



Australian Government

Australian Fisheries Management Authority

Tropical Tuna and Billfish Fisheries Resource Assessment Group (TTRAG) 34

Minutes

9 - 10 March 2022

Video Conference

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1 Preliminaries

1.1. Welcome and Apologies

1. The Chair, Dr Cathy Dichmont, welcomed members and opened the meeting at 9:00am QLD time) with an acknowledgement of country.
2. The following participants were present at the meeting:

Present	
Dr Cathy Dichmont	Chair
Ms Kate Martin	AFMA member
Dr Rich Hillary	Scientific member, CSIRO
Mr Gary Heilmann	Industry member
Dr Julian Pepperell	Recreational fishing member
Dr Ian Knuckey	Scientific member
Dr Rob Campbell	Scientific member, CSIRO
Mr Pavo Walker	Industry member
Invited Participants	
Dr Don Bromhead	ABARES, Fisheries Science
Mr Jason Hartog**	CSIRO
Mr Terry Romaro	Industry Invited Participant
Mr Paul Williams	Industry invited Participant
Observers	
Mr Phil Ravello	Tuna Australia, Project Manager
Dr Ashley Williams	CSIRO
Ms Fiona Hill	AFMA
Dr Robert Curtotti	ABARES, Fisheries Economics
Mr Michael Dylewski	ABARES, Fisheries Economics
Mr James Dell	CSIRO
Ms Anna Willock*	AFMA
Executive Officer	
Ms Claire Wallis	TTRAG Executive Officer
Apologies (did not attend)	
Mr David Ellis	Industry representative invited participant, TTRAG and TTMAC
Dr James Larcombe	Scientific member, ABARES

*Attended for Agenda item 4.1 only

**Attended for Agenda Item 4.1 and 5.2 only.

3. Apologies were received from Mr David Ellis and Dr James Larcombe prior to the meeting.

1.2. Declaration of Interest

4. 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 asked to leave the teleconference while the remaining members discussed their individual claims.

Member/participant	Declared Interests
Dr Cathy Dichmont (Chair)	Has a consulting company, but has no pecuniary interests in the tuna fisheries. <i>No conflict of interest declared.</i>
Ms Kate Martin	Employee of AFMA, which includes a salary. Is the Manager of the tropical tuna fisheries. No pecuniary interest in tropical tuna fisheries. <i>No conflict of interest declared.</i>
Ms Claire Wallis	Employee of AFMA, which includes a salary. Is the Executive Officer for TTRAG, but has no pecuniary interest in Australian tropical tuna fisheries. <i>No conflict of interest declared.</i>
Mr Gary Heilmann	Industry member, director of a processing company, no longer holds ETBF boat or quota SFRs. <i>Declared an interest in Agenda item 4.1.</i>
Dr Rich Hillary	Employee of CSIRO, no pecuniary interest in Australian tropical tuna fisheries. Is the PI for the Management Strategy Evaluation (MSE) project for the tropical tuna and billfish species. <i>Declared an interest in Agenda item 4.1.</i>
Dr Robert Campbell	Affiliated with CSIRO as a consultant, no pecuniary interest in Australian tropical tuna fisheries. Previously engaged in research on the Eastern and Western Tuna and Billfish Fisheries as former PI of the following research project: <i>“Data management, provision of fishery indicators and implementation of the harvest strategies for Australia's tropical tuna fisheries”</i> . <i>No conflict of interest declared.</i>
Dr Ian Knuckey	Has a consulting company with interests in electronic reporting in the tuna fisheries, and is a member on several other AFMA Committees. Has previously worked on a project on FADs in Tasmania and work relating to the Commonwealth resource sharing framework. <i>No conflict of interest declared.</i>
Dr Julian Pepperell	Independent fisheries consultant and representative of the recreational fishing sector. Is currently undertaking research into game fishing. Is involved in projects including the monitoring of fish landed at game fishing tournaments and pop-up satellite tagging on juvenile black marlin. <i>No conflict of interest declared.</i>
Ms Fiona Hill	Employee of AFMA, which includes a salary. Is the Senior Manager of the Tuna and International section. No pecuniary interest in tropical tuna fisheries. <i>No conflict of interest declared.</i>
Mr Phil Ravello	Is currently the program manager of the industry association, Tuna Australia which includes a salary paid by industry. <i>No conflict of interest declared</i>
Dr Don Bromhead	Employee of ABARES, involved in fisheries research, primarily through engagement with the Western Central Pacific Fisheries Commission and the Indian Ocean Tuna Commission. Involved on the FRDC funded Tuna Australia protected species mitigation project. Has no pecuniary interest in the Australian Tropical Tuna Fisheries.

	<i>Declared an interest in Agenda item 4.1.</i>
Mr Pavo Walker	Owns several ETBF boat SFRs. Holds a Coral Sea permit and minor line permit. <i>Declared an interest in Agenda item 4.1.</i>
Dr Ashley Williams	Employee of CSIRO, no pecuniary interest in Australian tropical tuna fisheries. Is the PI for the project on Data Management, Assessment and implementation of Harvest Strategy for Australia's Tropical Tuna and Billfish Fisheries. <i>Declared an interest in Agenda item 4.1.</i>
Mr James Dell	Employee of CSIRO, no pecuniary interest in Australian tropical tuna fisheries. <i>Declared an interest in Agenda item 4.1.</i>
Mr Terry Romaro	Director of a company that owns Eastern Tuna and Billfish Fishery (ETBF) boat statutory fishing rights (SFRs), minor line SFRs, ETBF longline SFRs, Western Tuna and Billfish Fishery (WTBF) boat SFRs, WTBF longline SFRs, Western Skipjack Tuna Fishery (WSTF) purse seine permit, Small Pelagic Fishery (SPF) purse seine, mid-water trawl SFRs, and SPF quota SFRs. Shareholder of a company that owns shares in a proposal to fish with foreign longliners in the WTBF. Industry member on Southern Bluefin Tuna (SBT) and Tropical Tuna MAC, Invited participant for TTRAG, and industry representative at the Commission for the Conservation of SBT (CCSBT) & IOTC. Invited participant for SquidRAG and squid concession holder. Director of a company who owns a fish processing facility in Port Lincoln. <i>Declared an interest in Agenda item 4.1.</i>
Mr Michael Dylewski	Employee of ABARES, involved in fisheries economic research related to the Eastern Tuna and Billfish Fishery. Has no pecuniary interest in the Australian Tropical Tuna Fisheries. <i>Declared an interest in Agenda item 4.1.</i>
Dr Rob Curtotti	Employee of ABARES, involved in fisheries economic research related to the Eastern Tuna and Billfish Fishery. Has no pecuniary interest in the Australian Tropical Tuna Fisheries. <i>Declared an interest in Agenda item 4.1.</i>
Mr Paul Williams	Director of a company that holds an ETBF boat SFR, ETBF quota SFRs, and holds a Commonwealth fish receiver's permit. <i>Declared an interest in Agenda item 4.1.</i>

5. Industry and Researchers (ABARES and CSIRO) were identified as holding a conflict of interest in regard to item 4.1, due to discussion of exceptional circumstances potential work exceeding the usual scope of Harvest Strategy agreed work with CSIRO and ABARES. Members agreed that this was a sensible approach.
6. In all cases where a member or observer declared a conflict of interest, the participant left the teleconference. The remaining members unanimously agreed they were permitted to participate in the agenda item 4.1 of the discussion, noting the expertise of the individuals and benefits of these members contributing to discussions.

