Australian Government

Australian Fisheries Management Authority

AFMA submission for reassessment of the Eastern Tuna and Billfish Fishery

2022

This report has been prepared by AFMA for consideration by the Department Agriculture, Water and the Environment in relation to the export approval of the Eastern Tuna and Billfish Fishery under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Contents

Introduction

This submission meets the requirements for the Strategic Assessment and the 2021 annual report. The submission covers fishing methods in the Eastern Tuna and Billfish Fishery (ETBF), for the methods of longline and minor line, such as poling or trolling, as managed by the *Eastern Tuna and Billfish Fishery Management Plan 2010* (the ETBF Management Plan). The ETBF was declared an approved Wildlife Trade Operation (WTO) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 28 July 2005. Since then, the ETBF has been re-approved under the EPBC five times with the current WTO accreditation expiring on 19 August 2022. A copy of the letter to AFMA, including conditions can be found at:

http://www.environment.gov.au/coasts/fisheries/commonwealth/eastern-tuna-billfish/index.html

This submission has been produced to meet the requirements of the 2021 annual report and to enable the Department of Agriculture, Water and the Environment to assess the management arrangements under the EPBC Act prior to the expiry of the current WTO.

1. Description of the Fishery

The ETBF extends from Cape York, Queensland, to the South Australian/Victorian border and includes waters around Lord Howe and Norfolk Island and the high seas area under the region of concern of the Western and Central Pacific Fisheries Commission (WCPFC).

Major ports used by the fleet include Cairns, Mooloolaba, Coffs Harbour, Gold Coast, Ulladulla and various other New South Wales south coast ports. See table 1 for an overview of the fishery and how it is managed.

Table 1: Overview of the Eastern Tuna and Billfish Fishery and how it is managed

At a glance	
Principal species	Yellowfin tuna (*Thunnus albacares*), bigeye tuna (*T. obesus*), albacore tuna (*T. alalunga*), broadbill Swordfish (*Xiphias gladius*) and striped marlin *(Tetrapturus audax)*[1]
Fishing techniques	Pelagic longline, minor line (handline, troll, rod and reel)
No. concessions at April 2022	81 longline boat Statutory Fishing Rights (SFRs); 83 minor line SFRs;

[1] Southern Bluefin Tuna (SBT) is also caught by boats operating in the ETBF however, SBT catch is managed through the *Southern Bluefin Tuna Management Plan 1995*.

At a glance	
	1,076,026 quota SFRs for each quota species; 11 Coral Sea Zone SFRs; and, 1 ETB Fishing Permit
No. of active boats in 2021	41 (including minor lining boats)
Estimated catch and value for 2019-2020 financial year. ABARES Fishery Status reports 2021	Yellowfin tuna 1,757t ($A 24.4 million); bigeye tuna 303t ($A 3.0 million); albacore tuna 1,160t ($A 3.3 million); broadbill swordfish 539t ($A 6.7 million); striped marlin 186t ($A 1.1 million); Total 3,945t ($A 39.80 million)
Main markets	○ Fresh product - domestic, Japan, United States. ○ Frozen product - Europe ○ Canneries in Samoa, Thailand, and Indonesia (albacore)
Stock status	Stock assessments are conducted for the broader region (Western and Central Pacific Ocean) and the reported status reflects the species status in this region. ○ Yellowfin tuna - not overfished and not subject to overfishing ○ Bigeye tuna - not overfished and not subject to overfishing ○ Striped marlin - overfished and not subject to overfishing ○ Broadbill swordfish - not overfished and not subject to overfishing ○ Albacore tuna - not overfished and not subject to overfishing
Management Plan	The ETBF Management Plan was implemented on 1 March 2011. The introduction of the ETBF Management Plan changed the management of the fishery from limiting the amount of gear set (input controls) to limiting the catch of the target species (catch quota management).
Management method	Under the ETBF Management Plan, the ETBF is managed through output controls with a Total Allowable Commercial Catch (TACC) limit set for each of the five quota species. SFRs allow an operator to fish in the fishery and catch a portion of the TACC for each quota species. These fishing rights are fully transferable and are also known as Individually Transferable Quota. Under these arrangements each fisher is limited to catching up to the amount of quota that they hold and the whole fishery is limited to the TACC that is set each season.
Consultative mechanism	The Tropical Tuna Management Advisory Committee (TTMAC) is the principal forum to discuss issues relating to the management of the ETBF. The Tropical Tuna Resource Assessment Group (TTRAG) provides advice on the status of fish stocks, sub-stocks, species (target and non-target), and on the impact of fishing on the marine environment.
International management	Australia is a member of the WCPFC and participates in meetings as part of the Pacific Forum Fisheries Committee.

At a glance	
Bycatch management – Fishery Management Strategy 2019-2023	The ETBF Fishery Management Strategy 2019-2023 (the ETBF FMS) describes the key "operational" fisheries management processes and arrangements that will pursue AFMA's legislative objectives in the ETBF (including those outlined in the ETBF Fishery Management Plan) over a 5-year period. The FMS sets out management responses to high ecological risks, including impacts on Threatened, Endangered and Protected (TEP) species, and discarding of target species.
Major management issues over the next 12 months	○ Continued operation of the fishery under quota-based management arrangements. ○ Continued development and monitoring of implementation of bycatch mitigation.
Long term strategic management issues	○ Assist Australian delegations to influence WCPFC deliberations to ensure regional sustainability. ○ Consider the economic status of the fishery and the factors affecting the economic climate. ○ Continued improvement in bycatch mitigation. ○ Improvements to scientific data collection. ○ Incorporate information from climate change and stock structure. research into the management of the fishery.

1.1 Target and by-product species

Under the ETBF Management Plan the primary species in the Fishery are bigeye tuna, albacore tuna, broadbill swordfish, striped marlin, longtail tuna, northern bluefin tuna, rays bream, skipjack tuna and yellowfin tuna. The majority of effort in the fishery is targeted at five quota (target) species bigeye tuna, albacore tuna, broadbill swordfish, striped marlin and yellowfin tuna, which are managed through Individual Transferrable Quotas (ITQs). See table 1 for more information on the ETBF Management Plan and management method. Mahi mahi, oil fishes, wahoo and moonfish (opah) also make up an important component of the catch and are considered by-product species (species that are retained for sale but comprise a minor component of the fishery catch and economic return).

Operators fishing in the ETBF also target Southern Bluefin Tuna (SBT) along the New South Wales (NSW) coast during certain times of the year. All catch of SBT is managed under the *Southern Bluefin Tuna Management Plan 1995* (the SBT Management Plan).

An overview of the target and by-product species can also be found in the Fisheries status report 2021 by ABARES.

1.2 Management arrangements

The ETBF Management Plan, which is based on quota management, came into operation on 1 March 2011 following a process of public consultation. In 2011 the ETBF went from being managed through pelagic longline and minor-line effort SFRs to being managed by output controls via quota SFRs for each of the quota species (bigeye tuna, albacore tuna, broadbill swordfish, striped marlin and yellowfin tuna). The move to output-control based management of the ETBF was in line with the Ministerial Direction given to AFMA in 2005 and adheres with the principles of the Commonwealth Harvest Strategy Policy (CHSP 2018).

Output controls regulate fishing activity in a fishery by restricting the amount of fish that can be landed. A Total Allowable Commercial Catch (TACC) is determined for each quota species by the AFMA Commission. This Determination is consistent with the requirements for highly migratory species outlined in the CHSP 2018 and considers Australia's obligations to the WCPFC, the results of the ETBF Fishery Management Strategy, and relevant advice from TTMAC and TTRAG. The TACCs are divided equally among the total number of quota SFRs for each species.

In determining a recommended TACC, TTMAC and TTRAG include estimates of recreational catch of quota species in advice to the Commission and may also consider any agreements on resource sharing.

Table 2: The TACC for each quota species in the ETBF for the 2020 and 2021 fishing seasons were as follows:

Species	TACC (t) 2020	TACC (t) 2021
Albacore tuna *(T. alulunga)*	2,500	2,500
Bigeye tuna *(T. obesus)*	1,056	1,056
Yellowfin tuna *(T. albacares)*	2,400	2,400
Broadbill swordfish *(Xiphias gladius)*	1,250	1,163
Striped marlin *(Tetrapturus audux)*	351	351

The ETBF has extensive by-product trip limits with no take species and different limits in waters adjacent to states (Queensland, New South Wales, Tasmania and Victoria). See the ETBF Management Arrangements booklet section on catch limits on AFMA's website for more details. The ETBF also has a Bycatch and discards workplan. The Bycatch and discards workplan aims to minimise bycatch and discarding of high risk species that have been identified through the Commonwealth Scientific and Industrial Research Organisation (CSIRO) Ecological Risk Assessment (ERA) process.

The focus of the ETBF Bycatch and discards workplan is:

- seabirds
- marine turtles
- marine mammals
- sharks
- other “no take species” (e.g. blue and black marlin).

1.3 Fishing methods

The methods used to target tuna and billfish in the ETBF are pelagic longline and minor line gears (trolling, handlining and rod and reel fishing).

Pelagic longline fishing is the predominant method used in the ETBF and involves the use of branch lines attached to a mainline (Figure 1). Each branch line (snood) is fitted with one or more baited hooks. The longline is set in the sea in such a manner that the mainline, branch lines and hooks are suspended in the water column by floats at the sea surface. By setting a different number of hooks between floats, longer float lines and varying line setter and boat speed, fishers can set gear at different depths in the water column allowing them to target different species.

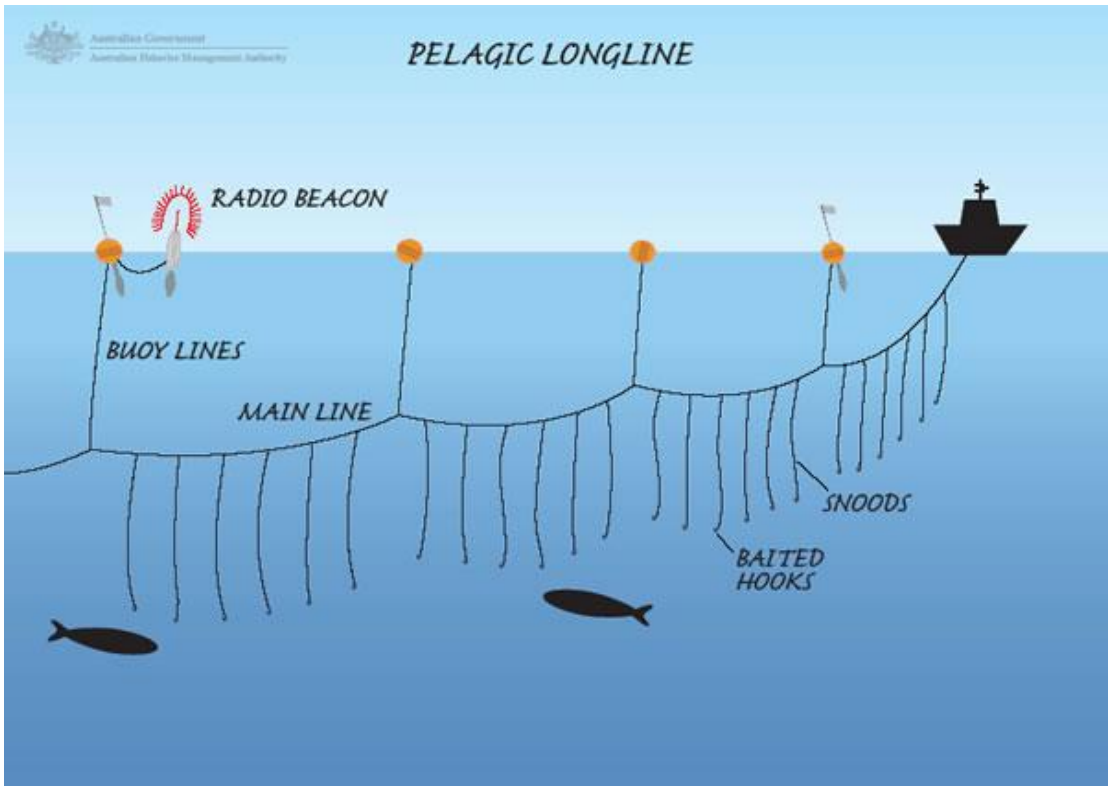

Figure 1: Illustration of a pelagic longline (a longline [baited] hook is attached to each snood and termed a longline clip).

1.4 Fishing areas

See map detailing the area of the fishery:

https://www.afma.gov.au/fisheries/eastern-tuna-and-billfish-fishery-page

For more information on where effort is concentrated see (Section 5.4: Spatial issues/trends).

