



Australian Government

Australian Fisheries Management Authority

Meeting of the Tropical Tuna Management Advisory Committee (TTMAC)

Draft RECORD

TTMAC 29

23 October 2023

TROPICAL TUNA MANAGEMENT ADVISORY COMMITTEE (TTMAC)

Chair: Catherine Sayer

Date: 23 October 2023

Meeting: 29

Venue: Online Teleconference

Attendance:

All members attended the meeting online. The Chair, Catherine Sayer attended the Majura Park AFMA Office.

Table 1: Member attendance

Members	Invited Participants	Observers
Catherine Sayer, Chair	Kate Martin, AFMA Tropical Tuna Fisheries Manager	Daniel Casement, Incoming Industry Invited participant Australian Southern Bluefin Tuna Industry Association (ASBTIA) ¹
Grahame Williams, Recreational member	Ian Bladin, Recreational Invited Participant	Patrick Sachs, Department of Agriculture, Fisheries and Forestry
Dr Ashley Williams, Science Member	Chad Lunow, State Government - invited participant Fisheries Queensland	Robert Wood, Fisheries Management Officer, AFMA
Pavo Walker, Industry Member	Brian Jeffriess AM, Outgoing Industry Invited participant Australian Southern Bluefin Tuna Industry Association (ASBTIA) ²	
Gary Heilmann, Industry Member		
David Ellis, Industry Member		
Terry Romaro OAM, Industry Member		
Sara Murphy, Executive Officer, AFMA		

Apologies:

Selina Stoute, AFMA member

Agenda item 1 - Preliminaries

1.1 Welcome and Apologies

The twenty ninth meeting of the Tropical Tuna Management Advisory Committee (TTMAC 29) was opened at 9:00am on 23 October 2023 by the Chair, Catherine Sayer. The Chair welcomed members and observers to the meeting and:

- a) made an acknowledgement of country;
- b) noted the only apology for the meeting from Selina Stoute, Senior Manager Tuna and International, who was not able to attend; and

¹ Did not attend meeting

² Present at meeting 9:20 to 9:40

- c) advised members the meeting would be recorded to assist with the preparation of the meeting record. The recording will be deleted once the record is finalised.

1.2 Declarations of interest

The standing declaration of interests was reviewed by MAC members and MAC members provided updates as necessary following the TTRAG meeting (meeting 38) and the previous TTMAC meeting (meeting 28). The updated declarations of interest are at **Attachment 1.2**.

The MAC agreed that industry members with fishing concession holdings and the industry invited participants held potential conflicts of interest with *Agenda Item 3.1 TACC Advice for ETBF indicator species and 3.2. TACC Advice WTBF indicator species*.

These members were asked to leave the room while the MAC considered the nature of the conflict and appropriate action to be taken when the agenda item is discussed. The MAC members agreed on an inclusive approach to manage the perceived conflicts to make use of the expertise of members. The MAC agreed that all members and participants could be present for discussion, but not for the recommendations on the abovementioned items.

1.3 Adoption of agenda

The MAC adopted the agenda with no amendments, this is provided at **Attachment 1.3**.

1.4 Actions arising from previous meetings

The MAC noted the status of actions items. The status of actions arising together with MAC advice on the ongoing relevance of certain items, can be found at **Attachment 1.4**.

1.5 Out of session correspondence

The MAC noted the out of session correspondence between TTMAC 28 and TTMAC 29 as detailed in the table below.

Table 2: Intersessional Correspondence

Date	Description
21 October 2022	Notification of the extension of Exemption Period Under the Import Provisions of the Marine Mammal Protection Act.
26 October 2022	The draft meeting minutes of TTMAC 28 provided to TTMAC p28 participants for comment.
01 November 2022	Invitation to complete WTBF and ETBF National Compliance Risk Assessment 2023-25.
10 November 2022	Notification to members of the re-accreditation of the WTBF WTO for 3 years.
18 November 2022	Notification of agreement/determination by the AFMA Commission to the following documents: <ul style="list-style-type: none"> • ETBF (Fishing Season and Total Allowable Commercial Catch) Determination 2023 • ETBF (Overcatch and Undercatch) Determination 2023 • WTBF Total Allowable Commercial Catch Determination 2023 • ETBF Swordfish Harvest Strategy modification • The AFMA Commission agreed to the proposed modification to the Swordfish Harvest Strategy.
24 November 2022	A request from ARC seeking feedback on the draft research proposal - Scientific advice for management of Tropical Tuna and Billfish Fisheries by COB 10 January 2023.
29 November 2022	Information for members - Threatened and Migratory Species Fisheries Bycatch Mitigation Program was officially <u>launched</u> last Friday by Minister Pliibersek. This program is administered through the Department of Climate Change, Energy, the Environment and Water.
11 January 2023	Out of session consultation regarding updates to licence conditions to reflect IOTC bycatch measures.
22 May 2023	Two items distributed to the MAC: <ol style="list-style-type: none"> 1. Letter to Dr Ashley Williams - regarding ARC's guidance on research proposal - Scientific advice for management of Tropical Tuna and Billfish Fisheries. 2. Final report - EM-Logbook Congruence Report - An evaluation of the reliability of electronic monitoring and logbook data for informing fisheries science and management.
25 May 2023	Information for members – AFMA Commission determined the WTBF Overcatch and Undercatch Determination for the 2023 fishing season. The determination listed on Federal Register of Legislative Instruments.
09 June 2023	Update to MAC members advising AFMA Management is currently undertaking a review of Fishery Management Paper Number 14 – AFMA's Approach to Ecological Risk Management and its supporting Guide to AFMA's Ecological Risk Management Framework. Feedback or comments on the drafts, to be provided to Nigel Abery, Manager Policy at policycomment@afma.gov.au by COB 31 July 2023 (Attachment 1.5a).
20 July 2023	Out of session consultation regarding the AFMA's intention to remake the Multiple Fishery (Closures) Direction No. 1 2014, due to sunset in April 2024.

27 July 2023	TTMAC consultation regarding date setting for TTMAC 29 – October 2023
10 August 2023	Out of session consultation documents: ETBF and WTBF Draft Annual Research Statement 2024, ETBF and WTBF Five Year Research plan 2023-2028 and Research Scope ETBF (Close kin mark recapture swordfish stock structure) for TTMAC review following clearance by TTMAC. Notification that the documents would be discussed at ARC-MAC Chairs meeting on Thursday 17 August.
16 August 2023	Email confirmation to participants of TTMAC 29 meeting date of 23 October 2023 online meeting and invite.
08 September 2023	AFMA Research Committee call for research proposals for potential AFMA funding in 2024-25. AFMA is seeking submission of full proposals by Wednesday, 25 October 2023 to research.secretary@afma.gov.au
5 October 2023	Email to members with draft TTMAC 29 agenda for comment.

Agenda item 2.1 Industry, recreational fishing and scientific member update

The MAC noted the written updates, from the following TTMAC members and invited participants: Grahame Williams, Recreational Member, David Ellis, Industry member, Tuna Australia (TA) and Brian Jeffries, Invited Participant, ASBTIA. The written updates are at **Attachment 2.1a**, **Attachment 2.1b** and **Attachment 2.1c**.

TTMAC noted the following update from the recreational fishing members:

- Recreational fishers raised concerns on the proposal to locate an Offshore Wind Farm in Commonwealth waters off NSW in the Hunter and Illawarra regions and noted that this is a threat to recreational fishing, particularly in these two areas Southern part of the continent.
- The TA Industry Member informed the MAC that TA has developed industry position statement and services agreement with particular energy companies. TA is undertaking consultation with Industry to present a collective view of the impacts on fishing in NSW Hunter and Illawarra region. The industry member further noted the importance of Industry representation and contribution to initiatives such as *Blue Economy Cooperative Research Centre* which is a ten-year, multi-country industry focused research and training initiative which will focus on increasing offshore sustainable aquaculture and renewable energy production.
- An associated project *Futures of Seafood Project* is an FRDC supported Commonwealth collaboration of government, industry and research partners launched to support industry growth, improve sustainability and identify emerging issues impacting the fisheries and aquaculture sectors. An aim of this project is to profile and map the Australian seafood footprint, provide evidence-based insights and chart a course for Australia's futures of seafood alongside other ocean uses for the coming 10-15 years.

Agenda item 2.2 AFMA Management Update and international meeting

The MAC noted the AFMA Management's update as detailed in the agenda paper outlining outcomes from the 86th AFMA Commission meeting November 2022, Western and Central Pacific Commission meeting (WCPFC 19) December 2022, Indian Ocean Tuna Commission meeting (IOTC27) May 2023 and an update on the AFMA's review of Fishery Management Paper Number 14 (FMP 14) – AFMA's Approach to Ecological Risk, MAC and RAG review update, Management and its supporting Guide to AFMA's Ecological Risk Management Framework, AFMA 2023-2025 National Compliance and Enforcement Program (NCEP), Implications of updated CITES Appendix II listings on export fisheries; and Catchwatch Report for ETBF and WTBF year to date

- The AFMA invited participant highlighted the most updated stock status assessments in the Regional

Fisheries Management Organisations (RFMO) 3 meetings through the year.

- An Industry member requested an update on the yellowfin tuna interim measure in the IOTC. The Industry member explained the effect of the application of the interim measure, where previously the yellowfin tuna TACC was set at 5000 t but was reduced from the 2022 fishing season to 2000 t under the measure. In their view, this meant the kilogram value of quota SFRs was reduced and in industry's experience was measured by banks as a decrease in the value of their assets. Additionally, the industry member noted due to the remote location of the fishery, to gain the most value from fishing, freezer boats are required to ensure product remains high quality and this requires large upfront investment. He explained that industry in the WTBF believe this is also a responsible way to fish. However, the cost associated with freezer boats has hindered the fishery in recent years.
- The Department engaged recently at 12th meeting of the IOTC Technical Committee on Allocation Criteria meeting from 16-19 October 2023 to further progress negotiations on an allocation framework for tropical tunas in the Indian Ocean. **Agenda item 3.1 ETBF TACC recommendations for the 2024 fishing season**

The AFMA invited participant provided a summary of the ETBF TTAG TACC recommendations for the 2024 fishing season. The RAG met on the 3rd of October (TTRAG 39) and recommended current determinations across all quota species for the ETBF are for a 10 percent overcatch, 10 percent undercatch and a determined weight of 2 tonnes per species. The TACCs for all five quota species remain unchanged for the 2024 fishing season.

The MAC noted the TACC recommendations were based on the application of:

- a) matters prescribed in the *Eastern Tuna and Billfish Fishery Management Plan 2010* which AFMA must consider prior determining the TACC (section 3.2) of the Plan; and
- b) Australia's obligations to the Western and Central Pacific Fisheries Commission (WCPFC).
- c) an indicators approach and whole of government position, for bigeye tuna, yellowfin tuna and albacore tuna;
- d) the application of the modified Harvest Strategy to determine a Recommended Biological Commercial Catch (RBCC) for Broadbill Swordfish;
- e) the annual indicators to evaluate the constant catch HS for striped Marlin, assessed through previous Management Strategy Evaluation (MSE) work recommended by the RAG in 2021, TTRAG found that a review of the constant catch striped marlin HS MSE had not been triggered;
- f) the ETBF Ecosystem and Climate Status report, a compilation of readily available accessible indicators and forecasts;
- g) The most recent WCPFC 2023 stock assessments for bigeye and yellowfin³, both species remain unchanged and were assessed as not overfished and not subject to overfishing
- h) There has been no change to the stock assessments for albacore tuna and south west pacific broadbill swordfish, which are not overfished nor subject to overfishing. For south west pacific striped marlin, the stock is close to being overfished and close to undergoing overfishing⁴.

TTRAG recommended the following TACCs:

Table 3: ETBF recommended TACCs for 2024 fishing season

³IOTC 27 meeting - 8-12 May 2023 meeting and WCPFC Scientific Committee Meeting 19 - 16-24 August, 2023,

⁴ Latest stock assessments were completed in 2021 for Swordfish and Albacore and 2019 for Striped Marlin.

Quota species	Recommended Total Allowable Commercial Catch (t)
Albacore tuna	2,500
Bigeye tuna	1,056
Yellowfin tuna	2,400
Broadbill Swordfish	1,047
Striped marlin	351

- Having assessed the range of agreed indicators, TTRAG did not find evidence to recommend alternative TACCs for bigeye, yellowfin and albacore tuna. The RAG advice was derived from implementation of the ETBF modified broadbill swordfish Harvest Strategy (endorsed by TTMAC in 2022). The ETBF harvest strategy for Swordfish, modified in 2022, was used to recommend the RBCC setting of the 2024 TACC and no exceptional circumstances identified. Similarly, TTRAG found that a review of the constant catch striped marlin HS MSE had not been triggered and concluded that conditions for triggering a review of the HS were unlikely to arise. The TTRAG’s indicator assessment is provided in **Attachment 3.1**.
- An Industry member did question the need to review and set TACC and associated determinations yearly given the ETBF catch proportions of tropical tuna species is less than 30 per cent of region 5. Additionally, in their view this may need to be considered when reviewing climate change projections at a regional level to stocks across their range in WCPFC.
- The Tropical Tuna Fisheries Manager explained that TTRAG has provided advice the project team on priority analysis to review TACC indicators approach within project ‘*Scientific advice for management of Tropical Tuna and Billfish Fisheries*’.

Summary

- **TTMAC supported the TTRAG recommendations for TACCs, overcatch/undercatch and determined weights for the ETBF 2024 fishing season.**

Agenda item 3.2 WTBF TACC recommendations for the 2024 fishing season

The AFMA invited participant provided a summary of the WTBF TTAG TACC recommendations for the 2024/2025 fishing season⁵. The RAG met on the 3rd of October (TTRAG 39) and recommended and current determinations across all quota species for the WTBF are for a 10 percent overcatch, 10 percent undercatch and a determined weight of 2 tonnes per species. The TACCs for all four quota species remain unchanged for the 2024/2025 fishing season.

- The MAC noted that in the absence of a local harvest strategy, the provision of annual information relevant to the consideration of TACC levels. The TACC recommendations were based on the application of:
 - a) an indicators-based and ‘whole of government position’ approach for bigeye tuna, yellowfin tuna, swordfish and striped marlin. This approach has been implemented since 2018. Previously, the WTBF used the harvest strategy framework developed for the ETBF. However, in 2018, the AFMA Commission decided to stop using this harvest strategy, due, in part, to its unnecessary complexity and the low levels of effort in the fishery;
 - b) The most recent stock assessment for bigeye tuna⁶, which was classified by IOTC as overfished and subject to overfishing;
 - c) There has been no change to the stock assessments for striped marlin and yellowfin tuna are classified by the IOTC as overfished and subject to overfishing. For swordfish, the stock is classified by IOTC as not

⁵ WTBF fishing season commences 1 February 2024.

⁶ 26th IOTC Scientific committee meeting (4 December 2022)

- overfished nor subject to overfishing and;
- d) Australia’s obligations to the Indian Ocean Tuna Commission (IOTC).

Having assessed the range of agreed indicators, TTRAG did not find evidence to recommend alternative TACCs for bigeye tuna, yellowfin tuna, broadbill swordfish and striped marlin. TTRAG’s indicator assessment is provided in **Attachment 3.2**.

TTRAG’s recommendations for TACCs remain the same those as set for the 2024/25 fishing season.

Table 4: WTBF recommended TACCs for 2024/25 fishing season

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

An Industry member reiterated in his views the impact that the reduction of the Yellowfin tuna TACC from 5000 t to 2000 t is having on WTBF operators, noting:

- Catch levels are low due the vast and remote nature of the fishery;
- Freezer boats are required in this fishery, rather than ice boats which cannot hold the fish stable for the long trips required in WTBF by the distances between grounds and processors;
- Industry’s desire is to target large, sashimi grade fish not bulk small fish for canning
- Other nations fishing in the west of the IOTC area are taking large volumes of fish and potentially not adhering to the yellowfin resolution; and
- Banks are unable to differentiate between SFR holdings and TACCs set in kilos for the fishing season; and
- Noted a scientific paper detailing catches from the period during which the Japanese were fishing in our zone as this represents the period of high catch history for the fishery⁷.
- The observer for the Department of Agriculture, Forestry and Fisheries acknowledged the concerns of the Industry member and provided an update on the discussions relating to IOTC’s allocation frameworks and the ongoing work the Department is pursuing within the RFMO.

Summary

- **TTMAC supported the TTRAG recommendations for TACCs, overcatch/undercatch and determined weights for the WTBF 2024/25 fishing season.**
- The Industry member requested that the AFMA Commission consider the impacts on Industry of the application of the IOTC resolution 21/01 for yellowfin tuna in conjunction with any future allocation discussions relating to WTBF concession holders.

Agenda Item 4. Coral Sea Zone Hook Trial Update

The AFMA invited participant provided an update on the Coral Sea hook trial.

The MAC noted the following:

- That the coral sea hook trial working group and TTRAG 37 supported AFMA’s proposal to continue the trial throughout 2023 and 2024 and noting the trial has safeguards in place to mitigate potential threats to marlin and TEP species.

⁷ Summary of catch and effort information for Australian longline fishing operations in the Western Tuna and Billfish Fishery—1998 to 2021, Laura Tremblay-Boyer, Scott Cooper and Ashley Williams, 6 July 2022

- During 2023, a scientific subgroup of the Coral Sea Zone Hook Trial Working group met twice to discuss an appropriate sampling design to determine the impacts of increasing the CSZ hook limit on interactions with marlin species and TEPS (in particular turtles) and recommended that a project be established to ensure that the trial collects the data critical to form a decision at its conclusion.
- At its July meeting (meeting 38) the RAG supported a small tactical project be funded as part of the annual research priorities (noting this will be through the levy base) to analyse the trial data and determine what, if any, further sampling is necessary to detect any impacts during the middle of 2024. The analysis will also assist the RAG to determine the sampling size (via power analysis) to detect the level of confidence and detect the level of change in mortality on blue and black marlin and TEPS in the CSZ. Industry and scientific members supported the continuation of the trial to collect further data into 2024 and in the meantime AFMA will continue monitoring catches and triggers already designed by TTRAG.
- The scientific advice is to be developed intersessionally, AFMA will seek RAG advice on next steps for the CSZ Hook Trial and has proposed an approach for consideration by July 2024.
- The Recreational member and Recreational invited participant requested CSZ Hook trial results to date for a Game Fishing Association of Australia GFA meeting on 28/29 October.
- The AFMA invited participant will aim to provide the requested data within the timeframe, however noted that the data set are preliminary and is not appropriate for comparison with other fishing years as the trial runs for the whole of 2023.
- The complete dataset for 2023 will be presented to the February 2024 meeting of the Coral Sea Trial Working Group.

ACTION ITEM: AFMA will seek to provide 2023 month by month Coral Sea Zone Hook Trial data to the Recreational Sector in time for a meeting on 28/29 October 2023, noting that this data will be incomplete as the season is not yet concluded and therefore should not be compared to previous years data.

Agenda item 5. Priorities and meeting schedule

The AFMA invited participant introduced this new agenda item to the MAC explaining that it has been introduced to TTRAG as well, in an effort to signal to both the scientific and management group what work is ahead for them for the next 6 to 12 months. Refer to TTMAC priorities at Table 5

Table 5: TTMAC priorities

Priority	Description	MAC advice sought by AFMA
Provide advice on TACCs	This is a key standing priority for the MAC. The Commission has agreed a process for monitoring and providing advice on TACC in the ETBF and WTBF comprising a mix of an indicator and harvest strategy approach.	The MAC should note that AFMA is seeking for this to be a standing priority in September/October MAC meetings.
Consider results of the Swordfish Harvest Strategy Review 2024/25	The Swordfish Harvest priority work will commence in 2024 as part of the project <i>“Scientific advice for management of Tropical Tuna and Billfish Fisheries”</i> The ETBF Management Strategy commits AFMA to reviewing the harvest strategy 3 years after implementation to assess if the harvest strategy is functioning in a manner consistent the results of the MSE and CHSP	TTMAC to consider RAG project team recommendations on the nature and extent of the harvest strategy review and provide peer review and feedback, as requested by TTRAG.

	<p>requirements and at the same time providing settings that meet AFMA’s objectives and industries preferences of stability/reactivity. CSIRO work undertaken to support the RAG recommendations. As the Harvest Strategy Review progresses, TTMAC will be updated and requested to provide advice in relation to review aspects.</p>	
<p>Note that a RAG review of the process for recommending TACCs for Tuna species is flagged for 2023/24</p>	<p>CSIRO is conducting a review of the current approach to recommendation of TACCs as part of the project “<i>Scientific advice for management of Tropical Tuna and Billfish Fisheries</i>” undertaken to support the RAG. The RAG agreed to a priority approach to the review. TTMAC will be requested to provide advice on the findings of the review.</p>	<p>TTMAC will note and respond to RAG requests for advice as requested.</p>
<p>Review impact of international fisheries on the fish resources</p>	<p>This has been a standing priority for the RAG and MAC and will be undertaken as part of CSIRO support of TTRAG functions.</p>	<p>This priority relates to the ongoing ‘evaluation’ of impacts of international fisheries on the fish resources as opposed to a unique review.</p>
<p>Coral Sea hook trial</p>	<p>MAC to provide advice and oversight, where appropriate, to the Coral Sea Zone Hook Trial. TTMAC will be requested to provide advice following the RAG recommendations proceeding the small tactical project.</p>	<p>TTMAC will note and respond to RAG requests for advice as requested.</p>
<p>Ecological Risk Assessment and response</p>	<p>The Wildlife Trade Operation approval is subject to conditions that by 2024 (July; ETBF) and (November; WTBF) AFMA must publish an updated Ecological Risk Assessment. The data used to inform the updated Ecological Risk Assessment includes fishing operations data collected since the implementation of electronic monitoring in the fishery. Updating the ETBF and WTBF ERAs are included in the priority fishery’s for completion by CSIRO 2023/24.</p>	<p>TTMAC should note that TTRAG supported as a priority. Preliminary results of ERA will be presented to TTRAG in March 2024.</p>
<p>Performance review of seabird management arrangements – 2024</p>	<p>The Seabird TAP is currently under review. AFMA will need to assess its management arrangements against any changes to the Seabird TAP that might be agreed following the review. In preparation and consistent with good practice, AFMA will seek advice from both the RAG and MAC</p>	<p>TTMAC to note that TTRAG supported in principle as a priority</p> <p>Further advice is expected from AFMA on the need for specific MAC advice. This will be informed by work planned by AFMA to review the performance of seabird</p>

	on the performance of current seabird management arrangements.	management arrangements in the fishery.
Climate Change Adaptation program	Following endorsement from the AFMA Commission, climate change information is now incorporated into fisheries management advice and decisions in AFMA's Commonwealth fisheries. The 2023 Indicators papers include information on climate change for TTMAC's consideration in making TACC recommendations.	As part of AFMA's consultative process, TTMAC will need to consider climate change information provided.

Agenda Item 6. Other Business

- Seabird TAP - Threat Abatement Plan for the Incidental catch (or bycatch) of seabirds during oceanic longline fishing operations (2018) which is currently under review by Australian Antarctic Division (AAD) and the Department of Climate Change, Energy, the Environment and Water. The review of the TAP will be provided to the Minister for consideration.
- An Industry invited participant noted how well the ETBF Industry has managed seabird bycatch under the TAP, innovating mitigation measures to reach the point where seabird interactions are reduced to less than one per cent. Attention should be given now to vessels of other nations which continue to fish without mitigation measures in place and reportedly with high levels of interactions.
- An Industry member raised the number of longline vessels now spending significant time targeting SBT in the ETBF, which has increased to 10 boats this year and asked AFMA to consider the application of the CRIS to ensure cost recovery is apportioned justly between the SBT and ETBF.
- The Chair acknowledged Brian Jeffriess' final TTMAC meeting, noting his massive contribution, sound counsel and wisdom as an invited participant to the MAC. The Chair noted that the Tropical Tuna Manager Kate Martin will be undertaking personal leave next year and EO Sara Murphy who will be undertaking a new interim role within AFMA and thanked her for her efforts.
- Finally, the Chair acknowledged the difficulty in identifying an agreed meeting time and date and especially thanked those attending the meeting online from WA who agreed and had a very early start.
- The meeting closed at 10:30am

Attachment 1.2

Name	Role	Declared interests
Ms Catherine Sayer	Chair	Chair TTMAC. No pecuniary interests in tropical tuna fisheries. CEO Family Business Association, Deputy Chair of Seafood Industry Australia (SIA) Board, Board member of Camp Quality
Mr Pavo Walker	Industry member	Owner of several ETBF boat SFRs and holds a Coral Sea permit and minor line permit.
Mr Terry Romaro, OAM	Industry Member	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 SFR holder. Director of a company who owns a fish processing facility in Port Lincoln, & a Director of Tuna Australia.
Dr Ashley Williams	Scientific member	Employee of CSIRO, no pecuniary interest in Australian tropical tuna fisheries. Is the PI for the project on <i>Data Management, Assessment and implementation of Harvest Strategy for Australia's Tropical Tuna and Billfish Fisheries</i> .
Mr Grahame A Williams OAM	Recreational/c harter fishing member	Past President of the Game Fishing Association of Australia, Treasurer and Records Officer of the NSW Game Fishing Association and Game Fishing Association Australia Executive Officer. No pecuniary interests in tropical tuna fisheries. Member of the NSW Recreational Fishing Trust. NSW Minister for Fisheries Special Advisory Council – RF NSW.
Conservation member	Vacant	Yet to be filled, no applications received. AFMA is convening a new application process, to be commenced soon.
Mr Gary Heilmann	Industry member	Industry member, director of a processing company, no longer holds ETBF boat or quota SFRs.
Mr David Ellis	Industry member	Is currently the CEO of the industry association, Tuna Australia which includes a salary paid by industry. Is the PI on the following projects: <ul style="list-style-type: none"> - FRDC Project 2020-041. Improving the effectiveness, efficiency and safety of mitigation tools for protected species interactions in the Eastern Tuna and Billfish Fishery - FRDC Project 2021-078. Improving the management of wildlife interactions in pelagic longline fisheries - FRDC Project 2021-063. Future Proofing: Integrating community quota, product supply, product innovation and market diversification in Australia's Tropical Tuna Industry.
Ms Sara Murphy	Executive Officer	Employee of AFMA, which includes a salary. Is a member of the Tuna and International section and EO to TTMAC. No pecuniary interest in tropical tuna fisheries.

Invited participants		
Mr Brian Jeffriess AM	Industry invited participant	Outgoing Chief Executive Officer of Australian Southern Bluefin Tuna Industry Association.
Mr Ian Bladin	Recreational/chart er fishing invited participant	President of the Game Fishing Association of Australia, Director Australian Recreational Fishing Foundation, former Queensland charter boat owner. Member FRDC Commonwealth Research Advisory Committee (COMMRAC)
Mr Chad Lunow	State Government Invited Participant	Employee of Queensland Government, Fisheries Manager, Management and Reform
Ms Kate Martin	AFMA Manager	Employee of AFMA, which includes a salary. Is the Manager of the tropical tuna fisheries. No pecuniary interest in tropical tuna fisheries.
Observers		
Pat Sachs	Dept of Agriculture, Forestry and Fisheries	Employee of Department of Agriculture, Forestry and Fisheries, which includes a salary. No pecuniary interest in tropical tuna fisheries.
Mr Daniel Casement	Industry invited participant	Incoming Chief Executive Officer of Australian Southern Bluefin Tuna Industry Association.
Mr Robert Wood	AFMA Employee	Employee of AFMA, which includes a salary. Is in the tropical tuna fisheries management Team. No pecuniary interest in tropical tuna fisheries.