1.3. Adoption of Agenda

7. The updated draft meeting agenda was circulated on 8 March 2022 and accepted by TTRAG, as detailed in Appendix 1.

1.4. Adoption of Minutes

8. The TTRAG noted that minor comments received out of session from attendees on the TTRAG 33 meeting minutes were incorporated into the draft at Attachment 1.4a.

9. The TTRAG adopted the TTRAG 33 minutes following minor amendments, including removing Dr Rob Campbell as the CSIRO contact going forward, and a grammatical correction.

1.5.Actions Arising

10. The RAG noted the status of action items from previous meetings (Table 1). The comments from the RAG on the actions arising can be found at Table 1.
11. The RAG heard that while no action had yet been taken on Action Item 6, AFMA remains committed to moving forward with this item as resources allow.
12. 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 at TTRAG 34
1	AFMA to revise the WTBF Indicators template to include subregional IOTC information, recreational fishery information, summary statements and historic catch trends for foreign fishing in the EEZ.	TTRAG 29	AFMA	ONGOING: AFMA will look to incorporate TTRAG’s suggestions for the WTBF indicators paper at the TTRAG meeting in September.
2	In relation to the ETBF data dictionary: a. CSIRO to provide AFMA with a copy of the CSIRO Tuna Legacy Data as described in the Data Dictionary. b. AFMA to provide more details for the ADC line tables to CSIRO	TTRAG 29	AFMA	(a) COMPLETE Since TTRAG 31, AFMA has confirmed they have a copy of the Tuna Legacy database. (b) ONGOING: The ETBF Data Dictionary will be updated with new information on the new AFMA e-logs at the next FMS data strategy chapter update.
3	AFMA to update the Significant Events spreadsheet with the suggestions made by the RAG	TTRAG 32	AFMA	ONGOING: Significant events spreadsheet not included in agenda for this meeting, will be reported in July 2022
4	AFMA to include Dr Robert Campbell’s WCPFC SC paper that contains explanatory notes for significant events in the fishery alongside the Significant Events spreadsheet in future.	TTRAG 32	AFMA	ONGOING: Significant events spreadsheet not included in agenda for this meeting, will be reported in July 2022
5	Future data summaries to (1) remove the linear trend line from the catch plots and (2) provide more information of discards such as including life status and context around discards relative to effort, and (3) present future size data summaries to show trends over time (e.g. by year) rather than by quarter.	TTRAG 32	CSIRO	ONGOING: To be addressed in preliminary meetings early in 2022 when the new CSIRO employee is on board.
6	A RAG sub-group (consisting of AFMA, industry and RAG scientist) meet to discuss how to progress gaining better information on depredation.	TTRAG 32	AFMA	ONGOING: The group has not yet been convened.

7	AFMA to circulate the RAG's discussions and recommendations on the Striped Marlin MSE and prepare a paper for TTMAC outlining their recommendations.	TTRAG 32	AFMA	COMPLETE: A paper with this information was put to TTMAC in October 2021. The MAC agreed that at this stage a constant striped marlin TACC is a precautionary and practical way to manage this species.
8	The RAG requested that AFMA to add a graph showing effort (hooks) for the same period as species catch data to the Catchwatch report.	TTRAG 33	AFMA	PARTIALLY COMPLETE: Provided under Agenda Item 2.2. Noting database issues for the month of February 2022.
9	AFMA to review and update if necessary the yellowfin catch in the catchwatch report, noting a possible typo in the RAG paper.	TTRAG 33	AFMA	COMPLETE: Provided under Agenda Item 2.2
10	ABARES to provide further explanation of inputs/outputs in calculation of 'Economic performance Annual Indicators' for ETBF.	TTRAG 33	ABARES	ONGOING: Not yet actioned
11	ABARES to pursue options to take account of SBT in the catch figures and calculations of GVP and NER for the ETBF and include SBT in future ETBF economic indicators for TTRAG considerations.	TTRAG 33	ABARES	ONGOING: Not yet actioned
12	AFMA to circulate CSIRO Addendum to 2020 key species CPUE presented to TTRAG 32 (July 2021).	TTRAG 33	AFMA	COMPLETE: AFMA circulated in February 2022
13	CSIRO will undertake quantitative analysis to determine possible ways to understand if the low catch to TACC for Broadbill Swordfish constitutes exceptional circumstances in some way. CSIRO will also investigate if opportunity exists to collect and integrate additional data into the CPUE standardisation around bait types and sizes, and to undertake discussions with industry if there are other data that could be useful but aren't included.	TTRAG 33	CSIRO	ONGOING: To be discussed under Agenda Item 4.1
14	AFMA to investigate, if possible, whether bait changes have been experienced by NZ and the Spanish.	TTRAG 33	AFMA	ONGOING: AFMA to explore ability to provide update at July meeting (TTRAG35)
15	Japanese catch data to AFMA provided by Dr Rob Campbell to be included in this WTBF Indicators Paper.	TTRAG 33	AFMA	ONGOING: WTBF Indicators to be discussed at TTRAG35

16	AFMA to include any new stock structure advice elements in the WTBF Indicators Paper.	TTRAG 33	AFMA	ONGOING: WTBF Indicators to be discussed at TTRAG35
17	The Chair requested that, if the CSIRO yellowfin close kin study and associated stock structure work requested by the IOTC required further discussion by the RAG, it should be added to the agenda for the March 2022 TTRAG meeting.	TTRAG 33	RAG Members	ONGOING: Item to be discussed at TTRAG35
18	AFMA to add collection/updating of recreational catch data for Australia and NZ, particularly non-club take of yellowfin and striped marlin for consideration as a future research priority.	TTRAG 33	AFMA	ONGOING: Not yet actioned

Table 2 CPUE related action items

Item	Meeting Raised	Status at TTRAG 33	TTRAG comments
CPUE analyses: CSIRO to contact ABARES scientists regarding their 'clustering' analyses work to determine if it may provide insights for improving the CPUE analyses (and vice versa).	TTRAG 21 TTRAG 22	ONGOING: This work is still being progressed noting a change in staff working on it at ABARES.	Taken as read.
CSIRO 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	ONGOING: CSIRO to obtain the specific boundaries of the marine parks and then will pass onto whoever takes on the work	Taken as read.
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.	TTRAG 23	ONGOING: Not yet actioned.	Taken as read.
AFMA to examine VMS data to check and verify sets reported on logbooks as having mainline lengths greater than 100km. TTRAG to consider frequency distributions of values for all factors used in CPUE standardisations and provide advice regarding the removal of outliers.	TTRAG 24	ONGOING: Not yet actioned.	Taken as read.
TTRAG to give further consideration to additional potential fields, specifically, those required by WCPFC logbooks and ROP, fields relevant to collecting data on depredation, and shape of mainline set.	TTRAG 29	ONGOING: Not yet actioned.	Taken as read.
AFMA to provide CSIRO with the locations of recreational fishing FADs off the southeast Queensland coast for consideration in future CPUE standardisations	TTRAG 31	COMPLETE: AFMA provided a spreadsheet of FAD locations in February 2022.	Taken as read.

