



Australian Government  
Australian Fisheries Management Authority

**Attachment 7**

# **Australian Tuna and Billfish Longline Fisheries**



**BYCATCH AND DISCARDING  
WORKPLAN**

 **NOVEMBER 1, 2008 TO OCTOBER 31, 2010**

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Box 7051, Canberra Business Centre, ACT 2610 Tel (02) 6225 5555 Fax (02) 6225 5500

**AFMA Direct 1300 723 621**

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# Australian Tuna and Billfish Longline Fisheries

## Bycatch and Discarding Work Plan 2008-2010

### ***Introduction***

The *Bycatch and Discard Work Plan for the Australian Tuna and Billfish Longline Fisheries* (ATBLF) incorporates both the Eastern Tuna and Billfish Fishery and the Western Tuna and Billfish Fishery and covers a two year period from 1 November, 2008 to the 31 October 2010. The objective of the plan is to develop focused and cost-efficient strategies that will:

- Respond to high ecological risks assessed through AFMA's Ecological Risk Assessment for the Effects of Fishing (ERAEF);
- Avoid interactions with species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- Minimise discarding of target/quota species to as close to zero as practically possible;
- Provide continual monitoring for the collection and assessment of data that can help direct future bycatch research; and
- Minimise bycatch in the fishery over the long-term and therefore assist in meeting future international, conservation and management measures.

All Commonwealth fisheries are committed under the Australian Government's *Commonwealth Policy on Fisheries Bycatch* to minimise bycatch. "Bycatch" is defined as any "part of the fisher's catch which is returned to the sea either because it has no commercial value or because regulations preclude it being retained and any part of the catch that does not reach the deck of the fishing vessel but is affected by interactions with the fishing gear."

The ATBLF work plan will focus on developing management measures to reduce and monitor interactions with high risk and protected species and discarding of key target species. This work plan should be read in conjunction with the *Commonwealth Policy on Fisheries Bycatch* and *AFMA's program for addressing bycatch and discarding in Commonwealth fisheries: an implementation strategy*. Work plans should be reviewed annually to assess any specified milestones, incorporation of new bycatch information or need for new research. They must be formally reviewed every two years to assess the effectiveness of instigated mitigation measures and research.

## ***Fisheries Descriptions***

### **The Eastern Tuna and Billfish Fishery (ETBF)**

The ETBF extends from the tip of Cape York to the South Australia/Victoria borders and includes waters around Lord Howe Island and the area of the high seas under the region of concern of the Western and Central Pacific Fisheries Commission (See Appendix: Figure A1). The target species of the fishery are yellowfin tuna, albacore tuna, bigeye tuna, broadbill swordfish and striped marlin which are taken predominately by pelagic longline. The smaller minor line sector of this fishery also employs trolling, hand lining and rod and reel fishing to target these species.

The fishery is currently managed by the Australian Fisheries Management Authority (AFMA) according to transitional arrangements provided for in the *Eastern Tuna and Billfish Fishery Management Plan 2005* until hook Statutory Fishing Rights (SFRs) are granted (expected to be effective during 2009). Under the transitional arrangements, commercial fishing is managed through a system of input controls based upon annually granted fishing permits which limit entry to the fishery, the area of operations, and impose limits on the take of bycatch species and the fishing gear which may be employed in the fishery.

### **The Western Tuna and Billfish Fishery (WTBF)**

The Western Tuna and Billfish Fishery covers the area of the Australian Fishing Zone westward from Cape York Peninsula (142°30'E) off Queensland, along the west coast of Western Australia and then extending eastward across the Great Australian Bight to 141°E at the South Australian/Victorian border. The fishery also encompasses the high seas areas in the region of competence of the Indian Ocean Tuna Commission (IOTC) (See Appendix: Figure A2). The target species of the fishery are yellowfin tuna, bigeye tuna, broadbill swordfish and striped marlin which are taken predominately by pelagic longline. The smaller minor line sector of this fishery also employs trolling, hand lining and rod and reel fishing to target these species.

The fishery is currently managed by AFMA according to transitional arrangements provided for in the *Western Tuna and Billfish Fishery Management Plan 2005* until quota SFRs are granted (expected to be effective during 2009). Under the transitional arrangements, commercial fishing is managed through a system of input controls based upon annually granted fishing permits which limit entry to the fishery, the area of operations, and impose limits on the take of bycatch species and the fishing gear which may be employed in the fishery.

## ***Bycatch and Discarding Issues***

The ATBLF catches a range of non-target fish and chondrichthyan species and on occasion interacts with a variety of marine birds, turtles and mammals. In this work plan we use the term “bycatch” to cover all the non-target species, however it should be noted that some non-target species (byproduct) are actually retained and sold because they have market value.

### **Protected Species**

This category includes all species of marine birds, turtles, mammals and protected species of sharks (grey nurse and great white) as listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999).

- **Marine Birds**

The incidental capture of seabirds in oceanic longline operations was listed as a key threatening process by the Commonwealth on 24 July 1995. Seabirds are attracted to fishing vessels by discarded offal and baits and on occasion ingest baited hooks during the setting or, less commonly, hauling of the longline. The impact of this additional mortality upon marine bird species is uncertain but many are long lived and late maturing with populations that are listed as vulnerable or have unknown status. As such, any additional mortality as a result of longline fishing operations has the potential lead to further declines in seabird populations.

In the ETBF there has been a history of interactions with species of albatross and flesh-footed shearwaters. In 2007, there were a total of nine interactions with seabirds reported through AFMA observers and logbooks, with four released alive. This was fewer than in 2006, where 16 interactions were reported, with only four released alive.

There have been no interactions with marine birds reported by observers or recorded in logbooks in the past two years in the WTBF. This is probably due to the prevalence of seabirds being less than that in the ETBF. In addition to the lower abundance of birds, there is significantly less effort in the fishery with the majority of operations conducted at night, aimed at targeting broadbill swordfish.

The ATBLF currently manage seabird bycatch through provisions under the Threat Abatement Plan (2006).

- **Marine Turtles**

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

Even though the estimated marine turtle bycatch in Australian longline fisheries is less than other foreign longline fisheries, most species of turtle are considered vulnerable to local and even global extinction due to declining numbers. As a result, reductions in mortality from all sources is important for the long-term viability of these species.

Historically the majority of interactions that have occurred in ETBF have been with green and leatherback turtles. In 2007 there were a total of 17 interactions reported through AFMA observers and logbooks with marine turtles, with 15 released alive. This was similar to 2006 where a reported 16 interactions occurred, with 13 released alive.

Over the last two years marine turtle interactions have not been common in the WTBF due to the low levels of effort in the fishery. During the 2006 and 2007 period there were five interactions reported through AFMA observers and logbooks with all turtles released alive.

- **Marine Mammals**

The ATBLF has a very low recorded incidence of marine mammal interactions with no interactions being reported by AFMA observers in the WTBF since the inception of the fisheries observer program in 2003. In 2006 and 2007 a total of 11 interactions with marine mammals (including 10 whales) have been reported by AFMA observers or recorded in logbooks in the ETBF. The majority of these interactions predominately involve cetaceans (whales) being hooked or entangled in the gear while trying to “steal” tuna from lines.