1.5 Sectors

There are two commercial sectors in the ETBF: the pelagic longline sector and the minor line sector. Under the ETBF Management Plan, operators within the longline sector must have a longline boat SFR nominated to the boat operating, and the holder of the boat SFR must hold a number of uncaught quota SFRs for each species (table 3). To minor line, an operator must hold a number of uncaught quota SFRs and a minor line boat SFR.

Within the longline sector there is sub-sector called the Coral Sea Zone (CSZ). To longline in the CSZ, the operator must hold a CSZ SFR, at least one uncaught quota SFR and a longline SFR.

Table 3: Summary of SFR for fishing within sectors of the ETBF.

	Longline sector	Coral Sea longline sub-sector	Minor line sector
Quota SFR	Yes	Yes	Yes
Longline boat SFR	Yes	Yes	No
Minor line boat SFR	No	Yes	Yes
Coral Sea SFR	No	Yes	No

With the move to quota-based management in the ETBF, the take of quota species in the Skipjack Fishery was brought under the ETBF Management Plan. Skipjack purse seine operators were allocated an amount of quota for the five target species under the ETBF Management Plan and are required to cover any bycatch they take with quota.

1.6 Governing legislation/fishing authority

All Commonwealth managed fisheries are managed under the *Fisheries Management Act 1991, Fisheries Management Regulations 2019* (the Fisheries Regulations) and the respective management plans. The ETBF is managed through the *Eastern Tuna and Billfish Fishery Management Plan 2010.*

Australian commitments and obligations under the WCPFC are implemented via the ETBF Management Plan, the Fisheries Regulations, the *Fisheries Management (International Agreements) Regulations 2009* and conditions on SFRs.

1.7 Status of export approval under the *Environment Protection and Biodiversity Conservation Act 1999*

The ETBF was declared an approved WTO under the EPBC Act on 28 July 2005. Since then, the ETBF has been re-approved under the EPBC Act five times, with the current WTO accreditation expiring on 19 August 2022. https://www.awe.gov.au/environment/marine/fisheries/commonwealth/eastern-tuna-billfish

2. Socio-economic environment

2.1 Value of the fishery

The estimated value of the ETBF in the 2019-2020 financial year (published in October 2021) was $A 39.8 million. The estimated value of the key species is provided in table 4. A detailed breakdown of the catch composition (amounts of each species by each gear but without value) is provided in Section 5.

Table 4: Estimated catch and value for ETBF in 2019-2020[1] financial year.

Species	Catch (t)	Value ($A million)
Yellowfin tuna	1,757	24.4
Albacore tuna	1,160	3.3
Broadbill swordfish	539	6.7
Striped marlin	186	1.1
Bigeye tuna	303	3.0
Bycatch / other	-	1.3
Total	3,945	39.8

Source: ABARES Fishery Status Report 2021, with values for 2019-20. Note that values are for the financial year to align with financial reporting timetables. Data elsewhere is often reported by calendar year as this aligns more closely to the fishing patterns and fishing season.

2.2 Economic assessment

The Australian fisheries economic indicators report – Eastern Tuna and Billfish Fishery 2018 produced by ABARES brings together available indicators of the economic performance of each of the diverse fisheries managed by the AFMA. The report presents results of the 2018 survey of the ETBF. Results of the survey are used to estimate the economic performance of the ETBF and provide insights into the drivers of the fishery's economic and financial performance and how management and policy changes influence this.

Other indicators presented in the report include total factor productivity, terms of trade, management costs and quota latency.

The construction of these indicators draws upon the data collected through the fisheries survey program. Together with the financial and economic performance information, these indicators help to form a comprehensive picture of the economic performance of the ETBF over a number of years.

Economic status is also assessed annually in the ABARES fisheries status reports.

2.3 Downstream employment resulting from fishing activity

The Commonwealth seafood industry is important to the economy of rural and regional Australia, with direct employment in fisheries production and processing, and a substantial downstream employment effect in supporting industries including the transportation, storage, wholesaling and retailing sectors, and the catering and tourism industries. Operators in the ETBF use major ports between Cairns and Hobart to land catch and use the fish receiving and/or processing facilities. This generates employment for cold stores, processing plants, provisioning for the boats and aspects of repairs and maintenance. Major ports are located in Mooloolaba, Sydney and Ulladulla, with the ports of Cairns and Coffs Harbour used to a lesser extent.

2.4 Quality assurance and control

Australian seafood destined for export is subject to Commonwealth regulation under the *Export Control Act 2020* and *Export Control (Fish and Fish Products) Rules 2021* to ensure compliance with food safety and trade description requirements.

3. Management

3.1 Changes to management

Electronic logbooks (e-logs)

In 2020 industry was notified that paper-based logbooks were being phased out across Commonwealth fisheries, with the ETBF to transition to mandatory e-log reporting in 2020. Full implementation of e-logs has been impacted by the COVID-19 pandemic, which influenced uptake in both the 2020 and 2021 fishing seasons. Prior to the 2021 season, there were 27 longline boats and 2 minorline boats using e-log reporting. For the 2021 season, 9 additional boats transitioned to e-log reporting, while 3 boats continued using paper logbooks.

E-monitoring requirements

A new e-monitoring direction (*Fisheries Management (E-monitoring Eastern Tuna and Billfish Fishery) Direction 2021)* was implemented in April 2021, and requires all concession holders (irrespective of days fished) using pelagic longline methods to implement on-board e-monitoring systems and to comply with e-monitoring obligations. The direction also requires concession holders to monitor the functioning of the e-monitoring system and provide certain information to AFMA.

All current longline operators in the fishery have an e-monitoring system installed and operating, so this requirement did not materially affect any existing operators. However, all new longline entrants into the fishery will need to install and operate an e-monitoring system, regardless of the number of days they intend to fish each season.

Harvest Strategy for Swordfish

ETBF Swordfish was adopted by the AFMA Commission on 8 September 2020, following the cessation of the previous Swordfish harvest strategy in 2018. Development and Management Strategy Evaluation (MSE) testing of the revised harvest strategy was led by CSIRO, in close consultation with TTRAG and TTMAC. A component of the HS process is a review and MSE testing of the harvest strategy after a pre-determined period to ensure that the harvest strategy is achieving its objectives and meeting the requirements of the CHSP 2018.

The AFMA Commission is responsible for making the final TACC decision for the following fishing season. When making a TACC determination, the Commission considers advice from both TTRAG (including the harvest strategy outcomes) and TTMAC.

The Swordfish Harvest Strategy was applied to generate the 2021 and 2022 Swordfish RBCCs and resulted in a reduction to TACC for Swordfish in 2021 and 2022.

Harvest Strategy for Striped Marlin

The TTRAG had previously provided direction for the MSE testing of a new harvest strategy for striped marlin in the ETBF to replace the previously adopted harvest strategy for recommending the TACC in the ETBF. Based on advice from TTRAG and TTMAC, in 2019-20, CSIRO received AFMA funding to undertake, in consultation with TTRAG and TTMAC, the redevelopment of the ETBF Harvest Strategy for striped marlin. TTRAG considered the results from MSE of several alternative harvest strategies for striped marlin and requested modification to the operating model implementation error, additional diagnostics and alternative constant catch projections to assist future decision making.

TTRAG also requested constant catch projections. Zero constant catch indicated that the population would increase in the absence of fishing in the ETBF, and the constant catch of 250t, 300t and 351t (which is the current TACC) all showed rebuilding of the stock above current low levels, higher median CPUE in 2035, and a low risk of falling below the limit reference point. A constant catch TACC of 351t was determined by the AFMA Commission and is considered a precautionary TACC as the striped marlin stock is assessed to be at or around the B_{20} limit reference point proxy defined under the CHSP 2018.

Minor changes to seabird mitigation conditions

Following extensive consultation with Tuna Australia and ETBF Industry operators, AFMA developed a revised seabird management approach that was implemented at the start of the 2020 ETBF fishing season (see 2019 reassessment report). A review of the measures in 2020 identified some improvements that were endorsed by the TTMAC and entered into force for the 2021 season. The seabird conditions were amended so that additional seabird mitigation requirements will apply to boats that;

- exceed 10 bird interactions within the current or previous Threat Abatement Plan (TAP) season; and
- are found to have an unreported seabird interaction.

Under the revised arrangements, additional mitigation requirements will cease when a boat achieves a bycatch rate of less than 0.05 birds per 1,000 hooks (rather than the end of each TAP season[2]).

To support work undertaken by Tuna Australia (see below for update on tori line trial) reviewing line-weighting mitigation approaches, SFR conditions were amended in mid-2021 to allow the use of both sliding and fixed weight systems. The requirements for weight mass and proximity to the hook were retained, in line with Agreement on the Conservation of Albatrosses and Petrels (ACAP) best practice measures.

[2] TAP seasons: winter 1 May – 30 August and summer 1 September and 30 April.

These amendments are intended to improve the management of seabird mitigation in the fishery.

Tori Line Trial

An FRDC funded tori line project (2020-041) is currently underway. There are five ETBF boats participating in the trial. The project objective is to trial several new and / or modified protected species mitigation tools and processes in the ETBF to further reduce the rate of protected species interactions. The five boats are operating under scientific permit. The project has a dual focus of reducing TEP interaction rates and improving Workplace Health and Safety conditions on boats.

Coral Sea Zone Hook Trial

There are 11 CSZ boat SFR's (previously Area E permits). These are restricted to fish in an area adjacent to the Great Barrier Reef with a maximum number of hooks per set (500) per trip. These permits were initially instigated as an exploratory fishery tool at a time when there was significant international activity in the fishery. They have remained intact since this time through several iterations, and in recent times have been used to manage fishing in this unique area, with specific considerations of managing interactions with blue and black marlin.

In 2020, Great Barrier Reef Tuna put a proposal to AFMA though TTRAG and TTMAC to vary the conditions of the CSZ boat SFR's and allow an increased number of hooks to be set in a single trip. The proposal did not request a certain number of hooks but did recognise that there should be both spatial and temporal conditions to any increased maximum of hooks to minimise the risk of interacting with blue and black marlin.

A small working group, the Hook Trial Working Group, was established to refine the exact details of the trial consisting of; industry, scientists, management and several recreational members, noting all are members of either TTRAG or TTMAC. The working group evaluated the proposal and agreed to the following:

- a two-year trial beginning in early 2021 to increase maximum hook allowances per trip; and
- the trial must include safeguards (like spatial and temporal elements) specifically aimed at managing interactions with blue and black marlin.

The trial proceeded in 2021, with a maximum of 1200 hooks permitted in a single set per trip. The trial was permitted year round east of 148°E and between 1 March and 31 August if fishing west of 148°E, noting the higher risk of interaction with marlin outside of the trial period west of 148°E. The working group also recommended two combined marlin trigger limits, with either a review point or cessation of trial if the first or second triggers were breached.

The 2021 season saw limited effort expended in the CSZ, influenced by Covid-19 disruptions and changes within industry in the region. Neither of the marlin trigger limits were reached in 2021. The Hook Trial Working Group convened in early 2022 to review the outputs from the first year of the trial and noted the need for additional data given the limited effort expended in 2021. The trial will continue in 2022, with a slightly modified condition to allow a boat to set a maximum of 1200 hooks per day over several sets, which was previously restricted to a single set.

3.2 Performance of the fishery against objectives, performance indicators and performance measures

A statement of the performance of the ETBF against its objectives, performance indicators and performance measures are made in AFMA's 2020-21 report. A copy of the current statement can be found on AFMA's website.

3.3 Fisheries Management Strategy

The ETBF is the first Commonwealth managed Fishery to have an FMS developed. The FMS describes the key operational fisheries management processes and arrangements that will pursue AFMA's legislative objectives in the ETBF and is reviewed yearly.

The Fishery Management Strategy – Eastern Tuna and Billfish Fishery (ETBF) 2019-2023 was developed through substantial inputs and contributions from a broad range of stakeholders and first adopted in May 2019. Since this time, it has been updated to include the revised swordfish harvest strategy, seabird conditions, accessibility requirements and historical logbook designs in the ETBF.

3.4 Compliance risks present in the fishery and actions taken to reduce these risks

Compliance risks

AFMA employs a risk-based compliance strategy. Compliance risk is defined as the risk that fishing operators do not comply with fisheries management arrangements and/or fishing permit/concession conditions. AFMA conducts an assessment each financial year of all risks to compliance across the major Commonwealth fisheries to direct resources towards high risks that are identified.