Attachment 1.3

Tropical Tuna Fisheries Management Advisory Committee

Meeting 29
2023

23 October

Venue – Online meeting

23 October 2023

08:45am to 12:00pm (EST)

1. Preliminaries

- 1.1. Welcome (including acknowledgement of Country) and apologies
- 1.2. Adoption of agenda
- 1.3. Declarations of interest
- 1.4. Actions arising from previous meetings
- 1.5. Intersessional correspondence between TTMAC 28 and TTMAC 29

2. Updates (*by exception only*)

A template has been provided for TTMAC members and invited participants wishing to submit a written general update for inclusion in record of meeting or to highlight issues requiring further discussion. These will be taken as read during the meeting unless otherwise noted. A written AFMA and International meeting update is included in the meeting papers.

- 2.1. Industry and scientific members update
 - 2.1a Items requiring discussion from written reports and any other items for discussion
- 2.2. AFMA and international meeting update

3. TACC Advice for ETBF and WTBF indicator species

TTMAC will be invited to review and consider TTRAG's TACC recommendations for the key quota species within the ETBF and WTBF for the 2024 season.

- 3.1. ETBF TACCs for 2024 and over/under catch
- 3.2. WTBF TACCs for 2024/25 and over/under catch

4. Coral Sea Zone Hook Trial Update

An update will be provided in the meeting papers

5. TTMAC Priorities and Meeting Schedule

An update will be provided in the meeting papers

6. Other Business

Members will be invited to raise any other business agreed by the Chair. Note there is no meeting paper for this item

7. Date and venue for next meeting

The MAC will be invited to agree on date and venue for the next meeting. Note there is no meeting paper for this item. The MAC will be invited to agree on date and venue for the next meeting. Note there is no meeting paper.

Attachment 1.4A

Item	Meeting raised	Action	Responsibility	Status
1	TTMAC 25 – action arising	<p>(a)TTMAC members to provide AFMA with feedback on what information would be useful to include in the FMS annual report</p> <p>(b)An agenda item for discussion on the FMS annual report to be added to the next TTMAC meeting in October 2022.</p>	AFMA	<p>Completed</p> <p>The FMS reporting is part of reporting requirements under the Fisheries Management Strategy.</p> <p>AFMA has undertaken a review of Fishery Management Paper Number 14 – AFMA’s Approach to Ecological Risk Management and its supporting Guide to AFMA’s Ecological Risk Management Framework. The policy and guide have been updated through AFMA’s Ecological Risk Management Steering Group (ERMSG) to address criticism of performance, improve efficiency and be up to date with latest approaches in the implementation of risk management.</p> <p>The Commission approved release of a draft version of the policy and guidelines for consultation at its September 2022 meeting. A further update is provided under <i>Agenda item 2.2 AFMA management and international meeting update</i>.</p>
2	TTMAC 27	AFMA will review EM discussion documents for reference to the amortisation of capital costs EM equipment.	AFMA	<p>NOT YET ACTIONED:</p> <p>AFMA has not been able to review EM discussion documents associated with costings, due to competing timeframes for agenda items. AFMA is aiming to present an update on the Data Transformation Program and latest EM program of works in the new year.</p>
3	TTMAC 28 – action arising	AFMA to provide TTMAC an update on the proposed CITES Appendix 2 listing of Blue sharks out of	AFMA	<p>Completed.</p> <p>Update on CITES listings provided under <i>Agenda item 2.2 AFMA management and international meeting update</i>.</p>

Item	Meeting raised	Action	Responsibility	Status
		session.		
4	TTMAC 28 – action arising	AFMA to check the catch weights submitted for WCPFC to ensure weights are accurate.	AFMA	<p>IN PROGRESS</p> <p>CSIRO, AFMA and ABARES has been working with WCPFC Scientific Pacific community (SPC) on the history of reported catch data and mismatches and changes over time. AFMA is aiming to present an update on the outcomes in the new year.</p>
5	TTMAC 28 – action arising	AFMA to convene a working group to discuss management possibilities of utilising pulse events within the fishery.	AFMA	<p>IN PROGRESS</p> <p>At its July meeting (meeting 38) The RAG agreed to consider greater flexibility and the potential change in the TACC approaches for YFT. AFMA and the project team will explore options to recognise a YFT pulse event and possible Harvest Control Rule (HCR) that could apply in response as part of the project '<i>Scientific advice for management of Tropical Tuna and Billfish Fisheries</i>'.</p>
6	TTMAC 29 – action arising	AFMA will seek to provide 2023 month by month Coral Sea Zone Hook Trial data to the Recreational Sector in time for a meeting on 28/29 October 2023, noting that this data will be incomplete as the season is not yet concluded and therefore	AFMA	<p>IN PROGRESS – 27/10/23</p> <p>AFMA sent email (27/10/23) to Recreational member and invited participant providing an update of the trial to date and links to Coral Sea zone hook Meeting group meeting summaries and 2023 discussion document, noting 2023 data incomplete until season end however will be reviewed in February 2024 by Working group.</p>

Item	Meeting raised	Action	Responsibility	Status
		should not be compared to previous years data.		



Tropical Tuna Fisheries Management Advisory Committee

Meeting 29

23 October 2023

Agenda item 2 Background Information

Agenda Item 2.1a Written update from members

Template for TTMAC members and invited participants wishing to submit a written general update prior to the meeting for inclusion in record of meeting.

Provided by: Grahame A Williams, OAM
Position on TTMAC: Recreational/Charter Fishing Member
General Update: Fishing area from QLD border to VICTORIAN border in Commonwealth Waters 2023.

Fishing this past year has been very good and all clubs running Sanctioned Tournaments had a good turnout of boats and anglers. The number of anglers registered & affiliated with NSWGFA clubs this year is 3128, which is made up of 2454 adult males, 304 adult females, 193 Jnr males, 31 Jnr females, 132 Small Fry males and 14 Small Fry females. Note: Small Fry anglers are under 11 years old, juniors are 11 to 16 years old.

For the information of all the total membership of GFAA at end of 2022 financial year was 7560 affiliated members with 81 clubs.

NSWGFA ran the Interclub State Championships this year on the last week-end in February out of Port Stephens with 94 Boats and 486 anglers. A good successful tournament with plenty of fish.

Number of fish T&R in the tournament was 269 of which 195 were Marlin, made up of 160 Black, 20 Blue and 15 Striped. Captured was a total of 7 of which 2 were Blue Marlin, 1 Yellowfin Tuna and 4 large Sharks.

Newcastle & Port Stephens GFC also ran their Shootout Tournament the previous week-end with 135 boats entered. Also plenty of fish with a total of 265 fish T&R and 10 captured and weighed. Of the 265 T&R were 260 Marlin, 2 Shortbill Spearfish and 3 large sharks.

The Southern waters from Shellharbour down to Eden also produced good numbers of fish between January and April. Again plenty of Marlin, however the mix of Marlin was predominantly Striped Marlin which is usual for these waters each year.

Yellowfin Tuna have been scarce again this year. A few turned up off Sydney in June and July, mainly around 45-65kg fish, some smaller as well. A few SBT also turned up off Sydney around the same time with a few good size fish captured, in fact 1 caught by a junior angler weighed at Sydney GFC in early July was 120kgs on 15kg line which was a Jnr NSW record, **a great capture for a 13 year old.**

Another interesting statistic for this year is that so far there have been 1806 Marlin T&R in the NSW waters mentioned in the area described above. Plus many more in the waters above the QLD border and in Northern WA waters.

Currently the greatest threat to game/charter and general recreational fishing in many areas of Commonwealth waters in Australia is the current government's plans for Offshore Wind Farms. In the NSW area waters the declared areas presently are the Hunter which is 1,800 km² of our ocean with wind towers 260m high with blades 107m long. This total area will have an exclusion of 500m so we will lose fishing in the total area and also no transiting through it to other fishing grounds. This declared area is right in the middle of the best game/charter and general recreational fishing in Australia, in fact it will

destroy the Port Stephens/Newcastle/Lake Macquarie fishing area, let alone destroy and kill many protected sea birds and affect whale migrations as well as other marine animals.

This particular declared area is right in the middle of where we hold the NSWGFA game fishing State Championships.

The other declared area is the Illawarra which is proposed to be 1461 km² of our ocean, again the area will have an exclusion zone of 500m therefor no fishing in the total area and no transiting. Again these wind turbines will kill many protected sea birds and affect many other marine animals.

I also believe the next area to be declared in the NSW border waters will be the Eden area which will also have a devastating effect on our Striped Marlin fishery in particular as the southern waters of NSW produce the best game/charter/recreational Striped Marlin fishery in Australian waters.

I would like to know the thoughts and concerns of the other TTMAC Members and Participants on the subject of Offshore Wind Farms.

Happy to answer any questions of my report.

Regards to all,

Grahame.



Tropical Tuna Fisheries Management Advisory Committee

Meeting 29

23 October 2023

Agenda item 2 Background Information

Agenda Item 2.1b Written update from members

Template for TTMAC members and invited participants wishing to submit a written general update prior to the meeting for inclusion in record of meeting.

Provided by: David Ellis

Position on TTMAC: Industry member

General Update

One of the biggest changes in the Eastern Tuna and Billfish Fishery (ETBF) is the targeting of southern bluefin tuna (SBT) at the expense of other ETBF fish species. This year, yellowfin tuna (YFT) maintains its position in terms of volume at the top of the species list at 32% of total landings, and SBT follows closely behind at 27%. Then there is a big gap in fish landings with swordfish 16%, Albacore 16%, Bigeye 5%, and Striped marlin 4%. This shift in fishing behaviour is due to the rebuilding of the SBT fishery and has implications for fishery management that will need to be considered closely by AFMA.

The YFT season started with a big pulse and fishers were hopeful the fishery was in for a bumper year. However, this did not occur. Markets have been difficult due to the large volume of fish (rats) below 23kg in the fishery. Small YFT generally attract a poor price in the US, with sizes >25kg, and then >40kg being the main classes sought. Fishers have moved away from the shelf break where these small fish have been in large numbers.

The SBT season has been significantly better this year mainly due to catching location with over 1000t landed to date. Most fish have been caught closer to port, with the majority caught inside 151° and between 36° and 37°S. Fish size generally improved as the season progressed with fish averaging 40-42kg in June and July, 45-50kg in August with improved quality, and around 45kg in September with a high degree of variation in fish size.

Global marketing of SBT has been challenging with the US East Coast supporting local landings of Atlantic bluefin and reduced SBT demand. The US West Coast was very similar to last year, and the Japanese market improved as the season progressed. Possibly due to less competition from NZ fish. There were some higher prices paid for SBT, but the benefit was outweighed by the weak Japanese yen. Domestic fish sales to restaurants slumped in June/July as cost-of-living pressures increased and patronage slowed due to weather. However, the domestic volume of YFT dropped through August and September which resulted in higher prices for SBT through the Sydney Fish Market.

The global demand for Albacore has collapsed which has caused fishers to change fishing tactics to avoid large catches. Processors have been unable to move regular volumes and have been caught with stockpiles of frozen fish in cold store. Canneries are prioritising Skipjack tuna based on market price.

Other fish species have been sold on overseas markets and domestically depending on a range of factors.

Business conditions

The longline fishing sector is under extreme pressure due to

1. Increased operational costs (fuel, labour, bait, insurance)
2. Competition for skilled employees and slow overseas worker recruitment process
3. Government regulatory and economic burden – Seabird TAP, AMSA, Home Affairs, DEECCW
4. Consultation fatigue ‘Have your say’, and engagement with renewable and non-renewable energy companies for environmental plans
5. Challenging research projects and no communication with the ETBF
 - a. CSIRO/UQ – *Bycatch rates in fisheries largely driven by variation in individual vessel behaviour*
 - b. UTAS – *Improving the management of ITQ fisheries*
6. Marine Spatial squeeze (FADs, Aquaculture, Energy sector activities, Rocket launches, Marine Parks)

The fishery

South Coast NSW

SBT fishing has tapered off. Fish are being caught south of Eden, averaging 20kg. The remaining boats are unlikely to continue targeting SBT and will now shift to YFT. Several boats working east of Ulladulla are now targeting tropical tunas, with three 70 piece landings in the last few days.

Interestingly, this has been a very big year for Northern Bluefin Tuna, and in conversation with Inshore Fisheries NZ, their fishery has landed approximately 60t this fishing year.

North coast NSW

Catches of YFT and Swordfish have been consistent with boats working wide of Nelson Bay and Coffs Harbour to avoid small YFT. Prime Swordfish in the 60-80kg class have been prevalent in catches with incidental bycatch of Albacore still occurring.

SE Queensland

Most Mooloolaba based boats have worked well offshore east of SE Queensland to target Swordfish. Offshore fishing has been prioritised to reduce catch of smaller YFT which have been in plague proportions on the shelf break. Fishing sets have been shallower to avoid albacore. After the October new moon Mooloolaba based boats will return to the Coral Sea to target swordfish.

Nth Queensland

Fishing has been very good with small YFT having left the area and larger 35kg average fish now on the grounds in the last month. Fishers still targeting albacore to service the local processors’ requirements for value adding (preserved in jars). Sharks are having a big impact on catches.

Western Australia

Only one vessel is working out of Fremantle with consistent catches of swordfish to 100kg over the last month. Yellowfin have averaged around 30kg and are attracting poor prices in Japan. Freight continues to be problematic, but a new direct service to Japan is due to start next month. Both WA based boats are on the market for sale as the owner is looking to retire.



Tropical Tuna Fisheries Management Advisory Committee

Meeting 29

23 October 2023

Agenda item 2 Background Information

Agenda Item 2.1c Written update from members

Template for TTMAC members and invited participants wishing to submit a written general update prior to the meeting for inclusion in record of meeting.

Provided by: Brian Jeffriess. Adviser. Australian SBT Industry Association (ASBTIA)
 Position on TTMAC: Invited Participant

General Update:

(1) **Increase in SBT quota 2024-2026:** On 12/10/23 the CCSBT increased the **global** SBT quota by 17% for the triennium 2024-2026. This 3,000t global increase is the maximum allowed under the Harvest Strategy agreed by the CCSBT Scientific Committee.

(2) **Increase for Australia 2024-2026:** Australia's share of the global quota is 35.5%, the same as Japan. This means that, after donating quota to Indonesia, Australia's quota is:

	Whole tonnes
2009-2011	4,015
2015-2017	5,665
2021-2023	6,273
2024-2026	7,295

(3) **Implications for charter/recreational sector:** Under the legislated SBT Management Plan – 5% of Australia's SBT allocation (after donations to other countries) is reserved for the charter/recreational sector. This is based on the major National Recreational Survey. This means an allocation of:

	Whole tonnes
2021-2023	312
2024-2026	362

(4) For **2027-2029**, the CCSBT Science Committee found "The probability of the quota increasing by 11-17% is high." That decision is due to be made in Oct 2025.

Use in farms and longlining

(1) David Ellis has outlined the increased SBT use for East Coast longlining. The data shows:

	Whole tonnes	
	Into farms	Longline
2021	4,592	1,053
2022	4,942	1,030
2023	4,706	1,100 (p)

- (2) The expansion of farming is being delayed by the 18-month delay in approving the new Lower Eyre Peninsula Aquaculture Plan which allows for a major expansion in the tonnage allowed for tuna farming.
- (3) TA has raised the issue of how AFMA should deal with the effect of the increase in the SBT catch on the East Coast (see below).

CCSBT Science

CCSBT is fortunate enough to have a single species and a small number of Member countries. However, most of all, the CCSBT is fortunate to have the Australian globally cutting-edge science.

Research program and impact of 3-year La Nina

ASBTIA/CSIRO are putting out 45 E-tags in 2023-2024, including in Bass Strait. Some have already detached and show valuable data on SBT migration and thermocline movement.

In 2023, ASBTIA and a research partner trialled satellite identification of SBT school position and density. Challenges included limited satellite passes and assessing school depths.

It appears that the very rare 3-year La Nina has had an unquantified effect on migration and fish behaviour. The fishery impact of the return to El Nino in 2024 is unknown.

Change in CEO at ASBTIA

Now the SBT quota has been increased, the current CEO is retiring. The new CEO, Daniel Casement, has had substantial experience in government and in fishing – and brings to the tasks a new level of ideas and expertise.

MSC/ASC Accreditation

ASBTIA has completed the first step in MSC accreditation and expects to start the ASC process in later 2024.

Spatial competition

The GAB had been seen as one of the world's major unused oil/gas opportunities. However, it was apparent that 3D surveys were having an impact on SBT migration patterns. As a result, ASBTIA has been able to have licence conditions imposed on all oil/gas companies which have made it uneconomic to do seismic surveys or drill. The biggest threat is now the Otway area into Victoria.

Impact of climate change

CCSBT is discussing how the changes might be taken into account – as the Harvest Strategy used to manage SBT is already highly precautionary. The GAB fishery appears to have slower change due to the Antarctic Current and the likely positive impact of climate change on small pelagic populations.

Issue of the effect any expansion of the Australian SBT longline fishery on the ETBF levy base

TA has raised this issue for AFMA to consider. At this stage, points to consider are:

- (1) SBT quota owners already pay a significant part of the ETBF levy through being also ETBF owners.
- (2) The SBT levy already includes a large contribution to the cost of EM on the East Coast – calculated by the proportion of SBT catch/total tuna catch.
- (3) The future SBT catch in the ETBF is unclear.

Brian Jeffriess - ASBTIA

TTRAG Advice for the Eastern Tuna and Billfish Fishery for the 2024 Season

October 2023

Overview

The tuna longline sector still recovering from the effects of COVID along with uncertainty of the economic environment, especially in relation to operational costs. International freight availability continues to be a challenge for industry. A freight logistics coordinator has been employed and has provided some cost-effective options to industry, such as sending product on partially filled planes.

Labour and skills shortages have resulted in some vessels being tied up, soft recruitment is still remains from other fishing sectors, and other primary industries. Combined with very high fuel prices, high bait costs, a shortage of labour in service industries impacting vessel maintenance and restricted market access created economic challenges for fishing businesses in 2022.

During 2022, additional MSE testing was undertaken to evaluate a modified HS for swordfish which adequately addressed the exceptional circumstances of the low catch to TACC ratio. The modified HS was endorsed by TTRAG and TTMAC out of session and has been used for setting the RBCC for SWO for 2023 and 2024.

The modified Swordfish (HS) was adopted by AFMA Commission in November 2022. The Commission noted, when making the modification to the ETBF Harvest Strategy, that the purpose of the modification is to explicitly account for recent low catch levels compared to the TACC and, in doing so, avoid unnecessary TACC reductions. The modification has been designed and tested assuming the level of recent under catching ceases from 2025 onwards. TTRAG advice was derived from the modified swordfish HS. TTRAG recommended a RBCC of 1047t, no change to the TACC for 2024 season.

For YFT, BET and ALB, TTRAG is providing advice based on fishery indicators. STM advice is under a constant catch scenario. TTRAG reviewed the annual conditions, ETBF climate change status report and indicators.

In providing this advice, TTRAG took into consideration the results of the most recent stock assessments undertaken for each of the principal catch species in the ETBF. These results indicate, based on the median values across the uncertainty grid adopted for each species, that for the four species (YFT, BET, ALB, SWO) the stock is not overfished (i.e. $SB_{\text{recent}}/SBF=0 > 0.20$) nor is overfishing occurring (i.e. $F_{\text{recent}}/F_{\text{MSY}} < 1.0$) (c.f. Figure 1). For STM, the stock is close to being overfished based on the LRP adopted for tunas ($SB_{\text{recent}}/SBF=0 \sim 0.20$) and close to undergoing overfishing (i.e. $F_{\text{recent}}/F_{\text{MSY}}=0.91$) (Figure 1).

TTRAG also took into consideration the information about the ETBF catch relative to the catch of other fleets in regions adjacent to the ETBF (Region 1 for the two billfish species and Region 5 for the three tuna species – see next section). The proportion of the ETBF billfish catches in Region 1 (0-50oS and 140-165oE as shown in Figure 2) is different for each species – SWO (76%) and STM (56%) in 2021. If the estimated catch (assuming a 20% mortality for tagged and released fish) of the

recreational sector in Australia is included, then the proportion of the ETBF catch in Region 1 for striped marlin is ~51%. The proportion of the ETBF tuna catches in Region 5 (10-50oS and 140-170oE as shown in Figure 2) is: YFT (13%), BET (23%), and ALB (6%) in 2022. TTRAG noted that the catch estimates in these regions for 2022 are provisional.

In considering the number of years over which the trend in several of the resource indicators was assessed, TTRAG took into account the life-history (e.g. longevity) of each species. As such, trends were considered over five years for YFT and BET and ten years for ALB, SWO and STM.

Finally, TTRAG have included ETBF climate change status report and economic indicators information in this advice paper. Indicators are provided at whole fishery for climate change status and economic status/performance (see “Economic Conditions in the ETBF” below) and economic conditions at an individual species level.

At the end of the summary for each species, some additional Key Points are provided. Please note that in stock indicators sections, “CPUE” refers to standardised CPUE (std-CPUE) and in the economics sections, “CPUE” refers to nominal CPUE (un-standardised).

The results of the most recent stock assessments undertaken for each of the principal catch species in the ETBF are shown in Figure 1. Note that the year of the most recent assessment varies across species (i.e., 2023 for yellowfin and bigeye tuna, 2022 for skipjack tuna, 2021 for south Pacific albacore and broadbill swordfish, and 2019 for striped marlin)(Williams et al, 2023.).

The results from these assessments indicate, based on the median values across the uncertainty grid adopted for each species, that for five species (yellowfin tuna, bigeye tuna, south Pacific albacore, skipjack tuna and broadbill swordfish) the stock is not overfished (i.e. $SB_{recent}/SB_{F=0} > 0.2$) nor is overfishing occurring (i.e. $F_{recent}/F_{MSY} < 1$). For striped marlin, however, the stock is at the point of being overfished ($SB_{recent}/SB_{F=0} \sim 0.20$) based on the limit reference point adopted for tunas of 0.2, and close to being subject to overfishing (i.e. $F_{recent}/F_{MSY} = 0.91$).

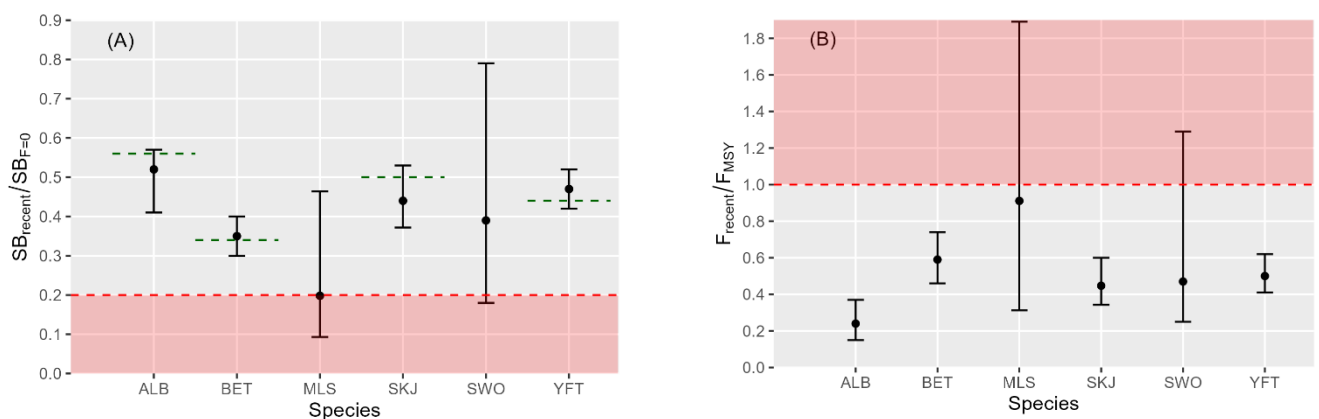


Figure 1. Median value (and 80% probability interval) of (A) the time-dynamic spawning biomass depletion ($SB_{recent}/SB_{F=0}$) and (B) fishing mortality ratio (F_{recent}/F_{MSY}) across the respective uncertainty grid used in the stock assessment for each of the principal tuna and billfish species in the WCPO. In (A) the dotted red line indicates the Limit Reference Point (LRP) adopted by the WCPFC for tunas while the dotted green line indicates the Target Reference Point adopted for skipjack tuna, yellowfin tuna, bigeye tuna and south Pacific albacore tuna, while in (B) the dotted red line is a generally accepted MSY-based LRP for fishing mortality. ALB = south Pacific albacore, BET = bigeye tuna, MLS = striped marlin, SKJ = skipjack tuna, SWO = broadbill swordfish, YFT = yellowfin tuna.

Regions of interest

TTRAG takes into consideration information about the ETBF catch relative to the catch of other fleets in regions adjacent to the ETBF. To do this, “Region 1” is used for the two billfish species and “Region 5” is used for the three tuna species. A third “ANZ region” region is used elsewhere (but not in this paper) for any species. A map of these regions is shown in Figure 2 and a description is as follows:

Region 1

Region 1 is used for the two billfish species. This region, bounded by 0-50oS and 140-165oE, extends eastwards from the east coast of Australia and comprises most of the area fished by the ETBF fleet in recent years. Region 1 is one of the two regions used in stock assessments for broadbill swordfish in the south Pacific (Ducharme-Barth et al. 2021). Note, at present no regional structure is used in the assessment for southwest Pacific striped marlin.

Region 5

Region 5 is based on two of the nine regions used in the 2020 stock assessment models for yellowfin tuna (Vincent et al., 2020) and bigeye tuna (Ducharme-Barth et al., 2020) within the WCPO. These two assessment regions (5 and 9) bounded by 10-40oS, and 140-170oE, extend eastwards from the east coast of Australia and comprise both the main area fished by the ETBF fleet and a large proportion of both the Coral and Tasman Seas. These two regions are combined for the analyses presented here and referred to as Region 5. Also, in order to encompass all ETBF fishing operations, including those off eastern Tasmania, the southern boundary was extended to 50oS. Note, the regions used in the assessment for South Pacific albacore tuna do not align with those used for the two tropical tunas, with region bounded by 0-50oS, and 140-150oW divided into three latitudinal zones with boundaries at 10oS and 25oS.

Australia-New Zealand (ANZ) region

This region represents an extension of the eastern boundary of Region 5 to 175oW, encompassing much of the New Zealand exclusive economic zone and adjacent high seas. This region is not used in the figures reported in this paper but is mainly used in other papers to look at relative regional catches of broadbill swordfish and striped marlin in an extended area where there is uncertainty around stock connectivity with the ETBF. This region is distinct from and smaller than the SW-Pacific regions used in the assessments for the two billfish species.

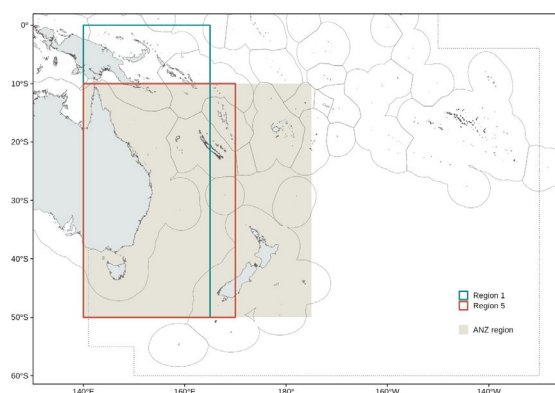


Figure 2. Map showing the boundaries of the three regions used in the analyses described in this paper. The boundaries associated with the exclusive economic zones for the nations within this region are also shown. Region-5 is used for the three tuna species, Region-1 is used for the two billfish species, while the ANZ region is used for all species. The dotted line indicates the boundary of the WCPFC Convention area.

