



Australian Government

Australian Fisheries Management Authority

AFMA submission for Reassessment of the Western Tuna and Billfish Fishery 2019

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



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1 Introduction

This assessment covers fishing methods in the Western Tuna and Billfish Fishery (WTBF), for the methods of purse seining, longline and minor line, such as poling or trolling, as managed by the *Western Tuna and Billfish Fishery Management Plan 2005*. In December 2004, the Delegate of the then Minister for the Environment and Heritage declared the WTBF exempt from the export controls under Part 13A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for a period of five years until 1 December 2009. Two additional five year approvals were subsequently granted (with the latest due to expire on 28 November 2019), following further reassessments in relation to the protected species provisions of Part 13 and the wildlife trade provisions of Part 13A under the EPBC Act.

A copy of the letter to AFMA, including conditions and recommendations, can be found on the Department of the Environment and Energy website at: [Western Tuna and Billfish Fishery Wildlife trade operation accreditation](#).

This submission has been produced to allow the Department of Environment and Energy to assess the management arrangements under the EPBC Act prior to the expiry of the current WTO.

Please note: AFMA has in place robust information disclosure policy and procedures. In performing its functions, AFMA *collects* a range of information. Information collected by AFMA is official information which is held on behalf of the Australian community. AFMA must ensure that information disclosed does not include data where an individual may be reasonably identifiable. Due to the low effort in the WTBF (less than 5 active boats), some information in this report is aggregated to the fishery to ensure commercial data is not disclosed. For more information, view AFMA's Disclosure policy on the [AFMA website](#).

2 Description of the Fishery

For a brief overview of the fishery including information on target species, fishing techniques, number of operators, stock status and management arrangements, see the [WTBF page](#) on AFMA's website.

2.1 Target and by-product species

Under the *Fisheries Management Act 1991* and the *Western Tuna and Billfish Management Plan 2005* (the Plan), the target species are tuna and billfish. The majority of this effort is targeted at Broadbill Swordfish, Bigeye Tuna, Yellowfin Tuna and Striped Marlin.

Important by-product species include: Albacore Tuna, Longtail Tuna, Escolar, Rudderfish, Ray's Bream and Moonfish.

An overview of the target and by-product species can also be found in the Australian Bureau of Agricultural and Research Economics and Sciences (ABARES) most recent [Fishery Status Reports 2018](#).

2.2 Management arrangements

The [WTBF Management Plan](#) (the Plan) came into effect on 22 October 2005, following a process of public consultation, and has since been amended in 2010. This has had the effect of transitioning the management of the fishery to output controls via quota Statutory Fishing Rights (SFRs) for each of the four key target species (Bigeye Tuna, Broadbill Swordfish, Striped Marlin and Yellowfin Tuna). The move to output based management of the WTBF was in line with the Ministerial Direction given to AFMA in 2005, and adheres to the principles of the Commonwealth Harvest Strategy Policy which was most recently updated in October 2018.

Output controls regulate fishing activity within 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 2018 revision of the Commonwealth Harvest Strategy Policy, and takes into account advice from the Tropical Tuna Management Advisory Committee (TTMAC) and advice from the Tropical Tuna Resource Assessment Group (TTRAG). The TACCs are then divided equally among the total number of quota SFRs for each species.

The TACCs determined for each quota species in the WTBF for the 2018/19 and 2019/20 fishing seasons are as follows:

Species	TACCs 2018-19 fishing season	TACCs 2019-20 fishing season
Bigeye Tuna	2,000 tonnes	2,000 tonnes
Yellowfin Tuna	5,000 tonnes	5,000 tonnes
Broadbill Swordfish	3,000 tonnes	3,000 tonnes
Striped Marlin	125 tonnes	125 tonnes

Under the Plan, operators must have a boat SFR nominated to the boat that is operating and if the person takes a quota species, they must hold uncaught quota for that species. TACCs are determined for each species, for each fishing season. The fishing season in the WTBF starts on 1 February in a year and ends on the 31 January in the following year. Due to the relatively low effort in the WTBF and the highly unlikely incidence that the low catches will impact on the status of stocks in the Indian Ocean, the TACCs in the WTBF are set for a 3-year period to the end of the 2020/21 fishing season.

For further information see AFMA's [WTBF webpage](#).

2.3 Fishing methods

The methods allowed to target tuna and billfish in the WTBF are; pelagic longline, trolling, handlining and rod and reel fishing. Fishing using the purse seine method is permitted in the WTBF for species other than Skipjack Tuna. However, there has not been any purse seine activity in this fishery.

Pelagic longline fishing (**Figure 1**) involves the use of branch lines attached to a mainline. Each branch line 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.