ETBF specific risks include:

1. *Vessel Monitoring System non-compliance*
2. *Quota evasion:*
    i. *Misreporting*
    ii. *Substitution and concealment*
    iii. *Fish receiver fraud*
    iv. *Taskforce*
3. *Electronic Monitoring non-compliance*

Compliance management tools

To address these risks AFMA's compliance program contains five main elements:

1. ***Integrated Computer Vessel Monitoring System (VMS)***

VMS is used to monitor pelagic longline operations and the movement of boats in and out of ports. AFMA monitors the activity of the fleet through VMS continuously. VMS allows AFMA to contact boats whose reports are overdue and to ensure that the boat and VMS is working in accordance with conditions imposed on fishing permits. Temporary reporting schedules may be arranged for a boat when a VMS unit has stopped working while at sea or the boat may be directed to return to port.

2. ***Vessel inspections***

Random in-port and at-sea inspections are to be carried out on active boats in the fishery during the year. Additional inspections may be carried out on targeted boats if intelligence indicates further attention is warranted.

3. ***Fish receiver inspections***

Regular inspections of fish receiver premises are carried out during the year. Additional inspections may be carried out on targeted receivers if intelligence indicates further attention is warranted.

4. ***At-sea compliance***

Each year AFMA determines an appropriate number of sea patrol days that will be conducted in Commonwealth waters.

5. ***Information program***

Centralised compliance officers maintain a client liaison role to gauge operator response to compliance. Centralised compliance provides fishers and processors with regular feedback on the level of compliance with the management arrangements.

3.5 Consultation processes

AFMA actively involves a wide range of stakeholders in the process of developing and implementing fisheries management arrangements. This approach is supported by specific consultative processes which are embodied in AFMA's governing legislation and undertaken as part of effective fisheries management practices.

TTMAC is the key advisory committee for management of the ETBF domestic fishery. The TTMAC membership is made-up of members from AFMA, scientific agencies, conservation Non-Government Organisations (eNGOs), the industry sector, industry invited participants, recreational/charter sector

and an invited state Government participant. Representatives from the state fisheries agencies, the recreational/charter fishing sectors and invited industry participants have permanent observer status at TTMAC meetings, at the Chair's discretion in consultation with AFMA management. Agencies such as DAWE and ABARES attend TTMAC meetings as observers on an as needs basis. All management arrangements, including the current ETBF Management Plan and FMS, were developed in consultation with TTMAC, operators and other stakeholders.

The TTRAG is the key research and scientific committee for management of the domestic ETBF fishery. Membership for TTRAG is drawn from AFMA, scientific agencies, ABARES and the pelagic longline sector of industry. Agencies such as DAWE attend meetings as observers on an as needs basis. The RAG provides advice to the AFMA Commission regarding the status of the target species stock in Australia and the Pacific and is the key group providing advice on the development and implementation of harvest strategies and ecological risk assessments.

Further information on TTMAC and TTRAG available on the AFMA website at:

Tropical Tuna Management Advisory Committee

https://www.afma.gov.au/fisheries/committees/tropical-tuna-management-advisory-committee-tropical-tuna-mac

Tropical Tuna Resource Assessment Group

https://www.afma.gov.au/fisheries/committees/tropical-tuna-resource-assessment-group

3.6 Harvest strategy

The *Commonwealth Fisheries Harvest Strategy Policy* (hereafter referred to as the CHSP) was first implemented in 2007 in response to a Ministerial Direction (2005) with a subsequent review and revision released in 2018. The CHSP provides a framework for the development of harvest strategies for **key commercial species** taken in Australia's Commonwealth fisheries and requires appropriate management of **by-product species**. Harvest strategies consistent with the Policy are intended to:

- provide the Australian community with a high degree of confidence that commercial fish species are being managed for long-term biological sustainability and economic profitability.
- provide the fishing industry with a more certain operating environment.

The CHSP 2018 states that harvest strategies must outline:

- processes for monitoring and assessing the biological and economic conditions of commercial fish species within fisheries in relation to fishery specific reference levels (a reference point or points); and
- pre-determined rules that control fishing activity according to the biological and economic conditions of the fishery (as defined by monitoring or assessment). these rules are referred to as harvest control rules or decision rules.

Control rules are designed to keep the fishery on track in pursuit of its defined objectives by specifying the management actions or decisions that need to be taken. For control rules to be clear and effective, the objectives need to be expressed in the form of quantifiable reference points. These reference points are used to guide management decisions.

The high-level objective of the CHSP (2018) is:

- The ecologically sustainable and profitable use of Australia's Commonwealth commercial fisheries resources (where ecological sustainability takes priority)—through the implementation of harvest strategies.

More specifically, to meet the objective of the CHSP 2018[3], AFMA must implement harvest strategies that:

- Ensure the exploitation of fisheries resources and related activities are conducted in a manner consistent with ESD principles and the precautionary principle.
- Maximise net economic returns to the Australian community—always in the context of maintaining commercial fish stocks at sustainable levels
- Maintain key commercial fish stocks, on average, at the required target biomass to produce maximum economic yield from the fishery
- Maintain all commercial fish stocks, including by-product, above a biomass limit (B_{LIM}) where the risk to the stock is regarded as unacceptable, at least 90 per cent of the time
- Ensure fishing is conducted in a manner that does not lead to over-fishing. Where overfishing of a stock is occurring, take action immediately to cease overfishing.
- Minimise discarding of commercial species as much as possible.
- Are consistent with the EPBC 1999 and the associated Guidelines for the Ecologically Sustainable Management of Fisheries (2nd edition).

The CHSP 2018 provide specific guidance for international fisheries such as the **ETBF**, stating that:

- In the case of fisheries that are managed jointly by an international organisation or arrangement, the Harvest Strategy Policy does not prescribe management arrangements. However, it does articulate the government's preferred approach.
- The government (including AFMA) must implement decisions taken by all relevant RFMOs and other international arrangements that Australia is a party to (except where Australia has made a permissible reservation about the decision).

[3] Additional guidance material on the Harvest Strategy Policy available at: Guidelines to the Harvest Strategy Policy (Commonwealth Fisheries Harvest Strategy Policy Guidelines 2018).

- Through these forums, Australia will pursue the adoption of measures that are consistent with the HSP and domestic management measures.
- AFMA will set Commonwealth catch levels taking into account available science and evidence, the Australian negotiating position, advice from the government and any relevant decisions of the applicable regional organisation.
- AFMA must determine a domestic catch level that is the same or less than that permitted under the relevant international arrangement and can impose additional constraints on fishing effort and/or biomass based on recommendations or rebuilding targets. AFMA cannot set a domestic catch level greater than that permissible under the relevant international arrangement.
- AFMA may impose additional constraints on fishing effort, biomass-based recommendations or rebuilding targets.
- If Australia **is** a major harvester of the stock and no harvest strategy has been determined internationally, the AFMA must develop and implement a harvest strategy consistent with the objective of this policy.
- Where Australia **is not** a major harvester of the stock and no harvest strategy has been determined internationally, the key consideration in setting catch limits will be consideration Australia's negotiating position in bilateral, regional or international negotiations.

AFMA also takes into account local stock indicators when setting domestic TACCs.

The ETBF has developed a FMS that include a Commercial Species Strategy that explicitly recognises the two different approaches used to determining RBCC and TACCs for key commercial species in the ETBF, and a third separate approach for managing and monitoring by-product species. These approaches are:

- **Harvest strategy (control rule) approach** - This approach is described in Section 3.4 of the ETBF FMS and comprises a traditional harvest control rule-based harvest strategy approach (tested via MSE) to determine RBCCs for two key commercial species in the ETBF (striped marlin and broadbill swordfish). The application of a harvest strategy to these species is consistent with the CHSP 2018 because Australia is a major harvester of these stocks in our region.
- **Indicators-based and "whole of government position" approach -** This approach is described in detail in the ETBF FMS and combines consideration of local and Western and Central Pacific Ocean stock status indicators with Australia's whole of government position on national allocation (and resource sharing), to determine TACCs for those key commercial species (currently albacore, yellowfin and bigeye tuna) for which the HCR based approach has been determined by MSE testing to be ineffective. For these three tuna species, the application of a domestic harvest strategy is not possible due to the ETBF harvesting only a small proportion of the total catch of these species in the southwest Pacific. Instead, Australia pursues the implementation of harvest strategies for these species at the regional

level through the WCPFC; and

- **Monitoring rules-based approach -** This approach is described in Section **Error! Reference source not found.** of the ETBF FMS and is applied to by-product species (non-quota species) in the ETBF, which are only assessed every five years under the ERA cycle but for which fishery effort and/or catch levels are to be monitored annually against trigger levels in the period in between assessments. By-product species found to be at high risk from the fishery via ERA will have case specific (not pre-specified) management responses designed to reduce catches and risk to acceptable levels. **Note:** A number of by-product species are also subject to catch limits derived from Offshore Constitutional Settlement (OCS) arrangements between the Commonwealth and States and Territories.

3.7 Description of cross-jurisdictional management arrangements

Under OCS arrangements the Commonwealth has jurisdiction for most tuna and tuna-like species to the high-water mark, except off NSW where the Commonwealth has jurisdiction outside three nautical miles. For a description of the other fisheries that operate in the same region as the ETBF and any species catches see Section 5.2 below. AFMA continues to work toward complimentary fisheries research and management with other jurisdictions.

3.8 SBT zones

The ETBF Management Plan does not allow fishing for SBT. However, ETBF operators may take SBT if done in accordance with the quota management arrangements under the SBT Management Plan.

During the period from May to October, the waters off the east coast of NSW become an area of significant interaction between SBT and the ETBF. While the ETBF is a multi-species fishery, taking a variety of species other than SBT, the SBT Fishery is a single species fishery that requires operators to hold SBT quota nominated to their boat before they take SBT. Consequently, ETBF operators cannot take SBT unless they hold sufficient SBT quota to cover the catch.

To address the risk of SBT being caught in the ETBF without quota, AFMA annually institutes restricted access areas in the ETBF and are reviewed regularly throughout the season. These arrangements require ETBF operators to have minimum SBT quota holdings and have a fully functioning EM system installed in order to operate in areas of the ETBF where SBT are likely to interact with longline fishing gear.

For full details of the SBT zones and requirements for quota holdings and observer coverage please refer to the AFMA website at: https://www.afma.gov.au/fisheries-services/sbt-zones

4. Research and monitoring

4.1 Collaborative research and results

Research projects, related to the ETBF Fishery, that have received funding recently include:

- Data Management, assessment & implementation of HS for Australia's Tropical Tuna Fisheries 2020/21 to 2022/23 (Dr Robert Campbell and Ann Preece, CSIRO)
- ETBF broadbill swordfish & striped marlin Harvest Strategy Revision (Dr Rich Hillary, CSIRO)
- Investigate oceanographic and environmental factors impacting on the ETBF (Dr Jason Hartog, CSIRO)
- Tropical Tuna size monitoring program – 2022 (CSIRO)

In addition to the research projects listed above, Tuna Australia has received FRDC funding for the following projects:

- Improving the management of wildlife interactions in pelagic longline fisheries'
- Improving effectiveness, efficiency and safety of mitigation tools for protected species interactions in the Eastern Tuna and Billfish Fishery

Completed research projects in the ETBF post the 2014 reassessment include:

- Data management, provision of fishery indicators and implementation for harvest strategies for Australia's tropical tuna fisheries (Dr Robert Campbell, CSIRO)
- Determination of the spatial dynamics and movement rates of the principal target species with the broader western and central Pacific Ocean – beyond tagging - 2018 (Dr Karen Evan, CSIRO)

4.2 Monitoring programs used to gather information on the fishery

The key monitoring and data collection programs in the ETBF continue to include the logbook/e-logs, catch disposal record (CDRs)/electronic CDRs, e-monitoring and VMS, size monitoring program, port visits and boat inspections, amongst others.

Fisheries Management (E-monitoring Eastern Tuna and Billfish Fishery) Direction 2021 requires all concession holders using pelagic longline methods to implement on-board e-monitoring systems and comply with e-monitoring obligations, irrespective of days fished.

Electronic Monitoring

E-monitoring is currently implemented in the ETBF. A typical e-monitoring system uses video cameras and sensors to detect and record fishing activity, which can be reviewed later to validate logbook catch and effort data, verify catch composition, mitigation methods and reporting of EPBC listed species interactions. The AFMA website contains more detailed information regarding e-monitoring at: https://www.afma.gov.au/monitoring-enforcement/electronic-monitoring-program.

However, since 1 July 2015, e-monitoring has been implemented in the ETBF for all full-time fishing boats to replace human observers. To meet the requirements of the WCPFC, 10% of all footage across the fishery, including SBT zones, is selected at random, and reviewed to verify logbook data.

The objective of the ETBF e-monitoring program is to validate:

- the commercial catch of ETBF quota and by-product species;
- catch interactions with EPBC Act listed species and other bycatch species and discards to quantify the effects of fishing on these species; and
- the incidence of discarding (including life status) and high grading.