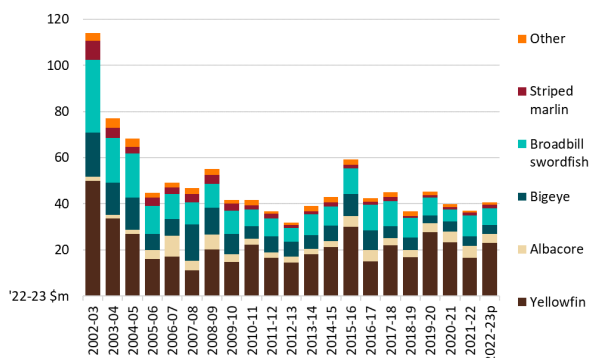
Economic conditions in the ETBF

Derived ETBF economic working paper *Economic conditions in the Eastern Tuna and Billfish Fishery* September 2023 ABARES.

Gross value of production

Gross value of production (GVP) in the ETBF decreased between 2002–03 and 2012–13 from \$114.4 million to \$31.9 million in real terms (2022–23 dollars), reflecting lower landed catch and falling average prices. Average prices are likely to have been influenced by movements in the Japanese Yen and Australian dollar exchange rate. Between 2012–13 and 2015–16, GVP increased to an 11-year high of \$59.1 million in 2015–16 in real terms (2022–23 dollars). This increase resulted from higher landed catch and rising prices of key targeted species (particularly yellowfin tuna).

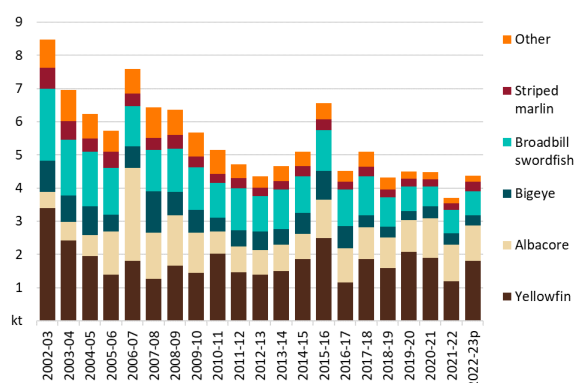
The decrease in GVP between 2015–16 and 2022–23 largely resulted from lower bigeye tuna, Broadbill swordfish and Yellowfin tuna production value.



Catch

Catch in the ETBF has trended downwards between 2002–03 and 2022–23, with peaks during those years in 2002–03, 2006–07 and 2015–16.

Since 2002–03 the number of active vessels (and fishing effort to a lesser extent) decreased significantly, likely because of a decline in economic conditions in the fishery and the removal of vessels through the Securing Our Fishing Future structural adjustment package (Patterson et al 2020). Declining prices and rising input costs during this period may have also reduced fishing effort and catch.



Between 2012–13 and 2015–16 landed catch increased by 50% to 6,572 tonnes and has remained well below this level since 2015–16.

Weighted average price of landed catch tracks the JPY/AUD exchange rate

The weighted average price of fish caught in the ETBF fell significantly in the early 2000s, largely a result of the appreciation of the Australian dollar against the Japanese Yen. Japan was Australia's major export market for yellowfin tuna, and bigeye tuna during this period.

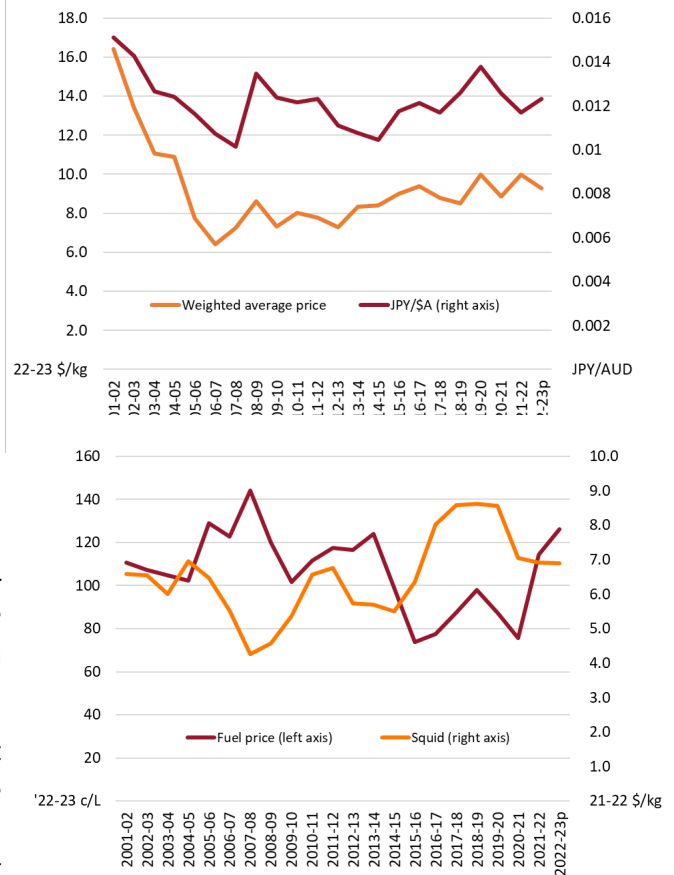
The weighted average price of fish caught in the ETBF trended upwards from 2006–07. There is a strong correlation of the Australian dollar against the Japanese Yen and the weighted average price movement.

Input prices – fuel and squid

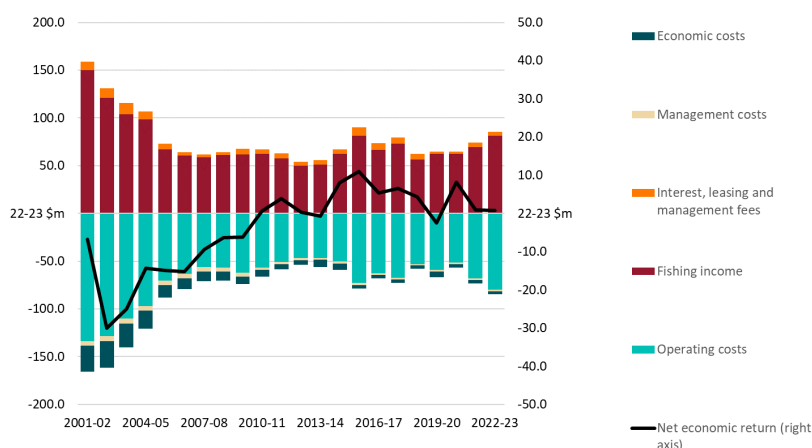
The price of fuel and squid in real terms (2022–23 dollars) have varied significantly between 2000–01 and 2022–23.

The average real price of fuel peaked in 2007–08, 2013–14 and 2022–23. Real fuel prices have trended upwards since 2015–16 and were at historically high levels through 2022–23.

The average real price of squid imports (a proxy for bait price) peaked in 2017–18 at more than double the average price in 2007–08. According to the FAO (2019), squid prices have risen on tight world supplies which are not expected to ease in the short term. Squid prices declined in 2020–21, but remained high in 2021–22 and 2022–23 in real terms compared to the early 2000s period.



Economic performance (ABARES surveys)



Net economic returns (NER) generated in the ETBF are measured by ABARES surveys. NER in real terms (2022–23 dollars) trended upwards from 2002–03. NER were negative between 2002–03 and 2009–10. In 2010–11 the fishery achieved positive real NER, driven primarily by reduced operating costs, and peaked at \$11.0 million in 2015–16.

From 2016–17 real NER in the ETBF has followed a generally declining trend, dipping to negative \$2.6 million in 2019–20. Preliminary non-survey-based estimates indicate real NER averaging \$0.8 million 2021–22 and 2022–23. These low levels of NER are attributed to higher input costs experienced in these years.

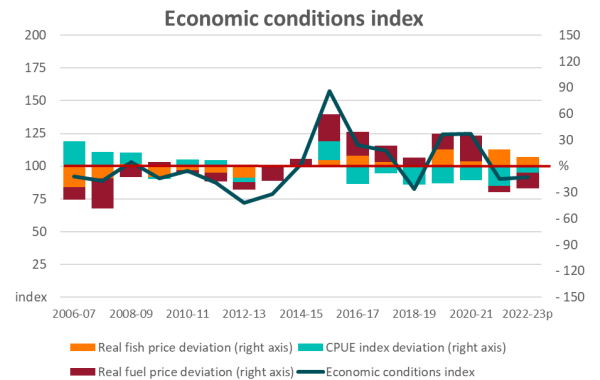
From 2016–17 real NER in the ETBF has followed a generally declining trend, dipping to negative \$2.6 million in 2019–20. Preliminary non-survey-based estimates indicate real NER averaging \$0.8 million 2021–22 and 2022–23. These low levels of NER are attributed to higher input costs experienced in these years.

Economic conditions index (weighted)

The ECI reflects that the ETBF is a multi-species fishery. Nominal GVP weights of the 5 key commercial species in the ETBF were used to calculate ECI and deviations in its component indices from the long-term (2005–06 to 2022–23) average.

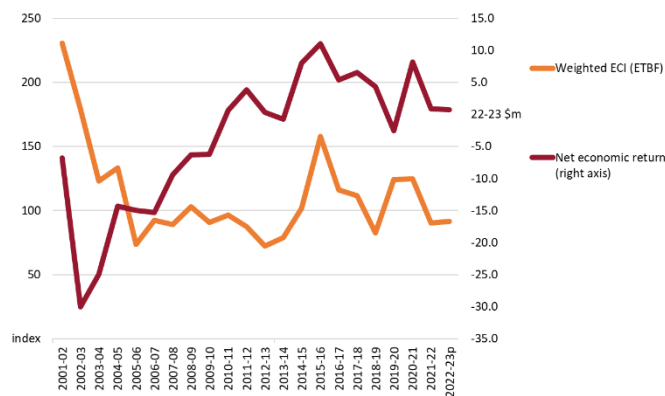
Using the weighted ECI approach, in 2022–23 the ECI remains at around a level of 90.0 indicating below average economic operating conditions. This outcome is attributed to elevated input costs in an environment of steady fish prices, and declining catch per unit effort.

During early 2023-24 fuel prices are likely to continue to limit economic conditions in the fishery. It is unclear to what extent price improvements or catch rates can offset the downward pressure on the index in this period from higher fuel prices. It is also unclear if current high fuel prices will persist into 2024.



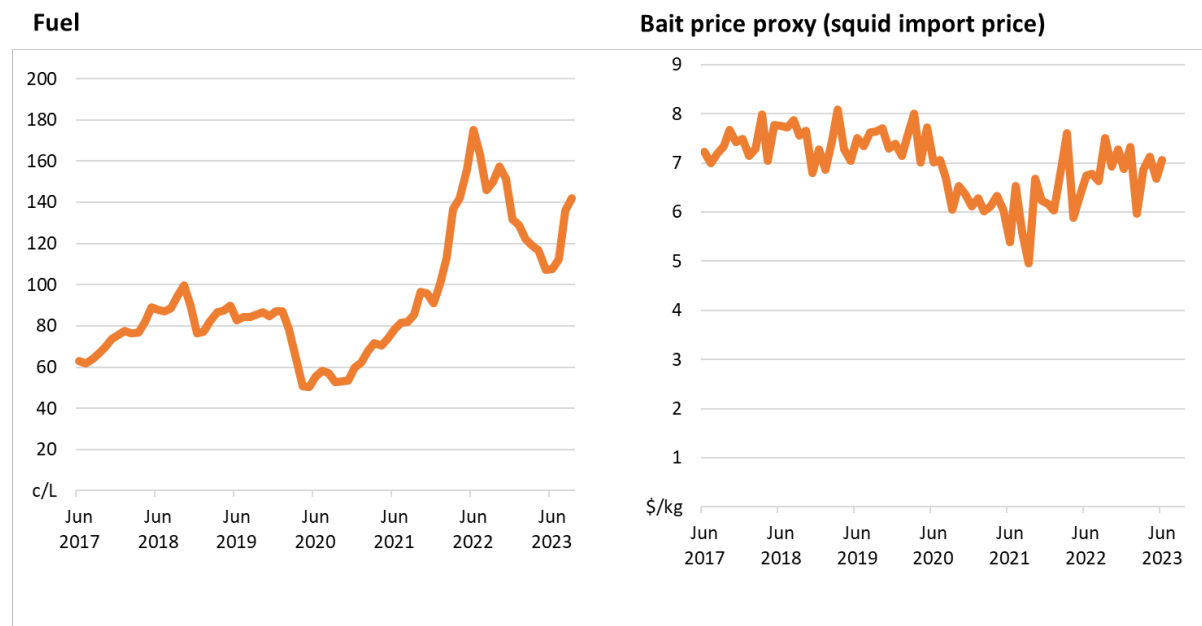
Economic conditions index (weighted) and NER

The weighted ECI approach has the potential to be a leading indicator of NER. Weighted ECI and NER are highly correlated: 60% since 2012–13.



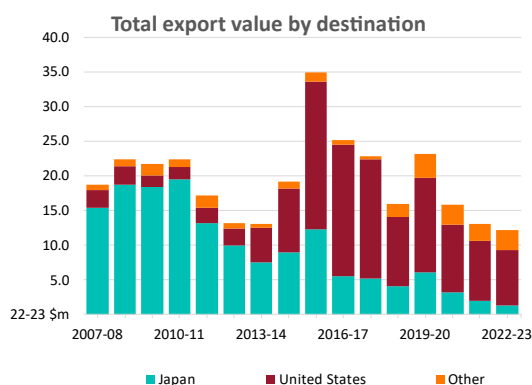
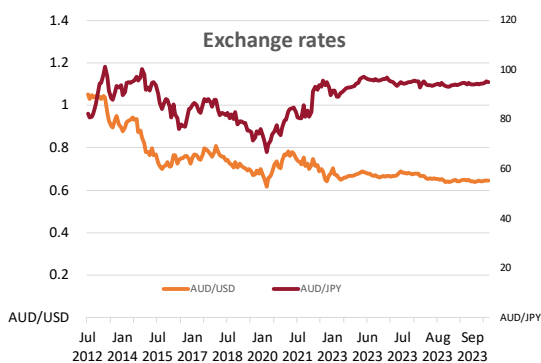
Economic conditions in the Eastern Tuna and Billfish Fishery Monthly indicators

Input prices



Notes: Nominal dollars. Fuel price (diesel) excludes GST and excise. Source: ABARES.

Note: Nominal dollars. Source: ABS, ABARES.



Climate Indicators

The Report at *Climate and Ecosystem Status Report for the Eastern Tuna and Billfish Fishery June 2023 (Attachment A)* is preliminary in nature and supported discussion and feedback on relevant indicators. The ETBF climate change status report, provided the RAG with supplementary guidance when considering TACs for the ETBF in 2024. The RAG noted the following from the status report. Additionally, further detailed information on the report can be found at **(Attachment A)**:

- That it is anticipated that ETBF tuna fishing will experience normal shifts in distribution and abundance with the El Niño-Southern Oscillation (ENSO) cycle (i.e. La Niña and El Niño).
- El Niño is typically associated with higher catches in some of key target species.

- Further warming to sea surface temperatures in central and Eastern Pacific likely and sea surface temperatures above average off Victoria and Tasmania, and Queensland to a lesser extent, during August.

Species summaries

South Pacific albacore tuna

South Pacific albacore tuna (*Thunnus alalunga*) were last assessed and presented at the WCPFC scientific committee meeting in 2021 (Jordán et al., 2021). The assessment results were consistent with the 2018 assessment. Annual catch estimates for albacore in the South Pacific peaked at 93,835 mt (all gears) in 2017 (SC17-SA-IP-04). Catch by longliners represented 93% of the catch weight in 2020 at 64,963 mt and represented a 21% decrease from 2019 despite a shift of effort from the tropical to the southern longline fishery in 2020. By comparison, the 2020 total albacore catch within the southern part of the WCPFC-CA was 61,778 mt and the longline catch was 57,006 mt.

Indicators summary:

- In the ETBF, the 2022 catch of albacore tuna (1132 t) was above both the five-year (2017-2021) and ten-year (2012-2021) average catch of albacore tuna in the ETBF of 1015 t and 934 t respectively (Figure 3). Catches of albacore tuna in the ETBF have been slowly increasing over the last decade after a sharp decline from a peak in 2006.
- The 2022 ETBF catch of albacore tuna represents 6% of the provisional total catch of albacore tuna within Region 5 (10-50oS and 140-170oE). The average contribution is 7% over the previous five years (2017-2021), with a maximum in recent years of 9% in 2016 (Tremblay-Boyer and Williams, 2023a).
- South Pacific albacore tuna are not overfished. The median estimate of spawning biomass (SB) depletion for the recent period (2016-2019; $SB_{\text{recent}}/SBF=0$) was 0.52 with a range (80% CI) of 0.41–0.57. None of the 72 model runs estimated depletion to be below 0.2. South Pacific albacore tuna are not subject to overfishing. The median estimate of recent (2015-2018) fishing mortality relative to FMSY ($F_{\text{recent}}/FMSY$) was 0.24 with a range (80% CI) of 0.15-0.37. None of the 72 model runs estimated recent fishing mortality to be above FMSY.
- The median of processed fish weights has increased slightly over time, with bimodality for some years, including 2021 and 2022, (Figure 4) (Tremblay-Boyer and Williams, 2023b).
- The standardised CPUE index of albacore tuna has been highly variable over time. It remains above the recent five-year average in 2022 (Figure 5) (Tremblay-Boyer and Williams, 2023c).

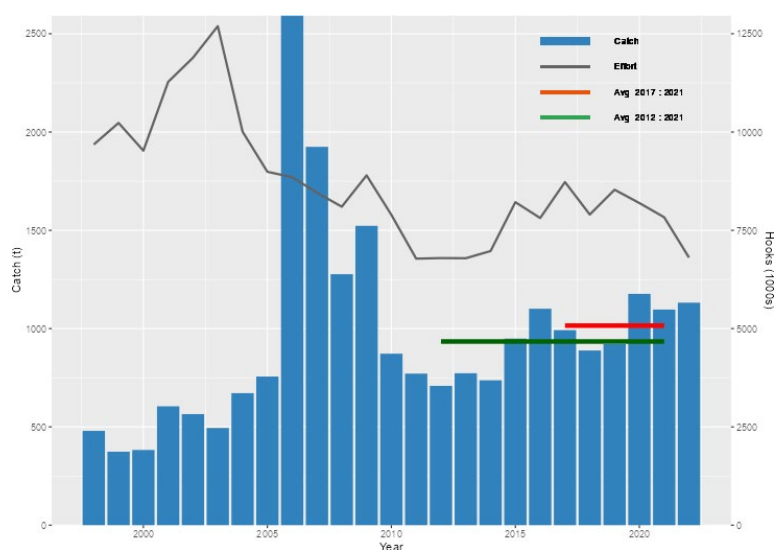


Figure 3 Total albacore tuna catch (tonnes) and overall effort (hooks) in the ETBF. The average catch is shown for the periods 2012-21 (green) and 2017-21 (red).



Figure 4 The distribution in processed weights (kg) of albacore tuna caught in the ETBF. The horizontal line in each annual distribution represents the median weight and shaded blue area the 50th percentiles (source: Tremblay-Boyer and Williams, 2023b).

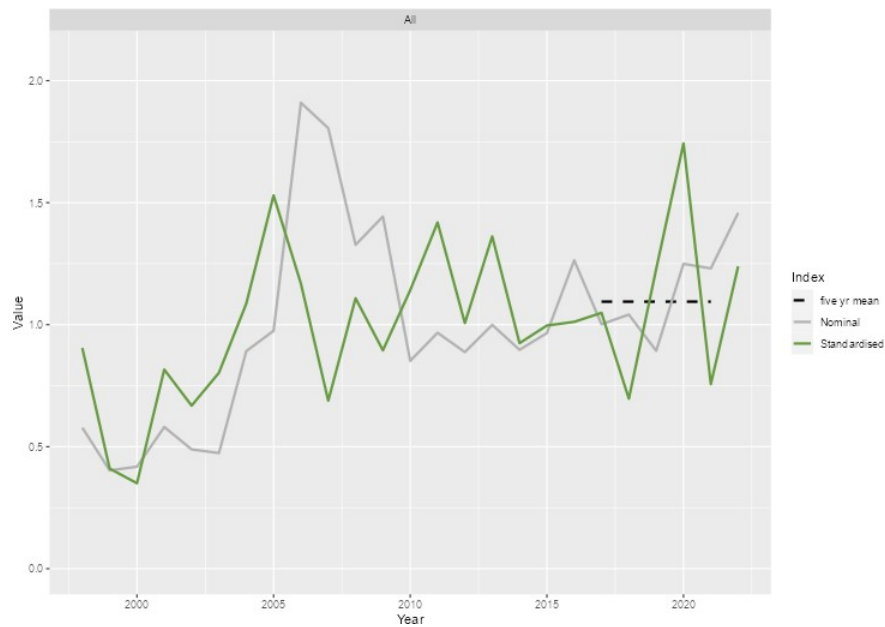


Figure 5 Nominal and standardised CPUE time series for albacore tuna in the ETBF and the recent five-year average (2017-2021) (source: Tremblay-Boyer and Williams, 2023c).

Stock Status Albacore Tuna

Indicator	Comment
Stock	Considered single stock in the south Pacific.
South Pacific (SP) Stock Assessment ¹	<p>Last assessment: 2021².</p> <p>Overfished³: No</p> <p>Overfishing⁴: No</p> <p>South Pacific albacore were last assessed in 2021 (Castillo Jordán <i>et al.</i>, 2018). A short summary:</p> <ul style="list-style-type: none"> The median estimate of fished-to-unfished spawning biomass ratio was 0.52 with a range (80% CI) of 0.41-0.57 (across the swathe of different runs in the uncertainty grid) with none of the 72 models estimating a depletion level lower than 0.2. All the 72 model runs have an estimate of the MSY fishing mortality ratio less than 1 (no overfishing at all). 1) WCPFC CPUE analysis: CPUE analysis for South Pacific albacore WCPFC <p>Next assessment: 2024.</p>
WCPFC Scientific Committee Management advice 2021	<ul style="list-style-type: none"> The 2021 South Pacific albacore stock assessment provided results consistent with the 2018 assessment; that is, a decline in estimated spawning potential over most of the assessment period, and in particular, within the most recent years. The addition of the EPO region into the current entire South Pacific assessment did not notably alter the main assessment outcomes, and similar trajectories and terminal depletion were estimated in both RFMO regions. For the WCPFC-CA region, the 'recent' and 'latest' SB estimates are on average both below the interim target reference point of 0.56. Further, 86% of models (62 out of 72 models) estimated that $SB_{recent}/SB_{F=0}$ was below the interim TRP. In relation to management objectives for the WCPFC-CA longline fishery, this assessment estimated that the median 'latest' (2019) and 'recent' (2016-2019) longline vulnerable biomass for the WCPFC-CA are 56% and 76% of the 2013+8% target level that defined the interim TRP. SC17 scheduled a recalibration of the interim TRP for review at WCPFC18. The analysis will estimate the constant catch levels that would achieve that TRP on average over the long-term.

¹ The stock assessment area for south-Pacific ALB in 2021 covers the entire region of the south Pacific from 0-50oS.

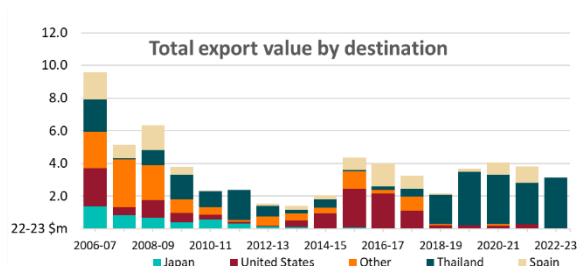
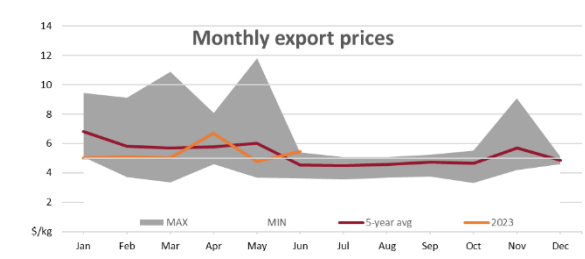
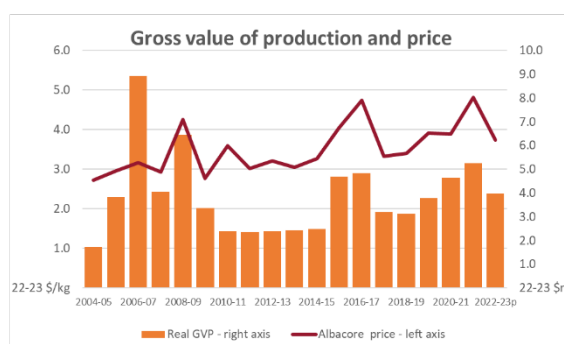
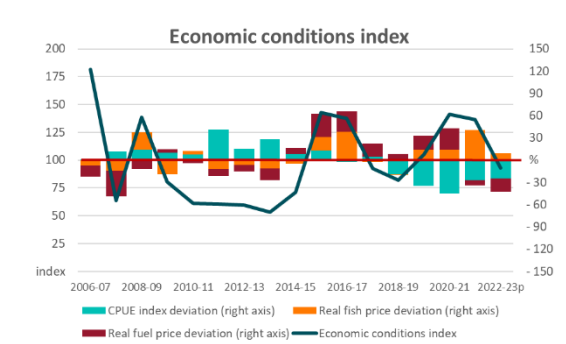
² The assessment covers the period from July 1960 to December 2019.

³ The WCPFC has adopted the indicator $SB_{latest}/SB_{F=0} = 0.2$ as a Limit Reference Point for ALB where in the latest assessment SB_{latest} refers to the mean annual spawning biomass in 2019 and $SB_{F=0}$ is the estimated average annual spawning biomass over the period 2009- 2018 in the absence of fishing.

⁴ The indicator F_{recent}/F_{MSY} is used to estimate fishing pressure on the stock where in the latest assessment F_{recent} is the mean fishing mortality over the period 2015- 2018 and F_{MSY} is the fishing mortality at Maximum Sustainable Yield (MSY).

- Noting the Commission is scheduled to adopt an MP for South Pacific albacore tuna in 2022, SC18 reviewed the progress on developing and testing MPs for South Pacific albacore tuna as outlined in SC18-MI-WP-05 (Progress update and technical challenges for the South Pacific albacore MSE framework).
- SC18 noted the progress on the development of MPs using model-based approaches for South Pacific albacore tuna and recommended that candidate HCRs for this species be adapted from those already considered for skipjack tuna.
- SC18 recommended that both the Science-Management Dialogue and WCPFC19 take note of the progress to date on the development of an MSE framework for South Pacific albacore tuna and that further work is required prior to adoption of an MP.

Economic conditions in the Eastern Tuna and Billfish Fishery Albacore



Notes: Economic conditions index (and component indices) 2006–07 to 2022–23 average = 100. Deviation represents percentage difference of each component index from long-term average. Monthly export prices based on all albacore exports. Total export value by destination based on all albacore exports from Australia. Albacore export product form varies and between 2016–17 and 2020–21 on average 78% was exported frozen and 22% was exported as ‘fresh or chilled’. In 2020–21 only 5% was exported as ‘fresh or chilled’.

Sources: ABARES, ABS, FFA.