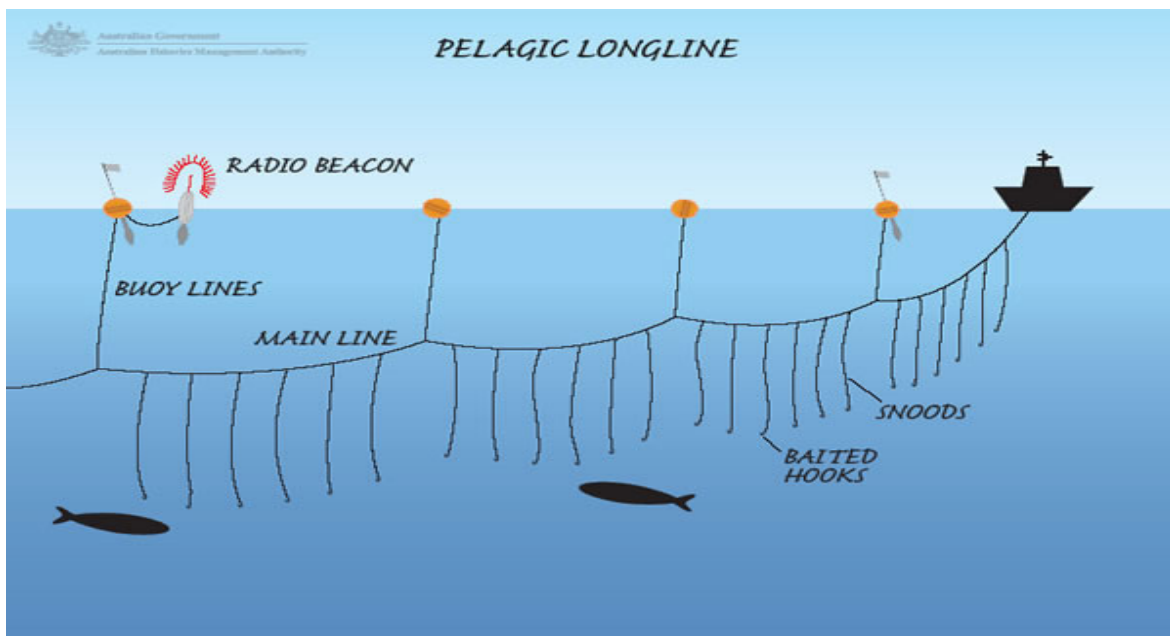


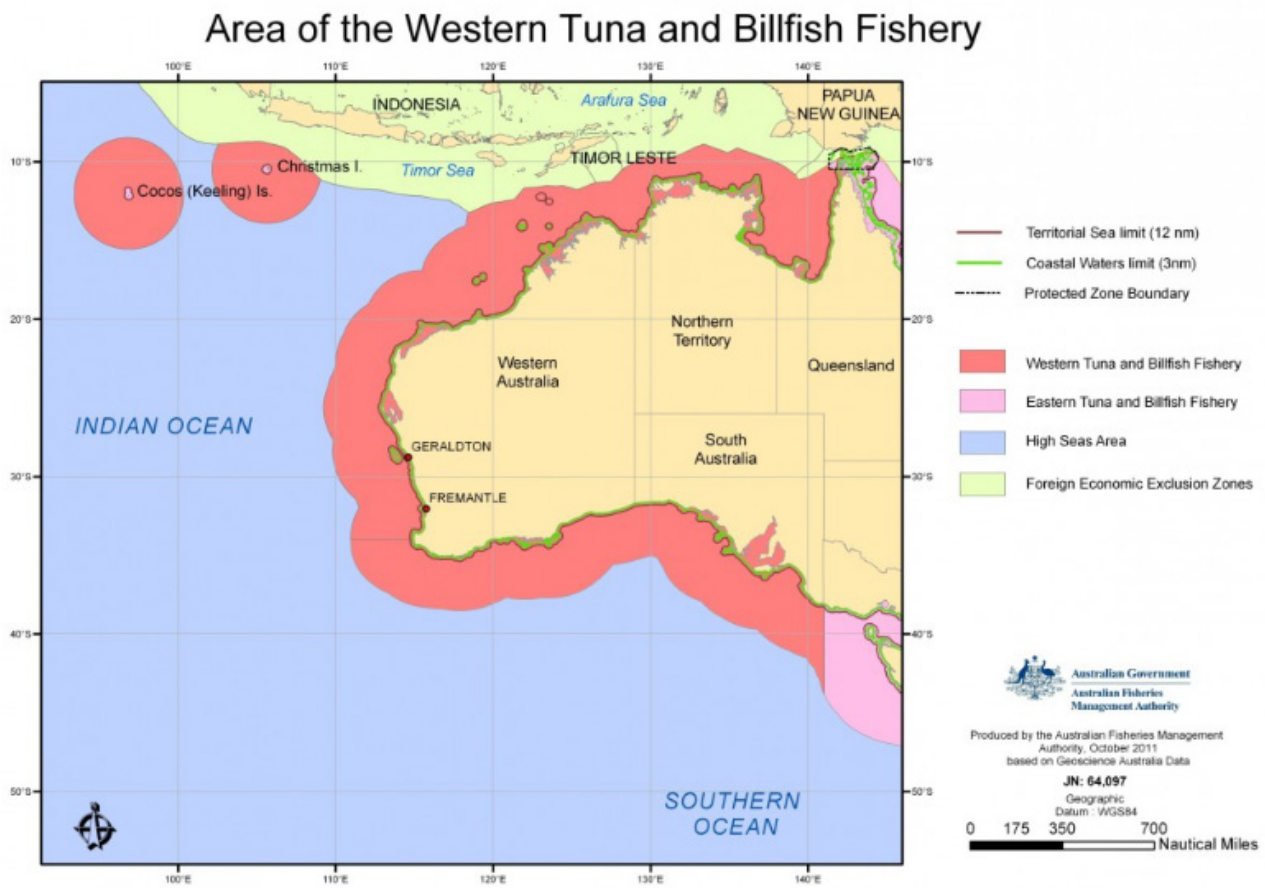
Figure 1: Illustration of a pelagic longline (a longline [baited] hook is attached to each snood and termed a longline clip)

2.4 Fishing areas

The Western Tuna and Billfish Fishery extends from Queensland's Cape York Peninsula to the South Australia–Victoria border on the western side of Australia. It also includes waters around Christmas Island and the Cocos (Keeling) Islands and a high seas fishing zone in the Indian Ocean.

The area of the WTBF fishery is detailed at **Figure 2** (for more information on where effort is concentrated, see Section 5.4: Spatial issues and trends).

Figure 2: Area of the WTBF.



The WTBF has extensive by-product trip limits with no take species and different limits in waters adjacent to the states. See the [WTBF management arrangements booklet](#) section on catch limits on AFMA's website for more details. The WTBF also has a [Bycatch and Discard Workplan](#). The Bycatch and Discard 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 process.

2.5 Governing legislation/fishing authority

All Australian Commonwealth fisheries are managed under the [Fisheries Management Act 1991](#) and their respective management plan, which for this fishery is the [Western Tuna and Billfish Fishery Management Plan 2005](#). The fishery is continuing to be managed by Statutory Fishing Rights (SFRs).

Australian commitments and obligations under the [Indian Ocean Tuna Commission \(IOTC\)](#) are put in place through the Management Plan and conditions on SFRs and the [Fisheries Management \(International Agreements\) Regulations 2009](#).

3 Socio-economic environment

3.1 Value of the fishery

The value of the fishery is confidential. This is due to the small number of vessels operating in the fishery. For more information on AFMA's information disclosure policy on the [website](#).

3.2 Quality assurance and control

Australian seafood destined for export is subject to Commonwealth regulation under the *Export Control Act 1982* and Export Control (dairy, eggs and fish) Orders 2005 to ensure compliance with food safety and trade description requirements. All land based processing establishments and vessels which process on board are required to be registered by the Australian Quarantine and Inspection Service (AQIS).

4 Management

4.1 Changes to management

Since the reassessment in 2014, new amendments have been made to the management of the fishery. The amendments to the WTBF management were as follows:

4.2 Introduction to electronic monitoring

A key change to management in the WTBF has been the introduction of electronic monitoring. Electronic monitoring (e-monitoring) is a system of strategically placed video cameras and sensors capable of monitoring and recording fishing activities, which can be reviewed at a later point to verify fishery dependent data, such as logbooks.

E-monitoring was first trialled in Commonwealth managed fisheries in 2010 with the use of e-monitoring being the first instance of this technology being used in the southern hemisphere. Since this time, AFMA's e-monitoring program (EM program) has expanded, with e-monitoring in the ETBF since 2015, with most active in the Fishery having an E-monitoring system installed. E-monitoring will be mandatory for all remaining qualifying boats operating in the WTBF, with mandatory installations on new boats entering the Fishery.

AFMA has contracted Archipelago Asia Pacific (AAP), a subsidiary of Archipelago Marine Research, to assist in the design and installation of e-monitoring, and the analysis of e-monitoring data. There is regular communication between AAP and operators on the quality of the data analysed.

Further information on the improved accuracy of logbook reporting, since the introduction on EM can be found on the Australian Bureau of Agricultural and Resource Economics and Sciences

(ABARES) website <http://www.agriculture.gov.au/abares/research-topics/fisheries/fishery-status/eastern-tuna-billfish-fishery#214-environmental-status>.