- **Great White Shark and Grey Nurse Shark**

Under the *EPBC Act 1999*, the great white and grey nurse sharks are listed as protected species. Over the last decade there have been few interactions with these sharks in the ATBLF. In the ETBF since 1999/2000 there have been a total of four great white shark interactions with one released alive and there have been a total of 11 grey nurse shark interactions, with all released alive. Since 2003, no interactions with either of these species have been reported by AFMA observers or through logbooks by vessels operating in the WTBF.

## **Sharks**

Of the 166 species of sharks that occur in Australian waters, fewer than 12 are commonly caught by pelagic longliners. A recent estimate of the average catch rate of all shark species on Australia’s east coast was 5.5 per 1000 hooks<sup>1</sup>. Blue sharks are caught in greatest numbers, with oceanic whitetips, shortfin mako, bronze whaler and thresher spp. also frequently caught. Less frequently caught are hammerhead, tiger, crocodile,

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<sup>1</sup> Gilman, E., Clarke, S., Brothers, N., Alfaro-Shigueto-J., Mandelman, J., Mangel, J., Petersen, S., Piovano, S., Thomson, N., Dalzell, P., Donoso, M., Goren, M., Werner, T. (2007) *Shark Depredation and Unwanted Bycatch in Pelagic Longline Fisheries: Industry Practices and Attitudes, and Shark Avoidance Strategies*. Western Pacific Regional Fishery Management Council, Honolulu, USA. 149pp.

silky, porbeagle sharks and longfin mako sharks. There is a large amount of uncertainty in the species composition of shark catch due to identification issues that can arise due to similarities between certain species.

The sharks that are captured in the ETBF in greatest numbers and discarded include: blue sharks (95%), tiger sharks (82%), oceanic whitetip sharks (77%) and bronze whalers (71%)<sup>2</sup>. The sharks that are captured in the WTBF in greatest numbers and discarded include: crocodile sharks (100%), dusky sharks (100%), blue sharks (90%) and shortfin makos (80%)<sup>3</sup>.

### **Offshore Constitutional Settlement (OCS) driven bycatch**

As the ATBLF operates in the waters adjacent to all coastal States and Territories in Australia, the potential exists for the fisheries to interact with species managed as part of a separate fishery. As a result of Offshore Constitutional Settlement (OCS) negotiations between the Commonwealth and the States, a number of bycatch limits have been imposed upon operators to ensure that species which are managed through other arrangements are not taken in commercial quantities by ATBLF operators.

While the amount of catch discarded due to the limits imposed by the current OCS arrangements has not yet been fully quantified in the ATBLF, it is believed to be minimal for most species.

During 2007 it was brought to the attention of the Eastern Tuna Management Advisory Committee (ETMAC) that some discarding of wahoo (*Acanthocybium solandri*) was occurring in the fishery due to increased catches through deep-setting to target albacore in the fishery. AFMA has since entered into negotiations with the Queensland Department of Primary Industries and Fisheries (QDPI&F) to resolve this issue.

### **Blue and Black Marlin**

Since 1998, a legislative ban has been in place prohibiting the commercial take of blue and black marlin (dead or alive), as a recognition of the importance of these species to the Australian game fishing sector. In 2007, the pelagic longline sector of the ETBF reported a catch of 341 black marlins and 348 blue marlins, a reduction on that reported in 2005 and 2006 where 793 and 582 black marlins and 927 and 535 blue marlins were reported. Most of these marlins are reported in logbooks as released alive, however observer data has suggested otherwise with indications that 60% of black and 36% of blue marlin are dead when landed<sup>4</sup>. As the post-release mortality of these species is unknown, it is quite possible that a higher level of mortality is occurring.

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<sup>2</sup> Based on observer records from 2005/2006.

<sup>3</sup> Based on observer records from 2003/2004 and 2004/2005.

<sup>4</sup> Dambacher, J.M. (2005) Analysis of AFMA observer data July 2004-June 2005. Report to the Eastern Tuna and Billfish Fishery Resource Assessment Group Meeting, November 17-18, 2005.

## **Target Species**

- **Juvenile or Damaged Catch**

Target species in the ATBLF are normally retained and sold. Some are released due to not being of a marketable size (juveniles) or discarded due to damage from shark predation.

- **Southern Bluefin Tuna (SBT)**

Each year during the winter months southern bluefin tuna migrate along the New South Wales coast following cooler currents from the south. During this time AFMA institutes restricted access areas (Core and Buffer Zones) in the ETBF in an attempt to ensure that the incidental capture of southern bluefin tuna by ETBF longline operators is covered by quota. There is the potential for discarding of SBT to occur due to no quota being held. Or alternatively, there is the possibility of high grading taking place to obtain more valuable species or to fish down quota to a predetermined level.

## ***Current measures in place to address bycatch and discarding***

Refer to Appendix: Figures A4 and A5 for a detailed timeline of bycatch and discarding mitigation and monitoring measures that have been introduced in the ATBLF.

### **Management**

The ATBLF has taken considerable steps towards reducing bycatch and addressing other ecological issues, including the establishment of a bycatch working group to provide specialist advice on the development of strategies to reduce bycatch and the development of a Bycatch Action Plan (BAP). The BAP which is reported against six-monthly and reviewed every three years specifies actions to ensure the impacts of the fishery's bycatch on the ecosystem are sustainable.

Both fisheries in the ATBLF have an *Industry Code of Practice for Responsible Fishing* (CoP) which were developed in 2003. These specify principles and standards of behaviour and include voluntary bycatch mitigation measures and handling and release guidelines for bycatch species.

In addition to these overarching measures the following are specific examples of mandatory bycatch and discarding management arrangements implemented to address risk to particular species groups.

- **Threat Abatement Plan (TAP)**

Oceanic longline fishing is listed as a key threatening process for seabirds under the *EPBC Act 1999* requiring the development of a TAP. The current iteration of the TAP (2006) requires the ATBLF to significantly reduce the bycatch of seabirds in oceanic longline operations and maintain a bycatch rate of less than 0.05 birds per 1000 hooks in all fishing areas (by 5 degree latitudinal bands) and all seasons (1 September – 30 April; 1 May – 31 August).

In the ETBF, AFMA has implemented fishing permit conditions aimed at reducing seabird mortality which are consistent with the objectives and prescriptions of the TAP. These include:

- All longline operators fishing south of 25 degrees deploying a tori line (of specific design requirements), using a line weighting system and thawed baits. With a banning on offal discharge while setting and avoiding discharge during hauling.
- All longline operators fishing north of 25 degrees carrying a tori line. With a banning on offal discharge while setting and avoiding discharge during hauling.

In the WTBF these conditions include all longline operators fishing south of 30 degrees setting between nautical dusk and nautical dawn, deploying a tori line and using thawed baits.