In the years since the introduction of e-monitoring into the ETBF, preliminary findings have shown improvements in data collection, compliance and fishers behaviour that have resulted in improved overall management of the fishery and increased transparency.

While no observers have been onboard boats in the ETBF since 2015, observers may be required on some fishing trips at the request of the Fishery Managers or the AFMA Observer Program.

Size monitoring program

Stock assessments require a comprehensive understanding of the size/age structure of the catch. Ideally, this catch information is required over a long time period. The TTRAG research priority list highlights the importance of certain specific data as being central to but standing above all other research priorities. Size monitoring is high on this essentials list. Catch length and weight data are essential inputs into any stock assessment. As part of the ETBF fishery stock assessment process, CSIRO require a comprehensive breakdown of the longline fisheries catch by species, and size by area. Accurate information on catch at age structures is also essential to follow cohorts from year to year and to assess the relative abundance of various year classes.

The individual size data, when incorporated into the CSIRO database, allows for various population analyses and stock assessments for the main species, which would otherwise be impossible. The results of these undertakings are reviewed and utilised by TTRAG on an annual basis.

The collection of extensive, individual size data sets from all the major processors ensures that a scientifically robust catch by size matrix can be collated. The size database collects as much as 80-90% of the total landed catch. These data are generally collected as individual landed weights. A

scientifically acceptable size database ensures the adequacy of the stock analyses by the scientific agencies involved.

The ongoing ETBF Size Monitoring Program, components of which are now undertaken as part of a co-management arrangement with Tuna Australia, has provided a high level of confidence in estimates of the fishery's commercial landings. This program has been running since the 1997-98 fishing season and provides a means of comparing logbook data with landed catch. The data collected through this program provides independent verified data from a subset of all landed catch. This information is used in conjunction with logbook information to estimate commercial landings for the fishery.

Vessel Monitoring Systems (VMS)

Vessel Monitoring Systems are mandatory for all Commonwealth Fishing boats for the delivery of near real time vessel information in order to effectively monitor the movements of all Commonwealth endorsed fishing boats. VMS enables cost effective monitoring of boats operating in all areas of the fishery including those under specific management arrangements. In addition, where an at-sea or aerial patrol is required, reporting from VMS allows a patrol vessel or plane to be directed to the exact location of the boat, resulting in substantial savings in search time. More information regarding the use of VMS in Commonwealth Fisheries can be found at https://www.afma.gov.au/monitoring-enforcement/satellite-monitoring-fishing-boats.

Licensing and quota management

Licensing and quota management is facilitated through GoFish - an online service that collects and stores information for AFMA's clients. The information held in GoFish includes records of fishing concessions, permit information, SFR leasing and holdings, and quota balances. The AFMA website contains extensive information to assist fishers this service at https://www.afma.gov.au/services-for-fishers.

5. Catch data

5.1 Total catch of target, by-product and bycatch species (including retained and discarded catch)

During the 2021 season, the highest reported catch via logbooks in the ETBF was for the main target species of yellowfin tuna with 37,358 fish retained. The other four target species were broadbill swordfish 11,363, albacore tuna 74,135, bigeye tuna 9,965 and striped marlin 2,308. The catch of broadbill swordfish is the lowest catch in a season for over two decades. This is likely due to a combination of lower availability (local abundance), high squid bait prices, and impacts on markets resulting from the Covid-19 pandemic all combining to reduce targeting of swordfish in the fishery. Bigeye tuna catch was also at its lowest level for many years and follows a decline in bigeye catch rates in recent years. Mahi mahi was the most significant by-product species caught with 5,788 fish retained reported in logbooks. Table 5 below lists the total retained (by weight and number) and discarded (by number) catches of target, byproduct and general bycatch species in the ETBF.

Table 5: Longline and minorline logbook catch data 2021

Longline and minorline logbook catch (Dropline, Trolling - N.A retained or discarded catch in 2021)			
	Drifting longline (pelagic longline) logbook reported catch		
Common name	**Catch retained weight (kg)**	**Catch retained number**	**Discard number**
Albacore	1,016,535	74,135	5,249
Australian bonito[#]	245	24	151
Barracouta[#]	-	-	779
Barracudas	-	-	-
Batfishes	-	-	1
Bigeye thresher	65	1	14
Bigeye tuna	348,520	9,965	1244
Bigscale pomfret	-	-	15
Black marlin[$]	-	-	1,486
Blacktail snapper	-	-	-
Blue marlin[$]	-	-	1,220
Blue shark[*#]	-	-	20,595
Broadnose shark	-	-	-
Bronze whaler	-	-	11,376
Bull shark	-	-	-
Crocodile shark	-	-	141
Dusky whaler	40	6	333
Escolar	248	44	564
Fish (mixed)	-	-	-
Frostfish	-	-	-
Gemfish	-	-	112
Giant manta ray	-	-	499
Great barracuda	-	-	-
Grey reef shark	-	-	-

Hammerhead sharks	-	-	374
Hawksbill turtle	-	-	-
Lancetfishes	15	1	21,206
Longfin mako	-	-	-
Longnose lancetfish	-	-	484
Mahi mahi	52,898	5,788	568
Marlins (unspecified)	916	27	-
Moonfish (mixed)	33,208	1,099	27
Northern bluefin tuna	4,994	71	22
Oarfish	5	1	20
Ocean sunfish	-	-	5,662
Oceanic whitetip shark	-	-	1,629
Oilfish	428	17	745
Pomfret	-	-	-
Porbeagle	-	-	-
Rainbow runner	-	-	3
Ray's bream	7,876	3,689	65
Rays (mixed)	-	-	28
Ribbonfishes	-	-	1
Rudderfish	10579	1371	3889
Sailfish	1,660	65	73
Sandtiger shark	-	-	-
Sharks (mixed)	4,214	287	3,232
Short sunfish	-	-	342
Shortbill spearfish	4,426	289	100
Shortfin mako	12,348	274	1,061
Shortnose lancetfish	-	-	-
Silky shark	-	-	60
Skates and rays	-	-	24
Skipjack tuna	2,240	434	788
Smalltooth cookie cutter shark	-	-	1

Smooth hammerhead	-	-	69
Snake mackerel	-	-	614
Southern bluefin tuna**	780,495	17,395	5,118
Spanish mackerel	-	-	-
Stingrays - unspecified	-	-	1,801
Striped marlin	162,882	2,308	145
Swordfish	586,841	11,363	1,019
Thresher shark	-	-	856
Tiger shark	-	-	1,669
Toadfishes unspecified	-	-	6
Trevallies and scads	-	-	-
Tuna (mixed)	-	-	1
Wahoo	12,597	776	90
Whaler and weasel sharks	-	-	455
Whitetip reef shark	-	-	3
Yellowfin tuna	1,375,744	37,358	7,142

[1] Fish are not kept for a number of reasons including: management (no-take species), undersized fish (market requirements), shark damage, or simply no market.

[2] Fishers typically do not report estimated weights of released fish.

* Sharks & rays (Chondrichthyes) subject to limits of not more than the number of tuna and billfish quota species taken per trip not exceeding a maximum of 20 carcass per trip.

** SBT area managed under the SBT Management Plan and is subject to quota.

Subject to trip limits under OCS agreements or catch limits

$ No take species

For more information on interactions with protected species see Section: 7.1 Frequency and nature of interactions

5.2 Total catch of target species taken in other fisheries

Commonwealth fisheries that operate in the same region as the ETBF include the SBT Fishery, Small Pelagic Fishery (SPF), Southern and Eastern Scalefish and Shark Fishery (SESSF), and the Coral Sea Fishery. Catches of ETBF target species within these fisheries remains low and this catch is required to be covered with ETBF quota (see Table 6 below).

Table 6: 2021 fishing season catch of ETBF target species reported in logbooks from other Commonwealth fisheries that overlap with the ETBF.

Fishery	Species name	Catch Weight (kg)
Gillnet Hook and Trap Fishery	Swordfish	220
Gillnet Hook and Trap Fishery	Yellowfin tuna	10
Small Pelagic Fishery	Striped marlin	200

Many state finfish fisheries operate adjacent to the waters of the ETBF such as the NSW Ocean Trap and Line Fishery (OTLF), the Queensland Rocky Reef fishery and the East Coast Inshore Finfish Fishery. However, direct interactions are limited given that most pelagic species caught in the ETBF do not venture into near shore waters and only a few species of inshore fish are susceptible to capture on pelagic longlines.

More information on the management of state fisheries can be found at the relevant jurisdiction website:

Queensland - https://www.daf.qld.gov.au/

NSW - www.fisheries.nsw.gov.au

Victoria - http://www.dpi.vic.gov.au/fisheries

Tasmania - https://dpipwe.tas.gov.au/

For information on overlapping recreational catch and effort from the 2001 National Recreational Fishing Survey see the Department of Agriculture, Water the Environment website. There is recreational take of the key ETBF species. Of the ETBF species, striped marlin is perhaps the most highly prized by recreational fishers who target and catch what is estimated to be significant numbers of this species each year. Though recreational fishers target the other ETBF target species the estimated recreational catch is not significant compared to the commercial catch and stock size. Estimates of recreational catch are based primarily on charter and club / tournament records, it is noted that there is a current lack of information about non-club affiliated fishers and this could be improved. AFMA does not manage the recreational fishing / take of striped marlin or other species.

5.3 Western Central Pacific Fisheries Commission

Table 7. For each species in: ETBF Catch and proportions of WCPO Catch

Species	ETBF catch (t) 2020	ETBF 2020 TACCs	WCPFC catch 2020	Region 5 catches[4]	Percentage ETBF catch of Region 5 catches
Albacore tuna	1,101t	2,500t	105,577t	20,018t	5.5%
Broadbill swordfish	535t	1,056t	5,373t	831t	64.4%
Bigeye tuna	283t	1,250t	156,639t	2,067t	13.7%
Striped marlin	162	351t	3,492t	256t	63.3%
Yellowfin tuna	1,668	2,400t	727,012t	9,812t	17.0%

Source: AFMA catch data, WCPFC Tuna Fishery Yearbook 2020 and WCPFC-SC17-2018/GN-IP-01 - Overview of Tuna Fisheries in the Western and Central Pacific Ocean, including Economic Conditions - 2020 – Presented at WCPFC Scientific Committee (online meeting) 11-19 August 2021. Source: AFMA CDR catch data (verified weights, differ to logbook estimates) and WCPFC Tuna Fishery Yearbook 2020. Note – 2021 data for WCPFC are not yet available. WCPFC catch figures shown are for South Pacific Albacore-all gear types, WCPO Bigeye and Yellowfin-all gear types, WCPFC statistical area Striped Marlin and Swordfish-all gear types.

Table 8: Comparison of WCPFC and ETBF catch.

Species	ETBF catch (t) 2021	WCPFC catch (t) 2020
Albacore tuna	1,039	105,577
Broadbill swordfish	608	5,373
Bigeye tuna	362	156,639
Striped marlin	167	3,492
Yellowfin tuna	1,409	727,012

[4] Percentage ETBF catch of Region 5 – Annual Catch by Fleet and Fishing Method within the south-west Pacific: 2020 Update, Robert Campbell CSIRO – Data used is most recent at the time of reporting

Yellowfin tuna catch reported for 2020 in the WCPFC statistical area (727,012t), is the highest on record. Bigeye tuna catch reported for 2020 was 156,639t, similar to the total catch for 2018. The 2020 catch of albacore tuna (105,577t) was the lowest catch since 2016. Skipjack tuna catch in the WCPFC area in 2020 was 1,754,082t almost 300,000t less than the record catch of the previous year (2019) figure 3. Figure 2 describes the WCPFC Regional assessment areas for tuna and billfish species.