TTRAG TACC Advice for Albacore:

South Pacific albacore tuna (*Thunnus alalunga*) were last assessed and presented at the WCPFC scientific committee meeting in 2021. TTRAG considered the available information and indicators and concluded:

- Albacore tuna are not overfished. The median estimate of spawning biomass was 0.52 SBF=0) with a range (80% CI) of 0.41-0.57 SBF=0. The spawning biomass was estimated to be below the level that would be considered overfished (0.2 SBF=0).
- Albacore tuna are not subject to overfishing. Fishing mortality was estimated to be below the level that would achieve maximum sustainable yield (F_{MSY}).
- The ETBF is considered to be part of a common south pacific albacore stock.
- Noting the stock is not assessed as overfished or subject to overfishing it is important to note the following from a recent WCPFC SC17 meeting (2021): under “status quo” conditions (2017–2019 or 2020 average catch or, separately, fishing effort) results of model projections show a steep and rapid decline in biomass towards the LRP in the year 2021 followed by an increase in biomass thereafter.
- The 2022 ETBF catch of albacore tuna was 1132 t which represents 6% of the provisional total catch of albacore tuna within region 5 (10-50oS and 140oE-170oW).
- In the ETBF, the 2022 catch of albacore tuna (1132 t) was above both the five-year (2017-2021) and ten-year average (2012-2021)
- The median of processed fish weights has increased slightly over time, with some evidence of a recruitment pulse entering the fishery in 2020 progressing into 2021 and a new cohort of recruits entering into the fishery in 2022.
- The standardised CPUE index of albacore tuna has been highly variable over time. It remains above the recent five-year average in 2022
- Economic conditions index for 2022 is below average with a distinct downward trend since 2020-2021.

TTRAG TACC recommendation 2024: 2,500t

Bigeye tuna

A new stock assessment for bigeye tuna (*Thunnus obesus*) in the WCPO was conducted in 2023 (Day et al., 2023). Preliminary results were similar to the 2020 stock assessment (Ducharme-Barth et al., 2020), except that the stock was estimated to be more depleted (lower depletion level), and fishing mortality was estimated to be lower in the 2023 assessment (Day et al., 2023). The total catch of WCPO bigeye tuna for 2022 was 140,664 mt which was similar to the 2021 level.

Indicators summary:

- In the ETBF, the 2022 catch of bigeye tuna (346 t) is below both the five-year and ten-year average catch in the ETBF of 360 t and 499 t respectively (Figure 6). Catches of bigeye tuna in the ETBF have declined since a peak in 2016, however catches have shown a slight increase in 2021 and 2022.
- The 2022 ETBF catch of bigeye tuna represents 23% of the provisional total catch of bigeye tuna within Region 5 (10-50oS and 140-170oE). The average contribution is 22% over the previous five years (2017-2021), with a maximum of 38% in 2016 (Tremblay-Boyer and Williams, 2023a).
- Bigeye tuna are not overfished. The median estimate of spawning biomass (SB) depletion for the recent period (2018-2021; $SB_{\text{recent}}/SB_{F=0}$) was 0.35 with a range (80% CI) of 0.30–0.40. None of the model runs estimated depletion to be below 0.2.
- Bigeye tuna are not subject to overfishing. The median estimate of recent (2017-2020) fishing mortality relative to FMSY ($F_{\text{recent}}/F_{\text{MSY}}$) was 0.59 with a range (80% CI) of 0.46-0.74. None of the model runs estimated recent fishing mortality to be above F_{MSY} .
- The distribution of processed fish weights of bigeye tuna has been variable across size classes (small, prime, and large), but with no clear directional trends (Figures 7 and 8). There is a bimodal distribution of sizes in several years, potentially indicating progression of cohorts (Tremblay-Boyer and Williams, 2023b).
- The standardised CPUE indices for bigeye tuna increased for adults but decreased for recruits in 2022 (Figure 9) (Tremblay-Boyer and Williams, 2023c). Overall, the standardised CPUE index for all sizes declined slightly in 2022. The CPUE indices for adults and all sizes combined were above the recent five-year average in 2022, while the CPUE for recruits was below. Each of the indices have been below average or declining over the last five to ten years and these increases show a return of the index toward the long-term average.

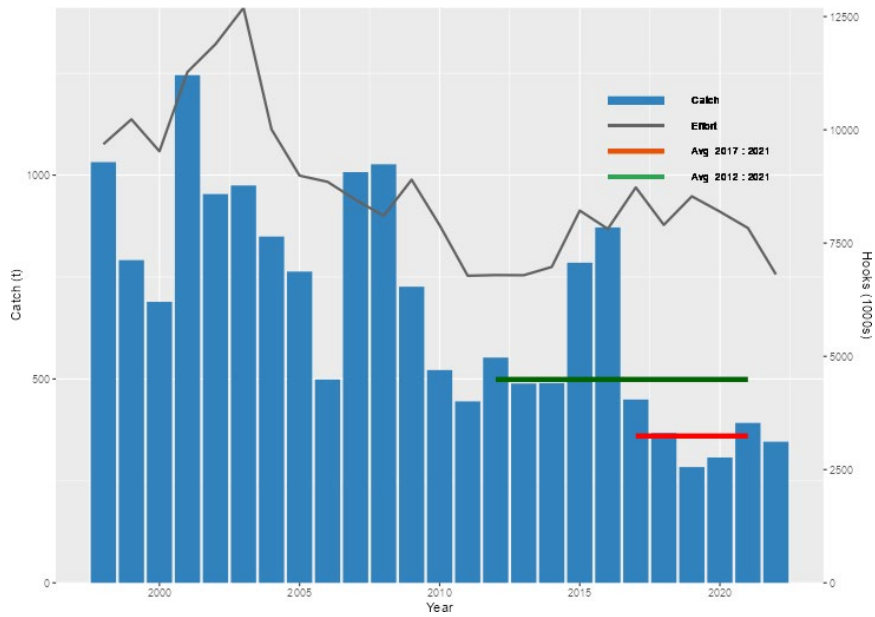


Figure 6 Total bigeye tuna catch (tonnes) and overall effort (hooks) in the ETBF. The average catch is shown for the periods 2012-21 (green) and 2017-21 (red).

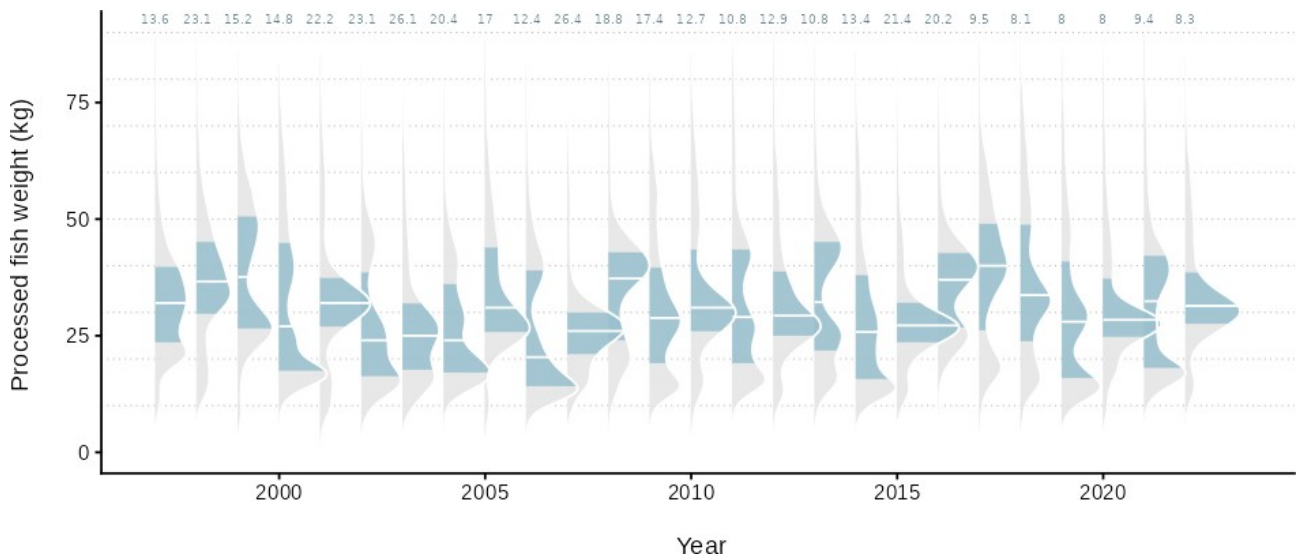


Figure 7 The distribution in processed weights (kg) of bigeye tuna caught in the ETBF. The horizontal line in each annual distribution represents the median weight and shaded blue area the 50th percentiles (source: Tremblay-Boyer and Williams, 2023b).

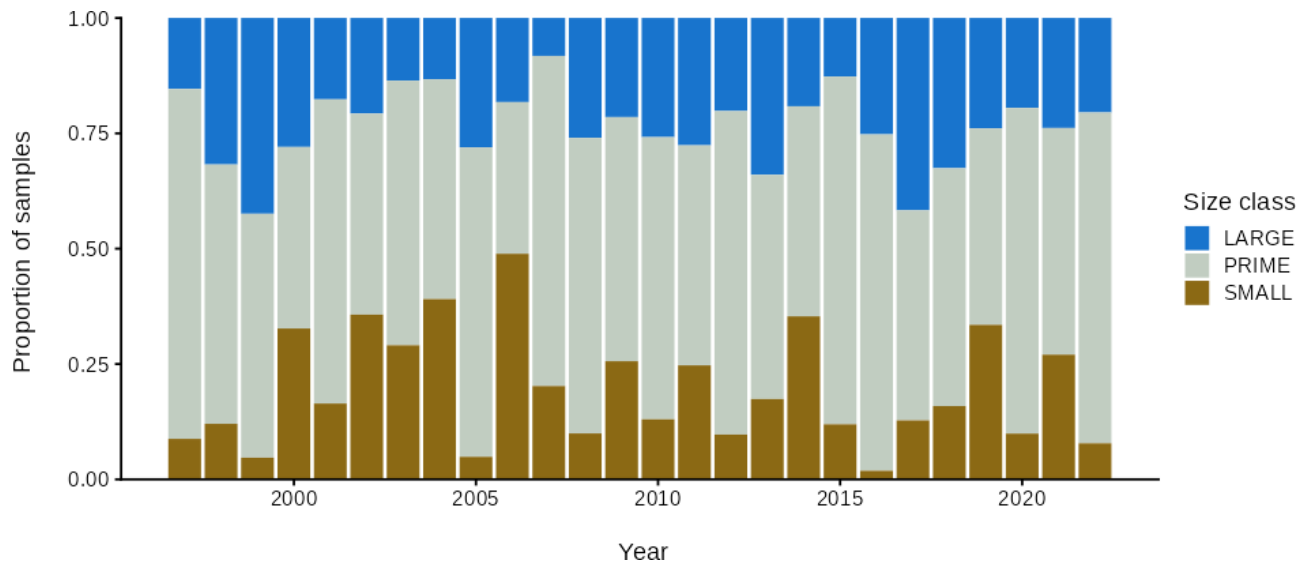


Figure 8 Size distribution of bigeye tuna caught in the ETBF across small, prime, and large size classes. (source: Tremblay-Boyer and Williams, 2023b)

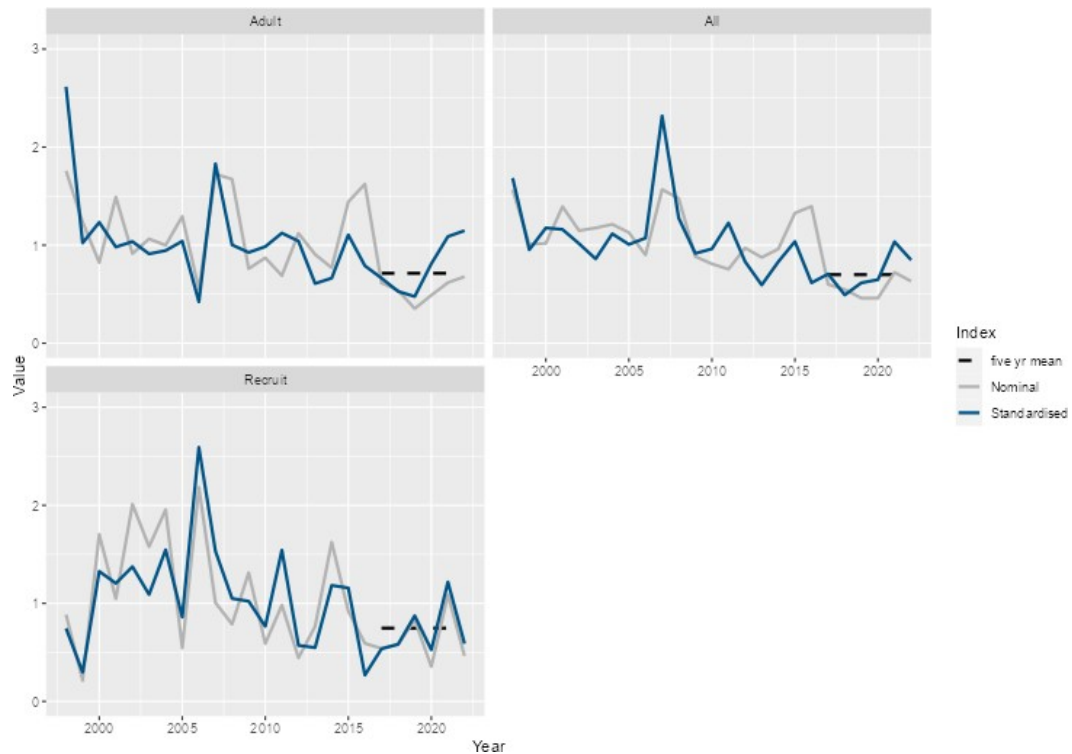


Figure 9 Nominal and standardised CPUE time series for bigeye tuna in the ETBF across size classes and the recent five-year average (2017-2021) (source: Tremblay-Boyer and Williams, 2023c).

Stock Status Bigeye Tuna

Indicator	Comment
Stock	Considered a single stock in the Pacific Ocean – connectivity between ETBF and equatorial regions uncertain but may be small.
WCPO Stock Assessment	<p>Preliminary results:</p> <p>Last assessment: 2023.</p> <p>Overfished: Not Overfished</p> <p>Overfishing: No Overfishing</p> <p>The last full assessment of bigeye tuna was in 2023. Please note the preliminary estimates below.</p> <p>Next assessment: TBA</p>
WCPFC Scientific Committee noted the preliminary estimates 2023	<ul style="list-style-type: none"> • SC19 noted that the preliminary estimate of total catch of WCPO bigeye tuna for 2022 was 140,664 mt which was similar to the 2021 level. Longline catch in 2022 (54,800 mt) was similar to the 2021 catch and lower than the recent ten-year average and understood to be partly due to the impacts of the COVID-19 pandemic. Purse-seine catch in 2022 (62,811 mt) was also similar to the 2021 catch, and lower than the recent ten-year average. • The 2023 WCPO bigeye tuna stock assessment median depletion from the model grid for the recent period (2018-2021; $SB_{recent}/SBF=0$) was 0.35 (10th to 90th percentile interval of 0.30 to 0.40, including estimation and structural uncertainty, Table BET-02). For all models in the grid $SB_{recent}/SBF=0$ was above the biomass limit reference point. The recent median fishing mortality (2017-2020;

$F_{\text{recent}}/F_{\text{MSY}}$ was 0.59 (10th to 90th percentile interval of 0.46 to 0.74, including estimation and structural uncertainty, Table BET-02). For all models in the grid, $F_{\text{recent}}/F_{\text{MSY}}$ was less than one.

- SC19 noted that the catch in the last year of the assessment (2021) was less than the median MSY (164,640 mt), which is a 17% increase in the estimated MSY for bigeye tuna from the 2020 stock assessment (140,720 mt).
- The objective for bigeye tuna in CMM 2021-01 (the Tropical Tuna Measure) – to maintain the spawning biomass depletion ratio at or above the average $SB/SB_{F=0}$ for 2012-2015 – is being achieved. $SB_{\text{recent}}/SB_{F=0}$ (35%) is very close to the average $SB/SB_{F=0}$ for 2012-2015 (34%) calculated across the unweighted grid.
- The WCPO bigeye tuna spawning biomass is above the biomass LRP, and F_{recent} is below F_{MSY} for all models in the uncertainty grid. The stock is very likely not experiencing overfishing (100% probability $F_{\text{recent}} < F_{\text{MSY}}$) and is not in an overfished condition (0% probability $SB_{\text{recent}}/SB_{F=0} < \text{LRP}$).
- The interim objective of bigeye tuna stock under CMM 2021-01 is to maintain the depletion level of the stock at or above the average $SB/SB_{F=0}$ for 2012-2015. The recent depletion level of bigeye tuna is close to this interim objective. SC19 noted that while the projection results based on the 2023 bigeye tuna assessment were not available for SC19 to review, this information will be available for the 4th tropical tuna management workshop and will provide the Commission guidance on future expected levels of fishing mortality and the outcomes relative to the interim or future management objectives.

Economic conditions in the Eastern Tuna and Billfish Fishery Bigeye tuna



Notes: Economic conditions index (and component indices) 2006–07 to 2022–23 average = 100. Deviation represents percentage difference of each component index from long-term average. Monthly export prices based on fresh or chilled bigeye tuna exports. Total export value by destination based on all bigeye tuna exports from Australia. 99.9% of bigeye tuna exports are as 'fresh or chilled'. Sources: ABARES, ABS, FFA.

TTRAG TACC Advice for Bigeye Tuna:

A new stock assessment for bigeye tuna (*Thunnus obesus*) in the WCPO was conducted in 2023. TTRAG considered the available information and indicators and concluded:

- Bigeye tuna are not overfished. The median estimate of spawning biomass (SB) depletion for the recent period (2018-2021; $SB_{\text{recent}}/SB_{F=0}$) was 0.35 with a range (80% CI) of 0.30–0.40. None of the model runs estimated depletion to be below 0.2.
- Bigeye tuna are not subject to overfishing. The median estimate of recent (2017-2020) fishing mortality relative to FMSY ($F_{\text{recent}}/F_{\text{MSY}}$) was 0.59 with a range (80% CI) of 0.46- 0.74. None of the model runs estimated recent fishing mortality to be above F_{MSY} .
- The 2022 ETBF catch of bigeye tuna was 346 t which represents 23% of the provisional total catch of bigeye tuna within region 5 (10-50oS and 140oE-170oW). The average contribution is 22% over the previous five years (2017-2022).
- In the ETBF, the 2022 catch of bigeye tuna is below both the five-year and ten-year average catch 360 t and 499 t respectively. Catches of bigeye tuna in the ETBF have declined since a peak in 2016, however catches have shown a slight increase in 2021 and 2022.
- The standardised CPUE indices for bigeye tuna (adults, recruits and combined) increased for adults but decreased for recruits in 2022. Overall, the standardised CPUE index for all sizes declined slightly in 2022. The CPUE indices for adults and all sizes combined were above the recent five-year average in 2022, while the CPUE for recruits was below. Each of the indices have been below average or declining over the last five to ten years and these increases show a return of the index toward the long-term average.
- Economic conditions index for 2022 is below average with a distinct downward trend since 2020-2021.

TTRAG TACC recommendation 2024:

1,056t

Broadbill swordfish

Broadbill swordfish (*Xiphias gladius*) were last assessed in the WCPO in 2021 using data up to 2019 (Ducharme-Barth et al., 2021). Annual catch estimates for Southwest Pacific swordfish peaked at 11,128 mt in 2012 (SC17-ST-IP-01). Catch by longline vessels in 2020 was 5,373 mt compared to 5,812 mt in 2019, a decline of 7.6%.

Indicators summary:

- In the ETBF, the 2022 catch of broadbill swordfish (723 t) is below both the five-year and ten-year average catch in the ETBF of 846 t and 994 t respectively (Figure 10). Catches of broadbill swordfish in the ETBF have been gradually declining over time from a peak in the late 1990s and early 2000s, but have started to increase in the past 2 years since the lowest catches were reported in 2020.
- The 2022 ETBF catch of broadbill swordfish represents 76% of the provisional total catch of broadbill swordfish within Region 1 (0-50oS and 140-165oE). The average contribution is 67% over the previous five years (2017-2021), with a maximum of 83% in 2007 (Tremblay-Boyer and Williams, 2023a).
- The outcomes of the stock assessment are on average more optimistic than the 2017 assessment, however uncertainty in estimates has increased. Broadbill swordfish are not overfished. The median estimate of spawning biomass (SB) depletion for the recent period (2018-2021; $SB_{\text{recent}}/SB_{F=0}$) was 0.39 with a range (80% CI) of 0.18-0.79. There is a 10% probability that depletion in spawning biomass is below 0.2.
- Broadbill swordfish are unlikely to be subject to overfishing. The median estimate of recent (2017- 2020) fishing mortality relative to FMSY ($F_{\text{recent}}/F_{\text{MSY}}$) was 0.47 with a range (80% CI) of 0.25-1.29. There is a 20% probability that fishing mortality is above F_{MSY} .
- The annual size distribution (Figure 11) shows a clear mode of smaller individuals and a median much higher than the mode across all years, reflecting a wide span of weights in the catch samples. The proportion of large broadbill swordfish landed has declined over the last six years, while the proportion of small fish has increased. However, the proportion of prime-sized broadbill swordfish has increased over the past year or two, likely due to the growth of small fish moving them into the prime size category, resulting in an increase in the overall median size of fish (Figure 11 and [1](#)) (Tremblay-Boyer and Williams, 2023b).
- For all size groups, the standardised CPUE index appears to vary cyclically with a low period from 2016. There is an increase in the standardised CPUE indices from 2021 to 2022 for all size groups, except recruits where the index remains stable (Figure 13) (Tremblay-Boyer and Williams, 2023c). The sub-adults group shows the steepest increase in 2022.

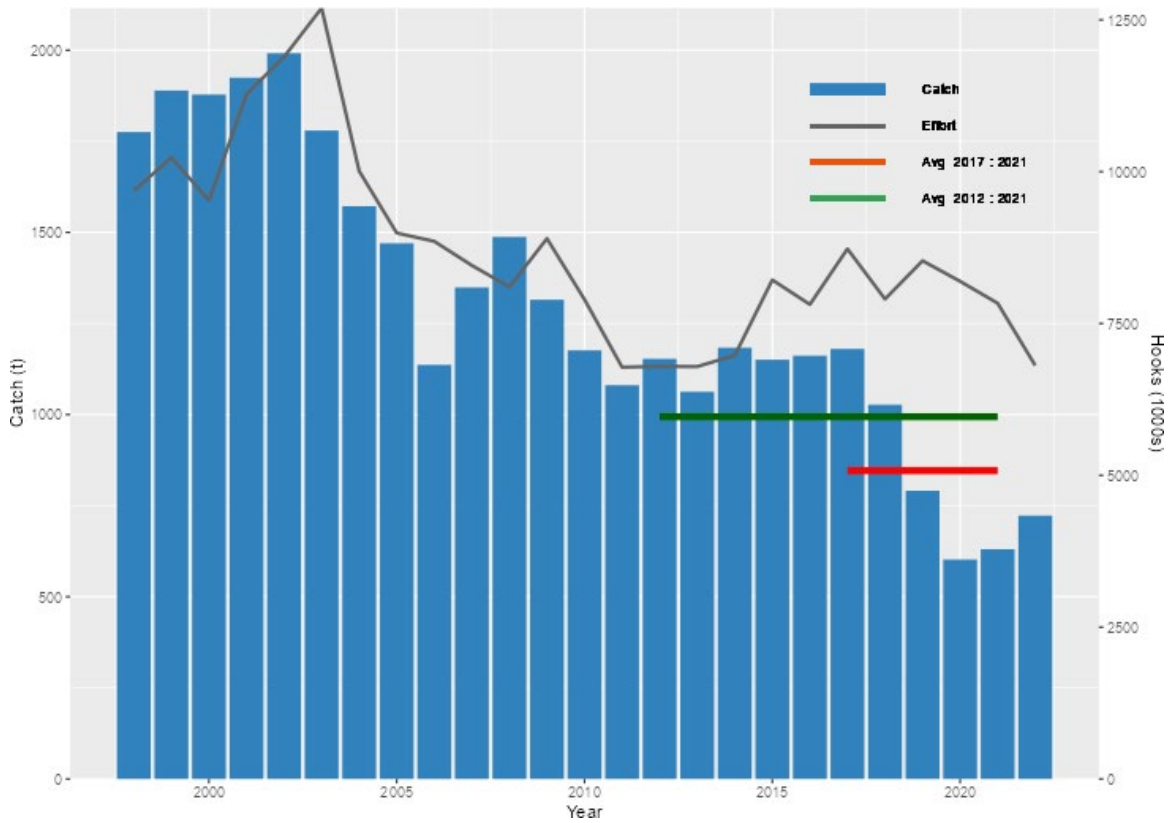


Figure 10 Total broadbill swordfish catch (tonnes) and overall effort (hooks) in the ETBF. The average catch is shown for the periods 2012-21 (green) and 2017-21 (red).

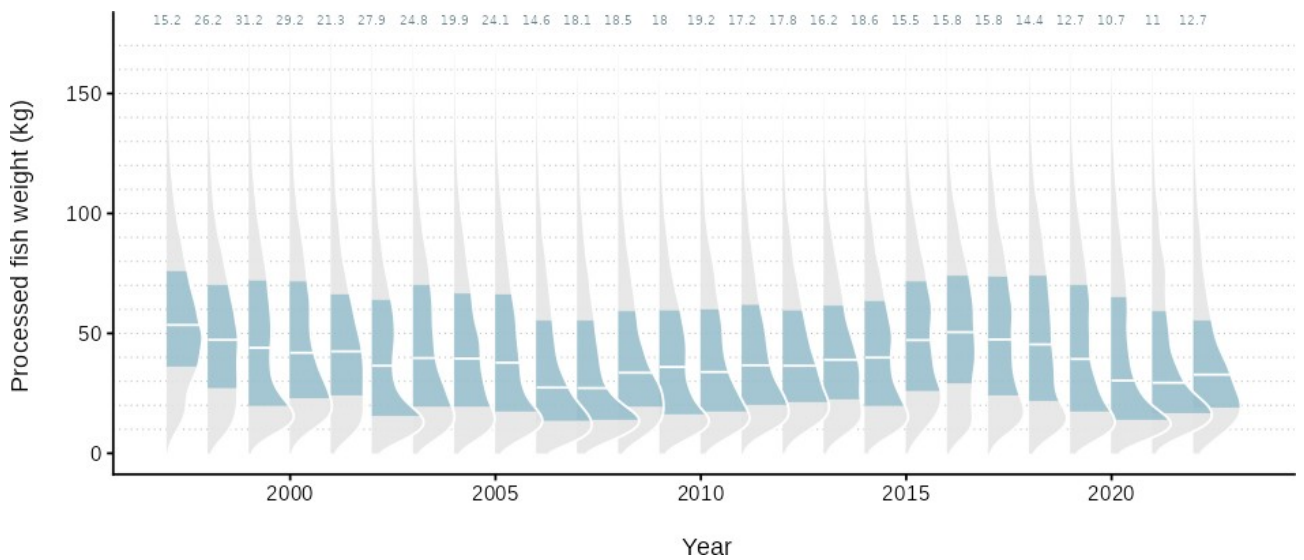


Figure 11 The distribution in processed weights (kg) of broadbill swordfish caught in the ETBF. The horizontal line in each annual distribution represents the median weight and shaded blue area the 50th percentiles (source: Tremblay- Boyer and Williams, 2023b).