In addition to these compulsory measures some operators in the ATBLF have adopted voluntary measures from their respective fishery's *Industry Code of Practice* to reduce seabird bycatch including:

- Using a tori line north of 25 degrees in the ETBF and north of 30 degrees in the WTBF.
- Puncturing of the swim bladders of thawed baits to assist in sinking rate
- The use of bait casting machines
- Gear selection that minimises the probability of seabird bycatch
- Promoting safe handling and release of all seabirds caught alive on longlines
- Promoting night setting

AFMA undertook an extensive seabird bycatch education program in 2005 with interactive workshops at key ATBLF ports. Participants were provided with information about the implementation of new fishing practices designed to minimise seabird bycatch, including highlighting the effectiveness of line weighting and how to correctly assemble and deploy tori lines.

In the past AFMA has responded quickly to observed increases in seabird bycatch. This was demonstrated in 2006 when AFMA introduced a four week closure (13 July – 9 August) to daylight fishing in the southern area of the ETBF in response to a significant increase in observed albatross capture in this area of the fishery.

- **Wire Traces and Trip Limit for Sharks**

In 2000, a retention limit of 20 sharks per trip was imposed in the ATBLF. Any sharks caught in excess of 20 are no longer classified as byproduct but become bycatch and must be discarded whether alive or dead.

This is an issue in the WTBF where catch rates of sharks, particularly blue shark and crocodile shark are high enough to approach, if not exceed this limit on a frequent basis. For this reason operators in the WTBF who conduct a 'high seas only' trip are subject to a trip limit of 100 sharks per trip. The 100 per trip limit does not apply to vessels operating inside the AFZ as Offshore Constitutional Settlement negotiations on this issue are yet to be resolved.

To reduce the capture of sharks in these fisheries, the use of wire trace was banned in the WTBF and ETBF in 2001 and 2005 respectively. Research conducted off north-eastern Australia comparing the catch rates of nylon monofilament traces to wire traces found that the catch rates of sharks were lower on nylon than on wire leaders<sup>5</sup>. With a few exceptions, more bycatch was taken on wire than on monofilament, with the data suggesting that the five boats involved in the study would catch an extra 679 sharks and over 3,000 additional lancetfish and snake mackerel per year if they were permitted to use 100% wire traces.

- **Area E in the ETBF**

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<sup>5</sup> Ward, P., Lawrence, E., Darbyshire, R., & Hindmarsh, S. (2008) Large-scale experiment show that nylon leaders reduce shark bycatch and benefit pelagic longline fishers. *Fisheries Research* 90, pp. 100-108.

The Area E closure (See Appendix: Figure A1 for map) was introduced to protect spawning grounds of black marlin and covers the waters outside the Great Barrier Reef from Cape Greville to the waters off Townsville. Due to the importance of this area to these species, operations in Area E are limited to a small number of permits (currently only 11) which are subject to restrictions limiting the amount of hooks which can be set (500 per shot) and carried (250 spare hooks).

- **SBT Zones in the ETBF**

Each year AFMA restricts fishing operations to prevent the capture of Southern Bluefin Tuna (SBT) not covered by quota in the ETBF. This is achieved through the implementation of SBT Core and Buffer zones where operators must hold a suitable amount of quota before entering the zones (See Appendix: Figure A3 for example of zones map). These are typically in place during the winter and spring months and reviewed fortnightly based on a CSIRO SBT habitat preference model, sea surface temperatures, landings data, observer and ICVMS data and industry advice.

## **Data and Research**

- **Monitoring Programs**

Fishery information in the ATBLF is collected mainly through the Australian pelagic longline daily fishing logbook (ALO6), Catch Disposal Records (CDRs), observer data and a size monitoring program for yellowfin, bigeye and swordfish.

The AFMA logbook provides for the recording of information on the location, time and method of fishing as well as the resultant catch for each fishing operation. In 2006, AFMA ensured further accuracy of catch data through the introduction of the Commonwealth Pelagic Fisheries CDR which is an accurate record of all the catch landed, where an independent licensed fish receiver verifies the landed weight of each species.

While logbook information has proved reasonably reliable for target species, information on byproduct, bycatch and fishing practices has been less reliable. To address these issues AFMA implemented an observer program to the ETBF in 2003 with the aim of monitoring 5.1% of effort in the fishery. This increased in December 2005, following the Ministerial Direction, when it was decided to increase the target coverage rate to 8.5% of effort in the fishery.

Observers provide reliable data on catch composition, fate of target and non-target species, fishing effort and fishing practices. One of their main tasks in the ATBLF is to report on the use and effectiveness of mitigation measures under the TAP and collect comprehensive information on bycatch and protected species as well as detailed information on fishing practices.

- **Bycatch Research Projects**

The ATBLF have supported the development and funding of numerous research projects examining bycatch issues faced by the fisheries and these are outlined in Tables A1 and A2 in the Appendix of this report.

- **Priority Species Assessment**

A key component in AFMA's move towards Ecosystem Based Fisheries Management (EBFM) has been the undertaking of ecological risk assessments (ERA) for all AFMA-managed fisheries. The result of the risk assessment process is a priority list identifying the key ecological areas in the fishery that require management attention (Table 1). A fishery's priority list will be comprised of:

- Those species identified as precautionary high risk, extreme high risk or precautionary extreme high risk through the rapid quantitative risk assessment; and
- Those species that have not undergone a further rapid quantitative risk assessment and are identified as high risk through the application of the residual risk assessment methodology; and,
- All TEP species identified through the ERA.

Once identified, species that form the priority list for each fishery will be managed either through fishery specific arrangements or under one or more of the following policies or measures:

- Harvest Strategy Policy and Guidelines;
- Non-key Commercial Species (byproduct) Policy;
- Bycatch and Discard Program;
- Shark Policy and the Chondrichthyan Working Group; and
- TEP species under various international plans of action, recovery plans etc.

A detailed ERM strategy for each Commonwealth fishery will be prepared which clearly identifies how each species or group of species will be managed under the policies or measures described above.

ERM strategies to address those remaining species identified as at medium or low risk will be implemented at a later date. Due to limitations in the ERA methodology development for assessing the impacts of fishing operations on habitats and communities, AFMA will defer the development of an ERM strategy for these components until more refined and meaningful results become available.

**Table 1: List of high risk species following level 2 residual risk assessment and level 3 quantitative assessment for the ETBF and WTBF**

<b>Fishery</b>	<b>High Risk after Lvl 2 Residual Risk</b>	<b>Addressed in</b>	<b>High Risk after Lvl 3</b>	<b>Addressed in</b>
<b>ETBF</b>	Longfin Mako ( <i>Isurus paucus</i> )	Actions 1,2,4,5	Longfin Mako ( <i>Isurus paucus</i> )	Actions 1,2,4,5
	Dusky Shark ( <i>Carcharhinus obscurus</i> )	Actions 1,2,4,5	Crocodile Shark ( <i>Pseudocarcharias kamoharai</i> )	Actions 1,2,4,5
	Short-finned Pilot Whale ( <i>Globicephala macrorhynchus</i> )	Action 4	Pelagic Thresher ( <i>Alopias pelagicus</i> )	Actions 1,2,4,5
	False Killer Whale ( <i>Pseudorca crassidens</i> )	Action 4	Ocean Sunfish ( <i>Mola mola</i> )	Actions 3,4
	Leatherback Turtle ( <i>Dermochelys coriacea</i> )	Actions 1,2	An Ocean Sunfish ( <i>Mola ramsayi</i> )	Actions 3,4
<b>WTBF</b>	Long-finned Pilot Whale ( <i>Globicephala melas</i> )	Action 4	Not applicable; no lvl 3 assessment completed yet	
	Andrew's Beaked Whale ( <i>Mesoplodon bowdoini</i> )	Action 4		
	Ginko Beaked Whale ( <i>Mesoplodon ginkgodens</i> )	Action 4		
	True's Beaked Whale ( <i>Mesoplodon mirus</i> )	Action 4		
	Dusky Shark ( <i>Carcharhinus obscurus</i> )	Actions 1,2,4,5		
	Porbeagle Shark ( <i>Lamna nasus</i> )	Actions 1,2,4,5		
White Shark ( <i>Carcharodon carcharias</i> )	Actions 1,2,4,5			

