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Australian Bureau of Agricultural and Resource Economics – Bureau of Rural Sciences

Australian National Report to the Scientific Committee of the Indian Ocean Tuna Commission for 2009

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Australian Government

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Executive Summary

Pelagic longline and purse seine are the two main fishing methods used by Australian vessels to target tuna and billfish in the Indian Ocean Tuna Commission (IOTC) Convention Area. In 2009, four Australian longliners (three from the Western Tuna and Billfish Fishery and one from the Eastern Tuna and Billfish Fishery) operated in the IOTC Convention Area. Together they caught 19.9 t of albacore tuna (*Thunnus alalunga*), 61.7 t of bigeye tuna (*Thunnus obesus*), 11.7 t of yellowfin tuna (*Thunnus albacares*), 349.3 t of broadbill swordfish (*Xiphius gladius*) and 0.3 t of striped marlin (*Tetrapturus audax*). These catches represent less than 14 per cent of the peak catches taken by Australian vessels fishing in the IOTC Convention Area in 2001, for these five species combined. The number of active longliners and levels of fishing effort have declined substantially in recent years due to reduced profitability, primarily as a result of lower fish prices and higher operating costs. The catch of southern bluefin tuna (*Thunnus maccoyii*) in the purse seine fishery was 4882 t in 2009. The 2009 purse seine catch of skipjack tuna (*Katsuwonus pelamis*) was 855 t, representing 82 per cent of the peak catches taken by Australian vessels fishing in the IOTC Convention Area in 2001 (1039 t). In 2009, approximately 11 t of shark were landed by the Australian longline fleet operating in the IOTC Convention Area.

Contents

1. General fishery information

Australian fisheries targeting tuna and billfish in the Indian Ocean Tuna Commission (IOTC) Convention Area are primarily the pelagic longline fisheries – Western Tuna and Billfish Fishery (WTBF) and Eastern Tuna and Billfish Fishery (ETBF) (Fig. 1) and the purse seine fisheries – Southern Bluefin Tuna Fishery (SBTF) and the Skipjack Fishery (SJF). These four fisheries are managed by the Australian Government through the Australian Fisheries Management Authority (AFMA). Other methods such as handline, dropline, trolling and gillnetting capture small amounts of tuna and related species in multi-purpose fisheries, which are managed by the Commonwealth and State Governments.

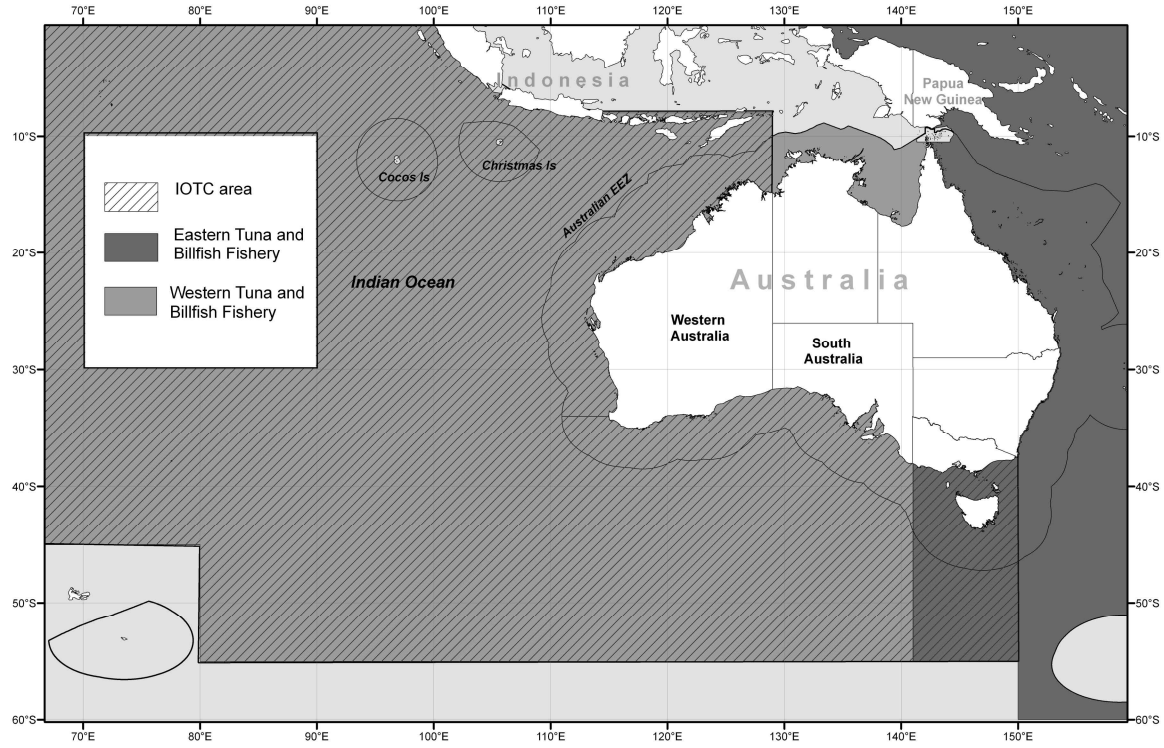

Figure 1: Locations of the Eastern Tuna and Billfish Fishery (ETBF) and the Western Tuna and Billfish Fishery (WTBF) in relation to the Indian Ocean Tuna Commission (IOTC) Convention Area.

2. Catch by species and gear

Longline fleet

Australian longline fishing activity and associated catches for tunas and billfishes in the eastern Indian Ocean increased rapidly between 1998 and 2001, especially off Australia's western coast, south of latitude 20°S. Since 2001, however, catches for all species have declined substantially (Table 1). Swordfish (*Xiphius gladius*) has been the main target species since 1999 (peak catch of 2136 t in 2001) with smaller amounts of albacore tuna (*Thunnus alalunga*), bigeye tuna (*Thunnus obesus*), yellowfin tuna (*Thunnus albacares*) and striped marlin (*Tetrapturus audax*) landed each year (Table 1). The swordfish catch declined to a low of 142.2 t in 2008. Catches of yellowfin tuna and bigeye tuna have also declined dramatically since 2001 to 11.7 t and 61.7 t in 2009, respectively (Table 1).

Table 1: Total numbers of Australian longline vessels, hooks set and total catches (tonnes live weight) of the five main tuna and billfish species taken by those vessels operating in the IOTC Convention Area from 1998 to 2009.

