Bycatch mitigation approaches in Australia's Western Tuna and Billfish Fishery: seabirds, turtles, marine mammals, sharks and non-target fish.

by

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Summary

The Australian tuna and billfish fisheries generally encompass all waters of the Australian Fishing Zone, dividing it into three main areas forming the eastern, southern and western fisheries. The fisheries also extend onto the high seas and the main fishing method used in these fisheries is longline.

Australia's Western Tuna and Billfish Fishery (WTBF) is predominantly a pelagic longline fishery targeting tuna and billfish species. Aside from the target species the fishery also catches a range of other fish and shark species, some of which are retained (by-product) and some discarded (bycatch). The fishery also interacts with seabird, marine turtle and marine mammal species.

In moves to ensure the ecologically sustainable development of the WTBF a range of bycatch mitigation measures have been put in place. These include overarching measures covering several bycatch groups and specific measures for particular bycatch groups. Bycatch species such as seabirds, marine turtles, marine mammals and some sharks are protected species in Australia. Therefore fisheries can not retain these species and must report all interactions[1] in daily fishing logbooks. Fisheries are also required to demonstrate they are taking all reasonable steps to avoid adverse interactions with, and mortality of protected species.

The Australian Fisheries Management Authority (AFMA) has developed a *Bycatch Action Plan for Tuna and Billfish Longline Fisheries* which specifies actions to ensure the impacts of the fishery's bycatch on particular species and ecosystem as a whole are sustainable. The WTBF industry adopted its *Industry Code of Practice for Responsible Fishing* in September 2003 which sets out specifies principles and standards of behaviour and includes voluntary bycatch mitigation measures and handling and release guidelines for bycatch.

Aside from these overarching measures, Table 1 summarises the mandatory and voluntary mitigation measures in place for the different bycatch groups.

[1] "Interaction" means any physical contact an individual (person) boat or gear has with a protected species, this includes all catching (hooked, netted, entangled) and collisions with an individual of these species.

Table 1. Current bycatch mitigation measures in Australia's Western Tuna and Billfish Fishery, based on the *Australian Fisheries Management Regulations 1992* and AFMA Permit Conditions (note this does not include the overarching measures mentioned above).

Group	Mitigation measures
Seabirds	Seabird bycatch must be < 0.05 birds/1000 hooks, in all fishing areas and seasons. *Mandatory* South of latitude 30° S: • Tori pole (AFMA specifications) deployed during line setting at any time, • Use only properly thawed bait, • No offal discharge during line setting and avoid offal discharge during line hauling, • Set all hooks at night or use weighted branchlines if setting during daylight. North of latitude 30° S: • Carry a tori pole (AFMA specifications) for each point at which hooks enter the water, • Use only properly thawed bait, • No offal discharge during line setting and avoid offal discharge during line hauling. *Voluntary* • The use of tori pole when seabirds are present during line setting north of latitude 30° S • Puncture bait swim bladders to ensure rapid sinking of bait, • Bait casting machines, • Promoting night-setting north of 30° South, • Measures to maximise bait sink rate (boat speed, bait position), • Promotion of safe handling and release procedures, including the use of de-hookers and line-cutters.
Turtles	*Voluntary* • Promotion of safe handling and release procedures, including the use of de-hookers and line-cutters. • Promotion, research and extension of circle hooks.
Marine mammals	*Voluntary* • Promotion of safe handling and release procedures, including the use of de-hookers and line-cutters.
Sharks and rays	*Mandatory* • Wire traces banned. • Trip limit of 20 sharks, excluding school shark, gummy shark, elephant fish (Families Callorhinchidae, Chimaeridae and Rhinochimaeridae) and sawshark which have a combined limit of 5, and protected species (great white and grey nurse shark) which cannot be retained. • Prohibited from carrying, retaining or landing all shark fins that are not attached to their carcass. • Prohibited from carrying, retaining and landing livers unless the carcasses are also landed. *Voluntary* • Not target sharks for fins. • Utilise all of the shark product. • If sharks are not retained attempt to release alive in a state that will maximize recovery.
Non-target fish	*Mandatory* • Prohibited from retaining blue and black marlin. *Voluntary* • Promotion of safe handling and release procedures, including the use of de-hookers and line-cutters.

INTRODUCTION

Australia's Western Tuna and Billfish Fishery (WTBF) is a multi-species fishery targeting tuna and billfish species. The main fishing method used is pelagic longlining. The fishery covers the area of the Australian Fishing Zone, from Cape York Peninsula (142°30'E) off Queensland to 34°S off the west coast of Western Australia. It also extends eastward from 34°S off the west coast of WA, across the Great Australian Bight to 141°E at the South Australian/Victorian border and includes high seas areas covered by the *Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean*.

Aside from its target species, the WTBF catches a range of non-target fish and shark species and interacts with a number of seabird, marine turtle and marine mammal species. In this paper we use the term "bycatch" to cover the non-target species. However, it must be noted that some non-target fish and shark species are actually by-product as they have market value and are retained and sold.

This paper provides an overview of the bycatch mitigation measures currently in place in the WTBF. The paper includes:

- an overview of the relevant legislation and policy;
- the current fishery monitoring methods;
- summaries of observer data and mitigation measures for seabirds, marine turtles, marine mammals, sharks and other non-target fish species.

It should be noted that fishing activity in the WTBF is currently quite low and has been on a steady decline during recent times and since 2001/02 has dropped from a total of 46 vessels operating in the fishery deploying a total of 6,113,240 hooks to 12 vessels deploying a total of 1,021,788 hooks in 2004/05.

LEGISLATION AND POLICY

Australia has invested considerably in the endeavour to manage the broader environmental impact of fisheries, particularly bycatch mitigation. This is in-line with the ecological sustainable development objective within the *Australian Fisheries Management Act 1991* and in the *Commonwealth Bycatch Policy 2000*. The aim of the *Commonwealth Bycatch Policy 2000* is to ensure bycatch species are managed sustainably through the reduction of bycatch and improved protection for vulnerable species. In-line with the *Commonwealth Bycatch Policy 2000* AFMA has developed a *Bycatch Action Plan for Tuna and Billfish Longline Fisheries* which specifies actions to ensure the impacts of the fishery's bycatch on specific bycatch species and the ecosystem as a whole are sustainable. AFMA has also invested in an Ecological Risk Assessment of the WTBF, which analyses the risk posed by the fishery on a species by species basis. This will enable AFMA to identify bycatch species potentially at high risk of adverse interactions with fisheries and focus management actions on these species.

The Australian *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*)[2] has also been a significant driver for bycatch mitigation. Species can be protected by listing under the *EPBC Act*, this includes listing as threatened species (i.e. critically endangered, endangered, vulnerable or conservation dependent), marine species and/or migratory species. Protected marine species currently includes all seabirds, marine turtles, marine mammals and some shark species. Under the *EPBC Act* it is an offence to undertake an activity that will have a significant adverse impact on a protected species. The fishing industry interacts with protected species and so Commonwealth fisheries and any fisheries with an export component must also undergo and be accredited through a strategic risk assessment

[2] http://www.deh.gov.au/epbc/about/index.html

process. The assessment process, requires fisheries managers to demonstrate management arrangements incorporate all reasonable steps to avoid interactions with, and mortality of, protected species. Fishers can not retain protected species and must report all interactions with protected species.

