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BYCATCH MITIGATION APPROACHES IN AUSTRALIA'S EASTERN TUNA AND BILLFISH FISHERY: SEABIRDS, TURTLES, MARINE MAMMALS, SHARKS AND NON-TARGET FISH.

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Summary

Australia's Eastern Tuna and Billfish Fishery (ETBF) is predominantly a pelagic, longline fishery targeting tuna and billfish species. Aside from the target species the fishery catches a range of 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 towards ensuring ecologically sustainable development the ETBF has put in place a range of bycatch mitigation measures. 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]. Fisheries are also required to demonstrate they are taking all reasonable steps to avoid 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 the ecosystem are sustainable. The ETBF industry has also developed an *Industry Code of Practice for Responsible Fishing* which 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.

Analyses of AFMA observer data collected during seabird bycatch mitigation trials conducted in the ETBF in 2001-2004 indicate that seasonal and spatial patterns in seabird abundance and bycatch need to be better understood in order to design effective mitigation regimes. Season and seabird abundance could also be examined as triggers for mitigation measures. Mitigation measures such as night-setting and the use of tori poles were shown to significantly reduce the number of seabird captures. The bait life status (live, dead or mixed), and lightstick use also influenced the seabird bycatch rates.

[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.

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

[3] The grey nurse shark is listed as two separate populations under the EPBC Act. The east coast population is listed as critcally endangered and the west coast population is listed as vulnerable.

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

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

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

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

[8]. Landed refers to when the catch is brought on board the vessel

Table 1. Current bycatch mitigation measures in Australia's Eastern 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	*Mandatory* Seabird bycatch must be < 0.05 birds/1000 hooks, in all fishing areas and seasons. South of latitude 25° 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 25° 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* • Puncture bait swim bladders to ensure rapid sinking of bait, • Bait casting machines, • Promoting night-setting north of 25° 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 Eastern Tuna and Billfish Fishery (ETBF) 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 the northern tip of Australia, down the east coast to the southern part of Tasmania 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 ETBF 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 ETBF. The paper includes:

- an overview of the relevant legislation and policy;
- the current fishery monitoring methods;
- summaries of current catch rates and mitigation measures for seabirds, marine turtles, marine mammals, sharks and other non-target

fish species.

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 the *Commonwealth Bycatch Policy 2000*. The aim of the *Commonwealth Bycatch Policy 2000* is to ensure bycatch species are maintained, 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 the ecosystem are sustainable. AFMA has also invested in an Ecological Risk Assessment of the ETBF, 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 (for details see EBWG-WP16).

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 threatened species (i.e. critically endangered, endangered, vulnerable or conservation dependent), marine species and migratory species. Protected marine species currently include 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 impact on a protected species. The fishing industry interacts with protected species and so Commonwealth fisheries and any fisheries with an export component must be accredited through a strategic assessment process. The strategic assessment process, requires fisheries managers to demonstrate management arrangements iclude all resonablee steps to avoid interactions with and mortality of protected species. In general, 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 sharks3, great white sharks, marine turtles and some seabirds under the *EPBC Act*4. The plans identify threats to the species and actions to reduce these threats, some of which have implications for fishing activities and which 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)5. The TAP is discussed in a section below titled 'seabird interactions'.

Australia is also a signatory to numerous 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)6. The Shark-plan identifies key actions that have been translated into sub-national plans and the 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 has implemented the seabird TAP and developed a draft *National Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries* (NPOA-Seabirds). The NPOA-Seabirds has been delayed due to the development of a revised TAP but should be finalised soon.

FISHERIES MONITORING

Logbooks

The ETBF 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 the 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

The AFMA run observer program for the ETBF began in September 2001 with a target of covering 6 % of the effort in the fishery (determined according to the number of hooks set). 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 recored the number (and weight where appropriate) of each species caught, the life status and whether it was retained or discarded for each shot observed.

Port Monitoring

AFMA Fisheries Officers conduct random inspections of landings at key ports, as well as at-sea boardings 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

At least 15 species of seabird have been observed as bycatch in the ETBF (Table 2). In 2001-02 bycatch of flesh-footed shearwaters was observed in high numbers but the observed bycatch of this species has since decreased. Recent observer data suggest incidental catch of albatross has been higher in 2005-06. There is substantial interannual variation in the number and species of seabirds observed as bycatch in the ETBF. This could be due to differences in environmental factors, fishing patterns, observer coverage or mitigation measures. At present there is insufficient data to assess the causes of the interannual variation but it is the focus of ongoing monitoring.

