRAG was reminded that the final report is due in October with Dr Campbell to finalise the data analyses and text leading up to the deadline. A presentation with the full results will be available closer to this date. The TTRAG thanked Dr Pepperell and Dr Campbell for their report and the considerable amount of data collected.

6 Other business

6.1 ETBF & WTBF significant events spreadsheet

The TTRAG went through the significant events spreadsheet as part of the annual presentation to the TTRAG at its July meeting.

The AFMA member noted that there had been no further work on this, but that AFMA had found the date for the removal of the trip limit for Mahi Mahi (18 June 2003).. The recreational member also described the timeline of events for the recreational sector, which was included in the spreadsheet.

The TTRAG discussed potential further additions in the spreadsheet, which included the new Marine Protected Areas, as well as including this for addition in the recreational sector timeline of events. There was a suggestion of whether squid bait prices should be included in the spreadsheet as a phenomenon with great potential impacts on the fishery. It was agreed however, that this isn't a management change but should be included into the economic events tab in the spreadsheet as a significant factor affecting the fishery, particularly through 2019. Granting of the live bait permit off NSW was also suggested, as well as the changes to logbooks. Particularly for the recreational sector, a suggestion that social media should be included in the spreadsheet as a phenomenon affecting the way some catches are recorded. The effect of sounders and more sophisticated technology (including lures) should be added to the spreadsheet.

The AFMA member also provided updates to agenda items 2.3 and 2.4 under this agenda item, to allow enough time for discussion against other items at the meeting.

7 Date and venue for next meeting

The dates proposed for the September 2019 meeting was confirmed as 3 - 4 September, in Mooloolaba.

The TTRAG also discussed the possibility of an intersessional teleconference to allow Dr Hillary to receive feedback and progress the harvest strategy work ahead of the March 2020 meeting. AFMA will send a poll in the weeks following the RAG to identify a teleconference date in mid-October or early November.

The Chair thanked all participants and observers for their contributions and closed the meeting at 1:45pm.

Appendix 1: Adopted Agenda

Mantra Mooloolaba Beach

Wednesday 17 – Thursday 18 July 2019

Commencing 8:30am

Wednesday 17 July 2019

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 AFMA catch watch reports (AFMA)
2.2. Current catches and effort in the domestic fishery – verbal updates from scientists, industry and recreational fishing members since last RAG Meeting (March 2019)

3.Review of Fishing Practices and Fishery Indicators

3.1 Fishery Data Summaries (CSIRO)
3.2 Fishing practices (CSIRO
3.3 CPUE standardisations (CSIRO)
3.4 WTBF indicators (AFMA/CSIRO) *moved to morning of second day

4. Harvest Strategy

4.1 Harvest strategy redevelopment (CSIRO)

Thursday 18 July 2019

5.Research update

5.1 Processes and deadline update (AFMA)
5.2 ATBF Annual Research Statement
5.3 Genetics project update (Dr Karen Evans)
5.4 Recreational fishing project update (Dr Pepperell and Dr Campbell)

6.Other Business

6.1 ETBF & WTBF significant events spreadsheet (AFMA)
6.2 International meeting updates (AFMA) *moved from agenda item 2.3
6.3 MAC/AFMA Commission outcomes (AFMA) *moved from agenda item 2.4

7.Next Meeting

Appendix 2: Actions arising from TTRAG 24

	Action	Responsibility
1	ABARES to continue work with SPC staff to discuss the inclusion of NSW recreational tagging data in the SPC tagging database.	ABARES
2	AFMA to examine VMS data to check and verify sets reported on logbooks as having mainline lengths greater than 100km.	AFMA
3	TTRAG to consider frequency distributions of values for all factors used in CPUE standardisations and provide advice regarding the removal of outliers.	TTRAG
4	Dr Campbell to revise Table 5 in the CPUE Standardisations paper to reflect the new size categories, and fix labelling (e.g. YFT-5) to clarify the cluster analyses.	Dr Campbell
5	Dr Campbell to present Coral Sea area trends in catches and CPUEs for striped marlin and Swordfish to the September TTRAG meeting	Dr Campbell
6	Dr Hillary to include an additional level of effort share being 25% in the operating model.	Dr Hillary
7	Dr Hillary to relabel the HCR plot “limit” to being the “threshold”	Dr Hillary
8	Dr Hillary to present future results to include both the average, the confidence intervals (violin plots) and the individual model runs (the “worms”) similar to the work presented for the Southern Bluefin Tuna management procedure testing. TTRAG also requested that the HCR plot labelling being changed to reflect that the x axis “index” is the CPUE, and the Y axis “HCR response” is the relative TACC change. All of these modifications would help TTRAG members to better understand how the HCR is working.	Dr Hillary
9	AFMA to include SBT catches in the catchwatch reports alongside the target species for information.	AFMA
10	AFMA to prepare a historical paper on the reasons TTRAG decided that Dr Campbell used a set of conversion factors for his analysis, and AFMA used another.	AFMA
11	AFMA to clarify whether there is an expectation from the AFMA Commission whether they are expecting to see the completed WTBF indicators from TTRAG at the September Commission meeting.	AFMA
12	ABARES (with Dr Ash Williams as lead at IOTC SC) and CSIRO to look at framework with AFMA on the template and populating IOTC information.	ABARES AFMA CSIRO
13	AFMA and TTRAG Chair to discuss the most appropriate avenue to address the transition for Dr Campbell. Dr Knuckey	AFMA TTRAG Chair

	to also send AFMA details on how similar situations have been handled, based on his prior experiences.	
14	CSIRO and AFMA to discuss and secure extension of the project including relevant funding components (in particular salary time) to ensure collection and analyses of year-2 swordfish samples from AU and NZ.	AFMA