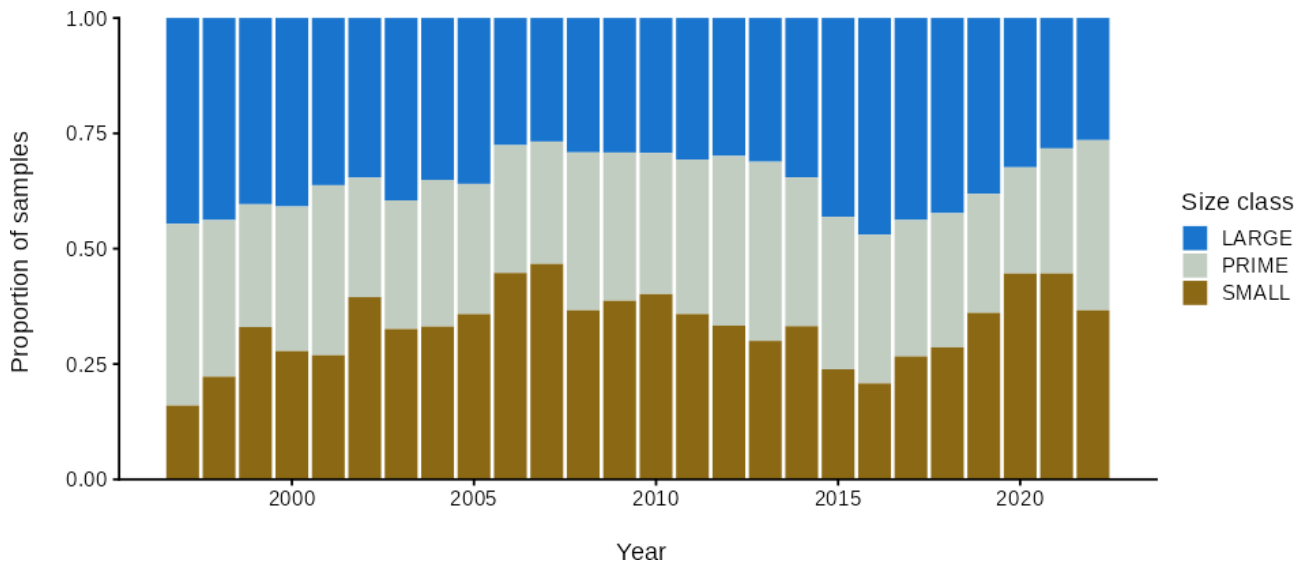


Figure 1 Size distribution of broadbill swordfish caught in the ETBF across small, prime, and large size classes (source: Tremblay-Boyer and Williams, 2023b).

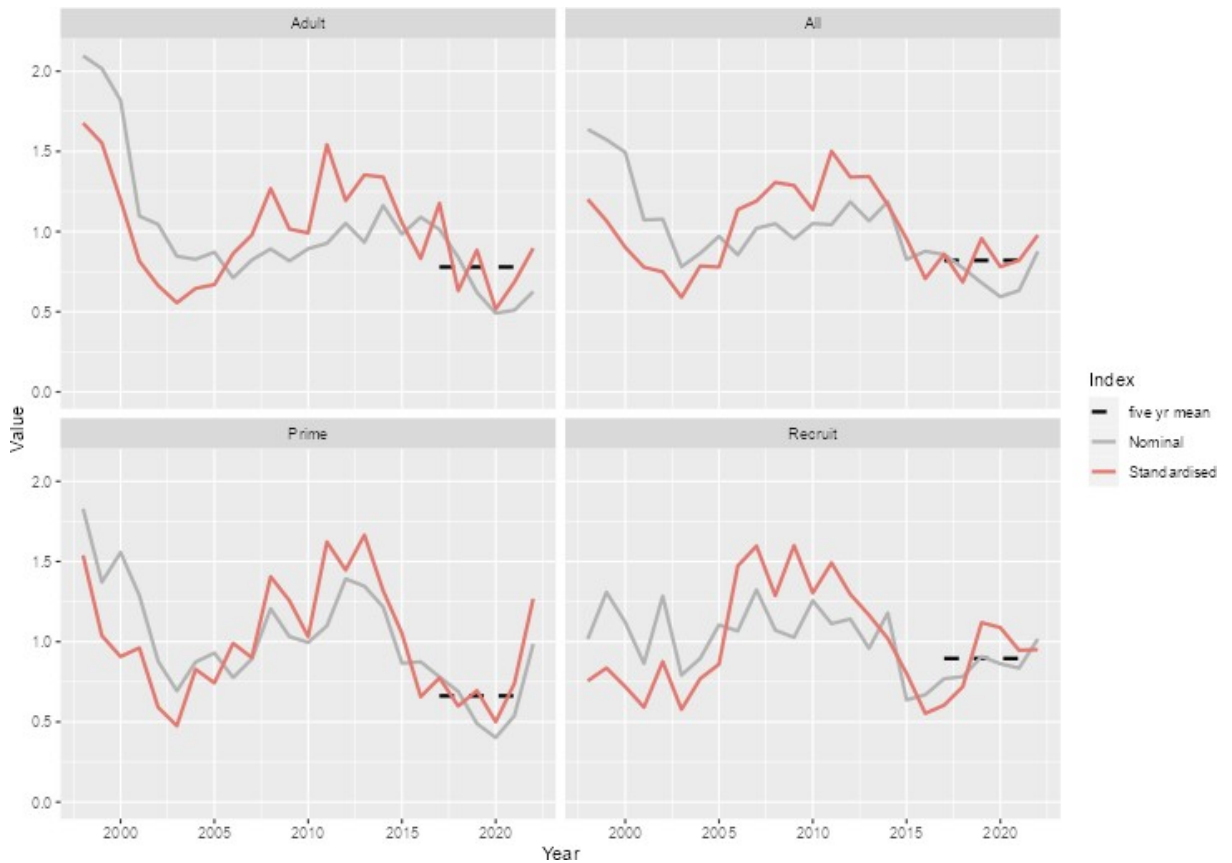


Figure 2 Nominal and standardised CPUE time series for broadbill swordfish in the ETBF across size classes and the recent five-year average (2017-2021) (source: Tremblay-Boyer and Williams, 2023c).

Stock Status

Indicator	Comment
Stock Structure	The results of genetic studies support a separate south-western Pacific stock of Broadbill Swordfish. At its July meeting (TTRAG 38) TTRAG agreed, although there is limited data on swordfish movements, the current available data suggests the swordfish stock movements are predominantly north/south rather than east/west within the Australian region. The RAG agreed that this information supports the hypothesis that there is a swordfish sub stock within Australia's exclusive economic zone. The RAG recognised that further research should be undertaken to further reduce the uncertainty of swordfish stock structure. Please refer TTRAG 38 Minutes, Agenda Item 5.1 – Harvest Strategy Review .
WCPO ⁵ Stock Assessment – Stock wide status	<p>Last assessment: 2021⁶</p> <p>Overfished⁷: Highly Unlikely</p> <p>Overfishing⁸: Unlikely</p> <p>Broadbill Swordfish were last assessed in 2021 (Ducharme-Barth et al., 2021) using data through to 2019. The outcomes of the assessment are on average more optimistic compared to the 2017 assessment, but the estimated uncertainty has increased. A short summary:</p> <ul style="list-style-type: none"> • Broadbill swordfish are not overfished. The median estimate of spawning biomass was 0.39 B₀ with a range (80% CI) of 0.18-0.79. There is a 10% probability that spawning biomass is below 0.2 B₀. • Broadbill swordfish are unlikely to be subject to overfishing. Fishing mortality was estimated to be 0.47 of F_{MSY} with a range (80% CI) of 0.25-1.29. There is a 20% probability that fishing mortality is above F_{MSY}. <p>Next assessment: 2025</p>
WCPFC Scientific Committee Management advice 2021	<ul style="list-style-type: none"> • The outcomes of the assessment are on average more optimistic in relation to the 2017 assessment, but the estimated uncertainty has increased. Noting that a LRP for Southwest Pacific swordfish has not yet been adopted by WCPFC, SC17 noted that the median latest • Southwest Pacific swordfish spawning biomass is above both SB_{MSY} and the LRP 20%SBF=0 applied to tunas, and recent fishing mortality is below F_{MSY}. The stock is likely not experiencing overfishing (80% probability F<F_{MSY} and 20% probability F>F_{MSY}) and is likely not in an overfished condition (13% probability that SB_{latest}/SB_{MSY} < 1 and a 10% probability that SB_{latest}/SBF=0<0.2). • SC17 noted that the levels of fishing mortality and depletion in the diagnostic case differ

⁵ The stock assessment area for the SW-Pacific SWO stock covers the region of the south Pacific from 0-50oS and 140oE-130oW (excluding the smaller region 0-5oS,130-150oW)

⁶ The assessment covers the years 1952-2019.

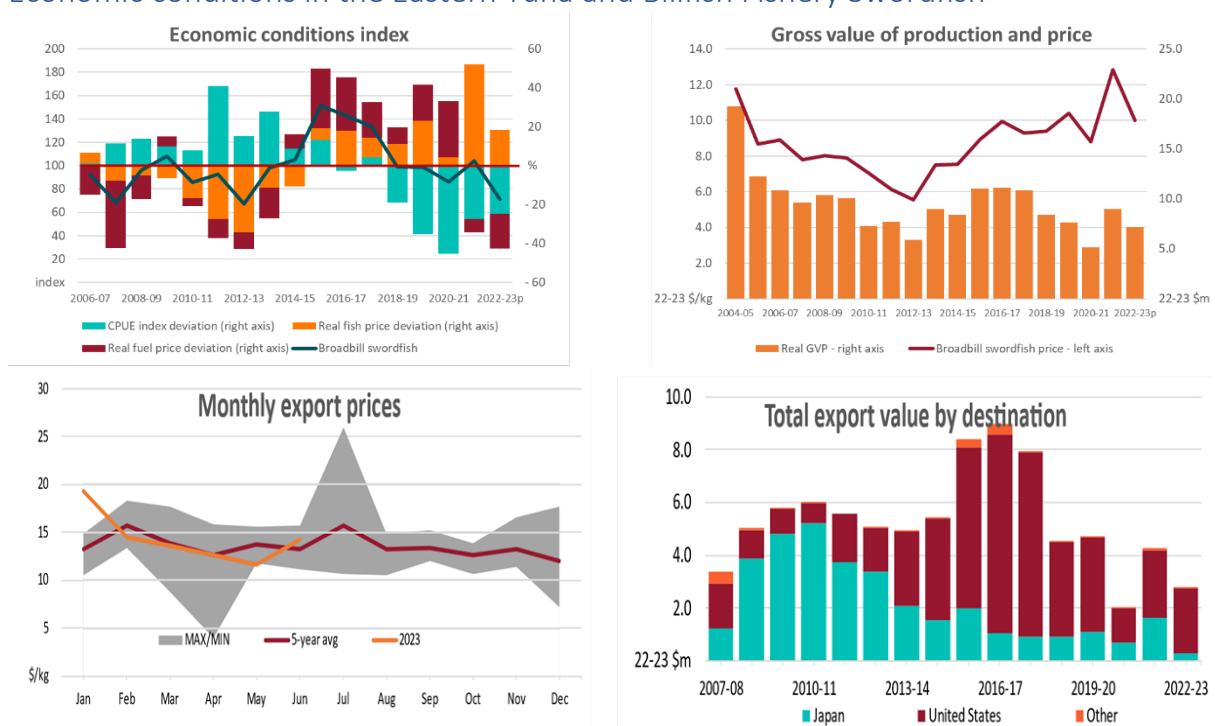
⁷ As the WCPFC has not adopted a Limit Reference Point for SWO, the indicator SB_{recent}/SBF=0 is used where in the latest assessment SB_{recent} refers to the mean annual spawning biomass over the period 2015-19 and SBF=0 is the estimated average annual spawning biomass over the period 2009-18 in the absence of fishing. No Target Reference Point has yet been adopted for SWO.

⁸ The indicator F_{recent}/F_{MSY} is used to estimate fishing pressure on the stock where in the latest assessment F_{recent} is the mean fishing mortality over the period 2015-19 and F_{MSY} is the fishing mortality at Maximum Sustainable Yield (MSY).

between the two model regions, with fishing mortality higher in Region 1 but spawning biomass depletion greater (more depleted) in Region 2. SC17 noted that over the past two decades, the majority of catch has been taken by a combination of swordfish targeting fleets (in the area south of 20°S; 42% of catches) and fleets taking swordfish as a bycatch on the high seas (in particular in the eastern stock area north of 20°S; 34% of catches).

- SC17 recommended that research priorities for this stock include directed longitudinal tagging of swordfish and a feasibility study on the utility of Close Kin Mark Recapture (CKMR).
- SC17 noted the current measure (CMM 2009-03) for this stock does not contain provisions to limit total fishing mortality on the stock and emphasized the continued importance of WCPFC to develop a revised and strengthened CMM that will ensure the ongoing future sustainability of the Southwest Pacific swordfish. SC17 noted that the suite of catch projections requested by WCPFC16, which are to be undertaken by the SSP postSC17 and prior to WCPFC18, are intended to test the future likely state of the stock under a range of potential future catch or effort scenarios. This information will inform the revision of the future measure.

Economic conditions in the Eastern Tuna and Billfish Fishery Swordfish



Notes: Economic conditions index (and component indices) 2006–07 to 2022–23 average = 100. Deviation represents percentage difference of each component index from long-term average. Monthly export prices based on fresh or chilled swordfish exports. Total export value by destination based on all swordfish exports from Australia. 99% of swordfish exports are as ‘fresh or chilled’.

Sources: ABARES, ABS, FFA.

Application of the modified harvest strategy

- The modified harvest strategy was supported by both TTRAG (meeting 35, July 2022) and TTMAC (out of session, August 2022) and will be applied to calculate a TACC recommendation for the 2023 and 2024 fishing seasons.
- At its September meeting 36, TTRAG advice was derived from the modified swordfish HS. TTRAG recommended a RBC of 1047t, no change to the TACC for 2023 season.

- At its 86th AFMA Commission meeting (November 2022), the AFMA Commission agreed to modify the ETBF Harvest Strategy. The Commission noted, when making the modification to the ETBF Harvest Strategy, that the purpose of the modification is to explicitly account for recent low catch levels compared to the TACC and, in doing so, avoid unnecessary TACC reductions. The modification has been designed and tested assuming the level of recent under catching ceases.

RBCC Calculation

The mean sub-adult standardised CPUE for the years 2019–2022 (correctly rescaled by the mean of the 1998–2018 index used in the original MSE work, Hillary 2020) was 0.772. This is slightly below the lower limit of the buffer of 0.8 in the HCR, which means a decrease in the RBCC should result. Of note, this is an improvement in scalar value from previous iterations of the HS (e.g. Hillary et al., 2022), reflecting recent increases in the sub-adult standardised CPUE index.

The resulting prescribed reduction in RBCC from the standardised CPUE alone is a scalar of 0.953. This scalar is within the 10% maximum change constraint, so should normally be applied as is to the previous TAC. However, under the modified HS, current catches (723t) are below the original RBCC (998t) by a level greater than the difference between the RBCC and the recent TAC of 1,047t, so the recommended RBCC is set to the recent TAC (1,047 tonnes, no change) (Figure 2) (Hillary et al., 2022).

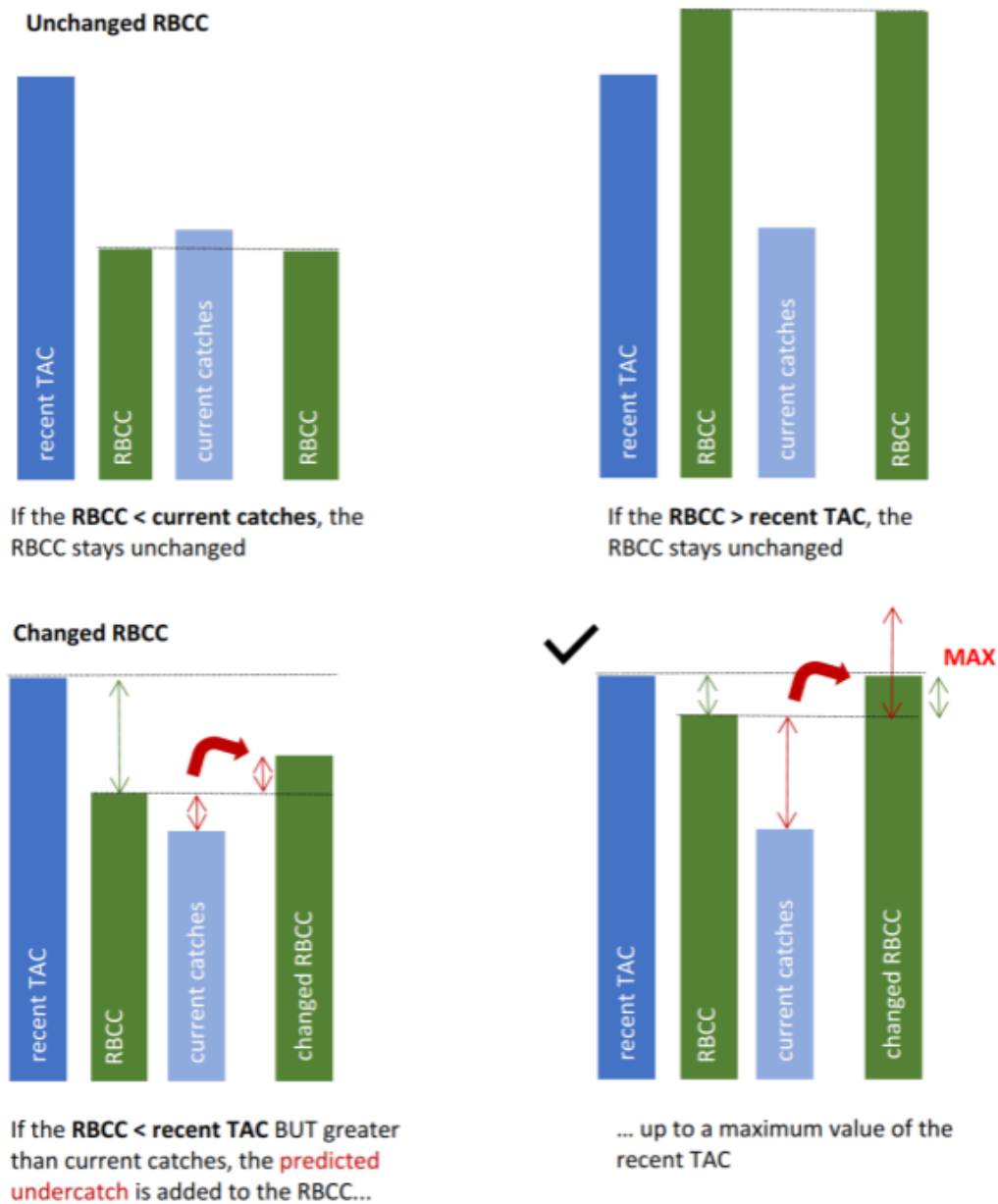


Figure 2: Illustration of the outcomes of the modified Harvest Strategy under different relative levels of recent TAC, RBCC (as prescribed by the original Harvest Strategy) and the predicted undercatch (i.e., the difference between the RBCC and current catches). The top row shows cases where the RBCC remained unchanged from the original recommendation, the bottom row shows cases where the RBCC is changed as a function of the extent of the predicted undercatch. The tick mark indicates the case applied for this year's Harvest Strategy update.

TTRAG TACC Advice for Broadbill Swordfish:

Broadbill swordfish were last assessed in the WCPO in 2021 using data up to 2019. TTRAG considered the available information and indicators and concluded:

- Broadbill swordfish are not overfished. The median estimate of spawning biomass (SB) depletion for the recent period (2018-2021; $SB_{\text{recent}}/SB_{F=0}$) was 0.39 with a range (80% CI) of 0.18-0.79. There is a 10% probability that depletion in spawning biomass is below 0.2.
- Broadbill swordfish are unlikely to be subject to overfishing. The median estimate of recent (2017- 2020) fishing mortality relative to FMSY ($F_{\text{recent}}/F_{\text{MSY}}$) was 0.47 with a range (80% CI) of 0.25-1.29. There is a 20% probability that fishing mortality is above F_{MSY} .
- The 2022 ETBF catch of broadbill swordfish was 723 t which represents 76% of the provisional total catch of broadbill swordfish within Region 1 of the southwest Pacific (0-50oS and 140-165oE). The average contribution is 67% over the previous five years (2017-2021).
- In the ETBF, the 2022 catch of broadbill swordfish (723 t) is below both the five-year and ten-year average catch in the ETBF of 846 t and 994 t respectively. Catches of broadbill swordfish in the ETBF have been gradually declining over time from a peak in the late 1990s and early 2000s, but have started to increase in the past 2 years since the lowest catches were reported in 2020.
- Economic conditions index for 2022 is below average with a distinct downward trend since 2021-2022.

There have been temporally sequential trends in the standardised CPUE indices for the different size classes (small, prime, large, combined) of broadbill swordfish that are consistent with a series of weak cohorts has moved through the fishery over the last few years. For all size groups, the standardised CPUE index appears to vary cyclically with a low period from 2016. There is an increase in the standardised CPUE indices from 2021 to 2022 for all size groups, except recruits where the index remains stable. The sub-adults group shows the steepest increase in 2022.

- There is no evidence to suggest that drivers for the sequence of poor recruitments are related to a decline in adult fish within the ETBF and may be related to environmental conditions.
- Industry members have previously raised strong concerns about the CPUE standardisation, which they consider does not reflect changes to fishing behaviours (avoidance due to a lack of market) over recent years. However, scientific members noted that while the overall nominal CPUE drops significantly in recent years (consistent with industry observations), the std-CPUE does not and thus considered it to be capturing some of recent changes in the fishery. Significant efforts have been made to enhance CPUE standardisation, and this work is ongoing
- The RAG advice was derived from implementation of the ETBF modified swordfish Harvest Strategy (endorsed by TTMAC in 2022). The ETBF harvest strategy for Swordfish, modified in 2022, was used to recommend the RBCC setting of the 2023 TACC. No further exceptional circumstances were identified by TTRAG 39.
- The harvest strategy has been MSE tested to address the low catch to TACC. The additional MSE testing of the modified HS adequately addressed the exceptional circumstances of the low catch to TACC. Noting

that, now that the scenario of under-catch to the TAC has been explored, the exceptional circumstances is no longer applied as the new modified harvest strategy has been accepted.

TTRAG TACC recommendation 2024:

1,047t

Striped marlin

Striped marlin (*Kajikia audax*) in the WCPO were last assessed in 2019 (Ducharme-Barth et al., 2019). SC15 noted that recent catches are approximately half the MSY, and that recent fishing mortality is slightly less than the fishing mortality that would result in MSY.

Indicators summary:

- In the ETBF, the 2022 catch of striped marlin (283 t) is above both the five-year and ten-year average catch in the ETBF of 239 t and 257 t respectively (Figure 3). Catches of striped marlin in the ETBF have been declining gradually over time since a peak in 2001, but increased sharply in 2022.
- The 2022 ETBF catch of striped marlin represents 56% of the provisional total catch of striped marlin within Region 1 (0-50oS and 140-165oE). The average contribution is 60% over the previous five years (2017-2021), with a maximum of 72% in 2006 (Tremblay-Boyer and Williams, 2023b).
- Striped marlin are potentially overfished. The median estimate of spawning biomass (SB) depletion for the recent period (2014-2017; $SB_{recent}/SBF=0$) was 0.2 with a range (80% CI) of 0.09-0.46. There is a 50% probability that depletion in spawning biomass is below 0.2.
- Striped marlin are potentially subject to overfishing. Estimates of fishing mortality were highly uncertain, with the median estimate of recent (2013-2016) fishing mortality relative to FMSY ($F_{recent}/FMSY$) of 0.91 with a range (80% CI) of 0.31-1.89. There is a 44% probability that fishing mortality is above FMSY.
- The annual size distribution shows a single mode between about 50 and 70 kg throughout the time series with a decline in median size over time but a slight increase from 2021 to 2022 (Figure 4 and 5) (Tremblay-Boyer and Williams, 2023b).
- The standardised CPUE index for striped marlin has been relatively stable over the last two decades (Figure 17.). Standardised CPUE reached a minimum in 2020, but it has increased sharply, above the five-year recent average in 2022 (Tremblay-Boyer and Williams, 2023c).

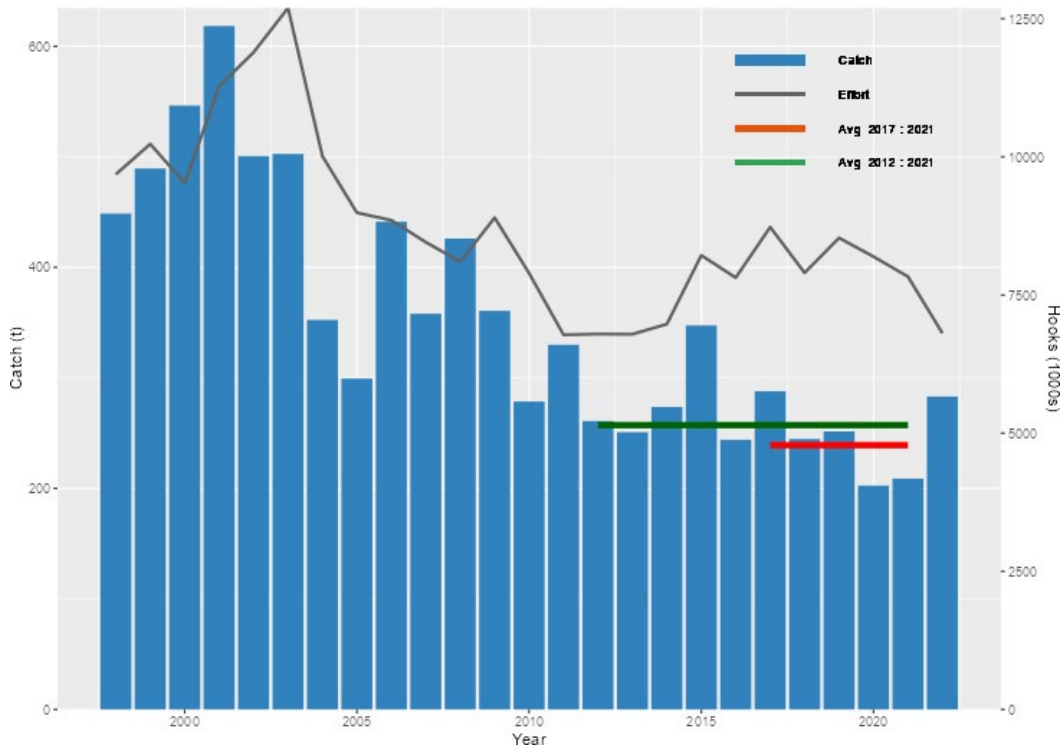


Figure 3 Total striped marlin catch (tonnes) and overall effort (hooks) in the ETBF. The average catch is shown for the periods 2012-21 (green) and 2017-21 (red).