Calendar year	No. of longline vessels	Hooks set (thousands)	Albacore tuna	Bigeye tuna	Yellowfin tuna	Swordfish	Striped marlin	Total
1998	37	1807	25.1	161.1	231.3	238.3	8.8	664.6
1999	49	4031	29.2	411.6	406.2	1013.7	22.6	1883.3
2000	61	6246	30.9	436.2	429.1	1690.5	1.7	2588.4
2001	45	6175	93.9	386.0	557.5	2135.7	0.0	3173.1
2002	44	5956	72.1	419.5	355.2	2004.8	0.7	2852.3
2003	36	4000	65.7	205.5	191.3	1184.0	0.2	1646.7
2004	22	1593	26.6	90.9	152.3	370.0	0.4	640.2
2005	6	773	7.3	31.3	35.9	301.4	4.1	380.0
2006	4	718	10.6	58.7	37.3	311.2	4.5	422.3
2007	3	738	12.1	69.1	29.3	281.2	1.6	393.3
2008	5	237	10.3	26.6	1.2	142.2	0.5	180.8
2009	4	529	19.9	61.7	11.7	349.3	0.3	442.9

Purse seine fleet

Purse seine fishing operations by Australian vessels in the IOTC Convention Area are dominated by targeting of southern bluefin tuna (*Thunnus maccoyii*, SBT) in the Great Australian Bight for grow-out in farm cages at Port Lincoln, South Australia. The catch (actual) of southern bluefin tuna in the purse seine fishery was 4882 t in 2009. However, in the 2008–09 fishing season (1 Dec 2008 to 30 Nov 2009) the catch (actual) taken was 5017 t (Table 2). In some fishing seasons, purse seine vessels also target skipjack tuna (*Katsuwonus pelamis)* late in the SBT season. Purse seine catches of skipjack in 2009 (855 t) represents 82 per cent of the peak catches taken by Australian vessels fishing in the IOTC Convention Area in 2001 (1038.8 t) (Table 2).

Multi-purpose fleets

The multi-purpose fisheries (dropline, gillnet, minor line, trawl and troll) target different species to the longline and purse seine fisheries. In 2009, total catch and effort using minor line methods (e.g. handline and trolling), decreased from those caught in 2008 (Tables 3 and 4).

A total of 2.3 t of SBT was caught by pole-and-line in the IOTC Convention Area in 2009.

Table 2: Purse seine catches (tonnes live weight) of southern bluefin tuna and skipjack tuna by Australian vessels fishing in the IOTC Convention Area by fishing season and calendar year.

Southern bluefin tuna						Skipjack tuna (Calendar year)
Fishing season	Estimated catch (t)	Actual catch (t)	Calendar year	Estimated catch (t)	Actual catch (t)	Estimated catch (t)
1994–95	2179	2009	1995	-	1840	n/a
1995–96	2859	3442	1996	-	3121	n/a
1996–97	3134	2505	1997	-	2998	n/a
1997–98	3916	3629	1998	3290	3584	n/a
1998–99	4418	4991	1999	5120	5325	n/a
1999–00	4746	5131	2000	4616	5132	n/a
2000–01	5100	5162	2001	5319	4767	1038.5
2001–02	5400	5234	2002	4920	4683	1144.2
2002–03	5188	5375	2003	5587	5792	0.5
2003–04	5299	4874	2004	5178	4834	30.1
2004–05	5225	5215	2005	5330	5210	<0.1
2005–06	5463	5302	2006	5852	5629	446.2
2006–07	5091	5230	2007	4822	4809	4.2
2007–08	4530	5211	2008	4531	5010	877.4
2008–09	4348	5017	2009	4332	4882	855.0
2009–10	3323*	3998*	2010	-	-	-

*the 2009–10 figures are preliminary as the SBT fishing season does not finish until end November 2010.

Table 3: Numbers of vessels fishing and catch (kg live weight) in Western Australian state fisheries by method.

Year	Dropline		Gillnet		Line (mainly handline)		Trawl		Troll	
	Catch (kg)	Vessels	Catch (kg)	Vessels	Catch (kg)	Vessels	Catch (kg)	Vessels	Catch (kg)	Vessels
2004	581	7	2 706	9	36 787	46	3 413	14	435 062	34
2005	42	6	2 617	8	46 348	30	4 989	4	310 445	22
2006	-	-	903	6	*10 600	30	23 357	10	283 641	18
2007	101	5	1 189	8	23 559	24	-	-	317 830	18
2008	-	-	5 010	9	12 632	22	-	-	333 614	26
2009	-	-	1 259	7	12 076	17	-	-	285 614	16

* total includes dropline catches for this year as individual method data could not be presented for state jurisdictional confidentiality reasons (i.e. < 5 active vessels using each method).

Table 4: Catch of tuna and tuna-like species in Western Australian state fisheries, by method. GN = Gillnet; LI = Line (mainly handline); TL = Troll.

Year	Species		Live weight (kg)			
	Common name	Scientific name	GN	LI	TL	Total
2008	Australia bonito	*Sarda australis*	23	1 760	648	2 431
	mackerel, Australian spotted	*Scomberomorus munroi*	-	-	466	466
	mackerel, Broad-barred Spanish	*Scomberomorus semifasciatus*	4 247	3 933	13 794	21 974
	mackerel, Narrow-barred Spanish	*Scomberomorus commerson*	110	6 088	317 219	323 417
	mackerel, Shark	*Grammatorcynus bicarinatus*	-	5	516	521
	mackerels, General	*Scombridae*	5	-	98	103
	tuna, Bigeye	*Thunnus obesus*	-	2	-	2
	tuna, Mackerel	*Euthynnus affinis*	-	26	344	370
	tuna, Northern bluefin	*Thunnus orientalis*	-	11	16	27
	tuna, Longtail	*Thunnus tonggol*	82	20	46	148
	tuna, Other	*Scombridae*	148	692	46	886
	tuna, Skipjack	*Katsuwonus pelamis*	-	4	33	37
	tuna, Yellowfin	*Thunnus albacares*	396	60	33	489
	Wahoo	*Acanthocybium solandri*	-	31	354	384
	Total		**5 010**	**12 632**	**333 614**	**351 256**
2009	Australia bonito	*Sarda australis*	-	463	301	764
	mackerel, Australian spotted	*Scomberomorus munroi*	-	3	5	8
	mackerel, Broad-barred Spanish	*Scomberomorus semifasciatus*	-	1 811	9 275	11 087
	mackerel, Narrow-barred Spanish	*Scomberomorus commerson*	25	9 159	275 058	284 242
	mackerel, Shark	*Grammatorcynus bicarinatus*	-	-	90	90
	mackerels, General	*Scombridae*	72	-	-	72
	tuna, Bigeye	*Thunnus obesus*	30	-	-	30
	tuna, Mackerel	*Euthynnus affinis*	-	6	150	156
	tuna, Northern bluefin	*Thunnus orientalis*	-	162	16	178
	tuna, Longtail	*Thunnus tonggol*	92	11	354	457
	tuna, Other	*Scombridae*	418	413	15	846
	tuna, Yellowfin	*Thunnus albacares*	622	48	83	752
	Wahoo	*Acanthocybium solandri*	-	-	267	267
	Total		**1 259**	**12 076**	**285 614**	**298 949**