1.6. Out of session Correspondence

13. The TTRAG noted the out of session correspondence between the TTRAG 33 and TTRAG 34 meetings as provided in the written update by AFMA.

2 Fishery Performance Review

2.1. Verbal updates from scientists, industry and recreational fishing members since last RAG Meeting (September 2021)

13. Industry members and invited participants provided an update on recent fishing activity with the RAG noting:
 - The Cairns based fleet broadly reported poor fishing going on three consecutive years, with particularly low availability of bigeye tuna and striped marlin. Industry members noted that in their experience, La Niña years are not as good as El Niño periods for fishing and advised that recent reports indicate water temperatures remain quite low.
 - Due to changes in the market and supply chain dynamics, operators are reporting that they are not targeting swordfish. Despite this, anecdotal reports are that high numbers of sub-adult swordfish are currently being seen in the fishery. This was supported by operators from the Coral Sea, and a link between reduced targeting over the last few years and a potential recruitment pulse was raised.
 - An increase in small yellowfin tuna (15-20kg) on the continental shelf since the start of February was also reported, though the ability for industry to access these fish has been limited by weather conditions. Industry reported that this influx of small yellowfin used to be regular but less so in recent years.
 - South coast fishing was reported as quite poor, with vessels out of Ulladulla travelling to Nelson Bay in search of catch. Shots with only 5-6 fish at a time reported as average.
 - On the west coast, activity has been low but catches and weather have been good. The RAG heard that the cost of freight for bait has quadrupled, and west coast fishers only have access to domestic markets at this time.
 - Crew recruitment and retention, particularly around availability of international crew is a key challenge for all fleets. Crew unavailability has resulted in reduced trips, with flow on effects on catches. Industry is concerned about the duration of this issue and expressed that the Agricultural Visa program did not currently address their needs, noting that sponsoring visas can be a 6-month process with associated costs, and that English language skills can limit applicants. The RAG heard reports of other sectors head-hunting international crew members, and that it is difficult to recruit domestic crew.
 - Following the cessation of the International Freight Assistance Mechanism program, air freight remains an issue and market access will remain reduced until improvements to international freight flights occur. The RAG heard that sea freight is also not working well, with freezer containers unavailable and reports of fleets in other countries tied up due to supply chain constraints.
 - Biosecurity processes were raised as an emerging issue, with industry reporting that several squid consignments have been intercepted by biosecurity requiring importers to defrost several tonnes

of bait for inspection. Defrosting at port of entry impacts bait quality as well as availability at key times, and industry suspects that degradation of large quantities of bait due to this process may be reflected in catch rates going forward.

- The domestic market has been very strong, with the highest prices on record reported and insufficient supply to meet demand. Operators report that Sydney Fish Market has been paying an average of \$40/kg (up to \$60/kg) for gilled and gutted fish. Marlin is reported as selling \$12-\$13/kg, and both swordfish and tunas have doubled in value over the holiday and late summer period.

14. The recreational fishing member provided an update on recent fishing activity with the RAG noting:

- The Cairns heavy tackle black marlin season has again suffered from COVID impacts, with most vessels having insufficient clients to fish the season. Average strike rates on adult fish were reported.
- In southern QLD a recruitment pulse of tiny black marlin was reported in Harvey Bay, despite it being a low recruitment year for 1yo fish (30kg), the key class for the inshore fishery. The next year (30-40kg) class has been seen between the Sunshine Coast and into NSW.
- NSW has had a slow start to the season, with fuel costs reducing tournaments participation. The recreational fishing member suggested that this effect would also occur in the non-tournament fleet, and that effort is likely lower generally. Striped marlin is reported to be in very low abundance this year, compared to previous seasons where low black marlin presence has been offset by striped marlin. High SST was reported off the coast recently, which may have influenced marlin to move south.
- The RAG heard that La Niña has been linked to an increase in catches of shortbill spearfish, and smaller blue marlin (less than 100kg) have been seen in NSW following warmer tropical waters. Similarly, reports from NZ indicate increases in spearfish catch, though NZ has seen a good season for big Striped Marlin.
- Game fishing tournaments in Port Stephens have recently concluded, with generally slow fishing reported and reduced catch rates on all 3 species of marlin, very few midsize yellowfin tuna, and very small yellowfin tuna are on the continental shelf. High abundance of 20kg mahi mahi, was reported, indicating good recruitment.
- The recreational member advised the RAG that all retained fish from tournaments were sexed, reporting that of 250 blue marlin, 90-95% were adult females in non-spawning condition. One gravid female blue marlin was reported in early March, which is uncharacteristic for this species which is understood to spawn at latitudes of 15-20 degrees.
- Information on recreation swordfish and southern bluefin tuna is limited due to seasonality of effort, however swordfish effort is thought to have reduced over time, as targeting this species can be expensive and time consuming. The RAG noted that reports on social media may indicate still increasing interest in swordfish, and that level of swordfish recreational fishing effort is better understood in Tasmania while Victoria and Western Australia are less transparent at this stage. The RAG also noted that social media reports may not align with real time behaviours and be subject to bias in the types of trips reported.
- The RAG received an update on swordfish tagging work in Western Australia, with Ifremer (France) providing pop-up tags for Indian Ocean focused billfish research. The Exmouth recreational billfish

season has been good and provided an opportunity for 40 billfish including sailfish, and striped, blue, and black marlin, to be tagged.

- The RAG requested that recreational CPUE indices be developed into an annual report for presentation at the July meeting. AFMA and the Recreational Fishing Member were requested to collaborate on this, and to produce a report summarising current a previous season CPUE (state based and New Zealand if possible), and current and prior season results from tournament sampling and size frequency and sex-ratio monitoring reports.

ACTION: AFMA to work with J Pepperell on development of a TTRAG35 paper summarising State (Victoria, NSW, Queensland) recreational CPUE indices, Australian tournament sampling and size frequency and sex ratio monitoring reports for the 2021 and 2022 seasons, and, where possible, New Zealand recreational swordfish effort.

15. An invited Economics participant provided an update, with the RAG noting:

- ABARES is currently running the ETBF survey and advised they'd contacted operators in late December with minimal response, recognising the impact of the summer holidays and recent Omicron outbreak.
- ABARES requested the support of industry members in encouraging engagement with the survey, and advised that a reminder will be sent out in the coming weeks. This request was supported by the Chair, who encouraged industry participants to speak to their members to support survey responses. The importance of responding this year to accurately capture COVID impacts was noted. Tuna Australia asked to be copied into the forthcoming reminder to support promotion of the survey during port visits.

2.2. AFMA catch watch reports (AFMA)

16. The RAG was presented with the fishery catch data paper provided by AFMA noting:

- The 2021 season had very low catches of swordfish, striped marlin and bigeye tuna.
- In 2020 albacore catch was the highest the peak in the 2006/07 period. In 2021 albacore catch declined slightly, but still exceeded catches from 2015 onwards.
- Yellowfin tuna catches fell to below average in 2021.
- Southern bluefin tuna catch has increased to a level last seen in 2017.
- The group noted that the catch and effort graphs produced for the report were becoming more complicated to read, as cumulative years are presented. The RAG requested that AFMA explore alternate means of presenting the data, including a shaded band between the maximum and minimum values, and only the prior decade and one reference year presented as individual lines. The reference year for effort was recommended to be 2003, while 2006 was recommended as the reference year for catch, based on the availability of CDR at that time.