The EPBC Act also requires recovery plans to be developed for threatened species. Recovery Plans are currently in place for; grey nurse sharks great white sharks, marine turtles and some seabirds under the EPBC Act[3]. Recovery plans identify threats to the species and actions to reduce these threats, some of which have implications for fishing activities and may be incorporated into fisheries management.

Activities can also be listed as key threatening processes under the *EPBC Act*. Oceanic longline fishing operations have been listed as a key threatening process for seabirds. This listing required the Australian Government to develop a *Threat Abatement Plan for the Incidental Catch (or Bycatch) of Seabirds During Longline Fishing Operations* (TAP)[4]. The TAP is discussed in the section below titled 'seabird interactions'.

Australia is also a signatory to several key international agreements/obligations that are being implemented domestically and on the high seas with respect to bycatch. In response to the United Nation's Food and Agriculture Organisation (FAO) *International Plan of Action for the Conservation and Management of Sharks* (IPOA-Sharks) Australia has developed and implemented a *National Plan of Action for the Conservation and Management of Sharks* (NPOA-Sharks or Shark-plan)[5]. The Shark-plan identifies key actions that have been translated into sub-national plans and implementation is being overseen by an inter-governmental Shark-plan Implementation and Review Committee. In response to the FAO *International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries* Australia has implemented the TAP and developed a draft *National Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries* (NPOA-Seabirds or Seabird-plan). Australia's Seabird-plan has been delayed due to the development of a revised TAP (Appendix A), released in July 2006, and therefore should be finalised soon.

FISHERIES MONITORING

Logbooks

WTBF vessels are required to keep daily logbooks which are managed by the Australian Fisheries Management Authority (AFMA). All retained catch (whether targeted or not) must be recorded in logbooks. For commonly caught species (which are listed in the logbook), fishers are also required to report the number of fish that are discarded. Interactions with protected species must also be recorded in logbooks.

Observer Program

A pilot observer program began in the WTBF in April 2003 and has been continued despite a significant reduction in fishing over the past few years. AFMA Observers are professionally trained and briefed to collect and verify fishery data on both target and non-target species. The information collected by observers is extensive and includes details of daily fishing operations, the mitigation measures employed and any non-target interactions. In terms of non-target species, observers aim to record the number (and weight where appropriate) of each species caught, the life status and whether it was retained or discarded for each shot observed.

[3] www.deh.gov.au/biodiversity/threatened/recovery/list-common.html

[4] http://www.aad.gov.au/default.asp?casid=20587

[5] http://www.daff.gov.au/content/publications.cfm?ObjectID=4914EFAD-E68A-4614-A2A8096C1E824C7A

Port Monitoring
Fisheries Officers conduct random inspections of landings at key ports, as well as at-sea boarding and inspection of vessels. Compliance risk assessments for all fisheries are completed annually and a specific compliance operational plan is then developed and implemented annually for each fishery.

SEABIRD INTERACTIONS

Observed Interactions with Seabirds
The prevalence of seabirds on the west coast of Australia is considerably less than that of the east coast. In addition to the lower abundance of birds, the majority of the fleet in the WTBF targets broadbill swordfish and therefore operates at night. While observer data is only available for recent years (2003 onwards) during which time fishing activity has been very low, the data indicates that seabird interactions are well below the target rate of *less than* 0.05 birds/per 1000 hooks prescribed by the TAP. AFMA observer records indicate during the period 2003 to June 2005, 5 shearwaters (*Puffinus sp.*) were observed caught in the WTBF.

Mitigation Measures to Minimise Seabird Interactions
Under the *EPBC Act* the fishery must take all reasonable steps to minimize interactions with seabirds, as they are protected species, no seabirds can be retained[6] and all interactions must be reported.

As mentioned previously, oceanic longline fishing operations have been listed as a key threatening process for seabirds under the EPBC Act. In response to this the Australian Government developed the TAP. The original TAP came into effect in 1998 with a requirement to review it after five years. The TAP aims to significantly reduce the bycatch of seabirds during oceanic longline operations and set a performance indicator of a maximum bycatch rate of < 0.05 birds per 1000 hooks in any fishery.

The TAP review process has examined the success of the TAP against its objectives. The review determined the TAP has led to substantial progress towards reducing the threat longlining poses to seabirds. Regulations aimed at reducing seabird bycatch in Australia's longline fisheries were put in place in February 2001. The regulatory conditions are separated by the latitudinal line of 30° South in the WTBF and due to greater concerns on the East Coast of Australia, has recently moved to 25° South in the Eastern Tuna and Billfish Fishery (ETBF). This was based on scientific advice that suggested that areas south of 30° South were of greatest concern, and with the accumulation of observed data on seabird interactions in the ETBF it became clear that seabird bycatch in this fishery extended further north than originally anticipated.

As a result of the review, a revised TAP was brought into effect in July 2006; and maintains the overarching objective to significantly reduce the bycatch of seabirds during oceanic longline operations at current fishing levels. The TAP acknowledges that the ultimate aim is a zero bycatch of seabirds in all longline fisheries. However, it recognises that fisheries must move towards this incrementally. The performance measure set in the TAP for the WTBF is to achieve seabird bycatch of < 0.05 birds per 1000 hooks in all fishing areas and all seasons. The performance measure will be revised if fishing effort increases or decreases significantly (>20%). Consistent with the objectives and prescriptions of the TAP, AFMA has implemented fishing permit conditions aimed at reducing seabird mortality. If the fishery fails to meet the revised TAP target further measures will be introduced.

[6] In some cases dead seabirds are retained for identification, under specific permits.

Mandatory Measures
The mandatory measures are prescribed within the Australian *Fisheries Management Regulations 1992* or within Australian Fisheries Management Authority (AFMA) fishing permit conditions.

WTBF vessels operating south of latitude 30° South are required to:

- Deploy a tori pole apparatus prior to longlines entering the water.
- Construct and use the tori pole apparatus in accordance with, amongst other things, the following specifications:
  - Must have at least three streamer pairs attached
  - Be operable in all weather conditions
  - Have a bird line capable of being set to extend at least 150 metres from the stern of the boat;
  - Must have streamer pairs attached to it with a maximum interval between them of 7 metres with the first no more than 10 metres from stern;
  - Streamers will be maintained so as to ensure that their lengths are as close to the surface of the water as possible ;
- Set longlines only at night
- Ensure that all bait used is properly thawed;

Voluntary Measures
In addition to mandatory measures operators in the WTBF longline sector are encouraged to adopt voluntary measures to reduce seabird bycatch. These include:

- Carry a tori pole apparatus that complies with AFMA specifications for each point at which hooks enter the water if setting north of 30 degrees S;
- Prevent the discharge of any offal during line setting;
- Avoid the discharge of any offal during line hauling, or if this is not possible, offal may be discharged while the vessel is not underway or from the opposite side of the vessel to that where the line is being hauled;
- Puncturing of the swim bladders of thawed baits to assist in rapidly sinking the baits out of the diving reach of seabirds;
- The selection of gear which minimises the probability of seabird bycatch;
- Promoting safe handling and release of all seabirds caught alive on longlines;
- Promoting night-setting north of 30° South.