3. Fleet structure

Longline fleet

The number of Australian longline vessels operating in the IOTC Convention Area has declined substantially since 2000 (61 vessels) with only four vessels operating in 2009 (Table 5). Historically, most of these vessels have operated in the WTBF (Fig. 2) with very little longline effort taking place in the area of the ETBF west of 150°E. In 2009, three vessels from the WTBF fished in the Convention Area compared to one vessel from the ETBF. In recent years, the longline fleet has fished mainly within the Australian Exclusive Economic Zone (EEZ) (82.9 per cent of total effort in 2009), between 20°S and 35°S. Longline fishing effort by Australian vessels in the IOTC Convention Area has declined substantially from a peak of approximately 6.25 million hooks in 2000 to 0.24 million hooks in 2008. The number of hooks deployed increased slightly in 2009 to approximately 0.53 million hooks (Table 1). The main factor influencing the decline in fishing effort is reduced profitability, caused by lower export prices and higher operating costs, particularly fuel costs.

Most longline vessels range in length from 20 to 35 m and are less than 200 gross tonnage. Ice, ice slurry or brine spray systems are used to chill the catch. The majority of the fishing trips undertaken by Australian longline operators are less than 14 days in length (55 trips undertaken in 2009). Vessels fishing in the high seas undertake longer voyages, up to 28 days in recent years.

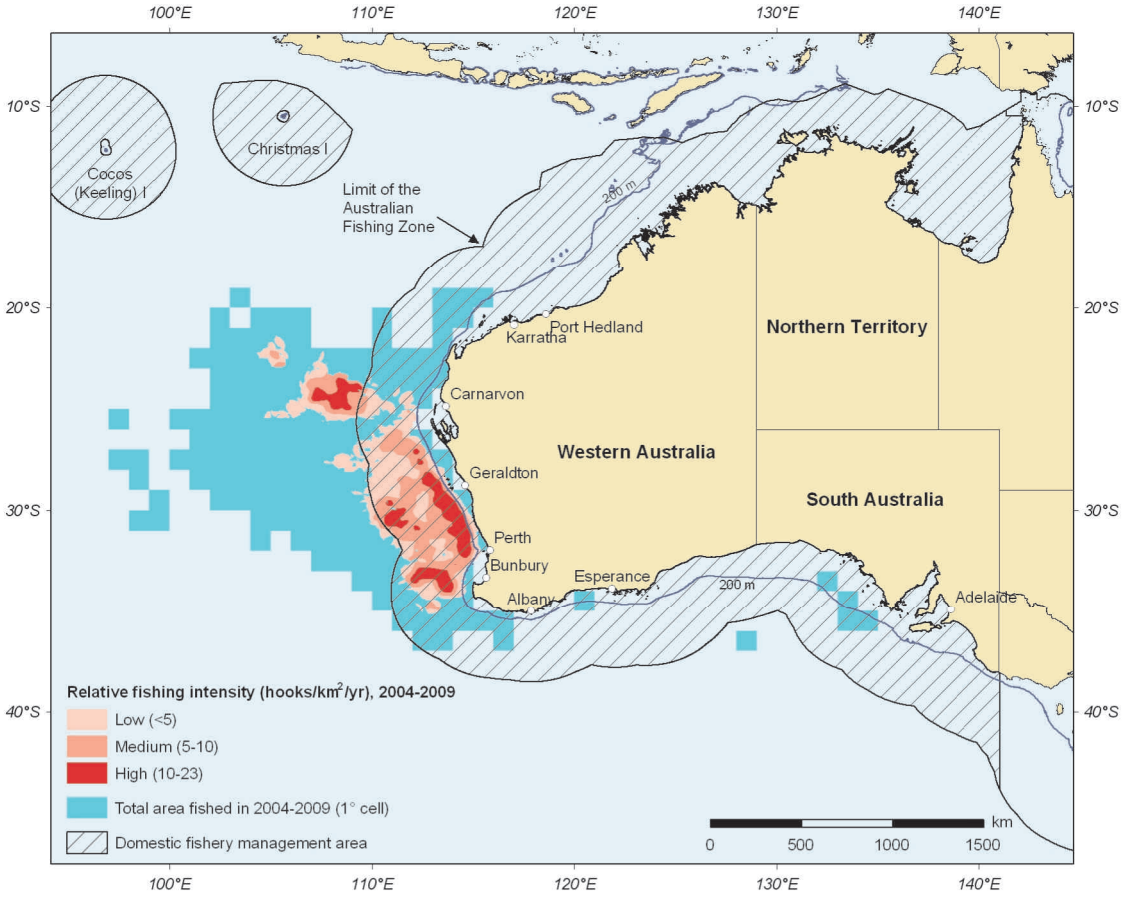

Figure 2: Relative fishing intensity in the Western Tuna and Billfish Fishery (WTBF), 2004–2009 (source: Wilson et al. 2010).

Purse seine fleet

The purse seine fleet has fluctuated from 5–14 vessels since 1998 (Table 5). The purse seine fleets' vessels vary in length from 20 to 45 m. The focus has been on the capture of SBT for farm cage grow-out.

Table 5: Number of Commonwealth and State longline and purse seine vessels reporting one or more fishing trips in the IOTC Convention Area from 1998 to 2009. For the purse seine fleet, the numbers in brackets represent the number of active SBT purse seine vessels from the total number of purse seiners.