4.3 Billfish management

Management arrangements in the fishery with respect to environmental standards remain largely unchanged, with the main change in permit conditions relating to an IOTC billfish measure. Specifically, in line with conservation measures through the Indian Ocean Tuna Commission (IOTC) operators in the WTBF must ensure that they do not retain or land any specimen smaller than 60 cm Lower Jaw Fork Length (LJFL) of Striped Marlin and Indo Pacific Sailfish. This condition was implemented in for the 2019/2020 season.

4.4 Other

Other changes to management arrangements included:

- From 2016 an SBT Permit condition required WTBF operators to have at least 2000kg of uncaught SBT nominated to their WTBF Fishing concession and SBT conditions were periodically updated to follow as closely as possible SBT conditions in the ETBF,
- In 2015 a permit condition was included that exempted WTBF permit holders from a ban on discharging offal while the crew are hauling the line,
- Changes to Tori line conditions have evolved during the period 2013 to 2019. Specifically no longer require deployment of tori lines during darkness providing the deck lighting is controlled and allow use of smart hooks if wanted,
- Conditions in relation to retention and sizes of certain species while purse seine fishing were added in 2015/16
- Bycatch limitations were modified in relation to Mahi Mahi (*Coryphaena hippurus*) in 2017 to allow the taking of 200 fish in total in waters off Western Australia (up from 10) and ten fish in total of this species in waters off Northern Territory,
- General bycatch provisions in all waters have been updated progressively to include EPBC protected species list inclusions and IOTC no take species between 2013 and 2019 for example Silky Shark and Oceanic Whitetip sharks
- Permit conditions in relation the take of shark species in WTBF have evolved between 2013 and 2019. For most information on these species see [section 8.3.1.1](#), and
- Updating of VMS and bycatch Handling provisions – in line with general updates to all AFMA permit conditions to ensure continuity during period 2013 to 2019.

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

A statement of the performance of the WTBF against its objectives, performance indicators and performance measures is made annually in AFMA's annual report. A copy of the current statement can be found on AFMA's [website](#).

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

4.6.1 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.

WTBF specific risks include:

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

Electronic Monitoring non-compliance

4.6.2 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 vessels whose reports are overdue and to ensure that the vessel and VMS is working in accordance with conditions imposed on fishing permits. Temporary reporting schedules may be arranged for a vessel that's VMS has stopped working while at sea or the vessel 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 vessels if intelligence indicates further attention is warranted.

3. Fish Receiver Inspections

Regular inspections of fish receiver premises will be 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.

4.7 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 the Authority's governing legislation and undertaken as part of effective fisheries management practice

The Plan and associated management arrangements in place were developed in consultation with the Tropical Tuna Management Advisory Committee (TTMAC), the Tropical Tuna Resource Assessment Group (TTRAG), operators and other stakeholders. The Plan details the objectives for the fishery, measures to achieve these objectives and criteria to assess the Plan's performance. Australia is a member of the IOTC for highly migratory fish stocks, and therefore any conservation and management measures implemented by the IOTC Commission are binding. Therefore the AFMA Commission, TTMAC and IOTC (and its science and compliance committees) are all involved in determining management measures for the fishery.

The Tropical Tuna Management Advisory Committee (TTMAC) is the key advisory committee for management of the domestic fishery. The MAC membership is drawn from AFMA, scientific agencies, an environment/ conservation member, industry representatives, and a recreational fishing member. Invited participants from industry, recreational fishing member and state government are also permanent observers on the MAC. Agencies such as the Department of Agriculture, the Department of the Environment and Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) regularly attend meetings as observers.

The Tropical Tuna Resource Assessment Group (TTRAG) is the key research and scientific committee for management of the domestic fishery. The RAG membership is drawn from AFMA, scientific agencies, the pelagic longline sector of industry, a recreational member. Agencies such as the Department of Agriculture, The Department of the Environment and ABARES have attended meetings as observers. This committee provides advice to the AFMA Commission, TTMAC and AFMA management regarding the status of the target species stock in Australia and the Pacific, and is the key group in implementing the Commonwealth Harvest Strategy Policy.

Further information on these groups are located 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>

4.7.1 Description of cross-jurisdictional management arrangements

Under Offshore Constitutional Settlement (OCS) arrangements, the Commonwealth has jurisdiction for tuna and tuna-like species to the high water mark in Queensland, Western Australia and South Australia. For a description of what other fisheries operate in the same region as the WTBF and any species catches, see Section 5.2: Total catch of target species taken in other fisheries.

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

The WTBF Management Plan and supporting instruments, implement the requirements of Threat Abatement Plans (seabird TAP) 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](#).

Overall, the WTBF has exceeded the agreed seabird bycatch level of 0.05 birds per 1,000 hooks only once since 2006 when the revised TAP was implemented as a result of these management measures. The one occurrence of the trigger rate being exceeded (albeit only marginally at 0.056) occurred in the area 30S – 35S in the 2016 Summer TAP season. In response, AFMA reviewed the interactions and mitigation, emphasised the importance of proper mitigation to the operator concerned and also deployed an observer onto the main vessel responsible for the interactions, to observe and provide advice on seabird mitigation. Subsequent TAP season interaction rates were reduced and below the trigger rate.

A revised TAP was released in 2018 and it is expected that the WTBF will be fully compliant with any revised TAP that has been approved by the Minister for the Environment.

Australia is a member of the Indian Ocean Tuna Commission (IOTC), and is therefore bound to their international conservation and management measures in the WTBF.

4.8 Research and monitoring

4.8.1 Collaborative research and results

The research needs of the fishery are reviewed annually by the TTMAC on advice from the TTRAG. This process provides for further research into stock assessment, collection of fishery and biological data as well as providing an ecological and economic assessment of the fishery.

As part of its core functions, AFMA uses biological data to assess target species, bycatch species and the impact of the fishery on the broader marine environment. Observers previously undertook biological sampling in the WTBF of target and bycatch species, but since the introduction of electronic monitoring in the fishery, observers have not regularly been present on-board. Biological data is still recorded and sampling is now undertaken in port with the size monitoring program. This program is also in effect in the Eastern Tuna and Billfish Fishery (ETBF). AFMA also assesses the

effectiveness of management measures and commitments under the Australian Tuna and Billfish Longline fishery Bycatch and Discarding Workplan.

AFMA calls annually for research applications to address research priorities and gaps in knowledge. The TTMAC, TTRAG and the AFMA Research Committee (ARC) assess these applications for funding from the AFMA Research Fund. The Fisheries Research and Development Corporation (FRDC) administered Commonwealth Fisheries Research Advisory Committee (COMRAC) also meet three times a year to consider non-core research needs and priorities across Commonwealth fisheries.