An *Industry Code of Practice for Responsible Fishing* was developed by the industry association in 2003 and sets out principles and standards of behaviour for responsible fishing practices. The *Industry Code of Practice* which includes a water proof deck-manual, provides a guide for operators, and includes information on voluntary mitigation measures for seabirds and handling and release guidelines to assist the live release of captured birds.

AFMA undertook an extensive education program in 2005 with interactive workshops at ETBF ports and WTBF ports. Participants were provided with information about the implementation of new fishing practices designed to eliminate seabird bycatch, including the importance of the prescribed line-weighting approach and how to correctly assemble and use the new tori poles. Further extension work will be instigated by AFMA dependent on the levels of activity in the fishery changing.

The observers provide some data on compliance with mitigation measures for a subset of the fleet. Robust measures of compliance with, and the effectiveness of, mitigation measures are required.

Measures under Development and Testing

During the past four years Australia has conducted a number of trials of seabird bycatch mitigation measures in the ETBF.(a similar but larger fishery on Australia's east coast Between 2001 and 2004 AFMA facilitated three industry-initiated and funded trials, involving the use of an underwater setting chute, tori poles and various line weighting regimes. The aim of the trials was to mitigate seabird bycatch to < 0.05 birds per 1000 hooks.

The trials were unable to achieve the target catch rate but provide useful information regarding the factors that had a significant effect on the capture of seabirds (Lawrence *et al.* 2006). The line weighting regimes trials were more effective than the underwater setting chute trial based on nominal catch rates. Environmental factors, season and seabird abundance, significantly affected the number of captures and seabird interactions with fishing gear (Table 2). This suggests that seasonal and spatial patterns in seabird abundance and bycatch need to be understood in order to design mitigation regimes. These factors could also be examined as triggers for mitigation measures (Table 2). In terms of fishing operations, night-setting and the use of tori poles significantly reduced the number of captures. The bait life status (live, dead or mixed) and the use of lightsticks also had a significant effect on the seabird bycatch rate in at least one of the models considered (Table 2). The analysis of the mitigation trial data highlighted issues regarding data collection during mitigation trials and the need for more data to enable more robust analyses of the factors influencing seabird capture.

Table 2. Summary of the influence of different factors on seabird bycatch and interactions, based on seabird bycatch mitigation trials in the ETBF, 2001-04. (Derived from Lawrence *et al.* 2006).

Factor	**Influence on seabird bycatch and interactions**
Season	Significantly higher catches and interactions in spring, lowest catches in winter
Seabird abundance	Daytime: positively related to interactions and captures
Night-setting	Catch rates 77 % lower during night-setting than day-setting
Percentage of hooks set during daylight	Positively related to seabird interactions and catches
Tori poles	Significantly reduced catch rates
Light sticks	Associated with significantly lower seabird catches for night sets
Bait life status	Daytime: higher catches with live bait than dead bait, Night-time: opposite

Results of other trials in the ETBF have also confirmed the value of tori poles and weighted lines in reducing seabird capture. This may be at least in part, due to the relative simplicity of these approaches. Given the low activity in the WTBF at present little data exist for interactions with seabirds. The ETBF experience will provide a guide if further work is required to understand interactions in the WTBF.

Scientific studies are on going to examine the most appropriate sink rate of live and dead baits, the impact of differences of bait types (live/dead), the utility of dyed bait and a variety of weighted branchline arrangements. Operators are also encouraged to develop and experiment with mitigation measures to suit their own situations and vessels. In this regard, the revised TAP includes provisions for individual accreditation for those fishers who do continue to trial innovative mitigation measures.

MARINE TURTLE INTERACTIONS

Observed Interactions with Marine Turtles

The WTBF has a very low incidence of marine reptile interaction compared with many other fisheries both within Australia and throughout the world. AFMA observer records indicate during the period 2003 to June 2005, 11 marine turtles were observed caught in the WTBF all of which were released alive: 4 Leatherback turtles (*Dermochelys coriacea*), 4 Loggerhead turtles (*Caretta caretta*), 2 Green turtles (*Chelonia mydas*), and 1 Pacific (Olive) Ridely turtle (*Lepidochelys olivacea*).

Mitigation Measures to Minimise Marine Turtle Interactions

Under the *EPBC Act* the fishery must take all reasonable steps to minimise interactions with marine turtles, turtles cannot be retained and all interactions must be reported. Aside from these general principles, there are currently no mandatory mitigation measures in place for turtle bycatch. Handling and release procedures, including the use of line-cutters and de-hookers, are currently being promoted to encourage safe release of turtles.

A DVD called *Crossing the Line* was produced and provided to the Australian longline fleet to help minimise their impact on marine turtle populations. The DVD shows how to:

- use de-hooking devices on turtles both on deck and still in the water;
- safely bring turtles onboard and handle them on deck;
- help comatose turtles recover and how to release them back into the water; and
- tag, measure and identify the different species of marine turtle.

The handling and release procedures are included in the *Industry Code of Practice* and, subject to the level of fishing effort in the WTBF, will be the focus of an extension and education program.

Measures under Development and Testing

A three-phase project has been established with the aim of quantifying the relative effects of circle and tuna hooks on catches of target and common non-target species in the ETBF. The aim of project is to determine whether large circle hooks and mackerel-type bait, that have been shown to be effective at reducing turtle bycatch in other pelagic longline fisheries, are economically viable and commercially practical in our pelagic longline fisheries. The project results will assist fishery managers in making management decisions regarding future bycatch mitigation strategies.

MARINE MAMMAL INTERACTIONS

The WTBF has a very low observed incidence of marine mammal interactions. Since its inception in 2003, the observer program has not recorded any marine mammal interactions.

Mitigation Measures to Minimise Marine Mammal Interactions

All marine mammals are protected under the EPBC Act and so the fishery must take all reasonable steps to minimize interactions, no marine mammals can be retained and all interactions must be reported. Safe release is promoted through handling and release procedures, including the use of wire cutters and de-hookers. These are included in the *Industry Code of Practice*.

SHARK INTERACTIONS

Observed Interactions with Sharks

The prevalence of shark captures in Australia's fisheries has received considerable attention over the past several years. Historically, longliners have often used wire trace to reduce damage to gear and gear loss caused by sharks. Sharks are unable to break free from wire leaders and are landed, usually dead, so the hook can be retrieved. To reduce the incidence of shark deaths, the use of wire trace has been banned in the WTBF.

In addition, to reduce the impact of indiscriminate shark finning and promote the full utilisation of sharks, longline operators are restricted to a 20 shark trip limit and must land trunks with fins attached. This limit however, does not apply to great white and grey nurse sharks, which are no-take species protected under Australian law. These regulations preclude the targeting of sharks by the longline sector.