Table 2. Number of seabirds recorded by AFMA observers as incidentally caught in the ETBF for July-June annual time periods (Dambacher 2005). Their listing under the Australia *EPBC Act* is also shown, V = vulnerable, P = protected.

Common Name	Species	Listing	2001-02	2002-03	2003-04	2004-05
Flesh-footed shearwater	*Puffinus carneipes*	P	222	36	17	2
Black-browed albatross	*Thalassarche melanophrys*	V	2	5	5	1
Great-winged petrel	*Pterodroma macroptera*	P	5	5	1	
Wandering albatross	*Diomedea exulans*	V		2	1	7
Short-tailed shearwater	*Puffinus tenuirostris*	P	2	2	5	
Wedge-tailed shearwater	*Puffinus pacificus*	P	2		6	
Westland petrel	*Procellaria westlandica*	P		1	4	
Cape petrel	*Daption capense*	P				4
Shy albatross	*Thalassarche cauta*	V	1		2	1
Petrels, prions and shearwaters	Family Procellariidae		1		1	
Sooty shearwater	*Puffinus tenuirostris*	P	1		1	
Great skua	*Catharacta*	P	1			

	skua					
Buller's albatross	*Thalassarche bulleri*	V			1	
Grey-headed albatross	*Thalassarche chrysostoma*	V		1		
Southern royal albatross	*Diomedea epomophora*	V			1	
Yellow-nosed albatross	*Thalassarche chlororhynchos*	P			1	
Albatrosses (other)	Family Diomedeidae			1		
Total			237	53	46	15

The observed catch has been used to estimate catch for the fishery as a whole (Table 3), however this excludes fishing areas where < 10 sets were observed. Some information on the life status of captured birds has been recorded but the observations are limited (Table 4).

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[7] 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 original TAP aimed 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.

Table 3. The estimated catch (numbers) of non-target seabird, marine turtle, and shark and ray species based on AFMA observer data for July 2004 – June 2005. The observer data were stratified by season and fishing area before estimating the catch. The estimated catch was only generated for areas of the fishery where there were > 10 sets observed (derived from Dambacher 2005).

Common	**Species**	**Estimated catch**	**95% CI**	
			Min	**Max**
Seabirds				
Cape petrel	*Daption capense*	92	4	189
Wandering oss	*Diomedea exulans*	85	7	190
Flesh-footed water	*Puffinus carneipes*	31	2	69
Black-browed oss	*Thalassarche ophrys*	29	1	86
Shy albatross	*Thalassarche*	13	1	35
Turtles				
Leatherback	*Dermochelys cea*	156	48	264
Green turtle	*Chelonia mydas*	50	3	106
Olive Ridley	*Lepidochelys ea*	16	1	46
Sharks &				
Blue shark	*Prionace glauca*	3,923	3,138	4,708
Mako shark	*Isurus oxyrinchus*	2,669	2,295	3,043

Pelagic ray	*Dasyatis violacea*	1,268	964	1,572
Hammerhead	F. Sphyrnidae	839	277	1,401
Tiger shark	*Galeocerdo cuvier*	462	213	711
Bronze whaler	*Carcharhinus yurus*	415	228	602
Oceanic tipped shark	*Carcharhinus nanus*	404	190	618
Dusky shark	*Carcharhinus rus*	321	122	520
Pelagic her shark	*Alopias pelagicus*	292	70	514
Manta ray	*Manta birostris*	287	144	431
Thintail her shark	*Alopias vulpinus*	209	100	318
Silky shark	*Carcharhinus rmis*	146	10	293
Bigeye her shark	*Alopias ciliosus*	127	33	221
Porbeagle	*Lamna nasus*	54	5	168
Cookiecutter	*Isistius brasiliensis*	48	3	93
Australian ip shark	*Carcharhinus i*	43	4	134
Crocodile	*Pseudocarcharias harai*	37	1	111
Scalloped herhead	*Sphyrna lewini*	20	1	62
Basking shark	*Cetorhinus nua*	15	1	47
Long finned	*Isurus paucus*	11	1	30
Whaler sharks	F. Carcharhinidae	11	1	34

Table 4. The life status of seabirds and turtles caught in the ETBF, recorded by AFMA observers, July 2004–June 2005 (Dambacher 2005).