Research projects related to the fishery which have received funding recently are:

- Data Management, Assessment & implementation of HS for Australia's Tropical Tuna Fisheries (3 year TTRAG Assessment project),
- Tropical Tuna Size Monitoring Program,
- IOTC Project to determine Stock Structure of target species in the Indian Ocean

Completed research projects relevant to the WTBF post-2003 include:

- Implementation of bycatch mitigation measures in Australia's pelagic longline fisheries: quantifying effects on target and non-target catches (Peter Ward, ABARES)
- Population biology and habitat preferences of Striped Marlin (Peter Davie)
- Integrated evaluation of management strategies for multi-species longline fisheries (Campbell Davies, CSIRO)
- Broadbill Swordfish Tag and Release Project (CSIRO and AFMA)
- Development and preliminary testing of the Harvest Strategy Framework for the Western Tuna and Billfish Fishery (Campbell Davies, CSIRO)
- Effects of fishing on high risk bycatch species in the Western Tuna and Billfish Fishery (Peter Ward and Sheree Epe)
- Western Tuna and Billfish Fishery Size Monitoring Program (Kevin Williams, WW Fisheries)
- Determining the nature and extent of swordfish movement and migration in the eastern and western AFZ through an industry-based tagging program (C.A. Stanley, CSIRO)
- Fishery Assessment Report – Southern and Western Tuna and Billfish Fishery 2004 (Southern and Western Tuna and Billfish Fishery Scientific Assessment Group)
- Assessment of Blue Shark population status in the western South Pacific (Pierre Kleiber, et. al)

4.8.2 Monitoring programs used to gather information on the fishery

4.8.3 Logbooks and CDRs

AFMA requires WTBF fishers to record catch, fishing effort and fishing method information in paper or electronic logbooks (e-logs) at sea, and in CDRs which record the landed catch at port. AFMA is requiring WTBF operators to move to full e-log implementation in 2019.

CDRs are more accurate than logbook records as fish are weighed in port whereas logbook weights are often estimates. The following data is recorded for each fishing operation: the port and date of departure and return; date and fishing location; gear type and fishing method; number and total processed weight of fish retained (by species) and number of fish discarded (by species); and processed form of retained fish (e.g. trunked, gutted, filleted, whole).

Catch and effort data from commercial logbooks is the main data source used to monitor catch and effort trends, to standardise effort for CPUE analyses (when there is sufficient fishing effort), for quota management, ecological risk assessment, input into gross value of production estimates, and monitoring and reporting of EPBC listed species interactions to the Department of the Environment and Energy.

CDR data is used to monitor quota species, verify logbook weight data for stock assessments, verify logbook recorded catch and input into gross value of production.

4.8.4 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.

AFMA's ongoing Size Monitoring Program (also in-place in the ETBF) 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.

4.8.5 Vessel Monitoring Systems (VMS)

Vessel Monitoring Systems are mandatory for all Commonwealth Fishing vessels are employed by AFMA for the delivery of near real time vessel information in order to effectively monitor the movements of all Commonwealth endorsed fishing vessels. VMS enables cost effective monitoring of vessels 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 vessel, 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>.

4.8.6 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, Statutory Fishing Rights (SFRs) 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>.

4.8.7 Electronic Monitoring

5 E-monitoring is currently implemented in the WTBF. 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.

Since 1 July 2015, e-monitoring has been implemented in the WTBF for all full-time fishing vessels to replace human observers. To meet requirements, 10% of all footage across the fishery, is selected at random and reviewed to verify logbook data.

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

- the commercial catch of WTBF 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 EM into the WTBF, 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 observers may be required on some fishing trips at the request of the Fishery Managers or the AFMA Observer Program, e-monitoring has largely replaced observers in the WTBF since 2015. The last observer placed on-board a vessel in the WTBF was in 2017.

The AFMA website contains more detailed information regarding E-monitoring at: <https://www.afma.gov.au/monitoring-enforcement/electronic-monitoring-program>.

6 Catch data

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

Detailed catch data is not available for the WTBF due to the small number of operators in the fishery. The only catch information available for the WTBF is aggregated yearly catches (**Table 1**).

Table 1: Estimated catch for WTBF in 2018

Species	2018	
	TACC	Catch (t)
Yellowfin Tuna	5,000	42
Bigeye Tuna	2,000	49
Broadbill Swordfish	3,000	173
Striped Marlin	125	4

6.2 Total catch of target species taken in other fisheries

Catches of tuna in other fisheries is generally low and is restricted by small trip limits. Commonwealth fisheries that operate in the same region as the WTBF include; the Northern Prawn Fishery (NPF), Southern Bluefin Tuna (SBT) Fishery, North West Slope (NWS) Fishery, Great Australian Bight (GAB) Fishery, and the Gillnet, Hook and Trap (GHAT) Fishery (See **Table 2**). The Eastern Tuna and Billfish Fishery (ETBF) operates in waters adjacent to the WTBF, but genetic studies have found some differences between target species stocks in the Pacific Ocean compared to the Indian Ocean. Many State finfish and shark fisheries operate adjacent to the waters of the WTBF, such as the:

- West Coast Demersal Gillnet and Demersal Longline Fishery (WA)
- South Coast and West Coast Purse Seine Fisheries (WA)
- Western Australian North Coast Shark Fishery (WA)

There are also two Western Australian fisheries that are jointly managed by the State and Commonwealth governments:

- The Joint Authority Southern Demersal Gillnet and Demersal Longline Fishery (WA and Commonwealth); and
- The Joint Authority Northern Shark Fishery (WA and Commonwealth).

More information on the management of State fisheries can be found at the individual States websites:

Western Australia – <http://www.fish.wa.gov.au/>

South Australia – <http://www.pir.sa.gov.au/fisheries/>

Northern Territory - <https://dpir.nt.gov.au/fisheries>

The last Australia-wide survey of the sector was the 2001 National Recreational and Indigenous Fishing Survey (NRIFS) conducted by Australian Government and state/territory fishery management agencies. For information on overlapping recreational catch and effort from the National Recreational Fishing Survey, see the [Department of Agriculture website - Recreational Fishing Survey](#).

Table 2: Catch of WTBF target species in other Commonwealth fisheries 1 January 2018 - 31 December 20183

Gillnet Hook and Trap Fishery		
<i>Species</i>	<i>Retained (kg)</i>	<i>Discarded (kg)</i>
Broadbill Swordfish	518	0
Yellowfin Tuna	0	35

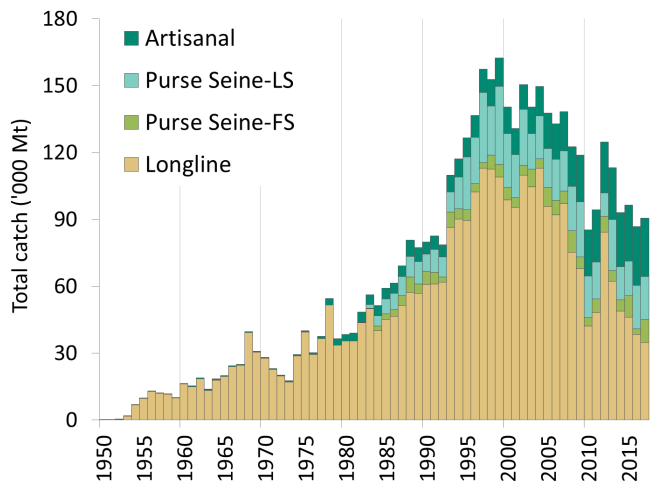
Small Pelagic Fishery		
<i>Species</i>	<i>Retained (kg)</i>	<i>Discarded (kg)</i>
Striped Marlin	180	0