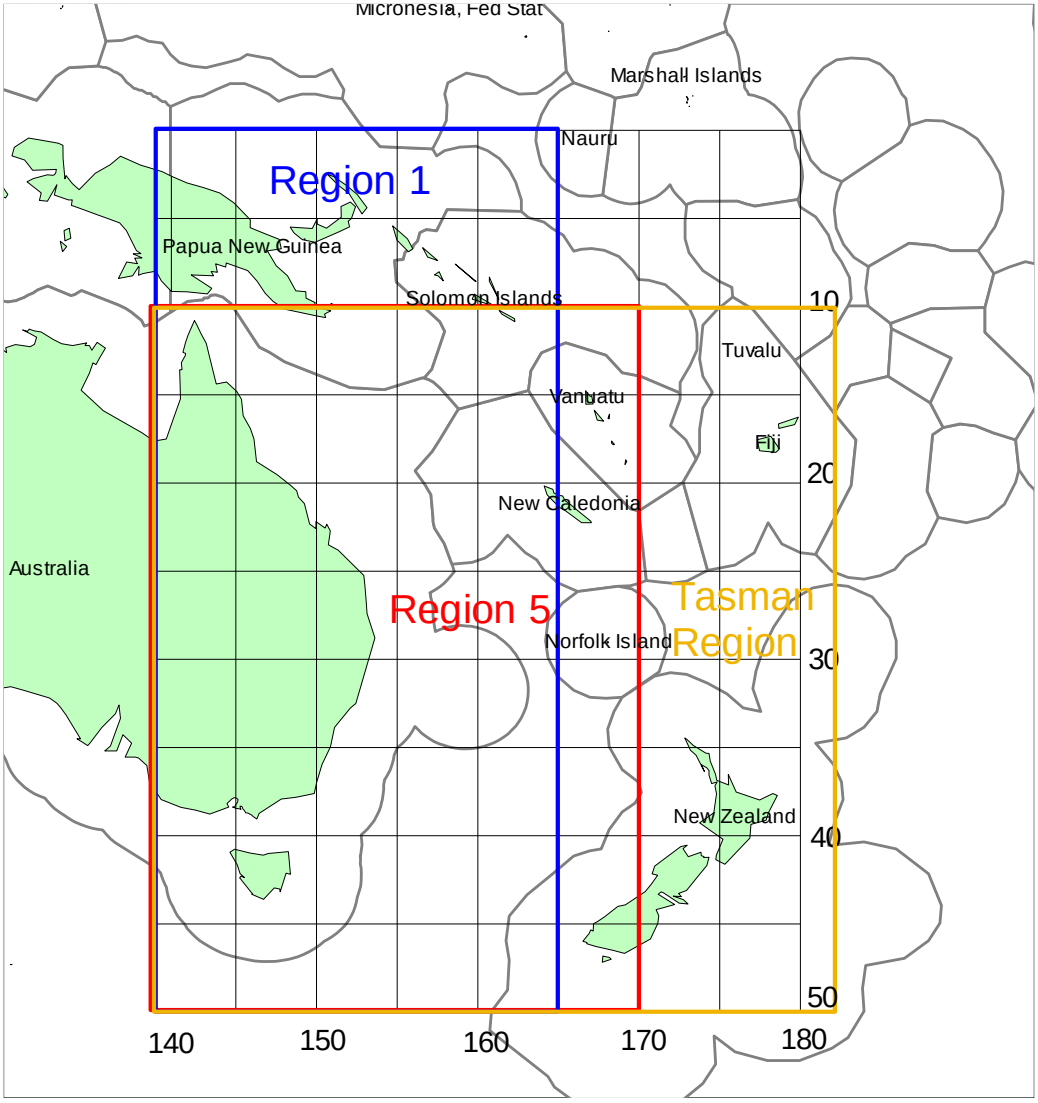

Figure 2. WCPFC Regional assessment areas for tuna and billfish species.

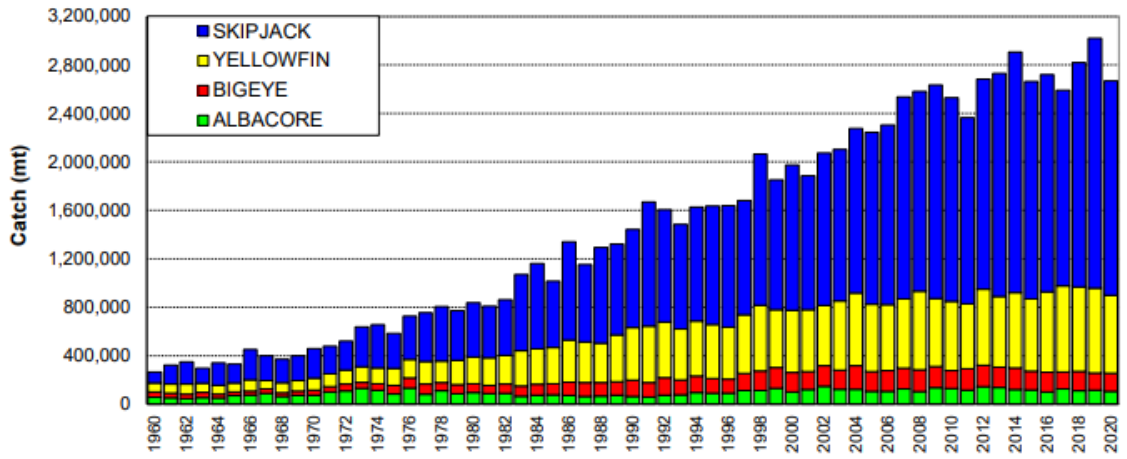

Figure 3. Catch (t) of albacore, bigeye, skipjack and yellowfin tuna in the WCPFC Statistical area to 2020 (data shown in calendar years). (Source: WCPFC, 2020).

5.4 Spatial issues/trends

The number of active boats in the ETBF has steadily decreased since the early 2000's along with an overall reduction in effort remaining relatively stable over the past 5 years and change in effort characteristics to favour higher numbers of hooks per shot. The effort in hooks set has declined (though to a lesser extent) from a peak of more than 12 million in 2003 to around 7 to 8 million per year in 2020 and 2021.

Following this decrease in effort, the total retained catch of all species in the ETBF declined from a high of more than 8,000t in 2002 to around 4,200t in 2013. Catches have declined for 2020 and 2021 largely attributed to Covid-19 global pandemic decreased from 4,341t in 2019 to 3,945t in 2020. Swordfish, yellowfin tuna and bigeye tuna continue to be the main target species. This may also be attributed to increases in fuel prices in recent years. A large proportion of effort in the ETBF remains off the NSW and southern Queensland coasts.

Fishing through different sections of the water column (deeper setting in the case of fishing for albacore tuna) obviously impacts on the range and magnitude of bycatch and by-product species taken. The general perception is that deep setting reduces the take of TEP species (such as seabirds and marine turtles because the gear is rapidly sunk below the normal range of such animals) and is an effort made to further minimise interactions. Fishing through different sections of the water column (deeper setting in the case of fishing for albacore tuna) obviously impacts on the range and magnitude of bycatch and by-product species taken.

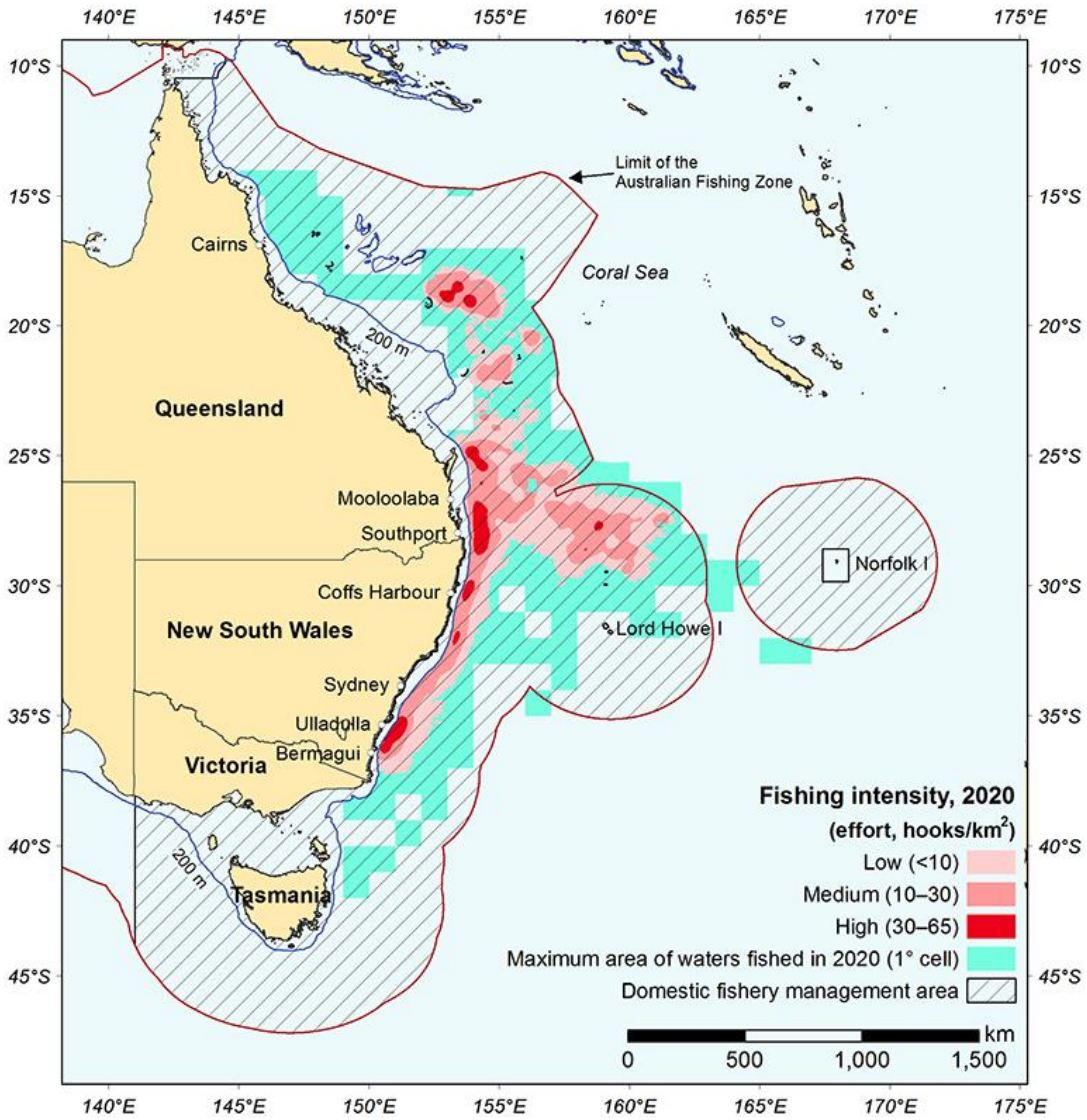

Figure 4: Numbers of hooks set in the ETBF (by 1-degree squares) across all sectors in 2020. Data sourced from ABARES Fishery Status Report 2020

5.5 Effort data

Total ETBF longline effort decreased by 757,924 hooks in 2021 relative to 2020, likely driven by interruptions to fishing operations resulting from the Covid-19 global pandemic. There was an increased in minorline activity in 2021 compared to previous years. See tables 9 and 10 below.

Table 9: Longline fishing effort in the ETBF.

Year	Hooks	Shots	Av hooks per shot	Boats
2001	10,968,225	12,555	874	125
2002	11,533,542	12,878	896	121
2003	12,401,703	13,225	938	117
2004	9,968,136	10,681	933	105
2005	8,948,607	9,118	981	87
2006	8,822,451	7,688	1,148	69
2007	8,443,782	6,845	1,234	57
2008	8,058,717	6,415	1,256	49
2009	8,847,469	6,639	1,333	51
2010	7,874,863	5,811	1,355	47
2011	6,761,856	5,015	1,348	40
2012	6,792,185	4,715	1,441	41
2013	6,777,421	4,696	1,443	46
2014	6,963,445	4,664	1,493	43
2015	8,219,473	5,370	1,530	42
2016	7,823,984	4,997	1,565	39

Year	Hooks	Shots	Av hooks per shot	Boats
2017	8,746,936	5,371	1,628	42
2018	7,896,008	4,541	1,738	41
2019	8,582,875	4804	1787	37
2020	8,150,552	4480	1819	36
2021	7,392,628	3878	1906	33

Table 10: Minorline (i.e. dropline; hook and line; trolling; mechanised handline; non-mechanised handline; rod and reel; and trotline) fishing effort in the ETBF.

Year	Shots	Boats
2001	587	16
2002	479	11
2003	650	16
2004	400	10
2005	144	7
2006	522	8
2007	1,028	9
2008	379	6
2009	170	6
2010	9	2
2011	107	4
2012	73	3
2013	87	8
2014	20	4
2015	38	5
2016	24	2
2017	82	3
2018	-	-
2019	1	1
2020	70	5
2021	278	8

6. Status of target stock

6.1 Resource concerns

ABARES produces annual status reports for Commonwealth fisheries based on Australian and regional data and stock assessments. The most recent is provided in Figure 5 below, further information on the ETBF see the ABARES 2021 Report Eastern Tuna and Billfish Fishery – DAWE.