## ***Management solutions and work plan for reducing bycatch***

There is an increasing recognition of the need to focus on those species that may currently or in the future be at risk from longline fishing activity. The main ecological sustainability issue for species in the ATBLF appears to be catches of TEP species, in particular, seabirds, turtles, sharks and to a lesser extent, marine mammals. As such, the ATBLF over the period 2008-2010 will focus on:

- Reducing the level of risk for bycatch identified as high risk through the ERA process;
- Providing continual monitoring through the observer program for high risk and threatened, endangered or protected species (TEP species);
- Providing for the collection and assessment of data that can help direct future research
- Developing and implementing cost-effective strategies to pursue continual improvement in bycatch reduction; and
- Assessing relative changes in bycatch due to bycatch mitigation and target species management measures

The residual risk assessment results clearly illustrate the effectiveness of management measures in reducing the effect of fishing operations on bycatch species. The implementation of the TAP for seabirds and trip limit and the banning of wire trace for sharks have both contributed to the majority of those species not remaining at high risk.

Further mitigation measures for bycatch species proposed in this work plan include making circle hook use compulsory to reduce turtle and seabird interactions and assessing their affect on shark capture rates; making the carriage of line cutters and de-hookers compulsory; providing a weather-proof bycatch recording device to all vessels; investigating the difference between “deep-setting” and shallow-setting of lines for bycatch and; analysing logbook and observer data to determine spatial and seasonal variations in ATBLF bycatch species abundance (Tables 2 & 3).

The following action list is as a result of actions suggested by the ATBLF bycatch and discard working group meeting on 18 June 2007. It also outlines how it addresses outcomes from the ERA/ERM process, where responsibility lies, how much the action will cost, and when it will be done. The components of this list are designed to not only address immediate actions to reduce bycatch and discarding, but initiates actions that will help determine if the perceived problem actually exists and if so, how best to deal with it. This is in accordance with ‘AFMA’s *Program for Addressing Bycatch and Discarding in Commonwealth Fisheries: an Implementation Strategy.*’

- *Actions, including incentives to reduce bycatch and discarding, trials (of fishing gear), specific management actions (eg, mitigation devices, spatial management), research, quantitative assessments, fishery surveys, changes in fishing practices*

*and enhanced monitoring programs, using the precautionary principle, where applicable:*

- These may be short-term specific actions or longer-term actions that will contribute to mitigation over time,*
- Actions should align with specific species or species groups at risk,*
- Actions should include information on, where relevant, a timeframe, proposed costs and how performance will be measured*

**Table 2: Action List for 2008-2010**

<b>Action</b>	<b>How does this respond to the outcomes of the ERA/M process?</b>	<b>Time Frame</b>	<b>Projected Cost</b>	<b>How action will be measured</b>	<b>Responsible</b>
1. Make the carriage of line cutters and de-hookers compulsory on ATBLF vessels	To help in the release of hooked and tangled sharks and turtles.	Considered by MAC in 2009 and implemented in permits June 2010 or earlier if the opportunity arises	Estimated hardware cost = 25K (Based on past cost of equipment)	Observed and documented being carried and used.	AFMA to present to ETMAC &, WTMAC for decision, Industry responsible for purchasing units
2. Analysis of the impacts of making circle hooks compulsory in the ATBLF (eg: quantifying the catch rates of turtles and sharks).	Reduction in risk to turtles and marlins possible increase to sharks.	Awaiting completion of BRS analysis expected November 2008. Decision within 6 months of receipt of report.	Report already funded Hooks purchased on an as needed basis.	Report presented to WTMAC and ETMAC for decision as to whether circle hooks should be made compulsory in ALTBF. (after considering implications for different bycatch species)	BRS to complete report. ETMAC, WTMAC & AFMA to consider the costs and benefits of making circle hooks compulsory in the ALTBF
3. Investigate the variance in bycatch composition between “deep set” (albacore) and “shallow set” longline operations	Reduction in risk to turtles and other bycatch species through deep-setting if data suggests fewer interactions. Identification of potential OCS-driven bycatch issues as a result of operational change in ETBF.	To be completed before 1/07/09	Existing staff time (FMO to complete)	AFMA to provide report to ETRAG on observed changes in bycatch composition between shallow and deep set operations. Due to trip limit of wahoo, potential discarding issue avoided.	AFMA to analyse data and report to ETRAG. ETRAG to identify any potential bycatch issues and suggest proactive measures to address identified issues.
4. Provision of a weather proof bycatch recording device (with attached identification guide) to all ATBLF vessels to provide convenient facility to record bycatch during hauling operations	Address operational requirements to provide aids to recording accuracy of data to determine bycatch & discarding issues.	To be completed before 1/04/09	Graduate Project & Existing staff time \$1000	Provision to all active vessels To be read in conjunction with Action Item 5. Part of the education strategy. Laminated A3 sheet with main target and bycatch species and a chinagraph pencil.	AFMA to produce recording device and provide to industry.
5. Review outcomes and recommendations from the	Address shark mitigation on an all fisheries/all jurisdictions basis. Has	<i>Within 6 months from receipt of formal</i>	<i>As part of the RAG meeting</i>	<i>ETRAG and WTRAG to review outcomes from CTWG and make</i>	<i>ETRAG &amp; WTRAG</i>

<b>Action</b>	<b>How does this respond to the outcomes of the ERA/M process?</b>	<b>Time Frame</b>	<b>Projected Cost</b>	<b>How action will be measured</b>	<b>Responsible</b>
Chondrichthyan Technical Working Group (CTWG) and implement formal CTWG recommendations.	relevance to the high risk species associated with this fishery.	<i>recommendations from CTWG working group</i>		<i>recommendation to MAC about possible options which may be effective in reducing shark bycatch in ALTBF</i> Consideration of behavioural, spatial, temporal and susceptibility patterns.	
6. Develop and implement an education strategy for crew to be made aware of bycatch and discarding obligations	More accurate reporting by crew. Develop an understanding of bycatch & TEP issues and address misreporting of interactions.	<i>Completed before 30/09/09</i>	<i>Estimate \$20K (based on previous observed costs)</i>	<i>AFMA to organise for a series of port visits to educate skippers on the importance of correctly recording bycatch in logbooks. Measured by analysing quality bycatch reporting in logbooks before and after education strategy.</i>	<i>AFMA and MAC EO to organise</i>
7. Analysing observer data in an attempt to quantify weight of discarded target species	Improves understanding of discarding issues in ALTBF particularly with regard quantity of released juveniles and damaged catch.	<i>Completed before 30/08/09</i>	<i>Existing staff time (FMO to complete)</i>	<i>AFMA to produce report for submission to WTRAG and ETRAG for consideration.</i>	<i>AFMA</i>