Commonwealth Trawl Sector		
<i>Species</i>	<i>Retained (kg)</i>	<i>Discarded (kg)</i>
Broadbill Swordfish	84	0

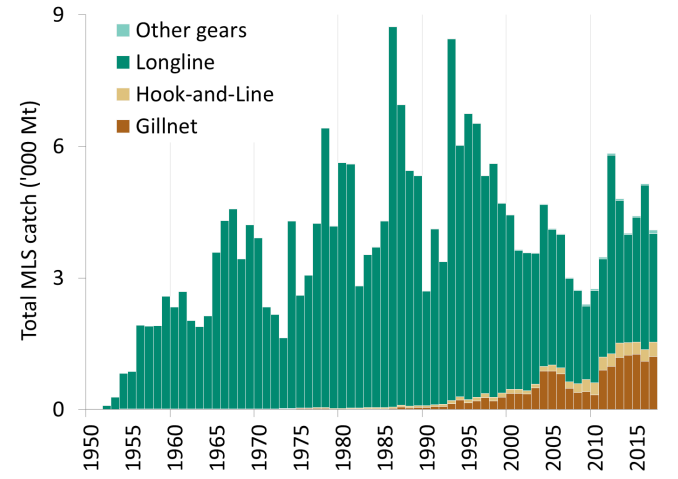
Internationally, the Indian Ocean Tuna Commission (IOTC) monitors catches of tuna and tuna-like species in the Indian Ocean and adjacent seas. The catch in 2017 of Tuna and Billfish for the key WTBF species are: Bigeye Tuna – 90,050t, Broadbill Swordfish, Skipjack Tuna, Striped Marlin – 3,082t and Yellowfin Tuna – 409,101t).

Figure 2: Catch (t) of WTBF target species (Bigeye Tuna, Broadbill Swordfish, Striped Marlin and Yellowfin Tuna) in the Indian Ocean from 1950 to 2017¹.

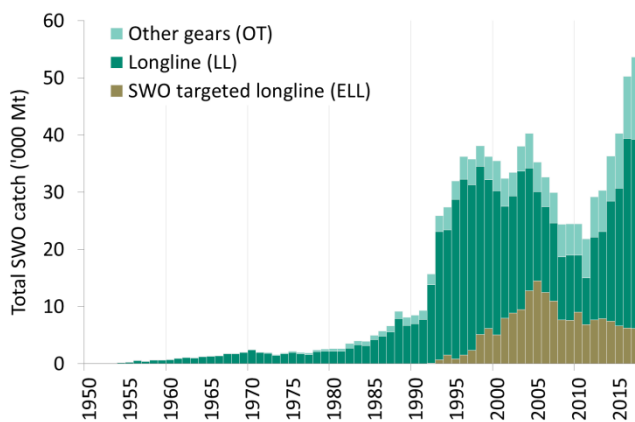
Bigeye tuna



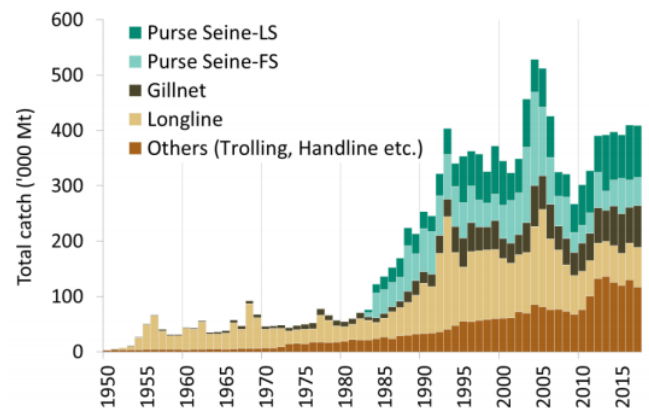
Striped Marlin



Broadbill Swordfish



Yellowfin tuna



¹ Source: 21st session of the IOTC Scientific Committee meeting Report 2017 (meeting dates of 3/12/2018 – 7/12/2018).

6.3 EM observed data

AFMA requires that 10% of all effort in the fishery is observed to verify logbook data. Due to the small number of operators in the WTBF, the information available for the WTBF is aggregated yearly by shots observed (**Table 3**).

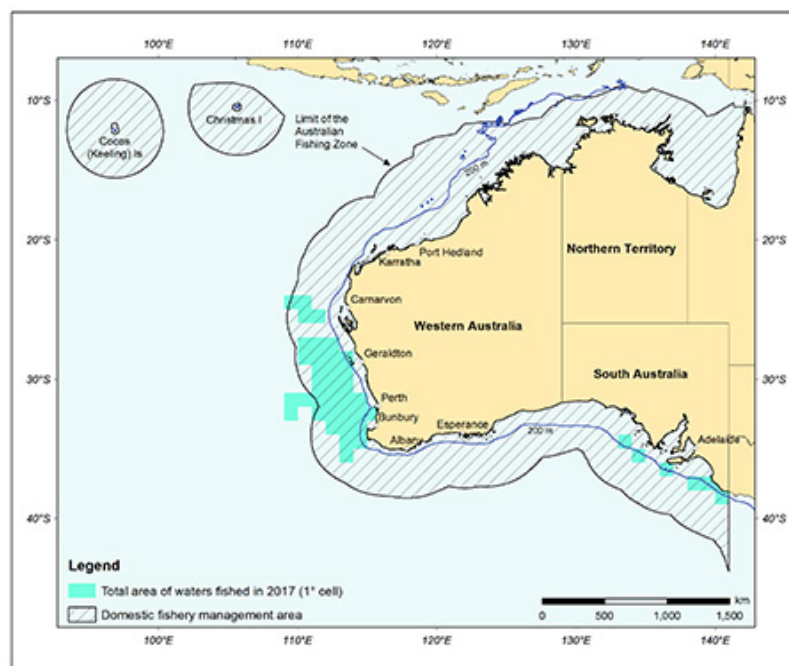
Table 3: Number of shots observed 1 January 2015 - 31 December 2018

Year	Total shots	EM observed shots	Percentage of shots observed
2015	259	-	-
2016	231	24	10%
2017	275	34	12%
2018	288	38	13%

6.4 Spatial issues/trends

Due to the limited number of active boats in the WTBF (less than five vessels), AFMA cannot publish spatial catch and effort information from the fishery. Since 2000, the number of vessels operating in the fishery has reduced from 45 to less than five. The figure below shows the waters fished in the WTBF in 2017 (Source: 2017 ABARES Fishery Status Report (2018)).