Biological status					
Stock	2019		2020		Comments a
	Fishing mortality	Biomass	Fishing mortality	Biomass	
Striped marlin (*Kajikia audax*), south-west Pacific					Most recent estimate (2019) indicates that spawning biomass is below the default LRP. Current fishing mortality rate is below F_{MSY}.
Swordfish (*Xiphias gladius*), south-west Pacific					Most recent estimate (2017) indicates that spawning biomass is likely above the default LRP. Recent fishing mortality is likely below F_{MSY}.
Albacore (*Thunnus alalunga*), south Pacific					Most recent estimate (2018) indicates that spawning biomass is well above the default LRP. Recent estimate of fishing mortality is below F_{MSY}.
Bigeye tuna (*Thunnus obesus*), western and central Pacific					Most recent estimate (2020) indicates that spawning biomass is likely above the LRP. Recent fishing mortality is likely below F_{MSY}.
Yellowfin tuna (*Thunnus albacares*), western and central Pacific					Most recent estimate (2020) indicates that spawning biomass is highly likely above the LRP. Recent fishing mortality is highly likely below F_{MSY}.

Economic status

NER are positive and increasing in an environment of relatively stable biomass over the past 2 decades. Productivity improvements are likely driven by a smaller fleet and ITQs. Evidence suggests that NER are not being dissipated through overcapitalisation or overfishing of the fish stocks.

a Regional assessments of species and the default limit reference points from the Commonwealth Fisheries Harvest Strategy Policy (Department of Agriculture and Water Resources 2018) are used as the basis for determining stock status.

Notes: F_{MSY} Fishing mortality at maximum sustainable yield. **ITQ** Individual transferable quota. **LRP** Limit reference point. **NER** Net economic returns.

Fishing mortality	Not subject to overfishing	Subject to overfishing	Uncertain
Biomass	Not overfished	Overfished	Uncertain

Figure 5: ABARES Fishery Status Report 2021 results for target species in the ETBF (Source: ABARES).

6.2 Stock assessments and recovery strategies

Albacore tuna

The assessment for albacore in the south Pacific was updated in 2018 using MULTIFAN-CL (Tremblay-Boyer et al. 2018). Significant improvements in the 2018 stock assessment included modifications to the catch rate index of abundance, inclusion of a higher natural mortality (0.4) in the grid, inclusion of alternative growth models and a simplified regional structure. These changes resulted in more optimistic outcomes than the 2015 assessment. The WCPFC Scientific Committee provided advice based on the full set of 72 models in the uncertainty grid, with equal weighting for all axes of uncertainty.

The median recent spawning stock biomass was 52% (80% PI 37–63%) of the levels predicted to occur in the absence of fishing. The probability that the recent spawning stock biomass had breached the limit reference point was zero. The median recent fishing mortality was below the level associated with MSY (F_{recent}/F_{MSY} = 20%; 80% PI 8–41%). The probability that the recent fishing mortality was above F_{MSY} was zero.

Stock status determination

The most recent estimate of spawning biomass is very likely above the default limit reference point of 20% of initial unfished levels. The most recent estimates of fishing mortality are very likely below the levels associated with MSY, and recent catches are around MSY. As a result, albacore in the south Pacific Ocean (including the ETBF) is classified as **not subject to overfishing** and **not overfished**.

Bigeye tuna

The bigeye tuna stock in the western and central Pacific Ocean (WCPO) was most recently assessed in 2020 (Ducharme-Barth et al. 2020) using the assessment package MULTIFAN-CL. The stock assessment is based on a structural uncertainty grid that includes steepness, growth, maturity, tagging dispersion, size data weighting and regional structure as the main uncertainties. The uncertainty grid using this approach contained 24 related models.

The median recent spawning biomass was 41% (80% PI 27–52%) of the levels predicted to occur in the absence of fishing. There was zero probability that the recent spawning stock biomass had breached the limit reference point. The median recent fishing mortality was below the level associated with MSY (F_{recent}/F_{MSY} = 72%; 80% PI 49–102%). There was a 12.5% probability that the recent fishing mortality was above F_{MSY}.

Significant concerns and problems were found with the most recent assessment and modelling approach (Ducharme-Barth et al. 2020) and the bigeye tuna assessment will be independently reviewed during 2021–22.

Stock status determination

Based on the uncertainty grid, the spawning biomass is very likely to be above the limit reference point of 20%$SB_{F=0}$ adopted for tunas. As a result, the stock is classified as **not overfished**. Similarly, recent fishing

mortality is very likely to be below F_{MSY}. As a result, the WCPO stock (including the ETBF) is classified as **not subject to overfishing**.

Broadbill swordfish

The SWPO stock of swordfish was most recently assessed in 2017 using the assessment package MULTIFAN-CL (Takeuchi, Pilling & Hampton 2017). The stock assessment was based on a structural uncertainty grid that included steepness, size data weighting, diffusion rate and natural mortality as the main uncertainties. The uncertainty grid using this approach contained 72 related models. The WCPFC Scientific Committee agreed to use the full grid, with equal weighting for all axes of uncertainty. Note that the primary uncertainty in the 2013 assessment (Davies et al. 2013), relating to growth and maturity schedules, has been resolved based on new research (Farley et al. 2016).

Across all models in the uncertainty grid, the spawning biomass declined steeply between the late 1990s and 2010, but the rate of decline has been less since then. These declines are greater in eastern region 2 (equator to 50°S, 165°E to 130°W), where fishing mortality is also greater, compared with western region 1 where the Australian fishery operates.

The median recent spawning stock biomass was 35% (80% PI 29–43%) of the levels predicted to occur in the absence of fishing. The probability that the recent spawning stock biomass has breached the limit reference point was very low. The median recent fishing mortality was below the level of fishing mortality associated with MSY (F_{recent}/F_{MSY} = 86%; 80% PI 51–123%). The probability that the recent fishing mortality was above F_{MSY} was about 32%.

Stock status determination

Based on the uncertainty grid, the spawning biomass is highly likely above the limit reference point of $0.2SB_{F=0}$ adopted for tunas (noting that the WCPFC Commission has yet to adopt a limit reference point for this stock). As a result, the swordfish stock in the SWPO (including the ETBF) is classified as **not overfished**.

Recent fishing mortality is also likely below F_{MSY}. The stock is therefore classified as **not subject to overfishing**.

Domestic harvest strategy

A revised Swordfish Harvest Strategy (to assist in annual TACC setting) was implemented in 2020 and utilises a standardised CPUE based harvest control rule, with a target reference point equivalent to the average ETBF std-CPUE for the period 2012-15. The harvest control rule provides a buffer zone around the target reference point to ensure some stability in the Recommended Biological Commercial Catch when the std-CPUE is near the target level, but acts to reduce the RBCC when the std-CPUE is below the buffer zone and increase the RBCC when the std-CPUE is above the buffer zone. The harvest strategy was MSE tested to ensure consistency with the CHSP 2018, including its ability to pursue the TRP and avoid the stock falling below the LRP. The Swordfish Harvest Strategy was used to set the TACC for the 2021 fishing season, which resulted in a decrease to the TACC.

Striped marlin

The last stock assessment for striped marlin in the SWPO (0–40°S, 140°E to 130°W) was in 2019 (Ducharme-Barth, Pilling & Hampton 2019). Influential changes from the previous (2012) assessment included use of standardised catch-per-unit-effort for the Japanese and Chinese Taipei fisheries, calculated using a geostatistical model, and updating the biological information on maturity and defining maturation as a function of length rather than age. The full stock assessment comprises a grid of 300 individual assessment models covering 6 axes of uncertainty, all with equal weighting.

The grid median recent spawning stock biomass (SB) was 19.8% (80% probability interval [PI] 9–46%) of the levels predicted to occur in the absence of fishing. There was a 50.3% probability that the recent spawning stock biomass had breached the Commonwealth default limit reference point ($0.2SB_0$). This was more pessimistic than the previous (2012) assessment in which spawning biomass (2006 to 2009) was estimated to be 34% of the levels predicted to occur in the absence of fishing.

In terms of maximum sustainable yield (MSY), the median recent spawning biomass was clearly below the level associated with MSY (SB_{recent}/SB_{MSY} = 74%; 80% PI 33–163%). There was a 68.6% probability that the recent spawning biomass depletion was below the spawning biomass associated with MSY.

The median recent fishing mortality was below the level associated with MSY (F_{recent}/F_{MSY} = 91%; 80% PI 31–189%). There was a 44.3% probability that the recent fishing mortality was above F_{MSY}. This is slightly more pessimistic than the previous (2012) assessment, where fishing mortality was at 81% of the level associated with MSY.

Stock status determination

The most recent median estimate of the SWPO spawning biomass of striped marlin is estimated to be very close to, but just below, the $0.2SB_0$ limit reference point adopted in the HSP and in the WCPFC for tunas (specifically, 20% of the levels predicted to occur in the absence of fishing). As a result, the striped marlin stock in the SWPO (including the ETBF) is classified as **overfished**. The most recent median estimate of fishing mortality (and a majority of the grid outcomes) was below the level associated with MSY (F_{MSY}). As a result, the stock is classified as **not subject to overfishing**. The WCPFC Scientific Committee recommended measures to control overall catch, through expansion of the geographical scope of CMM 2006-04 to cover the distribution of the stock; the WCPFC has not yet adopted this recommendation.

Domestic harvest strategy

A constant catch approach has been agreed to assist setting the TACC for striped marlin. In 2021, a TACC of 351t was determined by the AFMA Commission and is considered a precautionary TACC as the striped marlin stock is assessed to be at or around the B_{20} limit reference point proxy defined under the CHSP 2018.

Yellowfin tuna

The yellowfin tuna stock in the WCPO was most recently assessed in 2020 (Vincent et al. 2020) using the assessment package MULTIFAN-CL. The stock assessment is based on a structural uncertainty grid that includes steepness, tagging dispersion, tag mixing, size frequency and regional structure as the main uncertainties. The uncertainty grid using this approach contained 72 related models. The WCPFC Scientific Committee agreed to use the full grid, with equal weighting for all axes of uncertainty.

The median recent spawning stock biomass was 58% (80% PI 51–64%) of the levels predicted to occur in the absence of fishing. The probability that the recent spawning stock biomass had breached the limit reference point was zero. The median recent fishing mortality was below the level associated with MSY (F_{recent}/F_{MSY} = 36%; 80% PI 27–47%). The probability that the recent fishing mortality was above F_{MSY} was zero.

Significant concerns and problems were found with the most recent assessment and modelling approach (Vincent et al. 2020) and the yellowfin tuna assessment will be independently reviewed during 2021–22.

Stock status determination

Based on the uncertainty grid, the spawning biomass is very likely to be above the limit reference point of $0.2SB_{F=0}$ adopted for tunas. As a result, the WCPFC stock (including the ETBF) is classified as **not overfished**. Similarly, recent fishing mortality is highly likely to be below F_{MSY}. As a result, the stock is classified as **not subject to overfishing**.

7. Interactions with protected species

7.1 Frequency and nature of interactions

There are protected species listed under the EPBC Act that may interact with the tuna longline and minor line fisheries of the ETBF. In accordance with accreditation under the EPBC Act (see Chapter 1, 'Protected species interactions'), AFMA publishes and reports quarterly on interactions with protected species on behalf of Commonwealth fishing operators to DAWE. Table 11 below describes the recorded logbook TEP interactions that occurred in 2021. For more information and previous interactions please visit the Protected species interaction reports section of the AFMA website.

There was a minor decrease in the number of seabird interactions during 2021. AFMA strengthened seabird management regime for the 2020 season to focus on boats with higher interactions in response to the number of interactions reported during the 2019 season.

The total seabird TEP interactions for the 2021 season was 52 (Table 11), compared to 49 in 2020.

Table 11: Protected species interactions in 2021 in the ETBF each interaction was reported as (hooked, caught or entangled)

Eastern Tuna and Billfish Fishery TEP Interactions: 2021 Season				
Species	No. Interactions	Life Status		
		Alive	Dead	Unknown
Albatrosses	17	9	8	-
Birds (sp. Unidentified)	11	1	10	-
Bottlenose dolphin	1	1	-	-
Dolphins	1	-	-	-
Flatback turtle	1	-	1	-
Flesh-footed shearwater	16	1	15	
Green turtle	16	14	2	-
Hawksbill turtle	2	2	-	-
Leatherback turtle	20	20	-	-
Loggerhead turtle	12	11	1	-
Long-finned pilot whale	2	2	-	-
Oceanic whitetip shark	4	4	-	-
Pacific (olive) ridely turtle	5	4	1	-
Porbeagle	3	3	-	-
Seals	9	9	-	-
Short-tailed shearwater	1	-	1	-
Short-finned mako	209	111	47	51
Short-finned pilot whale	4	3	1	-
Silky shark	60	-	-	60
Turtles	33	28	5	-
Unknown or other	5	-	5	-
Total	**432**	**220**	**100**	**111**

7.2 Management action taken to reduce interactions

A number of management measures have been implemented in the ETBF to reduce interactions with protected species including:

- Minor amendments to seabird conditions 2021, so that additional seabird mitigation requirements will apply to boats that;
    - exceed 10 birds within the current or previous TAP season; and
    - are found to have an unprecedented seabird interaction
- The Longline Boat SFR Conditions were amended in 2022 to include Mobulid rays (Mobula sp.) to the list of protected / no take species.