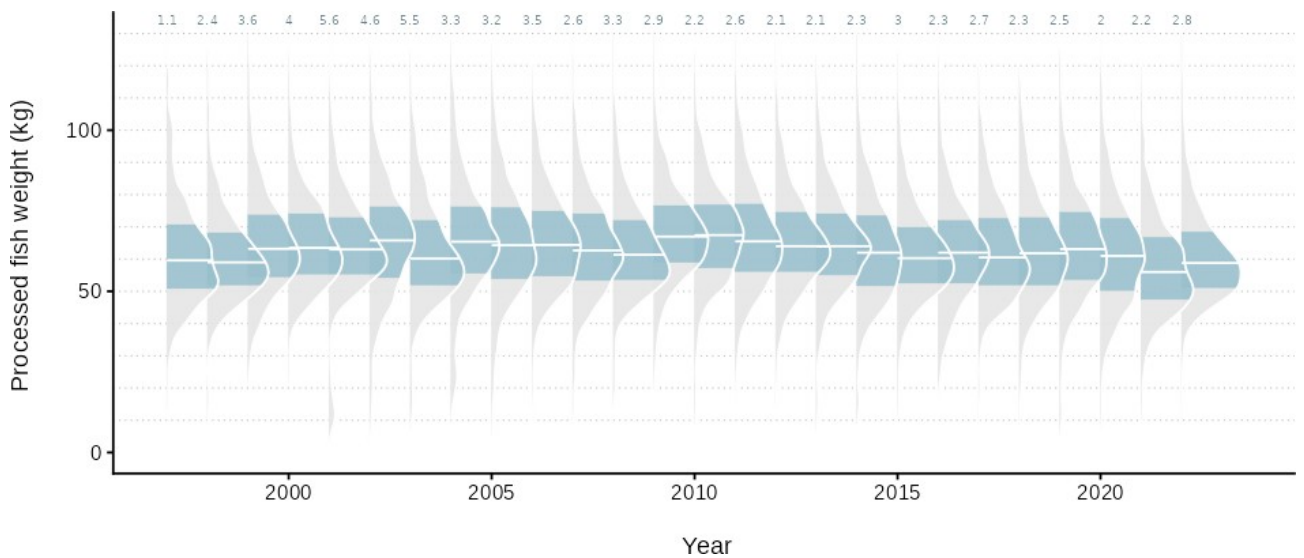


Figure 4 The distribution in processed weights (kg) of striped marlin caught in the ETBF. The horizontal line in each annual distribution represents the median weight and shaded blue area the 50th percentiles (source: Tremblay-Boyer and Williams, 2023b).

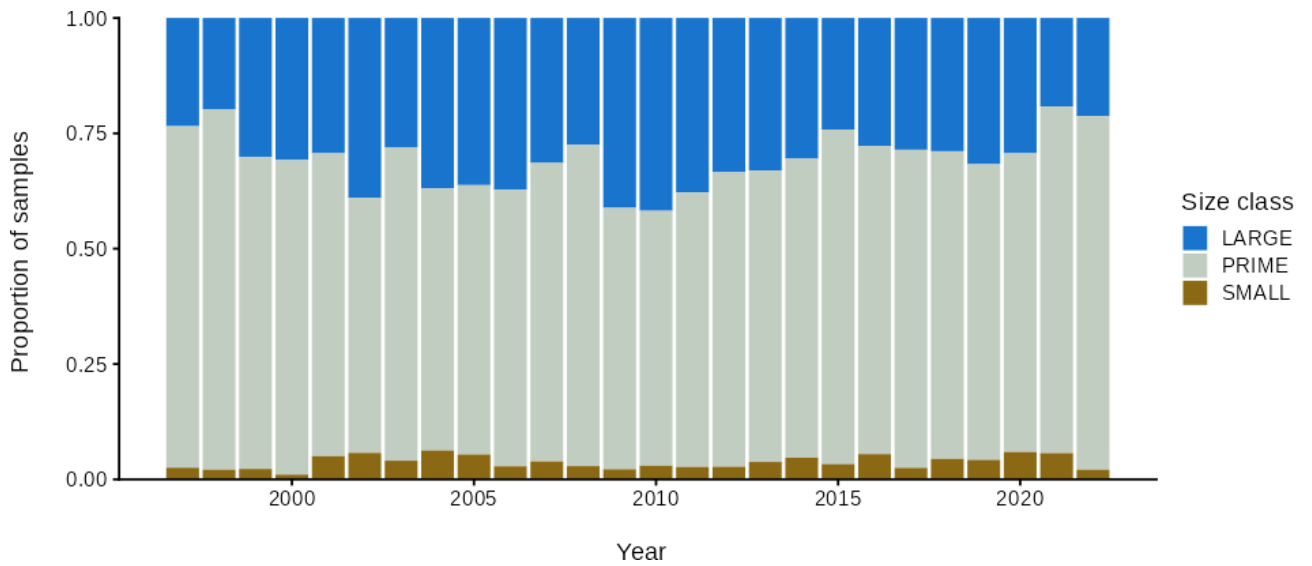


Figure 5 Size distribution of striped marlin caught in the ETBF across small, prime, and large size classes (source: Tremblay-Boyer and Williams, 2023b).

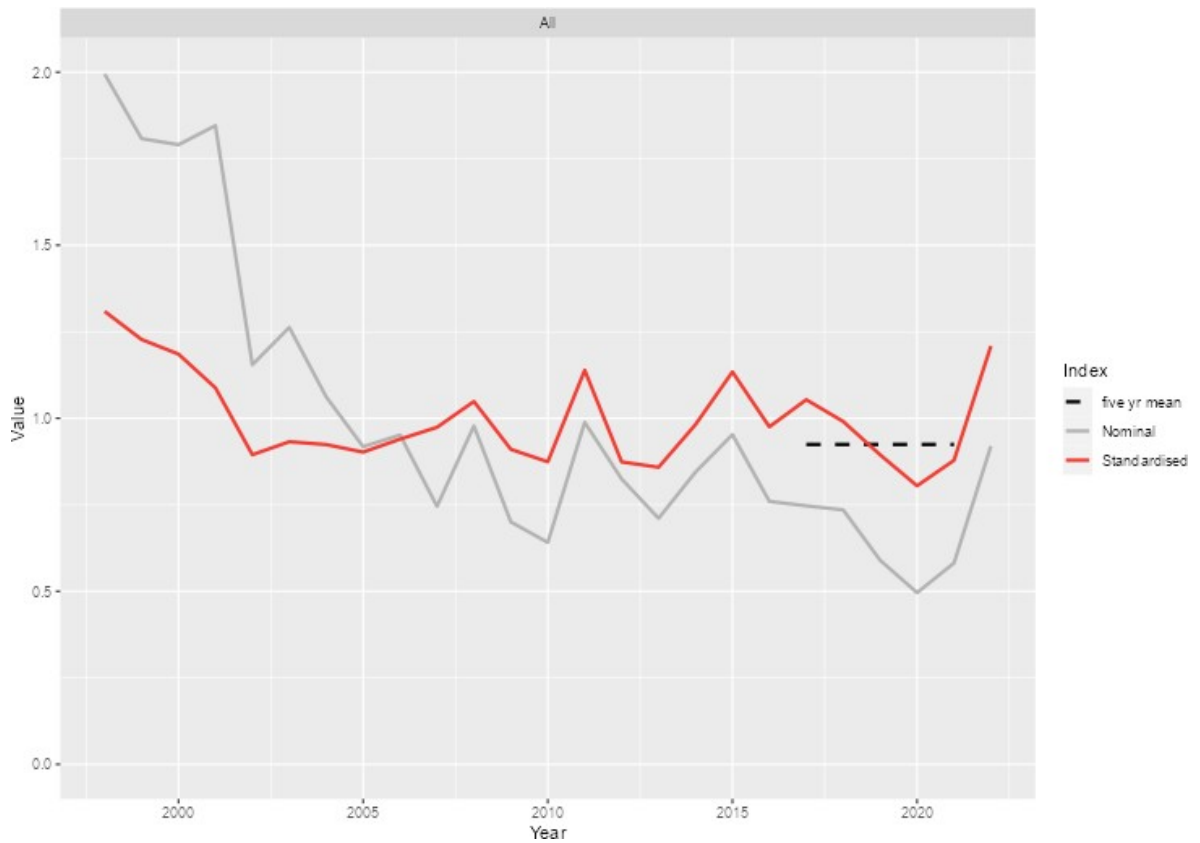


Figure 17 Nominal and standardised CPUE time series for striped marlin in the ETBF across size classes and the recent five-year average (2017-2021) (source: Tremblay-Boyer)

Stock Status Striped Marlin

Indicator	Comment
Stock Structure	The results of genetic studies support a separate south-western Pacific stock of Striped Marlin. TTRAG therefore considered that Striped Marlin is a single stock within the south-west Pacific.
WCPO ⁹ Stock Assessment – Stock wide status	<p>Last assessment 2019¹⁰</p> <p>Overfished¹¹: Likely</p> <p>Overfishing¹²: Undergoing</p> <ul style="list-style-type: none"> • The striped marlin stock was last assessed in 2019 (Ducharme-Barth et al. 2019), so the major indicators with respect to the stock assessment haven't changed since 2019. • Striped marlin are potentially overfished. The median estimate of spawning stock biomass was 0.2B0 with 69% of model runs below the value expected to support catches at MSY. • Striped marlin are potentially subject to overfishing. Estimates of fishing mortality were very uncertain, ranging from 0.03-3.5 of FMSY with the median estimate at 0.91 FMSY and 56% of model runs estimating that overfishing is occurring. Fishing mortality has increased continuously (since major fishing operations began post-war) on both juveniles and adults up to 2010 and has been slowly decreasing since then. Recruitment has shown a general downward trend over the assessment period consistent with previous assessments, but with recent recruitment somewhat above the average predicted by the stock-recruit relationship. <p>Next assessment: TBA</p>
WCPFC Scientific Committee Management advice 2019	<ul style="list-style-type: none"> • SC15 noted that there are no agreed limit reference points for the WCPO billfish. • SC15 noted that recent catches are approximately half the MSY, and that recent fishing mortality is slightly less than the fishing mortality that would result in MSY. • SC15 recommended that WCPFC16 consider measures to reduce the overall catch of this stock, including through the expansion of the geographical scope of CMM2006-04, in order to cover the distribution range of the stock.

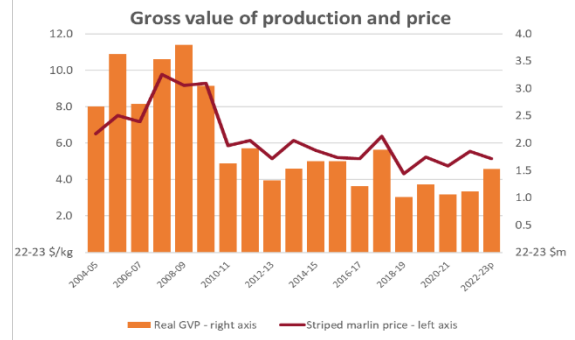
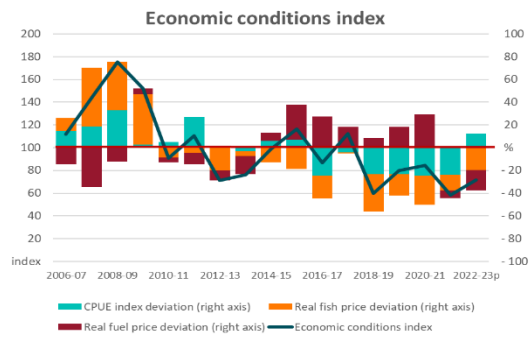
⁹ The stock assessment area for SW-Pacific STM covers the region of the south Pacific from 0-50oS and 140oE-130oW.

¹⁰ The assessment covers the years 1952-2017. The assessment covers the years 1952-2017.

¹¹ As the WCPFC has not adopted a Limit Reference Point for STM the indicator SB_{recent}/SB_{MSY} is used where in the latest assessment SB_{MSY} refers to the mean annual spawning biomass at Maximum Sustainable Yield (MSY) and SB_{recent} is the estimated average annual spawning biomass over the period 2008-17 in the absence of fishing. No Target Reference Point has yet been adopted for STM.

¹² The indicator F_{recent}/F_{MSY} is used to estimate fishing pressure on the stock where in the latest assessment F_{recent} is the mean fishing mortality over the period 2014-17 and F_{MSY} is the fishing mortality at Maximum Sustainable Yield (MSY).

Economic conditions in the Eastern Tuna and Billfish Fishery Striped Marlin



TTRAG TACC Advice for Striped Marlin:

Striped marlin (*Kajikia audax*) in the WCPO were last assessed in 2019. TTRAG considered the available information and indicators and concluded:

- Striped marlin are potentially overfished. The median estimate of spawning biomass (SB) depletion for the recent period (2014-2017; $SB_{\text{recent}}/SB_{F=0}$) was 0.2 with a range (80% CI) of 0.09-0.46. There is a 50% probability that depletion in spawning biomass is below 0.2.
- Striped marlin are potentially subject to overfishing. Estimates of fishing mortality were highly uncertain, with the median estimate of recent (2013-2016) fishing mortality relative to F_{MSY} ($F_{\text{recent}}/F_{\text{MSY}}$) of 0.91 with a range (80% CI) of 0.31-1.89. There is a 44% probability that fishing mortality is above F_{MSY} .
- Recruitment has shown a general downward trend over the assessment period consistent with previous assessments, but with recent recruitment somewhat above the average predicted by the stock-recruit relationship.
- Overall catches from the stock have declined over the past 15 years while biomass has been relatively stable but at historically low levels since 2005.
- The 2022 ETBF catch of striped marlin was 283 t which represents 56% of the provisional total catch of striped marlin within Region 1 of the southwest Pacific (0-50oS and 140-165oE). The average contribution is 60% over the previous five years (2017-2021), with a maximum of 72% in 2006.
- In the ETBF, the 2022 catch of striped marlin (283 t) is above both the five-year and ten-year average catch in the ETBF of 239 t and 257 t respectively. Catches of striped marlin in the ETBF have been declining gradually over time since a peak of 730 t in 2001 but increased sharply in 2022.
- The distribution of processed fish weights of striped marlin has been stable over time with a recent minor decline apparent in the proportion of large fish harvested.
- Over the past two years, there have been notably fewer tags applied in New Zealand and Australia compared to the long-term average. This trend may be connected to La Niña.
- Economic conditions index for 2022 is below average with an upward trend in 2022-2023.
- TTRAG reviewed the following indicators in reference to triggering a review of the HS for Striped Marlin:
 - **The most recent WCPFC stock assessment of south western Pacific Striped Marlin**
 - **Any changes in targeting practice**
 - **Industry desire to increase catch.**
 - i. TTRAG assessed the most recent WCPFC stock assessment of south western Pacific Striped Marlin which was in 2019, and noted there has not been a new stock assessment since last year's TTRAG recommendation.
 - ii. Industry members noted there have been no changes in targeting practices. The 2022 catch of striped marlin (283 t) is above both the five-year and ten-year average catch in the ETBF of 239 t and 257 t

respectively. Catches of striped marlin in the ETBF have been declining gradually over time since a peak of 730 t in 2001, but increased sharply in 2022. These changes in catch have mirrored changes in overall effort in the ETBF. The RAG noted that increase of striped marlin catches could increase of striped marlin catches, if yellowfin tuna catches increase.

iii. Presently there is no change in industry's desire to increase catch.

TTRAG does not anticipate conditions that would trigger a review of the constant catch HS.

**TTRAG TACC recommendation 2024:
351t**

Yellowfin tuna

A new stock assessment for yellowfin tuna (*Thunnus albacares*) in the WCPO was conducted in 2023 (Magnusson et al., 2023). Preliminary results were more pessimistic than the 2020 stock assessment (Vincent et al., 2020), with the stock estimated to be more depleted (lower depletion level) and higher levels of fishing mortality. The total catch of WCPO yellowfin tuna for 2022 was 721,169 mt which was lower than the 2021 level.

Indicators summary:

- In the ETBF, the 2022 catch of yellowfin tuna (1358 t) was below both the five-year and ten-year average catch in the ETBF of 1754 t and 1699 t respectively (Figure 18). Catches of yellowfin tuna in the ETBF have been stable at values around 1500 t after a peak catch in 2003, but have declined in the last few years (since 2019).
- The 2022 ETBF catch of yellowfin tuna represents 13% of the provisional total catch of yellowfin tuna within region 5 (10-50oS and 140-170oE). The average contribution is 15% over the previous five years (2017-2021), with a maximum of 20% in 2019 (Tremblay-Boyer and Williams, 2023a).
- Yellowfin tuna are not overfished. The median estimate of spawning biomass (SB) depletion for the recent period (2018-2021; $SB_{\text{recent}}/SB_{F=0}$) was 0.47 with a range (80% CI) of 0.42–0.52. None of the model runs estimated depletion to be below 0.2.
- Yellowfin tuna are not subject to overfishing. The median estimate of recent (2017-2020) fishing mortality relative to FMSY ($F_{\text{recent}}/F_{\text{MSY}}$) was 0.50 with a range (80% CI) of 0.41-0.62. None of the model runs estimated recent fishing mortality to be above FMSY.
- The annual size distribution (Figure 19) shows some variability in the median value across years with no clear trends in recent years and bimodality in 2022 (Tremblay-Boyer and Williams, 2023b). The frequency of smaller individuals (recruits) over time in the size samples has been variable over time, with most samples from 2022 coming from the 'Small' category in contrast to 2021 when most samples came from the 'Prime' category (Figure 20) (Tremblay-Boyer and Williams, 2023b).
- Standardised CPUE indices for yellowfin tuna in the ETBF are variable for all size classes (recruit, adult, and all) (Figure 21). For all size classes, the standardised CPUE in 2022 was above the recent five-year average (Tremblay-Boyer and Williams, 2023c).

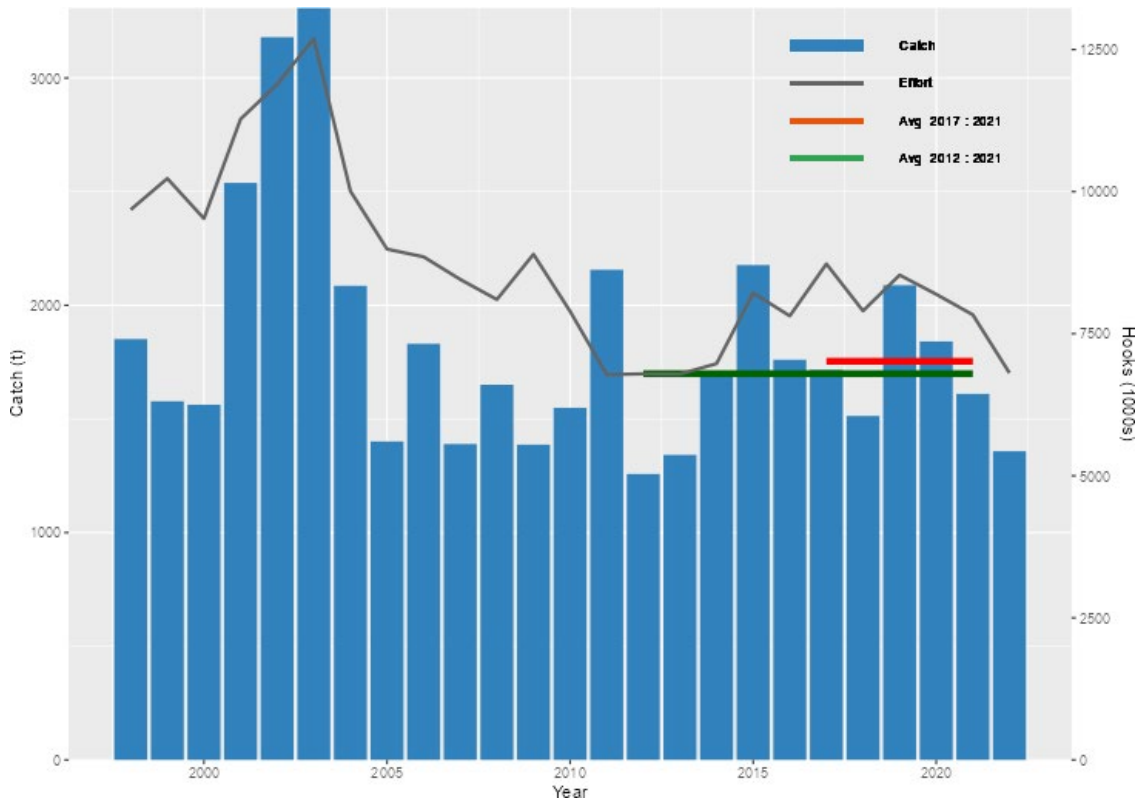


Figure 18 Total yellowfin tuna catch (tonnes) and overall effort (hooks) in the ETBF. The average catch is shown for the periods 2012-21 (green) and 2017-21 (red).

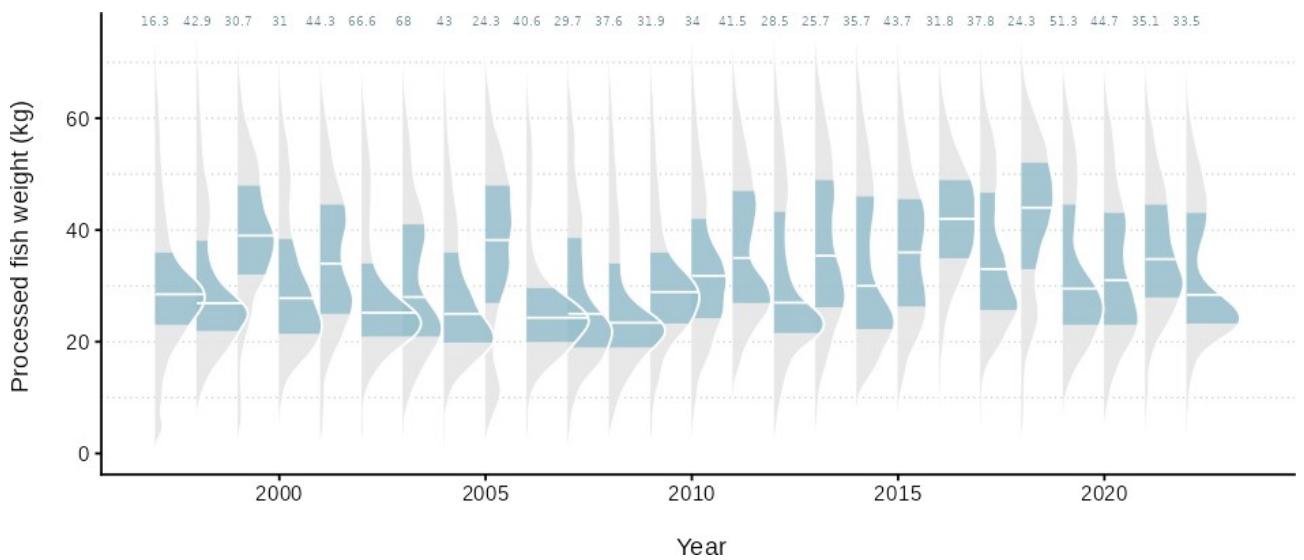


Figure 19 The distribution in processed weights (kg) of yellowfin tuna caught in the ETBF. The horizontal line in each annual distribution represents the median weight and shaded blue area the 50th percentiles (source: Tremblay-Boyer and Williams, 2023b).

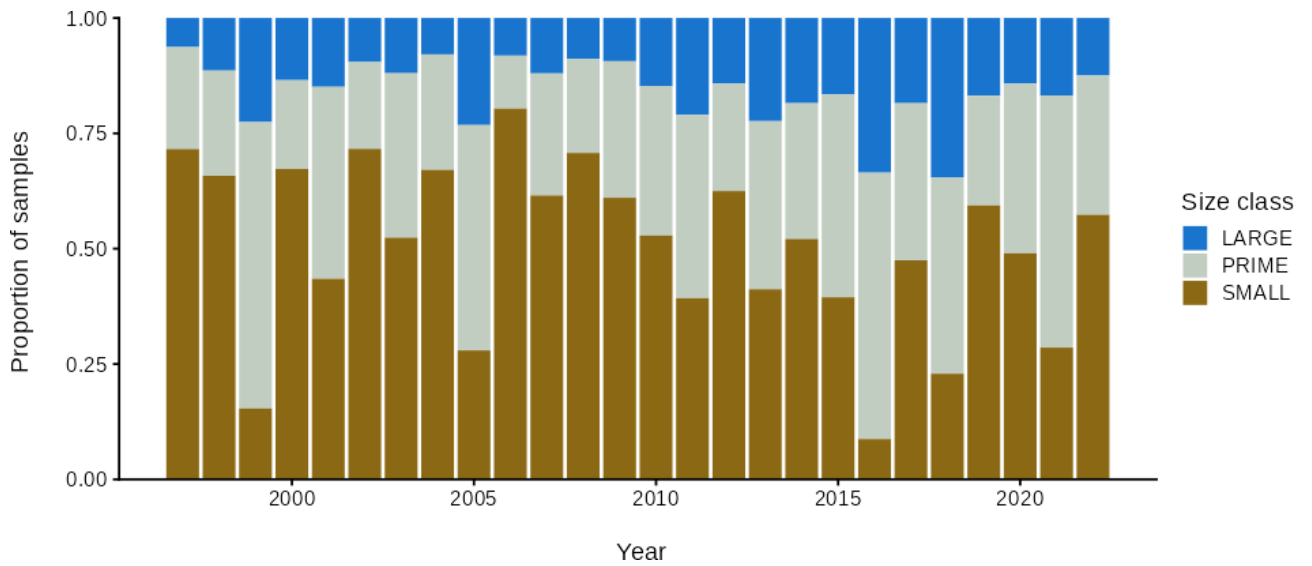


Figure 20 Size distribution of yellowfin tuna caught in the ETBF across small, prime, and large size classes (source: Tremblay-Boyer and Williams, 2023b).