ACTION: AFMA to present an updated approach to Catch Watch Report catch and effort figures at the next meeting. Figures should include a reference year, the current season, and the prior 10 years as individual lines, and the application of a shaded area between historical maximum and minimum values.

2.3. International meetings update

17. The RAG was provided with an update from ABARES on recent international meetings:

Western and Central Pacific Fisheries Commission

- The Western and Central Pacific Fisheries Commission (WCPFC) met from 1-7 December 2021. The Australian delegation was led by Emma Campbell from the Department of Agriculture, Water and the Environment, and included AFMA, ABARES, DFAT and industry members.
- The WCPFC was scheduled to negotiate a new Tropical Tuna Conservation and Management Measure (CMM), which provides a core management framework for Western Pacific skipjack, bigeye and yellowfin tuna stocks. Despite extensive efforts on redevelopment of the CMM since the 2020 meeting, the existing measure was extended for 2 years with only minor changes. The minor changes included new provisions to mitigate the impacts of FADS on the marine environment.
- Given the extent of some proposed changes raised during the negotiations, and the risk of having no CMM in place for these species, the retention of a strong Tropical Tuna CMM is a good outcome.
- The WCPFC also considered the Compliance and Monitoring Scheme (CMS), the central CMM for assessing member compliance with obligations. The Commission agreed to extend the CMS CMM for an additional 2 years while agreeing to undertake work to respond to weaknesses in the CMM during that period. Extension of the existing measure ensures requirements continue to apply to member fleets, and auditing work against the rules of the Commission continues.
- The WCPFC considered Harvest Strategy (HS) development, with little substantive progress made. Members agreed to prioritise HS in the coming year, and the Commission agreed to hold a Science-Management Dialogue following the next meeting of the WCPFC-SC, to progress key technical and policy work. Australia led the work to revise and update the Commission's harvest strategy workplan and the group heard that Australia would provide a convenor for the Management Issues theme.
- Australia led the work to revise and update the HS Workplan, setting out key milestones in coming years. In 2022, HS decisions are scheduled to be agreed for skipjack tuna and south pacific albacore tuna. These discussions are likely to be complex.
- Australia continues to advocate for strengthened management of swordfish, in the South West Pacific, and introduced (with support from FFA members) a first draft of a new Swordfish Management CMM to Commission Members for their consideration and feedback. Australia will continue to facilitate discussions with other Commission Members during 2022 on this draft CMM with the intention to submit for adoption at WCPFC19 in December 2022.
- The primary aim of the draft Swordfish Management CMM is to prevent future increases in swordfish fishing mortality, noting that the current CMM places no restrictions on total fishing mortality. The new CMM describes a framework incorporating a series of catch limits for swordfish targeting fleets in addition to a suite of alternate measures for fleets taking swordfish as bycatch. The CMM was developed taking into account the stock assessment, future catch projections, and swordfish target and bycatch information.
- The impact of COVID and online meetings in slowing work, particularly on the issues of HS development and MSE supporting Target Reference Point setting and updating, was raised by a scientific member.
- An industry participant expressed concern regarding WCPFCs slow progress towards implementation of harvest strategies and the implications of this for ongoing MSC certification. The group heard that MSC is revising their standard, and it is hoped that feedback from a range of fisheries in the Pacific will cause MSC to take into account the complex nature of the development of HS in multinational fisheries, in comparison to single species and single fishery certification

approaches. However, industry participants expressed concern that longer timelines may not be allowed for fisheries subject to complex management environments.

- The recreational member noted the distinctions in striped marlin stocks between the Eastern and Western Pacific and queried whether a difference in biomass between those stocks exists. The member also noted some genetic work on black marlin indicating Eastern Australian black marlin stock is contiguous with the North Eastern Pacific while a separate stock was described in North Western Pacific stock.

Indian Ocean Tuna Commission

- The Indian Ocean Tuna Commission (IOTC) Scientific Committee (SC) met on 6-10 December 2021. The Australian delegation was made up of ABARES and CSIRO, including current and past RAG scientific members and participants.
- Among species of particular interest to Australia, new stock assessments were considered for yellowfin tuna, black marlin, striped marlin and blue shark. The 2021 yellowfin tuna assessment indicates that the stock remains overfished relative to the IOTC SB_{MSY} reference point (which differs from the harvest strategy policy default LRP of 20% of unfished SB) and subject to overfishing ($F > F_{MSY}$). Median spawning biomass depletion was estimated to be ~31%.
- The new assessment improved on the 2018 assessment in some aspects and was endorsed by SC24 alongside some new catch projections, however a range of technical issues remain, creating uncertainty in the assessment outcomes. SC24 recommended that IOTC Commission fund and implement a full independent review of the assessment from 2022-24. Approval of this recommendation by the Commission is anticipated, and background work is underway.
- The yellowfin tuna catch projections generated from the 2021 assessment were reviewed by SC24 against a range of catch level and time frame scenarios to achieve the MSY-based objectives. This exploration will inform Commission discussions on the revision of the main yellowfin tuna Resolution (Res. 21/01) which applies the catch limits for the stock. The projection outcomes that are likely to be of most interest to the Commission are those indicating that if catches are reduced to less than 80% of 2020 levels (~344,000 tonnes) this would result in a >50% probability of ending overfishing by 2023 and 2030, and the stock no longer being in an overfished state by 2030.
- The SC noted that skipjack catches in 2020 were approximately 555,000 tonnes, and exceeded both the Harvest Control Rule generated TACC for that time period (470,000 tonnes) and the revised TACC 2021-23 (513,000 tonnes).
- The updated black marlin and striped marlin assessments indicated that striped marlin is overfished, subject to overfishing, and severely depleted, with estimates putting the stock between 6-12% of B_0 . Black marlin status remains uncertain, and recent average catches of black marlin and sailfish have exceeded MSY levels and catch limits under Res. 18/05. The SC has recommended that the IOTC Commission review Res. 18/05 to provide mechanisms to ensure limits are adhered to, noting that take of these species is primarily coastal.
- Australia holds particular interest in the implementation of Management Procedures (MP), with key technical work being led by CSIRO. The SC24 recommended a revised schedule of work (drafted by Australia), and endorsed a paper describing exceptional circumstances guidelines developed by CSIRO. The SC also recommended to implement an independent review of the bigeye tuna MSE (led by CSIRO). The SC agreed that this work had progressed sufficiently to inform a Commission decision in determining a MP for this stock and indicated that the review should not delay a decision on adopting an MP for bigeye tuna.