**Table 3: Potential future work on bycatch species for the ATBLF**

<b>Long Term Goal</b>	<b>Short Term Objective (2008-09)</b>	<b>Projected Cost</b>	<b>Responsible</b>
1. Investigation into the feasibility of introducing a crew member observer program to the ATBLF	Provide a report to the MAC examining all issues which a CMO program would face in the ETBF & WTBF	<i>Existing staff time</i>	AFMA
2. Investigation into the possible effectiveness of 'move on' provisions with regards to the fishery's impact on bycatch species	Following on from seasonal, spatial and temporal variation investigations above	<i>Costs to be determined</i>	AFMA
3. Analyse logbook and observer data to determine spatial and seasonal variations in ATBLF bycatch species abundance	General improvement in bycatch monitoring and reduction in catch levels of non-target fish species such as lancet fish, oil fishes and dolphin fish.	<i>Existing staff time</i>	AFMA to produce a report and submit to ETRAG for future consideration of effectiveness of move on provisions in the ALTBF.

## **Summary**

The ATBLF workplan will assist in pursuing AFMA's wider bycatch and discarding objectives of assisting fisheries to determine and implement a course of action that will address high risk bycatch, avoid interactions with TEP species and minimise discarding of target/quota species.

The completion of the CSIRO ERAEF for the ATBLF has provided insight into the high risk species and the effect management has had on reducing their risk through the residual risk assessment. The greatest bycatch issue for longlining is their interaction with TEP species, being seabirds, protected shark species and marine turtles. This was confirmed by the ERAEF and hence the work plan initiatives for 2008-2010.

The initiatives outlined above, will assist AFMA in quantifying specific variables that may affect bycatch and improve reporting by industry, inevitably strengthening the decision making ability in relation to bycatch and discarding issues.