Under the revised seabird arrangements, additional mitigation requirements will cease when a boat achieves a bycatch rate of less than 0.05 birds per 1,000 hooks (rather than the end of the TAP season).

To support Tuna Australia research into line-weighting mitigation approaches, SFR conditions were amended in mid-2021 to allow the use of both sliding and fixed weight systems. The requirements for weight mass and proximity to the hook were retained, in line with ACAP best practice advice.

8. Impacts of the fishery on the ecosystem

8.1 Results of the Ecological Risk Assessments

A key component in AFMA's strategy to pursue the ecological component of Ecologically Sustainable Development has been the undertaking of ecological risk assessments (ERA) for all AFMA-managed fisheries. By assessing the impacts of fishing on all parts of the marine environment, the ERAs encompass an ecosystem-based assessment approach. The ERAs will help to prioritise research, data collection monitoring needs and management actions for fisheries and ensure that they are managed both sustainably and efficiently.

The ERA process has three levels of analysis ranging from a preliminary Level 1 assessment to more comprehensive Level 2 and Level 3 assessments. A summary of the results from the Level 2 and Level 3 assessments are presented here including the results of a residual risk assessment conducted for the Level 2 assessment.

Level 2 ERA Results

The Level 2 productivity susceptibility analysis (PSA) is a semi-quantitative analysis of the risk posed by fishing to all individual species, habitats and communities identified in the scoping stage. At the Level 2 species assessment, a total of 261 species were evaluated. Eight species found to be at potential high risk after PSA or SAFE analyses. A residual risk analysis demonstrated that, after fifteen years of high logbook coverage and ongoing observer data collection (2001-2015, at around 3-5% per year), the low or zero level of reported interactions for seven of the species meant the likely potential risk posed by the ETBF was in fact low. The eighth species, dusky whaler shark (Carcharhinus obscurus), required more investigation.

Level 2 ERA Residual Risk Results

Due to the semi-quantitative nature of the Level 2 risk assessment, the analysis did not take into account all management measures currently in place in fisheries, resulting in a potential over-estimate of the actual risk for some species. To take account of this constraint, residual risk of the potential high-risk species is quantified using guidelines developed by AFMA with input from CSIRO and stakeholders. Residual risk is broadly defined as the risk remaining after the implementation of mitigation measures.

As dusky whaler sharks remained the only species identified as high-risk in the Level 2 ERA, CSIRO subsequently assessed that dusky whaler shark remained high risk after the residual risk assessment. These findings were presented to the TTRAG and while TTRAG endorsed the findings of the revised ERA, it requested ABARES to conduct some further residual risk analysis on dusky whaler shark, noting in-

particular that that the SAFE assessment assumed that all dusky whaler sharks are retained and therefore dead and there is significant uncertainty around the proportion of these sharks that would survive post capture.

TTRAG indicated that the level of likely post capture mortality (PCM) should be investigated (through queries of available literature) to better understand the impact of this factor upon the risk posed by the fishery, and whether there was a need to recalculate the risk if more reliable information on PCM was found.

Following further work by ABARES on post capture mortality, presented at the July 2018 TTRAG, CSIRO reevaluated the analysis, which determined the risk for dusky whaler shark to now be in the low-medium risk range.

Level 3 Quantitative Assessment Results

There was no requirement to progress to Level 3 in the most recent ERA.

8.2 Nature of impacts on the ecosystem

Since the 2019 re-assessment there has been no change to: impacts of fishing operations to the ecosystem in which the fishery operates, and how these impacts are managed to minimise any long-term risks or impacts. There has also been no change to the ERA since the 2019 WTO re-assessment. ERAs are scheduled to be undertaken in the ETBF every 5 years.

8.3 Management action taken to reduce impacts

The ETBF FMS contains a detailed description of the management actions taken (and planned) to manage the ETBFs interaction with key commercial species, by-product species, general bycatch species, EPBC listed species, habitats and ecological communities.

The FMS specifies the management arrangements in three main sections:

- Commercial Species (covering management arrangements for key commercial and by-product species)
- Bycatch Species - covering general bycatch and EPBC listed species
- Habitats and Ecological Communities

Supporting these management approaches are an ETBF Data strategy and Research strategy.

This management strategy is designed to achieve bycatch objectives outlined in Section 2, taking into account the most recent assessments of performance against those objectives summarised in Section 3. Bycatch management arrangements can be divided into three categories (Table 2 below).

Table 12: Categories of bycatch management arrangements

Category	Purpose
General	Relevant to all species
Species group	Designed to address bycatch objectives for groups of related species. AFMA has determined that such strategies will better achieve objectives relating to overall bycatch minimisation, sustainability and conservation, and avoidance of injury/death than species specific measures, and also allow for consistent management across fisheries and consideration of cumulative risks and are more efficient and cost-effective approaches to managing bycatch.
Species specific	Designed for a particular species only, often due to resource sharing agreements with recreational or State fisheries and international stock status agreements or local ERA risks and ERM.

While specific management responses to bycatch species identified as at high risk from ERA are implemented via either species group strategies or species-specific measures, AFMA has also identified a series of "future actions" that will be undertaken in a manner consistent with former bycatch action plans to support and develop existing management measures. These actions are summarised in Section 7.2.

8.4 General management arrangements requirements

Catch reporting

Fishers must record all bycatch, byproduct and discards under the 'Catch Details' section of their logbook and any interactions with EPBC listed species under the 'Wildlife and other Protected Species' section of their logbook.

Bycatch handling/treatment

Fishers are responsible for handling bycatch species appropriately to maximise the chance of their survival. Mishandling bycatch species can significantly reduce their chances of survival and have long-term impacts on the sustainability of the species.

Fishers must not mistreat bycatch. Mistreat is defined as the taking of an action or actions, or the failure to take an action or actions, which results, or is likely to result, in the death of, injury to, or causing of distress

to any bycatch. AFMA has developed six bycatch handling and treatment principles to minimise the risk of breaching bycatch handling and treatment (Table 3 below).

Table 13: Overarching principles for bycatch handling

Principle		Description
1	Safety of the boat and its crew are paramount	Mishandling does not include actions taken (or not taken), which are reasonably necessary to ensure the safety of the boat and or its crew.
2	All reasonable steps should be taken	Operators are expected to take all reasonable steps to ensure that bycatch is returned to the water as quickly as practicable and in a manner which does not reduce its chance of survival.
3	Minor gear recovery is not 'reasonably necessary'	Actions taken for the sole purpose of recovering minor fishing gear, are not considered 'reasonably necessary'.
4	Expediting removal from gear is not 'reasonably necessary'	It is not 'reasonably necessary' to injure bycatch when removing it from fishing gear to save time.
5	Harm, injury or death caused during capture is not mishandling	Mishandling does not include where bycatch is already dead, injured or stressed when it is brought on-board
6	Compliance with approved bycatch management plans	Handling of bycatch in accordance with AFMA approved bycatch management plan(s) is not mishandling.

For the full AFMA Bycatch Handling and Treatment Guide see: AFMA-Bycatch-Handling-and-Treatment-Guide_-2016-17_Public-Doc_FINAL.pdf

8.5 Species Groups Management Strategies

8.5.1 Sharks and rays

It is recognised that shark populations tend to be more vulnerable to fisheries impacts than bony fish, as they tend to be slow growing, mature at a later age and have few young (Last and Stevens 1994) and some shark species have naturally small population sizes (Shark Plan 2, 2012). There is global concern that high levels of shark catch are affecting shark species in several areas of the world's oceans (FAO 1999; Clarke 2009). In recognition of this, AFMA (and the Commonwealth Government) is committed to minimising, to the extent possible, ETBF and other fishery impacts upon shark populations including shark bycatch species.

Fishery wide measures are in place to reduce the capture and mortality of all shark species, regardless of conservation or ecological risk status. These measures include:

- A ban on the use of wire trace (to minimise shark captures)

- A ban on shark finning
- Requirement for boats to have line cutters (which can be used to release sharks prior to hauling on deck) and dehookers
- A requirement that retained shark numbers (byproduct) per trip do not exceed tuna and billfish quota catch numbers, with a total trip limit of 20 sharks (this effectively prevents trips targeting shark). Any excess sharks are classified as bycatch and must be discarded whether alive or dead.

In addition to these requirements, there are a suite of documents developed to assist fishery managers and fishers with the mitigation of sharks and rays. These include:

- Quick identification guides for shark species (including shortfin mako, longfin mako, dusky shark, silky shark and bronze whaler sharks) to assist operators in accurate identification and reporting of these species:
    - *Marine species identification manual for horizontal longline fishermen* developed by SPC.
    - Sharks caught in SBT Fishing grounds identification guide
- The *Chondrichtyan guide for fisheries managers: A practical guide to mitigating chondrichtyan bycatch*. This guide was developed in 2009, by ABARES and AFMA, the guide aims to provide fisheries managers with practical options to mitigate chondrichthyan TEP and high-risk species bycatch.
- A *National Plan of Action for the Conservation and Management of Sharks 2012 Shark-plan 2* developed by the Commonwealth Government. Shark-plan 2 provides an updated assessment of the conservation and management issues concerning sharks in Australian waters and identifies the research and management actions across Australia's state, territory and Commonwealth jurisdictions that will be pursued over the life of the ETBF Management Plan.

Under the EPBC Act taking and retaining of longfin mako, shortfin mako and porbeagle sharks is prohibited in Commonwealth waters. There are exceptions to these prohibitions where species are caught as bycatch in the ETBF in the following specific circumstances:

- All **live** longfin mako, shortfin mako and porbeagle sharks (including those in poor condition or showing minimal signs of life) must be **released** back into the water;
- Only dead on line longfin mako, shortfin mako and porbeagle sharks may be retained;
- All longfin mako, shortfin mako and porbeagle sharks caught, regardless of whether they are returned to the water, must be **recorded on the appropriate logbook.**

Table 14: Number of mako and porbeagle sharks reported in ETBF logbooks since the 2014 assessment.

Year	Species name	Catch weight (kg)	Catch numbers	Discard numbers
2014	Longfin mako	125	3	7
	Porbeagle	0	0	2
	Shortfin mako	38,325	1,234	305
2015	Longfin mako	40	1	5
	Porbeagle	0	0	7
	Shortfin mako	32,812	1,016	1,066
2016	Longfin mako	75	2	6
	Porbeagle	0	0	8
	Shortfin mako	25,807	744	1,261
2017	Longfin mako			18
	Porbeagle	815	28	124
	Shortfin mako	31,366	830	1,451
2018	Longfin mako	180	3	6
	Porbeagle	50	2	4
	Shortfin mako	24,891	671	1,311
2019	Longfin mako	180		
	Porbeagle			1
	Shortfin mako	23,726	608	1,219
2020	Longfin mako	50	1	3
	Porbeagle	70	1	1
	Shortfin mako	15,973	385	802
2021	Longfin mako	-	-	-
	Porbeagle	-	-	-
	Shortfin mako	13,220	295	1,090
Grand Total		**207,705**	**5,824**	**7,895**

Table 15. Number of mako and porbeagle sharks retained reported in Catch Disposal Records (CDRs).

Year	Species name	Commonwealth weight (kg)
2014	Longfin mako	140
	Porbeagle	44
	Shortfin mako	42,845
2015	Longfin mako	40
	Porbeagle	-
	Shortfin mako	38,881
2016	Longfin mako	93
	Porbeagle	-
	Shortfin mako	31,970
2017	Longfin mako	-
	Porbeagle	964
	Shortfin mako	34,193
2018	Longfin mako	196
	Porbeagle	71
	Shortfin mako	27,986
2019	Longfin mako	370
	Porbeagle	68
	Shortfin mako	24,757
2020	Longfin mako	116
	Porbeagle	132
	Shortfin mako	20,369
2021	Longfin mako	-
	Porbeagle	-
	Shortfin mako	17,908

8.5.2 Shark management measures

A local scale assessment (CSIRO, 2018) of risk posed by the ETBF to ecological sustainability of shark bycatch species populations/stocks determined that the ETBF did not pose a high risk to any shark populations. However, impacts by other fisheries (state and international) on some shark species populations that the ETBF interacts with have been significantly greater and have resulted in a number of species being given protected status under the EPBC Act or placed under a conservation and management measure by the WCPFC.