The observed catch of sharks in the WTBF is summarised in Table 3. In recent years the highest proportion of the catch in the WTBF has been made up by blue sharks, most of which are landed alive and discarded (Table 3). As a consequence of the lack of scientific population studies on blue sharks in the WTBF and the wider Indian Ocean, the data does not yet exist to definitively indicate what the sustainable levels of catch may be. Crocodile sharks have also been caught in relatively high numbers in the fishery in the past, and these tend to be discarded (Table 3).

Under the EPBC Act the great white shark and the grey nurse shark are protected species. There have been no observed interactions with great white or grey nurse sharks observed in the WTBF.

Table 3. The observed catch and fate of shark and ray species in the WTBF 2003 – June 2005 from AFMA Observer records (203205 hooks observed over the period, involving 9 vessels).

Common name	Species	Number	Fate		Life Status	
			% Retained	% Discarded	% Alive	% Dead
Blue Shark	*Prionace glauca*	1448	10	90	91	9
Crocodile Shark	*Pseudocarcharias kamoharai*	657	0	100	85	15
Pelagic Stingray	*Dasyatis spp*	77	4	96	88	12
Shortfin Mako	*Isurus oxyrinchus*	56	20	80	71	29
Dusky Shark	*Carcharhinus obscurus*	37	0	100	97	3
Thresher Shark	*Alopias vulpinus*	21	0	100	57	43
Hammerhead Shark	*Sphyrna spp.*	13	8	92	31	69
Oceanic Whitetip Shark	*Carcharhinus longimanus*	9	33	67	89	11
Silky Shark	*Carcharhinus falciformis*	8	13	88	88	13
Sandbar Shark	*Carcharhinus plumbeus*	8	0	100	100	0
Manta Ray	*Manta birostris*	7	0	100	100	0
Whaler Shark	Carcharhinus "family"	5	0	100	80	20
Smooth Hammerhead	*Sphyrna zygaena*	5	20	80	0	100
Pelagic Thresher	*Alopias pelagicus*	5	0	100	20	80
Bigeye Thresher	*Alopias superciliosus*	4	0	100	75	25
Tiger Shark	*Galeocerdo cuvier*	2	0	100	100	0
Silvertip Shark	*Carcharhinus albimarginatus*	1	0	100	100	0
Cookie-cutter Shark	*Isistius brasiliensis*	1	0	100	100	0
Porbeagle	*Lamna nasus*	1	0	100	0	100
Total		2365	7	93	88	12

Mitigation Measures to Minimise Shark Bycatch

Mandatory Measures
As mentioned previously the great white shark and grey nurse shark are protected species and the fishery must take all reasonable steps to minimise interactions with these species. Protected species cannot be retained and all interactions with protected species must be reported.

Australia has developed the Shark-plan in line Australia's commitment to implementing the IPOA-Sharks. As part of the implementation of the Shark-plan actions regulations have been put in place in the longline sector to minimise shark bycatch, prevent indiscriminate finning and encourage full utilisation. The mandatory measures are incorporated in AFMA fishing permits.

Regulations currently mandatory in the ETBF:

- A ban on the use of wire traces.
- A limit of 20 sharks per trip, (excluding school shark, gummy shark, elephant fish of the Families Callorhinchidae, Chimaeridae and Rhinochimaeridae, and sawshark, which have a combined limit of five. This limit however, does not apply to great white and grey nurse sharks, which are no-take protected species.
- Fishing permit holders are prohibited from carrying, retaining, or landing all shark dorsal, pectoral, caudal, pelvic and anal fins that are not attached to their carcass.
- Fishing permit holders are prohibited from carrying, retaining and landing livers obtained from sharks unless the individual carcasses from which the livers were obtained are also landed.

Voluntary mitigation measures
Handling and release procedures, including the use of line-cutters and de-hookers, are promoted to encourage safe release of live sharks.

Measures under Development and Testing
Trials are currently underway to examine the impact of the ban on the use of wire trace in the ETBF. These trials seek to provide information to balance the benefits in terms of decreased shark mortality with potential costs including higher rates of gear loss and decreased catch of target species.

NON-TARGET FISH

Whilst the target species in Australia's longline fisheries are primarily tuna and billfish, there is a wide range of other fish species taken in these fisheries. For the observed catch composition in the WTBF, as mentioned previously blue shark represents the largest catch, closely followed by swordfish. crocodile shark, lancetfish, bigeye tuna, albacore tuna and yellowfin tuna, dolphin fish, and black oil fish make up the majority of the remaining catch composition for this fishery (Tables 3 and 4)

Summaries of the composition of observed fish catch (excluding shark and ray species), including non-target species, recorded in the WTBF are detailed in Table 4. This data represents the majority of observer records since the inception of the observer program. The information includes a record of life status and whether catch was retained or not for the WTBF longline fishery.

Mitigation Measures to Minimise Fish Bycatch

Mandatory Measures
Effective from 27 July 1998, the commercial take of blue and black marlin was banned under the *Australian Fisheries Management Act 1991*. Regulations specified that blue and black marlin caught in the WTBF must be returned to the water irrespective of life status.

Table 4. The observed catch and fate of fish species in the WTBF 2003 – June 2005 from AFMA Observer records (203205 hooks observed over the period, involving 9 vessels).

Common name	Species	Number	Fate		Life Status	
			% Retained	% Discarded	% Alive	% Dead
Broad Billed Swordfish	*Xiphias gladius*	1422	91	9	37	63
Longnose Lancetfish	*Alepisaurus ferox*	629	0	100	56	44
Bigeye Tuna	*Thunnus obesus*	335	71	29	75	25
Albacore Tuna	*Thunnus alalunga*	305	89	11	12	88
Yellowfin tuna	*Thunnus albacares*	229	83	17	51	49
Dolphinfish	*Coryphaena hippurus*	227	61	39	88	12
Black Oilfish	*Lepidocybium flavobrunneum*	203	76	24	76	24
Oilfish	*Ruvettus pretiosus*	103	35	65	80	20
Southern Bluefin Tuna	*Thunnus maccoyii*	56	4	96	50	50
Striped Marlin	*Tetrapturus audax*	50	24	76	68	32
Mixed fish	Mixed fish	49	4	96	63	37
Shortnose Lancetfish	*Alepisaurus brevirostris*	49	0	100	31	69
Skipjack Tuna	*Katsuwonus pelamis*	34	50	50	15	85
Sunfish	*Mola ramsayi*	31	0	100	97	3
Indo-Pacific Sailfish	*Istiophorus platypterus*	25	0	100	40	60
Pickhandle Barracuda	*Sphyraena jello*	21	0	100	52	48
Shortbilled Spearfish	*Tetrapturus angustirostris*	18	28	72	44	56
Black Marlin	*Makaira indica*	10	0	100	50	50
Rudderfish	*Centrolophus niger*	10	80	20	80	20
Wahoo	*Acanthocybium solandri*	6	100	0	33	67
Northern Bluefin Tuna	*Thunnus thynnus*	2	100	0	100	0
Ray's Bream	*Brama brama*	2	100	0	100	0
Small-scale Pomfret	*Xenobrama microlepis*	2	50	50	100	0
Snake Mackerel	*Gemphylus serpens*	2	0	100	50	50
Southern Ray's bream	*Brama australis*	2	100	0	50	50
Squids	*Teuthoidea*	2	50	50	50	50
Striped Sea Pike	*Sphyraena spp*	2	0	100	100	0
White-Spotted Dogfish	*Squalus acanthias*	2	0	100	100	0
Banded/Spotted Croaker	*Protonibea diacanthus*	1	0	100	100	0
Big-scale Pomfret	*Taractichthys longipinnis*	1	0	100	0	100
Butterfly Mackerel	*Gasterochisma melampus*	1	100	0	100	0
Coley	*Pollachius virens*	1	0	100	100	0
Frostfishes	*Benthodesmus spp.*	1	0	100	0	100
Malabar Grouper	*Epinephelus malabaricus*	1	0	100	100	0
Pomfret	*Brama spp.*	1	100	0	100	0
Total		3835	62	38	50	50