## Appendix

Figure A1: Map of the ETBF highlighting the location of Area E

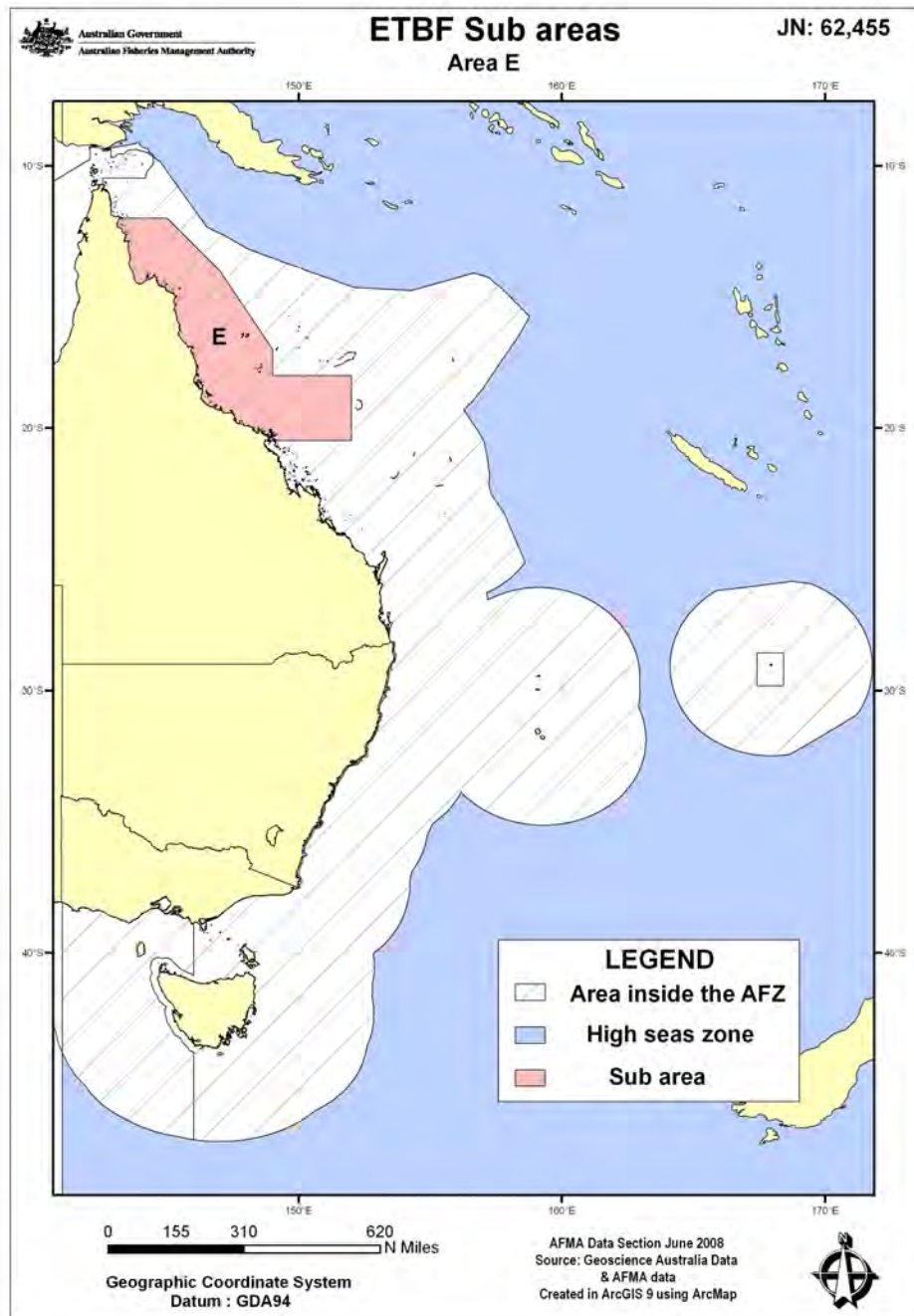


Figure A2: Map of the WTBF

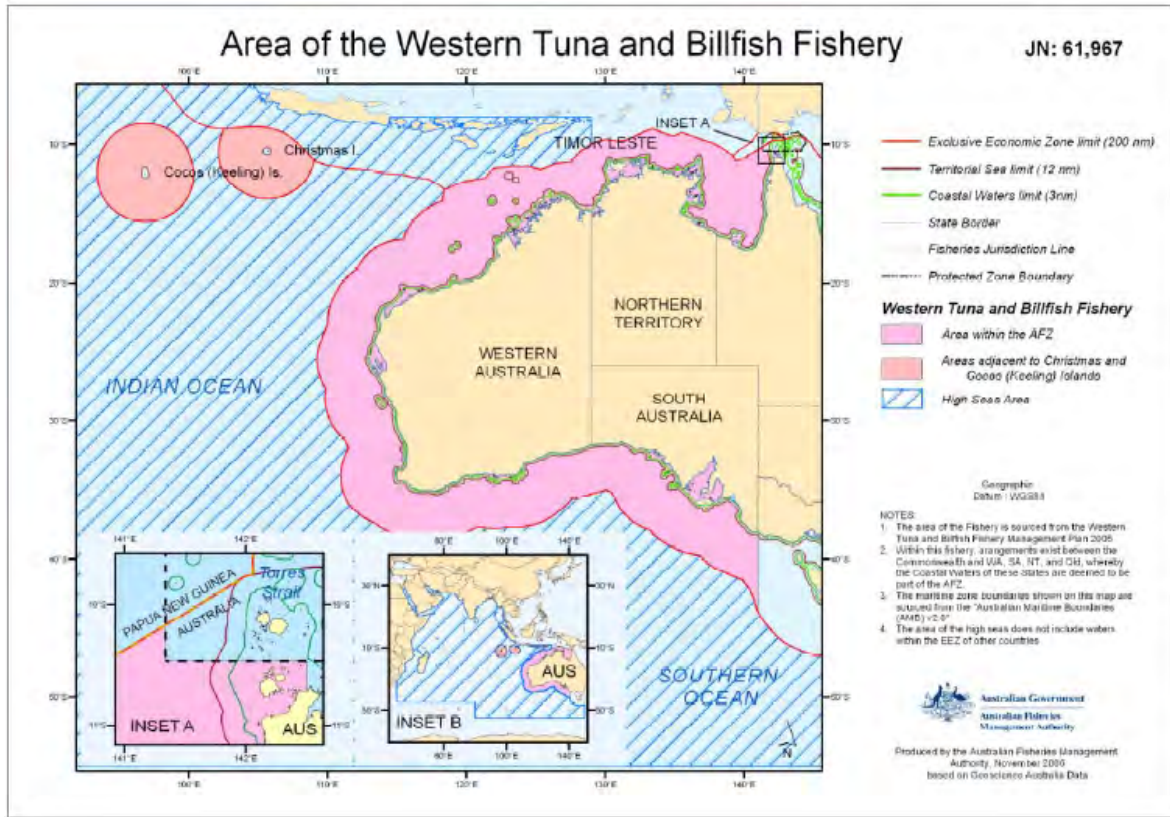
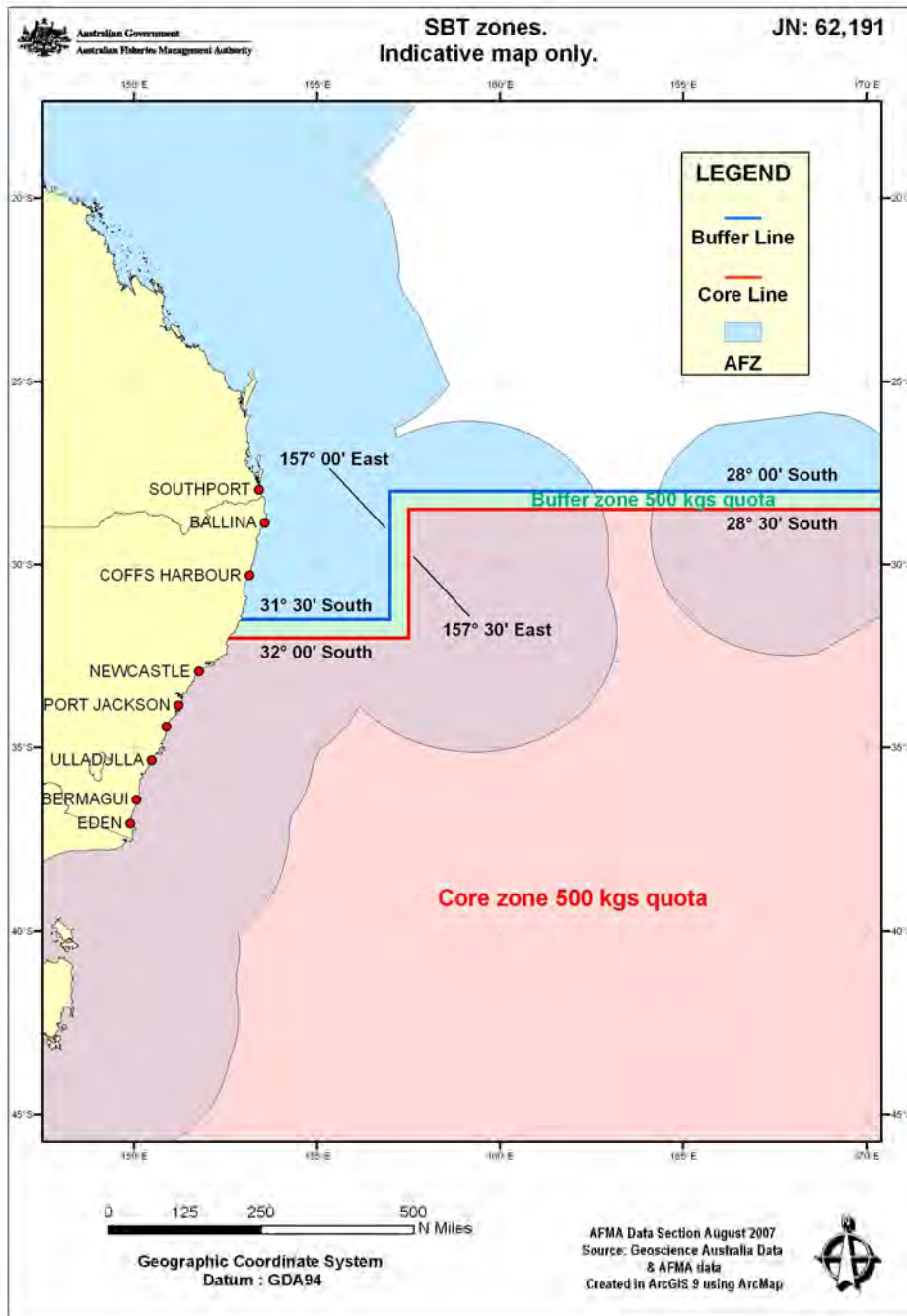


Figure A3: Map of the ETBF with an example of the location of SBT core and buffer zones in 2007