Group	Common name	Number observed	Dead	Just-alive	Sluggish-alive	Vigorous-alive
Seabirds	Wandering albatross	7	57%	0%	43%	0%
	Cape petrel	4	0%	0%	0%	100%
	Flesh-footed shearwater	2	50%	0%	0%	50%
	Black-browed albatross	1	100%	0%	0%	0%
	Shy albatross	1	0%	0%	0%	100%
Turtles	Leatherback turtle	10	0%	0%	30%	70%
	Green turtle	3	0%	0%	33%	67%
	Olive Ridley turtle	1	0%	0%	0%	100%

The TAP review process examined the success of the TAP against its objectives. The review determined that as a result of voluntray and mandatory measures adopted under the original TAP substantial progress has been achieved towards reducing the threat longlinefishing possess to seabirds. With the implementation of the original TAP, some of the ETBF fleet began to set their lines during the night to avoid interactions with albatross species. Regulations designed to reduce seabird bycatch in Australia's longline fisheries were put in place in February 2001. At the time,regulatory conditions were separated by the latitudinal line of 30° South. This was based on scientific advice suggesting areas south of 30° South were of greatest concern. In 2004, with the accumulation of observed data on seabird interactions, it has become clear that in the ETBF, seabird bycatch extended further north than originally anticipated. The observer data showed that interactions with shearwaters were an issue in the ETBF, particularly the flesh-footed shearwater. This species breeds at Lord Howe Island, located at 31° 30' South and so mitigation measures are now required from 25° South.

As a result of the review a revised TAP was brought into effect in July 2006 (Appendix A); 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 recognizes that fisheries must move towards this incrementally. The performance measure set in the TAP for the ETBF 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.

Mandatory Measures

The mandatory measures are prescribed within the Australian *Fisheries Management Regulations 1992* or within AFMA fishing permits.

ETBF vessels operating south of latitude 25° 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 the following specifications:
  - Must be a minimum of 100 metres in length;
  - Must be deployed from a position on board the boat so that it remains above the water for a minimum of 90 metres from the stern of the boat;
  - Must have streamers attached to it with a maximum interval between the streamers of 3.5 metres;
  - Streamers will be maintained so as to ensure that their lengths are as close to the surface of the water as possible ;
  - A drogue at the end of the tori-line should provide sufficient drag for the tori line to meet the above 90 metre aerial coverage criteria.
- Use weighted branchlines in order to operate during daylight hours, with either a minimum of:
  - 60 gm swivels at a distance of no more than 2 metres from the hook; or
  - 98 gm swivels at a distance of no more than 3.5 metres from the hook;
- Operate only at night if suitably weighted lines are not in use;
- Ensure that all bait used is properly thawed;
- Prevent the discharge of any offal during line setting; and

• Avoid the discharge of any offal during line hauling. If this is not possible, offal may only be discharged while the vessel is not underway or from the opposite side of the vessel to that where the line is being hauled.

AFMA recently introduced a four week closure (13 July 2006 to 9 August 2006) to daylight fishing in the southern area of the fishery in response to a significant increase in observed albatross capture.

ETBF vessels operating north of latitude 25° South are required to:

• Carry a tori pole apparatus that complies with AFMA specifications for each point at which hooks enter the water;
• Prevent the discharge of any offal during line setting; and
• Avoid the discharge of any offal during line hauling. However if this is not possible, offal may only be discharged while the vessel is not underway or from the opposite side of the vessel to that where the line is being hauled.

Voluntary Measures

In addition to mandatory measures some operators in the ETBF longline sector are adopting voluntary measures to reduce seabird bycatch. These include:

• Puncturing of the swim bladders of thawed baits to assist in rapdily sinking the baits out of the diving reach of seabirds;
• The use of bait casting machines on suitable vessels;
• 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 25° South.

An Industry Code of Practice for Responsible Fishing has also been developed by the relevant industry organisations and sets out principles and standards of behaviour for responsible fishing practices. The Industry Code of Practice provides a guide for operators and includes information on voluntary mitigation measures for seabirds and handling and release guidelines to promote live release of captured birds.

AFMA undertook an extensive education program in 2005 with interactive workshops at ETBF 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 (Appendix B). AFMA has identified funding from the industry levy base for a further on board extension program to assist the uptake of fully effective tori poles.

The observers provide some data on compliance with mitigation measures for a subset of the fleet. Robust measures of compliance with and effectiveness of the 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. 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 5). 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 5). 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 5). 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 5. 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.

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

Five species of marine turtle have been observed as bycatch in the ETBF (Table 6). The observer data has been used to estimate the number caught in the fishery in 2004-05 (Table 3). The data suggest that most interactions occur with leatherbacks

and green turtles. The observed life status of turtles suggests most are alive when the line is hauled (Table 4), however data is limited.