Calendar Year	Longline	Purse seine
1998	37	5 (5)
1999	49	7 (7)
2000	61	8 (8)
2001	45	13 (8)
2002	44	9 (7)
2003	36	7 (7)
2004	22	7 (6)
2005	6	8 (8)
2006	4	14 (7)
2007	3	11 (6)
2008	5	10 (7)
2009	4	10 (8)

4. National data collection and processing systems

Logbooks

Catch and effort data continues to be collected by daily fishing logbooks for the Australian longline and purse seine vessels operating in the IOTC Convention Area. AFMA distributes, collects and processes these logbooks.

Disposal of catch is monitored using catch disposal record forms for the WTBF and ETBF longline, and the SJF and SBT purse seine fisheries.

Approximately 60 species of fish are recorded in longline logbooks as being captured by Australian flagged vessels in the IOTC Convention Area. The majority of non-target species are caught, and retained or discarded, in low numbers with the notable exceptions of blue shark (*Prionace glauca*) and crocodile shark (*Pseudocarcharias kamoharai*) (Tables 6–8). Electronic logbooks were recently implemented for these fisheries.

Vessel Monitoring System

A Vessel Monitoring System (VMS) has been required in all Commonwealth managed fisheries since 1 July 2007, including the WTBF, ETBF, SJF and the SBTF.

Observer Program

In March 2010, the IOTC passed Resolution 10/04 on a regional observer scheme that specified:

1) *In order to improve the collection of scientific data, at least 5% of the number of operations/sets for each gear type by the fleet of each CPC while fishing in the IOTC Area of 24 meters overall length and over, and under 24 meters if they fish outside their EEZs shall be covered by this observer scheme. For vessels under 24 meters if they fish*

outside their EEZ, the above mentioned coverage should be achieved progressively by January 2013; and

2) *When purse seiners are carrying an observer as stated in paragraph 1, this observer shall also monitor the catches at unloading to identify the composition of bigeye catches. The requirement for the observer to monitor catches at unloading is not applicable to CPCs already having a sampling scheme, with at least the coverage set out in paragraph 2.*

The AFMA has recruited and trained observers since its establishment in 1992. Approximately 22 observers are currently employed in the AFMA observer program. They are sourced from universities and maritime industries from around Australia and require the ability to live and work at sea, have demonstrated experience in collecting biological data at sea, and have experience in fisheries research methodologies and collection of associated scientific data. Observers also hold marine radio operators certificate of proficiency (or similar qualifications and/or experience), a sea safety certificate and medical certificate, and have completed an AFMA observer training course.

In 2009, a total of 529 144 longline hooks were deployed in the IOTC Convention Area by Australian vessels (528 038 hooks and 1106 hooks by vessels operating in the WTBF and ETBF respectively). Of these, 44 790 hooks were observed as part of AFMA's scientific observer program, representating a total of 8.46 per cent coverage.

Western Tuna and Billfish Fishery

In 2007, an ongoing observer program was implemented in the WTBF with a target level of observer coverage set at five per cent. In 2009, 8.48 per cent of hooks set in WTBF longline operations were observed (12.72 per cent in 2008).

A size monitoring program for the WTBF has been conducted since 1999. A contractor collects weights and lengths (where possible) for yellowfin tuna, bigeye tuna and broadbill swordfish from processors in Western Australia. In most years, the majority of landings for these three species are monitored by this project due to the low level of fishing effort and catches. Size monitoring of the SBT purse seine catch is carried out when fish are transferred from tow cages to farm cages. When calculating the average weight per tow cage a sample of at least 40 fish (excluding those under 10 kg) from each tow cage are weighed and measured.

Eastern Tuna and Billfish Fishery

There was a small amount of effort (1106 hooks set) in the ETBF as part of the IOTC Convention Area in 2009, although none of these were observed. It should be noted that for the remainder of the ETBF effort, that occurs in the Western and Central Pacific Fisheries Commission (WCPFC) Convention Area, 6.4 per cent observer coverage occurred (10.38 per cent in 2008).

Southern Bluefin Tuna Fishery

The ongoing target coverage for the SBT purse seine fleet operating out of Port Lincoln is 10 per cent of the total catch and effort for the fishery. During the 2009–10 quota year, an observer spent 39 days at sea and observed purse seiner activities for three days and tow activities for 27 days, with the remainder of the days spent in transit. The observer monitored seven purse seine sets where fish were retained and one set that was aborted, representing 9.0 per cent coverage for sets where fish were retained. This equates to approximately 13.5 per cent of the total catch.

5. Implementation of Scientific Committee recommendations

Australia participates actively in the IOTC Scientific Committee and the associated working parties. Complete data were provided to the IOTC for statistical reporting in June 2010 including bycatch and size-frequency data for target tuna and billfish species. Observers continue to be placed on Australian longline vessels fishing in the eastern Indian Ocean to monitor catch and effort reporting, bycatch and wildlife interactions.

6. National research programs

The current research priorities for Australia's WTBF include:

- investigate the stock structure of bigeye tuna and swordfish in the eastern Indian Ocean, with particular emphasis on determining the relationship between fish caught within the WTBF and those caught in nearby waters and the broader Indian Ocean (currently underway for swordfish);
- monitor catch and effort by the recreational and charter fishing sectors targeting highly migratory fishes;
- determine key biological parameters (age, growth, reproduction) required for assessment of Indian Ocean populations of bigeye tuna, yellowfin tuna and swordfish stocks;
- develop a harvest strategy including appropriate target and limit reference points;
- assess the impact and reliance of the WTBF on the pelagic ecosystem, including trophic linkages and the impact of fishing on ecologically related species;
- develop strategies to reduce the damage and loss of catch through predation.

7. Recreational fishery

Western Australia has an active recreational gamefish fishery, targeting blue marlin (*Makaira mazara*), sailfish (*Istiophorus platypterus*), black marlin (*M. indica*), striped marlin (*Tetrapturus audax*) and yellowfin tuna (*Thunnus albacares*). In 1994, Western Australia passed legislation preventing the landing of all billfish of the family Istiophoridae. This legislation came into force in December 1999. Meanwhile, in 1998 the Australian Government banned the retention of blue and black marlin, whether alive or dead, taken anywhere in the Australian Fishing Zone (AFZ) by commercial fishing. In 2005, legislation was introduced by the Australian Government to allow the landing of striped marlin in Western Australia.

8. Harvest Strategy

In 2007, the Australian Government introduced a harvest strategy policy to guide sustainability of its fisheries. A copy of the *Commonwealth Fisheries Harvest Strategy Policy* can be obtained from www.daff.gov.au. Harvest strategies that incorporate appropriate target and limit reference points are being developed for the WTBF (Davies et al. 2008) and ETBF (AFMA 2007).