Acknowledgements

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REFERENCES

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Appendix A

THREAT ABATEMENT PLAN 2006
for the incidental catch (or bycatch) of seabirds during oceanic longline fishing operations

Background

Oceanic longline fishing is a technique used to target pelagic and demersal finfish and shark species. Longline fishing commenced in the southern oceans and operates in almost all Australian waters today. The impact of longline fishing activities on seabirds was not fully realised until the 1980's when seabird bycatch was first reported and then documented.

The incidental catch (or bycatch) of seabirds during oceanic longline fishing operations was listed as a key threatening process on 24 July 1995. As required under Commonwealth legislation (now the Environment Protection and Biodiversity Conservation Act 1999 — EPBC Act), a *Threat Abatement Plan for the Incidental Catch (or By-catch) of Seabirds During Oceanic Longline Fishing Operations* was prepared and approved by the Minister for the Environment on 2 August 1998. The Threat Abatement Plan (TAP) expired in August 2003, necessitating a review under subsection 279(2) of the EPBC Act. The provisions of the current TAP continue to apply to all fisheries managed by the Australian Government until such time as the new TAP is in place.

This threat abatement plan (2006) is a result of that review. It was prepared to meet the requirements of the EPBC Act and to coordinate national action to alleviate the impact of longline fishing activities on seabirds in Australian waters. It applies to all fisheries under Commonwealth jurisdiction.

Over the life of the first plan, substantial progress toward reducing the key threatening process has been achieved. A number of fisheries recorded incidental catch rates well below 0.05 birds per 1000 hooks, the maximum permissible level set by the plan as a performance indicator. The draft prescriptions in this Plan recognise this success and seek to further reduce the incidental capture of seabirds.

Despite considerable effort involving trials of various weighting regimes and other mitigation measures in the Eastern Tuna and Billfish Fishery (ETBF), areas of this fishery recorded seabird bycatch levels that exceeded 0.05 birds per 1000 hooks. This occurred until 2004/2005, when it fell below 0.05 birds per 1000 hooks. However, bycatch in this fishery appears variable across years, and the 2004/2005 levels may not be indicative. The original prescription of allowing night setting throughout the year in isolation of other mitigation measures was not sufficiently effective for flesh-footed shearwaters in particular, although it dramatically reduced the capture of albatrosses.

To date industry has largely funded the costs of the trials, with the major cost being the provision of observer coverage. There has been minimal research and development funded by non-industry sources, despite the public interest in this issue and the need to develop a technological solution to the seabird bycatch problem.

Despite the substantial progress made in the first plan, further work is required to solve the problem of seabird bycatch in fisheries. Whereas albatross species were once the principal species caught in the Australian Fishing Zone (AFZ), changes in the distribution of fishing effort in eastern Australian waters have since led to significant problems with bycatch of flesh-footed shearwaters in pelagic fisheries operating in these waters, and a similar situation is likely to exist in western Australian waters.

Although there are a number of longline fisheries operating in the Australian Fishing Zone, only five have been identified as having significant or potential seabird bycatch problems. These are the Eastern Tuna and Billfish Fishery, the Western Tuna and Billfish Fishery, the Antarctic Longline Fishery, the Coral Sea Fishery and the Southern and Eastern Scalefish and Shark Fishery (Scalefish Hook Sector).

Information on the level and nature of interactions between seabirds and fishing gear is still incomplete in all domestic pelagic tuna fisheries, the Coral Sea Fishery and the Southern and Eastern Scalefish and Shark Fishery (Scalefish Hook Sector). There are also longline fisheries for Patagonian toothfish in subantarctic waters with potential for seabird bycatch. Information on the level and nature of interactions between seabirds and fishing gear in these fisheries is extensive and well-documented.

Detailed background information on the key threatening process, the Australian longline fisheries that impact upon seabirds, and the species of seabirds impacted by longline fishing can be found at:

http://www.aad.gov.au/default.asp?casid=20587

This Plan is closely linked to recovery plans for threatened seabirds which are caught on longlines and Australia's NPOA-Seabirds prepared to meet Australia's commitment to the *FAO International Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries*. The Threat Abatement Plan relies on these recovery plans to collect specific data on population trends in the breeding populations of those threatened species found breeding in Australia. Of particular relevance is the *Recovery plan for Albatrosses and Giant-Petrels* which can be found at:

http://www.deh.gov.au/biodiversity/threatened/publications/recovery/albatross/index.html

This Plan represents Australia's domestic contribution to the global conservation of seabirds by managing the threat from longline fishing by-catch. However, conservation of migratory seabird species relies on more than Australian action. Mitigation strategies such as those outlined in the plan should be pursued in international waters and the Exclusive Economic Zones of other Southern Hemisphere nations. The Australian Government is actively pursuing such action through the *Agreement on the Conservation of Albatrosses and Petrels*, an international Agreement that aims to achieve and maintain a favourable conservation status for albatrosses and petrels. ACAP has been developed under the auspices of another international Agreement, the *Convention on the Conservation of Migratory Species of Wild Animals* (CMS).

The following sets out the Threat Abatement Plan for this key threatening process.

Objective: (EPBC Act 271(2)(a)

The ultimate aim of the threat abatement process is to achieve a zero bycatch of seabirds, especially threatened albatross and petrel species, in all longline fisheries. However, using currently available mitigation methods, this goal is not realistic in the short term.

Therefore the objective of this Plan is to significantly reduce the bycatch of seabirds during oceanic longline operations in the Australian Fishing Zone at current fishing levels.

As many seabird species have large distributional ranges actions by the Australian fishing industry alone may not be sufficient to prevent any decline in some populations. Hence Australian government agencies will pursue the global adoption of by-catch mitigation strategies through international conservation and fisheries management fora.