- SC noted that redevelopment of the yellowfin tuna Operating Model (OM) may be required due to ongoing issues with the stock assessment model that underpins the current OM.
- The SC recommended the Commission endorse the continuation of the EM Standards Working Group and to determine reporting lines for this group. The next meeting of the Working Group is scheduled for June 2022.
- The RAG noted industry’s ongoing concerns regarding catch reductions in the IOTC convention area, and the broader challenges in data collection and precautionary decision making. A scientific participant updated the RAG on work undertaken by CSIRO with Indonesia to improve data collection and noted the work of NGOs to work with other coastal states on the issue.
- An industry member requested an update on work being undertaken on stock structure for yellowfin tuna stocks, and was advised that preliminary results show separation in populations across the equator in the northern Indian Ocean. Further work to understand stock boundaries and dynamics is still to be completed.

2.4.MAC and AFMA Commission outcomes

18. The RAG was provided with an update from the TTMAC 26 meeting held on 26 October 2021 and the 80th AFMA Commission meeting held in November 2021. The RAG noted that:

- The key outcome from the AFMA commission meeting was Total Allowable Commercial Catch setting for target species in the ETBF and the WTBF.

ETBF Quota species	Total Allowable Commercial Catch (t)	Overcatch %	Undercatch %	Determined weight (kg)
Albacore Tuna	2,500	10	10	2,000
Bigeye Tuna	1,056	10	10	2,000
Yellowfin Tuna	2,400	10	10	2,000
Broadbill Swordfish	1,047	10	10	2,000
Striped Marlin	351	10	10	2,000

WTBF Quota species	TACC
Bigeye tuna	2,000t
Yellowfin tuna	2,000t
Broadbill Swordfish	3,000t
Striped marlin	125 t

- The key outcome from TTMAC 26 was a request tasking the RAG to consider the ongoing low catch to TACC for swordfish, and for the RAG to consider CPUE standardisations for swordfish. The group noted that both these items were set to be discussed under Agenda Item 4.1.

3 Coral Sea Zone Hook Trial

3.1 Coral Sea Zone Hook Trial

19. The RAG noted that in February 2022, a small working group consisting of industry, scientists, managers and several recreational members of either TTRAG or TTMAC met to discuss the outcomes of the 2021 Coral Sea Zone (CSZ) hook trial.
20. The RAG heard that the key outcomes of the first year:
- Neither of the combined trigger limits were reached during the 2021 season. While effort was reduced compared to previous years due to the impacts of COVID, weather, and industry transitions, 26 shots of greater than 500 hooks were reported by 2 vessels in the CSZ in 2021.
 - Trial data showed an improvement in discard fate reporting, with a substantial decrease in “unknown” fates, and correlated increases in “alive” and “dead” fates. Proportionally more alive marlin was reported than dead.
21. The RAG noted that the working group recommended the CSZ hook trial should continue for its second year, under the following amended conditions:
- In the area west of 148°E, fishing under the adjusted hook limit will apply between the months of March and August in 2022. Fishing effort east of 148°E will be subject to the higher hook limit until 31 December 2022.
 - In response to a request from industry, conditions were adjusted to remove the prior limit of one set per day if shooting more than 500 hooks. The new conditions allow for a cumulative maximum of 1,200 hooks set per day in either a single or multiple shots.
 - A combined species two-tier marlin catch limit will apply during the second year of the trial. If the first tier is reached, this will trigger AFMA convening the working group (within two weeks of the breach) to review available data. If the second tier is reached, the trial will be terminated.
 - The following catch limits will be applied:
- | | |
|-------------|--------|
| | Marlin |
| First tier | 99 |
| Second tier | 131 |
- All boats operating in the trial must comply with the ETBF e-monitoring requirements. AFMA will continue to monitor e-monitoring audit rates for reporting accuracy.
 - Life status will continue to be collected during the trial, facilitated through the new e-log software and verified through e-monitoring.
22. A discussion between RAG participants following the presentation addressed the following points:
- Fishing gear configuration, besides hook numbers, is not expected to change during the trial.
 - The RAG noted that the permit conditions apply to all permit holders, and that the combined trigger limits apply across the fishery, rather than at the vessel level.
 - The RAG heard that two vessels that were previously active in the CSZ have recently been sold, with one moving to Ulladulla and the other remaining in Cairns under operation by a new entrant to the fishery. A third vessel is reportedly transitioning to a Tropical Rock Lobster setup, and the group noted advice that an increase in effort in the CSZ is not expected.

- The possibility of revisiting an earlier study on recreational CPUE of blue and black marlin in the Coral Sea, seeking to update with another 20 years of data was discussed. The group noted the progress of a research proposal on this matter which has seen partial success seeking funding from industry groups but has not yet found supplementary funding from other bodies. The RAG noted potential pathways for exploration including FRDC recreational fishing research and ComRAC.

4 Swordfish Harvest Strategy

4.1 Swordfish Harvest Strategy

23. CSIRO led a discussion on the Swordfish Harvest Strategy, focusing on two distinct issues. The first issue discussed was CPUE standardisation and approaches to identifying changes in fishery characteristics with regard to bait. The second issue addressed was the determination of exceptional circumstances under the Swordfish Harvest Strategy due to ongoing low catch to TACC.
24. Key points from the RAG's discussion on CPUE standardisation were that:

- Identification of key information is of ongoing interest to the RAG and industry, and the group noted that prior work included a framework-focused CPUE standardisation workshop in 2013, and the addition of e-log fields, with a particular focus on line-depth estimates, following discussions in 2019 at TTRAG 23. The RAG requested clarification on the status of the recommendation from TTRAG 23.

ACTION: AFMA to distribute a copy of the current ETBF e-log fields and confirm whether the additions recommended at TTRAG 23 were included (vessel log speed, shooting speed, branchline length, bubble dropper length).

- Industry reported concerns that current data doesn't capture long term changes in bait size and texture, estimating that vessels targeting swordfish had seen a change from an estimated average squid weight of 300g in 1999 to <100g in recent years. The RAG heard that changes in bait characteristics has occurred in response to shifts in market price and availability of *Illex spp.* squid, due to increasing human consumption of this species. The group also noted reports by industry that black squid (*Sthenoteuthis spp.*) results in lower CPUE, particularly for swordfish, and that reduced CPUE in combination with limited market access for swordfish has resulted in reduced targeting of this species in recent years.
- The RAG heard that if shots using particular bait types could be identified, then that information could be incorporated into modelling. Industry agreed to work with AFMA to estimate the dates some swordfish targeting vessels changed from *Illex* to black squid. In response to discussion about estimating an effect size of bait type, CSIRO advised that exploration of bait impacts on CPUE need to be data-based, and this approach is consistent with current standardisation methods.

ACTION: AFMA and Tuna Australia to capture historical dates of changes to squid bait species, with evidence to be provided through bait import documents and a questionnaire.

ACTION: AFMA to provide CSIRO with data capturing squid bait changes by mid-April 2022. CSIRO to include these changes in the Swordfish CPUE standardisation to be presented at TTRAG 35 in July.

- The group also noted that an alternative approach could be taken to examine effect of bait change on CPUE through generation of indices for vessels using squid versus the remainder of the fleet.

Industry cautioned that squid use is not limited to vessels targeting swordfish, and this should be considered in developing an approach.