Figure 4: Area of waters fished in the longline sector of the WTBF in 2017



6.5 Effort data

Detailed effort data is not available for the WTBF due to the small number of operators in the fishery. The only effort information available for the WTBF is aggregated yearly figures (**Table 4**).

Table 4: Total longline hooks and shots deployed by year since the last assessment (2014 – 2019) for all WTBF vessels.

Year	Shots	Hooks	Active vessels
2014	297	452,658	5
2015	259	421,185	3
2016	231	352,274	3
2017	275	417,997	4
2018	288	404,880	3
2019*	105	158,765	2

7 Status of target stock

7.1 Resource concerns

The four target species in the WTBF are highly migratory and internationally managed by the IOTC. Therefore it is important to note that any assessment of resources is based on the IOTC assessment ([See Section 6.2: Stock assessments and recovery strategies](#))

Table 5: ABARES Fishery Status Report 2017 results for target species in the WTBF (Source: ABARES, 2018)

Species	Status in Indian Ocean
Yellowfin Tuna	Subject to overfishing and not overfished
Bigeye Tuna	Not subject to overfishing and not overfished

Albacore Tuna	Not subject to overfishing and not overfished
Broadbill Swordfish	Not subject to overfishing and not overfished
Striped Marlin	Subject to overfishing and uncertain whether overfishing of occurring

7.2 Stock assessments and recovery strategies

7.2.1 Albacore Tuna

In 2016, five assessment models were used to assess the Indian Ocean albacore stock: SS3, ASPIC, a statistical catch-at-age model (SCAA), a Bayesian state-space production model (BSPM) and a Bayesian biomass dynamic model (BBDM). The results from the SS3 model were used to determine the current status of albacore and provide management advice (IOTC 2017), although the results from all the models were generally consistent. Considerable uncertainty exists in the SS3 model results because of uncertainty in CPUE data and length composition data, and a lack of biological information on albacore stocks in the Indian Ocean (IOTC 2017).

The result of the SS3 model indicated that the current (2014) biomass was above the limit reference point ($SB_{2014}/SB_{1950} = 0.37$; 80 per cent CI 0.28–0.46) and above the level that supports MSY ($SB_{2014}/SB_{MSY} = 1.80$; 80 per cent CI 1.38–2.23). Fishing mortality was estimated to be below the level that supports MSY ($F_{2014}/F_{MSY} = 0.85$; 80 per cent CI 0.57–1.12) (IOTC 2017).

The assessment indicates that the spawning biomass is above the default limit reference point (0.2B₀), and so the stock is classified as **not overfished**. Fishing mortality across the entire IOTC area is below F_{MSY}, and so the stock is classified as **not subject to overfishing**.

7.2.2 Striped Marlin

Four assessment models were used to assess the Indian Ocean stock of striped marlin in 2017: a stock reduction analysis (SRA), a stock production model incorporating covariates (ASPIC), a Bayesian surplus production model (BSP) and Stock Synthesis 3 (SS3). The SS3 model is a fully integrated model that accounts for spatial, length, age and sex structure, whereas the SRA, ASPIC and BSP models are simpler biomass dynamic models that do not. The SRA, ASPIC and BSP models provided estimates of total biomass (B), and SS3 provided estimates of spawning biomass (SB). The median estimates of the 2015 total biomass were 9–32 per cent of unfished (1950) levels using the SRA, ASPIC and BSP models ($B_{2015}/B_{1950} = 0.09–0.32$), and the median estimate of the 2015 spawning biomass using SS3 was 6 per cent of unfished (1950) levels ($SB_{2015}/SB_{1950} = 0.06$). These estimates were all below the level that would support MSY. The median point estimates of fishing mortality from all four models were above the level that would result in MSY ($F_{2015}/F_{MSY} = 1.32–3.40$). Results from all four models were used to provide management advice to the IOTC (IOTC 2017).

Numerous sources of uncertainty make it difficult to interpret clearly the outputs from the stock assessments for striped marlin. There was uncertainty in the catch data for striped marlin in the Indian Ocean due to non-reporting by some fleets, reporting of striped marlin in an aggregate billfish species group, and conflicting reports from different data sources indicating potentially much larger catches than initially reported by some fleets. Therefore, a large proportion of striped marlin catch data (41 per cent in 2016) is estimated by the IOTC Secretariat. There were large data conflicts among the time series of standardised catch-per-unit-effort (CPUE) and catch data (and length data for SS3) used for the assessments. Standardised CPUE data from the coastal gillnet fisheries, which report the largest catches of striped marlin, were not used in any of the assessment models. For the SS3 model, no length data were available from the coastal gillnet fisheries to estimate selectivity for this fleet, and all the biological parameters used—including growth, maturity, steepness and mortality—were sourced from the Pacific Ocean.

7.2.3 Broadbill Swordfish

In 2017, the Indian Ocean swordfish assessment was updated using SS3 with data up to 2015 (IOTC 2017). The SS3 model was spatially disaggregated, sex explicit and age structured. The 2015 spawning biomass for the Indian Ocean-wide stock was estimated to be 31 per cent of unfished (1950) biomass ($SB_{2015}/SB_{1950} = 0.31$; range 0.26–0.43) and above the level that supports MSY ($SB_{2015}/SB_{MSY} = 1.50$; 80 per cent confidence interval [CI] 1.05–2.45) (IOTC 2017). Fishing mortality was estimated to be below FMSY ($F_{2015}/F_{MSY} = 0.76$; 80 per cent CI 0.41–1.04).

Assessments of the ocean-wide stock indicate that swordfish biomass is above the default limit reference point (0.2B₀) and that fishing mortality is below FMSY. As a result, the stock is classified as **not overfished** and **not subject to overfishing**.

7.2.4 Yellowfin Tuna

In 2016, the 2015 yellowfin tuna assessment was updated using a revised composite CPUE series and revised catch estimates. Two assessment models were used (BBDM and SS3; IOTC 2017), although management advice for the stock was based on the results of the SS3 analysis. The results indicate that 2015 levels of fishing mortality were above the level that would achieve MSY ($F_{2015}/F_{MSY} = 1.11$; 80 per cent CI 0.86–1.36). Current spawning biomass was estimated to be below the level associated with MSY ($SB_{2015}/SB_{MSY} = 0.89$; 80 per cent CI 0.79–0.99) but above the default limit reference point ($SB_{2015}/SB_0 = 0.29$; 80 per cent CI not available).

The assessments indicate that fishing mortality is above the level associated with MSY. As a result, the yellowfin tuna stock is classified as **subject to overfishing**. The biomass is above the default limit reference point (0.2B₀), and, as a result, the stock is classified as **not overfished**.

7.2.5 Bigeye Tuna

Six assessment models were used to assess the Indian Ocean bigeye stock in 2016: SS3, ASPIC, SCAA, an Age Structured Assessment Program (ASAP), a BBDM and a BSPM (IOTC 2017). The SS3 assessment captured uncertainty in the stock–recruitment relationship, as well as the influence of tagging data on the model outcomes, and was used to provide management advice.