The TAP objectives are to be achieved through five key areas:

1. Mitigation — Effective measures will be put in place, both through legislative frameworks and fishing practices, to ensure the rate of seabird bycatch is continually reduced.
2. Education — Results from data analysis will be communicated throughout the community, stakeholder groups and international forums, and programs will be established that provide information and education to longline operators.
3. International initiatives— global adoption of seabird by-catch mitigation targets and methods will be pursued through international conservation and fisheries management fora.
4. Research and Development — Research into new mitigation measures and their development, trialling and assessment will be supported through the granting of individual permits and the potential certification of new measures to apply throughout a fishery.
5. Innovation — Potential individual accreditation of longline operators who are able to demonstrate 'bird friendly' fishing practices will be supported.

Data collection and analysis is another key action of this plan. Data will be collected and analysed to assess the performance of mitigation measures and to improve knowledge of seabird–longline interactions.

Actions to Achieve the Objectives (EPBC Act 271(2)(c)

This Threat Abatement Plan requires that the government agencies identified below implement the following actions:

Mitigation

1. AFMA will require all pelagic longline tuna fishers operating within the Eastern Tuna and Billfish Fishery south of latitude 25^0 South to adopt one of two options:
    - a line-weighting strategy that enables the bait to be rapidly taken below the reach of most seabirds; or
    - set all hooks during the night.

    In both options vessels shall also employ at least one bird-scaring line constructed to a specified standard, not use bait that is still frozen and retain all offal during line setting.
2. AFMA will require all pelagic longline tuna fishers operating within the Western Tuna and Billfish Fishery south of latitude 30^0 South to set all hooks during the night. In addition vessels shall also employ at least one bird-scaring line constructed to a specified standard, not use bait that is still frozen and retain all offal during line setting.

3. AFMA will continue to require domestic and foreign longline vessels in all demersal fisheries operating within Australian jurisdiction to adopt proven mitigation measures that ensure the performance criteria for each fishery are achieved in all areas and seasons.
4. AFMA will implement an appropriate management response (described below) if data analysis indicates that the Criteria, defined elsewhere in this plan, have not been met in any area, season and fishery, or that observer coverage has dropped below acceptable levels.

Problem	**Management Response within 3 months**
Criterion for a longline fishery exceeded in an area during one season	AFMA will: 1. review mitigation currently deployed in area/season and the relevant circumstances — environmental conditions, fishing practices — within 1 month of the criteria being exceeded. 2. implement a revised mitigation regime to address bycatch problem within 3 months of the criteria being exceeded.
Criterion for a fishery exceeded in an area during one season within 12 months of introduction of new arrangements	3. AFMA will close the area/fishing season until the Minister for Environment and Heritage is satisfied that mitigation methods are available for implementation to enable the Criteria to be achieved. In areas where there are less than 3 operators, consideration will be given to limiting closure of an area/ fishing season to individual vessels.
Observer coverage of a fishery in an area and/or season does not meet coverage levels in Action 5 (below).	4. AFMA will increase observer levels to meet specified levels.

Education and Compliance

5. AFMA and DEH will report as appropriate to key stakeholders on the analysis of bycatch data and seabirds collected in relation to achieving the objectives of the Threat Abatement Plan.
6. AFMA will implement extension and training programs for longline fishers where appropriate.
7. AFMA will implement a risk based compliance strategy to ensure that requirements relevant to the mitigation of seabird bycatch are complied with.
8. DAFF and AFMA will communicate the results of implementing the Threat Abatement Plan and promote seabird bycatch mitigation to foreign fishers through international fisheries forums.
9. DEH will communicate the results of implementing the Threat Abatement Plan and will promote bycatch mitigation through relevant international conservation forums including ACAP and CMS.

Research and Development

10. AFMA, DAFF and DEH will promote and support research and development of new mitigation measures by facilitating access to and awareness of fisheries research funding programs.

Innovation

11. AFMA will support the trialling of new mitigation measures and devices under operational conditions by granting individual scientific permits to operators. AFMA will ensure the experimental design of trials will be robust and properly complied with. Measures will be tested across all seasons, on different boats and for a minimum number of hooks. Once a new measure or device has been demonstrated to consistently and effectively meet the TAP criteria, it may be included in the management arrangements for fisheries.
12. AFMA will support innovation and/or effective bycatch mitigation practices through individual accreditation of longline operators able to demonstrate mitigation measures that consistently and effectively achieve the TAP criteria on their vessels. This will be done through a formally agreed set of criteria under which approval to operate would be granted. The basis for the criteria would be to demonstrate an ability to meet bycatch standards on their vessel.

Other Actions

Data Collection and Analysis

13. AFMA will collect data on the bycatch of seabirds on longline vessels using observer programs. The level of observer effort shall be commensurate with the nature and level of bycatch in each area, season and fishery and shall be in accordance with the guidelines below:
    - ETBF and WTBF 5% of all hooks set and hauled in all areas;
    - SESSF 10% of all hooks set and hauled;
    - Coral Sea Fishery 10% of all hooks set and hauled;
    - Antarctic Fisheries 20% of all hooks set and 40% of all hooks hauled.

14. AFMA will continue to require that all seabirds killed on pelagic or demersal longlines in the AFZ are:
    - brought aboard the vessel;
    - reported to AFMA;
    - reported to the Australian Bird and Bat Banding Schemes if banded;
    - collected for scientific analysis and stored on board the vessel in manner which will limit decay of the specimen and meet AQIS requirements; and
    - transported to a storage and analysis facility nominated by DEH.

    DEH will provide seabird collection kits to facilitate appropriate handling of dead seabirds in preparation for analysis.

    DEH will analyse the collected seabirds to determine species, subspecies, provenance (where possible), age, sex and breeding status.
15. AFMA and DEH will analyse and review the seabird–fisheries interactions data to assess seabird bycatch levels by area, season, fishery and fishing method to monitor compliance with the Criteria. These analyses will be prepared annually and show, for each area and season, the bycatch rate with confidence intervals, together with the species composition of any bycatch.

16. AFMA will ensure that all longline fisheries' logbooks and VMS information collection procedures accurately record:
    - the number of seabirds caught;
    - the species of seabirds caught;
    - the life status of seabirds caught;
    - the type of bait used;
    - the fishing gear and mitigation measures used and stage of operation when the catch occurred;
    - the time of day/night of the line setting and haul;
    - the date and location of the catch; and
    - external factors (weather conditions, moon phase) that may influence bycatch.
17. AFMA will use longline observer programs to validate seabird bycatch data collected by the logbook system and identify deficiencies in existing programs.
18. DEH, AFMA, DAFF, relevant experts and representatives of key stakeholders will collaborate to assess the impact of TAP actions on other marine species.

Criteria to Measure Performance of the Plan (EPBC Act 271(2)(b)

Seabird bycatch in all fishing areas and seasons is less than the following bycatch rates:

- Eastern Tuna and Billfish Fishery 0.05 birds per 1000 hooks;
- Western Tuna and Billfish Fishery 0.05 birds per 1000 hooks;
- Southern and Eastern Scalefish and Shark Fishery (Scalefish Hook Sector) 0.01 birds per 1000 hooks;
- Antarctic Fishery 0.01 birds per 1000 hooks; and
- all other fisheries (including new and developing fisheries) 0.01 birds per 1000 hooks.