9. Environmental issues

In Australia, the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) covers environmental issues including the ecologically sustainable use of marine resources. The environmental performance of Commonwealth, State and the Northern Territory-managed wild-harvest fisheries is assessed under the EPBC Act. The EPBC Act requires that:

- all Commonwealth-managed and State wild capture marine fisheries with an export component be assessed to ensure they are being managed in an ecologically sustainable way;
- all Commonwealth-managed fisheries are also assessed to determine the impact of actions taken under a fishery management plan on matters of national environmental significance; and
- all Commonwealth-managed fisheries and any State-managed fisheries that operate in Commonwealth waters must also be assessed to determine the impacts of fishing operations on cetaceans, listed threatened species and ecological communities, migratory species, and listed marine species under the EPBC Act.

The assessments consider the impacts of the fishery on target and non-target species caught and the impacts of fishing on the broader marine environment. Assessments have been completed for the WTBF, ETBF and SBTF, and continue to guide the development of improved management arrangements to reduce the ecological impacts of Australian tuna and billfish fisheries (see http://environment.gov.au/coasts/fisheries/commonwealth/index.html).

Measures to reduce the ecological impacts of these fisheries rely initially on the analysis of fishery-dependent and -independent data collected through observer programs, logbooks and targeted research activities. As data are collected and the impacts of fishing operations on ecologically related species (ERS) become clearer, strategies to reduce these impacts continue to be developed and refined.

In this context, Australia has:

- Continued to use catch and effort logbooks to collect data on the catch of target and non-target species
- Introduced observer programs in the WTBF, ETBF and SBTF, which include specific reporting requirements for Threatened, Endangered and Protected (TEP) species
- Initiated a range of at-sea programs to trial strategies to reduce the incidental mortality of seabirds caught during longlining operations (e.g. by increasing line sink rates)
- Introduced detailed strategies to reduce bycatch and impacts on ERS, performance measures to monitor progress, and reporting and review targets to assess the effectiveness of these strategies, and refine them where necessary. An important part of these strategies is the development of fishing industry codes of practice to reduce impacts on ERS (see below).

AFMA has commenced an ecological risk assessment for each of its fisheries (www.afma.gov.au/environment/eco_based/eras/reports.htm) with an aim of quantifying impacts on ERS and the marine environment. The purpose of AFMA's ecological risk management is to undertake ecological risk assessments for major fisheries managed by the Australian Government and to develop a framework for future risk assessments as additional information becomes available. The results of the framework will help inform fisheries management agencies of priorities for research, data collection, monitoring and management, and ensure there is a high level of confidence in verifiable results.

The ecological risk assessments rely on existing biological and catch information and consider five ecosystem components: target species, by-product and bycatch species, TEP species, habitats, and communities. The assessments categorise various species as being at high, medium or low risk on the basis of a range of factors, including their susceptibility to capture by the various fishing methods, their distribution, and the ability for species populations to recover. AFMA has completed ERAs for the WTBF (Webb et al. 2007a, AFMA 2009e, Zhou et al. 2009, AFMA 2010b), ETBF (Webb et al. 2007b, AFMA 2009a), SBTF (Hobday et al. 2007, AFMA 2009b,

Zhou et al. 2009) and SJTF (Daley et al. 2007, Zhou et al. 2009, AFMA 2010a). These reports are available at the web address shown above.

Western Tuna and Billfish Fishery

AFMA, in conjunction with the Commonwealth Scientific and Industrial Research Organisation (CSIRO) has undertaken three levels of ecological risk assessment (ERA) for the WTBF (Webb et al. 2007, AFMA 2009e, Zhou et al. 2009). By assessing the impacts of fishing on all parts of the marine environment, the ERAs take an ecosystem-based assessment approach. The aim of the ERA process is to help prioritise research, data collection and monitoring needs and management actions for fisheries, and ensure that they are managed both sustainably and efficiently. AFMA commissioned the CSIRO to conduct a comprehensive, rapid, quantitative assessment of the risk from fishing to the sustainability of all chondrichthyan and teleost species (Zhou et al. 2009). The project extended the methodology of the previous Level 2 Productivity Susceptibility Analysis (AFMA 2009e) to provide quantitative estimates of risk for a large number of fish species. Classifications of risk were divided into low, medium, high and extreme high; each category had a corresponding precautionary criterion to take into account uncertainty.

The project examined 187 fish species in the WTBF (38 chondrichthyans and 149 teleosts). No species were classified as at risk of potential overfishing. The results of the Level 3 assessment will be combined with the results of the residual risk assessment and addressed through environmental risk management strategies. These strategies include a chondrichthyan working group and the Australian Tuna and Billfish Longline Fisheries Bycatch and Discarding Workplan. AFMA has indicated that these will be implemented and reviewed over the coming years. Given the connectivity of stocks beyond the AFZ, the final strategy may need to take into account broader Indian Ocean issues.

A summary of priority issues for managing the ecological effects of fishing in the WTBF, arising from the three levels of ecological risk assessment is described in AFMA (2010b), and available at: http://afma.gov.au/environment/eco_based/eras/docs/wtbf/erm_wtbf.pdf.

Eastern Tuna and Billfish Fishery

AFMA, in conjunction with the CSIRO, has undertaken three levels of ecological risk assessment (ERA) for the ETBF (Webb et al. 2007b, AFMA 2009c, Zhou et al. 2009). A total of 390 species were initially assessed in the ERA process (Webb et al. 2007b). Of these, eight species were considered to be at high risk to the effects of pelagic longline fishing in the ETBF: four chondrichthyans (longfin mako, crocodile shark, pelagic thresher and dusky shark), two teleost species (two species of ocean sunfish), two cetacean species (short-finned pilot whale and false killer whale) and one turtle species (leatherback turtle) (AFMA 2009a). These species will be addressed through environmental risk management strategies, which include making the carriage of line cutters and de-hookers compulsory in 2010.

A summary of priority issues for managing the ecological effects of fishing in the ETBF, arising from the three levels of ecological risk assessment is described in AFMA (2009a), and available at: http://afma.gov.au/environment/eco_based/eras/docs/ETBF_ERM_May09.pdf.