Mitigation Measures to Minimise Marine Turtle Interactions

Under the *EPBC Act* the fishery must take all reasonable steps to minimize interactions with marine turtles, no turtles can 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.

Table 6. The number of marine turtles reported by AFMA observers caught in the ETBF for July-June annual time periods (Dambacher 2005). Their listing under the Australian EPBC Act is also shown, E = endangered, V = vulnerable, P = protected.

Common Name	Species	Listing	2001-02	2002-03	2003-04	2004-05
Leatherback turtle	*Dermochelys coriacea*	V		2	5	10
Green turtle	*Chelonia mydas*	V	2			5
Loggerhead turtle	*Caretta caretta*	E	1		3	1
Olive Ridley turtle	*Lepidochelys olivacea*	E			1	1
Hawksbill turtle	*Eretmochelys imbricata*	P			1	
Total			3	2	10	17

The handling and release procedures are included in the *Industry Code of Practice* and were an important focus of the 2005 AFMA education program in the ETBF.

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 ETBF has a very low observed incidence of marine mammal interactions. Since its inception in 2001 the observer program has only recorded bycatch of one short-finned pilot whale, which occurred in 2004-05. This individual was recorded as vigorously alive.

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 estimated catch of sharks and rays in the ETBF in 2004-05 is provided in Table 3. The observer program indicates that blue sharks, mako sharks and pelagic stingrays account for most of the reported shark catch, with lower catches of threshers, hammerheads, tiger sharks and bronze whalers. Most of the shark bycatch is currently landed[8] alive (Dambacher 2005) and discarded (Table 7); species that tend to be retained are mako, bronze whalers, hammerheads and silky shark although the information on this is limited. The blue shark and pelagic stingrays are generally discarded and appear to be most often alive, with < 5% recorded as dead when landed (Dambacher 2005).

Under the *EPBC Act* the great white shark and the grey nurse shark are protected species. There have been very few interactions with great white or grey nurse sharks observed in the ETBF. In the first reported interaction in a number of years, a great white shark was caught in 2004-05.

Table 7. The observed catch and fate of shark and ray species in the ETBF in 2004-05 from AFMA Observer records (derived from Lynch 2005).

Common name	No. observed	% retained	% discarded
Blue shark	536	9	72
Shortfin mako	186	69	30
Pelagic stingray	98	0	100
Hammerhead shark	34	44	53
Crocodile shark	29	3	97
Bronze whaler shark	28	54	46
Tiger shark	25	48	52
Oceanic whitetip shark	20	20	80
Manta ray	19	0	100
Dusky shark	15	0	100
Pelagic thresher	13	0	100
Thresher	13	46	54
Bigeye thresher	11	0	100
Silky shark	11	64	36
Porbeagle	5	0	100
Australian blacktip shark	4	0	100
Cookiecutter shark	4	100	0
Longfin mako shark	1	0	100
Scalloped hammerhead	1	100	0
Whaler shark	1	100	0

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 speices must be reported.

Australia has developed the Shark-plan in line Australia's committment 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 5). 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. These are included in the *Industry Code of Practice* and fishers were shown how to use de-hooking and line-cutting equipment to reduce the impact on sharks during the AFMA 2005 education program.

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. The estimated catch of non-target fish is provided in Table 8. Black oil fish (escolar), dolphin fish and lancet fish are the most commonly caught non-target fish and most are discarded (Table 9). The life status of fish varies between species, most of the black oil fish and dolphin fish appear to be landed alive, while most lancet fish are dead when landed (Dambacher 2005).

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 ETBF must be returned to the water irrespective of life status. Observer data from 2004-05 suggests 60% of blue and black marlin are dead when landed (Dambacher 2005).

Table 8. The estimated catch (numbers) of non-target 'fish' species based on AFMA observer data for July 2004 – June 2005. The observer data were stratified by season and fishing area before estimating the catch. The estimated catch was only generated for areas of the fishery where there were > 10 sets observed (derived from Dambacher 2005).