These criteria have been set on the basis of annual fishing levels at the time this Plan is approved. Trends in fishing effort will be reviewed annually and, if fishing levels increase or decrease significantly (>20%), DEH and AFMA will review the bycatch rates identified above, taking into account spatial and temporal trends, and the vulnerability of seabird species encountered.

Major Ecological Matters that will be affected by the Plan (EPBC Act 271(2)(f)

This threat abatement plan is unlikely to affect other ecological matters, but all actions undertaken will take into account any impacts on the conservation status of non-seabird species including fish, sharks, marine mammals and marine reptiles.

Duration and Cost of the Threat Abatement Plan (EPBC Act 271(2)(d)

This plan was approved by the Minister for the Environment and Heritage on 18 July 2006 and should be reviewed in five years time.

The cost of this plan should be covered under the core business expenditure of the affected organisations.

Organisations/Persons Involved in Evaluating the Performance of the Threat Abatement Plan (EPBC Act 271(2)(e)

The Department of the Environment and Heritage, in consultation with relevant seabird experts and key stakeholders, will evaluate the performance of this plan and report the results of their review to the Minister for the Environment and Heritage, through the Threatened Species Scientific Committee.

Definitions and Acronyms

ACAP - Agreement on the Conservation of Albatrosses and Petrels.

AFMA - Australian Fisheries Management Authority.

Antarctic fishery - fisheries defined by the *Heard Island and McDonald Islands Fishery Management Plan 2002*, the *Macquarie Island Management Plan 2005*, and new and exploratory fisheries operated under the framework of the *Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR)*.

Bycatch - the unintentional catch of a species of animal during fishing operations.

CMS - Convention for the Conservation of Migratory Species of Wild Animals, or Bonn Convention.

Coral Sea Fishery - a fishery defined under the *Fisheries Management Regulations 1992.*

DAFF - Dept of Agriculture, Fisheries and Forestry.

Dead seabird - a seabird caught by a longline shall be considered to be dead if:

1. it is obviously dead (i.e. shows no muscle movement or corneal reflex); or
2. is landed alive but displays any of the following pathologies that may lead to death on its release:
   - fracture of a wing bone, a leg bone or beak;
   - more than two primary feathers on either wing that have broken feather shafts;
   - substantial damage to the patagial tendon (indicated by a drooping wing or the inability to fly upon release);
   - an open wound (other than superficial injuries in which there is no subcutaneous muscle damage);
   - waterlogged or hydrocarbon-soiled plumage; or
   - any bird released with a hook in situ.

DEH - Department of the Environment and Heritage, Australian Antarctic Division.

ETBF - Eastern Tuna and Billfish Fishery, a fishery defined in the *Eastern Tuna and Billfish Fishery Management Plan 2005*.

Fishing areas - areas divided, for the purposes of the Criteria, into 5 degree latitudinal bands within the AFZ. This means that the bycatch rates will apply separately to each of these bands. For the ETBF the waters between 30 and 35 degrees latitude south will be further divided into two zones by the meridian of longitude 156 degrees east.

Fishing seasons - seasons defined, for the purposes of the Criteria, into two: Summer 1 September - 30 April; Winter 1 May - 31 August.

Interaction - an interaction with a seabird where a bird is observed caught under one of the following situations:

1. Dead not landed on board – birds observed to be killed by direct interaction with fishing gear but not landed on the fishing vessel.
2. Dead landed on board – birds landed on the vessel that are dead.
3. Alive landed on board following direct interaction with fishing gear
    a. injured, or
    b. released uninjured.

Longline fishing - the setting one or more single lines (mainline) containing many individual hooks on branch lines or snoods. The mainline can either be anchored or drifting. It can be oriented vertically or horizontally and vary considerably in length and number of hooks.

Night - the time between nautical dusk and nautical dawn.

Night setting - the setting of all hooks deployed by a vessel during the night.

Observer programs, observer coverage and observer levels — includes the use of appropriate video technology capable of independently monitoring fishing activities.

Operator - a person who holds a fishing concession as defined under the *Fisheries Management Act 1991.*

Seabird - means, for the purposes of the Criteria, all species in the Class Aves that are caught by any part of the fishing gear and observed to be either dead or alive.

SESSF - Southern and Eastern Scalefish and Shark Fishery (Scalefish Hook Sector), a fishery defined in the *Southern and Eastern Scalefish and Shark Fishery Management Plan 2003*.

WTBF - Western Tuna and Billfish Fishery, a fishery defined in the *Western Tuna and Billfish Fishery Management Plan 2005*.

This threat abatement plan can be obtained from:

http://www.aad.gov.au/default.asp?casid=20587

Australian Antarctic Division,
Department of the Environment and Heritage
Channel Highway, Kingston, Tasmania 7050

Annex 1: Summary of the albatross species affected by pelagic longline fishing bycatch in the AFZ.

Species name	**International conservation status (BirdLife International 2004)**	***EPBC Act* listing**	**Likely incidence in longline bycatch**	**Jurisdiction and location of breeding areas**
Wandering albatross *Diomedea exulans*	Vulnerable	Vulnerable	Moderate	Australia: Macquarie Island France: Kerguelen Island, Crozet Islands South Africa: Marion Island, Prince Edward Island U.K.: South Georgia
Antipodean albatross *Diomedea antipodensis*	Vulnerable (Croxall & Gales 1998)	Vulnerable	Low	New Zealand: Antipodes Island, Campbell Island
Gibson's albatross *Diomedea gibsoni*	Vulnerable (Croxall & Gales 1998)	Vulnerable	Moderate	New Zealand: Auckland Islands (Adams Island, Disappointment Island, Auckland Island)
Tristan albatross *Diomedea dabbenena*	Endangered	Endangered	Low	U.K.: Gough Island, Tristan da Cunha
Amsterdam albatross *Diomedea amsterdamensis*	Critically Endangered	Endangered	Low	France: Amsterdam Island
Southern royal albatross *Diomedea epomophora*	Vulnerable	Vulnerable	Low	New Zealand: Campell Island, Enderby Island, Auckland Islands (Adams Island, Auckland Island)
Northern royal albatross *Diomedea sanfordi*	Endangered	Endangered	Low	New Zealand: South Island (Taiaroa Head) Chatham Islands (Big Sister Island, Little Sister Island, Forty-fours Island)
Black-browed albatross *Thalassarche melanophrys*	Endangered	Vulnerable	High	Australia: Heard Island, McDonald Islands, Macquarie Island (incl. Bishop and Clerk Islets) Chile: Diego Ramirez Island, Ildefonso Island, Diego de Almagra Island France: Crozet Islands, Kerguelen Island New Zealand: Bollons Island, Campbell Island, Snares Island U.K.: South Georgia, Falkland Islands
Campbell albatross *Thalassarche impavida*	Vulnerable	Vulnerable	High	New Zealand: Campbell Island
Buller's albatross *Thallassarche bulleri*	Vulnerable	Vulnerable	Low	New Zealand: Snares Island, Solander Island, Little Solander Island
Pacific albatross *Thalassarche* nov. sp.	Vulnerable (Croxall & Gales 1998)	Vulnerable	Low	New Zealand: Three Kings Island, Chatham islands (Big Sister Island, Little Sister Island, Forty-fours Island)
Shy albatross *Thalassarche cauta*	Vulnerable (Croxall & Gales 1998)	Vulnerable	Moderate	Australia: Tasmania (Albatross Island, Mewstone, Pedra Branca)

Annex 1 continued.