- Industry reported that the condition of bait had also seen more variation recently, with higher quality (jig caught) and lower quality (trawl caught) both being used depending on availability. The impact of biosecurity inspections requiring large quantities of bait to be defrosted for inspection on import was also raised.
- The use of an industry-wide questionnaire to capture changes in fishing practices, including changes in bait types during and prior to COVID was raised by a scientific member, to explore vessel level changes that could inform standardisation approaches.
- The RAG briefly considered whether other target species CPUE standardisation could benefit from the same discussion being held for swordfish. Industry flagged that fishing effort was influenced by shipping schedules across species since COVID.
- The group heard advice from CSIRO that extensive oceanographic and environmental information not recorded in logbooks is collated from a variety of other sources, which is then linked to logbook records through date and location information. The RAG noted that some of this information was previously captured in Observer Logs at a finer scale, which CSIRO noted may have provided insight into variability at a scale not currently available in the models.
- The RAG noted that logbooks record the weight of bait by set, rather than individual bait piece size, and recommended that AFMA explore means of adjusting logbooks/e-logs to allow for recording:
 - Bait type to species
 - Individual bait size
 - Bait condition (e.g. trawl or jig capture)

RECOMMENDATION: TTRAG recommend AFMA amend the ETBF e-log to include fields for bait species, bait size and condition of bait.

- The RAG heard from industry that COVID related market closures had resulted in a loss of skippers from the industry, with associated changes in pay structure implemented. Industry expressed concerns that effort reported in logbooks was not accurate and that skippers may have been reporting greater hooks than were set during this period and proposed that review of Electronic Monitoring footage may be useful to shed light on the accuracy of effort reporting. AFMA agreed that a spot audit was possible but noted that there would be an associated cost.

ACTION: AFMA to contact AAP to explore cost of undertaking a spot audit of effort reporting in the ETBF.

- The RAG considered the need for greater information on size classes of discarded swordfish to support size-class based standardisation assessments. This information had previously been provided through observer notes, and the group noted previous calls for better understanding of this data which is anticipated to focus on smaller sized fish. The group noted that catch predation levels might also be explored through addition of a “head only” or similar field in e-logs.
- The group requested that AFMA and Tuna Australia work together to explore a means of improving data collection on discard sizes through e-log reporting.

ACTION: AFMA to work with Tuna Australia to develop operationally feasible options to capture discard sizes for swordfish. i.e. (E-log comment section, tick box for fish between 10-20kg, head only, small, medium or large).

25. Key points from the RAG's discussion on determination of exceptional circumstances under the Swordfish Harvest Strategy included:

- The MSE testing was modelled on pre-COVID fishery characteristics, including seasonal undercatch parameters. The RAG acknowledged that low catch to TACC is an ongoing issue, and that the most recent season brings the swordfish fishery to 3 of 4 years with a catch: TACC ratio that was untested in the MSE.
- Noting that the HS models the most recent 4 years, RAG members agreed that based solely on catch: TACC ratio, the conditions for exceptional circumstances under the Swordfish Harvest Strategy have been met.

RECOMMENDATION: TTRAG recommend the persistent low catch to TACC be considered an exceptional circumstance under the Swordfish Harvest Strategy.

- The group heard that CPUE for swordfish is low, but within the bounds tested by the MSE and not justification for exceptional circumstances. Similarly, CSIRO reported that analysis did not indicate that external fishing pressure was causing exceptional circumstances, noting that the MSE test had explored a scenario with twice as much fishing from foreign fleets.
- The repeated years of low catch to TACC were recognised as now making up a dominant part of the new index to be generated by the HS, and the group was asked to consider technical options to respond to this scenario, including running the MSE to test within the range of current conditions.
- Noting that the HS is due for its 3-year review in 2023, the RAG considered how to respond to ongoing low catch ratios. The group considered that two scenarios are possible under the current conditions, and that it is important to differentiate whether (1) low recruitment events has resulted in the current indices or (2) low catch proportion has resulted in generation of inaccurate indices.
- In the case of low recruitment, it was noted that this event has been included in modelling, and that it takes approximately four years for this signal to move through the model, and that industry has reported increasing numbers of young swordfish more recently.
- CSIRO advised that in a scenario of low sub-adult recruitment, which stock assessment data indicates is also occurring in the fishery, there are ways to ameliorate TACC cut recommendations generated by the HS. Noting that it is not desirable to stop a HS from responding to negative signals overall, the RAG recommended that CSIRO should undertake work to further explore mechanisms in the HS to offset TACC decreases over appropriate timeframes.

RECOMMENDATION: TTRAG recommended the adjustment to the swordfish be time bound, with a review of the Swordfish Harvest Strategy to take place in 2023, as scheduled to ensure exceptional circumstances adjustments do not mask a potential long term recruitment issue.

ACTION: CSIRO to explore offsetting a decrease in the TAC under the HS, by comparing average catch to additional recent undercatch and applying a decision rule based on the relationship of actual and additional undercatch proportions (detailed in Appendix 3) in time for TTRAG 35.

5 Research Update

5.1 Update on Tuna Australia projects

26. The RAG was provided with a verbal update on Tuna Australia projects noting that:

- FRDC project 2020-041 is focused on improving safety outcomes with respect to flybacks from seabird mitigation related line weighting. The project has four components under investigation, including flyback safety-bar prototypes (two vessels engaged); flyback safety screens (one vessel); modified sliding lumo leads (reduced length, dark blue colour); and tori line design with a focus on ease of deployment (60 shots so far).
- A research assistant working on historical bait use and artificial bait trials in support of continuing MSC certification bait sustainability requirements. Tuna Australia intends to seek industry comments on bait options and potentially import artificial baits for fleet-based testing.
- Twenty-three vessels owned by Tuna Australia members have received installation and support in using a digital safety management system (OffshoreSMS) to meet AMSA requirements, in concert with engagement with the Sea Safe program.
- A more recently approved FRDC project will seek to investigate if live-bait can be set successfully using an underwater bait-setter. If successful, Tuna Australia hopes that underwater bait setting might eventually be considered as a seabird mitigation approach under the TAP. As part of this study, Tuna Australia intends to use TDRs to explore live bait characteristics (sink rate, swimming behaviour) and how this might interact with bait setting and seabird interaction risk.
- Conversations are ongoing with industry on magnesium hook banding, and a pilot trial is being negotiated with industry. Hookpods and hook-shields with live bait are also of interest for the pilot, though hook shields are currently not readily available. This trial will be in collaboration with a Masters student from the University of the Sunshine Coast (USC).
- Honours students from USC are anticipated to collaborate with Tuna Australia to undertake desktop-based studies on interaction characteristics with toothed whales, seabirds, sharks and turtles. The RAG noted that the turtle project will use TDRs, which will also explore depth profiles of 5-6 main species-specific setting strategies in the ETBF. This depth information may be useful to inform CPUE standardisation in the future.
- An application has been submitted to a third funding round related to Marine Parks, hoping to explore oceanographic data collection in real time during fishing operations.

5.2 Fisheries Oceanography project

27. The RAG was provided with an update on the Fisheries Oceanography Project and noted that:

- The project is in the final stages of writeup, and a final presentation on this project might be anticipated at TTRAG 25 in July 2022. The group were reminded that the project was initiated five years ago, and that the project objectives were to;
 - Enhance AFMA and industry understanding of climate-ocean system drivers on spatial and temporal variability of key ETBF species
 - Develop and deliver a suite of predictive models at seasonal and decadal timescales to assist both management and industry planning
 - Provide operational forecasts of habitat distribution for Australia and Pacific regional partners
 - Inform regional and inter-sectoral allocation discussions.
- Using a combination of data from the ETBF and international WCPFC longline fleets, the project reviewed historical patterns of key species, then sought to develop and test pattern predictability

through mechanistic or statistical pattern understanding. Habitat models were developed based on these patterns, including models of current and predicted future conditions.