Southern Bluefin Tuna Fishery

AFMA, in conjunction with the CSIRO, has undertaken three levels of ecological risk assessment (ERA) for the SBTF (Hobday et al. 2007, AFMA 2009d, Zhou et al. 2009). The Level 2 assessment indicated that only two species, of the 193 assessed, were considered to be at high risk: SBT and white shark (Hobday et al. 2007). A Level 3 assessment was also conducted on 83 non-target species (6 chondrichthyans and 77 teleosts) to determine the impact of SBT fishing on the sustainability of these species (AFMA 2009d). It was determined that the risk to the sustainability of these non-target species was low (Zhou et al. 2009).

A summary of priority issues for managing the ecological effects of fishing in the SBTF, arising from the three levels of ecological risk assessment is described in AFMA (2009b), and available at: http://afma.gov.au/environment/eco_based/eras/docs/sbt/sbt_erm.pdf.

Skipjack Tuna Fishery

The highest level of assessment conducted on the Skipjack Tuna Fishery (SJTF) was a quantitative Level 3 assessment. The ERA identified 25 species at high risk to the effects of fishing in the SJTF, all of which are marine mammals (Daley et al. 2007, Zhou et al. 2009, AFMA 2010a).

No interactions with protected species have been recorded in the SJTF. Observer coverage levels in the fishery have been low due to the lack of effort in the fishery and further observer coverage will clarify whether interaction with any species is likely to occur.

No target species, ecological communities or habitats were assessed to be at high risk from the effects of fishing in the SJTF.

Ecological risk management for the SJTF is designed to achieve an adequate level of monitoring to establish the level of interaction that may occur if effort increases and to quantify the effect that the fishery is having on the species identified above as being at high risk from the effects of fishing (AFMA 2010a).

Bycatch and Discard Work Plan

In response to bycatch issues, AFMA has formulated a Bycatch and Discard Work Plan for both the WTBF and ETBF (AFMA 2008). The work plan outlines a series of measures to improve the monitoring of, and reduce fishery impacts on the bycatch species identified in the ecological risk assessment process as being at high risk from fishing operations. The Bycatch and Discard Work Plan commenced on 1 November 2008.

Sharks

NPOA-Sharks

Australia's National Plan of Action for Conservation and Management of Sharks (NPOA-Sharks) was released in 2004 according to guidelines as set out in the International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks). The NPOA-Sharks was designed to provide advice and guidance to fisheries managers, conservation managers and the general public on action needed to ensure that Australia's shark populations are managed sustainably into the future. A copy of the NPOA-Sharks can be obtained from www.daff.gov.au.

Australia's NPOA-Sharks is currently under review and the Australian Government recently finalised the 2009 Shark Assessment Report (SAR) which is the scientific basis for the adoption of the Shark Plan. The 2009 SAR (Bensley et al. 2010) builds upon the information provided in the 2001 SAR and aims to identify significant changes that have occurred in fisheries since the release of the 2001 SAR. The assessment includes the presentation and where possible, analyses of:

- resource information (e.g. harvest methods, catch and effort data, and stock assessments);
- management information (e.g. management frameworks, fishery statistics and markets);
- law and enforcement information.

The second Australian NPOA-Sharks is expected to be finalised in 2011 and will be provided to the IOTC working party on ecosystems and bycatch (WPEB) and SC in 2011.

Shark catch and finning regulation

Australia prohibits the possession or landing of fins separate from shark carcasses. This policy was implemented in 2000. AFMA has enforced the landing limit of 20 sharks per longline vessel per fishing trip, and also banned wire traces (which increase the likelihood of retaining shark).

Longline vessels undertaking single jurisdiction high seas trips may apply for a permit to retain 100 sharks per fishing trip, of which only 80 can be blue sharks.

Shortfin makos, longfin makos and porbeagles were listed under the Convention of Migratory Species (CMS) in 2008, which triggered a mandatory legal obligation to list them under the EPBC Act. Listing under the EPBC Act came into effect on 29 January 2010. As a consequence, in February 2010 all Australian fisheries that interact with these species in Commonwealth waters were assessed under the EPBC Act. The management arrangements for each fishery was reaccredited on the basis that the arrangements in place required all reasonable steps to be taken to ensure that shortfin and longfin makos and porbeagles are not killed or injured as a result of fishing activities. These species may be retained in accredited fisheries if the sharks have come onboard dead. Live caught specimens must be released unharmed and fishers are required to report interactions.

Interactions

Western Tuna and Billfish Fishery & Eastern Tuna and Billfish Fishery

Total interactions by the Australian longline fleet with shark species in the IOTC Convention Area are provided in Tables 6-8. In 2009, approximately 11 t of shark were landed (Table 6), totalling 446 individual sharks (Table 7), while 13 894 individuals were discarded/released (Table 8). No information is currently available from logbooks on the life status of discarded/released sharks, and limited data from observer records due to limited effort in the WTBF and ETBF.

Table 6: Total weight (kg trunked weight) of shark species retained by Australian longline vessels in the IOTC Convention Area from 2004 to 2009 (source: AFMA logbook data).

Common name	Scientific name	2004	2005	2006	2007	2008	2009
Blacktip sharks	*Carcharhinus* spp.	60	40	180	50	0	0
Blue Shark	*Prionace glauca*	19 330	9 905	10 828	15 120	9 193	10 225
Bronze Whaler	*Carcharhinus brachyurus*	260	40	0	0	0	0
Cookie-cutter Shark	*Isistius brasiliensis*	0	0	0	0	0	0
Crocodile Shark	*Pseudocarcharias kamoharai*	0	0	0	30	0	145
Dusky Shark	*Carcharhinus obscurus*	220	0	0	0	0	0
Hammerhead Shark	*Sphyrna* spp.	0	0	134	0	0	0
Oceanic Whitetip Shark	*Carcharhinus longimanus*	435	425	565	283	740	280
Porbeagle	*Lamna nasus*	0	0	50	55	205	0
Roughskin Shark	*Centroscymnus* spp. *Deania* spp.	0	0	0	0	0	0
Sandbar Shark	*Carcharhinus plumbeus*	50	0	0	0	0	0
Scalloped Hammerhead	*Sphyrna lewini*	340	70	0	0	0	0
Shortfin Mako	*Isurus oxyrinchus*	2 395	898	1 928	590	210	209
Silky Shark	*Carcharhinus falciformis*	0	60	0	0	0	40
Smooth Hammerhead	*Sphyrna zygaena*	0	0	0	0	0	0
Thresher Shark	*Alopias vulpinus*	0	0	0	30	0	40
Tiger Shark	*Galeocerdo cuvier*	55	110	0	0	0	0
Shark - other	-	0	0	0	0	0	0
TOTAL		**23 245**	**11 548**	**13 685**	**16 158**	**10 408**	**10 939**

Table 7: Total number of sharks, by species, retained by Australian longline vessels in the IOTC convention area from 2004 to 2009 (source: AFMA logbook data).