Species name	**International conservation status (BirdLife International 2004)**	***EPBC Act* listing**	**Likely incidence in longline bycatch**	**Jurisdiction and location of breeding areas**
White-capped albatross *Thalassarche steadi*	Vulnerable (Croxall & Gales 1998)	Vulnerable	Moderate	New Zealand: Auckland Islands (Adams Island, Auckland Island, Disappointment Island) Bollons Island
Salvin's albatross *Thalassarche salvini*	Vulnerable	Vulnerable	Low	France: Crozet Islands (Ile des Pingouins) New Zealand: Bounty Island, Snares Island
Chatham albatross *Thalassarche eremita*	Critically Endangered	Endangered	Low	New Zealand: Chatham Island
Atlantic yellow-nosed albatross *Thalassarche chlororhynchos*	Endangered	Not listed	Low	U.K.: Gough Island, Tristan da Cunha (Tristan da Cunha Island, Nightingale Island, Inaccessible Island, Middle Island, Stoltenhoff Island)
Indian yellow-nosed albatross *Thalassarche carteri*	Endangered	Vulnerable	Moderate	France: Amsterdam Island, St Paul Island, Kerguelen Islands, Crozet Islands South Africa: Prince Edward Island
Grey-headed albatross *Thalassarche chrysostoma*	Vulnerable	Vulnerable	Moderate	Australia: Macquarie Island Chile: Diego Ramirez Island, Isla Iledefonso France: Kerguelen Islands, Crozet Islands South Africa: Marion Is, Prince Edward Is. New Zealand: Campbell Island U.K.: South Georgia
Laysan albatross *Phoebastria immutabilis*	Vulnerable	Not listed	Low	USA**:** Hawaiian Leeward Islands Japan**:** Bonin Islands (Mukojima) Mexico**:** Isla Guadalupe, Isla Benedicto, Isla Clarion
Sooty albatross *Phoebetria fusca*	Endangered		Low	France**:** Amsterdam Island, St Paul Island, Kerguelen Islands, Crozet Islands South Africa**:** Prince Edward Island, Marion Island U.K.: Gough Island, Tristan da Cunha
Light-mantled albatross *Phoebetria palpebrata*	Near Threatened	Not listed	Low	Australia: Heard Island, McDonald Islands, Macquarie Island France**:** Kerguelen Islands, Crozet Islands New Zealand**:** Auckland Island Campbell Island Antipodes Island South Africa**:** Prince Edward Island Marion Island U.K.: South Georgia

Annex 2: Summary of other species affected by pelagic longline fishing bycatch in the AFZ.

Species name	**International conservation status (BirdLife International 2004)**	***EPBC Act* listing**	**Likely incidence in longline bycatch**	**Jurisdiction and location of breeding areas**
Southern Giant Petrel *Macronectes giganteus*	Vulnerable	Not listed	Low	**Australia:** Heard Island, McDonald Islands, Macquarie Island, Australian Antarctic Territory **France**: Crozet Islands, Kerguelen Islands **Norway:** South Sandwich, South Orkney, Bouvet Island **South Africa:** Prince Edward Island, Marion Island **U.K.:** South Georgia
Northern Giant Petrel *Macronectes halli*	Lower Risk - Near Threatened	Not listed	Low	**Australia:** Macquarie Island **France:** Crozet Islands, Kerguelen Islands **New Zealand:** Antipodes Islands, Auckland Island, Campbell Islands, Chatham Island, Stewart Island **South Africa:** Prince Edward Island, ,Marion Islands
Great-winged Petrel *Pterodroma macroptera*	Not listed	Not listed	Moderate	**Australia:** Western Australia (Recherche Arch., Bald Island, Coffin Island, Gull Island, Rabbit Island, Remark Island, Breaksea Island, Eclipse Island, Mistaken Island) **France:** Kerguelen Islands, Crozet Islands **New Zealand:** North Island (north-east coast) **South Africa:** Prince Edward Island, Marion Islands **U.K.:** Gough Island, Tristan da Cunha Islands
White-chinned Petrel *Procellaria aequinoctialis*	Vulnerable	Not listed	Moderate	**France**: Kerguelen Island, Crozet Islands **New Zealand**: Antipodes Island, Campbell Islands, Auckland Islands **South Africa**: Prince Edward Island, Marion Islands **U.K.:** South Georgia
Westland Black Petrel *Procellaria westlandica*	Vulnerable	Not listed	Low	**New Zealand:** South Island (Punakaiki River)

Annex 2 continued

Species name	**International conservation status (BirdLife International 2004)**	***EPBC Act* listing**	**Likely incidence in longline bycatch**	**Jurisdiction and location of breeding areas**
Black Petrel *Procellaria parkinsonia*	Vulnerable	Not listed	Low	**New Zealand:** Great Barrier Island, Little Barrier Island
Grey Petrel *Procellaria cinerea*	Near Threatened	Not listed	Moderate	**Australia**: Macquariesland **France**: Crozet Islands, Kerguelen Islands, Amsterdam Island **New Zealand:** Campbell Island, Antipodes Islands **South Africa**: Prince Edward Island **U.K.:** Tristan da Cunha Islands
Wedge-tailed shearwater *Puffinus pacificus*	Not listed	Not listed	Moderate	**Australia**: Numerous islands off NSW, QLD and Western Australia, Lord Howe Island, Norfolk Island, North Keeling Island **Other:** extensive distribution throughout the tropical and sub-tropical Pacific and Indian Oceans.
Flesh-footed shearwater *Puffinus carneipes*	Not listed	Not listed	High	**Australia**: Lord Howe Island, South Australia (Smith Island), Western Australia (numerous islands) **France:** St Paul Island **New Zealand:** North Island (north-east and west coasts), Cook Strait
Sooty shearwater *Puffinus griseus*	Near Threatened	Not listed	Low	**Australia** Numerous islands off NSW and Tasmania; Macquarie Island **Chile:** Cape Horn **New Zealand:** Numerous islands off North and South Islands; Solander Island, Snares Island, Antipodes Island, Auckland Island, Campbell Island, Chatham Island **U.K.:** Falkland Islands
Short-tailed shearwater *Puffinus tenuirostris*	Not listed	Not listed	Low	**Australia:** Numerous islands off Victoria, Tasmania, South Australia and Western Australia
Southern Skua *Catharacta antarctica*	Not listed	Not listed	Low	**Australia:** Macquarie Island, Heard Island **Other**: extensive distribution throughout the sub-Antarctic