Current (2015) spawning stock biomass was estimated to be above the level that would produce MSY (SB2015/SBMSY = 1.29; 80 per cent CI 1.07–1.51). Similarly, the assessment indicated that spawning biomass was above 20 per cent of the initial unfished level (SB2015/SB0 = 0.38; 80 per cent CI not available). Fishing mortality was below the level associated with MSY (F2015/FMSY = 0.76; 80 per cent CI 0.49–1.03).

The SS3 assessment indicates that bigeye tuna spawning stock biomass is above the default limit reference point (0.2B0). As a result, the Indian Ocean bigeye tuna stock is classified as **not overfished**. Since the current spawning biomass is above the level that would produce MSY, and fishing mortality is below FMSY, the stock is classified as **not subject to overfishing**.

7.2.6 Frequency and nature of interactions

There are some protected species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) that may interact with the tuna longline and minor line fisheries of the WTBF. For more information please visit AFMA's [Protected Species](#) section of the website.

Table 5: Protected species interactions (defined as hooked, caught or entangled) in 2018 in the WTBF

Western Tuna and Billfish Fishery Interactions: 1 January - 31 December 2018					
Species	No. Interactions	Life Status			Interaction type
		Alive	Dead	Unknown	
Albatrosses	1		1		Wildlife Hooked, Caught or Entangled in Net
Black Marlin	7			7	Wildlife Hooked, Caught or Entangled in Net
Blue Marlin	5			5	Wildlife Hooked, Caught or Entangled in Net
False killer whale	1	1			Wildlife Hooked, Caught or Entangled in Net
Flesh Footed Shearwater	3		3		Wildlife Hooked, Caught or Entangled in Net
Leatherback Turtle	12	12			Wildlife Hooked, Caught or Entangled in Net
Loggerhead Turtle	10	10			Wildlife Hooked, Caught or Entangled in Net

Western Tuna and Billfish Fishery Interactions: 1 January - 31 December 2018					
Long-finned pilot whale	2	1	1		Wildlife Hooked, Caught or Entangled in Net
Pacific (Olive) Ridely Turtle	6	4	2		Wildlife Hooked, Caught or Entangled in Net
Porbeagle	5			5	Wildlife Hooked, Caught or Entangled in Net
Total	53	29	8	17	

Note: report excludes Longfin Mako sharks and Short Fin Mako sharks.

For information on arrangements to reduce protected species interactions, see section 8.3 - Management action taken to reduce impacts.

8 Impacts of the fishery on the ecosystem

8.1 Results of the Ecological Risk Assessments

A key component in AFMA's move towards Ecosystem Based Fisheries Management (EBFM) has been the undertaking of Ecological Risk Assessments (ERAs) 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 help to prioritise research, data collection monitoring needs and management actions for fisheries and ensure that they are managed both sustainably and efficiently.

AFMA is currently undertaking revised ERA's across its fisheries through the period 2018-2022. A revised ERA for the WTBF will be undertaken as a part of this process.

The risks that the WTBF poses to the sustainability of the marine ecosystem have **previously** been assessed through the application of the below risk assessment methodologies:

- a Level 2 PSA Risk Assessment completed in June 2007;
- a Level 2 PSA Residual Risk assessment, finalised in November 2009 for all species occurring in the fishery; and
- a Level 3 Sustainability Assessment for Fishing Effects (SAFE) assessment completed in April 2009.

The results of these risk assessments have been consolidated, with no species listed as being a high priority for management from the ERA process.

The risk assessment identified that 264 protected species occur within the area of the WTBF (Level 2 PSA). In recent times there have been few interactions reported with protected species in the WTBF fishery. Of the Threatened, Endangered, Protected (TEP) species; 107 are teleosts, 28 are reptiles, 50 are marine mammals, 76 are seabirds and 3 are chondrichthyans. No protected species were found to be at high risk through the ERA process, however to be consistent with AFMA's objectives and good fisheries management practices, all steps will be taken to minimise interactions between these species and the fishery.

The priority for Ecological Risk Management (ERM) is to maintain monitoring of the WTBF and respond to any interactions with protected species or increases in interaction rates with bycatch or byproduct species. Effort will continue to be monitored and AFMA will respond accordingly with management measures if effort increases significantly.

Table 6: Details the results at each level of assessment.

Level of assessment and risk levels attributed	Target Species	Byproduct Species	Bycatch Species	Protected (TEP) Species
Level 1 SICA Assessment				
Consequence score (for each species component)	4	4	4	3
Proceeded to Level 2 PSA Assessment (scores ≥ 3)	Y	Y	Y	Y
Level 2 PSA Assessment				
High Risk	0	1	2	26
Medium Risk	1	8	26	115
Low Risk	13*	14	20	123
Level 2 PSA Residual Risk Assessment				
High Risk	0	0	0	0
Medium Risk	1	7	26	130
Low Risk	13*	16	22	134
Level 3 SAFE Assessment				
$F_{cur} > F_{msm}$	0	0	0	0
$F_{cur} < F_{msm}$	6	23	48	110

*There were 7 targeted bait species included in the assessment which have here been classified as target species.

Further information and reports for each level of assessment can be found on [AFMA's website](#).

8.2 Nature of impacts on the ecosystem

The nature of impacts the WTBF has on the ecosystem were related to direct impacts from primary fishing operations in relation to the take of target, by-product and bycatch species. No habitats or communities were identified as high risk from the effects of pelagic longline fishing in the ERA process.

8.3 Management action taken to reduce impacts

8.3.1 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 13).

Table 7: 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: <http://www.afma.gov.au/wp-content/uploads/2017/03/AFMA-Bycatch-Handling-and-Treatment-Guide-2016-17-Public-Doc-FINAL.pdf>

8.4 Species Groups Management Strategies

Sharks and rays

It is recognised that sharks 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, WTBF 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)
- ban on shark finning
- requirement for vessels to have line cutters (which can be used to release sharks prior to hauling on deck) and dehookers
- ban on the take of certain shark species including Silky Shark, Oceanic Whitetip sharks and sub-class *Elasmobranchii*
- a trip limit of 5 carcasses in total of School shark, Gummy shark, Elephant fish of the Families *Callorhynchidae*, *Chimaeridae* and *Rhinochimaeridae*, Sawshark (*Pristiophorus cirratus* and *Pristiophorus nudipinnis*) and
- 100 pelagic sharks per trip comprised of a maximum of 80 Blue whaler shark (*Prionace glauca*);
- for high seas trips, a total trip limit of 20 sharks of the species (Crocodile shark (*Pseudocarcharias kamoharai*); Shortfin mako shark (*Isurus oxyrinchus*); Porbeagle shark (*Lamna nasus*); Smooth hammerhead shark (*Sphyrna zygaena*); and Pelagic stingray (*Dasyatis violacea*). 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 identification guide
- The [Chondrichthyan guide for fisheries managers: A practical guide to mitigating chondrichthyan 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 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 WTBF 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**.

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.

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 WTBF (by AAD and AFMA), which now forms a key component of this Bycatch Strategy. A revised TAP was released in 2018.