Common name	Scientific name	2004	2005	2006	2007	2008	2009
Blacktip sharks	*Carcharhinus* spp.	2	1	5	2	0	0
Blue Shark	*Prionace glauca*	649	309	406	612	309	366
Bronze Whaler	*Carcharhinus brachyurus*	8	1	0	0	0	0
Cookie-cutter Shark	*Isistius brasiliensis*	0	0	0	0	0	0
Crocodile Shark	*Pseudocarcharias kamoharai*	0	0	0	6	0	51
Dusky Shark	*Carcharhinus obscurus*	27	0	0	0	0	0
Hammerhead Shark	*Sphyrna* spp.	0	0	8	0	0	0
Oceanic Whitetip Shark	*Carcharhinus longimanus*	14	10	19	14	24	11
Porbeagle	*Lamna nasus*	0	0	1	2	9	0
Roughskin Shark	*Centroscymnus* spp. *Deania* spp.	0	0	0	0	0	0
Sandbar Shark	*Carcharhinus plumbeus*	2	0	0	0	0	0
Scalloped Hammerhead	*Sphyrna lewini*	10	1	0	0	0	0
Shortfin Mako	*Isurus oxyrinchus*	53	19	56	21	8	16
Silky Shark	*Carcharhinus falciformis*	0	2	0	0	0	1
Smooth Hammerhead	*Sphyrna zygaena*	0	0	0	0	0	0
Thresher Shark	*Alopias vulpinus*	0	0	0	1	0	1
Tiger Shark	*Galeocerdo cuvier*	2	2	0	0	2	0
Shark - other	-	0	0	0	0	0	0
TOTAL		**769**	**345**	**495**	**658**	**352**	**446**

Table 8: Total number of sharks, by species, released/discarded by Australian longline vessels in the IOTC Convention Area from 2004 to 2009 (source: AFMA logbook data).

Common name	Scientific name	2004	2005	2006	2007	2008	2009
Blacktip sharks	*Carcharhinus* spp.	5	1	6	0	0	0
Blue Shark	*Prionace glauca*	7 582	3 329	3 717	7 213	4 044	8 596
Bronze Whaler	*Carcharhinus brachyurus*	81	7	2	14	3	2
Cookie-cutter Shark	*Isistius brasiliensis*	0	1	0	0	0	0
Crocodile Shark	*Pseudocarcharias kamoharai*	2 540	4 197	4 079	3 650	900	4 651
Dusky Shark	*Carcharhinus obscurus*	186	3	3	0	0	0
Hammerhead Shark	*Sphyrna* spp.	4	0	55	79	32	3
Oceanic Whitetip Shark	*Carcharhinus longimanus*	293	55	117	85	19	66
Porbeagle	*Lamna nasus*	1	6	7	2	0	0
Roughskin Shark	*Centroscymnus* spp. *Deania* spp.	199	0	0	0	0	0
Sandbar Shark	*Carcharhinus plumbeus*	0	0	0	0	0	0
Scalloped Hammerhead	*Sphyrna lewini*	181	30	0	0	0	0
Shortfin Mako	*Isurus oxyrinchus*	236	74	158	356	50	575
Silky Shark	*Carcharhinus falciformis*	7	19	2	0	0	0
Smooth Hammerhead	*Sphyrna zygaena*	5	2	0	0	0	0
Thresher Shark	*Alopias vulpinus*	23	9	2	0	4	1
Tiger Shark	*Galeocerdo cuvier*	19	10	8	131	0	0
Shark - other	-	0	0	2	0	0	0
TOTAL		**11 362**	**7 743**	**8 158**	**11 530**	**5 052**	**13 894**

Southern Bluefin Tuna Fishery

No interactions with sharks were reported by observers in the IOTC Convention Area relevant to the SBTF in 2009.

Seabirds

Seabirds are attracted to longline vessels by discarded offal and baits, and on occasion ingest baited hooks during the setting or, less commonly, hauling of longlines. Because baited hooks are not used when purse seining, the rate of seabird interactons in this sector is low.

Longline

Australia has demonstrated its commitment to reduce the incidental catch of seabirds through the development of the *Threat Abatement Plan for the incidental catch (or by-catch) of seabirds during oceanic longline fishing operations* (TAP). The TAP is Australia's key national measure for mitigating the impact of longline fisheries on seabird populations and demonstrates Australia's commitment to the *International Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries (IPOA-Seabirds)*.

The TAP was adopted in 1998 and subsequently updated in 2006 (Anon 2006). It meets the requirements of the EPBC Act to implement actions to reduce the impact of longline fishing practices on seabirds in Commonwealth waters.

A copy of the 2006 TAP can be obtained from: http://www.aad.gov.au/default.asp?casid=35316.

The objective of the 2006 TAP is to significantly reduce the bycatch of seabirds in Commonwealth waters as a result of longline fishing operations.

This is being achieved through:

1. Mitigation – effective fishing practices and legislative directives to ensure reducing levels of seabird bycatch.
2. Education – disseminating information to longline fishers.
3. International initiatives – global adoption of best practice mitigation measures pursued at international level.
4. Research and Development – new mitigation measures developed, trialled, assessed and supported.
5. Innovation – the potential accreditation of longline fishers who are able to demonstrate 'bird friendly' fishing practices.

In the 2006 TAP the following mitigation actions are prescribed:

1. AFMA will require all pelagic longline tuna fishers operating within the ETBF south of latitude 25°S to adopt one of two options:
    a. a line-weighting strategy that enables the bait to be rapidly taken below the reach of most seabirds; or
    b. set all hooks during the night;

    In both options, vessels will also employ at least one seabird scaring ('tori') 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 WTBF south of latitude 30°S to set all hooks during the night. In addition, vessels will also employ at least one seabird scaring line constructed to a specified standard, not use bait that is still frozen and retain all offal during line setting.

3. AFMA will 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 if data analysis indicates that the criteria defined in the 2006 TAP have not been met in any area, season and fishery, or that observer coverage has dropped below acceptable levels (performance criteria) for each fishery (Anon 2006).