**Figure A4: Time series of key management actions taken in the ETBF that have reduced bycatch**

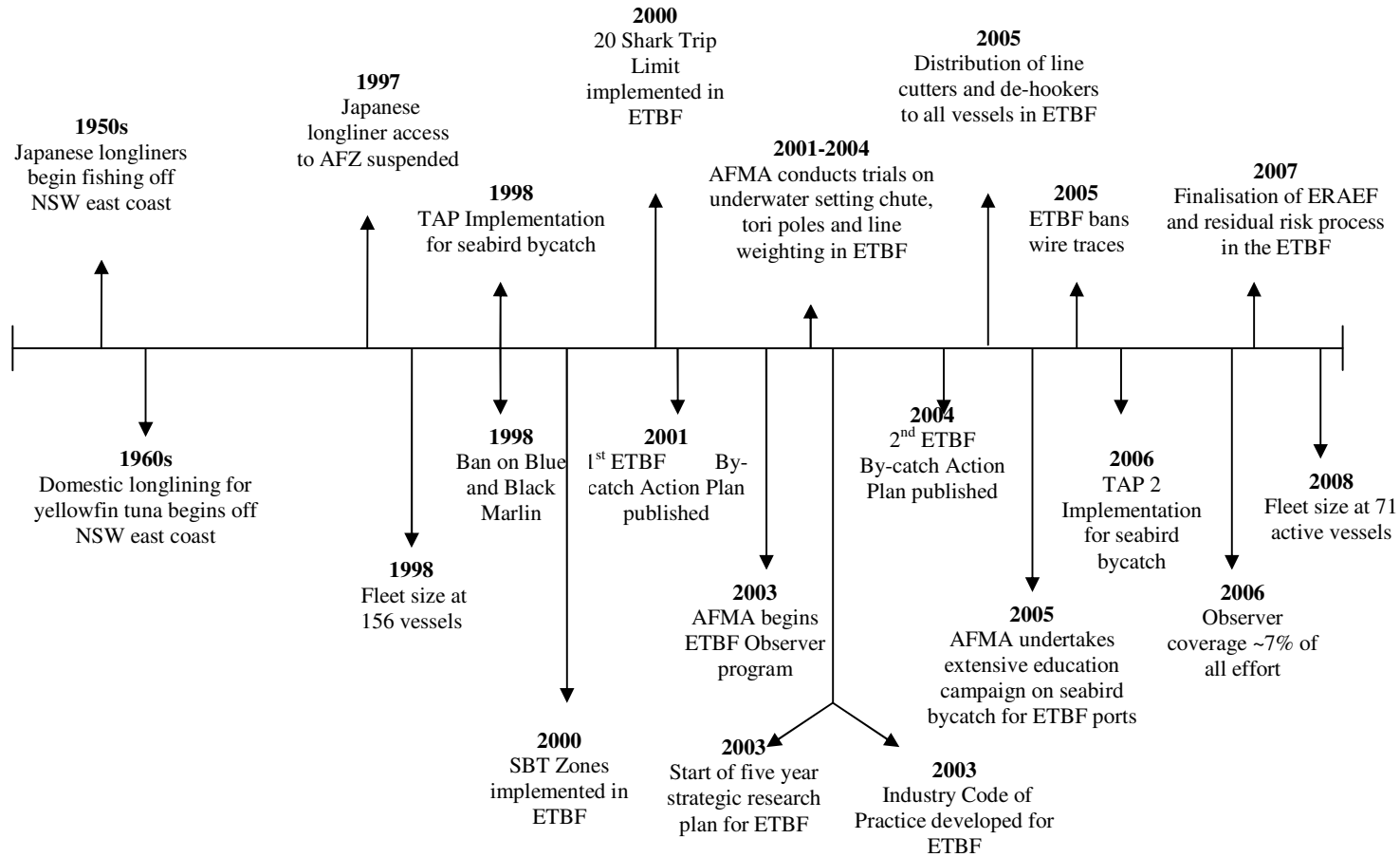
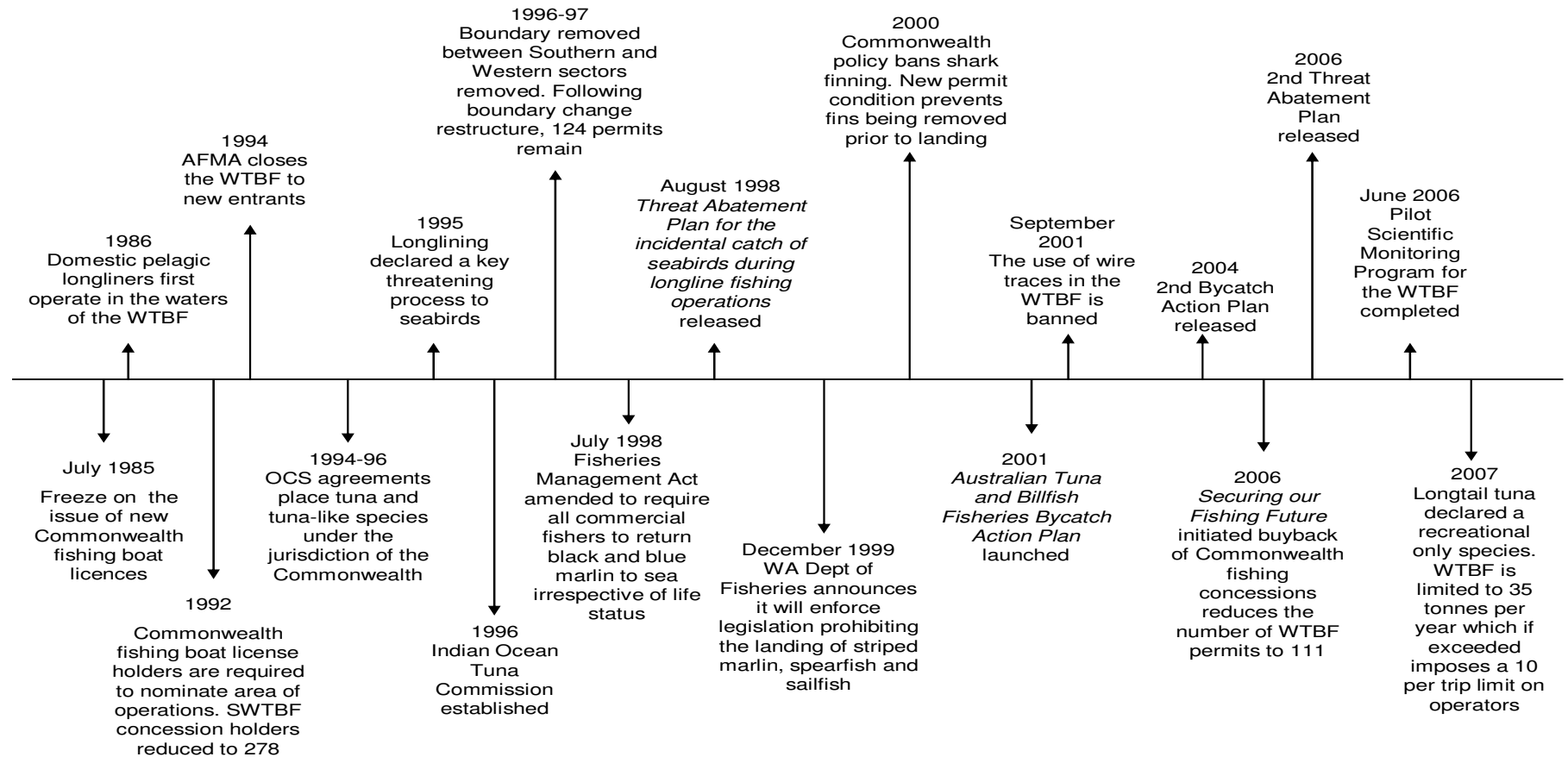


Figure A5: Time series of key management actions taken in the WTBF that have reduced bycatch