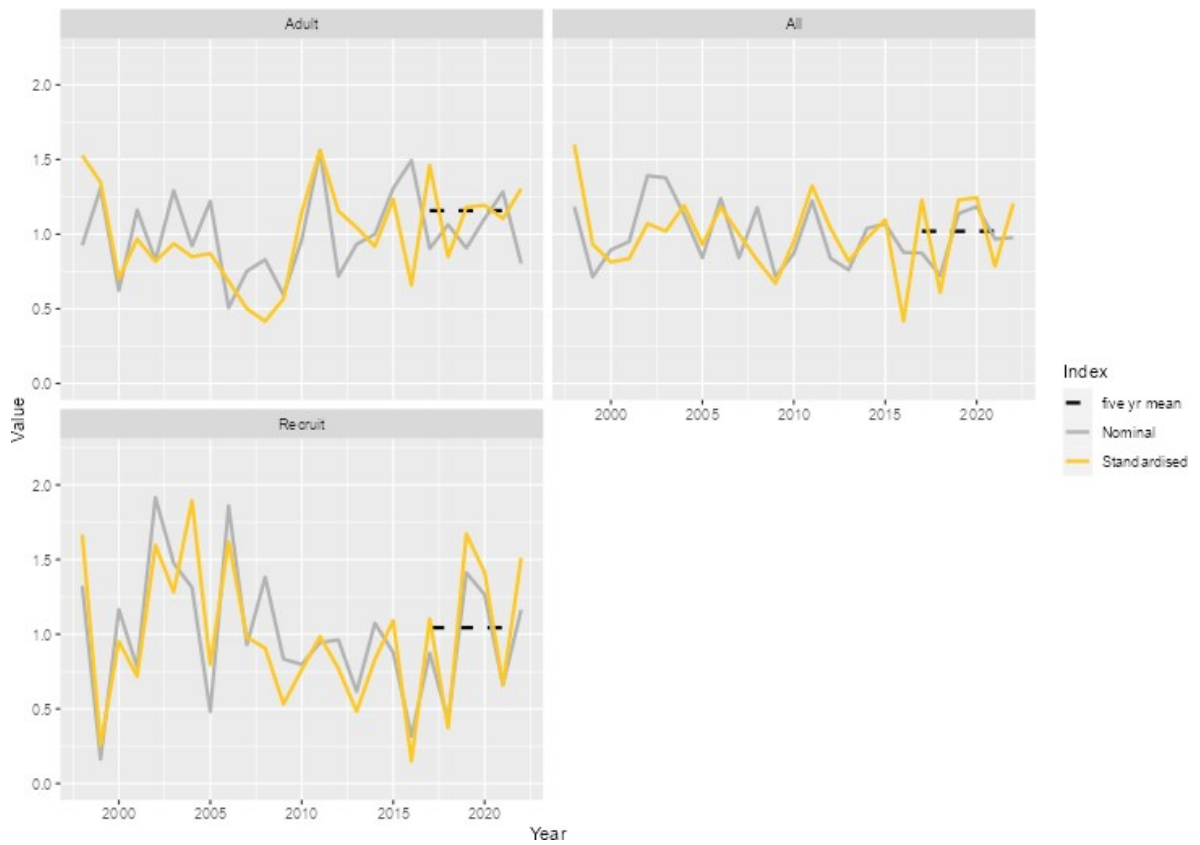
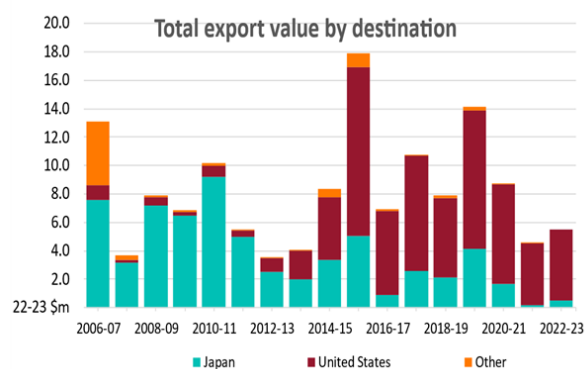
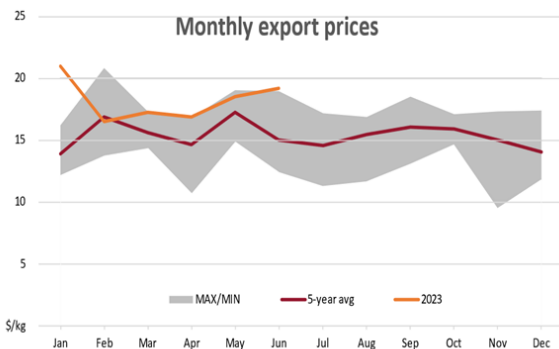
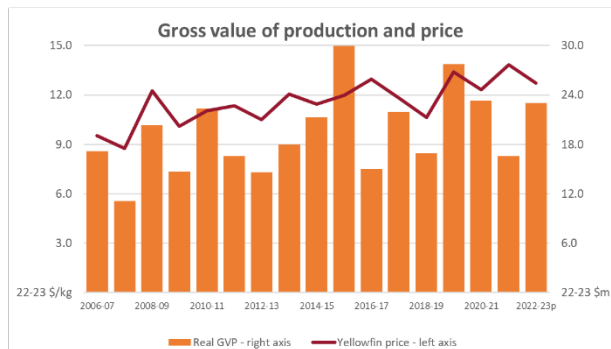
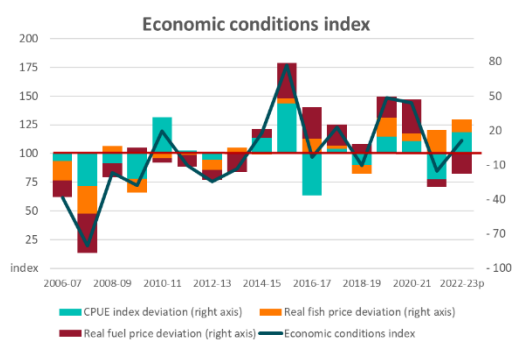


Figure 21 Nominal and standardised CPUE time series for yellowfin tuna in the ETBF across size classes and the recent five-year average (2017-2021) (source: Tremblay-Boyer and Williams, 2023c).

Stock Status Yellowfin Tuna

Indicator	Comment
Stock Structure	Considered a single stock in the Western and Central Pacific Ocean (WCPO) – connectivity between ETBF and equatorial regions uncertain but may be small.
WCPO Stock Assessment – Stock wide status	<p>Preliminary results</p> <p>Last assessment: 2023.</p> <p>Overfished: Unlikely</p> <p>Overfishing: Unlikely</p> <p>The last full assessment of yellowfin tuna was in 2023. Please note the preliminary estimates below.</p> <p>Next assessment: TBA</p>
WCPFC Scientific Committee noted the preliminary estimates 2023	<ul style="list-style-type: none"> • SC19 noted that the preliminary estimate of total catch of WCPO yellowfin tuna for 2022 was 721,169 mt which was lower than the 2021 level. Longline catch in 2022 (84,232 mt) was higher than the 2021 catch, but lower than the recent 10-year average. Purse-seine catch in 2022 (379,715 mt) was similar to the 2021 catch, and higher than the recent 10-year average. • The 2023 WCPO yellowfin tuna stock assessment median depletion from the model grid for the recent period (2018–2021; $SB_{\text{recent}}/SB_{F=0}$) was estimated at 0.47 (10th to 90th percentile interval of 0.42 to 0.52, including estimation and structural uncertainty). For all models in the grid $SB_{\text{recent}}/SB_{F=0}$ was above the biomass limit reference point. The recent median fishing mortality (2017–2020; $F_{\text{recent}}/F_{\text{MSY}}$) was 0.50 (10th to 90th percentile interval of 0.41 to 0.62, including estimation and structural uncertainty, Table YFT-02). For all models in the grid, $F_{\text{recent}}/F_{\text{MSY}}$ was less than one. • SC19 noted that the spawning potential of the stock has become more depleted across all model regions until around 2010, after which it has become more stable, or shown a slight increase. • SC19 also noted that average fishing mortality rates for juvenile and adult age-classes have increased throughout the period of the assessment, although more so for juveniles which have experienced considerably higher fishing mortality than adults. In the recent period (2015-2021), a sharp increase in juvenile fishing mortality was estimated, while adult fishing mortality stabilized. • The objective for yellowfin tuna in CMM 2021-01 (the Tropical Tuna Measure) to maintain the spawning biomass depletion ratio at or above the average $SB/SB_{F=0}$ for 2012-2015 is being achieved. $SB_{\text{recent}}/SB_{F=0}$ (47%) exceeds the average $SB/SB_{F=0}$ for 2012-2015. • The interim objective for the yellowfin tuna stock under CMM 2022-01 is to maintain the depletion level of the stock at or above the average $SB/SB_{F=0}$ for 2012-2015 and the recent depletion level of yellowfin tuna is close to the interim objective. SC19 noted that while the projection results based on the 2023 yellowfin tuna assessment were not available for SC19 to review, this information will be available when for the 4th tropical tuna management workshop and will provide the Commission guidance on future expected levels of fishing mortality and the outcomes relative to the interim or future management objectives.

Economic conditions in the Eastern Tuna and Billfish Fishery Yellowfin tuna



Notes: Economic conditions index (and component indices) 2006–07 to 2022–23 average = 100. Deviation represents percentage difference of each component index from long-term average. Monthly export prices based on fresh or chilled yellowfin tuna exports. Total export value by destination based on all yellowfin tuna exports from Australia. 99% of yellowfin tuna exports are as 'fresh or chilled'.

Sources: ABARES, ABS, FFA.

TTRAG TACC Advice for Yellowfin Tuna:

A new stock assessment for yellowfin tuna (*Thunnus albacares*) in the WCPO was conducted in 2023. TTRAG considered the available information and indicators and concluded:

- Yellowfin tuna are not overfished. The median estimate of spawning biomass (SB) depletion for the recent period (2018-2021; $SB_{\text{recent}}/SBF=0$) was 0.47 with a range (80% CI) of 0.42–0.52. None of the model runs estimated depletion to be below 0.2.
- Yellowfin tuna are not subject to overfishing. The median estimate of fishing mortality was 0.50 of F_{MSY} with a range (80% CI) of 0.41-0.62 and there is a 0% probability that fishing mortality was above F_{MSY} .
- The 2022 ETBF catch of yellowfin tuna was 1358 t which represents 13% of the provisional total catch of yellowfin tuna within region 5 (10-50oS and 140oE-170oW). The average contribution is 15% over the previous five years (2017-2021).
- In the ETBF, the 2022 catch of yellowfin tuna (1358 t) was below both the five-year and ten-year average catch in the ETBF of 1754 t and 1699 t respectively. Catches of yellowfin tuna in the ETBF have been stable at values around 1500 t after a peak catch in 2003 but have declined in the last few years (since 2019).

- The annual size distribution shows some variability in the median value across years with no clear trends in recent years and bimodality in 2022. The frequency of smaller individuals (recruits) over time in the size samples has been variable over time, with most samples from 2022 coming from the 'Small' category in contrast to 2021 when most samples came from the 'Prime' category
- Standardised CPUE indices for yellowfin tuna in the ETBF are variable for all size classes (recruit, adult, and all) (Figure 21). For all size classes, the standardised CPUE in 2022 was above the recent five-year average
- Economic conditions index for 2022 is above average with an upward trend in 2022-2023.

**TTRAG TACC recommendation 2024:
2,400t**



Climate & Ecosystem Status Report

Eastern Tuna and Billfish Fishery

June 2023



Historical Period

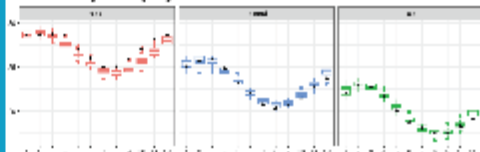
Climate Drivers



Monthly Southern Oscillation Index¹ ([link](#)).

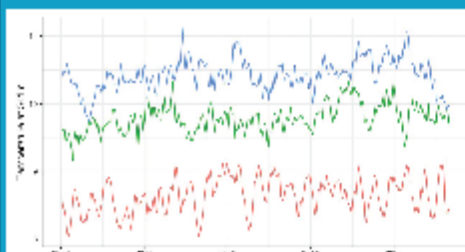
Sea Surface Temperature

Monthly SST (°C) from 2000-2022:



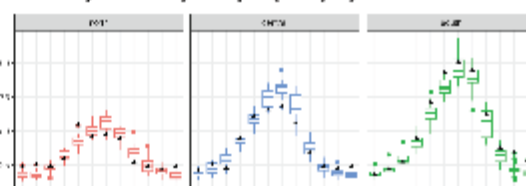
Seasonal SST dynamics for each region, with black triangles show the most recent monthly SST (July 2022-June 2023). SST last year was warmer than average in the North, but cooler than average in Central and South regions. This may support higher recruitment.

Subsurface Temperature



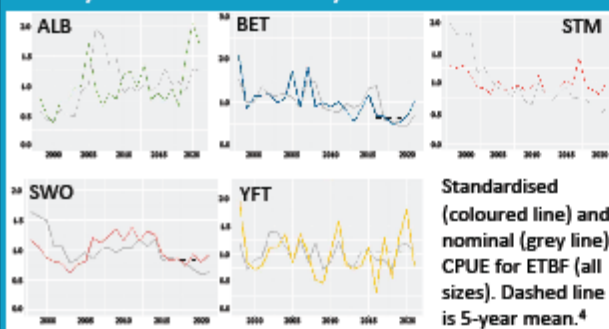
Temperature at 500 m indicates sub-surface ocean structure. All regions have warmed over time, but more so in the Central and South regions³.

Monthly Mixed Layer Depth (MLD; m) from 2000-2022:



MLD indicates the depth of surface mixing and can impact the distribution of top predators. MLD can be deeper in the South & Central regions but varies seasonally. Black triangles show the most recent monthly MLD (Jun 2022-May 2023).

Ecosystem and Fishery



Standardised (coloured line) and nominal (grey line) CPUE for ETBF (all sizes). Dashed line is 5-year mean.⁴

Observations

- Catches higher during El Niño.
- Recreational fishing sector noted a recruitment event is occurring due to juvenile species being caught.
- Bigeye is usually fished at different depths especially before El Niño.
- High sea temperatures during La Niña thought to be good conditions for spawning.

Sources: BOM¹ NOAA² CMEMS³ CSIRO⁴ AFMA⁵



Climate & Ecosystem Status Report

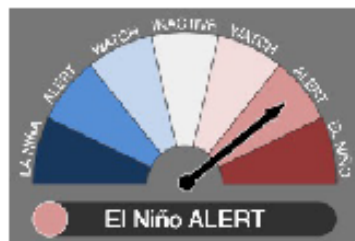
TTRAG 39 - Agenda Item 5 - Attachment 3.1a Climate change Report ETBF 2023
Eastern Tuna and Billfish Fishery

June 2023

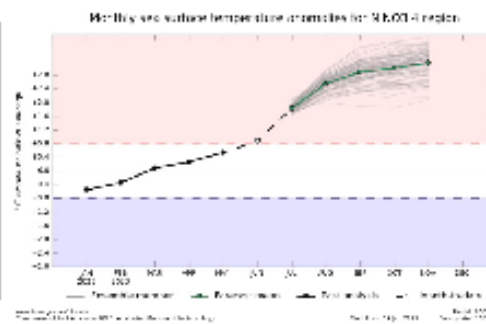


Future Outlook for 2023

Climate Drivers

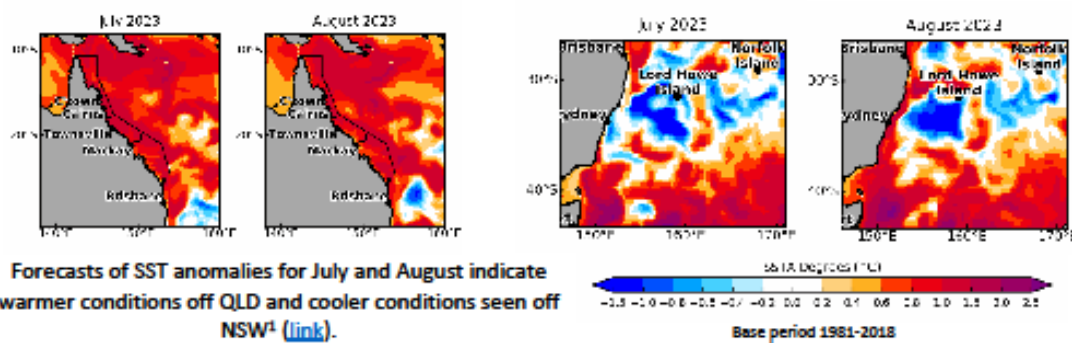


Currently transitioning to El Niño¹ ([link](#))

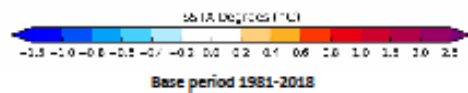


El Niño is predicted¹ ([link](#)). These conditions can favour higher catches for YFT, BET, ALB, & STM in the Western Central Pacific⁴

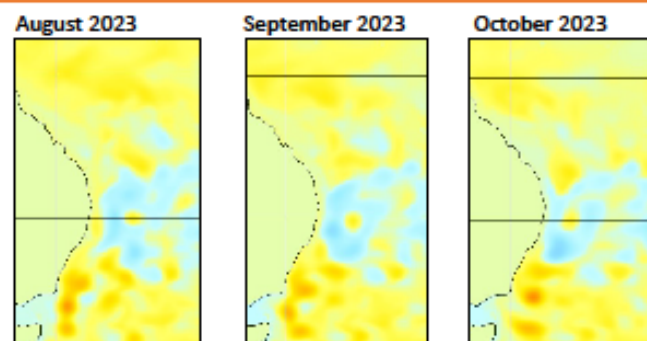
Temperature for the region



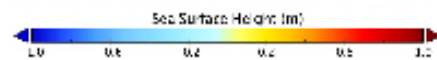
Forecasts of SST anomalies for July and August indicate warmer conditions off QLD and cooler conditions seen off NSW¹ ([link](#)).



Sea Surface Height Forecasts



Forecasts of sea surface height show how regional ocean dynamics may change over the next 3 months¹. Sea surface Height anomalies can indicate the location of eddies.



Sources: BOM¹ NOAA² CMEMS³ CSIRO⁴ AFMA⁵

contact details:
steph.brodie@csiro.au

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Australian Government

Australian Fisheries Management Authority

TTRAG Indicators Paper for the Western Tuna and Billfish Fishery (WTBF)

October 2023

It is important to note in this report that the stock status reported for the Indian Ocean Tuna Commission (IOTC) differs from that which is measured by the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) within the Fisheries Status Reports. ABARES applies the default limit reference points within the Commonwealth Fisheries Harvest Strategy Policy (Department of Agriculture and Water Resources 2018) which establish the limit reference points for biomass as 20% of unfished levels ($0.2B_0$); and for fishing mortality the limit reference point is the fishing mortality that would achieve maximum sustainable yield (F_{MSY}). It is important to note that the IOTC determines stock status using MSY-based reference points for most stocks (specifically B_{MSY} and F_{MSY}) which can result in IOTC reporting different biomass ('overfished') status for some stocks, notably for yellowfin.

Broadbill Swordfish (SWO)

<p>Current TACC: 3,000t WTBF catch in 2022 quota year (CDR based): 85t 2021 catch* in IOTC Area: 23,917t (average catch 2017 – 2021: 31,157t)</p>

*Based on data supplied by the IOTC status summary for species of tuna and tuna like species. 2022 catch data for IOTC are not due to be submitted by CPCs until 30 June 2023 and not finalised until 30 December 2023.

Indicators

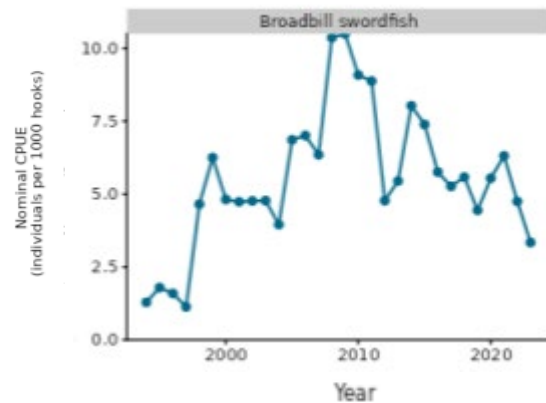
A summary of the main indicators is found in the table below.

Indicator	Comment	
Stock ¹	In the Indian Ocean, genetic and otolith microchemistry analyses have not indicated more than a single biological stock (Muths et al. 2013, Davies et al. 2019). In the Pacific Ocean, genetic studies have suggested the presence of several biological stocks (Takeuchi et al. 2017), although the degree of genetic variation among these stocks is low (Kasapidis et al. 2008).	
IOTC ² Stock status (based on most relevant regional stock assessments)	<p>Last Assessment: 2020</p> <p>Overfished: No Subject to overfishing: No</p> <p>An assessment was undertaken in 2020 using stock synthesis with fisheries data up to 2018. The assessment uses a spatially disaggregated, sex explicit and age structured model. The SS3 model, used for stock status advice, indicated that MSY-based reference points were not exceeded for the Indian Ocean population as a whole ($F_{2018}/F_{MSY} < 1$; $SB_{2018}/SB_{MSY} > 1$). The two alternative models (ASPIC and JABBA) applied to swordfish also indicated that the stock was above a biomass level that would produce MSY. Spawning biomass in 2018 was estimated to be 40-83% of the unfished levels.</p> <p>Next assessment: 2023 - full assessment</p>	
Present IOTC Management Arrangements	There are no specific measures to limit catches of swordfish.	
	IOTC	WTBF
Catch	Most recent catches of 24,528t in 2021 and is below the MSY level (33,000t).	Annual swordfish catch in the WTBF peaked at around 2,000t in the early 2000s, but has declined to below 350t since 2005.

¹ Advice obtained from stock status swordfish IOTC executive summary and supporting information

² Schedule of Stock Assessment for IOTC Species of interest from 2023-2027, and for other working party priorities [Status summary for species of tuna and tuna-like species under the IOTC mandate, as well as other species impacted by IOTC fisheries | IOTC](#)

CPUE is the Nominal catch-per-unit-effort (CPUE from retained catch) in individuals per thousand hooks for key species of tuna and billfish in the WTBF over 1998-2022. Species panel are ordered from highest to lowest maximum CPUE. CPUE is only shown when at least 50 individuals were retained for the calendar year.



Tremblay Boyer et.al 2023

Management advice from the IOTC Scientific Committee Meeting

No further management advice has been provided by IOTC Scientific Committee since TTRAG met in 2022.

1. **Maximum Sustainable Yield (MSY):** estimate for the Indian Ocean is 33,000 t.
2. **Provisional reference points:** noting that the Commission in 2015 agreed to Resolution 15/10 on target and limit reference points and a decision framework, the following should be noted:
 - a. **Fishing mortality:** current fishing mortality is considered to be below the provisional target reference point of F_{MSY} and below the provisional limit reference point of $1.4 * F_{MSY}$.
 - b. **Biomass:** current spawning biomass is considered to be above the target reference point of SB_{MSY} , and therefore above the limit reference point of $0.4 * SB_{MSY}$.
3. **Main fisheries (mean annual catch 2017-2021):** swordfish are caught using longline (53.9%), followed by line (30.2%) and gillnet (14.9%). The remaining catches taken with other gears contributed to 1% of the total catches in recent years (**Fig 1**).
4. **Main fleets (mean annual catch 2017-2021):** the majority of swordfish catches are attributed to vessels flagged to Sri Lanka (29.2%) followed by Taiwan, China (17.9%) and EU (Spain) (6.5%). The 25 other fleets catching swordfish contributed to 46.4% of the total catch in recent years.

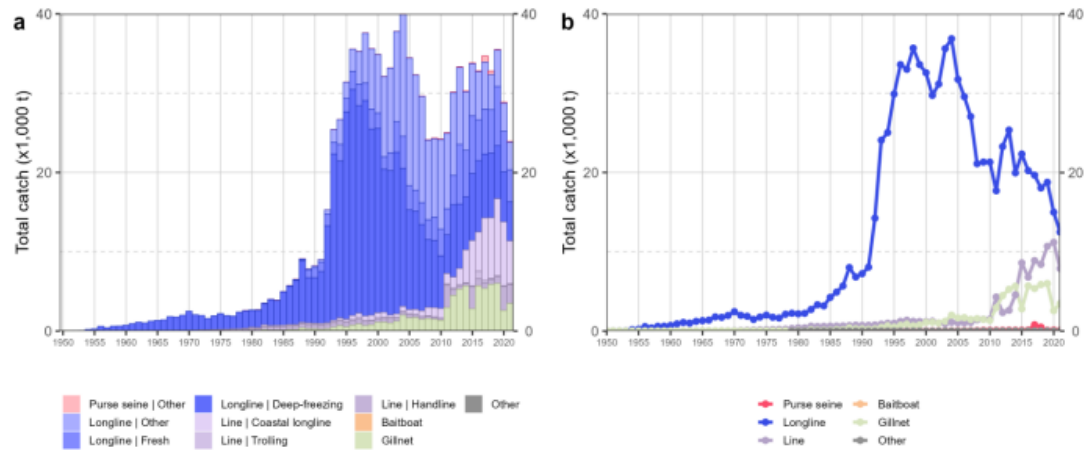


Fig. 1. Annual time series of (a) cumulative nominal catches (metric tons; t) by fishery and (b) individual nominal catches (metric tons; t) by fishery group for swordfish during 1950–2021. Longline | Other: swordfish and sharks-targeting longlines; Other: all remaining fishing gears

TTRAG’s summary of information relevant to TACC decisions

The implications of any given TACC decision (i.e. maintaining, increasing or decreasing the TACC) for the Broadbill swordfish stock at both regional and subregional levels will be dependent on and informed by a number of factors:

- The most recent IOTC stock status advice (2020) has determined Broadbill Swordfish is not overfished and not subject to overfishing.
- The current TACC of 3000t is much higher than recent historical catch levels (85t in 2022/23 season or 2.8% of TACC). If caught, the TACC would represent ~10% of total IOTC catch.
- There is little recent information available to determine if 3000 t catch in the WTBF is “locally sustainable” i.e. would lead to local depletions. Historically the domestic component of the fishery took upwards of 1,000 t, and in 2001 and 2002 took around 2,000 t. In any case the TACC levels should be reviewed if the fishery were to significantly expand, using and assessing catch and CPUE information from the expanding fishery.
- At current catch levels, there is no risk to the IOTC stock, however if catch were to increase towards the TACC and other factors (recruitment, environmental etc.) took place then risk is uncertain.
- TTRAG recognises that other considerations (whole of government position in allocation discussions) may be taken into account when setting the TACC level.

TTRAG’s TACC recommendation:

3,000t

Current TACC: 2,000t
 WTBF catch in 2022 quota year (CDR based): 22t
 2021 catch* in IOTC Area: 94,803t (average catch 2017 – 2021: 87,488t)

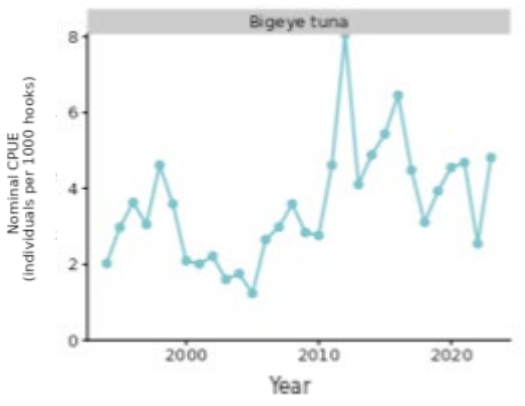
Bigeye Tuna (BET)

*Based on data supplied by the IOTC status summary for species of tuna and tuna like species. 2022 catch data for IOTC are not due to be submitted by CPCs until 30 June 2023 and not finalised until 30 December 2023.

Indicators

A summary of the main indicators is found in the table below.

Indicator	Comment
Stock	The stock structure of bigeye tuna in the Indian Ocean is uncertain, but the species is a single distinct biological stock for assessments. The assumption of a single stock is based on genetic studies (Chiang et al. 2008, Davies et al. 2020) that indicated no genetic differentiation within the Indian Ocean and tagging studies that have demonstrated large-scale movements of bigeye tuna within the Indian Ocean (IOTC 2014).
IOTC ¹ Stock status (based on most relevant regional stock assessments)	<p>Last Assessment: 2022</p> <p>Overfished: Yes Subject to overfishing: Yes</p> <p>In 2022 a new stock assessment was carried out for bigeye tuna in the IOTC area of competence to update the stock assessment undertaken in 2019. Two models were applied to the bigeye stock (Statistical Catch at Size (SCAS) and Stock Synthesis (SS3)), with the SS3 stock assessment selected to provide scientific advice. The reported stock status is based on a grid of 24 model configurations designed to capture the uncertainty on stock recruitment relationship, longline selectivity, growth and natural mortality. Spawning biomass in 2021 was estimated to be 25% (80% CI: 23-27%) of the unfished levels in 2021 and 90% (75-105%) of the level that can support MSY. Fishing mortality was estimated at 1.43 (1.1-1.77) times the F_{MSY} level. Considering the characterized uncertainty, the assessment indicates that SB_{2021} is below SB_{MSY} and that F_{2021} is above F_{MSY} (79%). As IOTC agreed on a bigeye Management Procedure (Res. 22/03) it should be noted that the stock assessment is not used to provide a recommendation on the TAC.</p> <p>Next assessment: 2023 – indicators and 2024 Indicators MP to be run.</p>
Present IOTC Management Arrangements	<p>Management Procedure. A management procedure for Indian Ocean Bigeye tuna was adopted under Resolution 22/03 by the IOTC Commission in May 2022 and was applied to determine a recommended TAC for Bigeye tuna for 2024 and 2025. A review of evidence for exceptional circumstances, was also conducted following the adopted guideline (ref SC 2021 report) as per the requirements of Resolution 22/03. The review covered information pertaining to</p> <ul style="list-style-type: none"> i) new knowledge about the stock, population dynamics or biology, ii) changes in fisheries or fisheries operations,

	<p>iii) changes to input data or missing data, and iv) inconsistent implementation of the MP advice.</p> <p>The evaluation concluded that there were no exceptional circumstances requiring either further research or management action on the TAC calculated by the MP. Application of the MP in 2022 results in a recommended TAC of 80,583t per year for 2024 and 2025.</p>	
<p>Catch</p>	<p>IOTC</p> <p>Catch in 2021 (94,803t) of bigeye tuna is above the recommended TAC for 2024 and 2025 from the application of the bigeye tuna MP. Achieving the objectives of the Commission for this stock will require effective implementation of the MP TAC advice by the Commission going forward, a requirement further emphasised by the current status of the stock estimated from the stock assessment to be overfished and subject to overfishing.</p> <p>At its 8-12 May 2023 meeting (IOTC27), IOTC adopted Resolution 23/04 <i>On establishing catch limits for bigeye tuna in the IOTC area of competence</i> (the bigeye resolution). The bigeye resolution imposes an annual TAC for bigeye tuna of 80,583t in 2024 and 2025 in line with the MP for the species. The TAC is 15 per cent below the 2021 catch (94,803t). Note 15 per cent is the maximum change permitted under the MP.</p>	<p>WTBF</p> <p>Historical catches of Bigeye tuna in the WTBF have varied widely from peaks of around 800t in 1984 and 1995 to less than 22t in 1991. Since the early 2000s, declining effort in the WTBF has resulted in reduced catches of bigeye tuna. Catches have not exceeded 200t since 2004.</p>
<p>CPUE is the Nominal catch-per-unit-effort (CPUE from retained catch) in individuals per thousand hooks for key species of tuna and billfish in the WTBF over 1998-2022. Species panel are ordered</p>		 <p>Tremblay Boyer et.al 2023</p>

<p>from highest to lowest maximum CPUE. CPUE is only shown when at least 50 individuals were retained for the calendar year.</p>		
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Management advice from the IOTC Scientific Committee Meeting

1. **Management advice.** The TAC recommended from the application of the MP specified in Resolution 22/03 is 80,583t / year for the period 2024-2025. The recommended TAC is 15% below the 2021 catch. The following key points should also be noted:
2. **Main fisheries (mean annual catch 2017-2021):** bigeye tuna are caught using purse seine (41.7%), followed by longline (37%) and line (13.5%). The remaining catches taken with other gears contributed to 7.8% of the total catches in recent years (**Fig. 2**).
3. **Main fleets (mean annual catch 2017-2021):** the majority of bigeye tuna catches are attributed to vessels flagged to Indonesia (23.7%) followed by Taiwan, China (15.4%) and Seychelles (15.3%). The 30 other fleets catching bigeye tuna contributed to 45.8% of the total catch in recent years.