- Additional oceanographic datasets from satellite, modelled and bathymetric collection techniques were accessed through the Bureau of Meteorology among other sources. The group heard that electronic tagging, which had been intended to inform fine-scale individual behaviour patterns, was not successful in supplementing catch and effort data.
- The modelling approaches built on previous habitat model work and investigated use of Boosted Regression Trees (BRTs) which were further developed to include sub-surface variables. Basin and sub-region timeseries analyses were undertaken, and the data was modified to allow use of the Australian Community Climate & Earth System Simulator - Seasonal (ACCESS-S) that allowed Ocean Reanalysis at 25km resolution and was compatible with BoM system requirements.
- The ACCESS-S analysis included an investigation of the current operational system, based on hindcast data from 1990-2012, and provides forecasts up to 6 months. A second analysis used hindcast data from 1981-2020 and provides forecasts out to approximately 9 months.
- The RAG heard that models incorporating sub-surface structure were better able to predict CPUE at the basin level when compared to models using SST. At the regional scale, different sub-surface variables had varying impacts on CPUE predictions, depending on the species and region in question.
- The key outputs of the project include 6 updates tabled at TTRAG and/or SPC, development of a website, presentation at the World Fisheries Congress 2024 on some aspects of the modelling, and ongoing ACCESS-S reanalysis for surface and sub-surface physical variables, for which the optimal delivery mechanism is being finalised.
- The draft final report is due on 14 April 2022. The final stages of the project include assessment of the skill of subsurface variables informing the ACCESS-S models, which are on track to be published in the coming months. The project will be active until the end of June, with the final report due for delivery on 14 June 2022.
- The project team is exploring ongoing delivery of project-generated data into the future, with plans to provide:
 - Updated monthly timeseries hosted by CSIRO
 - Habitat forecasts following completion of the skill assessment
 - Bi-monthly ACCESS-S reanalysis and provision as an updated netcdf file, which could interface with CPUE standardisation processes.
 - Production of an article with Dr Simon Nicol for an SPC fisheries newsletter
 - Development of a dedicated WCPFC regional viewer of the ACCESS-S outputs.

28. The RAG thanked Mr Jason Hartog for the presentation.

29. The Recreational Member suggested that the game fishing and recreational fishing groups would also be interested in the work, and proposed that another avenue for sharing project results could be the Game Fishing Association of Australia newsletter and a presentation at their Annual General Meeting.

ACTION: CSIRO standardisation team to work with Jason Hartog to identify environmental factors included in the ETBF CPUE standardisations that could be informed by the outputs of the FRDC Oceanography Project.

6 Other business

6.1 Future meeting planning

39. No other business was raised by the group.

7 Next meeting

40. At the TTRAG 33 meeting in September 2021, TTRAG agreed to set placeholders for all meetings throughout 2022. The next tentative meeting dates scheduled are:

- TTRAG 35, 13-15 July 2022
- TTRAG 36, 13-15 September 2022

30. The RAG noted that the September meeting clashes with the announced dates for Seafood Directions, which impacts several participants. The Chair requested that AFMA work intersessionally to set an alternate September date.

ACTION: AFMA to work with the Chair to set new date for TTRAG36.

31. The Chair advised the RAG that this meeting was likely Dr Rob Campbell's last, and the group thanked Dr Campbell for his extensive and substantial contributions to the discussions of TTRAG.

32. The Chair closed the meeting at 2:15 pm on day two and thanked members for their attendance and contributions.

Video Conference
Wednesday 9 March – Thursday 10 March 2022
Time- 9:00am start (QLD time)

Day 1**Session 1 9:00am – 10:30am AEST**

- | | | |
|----------|--|-------|
| 1 | Preliminaries | |
| | 1.1 Welcome & Apologies | Chair |
| | 1.2 Declarations of Interest | Chair |
| | 1.3 Adoption of Agenda | Chair |
| | 1.4 Acceptance of TTRAG 33 Minutes | AFMA |
| | 1.5 Actions arising/ Out of Session Developments | AFMA |
| | 1.6 Out of Session Correspondence | AFMA |

Session 2 10:45am – 12:00pm AEST

- | | | |
|----------|-----------------------------------|-------|
| 2 | Fishery Performance Review | |
| | 2.1 Verbal Updates from members | Chair |
| | 2.2 AFMA Catch Watch | AFMA |

Session 3 12:30pm – 2:00pm AEST

- | | | |
|----------|-----------------------------------|-------------|
| | 2.3 International Meeting Updates | AFMA/ABARES |
| | 2.4 Commission & TTMAC Outcomes | AFMA |
| 3 | Coral Sea Hook Trial | |
| | 3.1 Coral Sea Zone Trial Update | AFMA |

Day 2**Session 4 9:00 – 10:30 am AEST**

- | | | |
|----------|--------------------------------|------------|
| 4 | Swordfish | |
| | 4.1 Swordfish Harvest Strategy | CSIRO/AFMA |

Session 5 10:45am – 12:30pm AEST

- | | | |
|--|--|--|
| | 4.1 Swordfish Harvest Strategy (continued) | |
|--|--|--|

Session 6 1:00pm – 2:30pm AEST

- 5 Research**
 - 5.1 Tuna Australia Projects Update Tuna Australia
 - 5.2 Fisheries Oceanography Project Update CSIRO/AFMA
- 6 Other Business**
- 7 Next Meeting**

APPENDIX 2: RECOMMENDATIONS AND ACTIONS ARISING FROM TTRAG 34

Table 1. Recommendations arising from TTRAG 34

	Recommendation	Responsibility
1	TTRAG recommend AFMA amend the ETBF e-log to include fields for bait species, bait size and condition of bait.	AFMA
2	TTRAG recommend the persistent low catch to TACC be considered an exceptional circumstance under the Swordfish Harvest Strategy.	AFMA
3	TTRAG recommended the adjustment to the swordfish be time bound, with a review of the Swordfish Harvest Strategy to take place in 2023, as scheduled to ensure exceptional circumstances adjustments do not mask a potential long term recruitment issue.	CSIRO
4	TTRAG recommended that the list of species to ETBF e-log be expanded to include the two types of squid (illex and black) which have been used in the fishery.	AFMA
5	TTRAG recommended AFMA to work with Tuna Australia to develop operationally feasible options to capture cut off weights for the discard sizes classes for Swordfish. i.e. (E-log comment section, tick box for fish between 10-20kg, head only, small, medium or large). Appendix 4.	AFMA/Tuna Australia