Table 16. Shark species with additional protection under the EPBC Act or the WCPFC Convention

Species	Protected under	Condition
Grey nurse shark	EPBC 1999	Landing is prohibited
Great white shark		
Silky shark	WCPFC Convention	Landing either species is prohibited and they must be released with as little harm as possible.
Oceanic whitetip shark		

8.5.3 Seabirds

The term 'Seabirds' is used generally to describe any species of bird which spends a substantial part of its life foraging and breeding in the marine environment. These species include albatrosses, petrels, gulls, shearwaters, boobies, gannets, cormorants, and terns. Seabird populations globally face threats from various sources including climate change, competition and pests at breeding sites and interactions with commercial fisheries. The latter has led to a suite of global and domestic agreements, plans and measures which aim to mitigate and reduce fishery impacts on seabird populations.

Through measures described in this Bycatch Strategy, and implemented via fishing permit conditions, AFMA aims to ensure that the ETBF is fully compliant with both international agreements, regional fishery management organisation measures, domestic legislation and policies, and AFMAs Bycatch Strategy.

At an international level, this Bycatch Strategy (including the conditions AFMA places on ETBF permit holders) is consistent with the requirements of:

- Convention on the Conservation of Migratory Species of Wild Animals
- Agreement on the Conservation of Albatrosses and Petrels (ACAP)
- The Food and Agriculture Organization of the United Nations (FAO)
- Guidelines for implementing responsible fisheries management practices.
- Code of Conduct for Responsible Fisheries
- International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries (IPOA – Seabirds)
- The Western and Central Pacific Fisheries Commission (WCPFC) Conservation and Management Measure on seabirds (CMM 2018-03)
- The Commission for the Conservation of Southern Bluefin Tuna (CCSBT) non-binding measures relating to seabirds

At a domestic level, oceanic longline fishing is listed as a key threatening process for seabirds under the EPBC Act, and as such required the development of a Threat Abatement Plan (TAP) for the ETBF (by Australian Antarctic Program (AAD) and AFMA), which now forms a key component of this Bycatch Strategy.

The TAP requires the ETBF to:

- Further reduce the bycatch of seabirds in oceanic longline operations and
- Maintain a bycatch rate of less than 0.05 birds per 1000 hooks set in all fishing areas (by five-degree latitudinal bands) and all seasons (1 September – 30 April; 1 May – 31 August).

The TAP requires these objectives are pursued by the following key actions: mitigation, education, international initiatives, research and development and uptake, innovation and data collection and analyses. Responses to each of these requirements are detailed below (management measures section and bycatch actions tables) and within the research and data strategy sections of this FMS.

Further responses are required by AFMA if the bycatch rate described above is triggered in one season or in consecutive seasons in any five-degree latitudinal band. Details of the required responses are available online: Threat Abatement Plan (TAP).

Guidance for AFMA and industry regarding management of seabird interactions is provided in the AFMA Seabird Bycatch Operational Guidelines for Commonwealth Fisheries (October 2018).

8.5.4 Seabird management measures

In response to its international and domestic requirements (including the TAP), AFMA has implemented fishery wide measures to reduce the interactions with and mortality of all seabird species. These measures stipulate that:

At all times a boat must:

- carry one or more assembled tori lines onboard; and
- not discharge offal while setting and discharge during hauling should be avoided if possible.

When fishing south of 25° South boats must:

- deploy a tori line before commencing a shot when fishing between the hours of nautical dawn and nautical dusk[5];
- a tori line is not required to be deployed when performing fishing operations between the hours of nautical dusk and nautical dawn.

[5] Note: Nautical Dawn is defined as the instant in the morning, when the centre of the Sun is at a depression angle of twelve degrees (12°) below an ideal horizon. Nautical Dusk is defined as the instant in the evening, when the centre of the Sun is at a depression angle of twelve degrees (12°) below an ideal horizon. At both times, the sea horizon is not normally visible.

- use only non-frozen bait;
- weight longlines with either a minimum of:
  - 60g weights at a distance of no more than 3.5m from each hook; or
  - 98g weights at a distance of no more than 4m from each hook; or
  - 40g weights immediately adjacent to the hook, or at no more than 0.5m from the hook, with dead, non-frozen baits attached to the hooks; or
  - ACAP approved "hook-shielding device" with a cap and weighing at least 38g may be deployed directly at the hook.

Boats tori lines must:

- be a minimum of 100 metres in length;
- be set up from a position on the boat that allows it to stay above the water for at least 75m from the stern;
- have streamers attached at a maximum interval of 3.5m;
- streamers must be maintained, ensuring lengths are as close to the water as possible; and
- have a towed line, material or object at the end of the line to give sufficient drag to meet the 75m aerial coverage criteria.

In addition to these compulsory measures, Tuna Australia and AFMA has prepared a *Tori lines – information to assist in design and implementation* guidance document, that is available as an attachment to the Fisheries Management Booklet.

8.5.6 Marine turtles

Six of the seven existing species of marine turtle are found in Australian waters, including the loggerhead turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), hawksbill sea turtle (*Eretmochelys imbricate*) olive ridley sea turtle (*Lepidochelys olivacea*), flatback sea turtle (*Natator depressus*) and leatherback sea turtle (*Dermochelys coriacea*).

Most species of marine turtle are considered vulnerable to local and even global extinction due to declining numbers. Reduction in mortality is important for the long-term viability of these species. Historically, most interactions that have occurred in the ETBF have been with green and leatherback turtles. A high proportion of turtles that are caught in the ETBF are brought to the boat alive.

8.5.7 Marine turtle management measures

The ETBF Bycatch Strategy utilises two main measures (included as compulsory conditions on concession holder permits) aimed at reducing the mortality of turtles interacting with the ETBF. These are:

- Use of dehookers to remove hooks from turtles. Line cutters and de-hookers must be carried on board the boat at all times and must meet strict design criteria (described in SFR conditions) to ensure that they are effective in the safe removal of hooks from turtles (and other animals).

- Compulsory use of large circle hooks on all shallow sets (less than 8 hooks per bubble) which have been demonstrated to lower sea turtle rates, and post release mortality, without undue adverse effects on catch rates of swordfish.

These measures are consistent with the WCPFC conservation measures relating to marine turtles: CMM2018-03.

8.5.8 Marine Mammals

Monitoring data indicates that the ETBF occasionally interacts with marine mammals, predominantly cetaceans (whales and dolphins), and very rarely seals.

8.5.9 Cetaceans

The majority of interactions with cetaceans (whales and dolphins) involve cetaceans being hooked or entangled in the fishing gear while predating on tuna from longlines. All cetacean species are protected under the EPBC Act. Recent data summaries for the ETBF, including during the recent period of e-monitoring, show relatively few interactions occurring with cetaceans. The most common whales that have been reported interacting with longlines in the ETBF include short finned pilot whales and toothed whales, followed by melon headed whales. The majority of whales entangled are released alive.

8.5.10 Seals

There are nine species of seals found in Australian waters and all of which are protected under the EPBC Act. The Australian fur seal and the New Zealand fur seal are the only species which breed on the Australian mainland and in Tasmanian waters. The ETBF very rarely interacts with seals but such interactions have historically occurred. In the event that a seal is hooked, ETBF fishers should use the dehooker to ensure the safe release of the seal.

8.6 Compliance with threat abatement plans, recovery plans and domestic and international agreements

The ETBF Management Plan and supporting instruments implement the requirements of Threat Abatement Plans (seabird TAP), recovery plans (sharks, turtles) and relevant national and international agreements.

In compliance with these plans and agreements AFMA has introduced a range of measures, see Section 8.3: Management action taken to reduce interactions.

As a member of the WCPFC Australia is obliged to implement all international conservation and management measures (CMM) adopted. Australia has implemented, or is in the process of implementing, all CMMs adopted and these relate to:

- Observer coverage levels (including through the use of EM);
- Interactions with protected species including turtles, sharks and seabirds;
- Measures aimed at reducing the fishing mortality to target species;
- Measures dealing with transhipping;

- A range of compliance measures such as vessel registers; and
- Vessel Monitoring Systems (VMS).

9. Progress in implementation of recommendations and conditions resulting from the previous assessment of the fishery

9.1 Summary

The ETBF was assessed under the EPBC Act to be an approved wildlife trade operation in August 2019. In accordance with this approval, a set of conditions and recommendations were made for the fisheries continued operation. Below is a summary of the progress and status in addressing them listed from the recommendations made from the 2019 assessment.

9.2 Progress in implementing each recommendation and condition

The ETBF was assessed under section 303FN of the EBPC Act *to be an approved wildlife trade operation in August 2019. In accordance with this approval a set of conditions and recommendations were made for the fisheries continued operation. Below is a summary of the progress and status as at April 2022.*

Recommendation	Level of Achievement as at April 2022	Deadline
Condition 1 Operation of the Eastern Tuna and Billfish Fishery will be carried out in accordance with *Eastern Tuna and Billfish Fishery Management Plan 2010* (as amended) in force under the *Fisheries Management Act 1991* (Cth).	**Achieved** The ETBF is managed consistent with the F*isheries Management Act 1991* and the *Eastern Tuna and Billfish Fishery Management Plan 2010*, which manages the fishery under catch quotas based on Total Allowable Commercial Catches.	**Lifetime of WTO**
Condition 2 The Australian Fisheries Management Authority to inform the Department of Agriculture, Water and the Environment the of any intended material changes to the Eastern Tuna and Billfish Fishery's management arrangements that may affect the assessment against which EPBC Act decisions are made.	**Achieved** AFMA has informed the Department of Agriculture, Water and the then Environment Department of Environment and Energy through annual reports of changes to management arrangements in the ETBF.	**Lifetime of WTO**
Condition 3 The Australian Fisheries Management Authority to produce and present reports to the Department of Agriculture, Water and the Environment annually as per Appendix B of the *Guidelines for the Ecologically Sustainable Management of Fisheries - 2nd Edition*.	**Achieved** Annual strategic assessment reports have been produced and presented to the Department of Agriculture, Water and the Environment as per Appendix B to the *Guidelines for the Ecologically Sustainable Management of Fisheries - 2nd Edition*.	**Lifetime of WTO**
Condition 4 The Australian Fisheries Management Authority to consult with Department of Agriculture, Water and the Environment prior to any changes to the management arrangements being implemented for a CITES listed species.	**Achieved** AFMA has not implemented changes to the management of CITES listed species and reports any changes to management to the	**Lifetime of WTO**

Recommendation	Level of Achievement as at April 2022	Deadline
	Department of Agriculture, Water and Environment in annual reports.	
Condition 5 The Australian Fisheries Management Authority to continue efforts to determine the extent of the impact of fishing in the Eastern Tuna and Billfish Fishery on shark species.	**Achieved** AFMA continually monitors the impact of fishing in the ETBF to shark species and implements a range of management measures specifically targeted at reducing the risk to shark species, described in the body of this report. The most recent ERA (2019) concluded that no chondrichthyan species were at high risk from the operations of the ETBF.	

Recommendation	Level of Achievement as at April 2022	Deadline
Condition 6 The Australian Fisheries Management Authority to: a) Ensure that the overall monitoring program for the Eastern Tuna and Billfish Fishery continues to provide sufficient data collection and analysis to meet the requirements of relevant recovery and threat abatement plans under the EPBC Act, and monitoring requirements of the Western and Central Pacific Fisheries Commission, and to implement appropriate management measures as required, and b) provide a summary of the monitoring program to the Department of Agriculture, Water and the Environment as part of annual reporting as required by Condition 3 above.	**Achieved** A summary of changes to AFMAs monitoring programs in the ETBF are provided in the main body of this report. Overall the monitoring programs in place continue to provide information to support the application of the seabird TAP in the ETBF, the monitoring requirements of the WCPFC, and to support management decision making in the fishery in general. Examples include the strengthening of ETBF seabird management permit conditions and the inclusion of Mobulid rays as a no take species.	

Recommendation	Level of Achievement as at April 2022	Deadline
Condition 7 The Australian Fisheries Management Authority to continue efforts to determine the extent of the impact of fishing in the Eastern Tuna and Billfish Fishery on marine turtle species.	**Achieved** The ETBF ERA was most recently finalised in 2019 and concluded that no marine turtle species were at high risk from the ETBF. In 2018/19, AFMA sought assistance from ABARES in undertaking analyses of spatial and temporal trends in sea turtle interactions, as well as other factors impacting turtle interactions, utilising data collected since electronic monitoring was introduced to the fishery. In 2019, AFMA also increased its review of sea turtle interaction video (aiming to review 100% of interactions, up from the previous 10%) and developing an associated database to store information on those interactions, to support decision making going forward. Currently AFMA implements turtle mitigation measures in the ETBF that are consistent with the requirements of WCPFC CMM for marine turtles CMM 2018-03.	**Lifetime of WTO**