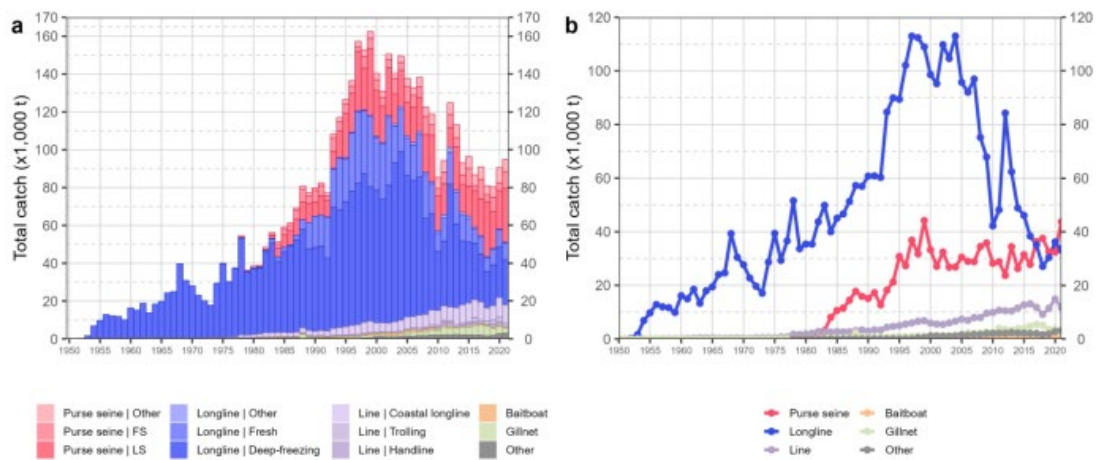


Fig. 2. Annual time series of (a) cumulative nominal catches (metric tonnes; t) by fishery group and (b) individual nominal catches (metric tonnes; t) by fishery group bigeye tuna during 1950-2021. FS = free swimming school; LS = schools associated with drifting floating

objects;Purse seine; Other: coastal purse seine, seine if unknown school associated type, ring net; Longline, Other; swordfish and sharks –

TTRAG's summary of information relevant to TACC decisions

The implications of any given TACC decision (i.e. maintaining, increasing or decreasing the TACC) for the Bigeye tuna stock at both regional and subregional levels will be dependent on and informed by a number of factors:

- A new stock assessment undertaken in 2022, determined that IOTC bigeye tuna as overfished and is subject to overfishing.
- The current WTBF TACC of 2000 t is much higher than recent historical catch levels (t in 2022/23 season or 1.1% of TACC). If caught, the TACC would represent ~2.3% of total IOTC catch.
- Australia's TACC for bigeye tuna, if fully caught, represents (~2.3%), which is a small fraction of the total fishing mortality on this stock, particularly compared to historic catches by other IOTC fleets. Australia's catches to date will have made a negligible contribution to current status of the stocks that are overfished or subject to overfishing.
- There is little information available to determine if a 2000 t catch in the WTBF is "locally sustainable" i.e. would lead to local depletion. Data for the domestic fleet, Japanese and Taiwanese longliners operating in the area of the WTBF and the Indian Ocean area around the Australian EEZ (latitudes 5°S to 49°S and longitudes 100°E to 139°E) show that there were significant catches recorded in this area prior to the year 2000.
- The catch in this area in the decades preceding 2000t this regularly exceeded 1,000 t and occasionally exceeded 1500 t.
- TACC levels should be reviewed if the fishery was to significantly expand, using and assessing catch and CPUE information from the expanding fishery, alongside information on stock status and structure.
- TTRAG recognises that other considerations (whole of government position in allocation discussions) may be taken into account when setting the TACC, noting there are no specific measures to limit catches of bigeye, however, at the Commission meeting in 2022 the IOTC adopted a Resolution 23/04 *On establishing catch limits for bigeye tuna in the IOTC area of competence* (the bigeye resolution). The bigeye resolution imposes an annual TAC for bigeye tuna of 80,583t in 2024 and 2025 in line with the MP for the species. The TAC is 15 per cent below the 2021 catch (94,803t). Note 15 per cent is the maximum change permitted under the MP.
- The bigeye resolution applies specific catch limits on those CPCs with recent 5-year average catches (2017-2021) above 2000t (*Indonesia, Seychelles, EU, Sri Lanka, Japan, China and Iran. The Resolution also requests that Taiwan, Province of China, limit its annual bigeye catch to 11,488t in 2024 and 2025*). The reductions for each CPC range from 7.7 to 18.7 per cent.
- All other CPCs are encouraged to maintain catch and effort at their recent 5-year average levels (2017-2021), without prejudice to their development aspirations. If catch of one of these CPC's exceeds 2000t, in either 2024 or 2025, the resolution commits the IOTC to consider establishing a binding catch limit to the CPC from the management period commencing in 2026, if an allocation scheme has not yet been agreed and implemented by the Commission.
- Australia's average catch of bigeye tuna in the WTBF for 2017-2021 is around 39t. The current TAC for bigeye tuna in the WTBF is 2000t.
- The Department of Agriculture, Fisheries and Forestry (the Department) and AFMA agree that the resolution requires Australian catches of bigeye to remain equal to or below the current TAC of 2000t.

TTRAG's TACC recommendation: 2,000t

Striped Marlin (STM)

Current TACC: 125t
 WTBF catch in 2022 quota year (CDR based): 0.5t
 2021 catch* in IOTC Area: 2,969t (average catch 2017 – 2021: 2,946t)

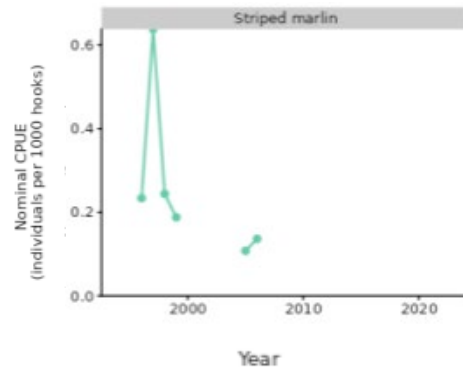
*Based on data supplied by the IOTC status summary for species of tuna and tuna like species. 2022 catch data for IOTC are not due to be submitted by CPCs until 30 June 2023 and not finalised until 30 December 2023.

Indicators

A summary of the main indicators is found in the table below.

Indicator	Comment	
Stock	Mamoozadeh, McDowell & Graves (2018) evaluated genetic variation in striped marlin populations sampled from the eastern and western Indian Ocean, and across the Pacific Ocean. Their results suggest that there could be genetically distinct east and west stocks of striped marlin in the Indian Ocean. However, the sample size from the eastern Indian ocean was small (eight fish) and no samples were collected from the central Indian Ocean, making it difficult to delineate a border between potential stocks. Therefore, striped marlin is currently considered to be a single distinct biological stock for assessments in the Indian Ocean.	
IOTC ¹ Stock status (based on most relevant regional stock assessments)	<p>Last Assessment: 2021</p> <p>Overfished: Yes Subject to overfishing: Yes</p> <p>The stock assessment was conducted based on two different models: JABBA, a Bayesian state-space production model (age-aggregated); and SS3, an integrated model (age-structured) (using data up to 2019). Both models were generally consistent with regards to stock status and confirmed the results from 2012, 2013, 2015, 2017 and 2018 assessments, indicating that the stock is subject to overfishing ($F > F_{MSY}$) and is overfished, with the biomass being below the level which would produce MSY ($B < B_{MSY}$) for over a decade.</p> <p>Next Assessment: 2024 – full assessment</p>	
Present IOTC Management Arrangements	Resolution 18/05 established overall catch limits for billfish (3,260t for striped marlin), but there is no mechanism to allocate catches or enforce catch limits.	
	IOTC	WTBF
Catch	Current or increasing catches have a very high risk of further decline in the stock status. The 2019 catches (3,001t)	Catches of striped marlin in the WTBF have been relatively low (<50t) since the mid - 1980s and very low (<5t) in recent years, with <1t taken in 2020 and 2021.

CPUE is the Nominal catch-per-unit-effort (CPUE from retained catch) in individuals per thousand hooks for key species of tuna and billfish in the WTBF over 1998-2022. Species panel are ordered from highest to lowest maximum CPUE. CPUE is only shown when at least 50 individuals were retained for the calendar year.



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Management advice from the IOTC Scientific Committee Meeting

No further management advice has been provided by IOTC Scientific Committee since TTRAG met in 2022.

1. **Management advice.** Current or increasing catches have a very high risk of further decline in the stock status. The 2019 catches (3,001 t) available at the time of the stock assessment are lower than MSY (4,601 t) but the stock has been overfished for more than a decade and is now in a highly depleted state. If the Commission wishes to recover the stock to the green quadrant of the Kobe plot with a probability ranging from 60% to 90% by 2026 as per Resolution 18/05, it needs to provide mechanisms to ensure the maximum annual catches remain between 900 t – 1,500 t (Table 3). The following key points should also be noted:
2. **Maximum Sustainable Yield (MSY):** estimates for the Indian Ocean stock are highly uncertain and estimates range between 4,120 - 5,160 t. However, the current biomass is well below the BMSY reference point and fishing mortality is in excess of FMSY at recent catch levels.
3. **Provisional reference points:** although the Commission adopted reference points for swordfish in Resolution 15/10 on target and limit reference points and a decision framework, no such interim reference points have been established for striped marlin.

4. **Main fisheries (mean annual catch 2017-2021):** striped marlin are caught using gillnet (59.5%), followed by longline (27%) and line (11.7%). The remaining catches taken with other gears contributed to 1.7% of the total catches in recent years (**Fig. 3**).
5. **Main fleets (mean annual catch 2017-2021):** the majority of striped marlin catches are attributed to vessels flagged to I. R. Iran (30.1%) followed by Pakistan (25.5%) and Indonesia (17.1%). The 22 other fleets catching striped marlin contributed to 27.1% of the total catch in recent years.

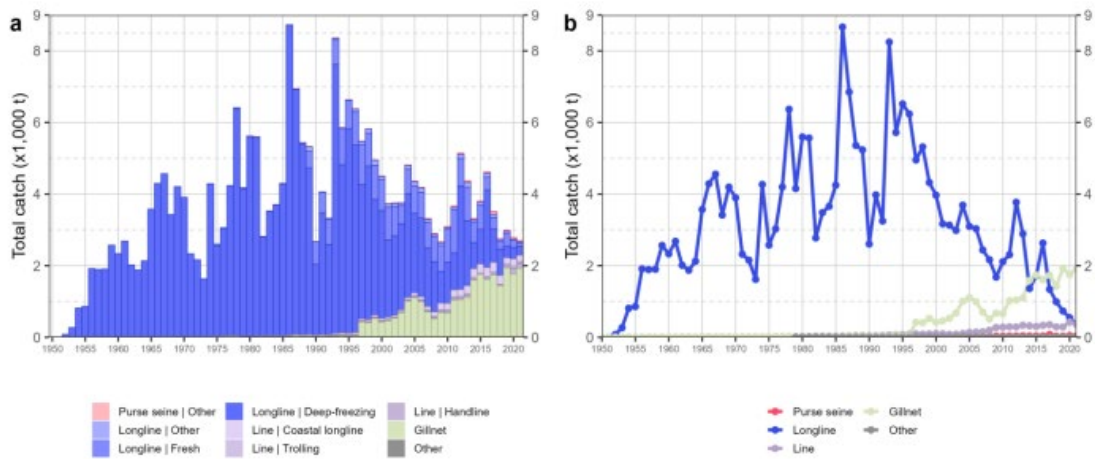


Fig. 3. Annual time series of (a) cumulative nominal catches (metric tonnes; t) by fishery group and (b) individual nominal catches (metric tonnes; t) by fishery group for striped marlin during 1950-2021. Longline, Other; swordfish and sharks – targeted longlines; Other: all remaining fishing gears.

TTRAG's summary of information relevant to TACC decisions

The implications of any given TACC decision (i.e. maintaining, increasing or decreasing the TACC) for the striped marlin stock at both regional and subregional levels will be dependent on and informed by a number of factors:

- IOTC stock assessments have determined that IOTC Striped Marlin is both overfished and subject to overfishing, and that reductions in fishing mortality are required to recover the stock.
- The current WTBF TACC of 125 t is much higher than recent historical catch levels (0.5t in 2022/23 season or <1% of TACC and <0.02% of IOTC catch). If caught, the TACC would represent ~4.8% of total IOTC catch.
- Given historic catch levels, it is unlikely the WTBF has contributed to the current poor stock status. Australia's TACC for striped marlin, if fully caught, represents (~4.8%), which is a small fraction of the total fishing mortality on this stock, particularly compared to historic catches by other IOTC fleets. Australia's catches to date will have made a negligible contribution to current status of the stocks that are overfished or subject to overfishing.
- There is little information available to determine if a 125 t catch in the WTBF is "locally sustainable" i.e. would lead to local depletions. TACC levels should be reviewed if the fishery was to significantly expand, using and assessing catch and CPUE information from the expanding fishery, alongside information on stock status and structure.
- TTRAG recognises that other considerations (whole of government position in allocation discussions) may be taken into account when setting the TACC level.

TTRAG's TACC recommendation:

125t

Yellowfin Tuna (YFT)

Current TACC: 2,000t
 WTBF catch in 2022 quota year (CDR based): 19t
 2021 catch* in IOTC Area: 416,235t (average catch 2017 – 2021: 435,225)

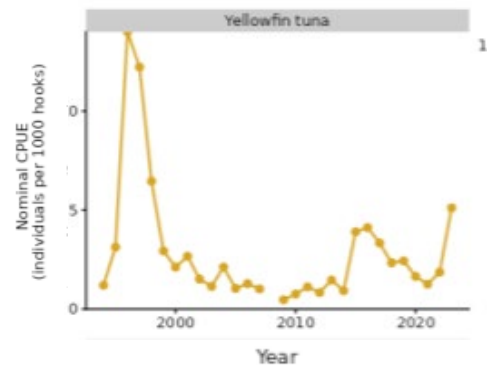
*Based on data supplied by the IOTC status summary for species of tuna and tuna like species. 2022 catch data for IOTC are not due to be submitted by CPCs until 30 June 2023 and not finalised until 30 December 2023.

Indicators

A summary of the main indicators is found in the table below.

Indicator	Comment	
Stock	The stock structure of yellowfin tuna in the Indian Ocean is uncertain, but the species is a single biological stock for assessments. A recent ocean-wide genetics and otolith microchemistry study revealed evidence for genetic differentiation north and south of the equator in the Indian Ocean (Davies et al. 2020)	
IOTC ¹ Stock status (based on most relevant regional stock assessments)	<p>Last Assessment: 2021</p> <p>Overfished: Yes</p> <p>Subject to overfishing: Yes</p> <p>The stock assessment was conducted using SS3, an integrated model (age-structured) (using data up to 2020). Results were generally consistent with regards to stock status and confirmed the results from 2012, 2013, 2015, 2017 and 2018 assessments, indicating that the stock is subject to overfishing ($F > F_{MSY}$) and is overfished, with the biomass being below the level which would produce MSY ($B < B_{MSY}$) for over a decade.</p> <p>Next Assessment: 2024 – full assessment</p>	
Present IOTC Management Arrangements	Resolution 21/01 On an interim plan for rebuilding the Indian Ocean yellowfin tuna stock establishes specific catch limits for yellowfin for all IOTC members. The interim catch limits agreed in 2021 sought to restrict catch to the then long-term estimate of catch at MSY (C_{MSY}) of 403,000t. However, the new stock assessment endorsed by the Commission in May 2022 now estimates C_{MSY} at 349,000 t.	
	IOTC	WTBF
Catch	Catches of yellowfin tuna remained stable between the mid-1950s and the early-1980s, ranging between 30,000t and 70,000t, with longliners and gillnetters as the main gear types being used. Landings of yellowfin tuna increased throughout the 1990s, fluctuating around 400,000t until 2002 after which landings increased further up to a peak of 525,000t in 2004.	Historical catches of yellowfin tuna in the WTBF have varied widely from peaks of around 800 t in 1984 and 1995 to less than 15t in 1991 and 1992. Since the early 2000s, declining effort in the WTBF has resulted in reduced catches of yellowfin tuna. Catches have not exceeded 100t since 2004.

CPUE is the Nominal catch-per-unit-effort (CPUE from retained catch) in individuals per thousand hooks for key species of tuna and billfish in the WTBF over 1998-2022. Species panel are ordered from highest to lowest maximum CPUE. CPUE is only shown when at least 50 individuals were retained for the calendar year.



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Management advice from the IOTC Scientific Committee Meeting

No further management advice has been provided by IOTC Scientific Committee since TTRAG met in 2022.

For each catch scenario, the probability of the biomass being below the SB_{MSY} level and the probability of fishing mortality being above F_{MSY} were determined over the projection horizon using the delta-MVLN estimator (Walter & Winker 2020), based on the variance-covariance derived from estimates of SB/SB_{MSY} and F/F_{MSY} across the model grid.

- If catches are reduced to 60% of 2020 levels there is >50% probability of being above SB_{MSY} levels by 2023.
- If catches are reduced to < 80% of 2020 levels, there is a >50% probability of being above SB_{MSY} in 2030.
- If catches are reduced to less than 80% of 2020 levels, there would be a >50% probability of ending overfishing ($F < F_{MSY}$) by 2023 and also by 2030. The probability of breaching the biological limit reference point ($0.4SB_{MSY}$) with 2020 catches is 7% by 2023 and 64% by 2030. The probability of breaching the F limit reference point ($1.4 F_{MSY}$) with 2020 catch is 52% by 2023 and 78% by 2030.

The Commission has an interim plan for the rebuilding the yellowfin stock, with catch limitations based on 2014/2015 levels (Resolution 21/01 which superseded 19/01, 18/01 and 17/01). Some of the fisheries subject to catch reductions have achieved a decrease in catches in 2021 in accordance with the levels of reductions specified in the Resolution; however, these reductions were offset by increases in the catches from CPCs exempt from and some CPCs subject to limitations on their catches of yellowfin tuna. The following key points should also be noted:

1. **Maximum Sustainable Yield (MSY):** estimate for the Indian Ocean stock is 349,000 t with a range between 286,000-412,000 t. The 2017-2021 average catches (435,225 t) were above the estimated MSY level. Although catch in 2021 reduced by 3% compared to the 2020 level, the last year catch remained substantially higher than the median MSY.

2. **Interim reference points:** Noting that the Commission in 2015 agreed to Resolution 15/10 on target and limit reference points and a decision framework, the following should be noted:
3. **Fishing mortality:** 2020 fishing mortality is considered to be 32% above the interim target reference point of F_{MSY} , and below the interim limit reference point of $1.4 * F_{MSY}$.
4. **Biomass:** 2020 spawning biomass is considered to be 13 % below the interim target reference point of SB_{MSY} and above the interim limit reference point of $0.4 * SB_{MSY}$.
5. **Catch data uncertainty:** the overall quality of the nominal catches of yellowfin tuna shows some large variability between 1950 and 2020. In some years, a large portion of the nominal catches of yellowfin tuna had to be estimated, and catches reported using species or gear aggregates had to be further broken down. The data quality was particularly poor between 1994 and 2002 when less than 70% of the nominal catches were fully or partially reported, with most reporting issues coming from coastal fisheries. The reporting rate has generally improved over the last decade however detailed information on data collection procedures, which determines the quality of fishery statistics, is still lacking.
6. **Main fisheries (mean annual catch 2017-2021):** yellowfin tuna are caught using line (35.4%), followed by purse seine (33.6%) and gillnet (18.3%). The remaining catches taken with other gears contributed to 12.7% of the total catches in recent years (**Fig. 4**).
7. **Main fleets (mean annual catch 2017-2021):** the majority of yellowfin tuna catches are attributed to vessels flagged to I. R. Iran (12.2%) followed by EU (Spain) (11.3%) and Sultanate of Oman (10.4%). The 35 other fleets catching yellowfin tuna contributed to 66.1% of the total catch in recent years.

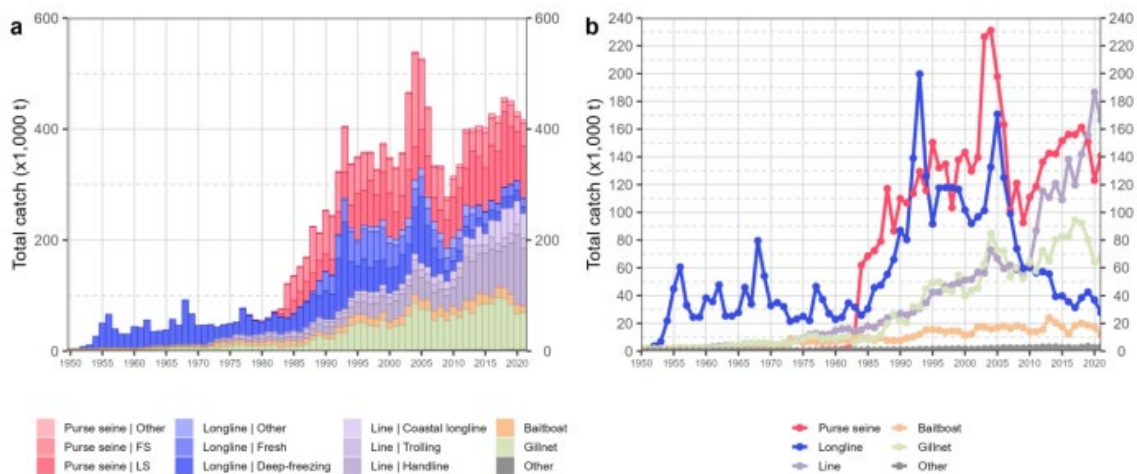


Fig. 4. Annual time series of (a) cumulative nominal catches (metric tonnes; t) by fishery group and (b) individual nominal catches (metric tonnes; t) by fishery group yellowfin tuna during 1950-2021. FS = free swimming school; LS = schools associated with drifting floating objects; Purse seine; Other: coastal purse seine, purse seine if unknown school associated type, ring net; Longline, Other; swordfish and sharks – targeted longlines; Other: all remaining fishing gears.

Additional Information

- Resolutions are binding on the Commission Members, unless there is a specific objection on the part of a Member. Resolutions are generally adopted by consensus, however, can also be adopted by a two-thirds majority of Members present and voting. Note: Australia did not object to this Resolution.
- Resolutions remain active unless the Resolution specifically states otherwise.
- Resolution 21/01 – On an Interim Plan for Rebuilding the Indian Ocean Yellowfin Tuna Stock in the IOTC Area of Competence entered into force on 17 December 2021 and the measures within became effective from 1st January 2022.
- Resolution 21/01 does state in paragraph 2 that the measures contained within the Resolution are considered as interim measures and will be reviewed by the Commission no later than at its annual Session in 2022. This does not mean the Resolution, or the measures contained expire.
- The 2022 and 2023 Commission meeting discussed new proposals to further restrict yellowfin tuna catch, however, there was no consensus and the proponents agreed to withdraw it, noting their disappointment in the lack of agreement on Management Measures for a stock assessed to be overfished and subject to overfishing by the SC.

TTRAG's summary of information relevant to TACC decisions

The implications of any given TACC decision (i.e. maintaining, increasing or decreasing the TACC) for the yellowfin tuna stock at both regional and subregional levels will be dependent on and informed by a number of factors:

- IOTC stock assessments have determined that IOTC Yellowfin Tuna is both overfished and subject to overfishing, and that reductions in fishing mortality are required to recover the stock. It should be noted again that the IOTC uses different limit reference points to that defined in the Commonwealth Harvest Strategy Policy.
- The adoption of Resolution 21/01 an interim rebuilding plan for Yellowfin Tuna is designed to apply to all contracting parties and co-operating non-contracting parties and not prejudice any future formal allocations. It is important to note this resolution does not establish an allocation but is designed to restrict the catch of Yellowfin Tuna in the Indian Ocean region. The resolution effectively states a floor in the measure which states if you reported catches of Yellowfin Tuna in 2014 of less than 5000 t and the average catch of the period 2015-2019 was below 2000 t then catches under the resolution 21/01 should not exceed 2000 t.
- Resolutions remain active unless the Resolution specifically states otherwise. Therefore, to adopted interim resolution Australia is required to reduce the WTBF Yellowfin Tuna TACC to 2000 t.
- The current TACC for yellowfin tuna in the WTBF (2,000 t) is 0.6% of the maximum sustainable yield (MSY) for Indian Ocean yellowfin tuna, estimated to be 349,000 t in 2021. Total catches by IOTC member countries have exceeded this level in every year since 2010. There has been no updated MSY estimate since 2021, due to ongoing issues with the data inputs to the stock assessment. A review of the assessment is due in 2023 which, if the issues are resolved and a new stock assessment accepted, may result in updated advice on sustainable catches for Indian Ocean yellowfin tuna in 2024.
- The current WTBF TACC of 2,000 t is much higher than recent historical catch levels (19 t in 2022/23 season or <1% of TACC). If caught, the TACC would represent ~1.2% of total IOTC catch.
- Australia's TACC for yellowfin tuna, if fully caught, represents (~1.2%), which is a small fraction of the total fishing mortality on this stock, particularly compared to historic catches by other IOTC fleets. Australia's catches to date will have made a negligible contribution to current status of the stocks that are overfished or subject to overfishing.
- TTRAG recognises that other considerations (whole of government position in allocation discussions) may be taken into account when setting the TACC level.

TTRAG's TACC recommendation:

2,000t