Common name	Species	Estimated catch	95% CI	
Fish				
Black oilfish lar)	*Lepidocybium runneum*	32,833	27,908	37,758
Dolphinfish	*Coryphaena hippurus*	20,516	17,233	23,799
Long nosed tfish	*Alepisaurus brevirostris*	16,808	14,455	19,161
Striped marlin	*Tetrapturus audax*	4,252	3,572	4,932
Unknown discard		2,928	2,108	3,748
Sunfish	F. Molidae	2,681	2,011	3,351
Shortbill fish	*Tetrapturus stirostris*	1,874	1,256	2,492
Snake mackerel	*Gempylus serpens*	1,296	816	1,776
Shortnosed tfish	*Alepisaurus brevirostris*	1,175	611	1,739
Wahoo	*Acanthocybium dri*	1,145	630	1,660
Black marlin	*Makaira indica*	1,065	53	2,130
Oilfish	*Ruvettus pretiosus*	789	537	1,041
Ray's bream	*Brama brama*	587	194	980
Blue marlin	*Makaira mazara*	490	265	715
Sailfish	*Istiophorus platypterus*	205	45	365
Opah	*Lampris guttatus*	183	51	315
Blue mackerel	*Scomber australasicus*	125	5	255
Pufferfish	F. Tetraodontidae	86	13	159
Bonito	*Sarda australia*	75	3	150
Barracouta	*Thyrsites atun*	68	3	156
Slender cuda	*Sphyraena jello*	67	0	149
Pomfret	*Brama brama*	48	3	108
Rudderfish	*Centrolophus niger*	41	3	89
Frostfish	*Lepidopus caudatus*	32	3	81
Southern Ray's n	*Brama australis*	30	2	92
Dealfish	F. Trachipteridae	29	2	67
Unidentified n	F. Istiophoridae	25	1	70
Black kingfish	*Rachycentron dum*	25	1	70
Short suckerfish	*Remora remora*	25	1	70
Moonfish	*Lampris immaculatus*	23	2	50
Bigscale pomfret	*Taractichthys innis*	20	1	62
Driftfishes	F. Nomeidae	15	1	46
White cardinal	*Epigonus denticulatus*	15	1	46
Ribaldo	*Mora moro*	11	3	30
Yellowtail kingfish	*Seriola lalandi*	11	1	34

Table 9. The observed catch and fate of ‘fish’ species in the ETBF in 2004-05 from AFMA Observer records (derived from Lynch 2005).

Common name	No. observed	% retained	% discarded
Yellowfin tuna	3571	97	3

Albacore	2736	97	3
Blackoil fish (escolar)	1701	96	4
Swordfish	1534	93	5
Long snouted lancetfish	1115	0	100
Dolphinfish	1001	98	2
Bigeye tuna	893	91	8
Striped marlin	242	93	7
Sunfish	164	0	99
Shortbill spearfish	104	86	14
Snake mackerel	76	0	100
Short snouted lancetfish	59	0	100
Black marlin	58	2	98
Oilfish	54	69	31
Skipjack tuna	53	64	36
Wahoo	52	94	6
Ray's bream	38	100	0
Blue marlin	24	0	100
Sailfish	13	77	23
Opah	11	82	18
Barracuda	8	0	100
Mackerel tuna	7	71	29
Blue mackerel	5	0	100
Rudderfish	4	75	25
Bonito	3	67	33
Barracouta	3	33	67
Frostfish	3	0	100
Pufferfish	3	0	100
Dealfish	2	0	100
Moonfish	2	100	0
Northern bluefin tuna	2	100	0
Amberjack	1	100	0
Butterfly mackerel	1	100	0
White cardinal fish	1	0	100
Black kingfish	1	100	0
Driftfishes	1	100	0
Unidentified marlin	1	0	100
Ribaldo	1	0	100
Short suckerfish	1	0	100

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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 gearbut 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

This tori line has been provided to you unassembled. The following instructions detail the construction of the line so that it conforms to the conditions detailed in the fishing permit for this vessel. This set of instructions gives a tori line height of 8 metres.

It is compulsory to use the tori line when fishing during day light hours in the area of water south of 25° South.

Your Kit Contains:

- 100m roll of 4.5mm Kuralon for tori line backbone
- 130m roll of 9.8mm Kraton streamer material (orange)
- 120m roll of 4.2mm Kraton streamer material (yellow)
- 1x 6mm snap clip
- 10x "A" 5.2mm lock crimps
- 1x packet of cable ties
- 1x 4 inch polystyrene float
- 1x 6 inch polystyrene float
- 1x 10 inch hard plastic float
- 1x 900mm cone

Tori Line Construction

1. The tori line is to be attached at a height of 8m from the surface of the water.
2. Unroll Kuralon and, using a crimp, attach the snap clip to one end. This end will be attached to the tori pole. The Kuralon is the backbone of the tori line and has already been cut to length.
3. The tori line consists of two types of streamers – a longer, paired streamer (9.8mm orange Kraton) and a shorter, double-paired streamer (4.2mm yellow Kraton) which alternate along the tori line backbone.
4. The length and positioning of the streamers is detailed in Table 1 over the page.
5. Cut a 15.4m length of orange Kraton. Using a cable tie, attach the middle of the length of Kraton to the tori line backbone making two streamers of equal length.
6. Cut two lengths of 7.4m yellow Kraton. Using a cable tie, attach the middle of both to the backbone at 3.5m from the first streamer.
7. Continue alternating the streamers at 3.5m intervals according to the streamer lengths detailed in Table 1.