The current TAP (2006) requires the ETBF to reduce the bycatch of seabirds in oceanic longline operations and maintain a bycatch rate of less than 0.05 seabirds per 1000 hooks in all fishing areas (by 5° latitudinal bands) and fishing seasons (1 September–30 April; 1 May–31 August).

AFMA has implemented fishing permit conditions that are designed to avoid the capture of seabirds. Conditions to fish south of 25°S include the mandatory use of seabird streamers or 'tori' lines to prevent seabirds from diving on the line, and weighted swivels to sink the line out of reach of seabirds.

Vessel/crew responses to interactions with seabirds are mandated in the TAP, and AFMA and the fishing industry have proven the current TAP is capable of minimising interactions and dealing with the occurrence of any unusual issues.

Consistent with the objectives and prescriptions of the TAP, Australia has implemented conditions aimed at reducing seabird mortality through requirements on fishing permits. These are detailed in Section 7 of this report.

The TAP is currently under review and will incorporate revised elements in any seabird CMM

NPOA-Seabirds

Australia has drafted an NPOA-Seabirds to address the potential risk posed to seabirds by longline fishing in State and Territory waters, not covered by the 2006 TAP. Low levels of longline fishing in State and Territory managed fisheries, and a reliance on inshore fishing areas where seabird species known to be at risk are low, suggest that seabird bycatch in these fisheries is unlikely to be a problem.

At its last meeting on seabird issues, the FAO released a set of technical guidelines for member countries to use when drafting NPOAs, which recommends fishing methods apart from longline (particularly gillnet and trawl) be assessed for risk, and mitigation methods be developed and prescribed when drafting an NPOA.

Trawl fishing has yet to be assessed in Australia in terms of its impact on vulnerable seabird species. The Australian Government is currently investigating other sources of mortality to seabirds through other fishing practices, such as trawl, gillnet and purse seine fishing, with a view to developing an appropriate response to mitigate the effects of these practices on endangered seabird species.

The TAP has been highly successful in reducing seabird bycatch in the most at-risk longline fishing areas since the first national assessment of incidental catch of seabirds in longline fisheries was conducted in 2003. This has been achieved through development of a suite of mitigation approaches prescribed by the TAP in 1998, which have been implemented and strengthened (where appropriate) following the review and subsequent updating of the TAP in 2006.

Recovery Plan

A Recovery Plan for Albatrosses and Giant Petrels in Australia has been in place since 2001 and is currently under review. The overall objective of the plan is to reduce the detrimental impacts on Australian populations of albatrosses and petrels and hence promote their recovery in the wild. A copy of the 2001 plan can be obtained from:
http://www.environment.gov.au/biodiversity/threatened/publications/recovery/albatross/index.html.

Interactions

Western Tuna and Billfish Fishery

The abundance of seabirds on the west coast of Australia is considerably lower than that on the east coast. In addition, the majority of the fleet in the WTBF targets swordfish and operates at night. While observer data are only available for recent years, when fishing activity has been very low, the data indicate that seabird interactions are below the limit of 0.05 seabirds per 1000 hooks prescribed by the TAP.

Observers placed on WTBF longliners during 2009 reported one yellow nosed albatross and one flesh footed shearwater hooked. The albatross was found dead and the shearwater was released alive.

Eastern Tuna and Billfish Fishery

With the implementation of the original TAP in 1998, a large proportion of the ETBF longline fleet began to set their lines during the night to avoid interactions with albatross species. In doing so, they dramatically reduced the catch of albatross but increased the catch of shearwaters. Through a number of at-sea trials and the subsequent improvement to a variety of mitigation measures, the catch of all seabirds in the fishery as a whole has been reduced to a level below the 0.05 seabirds per 1000 hooks set as required under the TAP. As very little effort from the ETBF has occurred in the IOTC Convention Area in recent years and none of that effort was observed in 2009, a full description of seabird interactions is not provided here, but can be found in Australia's national report to the WCPFC (Sands et al. 2010).

Southern Bluefin Tuna Fishery

There are very few recorded incidences of seabirds interacting with purse seine fishing vessels or gear in the SBTF, by observers. Observers did not report any seabird interactions in the purse-seine sector in 2008–09 or 2009–10.

Sea Turtles

Recovery Plan

A Recovery Plan for Marine Turtles in Australia was developed by the former Department of the Environment, Water, Heritage and the Arts (DEWHA). The overall objective of the plan is to reduce the detrimental impacts on Australian populations of marine turtles and hence promote their recovery in the wild. A copy of the plan can be obtained from: http://www.environment.gov.au/coasts/publications/turtle-recovery/index.html.

Interactions

Western Tuna and Billfish Fishery

Catches of sea turtles are reported in logbooks and recorded by observers. During the 2003-2006 pilot scientific monitoring program in the WTBF, observers reported 11 sea turtles (four leatherback turtle, four loggerhead turtle, two green turtle and an Olive Ridley turtle) during monitoring that accounted for four per cent of the total effort in the fishery. All were released alive.

Observers placed on WTBF longliners during 2009 (8.48 per cent of hook effort) reported one loggerhead turtle, two hawksbill turtles and four leatherback turtles hooked (Table 9). All seven sea turtles were released alive. No information is available on the survivorship of these released sea turtles.

Eastern Tuna and Billfish Fishery

No interactions with sea turtles were observed in the IOTC Convention Area relevant to the ETBF (noting none of the 1106 hooks deployed were observed). A full description of sea turtle interactions throughout the remainder of the ETBF can be found in Australia's national report to the WCPFC (Sands et al. 2010).

Table 9: Observed annual estimated captures of species of special interest (seabird, turtle and marine mammals) for the Australian longline fleet, in the IOTC Convention Area, for 2005 to 2009 (source: AFMA scientific observer data).

Group	Common name	Scientific name	2003-2006	2007	2008	2009
Seabirds	Yellow nosed albatross	*Thalassarche chlororhynchos*	0	0	0	1
	Flesh footed shearwater	*Puffinus carneipes*	12	0	0	1
Marine turtles	Loggerhead turtle	*Caretta caretta*	4	1	2	1
	Hawksbill turtle	*Eretmochelys imbricata*	0	0	0	2
	Leatherback turtle	*Dermochelys coriacea*	4	0	2	4
	Green turtle	*Chelonia mydas*	2	0	0	0
	Olive Ridley turtle	*Lepidochelys olivacea*	1	0	0	0

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