The TAP requires the WTBF 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. AFMAs work relating to each of these are detailed below (management measures section and bycatch actions tables) and through the research and data strategy sections of this FMS.
- Further responses are required by AFMA if the bycatch rate above is triggered in one season or in consecutive seasons in any five degree latitudinal band. Details of the required responses are located in the 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).

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 vessel must:

- Carry one or more assembled tori lines (bird-scaring device) onboard; and

- Not discharge offal while setting (Fisheries Management Regs 76(1)) and discharge during hauling should be avoided if possible.

When fishing south of 25° South vessels must:

- Deploy a tori line before commencing a shot when fishing between the hours of nautical dawn and nautical dusk²; a tori line is not required to be deployed when performing fishing operations between the hours of nautical dusk and nautical dawn, providing the vessel uses minimum deck lighting (where minimum deck lighting is a lighting level which does not pose a risk to safety and navigation);
- Use only non-frozen bait;
- Weight longlines with either a minimum of:
 - 60g swivels at a distance of no more than 3.5m from each hook; or
 - 98g swivels 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
 - “Smart Tuna Hooks” with a cap and weighing at least 38g may be deployed

Vessels tori line must:

- be a minimum of 100 metres in length and deployed so that it remains above the water surface for a minimum of 90 metres from the stern of the boat;
- have streamers attached to it with a maximum interval between the streamers of 3.5 metres and streamers lengths as close to the water as possible;

In addition to these compulsory measures, Tuna Australia are in the process of developing an *Industry Code of Practice* that will assist in the mitigation and management of seabird interactions.

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, the majority of interactions that have occurred in the WTBF have been with leatherback and loggerhead turtles. A high proportion of turtles that are caught in the WTBF are brought to the boat alive.

Two main management measures have been included as compulsory conditions on concession holder permits aimed at reducing the mortality of turtles interacting with the WTBF. These are:

Use of de-hookers 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 permit conditions) to ensure that they are effective in the safe removal of hooks from turtles (and other animals).

² 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.

Marine Mammals

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

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 electronic monitoring, show relatively few interactions occurring with cetaceans. The most common whales that have been reported interacting with longlines in the WTBF include Long-finned Pilot whales and False killer whales. The majority of whales entangled are released alive.

There are nine species of seals found in Australian waters all of which are protected by the EPBC Act 1999. The Australian fur seal is the only species which breed on the Australian mainland and in Tasmanian waters. The WTBF very rarely interacts with seals but such interactions have historically occurred, with the last interactions in 2016 and 2017.

In 2016 there was a reported interaction with three sea lions which were released alive. This was considered a rare interaction in this fishery.

9 Progress in implementing each recommendation and condition

The WTBF was assessed by the Department of Environment and Energy under section 303FN of the Environment Protection and Biodiversity Conservation Act 1999 to be an approved wildlife trade operation in August 2014. 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 2014 assessment.

Recommendation	Level of Achievement as at June 2019	Deadline
Recommendation 1: Operation of the Western Tuna and Billfish Fishery will be carried out in accordance with the management regime for the fishery made under the Fisheries Management Act 1991, Fisheries Management Regulations 1992 and the Western Tuna and Billfish Fishery Management Plan 2005.	Achieved The WTBF is managed consistent with the <i>Fisheries Management Act 1991</i> . The WTBF is also managed under the <i>Western Tuna and Billfish Fishery Management Plan 2005</i> , which manages the fishery under catch quotas based on Total Allowable Catches.	Lifetime of WTO
Recommendation 2: The Australian Fisheries Management Authority to inform the Department of the Environment of any intended amendments to the Western Tuna and Billfish Fishery management arrangements that may affect the assessment of the fishery against the criteria on which <i>Environment Protection and Biodiversity Conservation Act 1999</i> decisions are based.	Achieved AFMA has informed the Department of Environment and Energy through annual reports of changes to management arrangements in the WTBF.	Lifetime of WTO

Recommendation	Level of Achievement as at June 2019	Deadline
<p>Recommendation 3: The Australian Fisheries Management Authority to produce and present reports to the annually as per Appendix B to the Guidelines for the <i>Ecologically Sustainable Department of the Environment Management of Fisheries - 2nd Edition</i>.</p>	<p>Achieved</p> <p>Annual strategic assessment reports have been produced and presented to the Department of Environment and Energy as per Appendix B to the <i>Guidelines for the Ecologically Sustainable Management of Fisheries - 2nd Edition</i>.</p>	<p>Lifetime of WTO</p>
<p>Recommendation 4: The Australian Fisheries Management Authority, in accordance with the reviews of the harvest strategy policy for Commonwealth fisheries and the Commonwealth Policy on Fisheries Bycatch, to continue to develop and implement a formal framework applicable to the Western Tuna and Billfish Fishery to guide the management of non-quota and bycatch species, to include objectives, performance measures, management responses and information requirements as appropriate.</p>	<p>In progress</p> <p>The reviews and revision of the Commonwealth Harvest Strategy Policy and Bycatch Policy were prolonged and only completed in October 2018. Subsequent to that, AFMA has developed a schedule of Ecological Risk Assessments for across its fisheries, with the larger higher risk fisheries first, to be followed by smaller fisheries including the WTBF. Although the likelihood of the WTBF posing a high risk to any species population is relatively low (due to only 2 longline vessels actively fishing), should it be identified to pose a risk to a species population then AFMA's Ecological Risk Management framework (see ERM Guide 2017) ensures that those risks will be managed and reduced appropriately.</p> <p>AFMA also ensures that permit conditions attached to boat SFRs are reviewed annually</p>	<p>Lifetime of WTO</p>

Recommendation	Level of Achievement as at June 2019	Deadline
	and updated to reflect IOTC bycatch measures and best practice approaches across AFMA in relation to bycatch management.	
<p>Recommendation 5:</p> <p>The Australian Fisheries Management Authority to:</p> <ol style="list-style-type: none"> a. continue to determine the extent of the impact of fishing in the Western Tuna and Billfish Fishery on shark species, including to: <ol style="list-style-type: none"> i. identify the species impacted ii. develop, document and implement appropriate management measures to mitigate impacts on shark species identified through ecological risk assessments, protected species listing and/or other processes b. continue to encourage further co-operation with relevant jurisdictions to pursue increased knowledge and complementary management of shark species identified through the above processes across fisheries and across jurisdictions. 	<p>AFMA finalised an Ecological Risk Management (ERM) for the WTBF in March 2010. To mitigate a high risk rating for shark, seabird, teleost, turtle and cetacean species the following management measures are in place for the WTBF and are included in permit conditions for the fishery;</p> <ul style="list-style-type: none"> • Compulsory carriage of line cutters and de-hookers to be implemented; • Banning of wire trace; • Trip limits for sharks to remove incentives for targeting; and no-take requirements for certain species • Ban on shark finning. <p>AFMA continually monitors the interaction of fishing in the WTBF with shark species.</p>	<p>Lifetime of WTO</p>