Table 2. Actions arising from TTRAG 34

	Action	Responsibility
1	AFMA to work with J Pepperell on development of a TTRAG35 paper summarising State recreational CPUE indices, Australian tournament sampling and size frequency and sex ratio monitoring reports for the 2021 and 2022 seasons, and, where possible, New Zealand recreational swordfish effort.	AFMA & J Pepperell
2	AFMA to present an updated approach to Catch Watch Report catch and effort figures at the next meeting. Figures to include a reference year, the current season, and the prior 10 years as individual lines, and the application of a shaded area between historical maximum and minimum values.	AFMA
3	AFMA to distribute a copy of the current ETBF e-log fields and confirm whether the additions recommended at TTRAG 23 were included (vessel log speed, shooting speed, branchline length, bubble dropper length).	AFMA
4	AFMA and Tuna Australia to capture historical dates of changes to squid bait species, with evidence to be provided through bait import documents and a questionnaire.	AFMA & Tuna Australia

	Action	Responsibility
5	AFMA to provide CSIRO with data capturing squid bait changes by mid-April 2022. CSIRO to include these changes in the Swordfish CPUE standardisation to be presented at TTRAG 35 in July.	AFMA & CSIRO
6	AFMA to contact AAP to explore cost of undertaking a spot audit of effort reporting in the ETBF.	AFMA
7	AFMA to work with Tuna Australia to develop operationally feasible options to capture discard sizes for swordfish. i.e. (E-log comment section, tick box for fish between 10-20kg, head only, small, medium or large).	AFMA & Tuna Australia
8	CSIRO to explore offsetting a decrease in the TAC under the HS, by comparing average catch to additional recent undercatch and applying a decision rule based on the relationship of actual and additional undercatch proportions (detailed in Appendix 3) in time for TTRAG 35	CSIRO
9	CSIRO standardisation team to work with Jason Hartog to identify environmental factors included in the ETBF CPUE standardisations that could be informed by the outputs of the FRDC Oceanography Project.	CSIRO
10	AFMA to work with the Chair to set new date for TTRAG36	AFMA

Appendix 3: Outline of plan to modify the SWO harvest strategy and MSE test

*Rich Hillary
CSIRO O & A
Hobart
TAS 7000*

At the most recent TTRAG meeting the following was discussed:

- How to design a modification of the existing SWO Harvest Strategy (HS) to better deal with the most recent unprecedented level of TAC undercatch.
- Given the technical specifications of the proposed change to the SWO HS how the group could go about testing this change in a full MSE sense to be sure it has no obvious unintended effects.

Implementation error model in original MSE work

At the core of the Operating Models used in the MSE work was an implementation error model that specified a random level of the catch-to-TAC ratio based on the 2013 to 2019 reported information. The model assumed the ratio to be less than or equal to 1 (never above it) and with a mean (and associated standard error) of TAC undercatch percentage of 83% (3%).

Current estimates of undercatch

Clearly, the most recent estimates of this catch-to-TAC are not just below this average level, but well below even the lowest estimates in the range of values explored in the MSE. Therefore, Exceptional Circumstances (EC) has been called on this particular issue. Industry has outlined the reasons for the current level of undercatch, and likely changes in future conditions that might see a return to the kinds of export infrastructure and market access etc. That would hopefully alleviate those conditions. We could explore these most recent levels of undercatch in a retuned HS, but the concern was understandably placed on the implications of these levels of undercatch in the short-term and how they might interact with the current SWO HS.

Recent SWO HS dynamics

In the last two years the SWO HS has recommended to cut the quota from 1,250t to 1,163 in 2020 (7% reduction), and by a further 116t in 2021 (a maximum 10% reduction) to the current level of 1,047t. This was because of a sustained decline in the sub-adult abundance (and later the adult) index over a number of years, that is consistent with a period of low recruitment signalled in the recruitment index. Clearly, the actual catch taken in this period is actually well below all of the TAC levels – even less catch has been taken than what the HS would have recommended across all the testing scenarios.

Short-term vs. long-term behaviour

In the short term, the prevailing economic conditions are reducing the catch taken well below what the HS is recommending but the actual nominal TAC level has decreased as the HS acts on the clear signals it detects in the abundance index. If this low recruitment period reverts to average or better conditions – recent anecdotal information suggests that may be happening – then the HS could cut the TAC to a lower level than the cumulative catch actually taken. If both the recruitment and economic conditions improve and that is born out in the abundance indices we could end up with a situation where the TAC is at a notably lower level than several years ago, but the actual catch taken was *lower* than would have been the case if the HS was being followed as is and the previous undercatch dynamics were in place. That would end up with the potential for industry disadvantage after a very difficult period. Longer term we cannot

have a harvest strategy that doesn't act on clear signals, but if we do eventually see better conditions for both the stock and industry a short-term modification can be explored. If economic conditions improve but the stock signal doesn't, we don't want a HS that can't act to reduce the TAC as required. Any modification should have these features embedded within it.

TTRAG agreed to the suggested modification to the existing SWO HS

To try and account for offsetting a decrease in the TAC – based upon a clear signal in the data – with significant undercatch effectively doing the same job a modification to the current HS was proposed in the TTRAG meeting. The idea was outlined as follows:

- Calculate the recommended TAC from the HS as usual
- The average catch taken in the original MSE would be 83% of that TAC
- Calculate the recent average *actual* undercatch – say x%
- This gives us the effective additional undercatch $y\% = 83\% - x\%$
- If the HS proposes a TAC *decrease* of say z%:
 - If $y - z$ is greater than zero **do not** change the TAC
 - If $y - z$ is less than zero then the actual change is then $(y - z)\%$

The intended features are: (I) if the effective catch being taken is already lower than the proposed TAC decrease, then maintain the TAC at the current level; and (II) if that is not the case then decrease the TAC by an amount that is consistent with both the amount of TAC decrease required and the current lower level of catch to TAC ratio relative to the original MSE testing.

Testing the efficacy and dynamics of the suggested modified SWO HS

The background context of the SWO HS dynamics is in relation to what it does in a period of sustained lower recruitment. The proposed change tries to build into that what happens if this coincides with very poor economic conditions and historically low and untested levels of TAC undercatch. The assumptions agreed in the RAG were to look at this problem in a restricted time frame and assume that both phenomena move through the fishery and then revert to previous average conditions thereafter. In the MSE work a sequence of 5 poor years of recruitment takes around 6-7 years to really move through the sub-adult abundance index. CSIRO proposed that we use the recruitment failure robustness test as the key scenario, with which to explore the utility and behaviour of the proposed modification to the SWO HS. Specifically, we will run the modified HS and, at the end of the recruitment failure period (i.e. when it's effect has gone) we assume the original HS and economic conditions are restored **but** we focus on the summary statistics over that recruitment failure period **not** the whole time period as before. We are not looking to totally overhaul the SWO HS; we are trying to modify it given unprecedented recent economic conditions, while retaining its longer-term ability to change TACs based on clear signals in the abundance index.

Appendix 4. Table 2. Weight cut-offs (kilograms) used to apportion the catches in the ETBF to various age-based categories.

Table 2. Weight cut-offs (kilograms) used to apportion the catches in the ETBF to various age-based categories.

Species	Size-Category Cut-Off	Quarter			
		1	2	3	4
Yellowfin	Recruits - Adult	22.66	29.95	32.85	35.96
Bigeye	Recruits - Adult	14.63	17.99	19.45	21.51
Broadbill	Recruits - Sub Adult	20.47	22.62	27.53	30.36
	Sub Adult - Adult	47.96	49.57	57.09	59.84