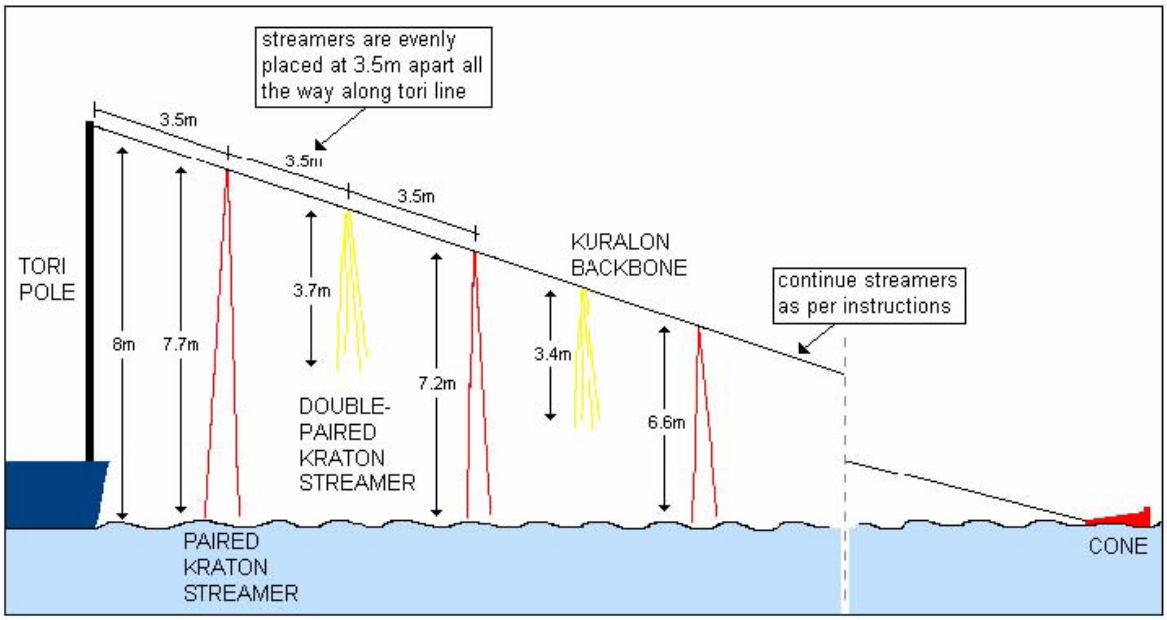

Table 1. Streamer Lengths

KRATON STREAMER COLOUR	LENGTH OF STREAMER (m)	CUT LENGTH (m)	PLACEMENT OF STREAMER FROM BOAT END(m)
Orange	7.7	15.4	3.5
Yellow	3.7	7.4 (x2)	7.0
Orange	7.2	14.3	10.5
Yellow	3.4	6.9 (x2)	14.0
Orange	6.6	13.2	17.5
Yellow	3.2	6.3 (x2)	21.0
Orange	6.0	12.1	24.5
Yellow	2.9	5.8 (x2)	28.0
Orange	5.5	11.0	31.5
Yellow	2.6	5.2 (x2)	35.0
Orange	4.9	9.8	38.5
Yellow	2.3	4.6 (x2)	42.0
Orange	4.4	8.7	45.5
Yellow	2.0	4.1 (x2)	49.0
Orange	3.8	7.6	52.5
Yellow	1.8	3.5 (x2)	56.0
Orange	3.2	6.5	59.5
Yellow	1.5	3.0 (x2)	63.0
Orange	2.7	5.4	66.5
Yellow	1.2	2.4 (x2)	70.0
Orange	2.1	4.2	73.5
Yellow	0.9	1.8 (x2)	77.0

Orange	1.6	3.1	80.5
Yellow	0.6	1.3 (x2)	84.0
Orange	1.0	2.0	87.5

For more information

Contact AFMA Direct on 1300 723 621