**Table A1: Past and current research relevant to bycatch and discarding reduction.**

<b>Project description</b>	<b>Author(s)</b>	<b>Status</b>
Movements and Variations in early year class strength of Black Marlin, <i>Makaira indica</i> , off eastern Australia	J. Pepperell	Completed (1988)
Baitfish and the East Coast Tuna and Billfish Fishery – Species Status and Situation	J. Glaister & J. Diplock	Completed (1993)
Trends in marlin abundance and stock composition off eastern Australia as indexed by catch, effort and tagging data	D. Williams, M. Milicich and R. Kearney	Completed (1993)
Post-release behaviour of black marlin, <i>Makaira indica</i> , caught by sportfishing off Cairns, Australia.	J. Pepperell & T. Davis	Completed (1996)
Domestic longline fishing methods and the catch of tunas and non-target species off north-eastern Queensland (1 <sup>st</sup> survey: October-December 1995)	R. Campbell, W. Whitelaw & G. MacPherson	Completed (1997)
Domestic longline fishing methods and the catch of tunas and non-target species off north-eastern Queensland (1 <sup>st</sup> survey: May-August 1996)	R. Campbell, W. Whitelaw & G. MacPherson	Completed (1997)
Baitfish usage on the east coast	P. Dixon, K. Paterson & R. Holiday	Completed (1997)
A review of Australia’s pelagic shark resources	CSIRO	Completed (1997)
Albatross longline interaction – seabird interactions with longline fishing in the AFZ: 1996 seabird mortality estimates and 1988-1996 trends.	Tasmanian Parks and Wildlife Service	Completed (1997)
The effects of longlining on seabird population	DPIWE (Tasmania)	Completed (1997)
Identification of marlin species in Australian waters	R. Ward	Completed (1998)
Non-target species in Australia’s Commonwealth Fisheries: A critical review.	A. Harris & P. Ward	Completed (1999)
Residence times, exchange rates, migration patterns and behaviour of black marlin in the NW Coral Sea: Pilot study to evaluate interactions between recreational and commercial fishing sectors in Area E.	T. Davis, J. Gunn & J. Pepperell	Completed (1999)
Analysis of historical charter boat data to assess black marlin catch rates in the recreational fishery of northern Queensland, Australia	R. Campbell, J. Pepperell and T. Davis	Completed (2000)
Population genetics and stock structure of black marlin ( <i>Makaira indica</i> ) in the Pacific and Indian Oceans	B. Falterman, J. Pepperell and J. Graves	Completed (2000)
A scientific appraisal of the suitability of underwater setting chute technology as a seabird mitigation measure for Australian tuna longline fisheries	Nigel Brothers	Completed (2001)
Predation of large marine mammals (Family <i>Delphinidae</i> ) on longline and dropline target species	G. McPherson, P. Turner, C. McPherson and D. Cato	Completed (2002)
Assessment of blue shark population status in the western south Pacific	J. Stevens	Completed (2003)
Acoustic tracking system for marine mammals around fishing gear and preliminary trials of predation mitigation prototypes for line based fisheries.	G. McPherson	Completed (2003)
Testing of acoustic tracking system for marine mammals around longline and gillnet fishing gear, and preliminary trials of predation mitigation devices for longline fisheries	Geoff McPherson, Phil Turner, Craig McPherson & Doug Cato	Completed (2003)
Seabird interactions with longline fisheries in the Australian fishing zone: assessment report for the National Plan of Action for reducing the incidental catch of seabirds in longline fisheries	DAFF	Completed (2003)
A review of byproduct interactions and economics in Australia’s tuna and billfish fisheries	James Findlay & Don Bromhead	Completed (2004)
New deep setting technique for bycatch mitigation	Steve Beverley	Completed (2004)
Assessment of blue shark population status in the western south Pacific	Grant West, John Stevens & Marinelle Basson	Completed (2004)
Reduction of interactions by toothed whales with fishing gear. Development and assessment of predation mitigation devices around longlines	Geoff McPherson	Completed (2005)
Marine turtle mitigation in Australia’s pelagic longline fishery	Carolyn Robins, Belldi Consultancy	Completed (2007)
Implementation of bycatch mitigation measures in Australia’s pelagic longline fisheries: quantifying effects on target and non-target catches	Peter Ward	In Progress
Determining ecological effects of longline fishing in the Eastern Tuna and Billfish Fishery	Jock Young	In Progress
Complementing the NRSMPA with off-reserve incentive-based spatial management and biodiversity offsets	Chris Wilcox	In Progress

Predicting the distribution and rate of Fishery-Seabird Encounters	Chris Wilcox Mark Hindell Barry Baker Geoff Tuck	In Progress
Assessing the potential impacts of fishing on the Lord Howe Island population of flesh-footed shearwaters.	Geoff Tuck Chris Wilcox Barry Baker	In Progress
Testing and development of smart hook system for mitigating seabird and turtle bycatch in longline fisheries	Hans Jusseit, Barry Baker and Kerstin Fritches	In Progress

**Table A2: Past and current research in the WTBF relevant to bycatch and discarding reduction.**

<b>Project description</b>	<b>Author(s)</b>	<b>Status</b>
The effects of longlining on seabird population	DPIWE (Tasmania)	Completed (1997)
Albatross longline interaction – seabird interactions with longline fishing in the AFZ: 1996 seabird mortality estimates and 1988-1996 trends.	Tasmanian Parks and Wildlife Service	Completed (1997)
A review of Australia’s pelagic shark resources	CSIRO	Completed (1997)
Identification of marlin species in Australian waters	R. Ward	Completed (1998)
Non-target species in Australia’s Commonwealth Fisheries: A critical review.	A. Harris & P. Ward	Completed (1999)
Population genetics and stock structure of black marlin ( <i>Makaira indica</i> ) in the Pacific and Indian Oceans	B. Falterman, J. Pepperell and J. Graves	Completed (2000)
A scientific appraisal of the suitability of underwater setting chute technology as a seabird mitigation measure for Australian tuna longline fisheries	Nigel Brothers	Completed (2001)
Predation of large marine mammals (Family <i>Delphinidae</i> ) on longline and dropline target species	G. McPherson, P. Turner, C. McPherson and D. Cato	Completed (2002)
Assessment of blue shark population status in the western south Pacific	J. Stevens	Completed (2003)
Seabird interactions with longline fisheries in the Australian fishing zone: assessment report for the National Plan of Action for reducing the incidental catch of seabirds in longline fisheries	DAFF	Completed (2003)
Acoustic tracking system for marine mammals around fishing gear and preliminary trials of predation mitigation prototypes for line based fisheries.	G. McPherson	Completed (2003)
Testing of acoustic tracking system for marine mammals around longline and gillnet fishing gear, and preliminary trials of predation mitigation devices for longline fisheries	Geoff McPherson, Phil Turner, Craig McPherson & Doug Cato	Completed (2003)
A review of byproduct interactions and economics in Australia’s tuna and billfish fisheries	James Findlay & Don Bromhead	Completed (2004)
New deep setting technique for bycatch mitigation	Steve Beverley	Completed (2004)
Assessment of blue shark population status in the western south Pacific	Grant West, John Stevens & Marinelle Basson	Completed (2004)
Reduction of interactions by toothed whales with fishing gear. Development and assessment of predation mitigation devices around longlines	Geoff McPherson	Completed (2005)
Marine turtle mitigation in Australia’s pelagic longline fishery	Carolyn Robins, Belldi Consultancy	Completed (2007)
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